

Project Manual For

Volume 1 of 4

Division 00

TOWN OF GREENWICH
GREENWICH CENTRAL MIDDLE SCHOOL

Phase 2 of 3 – Building Construction, Demolition, and Sitework

9 Indian Rock Lane
Greenwich, Connecticut 06830

SLAM

The S/L/A/M Collaborative

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PART 1 GENERAL

1.1 SUMMARY

A. For the preparation of Bidding Documents, Engineer has relied upon the following reports and tests of subsurface and latent physical conditions of the site. The location of all bore holes and test pits is shown on the Drawings.

1. Geotechnical report, Soil boring and test pit data, and laboratory test results (attached)

   a. The subsurface data are not guaranteed as to accuracy or completeness, nor are they a part of the Contract Documents.

   b. Bidders are cautioned that the subsurface data have been utilized for general design purposes only. No explicit or implicit representation is made as to the nature of the materials which may be encountered below the surface of the ground.

   c. The making available of this subsurface data to Bidders is not intended to relieve them from their responsibility to familiarize themselves with the subsurface and other site conditions.

2. Plan and Profile of Sewer in Stanwich Road & Fairfield Road Greenwich, CT dated Sept. 6 1961 (attached)

   a. The subsurface information provided is not guaranteed as to accuracy or completeness, nor are they a part of the Contract Documents.

   b. Bidders are cautioned that the information provided is for general design purposes only. No explicit or implicit representation is made as to the nature of the materials which may be encountered below the surface of the ground.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

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16-5068-003
January 26, 2024 (Revised October 29, 2024)

Kemp A. Morhardt, AIA, NCARB
Principal Architect
The SLAM Collaborative
80 Glastonbury Blvd
Glastonbury, CT 06033

Re: **Geotechnical Evaluation – Greenwich Central Middle School, Greenwich, CT**

Dear Mr. Morhardt:

Tighe & Bond is pleased to present this geotechnical evaluation for the proposed new Central Middle School at 9 Indian Rock Lane in Greenwich, Connecticut. A preliminary geotechnical evaluation report dated October 17, 2023 was previously prepared by Tighe & Bond for the project This geotechnical report was prepared to present supplemental subsurface data and geotechnical recommendations, and is intended to supersede the preliminary geotechnical evaluation report in its entirety.

A Site Locus is presented as Figure 1 of Appendix A. This evaluation was completed in general accordance with our agreement dated February 2, 2023. Elevations in this report reference the North American Vertical Datum of 1988 (NAVD 88).

Executive Summary

Tighe & Bond conducted a subsurface exploration program in August and November 2023 consisting of nine geotechnical borings and thirteen geotechnical test pits. For this evaluation, Tighe & Bond also incorporated 20 borings and 12 test pits performed by ATANE in 2022. In general, subsurface conditions encountered in the explorations consisted of surficial topsoil, forest mat or recreational field sand underlain by native granular soils and bedrock, or in the eastern portion of the proposed building and to the east/southeast of the proposed building the surficial materials were underlain by existing granular fill followed by a layer of buried sand with organics, followed by native granular soils, a discontinuous layer of sandy clay that was 0.5 to 3 feet thick, and bedrock.

The existing fill and underlying sand with organics layers are not suitable to remain in place below the proposed building footprint (slab and foundations) due to the potential for intolerable settlement of the building foundations and/or slab that may result from additional load on the uncontrolled fill of variable composition and density, and organic-containing layers that are expected to decompose over the life of the structure. Existing fill and underlying sand with organics should be completely over-excavated from below the proposed building footprint and foundation bearing zones (defined as the 1 horizontal to 1 vertical [1H:1V] lines extending down and away from the bottom of footing elevation starting at 1 foot away from the footing edge) to the top of suitable native soils, and be replaced with suitable compacted backfill. After completion of over-excavation and replacement of the unsuitable materials, the proposed building can be supported on conventional shallow soil-supported footings and a soil-supported slab-on-grade bearing on native soils or suitable compacted backfill placed over native soils. A maximum net allowable bearing pressure of 4 kips per square foot (ksf)

is recommended for footings. Total and differential settlements are anticipated to be less than 1 inch and ½ inch, respectively.

Permanent slopes and/or retaining walls are planned to the west of the proposed building, with maximum cuts of up to 22 feet. The thickness of overburden soils in the existing hillside where the permanent slopes and/or retaining walls are planned was approximately 3 to 14.5 feet, with an average thickness of approximately 7 feet. It is anticipated that the proposed permanent slopes and/or retaining walls could consist of a combination of permanent rock and soil slopes, or modular block or mechanically-stabilized earth (MSE) retaining walls. These areas were not accessible during our exploration program due to dense tree growth.

Once access is available at the actual locations of proposed permanent slopes and/or retaining walls, at least 2 borings are recommended along the alignment of the proposed permanent slope and/or retaining wall to the west of the southern portion of the proposed building to estimate the thickness of overburden soil and composition/quality of bedrock. A bedrock core is recommended to be collected for the full elevation range of the potential rock cut.

Site Conditions

Existing – The site is located at 9 Indian Rock Lane in Greenwich, Connecticut, and is currently developed with the existing Central Middle School. The existing site includes an approximately 76,000 square foot school building in the southern portion of the site, parking and driveway areas to the south of the existing building, recreational fields to the north of the existing building, and wooded areas to the west and north of the existing building and recreational fields. Indian Rock Lane borders the site to the south, and Stanwich Road and Orchard Street border the site to the west and east, respectively.

Based on the Property / Boundary & Topographic Survey dated May 22, 2023, and prepared by Martin Surveying Associates, LLC (Martin), ground surface topography in the above-referenced recreational field area is approximately elevation 45 feet, and then slopes upward to the west (toward Stanwich Road) and north to approximately elevation 85 feet to 110 feet at a typical steepness of 4 horizontal to 1 vertical (4H:1V).

Proposed – The proposed project generally consists of demolishing the existing building and construction of a new approximately 110,000 square-foot, multi-story school building in the northern portion of the site. The proposed building is planned to be located partially in the existing recreational field, and to the west into the existing wooded, upward sloping area. The proposed building is planned to have a lowest floor at elevation 47 feet, and a second floor level with a slab at elevation 63 feet. The western portion of the proposed building is planned to be single-story with the slab at elevation 63 feet (i.e., no lower level in the western portion of the building). The eastern-portion of the building with a FFE at elevation 47 feet will require approximately 1 to 4 feet of fill to achieve the FFE, and the western portion of the building with a FFE at elevation 63 feet will require approximately 2 to 18 feet of fill to achieve the FFE.

In addition to the proposed new building, proposed construction includes new parking/driveway areas, retaining walls or cut slopes to the west of the proposed building (cutting into the existing slope for the lower finished roadway grades), new recreational fields to the south of the proposed building (in the footprint of the existing building to be demolished), and stormwater management features. Two primary retaining walls or cut slopes

are planned to the west of the proposed building: the northern wall / cut slope is proposed to be approximately 140 feet in length and is expected to be cut into the existing slope and will have a maximum height of approximately 9 feet; and the southern wall / cut slope is proposed to be approximately 340 feet in length and is expected to be cut into the existing slope and will have a maximum height of approximately 22 feet.

Subsurface Conditions

The generalized subsurface conditions described in the text below summarize trends observed in the explorations. The boundaries between soil strata are approximate and are based on interpretations of widely spaced explorations and samples. Actual conditions could be more variable.

Tighe & Bond Borings and Test Pits – Nine geotechnical borings (T&B-B-1 through T&B-B-9) were drilled by General Borings, Inc. (General Borings) between August 28 and 30, 2023. Borings were advanced with 3.25-inch inside-diameter hollow-stem augers. Split-spoon sampling and Standard Penetration Tests (SPTs) were conducted semi-continuously to a depth of up to 7 feet below ground surface (bgs), and at 5-feet intervals thereafter to the termination depths of the borings. Auger refusal on presumed bedrock was encountered in each of the borings at depths ranging from approximately 3 to 29 feet bgs. At borings T&B-B-4 and T&B-B-8, auger refusal was encountered and the borings were off-set and drilled to deeper depths, and the offset borings were identified as T&B-B-4A and T&B-B-8A, respectively. Bedrock core samples were collected at two borings: T&B-B-1 from a depth of 6.5 to 11.5 feet bgs; and T&B-B-2 from a depth of 3 to 8 feet bgs. Borings were backfilled upon completion with cuttings.

Thirteen geotechnical test pits (TP-101 through TP-113) were excavated on November 11 through 17, 2023 by General Borings using a Volvo EC55L excavator to depths ranging from approximately 3 to 8 feet bgs. After completion of the test pits, the pits were backfilled with excavated material in controlled lifts and compacted with the heel of the bucket.

Boring and test pit locations are shown on Figure 2 of Appendix A. Tighe & Bond boring and test pit logs are included in Appendix B.

Explorations by Others – Borings and test pits were performed by ATANE that were documented in a report titled Preliminary Geotechnical Investigation for Central Middle School, dated October 10, 2022. Twenty borings (B-1 through B-20) were drilled by Soil Testing, Inc. on August 23 through 25, 2022, and on September 3, 2022. The borings were drilled using 4.25-inch inside-diameter hollow-stem augers. Split-spoon sampling SPTs were typically conducted continuously or semi-continuously to the termination depths of the borings. Borings were advanced to maximum depths ranging from 3 to 16 feet bgs, and auger refusal was noted on the boring logs at 12 of the borings at depths ranging from 3 to 12 feet bgs.

Twelve test pits (TP-1 through TP-12) were excavated by JJK Electric on August 12, 2022 using a Bobcat E35. Test pits were excavated to maximum depths ranging from 3 to 10 feet bgs.

The ATANE borings logs did not include ground surface elevations, and the test pit logs included ground surface elevations that vary significantly from the existing ground surface

elevations shown on the Martin Property / Boundary & Topographic Survey. Therefore, for this evaluation the ground surface at each of the ATANE borings and test pits were interpolated based on an overlay of the ATANE exploration location plan on the Martin Property / Boundary & Topographic Survey. This assumes there have not been any significant grade changes since ATANE's explorations and the Martin Property / Boundary & Topographic Survey.

Boring and test pit locations are shown on Figure 2 of Appendix A, based on the above-referenced overlay. The ATANE boring and test pit logs are included in Appendix C.

Laboratory Testing – Laboratory tests were performed as part of the ATANE exploration program consisting of nine sieve analysis tests (ASTM C136), eight specific gravity tests (ASTM D854) and two Atterberg limits tests (ASTM D4318). Additionally, laboratory tests were performed on soil and rock samples collected from the Tighe & Bond borings and test pits consisting of four mechanical Particle Size Analysis tests (ASTM D6913), six organic content tests (ASTM D2974), six natural moisture content tests (ASTM D2216) and two uniaxial compressive strength tests (ASTM D7012D). Tighe & Bond and ATANE laboratory test results are included in Appendix D.

Summary of Subsurface Conditions – In general, subsurface conditions encountered in the explorations consisted of surficial topsoil, forest mat or recreational field sand underlain by native granular soils and bedrock, or in the eastern portion of the proposed building and to the east/southeast of the proposed building the surficial materials were underlain by existing granular fill followed by a layer of buried sand with minor organics, followed by native granular soils, a discontinuous layer of sandy clay that was 0.5 to 3 feet thick, and bedrock. The native granular soils were typically medium dense to very dense, with the exception of the upper 2 to 3 feet that was occasionally very loose to loose. The existing fill was variable in density, ranging from very loose to very dense where SPTs were performed. The buried sand with minor organics was loose to medium dense where SPTs were performed.

Table 1 below presents the general stratigraphy encountered at the subsurface exploration locations in descending depth from the ground surface. A tabular summary of subsurface conditions is included as Table B1 in Appendix B.

Table 1
Description of Subsurface Conditions

Strata (In Descending Depth)	General Description [1]
FILL[2,3]	Loose to very dense, brown, gray or black, fine to coarse SAND (portions of which are only fine SAND), up to 50% Gravel, up to 50% Silt, trace Roots, trace Asphalt or trace "debris," *or* SILT, trace Gravel, trace Clay; fill contains Cobbles and Boulders
SAND WITH MINOR ORGANICS[2,3,4]	Loose, brown or tan, fine to coarse or fine to medium SAND, up to 50% Silt, up to 50% Gravel, trace to little Organics; layer contains Cobbles
NATIVE GRANULAR SOIL[5]	Medium dense to very dense, brown, gray or black, fine to coarse SAND (portions of which are only fine SAND), up to 50% Gravel, up to 50% Silt *or* GRAVEL, some fine to coarse Sand, little Silt *or* SILT, some fine to medium Sand; layer contains Cobbles and Boulders
SANDY CLAY[6]	Gray, low plasticity CLAY or Clayey SILT, with minor proportions of Sand, Gravel or Sand-Clay mixtures

1. Definition of Soil Description Terms: "trace" = 0-10%, "little" = 10-20%, "some" = 20-35%, "and" = 35-50%, by weight
2. Encountered at T&B-B-5 and T&B-B-8, TP-101 through TP-111, and interpreted to have been encountered at TP-1, TP-6, and TP-8 through TP-11.
3. The borings and test pits performed by ATANE do not explicitly identify fill, sand with minor organics, and native soils on each of the logs. Fill at the ATANE borings and test pits, as well as the sand with minor organics layer, where not explicitly identified as fill was interpreted by Tighe & Bond as part of this evaluation.
4. Based on six laboratory organic and moisture content tests of soil samples collected from the sand with minor organics layer, the organic content and moisture content of the layer ranged from 1.1% to 10.5% and 20.7% to 52.1%, respectively.
5. The upper 2 feet of the native soil where present directly below ground surface was very loose to loose at some locations, likely the result of seasonal freeze/thaw.
6. Encountered at TP-104, B-4, TP-3, TP-4, and TP-7 through TP-11.

Of the 52 total subsurface explorations, 21 of the explorations terminated upon encountering refusal on presumed bedrock at depths ranging from approximately 3 to 29 feet bgs. A 0.5- to 3.5-feet thick weathered bedrock zone was encountered before apparent intact bedrock at four of the Tighe & Bond borings. In general, refusal elevations were shallower in the western portion of the site (the existing hillside) and deeper in the central portion of the site (south-central portion of the proposed building footprint). Two 5-foot long bedrock cores were collected at borings drilled in the northern portion of the site (T&B-B-1 and T&B-B-2). Based on the rock cores and consistent with the 1985 Bedrock Geological Map of Connecticut, bedrock underlying the site consists of gneiss as part of the Hawley Formation. The Rock Quality Designation (RQD) of samples collected ranged from 70 to 78 percent, indicating fair to good rock quality.

Groundwater was encountered at depths ranging from approximately 6 to 10 feet bgs, corresponding to approximately elevation 39 feet to 33 feet, in explorations performed in the existing recreational field area; groundwater was not encountered in borings drilled on the

existing hillside. Water levels were taken during or shortly after drilling/excavating and may not reflect stabilized conditions. Water levels can fluctuate with season, precipitation, and nearby construction or other below grade activities, such as excavation, dewatering, wells, infiltration basins, etc. The possibility of groundwater level fluctuations should be considered during design.

Geotechnical Evaluation and Recommendations

The analyses and recommendations submitted in this evaluation are based upon the data obtained from the relatively widely spaced subsurface explorations. Subsurface explorations included as part of this evaluation were performed by others (ATANE), not under the observation of Tighe & Bond. The evaluation and recommendations provided herein should be considered only as reliable as the information on which they were based. The nature and extent of variations between explorations may not become evident until construction. If significant variations from these descriptions appear during construction, it will be necessary to re-evaluate these recommendations.

Subsurface conditions encountered in the borings within the footprint of the proposed building generally consisted of native granular soils underlain by bedrock, or (in the eastern portion of the proposed building footprint) existing fill with minor organics underlain by a layer of granular soil with minor organics, followed by native granular soils, a discontinuous layer of sandy clay, and bedrock. The thickness of the organic-containing layer was observed to range from approximately 0.5 to 3.5 feet. Based on six laboratory organic and moisture content tests of soil samples collected from the sand with minor organics layer from Tighe & Bond borings and test pits, the organic content and moisture content of the layer ranged from 1.1% to 10.5% and 20.7% to 52.1%, respectively. ATANE explorations describe "some organic materials" within the fill and granular soil with minor organics layers.

The existing fill and underlying sand with organics layers are not suitable to remain in place below the proposed building footprint (slab and foundations) due to the potential for intolerable settlement of the building foundations and/or slab that may result from the presence of uncontrolled fill of variable composition and density, and organic-containing layers that are expected to decompose over the life of the structure. Existing fill and underlying sand with organics should be completely over-excavated from below the proposed building footprint and foundation bearing zones (defined as the 1H:1V lines extending down and away from the bottom of footing elevation starting at 1 foot away from the footing edge) to the top of suitable native soils, and be replaced with suitable compacted backfill. After completion of over-excavation and replacement of the unsuitable materials, the proposed building can be supported on conventional shallow soil-supported footings and a soil-supported slab-on-grade bearing on native soils or suitable compacted backfill placed over native soils.

In areas outside the proposed building footprint (such as pavement and landscaped areas), the existing fill and underlying sand with organics layers are considered suitable to remain in place.

Foundation and Slab Design – It is recommended the proposed building be designed with conventional soil-supported spread and continuous footing foundations. Per the 2022 Connecticut State Building Code, footings should bear a minimum of 3.5 feet below adjacent ground surface exposed to freezing temperatures for frost protection. Interior footings not

exposed to freezing temperatures should bear a minimum of 1.5 feet below the slab; however, possible building shut downs or power failures should be considered.

Foundations are recommended to bear on native granular soil or compacted Granular Fill, Gravel Borrow or Crushed Stone wrapped in a non-woven geotextile separation fabric, placed over native granular soil after over-excavation of the existing fill and underlying sand with organics layers.

Bedrock is not expected to be encountered at or within 12 inches of footing bearing elevations. Although not expected, if bedrock is encountered above or within 12 inches of footing bearing elevations, the bedrock should be removed to 12 inches below the bottom of footing and be replaced with compacted Crushed Stone. This will help limit differential settlement or concrete cracking that may occur due to bearing on dissimilar materials (bedrock versus soil).

A maximum net allowable bearing pressure of 4 ksf is recommended for footings. The net allowable bearing pressure is based on column and wall footings having a minimum width of 3 feet and 2 feet, respectively. At the recommended bearing pressure, total and differential settlements are anticipated to be less than 1 inch and ½ inch, respectively. Most settlement will occur during construction as dead load is applied.

Where footings are stepped, the maximum steepness of the steps should be 2H:1V.

An ultimate coefficient of friction equal to 0.45 ($\delta = 24$ degrees) should be used for concrete on existing granular soils or on compacted Granular Fill, Gravel Borrow or Crushed Stone. The recommended ultimate passive earth pressure against the sides of footings is 400 pounds per cubic foot as an equivalent fluid unit weight. A factor of safety of 2.0 is recommended to be applied to the ultimate passive earth pressure value.

The floor slab may be designed as a slab-on-grade bearing on 12 inches of compacted Gravel Borrow or Crushed Stone placed over native granular soil or compacted Granular Fill if used as backfill after removal and replacement of the existing fill and underlying sand with organics layers.

Subgrades and required fill to achieve proposed grade should be prepared, placed, and compacted as recommended later in this letter.

Foundation and Underslab Drainage – Groundwater was encountered at depths ranging from 6 to 10 feet bgs, corresponding to approximately elevation 39 feet to 33 feet. Based on this information, foundation and underslab drainage is not likely necessary, with the exception of the foundation/retaining wall that will provide transition between the lower portion of the building with FFE at elevation 47 feet and the upper portion of the building with FFE at 63 feet, which should include a foundation perimeter drain. The foundation perimeter drain should consist of a perforated PVC drain, at least 6 inches in diameter, and should be surrounded by appropriate filters such as crushed stone, gravel, and/or geotextiles. Water collected in pipes should be conveyed to properly filtered sump pumps for discharge or daylighted by gravity, if possible.

Lateral Earth Pressures – Earth-retaining structures should be designed to resist lateral pressures generated by soil backfill material and any temporary or permanent surcharge loads. At-rest conditions can be used for design of walls that are not free to deflect or rotate

(braced walls). Walls that are free to deflect or rotate (unbraced walls) should be designed using active conditions.

Table 2, below, provides recommended lateral loads.

Table 2
Lateral Earth Pressures

Condition	Recommended Value
Braced / At-Rest	At Rest Earth Pressure Coefficient (k_o): 0.50 Equivalent Fluid Pressure: 65 pcf[1] Surcharge: 0.5 times the vertical surcharge load uniformly distributed over the height of the wall (in psf[1])
Unbraced / Active[2]	Active Earth Pressure Coefficient (k_a): 0.33 Equivalent Fluid Pressure: 45 pcf Surcharge: 0.33 times the vertical surcharge load uniformly distributed over the height of the wall

1. pcf = pounds per cubic foot; psf = pounds per square foot
2. For active conditions to be developed, the wall must rotate about its base with lateral top movement of approximately 0.002H, where H is the height of the wall.

The recommended earth pressures above are based on level ground surface at the top of the wall. These design values were calculated using a soil unit weight of 130 pcf and a friction angle of 30 degrees, assuming the use Granular Fill or Gravel Borrow as backfill against the wall. The design values above do not include unbalanced hydrostatic loads; the values provided assume drainage will be included in the design of earth retaining structures. Where the calculated lateral earth pressure is less than 200 psf, it should be increased to 200 psf (as a surcharge) to account for compaction induced stresses.

The resultant earth pressure should be applied at a location of H/3 from the bottom of the wall.

According to the Connecticut State Building Code, seismic lateral earth pressure loads on basement and retaining walls in Seismic Design Categories A through C need not be considered. It is anticipated that Seismic Design Categories A through C will apply for this project, but should be confirmed by the structural engineer.

The recommended minimum factors of safety against sliding and overturning are 1.5. A coefficient of friction equal to 0.45 ($\delta = 24$ degrees) may be used for concrete on existing granular soil or and compacted Granular Fill, Gravel Borrow or Crushed Stone.

Seismic Design – Based on data from the borings, the site is assigned to Site Class D, according to the State of Connecticut Building Code. The design spectral response accelerations at short periods (S_{DS}) and at 1-second period (S_{D1}) are 0.292 and 0.095, respectively. These values were calculated based on mapped spectral response accelerations and the appropriate magnification factors for Site Class D. The structural engineer should determine the Seismic Design Category based upon the assumed seismic use group.

Based on standard penetration test N-values, composition of the soils encountered in the test borings, and depth of groundwater observed, the site soils are not considered susceptible to liquefaction.

Pavement Design – Table 3 provides minimum recommended pavement cross-sections for the proposed pavement areas:

Table 3
Minimum Pavement Sections

Layer Description	Layer Thickness (inches)	
	Light Use	**Heavy Use**
Bituminous Concrete Wearing Course	1.5	2
Bituminous Concrete Binder Course	2	2.5
Processed Aggregate Base (CTDOT M.05.01)	8	12

Permanent Slopes and Site Retaining Walls – Permanent slopes and/or retaining walls are planned to the west of the proposed building. The thickness of overburden soils in the existing hillside where the permanent slopes and/or retaining walls are planned was approximately 3 to 14.5 feet, with an average thickness of approximately 7 feet. It is anticipated that the proposed permanent slopes and/or retaining walls could consist of a combination of permanent rock and soil slopes, or modular block or mechanically-stabilized earth (MSE) retaining walls. Additional subsurface explorations will be necessary to determine the thickness of overburden soil and composition/quality of bedrock at the actual locations of proposed permanent slopes and/or retaining walls. However, preliminary recommendations for permanent soil and rock slopes are as follows.

Permanent soil slopes should be loamed and seeded, and should not be steeper than 2H:1V unless additional slope stabilization measures are provided; however, it is recommended that soil slopes be 3H:1V or flatter as they provide additional slope stability and are easier to mow and maintain.

Bedrock cut slopes should not be steeper than 1H:6V, should be cleared of any loose rock, and should have a 5-foot setback clear of soil at the top of the bedrock before any soil slopes begin. The bedrock should be pre-split for a clean, durable rock face. For rock cut slopes greater than 6 feet in height, the toe of bedrock cut slopes should include a rock fall zone, which should generally consist of a ditch that is at least 12 feet wide and 3.5 feet deep, for rock slopes of up to 20 feet in height. If construction of a rock fall ditch is not feasible due to space limitations, rock fall catchment fencing should be considered.

Additional Subsurface Explorations –Once access is available at the actual locations of proposed permanent slopes and/or retaining walls, at least 2 borings are recommended along the alignment of the proposed permanent slope and/or retaining wall to the west of the southern portion of the proposed building to estimate the thickness of overburden soil and composition/quality of bedrock. A bedrock core is recommended to be collected for the full elevation range of the potential rock cut.

Geotechnical Construction Recommendations

This section provides comments related to foundation construction, earthwork, and other geotechnical aspects of the project that will aid those responsible for preparing construction specifications.

Initial Site Preparation – Initial site preparation should include stripping of vegetation, topsoil and forest mat from areas of proposed work and clearing/grubbing existing trees where they exist in proposed improvement areas. Tree removal should include removal of root systems. Excavations for removal of trees and root systems should be properly backfilled with compacted Granular Fill, Gravel Borrow or Crushed Stone, as described herein.

Excavation and Fill – Conventional heavy construction equipment should be suitable for excavation in existing soil materials. It should be expected that cobbles and boulders will be present within soils at the site. Excavation should conform to OSHA excavation regulations contained in 29 CFR Part 1926, latest edition. Subgrades should be excavated in such a way to minimize disturbance, such as using a smooth faced bucket. Gravel Borrow or Crushed Stone should be used for the slab base course. Other fill needed below the structure, if any, should consist of Granular Fill, Gravel Borrow, or Crushed Stone wrapped in a non-woven geotextile separation fabric. Blast rock fill may be used as fill below the structure, provided it is placed as described in the Reuse of Existing Soils section, herein.

All backfill should be placed in 12-inch maximum lifts and should be compacted to 95 percent of the maximum dry density as determined by the Modified Proctor laboratory test (ASTM D1557). Thinner lifts may be needed depending on the material placed and the type of compactor used. Crushed Stone should be placed in loose lift thicknesses of less than 12 inches and be compacted with heavy compaction equipment to achieve an unyielding subgrade.

Table 4 presents the required gradations for imported materials.

Table 4
Recommended Gradation Requirements for Borrow Materials

Sieve Size	**Percent Finer by Weight**		
	Granular Fill	**Gravel Borrow**	**1-1/2" Crushed Stone**
2/3rd lift thickness	100		
2 inch	--	100	100
1½ inch	--	--	95-100
1 inch	--	--	35-70
¾ inch	--	--	0-25
½ inch	--	50-85	--

Sieve Size	Percent Finer by Weight		
	Granular Fill	**Gravel Borrow**	**1-1/2" Crushed Stone**
No. 4	--	40-75	--
No. 10	30-95	--	--
No. 40	10-70	--	--
No. 50	--	8-28	--
No. 200	0-15	0-10	--

Rock Removal – Bedrock removal should be anticipated to achieve finished grades to the west of the proposed building. It is anticipated that bedrock removal of up to approximately 1 to 2 feet within localized areas can likely be completed efficiently using mechanical methods, such as a hydraulic hoe-ram. Where bedrock removal is required to greater depths (such as the permanent slopes and/or retaining walls are planned to the west of the proposed building), systematic drilling and blasting may be considered in order to efficiently remove rock to reach the required elevations. Controlled blasting with pre-splitting is recommended to form the faces of slopes that will be permanently exposed.

If systematic drilling and blasting is pursued, blast hole depths should be controlled in order to reduce breakage 12 inches below the intended rock removal elevation, to the extent practicable. Controlled blasting procedures are recommended to: limit the charge weight using millisecond delays; limit the peak particle velocity at adjacent structures to acceptable levels; and yield rock sizes suitable for use as fill. Controlled blasting methods also need to maintain vibrations at the nearest residence and nearby existing buildings/utilities within the requirements of State and local codes, with additional consideration given for sensitive structures (if present). A common basis for establishing maximum permissible vibration for residential houses is the criteria published by the United States Bureau of Mines (USBM) "safe levels of blasting vibration for houses using a combination of velocity and displacement."

Pre-blast surveys of existing structures to remain and water supply wells (if any) are recommended within 500 feet of the proposed blast area.

We recommend the contractor familiarize her/himself with bedrock excavation conditions before construction. In addition, project specifications should clearly define bedrock excavation.

Excavation Slopes and Temporary Earth Support – It is anticipated that excavations will be accomplished by sloping or benching the sides of the excavations. Where space is not available to safely lay back excavations, a temporary earth support system will be required. Temporary earth support systems, like slide rail or trench boxes, if required, should be selected by the contractor and be designed by an experienced Professional Engineer registered in the State of Connecticut and retained by the Contractor.

The Owner and the Contractor should make themselves aware of and become familiar with applicable local, state, and federal safety regulations, including the current Occupational

Safety and Health Administration (OSHA) Excavation and Trench Safety Standards. Construction site safety generally is the sole responsibility of the Contractor, who shall also be solely responsible for the means, methods, and sequencing of construction operations.

The Contractor should be aware that slope height, slope inclination, or excavation depths (including utility trench excavations) should in no case exceed those specified in local, state, or federal safety regulations, e.g. OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926, or successor regulations. Such regulations are strictly enforced and, if they are not followed, the Owner, Contractor, and/or earthwork and utility subcontractors could be liable for substantial penalties.

Dewatering – Groundwater may be encountered during excavation to remove existing fill and buried sand with minor organics. If dewatering becomes necessary it can likely be accomplished by pumping from properly filtered sumps and be discharged according to federal, state, and local regulations. If groundwater is encountered, the groundwater level should be temporarily lowered at least two feet below excavations to limit potential "boils", loss of fines, or softening of the ground. Surface water entering the construction area should be diverted away from excavations.

Bearing Surface Preparation – Acceptable subgrades for supporting footings and slabs consist of native granular soil or compacted Granular Fill, Gravel Borrow or Crushed Stone wrapped in a non-woven geotextile separation fabric, placed over native granular soil. Existing fill and sand with organics layers are not suitable to remain in place below the proposed building slab and foundation bearing zones (defined as the 1H:1V lines extending down and away from the bottom of footing elevation starting at 1 foot away from the footing edge) and should be over-excavated to the top of suitable native soils, and be replace with compacted backfill.

The existing fill and sand with organics layers are expected to be suitable to remain in place below landscaped areas, pavements and light ancillary structures (such as transformer pads, dumpster pads or similar).

Prior to placement of fill or backfill, the native granular soil subgrades (within the building footprint or exterior of the building footprint, where present) or existing fill subgrades (outside the building footprint, only) should be proof compacted with either 10 passes of a 10-ton vibratory drum roller for open excavations or 6 passes of a large, reversible, walk behind vibratory compactor capable of exerting a minimum force of 2,000 lbs in trench or pit excavations. Any subgrades that are soft or yielding under proof compaction efforts should be removed to expose suitable subgrades, and should be replaced with compacted Granular Fill, Gravel Borrow or compacted Crushed Stone wrapped in a non-woven geotextile. Any cobbles or boulders protruding the subgrade should be removed and backfilled with Granular Fill or Gravel Borrow prior to proof compaction to ensure proper ground contact with the compaction equipment.

Due to the relatively high fines (silt) content, some of the bearing surfaces may be easily disturbed during foundation construction activities should they become wet from precipitation or groundwater. If desired, the bearing surfaces may be over-excavated by 6 to 12 inches and replaced by a layer of compacted Crushed Stone wrapped in a separation geotextile to provide a stable working surface.

Soil bearing surfaces should be protected against freezing and the elements before and after concrete placement. If construction is performed during freezing weather, footings and foundation walls should be backfilled as soon as possible after they are constructed. Alternatively, insulating blankets or other means may be used for protection against freezing.

Reuse of Existing Soils – Existing subsurface materials, excluding topsoil/forest mat, may be re-used as Granular Fill, regardless of its gradation, provided it is environmentally appropriate, free of organics, debris, stones greater than two thirds the lift thickness in diameter, or other unsuitable material, and they are placed to the required degree of compaction. It should be noted that some of the existing site soils have a relatively high fine-grained content, which could make them difficult to place and compact to the required degree of compaction when excessively wet.

Existing site soils may not be re-used as Gravel Borrow or Crushed Stone unless it meets the gradation requirements presented above, which is unlikely. Existing topsoil/subsoil may be reused in landscaped areas but should be tested for pH, percent organics, and nutrient content and modified as needed to support vegetative growth. It was not within Tighe & Bond's scope of work to evaluate the potential for soil contamination with regard to suitability for reuse or for off-site disposal purposes.

Rock generated during bedrock removal may be used as Blast Rock Fill. Blast Rock Fill should not be used within 12 inches of building foundations, slabs, and utilities. Blast Rock Fill may be used below pavement subbase course and landscape areas, provided it is well graded. If re-used on site, Blast Rock Fill should meet the gradation provided in Table 5. Blast Rock Fill should be placed in loose lift thicknesses of less than 18 inches and be compacted with heavy compaction equipment. A minimum of 12 inches of compacted "choke stone" should be placed over the Blast Rock Fill. Choke stone should be a well-graded mixture of blast rock fragments less than 6 inches in size and Granular Fill, such that it can be readily compacted to fill voids in the Blast Rock Fill below.

Table 5
Gradation Requirements for Blast Rock Fill

Sieve Size	Percent Finer by Weight
12 inch	100
4 inch	0-25
3 inch	--
1½ inch	--
1¼ inch	--
¾ inch	0-10
½ inch	--
No. 4	--
No. 10	--
No. 40	--
No. 50	--
No. 200	--

Closing

The preceding recommendations provided herein are for specific application to the Central Middle School at 9 Indian Rock Lane in Greenwich, Connecticut, in accordance with generally accepted soil and foundation engineering practices. No warranty, expressed or implied, is made. In the event that any changes in the design or location of the proposed structure are made, the conclusions and recommendations in this report should not be considered valid unless verified in writing. This report is for design purposes only and may not be sufficient to prepare accurate quantity take-offs. It is discouraged that this report in its entirety be included in the construction documents or be provided to a contractor. Rather, the construction recommendations should be incorporated appropriately into the construction specifications as well as exploration locations, exploration logs, and laboratory test results for the contractor's use under informational purposes only.

Thank you for the opportunity to provide these services. Please contact Brian Nereson at (603) 978-5826 or bnereson@tighebond.com if you should have any questions, comments, or require additional information.

Very truly yours,

TIGHE & BOND, INC.

Brian T. Nereson, PE
Principal Engineer

Charles J. Croce, PE
Vice President

Enclosures: Appendix A – Figures
Appendix B – Tighe & Bond Exploration Logs
Appendix C – ATANE Exploration Logs
Appendix D – Laboratory Test Results

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Appendix A
Figures

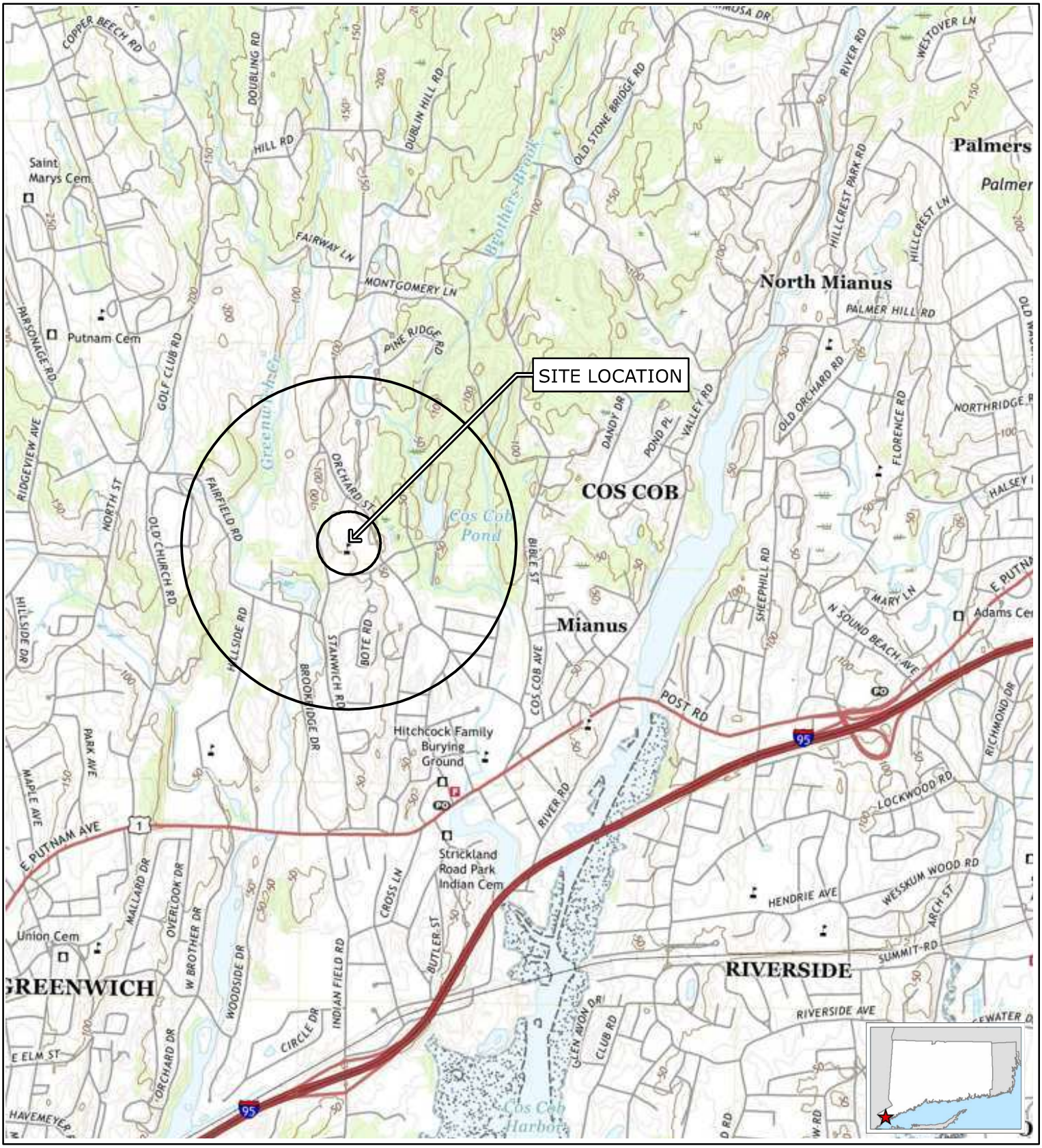


FIGURE 1
SITE LOCATION

Greenwich Central Middle School
9 Indian Rock Lane
Greenwich, Connecticut

Tighe&Bond

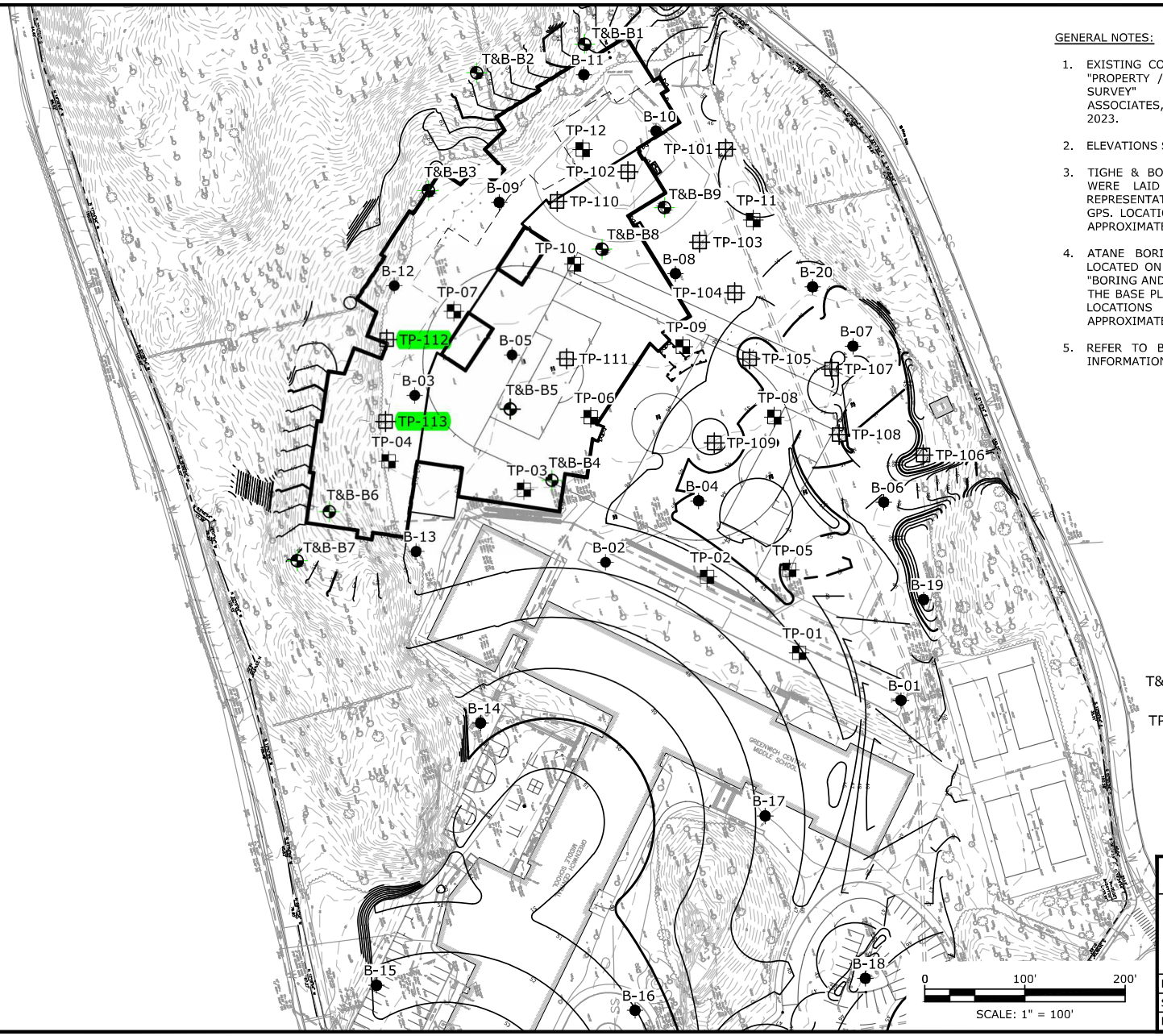
Based on USGS Topographic Map for Stamford, CT Revised 2021.
Contour Interval Equals 10-feet.
Circles indicate 500-foot and half-mile radii.

1:24,000
0 1,000 2,000
Feet

N

October 2023

G-5086



GENERAL NOTES:

1. EXISTING CONDITIONS SHOWN BASED ON "PROPERTY / BOUNDARY & TOPOGRAPHIC SURVEY" BY MARTIN SURVEYING ASSOCIATES, LLC AND DATED MAY 22, 2023.
2. ELEVATIONS SHOWN REFERENCE NAVD88.
3. TIGHE & BOND EXPLORATION LOCATIONS WERE LAID OUT BY TIGHE & BOND REPRESENTATIVES USING A HANDHELD GPS. LOCATIONS SHOULD BE CONSIDERED APPROXIMATE.
4. ATANE BORINGS AND TEST PITS WERE LOCATED ON THIS PLAN BY OVERLAYING A "BORING AND TEST PIT LOCATION PLAN" ON THE BASE PLAN REFERENCED HEREON. THE LOCATIONS SHOULD BE CONSIDERED APPROXIMATE.
5. REFER TO BORING LOGS FOR DETAILED INFORMATION.

LEGEND:

T&B-B5	APPROXIMATE LOCATION OF BORING BY TIGHE & BOND
TP-101	APPROXIMATE LOCATION OF TEST PIT BY TIGHE & BOND
B-02	APPROXIMATE LOCATION OF BORING BY ATANE
TP-03	APPROXIMATE LOCATION OF TEST PIT BY ATANE

GREENWICH CENTRAL MIDDLE SCHOOL
GREENWICH, CT

BORING LOCATION PLAN

DATE: 10/29/2024
SCALE: AS SHOWN
FIGURE: BLP-01

Tighe&Bond

Plotted On:Oct 29, 2024-1:39pm By: BNereson
Tighe & Bond:J:\G\G5068 Greenwich Public Schools\003 Central Middle School\Drawings\AutoCAD\figures\BLP-01_120423_rev base.dwg

Appendix B
Tighe & Bond
Exploration Logs

Greenwich Central
Middle School, Greenwich, CT

Table B1
Summary of Subsurface Data

Exploration Identification	Existing Ground Surface Elevation[1] (ft)	Depth to Groundwater (ft bgs)	Groundwater Elevation (ft)	Thickness of Fill (ft)[2]	Thickness of Sand with Minor Organics[3] (ft)	Depth to Refusal (ft bgs)	Refusal Elevation (ft)
T&B-B1	50	--	--	--	--	6.5	43.5 (C) [4]
T&B-B2	69	--	--	--	--	3	66 (C) [4]
T&B-B3	48.5	--	--	--	--	9	39.5
T&B-B4	43	--	--	--	--	--	--
T&B-B4A	43	--	--	--	--	18.5	24.5
T&B-B5	44	8.5	35.5	5.5	2	29	15
T&B-B6	57	--	--	--	--	5	52
T&B-B7	66	--	--	--	--	14.5	51.5
T&B-B8	45.5	--	--	5.5	2	--	--
T&B-B8A	45.5	10	35.5	--	--	15.5	30
T&B-B9	46	7.5	38.5	--	--	15	31
TP-101	46	8	38	3	2	--	--
TP-102	43	6 [5]	37 [5]	2.5	>3.5	--	--
TP-103	45	6 [5]	39 [5]	5	>2	--	--
TP-104	44.5	6 [5]	38.5 [5]	5	0.5	--	--
TP-105	44	5 [5]	39 [5]	3.5	--	--	--
TP-106	42.5	6 [5]	36.5 [5]	4	1	--	--
TP-107	43	7 [5]	36 [5]	4	1	--	--
TP-108	42.5	8 [5]	34.5 [5]	4	1	--	--
TP-109	43	6 [5]	37 [5]	4	--	--	--
TP-110	46	--	--	2.5	>1.5	--	--
TP-111	44	--	--	>3	--	--	--
TP-112	45.5	--	--	--	--	--	--
TP-113	45	--	--	--	--	--	--
B01	42	7	35	--	--	10.3	31.7
B02	42	9	33	--	--	>14	<28
B03	44.5	10	34.5	--	--	>14	<30.5
B04	42	7	35	--	--	>16	<26
B05	44.5	8	36.5	--	--	>16	<28.5
B06	42	8	34	--	--	>14	<28
B07	43	8	35	--	--	>11.3	<31.7
B08	45	10	35	11.5	--	>16	<29
B09	46	--	--	--	--	11.5	34.5
B10	46	--	--	--	--	10	36
B11	49	--	--	--	--	7	42
B12	46	--	--	--	--	7	39
B13	44	--	--	--	--	7	37
B14	50	--	--	6	--	12	38
B15	52	--	--	--	--	9	43
B16	52	--	--	6	--	12	40
B17	48	--	--	--	--	8	40
B18	46	9	37	10	--	>13.8	<22.2
B19	42	--	--	--	--	7.3	34.7
B20	44	--	--	--	--	3	41
TP01	42.5	6.5	36	2	1	>10	<32.5
TP02	42	6.5	35.5	3	--	>10	<32
TP03	43	7	36	4	--	>10	<33
TP04	45	8	37	--	--	>10	<35
TP05	42	6.2	35.8	6	--	>10	<32
TP06	43.5	7.5	36	3	2	>10	<33.5
TP07	45	9.5	35.5	--	--	>10	<35
TP08	43	9	34	6.5	0.5	>10	<33
TP09	44	8.5	35.5	2	0.5	>10	<34
TP10	45.5	--	--	5.5	1.5	>10	<35.5
TP11	45	9	36	3	2	>10	<35
TP12	46	--	--	--	--	>3	<46

1. Existing ground surfaces elevations rounded to the nearest 0.5-foot
2. Includes surficial topsoil thickness
3. Sand with minor organics layer is typically of mix of granular soil with minor organic materials
4. (C) indicates rock core collected at refusal elevation
5. Indicates depth / elevation of water seeping into test pit; seepage may or may not represent the groundwater level

Tighe&Bond
Engineers | Environmental Specialists

Boring No. **T&B - B-1**
Page 1 of 1
File No. G-5068-003
Checked by: B Nereson

Project: Greenwich Central Middle School
Location: Greenwich, CT
Client: The SLAM Collaborative

Drilling Co. General Borings, Inc.
Foreman: J. Casson
T&B Rep.: N. Marchetti
Date Start: 08/29/23 End: 08/29/23
Location See Exploration Location Plan
GS. Elev. 50' Datum: NAVD88

	Casing	Sampler
Type	HSA	Split Spoon
I.D./O.D.	3-1/4"/ 6-3/4"	1-3/8"/2"
Hammer Wt.	140#	140#
Hammer Fall	30"	30"
Rig Make/Model	Diedrich D50 ATV	

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
No Groundwater observed				

Depth (ft.)	Casing Blows Per Ft.	Sample No. / Rec.(in)	Sample Depth (ft.)	Blows Per 6"	PID Reading (ppm)	Sample Description	General Stratigraphy	Notes	Well Construction
		S-1 / 12	0-2	2-1		2" Forest Mat 10" Very loose, brown, SILT, some fine Sand, trace Roots	0.2' **FOREST MAT**	2	
				2-3			**SAND**		
		S-2 / 18	2-4	3-5		Medium dense, brown, fine to coarse SAND, little Silt, trace Gravel	3.5'		
				6-25					
5							**GLACIAL TILL**		
		S-3 / 13	5-6.3	30-45		Very dense, gray to brown, fine to coarse SAND and GRAVEL, little Silt	6.5'		
				50/3					
		C-1 / 60	6.5-11.5	2 min		Hard, slightly to moderate severely weathered, sound to moderately fractured, fine grained, gray, GNEISS, very close to close, shallow to moderate dipping REC: 60"/60" = 100% RQD: 42"/60" = 70%	**BEDROCK**		
				3 min					
10				3 min					
				3 min					
				3 min					
						End of Boring at 11.5 feet			
15									
20									
25									
30									

Notes:
1. Samples taken with a split spoon sampler driven by an autohammer.
2. Auger refusal at 6.5 feet. Switched to 3" I.D. flush joint casing.

Proportions Used

TRACE (TR.)	0 - <10%
LITTLE (LI.)	10 - <20%
SOME (SO.)	20 - <35%
AND	35 - <50%

Density/Consistency

VERY LOOSE	0-4	VERY SOFT	<2
LOOSE	4-10	SOFT	2-4
MEDIUM DENSE	10-30	MEDIUM	4-8
DENSE	30-50	STIFF	8-15
VERY DENSE	>50	VERY STIFF	15-30
		HARD	>30

Tighe&Bond
Engineers | Environmental Specialists

Boring No. **T&B - B-2**
Page 1 of 1
File No. G-5068-003
Checked by: B Nereson

Project: Greenwich Central Middle School
Location: Greenwich, CT
Client: The SLAM Collaborative

Drilling Co. General Borings, Inc.
Foreman: J. Casson
T&B Rep.: N. Marchetti
Date Start: 08/29/23 End: 08/29/23
Location See Exploration Location Plan
GS. Elev. 69' Datum: NAVD88

	Casing	Sampler
Type	HSA	Split Spoon
I.D./O.D.	3-1/4"/ 6-3/4"	1-3/8"/2"
Hammer Wt.	140#	140#
Hammer Fall	30"	30"
Rig Make/Model	Diedrich D50 ATV	

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
No Groundwater observed				

Depth (ft.)	Casing Blows Per Ft.	Sample No. / Rec.(in)	Sample Depth (ft.)	Blows Per 6"	PID Reading (ppm)	Sample Description	General Stratigraphy	Notes	Well Construction
		S-1 / 12	0-2	2-2		2" Forest Mat 10" Loose, brown, fine to coarse SAND, some Gravel, little Silt, trace Roots	0.2' **FOREST MAT** **SAND** 2'	2	
				2-2					
		S-2 / 4	2-2.5	50-50/0		Very dense, gray, GRAVEL	**WX ROCK** 3'		
		C-1 / 60	3-8	3 min		Hard to moderatly hard, moderately to very severely weathered, sound to moderately fractured, fine to coarse grained, gray, GNEISS, very close to close, shallow to moderate dipping REC: 60"/60" = 100% RQD: 47"/60" = 78%	**BEDROCK**		
5				4 min					
				3.5 min					
				3 min					
				5.5 min					
						End of boring at 8 feet			
10									
15									
20									
25									
30									

Notes:
1. Samples taken with a split spoon sampler driven by an autohammer.
2. Auger refusal at 3 feet. Switched to core barrel.

Proportions Used

TRACE (TR.)	0 - <10%
LITTLE (LI.)	10 - <20%
SOME (SO.)	20 - <35%
AND	35 - <50%

Density/Consistency

VERY LOOSE	0-4	VERY SOFT	<2
LOOSE	4-10	SOFT	2-4
MEDIUM DENSE	10-30	MEDIUM	4-8
DENSE	30-50	STIFF	8-15
VERY DENSE	>50	VERY STIFF	15-30
		HARD	>30

Tighe&Bond
Engineers | Environmental Specialists

Boring No. **T&B - B-3**
Page 1 of 1
File No. G-5068-003
Checked by: B Nereson

Project: Greenwich Central Middle School
Location: Greenwich, CT
Client: The SLAM Collaborative

Drilling Co. General Borings, Inc.
Foreman: J. Casson
T&B Rep.: N. Marchetti/K. Gagnon
Date Start: 08/30/23 End: 08/30/23
Location See Exploration Location Plan
GS. Elev. 48.5' Datum: NAVD88

	Casing	Sampler
Type	HSA	Split Spoon
I.D./O.D.	3-1/4"/ 6-3/4"	1-3/8"/2"
Hammer Wt.	140#	140#
Hammer Fall	30"	30"
Rig Make/Model	Diedrich D50 ATV	

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
No Groundwater observed				

Depth (ft.)	Casing Blows Per Ft.	Sample No. / Rec.(in)	Sample Depth (ft.)	Blows Per 6"	PID Reading (ppm)	Sample Description	General Stratigraphy	Notes	Well Construction
		S-1 / 13	0-2	2-2		3" Forest Mat 10" Loose, brown, fine to medium SAND, some Silt, trace Gravel, trace Roots	0.2' **FOREST MAT** **SILTY SAND**	2	
				3-4					
		S-2 / 14	2-4	5-6		Medium dense, brown, SILT, some fine to medium Sand	2'		
				9-14			**GLACIAL TILL**		
5									
		S-3 / 7	5-5.8	48-50/4		4" Very dense, brown, GRAVEL, some fine to coarse Sand, little Silt 3" Very dense, gray, GRAVEL	5.5'		
							WEATHERED BEDROCK		
						End of Boring at 9 feet. Auger Refusal.			
10									
15									
20									
25									
30									

Notes:
1. Samples taken with a split spoon sampler driven by an autohammer.
2. Auger refusal at 9 feet.

Proportions Used

TRACE (TR.)	0 - <10%
LITTLE (LI.)	10 - <20%
SOME (SO.)	20 - <35%
AND	35 - <50%

Density/Consistency

VERY LOOSE	0-4	VERY SOFT	<2
LOOSE	4-10	SOFT	2-4
MEDIUM DENSE	10-30	MEDIUM	4-8
DENSE	30-50	STIFF	8-15
VERY DENSE	>50	VERY STIFF	15-30
		HARD	>30

Tighe&Bond
Engineers | Environmental Specialists

Boring No. **T&B - B-4**
Page 1 of 1
File No. G-5068-003
Checked by: B Nereson

Project: Greenwich Central Middle School
Location: Greenwich, CT
Client: The SLAM Collaborative

Drilling Co. General Borings, Inc.
Foreman: J. Casson
T&B Rep.: N. Marchetti
Date Start: 08/28/23 End: 08/29/23
Location See Exploration Location Plan
GS. Elev. 43' Datum: NAVD88

	Casing	Sampler
Type	HSA	Split Spoon
I.D./O.D.	3-1/4"/ 6-3/4"	1-3/8"/2"
Hammer Wt.	140#	140#
Hammer Fall	30"	30"
Rig Make/Model	Diedrich D50 ATV	

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
No Groundwater observed				

Depth (ft.)	Casing Blows Per Ft.	Sample No. / Rec.(in)	Sample Depth (ft.)	Blows Per 6"	PID Reading (ppm)	Sample Description	General Stratigraphy	Notes	Well Construction
		S-1 / 23	0-2	2-5		6" Topsoil 17" Medium dense, brown, fine to coarse SAND, some Gravel, little Silt	0.5' **TOPSOIL**	2	
				8-12					
		S-2 / 2	2-2.2	50/2		Very dense, brown, fine to coarse SAND and GRAVEL, little Silt	**SAND**		
5						End of Boring at 4.5 feet. Auger Refusal.			
10									
15									
20									
25									
30									

Notes:
1. Samples taken with a split spoon sampler driven by an autohammer.
2. Auger refusal at 4.5 feet in B-12. Boring was offset 8 feet northwest (See B-12A).

Proportions Used

TRACE (TR.)	0 - <10%
LITTLE (LI.)	10 - <20%
SOME (SO.)	20 - <35%
AND	35 - <50%

Density/Consistency

VERY LOOSE	0-4	VERY SOFT	<2
LOOSE	4-10	SOFT	2-4
MEDIUM DENSE	10-30	MEDIUM	4-8
DENSE	30-50	STIFF	8-15
VERY DENSE	>50	VERY STIFF	15-30
		HARD	>30

Tighe&Bond
Engineers | Environmental Specialists

Boring No. **T&B - B-4A**
Page 1 of 1
File No. G-5068-003
Checked by: B Nereson

Project: Greenwich Central Middle School
Location: Greenwich, CT
Client: The SLAM Collaborative

Drilling Co. General Borings, Inc.
Foreman: J. Casson
T&B Rep.: N. Marchetti
Date Start: 08/28/23 End: 08/29/23
Location See Exploration Location Plan
GS. Elev. 43' Datum: NAVD88

	Casing	Sampler
Type	HSA	Split Spoon
I.D./O.D.	3-1/4"/ 6-3/4"	1-3/8"/2"
Hammer Wt.	140#	140#
Hammer Fall	30"	30"
Rig Make/Model	Diedrich D50 ATV	

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
No Groundwater observed				

Depth (ft.)	Casing Blows Per Ft.	Sample No. / Rec.(in)	Sample Depth (ft.)	Blows Per 6"	PID Reading (ppm)	Sample Description	General Stratigraphy	Notes	Well Construction
						Borehole advanced to 5 feet without sampling. Refer to B-4.	0.5' **TOPSOIL**		
5		S-1 / 9	5-7	10-12		Medium dense, gray, fine to coarse SAND and GRAVEL, little Silt	**SAND**		
				10-7			8'		
10		S-2 / 13	10-12	15-19		Dense, brown, fine to coarse SAND and GRAVEL, little Silt	**GLACIAL TILL**		
				20-18					
15		S-3 / 12	15-17	20-42		Very dense, brown, fine to coarse SAND and GRAVEL, little Silt			
				29-28					
20						End of Boring at 18.5 feet. Auger Refusal.			
25									
30									

Notes:
1. Samples taken with a split spoon sampler driven by an autohammer.
2. Auger refusal at 18.5 feet.

Proportions Used

TRACE (TR.)	0 - <10%
LITTLE (LI.)	10 - <20%
SOME (SO.)	20 - <35%
AND	35 - <50%

Density/Consistency

VERY LOOSE	0-4	VERY SOFT	<2
LOOSE	4-10	SOFT	2-4
MEDIUM DENSE	10-30	MEDIUM	4-8
DENSE	30-50	STIFF	8-15
VERY DENSE	>50	VERY STIFF	15-30
		HARD	>30

Tighe&Bond
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Boring No. **T&B - B-5**
Page 1 of 1
File No. G-5068-003
Checked by: B Nereson

Project: Greenwich Central Middle School
Location: Greenwich, CT
Client: The SLAM Collaborative

Drilling Co. General Borings, Inc.
Foreman: J. Casson
T&B Rep.: N. Marchetti
Date Start: 08/28/23 End: 08/29/23
Location See Exploration Location Plan
GS. Elev. 44' Datum: NAVD88

	Casing	Sampler
Type	HSA	Split Spoon
I.D./O.D.	3-1/4"/ 6-3/4"	1-3/8"/2"
Hammer Wt.	140#	140#
Hammer Fall	30"	30"
Rig Make/Model	Diedrich D50 ATV	

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
8/28		8.5'	29'	

Depth (ft.)	Casing Blows Per Ft.	Sample No. / Rec.(in)	Sample Depth (ft.)	Blows Per 6"	PID Reading (ppm)	Sample Description	General Stratigraphy	Notes	Well Construction
		S-1 / 17	0-2	2-3		6" Topsoil 11" Loose, brown, fine to coarse SAND, some Gravel, trace Silt	0.5' **TOPSOIL**		
				6-13					
		S-2 / 24	2-4	10-17		6" Dense, brown, fine to medium SAND, trace Gravel, trace Roots	**FILL**		
				19-16		18" Dense, gray, fine to coarse SAND and GRAVEL, trace Silt			
5		S-3 / 13	5-7	6-4		Loose, brown, fine to medium SAND, trace Gravel, trace Silt, trace Organics (2.0%)	5.5' **SAND WITH MINOR ORGANICS**		
				2-5			7.5'		
10		S-4 / 21	10-12	5-7		Medium dense, brown, fine to coarse SAND, little Gravel, little Silt			
				10-12					
		S-5 / 24	15-17	5-11		Dense, brown, fine to coarse SAND, little Gravel, little Silt			
15				22-36					
							GLACIAL TILL		
20		S-6 / 24	20-22	3-3		Medium dense, brown, fine to coarse SAND, some Silt			
				8-12					
25		S-7 / 3	25-25.3	50/4		Very dense, brown, fine to coarse SAND, little Silt, trace Gravel, Weathered Rock in spoon tip			
							25.5' **WEATHERED ROCK**		
								2	
30						End of Boring at 29 feet. Auger Refusal.			

Notes:
1. Samples taken with a split spoon sampler driven by an autohammer.
2. Auger refusal at 29 feet.

Proportions Used

TRACE (TR.)	0 - <10%
LITTLE (LI.)	10 - <20%
SOME (SO.)	20 - <35%
AND	35 - <50%

Density/Consistency

VERY LOOSE	0-4	VERY SOFT	<2
LOOSE	4-10	SOFT	2-4
MEDIUM DENSE	10-30	MEDIUM	4-8
DENSE	30-50	STIFF	8-15
VERY DENSE	>50	VERY STIFF	15-30
		HARD	>30

Tighe&Bond
Engineers | Environmental Specialists

Boring No. **T&B - B-6**
Page 1 of 1
File No. G-5068-003
Checked by: B Nereson

Project: Greenwich Central Middle School
Location: Greenwich, CT
Client: The SLAM Collaborative

Drilling Co. General Borings, Inc.
Foreman: J. Casson
T&B Rep.: N. Marchetti/K. Gagnon
Date Start: 08/30/23 End: 08/30/23
Location See Exploration Location Plan
GS. Elev. 57' Datum: NAVD88

	Casing	Sampler
Type	HSA	Split Spoon
I.D./O.D.	3-1/4"/ 6-3/4"	1-3/8"/2"
Hammer Wt.	140#	140#
Hammer Fall	30"	30"
Rig Make/Model	Diedrich D50 ATV	

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
No Groundwater observed				

Depth (ft.)	Casing Blows Per Ft.	Sample No. / Rec.(in)	Sample Depth (ft.)	Blows Per 6"	PID Reading (ppm)	Sample Description	General Stratigraphy	Notes	Well Construction
		S-1 / 8	0-2	2-2		2" Forest Mat 6" Loose, brown, fine to medium SAND, some Silt, trace Gravel, trace Roots	0.2' **FOREST MAT** **SILTY SAND** 2'	2	
				5-4					
		S-2 / 2	2-4	6-9		Medium dense, brown, fine to medium SAND and GRAVEL, little Silt	**GLACIAL TILL**		
				10-11					
5							5'		
						End of Boring at 5 feet. Auger Refusal.			
10									
15									
20									
25									
30									

Notes:
1. Samples taken with a split spoon sampler driven by an autohammer.
2. Auger refusal at 5 feet.

Proportions Used

TRACE (TR.)	0 - <10%
LITTLE (LI.)	10 - <20%
SOME (SO.)	20 - <35%
AND	35 - <50%

Density/Consistency

VERY LOOSE	0-4	VERY SOFT	<2
LOOSE	4-10	SOFT	2-4
MEDIUM DENSE	10-30	MEDIUM	4-8
DENSE	30-50	STIFF	8-15
VERY DENSE	>50	VERY STIFF	15-30
		HARD	>30

Tighe&Bond
Engineers | Environmental Specialists

Boring No. **T&B - B-7**
Page 1 of 1
File No. G-5068-003
Checked by: B Nereson

Project: Greenwich Central Middle School
Location: Greenwich, CT
Client: The SLAM Collaborative

Drilling Co. General Borings, Inc.
Foreman: J. Casson
T&B Rep.: N. Marchetti/K. Gagnon
Date Start: 08/30/23 End: 08/30/23
Location See Exploration Location Plan
GS. Elev. 66' Datum: NAVD88

	Casing	Sampler
Type	HSA	Split Spoon
I.D./O.D.	3-1/4"/ 6-3/4"	1-3/8"/2"
Hammer Wt.	140#	140#
Hammer Fall	30"	30"
Rig Make/Model	Diedrich D50 ATV	

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
No Groundwater observed				

Depth (ft.)	Casing Blows Per Ft.	Sample No. / Rec.(in)	Sample Depth (ft.)	Blows Per 6"	PID Reading (ppm)	Sample Description	General Stratigraphy	Notes	Well Construction
		S-1 / 12	0-2	1-2		1" Forest Mat 11" Medium dense, brown, fine to coarse SAND, little Silt, trace Roots	0.1' **FOREST MAT** **SILTY SAND**		
				15-21					
		S-2 / 13	2-4	10-9		6" Medium dnese, brown, fine to coarse SAND, little Silt	2.5'		
				15-18		7" Medium dense, gray, fine to coarse SAND and GRAVEL, little Silt			
5		S-3 / 13	5-7	15-15		Very dense, gray, fine to coarse SAND, some Gravel, little Silt			
				45-24					
							GLACIAL TILL		
10		S-4 / 15	10-12	15-20		Dense, gray, fine to coarse SAND, little Gravel, little Silt, Weathered Rock in spoon tip			
				23-36					
								2	
15						End of boring at 14.5 feet. Auger Refusal.			
20									
25									
30									

Notes:
1. Samples taken with a split spoon sampler driven by an autohammer.
2. Auger refusal at 14.5 feet.

Proportions Used

TRACE (TR.)	0 - <10%
LITTLE (LI.)	10 - <20%
SOME (SO.)	20 - <35%
AND	35 - <50%

Density/Consistency

VERY LOOSE	0-4	VERY SOFT	<2
LOOSE	4-10	SOFT	2-4
MEDIUM DENSE	10-30	MEDIUM	4-8
DENSE	30-50	STIFF	8-15
VERY DENSE	>50	VERY STIFF	15-30
		HARD	>30

Tighe&Bond
Engineers | Environmental Specialists

Boring No. **T&B - B-8**
Page 1 of 1
File No. G-5068-003
Checked by: B Nereson

Project: Greenwich Central Middle School
Location: Greenwich, CT
Client: The SLAM Collaborative

Drilling Co. General Borings, Inc.
Foreman: J. Casson
T&B Rep.: N. Marchetti
Date Start: 08/28/23 End: 08/28/23
Location See Exploration Location Plan
GS. Elev. 45.5' Datum: NAVD88

	Casing	Sampler
Type	HSA	Split Spoon
I.D./O.D.	3-1/4"/ 6-3/4"	1-3/8"/2"
Hammer Wt.	140#	140#
Hammer Fall	30"	30"
Rig Make/Model	Diedrich D50 ATV	

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
No Groundwater observed				

Depth (ft.)	Casing Blows Per Ft.	Sample No. / Rec.(in)	Sample Depth (ft.)	Blows Per 6"	PID Reading (ppm)	Sample Description	General Stratigraphy	Notes	Well Construction
		S-1 / 21	0-2	2-4		8" Topsoil 13" Medium dense, brown, fine to coarse SAND, some Gravel, little Silt	0.5' **TOPSOIL**	2	
				8-23					
		S-2 / 9	2-4	20-26		Very dense, gray, fine to coarse SAND and GRAVEL, little Silt	**FILL**		
				30-20					
5							5.5'		
		S-3 / 7	5-7	23-6		3" Medium dense, gray, GRAVEL 4" Medium dense, brown, fine to coarse SAND and SILT, trace Organics (3.8%)	**SAND WITH MINOR ORGANICS**		
				4-10			7.5'		
							GLACIAL TILL		
10						End of Boring at 9 feet. Auger Refusal.			
15									
20									
25									
30									

Notes:
1. Samples taken with a split spoon sampler driven by an autohammer.
2. Auger refusal at 9 feet in B-10. Boring was offset 5 feet southwest (See B-10A).

Proportions Used

TRACE (TR.)	0 - <10%
LITTLE (LI.)	10 - <20%
SOME (SO.)	20 - <35%
AND	35 - <50%

Density/Consistency

VERY LOOSE	0-4	VERY SOFT	<2
LOOSE	4-10	SOFT	2-4
MEDIUM DENSE	10-30	MEDIUM	4-8
DENSE	30-50	STIFF	8-15
VERY DENSE	>50	VERY STIFF	15-30
		HARD	>30

Tighe&Bond
Engineers | Environmental Specialists

Boring No. **T&B - B-8A**
Page 1 of 1
File No. G-5068-003
Checked by: B Nereson

Project: Greenwich Central Middle School
Location: Greenwich, CT
Client: The SLAM Collaborative

Drilling Co. General Borings, Inc.
Foreman: J. Casson
T&B Rep.: N. Marchetti
Date Start: 08/28/23 End: 08/28/23
Location See Exploration Location Plan
GS. Elev. 45.5' Datum: NAVD88

	Casing	Sampler
Type	HSA	Split Spoon
I.D./O.D.	3-1/4"/ 6-3/4"	1-3/8"/2"
Hammer Wt.	140#	140#
Hammer Fall	30"	30"
Rig Make/Model	Diedrich D50 ATV	

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
8/29		10'	15'	

Depth (ft.)	Casing Blows Per Ft.	Sample No. / Rec.(in)	Sample Depth (ft.)	Blows Per 6"	PID Reading (ppm)	Sample Description	General Stratigraphy	Notes	Well Construction
						Borehole advanced to 10 feet without sampling. Refer to B-8.			
10		S-1 / 12	10-11.1	12-30		Very dense, brown, fine to coarse SAND, some Gravel, little Silt	**GLACIAL TILL**		
				50/1					
15		S-2 / 2	15-15.3	50/4		Very dense, brown, WEATHERED ROCK	15' **WEATHERED ROCK**	2	
						End of Boring at 15.5 feet. Auger Refusal.			

Notes:
1. Samples taken with a split spoon sampler driven by an autohammer.
2. Auger refusal at 15.5 feet.

Proportions Used

TRACE (TR.)	0 - <10%
LITTLE (LI.)	10 - <20%
SOME (SO.)	20 - <35%
AND	35 - <50%

Density/Consistency

VERY LOOSE	0-4	VERY SOFT	<2
LOOSE	4-10	SOFT	2-4
MEDIUM DENSE	10-30	MEDIUM	4-8
DENSE	30-50	STIFF	8-15
VERY DENSE	>50	VERY STIFF	15-30
		HARD	>30

Tighe&Bond
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Boring No. **T&B - B-9**
Page 1 of 1
File No. G-5068-003
Checked by: B Nereson

Project: Greenwich Central Middle School
Location: Greenwich, CT
Client: The SLAM Collaborative

Drilling Co. General Borings, Inc.
Foreman: J. Casson
T&B Rep.: N. Marchetti
Date Start: 08/29/23 End: 08/29/23
Location See Exploration Location Plan
GS. Elev. 46' Datum: NAVD88

	Casing	Sampler
Type	HSA	Split Spoon
I.D./O.D.	3-1/4"/ 6-3/4"	1-3/8"/2"
Hammer Wt.	140#	140#
Hammer Fall	30"	30"
Rig Make/Model	Diedrich D50 ATV	

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
8/29		7.5'		

Depth (ft.)	Casing Blows Per Ft.	Sample No. / Rec.(in)	Sample Depth (ft.)	Blows Per 6"	PID Reading (ppm)	Sample Description	General Stratigraphy	Notes	Well Construction
		S-1 / 18	0-2	5-6		6" Medium dense, brown, fine to medium SAND, trace Silt	0.5' **FIELD SAND**		
				8-8		12" Medium dense, brown, fine to coarse SAND, little Gravel, little Silt	**SILTY SAND**		
		S-2 / 8	2-4	14-13		Medium dense, brown, fine to coarse SAND, some Gravel, some Silt			
				7-9			4.5'		
5		S-3 / 10	5-6.3	38-9		Medium dense, gray, fine to coarse SAND and GRAVEL, little Silt			
				5-50/2					
10		S-4 / 12	10-12	12-16		Dense, gray, fine to coarse SAND and GRAVEL, some Silt	**GLACIAL TILL**		
				18-27					
15						End of boring at 15 feet. Auger Refusal.		2	
20									
25									
30									

Notes:
1. Samples taken with a split spoon sampler driven by an autohammer.
2. Auger refusal at 15 feet.

Proportions Used

TRACE (TR.)	0 - <10%
LITTLE (LI.)	10 - <20%
SOME (SO.)	20 - <35%
AND	35 - <50%

Density/Consistency

VERY LOOSE	0-4	VERY SOFT	<2
LOOSE	4-10	SOFT	2-4
MEDIUM DENSE	10-30	MEDIUM	4-8
DENSE	30-50	STIFF	8-15
VERY DENSE	>50	VERY STIFF	15-30
		HARD	>30

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G-5068-003 / Greenwich CMS

Greenwich Central Middle School
Greenwich, Connecticut

Test Pit No. **TP-101**
Page No. 1 of 1
Photo Log No. --
Checked By: B. Nereson

T&B Rep.	C.Watts	Contractor	General Borings			Date	11/10/23
		Operator	John Wyatt			Ground Elev.	46.0
Weather	Cloudy, 50s	Make	Volvo	Model	EC55L	Time Started	--
		Capacity	1/3yd	Reach	10 ft.	Time Completed	--

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulder Count/ Class	Note No.
0	0-0.4': Brown, fine to coarse SAND, some Silt, little Roots, moist (Topsoil)			E	A	
1'	0.4-1.5': Brown, fine to coarse SAND and fine to coarse GRAVEL, little Silt, little Wood, frequent Boulders, moist			M	A/B	
2'	1.5-3.0': Light brown, fine to coarse SAND, little fine to coarse Gravel, trace Silt, frequent Boulders, trace Roots at 2', moist (Fill)			M	A	
3'	3.0-5.0: Tan, fine to medium SAND, some Silt, occasional Boulders, trace Roots, moist			M	A	
4'	(Sand with Minor Organics)			M	A	
5'	5.0-8.0': Brown, fine to coarse SAND and fine to coarse GRAVEL, little Silt, frequent Boulders, moist			M	A	
6'				M	A	
7'	(Glacial Till)			M	B	1
8'	End of Test Pit - 8.0'. Refusal not encountered.					
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:
1. Groundwater encountered at 8'.
2. TP ID for civil design is 1-01.

Test Pit Plan

Volume = _____ cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" +

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(x) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

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G-5068-003 / Greenwich CMS

Greenwich Central Middle School
Greenwich, Connecticut

Test Pit No. **TP-102**
Page No. 1 of 1
Photo Log No. --
Checked By: B. Nereson

T&B Rep.	C.Watts	Contractor	General Borings			Date	11/10/23
		Operator	John Wyatt			Ground Elev.	42.8
Weather	Cloudy, 50s	Make	Volvo	Model	EC55L	Time Started	--
		Capacity	1/3yd	Reach	10 ft.	Time Completed	--

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulder Count/ Class	Note No.
0	0-0.5': Brown, fine to coarse SAND, some Silt, little Roots, moist (Topsoil)			E		
1'	0.5-1.0': Brown, fine to coarse SAND, some Silt, little fine to coarse Gravel, moist			M	A	
2'	1.0-2.0': Light brown, fine to coarse SAND and fine to coarse GRAVEL, trace Silt, occasional Boulders (Fill)			M	A	
3'	2.0-6.0': Gray, fine to coarse SAND and fine GRAVEL, little Silt, trace Roots, frequent Boulders, moist			M	A	
4'				M	A/B	
5'				M	A/B	
6'	(Sand with Minor Organics) End of Test Pit - 6.0'. Refusal not encountered.					
7'						
8'						
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:
1. Water seeping into test pit at 6'.
2. TP ID for civil design is 1-18.

Test Pit Plan

Volume = _____ cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" +

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
( ) Encountered
(x) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

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Greenwich Central Middle School
Greenwich, Connecticut

Test Pit No. **TP-103**
Page No. 1 of 1
Photo Log No. --
Checked By: B. Nereson

T&B Rep.	C.Watts	Contractor	General Borings			Date	11/10/23
		Operator	John Wyatt			Ground Elev.	45.0
Weather	Cloudy, 50s	Make	Volvo	Model	EC55L	Time Started	--
		Capacity	1/3yd	Reach	10 ft.	Time Completed	--

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulder Count/ Class	Note No.
0	0-0.5': Brown, fine to coarse SAND, some Silt, little Roots, moist (Topsoil)			E		
1'	0.5-1.0': Brown, fine to coarse SAND and fine GRAVEL, little Silt, moist 1.0-2.0': Light brown, fine to medium SAND, little Silt, trace fine Gravel, moist			E		
2'	2.0-3.0': Brown, fine to coarse SAND and fine to coarse GRAVEL, trace Silt, occasional Boulders, moist			M	B/C	
3'	3.0-5.0': Gray, fine to coarse SAND and fine GRAVEl, little Silt, frequent Boulders, moist			M	B/C	
4'	(Fill)			M	C	
5'	5.0-7.0': Brown, fine to medium SAND, some Silt, little Organics, moist			E		
6'	(Sand with Minor Organics)					1
7'	End of Test Pit - 7.0'. Refusal not encountered.					
8'						
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:
1. Water seeping into test pit at 6'.
2. TP ID for civil design is 1-03.

Test Pit Plan

Volume = _____ cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" +

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
( ) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

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Test Pit No. **TP-104**
Page No. 1 of 1
Photo Log No. --
Checked By: B. Nereson

T&B Rep.	C.Watts	Contractor	General Borings			Date	11/10/23
		Operator	John Wyatt			Ground Elev.	44.4
Weather	Cloudy, 50s	Make	Volvo	Model	EC55L	Time Started	--
		Capacity	1/3yd	Reach	10 ft.	Time Completed	--

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulder Count/ Class	Note No.
0	0-0.5': Brown, fine to coarse SAND, some Silt, little Roots, moist (Topsoil)			E		
1'	0.5-1.0': Brown, fine to coarse SAND, some fine to coarse Gravel, trace Silt, moist			E	A	
2'	1.0-4.0': Light brown, fine to coarse SAND and fine to coarse GRAVEL, little Silt, frequent Boulders, moist			M	A	
3'				M	A	
4'	4.0-5.0': Gray, fine to coarse SAND, little fine to coarse Gravel, trace Silt, frequent Boulders, moist (Fill)			H	B/C	
5'	5.0-6.0': Dark brown, fine to medium SAND, some Silt, little Organi (Sand with Minor Organics)			H		
6'	6.0-8.0': Gray, Clayey SILT, some fine to medium Sand, moist			H		1
7'				H		
8'	(Glacial Till) End of Test Pit - 8.0'. Refusal not encountered.					
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:
1. Water seeping into test pit at 6'.
2. TP ID for civil design is 1-02.

Test Pit Plan

Volume = _____ cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" +

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
( ) Encountered
(x) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

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Greenwich, Connecticut

Test Pit No.	**TP-105**
Page No.	1 of 1
Photo Log No.	--
Checked By:	B. Nereson

T&B Rep.	C.Watts	Contractor	General Borings			Date	11/10/23
		Operator	John Wyatt			Ground Elev.	43.8
Weather	Cloudy, 50s	Make	Volvo	Model	EC55L	Time Started	--
		Capacity	1/3yd	Reach	10 ft.	Time Completed	--

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulder Count/ Class	Note No.
0	0-0.5': Brown, fine to coarse SAND, some Silt, little Roots, moist (Topsoil)			M		
1'	0.5-3.5': Light brown, fine to coarse SAND and fine GRAVEL, little Silt, frequent Boulders, moist			M	A/B	
2'				M	A/B	
3'	(Fill)			M		
4'	3.5-5.0': Gray, fine to coarse SAND, little fine to coarse Gravel, trace Silt, frequent Boulders, moist			M	B/C	1
5'	(Glacial Till) End of Test Pit - 5.0'. Refusal on apparent Boulders.					
6'						
7'						
8'						
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:
1. Water seeping into test pit at 5'.
2. TP ID for civil design is 1-04.

Test Pit Plan

Volume = _____ cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" +

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
( ) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

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Greenwich Central Middle School
Greenwich, Connecticut

Test Pit No.	**TP-106**
Page No.	1 of 1
Photo Log No.	--
Checked By:	B. Nereson

T&B Rep.	C.Watts	Contractor	General Borings			Date	11/13/23
		Operator	John Wyatt			Ground Elev.	42.3
Weather	Cloudy, 50s	Make	Volvo	Model	EC55L	Time Started	--
		Capacity	1/3yd	Reach	10 ft.	Time Completed	--

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulder Count/ Class	Note No.
0	0-0.5': Brown, fine to coarse SAND, some Silt, little Roots, moist (Topsoil)			E	A	
1'	0.5-2.0': Brown, fine to coarse SAND and fine to coarse GRAVEL, little Silt, trace Roots, occasional Boulders, moist			M	A	
2'						
3'	2.0-4.0': Brown, fine to coarse SAND and fine to coarse GRAVEL, trace Silt, frequent Boulders, moist (Fill)			M	A/B	
4'	4.0-5.0': Gray, fine to medium SAND, some Silt, trace Roots, moist (Sand with Minor Organics)			M	A/B	
5'	5.0-6.0': Brown, fine to coarse SAND and fine to coarse GRAVEL, trace Silt, frequent Boulders, moist (Glacial Till)			M	A/B	1
6'	End of Test Pit - 6.0'. Refusal on apparent Boulders.					
7'						
8'						
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:
1. Water seeping into test pit at 6'.
2. TP ID for civil design is 1-08.

Test Pit Plan

Volume = _____ cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" +

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
( ) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

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Greenwich Central Middle School
Greenwich, Connecticut

Test Pit No.	**TP-107**
Page No.	1 of 1
Photo Log No.	--
Checked By:	B. Nereson

T&B Rep.	C.Watts	Contractor	General Borings			Date	11/13/23
		Operator	John Wyatt			Ground Elev.	43.2
Weather	Cloudy, 50s	Make	Volvo	Model	EC55L	Time Started	--
		Capacity	1/3yd	Reach	10 ft.	Time Completed	--

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulder Count/ Class	Note No.
0	0-0.5': Brown, fine to coarse SAND, little Silt, little Roots, trace fine Gravel, moist (Topsoil)			E	A	
1'	0.5-4.0': Brown, fine to coarse SAND and fine to coarse GRAVEL, trace Silt, frequent Boulders, moist			M	A/B	
2'				M	A/B	
3'				M	A/B	
4'	(Fill) 4.0-5.0': Dark brown, fine to medium SAND, some Silt, little Roots, apparent organic odor, moist (Sand with Minor Organics)			M	A/B	
5'	5.0-8.0': Gray, fine to medium SAND, some Silt, little fine to coarse Gravel, occasional Boulders, moist			M	A/B	
6'				M	A/B	1
7'				M	A/B	
8'	(Glacial Till) End of Test Pit - 8.0'. Refusal not encountered.					
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:
1. Water seeping into test pit at 7'.
2. TP ID for civil design is 1-05.

Test Pit Plan

Volume = _____ cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" +

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
( ) Encountered
(x) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

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Greenwich Central Middle School
Greenwich, Connecticut

Test Pit No. **TP-108**
Page No. 1 of 1
Photo Log No. --
Checked By: B. Nereson

T&B Rep.	C.Watts	Contractor	General Borings			Date	11/13/23
		Operator	John Wyatt			Ground Elev.	42.7
Weather	Cloudy, 50s	Make	Volvo	Model	EC55L	Time Started	--
		Capacity	1/3yd	Reach	10 ft.	Time Completed	--

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulder Count/ Class	Note No.
0	0-0.5': Brown, fine to coarse SAND, some Silt, little Roots, moist (Topsoil)			E		
1'	0.5-4.0': Light brown, fine to coarse SAND and fine to coarse GRAVEL, little Silt, frequent Boulders, moist			E	A	
2'				E	A	
3'				E	A	
4'	(Fill)			M	A	
5'	4.0-5.0': Dark brown, fine to medium SAND, some Silt, little Roots, apparent organic odor, moist (Sand with Minor Organics)			M	A/B	
6'	5.0-6.0': Gray, fine to coarse SAND and fine to coarse GRAVEL, little Silt, frequent Boulders, moist			M	A/B	
7'	6.0-8.0': Gray, fine to medium SAND, some Silt, trace Roots, occasional Boulders, moist			M	A/B	1
8'	(Glacial Till)					
9'	End of Test Pit - 8.0'. Refusal not encountered.					
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:
1. Water seeping into test pit at 8'.
2. TP ID for civil design is 1-06.

Test Pit Plan

Volume = _____ cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" +

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
( ) Encountered
(x) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

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Greenwich Central Middle School
Greenwich, Connecticut

Test Pit No. **TP-109**
Page No. 1 of 1
Photo Log No. --
Checked By: B. Nereson

T&B Rep.	C.Watts	Contractor	General Borings			Date	11/13/23
		Operator	John Wyatt			Ground Elev.	43.0
Weather	Cloudy, 50s	Make	Volvo	Model	EC55L	Time Started	--
		Capacity	1/3yd	Reach	10 ft.	Time Completed	--

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulder Count/ Class	Note No.
0	0-0.5': Brown, fine to coarse SAND, little Silt, little Roots, moist (Topsoil)			E	A	
1'	0.5-4.0': Brown, fine to coarse SAND and fine to coarse GRAVEL, trace Silt, frequent Boulders, moist			D	B/C	
2'				D	B/C	
3'				D	B/C	
4'	(Fill)			D	B	
5'	4.0-5.0': Gray, fine to coarse SAND and fine to coarse GRAVEL, trace Silt, frequent Boulders, moist			M	A	
6'	5.0-8.0': Brown, fine to coarse SAND and fine GRAVEL, little Silt, occasional Boulders, moist			M	A	1
7'				M		
8'	(Glacial Till)					
9'	End of Test Pit - 8.0'. Refusal not encountered.					
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:
1. Water seeping into test pit at 6'.
2. TP ID for civil design is 1-07.

Test Pit Plan

Volume = _____ cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" +

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
( ) Encountered
(x) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

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Greenwich Central Middle School
Greenwich, Connecticut

Test Pit No. **TP-110**
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Photo Log No. --
Checked By: B. Nereson

T&B Rep.	N. Greto	Contractor	General Borings			Date	11/17/23
		Operator	John Wyatt			Ground Elev.	45.8
Weather	Clear, 50s	Make	Volvo	Model	EC55L	Time Started	--
		Capacity	1/3yd	Reach	10 ft.	Time Completed	--

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulder Count/ Class	Note No.
0	0-0.5': Brown, fine to coarse SAND, little Silt, little Roots, moist (Topsoil)			E	A	
1'	0.5-2.5': Brown, fine to coarse SAND, some Silt, frequent Cobbles, moist			M	A	
2'	(Fill)			M	A	
3'	2.5-4.0': Gray, fine to medium SAND, some Silt, trace Roots, apparent organic odor, moist			M		
4'	(Sand with Minor Organics)					
	End of Test Pit - 4.0'. Refusal not encountered.					
5'						
6'						
7'						
8'						
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:
1. TP ID for civil design is 1-19.

Test Pit Plan

Volume = _____ cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" +

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
( ) Encountered
(x) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

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Greenwich, Connecticut

Test Pit No. **TP-111**
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Photo Log No. --
Checked By: B. Nereson

T&B Rep.	N. Greto	Contractor	General Borings			Date	11/17/23
		Operator	John Wyatt			Ground Elev.	44.2
Weather	Clear, 50s	Make	Volvo	Model	EC55L	Time Started	--
		Capacity	1/3yd	Reach	10 ft.	Time Completed	--

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulder Count/ Class	Note No.
0	0-0.5': Brown, fine to coarse SAND, little Silt, little Roots, moist (Topsoil)			E	A	
1'	0.5-3.0': Brown, fine to coarse SAND, some Silt, frequent Cobbles, moist			M	A	
2'				M	A	
3'	(Fill) End of Test Pit - 3.0'. Refusal not encountered.			M		
4'						
5'						
6'						
7'						
8'						
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:
1. TP ID for civil design is 1-20.

Test Pit Plan

Volume = _____ cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" +

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
( ) Encountered
(x) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

J:\G\G5068 Greenwich Public Schools\003 Central Middle School\Geotechnical\Explorations\[Test Pit Logs.xls]TP-111

Tighe&Bond
Engineers | Environmental Specialists

G-5068-003 / Greenwich CMS

Greenwich Central Middle School
Greenwich, Connecticut

Test Pit No.	TP-112
Page No.	1 of 1
Photo Log No.	--
Checked By:	B. Nereson

T&B Rep.	N. Greto	Contractor	General Borings			Date	11/17/23
		Operator	John Wyatt			Ground Elev.	45.7
Weather	Clear, 50s	Make	Volvo	Model	EC55L	Time Started	--
		Capacity	1/3yd	Reach	10 ft.	Time Completed	--

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulder Count/ Class	Note No.
0	0-0.5': Brown, fine to coarse SAND, little Silt, little Roots, moist (Topsoil)			E	A	
1'	0.5-2.5': Brown, fine to coarse SAND, some Silt, some Gravel, frequent Boulders, moist			M	A	
2'				M	A	
3'	2.5-7.0': Brown, fine to coarse SAND, some Silt, frequent Cobbles/Boulders, moist			M	A	
4'				M	A	
5'				M	A	
6'				M	A	
7'	(Glacial Till) End of Test Pit - 7.0'. Refusal not encountered.					
8'						
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

Test Pit Plan

Volume = _____ cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" +

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
( ) Encountered
(x) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

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G-5068-003 / Greenwich CMS

Greenwich Central Middle School
Greenwich, Connecticut

Test Pit No.	TP-113
Page No.	1 of 1
Photo Log No.	--
Checked By:	B. Nereson

T&B Rep.	N. Greto	Contractor	General Borings			Date	11/17/23
		Operator	John Wyatt			Ground Elev.	44.8
Weather	Clear, 50s	Make	Volvo	Model	EC55L	Time Started	--
		Capacity	1/3yd	Reach	10 ft.	Time Completed	--

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulder Count/ Class	Note No.
0	0-0.5': Brown, fine to coarse SAND, little Silt, little Roots, moist (Topsoil)			E	A	
1'	0.5-1.5': Brown, fine to coarse SAND, some Silt, some Gravel, frequent Boulders, moist			M	A	
2'	1.5-5.0': Light brown, SILT and fine to medium SAND, occasional Cobbles, moist			M	A	
3'				M	A	
4'				M	A	
5'	5-7.0': Brown, fine to coarse SAND, some Silt, occasional Cobbles, moist			M	A	
6'				M	A	
7'	(Glacial Till) End of Test Pit - 7.0'. Refusal not encountered.					
8'						
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

Test Pit Plan

Volume = _____ cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" +

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
( ) Encountered
(x) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

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Appendix C
ATANE
Exploration Logs

LOG OF TEST PIT – TP-01

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PROJECT

PRELIMINARY GEOTECHNICAL INVESTIGATION
Greenwich Public Schools – Central Middle School
9, Indian Rock Lane, Greenwich, CT 06830

Test Pit No: TP-01
Surface Elevation: ~ 50 Feet
Drilling Method: Trench Excavation
Sampling Method: Grab
Completion depth: 10.0 Feet BGS

Test Pit Subcontractor: J.J.K. Electric
Compact Excavators: Bobcat E35
Excavator Dig Depth in feet: 10'3"

Weather: Sunny, 84 F
Time Test Pit Started: 8:00 a.m.
Time Test Pit Ended: 8:35 a.m.

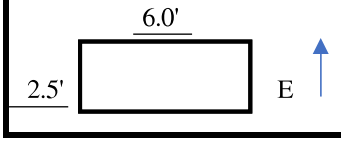
Date Test Pit Started: 08/12/2022
Date Test Pit Completed: 08/12/2022

Depth Below Ground Surface (BGS) in feet	Strata Change & Water Level	Subsurface Description	Excavation Effort	Boulder Qty/Class	Comments
1	**TOPSOIL**	Black; SILT; dry; loose to medium dense; with some fine Sand, with little Organics.	E	None	
2	**FILL**	Brown; fine to medium SAND and SILT; dry; loose to medium dense; with some gravel.	E	None	
3	**Silty SAND**	Black; fine to coarse SAND; dry; loose to medium dense; with some silt, with some organic material.	E	None	
4	**Silty SAND**	Gray; fine to coarse SAND; dry; loose to medium dense; with some silt; with some gravel.	E	None	
5	**Silty SAND**	Gray; fine to coarse SAND; moist to saturated; loose to medium dense; with some silt; with some gravel.			Grab Sample collected at ±6 feet BGS
6	▼				
7					
8					
9					
10					
11		Bottom of Exploration ±10.0'			
12					

Note 1: Short-term equilibrium groundwater level measured at approximately 6.5 feet below ground surface.
Note 2: Test pit backfilled with excavated soils and compacted with excavator bucket at ground surface.
Note 3: Some cave-in was noticed in the sand at about 7 feet below ground surface.

Water Symbols ▼ = Groundwater

Test Pit Dimensions & Orientation



BOULDER COUNT

Boulder	Class
12"-24"	A
24"-36"	B
>36"	C

PROPORTIONS USED

< 10%	Trace
10-20%	Little
20-35%	Some
35-50%	And

EXCAVATION EFFORT

E = Easy
M = Moderate
D = Difficult

LOG OF TEST PIT – TP-01

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Greenwich Public Schools – Central Middle School
9, Indian Rock Lane, Greenwich, CT 06830

Test Pit No: TP-01
Surface Elevation: ~ 50 Feet
Drilling Method: Trench Excavation
Sampling Method: Grab
Completion depth: 10.0 Feet BGS

Test Pit Subcontractor: J.J.K. Electric
Compact Excavators: Bobcat E35
Excavator Dig Depth in feet: 10'3"

Weather: Sunny, 84 F
Time Test Pit Started: 8:00 a.m.
Time Test Pit Ended: 8:35 a.m.

Date Test Pit Started: 08/12/2022
Date Test Pit Completed: 08/12/2022



In progress TP-01



Mixture of fine to coarse Sand, some Silt, and some Gravel



Short-term equilibrium groundwater level measured at approximately 6.5 feet below ground surfaces

LOG OF TEST PIT – TP-02

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PRELIMINARY GEOTECHNICAL INVESTIGATION
Greenwich Public Schools – Central Middle School
9, Indian Rock Lane, Greenwich, CT 06830

Test Pit No: TP-02
Surface Elevation: ~ 50 Feet
Drilling Method: Trench Excavation
Sampling Method: Grab
Completion depth: 10.0 Feet BGS

Test Pit Subcontractor: J.J.K. Electric
Compact Excavators: Bobcat E35
Excavator Dig Depth in feet: 10'3"

Weather: Sunny, 84 F
Time Test Pit Started: 8:40 a.m.
Time Test Pit Ended: 9:27 a.m.

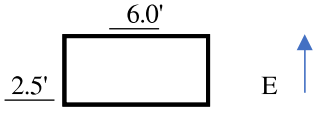
Date Test Pit Started: 08/12/2022
Date Test Pit Completed: 08/12/2022

Depth Below Ground Surface (BGS) in feet	Strata Change & Water Level	Subsurface Description	Excavation Effort	Boulder Qty/Class	Comments
1	**TOPSOIL**	Light brown; SILT; dry; loose to medium dense; with some fine Sand, with little Organics.	E	None	
2	**FILL**	Light brown and gray; fine to medium SAND; dry; loose to medium dense; with some silt; with some gravel.	E	None	
3			E	None	
4	**Gravelly SAND**	Dark yellowish brown; mixture of SAND and GRAVEL; dry; loose to medium dense; trace of silt; trace of cobbles.	E	None	
5	**Gravelly SAND**	Dark yellowish brown; mixture of SAND and GRAVEL; moist to saturated; loose to medium dense; trace of silt; trace of cobbles.	E	None	Grab Sample collected at ±6 feet BGS
6	▼				
7					
8					
9					
10					
11		Bottom of Exploration ±10.0'			
12					

Note 1: Short-term equilibrium groundwater level measured at approximately 6.5 feet below ground surface.
Note 2: Test pit backfilled with excavated soils and compacted with excavator bucket at ground surface.

Water Symbols ▼ = Groundwater

Test Pit Dimensions & Orientation



BOULDER COUNT

Boulder	Class
12"-24"	A
24"-36"	B
>36"	C

PROPORTIONS USED

< 10%	Trace
10-20%	Little
20-35%	Some
35-50%	And

EXCAVATION EFFORT

E = Easy
M = Moderate
D = Difficult

LOG OF TEST PIT – TP-02

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Test Pit No: TP-02
Surface Elevation: ~ 50 Feet
Drilling Method: Trench Excavation
Sampling Method: Grab
Completion depth: 10.0 Feet BGS

Test Pit Subcontractor: J.J.K. Electric
Compact Excavators: Bobcat E35
Excavator Dig Depth in feet: 10'3"

Weather: Sunny, 84 F
Time Test Pit Started: 8:40 a.m.
Time Test Pit Ended: 9:27 a.m.

Date Test Pit Started: 08/12/2022
Date Test Pit Completed: 08/12/2022



In progress TP-02. – Short-term equilibrium groundwater level measured at approximately 6.5 feet below ground surfaces



Mixture of fine to coarse Sand, some Silt, some Gravel, and trace of cobbles



Trace of cobbles in mixture of sand and gravel

LOG OF TEST PIT – TP-03

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Greenwich Public Schools – Central Middle School
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Test Pit No: TP-03
Surface Elevation: ~ 50 Feet
Drilling Method: Trench Excavation
Sampling Method: Grab
Completion depth: 10.0 Feet BGS

Test Pit Subcontractor: J.J.K. Electric
Compact Excavators: Bobcat E35
Excavator Dig Depth in feet: 10'3"

Weather: Sunny, 84 F
Time Test Pit Started: 9:30 a.m.
Time Test Pit Ended: 10:14 a.m.

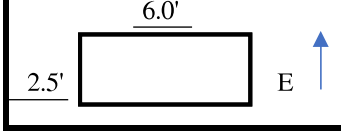
Date Test Pit Started: 08/12/2022
Date Test Pit Completed: 08/12/2022

Depth Below Ground Surface (BGS) in feet	Strata Change & Water Level	Subsurface Description	Excavation Effort	Boulder Qty/Class	Comments
1	**TOPSOIL**	Light brown; SAND, GRAVEL, and SILT; dry; medium dense; with little Organics.	E	None	
2	**Silty GRAVEL**	Light brown; Mixture of GRAVEL, SAND, and SILT; dry; medium dense; with little cobbles.	E	None	
3	**Silty GRAVEL**	Light brown; Mixture of GRAVEL, SAND, and SILT; dry; medium dense; with little cobbles; with some boulders	M	2/C	
4	**Silty GRAVEL**	Light brown; Mixture of GRAVEL, SAND, and SILT; dry; medium dense; with little cobbles; with some boulders; trace of debris	M	2/C	
5	**SILTS & CLAYS** ▼	Gray; CLAYS of low to medium plasticity; little gravelly clays; little sandy clays; little silty clays; trace of cobbles.	E	None	Grab Sample collected at ±6 feet BGS
6					
7					
8	**Gravelly SAND**	Gray; gravel-SAND-silt mixtures; moist to saturated; medium dense; trace of cobbles.			
9					
10					
11		Bottom of Exploration ±10.0'			
12					

Note 1: Short-term equilibrium groundwater level measured at approximately 7.0 feet below ground surface.
Note 2: Test pit backfilled with excavated soils and compacted with excavator bucket at ground surface.

Water Symbols ▼ = Groundwater

Test Pit Dimensions & Orientation



BOULDER COUNT

Boulder	Class
12"-24"	A
24"-36"	B
>36"	C

PROPORTIONS USED

< 10%	Trace
10-20%	Little
20-35%	Some
35-50%	And

EXCAVATION EFFORT

E = Easy
M = Moderate
D = Difficult

LOG OF TEST PIT – TP-03

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Test Pit No: TP-03
Surface Elevation: ~ 50 Feet
Drilling Method: Trench Excavation
Sampling Method: Grab
Completion depth: 10.0 Feet BGS

Test Pit Subcontractor: J.J.K. Electric
Compact Excavators: Bobcat E35
Excavator Dig Depth in feet: 10'3"

Weather: Sunny, 84 F
Time Test Pit Started: 9:30 a.m.
Time Test Pit Ended: 10:14 a.m.

Date Test Pit Started: 08/12/2022
Date Test Pit Completed: 08/12/2022



In progress TP-03. – Short-term equilibrium groundwater level measured at approximately 7 feet below ground surfaces



Mixture of fine to coarse Sand, some Silt, some clay, some Gravel, little cobbles, little boulders



Boulder ±4.0 feet long



Gravel-sand-silt mixtures; little cobbles

LOG OF TEST PIT – TP-04

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PRELIMINARY GEOTECHNICAL INVESTIGATION
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9, Indian Rock Lane, Greenwich, CT 06830

Test Pit No: TP-04
Surface Elevation: ~ 50 Feet
Drilling Method: Trench Excavation
Sampling Method: Grab
Completion depth: 10.0 Feet BGS

Test Pit Subcontractor: J.J.K. Electric
Compact Excavators: Bobcat E35
Excavator Dig Depth in feet: 10'3"

Weather: Sunny, 84 F
Time Test Pit Started: 10:15 a.m.
Time Test Pit Ended: 11:10 a.m.

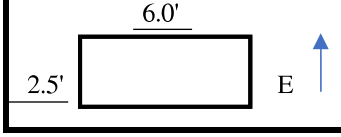
Date Test Pit Started: 08/12/2022
Date Test Pit Completed: 08/12/2022

Depth Below Ground Surface (BGS) in feet	Strata Change & Water Level	Subsurface Description	Excavation Effort	Boulder Qty/Class	Comments
1	**TOPSOIL**	Light brown; SILT; dry; loose to medium dense; with some fine Sand, with some Organics; trace of gravel.	E	None	
2	**Silty SAND**	Light brown; fine to medium SAND and SILT; dry; medium dense; with some gravel; with some cobbles; trace of boulders.	M	1/B	
3			M	1/B	
4			M	1/B	
5			M	None	Grab Sample collected at ±6 feet BGS
6					
7					
8 – 8.5	**Clayey SAND** ▼	Gray; sand-clay mixtures; moist; loose to medium dense; with some silt; with some gravel.			
8.5 – 9	**Silty SAND**	Dark yellowish brown; fine to coarse SAND; moist to saturated; loose to medium dense; with some silt; with some gravel; trace of cobbles.			
10					
11		Bottom of Exploration ±10.0'			
12					

Note 1: Short-term equilibrium groundwater level measured at approximately 8.0 feet below ground surface.
Note 2: Test pit backfilled with excavated soils and compacted with excavator bucket at ground surface.

Water Symbols ▼ = Groundwater

Test Pit Dimensions & Orientation



BOULDER COUNT

Boulder	Class
12"-24"	A
24"-36"	B
>36"	C

PROPORTIONS USED

< 10%	Trace
10-20%	Little
20-35%	Some
35-50%	And

EXCAVATION EFFORT

E = Easy
M = Moderate
D = Difficult

LOG OF TEST PIT – TP-04

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PRELIMINARY GEOTECHNICAL INVESTIGATION
Greenwich Public Schools – Central Middle School
9, Indian Rock Lane, Greenwich, CT 06830

Test Pit No: TP-04
Surface Elevation: ~ 50 Feet
Drilling Method: Trench Excavation
Sampling Method: Grab
Completion depth: 10.0 Feet BGS

Test Pit Subcontractor: J.J.K. Electric
Compact Excavators: Bobcat E35
Excavator Dig Depth in feet: 10'3"

Weather: Sunny, 84 F
Time Test Pit Started: 10:15 a.m.
Time Test Pit Ended: 11:10 a.m.

Date Test Pit Started: 08/12/2022
Date Test Pit Completed: 08/12/2022



In progress TP-04. – Short-term equilibrium groundwater level measured at approximately 8 feet below ground surfaces



Mixture of fine to coarse sand, some silt, and some gravel, trace of clay, some cobbles, trace of boulders



Mixture of sand and gravel, trace of silt, some cobbles, trace of boulders

LOG OF TEST PIT – TP-05

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Greenwich Public Schools – Central Middle School
9, Indian Rock Lane, Greenwich, CT 06830

Test Pit No: TP-05
Surface Elevation: ~ 50 Feet
Drilling Method: Trench Excavation
Sampling Method: Grab
Completion depth: 10.0 Feet BGS

Test Pit Subcontractor: J.J.K. Electric
Compact Excavators: Bobcat E35
Excavator Dig Depth in feet: 10'3"

Weather: Sunny, 84 F
Time Test Pit Started: 11:25 a.m.
Time Test Pit Ended: 11:50 a.m.

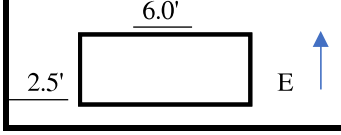
Date Test Pit Started: 08/12/2022
Date Test Pit Completed: 08/12/2022

Depth Below Ground Surface (BGS) in feet	Strata Change & Water Level	Subsurface Description	Excavation Effort	Boulder Qty/Class	Comments
1	**TOPSOIL**	Light brown; SILT; dry; loose to medium dense; with some fine Sand, with little Organics.	E	None	
1 – 2.5	**Silty SAND**	Light brown; fine to medium SAND and SILT; dry; loose to medium dense; with some gravel.	E	None	
2.5 – 3	**Silty SAND**	Gray; fine to coarse SAND; dry to moist; loose to medium dense; with some silt; trace of debris and organics; slightly odorous; trace of gravel; trace of cobbles.	E	None	
4			E	None	
5			E	None	Grab Sample collected at ±6 feet BGS
6	▼				
7	**Silty SAND**	Gray; fine to coarse SAND; saturated; loose to medium dense; with some silt; trace of clay; trace of gravel.	E	None	
8	**Silty SAND**	Gray; fine to coarse SAND; saturated; loose; with some silt; trace of gravel.	E	None	
9					
10					
11		Bottom of Exploration ±10.0'			
12					

Note 1: Short-term equilibrium groundwater level measured at approximately 6.2 feet below ground surface. Water flows from Northwest to Southeast before short-term equilibrium.
Note 2: Test pit backfilled with excavated soils and compacted with excavator bucket at ground surface.
Note 3: Some cave-in was noticed in the sand at about 7 feet below ground surface.

Water Symbols ▼ = Groundwater

Test Pit Dimensions & Orientation



BOULDER COUNT

Boulder	Class
12"-24"	A
24"-36"	B
>36"	C

PROPORTIONS USED

< 10%	Trace
10-20%	Little
20-35%	Some
35-50%	And

EXCAVATION EFFORT

E = Easy
M = Moderate
D = Difficult

LOG OF TEST PIT – TP-05

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Greenwich Public Schools – Central Middle School
9, Indian Rock Lane, Greenwich, CT 06830

Test Pit No: TP-05
Surface Elevation: ~ 50 Feet
Drilling Method: Trench Excavation
Sampling Method: Grab
Completion depth: 10.0 Feet BGS

Test Pit Subcontractor: J.J.K. Electric
Compact Excavators: Bobcat E35
Excavator Dig Depth in feet: 10'3"

Weather: Sunny, 84 F
Time Test Pit Started: 11:25 a.m.
Time Test Pit Ended: 11:50 a.m.

Date Test Pit Started: 08/12/2022
Date Test Pit Completed: 08/12/2022



In progress TP-05. – Short-term equilibrium groundwater level measured at approximately 6.2 feet below ground surfaces



Mixture of fine to coarse Sand, some Silt, some Gravel, some cobbles



Mixture of sand and gravel, trace of silt, trace of cobbles, trace of clay

LOG OF TEST PIT – TP-06

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PRELIMINARY GEOTECHNICAL INVESTIGATION
Greenwich Public Schools – Central Middle School
9, Indian Rock Lane, Greenwich, CT 06830

Test Pit No: TP-06
Surface Elevation: ~ 50 Feet
Drilling Method: Trench Excavation
Sampling Method: Grab
Completion depth: 10.0 Feet BGS

Test Pit Subcontractor: J.J.K. Electric
Compact Excavators: Bobcat E35
Excavator Dig Depth in feet: 10'3"

Weather: Sunny, 84 F
Time Test Pit Started: 11:50 a.m.
Time Test Pit Ended: 12:10 p.m.

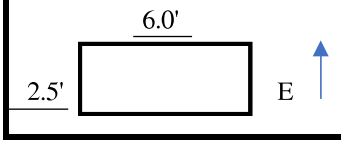
Date Test Pit Started: 08/12/2022
Date Test Pit Completed: 08/12/2022

Depth Below Ground Surface (BGS) in feet	Strata Change & Water Level	Subsurface Description	Excavation Effort	Boulder Qty/Class	Comments
1	**TOPSOIL**	Light brown; SILT; dry; loose to medium dense; with some fine Sand, with little Organics.	E	None	
2	**Silty SAND**	Light brown; fine to medium SAND and SILT; dry; loose to medium dense; with some gravel; trace of cobbles.	E	None	
3			E	None	
4	**Silty SAND**	Black and gray; SAND and silt mixture; dry; loose to medium dense; with some organics; trace of gravel.	E	None	
5					
6	**Silty SAND** ▼	Gray; fine to coarse SAND; moist to saturated; loose to medium dense; with some silt; with some gravel; trace of cobbles.	E	None	Grab Sample collected at ±6 feet BGS
7					
8					
9	**Silty SAND**	Gray; fine to coarse SAND; saturated; loose to medium dense; with some silt; with some gravel; trace of cobbles.			
10					
11		Bottom of Exploration ±10.0'			
12					

Note 1: Short-term equilibrium groundwater level measured at approximately 7.5 feet below ground surface.
Note 2: Test pit backfilled with excavated soils and compacted with excavator bucket at ground surface.
Note 3: Some cave-in was noticed in the sand at about 6 feet below ground surface.

Water Symbols ▼ = Groundwater

Test Pit Dimensions & Orientation



BOULDER COUNT

Boulder	Class
12"-24"	A
24"-36"	B
>36"	C

PROPORTIONS USED

< 10%	Trace
10-20%	Little
20-35%	Some
35-50%	And

EXCAVATION EFFORT

E = Easy
M = Moderate
D = Difficult

LOG OF TEST PIT – TP-06

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PRELIMINARY GEOTECHNICAL INVESTIGATION
Greenwich Public Schools – Central Middle School
9, Indian Rock Lane, Greenwich, CT 06830

Test Pit No: TP-06
Surface Elevation: ~ 50 Feet
Drilling Method: Trench Excavation
Sampling Method: Grab
Completion depth: 10.0 Feet BGS

Test Pit Subcontractor: J.J.K. Electric
Compact Excavators: Bobcat E35
Excavator Dig Depth in feet: 10'3"

Weather: Sunny, 84 F
Time Test Pit Started: 11:50 a.m.
Time Test Pit Ended: 12:10 p.m.

Date Test Pit Started: 08/12/2022
Date Test Pit Completed: 08/12/2022



In progress TP-06. – Short-term equilibrium groundwater level measured at approximately 7.5 feet below ground surfaces



Mixture of fine to coarse sand, some silt, some gravel; some cobbles



Mixture of sand, silt, gravel, cobbles, trace of organics



Mixture of sand, silt, gravel, and cobbles

LOG OF TEST PIT – TP-07

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PROJECT

PRELIMINARY GEOTECHNICAL INVESTIGATION
Greenwich Public Schools – Central Middle School
9, Indian Rock Lane, Greenwich, CT 06830

Test Pit No: TP-07
Surface Elevation: ~ 50 Feet
Drilling Method: Trench Excavation
Sampling Method: Grab
Completion depth: 10.0 Feet BGS

Test Pit Subcontractor: J.J.K. Electric
Compact Excavators: Bobcat E35
Excavator Dig Depth in feet: 10'3"

Weather: Sunny, 84 F
Time Test Pit Started: 12:20 p.m.
Time Test Pit Ended: 01:15 p.m.

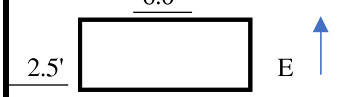
Date Test Pit Started: 08/12/2022
Date Test Pit Completed: 08/12/2022

Depth Below Ground Surface (BGS) in feet	Strata Change & Water Level	Subsurface Description	Excavation Effort	Boulder Qty/Class	Comments
1	**TOPSOIL**	Light brown; SILT; dry; loose to medium dense; with some fine Sand, with little Organics.	E	None	
2	**Silty SAND**	Light brown; fine to medium SAND and SILT; dry; loose to medium dense; with some gravel, trace of cobbles, trace of boulders.	M	4/A	
3					
4					
5					Grab Sample collected at ±6 feet BGS
6					
7					
8					
9	**SILT & CLAY** ▼	Gray; sandy and silty CLAY; low to medium plasticity;	E	None	
10					
11		Bottom of Exploration ±10.0'			
12					

Note 1: Short-term equilibrium groundwater level measured at approximately 9.5 feet below ground surface.
Note 2: Test pit backfilled with excavated soils and compacted with excavator bucket at ground surface.

Water Symbols ▼ = Groundwater

Test Pit Dimensions & Orientation



BOULDER COUNT

Boulder	Class
12"-24"	A
24"-36"	B
>36"	C

PROPORTIONS USED

< 10%	Trace
10-20%	Little
20-35%	Some
35-50%	And

EXCAVATION EFFORT

E = Easy
M = Moderate
D = Difficult

LOG OF TEST PIT – TP-07

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PRELIMINARY GEOTECHNICAL INVESTIGATION
Greenwich Public Schools – Central Middle School
9, Indian Rock Lane, Greenwich, CT 06830

Test Pit No: TP-07
Surface Elevation: ~ 50 Feet
Drilling Method: Trench Excavation
Sampling Method: Grab
Completion depth: 10.0 Feet BGS

Test Pit Subcontractor: J.J.K. Electric
Compact Excavators: Bobcat E35
Excavator Dig Depth in feet: 10'3"

Weather: Sunny, 84 F
Time Test Pit Started: 12:20 p.m.
Time Test Pit Ended: 1:15 p.m.

Date Test Pit Started: 08/12/2022
Date Test Pit Completed: 08/12/2022



In progress TP-07. – Short-term equilibrium groundwater level measured at approximately 9.5 feet below ground surfaces



Mixture of fine to coarse Sand, some Silt, some Gravel, Trace of cobbles, trace of boulders



Trace of cobbles and boulders

LOG OF TEST PIT – TP-08

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PRELIMINARY GEOTECHNICAL INVESTIGATION
Greenwich Public Schools – Central Middle School
9, Indian Rock Lane, Greenwich, CT 06830

Test Pit No: TP-08
Surface Elevation: ~ 50 Feet
Drilling Method: Trench Excavation
Sampling Method: Grab
Completion depth: 10.0 Feet BGS

Test Pit Subcontractor: J.J.K. Electric
Compact Excavators: Bobcat E35
Excavator Dig Depth in feet: 10'3"

Weather: Sunny, 84 F
Time Test Pit Started: 3:35 p.m.
Time Test Pit Ended: 4:03 p.m.

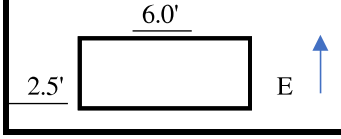
Date Test Pit Started: 08/12/2022
Date Test Pit Completed: 08/12/2022

Depth Below Ground Surface (BGS) in feet	Strata Change & Water Level	Subsurface Description	Excavation Effort	Boulder Qty/Class	Comments
1	**TOPSOIL**	Light brown; SILT; dry; loose to medium dense; with some fine Sand, with little Organics.	E	None	
2	**Silty SAND**	Light brown; fine to medium SAND and SILT; dry; loose to medium dense; with some gravel.	E	None	
2.5	**Silty SAND**	Black and gray; Mixture of SAND and Silt; dry; loose to medium dense; with some organic materials.	E	None	
3	**Silty SAND**	Light brown; fine to medium SAND and SILT; dry; loose to medium dense; with some gravel.			
4			E	None	
5					Grab Sample collected at ±6 feet BGS
6					
6.5					
7	**Silty SAND**	Black and Gray; fine to coarse SAND; dry; loose to medium dense; with some silt; with trace of organics.			
8	**Silty SAND**	Light brown; fine to medium SAND and SILT; dry; loose to medium dense; with some gravel.			
9	**SILT & CLAY** ▼	Gray; CLAYS of low to medium plasticity; moist to saturated; little sandy clays; little silty clays;			
10					
11		Bottom of Exploration ±10.0'			
12					

Note 1: Short-term equilibrium groundwater level measured at approximately 9.0 feet below ground surface.
Note 2: Test pit backfilled with excavated soils and compacted with excavator bucket at ground surface.

Water Symbols ▼ = Groundwater

Test Pit Dimensions & Orientation



BOULDER COUNT

Boulder	Class
12"-24"	A
24"-36"	B
>36"	C

PROPORTIONS USED

< 10%	Trace
10-20%	Little
20-35%	Some
35-50%	And

EXCAVATION EFFORT

E = Easy
M = Moderate
D = Difficult

LOG OF TEST PIT – TP-08

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PRELIMINARY GEOTECHNICAL INVESTIGATION
Greenwich Public Schools – Central Middle School
9, Indian Rock Lane, Greenwich, CT 06830

Test Pit No: TP-08
Surface Elevation: ~ 50 Feet
Drilling Method: Trench Excavation
Sampling Method: Grab
Completion depth: 10.0 Feet BGS

Test Pit Subcontractor: J.J.K. Electric
Compact Excavators: Bobcat E35
Excavator Dig Depth in feet: 10'3"

Weather: Sunny, 84 F
Time Test Pit Started: 3:35 p.m.
Time Test Pit Ended: 4:03 p.m.

Date Test Pit Started: 08/12/2022
Date Test Pit Completed: 08/12/2022



In progress TP-08. – Short-term equilibrium groundwater level measured at approximately 9.0 feet below ground surfaces



Mixture of fine to coarse Sand, some Silt, and some Gravel, some clay



Mixture of Clay, silt, sand, trace of organics



Mixture of Sand, some Silt, some Gravel, some clay

LOG OF TEST PIT – TP-09

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PRELIMINARY GEOTECHNICAL INVESTIGATION
Greenwich Public Schools – Central Middle School
9, Indian Rock Lane, Greenwich, CT 06830

Test Pit No: TP-09
Surface Elevation: ~ 50 Feet
Drilling Method: Trench Excavation
Sampling Method: Grab
Completion depth: 10.0 Feet BGS

Test Pit Subcontractor: J.J.K. Electric
Compact Excavators: Bobcat E35
Excavator Dig Depth in feet: 10'3"

Weather: Sunny, 84 F
Time Test Pit Started: 4:04 p.m.
Time Test Pit Ended: 4:20 p.m.

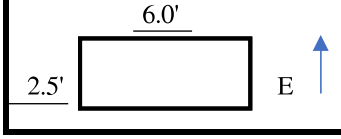
Date Test Pit Started: 08/12/2022
Date Test Pit Completed: 08/12/2022

Depth Below Ground Surface (BGS) in feet	Strata Change & Water Level	Subsurface Description	Excavation Effort	Boulder Qty/Class	Comments
1	**TOPSOIL**	Light brown; SILT; dry; loose to medium dense; with some fine Sand, with little Organics.	E	None	
2	**Silty SAND**	Light brown; fine to medium SAND and SILT; dry; loose to medium dense; with some gravel.	E	None	
2.5	**Silty SAND**	Dak brown; Mixture of SAND and Silt; dry; loose to medium dense; with roots and some organic materials.			
3	**Silty SAND**	Light brown; fine to medium SAND and SILT; dry; loose to medium dense; with some gravel; trace of cobbles.	E	None	
4			E	None	
5					
6					Grab Sample collected at ±6 feet BGS
7	**SILT & CLAY**	Gray; SILTS and CLAYS; dry to moist; low to medium plasticity; little sandy clays; little silty clays; trace of cobbles.	E	None	
8					
9	▼ **SILT & CLAY**	Gray; CLAYS of low to medium plasticity; moist to saturated; little sandy clays; little silty clays;			
10			E	None	
11		Bottom of Exploration ±10.0'			
12					

Note 1: Short-term equilibrium groundwater level measured at approximately 8.5 feet below ground surface.
Note 2: Test pit backfilled with excavated soils and compacted with excavator bucket at ground surface.

Water Symbols ▼ = Groundwater

Test Pit Dimensions & Orientation



BOULDER COUNT

Boulder	Class
12"-24"	A
24"-36"	B
>36"	C

PROPORTIONS USED

< 10%	Trace
10-20%	Little
20-35%	Some
35-50%	And

EXCAVATION EFFORT

E = Easy
M = Moderate
D = Difficult

LOG OF TEST PIT – TP-09

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PRELIMINARY GEOTECHNICAL INVESTIGATION
Greenwich Public Schools – Central Middle School
9, Indian Rock Lane, Greenwich, CT 06830

Test Pit No: TP-09
Surface Elevation: ~ 50 Feet
Drilling Method: Trench Excavation
Sampling Method: Grab
Completion depth: 10.0 Feet BGS

Test Pit Subcontractor: J.J.K. Electric
Compact Excavators: Bobcat E35
Excavator Dig Depth in feet: 10'3"

Weather: Sunny, 84 F
Time Test Pit Started: 4:04 p.m.
Time Test Pit Ended: 4:20 p.m.

Date Test Pit Started: 08/12/2022
Date Test Pit Completed: 08/12/2022



In progress TP-09. – Short-term equilibrium groundwater level measured at approximately 8.5 feet below ground surfaces



Mixture of fine to coarse Sand, some Silt, some Gravel; some Cobbles, trace of Clay.



Mixture of Sand, Silt, Gravel, and Cobbles



Mixture of Sand, Silt, Gravel, Cobbles, and trace of Clay

LOG OF TEST PIT – TP-10

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PRELIMINARY GEOTECHNICAL INVESTIGATION
Greenwich Public Schools – Central Middle School
9, Indian Rock Lane, Greenwich, CT 06830

Test Pit No: TP-10
Surface Elevation: ~ 50 Feet
Drilling Method: Trench Excavation
Sampling Method: Grab
Completion depth: 10.0 Feet BGS

Test Pit Subcontractor: J.J.K. Electric
Compact Excavators: Bobcat E35
Excavator Dig Depth in feet: 10'3"

Weather: Sunny, 84 F
Time Test Pit Started: 1:35 p.m.
Time Test Pit Ended: 2:39 p.m.

Date Test Pit Started: 08/12/2022
Date Test Pit Completed: 08/12/2022

Depth Below Ground Surface (BGS) in feet	Strata Change & Water Level	Subsurface Description	Excavation Effort	Boulder Qty/Class	Comments
1	**TOPSOIL**	Light brown; SILT; dry; loose to medium dense; with some fine Sand, with little Organics.	E	None	
2	**Silty SAND**	Light brown; fine to medium SAND and SILT; dry; loose to medium dense; with some gravel, with some cobbles, with some boulders.	M	>4/C	
3					
4					
5.5					
6.5	**Silty SAND**	Dark gray and black; fine to coarse SAND; dry; loose to medium dense; with some silt, with some organic material.	E	None	
7					
8	**SILT & CLAY**	Gray; CLAYS of low to medium plasticity; dry to slightly moist; little sandy clays; little silty clays.	E	None	
9					
10					
11		Bottom of Exploration ±10.0'			
12					

Note 1: No groundwater encountered.

Note 2: Test pit backfilled with excavated soils and compacted with excavator bucket at ground surface.

Water Symbols ▼ = Groundwater

Test Pit Dimensions & Orientation



BOULDER COUNT

Boulder	Class
12"-24"	A
24"-36"	B
>36"	C

PROPORTIONS USED

< 10%	Trace
10-20%	Little
20-35%	Some
35-50%	And

EXCAVATION EFFORT

E = Easy
M = Moderate
D = Difficult

LOG OF TEST PIT – TP-10

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PROJECT

PRELIMINARY GEOTECHNICAL INVESTIGATION
Greenwich Public Schools – Central Middle School
9, Indian Rock Lane, Greenwich, CT 06830

Test Pit No: TP-10
Surface Elevation: ~ 50 Feet
Drilling Method: Trench Excavation
Sampling Method: Grab
Completion depth: 10.0 Feet BGS

Test Pit Subcontractor: J.J.K. Electric
Compact Excavators: Bobcat E35
Excavator Dig Depth in feet: 10'3"

Weather: Sunny, 84 F
Time Test Pit Started: 1:35 p.m.
Time Test Pit Ended: 2:39 p.m.

Date Test Pit Started: 08/12/2022
Date Test Pit Completed: 08/12/2022



In progress TP-10



Mixture of fine to coarse Sand, some Silt, some Gravel, some Cobbles, some Boulders, little Clay, trace of Organics.



Class C Boulders



Mixture of Clay, Silt, Sand, and Gravel.

LOG OF TEST PIT – TP-11

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PROJECT

PRELIMINARY GEOTECHNICAL INVESTIGATION
Greenwich Public Schools – Central Middle School
9, Indian Rock Lane, Greenwich, CT 06830

Test Pit No: TP-11
Surface Elevation: ~ 50 Feet
Drilling Method: Trench Excavation
Sampling Method: Grab
Completion depth: 10.0 Feet BGS

Test Pit Subcontractor: J.J.K. Electric
Compact Excavators: Bobcat E35
Excavator Dig Depth in feet: 10'3"

Weather: Sunny, 84 F
Time Test Pit Started: 4:22 p.m.
Time Test Pit Ended: 4:50 p.m.

Date Test Pit Started: 08/12/2022
Date Test Pit Completed: 08/12/2022

Depth Below Ground Surface (BGS) in feet	Strata Change & Water Level	Subsurface Description	Excavation Effort	Boulder Qty/Class	Comments
1	**TOPSOIL**	Light brown; SILT; dry; loose to medium dense; with some fine Sand, with little Organics.	E	None	
2	**Silty SAND**	Light brown; fine to medium SAND and SILT; dry; loose to medium dense; with some gravel; with some cobbles; some boulders.	E	None	
3			E	>2/A	
4	**Silty SAND**	Light brown; fine to medium SAND and SILT; dry; loose to medium dense; with some gravel; with some cobbles; with some roots.	E	None	
5			M	None	
6	**Silty SAND**	Light brown; fine to medium SAND and SILT; dry; loose to medium dense; with some gravel; with some cobbles;	M	None	Grab Sample collected at ±6 feet BGS
7	**Silty SAND**	Gray; fine to coarse SAND; dry; loose to medium dense; with some silt; with some gravel.	E	None	
8					
9	▼ **SILT & CLAY**	Gray; CLAYS of low to medium plasticity; moist to saturated; little sandy clays; little silty clays.			
10					
11		Bottom of Exploration ±10.0'			
12					

Note 1: Short-term equilibrium groundwater level measured at approximately 9.0 feet below ground surface.
Note 2: Test pit backfilled with excavated soils and compacted with excavator bucket at ground surface.

Water Symbols ▼ = Groundwater

Test Pit Dimensions & Orientation



BOULDER COUNT

Boulder	Class
12"-24"	A
24"-36"	B
>36"	C

PROPORTIONS USED

< 10%	Trace
10-20%	Little
20-35%	Some
35-50%	And

EXCAVATION EFFORT

E = Easy
M = Moderate
D = Difficult

LOG OF TEST PIT – TP-11

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PRELIMINARY GEOTECHNICAL INVESTIGATION
Greenwich Public Schools – Central Middle School
9, Indian Rock Lane, Greenwich, CT 06830

Test Pit No: TP-01
Surface Elevation: ~ 50 Feet
Drilling Method: Trench Excavation
Sampling Method: Grab
Completion depth: 10.0 Feet BGS

Test Pit Subcontractor: J.J.K. Electric
Compact Excavators: Bobcat E35
Excavator Dig Depth in feet: 10'3"

Weather: Sunny, 84 F
Time Test Pit Started: 4:22 p.m.
Time Test Pit Ended: 4:50 p.m.

Date Test Pit Started: 08/12/2022
Date Test Pit Completed: 08/12/2022



In progress TP-11. – Short-term equilibrium groundwater level measured at approximately 9.0 feet below ground surfaces



Mixture of fine to coarse Sand, some Silt, some Gravel, some Cobbles; some Boulders



Mixture of Clay, Silt, Sand, Gravel

LOG OF TEST PIT – TP-12

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PRELIMINARY GEOTECHNICAL INVESTIGATION
Greenwich Public Schools – Central Middle School
9, Indian Rock Lane, Greenwich, CT 06830

Test Pit No: TP-12
Surface Elevation: ~ 50 Feet
Drilling Method: Trench Excavation
Sampling Method: Grab
Completion depth: 10.0 Feet BGS

Test Pit Subcontractor: J.J.K. Electric
Compact Excavators: Bobcat E35
Excavator Dig Depth in feet: 10'3"

Weather: Sunny, 84 F
Time Test Pit Started: 1:20 p.m.
Time Test Pit Ended: 1:35 p.m.

Date Test Pit Started: 08/12/2022
Date Test Pit Completed: 08/12/2022

Depth Below Ground Surface (BGS) in feet	Strata Change & Water Level	Subsurface Description	Excavation Effort	Boulder Qty/Class	Comments
1	**TOPSOIL**	Light brown; SILT; dry; loose to medium dense; with some fine Sand, with little Organics.	M	None	
2	**Silty SAND**	Light brown; fine to medium SAND and SILT; dry; medium dense; with some gravel; with some cobbles; with some boulders.	M	None	
3			D	>3/C	Grab Sample collected at ±3 feet BGS
4		Bottom of Exploration ±3.0'			
5					
6					
7					
8					
9					
10					
11					
12					

Note 1: No groundwater encountered.
Note 2: Test pit backfilled with excavated soils and compacted with excavator bucket at ground surface.
Note 3: Excavation stopped at about 3 feet below ground surface. Excavator could not remove the boulders.

Water Symbols ▼ = Groundwater

Test Pit Dimensions & Orientation

6.0' × 2.5' E

BOULDER COUNT

Boulder	Class
12"-24"	A
24"-36"	B
>36"	C

PROPORTIONS USED

< 10%	Trace
10-20%	Little
20-35%	Some
35-50%	And

EXCAVATION EFFORT

E = Easy
M = Moderate
D = Difficult

LOG OF TEST PIT – TP-12

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PROJECT

PRELIMINARY GEOTECHNICAL INVESTIGATION
Greenwich Public Schools – Central Middle School
9, Indian Rock Lane, Greenwich, CT 06830

Test Pit No: TP-12
Surface Elevation: ~ 50 Feet
Drilling Method: Trench Excavation
Sampling Method: Grab
Completion depth: 10.0 Feet BGS

Test Pit Subcontractor: J.J.K. Electric
Compact Excavators: Bobcat E35
Excavator Dig Depth in feet: 10'3"

Weather: Sunny, 84 F
Time Test Pit Started: 1:20 p.m.
Time Test Pit Ended: 1:35 p.m.

Date Test Pit Started: 08/12/2022
Date Test Pit Completed: 08/12/2022



In progress TP-12. – Class C Boulders



Mixture of fine to coarse Sand, some Silt, some Gravel; some Cobbles



Class C Boulders



Mixture of Sand, some Silt, some Gravel; some Cobbles

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September 19, 2022

ATANE Engineers
40 Wall St., 11th FL
New York NY 10005
Attn.: Paul Sousa

G189-2236-22

Re: 9 Indian Rock Ln.
Greenwich CT

Dear Mr. Sousa,

Attached please find the Test Boring Logs, and location plan for work in Greenwich CT.

If you have any questions, please do not hesitate to contact us.

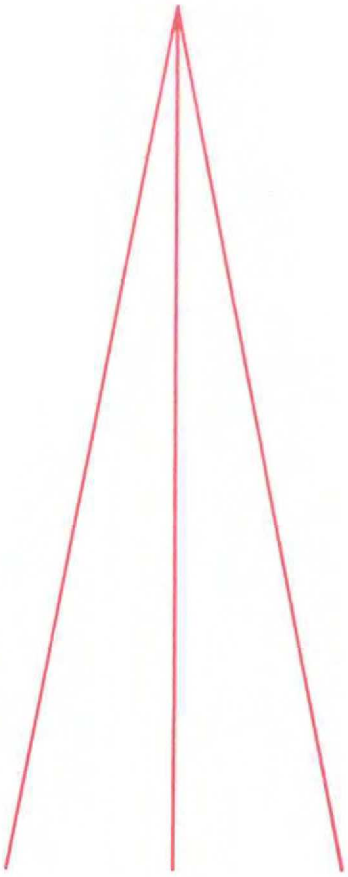
Very truly yours,

James DeAngelis

James A. DeAngelis
President
JAD:mv

SOILTESTING, INC.

TO	ATANE Engineers	DATE	19-Sep-22
ADDRESS	40 Wall St., New York NY 10005		
SITE LOCATION	9 Indian Roack Ln., Greenwich CT		
REPORT SENT TO	Paul Sousa		
SAMPLES SENT TO	Storage (Max 60 days)		



90 Donovan Road
Oxford, Connecticut 06478-1028
203-262-9328

Branch Office:
White Plains, New York 10607
914-946-4850

JOB NO.
G189-2236-22

SOILTESTING, INC. 90 DONOVAN RD. OXFORD, CT 06478 CT (203) 262-9328 NY (914) 946-4850	CLIENT: ATANE Engineers	SHEET 1 OF 1 HOLE NO. B-1
	PROJECT NO. G189-2236-22	
	PROJECT NAME Central Middle School	BORING LOCATIONS Per Plan
FOREMAN - DRILLER AO/aa	LOCATION 9 Indian Rock Lane Greenwich CT	
INSPECTOR	CASING / SAMPLER / CORE BAR	OFFSET
	TYPE: HSA / SS	DATE START 8/23/22
GROUND WATER OBSERVATIONS	SIZE I.D.: 4 ¼" / 1 3/8"	DATE FINISH 8/23/22
AT 7 FT AFTER 0 HOURS	HAMMER WT.: 140# / BIT	SURFACE ELEV.
AT __ FT AFTER __ HOURS	HAMMER FALL: 30"	GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	Type	PEN	REC.	DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0 - 6 / 6 - 12 / 12 - 18	CORE TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
5		1	ss	24"	4"	6'0"	17 / 29		dense		
							20 / 20		dry		Blk F sand, F-C gravel
		2	ss	24"	14"	8'0"	40 / 41		v dense		
							49 / 27		moist/wet		Brn F sand & silt, F-C gravel, trace cobbles
		3	ss	23"	14"	9'11"	14 / 25		dense	9'6"	
10							22 / 100/5"		wet		Poss partly weathered Bedrock or Boulder
		4	ss	4"	4"	10'4"	100/4"		v dense/wet	10'4"	Partly weathered Bedrock
											EOB 10'4"
15											
20											
25											
30											
35											
40											

NOTE: Subsoil conditions revealed by this investigation represent conditions at specific locations and may not represent conditions at other locations or times.

GROUND SURFACE TO _____ FT. USED _____ CASING THEN _____ CASING TO _____ FT. **HOLE NO. B-1**

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST

WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS C = COARSE

SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER M = MEDIUM

PROPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND =35 - 50% F = FINE

SOILTESTING, INC. 90 DONOVAN RD. OXFORD, CT 06478 CT (203) 262-9328 NY (914) 946-4850	CLIENT: ATANE Engineers	SHEET 1 OF 1 HOLE NO. B-2
	PROJECT NO. G189-2236-22	
	PROJECT NAME Central Middle School	BORING LOCATIONS Per Plan
FOREMAN - DRILLER AO/aa	LOCATION 9 Indian Rock Lane Greenwich CT	
INSPECTOR	CASING / SAMPLER / CORE BAR	OFFSET
	TYPE: HSA / SS	DATE START 8/23/22
GROUND WATER OBSERVATIONS AT 9 FT AFTER 0 HOURS AT FT AFTER HOURS	SIZE I.D.: 4 ¼" / 1 3/8"	DATE FINISH 8/23/22
	HAMMER WT.: 140# / BIT	SURFACE ELEV.
	HAMMER FALL: 30"	GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	SAMPLE Type	SAMPLE PEN	SAMPLE REC.	SAMPLE DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0 - 6 / 6 - 12 / 12 - 18	CORE TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
										4"	Topsoil
5		1	ss	24"	16"	6'0"	5 / 5		compact / dry		
							10 / 14				Gry F sand & silt, some F gravel, trace clay
		2	ss	24"	16"	8'0"	35 / 4		dense / wet		
							44 / 31				Gry F-M sand, F-C gravel, trace silt
		3	ss	24"	18"	10'0"	15 / 44		v dense / wet		
10							56 / 72				Gry F sand & silt, F-C gravel, trace cobbles
		4	ss	24"	16"	12'0"	7 / 32		v dense / wet		
							34 / 21				Brn F sand & silt, trace cobbles
		5	ss	24"	14"	14'0"	20 / 28		v dense / wet		
							27 / 27			14'	Brn F-C sand, F-C gravel
15											EOB 14'
20											
25											
30											
35											
40											

NOTE: Subsoil conditions revealed by this investigation represent conditions at specific locations and may not represent conditions at other locations or times.

GROUND SURFACE TO _____FT. USED _____ CASING THEN _____ CASING TO _____FT. **HOLE NO. B-2**

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST

WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS

SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER

PROPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND =35 - 50%

C = COARSE

M = MEDIUM

F = FINE

SOILTESTING, INC. 90 DONOVAN RD. OXFORD, CT 06478 CT (203) 262-9328 NY (914) 946-4850	CLIENT: ATANE Engineers	SHEET 1 OF 1 HOLE NO. B-3
	PROJECT NO. G189-2236-22	
	PROJECT NAME Central Middle School	BORING LOCATIONS Per Plan
FOREMAN - DRILLER AO/aa	LOCATION 9 Indian Rock Lane Greenwich CT	
INSPECTOR	CASING / SAMPLER / CORE BAR	OFFSET
	TYPE: HSA / SS	DATE START 8/23/22
GROUND WATER OBSERVATIONS AT 10_FT AFTER_0_HOURS AT__FT AFTER__HOURS	SIZE I.D.: 4 ¼" / 1 3/8"	DATE FINISH 8/23/22
	HAMMER WT.: 140# / BIT	SURFACE ELEV.
	HAMMER FALL: 30"	GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	Type	PEN	REC.	DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0 - 6	6 - 12	12- 18	CORE TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
5		1	ss	24"	14"	6'0"	12	32			dense		
							10	10			dry		Gry/brn F sand & silt, F-C gravel
		2	ss	24"	18"	8'0"	12	6			compact		
							14	17			dry/moist		Brn F-M sand, F-C gravel, some silt
		3	ss	24"	14"	10'0"	13	88			v dense		
10							30	32			dry		Same & cobbles, boulders
		4	ss	24"	14"	12'0"	14	14			dense		
							27	19			wet		Brn F sand & silt, F-C gravel
		5	ss	24"	8"	14'0"	18	17			dense		
							20	23			wet	14'	Same
15													EOB 14'
20													
25													
30													
35													
40													

NOTE: Subsoil conditions revealed by this investigation represent conditions at specific locations and may not represent conditions at other locations or times.

GROUND SURFACE TO _____FT. USED _____CASING THEN _____ CASING TO _____FT. **HOLE NO. B-3**

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST

WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS C = COARSE

SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER M = MEDIUM

PROPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND =35 - 50% F = FINE

SOILTESTING, INC. 90 DONOVAN RD. OXFORD, CT 06478 CT (203) 262-9328 NY (914) 946-4650	CLIENT: ATANE Engineers	SHEET 1 OF 1 HOLE NO. B-4
	PROJECT NO. G189-2236-22	
	PROJECT NAME Central Middle School	BORING LOCATIONS Per Plan
FOREMAN - DRILLER AO/aa	LOCATION 9 Indian Rock Lane Greenwich CT	
INSPECTOR	CASING / SAMPLER / CORE BAR	OFFSET
	TYPE: HSA / SS	DATE START 8/23/22
GROUND WATER OBSERVATIONS	SIZE I.D.: 4 ¼" / 1 3/8"	DATE FINISH 8/23/22
AT 7 * FT AFTER 0 HOURS	HAMMER WT.: 140# BIT	SURFACE ELEV.
AT FT AFTER HOURS	HAMMER FALL: 30"	GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	Type	PEN	REC	DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0 - 6 / 6 - 12 / 12 - 18	CORE TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
										8"	Topsoil
5		1	ss	24"	22"	6'0"	13 / 11		compact		
							17 / 19		moist		Brn F sand & silt, F-C gravel
		2	ss	24"	20"	8'0"	42 / 53		v dense		
							40 / 34		wet		Brn F-C snd, F-C gravel, some silt
		3	ss	24"	16"	10'0"	12 / 14		dense		
10							24 / 2		wet		Brn F-C sand, F-C gravel, trace cobbles, trace silt
		4	ss	24"	10"	12'0"	5 / 5		compact		
							7 / 5		wet		Same
		5	ss	24"	22"	14'0"	10 / 7		compact		
							7 / 8		wet		Gry F-C sand, F-C gravel
15		6	ss	24"	24"	16'0"	15 / 10		compact		
							10 / 30		wet	16'	Same, gry silt, trace clay
											EOB 16'
20											
25											
30											
35											
40											* Note: Driller log noted 3' observation.

NOTE: Subsoil conditions revealed by this investigation represent conditions at specific locations and may not represent conditions at other locations or times.

GROUND SURFACE TO _____FT. USED _____CASING THEN _____ CASING TO _____FT. HOLE NO. B-4

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST

WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS C = COARSE

SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER M = MEDIUM

PROPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND =35 - 50% F = FINE

SOILTESTING, INC. 90 DONOVAN RD. OXFORD, CT 06478 CT (203) 262-9328 NY (914) 946-4850	CLIENT: ATANE Engineers	SHEET 1 OF 1 HOLE NO. B-5
	PROJECT NO. G189-2236-22	
	PROJECT NAME Central Middle School	BORING LOCATIONS Per Plan
FOREMAN - DRILLER AO/aa	LOCATION 9 Indian Rock Lane Greenwich CT	
INSPECTOR	CASING / SAMPLER / CORE BAR	OFFSET
	TYPE: HSA / SS	DATE START 8/23/22
GROUND WATER OBSERVATIONS AT 8 FT AFTER 0 HOURS AT FT AFTER HOURS	SIZE I.D.: 4 ¼" / 1 3/8"	DATE FINISH 8/23/22
	HAMMER WT.: 140# / BIT	SURFACE ELEV.
	HAMMER FALL: 30"	GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	Type	PEN	REC	DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0 - 6 / 6 - 12 / 12 - 18	CORE TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
5		1	ss	24"	24"	6'0"	8 / 9		compact		
							7 / 8		dry		Brn F sand, F-C gravel, some silt
		2	ss	24"	16"	8'0"	16 / 20		dense		
							11 / 10		moist		Gry/brn F sand & silt, trace clay
		3	ss	24"	18"	10'0"	14 / 14		dense		
10							17 / 19		wet		Gry F sand, some silt
		4	ss	24"	24"	12'0"	20 / 14		compact		
							14 / 22		wet		Gry F-M sand, F-C gravel, some silt
		5	ss	24"	24"	14'0"	12 / 23		dense		
							23 / 25		wet		Same
15		6	ss	24"	24"	16'0"	15 / 25		v dense		
							46 / 23		wet	16'	Same
											EOB 16'
20											
25											
30											
35											
40											

NOTE: Subsoil conditions revealed by this investigation represent conditions at specific locations and may not represent conditions at other locations or times.

GROUND SURFACE TO _____ FT. USED _____ CASING THEN _____ CASING TO _____ FT. **HOLE NO. B-5**

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST

WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS C = COARSE

SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER M = MEDIUM

PROPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND =35 - 50% F = FINE

SOILTESTING, INC. 90 DONOVAN RD. OXFORD, CT 06478 CT (203) 262-9328 NY (914) 946-4850	CLIENT: ATANE Engineers	SHEET 1 OF 1 HOLE NO. B-6
	PROJECT NO. G189-2236-22	
	PROJECT NAME Central Middle School	BORING LOCATIONS Per Plan
FOREMAN - DRILLER AO/aa	LOCATION 9 Indian Rock Lane Greenwich CT	
INSPECTOR	CASING / SAMPLER / CORE BAR	OFFSET
	TYPE: HSA / SS	DATE START 8/23/22
GROUND WATER OBSERVATIONS AT 8 FT AFTER 0 HOURS AT FT AFTER HOURS	SIZE I.D.: 4 ¼" / 1 3/8"	DATE FINISH 8/23/22
	HAMMER WT.: 140# / BIT	SURFACE ELEV.
	HAMMER FALL: 30"	GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	SAMPLE Type	SAMPLE PEN	SAMPLE REC.	SAMPLE DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0 - 6	6 - 12	12 - 18	CORE TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
												8"	Topsoil
5		1	ss	24"	14"	6'0"	4	6			compact		
							22	10			dry		Brn F sand, F-C gravel
		2	ss	24"	16"	8'0"	8	9			compact		
							10	13			dry		Gry F sand & silt
		3	ss	24"	10"	10'0"	10	15			dense		
10							20	16			wet		Brn F sand & silt, F-C gravel
		4	ss	24"	24"	12'0"	19	25			v dense		
							34	23			wet		Same
		5	ss	24"	24"	14'0"	10	19			dense		
							31	31			wet	14'	Same
15													EOB 14'
20													
25													
30													
35													
40													

NOTE: Subsoil conditions revealed by this investigation represent conditions at specific locations and may not represent conditions at other locations or times.

GROUND SURFACE TO _____FT. USED _____CASING THEN _____ CASING TO _____FT. **HOLE NO. B-6**

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST

WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS

SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER

PROPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND = 35 - 50%

C = COARSE

M = MEDIUM

F = FINE

SOILTESTING, INC. 90 DONOVAN RD. OXFORD, CT 06478 CT (203) 262-9328 NY (914) 946-4850	CLIENT: ATANE Engineers	SHEET 1 OF 1 HOLE NO. B-7
	PROJECT NO. G189-2236-22	
	PROJECT NAME Central Middle School	BORING LOCATIONS Per Plan
FOREMAN - DRILLER AO/aa	LOCATION 9 Indian Rock Lane Greenwich CT	
INSPECTOR	CASING / SAMPLER / CORE BAR TYPE: HSA / SS SIZE I.D.: 4 ¼" / 1 3/8" HAMMER WT.: 140# / BIT HAMMER FALL: 30"	OFFSET DATE START 8/24/22 DATE FINISH 8/24/22 SURFACE ELEV. GROUND WATER ELEV.
GROUND WATER OBSERVATIONS AT 8 FT AFTER 0 HOURS AT FT AFTER HOURS		

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	Type	PEN	REC.	DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0 - 6 / 6 - 12 / 12 - 18			CORE TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
5		1	ss	24"	16"	6'0"	12	11			compact		
							16	31			dry		Brn/lt brn F sand, F-C gravel, some silt
		2	ss	24"	16"	8'0"	95	44			v dense		
							40	39			moist		Brn F-C sand, F-C gravel, trace cobbles
		3	ss	24"	18"	10'0"	35	57			v dense		
10							42	38			wet		Brn F sand & silt, F-C gravel, trace cobbles
		4	ss	15"	10"	11'3"	135	133			v dense		
							100/3"				wet	11'3"	Same
													EOB 11'3"
15													
20													
25													
30													
35													
40													

NOTE: Subsoil conditions revealed by this investigation represent conditions at specific locations and may not represent conditions at other locations or times.

GROUND SURFACE TO _____FT. USED _____CASING THEN _____ CASING TO _____FT. **HOLE NO. B-7**

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST

WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS

SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER

PROPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND =35 - 50%

C = COARSE
M = MEDIUM
F = FINE

SOILTESTING, INC. 90 DONOVAN RD. OXFORD, CT 06478 CT (203) 262-9328 NY (914) 946-4850	CLIENT: ATANE Engineers	SHEET 1 OF 1 HOLE NO. B-8
	PROJECT NO. G189-2236-22	
	PROJECT NAME Central Middle School	BORING LOCATIONS Per Plan
FOREMAN - DRILLER AO/aa	LOCATION 9 Indian Rock Lane Greenwich CT	
INSPECTOR	CASING / SAMPLER / CORE BAR TYPE: HSA / SS SIZE I.D.: 4 ¼" / 1 3/8" HAMMER WT.: 140# / BIT HAMMER FALL: 30"	OFFSET DATE START 8/24/22 DATE FINISH 8/24/22 SURFACE ELEV. GROUND WATER ELEV.
GROUND WATER OBSERVATIONS AT 10 FT AFTER 0 HOURS AT __FT AFTER __HOURS		

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	Type	PEN	REC.	DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0 - 6	6 - 12	12 - 18	CORE TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
5		1	ss	24"	14"	6'0"	15	9			compact		
							8	15			moist		Gry F sand & silt, F-C gravel
		2	ss	24"	14"	8'0"	105	64			v dense		
							65	17			dry		Same, cobbles
		3	ss	24"	12"	10'0"	16	5			loose		
10							3	3			moist		Gry silt, trace F gravel, trace clay
		4	ss	24"	10"	12'0"	4	9			compact		Gry F-C sand, some silt
							9	10			wet	11'6"	Gry silt, trace clay
		5	ss	24"	20"	14'0"	10	8			compact		
							7	6			wet		Gry F-C sand & silt, F-C gravel, trace clay
15		6	ss	24"	24"	16'0"	11	65			v dense		
							19	45			wet	16'	Gry F sand & silt, trace cobbles
													EOB 16'
20													
25													
30													
35													
40													

NOTE: Subsoil conditions revealed by this investigation represent conditions at specific locations and may not represent conditions at other locations or times.

GROUND SURFACE TO _____FT. USED _____CASING THEN _____ CASING TO _____FT. **HOLE NO. B-8**

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST

WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS C = COARSE

SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER M = MEDIUM

PROPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND =35 - 50% F = FINE

SOILTESTING, INC. 90 DONOVAN RD. OXFORD, CT 06478 CT (203) 262-9328 NY (914) 946-4850	CLIENT: ATANE Engineers	SHEET 1 OF 1 HOLE NO. B-9
	PROJECT NO. G189-2236-22	
	PROJECT NAME Central Middle School	BORING LOCATIONS Per Plan
FOREMAN - DRILLER AO/aa	LOCATION 9 Indian Rock Lane Greenwich CT	
INSPECTOR	CASING / SAMPLER / CORE BAR	OFFSET
	TYPE: HSA / SS	DATE START 8/24/22
GROUND WATER OBSERVATIONS AT none FT AFTER 0 HOURS AT FT AFTER HOURS	SIZE I.D.: 4 ¼" / 1 3/8"	DATE FINISH 8/24/22
	HAMMER WT.: 140# / BIT	SURFACE ELEV.
	HAMMER FALL: 30"	GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	Type	PEN	REC.	DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0 - 6 / 6 - 12 / 12 - 18	CORE TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
5		1	ss	19"	19"	6'7"	95 / 75		v dense		
							95 / 100/1"		dry		Brn F sand, F-C gravel, trace cobbles
											Cobbles & boulders
10										10'	Cobbles & boulders 6'6" - 10'
		2	ss	4"	4"	10'4"	100/4"		v dense/dry		Partly weathered Bedrock
										11'6"	Auger Refusal
15											EOB 11'6"
20											
25											
30											
35											
40											

NOTE: Subsoil conditions revealed by this investigation represent conditions at specific locations and may not represent conditions at other locations or times.

GROUND SURFACE TO _____ FT. USED _____ CASING THEN _____ CASING TO _____ FT. **HOLE NO. B-9**

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST

WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS

SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER

PROPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND =35 - 50%

C = COARSE

M = MEDIUM

F = FINE

SOILTESTING, INC. 90 DONOVAN RD. OXFORD, CT 06478 CT (203) 262-9328 NY (914) 946-4850	CLIENT: ATANE Engineers	SHEET 1 OF 1 HOLE NO. B-10
	PROJECT NO. G189-2236-22	
	PROJECT NAME Central Middle School	BORING LOCATIONS Per Plan
FOREMAN - DRILLER AO/aa	LOCATION 9 Indian Rock Lane Greenwich CT	
INSPECTOR	CASING / SAMPLER / CORE BAR	OFFSET
	TYPE: HSA / SS	DATE START 8/24/22
GROUND WATER OBSERVATIONS AT none FT AFTER 0 HOURS AT FT AFTER HOURS	SIZE I.D.: 4 ¼" / 1 3/8"	DATE FINISH 8/24/22
	HAMMER WT.: 140# / BIT	SURFACE ELEV.
	HAMMER FALL: 30"	GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	Type	PEN	REC.	DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0 - 6 / 6 - 12 / 12 - 18	CORE TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
5		1	ss	24"	12"	7'0"	25 / 34		v dense / dry		Brn F-M sand, F-C gravel, some silt, trace cobbles
							26 / 26				
		2	ss	24"	14"	9'0"	35 / 64		v dense / dry		Same
10							76 / 65			10'	Auger Refusal
											EOB 10'
15											
20											
25											
30											
35											
40											

NOTE: Subsoil conditions revealed by this investigation represent conditions at specific locations and may not represent conditions at other locations or times.

GROUND SURFACE TO _____ FT. USED _____ CASING THEN _____ CASING TO _____ FT. **HOLE NO. B-10**

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST

WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS

SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER

PROPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND =35 - 50%

C = COARSE

M = MEDIUM

F = FINE

SOILTESTING, INC. 90 DONOVAN RD. OXFORD, CT 06478 CT (203) 262-9328 NY (914) 946-4850	CLIENT: ATANE Engineers	SHEET 1 OF 1 HOLE NO. B-11
	PROJECT NO. G189-2236-22	
	PROJECT NAME Central Middle School	BORING LOCATIONS Per Plan
FOREMAN - DRILLER AO/aa	LOCATION 9 Indian Rock Lane Greenwich CT	
INSPECTOR	CASING / SAMPLER / CORE BAR	OFFSET
	TYPE: HSA / SS	DATE START 8/24/22
GROUND WATER OBSERVATIONS	SIZE I.D.: 4 ¼" / 1 3/8"	DATE FINISH 8/24/22
AT none FT AFTER 0 HOURS	HAMMER WT.: 140# / BIT	SURFACE ELEV.
AT FT AFTER HOURS	HAMMER FALL: 30"	GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	Type	PEN	REC.	DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0 - 6 / 6 - 12 / 12 - 18	CORE TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
5		1	ss	22"	22"	6'8"	18 / 19 52 / 150/4"		v dense dry	7'	Brn/lt brn F sand, F-C gravel, trace cobbles Auger Refusal
											EOB 7'
10											
15											
20											
25											
30											
35											
40											

NOTE: Subsoil conditions revealed by this investigation represent conditions at specific locations and may not represent conditions at other locations or times.

GROUND SURFACE TO _____FT. USED _____CASING THEN _____ CASING TO _____FT. **HOLE NO. B-11**

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST

WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS

SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER

PROPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND =35 - 50%

C = COARSE
M = MEDIUM
F = FINE

SOILTESTING, INC. 90 DONOVAN RD. OXFORD, CT 06478 CT (203) 262-9328 NY (914) 946-4850	CLIENT: ATANE Engineers	SHEET 1 OF 1 HOLE NO. B-12
	PROJECT NO. G189-2236-22	
	PROJECT NAME Central Middle School	BORING LOCATIONS Per Plan
FOREMAN - DRILLER AO/aa	LOCATION 9 Indian Rock Lane Greenwich CT	
INSPECTOR	CASING / SAMPLER / CORE BAR	OFFSET
	TYPE: HSA / SS	DATE START 8/24/22
GROUND WATER OBSERVATIONS	SIZE I.D.: 4 ¼" / 1 3/8"	DATE FINISH 8/24/22
AT none FT AFTER 0 HOURS	HAMMER WT.: 140# / BIT	SURFACE ELEV.
AT FT AFTER HOURS	HAMMER FALL: 30"	GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	SAMPLE Type	SAMPLE PEN	SAMPLE REC.	SAMPLE DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0 - 6 / 6 - 12 / 12 - 18	CORE TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
5											Boulders from 2' to 7'
										7'	Auger Refusal
10											EOB 7'
15											
20											
25											
30											
35											
40											

NOTE: Subsoil conditions revealed by this investigation represent conditions at specific locations and may not represent conditions at other locations or times.

GROUND SURFACE TO _____FT. USED _____CASING THEN _____ CASING TO _____FT. **HOLE NO. B-12**

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST

WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS C = COARSE

SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER M = MEDIUM

PROPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND =35 - 50% F = FINE

SOILTESTING, INC. 90 DONOVAN RD. OXFORD, CT 06478 CT (203) 262-9328 NY (914) 946-4850	CLIENT: ATANE Engineers	SHEET 1 OF 1 HOLE NO. B-13
	PROJECT NO. G189-2236-22	
	PROJECT NAME Central Middle School	BORING LOCATIONS Per Plan
FOREMAN - DRILLER SD/cp	LOCATION 9 Indian Rock Lane Greenwich CT	
INSPECTOR	CASING / SAMPLER / CORE BAR TYPE: HSA / SS SIZE I.D.: 4 ¼" / 1 3/8" HAMMER WT.: 140# / BIT HAMMER FALL: 30"	OFFSET DATE START 9/3/22 DATE FINISH 9/3/22 SURFACE ELEV. GROUND WATER ELEV.
GROUND WATER OBSERVATIONS AT none FT AFTER 0 HOURS AT__FT AFTER__HOURS		

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	SAMPLE Type	SAMPLE PEN	SAMPLE REC.	SAMPLE DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0 - 6	6 - 12	12 - 18	CORE TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
5		1	ss	24"	18"	6'0"	9	13			dense	5'	Brn F-M sand & F gravel, lit silt
							33	45			dry		Bedrock or Boulder Fragments
												7'	Cobbles and/or fractured Bedrock 5-7'
													EOB 7'
10													
15													
20													
25													
30													
35													
40													

NOTE: Subsoil conditions revealed by this investigation represent conditions at specific locations and may not represent conditions at other locations or times.

GROUND SURFACE TO _____FT. USED _____CASING THEN _____ CASING TO _____FT. **HOLE NO. B-13**

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST

WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS

SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER

PROPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND =35 - 50%

C = COARSE

M = MEDIUM

F = FINE

SOILTESTING, INC. 90 DONOVAN RD. OXFORD, CT 06478 CT (203) 262-9328 NY (914) 946-4850	CLIENT: ATANE Engineers	SHEET 1 OF 1 HOLE NO. B-14
	PROJECT NO. G189-2236-22	
	PROJECT NAME Central Middle School	BORING LOCATIONS Per Plan
FOREMAN - DRILLER AO/aa	LOCATION 9 Indian Rock Lane Greenwich CT	
INSPECTOR	CASING / SAMPLER / CORE BAR	OFFSET
	TYPE: HSA / SS	DATE START 8/25/22
GROUND WATER OBSERVATIONS AT none FT AFTER 0 HOURS AT FT AFTER HOURS	SIZE I.D.: 4 ¼" / 1 3/8" HAMMER WT.: 140# / BIT HAMMER FALL: 30"	DATE FINISH 8/25/22 SURFACE ELEV. GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	Type	PEN	REC.	DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0 - 6 / 6 - 12 / 12 - 18	CORE TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
5		1	ss	24"	4"	6'0"	15 / 6		compact / dry		
							7 / 12				Brn F sand, F-C gravel, trace silt, trace asphalt (fill)
		2	ss	24"	16"	8'0"	12 / 12		dense / dry		
							17 / 32				Brn F sand, F-C gravel, trace silt, trace cobbles
		3	ss	24"	18"	10'0"	28 / 25		v dense / dry		
10							30 / 39			10'	Brn F sand, F-C gravel, some silt, some weathered Bedrock frag
		4	ss	4"	4"	10'4"	100/4"		v dense/dry		Partly weathered Bedrock or Boulders
										12'	Auger Refusal
											EOB 12'
15											
20											
25											
30											
35											
40											

NOTE: Subsoil conditions revealed by this investigation represent conditions at specific locations and may not represent conditions at other locations or times.

GROUND SURFACE TO _____FT. USED _____CASING THEN _____ CASING TO _____FT. **HOLE NO. B-14**

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST

WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS C = COARSE

SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER M = MEDIUM

PROPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND =35 - 50% F = FINE

SOILTESTING, INC. 90 DONOVAN RD. OXFORD, CT 06478 CT (203) 262-9328 NY (914) 946-4850	CLIENT: ATANE Engineers	SHEET 1 OF 1 HOLE NO. B-15
	PROJECT NO. G189-2236-22	
	PROJECT NAME Central Middle School	BORING LOCATIONS Per Plan
FOREMAN - DRILLER AO/aa	LOCATION 9 Indian Rock Lane Greenwich CT	
INSPECTOR	CASING / SAMPLER / CORE BAR	OFFSET
	TYPE: HSA / SS	DATE START 8/25/22
GROUND WATER OBSERVATIONS AT none FT AFTER 0 HOURS AT FT AFTER HOURS	SIZE I.D.: 4 ¼" / 1 3/8"	DATE FINISH 8/25/22
	HAMMER WT.: 140# / BIT	SURFACE ELEV.
	HAMMER FALL: 30"	GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	Type	PEN	REC.	DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0 - 6 / 6 - 12 / 12 - 18	CORE TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
5		1	ss	24"	14"	6'0"	18 / 85		v dense dry		Weathered Bedrock fragments
							110 / 102				
		2	ss	3"	0"	6'3"	100/3"		v dense/dry		No recovery
										9'	Auger Refusal
10											EOB 9'
15											
20											
25											
30											
35											
40											

NOTE: Subsoil conditions revealed by this investigation represent conditions at specific locations and may not represent conditions at other locations or times.

GROUND SURFACE TO _____FT. USED _____CASING THEN _____ CASING TO _____FT. **HOLE NO. B-15**

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST

WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS

SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER

PROPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND =35 - 50%

C = COARSE
M = MEDIUM
F = FINE

SOILTESTING, INC. 90 DONOVAN RD. OXFORD, CT 06478 CT (203) 262-9328 NY (914) 946-4850	CLIENT: ATANE Engineers	SHEET 1 OF 1 HOLE NO. B-16
	PROJECT NO. G189-2236-22	
	PROJECT NAME Central Middle School	BORING LOCATIONS Per Plan
FOREMAN - DRILLER AO/aa	LOCATION 9 Indian Rock Lane Greenwich CT	
INSPECTOR	CASING / SAMPLER / CORE BAR TYPE: HSA / SS SIZE I.D.: 4 ¼" / 1 3/8" HAMMER WT.: 140# / BIT HAMMER FALL: 30"	OFFSET DATE START 8/25/22 DATE FINISH 8/25/22 SURFACE ELEV. GROUND WATER ELEV.
GROUND WATER OBSERVATIONS AT none FT AFTER 0 HOURS AT FT AFTER HOURS		

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	Type	PEN	REC.	DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0 - 6 / 6 - 12 / 12 - 18	CORE TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
5		1	ss	24"	18"	6'0"	20 / 29		v dense		
							25 / 9		dry		Brn F sand, F-C gravel, trace asphalt (fill)
		2	ss	24"	18"	8'0"	9 / 15		v dense	7'6"	Brn F sand & silt, F-C gravel
							39 / 83		moist/dry		Partly weathered Bedrock
		3	ss	24"	12"	10'0"	20 / 15		dense		
10							32 / 31		dry		Boulders or partly weathered Bedrock
		4	ss	22"	20"	11'10"	44 / 19		v dense		
							32 / 100/4"		dry	12'	Brn F-M sand, F-C sand, trace cobbles (parly weathered Bedrock)
15											EOB 12'
20											
25											
30											
35											
40											

NOTE: Subsoil conditions revealed by this investigation represent conditions at specific locations and may not represent conditions at other locations or times.

GROUND SURFACE TO _____FT. USED _____CASING THEN _____ CASING TO _____FT. **HOLE NO. B-16**

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST

WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS C = COARSE

SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER M = MEDIUM

PROPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND =35 - 50% F = FINE

SOILTESTING, INC. 90 DONOVAN RD. OXFORD, CT 06478 CT (203) 262-9328 NY (914) 946-4850	CLIENT: ATANE Engineers	SHEET 1 OF 1 HOLE NO. B-17
	PROJECT NO. G189-2236-22	
	PROJECT NAME Central Middle School	BORING LOCATIONS Per Plan
FOREMAN - DRILLER SD	LOCATION 9 Indian Rock Lane Greenwich CT	
INSPECTOR	CASING / SAMPLER / CORE BAR	OFFSET
	TYPE: HSA / SS	DATE START 9/3/22
GROUND WATER OBSERVATIONS	SIZE I.D.: 4 ¼" / 1 3/8"	DATE FINISH 9/3/22
AT none FT AFTER 0 HOURS	HAMMER WT.: 140# BIT	SURFACE ELEV.
AT FT AFTER HOURS	HAMMER FALL: 30"	GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	SAMPLE Type	SAMPLE PEN	SAMPLE REC.	SAMPLE DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0 - 6 / 6 - 12 / 12 - 18	CORE TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
										3'	Auger Refusal at 3' (on Boulder) offset 5' to B-17A
	B-17A										
5		1	ss	24"	12"	6'0"	4 / 3		loose		
							2 / 4		dry		Brn F-M sand & silt, some F gravel
		2	ss	23"	14"	7'11"	4 / 31		v dense	7'3"	Same
							33 / 50/5"		dry	8'	Bedrock or boulder fragments Auger Refusal
											EOB 8'
10											
15											
20											
25											
30											
35											
40											

NOTE: Subsoil conditions revealed by this investigation represent conditions at specific locations and may not represent conditions at other locations or times.

GROUND SURFACE TO _____FT. USED _____CASING THEN _____ CASING TO _____FT. **HOLE NO. B-17**

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST

WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS

SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER

PROPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND =35 - 50%

C = COARSE
M = MEDIUM
F = FINE

SOILTESTING, INC. 90 DONOVAN RD. OXFORD, CT 06478 CT (203) 262-9328 NY (914) 946-4850	CLIENT: ATANE Engineers	SHEET 1 OF 1 HOLE NO. B-18
	PROJECT NO. G189-2236-22	
	PROJECT NAME Central Middle School	BORING LOCATIONS Per Plan
FOREMAN - DRILLER SD/cp	LOCATION 9 Indian Rock Lane Greenwich CT	
INSPECTOR	CASING / SAMPLER / CORE BAR	OFFSET
	TYPE: HSA / SS	DATE START 9/3/22
GROUND WATER OBSERVATIONS	SIZE I.D.: 4 ¼" / 1 3/8"	DATE FINISH 9/3/22
AT 9 FT AFTER 0 HOURS	HAMMER WT.: 140# BIT	SURFACE ELEV.
AT __FT AFTER __HOURS	HAMMER FALL: 30"	GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	SAMPLE Type	SAMPLE PEN	SAMPLE REC.	SAMPLE DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0 - 6	6 - 12	12- 18	CORE TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
5		1	ss	24"	24"	6'0"	14	13			compact		
							10	10			dry		Gry F-M sand & F gravel, lit silt
		2	ss	21"	12"	8'0"	11	14			compact	7'6"	Same
							7	5			dry		Gry/blk F sand & silt (gry/blk) trace organics, F gravel-Cobbles 9'-10' (poss fill)
10												10'	
		3	ss	24"	16"	12'0"	9	11			compact		
							8	9			wet		Brn/tan F-M sand & F gravel, lit silt
		4	ss	22"	20"	13'10"	7	13			dense		
							20	50/4"			wet	13'10"	Same
15													EOB 13'10"
20													
25													
30													
35													
40													

NOTE: Subsoil conditions revealed by this investigation represent conditions at specific locations and may not represent conditions at other locations or times.

GROUND SURFACE TO _____FT. USED _____CASING THEN _____ CASING TO _____FT. **HOLE NO. B-18**

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST

WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS

SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER

C = COARSE M = MEDIUM F = FINE

PROPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND =35 - 50%

SOILTESTING, INC. 90 DONOVAN RD. OXFORD, CT 06478 CT (203) 262-9328 NY (914) 946-4850	CLIENT: ATANE Engineers	SHEET 1 OF 1 HOLE NO. B-19
	PROJECT NO. G189-2236-22	
	PROJECT NAME Central Middle School	BORING LOCATIONS Per Plan
FOREMAN - DRILLER SD	LOCATION 9 Indian Rock Lane Greenwich CT	
INSPECTOR	CASING / SAMPLER / CORE BAR	OFFSET
	TYPE: HSA / SS	DATE START 9/3/22
GROUND WATER OBSERVATIONS	SIZE I.D.: 4 ¼" / 1 3/8"	DATE FINISH 9/3/22
AT none FT AFTER 0 HOURS	HAMMER WT.: 140# / BIT	SURFACE ELEV.
AT FT AFTER HOURS	HAMMER FALL: 30"	GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	SAMPLE Type	SAMPLE PEN	SAMPLE REC.	SAMPLE DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0 - 6 / 6 - 12 / 12- 18	CORE TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
5		1	ss	24"	18"	6'0"	9 / 14		compact		
							14 / 14		dry		Brn F-M sand & silt, lit F gravel
		2	ss	16"	16"	7'4"	30 / 33		v dense		Same, cobbles, boulders and/or decomposed Bedrock
							50/4"		moist	7'4"	Spoon Refusal
											EOB 7'4"
10											
15											
20											
25											
30											
35											
40											

NOTE: Subsoil conditions revealed by this investigation represent conditions at specific locations and may not represent conditions at other locations or times.

GROUND SURFACE TO _____FT. USED _____CASING THEN _____ CASING TO _____FT. **HOLE NO. B-19**

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST

WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS

SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER

PROPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 35% AND =35 - 50%

C = COARSE
M = MEDIUM
F = FINE

SOILTESTING, INC. 90 DONOVAN RD. OXFORD, CT 06478 CT (203) 262-9328 NY (914) 946-4850	CLIENT: ATANE Engineers	SHEET 1 OF 1 HOLE NO. B-20
	PROJECT NO. G189-2236-22	
	PROJECT NAME Central Middle School	BORING LOCATIONS Per Plan
FOREMAN - DRILLER SD	LOCATION 9 Indian Rock Lane Greenwich CT	
INSPECTOR	CASING / SAMPLER / CORE BAR	OFFSET
	TYPE: HSA / SS	DATE START 9/3/22
GROUND WATER OBSERVATIONS	SIZE I.D.: 4 ¼" / 1 3/8"	DATE FINISH 9/3/22
AT none FT AFTER 0 HOURS	HAMMER WT.: 140# / BIT	SURFACE ELEV.
AT FT AFTER HOURS	HAMMER FALL: 30"	GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	SAMPLE Type	SAMPLE PEN	SAMPLE REC.	SAMPLE DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0 - 6 / 6 - 12 / 12 - 18	CORE TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
										3'	Auger Refusal
											EOB 3' Poss Bedrock
5											
10											
15											
20											
25											
30											
35											
40											

NOTE: Subsoil conditions revealed by this investigation represent conditions at specific locations and may not represent conditions at other locations or times.

GROUND SURFACE TO _____FT. USED _____CASING THEN _____ CASING TO _____FT. **HOLE NO. B-20**

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST

WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS

SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER

PROPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND =35 - 50%

C = COARSE
M = MEDIUM
F = FINE

Appendix D
Laboratory Test Results

Thielsch
DIVISION OF THE RISE GROUP

195 Frances Avenue
Cranston RI, 02910
Phone: (401)-467-6454
Fax: (401)-467-2398
cts.thielsch.com
Let's Build a Solid Foundation

Client Information:	
Tighe & Bond	
Portsmouth, NH	
Project Manager:	B. Nereson
Assigned By:	B. Nereson
Collected By:	Client

Project Information:	
Central Middle School	
Greenwich, CT	
Project Number:	G5068
Summary Page:	1 of 1
Report Date:	09.29.23

LABORATORY TESTING DATA SHEET, Report No.: 7423-J-188

Boring No.	Sample ID	Depth (ft)	Laboratory No.	Identification Tests									Proctor / CBR / Permeability Tests								Laboratory Log and Soil Description
				As Rcvd Moisture Content %	LL %	PL %	OD LL	Gravel %	Sand %	Fines %	Org. %	pH	g_d MAX (pcf) W_{opt} (%)	g_d MAX (pcf) W_{opt} (%) (Corr.)	Dry unit wt. (pcf)	Test Moisture Content %	Target Test Setup as % of Proctor	CBR @ 0.1"	CBR @ 0.2"	Permeability cm/sec	
				D2216	D4318			D6913			D2974	D4792	D1557								
B5	-	5.5-7	23-S-3929	42.2							2.0										Organic Content Only
B8	-	5.5-7	23-S-3930	25.1							3.8										Organic Content Only
B-3	-	2-4	23-S-3931					0.0	22.1	77.9											Brown silt with sand
B-4A	-	10-12	23-S-3932					42.0	47.7	10.3											Brown poorly graded sand with silt and gravel
B-7	-	5-7	23-S-3933					20.8	63.1	16.1											Brown silty sand with gravel
B-9	-	5-6.3	23-S-3934					39.0	47.5	13.5											Brown silty sand with gravel

Organic Contents tested by RB on 09.28.23

Date Received: **09.26.23** Reviewed By: Date Reviewed: **10.02.23**

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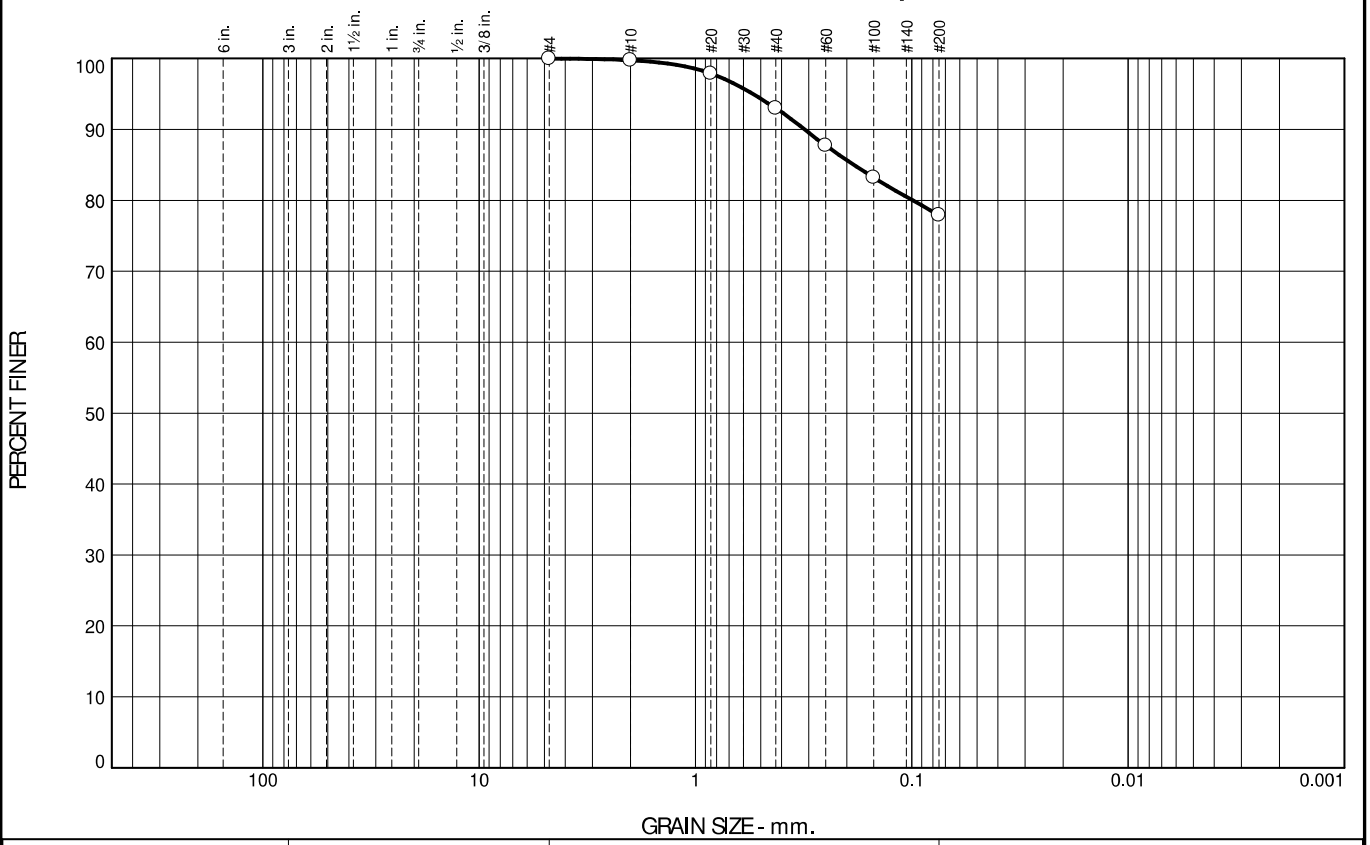
Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.2	6.8	15.1	77.9	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.8		
#20	97.9		
#40	93.0		
#60	87.7		
#100	83.2		
#200	77.9		

* (no specification provided)

Soil Description

Brown silt with sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.3129 D_{85}= 0.1849 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

Sample visually classified as non-plastic.

Source of Sample: Boring Depth: 2-4'
Sample Number: B-3

Date: 09.29.23

Thielsch Engineering Inc.

Cranston, RI

Client: Tighe & Bond
Project: Central Middle School
Greenwich, CT
Project No: G5068

Figure 23-S-3931

Tested By: RB Checked By: Andrew Vanasse

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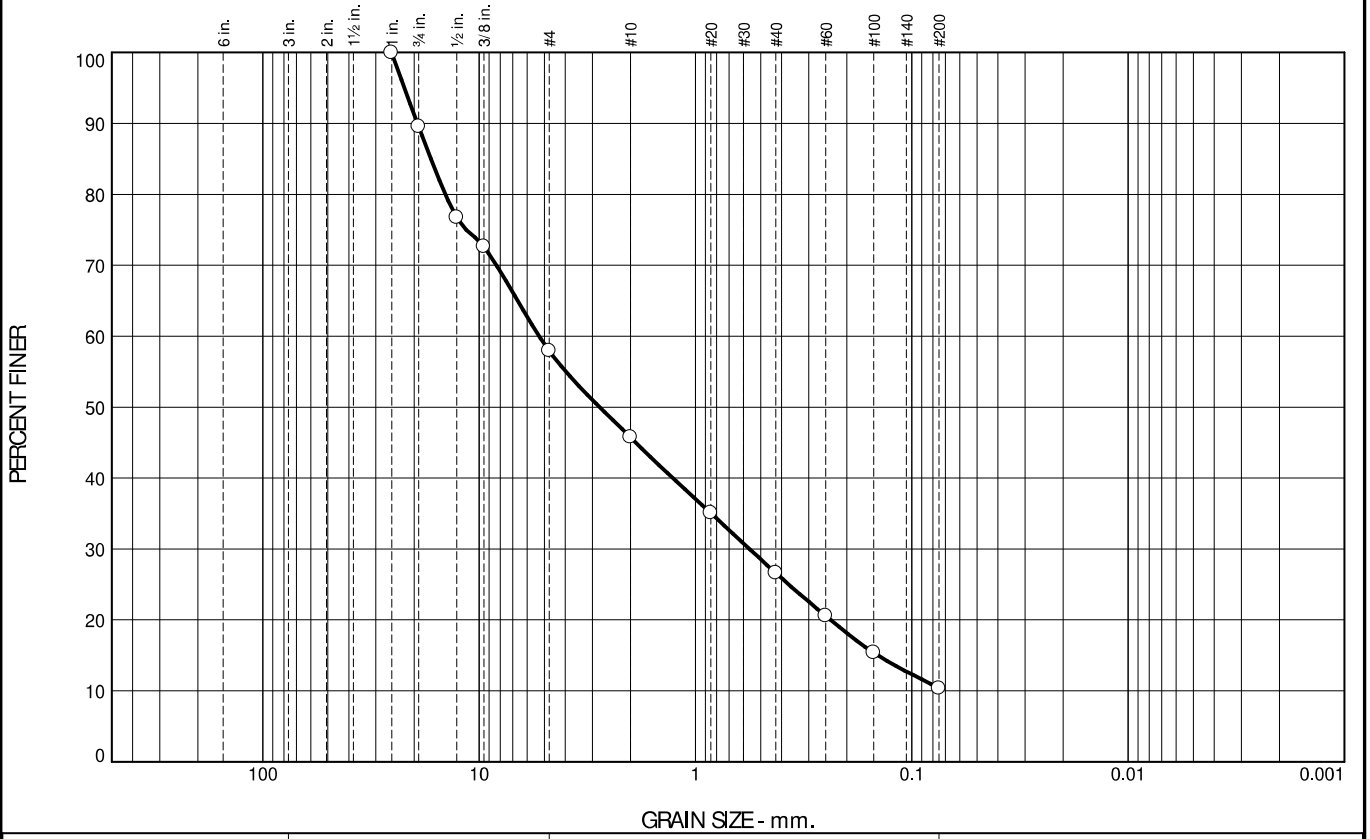
Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	10.4	31.6	12.2	19.2	16.3	10.3	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	89.6		
1/2"	76.7		
3/8"	72.6		
#4	58.0		
#10	45.8		
#20	35.1		
#40	26.6		
#60	20.6		
#100	15.4		
#200	10.3		

* (no specification provided)

Soil Description

Brown poorly graded sand with silt and gravel

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 19.2877 D_{85}= 16.6904 D_{60}= 5.2868
D_{50}= 2.7742 D_{30}= 0.5633 D_{15}= 0.1436
D_{10}= C_u= C_c=

Classification

USCS= SP-SM AASHTO= A-1-a

Remarks

Source of Sample: Boring Depth: 10-12'
Sample Number: B-4A

Date: 09.29.23

Thielsch Engineering Inc.
Cranston, RI

Client: Tighe & Bond
Project: Central Middle School
Greenwich, CT
Project No: G5068 Figure 23-S-3932

Tested By: RB Checked By: Andrew Vanasse

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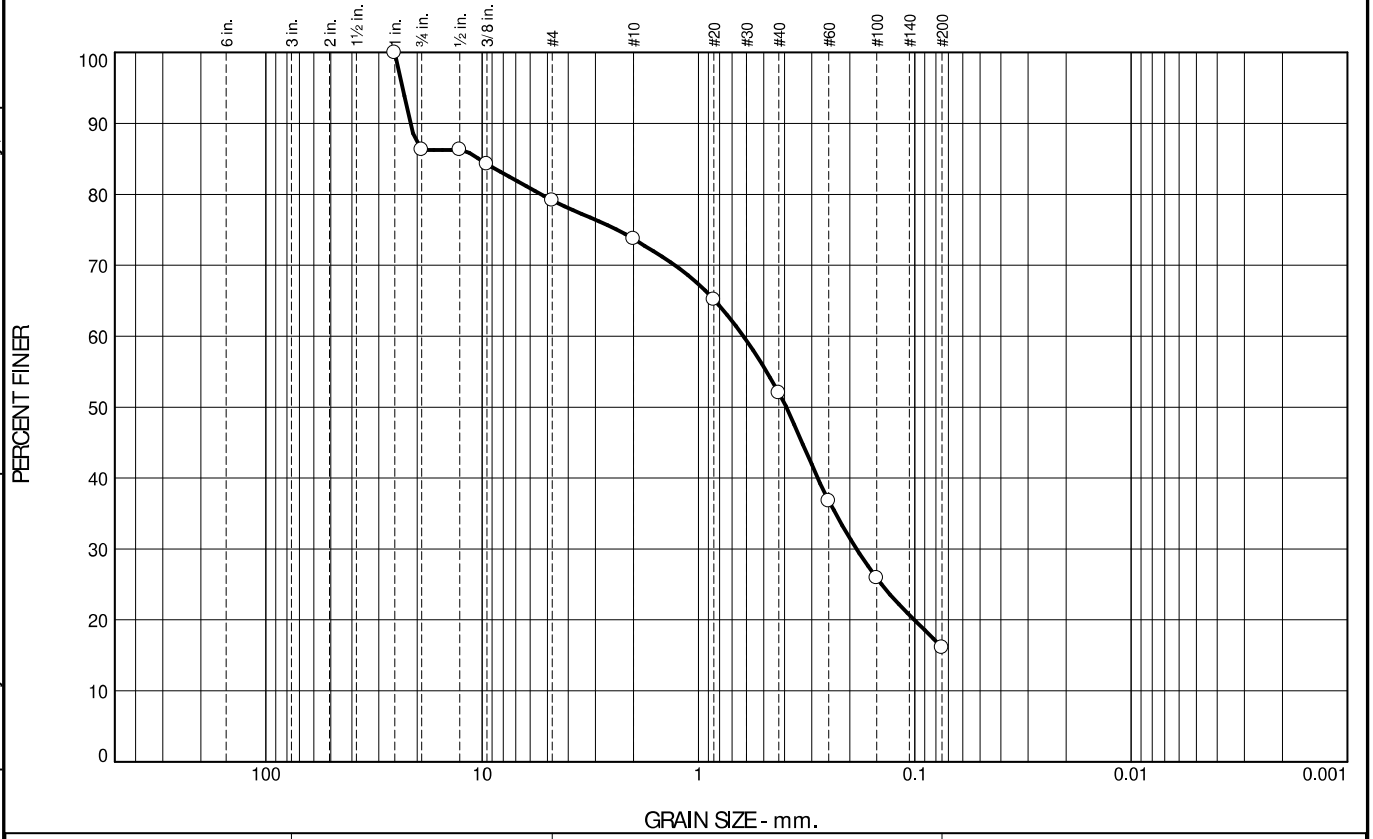
Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	13.7	7.1	5.5	21.7	35.9	16.1	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	86.3		
1/2"	86.3		
3/8"	84.3		
#4	79.2		
#10	73.7		
#20	65.2		
#40	52.0		
#60	36.8		
#100	25.9		
#200	16.1		

* (no specification provided)

Soil Description

Brown silty sand with gravel

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 21.4531 D_{85}= 10.3553 D_{60}= 0.6205
D_{50}= 0.3930 D_{30}= 0.1858 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Source of Sample: Boring Depth: 5-7'
Sample Number: B-7

Date: 09.29.23

Thielsch Engineering Inc.

Cranston, RI

Client: Tighe & Bond
Project: Central Middle School
Greenwich, CT
Project No: G5068 Figure 23-S-3933

Tested By: RB Checked By: Andrew Vanasse

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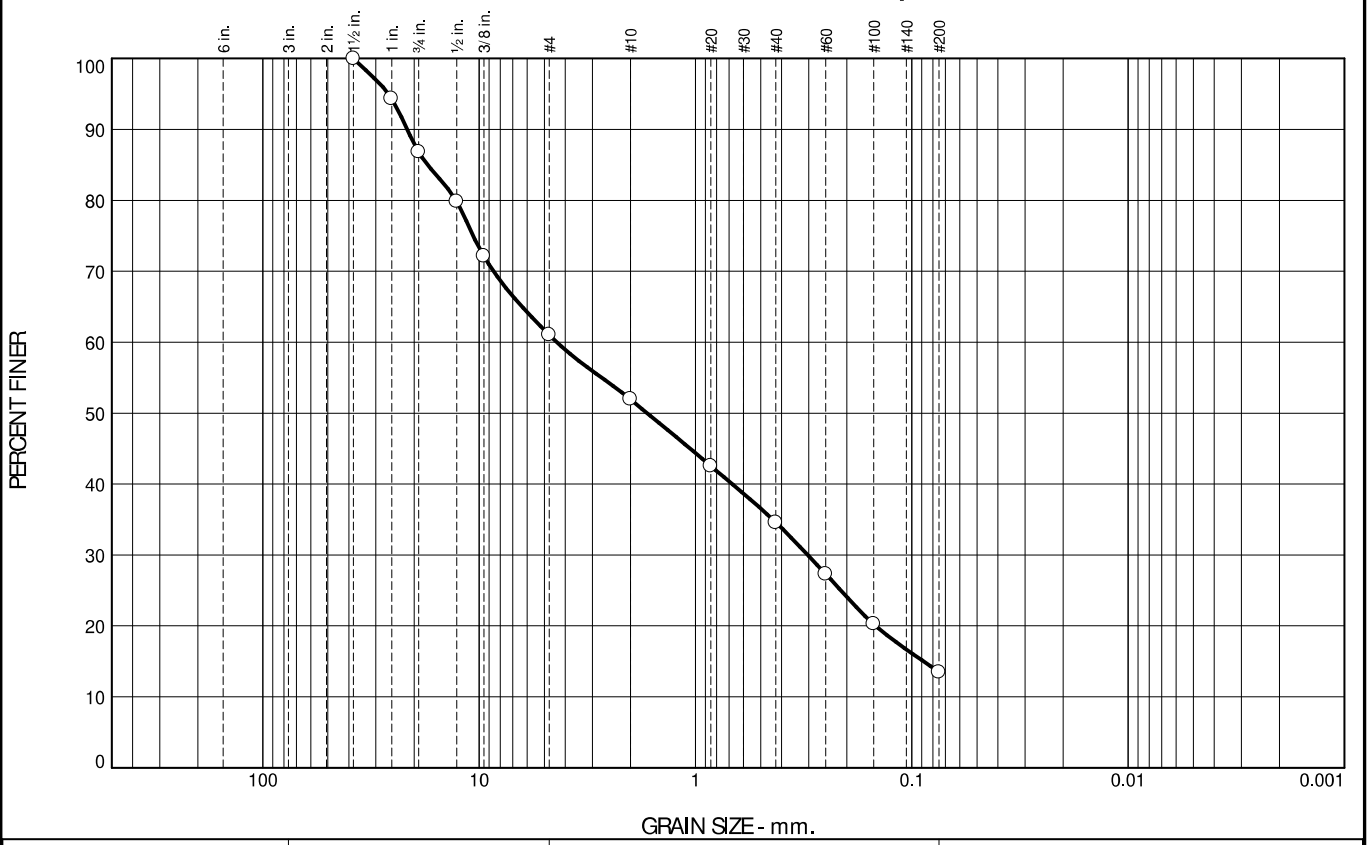
Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	13.2	25.8	9.0	17.4	21.1	13.5	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/2"	100.0		
1"	94.3		
3/4"	86.8		
1/2"	79.8		
3/8"	72.1		
#4	61.0		
#10	52.0		
#20	42.5		
#40	34.6		
#60	27.3		
#100	20.3		
#200	13.5		

* (no specification provided)

Soil Description

Brown silty sand with gravel

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 21.5122 D_{85}= 17.3087 D_{60}= 4.3766
D_{50}= 1.6689 D_{30}= 0.3031 D_{15}= 0.0883
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-1-b

Remarks

Source of Sample: Boring Depth: 5-6.3'
Sample Number: B-9

Date: 09.29.23

Thielsch Engineering Inc.
Cranston, RI

Client: Tighe & Bond
Project: Central Middle School
Greenwich, CT
Project No: G5068 Figure 23-S-3934

Tested By: RB Checked By: Andrew Vanasse

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Client Information:	Project Information:
Tighe & Bond	**Central Middle School**
Portsmouth, NH 03801	**Greenwich, CT**
Project Manager:	Project Number: G5068
Assigned By:	Summary Page: 1 of 1
Collected By:	Report Date: 12.10.23

LABORATORY TESTING DATA SHEET, Report No.: 7423-M-107

Material Source	Sample ID	Depth (ft)	Laboratory No.	Identification Tests									Proctor / CBR / Permeability Tests								Laboratory Log and Soil Description
				As Rcvd Moisture Content %	LL %	PL %	OD LL	Gravel %	Sand %	Fines %	Org. %	pH	g_d MAX (pcf) W_{opt} (%)	g_d MAX (pcf) W_{opt} (%) (Corr.)	Dry unit wt. (pcf)	Test Moisture Content %	Target Test Setup as % of Proctor	CBR @ 0.1"	CBR @ 0.2"	Permeability cm/sec	
				D2216	D4318			D6913			D2974	D4792	D1557								
	TP103	5-7	23-S-4871	52.1							10.5										Organic Content Only
	TP104	5-6	23-S-4872	29.0							3.6										Organic Content Only
	TP106	4-5	23-S-4873	20.7							1.1										Organic Content Only
	TP107	4-5	23-S-4874	40.6							5.4										Organic Content Only
Organic Content tested by RB on 12/6/23.																					

Date Received: **12.04.23** Reviewed By: Date Reviewed: **12.10.23**

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Client Information:	
Tighe & Bond	
Portsmouth, NH	
Project Manager:	Brian Nereson
Assigned By:	Brian Nereson
Collected By:	Client

Project Information:	
Central Middle School	
Greenwich, CT	
Project Number:	G5068
Summary Page:	1 of 1
Report Date:	10.17.23

LABORATORY TESTING DATA SHEET, Report No.: 7423-J-189

Boring No.	Sample No.	Depth (ft/in)	Laboratory No.	Specimen Data						Compressive Strength Tests								Rock Formation or Description or Remarks
				Mohs Hard-ness	Diameter (in)	Length (in)	(1) Unit Weight (PCF)	(2) Wet Density (PCF)	Bulk G_s	(3) Other Tests	(4) Strength PSI	(5) Strain %	(6) E sec PSI EE+06	(7) Poisson's Ratio	st PSI	Is_{50} PSI	(8) s_c PSI	
B1	Core 6.5-11.5	6.5-11.5	23-S-3935		1.982	4.533	164.3				9859	0.326	2.91	0.04				Grey Granite Schist
Fresh Break																		
B2	Core 3-8'	3-8	23-S-3936		1.985	4.465	162.8				10188	1.334	1.13	0.67				Grey Pegmatite
Fresh Break - minor break at about 1617 psi resulting in a high calculation for Poisson's Ratio																		

(1) Volume Determined By Measuring Dimensions

(2) Determined by Measuring Dimensions and Weight of Saturated Sample

Notes

(3) PLD=Point Load (diametrical), PLA= Point Load (Axial) ST= Splitting Tensile U= Unconfined Compressive Strength

(4) Taken at Peak Deviator Stress

Notes

(5) Strain at Peak Deviator Stress

(6) Represents Secant Modulus at 50% of Total Failure Stress

(7) Represents Secant Poisson's Ratio at 50% of Total Failure Stress

(8) Estimated UCS from Table 1 of ASTM D5731 for NX cores (Is x 24)

Date Received: **09.26.23** Reviewed By: Date Review **10.17.23**

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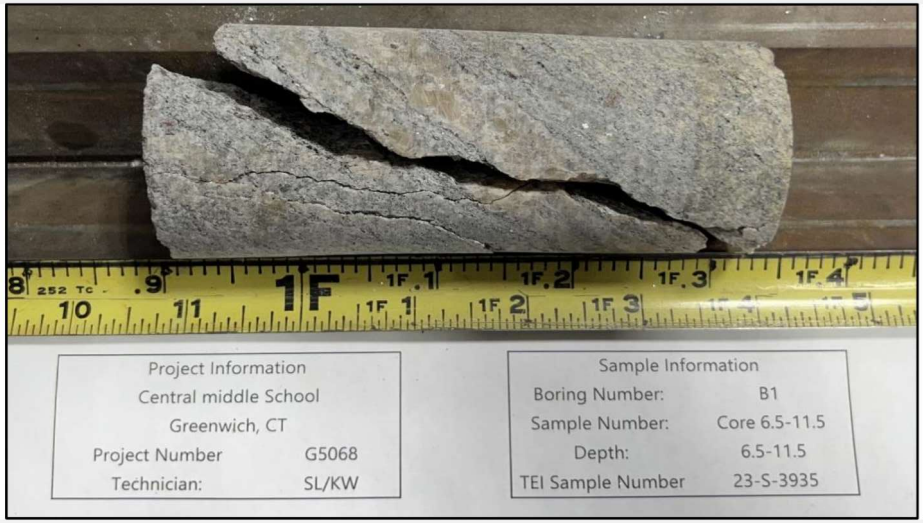
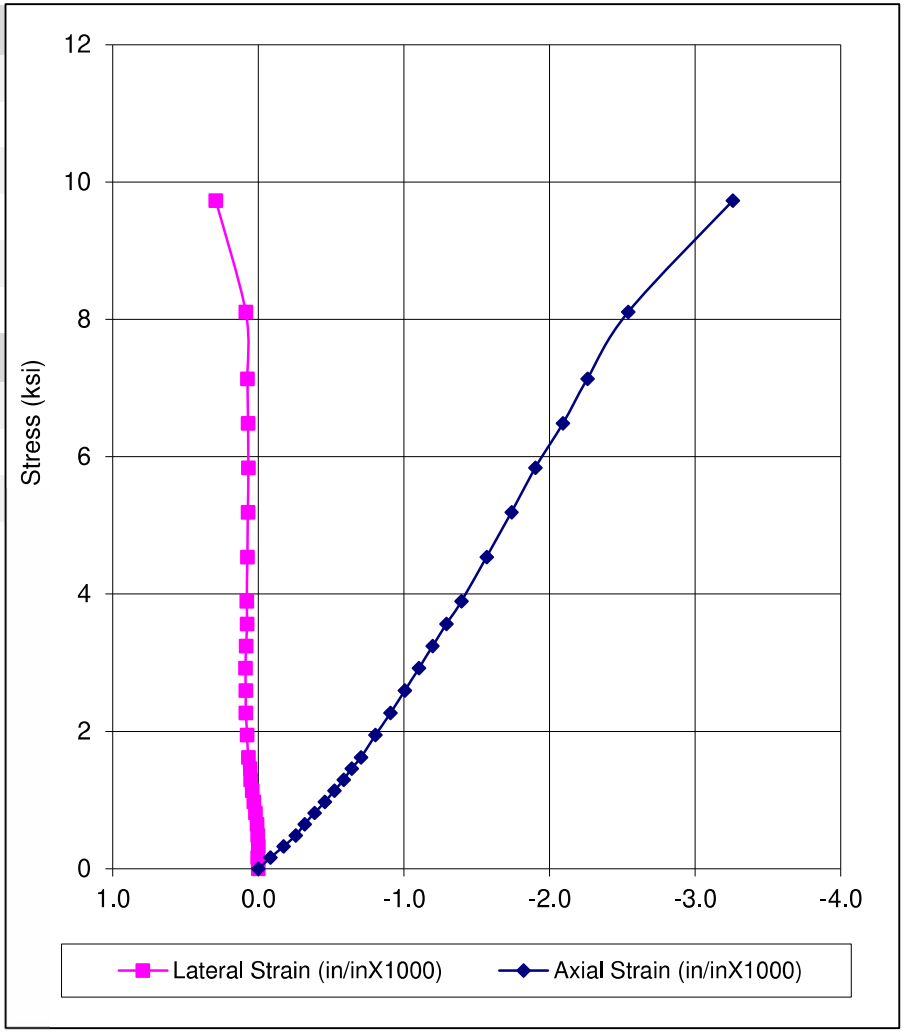
Client Information:	
Tighe & Bond	
Portsmouth, NH	
Project Manager:	Brian Nereson
Assigned by:	Brian Nereson
Collected by:	Client

Project Information:	
Central Middle School	
Greenwich, CT	
Project Number:	G5068
Technician:	KW
Report Date:	10.16.23

ASTM D7012 Compressive Strength and Elastic Moduli of Intact Rock Core Specimens

Sample Information		**Compressive Test Information**	
Boring ID:	B1	**Unit Weight (pcf):**	164.3
Sample #:	Core 6.5-11.5	**Failure Stress (psi):**	9,859
Depth (ft):	6.5-11.5	**Failure Mode:**	Fresh
Tested Depth (ft):	6.9-7.28	**Time to Failure (min)**	8.10
Rock Type:	Grey Granite Schist		
Features:	Fresh Break		
Test Specimen Information		**Elastic Moduli Test Information**	
Diameter, D (in):	1.982	**Poisson's Ratio @ 50%:**	0.04
Length, L (in):	4.533	**Strain %:**	0.326
L:D Ratio:	2.29	**E sec PSI @ 50%:**	2.91E+06





Testing Notes:

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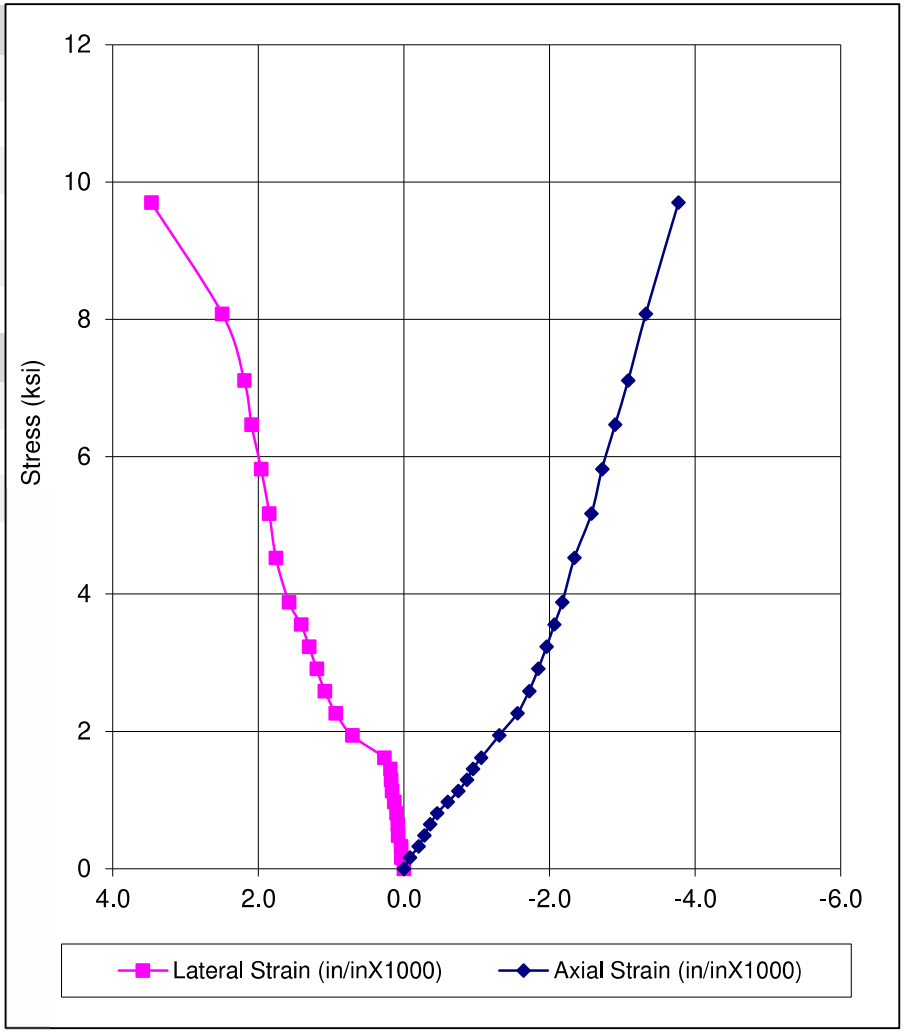
Client Information:	
Tighe & Bond	
Portsmouth, NH	
Project Manager:	Brian Nereson
Assigned by:	Brian Nereson
Collected by:	Client

Project Information:	
Central Middle School	
Greenwich, CT	
Project Number:	G5068
Technician:	KW
Report Date:	10.16.23

ASTM D7012 Compressive Strength and Elastic Moduli of Intact Rock Core Specimens

Sample Information		**Compressive Test Information**	
Boring ID:	B2	**Unit Weight (pcf):**	162.8
Sample #:	Core 3-8	**Failure Stress (psi):**	10,188
Depth (ft):	3-8	**Failure Mode:**	Fresh
Tested Depth (ft):	3.17-3.54	**Time to Failure (min)**	9.72
Rock Type:	Grey Pegmatite		
Features:	Fresh Break		
Test Specimen Information		**Elastic Moduli Test Information**	
Diameter, D (in):	1.985	**Poisson's Ratio @ 50%:**	0.67
Length, L (in):	4.465	**Strain %:**	1.334
L:D Ratio:	2.25	**E sec PSI @ 50%:**	1.13E-06





Testing Notes: **Minor break at about 1617 psi, due to this, the calculated Poisson's Ratio is high**

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SIEVE ANALYSIS ASTM DESIGNATION C136

Client: ***Town of Greenwich*** *101 Field Point Road* *Greenwich , CT 06830* ***Project:*** ***Greenwich Cen. Middle Sch.*** ***9 Indian Rock Lane*** ***Greenwich, CT 06830*** ***Project #: 2021-11-0386A02***	***Sample Source:*** ***Test Pit #1***	**Sample Date:** *08/12/22* **Sample #:** ***220812-1*** **Lab Tech:** *PJM* **Sampled by:** *MH*
	Sample Use: *Subgrade*	***Material Type:*** *Tan Gravel*

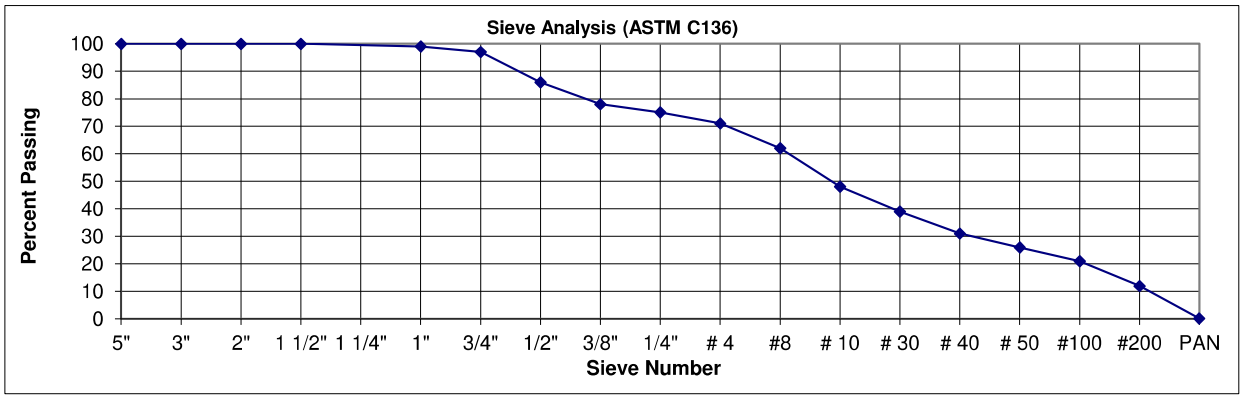
ATANE Report #: MA0386081222-1

SIEVE SIZE (IN / NO.)	WEIGHT (Retained)	% PASSING (Total Sample)	SPECIFICATIONS
5"	0.0	100	
3"	0.0	100	
2"	0.0	100	
1 1/2"	0.0	100	
1 1/4"	--		
1"	80.7	99	
3/4"	242.1	97	
1/2"	1022.1	86	
3/8"	1586.4	78	
1/4"	1810.8	75	
# 4	2108.5	71	
#8	2828.6	62	
# 10	3837.5	48	
# 30	4515.2	39	
# 40	5085.9	31	
# 50	5418.1	26	
#100	5854.5	21.0	
#200	6490.6	11.9	
PAN	7358.2	0.1	

Wet Wash: *No*

% Over #4, Under 3": ***29.0***

Reviewed by:



REVIEW **FAIL** **PASS**

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SIEVE ANALYSIS ASTM DESIGNATION C136

Client: ***Town of Greenwich***
101 Field Point Road
Greenwich, CT 06830

Project: ***Greenwich Cen. Middle Sch.***
9 Indian Rock Lane
Greenwich, CT 06830

Project #: 2021-11-0386A01

Sample Source:	**Sample Date:** *08/12/22*
Test Pit #2	**Sample #:** ***220812-7***
	Lab Tech: *PJM*
	Sampled by: *MH*
Sample Use:	***Material Type:***
Subgrade	*Dark Brown Gravel*

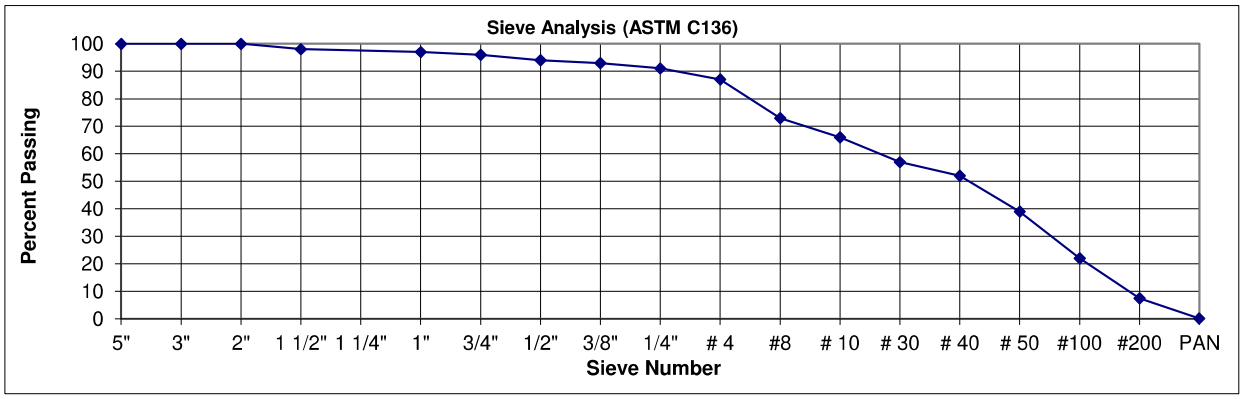
ATANE Report #: MA0386081222-7

SIEVE SIZE (IN / NO.)	WEIGHT (Retained)	% PASSING (Total Sample)	SPECIFICATIONS EARTH MOVING 31 20 00 2.01.G.4
5"	0.0	100	
3"	0.0	100	70-100
2"	52.1	100	
1 1/2"	212.4	98	
1 1/4"	--		
1"	439.3	97	
3/4"	573.2	96	45-95
1/2"	782.1	94	
3/8"	884.7	93	
1/4"	1208.7	91	
# 4	1646.7	87	30-90
#8	3508.5	73	
# 10	4334.4	66	25-80
# 30	5526.9	57	
# 40	6199.2	52	10-50
# 50	7770.4	39	
#100	9997.2	22.0	
#200	11872.6	7.5	0-10
PAN	12814.1	0.1	

Wet Wash: *No*

% Over #4, Under 3": ***13.0***

Reviewed by:



REVIEW X FAIL PASS

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ATANE SIEVE ANALYSIS ASTM DESIGNATION C136 Split Sample

Lab Work Sheet

Client: ***Town of Greenwich*** *101 Field Point Road* *Greenwich, CT 06830* ***Project:*** ***Greenwich Cen. Middle Sch.*** ***9 Indian Rock Lane*** ***Greenwich, CT 06830*** ***Project #: 2021-11-0386A02***	***Sample Source:*** ***Test Pit #3***	**Sample Date:** 8/12/2022 **Sample #:** 220812-8 **Lab Tech:** PJM **Sampled by:** MH	
	Sample Use:	***Material Type:***	
	Subgrade	*Tan Gravel*	

ATANE Report #: MA00386081222-8

Sample Initial Dry Weight: 15,289.40

SIEVE SIZE (IN / NO.)	WEIGHT (Retained)	% PASSING (Total Sample)
5"	0.0	100.0
3"	0.0	100.0
2"	50.1	99.7
1 1/2"	173.8	98.9
1 1/4"	--	
1"	748.9	95.1
3/4"	878.4	94.3
1/2"	1095.2	92.8
3/8"	1268.1	91.7

Split sample to size appropriate for smaller sieves here

Wt of -3/8":	14021.3
Weight of New Split Sample:	692.7

SIEVE SIZE (IN / NO.)	WEIGHT (Retained)	%Passing (Split Sample)	% Passing (Total Sample)
Split Sample			
1/4"	45.3	93.5	85.7
# 4	72.4	89.5	82.1
# 8	169.5	75.5	69.3
# 10	215.3	68.9	63.2
# 30	299.5	56.8	52.1
# 40	338.5	51.1	46.9
# 50	425.7	38.5	35.3
#100	517.8	25.2	23.2
#200	624.7	9.8	9.0
PAN	692.3	0.1	0.1

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SIEVE ANALYSIS ASTM DESIGNATION C136

Client: *Town of Greenwich* *101 Field Point Road* *Greenwich , CT 06830* ***Project:*** *Greenwich Cen. Middle Sch.* *9 Indian Rock Lane* *Greenwich, CT 06830* ***Project #:*** *2021-11-0386A02*	***Sample Source:*** *Test Pit #4* ***Sample Use:*** *Subgrade*	**Sample Date:** *08/12/22* **Sample #:** *220812-2* **Lab Tech:** *PJM* **Sampled by:** *MH* ***Material Type:*** *Tan Gravel*

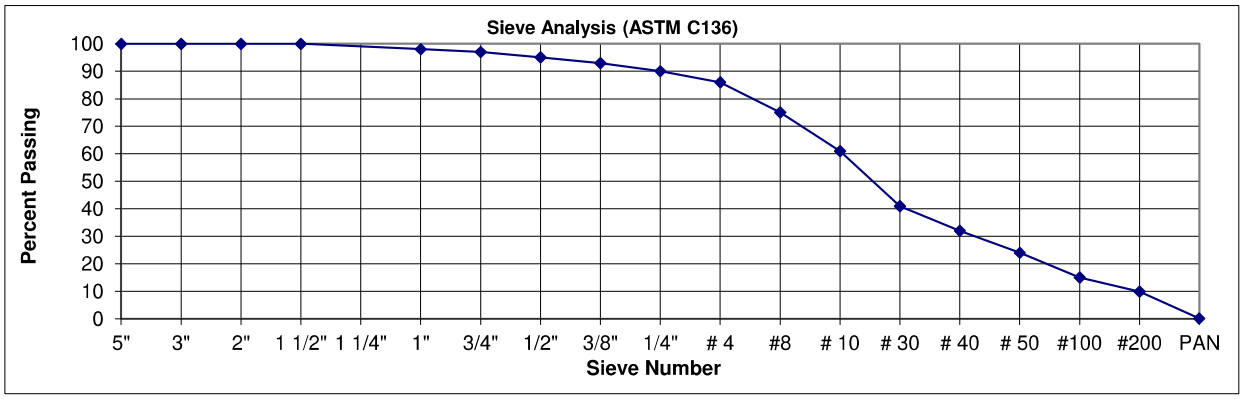
ATANE Report #: MA0386081222-2

SIEVE SIZE (IN / NO.)	WEIGHT (Retained)	% PASSING (Total Sample)	SPECIFICATIONS
5"	0.0	100	
3"	0.0	100	
2"	0.0	100	
1 1/2"	0.0	100	
1 1/4"	--		
1"	190.2	98	
3/4"	266.3	97	
1/2"	412.8	95	
3/8"	516.4	93	
1/4"	774.4	90	
# 4	1134.4	86	
#8	1958.4	75	
# 10	3089.4	61	
# 30	4671.9	41	
# 40	5391.8	32	
# 50	6000.5	24	
#100	6742.3	15.0	
#200	7145.0	9.9	
PAN	7927.4	0.1	

Wet Wash: *No*

% Over #4, Under 3": ***14.0***

Reviewed by:



REVIEW **FAIL** **PASS**

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617/778-7300
FAX 617/268-7832

SIEVE ANALYSIS ASTM DESIGNATION C136

Client: *Town of Greenwich* *101 Field Point Road* *Greenwich, CT 06830* ***Project:*** *Greenwich Cen. Middle Sch.* *9 Indian Rock Lane* *Greenwich, CT 06830* ***Project #:*** *2022-32-0386A02*	***Sample Source:*** *Test Pit #6* ***Sample Use:*** *Subgrade*	**Sample Date:** *08/12/22* **Sample #:** *220812-11* **Lab Tech:** *PJM* **Sampled by:** *MH* ***Material Type:*** *Brown Gravel*

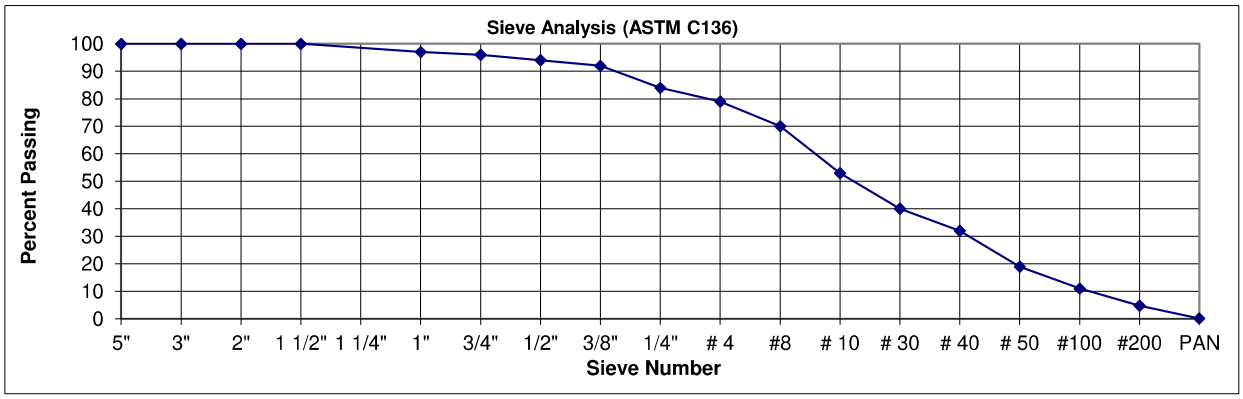
ATANE Report #: MA0386081222-11

SIEVE SIZE (IN / NO.)	WEIGHT (Retained)	% PASSING (Total Sample)	SPECIFICATIONS
5"	0.0	100	
3"	0.0	100	
2"	0.0	100	
1 1/2"	0.0	100	
1 1/4"	--		
1"	378.3	97	
3/4"	612.7	96	
1/2"	831.4	94	
3/8"	1072.8	92	
1/4"	2138.9	84	
# 4	2903.8	79	
#8	4136.0	70	
# 10	6483.5	53	
# 30	8181.2	40	
# 40	9338.6	32	
# 50	11169.6	19	
#100	12193.7	11.0	
#200	13073.6	4.8	
PAN	13717.9	0.1	

Wet Wash: *No*

% Over #4, Under 3": ***21.0***

Reviewed by:



REVIEW **FAIL** **PASS**

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ATANE

ENGINEERS,

P.C.

56 Roland Street
Suite 202
Boston, MA
617/778-7300
FAX 617/268-7832

SIEVE ANALYSIS ASTM DESIGNATION C136

Client: ***Town of Greenwich*** *101 Field Point Road* *Greenwich , CT 06830* ***Project:*** ***Greenwich Cen. Middle Sch.*** ***9 Indian Rock Lane*** ***Greenwich, CT 06830*** ***Project #: 2021-11-0386A02***	***Sample Source:*** ***Test Pit #8***	**Sample Date:** *08/12/22* **Sample #:** ***220812-3*** **Lab Tech:** *PJM* **Sampled by:** *MH*
	Sample Use: *Subgrade*	***Material Type:*** *Tan Gravel*

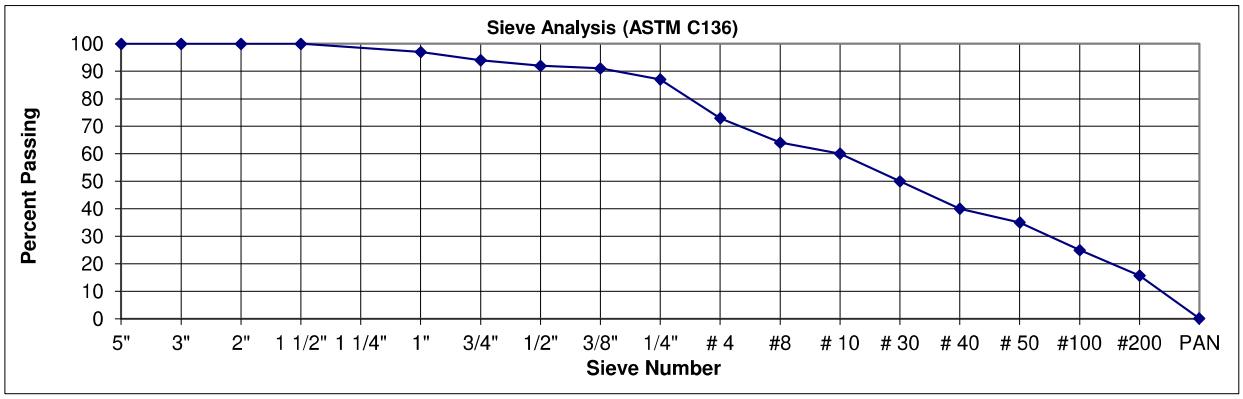
ATANE Report #: MA0386081222-3

SIEVE SIZE (IN / NO.)	WEIGHT (Retained)	% PASSING (Total Sample)	SPECIFICATIONS
5"	0.0	100	
3"	0.0	100	
2"	0.0	100	
1 1/2"	0.0	100	
1 1/4"	--		
1"	239.2	97	
3/4"	548.1	94	
1/2"	703.2	92	
3/8"	845.7	91	
1/4"	1232.8	87	
# 4	2556.1	73	
#8	3399.1	64	
# 10	3784.9	60	
# 30	4636.4	50	
# 40	5591.2	40	
# 50	6102.3	35	
#100	6983.4	25.0	
#200	7879.1	15.8	
PAN	9347.5	0.1	

Wet Wash: *No*

% Over #4, Under 3": ***27.0***

Reviewed by:



REVIEW **FAIL** **PASS**

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SIEVE ANALYSIS ASTM DESIGNATION C136

Client: ***Town of Greenwich*** *101 Field Point Road* *Greenwich, CT 06830* ***Project:*** ***Greenwich Cen. Middle Sch.*** ***9 Indian Rock Lane*** ***Greenwich, CT 06830*** ***Project #: 2021-11-0386A02***	***Sample Source:*** ***Test Pit #9***	**Sample Date:** *08/12/22* **Sample #:** ***220812-9*** **Lab Tech:** *PJM* **Sampled by:** *MH*
	Sample Use: *Subgrade*	***Material Type:*** *Brown Gravel*

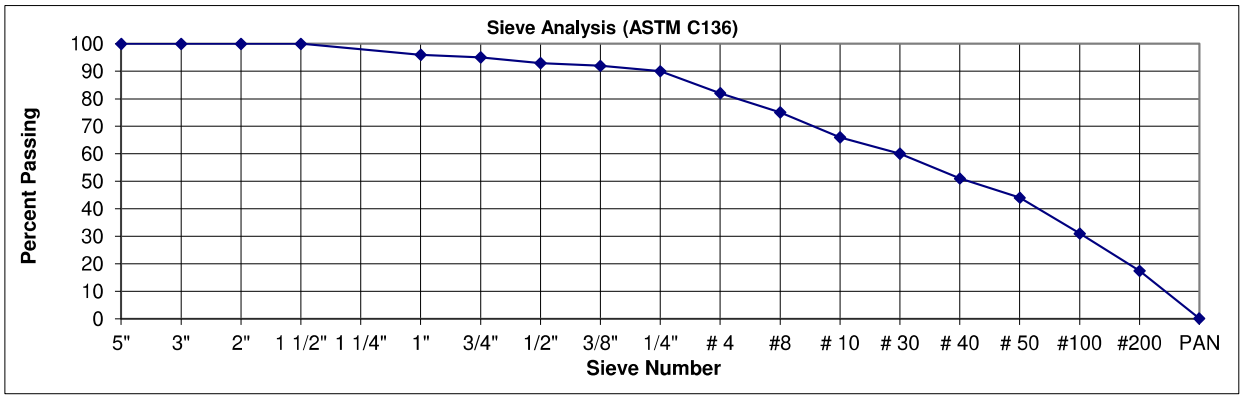
ATANE Report #: MA0386081222-9

SIEVE SIZE (IN / NO.)	WEIGHT (Retained)	% PASSING (Total Sample)	SPECIFICATIONS
5"	0.0	100	
3"	0.0	100	
2"	0.0	100	
1 1/2"	0.0	100	
1 1/4"	--		
1"	482.3	96	
3/4"	567.8	95	
1/2"	789.2	93	
3/8"	893.1	92	
1/4"	1074.0	90	
# 4	2077.5	82	
#8	2813.3	75	
# 10	3840.6	66	
# 30	4498.6	60	
# 40	5496.1	51	
# 50	6311.1	44	
#100	7797.6	31.0	
#200	9315.5	17.4	
PAN	11261.0	0.1	

Wet Wash: *No*

% Over #4, Under 3": ***18.0***

Reviewed by:



REVIEW X FAIL PASS

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ENGINEERS,

P.C.

56 Roland Street
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SIEVE ANALYSIS ASTM DESIGNATION C136

Client: *Town of Greenwich* *101 Field Post Road* *Greenwich, CT 06830* ***Project:*** *Greenwich Cen. Middle Sch.* *9 Indian Rock Lane* *Greenwich, CT 06830* ***Project #:*** *2021-11-0386A02*	***Sample Source:*** *Test Pit #12* ***Sample Use:*** *Subgrade*	**Sample Date:** *08/12/22* **Sample #:** *220812-12* **Lab Tech:** *PJM* **Sampled by:** *MH* ***Material Type:*** *Tan Gravel*

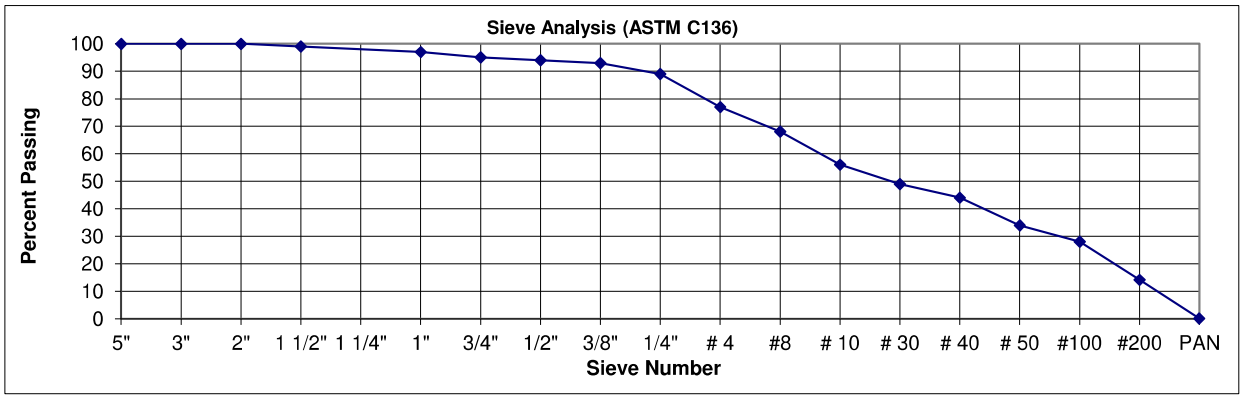
ATANE Report #: MA0386081222-12

SIEVE SIZE (IN / NO.)	WEIGHT (Retained)	% PASSING (Total Sample)	SPECIFICATIONS
5"	0.0	100	
3"	0.0	100	
2"	0.0	100	
1 1/2"	143.2	99	
1 1/4"	--		
1"	387.1	97	
3/4"	589.2	95	
1/2"	677.3	94	
3/8"	802.4	93	
1/4"	1338.8	89	
# 4	2699.6	77	
#8	3702.3	68	
# 10	5218.0	56	
# 30	6042.4	49	
# 40	6523.3	44	
# 50	7707.2	34	
#100	8421.9	28.0	
#200	10067.7	14.2	
PAN	11731.1	0.1	

Wet Wash: *No*

% Over #4, Under 3": ***23.0***

Reviewed by:



REVIEW **FAIL** **PASS**

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ATANE

MATERIAL TESTING GROUP

47 HUDSON STREET
OSSINING, NY 10562

TEL: (914) 945- 9010
FAX: (914) 945-9012

SIEVE ANALYSIS

Report: G-008
Sample Date
Test Date: 10/7/2022
Sample Id: Sample #8
Source: Composite/ combined sample B-17-B-18& B-19

ATANE Project #: 2111-386A02
General Location: Greenwich Central Middle School Greenwich CT

Sieve #	Weight, gms	% Retained	% Passing
2"	0.0	0.0	100
11/2"	0.0	0.0	100
1"	0.0	0.0	100
3/4"	60.4	3.8	96.2
1/2"	96.9	6.2	90.0
3/8"	64.0	4.1	85.9
1/4"	81.5	5.2	80.7
#4	47.8	3.0	77.7
#8	105.1	6.7	71.0
#16	109.4	*7.0*	*64.0*
#20	64.6	*4.1*	*59.9*
#30	66.7	4.2	55.7
#40	94.6	6.0	49.7
#60	151.0	9.5	40.2
#80	28.5	1.8	38.4
#100	99.3	6.3	32.0
#200	232.1	14.7	17.3
Material passing No 200 sieve by washing	258.6		
PAN	12.4	17.3	
TOTAL	1573.9		

Nature: Natural Soil. (Moisture Content # 5.3 %)
Color/ Odor / Impurities: Brownish /None /None
Sample free from larger gravel, debris, waste vegetation, frozen materials, organic materials & other deleterious matter.

Submitted by ATANE

ATANE **MATERIAL TESTING GROUP**

47 HUDSON STREET,
OSSINING, NY 10562

TEL: (914)945-9010
FAX: (914)945-9012

SPECIFIC GRAVITY SOILS TEST REPORT (ASTM D 854)

Client:	Town of Greenwich
Project:	Greenwich Central Middle School
Address:	9, Indian rock Lane, Greenwich CT.
Date Sampled:	Various Dates
Test Date:	10/05/22 & 10/06/22
Report #:	01
HAKS Project #	2021-11-0386A02

SAMPLE No.	LOCATION	Specific Gravity
1	Test Pit # 1	2.653
2	Test Pit # 2	2.659
3	Test Pit # 3	2.681
4	Test Pit # 4	2.677
5	Test Pit # 5	2.668
6	Test Pit # 9	2.680
7	Test Pit # 12	2.678
8	Composite / Combined Sample of B-17, B-18 & B-19	2.695

Lab Tech: NK **Lab Director: SG**

ATANE **MATERIAL TESTING GROUP**

47 HUDSON STREET,
OSSINING, NY 10562

TEL: (914)945-9010
FAX: (914)945-9012

LIQUID LIMIT, PLASTIC LIMIT & PLASTICITY INDEX OF SOILS TEST REPORT (ASTM D 4318)

Client:	Town of Greenwich
Project:	Greenwich Central Middle School
Address:	9, Indian rock Lane, Greenwich CT.
Date Sampled:	Various Dates
Test Date:	10/07/22 & 10/10/22
Report #:	02
HAKS Project #	2021-11-0386A02

LOCATION	Test Pit # 8	Test Pit # 9
Liquid Limit	21.1	22.5
Plastic Limit	18.3	19.1
Plasticity Index	2.8	3.4

Lab Tech: NK **Lab Director: SG**

DIVISION 00 PROCUREMENT AND CONTRACTING DOCUMENTS

SECTION 00 4000 – PROCUREMENT MANUAL

Procurement Documents Attached Herein:

00	**INVITATION TO BID**
1	SLAM DOCUMENTS - DRAWING & SPECIFICATION LIST
2	BID PACKAGE BREAKDOWN
3	BOILER PLATE ADDITIONAL PROVISIONS FOR ALL SUBCONTRACTORS
3A	BP#39 - SCOPE OF WORK - LOW VOLTAGE & AV
3B	TEMPORARY LIGHT AND POWER ADDITIONAL PROVISIONS
4	PROJECT SCHEDULE
5	PROJECT PHASING, LOGISTICS PLANS, & DELIVERY ROUTES
6	TURNER CORPORATE ENVIRONMENTAL HEALTH & SAFETY POLICY
7	CCIP MANUAL
8	TURNER FORM 36 - STANDARD FORM OF AGREEMENT
8A	TURNER FORM 36 - CT PUBLIC WORK RIDER
9	ACCELERATED PAYMENT PLAN RIDER AND INFORMATION SHEET
9A	ACCELLERATED PAYMENT PROGRAM RIDER - CONNECTICUT
10	MINIMUM RATES AND CLASSIFICATIONS FOR BUILDING CONSTRUCTION
11	TEXTURA SUBCONTRACTOR USAGE FEES
12A	FORM 111 PAYMENT BOND MULTIPLE OBLIGEE
12B	FORM 112 MULTIPLE OBLIGEE PERFORMANCE BOND REV
13A	FIRST TIER CONDITIONAL LIEN WAIVERS
13B	FIRST TIER UNCONDITIONAL LIEN WAIVERS
14A	SECOND TIER CONDITIONAL LIEN WAIVERS
14B	SECOND TIER UNCONDITIONAL LIEN WAIVERS

15 GENERAL RELEASE

16 CONTRACTOR SWORN STATEMENT

17 STATE OF CONNECTICUT OPM ETHICS FORM 1

18 STATE OF CONNECTICUT OPM ETHICS FORM 6

19 STATE OF CONNECTICUT PUBLIC ACT 89-255

20 TURNER TRACKER - ONLINE WASTE REPORTING MANUAL

21 TURNER BUSINESS CODE OF CONDUCT

22 UBE SUBCONTRACTOR COMMITMENT PLAN

23 EQUAL OPPORTUNITY POLICY

24 JOBISTE METERING AND FUEL TRACKING LOG

25 GENERAL CONDITIONS OF CONTRACT FOR CONTRACTOR - AIA A201

26 NON-COLLUSION AFFIDAVIT

27 ANTI-HARASSMENT POLICY

28 JOBSITE & OFFICE VANDALISM, GRAFFITI AND DEFACEMENT OF PROPERTY POLICY

29 INCLUSIVE AND RESPECTFUL WORKPLACE PLAYBOOK

30 CT CONTRACTOR VERIFICATION FORM

31 PRE-PURCHASED EQUIPMENT CONTRACTOR COORDINATION MATRICES

32 RECEIPT VERIFICATION FORM FOR SOURCEBLUE EQUIPMENT

33 GCMS WORKER EXPERIENCE PLAN

34 BIDDERS QUESTION LOG

35 TURNER FORM OF PROPOSAL

36 TURNER PREQUALIFICATION FORM

38 BID BOND FORM 110

END OF DOCUMENT 00 4000

INVITATION TO BID

RFI DUE DATE: **Monday, December 9, 2024**
RFI RESPONSES ISSUED BY: **Thursday, December 12, 2024**
BID DUE DATE: **12/20/2024 @ 10 a.m.**
TIME: 10:00 AM
Location: 290 Greenwich Ave. Greenwich CT 06830
PROJECT: Board of Education of The Town of Greenwich
New Central Middle School Project
State Project No. 057-0114 N
Greenwich, CT

ATTENTION ESTIMATING DEPARTMENT:
You are invited to submit your lump sum proposal for your work and materials in accordance with the plans and specifications for the work of your bid package (s) on the following project:

Board of Education of The Town of Greenwich
New Central Middle School Project
State Project No. 057-0114 N
Greenwich, CT

Bids will be received for the bid packages listed below and publicly opened shortly after the bid due date and time deadline at the location indicated. All Bids shall be submitted in a sealed envelope with hard copies in duplicate by mail or in person. The envelope shall be labeled by bid package number, GPS number and bid package description. Bidders submitting for multiple bid packages must submit each bid package sealed and labeled separately by bid package. Bids may be submitted at any time leading up to the specified due date and time, and will remain sealed until the specified due date and time. Turner Construction will be conducting a in person public bid opening at 290 Greenwich Ave, Greenwich CT. Bids received after the specified due date and time will not be allowed to be submitted.
The Form of Proposal and all attachments per the Bid Submission Checklist must included as part of the Bid Submission.

Project General Description:

The project includes approximate 133,500 SF New Central Middle School Project. The overall project consists of the construction of a new building including gymnasium, auditorium, cafeteria and classroom spaces on the north portion of the site where existing fields are currently located. The existing building will be occupied until the new facility is complete and will be demolished once construction is finished. Construction will take place in phases to allow the existing facility to remain functioning. The final site work will include access lanes, parking, athletic fields, and necessary drainage, utilities, and connections.

A list of preliminary trade packages for the project is as follows. If there are any changes to this trade package list, these will be identified in a future Bid Notice.

BP #	*Description*	*GPS #*	*DAS Required*	*SBE/MBE*	*Turner Contact*	*Email*	*Phone*
39	Low Voltage & AV	2495-24	Yes	25/6.25	Chris Leavitt	cleavitt@tcco.com	646-983-1459

Bid Documents

Drawings and specifications will are available at no cost you by downloading from the BUILDING CONNECTED FTP site. To access the project thru our FTP Site please use the following link: https://www.buildingconnected.com/ (Please see invite for access). Drawings can also be purchased at a cost to you from Burke Reprographics. You may call or email your order to Burke Reprographics at (203) 592-5714, or email Mr. Brian Burke at Brian@Burkereprographics.com. Bidders will be held accountable for the requirements of all documents made available and will not be relieved of responsibilities for requirements indicated in any bid documents not purchased or viewed.

Procurement Manual:
The following Documents are attached herein:

#	Description	Dated
1	SLAM Documents - Drawing & Specification List	11/7/2024
2	Bid Package Breakdown	11/7/2024
3	Boiler Plate Additional Provisions for All Subcontractors	9/30/2024
3a	BP#39 - Scope of Work - Low Voltage & AV	10/21/2024
3b	Temporary Light and Power Additional Provisions	7/26/2024
4	Project Schedule	9/24/2024
5	Project Phasing, Logistics Plans, & Delivery Routes	7/8/2024

Turner

INVITATION TO BID

6	Turner Corporate Environmental Health & Safety Policy	Aug-24
7	CCIP Manual	7/23/2024
8	Turner Form 36 - Standard Form of Agreement	7/31/2020
8a	Turner Form 36 - CT Public Work Rider	7/8/2024
9	Accelerated Payment Plan Rider and Information Sheet	Aug-16
9a	Accelerated Payment Program Rider - CONNECTICUT	7/8/2024
10	Minimum Rates and Classifications for Building Construction- CT Prevailing Wage Rates	9/23/2024
11	Textura Subcontractor Usage Fees	Jan-23
12a	Form 111 Payment Bond Multiple Obligee	2/13/2013 & 7/20/12
12b	Form 112 Multiple Obligee Performance Bond Rev	10/19/2018
13a	First Tier Conditional Lien Waivers	7/8/2024
13b	First Tier Unconditional Lien Waivers	7/8/2024
14a	Second Tier Conditional Lien Waivers	7/8/2024
14b	Second Tier Unconditional Lien Waivers	7/8/2024
15	General Release	7/8/2024
16	Contractor Sworn Statement	7/8/2024
17	State of Connecticut OPM Ethics Form 1	5/26/2015
18	State of Connecticut OPM Ethics Form 6	10/1/2011
19	State of Connecticut Public Act 89-255	7/8/2024
20	Turner Tracker - Online Waste Reporting Manual	Jan-15
21	Turner Business Code of Conduct	Jul-21
22	UBE Subcontractor Commitment Plan	7/19/2024
23	Equal Opportunity Policy	Jan-21
24	Jobsite Metering and Fuel Tracking Log	Aug-20
25	General Conditions of Contract for Contractor - AIA A201	7/8/2024
26	Non-Collusion Affidavit	Not Dated
27	Anti-Harassment Policy	9/1/2023
28	Jobsite & Office Vandalism, Graffiti and Defacement of Property Policy	8/21/2020
29	Inclusive and Respectful Workplace Playbook	5/3/2023
30	CT Contractor Verification Form	7/8/2024
31	Pre-Purchased Equipment Contractor Coordination Matrices- Rev.1	8/13/2024
32	Receipt Verification Form for Sourceblue Equipment	6/11/2024
33	GCMS Worker Experience Plan	7/8/2024
34	Bidders Question Log	11/7/2024
The following documentation must be submitted at the time of your proposal submission:		
35	Turner Form of Proposal	12/2/2024
36	Turner Prequalification Form	7/8/2024
37	Non-Collusion Affidavit of Bidder	See item 26 above
38	Bid Bond Form 110	7/8/2024

Requests For Information Procedure:

Any technical questions which bidders may have should be directed, in writing to the corresponding trade contact listed above. Questions received verbally will not be answered. All answers will be published by written Bid Notice. It is the responsibility of all bidders to verify that they are current with all bid notices issued with the blueprinter prior to bid submission and verify receipt of most current information. ***At a minimum bidders questions should include: specific drawing and or specification references and a detailed description of the issue*** . **Bidder Question Deadline is December 9th, 2024**

Turner

INVITATION TO BID

INSTRUCTIONS TO BIDDERS:

1) The following documentation **MUST** be submitted with each bid (2 copies of each) in order per below:
   a) Turner Form of Proposal
   b) Initialed Scope of work sheet for your assigned Bid Package
   c) Non- Collusion Affidavit
   d) Bid Bond (if applicable)
   e) Turner Prequalification Response Form
   f) Current DAS certificate (as applicable)
   g) Current SBE/MBE Certificate (Set-aside Packages Only)
   h) OPM Ethics Form 1 or 6 as applicable

2) **BID OPENING:** Bids will be received for the bid packages listed below and publicly opened shortly after the bid due date and time deadline at the location indicated. All Bids shall be submitted in a sealed envelope with hard copies in duplicate by mail or in person. The envelope shall be labeled by bid package number, GPS number and bid package description. Bidders submitting for multiple bid packages must submit each bid package sealed and labeled separately by bid package. Bids may be submitted at any time leading up to the specified due date and time, and will remain sealed until the specified due date and time. Turner Construction will be conducting a in person public bid opening at 290 Greenwich Ave, Greenwich CT. Bids received after the specified due date and time will not be allowed to be submitted.

3) Each bidder shall utilize the specified manufacturers. Any requests for substitutions **(Including "or equals")** must be submitted in writing by the RFI procedure and deadline. Acceptance or rejection of a substitution will be issued to all bidders as an addendum.
   NOTE: Manufacturers listed in the specifications are not considered a substitution.

4) Each form of proposal contains a section for alternates and/or unit prices. **All alternate prices must be completed with a dollar value**. Blanks, not applicable (n/a), no effect, etc. in these portions of the form of proposal shall be construed to indicate that the particular alternate shall be performed without increase to the contract price as they relate to the scope of the trade package.

5) Unit prices which do not affect the work of your trade may be filled in "not applicable (n/a)". "Not applicable or blanks in these portions of the form of proposal shall be construed to indicate that the unit price is not applicable as they relate to the scope of the trade package.

6) The successful bidder will produce a current audited or reviewed financial statement included with the proposal, for Turner Construction Company's review, which will remain strictly confidential, **NO EXCEPTIONS.**

7) All lines on the bid form must be completed. All items which do not apply to the work in the specified bid package, must be filled in with a dollar amount (n/a or no bid is considered $0 and can be grounds for bid dismissal).

8) No Bidder may withdraw it's Bid within 90 days after the actual date of Bid Opening.

9) **All bid awards must be approved by Turner Construction Company and The Owner. All contractors shall be required to execute the Turner Construction Company's standard Form of Contract (Form 36) or Purchase Order Goods as solely determined by Turner Construction Company.**

10) Bid packages that the Construction Manager estimates are greater $1,000,000 are marked with (Yes) in "DAS Cert. Req'd" column above. For these packages, prospective bidders must be pre-qualified by State of Connecticut Department of Administrative Services (DAS) for the classification of work indicated at the time of Bid. The contractor shall hold a current "DAS" Contractor Prequalification Certificate" (not a predetermination letter) from the Department of Administrative Services of the State of Connecticut according to Connecticut General Statutes Section 4a-100, 4a-101 and 4b-91. Bidders shall submit with their bids, unless noted otherwise, a current "DAS Contractor Prequalification Certificate" along with a current "Update (bid) Statement". If you have any questions regarding these requirements contact the State of CT.DAS, at telephone number 860-713-5280 or visit their web site at www.das.state.ct.us.

11) There will be no extensions of the bid date, unless issued thru Bid Notification. No bids will be accepted after the designated time.

12) Each bid shall be signed and accompanied by a bid security payable to Turner Construction Company in the amount of ten (10%) percent of the bid proposal (for Bids in excess of $100,000) and shall be in the form of Bid Bond Only. Bid Bonds must use the Bond Form issued in the bid documents, issued by a Surety Company listed on the Current U.S. Department of Treasury's Federal Register and be licensed to underwrite bonds in the State of Connecticut.

13) If awarded the Contract, the Successful Bidder will be required to furnish a Performance Bond and a Labor and Materials Payment bond, each in an amount equal to 100% of the Contract Price, in favor of Turner Construction Company and the Town of Greenwich. The premium for these bonds shall be paid by the Contractor and be included in the contract price.

INVITATION TO BID

14) The contract for each Bid Package shall be awarded to the bidder who provides the best combination of price competitiveness, responsiveness and who is highly qualified for work of this project. The successful bidder shall possess the skill, financial strength, technical ability and integrity necessary to ensure the faithful performance of the work. Turner Construction Company and/or The Owner reserve the right to consider as unqualified any bidder that does not habitually perform, with its own forces, the major portion of the work involved in their respective Bid Package. No contract will be awarded to any bidder who is at the time of award not qualified under applicable regulations issued by the Secretary of Labor, United States Department of Labor or any applicable State and local laws and regulations.

15) All bids shall be based on a project classified as tax exempt for New Construction.

16) If awarded the contract, the successful bidder will be responsible to execute The STATE OF CONNECTICUT SUMMARY OF REVISED ETHICS AND AFFIDAVITS ACKNOWLEDGEMENT. This is required for a large State construction or procurement contract, pursuant to C.G.S. §§ 4a-60(b)(c), 4a-81(c) and 1-101qq and 4-252 and Executive Order 21-2.

17) Turner Construction Company and/or The Owner reserve the right to reject any and all bids, waive defects in same, or accept any bid deemed to be in the best interest of Turner Construction Company and/or The Owner.

Please Advise Via BUILDING CONNECTED Immediately If You Do Not Intend To Bid

Very truly yours,

TURNER CONSTRUCTION COMPANY
Joseph Matta
Procurement Agent

Turner Construction is an affirmation action – equal opportunity employer. Minority/Women's Business Enterprises are encouraged to apply.
This Contract is subject to state set-aside and contract compliance requirements

LIST OF CONTRACT DRAWINGS, SPECIFICATIONS

Spec Section	Description	Date	Add. #1	Add. #2	Add. #3	Add. #4	Add. #5	Addendum #6	Comments
SPECIFICATIONS									
Volume 1 - Division 00									
DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS									
00 0110	TABLE OF CONTENTS	9/30/2024							
00 3132	GEOTECHNICAL DATA	9/30/2024		10/16/2024		10/30/2024			*Addendum #2, Addendum #4*
00 4000	TURNER CONSTRUCTION: PHASE 2 OF 3 PROCUREMENT MANUAL	9/30/2024							
Volume 2 - Divisions 01-14									
DIVISION 01 - GENERAL REQUIREMENTS									
01 1000	SUMMARY	9/30/2024							
01 2000	PRICE AND PAYMENT PROCEDURES	9/30/2024							
01 2000A	SUPPLEMENTAL INSTRUCTIONS FORM	9/30/2024							
01 2000B	PROPOSAL REQUEST FORM	9/30/2024							
01 2000C	CONSTRUCTION CHANGE DIRECTIVE FORM	9/30/2024							
01 2100	ALLOWANCES	9/30/2024							
01 2201	UNIT PRICES	9/30/2024							
01 2300	ALTERNATES	9/30/2024							
	SUBSTITUTION PROCEDURES ATTACHMENT – CSI FORM 1.5C	9/30/2024							
01 2500	ATTACHMENT – CSI FORM 13.1A								
01 3000	ADMINISTRATIVE REQUIREMENTS	9/30/2024							
01 3302	FORM B CADD EFT FORM REVD	9/30/2024							
01 3303	FORM C BIM ACCESS LICENSE AGREEMENT	9/30/2024							
	SUSTAINABILITY COMPLIANCE PROCEDURES – CTHPB WORKING	9/30/2024							
01 3566.42	COMPLIANCE CHECKLIST W/ LEED								
01 3566.43	CTHPB SUBMITTAL COVER	9/30/2024							
01 3566.44	CTHPB MATERIAL CALCULATOR	9/30/2024							
01 3566.45	CTHPB VOC FORM	9/30/2024							
01 3566.46	IAQ FIELD REPORT FORM	9/30/2024							
01 3573	DELEGATED DESIGN PROCEDURES	9/30/2024							
01 4000	QUALITY REQUIREMENTS	9/30/2024							
01 4219	REFERENCE STANDARDS	9/30/2024							
01 4339	MOCK-UPS	9/30/2024							
01 4533	CODE-REQUIRED SPECIAL INSPECTIONS AND PROCEDURES	9/30/2024							
	TEMPORARY FACILITIES AND CONTROLS -- ATTACHMENT FORM SCG-	9/30/2024							
01 5000	3021 PROJECT SIGN								
01 5639	TEMPORARY TREE AND PLANT PROTECTION	9/30/2024							
01 5719	TEMPORARY ENVIRONMENTAL CONTROLS	9/30/2024							
01 6000	PRODUCT REQUIREMENTS	9/30/2024							
01 6116	VOLATILE ORGANIC COMPOUND (VOC) CONTENT RESTRICTIONS	9/30/2024							
01 7000	EXECUTION AND CLOSEOUT REQUIREMENTS	9/30/2024							
01 7419	CONSTRUCTION WASTE AND MANAGEMENT DISPOSAL	9/30/2024							
01 7419A	ATTACHMENT: CW&MD CONSTRUCTION WASTE MANAGEMENT FORM	9/30/2024							
01 7800	CLOSEOUT SUBMITTALS	9/30/2024							
01 7900	DEMONSTRATION AND TRAINING	9/30/2024							
01 9113	GENERAL COMMISSIONING REQUIREMENTS	9/30/2024							
	ATTACHMENT: COMMISSIONING PLAN	9/30/2024							
DIVISION 02 - EXISTING CONDITIONS									
02 3000	SUBSURFACE INVESTIGATIONS	9/30/2024					*11/1/2024*		*Addendum #5*
02 4100	DEMOLITION	9/30/2024							
02 4113	SITE UTILITY ABANDONMENT	9/30/2024					*11/1/2024*		*Addendum #5*
	SELECTIVE HAZARDOUS BUILDING MATERIALS ABATEMENT DEMOLITION	9/30/2024							
02 8200									
02 8213	ASBESTOS ABATEMENT	9/30/2024							
	ATTACHMENT: FORM SCG-3011 – ASBESTOS CHECKLIST – CENTRAL MIDDLE SCHOOL	9/30/2024							
02 8313	LEAD-BASED PAINT AWARENESS	9/30/2024							
02 8416	UNIVERSAL WASTE REMOVAL AND RECYCLING	9/30/2024							
02 8432	PCBS GREATER THAN 50PPM REMEDIATION	9/30/2024							
	ATTACHMENT: FORM SCG-3012 PCB CHECKLIST – CENTRAL MIDDLE SCHOOL	9/30/2024							
	ATTACHMENT: FORM SCG-9008 PCB I CAULK - CENTRAL MIDDLE SCHOOL	9/30/2024							
DIVISION 03 - CONCRETE									
03 0516	UNDER-SLAB VAPOR RETARDER	9/30/2024							
03 1000	CONCRETE FORMING AND ACCESSORIES	9/30/2024							
03 2000	CONCRETE REINFORCING	9/30/2024							
03 3000	CAST-IN-PLACE CONCRETE	9/30/2024							
03 3250	CONCRETE POST-INSTALLED ANCHORS	9/30/2024							
03 3511	CONCRETE FLOOR FINISHES	9/30/2024							
03 6213	NON-METALLIC NON-SHRINK GROUTING	9/30/2024							
DIVISION 04 - MASONRY									
04 2000	UNIT MASONRY	9/30/2024							
04 4313	STONE MASONRY VENEER					10/30/2024			*Addendum #4*
04 7323	MANUFACTURED BUILDING STONE MASONRY	9/30/2024							
DIVISION 05 - METALS									
05 0905	FACTORY-APPLIED COATINGS FOR METAL	9/30/2024							
05 1200	STRUCTURAL STEEL FRAMING	9/30/2024							
05 2100	STEEL JOIST FRAMING	9/30/2024							
05 3100	STEEL DECKING	9/30/2024							
05 4000	COLD-FORMED METAL FRAMING	9/30/2024							
05 5000	METAL FABRICATIONS	9/30/2024		10/16/2024					*Addendum #2*
05 5100	METAL STAIRS	9/30/2024							
05 7000	DECORATIVE METAL RAILINGS	9/30/2024							
05 7100	MONUMENTAL METAL STAIRS	9/30/2024							

LIST OF CONTRACT DRAWINGS, SPECIFICATIONS

Spec Section	Description	Date	Add. #1	Add. #2	Add. #3	Add. #4	Add. #5	Addendum #6	Comments
DIVISION 06 - WOOD, PLASTICS AND COMPOSITES									
06 1000	ROUGH CARPENTRY	9/30/2024							
06 2000	FINISH CARPENTRY	9/30/2024							
06 4100	ARCHITECTURAL WOOD CASEWORK	9/30/2024							
06 4200	WOOD PANELING	9/30/2024							
06 6116	SOLID SURFACING FABRICATIONS	9/30/2024							
06 8316	FIBERGLASS REINFORCED PANELING	9/30/2024							
DIVISION 07 - THERMAL AND MOISTURE PROTECTION									
07 1400	FLUID-APPLIED WATERPROOFING	9/30/2024							
07 2100	THERMAL INSULATION	9/30/2024							
07 2119	FOAMED-IN-PLACE INSULATION	9/30/2024						11/6/2024	*Addendum #6*
07 2163	FLUID-APPLIED INSULATIVE COATING	9/30/2024							
07 2410	DIRECT-APPLIED EXTERIOR FINISH SYSTEMS	9/30/2024							
07 2726	FLUID-APPLIED MEMBRANE AIR BARRIERS	9/30/2024							
07 4213.23	METAL COMPOSITE MATERIAL WALL PANELS	9/30/2024							
07 4646	FIBER-CEMENT WALL PANELS	9/30/2024							
07 5423	THERMOPLASTIC POLYOLEFIN (TPO) ROOFING	9/30/2024							
07 6200	SHEET METAL FLASHING AND TRIM	9/30/2024			10/23/2024				*Addendum #3*
07 7100	ROOF SPECIALTIES	9/30/2024							
07 7200	ROOF ACCESSORIES	9/30/2024							
07 8100	APPLIED FIRE PROTECTION	9/30/2024							
07 8123	INTUMESCENT FIRE PROTECTION	9/30/2024							
07 8400	FIRESTOPPING	9/30/2024							
07 9200	JOINT SEALANTS	9/30/2024							
07 9513	EXPANSION JOINT COVER ASSEMBLIES	9/30/2024							
DIVISION 08 - OPENINGS									
08 1113	HOLLOW METAL DOORS AND FRAMES	9/30/2024							
08 1416	FLUSH WOOD DOORS	9/30/2024							
08 3323	OVERHEAD COILING DOORS	9/30/2024							
08 3326	OVERHEAD COILING GRILLES	9/30/2024						11/6/2024	*Addendum #6*
08 4313	ALUMINUM-FRAMED STOREFRONTS	9/30/2024			10/23/2024				*Addendum #3*
08 4413	GLAZED ALUMINUM CURTAIN WALLS	9/30/2024				10/30/2024		11/6/2024	*Addendum #4, Addendum #6*
08 5653	SECURITY AND SERVICE WINDOWS	N/A		10/16/2024					*Addendum #2*
08 6300	METAL-FRAMED SKYLIGHTS	9/30/2024							
08 7100	DOOR HARDWARE	9/30/2024		10/16/2024					*Addendum #2*
08 7101	DOOR HARDWARE SCHEDULE	9/30/2024							
08 8000	GLAZING	9/30/2024							
08 8300	MIRRORS	9/30/2024							
08 9100	LOUVERS	9/30/2024							
08 9200	LOUVERED EQUIPMENT ENCLOSURE	9/30/2024							
DIVISION 09 - FINISHES									
09 0561	COMMON WORK RESULTS FOR FLOORING PREPARATION	9/30/2024							
09 2116	GYPSUM BOARD ASSEMBLIES	9/30/2024							
09 2216	NON-STRUCTURAL METAL FRAMING	9/30/2024							
09 3000	TILING	9/30/2024							
09 5100	ACOUSTICAL CEILINGS	9/30/2024							
09 6429	WOOD STRIP AND PLANK FLOORING	9/30/2024							
09 6466	WOOD ATHLETIC FLOORING	9/30/2024							
09 6500	RESILIENT FLOORING	9/30/2024							
09 6566	RESILIENT ATHLETIC FLOORING	9/30/2024							
09 6700	FLUID-APPLIED FLOORING	9/30/2024							
09 6813	TILE CARPETING	9/30/2024							
09 7200	WALL COVERINGS	9/30/2024							
09 7800	INTERIOR WALL PANELING	9/30/2024							
09 8300	ACOUSTIC FINISHES	9/30/2024							
09 8416	FIXED SOUND REFLECTIVE PANELS	9/30/2024							
09 8430	SOUND-ABSORBING WALL AND CEILING UNITS	9/30/2024							
09 9123	INTERIOR PAINTING	9/30/2024							
DIVISION 10 - SPECIALTIES									
10 1100	VISUAL DISPLAY UNITS	9/30/2024							
10 1416	PLAQUES	9/30/2024							
10 1419	DIMENSIONAL LETTER SIGNAGE	9/30/2024							
10 1423	PANEL SIGNAGE	9/30/2024							
10 1453	TRAFFIC SIGNAGE [LANDSCAPE]	9/30/2024							
10 1453	TRAFFIC SIGNAGE [CIVIL]	9/30/2024							
10 1454	TRAFFIC SIGNAGE REMOVAL AND RELOCATION	9/30/2024							
10 1473	PAINTED SIGNAGE	9/30/2024							
10 2113.19	PLASTIC TOILET COMPARTMENTS	9/30/2024							
10 2123	CUBICLE CURTAINS AND TRACK	9/30/2024							
10 2800	TOILET ACCESSORIES	9/30/2024				10/30/2024			*Addendum #4*
10 4400	FIRE PROTECTION SPECIALTIES	9/30/2024							
10 5113	METAL LOCKERS	9/30/2024				10/30/2024			*Addendum #4*
10 5502	MAIL SORTER	9/30/2024							
10 7516	GROUND-SET FLAGPOLES	9/30/2024							
DIVISION 11 - EQUIPMENT									
11 0610	STAGE RIGGING AND CURTAINS	9/30/2024							
11 3013	APPLIANCES	9/30/2024							
11 4000	FOODSERVICE EQUIPMENT	9/30/2024							
11 5400	ART EQUIPMENT	9/30/2024						11/6/2024	*Addendum #6*
11 5410	TECHNICAL EDUCATION EQUIPMENT	9/30/2024							
11 6623	GYMNASIUM EQUIPMENT	9/30/2024							
11 6643	INTERIOR ELECTRONIC SCOREBOARD	9/30/2024							
11 6833	ATHLETIC FIELD EQUIPMENT	9/30/2024						11/6/2024	*Addendum #6*
11 7300	PATIENT CARE EQUIPMENT	9/30/2024							

LIST OF CONTRACT DRAWINGS, SPECIFICATIONS

Spec Section	Description	Date	Add. #1	Add. #2	Add. #3	Add. #4	Add. #5	Addendum #6	Comments
DIVISION 12 - FURNISHINGS									
12 2401	WINDOW SHADES	9/30/2024							
12 3553.19	WOOD LABORATORY CASEWORK	9/30/2024		10/16/2024					*Addendum #2*
12 3600	COUNTERTOPS	9/30/2024							
12 6100	FIXED AUDIENCE SEATING	9/30/2024			10/23/2024				*Addendum #3*
12 6613	TELESCOPING BLEACHERS	9/30/2024				10/30/2024			*Addendum #4*
12 9300	SITE FURNISHINGS	9/30/2024							
DIVISION 13 - SPECIAL CONSTRUCTION [Not Used]									
DIVISION 14 - Conveying Equipment									
14 2100	ELECTRIC TRACTION ELEVATORS	9/30/2024		10/16/2024					*Addendum #2*
Volume 3 - Divisions 21-26									
DIVISION 21 - FIRE SUPPRESION									
21 0400	GENERAL CONDITIONS FOR FIRE PROTECTION TRADES	9/30/2024							
21 0433	HEAT TRACE FOR FIRE SUPPRESSION PIPING	N/A			10/23/2024				*Addendum #3*
21 0516	EXPANSION FITTINGS AND LOOPS FOR FIRE SUPPRESSION PIPING	9/30/2024							
21 0533	HEAT TRACE FOR PLUMBING PIPING	N/A			10/23/2024				*Addendum #3*
21 0548	VIBRATION AND SEISMIC CONTROLS FOR FIRE SUPPRESSION PIPING AND EQUIPMENT	9/30/2024							
21 1313	WET PIPE SPRINKLER SYSTEMS	9/30/2024							
21 3000	FIRE PUMPS	9/30/2024							
DIVISION 22 - PLUMBING									
22 0400	GENERAL CONDITIONS FOR PLUMBING TRADES	9/30/2024							
22 0516	EXPANSION FITTINGS AND LOOPS FOR PLUMBING PIPING	9/30/2024							
22 0517	SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING	9/30/2024							
22 0519	METERS AND GAUGES FOR PLUMBING PIPING	9/30/2024							
22 0523	GENERAL DUTY VALVES FOR PLUMBING PIPING	9/30/2024							
22 0529	HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT	9/30/2024							
22 0548	VIBRATION AND SEISMIC CONTROLS FOR PLUMBING PIPING AND EQUIPMENT	9/30/2024							
22 0553	IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT	9/30/2024							
22 0700	PLUMBING INSULATION	9/30/2024							
22 1005	PLUMBING PIPING	9/30/2024						11/6/2024	*Addendum #6*
22 1123	FUEL GAS PIPING	9/30/2024							
22 1124	DOMESTIC WATER PUMPS	9/30/2024							
22 1500	GENERAL SERVICE COMPRESSED-AIR SYSTEMS	9/30/2024							
22 3000	PLUMBING EQUIPMENT	9/30/2024							
22 4000	PLUMBING FIXTURES AND SPECIALTIES	9/30/2024							
DIVISION 23 - HEATING, VENTILATING AND AIR CONDITIONING (HVAC)									
23 0400	GENERAL CONDITIONS FOR MECHANICAL TRADES	9/30/2024							
23 0516	EXPANSION FITTINGS AND LOOPS FOR HVAC PIPING	9/30/2024							
23 0517	SLEEVES AND SLEEVE SEALS FOR HVAC PIPING	9/30/2024							
23 0523	GENERAL DUTY VALVES FOR HVAC PIPING	9/30/2024							
23 0529	HANGERS AND SUPPORTS FOR HVAC PIPING, DUCTWORK, AND EQUIPMENT	9/30/2024							
23 0548	VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT	9/30/2024							
23 0553	IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT	9/30/2024							
23 0593	TESTING, ADJUSTING, AND BALANCING FOR HVAC	9/30/2024							
23 0700	HVAC INSULATION	9/30/2024							
23 0900	INSTRUMENTATION AND CONTROLS FOR HVAC	9/30/2024				10/30/2024		11/6/2024	*Addendum #4, Addendum #6*
23 0993	SEQUENCE OF OPERATIONS	9/30/2024			10/23/2024	10/30/2024			*Addendum #3, Addendum #4*
23 2113	HYDRONIC PIPING	9/30/2024							
23 2114	HYDRONIC SPECIALTIES	9/30/2024							
23 2123	HYDRONIC PUMPS	9/30/2024			10/23/2024				*Addendum #3*
23 2500	HVAC WATER TREATMENT	9/30/2024							
23 3100	HVAC DUCTS AND CASINGS	9/30/2024			10/23/2024			11/6/2024	*Addendum #3, Addendum #6*
23 3300	AIR DUCT ACCESSORIES	9/30/2024							
23 3400	HVAC FANS	9/30/2024			10/23/2024				*Addendum #3*
23 3600	AIR TERMINAL UNITS	9/30/2024							
23 3700	AIR OUTLETS AND INLETS	9/30/2024							
23 5100	BREECHINGS, CHIMNEYS, AND STACKS	9/30/2024							
23 5239	FIRE-TUBE BOILERS	9/30/2024							
23 5700	HEAT EXCHANGERS FOR HVAC	9/30/2024							
23 6411	PACKAGED WATER CHILLERS - SCROLL	9/30/2024						11/6/2024	*Addendum #6*
23 7413	MODULAR CENTRAL-STATION AIR-HANDLING UNITS	9/30/2024							
23 8126	SPLIT-SYSTEM AIR-CONDITIONERS	9/30/2024						11/6/2024	*Addendum #6*
23 8200	CONVECTION HEATING AND COOLING UNITS	9/30/2024				10/30/2024			*Addendum #4*
DIVISION 25 - INTEGRATED AUTOMATION [Not Used]									

LIST OF CONTRACT DRAWINGS, SPECIFICATIONS

Spec Section	Description	Date	Add. #1	Add. #2	Add. #3	Add. #4	Add. #5	Addendum #6	Comments
DIVISION 26 - ELECTRICAL									
26 0400	GENERAL CONDITIONS FOR ELECTRICAL TRADES	9/30/2024							
26 0503	EQUIPMENT WIRING CONNECTIONS	9/30/2024							
26 0519	ELECTRICAL POWER CONDUCTORS AND CABLES	9/30/2024							
26 0526	GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS	9/30/2024							
26 0529	HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS	9/30/2024							
26 0533	RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS	9/30/2024							
26 0534	FLOOR BOXES FOR ELECTRICAL SYSTEMS	9/30/2024							
26 0536	CABLE TRAYS FOR ELECTRICAL SYSTEMS	9/30/2024							
26 0548	VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL	N/A						11/6/2024	*Addendum #6*
26 0553	IDENTIFICATION FOR ELECTRICAL SYSTEMS	9/30/2024							
26 0573	OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY	9/30/2024						11/6/2024	*Addendum #6*
26 0923	LIGHTING CONTROL DEVICES	9/30/2024							
26 2200	LOW-VOLTAGE TRANSFORMERS	9/30/2024							
26 2413	SWITCHBOARDS	9/30/2024							
26 2416	PANELBOARDS	9/30/2024							
26 2653	ELECTRIC VEHICLE CHARGING EQUIPMENT	9/30/2024							
26 2716	ELECTRICAL CABINETS AND ENCLOSURES	9/30/2024							
26 2726	WIRING DEVICES	9/30/2024		10/16/2024					*Addendum #2*
26 2813	FUSES	9/30/2024							
26 2819	ENCLOSED SWITCHES	9/30/2024							
26 2823	ENCLOSED CIRCUIT BREAKERS	9/30/2024							
26 2826	ENCLOSED TRANSFER SWITCHES	9/30/2024							
26 3213	ENGINE GENERATORS	9/30/2024							
26 4113	LIGHTNING PROTECTION FOR STRUCTURES	9/30/2024							
26 5100	LIGHTING	9/30/2024							
26 5561	THEATRICAL LIGHTING	9/30/2024							
Volume 4 - Divisions 27-34									
DIVISION 27 - COMMUNICATIONS									
27 0536	CABLE TRAYS FOR COMMUNICATION SYSTEMS	9/30/2024							
27 1000	STRUCTURED CABLING	9/30/2024							
27 4100	AUDIO VIDEO SYSTEMS	9/30/2024							
27 5116	PUBLIC ADDRESS SYSTEM	9/30/2024							
27 5313	CLOCK SYSTEM	9/30/2024							
27 6010	EMERGENCY RESPONDER RADIO COVERAGE SYSTEM	9/30/2024							
DIVISION 28 - ELECTRONIC SAFETY AND SECURITY									
28 0500	SECURITY CONDUCTOR CABLES	9/30/2024							
28 0528	PATHWAYS FOR SECURITY SYSTEMS	9/30/2024						11/6/2024	*Addendum #6*
28 1300	ACCESS CONTROL SYSTEM	9/30/2024							
28 1600	INTRUSION DETECTION	9/30/2024							
28 2300	VIDEO SURVEILLANCE SYSTEM	9/30/2024							
28 3100	FIRE DETECTION AND ALARM	9/30/2024							
DIVISION 31 - EARTHWORK									
31 1000	SITE CLEARING	9/30/2024							
31 1000	SELECTIVE CLEARING AND THINNING [CIVIL]	9/30/2024							
31 1005	ATHLETIC FIELD SITE PREPARATION	9/30/2024							
31 1006	SOIL STRIPPING AND STOCKPILING	9/30/2024							
31 1200	SITE UTILITY PREPARATION	9/30/2024					*11/1/2024*		*Addendum #5*
31 2200	GRADING	9/30/2024							
31 2300	EXCAVATION, BACKFILL, COMPACTION AND DEWATERING	9/30/2024					*11/1/2024*		*Addendum #5*
31 2316.26	ROCK REMOVAL	9/30/2024					*11/1/2024*	11/6/2024	*Addendum #5, Addendum #6*
31 2323	BORROW MATERIAL	9/30/2024					*11/1/2024*		*Addendum #5*
31 2333	TRENCHING AND BACKFILLING	9/30/2024					*11/1/2024*		*Addendum #5*
31 2500	SOIL EROSION AND SEDIMENT CONTROLS	9/30/2024							
31 6616	AGGREGATE PIERS	9/30/2024					*11/1/2024*		*Addendum #5*
DIVISION 32 - EXTERIOR IMPROVEMENTS									
32 0529	GLACIAL BOULDERS FOR EXTERIOR IMPROVEMENTS	9/30/2024		10/16/2024		10/30/2024			*Addendum #2, Addendum #4*
32 1216	ASPHALT PAVING	9/30/2024							
32 1313	CONCRETE PAVING	9/30/2024						11/6/2024	*Addendum #6*
32 1373	CONCRETE PAVING JOINT SEALANTS	9/30/2024							
32 1400	UNIT PAVERS	9/30/2024				10/30/2024			*Addendum #4*
32 1500	AGGREGATE SURFACING	9/30/2024							
~~32 1613.23~~	~~PRECAST CONCRETE CURB~~	9/30/2024				10/30/2024			Specification Section Removed in Addendum #4
32 1640	GRANITE CURBING	9/30/2024				10/30/2024			*Addendum #4*
32 1726	TACTILE WARNING SURFACES	9/30/2024							
32 1823.17	NATURAL INFIELD AND WARNING TRACK SURFACING	9/30/2024							
32 3113	CHAIN LINK FENCES AND GATES	9/30/2024		10/16/2024					*Addendum #2*
~~32 3118~~	~~METAL FENCES AND GATES~~	9/30/2024							Specification Section Removed in Addendum #6
~~32 3120~~	~~VEHICLE BARRIER GATES~~	9/30/2024							Specification Section Removed in Addendum #6
32 3223	SEGMENTAL RETAINING WALLS	9/30/2024							
32 8415	SITEWORK SLEEVES	9/30/2024							
32 8423	IRRIGATION SYSTEMS	9/30/2024							
32 9113	SOIL PREPARATION	9/30/2024							
32 9113.29	ATHLETIC FIELD ROOT ZONE	9/30/2024							
32 9200	TURF AND GRASSES	9/30/2024							
32 9219.22	ATHLETIC FIELD SEEDING AND SODDING	9/30/2024							
32 9300	PLANTS	9/30/2024							
DIVISION 33 - UTILITIES									
33 0513	MANHOLES AND CATCH BASINS	9/30/2024				10/30/2024			*Addendum #4*
33 0514	BREAKING INTO EXISTING MANHOLES AND CATCH BASINS	9/30/2024				10/30/2024			*Addendum #4*
33 1113	DUCTILE IRON PIPE AND FITTINGS	9/30/2024					*11/1/2024*		*Addendum #5*
33 1300	DISINFECTION OF WATER DISTRIBUTION SYSTEMS	9/30/2024							
33 1400	TESTING OF WATER DISTRIBUTION SYSTEMS	9/30/2024							
33 3113	POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS	9/30/2024				10/30/2024	*11/1/2024*		*Addendum #4, Addendum #5*
33 3114	TESTING OF SANITARY SEWER AND STORM DRAINAGE SYSTEMS	9/30/2024				10/30/2024			*Addendum #4*
33 3115	TELEVISION INSPECTION OF PIPELINES	N/A		10/16/2024					*Addendum #2*
33 4100	STORM DRAINAGE	9/30/2024					*11/1/2024*		*Addendum #5*
33 4113	HIGH DENSITY POLYETHYLENE PIPE AND FITTINGS	9/30/2024					*11/1/2024*		*Addendum #5*
33 4114	UNDERGROUND WARNING TAPE	9/30/2024				10/30/2024			*Addendum #4*
33 4419	STORMWATER TREATMENT SYSTEM	9/30/2024					*11/1/2024*		*Addendum #5*
DIVISION 34 - TRANSPORTATION									
34 0000	TRANSPORTATION	9/30/2024							
34 4114	RECTANGULAR RAPID FLASHING BEACON	9/30/2024							
34 4115	LED SCHOOL RADAR SPEED DISPLAY WITH FLASHING BEACONS	9/30/2024							
34 4117	PEDESTRIAN PUSH BUTTON	9/30/2024							
34 7001	TRAFFIC PERSON	9/30/2024							
34 7002	MAINTENANCE AND PROTECTION OF TRAFFIC	9/30/2024							
DIVISION 40 - PROCESS INTEGRATION [Not Used]									
DIVISION 46 - WATER AND WASTEATER EQUIPMENT [Not Used]									
APPENDICES - tbd									

Board of Education of the Town of Greenwich
Central Middle School Project -
State Project No. 057-0114N
Greenwich, CT

Turner Construction Company
7/8/2024
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LIST OF CONTRACT DRAWINGS, SPECIFICATIONS

Spec Section	Description	Date	Add. #1	Add. #2	Add. #3	Add. #4	Add. #5	Addendum #6	Comments
DRAWINGS									
VOLUME 1									
[01] GENERAL									
C1	COVER SHEET (VOLUME 1)	9/30/2024							
GI01.1	DRAWING LIST	9/30/2024							
GI02.1	GENERAL INFORMATION	9/30/2024							
GC0A	CODE INFORMATION	9/30/2024						11/6/2024	*Addendum #6*
GC0B	BUILDING AREA PLANS	9/30/2024							
GC01	FIRST FLOOR FIRE SAFETY PLAN	9/30/2024							
GC02	SECOND FLOOR FIRE SAFETY PLAN	9/30/2024							
GC11	FIRST FLOOR FIRE PROOFING AND STEEL TREATMENT PLAN	9/30/2024							
GC12	SECOND FLOOR FIRE PROOFING AND STEEL TREATMENT PLAN	9/30/2024							
GC13	ROOF LEVEL FIRE PROOFING AND STEEL TREATMENT PLAN	9/30/2024							
[02] HAZARDOUS MATERIALS									
HBM-01	HAZARDOUS BUILDING MATERIALS ABATEMENT PLAN - FIRST FLOOR	9/30/2024							
HBM-02	HAZARDOUS BUILDING MATERIALS ABATEMENT PLAN - SECOND FLOOR	9/30/2024							
HBM-03	HAZARDOUS BUILDING MATERIALS ABATEMENT PLAN - ROOF	9/30/2024							
[03] SURVEY									
23-011	PROPERTY/BOUNDARY AND TOPOGRAPHIC SURVEY 1 OF 5	9/30/2024							
23-012	PROPERTY/BOUNDARY AND TOPOGRAPHIC SURVEY 2 OF 5	9/30/2024							
23-013	PROPERTY/BOUNDARY AND TOPOGRAPHIC SURVEY 3 OF 5	9/30/2024							
23-014	PROPERTY/BOUNDARY AND TOPOGRAPHIC SURVEY 4 OF 5	9/30/2024							
23-015	PROPERTY/BOUNDARY AND TOPOGRAPHIC SURVEY 5 OF 5	9/30/2024							
[04] CIVIL									
C001	GENERAL NOTES, ABREVIATIONS, AND LEGEND	9/30/2024							
C101	OVERALL SITE STORMWATER MANAGEMEN PLAN	9/30/2024		10/16/2024					*Addendum #2*
C102	SITE STORMWATER MANAGEMEN PART PLAN	9/30/2024							
C103	SITE STORMWATER MANAGEMEN PART PLAN	9/30/2024							
C104	SITE STORMWATER MANAGEMEN PART PLAN	9/30/2024		10/16/2024					*Addendum #2*
C105	SITE STORMWATER MANAGEMEN PART PLAN	9/30/2024							
C106	SITE STORMWATER MANAGEMEN PART PLAN	9/30/2024							
C107	SITE STORMWATER MANAGEMEN PART PLAN	9/30/2024							
C201	OVERALL SITE LOW IMPACT DEVELOPMENT PLAN	9/30/2024							
C202	SITE LOW IMPACT DEVELOPMENT PART PLAN	9/30/2024				10/30/2024			*Addendum #4*
C203	SITE LOW IMPACT DEVELOPMENT PART PLAN	9/30/2024				10/30/2024			*Addendum #4*
C204	SITE LOW IMPACT DEVELOPMENT PART PLAN	9/30/2024							
C205	SITE LOW IMPACT DEVELOPMENT PART PLAN	9/30/2024				10/30/2024			*Addendum #4*
C206	OVERALL SOIL TEST LOCATIONS PLAN	9/30/2024				10/30/2024			*Addendum #4*
C301	OVERALL SITE UTILITY PLAN	9/30/2024		10/16/2024		10/30/2024			*Addendum #2, Addendum #4*
C302	SITE UTILITY PART PLAN	9/30/2024				10/30/2024			*Addendum #4*
C303	SITE UTILITY PART PLAN	9/30/2024				10/30/2024			*Addendum #4*
C304	SITE UTILITY PART PLAN	9/30/2024				10/30/2024			*Addendum #4*
C305	SITE UTILITY PART PLAN	9/30/2024				10/30/2024			*Addendum #4*
C306	SANITARY SEWER EXISTING PLAN AND PROFILE	9/30/2024							
C307	SANITARY SEWER PROPOSED PLAN AND PROFILE	9/30/2024				10/30/2024			*Addendum #4*
C308	SITE UTILITY PROFILES	9/30/2024							
C401	OVERALL PHASE 1 DEMOLITION, ENABLING AND SITE SOIL EROSION AND SEDIMENTATION CONTROL PLAN	9/30/2024							
C402	PHASE 1 DEMOLITION, ENABLING AND SITE SOIL EROSION AND SEDIMENTATION CONTROL PART PLAN	9/30/2024							
C403	PHASE 1 DEMOLITION, ENABLING AND SITE SOIL EROSION AND SEDIMENTATION CONTROL PART PLAN	9/30/2024							
C404	PHASE 1 DEMOLITION, ENABLING AND SITE SOIL EROSION AND SEDIMENTATION CONTROL PART PLAN	9/30/2024							
C405	PHASE 1 DEMOLITION, ENABLING AND SITE SOIL EROSION AND SEDIMENTATION CONTROL PART PLAN	9/30/2024							
C406	PHASE 1 IMPROVED CONDITIONS SOIL EROSION AND SEDIMENTATION CONTROL PLAN	9/30/2024							
C407	PHASE 1 IMPROVED CONDITIONS SOIL EROSION AND SEDIMENTATION CONTROL PART PLAN	9/30/2024							
C408	PHASE 1 IMPROVED CONDITIONS SOIL EROSION AND SEDIMENTATION CONTROL PART PLAN	9/30/2024							
C409	PHASE 1 IMPROVED CONDITIONS SOIL EROSION AND SEDIMENTATION CONTROL PART PLAN	9/30/2024							
C410	PHASE 1 IMPROVED CONDITIONS SOIL EROSION AND SEDIMENTATION CONTROL PART PLAN	9/30/2024							
C411	PHASE 2 DEMOLITION SOIL EROSION AND SEDIMENTATION CONTROL PLAN	9/30/2024							
C412	PHASE 2 DEMOLITION SOIL EROSION AND SEDIMENTATION CONTROL PART PLAN	9/30/2024							
C413	PHASE 2 DEMOLITION SOIL EROSION AND SEDIMENTATION CONTROL PART PLAN	9/30/2024							
C414	PHASE 2 IMPROVED CONDITIONS SOIL EROSION AND SEDIMENTATION CONTROL PLAN	9/30/2024							
C415	PHASE 2 IMPROVED CONDITIONS SOIL EROSION AND SEDIMENTATION CONTROL PART PLAN	9/30/2024							
C416	PHASE 2 IMPROVED CONDITIONS SOIL EROSION AND SEDIMENTATION CONTROL PART PLAN	9/30/2024							
C417	SOIL EROSION AND SEDIMENTATION CONTROL NOTES, CONSTRUCTION SEQUENCE AND DETAILS - 1	9/30/2024							
C418	SOIL EROSION AND SEDIMENTATION CONTROL NOTES, CONSTRUCTION SEQUENCE AND DETAILS - 2	9/30/2024							
C501	SITE STORMWATER MANAGMENT DETAILS - 1	9/30/2024			10/23/2024				*Addendum #3*
C502	SITE STORMWATER MANAGMENT DETAILS - 2	9/30/2024							
C503	SITE STORMWATER MANAGMENT DETAILS - 3	9/30/2024							
C504	SITE STORMWATER MANAGMENT DETAILS - 4	9/30/2024							
C505	SITE STORMWATER MANAGMENT DETAILS - 5	9/30/2024							
C506	SANITARY SEWER DETAILS	9/30/2024				10/30/2024			*Addendum #4*
C507	SITE UTILITY DETAILS - 1	9/30/2024							
C508	SITE UTILITY DETAILS - 2	9/30/2024						11/6/2024	*Addendum #6*
C601	PARENT DRIVEWAY PROFILE 01	9/30/2024							
C602	PARENT DRIVEWAY PROFILE 02	9/30/2024							
C603	EMERGENCY PATH PROFILE 01	9/30/2024							
C604	EMERGENCY PATH PROFILE 02	9/30/2024							
C605	BUS DRIVEWAY PROFILE	9/30/2024							
C605A	SIGHT LINE PROFILES	9/30/2024							
C606	SIGHT LINE PROFILES	9/30/2024							
C607	BUS TURNING MOVEMENT PLAN	9/30/2024							
C608	FIRE TRUCK TURNING MOVEMENT PLAN	9/30/2024							
C609	SU-30 TURNING MOVEMENT PLAN	9/30/2024							
C610	WB-50 TURNING MOVEMENT PLAN	9/30/2024							
TC101	TRAFFIC CONTROL SIGNAL PLAN	9/30/2024							
TC101A	TRAFFIC CONTROL SIGNAL PLAN	9/30/2024							
TC102	TRAFFIC CONTROL SIGNAL PLAN	9/30/2024							
TC201	SIGNAGE AND PAVEMENT MARKING PLAN	9/30/2024							
TC202	SIGNAGE AND PAVEMENT MARKING PLAN	9/30/2024			10/23/2024				*Addendum #3*
TC203	OVERALL ON-SITE TRAFFIC SIGNAGE, PAVEMENT MARKINGS, AND PARKING SPACE LAYOUT PLAN	9/30/2024							
TC204	ON-SITE TRAFFIC SIGNAGE, PAVEMENT MARKINGS, AND PARKING SPACE LAYOUT PART PLAN	9/30/2024							
TC205	ON-SITE TRAFFIC SIGNAGE, PAVEMENT MARKINGS, AND PARKING SPACE LAYOUT PART PLAN	9/30/2024							
TC206	ON-SITE TRAFFIC SIGNAGE, PAVEMENT MARKINGS, AND PARKING SPACE LAYOUT PART PLAN	9/30/2024							
TC207	ON-SITE TRAFFIC SIGNAGE, PAVEMENT MARKINGS, AND PARKING SPACE LAYOUT PART PLAN	9/30/2024							
TC301	TRAFFIC DETAIL PLAN	9/30/2024							

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Spec Section	Description	Date	Add. #1	Add. #2	Add. #3	Add. #4	Add. #5	Addendum #6	Comments
TC302	TRAFFIC DETAIL PLAN	9/30/2024							
TC303	TRAFFIC DETAIL PLAN	9/30/2024							
TC304	TRAFFIC DETAIL PLAN	9/30/2024							
TC305	TRAFFIC DETAIL PLAN	9/30/2024							
TC306	TRAFFIC DETAIL PLAN	9/30/2024							
TC307	TRAFFIC DETAIL PLAN	9/30/2024							
TC308	TRAFFIC DETAIL PLAN	9/30/2024							
TC309	TRAFFIC DETAIL PLAN	9/30/2024							
TC310	TRAFFIC DETAIL PLAN	9/30/2024							
TC311	TRAFFIC DETAIL PLAN	9/30/2024							
TC312	TRAFFIC DETAIL PLAN	9/30/2024							
[06] SITE UTILITIES									
SU100	MEP SITE UTILITY PLAN	9/30/2024		10/16/2024	10/23/2024				*Addendum #2, Addendum #3*
SU500	MEP SITE UTILITY PLAN - DETAILS & SCHEDULES	9/30/2024						11/6/2024	*Addendum #6*
SU501	MEP SITE UTILITY PLAN - DETAILS & SCHEDULES	9/30/2024			10/23/2024				*Addendum #3*
PSU001	PLUMBING SITE UTILITY PLAN	9/30/2024		10/16/2024	10/23/2024				*Addendum #2, Addendum #3*
[10] LANDSCAPE									
L001	GENERAL SITE INFORMATION	9/30/2024						11/6/2024	*Addendum #6*
L002	VICINITY MAP	9/30/2024							
L101	SITE DEMOLITION AND PREPARATION OVERALL	9/30/2024							
L101A	SITE DEMOLITION AND PREPARATION NORTHEAST	9/30/2024							
L101B	SITE DEMOLITION AND PREPARATION SOUTHEAST	9/30/2024		10/16/2024					*Addendum #2*
L101C	SITE DEMOLITION AND PREPARATION SOUTHWEST	9/30/2024							
L101D	SITE DEMOLITION AND PREPARATION NORTHWEST	9/30/2024							
L201	SITE LAYOUT OVERALL	9/30/2024							
L201A	SITE LAYOUT NORTHEAST	9/30/2024							
L201B	SITE LAYOUT SOUTHEAST	9/30/2024							
L201C	SITE LAYOUT SOUTHWEST	9/30/2024							
L201D	SITE LAYOUT NORTHWEST	9/30/2024							
L202	SITE MATERIALS OVERALL	9/30/2024							
L202A	SITE MATERIALS NORTHEAST	9/30/2024		10/16/2024		10/30/2024		11/6/2024	*Add. #2, Add. #4, Addendum #6*
L202B	SITE MATERIALS SOUTHEAST	9/30/2024				10/30/2024			*Addendum #4*
L202C	SITE MATERIALS SOUTHWEST	9/30/2024		10/16/2024		10/30/2024			*Addendum #2, Addendum #4*
L202D	SITE MATERIALS NORTHWEST	9/30/2024							
L301	SITE GRADING	9/30/2024							
L301A	SITE GRADING NORTHEAST	9/30/2024							
L301B	SITE GRADING SOUTHEAST	9/30/2024							
L301C	SITE GRADING SOUTHWEST	9/30/2024		10/16/2024					*Addendum #2*
L301D	SITE GRADING NORTHWEST	9/30/2024							
L401	SITE PLANTING OVERALL	9/30/2024							
L401A	SITE PLANTING PLAN NORTHEAST	9/30/2024							
L401B	SITE PLANTING PLAN SOUTHEAST	9/30/2024							
L401C	SITE PLANTING PLAN SOUTHWEST	9/30/2024							
L401D	SITE PLANTING PLAN NORTHWEST	9/30/2024							
L402	PLANT MATERIAL LIST	9/30/2024						11/6/2024	*Addendum #6*
L403	PLANTING DETAILS	9/30/2024							
L404	SITE IRRIGATION PLAN	9/30/2024		10/16/2024					*Addendum #2*
L501	SITE DETAILS	9/30/2024				10/30/2024		11/6/2024	*Addendum #4, Addendum #6*
L502	SITE DETAILS	9/30/2024							
L503	SITE DETAILS	9/30/2024							
L504	SITE DETAILS	9/30/2024							
L601	ATHLETIC FIELD SITE DETAILS	9/30/2024				10/30/2024			*Addendum #4*
L602	ATHLETIC FIELD SITE DETAILS	9/30/2024						11/6/2024	*Addendum #6*
STRUCTURAL									
S001	GENERAL NOTES AND ABBREVIATIONS	9/30/2024							
S002	SCHEDULES AND DETAILS	9/30/2024							
S101A	FOUNDATION PLAN - PART A	9/30/2024		10/16/2024				11/6/2024	*Addendum #2, Addendum #6*
S101B	FOUNDATION PLAN - PART B	9/30/2024							
S101C	FOUNDATION PLAN - PART C	9/30/2024		10/16/2024					*Addendum #2*
S101D	FOUNDATION PLAN - PART D	9/30/2024							
S101E	FOUNDATION PLAN - PART E	9/30/2024		10/16/2024				11/6/2024	*Addendum #2, Addendum #6*
S101F	FOUNDATION PLAN - PART F	9/30/2024							
S200	TYPICAL FOUNDATION DETAILS	9/30/2024						11/6/2024	*Addendum #6*
S201	TYPICAL FOUNDATION DETAILS	9/30/2024							
S210	FOUNDATION DETAILS	9/30/2024							
S211	FOUNDATION DETAILS	9/30/2024		10/16/2024					*Addendum #2*
S212	FOUNDATION DETAILS	9/30/2024							
S301A	SECOND FLOOR FRAMING PLAN - PART A	9/30/2024							
S301B	LOW ROOF FRAMING PLAN - PART B	9/30/2024							
S301C	SECOND FLOOR FRAMING PLAN - PART C	9/30/2024							
S301D	LOW ROOF FRAMING PLAN - PART D	9/30/2024				10/30/2024			*Addendum #4*
S301E	SECOND FLOOR FRAMING PLAN - PART E	9/30/2024							
S301F	LOW ROOF FRAMING PLAN - PART F	9/30/2024							
S302A	ROOF FRAMING PLAN - PART A	9/30/2024							
S302B	HIGH ROOF FRAMING PLAN - PART B	9/30/2024							
S302C	ROOF FRAMING PLAN - PART C	9/30/2024							
S302D	HIGH ROOF FRAMING PLAN - PART D	9/30/2024							
S302E	ROOF FRAMING PLAN - PART E	9/30/2024							
S400	TYPICAL FRAMING DETAILS	9/30/2024							
S401	BUILDING SECTIONS	9/30/2024							
S402	BUILDING SECTIONS	9/30/2024							
S403	BUILDING SECTIONS	9/30/2024							
S410	FRAMING DETAILS	9/30/2024				10/30/2024			*Addendum #4*
S411	FRAMING DETAILS	9/30/2024				10/30/2024			*Addendum #4*
S420	FRAMING DETAILS	9/30/2024							
S421	FRAMING DETAILS	9/30/2024							
S430	FRAMING DETAILS	9/30/2024							
S500	LATERAL FRAME ELEVATIONS	9/30/2024							
S501	LATERAL FRAME ELEVATIONS AND DETAILS	9/30/2024							
S502	SHEAR WALL ELEVATIONS AND DETAILS	9/30/2024							
S600	COLUMN SCHEDULE	9/30/2024							
S601	COLUMN SCHEDULE	9/30/2024							
S700	SNOW DRIFT LOADING PLAN	9/30/2024							
S701	WALL & ROOF WIND PRESSURE PLANS	9/30/2024							

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Spec Section	Description	Date	Add. #1	Add. #2	Add. #3	Add. #4	Add. #5	Addendum #6	Comments
VOLUME 2									
[28] GENERAL									
C2	COVER SHEET (VOLUME 2)	9/30/2024							
GI01.2	DRAWING LIST	9/30/2024							
GI02.2	GENERAL INFORMATION	9/30/2024							
[29] ARCHITECTURAL DEMOLITION									
AD101A	FIRST FLOOR DEMOLITION PLAN PART A	9/30/2024							
AD102A	SECOND FLOOR DEMOLITION PLAN PART A	9/30/2024							
AD102B	SECOND FLOOR DEMOLITION PLAN PART B	9/30/2024							
AD103A	ROOF DEMOLITION PLAN PART A	9/30/2024							
AD103B	ROOF DEMOLITION PLAN PART B	9/30/2024							
AD301	DEMOLITION ELEVATIONS	9/30/2024							
AD401	DEMO BUILDING SECTIONS	9/30/2024							
[30] ARCHITECTURAL									
A091	FIRST FLOOR SLAB EDGE PLAN	9/30/2024							
A092	SECOND FLOOR & LOWER ROOF SLAB EDGE PLAN	9/30/2024				10/30/2024		11/6/2024	*Addendum #4, Addendum #6*
A093	ROOF SLAB EDGE PLAN	9/30/2024							
AL000	GEOMETRY LAYOUT PLAN	9/30/2024							
A101	OVERALL FIRST FLOOR PLAN	9/30/2024							
AL101A	FIRST FLOOR LAYOUT PLAN - PART A	9/30/2024							
A101A	FIRST FLOOR PLAN - PART A	9/30/2024				10/30/2024			*Addendum #4*
AL101B	FIRST FLOOR LAYOUT PLAN - PART B	9/30/2024							
A101B	FIRST FLOOR PLAN - PART B	9/30/2024							
AL101C	FIRST FLOOR LAYOUT PLAN - PART C	9/30/2024							
A101C	FIRST FLOOR PLAN - PART C	9/30/2024							
AL101D	FIRST FLOOR LAYOUT PLAN - PART D	9/30/2024							
A101D	FIRST FLOOR PLAN - PART D	9/30/2024							
AL101E	FIRST FLOOR LAYOUT PLAN - PART E	9/30/2024							
A101E	FIRST FLOOR PLAN - PART E	9/30/2024							
AL101F	FIRST FLOOR LAYOUT PLAN - PART F	9/30/2024							
A101F	FIRST FLOOR PLAN - PART F	9/30/2024							
A102	OVERALL SECOND FLOOR PLAN	9/30/2024							
AL102A	SECOND FLOOR LAYOUT PLAN - PART A	9/30/2024							
A102A	SECOND FLOOR PLAN - PART A	9/30/2024			10/23/2024				*Addendum #3*
AL102B	SECOND FLOOR LAYOUT PLAN - PART B	9/30/2024							
A102B	SECOND FLOOR PLAN - PART B	9/30/2024							
AL102C	SECOND FLOOR LAYOUT PLAN - PART C	9/30/2024							
A102C	SECOND FLOOR PLAN - PART C	9/30/2024			10/23/2024	10/30/2024			*Addendum #3, Addendum #4*
AL102D	SECOND FLOOR LAYOUT PLAN - PART D	9/30/2024							
A102D	SECOND FLOOR PLAN - PART D	9/30/2024							
AL102E	SECOND FLOOR LAYOUT PLAN - PART E	9/30/2024							
A102E	SECOND FLOOR PLAN - PART E	9/30/2024			10/23/2024	10/30/2024			*Addendum #3, Addendum #4*
A103	OVERALL ROOF PLAN	9/30/2024						11/6/2024	*Addendum #6*
A103A	ROOF PLAN - PART A	9/30/2024			10/23/2024			11/6/2024	*Addendum #3, Addendum #6*
A103B	ROOF PLAN - PART B	9/30/2024						11/6/2024	*Addendum #6*
A103C	ROOF PLAN - PART C	9/30/2024			10/23/2024			11/6/2024	*Addendum #3, Addendum #6*
A103D	ROOF PLAN - PART D	9/30/2024						11/6/2024	*Addendum #6*
A103E	ROOF PLAN - PART E	9/30/2024			10/23/2024			11/6/2024	*Addendum #3, Addendum #6*
A103F	ROOF PLAN - PART F	9/30/2024						11/6/2024	*Addendum #6*
A104	ROOF SCREEN LAYOUT PLAN	9/30/2024							
A111.1	ENLARGED PLAN & ELEVATIONS - CAFETERIA	9/30/2024							
A111.2	ENLARGED CEILING PLAN & DETAILS - CAFETERIA	9/30/2024							
A111.3	ENLARGED PLAN & ELEVATION - GYMNASIUM	9/30/2024							
A111.4	ENLARGED PLAN & ELEVATIONS - GYMNASIUM	9/30/2024				10/30/2024			*Addendum #4*
A111.5	ENLARGED PLAN - AUDITORIUM	9/30/2024							
A111.6	ENLARGED PLAN & ELEVATIONS - AUDITORIUM	9/30/2024							
A111.7	ENLARGED PLAN & DETAILS - AUDITORIUM	9/30/2024							
A111.8	ENLARGED CEILING PLAN - AUDITORIUM	9/30/2024							
A111.9	ENLARGED PLAN & ELEVATIONS - MEDIA CENTER	9/30/2024				10/30/2024			*Addendum #4*
A111.10	ENLARGED PLAN, ELEVATIONS & CEILING PLAN - MEDIA CENTER & OT/PT	9/30/2024							
A111.11	ENLARGED PLAN & ELEVATIONS - ORCHESTRA & FITNESS	9/30/2024							
A111.12	ENLARGED PLAN & ELEVATIONS - BAND & CHORAL	9/30/2024							
A111.13	ENLARGED PLAN & ELEVATIONS - ART ROOM & LIFE SKILLS	9/30/2024							
A111.14	ENLARGED PLAN & ELEVATIONS - INNOVATION / ROBOTICS / WOODSHOP	9/30/2024							
A111.15	ENLARGED PLAN & ELEVATIONS - FAMILY CONSUMER SCIENCE	9/30/2024							
A111.16	ENLARGED PLAN & ELEVATIONS - ADMIN SUITE, HEALTH SUITE & GUIDANCE SUITE	9/30/2024				10/30/2024			*Addendum #4*
A112.1	ENLARGED PLAN & ELEVATIONS - TYPICAL SCIENCE CLASSROOMS & PREP	9/30/2024							
A112.2	ENLARGED PLAN & ELEVATIONS - TYPICAL CLASSROOM, COMMONS	9/30/2024							
A120	ENLARGED STAIR PLANS AND SECTIONS	9/30/2024							
A121	ENLARGED STAIR PLANS AND SECTIONS	9/30/2024							
A122	ENLARGED STAIR AND ELEVATOR PLAN AND SECTIONS	9/30/2024							
A123	ENLARGED STAIR PLANS AND SECTIONS	9/30/2024							
A124	STAIR DETAILS	9/30/2024							
A125	STAIR DETAILS	9/30/2024							
A126	ELEVATOR DETAILS	9/30/2024							
A130	ENLARGED TOILET ROOM PLANS AND ELEVATIONS	9/30/2024				10/30/2024			*Addendum #4*
A131	ENLARGED TOILET ROOM PLANS AND ELEVATIONS	9/30/2024				10/30/2024			*Addendum #4*
A132	ENLARGED TOILET ROOM PLANS AND ELEVATIONS COPY 1	9/30/2024				10/30/2024			*Addendum #4*
A150	GYM PRACTICE COURT LAYOUT & TYPICAL COURT LINE LAYOUT	9/30/2024							
A201A	FIRST FLOOR REFLECTED CEILING PLAN - PART A	9/30/2024							
A201B	FIRST FLOOR REFLECTED CEILING PLAN - PART B	9/30/2024				10/30/2024			*Addendum #4*
A201C	FIRST FLOOR REFLECTED CEILING PLAN - PART C	9/30/2024							
A201D	FIRST FLOOR REFLECTED CEILING PLAN - PART D	9/30/2024							
A201E	FIRST FLOOR REFLECTED CEILING PLAN - PART E	9/30/2024							
A201F	FIRST FLOOR REFLECTED CEILING PLAN - PART F	9/30/2024							
A202A	SECOND FLOOR REFLECTED CEILING PLAN - PART A	9/30/2024							
A202B	SECOND FLOOR REFLECTED CEILING PLAN - PART B	9/30/2024							
A202C	SECOND FLOOR REFLECTED CEILING PLAN - PART C	9/30/2024							
A202D	SECOND FLOOR REFLECTED CEILING PLAN - PART D	9/30/2024							
A202E	SECOND FLOOR REFLECTED CEILING PLAN - PART E	9/30/2024							
A210	CEILING DETAILS	9/30/2024							
A211	CEILING DETAILS	9/30/2024							
A212	CEILING DETAILS - SHAFT WALL	9/30/2024							
A300	BUILDING ELEVATIONS	9/30/2024							
A301	AXON 3D VIEWS	9/30/2024							
A302	AXON 3D VIEWS	9/30/2024							
A310	EXTERIOR ELEVATIONS	9/30/2024							
A311	EXTERIOR ELEVATIONS	9/30/2024							
A312	EXTERIOR ELEVATIONS	9/30/2024							
A313	EXTERIOR ELEVATIONS	9/30/2024							
A314	EXTERIOR ELEVATIONS	9/30/2024							
A315	EXTERIOR STAND ALONE MOCK-UP	9/30/2024						11/6/2024	*Addendum #6*
A400	BUILDING SECTIONS	9/30/2024							
A401	BUILDING SECTIONS	9/30/2024							
A402	BUILDING SECTIONS	9/30/2024							
A403	BUILDING SECTIONS	9/30/2024							
A410	EXTERIOR WALL SECTIONS	9/30/2024							
A411	EXTERIOR WALL SECTIONS	9/30/2024							
A412	EXTERIOR WALL SECTIONS	9/30/2024							
A413	EXTERIOR WALL SECTIONS	9/30/2024							
A414	EXTERIOR WALL SECTIONS	9/30/2024							
A415	EXTERIOR WALL SECTIONS	9/30/2024							
A416	EXTERIOR WALL SECTIONS	9/30/2024							
A417	EXTERIOR WALL SECTIONS	9/30/2024							
A418	EXTERIOR WALL SECTIONS	9/30/2024							

Board of Education of the Town of Greenwich
Central Middle School Project -
State Project No. 057-0114N
Greenwich, CT

Turner Construction Company
7/8/2024
Revised: 11/7/2024

LIST OF CONTRACT DRAWINGS, SPECIFICATIONS

Spec Section	Description	Date	Add. #1	Add. #2	Add. #3	Add. #4	Add. #5	Addendum #6	Comments
A420	INTERIOR WALL SECTIONS	9/30/2024							
A421	INTERIOR WALL SECTIONS	9/30/2024							
A500	TYPICAL EXTERIOR ASSEMBLIES	9/30/2024							
A501	TYPICAL EXTERIOR DETAILS	9/30/2024							
A502	EXTERIOR SECTION DETAILS OF NON-PROJECTED THROUGH WALL FLASHINGS	9/30/2024				10/30/2024			*Addendum #4*
A510	EXTERIOR PLAN DETAILS	9/30/2024							
A511	EXTERIOR PLAN DETAILS	9/30/2024				10/30/2024			*Addendum #4*
A512	EXTERIOR PLAN DETAILS	9/30/2024							
A513	EXTERIOR PLAN DETAILS	9/30/2024							
A514	EXTERIOR PLAN DETAILS	9/30/2024			10/23/2024				*Addendum #3*
A515	EXTERIOR PLAN DETAILS	9/30/2024			10/23/2024				*Addendum #3*
A516	EXTERIOR PLAN DETAILS	9/30/2024							
A520	EXTERIOR SECTION DETAILS	9/30/2024			10/23/2024	10/30/2024			*Addendum #3, Addendum #4*
A521	EXTERIOR SECTION DETAILS	9/30/2024				10/30/2024			*Addendum #4*
A522	EXTERIOR SECTION DETAILS	9/30/2024				10/30/2024			*Addendum #4*
A530	TYPICAL MEMBRANE ROOFING DETAILS	9/30/2024				10/30/2024			*Addendum #4*
A531	TYPICAL MEMBRANE ROOFING DETAILS	9/30/2024				10/30/2024			*Addendum #4*
A540	INTERIOR PLAN DETAILS	9/30/2024							
A541	INTERIOR PLAN DETAILS	9/30/2024							
A600	TYPICAL FRAMED PARTITION TYPES AND DETAILS	9/30/2024							
A601	METAL STUD PARTITION FRAMING - TYPICAL DETAILS	9/30/2024							
A602	SPECIALTY PARTITION DETAILS	9/30/2024							
A605	TYPICAL MASONRY PARTITION TYPES AND DETAILS	9/30/2024							
A606	TYPICAL MASONRY PARTITION DETAILS	9/30/2024							
A610	DOOR AND FRAME TYPES	9/30/2024							
A611	DOOR SCHEDULE	9/30/2024				10/30/2024			*Addendum #4*
A620	TYPICAL HOLLOW METAL DOOR FRAME DETAILS	9/30/2024							
A621	TYPICAL HOLLOW METAL DOOR & FRAME DETAILS	9/30/2024							
A622	TYPICAL HOLLOW METAL DOOR & FRAME DETAILS	9/30/2024							
A630	ALUMINUM FRAME ELEVATIONS - CURTAIN WALLS	9/30/2024							
A631	ALUMINUM FRAME ELEVATIONS - STOREFRONTS	9/30/2024							
A632	ALUMINUM FRAME ELEVATIONS - CURTAIN WALLS AND STOREFRONTS	9/30/2024				10/30/2024			*Addendum #4*
A640	TYPICAL ALUMINUM FRAME DETAILS	9/30/2024				10/30/2024			*Addendum #4*
A641	ALUMINUM FRAME WINDOW DETAILS	9/30/2024	10/10/2024						*Addendum #1*
A642	ALUMINUM FRAME SECTION DETAILS	9/30/2024							
A701	TYPICAL MOUNTING HEIGHTS	9/30/2024							
A702	INTERIOR ELEVATIONS - PUBLIC LOBBY	9/30/2024							
A703	INTERIOR ELEVATIONS - FIRST FLOOR	9/30/2024							
A704	INTERIOR ELEVATIONS - MAIN CONCOURSE	9/30/2024							
A705	INTERIOR ELEVATIONS - MAIN CONCOURSE	9/30/2024							
A706	2ND FLOOR ELEVATIONS - CORRIDORS	9/30/2024							
A707	INTERIOR ELEVATIONS	9/30/2024							
A708	INTERIOR ELEVATIONS - GYMNASIUM - CUSTOM GRAPHIC DESIGN	9/30/2024							
A801	CASEWORK - TYPICAL DETAILS & GENERAL NOTES	9/30/2024							
A802	CASEWORK - TYPICAL DETAILS	9/30/2024							
A803	CASEWORK - TYPICAL DETAILS	9/30/2024							
A804	INTERIOR DETAILS	9/30/2024							
A805	INTERIOR DETAILS	9/30/2024		10/16/2024		10/31/2024		11/6/2024	*Add. #2, Add. #4, Addendum #6*
A806	INTERIOR DETAILS	9/30/2024							
A901A	FIRST FLOOR FINISH PLAN - PART A	9/30/2024							
A901B	FIRST FLOOR FINISH PLAN - PART B	9/30/2024						11/6/2024	*Addendum #6*
A901C	FIRST FLOOR FINISH PLAN - PART C	9/30/2024							
A901D	FIRST FLOOR FINISH PLAN - PART D	9/30/2024							
A901E	FIRST FLOOR FINISH PLAN - PART E	9/30/2024							
A901F	FIRST FLOOR FINISH PLAN - PART F	9/30/2024							
A902A	SECOND FLOOR FINISH PLAN - PART A	9/30/2024							
A902C	SECOND FLOOR FINISH PLAN - PART C	9/30/2024							
A902E	SECOND FLOOR FINISH PLAN - PART E	9/30/2024							
A903	FLOOR PATTERN DETAILS	9/30/2024						11/6/2024	*Addendum #6*
A910	FINISH PRODUCT LIST - PART A	9/30/2024						11/6/2024	*Addendum #6*
A911	FINISH PRODUCT LIST -PART B AND FINISH NOTES	9/30/2024		10/16/2024				11/6/2024	*Addendum #2, Addendum #6*
A912	SPECIALTY EQUIPMENT LIST	9/30/2024						11/6/2024	*Addendum #6*
A920	SIGNAGE SCHEDULE AND NOTES	9/30/2024							
A921A	FIRST FLOOR SIGNAGE PLAN - PART A	9/30/2024							
A921B	FIRST FLOOR SIGNAGE PLAN - PART B	9/30/2024							
A921C	FIRST FLOOR SIGNAGE PLAN - PART C	9/30/2024							
A921D	FIRST FLOOR SIGNAGE PLAN - PART D	9/30/2024							
A921E	FIRST FLOOR SIGNAGE PLAN - PART E	9/30/2024							
A921F	FIRST FLOOR SIGNAGE PLAN - PART F	9/30/2024							
A922A	SECOND FLOOR SIGNAGE PLAN - PART A	9/30/2024							
A922C	SECOND FLOOR SIGNAGE PLAN - PART C	9/30/2024							
A922E	SECOND FLOOR SIGNAGE PLAN - PART E	9/30/2024							
A923	SIGN TYPES	9/30/2024							
A924	EXTERIOR SIGN TYPES	9/30/2024							
[31] FURNITURE									
I101	OVERAL FIRST FLOOR FURNITURE PLAN	9/30/2024							
I101A	FIRST FLOOR FURNITURE PLAN - PART A	9/30/2024							
I101B	FIRST FLOOR FURNITURE PLAN - PART B	9/30/2024							
I101C	FIRST FLOOR FURNITURE PLAN - PART C	9/30/2024							
I101D	FIRST FLOOR FURNITURE - PART D	9/30/2024							
I101E	FIRST FLOOR FURNITURE PLAN - PART E	9/30/2024							
I101F	FIRST FLOOR FURNITURE PLAN - PART F	9/30/2024							
I102	OVERALL 2ND FLOOR FURNITURE PLAN	9/30/2024							
I102A	2ND FLOOR FURNITURE PLAN - PART A	9/30/2024							
I102C	2ND FLOOR FURNITURE PLAN - PART C	9/30/2024							
I102E	2ND FLOOR FURNITURE PLAN - PART E	9/30/2024							
[32] FOOD SERVICE									
FS001	FOODSERVICE EQUIPMENT SCHEDULE	9/30/2024							
FS101A	FIRST FLOOR - PART A - FOODSERVICE EQUIPMENT PLAN	9/30/2024							
FS111	FOODSERVICE EQUIPMENT PLAN	9/30/2024							
FS121	FOODSERVICE EQUIPMENT ROUGH-IN PLAN	9/30/2024							
FS131	FOODSERVICE EQUIPMENT VENTILATION ROUGH-IN PLAN	9/30/2024							
FS141	FOODSERVICE EQUIPMENT SPECIAL CONDITIONS PLAN	9/30/2024							
FS201	FOODSERVICE EQUIPMENT ELEVATIONS	9/30/2024							
FS301	FOODSERVICE EQUIPMENT DETAILS	9/30/2024							
[38] THEATRICAL									
TR1	THEATRICAL RIGGING	9/30/2024						11/6/2024	*Addendum #6*
TR2	THEATRICAL RIGGING RISER AND SCHEDULES	9/30/2024							
VOLUME 3									
[39] GENERAL									
C3	COVER SHEET (VOLUME 3)	9/30/2024							
GI01.3	DRAWING LIST	9/30/2024							
GI02.3	GENERAL INFORMATION	9/30/2024							
FIRE PROTECTION									
FP000	FIRE PROTECTION ABBREVIATIONS, NOTES AND SYMBOLS	9/30/2024		10/16/2024	10/23/2024				*Addendum #2, Addendum #3*
FP001	FIRE PROTECTION ZONING PLAN	9/30/2024			10/23/2024				*Addendum #3*
FP101A	FIRE PROTECTION FIRST FLOOR PLAN - PART A	9/30/2024		10/16/2024	10/23/2024				*Addendum #2, Addendum #3*
FP101B	FIRE PROTECTION FIRST FLOOR PLAN - PART B	9/30/2024		10/16/2024	10/23/2024				*Addendum #2, Addendum #3*
FP101C	FIRE PROTECTION FIRST FLOOR PLAN - PART C	9/30/2024		10/16/2024	10/23/2024				*Addendum #2, Addendum #3*
FP101D	FIRE PROTECTION FIRST FLOOR PLAN - PART D	9/30/2024		10/16/2024	10/23/2024				*Addendum #2, Addendum #3*
FP101E	FIRE PROTECTION FIRST FLOOR PLAN PART - E	9/30/2024							
FP101F	FIRE PROTECTION FIRST FLOOR PLAN - PART F	9/30/2024		10/16/2024					*Addendum #2*
FP102A	FIRE PROTECTION SECOND FLOOR PLAN - PART A	9/30/2024		10/16/2024					*Addendum #2*

LIST OF CONTRACT DRAWINGS, SPECIFICATIONS

Spec Section	Description	Date	Add. #1	Add. #2	Add. #3	Add. #4	Add. #5	Addendum #6	Comments
FP102B	FIRE PROTECTION SECOND FLOOR PLAN - PART B	9/30/2024							
FP102C	FIRE PROTECTION SECOND FLOOR PLAN - PART C	9/30/2024		10/16/2024					*Addendum #2*
FP102D	FIRE PROTECTION SECOND FLOOR PLAN - PART D	9/30/2024							
FP102E	FIRE PROTECTION SECOND FLOOR PLAN - PART E	9/30/2024		10/16/2024					*Addendum #2*
FP400	FIRE PROTECTION ENLARGED PLANS	9/30/2024							
FP500	FIRE PROTECTION DETAILS	9/30/2024							
[50] PLUMBING									
P000	PLUMBING ABBREVIATIONS, NOTES AND SYMBOLS	9/30/2024							
P100A	PLUMBING FIRST FLOOR UNDERSLAB PLAN - PART A	9/30/2024		10/16/2024					*Addendum #2*
P100B	PLUMBING FIRST FLOOR UNDERSLAB PLAN - PART B	9/30/2024		10/16/2024	10/23/2024				*Addendum #2, Addendum #3*
P100C	PLUMBING FIRST FLOOR UNDERSLAB PLAN - PART C	9/30/2024							
P100D	PLUMBING FIRST FLOOR UNDERSLAB PLAN - PART D	9/30/2024			10/23/2024				*Addendum #3*
P100E	PLUMBING FIRST FLOOR UNDERSLAB PLAN - PART E	9/30/2024		10/16/2024	10/23/2024				*Addendum #2, Addendum #3*
P100F	PLUMBING FIRST FLOOR UNDERSLAB PLAN - PART F	9/30/2024			10/23/2024				*Addendum #3*
P001	PLUMBING FIRST FLOOR OVERALL PLAN	9/30/2024							
P101A	PLUMBING FIRST FLOOR PLAN - PART A	9/30/2024		10/16/2024	10/23/2024				*Addendum #2, Addendum #3*
P101B	PLUMBING FIRST FLOOR PLAN - PART B	9/30/2024		10/16/2024					*Addendum #2*
P101C	PLUMBING FIRST FLOOR PLAN - PART C	9/30/2024							
P101D	PLUMBING FIRST FLOOR PLAN - PART D	9/30/2024		10/16/2024					*Addendum #2*
P101E	PLUMBING FIRST FLOOR PLAN - PART E	9/30/2024		10/16/2024	10/23/2024				*Addendum #2, Addendum #3*
P101F	PLUMBING FIRST FLOOR PLAN - PART F	9/30/2024		10/16/2024	10/23/2024				*Addendum #2, Addendum #3*
P002	PLUMBING SECOND FLOOR OVERALL PLAN	9/30/2024							
P102A	PLUMBING SECOND FLOOR PLAN -PART A	9/30/2024		10/16/2024					*Addendum #2*
P102C	PLUMBING SECOND FLOOR PLAN - PART C	9/30/2024							
P102E	PLUMBING SECOND FLOOR PLAN - PART E	9/30/2024							
P003	PLUMBING ROOF OVERALL PLAN	9/30/2024							
P103A	PLUMBING ROOF PLAN - PART A	9/30/2024		10/16/2024					*Addendum #2*
P103B	PLUMBING ROOF PLAN - PART B	9/30/2024							
P103C	PLUMBING ROOF PLAN - PART C	9/30/2024							
P103D	PLUMBING ROOF PLAN - PART D	9/30/2024							
P103E	PLUMBING ROOF PLAN - PART E	9/30/2024							
P103F	PLUMBING ROOF PLAN - PART F	9/30/2024		10/16/2024					*Addendum #2*
P400	PLUMBING ENLARGED VIEWS - KITCHEN	9/30/2024							
P401	PLUMBING ENLARGED VIEWS	9/30/2024		10/16/2024					*Addendum #2*
P402	PLUMBING ENLARGED VIEWS	9/30/2024		10/16/2024	10/23/2024				*Addendum #2, Addendum #3*
P403	PLUMBING ENLARGED VIEWS	9/30/2024							
P404	PLUMBING ENLARGED VIEWS	9/30/2024							
P405	PLUMBING ENLARGED VIEWS	9/30/2024		10/16/2024					*Addendum #2*
P500	PLUMBING DETAILS	9/30/2024							
P501	PLUMBING DETAILS	9/30/2024		10/16/2024					*Addendum #2*
P600	PLUMBING SCHEDULES AND DIAGRAMS	9/30/2024							
P601	PLUMBING SCHEDULES AND DIAGRAMS	9/30/2024		10/16/2024					*Addendum #2*
[60] MECHANICAL									
MEPD000	MEP DEMOLITION ABBREVIATIONS, NOTES, AND SYMBOLS	9/30/2024							
MEPD001	MEP DEMO PLAN VIEW	9/30/2024							
M0.00	MECHANICAL ABBREVIATIONS, NOTES AND SYMBOLS	9/30/2024							
M001	OVERALL MECHANICAL FIRST FLOOR PLAN	9/30/2024							
M101A	MECHANICAL FIRST FLOOR PLAN - PART A	9/30/2024							
M101B	MECHANICAL FIRST FLOOR PLAN - PART B	9/30/2024		10/16/2024					*Addendum #2*
M101C	MECHANICAL FIRST FLOOR PLAN - PART C	9/30/2024		10/16/2024					*Addendum #2*
M101D	MECHANICAL FIRST FLOOR PLAN - PART D	9/30/2024			10/23/2024				*Addendum #3*
M101E	MECHANICAL FIRST FLOOR PLAN - PART E	9/30/2024		10/16/2024					*Addendum #2*
M101F	MECHANICAL FIRST FLOOR PLAN - PART F	9/30/2024							
M002	OVERALL MECHANICAL SECOND FLOOR PLAN	9/30/2024							
M102A	MECHANICAL SECOND FLOOR PLAN - PART A	9/30/2024			10/23/2024				*Addendum #3*
M102B	MECHANICAL SECOND FLOOR PLAN - PART B	9/30/2024							
M102C	MECHANICAL SECOND FLOOR PLAN - PART C	9/30/2024							
M102D	MECHANICAL SECOND FLOOR PLAN - PART D	9/30/2024							
M102E	MECHANICAL SECOND FLOOR PLAN - PART E	9/30/2024							
M003	OVERALL MECHANICAL ROOF PLAN	9/30/2024							
M103A	MECHANICAL ROOF PLAN - PART A	9/30/2024				10/30/2024			*Addendum #4*
M103B	MECHANICAL ROOF PLAN - PART B	9/30/2024				10/30/2024		11/6/2024	*Addendum #4, Addendum #6*
M103C	MECHANICAL ROOF PLAN - PART C	9/30/2024				10/30/2024			*Addendum #4*
M103D	MECHANICAL ROOF PLAN - PART D	9/30/2024				10/30/2024		11/6/2024	*Addendum #4, Addendum #6*
M103E	MECHANICAL ROOF PLAN - PART E	9/30/2024				10/30/2024			*Addendum #4*
M103F	MECHANICAL ROOF PLAN - PART F	9/30/2024							
MP101A	MECHANICAL PIPING FIRST FLOOR PLAN - PART A	9/30/2024		10/16/2024					*Addendum #2*
MP101B	MECHANICAL PIPING FIRST FLOOR PLAN - PART B	9/30/2024		10/16/2024	10/23/2024				*Addendum #2, Addendum #3*
MP101C	MECHANICAL PIPING FIRST FLOOR PLAN - PART C	9/30/2024		10/16/2024	10/23/2024				*Addendum #2, Addendum #3*
MP101D	MECHANICAL PIPING FIRST FLOOR PLAN - PART D	9/30/2024		10/16/2024					*Addendum #2*
MP101E	MECHANICAL PIPING FIRST FLOOR PLAN - PART E	9/30/2024		10/16/2024					*Addendum #2*
MP101F	MECHANICAL PIPING FIRST FLOOR PLAN - PART F	9/30/2024							
MP102A	MECHANICAL PIPING SECOND FLOOR PLAN - PART A	9/30/2024		10/16/2024	10/23/2024			11/6/2024	*Add. #2, Add. #3, Addendum #6*
MP102B	MECHANICAL PIPING SECOND FLOOR PLAN - PART B	9/30/2024							
MP102C	MECHANICAL PIPING SECOND FLOOR PLAN - PART C	9/30/2024		10/16/2024				11/6/2024	*Addendum #2, Addendum #6*
MP102D	MECHANICAL PIPING SECOND FLOOR PLAN - PART D	9/30/2024							
MP102E	MECHANICAL PIPING SECOND FLOOR PLAN - PART E	9/30/2024		10/16/2024					*Addendum #2*
M500	MECHANICAL DETAILS	9/30/2024				10/30/2024		11/6/2024	*Addendum #4, Addendum #6*
M501	MECHANICAL DETAILS	9/30/2024				10/30/2024			*Addendum #4*
M502	MECHANICAL DETAILS	9/30/2024			10/23/2024				*Addendum #3*
M503	MECHANICAL DETAILS	9/30/2024							
M504	MECHANICAL DETAILS	9/30/2024							
M505	MECHANICAL DETAILS	9/30/2024							
M600	MECHANICAL SCHEDULES	9/30/2024							
M601	MECHANICAL SCHEDULES	9/30/2024		10/16/2024				11/6/2024	*Addendum #2, Addendum #6*
M602	MECHANICAL SCHEDULES	9/30/2024		10/16/2024	10/23/2024				*Addendum #2, Addendum #3*
M700	MECHANICAL CONTROLS DIAGRAMS	9/30/2024		10/16/2024	10/23/2024				*Addendum #2, Addendum #3*
M701	MECHANICAL CONTROLS DIAGRAMS	9/30/2024		10/16/2024	10/23/2024				*Addendum #2, Addendum #3*
[70] ELECTRICAL									
E000	ELECTRICAL ABBREVIATIONS, NOTES AND SYMBOLS	9/30/2024		10/16/2024		10/30/2024			*Addendum #2, Addendum #4*
EL001	ELECTRICAL LIGHTING FIRST FLOOR OVERALL PLAN	9/30/2024							
EL101A	ELECTRICAL LIGHTING FIRST FLOOR PLAN - PART A	9/30/2024		10/16/2024					*Addendum #2*
EL101B	ELECTRICAL LIGHTING FIRST FLOOR PLAN - PART B	9/30/2024		10/16/2024					*Addendum #2*
EL101C	ELECTRICAL LIGHTING FIRST FLOOR PLAN - PART C	9/30/2024		10/16/2024					*Addendum #2*
EL101D	ELECTRICAL LIGHTING FIRST FLOOR PLAN - PART D	9/30/2024		10/16/2024					*Addendum #2*
EL101E	ELECTRICAL LIGHTING FIRST FLOOR PLAN - PART E	9/30/2024			10/23/2024				*Addendum #3*
EL101F	ELECTRICAL LIGHTING FIRST FLOOR PLAN - PART F	9/30/2024		10/16/2024					*Addendum #2*
EL002	ELECTRICAL LIGHTING SECOND FLOOR OVERALL PLAN	9/30/2024							
EL102A	ELECTRICAL LIGHTING SECOND FLOOR PLAN - PART A	9/30/2024		10/16/2024					*Addendum #2*
EL102B	ELECTRICAL LIGHTING SECOND FLOOR PLAN - PART B	9/30/2024		10/16/2024					*Addendum #2*
EL102C	ELECTRICAL LIGHTING SECOND FLOOR PLAN - PART C	9/30/2024		10/16/2024					*Addendum #2*
EL102D	ELECTRICAL LIGHTING SECOND FLOOR PLAN - PART D	9/30/2024							
EL102E	ELECTRICAL LIGHTING SECOND FLOOR PLAN - PART E	9/30/2024		10/16/2024					*Addendum #2*
EP001	ELECTRICAL POWER FIRST FLOOR OVERALL PLAN	9/30/2024							
EP101A	ELECTRICAL POWER FIRST FLOOR PLAN - PART A	9/30/2024		10/16/2024		10/30/2024		11/6/2024	*Add. #2, Add. #4, Addendum #6*
EP101B	ELECTRICAL POWER FIRST FLOOR PLAN - PART B	9/30/2024			10/23/2024				*Addendum #3*
EP101C	ELECTRICAL POWER FIRST FLOOR PLAN - PART C	9/30/2024		10/16/2024					*Addendum #2*
EP101D	ELECTRICAL POWER FIRST FLOOR PLAN - PART D	9/30/2024			10/23/2024	10/30/2024			*Addendum #3, Addendum #4*
EP101E	ELECTRICAL POWER FIRST FLOOR PLAN - PART E	9/30/2024		10/16/2024	10/23/2024				*Addendum #2, Addendum #3*
EP101F	ELECTRICAL POWER FIRST FLOOR PLAN - PART F	9/30/2024							
EP002	ELECTRICAL POWER SECOND FLOOR OVERALL PLAN	9/30/2024							
EP102A	ELECTRICAL POWER SECOND FLOOR PLAN - PART A	9/30/2024							
EP102B	ELECTRICAL POWER SECOND FLOOR PLAN - PART B	9/30/2024							
EP102C	ELECTRICAL POWER SECOND FLOOR PLAN - PART C	9/30/2024							
EP102D	ELECTRICAL POWER SECOND FLOOR PLAN - PART D	9/30/2024							
EP102E	ELECTRICAL POWER SECOND FLOOR PLAN - PART E	9/30/2024							
EP003	ELECTRICAL POWER ROOF OVERALL PLAN	9/30/2024							
EP103A	ELECTRICAL POWER ROOF PLAN - PART A	9/30/2024			10/23/2024				*Addendum #3*
EP103B	ELECTRICAL POWER ROOF PLAN - PART B	9/30/2024			10/23/2024				*Addendum #3*

LIST OF CONTRACT DRAWINGS, SPECIFICATIONS

Spec Section	Description	Date	Add. #1	Add. #2	Add. #3	Add. #4	Add. #5	Addendum #6	Comments
EP103C	ELECTRICAL POWER ROOF PLAN - PART C	9/30/2024							
EP103D	ELECTRICAL POWER ROOF PLAN - PART D	9/30/2024							
EP103E	ELECTRICAL POWER ROOF PLAN - PART E	9/30/2024							
EP103F	ELECTRICAL POWER ROOF PLAN - PART F	9/30/2024							
E400	ELECTRICAL ENLARGED PLANS - KITCHEN	9/30/2024		10/16/2024	10/23/2024	10/30/2024			*Addendum #2, Addendum #3, Addendum #4*
E401	ELECTRICAL ENLARGED PLANS - AUDITORIUM	9/30/2024		10/16/2024					*Addendum #2*
E402	ELECTRICAL ENLARGED PLANS - ELEVATORS	9/30/2024							
E500	ELECTRICAL DETAILS	9/30/2024							
E501	ELECTRICAL DETAILS	9/30/2024		10/16/2024					*Addendum #2*
E502	ELECTRICAL DETAILS	9/30/2024			10/23/2024				*Addendum #3*
E503	ELECTRICAL DETAILS	9/30/2024							
E504	ELECTRICAL DETAILS	9/30/2024							
E505	ELECTRICAL DETAILS	N/A			10/23/2024			11/6/2024	*Addendum #3, Addendum #6*
E600	ELECTRICAL SCHEDULES AND DIAGRAMS	9/30/2024			10/23/2024			11/6/2024	*Addendum #3, Addendum #6*
E601	ELECTRICAL SCHEDULES AND DIAGRAMS	9/30/2024							
E602	ELECTRICAL PANEL SCHEDULES	9/30/2024						11/6/2024	*Addendum #6*
E603	ELECTRICAL PANEL SCHEDULES	9/30/2024		10/16/2024					*Addendum #2*
E604	ELECTRICAL PANEL SCHEDULES	9/30/2024			10/23/2024				*Addendum #3*
E605	ELECTRICAL PANEL SCHEDULES	9/30/2024							
E606	ELECTRICAL PANEL SCHEDULES	9/30/2024							
E607	ELECTRICAL PANEL SCHEDULES	9/30/2024				10/30/2024			*Addendum #4*
E700	ELECTRICAL RISER DIAGRAM	9/30/2024			10/23/2024	10/30/2024		11/6/2024	*Add. #3, Add. #4, Addendum #6*
E701	FIRE ALARM RISER DIAGRAM	9/30/2024		10/16/2024		10/30/2024		11/6/2024	*Add. #2, Add. #4, Addendum #6*
[80] TECHNOLOGY									
T000	TECHNOLOGY SYMBOL LEGEND & GENERAL NOTES	9/30/2024		10/16/2024					*Addendum #2*
T001	TECHNOLOGY OVERALL FIRST FLOOR PLAN CABLING DELINIATION PLAN	9/30/2024							
T002	TECHNOLOGY OVERALL SECOND FLOOR PLAN CABLE DELINIATION PLAN	9/30/2024							
T101A	TECHNOLOGY FIRST FLOOR PLAN A	9/30/2024		10/16/2024					*Addendum #2*
T101B	TECHNOLOGY FIRST FLOOR PLAN B	9/30/2024		10/16/2024					*Addendum #2*
T101C	TECHNOLOGY FIRST FLOOR PLAN C	9/30/2024		10/16/2024					*Addendum #2*
T101D	TECHNOLOGY FIRST FLOOR PLAN D	9/30/2024		10/16/2024					*Addendum #2*
T101E	TECHNOLOGY FIRST FLOOR PLAN E	9/30/2024		10/16/2024					*Addendum #2*
T101F	TECHNOLOGY FIRST FLOOR PLAN F	9/30/2024		10/16/2024					*Addendum #2*
T102A	TECHNOLOGY SECOND FLOOR PLAN A	9/30/2024		10/16/2024					*Addendum #2*
T102B	TECHNOLOGY SECOND FLOOR PLAN B	9/30/2024							
T102C	TECHNOLOGY SECOND FLOOR PLAN C	9/30/2024		10/16/2024					*Addendum #2*
T102D	TECHNOLOGY SECOND FLOOR PLAN D	9/30/2024							
T102E	TECHNOLOGY SECOND FLOOR PLAN E	9/30/2024		10/16/2024					*Addendum #2*
T201	TECHNOLOGY MDF 1066 DETAILS	9/30/2024							
T202	TECHNOLOGY IDF 1046 & 1023 DETAILS	9/30/2024							
T301	TECHNOLOGY DETAILS	9/30/2024							
T302	TECHNOLOGY DETAILS	9/30/2024							
T400	TECHNOLOGY WIRING DIAGRAM	9/30/2024							
[81] AUDIO VISUAL									
TA000	AUDIO VISUAL SYMBOL LEGEND & GENERAL NOTES	9/30/2024		10/16/2024					*Addendum #2*
TA101A	AUDIO VISUAL FIRST FLOOR PLAN A	9/30/2024							
TA101B	AUDIO VISUAL FIRST FLOOR PLAN B	9/30/2024							
TA101C	AUDIO VISUAL FIRST FLOOR PLAN C	9/30/2024							
TA101D	AUDIO VISUAL FIRST FLOOR PLAN D	9/30/2024							
TA101E	AUDIO VISUAL FIRST FLOOR PLAN E	9/30/2024							
TA101F	AUDIO VISUAL FIRST FLOOR PLAN F	9/30/2024							
TA102A	AUDIO VISUAL SECOND FLOOR PLAN A	9/30/2024							
TA102B	AUDIO VISUAL SECOND FLOOR PLAN B	9/30/2024							
TA102C	AUDIO VISUAL SECOND FLOOR PLAN C	9/30/2024							
TA102D	AUDIO VISUAL SECOND FLOOR PLAN D	9/30/2024							
TA102E	AUDIO VISUAL SECOND FLOOR PLAN E	9/30/2024							
TA201	AUDIO VISUAL DETAILS	9/30/2024							
TA300	AUDIO VISUAL SIGNAL FLOW	9/30/2024							
TA301	AUDIO VISUAL AUDITORIUM SIGNAL FLOW	9/30/2024							
TA400	AUDIO VISUAL AUDITORIUM ELEVATIONS	9/30/2024							
TA401	AUDIO VISUAL ELEVATIONS	9/30/2024							
[82] SECURITY									
TY000	SECURITY SYMBOL LEGEND & GENERAL NOTES	9/30/2024		10/16/2024					*Addendum #2*
TY100	SECURITY SITE PLAN	9/30/2024							
TY101A	SECURITY FIRST FLOOR PLAN A	9/30/2024		10/16/2024					*Addendum #2*
TY101B	SECURITY FIRST FLOOR PLAN B	9/30/2024							
TY101C	SECURITY FIRST FLOOR PLAN C	9/30/2024		10/16/2024					*Addendum #2*
TY101D	SECURITY FIRST FLOOR PLAN D	9/30/2024							
TY101E	SECURITY FIRST FLOOR PLAN E	9/30/2024							
TY101F	SECURITY FIRST FLOOR PLAN F	9/30/2024							
TY102A	SECURITY SECOND FLOOR PLAN A	9/30/2024							
TY102B	SECURITY SECOND FLOOR PLAN B	9/30/2024							
TY102C	SECURITY SECOND FLOOR PLAN C	9/30/2024							
TY102D	SECURITY SECOND FLOOR PLAN D	9/30/2024							
TY102E	SECURITY SECOND FLOOR PLAN E	9/30/2024							
TY301	SECURITY DETAILS	9/30/2024							
TY302	SECURITY DETAILS	9/30/2024							
TY401	SECURITY WIRING DIAGRAMS	9/30/2024							

ADDITIONAL DOCUMENTS AND SKETCHES

1651	Plan and Profile of Sewer in Stanwich Road & Fairfield Road (Greenwich, Conn) -- Issued to address Bidder RFI #91			9/6/1961					*Addendum #2: Provided as a for-reference-only document*
00 9113-1	Appendix A – Phase 1 Environmental Site Assessment. Dated May 30, 2023, authored by Langan Engineering			5/30/2023					*Addendum #2*
00 9113-2	Appendix B – Underground Storage Tank Investigation Report, Dated November 16, 2023, authored by Langan Engineering			11/16/2023					*Addendum #2*
00 9113-3	Appendix C – Limited In-Siti Soil Sampling, Dated April 1, 2024			4/1/2024					*Addendum #2*
00 9113-4	Appendix D – Stormwater Pollution Control Plan for Greenwich Central Middle School (Issued in response to Bidder RFI #93), authored by Tighe & Bond			10/16/2024					*Addendum #2*
00 9113-1	Appendix E - Greenwich Test Pit Field Log Forms (TP101-TP120) - New Per BQ RFI #233 - Reports Dated 11/17/2023					11/17/2023			*Addendum #4*
	Appendix F - GCMS Construction-Vibration and Controls During Construction (CVC), By Gap Mountain Consulting Engineers, PLLC.						11/1/2024		*Addendum #5*
	Appendix G - Statements of Special Inspections - Structural & Architectural							11/6/2024	*Addendum #6*

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BID PACKAGE BREAKDOWN

	Spec Number	Bid Package	Comments
	8	**Demolition & Abatement**	
	DIV 00	Division 00 - Procurement and Contracting Requirements	Shared
	DIV 01	Division 01 - General Requirements	Shared
	01 2200	Unit Prices - Hazardous Building Materials	Exclusive
	02 4100	Demolition	Exclusive
	02 8200	Selective Hazardous Building Materials Abatement Demolition	Exclusive
	02 8213	Asbestos Abatement	Exclusive
	02 8313	Lead-Based Paint Awareness	Exclusive
	02 8416	Universal Waste Removal and Recycling	Exclusive
	02 8432	PCBs Greater than 50ppm Remediation	Exclusive
	9	**Sitework**	
	DIV 00	Division 00 - Procurement and Contracting Requirements	Shared
	DIV 01	Division 01 - General Requirements	Shared
	02 3000	Subsurface Investigations	Exclusive
	02 4113	Site Utility Abandonment	Exclusive
	07 2100	Thermal Insulation	Shared
	07 9200	Joint Sealants	Shared
	10 1453	Traffic Signage [Landscape]	Exclusive
	10 1453	Traffic Signage [Civil]	Exclusive
	10 1454	Traffic Signage Removal and Relocation	Exclusive
	10 7516	Ground-Set Flagpoles	Exclusive
	12 9300	Site Furnishings	Exclusive
	31 1000	Site Clearing	Exclusive
	31 1000	Selective Clearing and Thinning [Civil]	Exclusive
	31 1005	Athletic Field Site Preparation	Exclusive
	31 1006	Soil Striping and Stockpiling	Exclusive
	31 1200	Site Utility Preparation	Exclusive
	31 2200	Grading	Exclusive
	31 2300	Excavation, Backfill, Compaction and Dewatering	Exclusive
	31 2316.26	Rock Removal	Exclusive
	31 2323	Borrow Material	Exclusive
	31 2333	Trenching and Backfilling	Exclusive
	31 2500	Soil Erosion and Sediment Controls	Exclusive
	31 6616	Aggregate Piers	Exclusive
	32 0529	Glacial Boulers for Exterior Improvements	Exclusive
	32 1216	Asphalt Paving	Exclusive
	32 1400	Unit Pavers	Exclusive
	32 1500	Aggregate Surfacing	Exclusive
	~~32 1613.23~~	~~Precast Concrete Curb~~	~~Exclusive~~
	32 1640	Granite Curbing	Exclusive
	32 1823.17	Natural Infield and Warning Track Surfacing	Exclusive
	32 3113	Chain Link Fences and Gates	Exclusive
	~~32 3118~~	~~Metal Fences and Gates~~	~~Exclusive~~
	~~32 3120~~	~~Vehicle Barrier Gates~~	~~Exclusive~~
	32 3223	Segmental Retaining Walls	Exclusive
	32 8415	Sitework Sleeves	Exclusive
	33 0513	Manholes and Catchbasins	Exclusive
	33 0514	Breaking Into Existing Manholes and CatchBasins	Exclusive
	33 1113	Ductile Iron Pipe and Fittings	Exclusive
	33 1300	Disinfection of Water Distribution Systems	Exclusive
	33 1400	Testing of Water Distribution Systems	Exclusive
	33 3113	Polyvinyl Cholride (PVC) Pipe and Fittings	Exclusive
	33 3114	Testing of Sanitary Sewer and Storm Drainage Systems	Exclusive
	33 3115	Television Inspection of Pipelines	Exclusive
	33 4100	Storm Drainage	Exclusive
	33 4113	High Density Polythylene Pipe and Fittings	Exclusive

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BID PACKAGE BREAKDOWN

	Spec Number	Bid Package	Comments
	33 4114	Underground Warning Tape	Exclusive
	33 4419	Stormwater Treatment System	Exclusive
	34 0000	Transportation	Exclusive
	34 4114	Rectangular Rapid Flashing Beacon	Exclusive
	34 4115	LED School Radar Speed Display with Flashing Beacons	Exclusive
	34 4117	Pedestrian Push Button	Exclusive
	34 7001	Traffic Person	Exclusive
	34 7002	Maintenance and Protection of Traffic	Exclusive
	10	**Concrete**	
	DIV 00	Division 00 - Procurement and Contracting Requirements	Shared
	DIV 01	Division 01 - General Requirements	Shared
	03 0156	Under-Slab Vapor Retarder	Exclusive
	03 1000	Concrete Forming and Accessories	Shared
	03 2000	Concrete Reinforcing	Shared
	03 3000	Cast-in-Place Concrete	Shared
	03 3250	Concrete Post-Installed Anchors	Shared
	03 6213	Non-Metallic Non-Shrink Grouting	Shared
	07 2100	Thermal Insulation	Shared
	07 9200	Joint Sealants	Shared
	11	**Masonry & Precast**	
	DIV 00	Division 00 - Procurement and Contracting Requirements	Shared
	DIV 01	Division 01 - General Requirements	Shared
	03 3250	Concrete Post-Installed Anchors	Shared
	03 6213	Non-Metallic Non-Shrink Grouting	Shared
	04 2000	Unit Masonry	Exclusive
	04 4313	Stone Masonry Veneer	Exclusive
	04 7323	Manufactured Building Stone Masonry	Exclusive
	05 5000	Metal Fabrications	Shared
	07 2100	Thermal Insulation	Shared
	07 2726	Fluid-Applied Membrane Air Barriers	Shared
	07 6200	Sheet Metal Flashing and Trim	Shared
	07 9200	Joint Sealants	Shared
	07 9513	Expansion Joint Cover Assmeblies	Shared
	12	**Structural Steel**	
	DIV 00	Division 00 - Procurement and Contracting Requirements	Shared
	DIV 01	Division 01 - General Requirements	Shared
	03 3250	Concrete Post-Installed Anchors	Shared
	05 0805	Factory-Applied Coatings for Metal	Shared
	05 1200	Structural Steel Framing	Exclusive
	05 2100	Steel Joist Framing	Exclusive
	05 3100	Steel Decking	Exclusive
	05 5000	Metal Fabrications	Shared
	07 2163	Fluid-Applied Insulative Coating	Exclusive
	13	**Misc. Metal**	
	DIV 00	Division 00 - Procurement and Contracting Requirements	Shared
	DIV 01	Division 01 - General Requirements	Shared
	03 3250	Concrete Post-Installed Anchors	Shared
	05 0805	Factory-Applied Coatings for Metal	Shared
	05 5000	Metal Fabrications	Shared
	05 5100	Metal Stairs	Exclusive

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	Spec Number	Bid Package	Comments
	05 7000	Decorative Metal Railings	Exclusive
	05 7100	Monumental Metal Stairs	Exclusive
	07 9200	Joint Sealants	Shared
	14	**Waterproofing**	
	DIV 00	Division 00 - Procurement and Contracting Requirements	Shared
	DIV 01	Division 01 - General Requirements	Shared
	07 1400	Fluid-Applied Waterproofing	Exclusive
	15	**Roofing**	
	DIV 00	Division 00 - Procurement and Contracting Requirements	Shared
	DIV 01	Division 01 - General Requirements	Shared
	07 5423	Thermoplastic Polyolefin (TPO) Roofing	Exclusive
	07 6200	Sheet Metal Flashing and Trim	Shared
	07 7100	Roof Specialties	Exclusive
	07 7200	Roof Accessories	Exclusive
	07 9513	Expansion Joint Cover Assmeblies	Shared
	16	**Fireproofing**	
	DIV 00	Division 00 - Procurement and Contracting Requirements	Shared
	DIV 01	Division 01 - General Requirements	Shared
	07 8100	Applied Fire Protection	Exclusive
	07 8123	Intumescent Fire Protection	Exclusive
	17	**Firestopping**	
	DIV 00	Division 00 - Procurement and Contracting Requirements	Shared
	DIV 01	Division 01 - General Requirements	Shared
	07 8400	Firestopping	Exclusive
	18	**Millwork & Casework**	
	DIV 00	Division 00 - Procurement and Contracting Requirements	Shared
	DIV 01	Division 01 - General Requirements	Shared
	06 2000	Finish Carpentry	Exclusive
	06 4100	Architectural Wood Casework	Exclusive
	06 4200	Wood Paneling	Exclusive
	06 6116	Solid Surfacing Fabrications	Exclusive
	07 9200	Joint Sealants	Shared
	07 9513	Expansion Joint Cover Assmeblies	Shared
	09 7800	Interior Wall Paneling	Exclusive
	09 8416	Fixed Sound Reflective Panels	Shared
	09 8430	Sound-Absorbing Wall and Ceiling Units	Shared
	10 1100	Visual Display Units	Exclusive
	10 1416	Plaques	Exclusive
	10 5502	Mail Sorter	Exclusive
	12 3553.19	Wood Laboratory Casework	Exclusive
	12 3600	Countertops	Exclusive
	19	**Glass, Glazing & Metal Panels/Rainscreen**	
	DIV 00	Division 00 - Procurement and Contracting Requirements	Shared
	DIV 01	Division 01 - General Requirements	Shared
	03 3250	Concrete Post-Installed Anchors	Shared
	07 2100	Thermal Insulation	Shared
	07 2726	Fluid-Applied Membrane Air Barriers	Shared

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BID PACKAGE BREAKDOWN

	Spec Number	Bid Package	Comments
	07 4213.23	Metal Composite Material Wall Panels	Exclusive
	07 6200	Sheet Metal Flashing and Trim	Shared
	07 9200	Joint Sealants	Shared
	07 9513	Expansion Joint Cover Assmeblies	Shared
	08 4313	Aluminum-Framed Storefronts	Exclusive
	08 4413	Glazed Aluminum Curtain Walls	Exclusive
	08 5653	Security & Service Windows	Exclusive
	08 6300	Metal-Framed Skylights	Exclusive
	08 7100	Door Hardware	Shared
	08 7101	Door Hardware Schedule	Shared
	08 8000	Glazing	Exclusive
	08 8300	Mirrors	Exclusive
	08 9100	Louvers	Exclusive
	08 9200	Louvered Equipment Enclosures	Exclusive
	20	**Doors, Frames & Hardware**	
	DIV 00	Division 00 - Procurement and Contracting Requirements	Shared
	DIV 01	Division 01 - General Requirements	Shared
	08 1113	Hollow Metal Doors and Frames	Shared
	08 1416	Flush Wood Doors	Shared
	08 7100	Door Hardware	Shared
	08 7101	Door Hardware Schedule	Shared
	21	**Drywall & General Trades**	
	DIV 00	Division 00 - Procurement and Contracting Requirements	Shared
	DIV 01	Division 01 - General Requirements	Shared
	03 3250	Concrete Post-Installed Anchors	Shared
	05 5400	Cold-Formed Metal Framing	Exclusive
	06 1000	Rough Carpentry	Exclusive
	06 8316	Fiberglass Reinforced Paneling	Exclusive
	07 2100	Thermal Insulation	Shared
	07 2119	Foamed-In-Place Insulation	Exclusive
	07 23410	Direct-Applied Exterior Finish Systems	Exclusive
	07 2726	Fluid-Applied Membrane Air Barriers	Shared
	07 4646	Fiber-Cement Wall Panels	Exclusive
	07 9200	Joint Sealants	Shared
	07 9513	Expansion Joint Cover Assmeblies	Shared
	08 1113	Hollow Metal Doors and Frames	Shared
	08 1416	Flush Wood Doors	Shared
	08 3323	Overhead Coiling Doors	Exclusive
	08 3326	Overhead Coiling Grilles	Exclusive
	08 7100	Door Hardware	Shared
	08 7101	Door Hardware Schedule	Shared
	09 2116	Gypsum Board Assemblies	Exclusive
	09 2216	Non-Structural Metal Framing	Exclusive
	10 2113.19	Plastic Toilet Compartments	Exclusive
	10 2123	Cubicle Curtains and Track	Exclusive
	10 2800	Toilet Accessories	Exclusive
	10 4400	Fire Protection Specialties	Exclusive
	11 3013	Appliances	Exclusive
	11 5400	Art Equipment	Exclusive
	11 5410	Technical Education Equipment	Exclusive
	11 6623	Gymnasium Equipment	Exclusive
	11 6643	Interior Electronic Scoreboard	Exclusive
	11 7300	Patient Care Equipment	Exclusive

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BID PACKAGE BREAKDOWN

	Spec Number	Bid Package	Comments
	22	**Acoustical Ceilings**	
	DIV 00	Division 00 - Procurement and Contracting Requirements	Shared
	DIV 01	Division 01 - General Requirements	Shared
	07 9200	Joint Sealants	Shared
	07 9513	Expansion Joint Cover Assmeblies	Shared
	09 5100	Acoustical Ceilings	Exclusive
	09 8416	Fixed Sound Reflective Panels	Shared
	09 8430	Sound-Absorbing Wall and Ceiling Units	Shared
	23	**Ceramic Tile**	
	DIV 00	Division 00 - Procurement and Contracting Requirements	Shared
	DIV 01	Division 01 - General Requirements	Shared
	09 0561	Common Work Results for Flooring Preparation	Shared
	09 3000	Tiling	Exclusive
	24	**Resilient Flooring**	
	DIV 00	Division 00 - Procurement and Contracting Requirements	Shared
	DIV 01	Division 01 - General Requirements	Shared
	09 0561	Common Work Results for Flooring Preparation	Shared
	09 6500	Resilient Flooring	Exclusive
	09 6566	Resilient Athletic Flooring	Exclusive
	09 6700	Fluid-Applied Flooring	Exclusive
	25	**Carpet**	
	DIV 00	Division 00 - Procurement and Contracting Requirements	Shared
	DIV 01	Division 01 - General Requirements	Shared
	09 0561	Common Work Results for Flooring Preparation	Shared
	09 6813	Tile Carpeting	Exclusive
	26	**Wood Flooring**	
	DIV 00	Division 00 - Procurement and Contracting Requirements	Shared
	DIV 01	Division 01 - General Requirements	Shared
	07 9200	Joint Sealants	Shared
	09 0561	Common Work Results for Flooring Preparation	Shared
	09 6429	Wood Strip and Plank Flooring	Exclusive
	09 6466	Wood Athletic Flooring	Exclusive
	27	**Painting & Wall Covering**	
	DIV 00	Division 00 - Procurement and Contracting Requirements	Shared
	DIV 01	Division 01 - General Requirements	Shared
	03 3511	Concrete Floor Finishes	Exclusive
	07 9200	Joint Sealants	Shared
	09 7200	Wall Coverings	Exclusive
	09 8300	Acoustic Finishes	Exclusive
	09 9123	Interior Painting	Exclusive
	28	**Signage**	
	DIV 00	Division 00 - Procurement and Contracting Requirements	Shared
	DIV 01	Division 01 - General Requirements	Shared
	10 1419	Dimensional Letter Signage	Exclusive
	10 1423	Panel Signage	Exclusive
	10 1473	Painted Signage	Exclusive

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BID PACKAGE BREAKDOWN

	Spec Number	Bid Package	Comments
	29	**Lockers**	
	DIV 00	Division 00 - Procurement and Contracting Requirements	Shared
	DIV 01	Division 01 - General Requirements	Shared
	10 5113	Metal Lockers	Exclusive
	30	**Food Service Equipment**	
	DIV 00	Division 00 - Procurement and Contracting Requirements	Shared
	DIV 01	Division 01 - General Requirements	Shared
	07 9200	Joint Sealants	Shared
	11 4000	Foodservice Equipment	Exclusive
	31	**Stage Extension, Draperies, Rigging, Acoustic Doors & Panels**	
	DIV 00	Division 00 - Procurement and Contracting Requirements	Shared
	DIV 01	Division 01 - General Requirements	Shared
	11 0610	Stage Rigging and Curtains	Exclusive
	32	**Fixed Seating**	
	DIV 00	Division 00 - Procurement and Contracting Requirements	Shared
	DIV 01	Division 01 - General Requirements	Shared
	12 6100	Fixed Audience Seating	Exclusive
	12 6613	Telescoping Bleachers	Exclusive
	33	**Window Treatment**	
	DIV 00	Division 00 - Procurement and Contracting Requirements	Shared
	DIV 01	Division 01 - General Requirements	Shared
	12 2401	Window Shades	Exclusive
	34	**Elevators**	
	DIV 00	Division 00 - Procurement and Contracting Requirements	Shared
	DIV 01	Division 01 - General Requirements	Shared
	14 2100	Electric Traction Elevators	Exclusive
	35	**Fire Protection**	
	DIV 00	Division 00 - Procurement and Contracting Requirements	Shared
	DIV 01	Division 01 - General Requirements	Shared
	07 9200	Joint Sealants	Shared
	21 0400	General Conditions for Fire Protection Trades	Exclusive
	21 0433	Heat Trace for Fire Suppression Piping	Shared
	21 0516	Expansion Fittings and Loops for Fire Suppression Piping	Exclusive
	21 0548	Vibration and Seismic Controls for Fire Suppression Piping and Equipment	Exclusive
	21 1313	Wet Pipe Sprinkler Systems	Exclusive
	21 3000	Fire Pumps	Exclusive
	36	**Plumbing**	
	DIV 00	Division 00 - Procurement and Contracting Requirements	Shared
	DIV 01	Division 01 - General Requirements	Shared
	07 9200	Joint Sealants	Shared
	21 0533	Heat Trace for Plumbing Piping	Shared
	22 0400	General Conditions for Plumbing Trades	Exclusive
	22 0516	Expansion Fittings and Loops for Plumbing Piping	Exclusive
	22 0517	Sleeves and Sleeve Seals for Plumbing Piping	Exclusive
	22 0519	Meters and Gauges for Plumbing Piping	Exclusive
	22 0523	General Duty Valves for Plumbing Piping	Exclusive
	22 0529	Hangers and Supports for Plumbing Piping and Equipment	Exclusive

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	Spec Number	Bid Package	Comments
	22 0548	Vibration and Seismic Controls for Plumbing Piping and Equipment	Exclusive
	22 0553	Identification for Plumbing Piping and Equipment	Exclusive
	22 0700	Plumbing Insulation	Exclusive
	22 1005	Plumbing Piping	Exclusive
	22 1123	Fuel Gas Piping	Exclusive
	22 1124	Domestic Water Pumps	Exclusive
	22 1500	General Compressed Air Systems	Exclusive
	22 3000	Plumbing Equipment	Exclusive
	22 4000	Plumbing Fixtures and Specialties	Exclusive
	37	**HVAC & Controls**	
	DIV 00	Division 00 - Procurement and Contracting Requirements	Shared
	DIV 01	Division 01 - General Requirements	Shared
	07 9200	Joint Sealants	Shared
	23 0400	General Conditions for Mechanical Trades	Exclusive
	23 0516	Expansion Fittings and Loops for HVAC Piping	Exclusive
	23 0517	Sleeves and Sleeve Seals for HVAC Piping	Exclusive
	23 0523	General Duty Valves for HVAC Piping	Exclusive
	23 0529	Hangers and Supports for HVAC Piping, Ductwork, and Equipment	Exclusive
	23 0548	Vibration and Seismic Controls for HVAC Piping and Equipment	Exclusive
	23 0553	Identification for HVAC Piping and Equipment	Exclusive
	23 0593	Testing, Adjusting, and Balancing for HVAC	Exclusive
	23 0700	HVAC Insulation	Exclusive
	23 0900	Instrumentation and Controls for HVAC	Exclusive
	23 0993	Sequence of Operations	Exclusive
	23 2113	Hydronic Piping	Exclusive
	23 2114	Hydronic Specialties	Exclusive
	23 2123	Hydronic Pumps	Exclusive
	23 2500	HVAC Water Treatment	Exclusive
	23 3100	HVAC Ducts and Casings	Exclusive
	23 3300	Air Duct Accessories	Exclusive
	23 3416	Centrifugal HVAC Fans	Exclusive
	23 3600	Air Terminal Units	Exclusive
	23 3700	Air Outlets and Inlets	Exclusive
	23 5100	Breechings, Chimneys, and Stacks	Exclusive
	23 5239	Fire-Tube Boilers	Exclusive
	23 5700	Heat Exchangers for HVAC	Exclusive
	23 6411	Packaged Water Chillers- Scroll	Shared
	23 7413	Modular Central Station Air Handing Units	Shared
	23 8126	Split-System Air-Conditioners	Exclusive
	23 8200	Convection Heating and Cooling Units	Exclusive
	38	**Electrical & Fire Alarm**	
	DIV 00	Division 00 - Procurement and Contracting Requirements	Shared
	DIV 01	Division 01 - General Requirements	Shared
	07 9200	Joint Sealants	Shared
	21 0433	Heat Trace for Fire Suppression Piping	Shared
	21 0533	Heat Trace for Plumbing Piping	Shared
	26 0400	General Conditions for Electrical Trades	Exclusive
	26 0503	Equipment Wiring Connections	Exclusive
	26 0519	Electrical Power Conductors and Cables	Exclusive
	26 0526	Grounding and Bonding for Electrical Systems	Exclusive
	26 0529	Hangers and Supports for Electrical Systems	Exclusive
	26 0533	Raceway and Boxes for Electrical Systems	Exclusive
	26 0534	Floor Boxes for Electrical Systems	Exclusive
	26 0536	Cable Trays for Electrical Systems	Exclusive

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BID PACKAGE BREAKDOWN

	Spec Number	Bid Package	Comments
	26 0548	Vibration and Seismic Controls for Electrical	Exclusive
	26 0553	Identification for Electrical Systems	Exclusive
	26 0573	Overcurrent Protective Device Coordination Study	Shared
	26 0923	Lighting Control Devices	Exclusive
	26 2200	Low-Voltage Transformers	Shared
	26 2413	Switchboards	Shared
	26 2416	Panelboards	Shared
	26 2653	Electric Vehicle Charging Equipment	Exclusive
	26 2716	Electrical Cabinets and Enclosures	Exclusive
	26 2726	Wiring Devices	Exclusive
	26 2813	Fuses	Exclusive
	26 2819	Enclosed Switches	Shared
	26 2823	Enclosed Circuit Breakers	Shared
	26 2826	Enclosed Transfer Switches	Shared
	26 3213	Engine Generators	Shared
	26 4113	Lightning Protection for Structures	Exclusive
	26 5100	Lighting	Exclusive
	26 5561	Theatrical Lighting	Exclusive
	28 3100	Fire Detection and Alarm	Exclusive
	39	**Low Voltage & AV**	
	DIV 00	Division 00 - Procurement and Contracting Requirements	Shared
	DIV 01	Division 01 - General Requirements	Shared
	07 9200	Joint Sealants	Shared
	27 0536	Cable Trays For Communication Systems	Exclusive
	27 1000	Structured Cabling	Exclusive
	27 4100	Audio Video Systems	Exclusive
	27 5116	Public Address System	Exclusive
	27 5313	Clock System	Exclusive
	27 6010	Emergency Responder Radio Coverage System	Exclusive
	28 0500	Security Conductor Cables	Exclusive
	28 0528	Pathways for Security Systems	Exclusive
	28 1300	Access Control System	Exclusive
	28 1600	Intrusion Detection	Exclusive
	28 2300	Video Surveillance System	Exclusive
	40	**Concrete Flatwork**	
	DIV 00	Division 00 - Procurement and Contracting Requirements	Shared
	DIV 01	Division 01 - General Requirements	Shared
	03 1000	Concrete Forming and Accessories	Shared
	03 2000	Concrete Reinforcing	Shared
	03 3000	Cast-in-Place Concrete	Shared
	32 1313	Concrete Paving	Exclusive
	32 1373	Concrete Paving Joint Sealants	Exclusive
	32 1726	Tactile Warning Surfaces	Exclusive
	41	**Landscaping**	
	DIV 00	Division 00 - Procurement and Contracting Requirements	Shared
	DIV 01	Division 01 - General Requirements	Shared
	11 6833	Athletic Field Equipment	Exclusive
	32 8423	Irrigation Systems	Exclusive
	32 9113	Soil Preparation	Exclusive
	32 9113.29	Athletic Field Root Zone	Exclusive
	32 9200	Turf and Grasses	Exclusive
	32 9219.22	Athletic Field Seeding and Sodding	Exclusive
	32 9300	Plants	Exclusive

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A. Documents & Policies

This Subcontractor agrees to perform all the work necessary to provide ***<<Bid Package Description>> Work*** for the ***New Central Middle School Project*** in **Greenwich Connecticut** in accordance with the following documents:

1. List of attached Contract Documents for ***New Central Middle School Project***:

   a. List of Contract Drawings and Specifications for the ***New Central Middle School Project,*** dated ***07.08.2024***.

   NOTE #1: This Subcontractor shall be responsible for all information contained in the Contract Drawings and Specifications as related to your work. If the Contract Drawings and Specifications conflict, then the greater quantity and quality shall apply.

   The Board of Education of the Town of Greenwich will be referred to as "Owner" in this document.

   b. Bid Package Breakdown for the ***New Central Middle School Project,*** dated ***09.30.2024***.

   c. Construction Schedule for the ***New Central Middle School Project,*** dated ***09.24.2024***.

   d. Phasing / Logistics Plans, for the ***New Central Middle School Project,*** dated ***07.08.2024***.

   e. Safety & Health Program & Additional Provisions for the ***New Central Middle School Project ,*** dated ***August 2024***

   f. CCIP Manual, for the ***New Central Middle School Project,*** dated ***07.08.2024***.

   g. Equipment Coordination Matrix(ces), for the ***New Central Middle School Project,*** dated ***08.13.2024***.

   h. Accelerated Payment Program Rider, Not Dated

   i. Minimum Rates and Classifications for Building Construction as issued by the Connecticut Department of Labor Wage and Workplace Standards Division for the ***New Central Middle School Project,*** dated ***09.23.2024***.

   j. Invitation to Bid for the ***New Central Middle School Project,*** dated ***09.30.2024***. (including reference documents).

   k. ***<<Bid Notice #>>*** for the ***<<Project Name>> Project,*** dated ***<<TBD>>*** (including reference documents).

   l. Bidders Question Log for the ***<<Project Name>> Project,*** dated ***<<TBD>>***

   m. Turner Utility Metering Schematic & Fuel Tracking Log

   n. Inclusive and Respectful Workplace Playbook dated **May 3, 2023**

   o. Worker Experience for the ***New Central Middle School Project,*** dated ***07.08.2024***.

2. List of referenced forms and policies that are hereby specifically made part of the Contract Documents:

   a. Turner Construction Company's Payment and Performance Bonds **(Nos. 111 and 112 – Multiple Obligee) (if Payment and Performance Bond alternate is accepted only).**

   b. Turner Construction Company's Partial Waiver of Lien and Release

   c. Turner Construction Company's Sub-Subcontractor/ Supplier Affidavit and Partial Release of Claims and Lien Waiver

   d. Turner Construction Company's General Release (final payment)

   e. Contractor Sworn Statement

   f. Turner Construction Company's Corporate Master Safety and Health Program

   g. The Turner Corporation's Substance Abuse Policy.

   h. The Turner Corporation's National Anti-Harassment Policy

i. The Turner Corporation's Equal Employment Opportunity Policy

j. State of Connecticut Public Act 89-255, License Requirements for Subcontractors.

k. Turner Construction Company's TurnerTracker Manual dated December 2023

l. Turner Construction's Code of Conduct

m. The Turner Corporation Jobsite and Office Vandalism, Graffiti and Defacement of Property Policy dated September 15, 2022

n. **Standard Form of Agreement between Owner and CM AIA A133 for the *New Central Middle School Project.***

o. General Conditions from Owner Agreement AIA A201 for the *New Central Middle School Project*

p. Form 36 Public Work Rider dated 2022

q. UBE Subcontractor Commitment Plan

These documents are available for viewing at Turner Construction Company's office located at 6 Corporate Drive, Suite 820, Shelton, CT 06484 (contact the Purchasing Dept. @ 203-712-6070).****Note**:** By signing this agreement, the Subcontractor acknowledges that he has read these referenced documents and will unconditionally abide by its terms and conditions.

3. **Diversity:** Turner Construction believes that its success comes from the value it places on diversity. To Turner, Diversity is a way of life. In an ever-changing global marketplace, diversity is good for business. It positions us well to meet the needs of our evolving customer base, and it facilitates the exchange of new perspectives and ideas. When all employees feel they can achieve their full potential, quality and productivity thrive.

Turner's environment, culture, policies, programs, and practices reflect the high value we place on diversity. We have an unwavering commitment to:

a. Promote an open and supportive work environment;
b. Value diversity in all its forms;
c. Encourage the candid expression of ideas;
d. Allow a free exchange of points of view; and
e. Support each other in the pursuit of common goals

It is the expectation of Turner, and the responsibility of every Subcontractor and Vendor with whom we work, to respect, value, and display Diversity through their daily actions on this and every project which we perform together.

Turner has and shall enforce a **Zero-Tolerance Policy** with Subcontractors, Vendors and/or workers who violate this policy and Federal, State, and Local law as it applies.

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THIS AGREEMENT INCLUDES AND ACKNOWLEDGES THE ADDITION OF THE FOLLOWING ARTICLE AS IF INSERTED IMMEDIATELY FOLLOWING THE ETHICS AND COMPLIANCE ARTICLE OF THIS AGREEMENT AS FOLLOWS:

"IT IS THE GOAL OF CONTRACTOR TO PROMOTE A WORK ENVIRONMENT AT THE PROJECT THAT IS FREE FROM HARASSMENT OF ANY KIND. CONTRACTOR HAS ZERO TOLERANCE FOR HARASSMENT, INCLUDING HARASSMENT ON THE BASIS OF RACE, SEX, GENDER, GENDER IDENTITY, GENDER EXPRESSION, TRANSGENDER STATUS, SEXUAL ORIENTATION, PREGNANCY, CHILDBIRTH AND OTHER PREGNANCY-RELATED CONDITIONS, COLOR, NATIONAL ORIGIN, ANCESTRY, AGE, RELIGIOUS CREED, CITIZENSHIP, MARITAL STATUS (INCLUDING REGISTERED DOMESTIC PARTNERS), PARENTAL STATUS, PHYSICAL DISABILITY, MENTAL DISABILITY, MEDICAL CONDITION, GENETIC INFORMATION, MILITARY OR VETERAN STATUS (INCLUDING PROTECTED VETERAN STATUS), OR ANY OTHER CHARACTERISTIC OR STATUS PROTECTED BY LAW. SUBCONTRACTOR AGREES TO BE BOUND BY THE POLICY STATEMENT ON HARASSMENT REFERENCED IN ARTICLE XXII BELOW, AND ANY VIOLATION OR SUSPECTED VIOLATION OF SUCH POLICY BY SUBCONTRACTOR OR ANY OF ITS OFFICERS, AGENTS, SERVANTS, EMPLOYEES, SUBCONTRACTORS OR SUPPLIERS SHALL BE CONSIDERED AS SUBCONTRACTOR'S FAILURE TO PERFORM ITS OBLIGATIONS UNDER THE TERMS AND CONDITIONS OF THIS AGREEMENT. SUCH FAILURE SHALL BE CONSIDERED ADEQUATE AND JUSTIFIABLE GROUNDS FOR CONTRACTOR TO EFFECTUATE ITS RIGHTS AND REMEDIES UNDER THE PROVISIONS OF ARTICLE XI OF THIS AGREEMENT. SUBCONTRACTOR SHALL ACTIVELY PROMOTE A HARASSMENT-FREE WORK ENVIRONMENT AMONG ITS OFFICERS, AGENTS, SERVANTS, EMPLOYEES, SUBCONTRACTORS, AND SUPPLIERS."

4. **SMALL AND MINORITY OWNED BUSINESS ENTERPRISES (SBE OR MBE):** The Owner and Turner Construction support and encourage SBE and MBE participation in this project.

   Aspirational inclusion goals for this project are 25% DAS-certified Small and Minority owned business, with 25% of that specific with DAS-certified Minority (6.25%). Successful prime bidders will be expected to make every effort to provide opportunities to MBE by actively soliciting bids for portions of the package prior to submitting a bid to Turner, and state on the Form of Proposal the specific intended percentage of awards to MBE firms. Where MBE utilization is intended but the specific subcontractor is still unknown, note a "TBD" and dollar amount on the plan. The Contracting Plan will be reviewed during the subcontractor closedown meeting. If you are unable to satisfy the package goals, be prepared to discuss your good efforts and plan for Set-Aside plan approval from CHRO.

   On a monthly basis, all subcontractors will be expected to report on the payment status of their subcontractors (sub tiers). The format of the MBE reporting tool is nearly identical to the Contracting Plan and is accessed through Textura, the monthly billing website. Failure to report on a monthly basis could result in a delay of payment.

   All Subcontractors noted as requiring CHRO SBE/MBE participation on the invitation to bid must follow required measures and submit appropriate Set-Aside plans to the Commission on Human Rights and Opportunities per the State of Connecticut requirements for approval.

5. Subcontractor acknowledges that this Subcontract is based on reasonable interpretation and within the confines of the documents / information/ specifications provided. This pricing shall be full compensation to the subcontractor for the complete work of the associated trade required at the Project. Subcontractor has included any necessary elaboration, missing segments, obvious requirements, etc. that would be necessary for a functioning system at the quality level established by the Contract Documents.

6. All pricing submitted by Subcontractors and Vendors, including pricing of change orders, alternates, and unit pricing, shall include all things necessary for a complete installation of the work. This includes, but is not limited to, all labor, materials, tools, bond premiums, shop drawings, allowances for waste, equipment, shipping costs, handling, storing, hoisting, rigging, distribution, protection of materials, fringe benefits, taxes, overhead, profit, applicable insurance, etc.. Pricing of RFP's and other proposed extras must be submitted within the time period as per Form 36, Article IX.

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7. The allowable combined percentage mark-up for overhead and profit on direct costs of changes when work is performed by the Subcontractor shall be as noted in Form 36, Artcle IX.b or as governed by the General Contract. This same percentage shall be allowed for any changes performed by Sub-Subcontractors and five percent (5%) may be added by the Subcontractor to the Sub-Subcontractor's estimate. The total on all tiers shall not exceed fifteen percent (15%) in the aggregate. If this subcontractor subcontracts work to a subsidiary or parent company of itself, the total markup shall not exceed ten percent (10%).

8. **Subcontractor's Partial Waiver of Lien, Sub-Subcontractor/ Supplier Affidavit and Partial Release of Claims and Lien Waiver, and Contractors Sworn Statement** for the Project is hereby made part of this Contract Agreement. Refer to Progress Payment Procedures in Section C below.

9. The following are hourly wage rates for all tradesmen associated with this bid package for performing extra work on a time and material basis. These rates are fully loaded (including benefits, taxes (All Sales Taxes, Labor and Material as applicable for this project and type of work), applicable insurance, overhead and profit, bond costs (if Subcontractor has provided Surety Bonds), small tools, travel, parking, and any other costs associated with labor, etc.) and are in accordance with the prevailing wages of the trade having jurisdiction in areas where the work is performed. The wage rates that are agreed upon shall be valid for the life of the project unless union contract or union contract renewal indicates periodic adjustment OR unless annual wage rate adjustment is issued by the CT Department of Labor. ***NOTE: Further, no mark-up shall be allowed on the premium time portion of the wage rate.*** These wage rates including detail and supporting documentation shall be made available within 5 days of verbal award and shall be broken down sufficiently representing all of the items noted above. ***All rates are subject to thorough analysis and subject to reduction if deemed inaccurate by Turner Construction Company and/or The Owner. THESE RATES ARE GOOD FOR BOTH ADDS AND DEDUCTS.***

Foremen	Straight Time	Time & One Half	Double Time
_____	$_____	$_____	$_____
_____	$_____	$_____	$_____

Journeymen	Straight Time	Time & One Half	Double Time
_____	$_____	$_____	$_____
_____	$_____	$_____	$_____

Apprentice	Straight Time	Time & One Half	Double Time
_____	$_____	$_____	$_____
_____	$_____	$_____	$_____

See from of Proposal to provide rates to be included per above:

10. Refer to Subcontract Article XV, Labor to be Employed, 2nd paragraph which refers to "Davis-Bacon Act or the Walsh-Healy Act, or other similar laws, statutes or requirements at a state or local level" and the requirement to "submit to Turner, as a condition for payment, certified payrolls in the form prescribed by any such laws, regulations or requirements". In compliance with this requirement, this project requires that this Subcontractor shall pay wages to workers in strict accordance with the laws of the State of Connecticut. This Subcontractor shall electronically submit payroll records, certified payroll, and related or required payroll documentation through www.LCPTracker.net hereinafter referred to as "certified payroll compliance system", within 14 days after the end of each payroll period. Failure to submit this information shall constitute a breach of this requirement. This requirement shall apply to [and Subcontractor shall be obligated to ensure that] all lower tier Subcontractors comply with these requirements. Access to the certified payroll compliance system and training will be facilitated by Turner Construction Company. Cost of access to the certified payroll compliance system shall be borne by Turner. Up to date payroll submissions are necessary to maintain monthly progress payments.

11. The successful bidder is responsible for procuring all documents required for construction purposes once awarded the contract. Neither Turner Construction Company nor The Owner will be furnishing construction documents to the successful bidder.

12. ~~All bidders performing or subcontracting carpentry work (including resilient flooring and carpet) shall be union contractors and any work subcontracted shall utilize union labor. The successful bidder will furnish evidence of such.~~

To the extent required under section 31-53 of the Connecticut General Statutes, the wages paid on an hourly basis to any person performing the work of any mechanic, laborer or worker on the work herin contracted to be done and the amount of payment or contribution paid or payable on behalf of each person to any employee welfare fund, as defined in subsection (i) of section 31-53 of the General Statutes of Connecticut shall be at a rate equal to the rate customary or prevailing for same work in the same trade or occupation in the town in which such public works project is being constructed.

Contractor may engage in activities in the field or otherwise to verify the information provided by Subcontractor or any lower-tier subcontractor with regard to the payment of prevailing wages. Such activities may include, but are not limited to, interviews of workers to confirm their hourly compensation and trade classification and review of documentation (e.g., copies of pay stubs and/or payroll records) establishing that prevailing wages properly were paid. Subcontractor agrees to cooperate and assist Contractor is performing these verification activities including, but not limited to, making workers available for interview and providing documentation requested by Contractor. Subcontractor shall require its lower-tier subcontractors to similarly cooperate and assist Contractor

B. Taxes, Bonds, Insurance, Etc.

1. If Turner Construction Company requires this Contractor to provide Payment and Performance Bonds, this Contractor shall provide Payment & Performance Bonds at the premium indicated by the Add Alternate on the Bid Form and the following shall apply:

   a) **100% Payment and Performance Bonds** are being furnished as part of this Agreement (Surety must be listed on the current issue of US Treasury Federal Register). Refer to Form 36, Article XV for Rider "A" requirements.

   b) The successful Subcontractor must be able to provide the Payment and Performance bonds on the Turner Bond Forms noted above.

   c). Bond costs shall be included in all Change Order Pricing however they shall be reconciled at the end of the project as substantiated by invoices from the Surety. Variations between cost charged for Bonds and actual invoices from Surety will result in downward adjustment if overcharged.

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2. **Connecticut State Sales and Use Taxes are INCLUDED in this Subcontract Agreement as per the Project Status Noted: *(TAX EXEMPT STATUS)*** and shall be paid by this subcontractor in accordance with the Laws and Statutes of the State of Connecticut for a project with this Tax Status. Further, all applications for payment shall indicate on the G702 Application for Payment Form that "Connecticut State Sales and Use Tax is included".

3. **Non-Resident Subcontractor Requirements:**

   In accordance with State of Connecticut Department of Revenue Services SN 2012 (2) Special Notice 2011, Non-Resident Subcontractors must either provide a current State of Connecticut Department of Revenue Services "Nonresident Contractor Notice of Verified Status"

   OR

   In accordance with SN 2012(2), Turner must withhold 5% of the amount due to unverified subcontractor (e.g. 5% in addition to retainage) until the subcontractor obtains and furnishes Form AU-968 Certificate of Compliance from the Department of Revenue Services (DRS) at which time Turner will release monies to the extent approved.

   Further, when all work is completed under the contract and if unverified subcontractor has not submitted Form AU-967 (Request for Certificate of Compliance) within 90-days of the completion date, then Turner must remit the amount held back to the DRS on Form OS-114 on the first return due after the 90 day period following the completion of the Contract. In this event, Subcontractor explicitly agrees herein to execute a deduct Change Order for the amount held back.

Insurance:

4. **Additional Insured:** Turner Construction Company, The Turner Corporation, Owner, Town of Greenwich, the Greenwich Board of Education, the Central Middle School Building Committee, State of Connecticut, the Owner's Representative (Construction Solutions Group, LLC & Jones Lang LaSalle) and their respective, officers, agents, officials, employees, volunteers, boards and commissions shall be named as Additional Insured on all insurances required with exception of Workers Compensation and Professional Liability Coverages.

5. Additional insured coverage shall be provided on form CG 20 10 (11/85), or on forms providing equivalent coverage. In lieu of the aforementioned form, Turner will accept a combination of CG 20 10 (Ongoing Operations) and CG 20 37 (Products-Completed Operations). Coverage forms shall be submitted to Turner for review and approval.

6. **FOR BID PACKAGES EXCLUDED FROM CCIP (Demo & Abatement to be excluded from CCIP. All other subcontractors, only if alternate for traditional insurance is exercised)** Minimum insurance limits per occurrence of **$5,000,000** for General Liability, Statutory Workers Compensation, **$2,000,000** for Employers Liability, **$2,000,000** disease limit, **$2,000,000** disease-policy limit and **$2,000,000** for Automobile Liability – refer to Form 166 for additional requirements. Any subcontractor performing Structural Demolition to include $20,000,000 for General Liability limit.

7. **Pollution Liability Insurance: Subcontractor (for disposal of contaminated material)** shall provide a minimum insurance limit of **$5,000,000 /Occurrence and $10,000,000 Aggregate** for Pollution Liability (non-project specific) – refer to Form 36 for additional requirements. This subcontractor shall provide endorsements for contingent transportation and contingent non-owned disposal site.

   a. Lead Containing Material - **$5,000,000 /Occurrence and $10,000,000 Aggregate**

   b. Contaminated Materials- **$5,000,000 /Occurrence and $10,000,000 Aggregate**

c. For all lead work performed by this Subcontractor, this Subcontractor shall be responsible to place all lead waste in a separate container provided by this Subcontractor, and remove this waste to a dumpster provided by this subcontractor and properly dispose of this material. This Subcontractor shall ensure that the hauler has the appropriate pollution liability insurance in accordance with the boilerplate additional provisions.

8. **CCIP FOR ALL OTHER BID PACKAGES**: In lieu of providing Commercial General Liability Insurance, Workers Compensation and Employer's Liability Insurance, **for on-site work activities**, directly through insurance carriers of the Subcontractors choosing, this Subcontractor shall enroll in Turner Construction Company's Contractor Controlled Insurance Program (CCIP). This Subcontractor shall provide all required information, including but not limited to, the Enrollment Application for the CCIP provided within the CCIP Insurance Manual and other forms as required in a timely manner as required. Failure to produce information for itself and the work of its secondary tier contractors will result in the lack of coverage in accordance with the insurance manual. Turner Construction Company pays the cost of the coverage provided under the CCIP directly, and **the related insurance premiums are NOT included in the Subcontract Price** in accordance with Article XXIV of Turner Construction Company's Standard Subcontract Agreement (Form 36S). ***Refer to the CCIP Insurance Manual for more complete coverage information, policy exclusions and additional Subcontractor Responsibilities.***

In addition to the insurance coverage provided under the CCIP, the following shall remain required to be provided by Subcontractor:

a. **Automobile Insurance:** A Minimum insurance limit per occurrence of **$2,000,000** for Automobile Liability insurance – refer to Form 36 for additional requirements.

Minimum insurance limits per occurrence of **$5,000,000** for General Liability and Statutory Coverage for Workers Compensation for **all off site work activities** – refer to Form 36 for additional requirements.

9. **Professional Liability Insurance:** For bid packages requiring stamped and certified design drawings, the Professional Engineer hired by this Subcontractor shall assume professional responsibility for any design work required in this Subcontract including but not limited Structural and Life Safety design components.

a. This Subcontractor will include PRACTICE (OFFICE) PROFESSIONAL LIABILITY INSURANCE (E&0) for protection from claims arising out of the performance of any design or engineering services performed or furnished in connection with the Work caused by any negligent act error or omission for which Provider and/or the Provider's Architect(s) and/or Engineer(s) may become legally liable. If this subcontractor intends to have a lower tier subcontractor provide this insurance, this must be indicated with bid and prior to contract issuance and requires GM approval. Such professional liability insurance shall provide for coverage as follows:

b. Limit of liability - **$3,000,000**

c. Deductible Amount - Not more than **$50,000** (payable by the Subcontractor)

d. Subcontractor agrees that he will maintain this Professional Liability coverage for **5 years** after substantial completion of the Project, will notify Turner of any changes in the policy in subsequent years and will ensure that the policy will not provide less limits or coverage than the current policy."

e. Sixty (60) days prior written notice to Turner of cancellation of such insurance or any material change with respect thereof.

f. Such professional liability insurance shall be in a form and from a company acceptable to Turner and policy shall be available for review by Turner as requested.

10. **Builders Risk Insurance Deductible: Turner Construction shall procure and maintain Property Insurance (Builders Risk). In the event that this Subcontractor is determined to be responsible for losses covered under this insurance, this Subcontractor shall bear and be responsible for the $10,000 deductible of each such occurrence.**

11. This Subcontractor hereby acknowledges that the Contract between Turner and the Owner provides that Turner shall become obligated to pay certain liquidated damages to the Owner in the event the Project is not completed in accordance with the time requirements set forth therein. Subcontractor hereby agrees, in addition to its other duties and obligations under this Agreement and not in limitation thereof, to indemnify and save harmless Turner Construction Company from any and all such penalties, including any loss, cost, expenses and/or legal fees and disbursements, incurred in connection therewith which Turner may become obligated to pay to the Owner by reason of, resulting from or otherwise caused by Subcontractor's failure to perform and prosecute its work in accordance with the terms of this Agreement and the Contract Documents.

Liquidated Damages shall be shall be $6,000 / Day for each day that Substantial Completion of the Work is delayed beyond Substantial Completion.

Subcontractor's Licenses:

12. This Subcontractor shall provide a **State of Connecticut Subcontractor's License** in accordance with The State of Connecticut Public Act 89-255 and Connecticut General Statutes Chapter 393c, Section 20-341gg. Furthermore, substantiating evidence must be forwarded to Turner Construction Company for new and renewal licensing, in the form of one of the following:

    a.) Copy of the actual Subcontractor's license.

    b.) Verification from The State of Connecticut that the license application has been received and is being processed (a copy of the actual license when received must be forwarded to Turner Construction Company).

    c.) Verification from the State of Connecticut stating that a Subcontractor's License is not required for your firm.

GENERAL NOTE: No final payment or reduction in reserve or will be entertained until Turner Construction Company receives and verifies one of the above documents.

C. Scope of Work

Without the intent of limiting the Scope of Work to be performed by the Subcontractor, included is the furnishing and installing of the ***<<Bid Package Name>> Work*** in accordance with the contract documents and as further enumerated herein:

1. Includes performing all the ***<<Bid Package Name>> Work*** in accordance with the Contract Documents and including but not limited to the following Specifications:

Division 0 – Bidding and Contract Requirements
Division 1 – General Requirements

See Section C.1 Trade Specific Scope of Work for Specifications List as per the Bid Package Breakdown

General Trade Requirements

2. This subcontractor has examined the Drawings and Specifications and any modifications necessary to conform to Code and/or good practice will be included at no additional cost.

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3. This subcontractor represents that they are familiar with and have expertise in the performance of this work. Further, Subcontractor is cognizant of, and agrees to, the project requirement for premium quality consistent with a first class facility in accordance with the best practice of the trade.

4. Considering the Subcontractor's skills and knowledge of their specialty, it shall be their responsibility upon discovery to immediately notify Turner, in writing, of errors, omissions, discrepancies and non-compliance with applicable codes and regulations within the documents, or any work which will not fit or properly function if installed as indicated in the Contract Documents.

5. Each Subcontractor understands that Quality Control and Quality Assurance is a specific commitment and attitude, which is required during the implementation of the Work. The focus required to establish a first-class quality level by providing skilled supervision and by monitoring daily production quality are expected to be carried out during the execution of this Contract. With this commitment in mind, this Subcontractor shall cooperate and participate in the Project Specific Quality Program developed for this Project by Turner Construction's Project Team. This includes, but is not limited to the following:

   (a) At a minimum of 4-weeks prior to the start of Work, this Subcontractor shall furnish their own Subcontractor Project Specific Quality Program which shall be tailored specifically to the performance of Work on this project and include documented staff responsibility. This Subcontractor shall review this Program with Turner's Project Team and make any necessary adjustments prior to approval by Turner Construction. Turner reserves the right to approve or reject any Subcontractor Project Specific Quality Program that is not project specific and/or does not include sufficient detail to maintain a first-class quality level.

   (b) This Subcontractor shall be responsible to attend, cooperate and participate in Pre-installation Meetings for Work items or Systems, also termed Definable Features of Work (DFOW), as determined by Turner Construction.

   (c) This Subcontractor shall be responsible to coordinate and schedule First-Delivery Reviews with Turner.

   (d) This Subcontractor shall include all mockups required by the Contract Documents and schedule / coordinate Mockup Reviews for the same. In addition, this Subcontractor shall include in-place mockups for DFOW's as determined by Turner Construction, including cooperation and coordination with other trades. This Subcontractor is responsible to schedule / coordinate First-Installation Reviews for the same.

   (e) Non-Conformance and Deficiency Notifications will be issued throughout the performance of Work on this Project by Turner Construction, The Design Team, The Owner and their Consultants. This Subcontractor shall take immediate action and close all non-conformance items within 2-workdays following the date of notification. This Subcontractor shall coordinate and schedule Follow-up Inspections with Turner Construction prior to commencement of subsequent Work which may be affected by or will conceal such Work. In the case of repeat Work, this Subcontractor shall not proceed with such work until the Follow-up Inspection confirms that the non-conformance or deficiency has been corrected.

6. Each Subcontractor is expected to be experienced and familiar with the requirements and conditions of construction of similar buildings. One of these conditions is the necessary performance of "out of sequence" work. This terminology shall include "come-back", including but not necessarily limited to work that may be necessary for dirt chutes, plants, temporary wire and piping, protection, etc. "Sequence" work shall include phasing of the construction cycle to accommodate the installation of the work of all Subcontractors in a logical and orderly fashion, including all necessary temporary block outs, connections, framing, and supports as required for the work of others.

7. Subcontractor shall maintain a full-time superintendent at the jobsite during any time in which his employees or Subcontractors are involved on this project. This superintendent will be responsible to attend all coordination meetings as scheduled by the Construction Manager's Project Manager and have the authority to make decisions. This superintendent shall furthermore be equipped with a cellular phone for communication with Turner and other trades. In addition this superintendent shall maintain a full set of up to date drawings and specifications on site at all times.

8. This Subcontractor shall attend regularly scheduled job meetings. This Subcontractor will properly coordinate their work with other trades and will resolve coordination issues as required to ensure the completion of work in accordance with the Project Schedule. The work of Subcontractor shall be performed in a manner that does not impede or delay another Subcontractor in the performance of his work.
9. A principal of this Subcontractor shall be required to attend a monthly "Principal's Meeting" conducted by Turner Construction Company at the project site. This meeting is intended to cover current project-wide issues including scheduling and logistics.

Submittal Requirements

10. This project will utilize Procore for the submittal and RFI process. Subcontractors will be provided access and reasonable guidance for use of this site. All product data shall be submitted electronically. Hard copy shop drawings and product samples as required in the contract documents shall be submitted to the TCCo field office.
11. Key Personnel:
    a.) Due from Subcontractor: Prior to the start of Subcontractor's start of Work
    b.) Includes: list of key personnel with addresses and telephone numbers for emergency situations
12. Schedule of Submittals – Shop Drawings, Products Data, Samples, Etc:
    a.) Due from Subcontractor: Within 10 working days of verbal award
    b.) Includes: complete listing of all shop drawings, samples, manufacturer's data, certifications, warranties/guarantees, O & M Manuals, etc., required by the specifications to be submitted for review, along with the subcontractor's submission date for each item listed consistent with the Construction Schedule.
        (i) Timing of Submittals: Submittals shall be provided allowing for sufficient time for review, approval, and delivery of materials in time as scheduled for this project, however, it remains the Subcontractors responsibility to ensure delivery of all material to the Jobsite to meet the schedule. The Architect will review these submittals on a priority basis. Subcontractors will be responsible for any delays to other Subcontractors as a result of delayed delivery of materials.
        (ii) No substitutions or variations from the specified manufacturers will be allowed without written review and approval of both the Architect and Turner. Requests for substitutions must be submitted in writing as defined within the Division 1 specifications.
        (iii) Shop drawings shall show all dimensions and clearances in coordination with other trades. All attachments must be designed and detailed on said shop drawings.
        (iv) Mockups as required by any or all of the specification sections are included in this Agreement.
13. Schedule of Values:
    a.) Due from Subcontractor: 30 working days prior to first application for payment
    b.) Includes: Draft AIA G703 (or equal) broken down with individual line items for labor and material for each major component of the work, including values for Daily Cleaning and Safety and Protection, mobilization, submittals, punch list and closeout. This document shall be subject to review and approval by Turner.
14. Equipment Commissioning / Owner Training Required:
    a.) Due from Subcontractor: Within 20 working days of verbal award where applicable. Source Blue providing Commissioning and Owner Training on equipment they furnished.
    b.) Includes: A schedule of all equipment requiring commissioning and Owner training including at minimum equipment name (tag #), location, area served
15. Man-Loaded Schedule:

a.) Due from Subcontractor: Within 10 working days of verbal award

b.) Includes: Construction schedule for all of Subcontractor's activities that fits within the time frame allotted by the Construction Schedule. This schedule shall be updated monthly, submitted with the application of payment , shall reflect the actual progress achieved to date and shall incorporate any recovery program to maintain the original submitted schedule. The Subcontractor is responsible to meet the requirements of the overall Construction Schedule included in this Subcontract. This includes providing the appropriate resources, equipment, and resources.

16. List of proposed or anticipated Lower Tier Contractors & Vendors:

a.) Due from Subcontractor: 30 working days prior to first application for payment

b.) Includes: List of Proposed lower tier Contractors and Vendors.

17. Requests for Information shall be made on standard forms made available by Turner.

18. Daily Construction Reports, and Daily Safety Checklists

a.) Due from Subcontractor: by 9:30 a.m. of each workday for all work completed on the previous day. The Daily Construction Reports do not constitute notification to Turner of delays or provide any other notifications to Turner other than that represented below. DCRs shall be submitted by the Subcontractor Superintendent / Foreman utilizing the Procore Application Technology on a Smart Phone or Tablet for the Project.

b.) Includes:
(i) The number of employees at the site, broken down by trade
(ii) Indicate for each crew the classifications (i.e., foremen, journeymen, apprentices, etc.)
(iii) Indicate a count of minority and female employees
(iv) Include a description of the type of work being performed and the location
(v) Include a count of **TOWN/CITY** residents and **TOWN/CITY** resident apprentices
(vi) Failure to maintain these records on a daily basis may result in the delay in monthly requisition payments on a day for day basis.

19. All foreman must have electronic access to Procore site in the field via Ipad, Smart Phone, etc.

Schedule and Progress

20. The Subcontractor shall perform all out-of-sequence work, phasing of work and protection of work as required by the Logistics Plans and to maintain the schedule at no additional cost to the Owner or Turner Construction Company. No additional compensation will be considered for comeback work. Each subcontractor understands that the schedule drives the project and will cooperate with Turner in meeting the schedule.

21. All shutdowns and tie-ins for active MEP, Security and Data systems must be performed on off hours. Premium time is included for the performance of this Work. All off-hours work must be scheduled 24 hours in advance with Turner Construction Company.

22. Unless noted to the contrary within individual Additional Provisions / Scopes of Work (i.e. refer to Sections C.1 or above), Working hours for this Project are 7:00 a.m. to 3:30 p.m. All trades will work common eight-hour (8) days Monday through Friday. There will be a coffee break in the morning only at the assigned time of 9:00 a.m. All trades will celebrate the agreed upon Holidays specified. Any Subcontractor working beyond the normal hours of 7:00 a.m. to 3:30 p.m. must bear any added costs for providing temporary services such as electricity, and heat, and any personnel such as Shop Stewards, Turner Staff, or inspectors. The Subcontractor shall notify Turner 48 hours prior to their intention to work overtime to allow sufficient time for arrangement of any support services and/or personnel.

a.) There will be no work on Saturdays or Sundays without direction and approval by Turner & the Owner. If work is performed on weekends, this subcontractor shall perform all work in accordance with the appropriate town ordinances.

b.) all perform all work in accordance with the appropriate town ordinances.

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Operations & Site Logistics

23. Permits: The General building permit will be obtained and paid for by others. The MEP subcontractors and any other subcontractors requiring a special permit will be required to pull their permits against the general building permit. This Subcontractor is required to meet and walk with local code officials at every inspection regardless if Turner is present.
24. This Subcontractor shall include all line & grade work for the performance of their work. Baseline survey only will be provided by Turner Construction. All other survey work required to perform this subcontractors work shall be provided under this contract. The layout within the building must be coordinated with all contractors onsite.
25. The Subcontractor shall locate and mark the exact locations of the utilities or during the work. This Subcontractor shall immediately repair or replace any utilities damaged by their work and restore service as promptly as possible at this Subcontractor's expense, including but not limited to Owner facility workers, utility companies, Town officials and resources. This subcontractor shall, at the time of installation, update their record set of documents and provide as-built information to Turner Construction. This is to be done as work is performed and evidence of such may, at Turner's discretion, be a requirement for progress payments.
26. Include all costs for erection aids, scaffolding, chain hoists, bracing, shoring, guy cables, falsework, and hoisting necessary to complete the work under this contract as well as all engineering, approvals, permits, and inspections for the same. This shall include providing shoring/re-shoring drawings stamped by a professional engineer licensed in the **State of Connecticut**.
    a.) This Subcontractor shall comply with the requirements for the inspection and certification of lifting devices and include all costs for them in the lump sum base bid as required by the Contract Documents, and the **State of Connecticut** and local authorities.
27. Furnish and install all sleeves, inserts, hangers, supporting devices, equipment dunnage beyond that shown on the Contract Drawings as required in connection with this Subcontractor's work. Submit shop drawings for review by the Structural Engineer for any additional support/framing. All exterior metal supports must be galvanized.
28. Each Subcontractor shall be responsible for all cutting, patching and coring which may be required in connection with the installation of their work unless otherwise noted in the Subcontract Agreement. This will include repair of insulation or spray on fireproofing damaged during this work.
29. This Subcontractor shall protect all of the equipment furnished or installed by this Subcontractor from the elements, damage, dust, non-use, etc. until the Owner accepts it in writing.

Clean-up

30. This subcontractor shall abide by Turner Construction's safety policy of "Nothing hits the Ground".as defined more clearly in the Turner Construction Company's Master Safety and Health Program and as referenced in the Safety Additional Provisions. This Subcontractor shall perform all necessary cleanup of all rubbish, debris, excess materials; etc. associated with this Subcontractor's work on a daily basis to a dumpster to be provided by Turner (unless noted to the contrary below). This Subcontractor shall perform all necessary clean-up associated with or resulting from their work to maintain a clean and acceptable condition as determined by Turner at all times. All work areas are to be broom swept on a daily basis. Failure to keep a clean work area may result in a project "shut down" requiring all Subcontractors to stop work and clean. All costs associated with the "shut down" will be borne by the Subcontractors. The Subcontractors will be required to make up any lost time associated with a "shut down".
    (a) The following Bid Packages shall provide their own dumpsters: ***Demolition & Abatement, Sitework, Concrete, Masonry, Roofing, Concrete Flatwork and Landscaping.***
    (b) Dumpsters / Waste Removal Requirements: For all Subcontractors providing Dumpsters or Waste Removal under their Scope of Work, the following shall apply:

This Subcontractor will make every effort possible to ensure that their waste is properly sorted and disposed of to divert as much waste as possible from disposal in a land fill. This Subcontractor will track this recycling effort using the TurnerTracker System established by Turner Construction Company. Each dumpster ticket is to be logged into this system and its recycled content reported as a means of tracking the total percentage of construction and demolition debris diverted from landfills. Refer to the Turner Construction Company TurnerTracker User Manual dated December 2023 included within the Project Manual and included as a reference document to this agreement. No payment will be authorized without On-Line Waste Reporting compliance.

31. **If any general debris is left behind by the trades, such as soda cans, juice bottles, paper products, banding material, snippets of wire, etc., Turner reserves the right to proportionately backcharge every Subcontractor on the site for this cleaning. In addition, eating in the building will be restricted. This will be a non-negotiable item.**
32. This Subcontractor is responsible to cleaning the tires of this subcontractor's vehicles and equipment exiting the site to avoid tracking mud, dust, etc. from the site and into public streets.

Site Logistics/Temporary Facilities

33. Provide traffic control for your work, including policemen, flagmen, barricades, signage, etc. as required by the City and/or The **State of Connecticut**.
34. This Subcontractor is to coordinate all requirements for testing and inspection in accordance with the specifications. The Owner will contract with the Testing and Inspection Company, but it is this Subcontractors responsibility to coordinate, schedule, provide access, and accommodate all testing and inspections as required for their work. This subcontractor shall include testing accessories as may be required, i.e. a cylinder curing box. Any testing or inspections by the Town, Municipal, or State Authorities will be the responsibility of this Subcontractor to coordinate.
35. Access to and use of the site is restricted in terms of space. See Site Logistics Plan for staging, parking, & loading areas. Onsite parking **IS NOT** permitted for contractors with the exception of 1 vehicle per Trade bid package can park on site. All other contractor Parking area will be provided at a location within 3 miles of the project site (Final location tbd), each contractor shall be responsible for shuttling of their employees to and from the site location from parking area. There will be approximate 40 spaces for worker parking available at the Baptist Church on Indian Rock Lane available on a fist come, first serve bases during the course of the project. Workers are encouraged to carpool to this location due to the limited number of spaces.
36. Where material is specified to be furnished by others, it shall be understood that such materials are to be furnished and delivered F.O.B. Jobsite. The receiving, unloading, inventory, handling and storage of materials furnished by others, including security for such stored materials, is the responsibility and obligation of the Subcontractor to whom the materials are delivered.
37. "Substantial Completion" shall be defined as when the Owner accepts the space for the use intended as further defined within the General Contract. All required warranties and guarantees are to commence at this time. The Owner reserves the right to accept individual pieces of equipment or systems early. In these individual cases, the warranty/guarantee shall begin upon written acceptance by the Owner.
38. Office trailers will not be allowed on site without specific permission granted by the Turner Superintendent.
    a.) If any temporary facilities are permitted by the Turner Superintendent, they are to be constructed utilizing fire-resistant materials. Each of these must be equipped with an ABC type fire extinguisher and shall conform to applicable codes. Subcontractors may be required to relocate their trailers or shanties during the progress of the job at the Subcontractors expense. All Power and Telephone hook-up costs and usage fees will be the responsibility of this Subcontractor.

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39. In support of Turner's safety initiative of "Nothing Hits the Ground", material delivery shall follow the premise of "Just in Time" delivery. The storage of materials and equipment anywhere around or within the Jobsite shall be permitted only as approved in advance by the Turner Superintendant AND shall include only materials that will be installed within a 72 Hour time frame from the date of delivery unless approved by the Turner Superintendent in writing prior to delivery. If material and/or equipment are stored in a manner, which obstructs the progress of any portion of the work without Turner's approval, the Subcontractor shall remove or relocate as directed by Turner immediately upon notification and without reimbursement of cost.

40. Temporary Power- will be provided as specified by the Electrical Subcontractor. Trade Subcontractors are responsible for hookups, extensions and removal of their equipment.

    a.) The Electrical Contractor shall provide temporary power and lighting within the work area during each phase of the project. Temporary lighting shall be provided in all areas in which work is being performed in order to adequately illuminate the work area. Trade Subcontractors are responsible for any task lighting required for their work.

    b.) actors are responsible for any task lighting required for their work.

41. Water - will be provided by the Plumbing Subcontractor as specified for reasonable construction purposes. Hoses, extensions and damage resulting from careless use will be each Trade Subcontractors responsibility.

42. Toilets – temporary toilets will be provided and maintained by the Sitework Subcontractor for the use of all workers.

43. Fire Protection - will be the responsibility of everyone on site. Adequate numbers of portable 20 lb ABC type extinguishers will be located within the work areas by Turner. Any Subcontractor performing cutting, grinding, burning, welding, or other heat, spark, or flame generating type of work will be required to submit a hot work permit with Turner Construction. A fire watch must be performed during the activity and for a minimum of one hour after completion. The subcontractor must have their own 20 lb Fire Extinguisher during hot work and they must be certified every year by a 3rd party and inspected monthly by a competent person by initialing the certification tag.

44. Drinking Water - Each Subcontractor will be responsible for all drinking water for their own forces, including containers, ice, and cups.

Stormwater Compliance –

45. Turner Construction Company ("Turner") is committed to achieving and maintaining full compliance with the federal Clean Water Act and applicable state statutes providing for the implementation of the National Pollutant Discharge Elimination System ("NPDES") related to the discharge of stormwater from construction activities. To that end, Turner has established and shall implement the following mandatory Construction Stormwater Compliance Program at all projects or portions of a project on which Turner is a party required by applicable federal or State law (1) to obtain a construction stormwater NPDES permit in its own name or (2) to assume responsibility for compliance with a construction stormwater NPDES permit obtained by another party (hereinafter, "Sites").

46. Specific Stormwater training requirements for Subcontractors engaged in earth moving/disturbing activities (excavation, grading, landscaping, paving, on site batch plant) or those responsible for installing or maintaining BMP's.

47. Requirement for subcontractor attendance at a project specific Stormwater Management orientation held in conjunction with a preconstruction meeting.

48. All subcontractors working on the site will be required to attend the Turner Stormwater Subcontractor Orientation which will be held in conjunction with the required Preconstruction Meeting and led by the Site SCC.

    a) Each subcontractor working on the site is required to have one subcontractor superintendent or field supervisor attend this orientation.

    b) Only those Subcontractors involved in earth moving/disturbing activities (excavation, grading, landscaping, paving, on site batch plant) or those responsible for installing or maintaining BMP's will be required to take the online Turner Stormwater Subcontractor Short Course Intro into Erosion and Sediment Control prior to attending the

preconstruction meeting. The person or persons taking this online course must have a regular presence on the project.

Progress Payments

49. Applications for Payment and all supporting documents (including but not limited to lien waivers, sworn statements, and the like) for Subcontractor and its sub-subcontractors and suppliers, shall be in electronic format and shall be submitted to Turner using the Textura® Construction Payment Management (CPM) system. Subcontractor shall be responsible for the fees and costs owed associated with Subcontractor's use of the Textura CPM payment management system and shall enter into an agreement with Textura® directly and provide evidence of this agreement to Turner. Subcontractor shall include a similar provision in its sub-subcontracts and purchase orders. Fees to Subcontractors are calculated as 0.22% (22 basis points) of contract value, with a maximum fee of $5,000. Fees to Subcontractors' sub-subcontractors and suppliers are a fixed fee of $100 per sub-subcontractor or supplier contract. Subcontractor is directed to Subcontractor's Procedure Manual, Part IV, for Accounting – Payment Procedures and Textura® procedures.
50. The attached Accelerated Payment Program Rider [State] amends and supplements your Agreement with Turner and provides you the opportunity to enroll in the Program through Textura CPM and receive accelerated payments from Turner on your invoices. Formal enrollment into the Program can then be accomplished via the Textura CPM system. Additional information and Program benefits are included in the attached Turner Accelerated Payment Program summary. You may be contacted by a representative from Turner or Textura who can provide additional information on the Program and answer questions you may have or you may call Textura at 1-866-TEXTURA (839-8872) with any questions.
51. All invoices and requisitions for payment shall be submitted on AIA Document G-702 and G-703 or such other forms as may be required by the Owner. All forms must include a breakdown by area for material and labor. Turner shall approve this breakdown and format prior to submittal of the first application for payment (refer to Submittal requirements above).
    a.) With the second Application for Payment, and with each application thereafter, this Subcontractor shall provide along with the Application for payment a **Subcontractor's Partial Waiver of Lien, Contractors Sworn Statement, and Sub-Subcontractor/ Supplier Affidavit and Partial Release of Claims and Lien Waiver (for each sub-subcontractor or vendor / supplier listed on the Contractors Sworn Statement)** whereby this Subcontractor and its Subcontractors, Laborers, Material-men and Suppliers do hereby expressly waive, release and relinquish all rights to file or maintain such liens and claims and agrees further the right to file or maintain such liens and claims shall apply as well to work, labor and services performed and materials, supplies, equipment, applicable taxes and other items furnished under any change order or supplemental agreement for extra or additional work in connection with the project as the original work covered by this agreement. Waivers shall be for work paid for from the previous Payment Applications beginning with the second Application and shall be on the job specific forms provided by Turner Construction Company. ***Note: Failure to provide all documents will delay the issuance of progress payments.***
52. All applications for payment drafts are required to be submitted to the Turner Project Superintendent for initial review by the **20th of the month**. This Turner review will occur within one week of receipt of application. The revised/corrected application is due for formal submission no more than 2 business days after approval. . Note: This Subcontractor will project their billings through the entire month.
53. Should this Subcontractor fail to submit their formal corrected version of their application for payment as stated above, they will miss the billing cycle and may not bill until the following billing cycle.

Stored Materials

54. If authorized by Turner Construction Company and the Owner, it is agreed that progress payments may be made for materials stored in a secure off-site location (less retention as required by contract) based upon TCCo's receipt of the documentation required by Turner's Procurement Department including but not limited to: Bill of Sale, Schedule A, Consent of Surety (if applicable), Insurance Certificate, Loss Payable Endorsement, Lease Agreement, and UCC-1.

    a. It shall be the responsibility of this Subcontractor to properly mark/identify all materials being stored with Project Name or similar so they may be inspected/quantified in an expeditious manner by all parties. This Subcontractor must submit all documentation referenced above prior to this inspection being scheduled, and this Subcontractor shall reimburse Turner for all travel expenses associated with the required inspections.

    b. Any subcontractor receiving and storing pre-purchased Sourceblue equipment shall complete the Receipt Verification Form and provide stored material paperwork for this equipment.

MEP Coordination

55. This project shall utilize 3D Modeling for the coordination of all Structural Steel, HVAC & Controls, Plumbing, Elevator, Electrical & Fire Alarm (include all conduit 1" and larger), Low Voltage & AV(include all conduit 1" and larger), Fire Protection, Misc Metal (stairs, gym supports), Acoustical Ceilings, Drywall & General Trades(CFMF, Drywall ceilings/supports), Kitchen Equipment, Masonry openings for MEPs and Steel support, etc. This includes performing all work in accordance with the Contract Documents and including but not limited to the following Guidelines:

    a. **Subcontractor** agrees to participate in the use of digital/computer based three dimensional models and other related functionality, generally referred to as building information modeling (such models and functionality are referred to herein as BIM) as Turner may determine to be beneficial for use in facilitating coordination, sequencing, scheduling and/or production of as- built depictions of the Project and performance of the Work and as hereafter provided. The Subcontractor's costs of such participation are included in the Price unless explicitly outlined herein.

    b. **Subcontractor** shall participate in BIM coordination and review meetings as Turner Construction may require. **Subcontractor** acknowledges that such meetings will require attendance of personnel that are familiar with both the data entry aspects of the BIM as well as an understanding of the work to be performed and its relation to other elements of the Project, and subcontractor therefore agrees that personnel conversant in both shall attend all such meetings.

    c. **Subcontractor** agrees that neither the BIM nor the use of the BIM is in lieu of nor intended to relieve the **Subcontractor** of its responsibilities under the Subcontract.

    d. In the event the **Subcontractor** discovers any error, inconsistency, or omission in its information or submissions, the information or submissions provided by others or any BIM, it shall be reported to Turner via written notice which shall contain all relevant specifics.

    e. **Subcontractor** acknowledges that the BIM may require updating throughout the life of the Project to addresses any changes to the Work so that the BIM at the conclusion of the Project accurately depicts the Work as actually performed and installed. **Subcontractor** agrees to promptly update and provide revised submissions to Turner throughout the course of the Project.

    f. Turner Construction will make available their *Document Management Server (DMS)* that will enable all project parties to upload and download their respective models, manage electronic drawing files, and other electronic documents used in the coordination process. When the coordination drawings are uploaded, **The BP#37 HVAC & Controls Contractor** will be the ***"Gatekeeper"*** and download all trade models and integrate them into a consolidated model. After this a clash report will be created by the **Gatekeeper** identifying all the clashes and

conflicts between trade systems. This report will be issued to the subcontractors for action and resolution. Turner may require that subcontractors divide their systems models by floors, zones, and/or areas in order to better manage the coordination process in a manner that is most conducive to meeting the project's schedule and needs.

g. Turner will collect and distribute 3-Dimensional Architectural and Structural Models from the design team in their native format for use as backgrounds for coordination. *If a 3D model (.rvt) format is provided, it is* ***Subcontractor's*** *responsibility to export into other formats if required for their work (ie. 2D CAD (.dwg) format, etc…).* Models may only include basic architectural features, such as the floors, a rough approximation of ceilings chases, door openings, partitions exterior wall surfaces, window openings, roofs, elevator shafts, and stairs, and basic Structural features such as slabs and walls, steel framing – columns, beams, and major structural elements. **Subcontractor** is ultimately responsible for coordinating to all information contained in the 2-Dimensional Contract Drawings and Specifications as related to their work.

h. Once the Architectural/Structural models are posted on the DMS, **Subcontractor** is required to download and use these files to create their respective system models by sequence or geographic area dictated by Turner's representatives.

i. **Subcontractor** is required to run the clash detection analysis for their respective trade system against the Architectural/Structural models to ensure that there are no conflicts with their respective system(s).

j. **Subcontractor** is required to post to the DMS, up-dated drawings/models at least once per week, and one day prior to the clash detection analysis run by the **Gatekeeper**. (Day and time to be determined). This will continue until the area is completely coordinated.

k. The clash reports will be run for MEP systems in conflict with other trades and systems. A clash analysis report will be generated by the **Gatekeeper**. The **Gatekeeper** will create a Navisworks .NWD (or BIM 360 Glue view) file showing the clash viewpoints. This Clash report & Navisworks .NWD file will be posted to the DMS by the **Gatekeeper** and a corresponding notice sent by the **Gatekeeper** to all parties involved that the report is ready. **The Gatekeeper** will run the clash detection analysis as frequently as required for all systems modeled.

l. **Subcontractor** is required to review the clash detection report generated by the **Gatekeeper** before the weekly meeting, and arrive at the meeting prepared to address the unresolved clashes in a constructive manner.

m. **Subcontractor** is responsible for producing a traditional 2-Dimensional coordination drawing after cleaning up resolved all clashes and collisions. The final Coordination CAD drawing file will be re-circulated through all trades after a BIM sign-off meeting. This electronic coordination drawing files shall include all coordinated drawing information, fully dimensions (especially elevation dimensions), texts, and tags, etc.

n. **Subcontractor** is required upload their 3-Dimensional As- Built models, once all issues are addressed from above. Turner reserves the right to request additional file formats as the needs of the client or project require.

o. **Subcontractor** is required to update and post any changes originating from RFI's, Submittal's and Bulletin's that have changed their perspective work. **Subcontractor** making changes shall post onto the BIM Server site and send out a corresponding notice indicating the changes and reasoning behind the change with-in two weeks from receipt of changes.

p. All work on the coordination drawings (including 3D models) shall be performed by competent draftsmen in a clear legible manner utilizing standard industry conventions. **Subcontractor** shall be responsible for providing their coordination drawing files according to the established coordination schedule. It is the responsibility of each contractor to supply a sufficient number of draftsmen so as not to delay the BIM 3-Dimensional coordination process and shop drawing submittals.

q. **Subcontractor** will use a mandated file naming convention for their files. *During the Coordination Kickoff meeting Turner will provide the detailed file naming convention to all subcontractors.* Any files that do not follow the file naming convention will be deleted and removed from the server at any time without any notification.

r. **Subcontractor's** drawing and model files shall be based on an agreed upon and authorized origin point. The cost of any changes required by the **Subcontractor** to their drawings or models due to the use of an unauthorized origin shall be borne by the trade contractor.

Jobsite Metering & Utility Tracking

56. The Electrical Subcontractor shall provide the following:

    (a) This Subcontractor shall furnish and install hardware for metering temporary electrical usage for the project. Commissioning of hardware and metering system to be purchased from Vitality. Coordinate with Turner Construction for vendor information. Components include:

        (i) A8810 AcquiSuite Gateway Panel and Power Supply located within the jobsite trailer/office (Part# IDAS-A8810)

        (ii) Wireless Enclosed Metering Panel. Contains Veris Power Meter, Wireless Modbus/Pulse Transceiver, Power Supply and Antenna. Rope CT Included. UL 508A (Part # IDAS-MH-V1A). Meter panel communicates via Modbus RS485 to the Gateway Panel.

        (iii) Wireless Modbus/Pulse Transceiver radio transmitters

    (b) This Subcontractor shall provide 120v electrical service to radio transmitters, data acquisition hub, and water/electrical meters

    (c) This Subcontractor shall wire the water meter furnished and installed by the plumbing subcontractor. This includes providing 120v power and step-down connections between metering components (e.g. water meter to modhopper via RS485 cabling) for a complete system connection.

    (d) This Subcontractor shall install Antenna at jobsite trailer/office as required

    (e) This Subcontractor shall perform amperage test post-install to verify that meter readings are accurate to field conditions.

    (f) This Subcontractor shall disconnect and remove metering equipment installed under this scope prior to turnover of building. Disconnect CT cables to maximize reusable length. Return to Turner in original packaging.

    (g) This Subcontractor shall engage with 3rd-party commissioning agent (Vitality) prior to, during, and after installation to ensure hardware is correctly communicating with network.

57. The Plumbing Subcontractor shall provide the following:

    (a) This Subcontractor shall furnish and install hardware for metering temporary water usage for the project. Commissioning of hardware and metering system to be purchased from Vitality. Coordinate with Turner Construction for vendor information. Components include:

        (i) Micronics Clamp-On Water Meter. Measurement Value: Gallons Per Minute, Modbus Comms, Factory Calibrated. (Part# U1000 Ultrasonic Meter)

    (b) The electrical subcontractor shall wire the water meter once installed by this subcontractor.

(c) Relocate water meters upon switchover to permanent water source.

(d) Disconnect and remove water metering equipment under this scope prior to turnover of building. Return to Turner in original packaging.

58. All Subcontractors shall provide the following Fuel Tracking:

(a) On a monthly basis, submit Monthly Fuel Tracking Log with all fuel (diesel, gasoline) used by Contractor's onsite equipment and trucked-in water. Data shall be categorized by fuel type (Diesel, E10 gasoline, E85 gasoline, biodiesel, ethanol, etc.). Tracking form to be provided by Turner - see Monthly Fuel Tracking Log). Transient and/or personal vehicles not stationed for use within the project boundary are exempt from this tracking requirement.

(b) On a monthly basis, submit tracking log of all natural gas, propane and steam and other energy sources used for temporary services. Example include generators, temp heating, etc. Tracking form to be provided by Turner- see Monthly Fuel Tracking Log.

59. **Earthwork/Sitework Tracking & Reporting:** Subcontractor will submit documentation via Turner Tracker on a monthly basis memorializing cut/fill on site as well as materials removed from site. A 'Disposal Method' must be selected for each material group reported to accurately represent next use of material. Data must be entered into Turner Tracker by the fifth (5th) day of the month following the invoice period. The Subcontractor shall make every effort to maximize diversion from landfill.

Green Equipment

60. All light towers, electric sign boards and security cameras to be fully electric, hybridized or solar.

61. All Small Off-Road Engine-powered equipment (under 25HP) that has an electric alternative and that does not impede production to be battery electric.

62. Compact telehandlers and warehouse forklifts to be fully electric unless vertical reach height required does not exist in that product line.

63. Slab-driven boom lifts to be fully electric or hybrid. When able, 60' hybrid off-road lifts are preferred (e.g. M-600 JLG).

64. All small tools to be run off of temporary power. In emergency situations, if generators are required, generators are required to be coupled with battery storage, use load sharing technology, utilize energy storage systems, or utilize renewable energy in order to reduce the project's greenhouse gas emissions.

Close Out

65. Turner follows the philosophy that "Project close-out begins with job start-up." Therefore, the following close-out procedures shall be adhered to:

(a) The Schedule of Values on the Subcontractor's application for payment shall include line items and values for all close-out documents and activities, such as as-builts, O&M Manuals, punchlist, attic stock, etc.

(b) Operations and Maintenance Manuals are due three months prior to anticipated turnover of each phase to the Owner. This subcontractor is required to provide 4 sets of CD's and 4 sets of Hard Copies for O&M's and As-Builts.

(c) Final As-built drawings, attic stock, and special tools shall be submitted within one month following Substantial Completion.

(d) Warranties and Guarantees are due within one month following substantial completion of the Project. This Subcontractor shall provide warranties and guarantees which start upon substantial completion for each phase of this project.

(e) The punchlist work must be complete per Turner's punchlist completion schedule (and prior to turnover to the Owner).

(f) The final application for payment is to be submitted no later than three months after substantial completion. All work must be complete and verified prior to review of this final application.

66. Failure to comply with the above requirements will result in a $1,000 deduct change order per item and will result in delays in progress and final payment(s).

Personnel Conduct

67. There shall be NO FRATERNIZATION OR INTERFERENCE with the Owner staff, neighboring businesses, or visitors; no verbal, physical, telephone or electronic contact with students or minor on the property of any kind, by any Construction Workers on or near the **Project** site. Any complaints by the Owner with regard to this matter will result in the immediate and permanent dismissal of the said employee from the Project site. Reference also AIA A133 section 14.7.6.2, all subcontractors to include this language in any subcontract to lower tier.

68. NO FOUL OR ABUSIVE LANGUAGE will be tolerated or allowed, also there is NO SMOKING/VAPING OR DRINKING allowed on the Owner's property and either infraction will result in immediate and permanent dismissal.

69. ALL EMPLOYEES AND VISITORS SHALL WEAR "SAFETY TRAINED HARD HAT LABEL IDENTIFICATION" AT ALL TIMES WHILE ON THE PROJECT JOB SITE. THE METHOD OF IDENTIFICATION IS FURTHER DESCRIBED IN TURNER'S SAFETY & HEALTH PROGRAM. LABELS WILL BE DISTRIBUTED UPON COMPLETION OF THE WORKERS SAFETY ORIENTATION TRAINING.

70. This subcontractor shall comply with all badging/background check requirements associated with performing work on the Owner's property as defined per **State of Connecticut Contractor Verification (in accordance with Public Act 16-67), reference form to be completed within Project Manual.**

71. Drug Testing: This Subcontractor shall participate in the drug testing required per the Project Specific Safety Manual and in accordance with Turner's Substance Abuse Policy. As part of your proposal, this Subcontractor shall include **$48/worker** for the drug testing associated with your workforce. Upon award, this Subcontractor will register all workers with Concentra via an online portal and shall report to a predetermined Concentra facility at the time that the drug screen testing is performed.

LEAN Approach

72. Lean focuses on maximizing customer value while eliminating waste through continuous improvement and respect for people. Turner requires that all subcontractors actively participate with Turner in the continuous improvement of the construction process. Turner and subcontractors will collaboratively participate in learning, planning, control processes, and strategies to achieve the goal of the greatest productivity for the project, thereby maximizing the value delivered to the customer. Maximizing value requires elimination of waste in all processes and implementing improvements at every opportunity. Subcontractors will assign an individual to represent them in these efforts. Qualifications for this individual include that they are on site daily, have the authority to make decisions and commitments on behalf of the subcontractor (including lower tiers) and whose behaviors support collaboration with the project team. This individual will be referred to as "On-Site Field Supervisor" throughout this Section.

    Turner may utilize some or all of the approaches and tools listed below for the betterment of the project, and Subcontractor will cooperate, contribute, and participate with Turner in these endeavors:

5S Methodology

5S is a system to optimize safety and productivity through maintaining an orderly workplace and using visual cues to achieve more consistent operational results.

1. Sort – Eliminate all unnecessary tools, parts, materials. Keep only essential items, eliminate what is not required, prioritize things per schedules/requirements and keeping them in easily accessible places.
2. Straighten (Set in Order for Flow) – Arrange the work, workers, equipment, parts, and instructions in such a way that workflows free of waste through value added tasks. Identify locations where items will be used and place those items close. Organize and communicate the location for items needed in the area.
3. Shine (Systematic Cleaning) – Clean the workspace, jobsite, and all equipment, and keep it clean, tidy and organized. At the end of each shift, clean the work area and be sure everything is restored to its place. Create elevated workstations for ergonomic working and more efficient cleanup. Employ a 'Nothing Hits the Ground' mentality to keep the project clean and free of waste.
4. Standardize – Develop cleaning schedules and cleanliness standards to maintain the first 3S's. Employ visual management to reveal abnormalities and potential problems.
5. Sustain – Follow the rules, schedules, and established standards.

Last Planner System®: Production System Planning

73. **Pull Planning** – This represents the Project team's (Turner and subcontractors) specific plan for how they intend to reach the milestone dates in the contract schedule. Pull plans must meet the contract schedule requirements, and teams must work together to achieve these project milestones. Turner requires team members to make and keep commitments based on their confidence that prerequisite work, design information, materials, labor, and equipment will be ready so they can start and complete installations to meet their commitments to reach milestones in the contract schedule.
74. **Make Ready Planning** – Make ready planning is a process of identifying work, typically six weeks out and verifying the work will be able to be completed as planned. Constraints that will prevent these activities in the next six weeks from starting and/or finishing are identified and added to the Constraint Log.
75. **Weekly Work Plans (WWP)** –The WWP is a detailed day-by-day, one week production plan created by each subcontractor's On-Site Field Supervisor to plan the next week's work, based on the project's production plan. WWP's are due weekly at a time established by Turner for the work to be performed the following week. Turner will establish the format for WWP's and the method of delivery for each project.

76. **Daily Production Huddle** – Subcontractor's On-Site Field Supervisor and Turner will meet for a daily stand-up discussion with their peers from other subcontractors and Turner field staff to assess the day's performance and discuss any new issues discovered. Turner's Project Superintendent will identify the time and place of the daily huddle, which will typically occur on the project site and last approximately 15 minutes.
77. **The Last Planner System® (LPS)** provides principles to improve coordination and create flow between contract milestone dates in the contract (or master) schedule. When production planning becomes reliable, and people fulfill their commitments, workflow, performance, and productivity are improved. Turner may require Subcontractor's On-Site Field Supervisor(s), Superintendents and/or the Project Manager to attend orientation and training sessions to prepare for the implementation of LPS.
78. When requested, Subcontractor shall participate in weekly coordination meetings with other subcontractors and shall provide updated weekly work plans on a weekly basis throughout the scheduled installation period. All subcontractors pledge to cooperate with each other and coordinate their work for the overall good of the project. Turner reserves the right to adjust and update the overall project schedule based on project conditions, the actual performance of the work, and detailed schedule information obtained from subcontractors. This update is intended to be for the betterment of the project as a whole. At Turner's discretion, it may utilize The Last Planner System® for developing additional coordination details over the life of the project.
79. Subcontractor will require its On-Site Field Supervisor(s) to participate in all the steps that comprise LPS and be able to commit to perform work they know can be made ready for their crews and to collaborate with the team to ensure this work can be started and completed without interruption. Subcontractor shall ensure that its On-Site Field Supervisors, the "Last Planners", have the authority to make decisions and plan the work and are involved before Subcontractor mobilizes to the project. Subcontractor shall direct its On-Site Field Supervisors to attend planning meetings

C.1 Specific Scope of Work

Without the intent of limiting the Scope of Work to be performed by the Subcontractor, included is the furnishing and installing of the ***<<Bid Package Description>> Work*** in accordance with the contract documents and as further enumerated within these Additional Provisions. The items listed herein are NOT intended to be a complete list of work items to be performed under this agreement. Furthermore, detail references are included for convenience but are not intended to identify all applicable details.

1. Includes performing all of the ***<<Bid Package Description>> Work*** in accordance with the Contract Documents and as established in the Project Specifications and Document List. This includes the following Specification Sections specifically but does not limit the Subcontractor from the responsibility of the entire Project Documents Scope of Work:

Additional Provisions/Scope of Work

New Central Middle School
State Project No. 057-0114 N
Greenwich, CT
<<For All Bid Packages>>
Dated: 07.08.2024
Revised: 10.16.2024

Exclusive Specifications

Specification Sections listed below as 'Exclusive' shall be considered the sole responsibility of this Subcontractor. This Subcontractor shall furnish and install all products listed within these specification sections in conformance with all requirements and as indicated in the Contract Documents, including coordination with other related sections as listed within these specification sections and in reference to the entire Contract Specifications and Drawings. This Subcontractor shall be responsible to perform a complete and thorough review of the Contract Documents and include in their lump sum bid amount all costs to complete the entire scope of work for products listed within these specification sections. This includes, but is not limited to, the review of all drawings, details, notes, keys, keynotes, legends, symbols, abbreviations, schedules, callouts, and all applications of the products listed within these exclusive specification sections for a complete system which are reasonably inferable (i.e. similar detail/symbol/illustration, adjacent construction, means & methods, etc.) from the Contract Documents. No additional costs will be considered without clear and definitive substantiation.

Spec. #	Specification Name

Shared Specifications

Specification Sections listed below as 'Shared' shall be considered the mutual responsibility of two (2) or more Subcontractors. This Subcontractor shall furnish and install products listed within these specification sections in conformance with all requirements and as indicated in the Contract Documents, including coordination with other related sections as listed within these specification sections and in reference to the entire Contract Specifications and Drawings. This Subcontractor shall be responsible to perform a complete and thorough review of the Contract Documents and include in their lump sum bid amount all costs to complete the specific scope, as defined below, for products listed within these specification sections. This includes, but is not limited to, the review of all drawings, details, notes, keys, keynotes, legends, symbols, abbreviations, schedules, callouts, and all applications of the products listed within these shared specification sections for a complete system which are reasonably inferable (i.e. similar detail/symbol/illustration, adjacent construction, means & methods, etc.) from the Contract Documents. No additional costs will be considered without clear and definitive substantiation.

Spec. #	Specification Name

General Items

1. The Bidder shall note that the use of the term "Subcontractor" shall be synonymous with the term "Bidder".
2. This Subcontractor has reviewed the Logistics Plans and the Construction Schedule and has included all associated costs as relevant to this scope of work. This includes all necessary lifts, cranes, scaffolding and all other equipment as required to perform the work. It is extremely important to coordinate your work with the other adjacent Subcontractors during the various phases and perform the work as required by these documents. No come back costs will be entertained. This Subcontractor shall include and allow Turner access without restriction to all scaffolds for use to access the work being performed by this subcontractor.
3. This Subcontractor will provide all pricing for changes within five (5) calendar days of notice of change (without exception). If subcontractor does not submit pricing within these terms, it will be assumed a ZERO cost change. The change orders shall include man-hours, material costs, tax (if applicable) and mark-ups as line items broken out separately.

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4. Intent of the project Lean initiative is that all items that are to be installed are to prefabricated, arranged and shipped to project for ease of installation. Deliveries are to be packaged and labeled by room/area for ease of installation (kit-of-parts).
5. This Subcontractor shall be responsible to provide out of sequence work at no additional costs when required in coordination with other trades.
6. This Subcontractor shall include consistent and complete scheduling and coordination with all other trades to properly sequence the work and for the complete scope under this agreement.
7. This Subcontractor's Project Manager/Foreman shall participate in Pull Planning Sessions which affect their scope of work. This Project Manager/Foreman shall provide input to further develop the accurate sequence and timing for completion of the work.
8. This Subcontractor shall examine the layout and installation of all adjacent work performed by others at weekly intervals leading up to the date of installation and shall report to Turner in writing any discrepancies that may affect the installation or operation of the scope provided under this agreement to avoid any delay in starting work as scheduled.
9. This Subcontractor shall include multiple mobilizations as required by the latest issuance of the project schedule.
10. This Subcontractor shall organize and neatly place all materials, tools, etc. This Subcontractor shall remove all debris resulting from their work on a daily basis to a trash Rubbermaid tilt truck provided by Drywall Contractor. Each subcontractor shall be responsible for emptying their trash from the Rubbermaids to the dumpster at the end of each shift. No trash or debris will remain in the work areas at the end of the shift. If debris is left in the work areas, it will be removed to the dumpster by others, and the labor expense back-charged to the responsible Subcontractor. Large sections of debris shall be disposed of to a dumpster provided by others by this Subcontractor.
11. This Subcontractor shall be required to store all onsite material on racks, carts or pallets capable of being easily moved and shall coordinate the delivery of and location of stored material with the Turner Superintendent. If material is stored on pallets, this Subcontractor is responsible to have a pallet jack onsite at all times. This Subcontractor shall include relocation and consolidation of materials as directed by Turner.
12. This Subcontractor must meet the latest issuance of the project schedule. To this end, this Subcontractor understands that all adjacent work may not be 100% complete at the time of field dimension verification and this Subcontractor shall coordinate with other trades and accept reasonable hold-to dimensions which may be required to meet the delivery and installation dates.
13. This Subcontractor shall clean all items installed by this Subcontractor and install, secure and maintain appropriate protection to prohibit damage from subsequent work. Protection must be approved by Turner.
14. This Subcontractor shall review, conform to, and furnish and install all requirements included in the Safety Additional Provisions included in this Agreement. This Subcontractor understands that this document is project specific and all provisions must be included in this Subcontractors' bid.
15. This Subcontractor shall ensure that they are able to supply the necessary manpower, equipment and materials to complete the Work for each Phase in its entirety as identified in Turner's Project Schedule.
16. This Subcontractor acknowledges that NO additional compensation will be considered for comeback work required as a result of your failure to perform work in accordance with the Contract Documents or your failure to coordinate your work with the work of others.
17. This Subcontractor will be responsible for the third-party engineering review for utilizing equipment and/or lifts on elevated slabs.
18. This subcontractor shall only be permitted one vehicle for onsite parking per the Logistics plans.
19. This subcontractor shall provide all hoses for when requiring water. A water source will be provided per the Logistics plans.

20. The Sitework Contractor shall be responsible for snow removal of the site, access roads and walkways to the building. This subcontractor will be responsible to remove snow and ice from all other areas for their work including but not limited to their work areas, material areas, storage conex's and trailers. Snow and ice removal is not allowed to free fall from upper levels of buildings, scaffolding or platforms.
21. This Subcontractor shall provide a site-specific plan on how they will comply with Turner's Ladder's Last Program.
22. This subcontractor shall ensure that any Lulls used on site are equipped with hydraulic fork positioners.
23. This subcontractor shall engage a 3rd Party to complete a GPR Survey to mark out existing utilities under and in the general area of any proposed Mobile Crane locations.

Bid Package Specific Scope

24. Refer to the Scope of Work Sheets Issued as part of the Bid Documents

D. Exclusions

25. Refer to the Scope of Work Sheets Issued as part of the Bid Documents

E. Safety – See Safety Additional Provisions

1. ***Include cost associated with EMR ACTION PLAN HERE IF EMR >1, refence Turner EH&S Manual.***
2. ***For subcontractors who's RIR is greater than 3 for previous year through the course of the project, this subcontractor shall include a full time dedicated safety manager if the crew size on site reaches 10 or more. Reference Turner EH&S Manual regarding Project Safety Staffing Policy.***

F. Unit Prices:

The following Unit Prices reflect the work of this bid package under which the bid proposal was submitted, and all unit prices shall remain valid for the life of the project and include all costs for a complete installation. Unit prices which do not affect the work of this bid package have been filled in "not applicable (n/a)". ***UNIT PRICES ARE GOOD FOR BOTH ADDS AND DEDUCTS.***

Unit Prices:	**Amount**
Refer to Form of Proposal	

G. Alternate Prices

The following Alternate Prices reflect the work of this bid package under which the bid proposal was submitted, and these alternate shall remain valid for the life of the project and include all costs for a complete installation.

Alternates:	**Amount**
Deduct Alternate to Exclude 100% Payment & Performance Bonds on Turner Standard Bond Forms	

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Add Alternate to Provide Traditional Insurance in lieu of enrolling in the Turner CCIP / Owner OCIP Program	
Refer to Form of Proposal	

END OF ADDITIONAL PROVISIONS

Additional Provisions/Scope of Work

New Central Middle School Project
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Greenwich, CT
BP39 – Low Voltage & AV
Dated: 07.08.2024
Revised: 10.21.2024

C.1 Specific Scope of Work

Without the intent of limiting the Scope of Work to be performed by the Subcontractor, included is the furnishing and installing of the ***BP #39 Low Voltage & AV Work*** in accordance with the contract documents and as further enumerated within these Additional Provisions. The items listed herein are NOT intended to be a complete list of work items to be performed under this agreement. Furthermore, detail references are included for convenience but are not intended to identify all applicable details.

1. Includes performing all of the ***BP #39 Low Voltage & AV Work*** in accordance with the Contract Documents and as established in the Project Specifications and Document List. This includes the following Specification Sections specifically but does not limit the Subcontractor from the responsibility of the entire Project Documents Scope of Work:

Exclusive Specifications

Specification Sections listed below as 'Exclusive' shall be considered the sole responsibility of this Subcontractor. This Subcontractor shall furnish and install all products listed within these specification sections in conformance with all requirements and as indicated in the Contract Documents, including coordination with other related sections as listed within these specification sections and in reference to the entire Contract Specifications and Drawings. This Subcontractor shall be responsible to perform a complete and thorough review of the Contract Documents and include in their lump sum bid amount all costs to complete the entire scope of work for products listed within these specification sections. This includes, but is not limited to, the review of all drawings, details, notes, keys, keynotes, legends, symbols, abbreviations, schedules, callouts, and all applications of the products listed within these exclusive specification sections for a complete system which are reasonably inferable (i.e. similar detail/symbol/illustration, adjacent construction, means & methods, etc.) from the Contract Documents. No additional costs will be considered without clear and definitive substantiation.

Spec. #	Specification Name
270536	Cable Trays For Communication Systems
271000	Structured Cabling
274100	Audio Video Systems
275116	Public Address System
275313	Clock System
276010	Emergency Responder Radio Coverage System
280500	Security Conductor Cables
280528	Pathways for Security Systems
281300	Access Control System
281600	Intrusion Detection
282300	Video Surveillance System

Additional Provisions/Scope of Work

New Central Middle School Project
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BP39 – Low Voltage & AV
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Shared Specifications

Specification Sections listed below as 'Shared' shall be considered the mutual responsibility of two (2) or more Subcontractors. This Subcontractor shall furnish and install products listed within these specification sections in conformance with all requirements and as indicated in the Contract Documents, including coordination with other related sections as listed within these specification sections and in reference to the entire Contract Specifications and Drawings. This Subcontractor shall be responsible to perform a complete and thorough review of the Contract Documents and include in their lump sum bid amount all costs to complete the specific scope, as defined below, for products listed within these specification sections. This includes, but is not limited to, the review of all drawings, details, notes, keys, keynotes, legends, symbols, abbreviations, schedules, callouts, and all applications of the products listed within these shared specification sections for a complete system which are reasonably inferable (i.e. similar detail/symbol/illustration, adjacent construction, means & methods, etc.) from the Contract Documents. No additional costs will be considered without clear and definitive substantiation.

Spec. #	Specification Name
Div 00	Division 00 – Procurement and Contracting Requirements
Div 01	Division 01 – General Requirements
019113	General Commissioning Requirements
079200	Joint Sealants

Bid Package Specific Scope

2. This Subcontractor shall examine the layout and installation of all adjacent work performed by others at weekly intervals leading up to the date of installation and shall report to Turner in writing any discrepancies that may affect the installation or operation of the scope provided under this agreement to avoid any delay in starting work as scheduled.
3. This Subcontractor shall include multiple mobilizations as required by the latest issuance of the project schedule.
4. This Subcontractor must meet the latest issuance of the project schedule. To this end, this Subcontractor understands that all adjacent work may not be 100% complete at the time of field dimension verification and this Subcontractor shall coordinate with other trades and accept reasonable hold-to dimensions which may be required to meet the delivery and installation dates.
5. This Subcontractor shall clean all items installed by this Subcontractor and install, secure and maintain appropriate protection to prohibit damage from subsequent work. Protection must be approved by Turner.
6. The drawings are diagrammatic and may not be complete in every detail. They reflect the intent of the Arch/Engineer to provide for a complete working system in compliance with all codes as shown by the documents. This contractor shall include any other equipment or devices necessary to provide a complete functioning system. This Trade Contractor shall include, as part of his work, the cost of relocating his work, due to the coordination procedure as part of his trade agreement price.

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7. This Subcontractor shall provide a full-time competent Project Manager for the duration of the project. This individual must have the authority to make all decisions for this subcontractor, attend all weekly meetings, and be responsible for all lower tier subcontractors and vendors. This Subcontractor shall submit a complete organization chart indicating the title and names of the people that will staff the project. Submit resumes of each person on the organization chart for Turner's approval. This shall include Project Managers, Commissioning Manager, Foreman, Superintendents and other key personnel as required by Turner Construction.
8. This Subcontractor shall be required to continuously record the progress of the ~~Electrical~~ Low Voltage & AV Work on a record set of Drawings, to be maintained on the jobsite at all times. The Architect, Engineer and Turner will review these Documents on a monthly basis in conjunction with their monthly payment application review; this shall be a condition of approval of each progress payment.
9. This Subcontractor shall examine the work of others, which will affect this subcontractor's work and notify Turner well in advance of any condition which will prevent the proper execution of this subcontractor's work. This shall include but not be limited to this subcontractor reviewing the layout and installation of all adjacent work performed by others at weekly intervals leading up to the date of installation and shall report to Turner in writing any discrepancies that may affect the installation or operation of the scope provided under this agreement to avoid any delay in starting work as scheduled. Any notice provides sufficient time to repair conditions without impacting overall schedule. Commencement of this subcontractor's work will constitute this subcontractor's acceptance of the existing conditions.
10. This Subcontractor is aware that this is a High-Performance Building and submittals should be submitted according to these standards. This Subcontractor has included all costs associated with meeting these requirements as set forth in the Division 1 Specifications.
11. This Subcontractor will provide the necessary written documentation for meeting the CT High Performance requirements as outlined in the Division 1 specifications.
12. This Subcontractor shall provide all necessary layout including benchmarks, extending of control lines, etc. in order to properly perform the Work.
13. This Subcontractor shall be responsible for providing out of sequence work at no additional costs when required in coordination with other trades.
14. Utilize total station system to layout and set hanger supports and layout risers/ boxes/ penetrations/ underslab infrastructure.
15. This subcontractor will provide all supports and support systems for ~~Electrical~~ Low Voltage & AV equipment, infrastructure, and pathways ~~piping~~ if not indicated on the structural drawings. Systems shall meet the requirements of seismic and sway parameters per the local building code and project specifications.
16. This subcontractor shall include all costs for escalation on materials, labor, equipment, etc. for the durations indicated on the project schedule.
17. Each Subcontractor understands that Quality Control and Quality Assurance is a specific commitment and attitude, which is required during the implementation of the work. The focus required to establish a quality level, by developing in-place mock-ups, by providing skilled supervision and by monitoring daily production quality are all expected to be carried out during the execution on this Contract.
18. It is understood that the specific warrantee/guarantee period will start when the equipment/system is accepted by the Owner for their operation/use at this time of Substantial Completion. Any gap between the scheduled start up of equipment and owner acceptance of the system shall be included.

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19. This Subcontractor shall review, conform to, and furnish and install all requirements included in the Safety Additional Provisions included in this Agreement. This Subcontractor understands that this document is project specific, and all provisions must be included in this Subcontractors' bid.
20. This Subcontractor has reviewed the Logistics & Phasing Plans and the Construction Schedule and has included all associated costs as relevant to this scope of work. It is extremely important to coordinate your work with the other adjacent Subcontractors during the various phases and perform the work as required by these documents. No come back costs will be entertained.
21. This Subcontractor shall examine the layout and installation of all adjacent work performed by others at weekly intervals leading up to the date of installation and shall report to Turner in writing any discrepancies that may affect the installation or operation of the scope provided under this agreement to avoid any delay in starting work as scheduled.
22. This Subcontractor shall include multiple mobilizations as required by the latest issuance of the project schedule.
23. This Subcontractor will provide all pricing for changes within five (5) calendar days of notice of change (without exception). If the subcontractor does not submit pricing within these terms, it will be assumed a ZERO cost change. The change orders shall include man-hours, material costs, tax and mark-ups as separate line items broken out separately. This subcontractor will utilize Turner's standard change order cover sheet for all change orders.
24. All Change Order quotes shall be price labor per NECA Column 1 Full breakdown of all pricing is required and should be broken out separately for each drawing. Pricing shall be provided in accordance with the expected project conditions, breaking out any premium installations required at the time of the installation ie: closed ceiling, furniture, additional cleaning etc. No additional compensation will be considered for logistics, staging, inefficiencies and/or coordination with other contractors in not clearly broken out in the Change Order Proposal.
25. This Subcontractor shall organize and neatly place all materials, tools, etc. This Subcontractor shall remove all debris resulting from their work on a daily basis to a dumpster provided by others. No trash or debris will remain in the work areas at the end of the shift. If debris is left in the work areas, it will be removed to the dumpster by others, and the labor expense back charged to the responsible Subcontractor. Large sections of debris shall be disposed of to a dumpster provided by others by this Subcontractor.
26. This Subcontractor shall include multiple mobilizations as required by the latest issuance of the project schedule.
27. No truck parking/idling is allowed on streets adjacent to the project site while waiting to unload. This Subcontractor shall include accommodations as required to adhere to "just in time" deliveries. Refer to Turner's "Logistic Plans – Scope of Work" for delivery restrictions.
28. This Subcontractor shall include consistent and complete scheduling and coordination with all other trades to properly sequence the work and for the complete scope under this agreement.
29. This Subcontractor's Project Manager/Foreman shall participate in Pull Planning Sessions which affect their scope of work. This Project Manager/Foreman shall provide input to further develop the accurate sequence and timing for completion of the work.
30. This Subcontractor shall provide their own lifts and access for construction. No scaffolding will be provided.

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31. This Subcontractor shall be responsible to core all penetrations required with this scope of work, this includes but is not limited to foundations, walls and slabs as well as where sleeves where not installed prior to placing of concrete.
32. This subcontractor is responsible for pulling all permits required for their scope of work.
33. This Subcontractor shall include 1 laborer per 10-person workforce while working on site but no less than 1 person for a composite cleanup crew. The composite cleanup crew will be required for 2 hours each Friday from 12:30-2:30 p.m. while the subcontractor is performing work on site. The composite crew is intended to clean up general debris not necessary associated with particular subcontractor (cardboard, plastic bottles, misc. trash item, general sweeping, etc.)

Low Voltage & AV

34. This Subcontractor shall furnish and install complete Low Voltage, AV, & Security Systems, including but not limited to head end equipment, pullboxes, devices & cover plates, cameras, WAPs, device boxes, hangers, J-hooks, low voltage cabling, conduit, cable tray, racks, cabinets, panels, uninterruptible power supplies, switches, patch panels, cameras, card readers, door contacts, lock down, etc. for all low voltage systems, including but not limited to telecommunications, telephone, data, optical fiber, security, AV, DAS / ERRCS / BDA system(s), etc. as shown on Contract Documents.
35. All data cabling & terminations required to connect all building systems to the network / internet shall be furnished, installed, and terminated by this subcontractor, including but not limited to network connections for Fire Alarm, Lighting Controls, Elevator, BMS / ATC controls, electrical metering, etc.
36. This subcontractor shall design, furnish & install all infrastructure for the DAS / ERRCS / BDA, including but not limited to all fire rated cabling, conduit pathways, in-wall rough, hangers & supports, backboxes, devices, etc. for a complete and fully functioning system. For an example, see detail 4 on E502. The Fire Alarm subcontractor will be responsible for all fire alarm integration.
37. The Electrical Subcontractor (BP#38) shall furnish & install in-wall rough, including standard electrical boxes with conduit raceways to accessible ceilings, for use by this Subcontractor except as indicated herein. This subcontractor shall furnish & install any additional pathways required above ceilings. Non-standard boxes shall be furnished by this subcontractor and installed by the Electrical Subcontractor. This subcontractor shall furnish & install any in-wall pathways required at low voltage system cabinets, including but not limited to installing the low voltage cabinet(s).
38. This subcontractor shall furnish and install their own conduit & cable tray pathways as needed for low voltage systems above ceiling. The Electrical Subcontractor (BP#38) will only be providing in-wall rough for use by this subcontractor.
39. This Subcontractor shall coordinate all in wall rough-in requirements with the Electrical Contractor (BP #38) and shall assume infrastructure will be installed concurrently with Electrical infrastructure. It is the Low Voltage Subcontractor's responsibility to ensure timely and correct information is provided to the Electrical Contractor to facilitate this installation. Any cost associated with delays and or incorrect information will be the responsibility of this Low Voltage Subcontractor. This Subcontractor shall provide the Electrical Contractor with detailed shop drawings electronically via Revit, CAD, and PDF to properly coordinate this effort.
40. The Electrical Contractor (BP #38) shall furnish & install all low voltage and security site underground raceways & ductbank required, including but not limited to ductbank for new telecom service, underground raceways / conduit for site cameras, all handholes, etc. For a reference see sheet SU100.

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41. This subcontractor shall coordinate, review, confirm, & sign off on all low voltage in-wall rough & site pathways being provided by the Electrical Subcontractor (BP#38). If any additional pathways (i.e. conduit, cable tray, etc.) are required after coordination & sign-off, then this subcontractor shall furnish & install them at their own expense.
42. This subcontractor shall furnish & install all ladder rack, conduit, & cable tray assemblies / pathways within data rooms (IDF/MDF). J-Hooks and other support of free air / plenum rated cabling for low voltage systems shall also be furnished & installed by this Subcontractor.
43. This subcontractor shall furnish & install all low voltage wiring and devices required for auto opening doors, overhead coiling doors, and access controlled / secured doors, including but not limited to cabling, terminations, access control panel(s) & board(s), door contacts, REX devices, crash bars, I.R. sensors, card readers, alarms, power supplies / transformers, etc. Electric strikes to be furnished by others but installed & wired by this subcontractor. This subcontractor shall furnish & install all power supplies per the hardware schedule hardware specifications. This subcontractor shall furnish & install all 12V/24V wiring from power supplies to equipment. Raceways through doors frames will be furnished & installed by the Electrical Subcontractor. This subcontractor shall furnish & install all wiring through pathways for a complete and fully functioning door.
44. This subcontractor shall furnish & install all power supplies and transformers required for Low Voltage & Security system components. The Low Voltage Subcontractor shall be required to bring 120v power from the nearest junction box to any Low Voltage or Security power supply, panels, or subpanels that are not quantified on the Electrical series of drawings. If power is shown on the Electrical series of drawings, then the Electrical Subcontractor (BP#38) will furnish, install and terminate 120V power. This subcontractor shall furnish, install, & terminate all 12V/24V wiring from these power supplies, panels, etc.
45. This Subcontractor shall coordinate with the Electrical subcontractor for all shared floor box and poke-thru requirements. Shared floor boxes and poke thrus shall be furnished & installed by the Electrical subcontractor (BP #38). This subcontractor is responsible for installing and terminating all low voltage cabling within the floor box for the low voltage system. This subcontractor shall furnish & install all floor boxes that are dedicated solely to low voltage systems.
46. This Subcontractor shall furnish, install and test all cabling, terminations and devices associated with the Low Voltage scope of work.
47. This subcontractor shall provide PE stamped drawings, calculations, & all delegated design as indicated in the contract documents.
48. This Subcontractor shall furnish and install all site & exterior low voltage electrical as indicated on the contract documents, including not limited to security cameras, emergency call stations, gate card readers and all communications / control wiring, etc. Also reference Civil, Landscape, & Architectural drawings for system details. Irrigation control wiring and pathways for control wiring shall be furnished and installed by the Irrigation contractor.
49. This subcontractor shall furnish & install all low voltage required for Emergency Blue Light Call Stations. Conduit pathways, pole, and fixtures provided by the Electrical Subcontractor. This subcontractor must coordinate requirements with the Electrical Subcontractor. This subcontractor shall perform all low voltage cabling, terminations, and testing as required.
50. This Subcontractor shall coordinate all requirements of the new telecommunications service(s) with the Owner and local power company.
51. This subcontractor shall furnish & install a complete and fully functioning public address system as indicated in the contract documents.

52. This subcontractor shall furnish & install a complete and fully functioning building clock system as indicated in the contract documents.
53. This subcontractor shall furnish & install all grounding required for their own scope of work, including but not limited to equipment furnished by others but installed by this subcontractor. The Electrical Subcontractor (BP #38) shall furnish & install grounding bus bars indicated in the contract documents.
54. This Subcontractor shall coordinate, receive, offload, hoist, protect, store, set in place, install, wire, & test all Low Voltage & AV equipment being furnished by the Owner. This shall include start up requirements and commissioning. Once this subcontractor receives and accepts delivery of equipment provided by others, it is in their sole care & custody. This subcontractor is responsible for inspecting and identifying any damage or deficiencies prior to accepting delivery & taking custody. If any equipment or component is damaged or lost after taking custody, it will be the responsibility of this subcontractor to repair or replace it at their expense.
55. This Subcontractor shall design, furnish & install an independent support system for all, but not limited to, hung equipment, fixtures, ~~ceiling and piping~~ low voltage systems, low voltage system components, etc. that are directly below the metal roof deck. This support system must attach to structural steel framing members as the metal roof deck cannot be utilized for support, either above or below the roof deck. Refer to A200 series drawings General Note #12 for criteria. This Subcontractor shall provide delegated design and include shop drawings and calculations indicating, but not limited to, load carrying capacities, point loads, etc. This Subcontractor shall include adding miscellaneous metal supports into the 3D model for coordination with all MEP trades.
56. This Subcontractor shall design and install all, but not limited to, channel support systems, heavy duty steel trapezes, seismic restraint hangers, etc. required for all Low Voltage & AV systems as indicated in the Contract Documents. All above ceiling scope shall be installed and inspected 4 weeks prior to any scheduled ceiling grid installation.
57. This subcontractor shall coordinate with the BP#38 electrical and BP#30 food service subcontractors to provide the required sequence of operations for the ansul & fire alarm systems. This subcontractor shall include all, but not limited to, wiring, conduit, devices, testing, etc. for complete operational systems. For example, muting of all sound systems and theatrical systems, refer to 1/E502, E701 & 5/P501.

Demolition

58. This subcontractor is responsible for all tracing of existing circuits prior to disconnect. Any circuits found to feed areas of the building or other buildings that are to remain active shall be rerouted to ensure occupied spaces remain active. This subcontractor understands that the demolition will be performed in multiple phases and will perform the demolition work according to these phases.
59. This subcontractor shall cut, cap, & make safe all Low Voltage & Security equipment and accessories scheduled to be demolished. For an example see sheet MEPD000 & MEPD001. This subcontractor shall cut and leave an air gap at the location of the start of the demo, this shall be at the upstream location at the source (i.e. equipment, valve, distribution point, etc.) All material to be removed shall be painted green by this subcontractor, green markings must be no more than 5' apart. Any material to remain will be painted red with markings no more than 5' apart. The Demolition subcontractor (BP #08) will remove and dispose of all materials.
60. The low voltage and security shall be cut, capped and made safe prior to the start of the demo/abatement.

61. The Demolition Subcontractor (BP #08) will perform all MEP mass demolition and removals (piping, conduits, wire, equipment, etc.) for all phases of the work after the services have been cut, capped and made safe by the MEP trades. The Demolition Subcontractor (BP #08) will remove and dispose of all the demolished material and equipment from the basement.
62. This subcontractor shall coordinate, furnish, & install a typical exterior conduit penetration and exterior back box at each different exterior wall material type, as part of the exterior wall mock-up process for Design Team review. Reference A315 for the intended exterior wall mock-up.

Commissioning and Testing

63. This Subcontractor shall fully cooperate with the Owner's Commissioning Agent for commissioning of systems furnished and/or installed by this Subcontractor.
64. This Subcontractor will provide a dedicated engineer / staff person on site dedicated to the contractor commissioning of all systems prior to occupancy. This includes documenting, organizing and submitting to the owner all startup reports, pre-functional checklists and any performance reports that may be required for each piece of equipment.
65. This Subcontractor's Project Manager and Commissioning engineer shall attend a weekly Commissioning/MEP coordination meeting for the duration of the project.
66. This subcontractor shall include sufficient time to fully commission all systems. Adequate manpower shall be available to fully meet the commissioning requirements.
67. Start-up reports shall be submitted to Turner within (3) days of startup.
68. This Subcontractor shall submit fully filled out Pre-Functional and Functional test reports to TCCo.
69. This Subcontractor shall perform all required testing in accordance with the specifications. Testing is to be performed in a manner so as to complement the schedule and procedure of construction, and the Work of others. Test reports shall identify the system, infrastructure and area testing with specified test requirements. Any and all manpower, temporary connections, etc. required to accomplish this work in this manner are included. NOTE: This Subcontractor will test every piece of equipment in the presence of Turner and / or the Engineer and provide a full report to Turner and the Engineer accordingly.
70. This subcontractor shall coordinate with the Authority Having Jurisdiction as required per the plans and specifications including those referenced in The Statement of Special Inspections. This subcontractor shall provide Turner a minimum of seventy-two (72) hours in advance notice for all required inspections.
71. This Subcontractor shall include all necessary shutdowns and / or tie-ins for your specific systems. This includes all required premium time, proper notification and coordination with all affected parties (Owner, Turner, local agencies, utilities, etc.).
72. This Subcontractor shall complete all identification, labeling and tagging prior to the installation of the ceiling grid by others so as to allow for proper inspections as to thoroughness of these items.
73. This Subcontractor shall include in their Bid all necessary overtime and / or off-hour work for testing so as not to delay the Work of other Trade Subcontractors. This includes testing in conjunction with any other Trade that tie-in to this Subcontractor's scope of Work.

74. This subcontractor will be responsible for all costs associated with the reopening and patching of ceilings or walls required for corrective work. All required testing of piping must be scheduled and completed before ceilings are installed. This subcontract includes any out of sequence work and testing required to complete the work before ceiling work starts.
75. This Subcontractor shall participate in rough-in inspection coordination with other trades and Turner utilizing color coded framing identification to illustrate completion and inspection ready areas. Color code key and inspection sequencing will be identified by Turner Superintendent.
76. This Subcontractor shall provide training as specified for all of the equipment and systems furnished by this Subcontractor by phases. This Subcontractor shall include two (2) man-days of additional training be used at Turner Construction Company's discretion.
77. This subcontractor shall include all training required for systems installed by this subcontractor, including but not limited to videotaping the training sessions for turnover to the Owner.

Coordination & Miscellaneous

78. This subcontractor shall fully participate in all 3-D coordination - All work per 3-D MEP Coordination Additional Provisions. This Subcontractor shall be responsible for all coordination activities and requirements identified for the Electrical Subcontractor in the BIM additional Provisions as pertinent to Low Voltage & AV systems scope of work. Ceiling modeling lead will remain by the Electrical Subcontractor however this Subcontractor shall coordinate Low Voltage with the Electrician as required.
79. This subcontractor must include 3D modeling of all cable bundles on J-hooks & IDF/MDF room raceways & equipment to ensure a fully coordinated installation, as well as for turnover of accurate 3D as-builts. This subcontractor must also coordinate locations of all hangers & embeds.
80. This subcontractor shall provide shop drawings and models showing blocking requirements for their systems and scope of work. Blocking will be furnished & installed by the General Trades Subcontractor. This subcontractor is responsible for coordination in order to ensure the correct type & size of blocking is provided in the correct locations.
81. The intent of the project Lean initiative is that all items that are to be installed are to prefabricated, arranged and shipped to project for ease of installation. Devices installed with partitions will be prefabricated with conduits/ piping as coordinated in the BIM model. These devices are to be packaged and labeled by room for ease of installation (kit-of-parts).
82. This subcontractor shall coordinate all installations to meet accessibility requirements as noted in the contract documents and all NEC clearance required for maintenance and code.
83. This Subcontractor will be required to relocate any conduit, wire, or other part of the Electrical system installed by this subcontractor that deviates from the coordinated drawings that prohibits access to any equipment, valve, damper, junction box or anything else requiring access in the future. Acceptable access shall be deemed by Turner, Owner, Engineer, or Cx agent

84. This Subcontractor shall furnish, F.O.B. jobsite, all access doors for all valves and other equipment requiring access and which may become inaccessible at a later date in the drywall and masonry assemblies. This Subcontractor shall arrange their work in such a manner to minimize the quantity of access doors required. All items requiring accessibility shall be located in already accessible areas, such as above lay-in ceilings, etc. if at all possible. It is the responsibility of the Mechanical Subcontractor to coordinate and provide information regarding the location, sizes and quantities of access doors, panels, etc. required for their Work as well as furnish same. Failure to furnish the access doors and / or coordinated locations such that other Subcontractors (e.g., masonry, drywall, etc.) must go back to complete work, shall result in a back-charge to this Subcontractor for out of sequence Work accordingly. Also note that all required access doors and / or panels shall be furnished from one (1) manufacturer with their ratings consistent with the respective partition / ceiling / floor ratings and must be keyed alike. Access door type will be per the architect's direction in each location. This Subcontractor shall provide access door shop drawings indicating locations, types and sizes in architectural ceilings and partitions for design team review and approval.
85. This Subcontractor shall provide installation of all mockups identified in the project documents as well as materials for each type of wall/ slab penetration to complete a firestopping mockup for review and approval by AHJ and Design Team.
86. This Subcontractor is required to cut ceiling pads for ceiling mounted devices installed under this scope of work. Ceiling pads shall be furnished by the Ceiling Subcontractor (BP #22).
87. This Subcontractor shall maintain utmost care so as not to damage Spray-on Insulating materials. Any and all damages and / or over-scraped areas, which may require repair, shall be back charged to the Subcontractor that causes the damage. Hangers and supports shall be installed prior to SOFP operations to minimize scraping after the fact.
88. This Subcontractor will provide all pricing for changes within five (5) calendar days of notice of change (without exception). If subcontractor does not submit pricing within these terms, it will be assumed a ZERO cost change. The change orders shall include man-hours, material costs, tax and mark-ups as separate line items broken out separately. This subcontractor will utilize Turner's standard change order cover sheet for all change orders.
89. This subcontractor shall include 2 complete cleanings of equipment and systems provided under this scope. Cleanings shall be performed prior to initial energizing equipment and again prior to turnover to the Owner. Cleanings shall include complete debris, dust removal and wiping of all internal and external components and shall be in accordance with manufacturers approved methods.
90. Additional drawings required during the coordination process are as follows:
    a) Space allocations and equipment paths for future equipment shall be planned for and included within all coordination drawings presented during the construction phases. This area shall not be utilized for any other means when equipment is installed.
    b) Provide penetration drawings for interior, exterior, foundation and floor penetrations. This should include dimensions off columns, elevations above finish floor, and required opening size. Layout as required for proper field coordination is included under this scope.
91. In addition to all other protection requirements listed elsewhere in the project documents, this Subcontractor is responsible for complete protection of equipment provided under this scope. This shall include protection from external dust, debris, and adjacent construction activities. Additionally, all sensitive exposed components such as controls, meters, displays, etc. shall be individually covered with protective material to avoid damage and/or scratching. The protection plan shall be reviewed with Turner prior to implementation and all resulting damage from improper protection shall be the responsibility of this subcontractor.

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92. This Subcontractor will be required to develop a Method of Procedure (MOP) for various specific operations occurring during construction, testing and commissioning of this project. The MOP must itemize in step-by-step, detailed fashion, each work task and time frame for a complete and safe procedure for execution of specific work activities. Examples of work activities requiring a written MOP may include, but not limited to, operations that present heightened safety concern, tie-in or shutdown of live/energized equipment, equipment/system testing, etc. The MOP must be prepared by This Subcontractor and submitted to Turner Construction for review and approval prior to the start of associated work.

93. This subcontractor shall include sufficient time to fully commission all systems. Adequate man power shall be available to fully meet the commissioning requirements.

94. This Subcontractor shall provide all permanent identification/labels for equipment, systems and components provided under this scope of work and per the specification requirements. Provide complete submittal of all identification components such as nameplates, tags, special signage, type, size, material, fastening/mounting methods, text, font and color for review and coordination prior to release. The submittal shall also include a table of all identification items clearly indicating the above characteristics for each and referencing associated cut-sheets/product literature.

95. Through wall and floor to floor fire stopping is included in a separate bid package. This subcontractor must coordinate all penetrations with the fire stopping subcontractor. This subcontractor will receive and install any in slab/cast in place sleeves or assemblies required for this subcontractor's scope of work. The coordination of wall and floor sleeves will be critical to the success of this project.

96. This Subcontractor shall layout, furnish and install all sleeves and inserts required for their work. This includes coordinating with Firestopping Subcontractor (BP #17) for receipt and install of pre-manufactured firestopped sleeves. Sound sealing shall be by this Subcontractor, including but not limited to acoustical putty pads. Firestopping will be by Fire Stopping Subcontractor.

~~97. This Subcontractor will furnish and install the electrical power circuits for the Automatic Door Operators and Electric Overhead Doors. This includes terminations of wiring, furnishing and installing of the relays/control modules for the interface with the fire alarm system, wiring electric hinges, crash bars, I.R. sensors, raceways for card readers and push plates (Includes running wires inside of metal frames). Wiring of the Fire Alarm system to the control modules will be by this subcontractor. Power supplies furnished by the Security Subcontractor shall be installed and connected to power circuits by this Subcontractor above an accessible ceiling. The Door Hardware shall be furnished by others.~~ See Item #43 for automatic door operator scope.

~~98. This Subcontractor will furnish and install the electrical power circuits for Electric Overhead Doors. This includes terminations of wiring, furnishing and installing of the relays/control modules for the interface with the fire alarm system (if required), wiring electric sensors, raceways for card readers and key switches (Includes running wires inside of metal frames). Include coordination with Overhead Door installer for specific electrical requirements. Wiring of the Fire Alarm system to the control modules will be by this subcontractor (if required).~~ See Item #43 for overhead coiling door scope.

99. This Subcontractor shall include all costs to provide delegated design criteria and submittals per the following, but not limited to, Delegated Design Table on Drawing GC0A. This Subcontractor has thoroughly read all Specification Sections regardless of what is indicated on the Delegated Design Table on Drawing GC0A and included all costs for delegated design scope of work.

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D. Safety

1. The Sitework Contractor shall be responsible for snow removal of the site, access roads and walkways to the building. This subcontractor will be responsible for removing snow and ice from all other areas for their work including but not limited to their work areas, material areas, storage conex's and trailers. Snow and ice removal is not allowed to free fall from upper levels of buildings, scaffolding or platforms.
2. This Subcontractor shall provide a site-specific plan on how they will comply with Turner's Ladder's Last Program.
3. This subcontractor shall ensure that any Lulls used on site are equipped with hydraulic fork positioners.
4. This subcontractor shall engage a 3rd Party to complete a GPR Survey to mark out existing utilities under and in the general area of any proposed Mobile Crane locations.
5. This subcontractor shall utilize a threaded rod cutter in lieu of a porta band or grinder to cut all threaded rods.
6. This Subcontractor shall protect all downward protruding threaded rods with rubber caps to prevent injury to employees while working around rods.
7. This Subcontractor shall eliminate slip/trip/fall hazards to surrounding trades and ensure all stub ups extend a minimum of 3' above the slab or walking surface. If this is not possible, a 3' or higher cone must be placed over the stub up. Impalement protection is required on all stub ups, when a hazard exists.

E. Logistics and Schedule

1. This subcontractor shall include the requirements of the Project Logistics Plan and Project Schedule.

F. Exclusions

2. This Subcontractor shall EXCLUDE wood backer boards in Electrical rooms (By General Trades BP #21)
3. This Subcontractor shall EXCLUDE Penetration Firestopping as it will be performed by Firestopping Subcontractor (BP #17). This Subcontractor shall provide an add alternate on the Bid Form of Proposal to perform penetration firestopping related to this scope of work.
4. Exterior bollards (by Sitework Subcontractor (BP#9)

G. Unit Prices

The following Unit Prices reflect the work of this bid package under which the bid proposal was submitted, and all unit prices shall remain valid for the life of the project and include all costs for complete installation. Unit prices which do not affect the work of this bid package have been filled in "not applicable (n/a)". ***UNIT PRICES ARE GOOD FOR BOTH ADDS AND DEDUCTS.***

Unit Prices:	**Amount**
Refer to Form of Proposal	

H. Alternate Prices

Additional Provisions/Scope of Work

New Central Middle School Project
State Project No. 057-0114 N
Greenwich, CT
BP39 – Low Voltage & AV
Dated: 07.08.2024
Revised: 10.21.2024

The following Alternate Prices reflect the work of this bid package under which the bid proposal was ***submitted, and these alternates shall remain valid for the life of the project and include all costs for a*** complete installation.

Alternates:	Amount
Refer to Form of Proposal	

Greenwich Central Middle School Project
TEMPORARY LIGHT AND POWER ADDITIONAL PROVISIONS FOR CONSTRUCTION PURPOSES
July 8th, 2024

1. CODE REQUIREMENTS

a. The electrical work for construction purposes shall conform to all Federal, State and Municipal requirements and must comply with the National Electrical Code and the Occupational Safety and Health Standards of the Occupational Safety and Health Act of 1970. The Electrical Subcontractor shall obtain and pay for any required applications, permits and inspections pertaining to this work.

2. GENERAL

a. Temporary power (transformer, panels and NEMA 3R Enclosure) is to be on-line and fully functional within 8 weeks from the start of Phase 1 and 2 weeks from the start of Phase 2. Temporary work shall be installed in such a manner so as not to interfere with the permanent construction. If such interference does occur, it will be the responsibility of the Electrical Subcontractor to make such changes as may be required to overcome the interference. The cost of these changes are included as part of the contract price.

b. Power to the Turner Field Trailer and Jobsite Bathroom Trailer should be made available immediately upon Project commencement.

c. Local power centers shall be constantly maintained to prevent the accumulation of "rat's nest circuitry". All temporary wiring shall be suspended and maintained at least eight feet above finished floors and pass through permanent walls and partitions above the permanent ceiling level. No open conductor wiring is acceptable.

3. MATERIAL REQUIREMENTS

a. As the life of this installation is limited and as this installation will not form a part of the finished building, minimum cost is the basic requirement consistent with material and workmanship, which will satisfactorily, meet job conditions and regulations of all governing authorities.

b. The Electrical Subcontractor is to submit to Turner Construction for approval shop drawings indicating the temporary electrical distribution. The shop drawings shall include the typical floor plan with the location of the load centers and the schematic riser distribution indicating feeder sizes, distribution panels, branch sub panels and outlets for review.

4. MAINTENANCE

a. All temporary facilities are to be maintained and kept in good operating condition. Maintenance necessary to perform this work shall be provided so that other trades are not delayed.

b. The Electrical Subcontractor shall be responsible for installing and maintaining a reasonably balanced system and shall take current readings on the feeders at regular intervals as required by Turner. Temporary wiring is to be laid out, balanced and wire sized so as to produce a voltage drop of no greater than 5% at the extreme end of the line when operating at full load.

5. TRANSFER TO PERMANENT SERVICE

a. The permanent power service shall be activated as soon as possible, shutdowns and/or cut-overs shall not interrupt construction systems, and shall be coordinated with Turner.

Greenwich Central Middle School Project
TEMPORARY LIGHT AND POWER ADDITIONAL PROVISIONS FOR CONSTRUCTION PURPOSES
July 8th, 2024

6. REMOVALS AND SALVAGE

a. The Electrical Subcontractor shall disassemble and remove from the property all temporary electrical wiring, lights, equipment, etc. when its use is no longer required. Surplus material will be salvaged and the salvage value reflected in the lump sum price. This is to include the removal of the temporary power currently installed at the Turner trailer including all outside wiring supports etc. not removed by the utility company.

7. PROTECTION

a. The Electrical Subcontractor will protect his installation against weather damage and the normal operations of other trades. This includes all plywood/watertight enclosures.

8. SCOPE OF WORK

a. Provide labor, material, equipment, and power company fees and costs for the installation and maintenance of temporary light and power as may be required during the period of construction. Power will be derived from the following:

i. **Phase 1a – New Construction**: This subcontractor shall furnish & install all infrastructure required to bring temporary power to the jobsite from Orchard Street or Stanwich Road. This subcontractor must coordinate with the utility company. This subcontractor shall furnish & install temporary power poles as needed to run temporary power overhead. This subcontractor shall remove all temporary service components and poles once permanent power is established and temp. no longer needed.

1. **Service Size** – (2) 800Amp 480V 3-Phase Panels to be located adjacent to New Electrical Room 1069 – as not to inhibit installations of new services or work.
    a. Provide the necessary Sub-Panels as needed to support Temp Power and Lighting Provisions within the Building.
2. **Turner Trailer** – Provide and disconnect power to Turner Field Trailer
3. **Jobsite Bathroom Trailer** - Provide and disconnect power to a standard issue, self-contained Bathroom Trailer.

ii. **Phase 1b – Abatement Summer of '25:** This Subcontractor shall coordinate, install and disconnect (upon abatement completion) (2) 100amp panels (panels provided by Demo Contractor) within the existing school at locations shown to be abated on the Logistics Plan, Summer of '25.

1. Existing School Power should be coordinated and used – if not available, utilize Phase 1 temp power.

iii. **Phase 2a – Demo of Existing School:**

1. The Electrical Subcontractor shall utilize the existing school power source at the exterior transformer for Phase 2 Power, if feasible and does not inhibit other's work. If not deemed feasible, this Subcontractor shall coordinate and install a new service feed off the adjacent street(s) coordinating with the Utility company. The Electrical Contractor shall remove any temporary power upon completion of the Project.
2. Service Size – (1) 800 Amp 480v 3-Phase Panel
    a. This should be located near Turner Field Trailer and weather rated.
    b. Provide necessary transformers and pathways into Existing School to facilitate Selective Demolition
    c. This installation of temporary service shall be expedited to help facilitate demolition and take existing Electrical Service of the School offline. To assist in the Cut, Cap, Make Safe Process.

3. This Subcontractor shall coordinate, install and disconnect (upon demo completion) (3) 100amp panels provided Demo Contractor for Abatement within Existing School. This power shall be feed off of the existing school power, until temporary power of Phase 2 is ready, then a cross over to temporary power shall be provided to serve this panels.

9. **SPECIFIC SCOPE OF WORK**

a. Without the intent of limiting the scope of work, this section contains additional scope clarifications that compliment the contract drawings, contract specifications and other contract documents. The items listed herein are NOT intended to be a complete list of work items to be performed under this agreement. Furthermore, detail references are included for convenience but are not intended to identify all applicable details.

b. The Electrical Subcontractor will install the temporary electrical service, including step down transformers required to provide sufficient distribution of the temporary electrical service for lighting and power to all points of the Project. The Electrical Subcontractor is to coordinate installation with Turner. The Electrical Subcontractor shall provide all temporary enclosures required. The Electrical Subcontractor will coordinate final switch sizing. Provide all breakers and disconnects as required for a safe, functional, code compliant system.

c. The Electrical Subcontractor shall design, engineer, furnish and install a complete temporary electrical system including Switchboards, breakers, transformers, panels, conduit, feeders, connectors, supports etc. to fully support the projected distribution loads. The design shall meet all applicable local and state codes and governing regulations.

d. The Electrical Subcontractor shall install a temporary disconnect at each temp power service that will cut off power to all temporary outlets.

e. The Electrical Subcontractor will furnish and install the temporary grounding system for the temporary service in accordance with the engineer and local codes.

f. The Electrical Subcontractor shall furnish, install and maintain temporary GFCI exterior rated outlets for use each temp. outlet location/power stand.

g. Temporary power requirements will largely be 120v small tool loads and temporary lighting (refer to temporary lighting section). Directly outside of each stairwell shall be a minimum of two GFCI protected quad outlets on two 20a circuits. Outlets shall be mounted to secure power stands off the floor and not attached to wall construction. (15) Temp power stands to be provided by Drywall Contractor. Additional quad power outlets shall be supplemented along corridors such that no temporary outlet is ever further than the reach of a 50 foot extension cord. Branch wiring/cords shall be routed overhead and in such to minimize running through new work. Route wiring/cords through corridors wherever possible.

h. On the exterior of the Building GFCI protected quad outlets will be installed at the base of the building perimeter. One Quad outlet per exterior elevation. (2) Quad outlets at all roof levels. Outlets should be protected from weather by means of temporary enclosures and weather rated boxes.

i. No temporary electric risers are to be run in elevator, mechanical shafts, or stairwells. Risers are to be sleeved and run up along an interior column, location to be determined by Turner's Project Superintendent. (Any electrical risers located within walls will be relocated at the expense of this Subcontractor to facilitate in wall inspections and not delay closing up the walls)

j. Battery Charging Stations (2 per floor) with 8 outlets each designated only for charging tool batteries and a rack for battery chargers shall be installed, maintained and removed at the direction of Turner

k. There are to be no interruptions of service for erection operations during normal working hours and any costs for shut downs required on off hours is included within the scope for the temporary electric service.

l. This Subcontractor shall provide temporary hoist way lighting for the elevator installation.

m. Furnish and install a temporary power service for the installation of the new Elevator. Coordinate with Elevator Subcontractor for switchover to permanent power once available.

n. This Subcontractor shall provide (26) temporary power hook-ups for other trades, for example welding operations and spray on fireproofing.

o. This Subcontractor shall provide temporary power feeds to all BAS/BMS Panels until final power is available. This subcontractor shall disconnect and remove all temp. power feeds once permanent power is connected.

p. This Subcontractor shall furnish and install Liveview Technologies, or similar as approved by Turner, solar powered site lighting and security camera systems with telephone poles, as laid out in the Logistics and Phasing Plans, including all hardware and software for a fully functioning temporary site lighting and security system. This subcontractor shall include all rental costs/fees, relocations and removal. This subcontractor shall furnish and install an additional camera setup at the toilet trailer; this is in addition to what is shown on the logistics and phasing plans.

q. This Subcontractor shall furnish & install temporary power to the temporary heating and cooling units, quantity and type per the Temporary Heating and Cooling Additional Provisions. This Subcontractor shall provide relocation and cut over of this temporary system to the permanent power source as soon as source is available in each area. This subcontractor will disconnect the units once no longer needed on site, as directed by Turner.

r. Subcontractor is required to inspect temporary power GFCI stations on a monthly basis and submit documentation of inspections to the Turner upon request.

10. <u>Temporary Lighting</u>

a. The Electrical Subcontractor shall include all labor and materials to install, maintain, relamp, and remove an OSHA approved temporary lighting system with pigtails and protective shields using 150-watt rough service bulbs. Temporary wiring will be of a moveable nature suspended from the structure above in such a manner so as not to do damage to the spray-on fireproofing when being installed, maintained, relocated, or removed.

b. All temporary lighting shall be circuited and controlled via a time-clock with an override switch. The intent is for the general building areas to go dark during non-working hours. (Stairways shall be lit 24/7). Include the use of CFL lighting or Low voltage LED. Power supply(s) shall be located and available in the event of an emergency for manual operation.

c. Immediately following the completion of structural steel and the establishment of access to the slab areas, a temporary lighting feed will be run down the center of what will be the main corridors to support concrete pour and finish operations. Care shall be taken to follow the layout of the new partitions such to limit crossings of new walls. A center light string utilizing basketed CFL lamps will be run following this path. Lamps shall be placed of adequate spacing to illuminate all areas to a minimum of 5 foot candles.

d. Immediately following the installation of interior wall framing and door frames, individual room stringers will be attached to the center corridor feed and looped through the doorways. Wiring shall not be run through framing or cross through partitions. Minimize lighting in each room to prevent “bird nesting” of lights. Larger rooms may require additional lamps to meet the 5 foot candle requirement.

e. Following the completion of Drywall and Taping and the establishment of available permanent power, light baskets shall be transferred to utilize the available permanent ceiling electrical box and the temporary wiring removed. Doors could now be installed within the frames. Permanent fixtures would then be later installed as construction progress dictates.

f. Include a dedicated circuit for lighting for stairways within the building. These circuits shall be lighted at all times. Include emergency exit lights at each stair with battery backup.

g. Some areas of the project do allow for high intensity lighting to provide illumination such as the gym, auditorium and other two story spaces. Hang fixtures in such a manner to avoid marring or defacing finishes and in such a manner as to not impede overhead work. In open areas high intensity lighting shall not be utilized unless the fixtures can be hung above 12’ due to light flash and burn exposure hazards.

h. The Electrical Subcontractor is required to manage the replacement of all bulbs and temporary wiring which shall be included as part of this scope of work. At least on a weekly basis, the entire job shall be inspected and re-lamped as required. Documented inspections shall be submitted to Turner upon request. At no time shall more than 5 percent of the temporary lighting be non operational. For lighting in stairwells, this subcontractor will check daily so as not to impair access to & from the upper floors.

i. The Electrical Subcontractor shall remove/reinstall/relocate any temporary lighting that is interfering with the installation of any permanent work.

j. The Electrical Subcontractor will ensure that after wall closure 5 foot candles will be maintained in every room. These lights shall remain operational until the permanent fixtures are operational. Turner's Superintendent shall determine if sufficient lighting is being provided for the finish operations.

k. The Electrical Subcontractor shall relocate any temporary light fixtures and wires below ceilings to allow for Above-Ceiling Inspections and/or In-Wall Inspections.

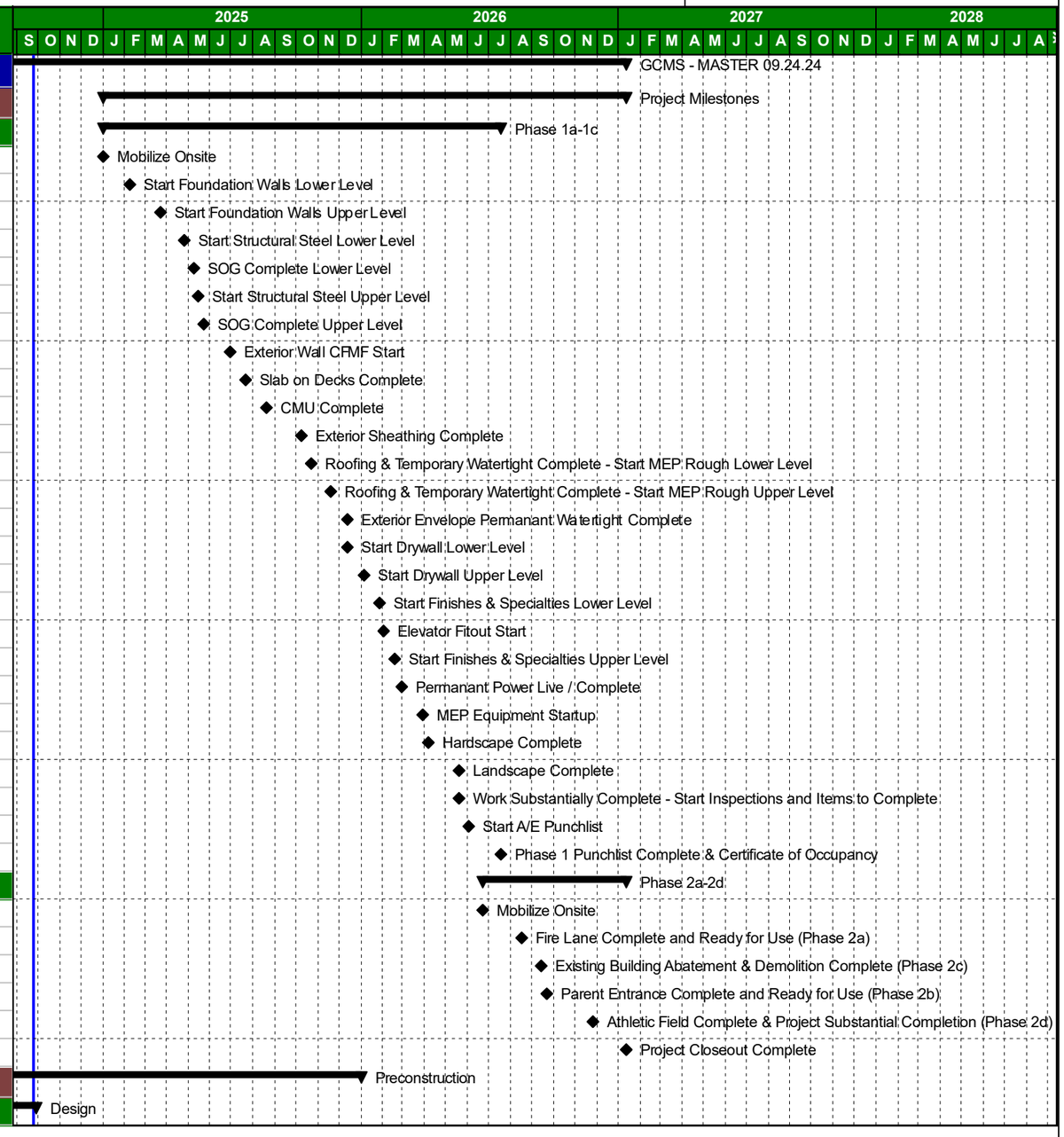
l. Provide and maintain twenty-five (25) temporary LED light stands for use by other trades such as concrete finishing and spray on fireproofing operations. These are to be checked prior to each operation and maintained in good working condition. The Electrical Subcontractor is required to store and secure these lights when not in use

m. Provide (10) Exterior Grade Spot lights to be installed around the building per the discretion of Turner, to illuminate pathways into the building. These shall be on a time clock.

Layout Name: CT-TEMPLATE-Full Sched
Data Date: 24-Sep-24

Greenwich Central Middle School

Activity ID	Activity Name	Rem. Dur.	Start	Finish
GCMS - MASTER 09.24.24		584	01-Jul-24 A	12-Jan-27
Project Milestones		516	02-Jan-25	12-Jan-27
Phase 1a-1c		393	02-Jan-25	17-Jul-26
Mile-Ph1-1000	Mobilize Onsite	0	02-Jan-25	
Mile-Ph1-1010	Start Foundation Walls Lower Level	0	07-Feb-25	
Mile-Ph1-1020	Start Foundation Walls Upper Level	0	24-Mar-25	
Mile-Ph1-1030	Start Structural Steel Lower Level	0	25-Apr-25	
Mile-Ph1-1040	SOG Complete Lower Level	0		09-May-25
Mile-Ph1-1050	Start Structural Steel Upper Level	0	16-May-25	
Mile-Ph1-1060	SOG Complete Upper Level	0		23-May-25
Mile-Ph1-1070	Exterior Wall CFMF Start	0	30-Jun-25	
Mile-Ph1-1080	Slab on Decks Complete	0		22-Jul-25
Mile-Ph1-1090	CMU Complete	0		19-Aug-25
Mile-Ph1-1100	Exterior Sheathing Complete	0		08-Oct-25
Mile-Ph1-1110	Roofing & Temporary Watertight Complete - Start MEP Rough Lower Level	0	22-Oct-25	
Mile-Ph1-1120	Roofing & Temporary Watertight Complete - Start MEP Rough Upper Level	0	19-Nov-25	
Mile-Ph1-1130	Exterior Envelope Permanant Watertight Complete	0		12-Dec-25
Mile-Ph1-1140	Start Drywall Lower Level	0	12-Dec-25	
Mile-Ph1-1150	Start Drywall Upper Level	0	06-Jan-26	
Mile-Ph1-1160	Start Finishes & Specialties Lower Level	0	27-Jan-26	
Mile-Ph1-1170	Elevator Fitout Start	0	02-Feb-26	
Mile-Ph1-1180	Start Finishes & Specialties Upper Level	0	17-Feb-26	
Mile-Ph1-1190	Permanant Power Live / Complete	0		27-Feb-26
Mile-Ph1-1200	MEP Equipment Startup	0		30-Mar-26
Mile-Ph1-1210	Hardscape Complete	0		07-Apr-26
Mile-Ph1-1220	Landscape Complete	0		19-May-26
Mile-Ph1-1230	Work Substantially Complete - Start Inspections and Items to Complete	0	20-May-26	
Mile-Ph1-1240	Start A/E Punchlist	0	03-Jun-26	
Mile-Ph1-1250	Phase 1 Punchlist Complete & Certificate of Occupancy	0		17-Jul-26
Phase 2a-2d		142	22-Jun-26	12-Jan-27
Mile-Ph2-1000	Mobilize Onsite	0	22-Jun-26	
Mile-Ph2-1010	Fire Lane Complete and Ready for Use (Phase 2a)	0		17-Aug-26
Mile-Ph2-1020	Existing Building Abatement & Demolition Complete (Phase 2c)	0		14-Sep-26
Mile-Ph2-1030	Parent Entrance Complete and Ready for Use (Phase 2b)	0		21-Sep-26
Mile-Ph2-1040	Athletic Field Complete & Project Substantial Completion (Phase 2d)	0		25-Nov-26
Mile-Ph2-1050	Project Closeout Complete	0		12-Jan-27
Preconstruction		323	01-Jul-24 A	02-Jan-26
Design		2	08-Jul-24 A	27-Sep-24



Actual Work
Remaining Work
Critical Remaining Work
Milestone
Summary

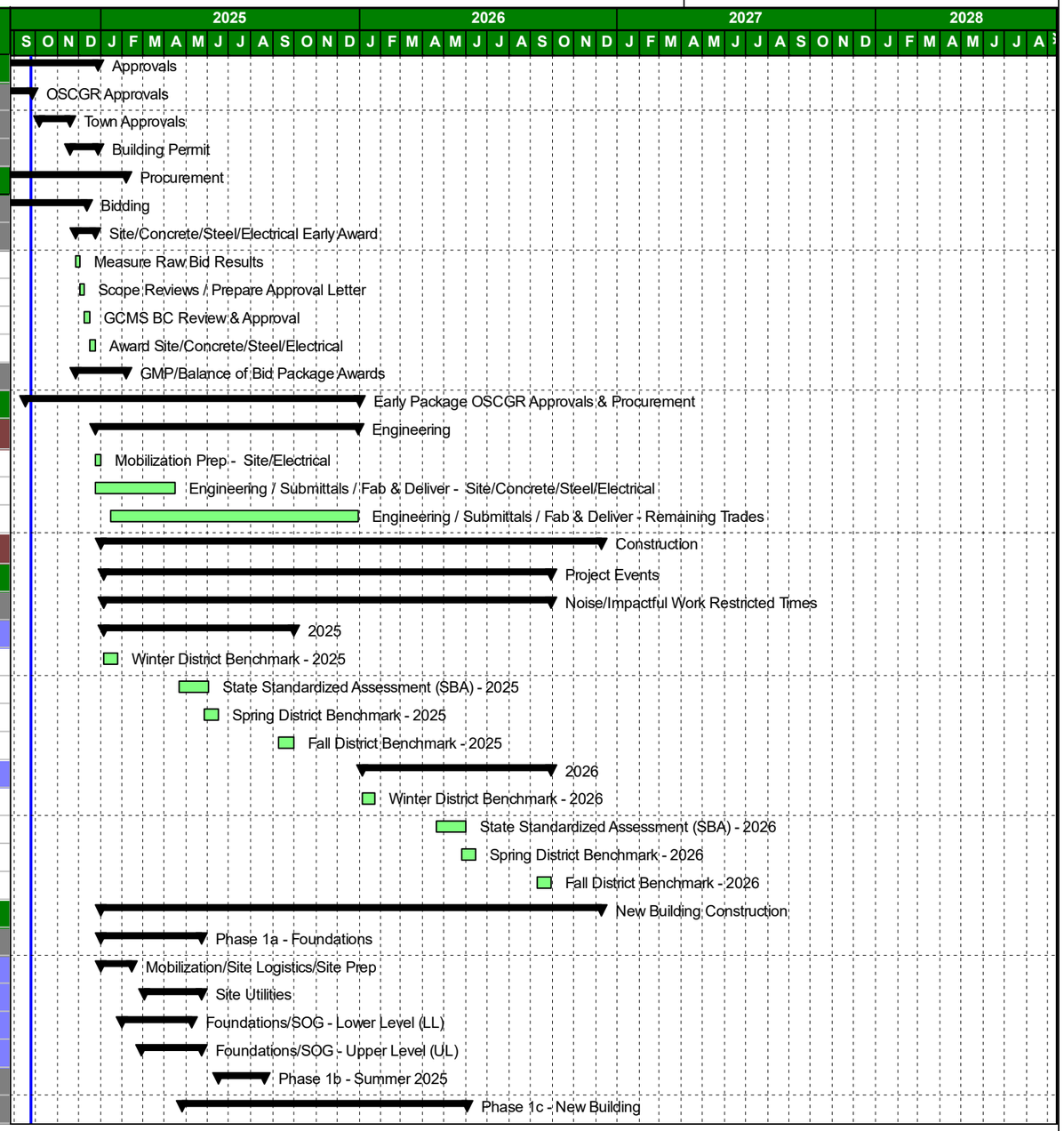
Greenwich CMS - Bid Schedule
(PCR Phase 2)

Turner

Layout Name: CT-TEMPLATE-Full Sched
Data Date: 24-Sep-24

Greenwich Central Middle School

Activity ID	Activity Name	Rem. Dur.	Start	Finish
Approvals		65	08-Aug-24 A	27-Dec-24
OSCGR Approvals		2	08-Aug-24 A	25-Sep-24
Town Approvals		30	07-Oct-24	18-Nov-24
Building Permit		26	19-Nov-24	27-Dec-24
Procurement		90	01-Jul-24 A	05-Feb-25
Bidding		52	01-Jul-24 A	12-Dec-24
Site/Concrete/Steel/Electrical Early Award		17	26-Nov-24	23-Dec-24
Procure-Early-1000	Measure Raw Bid Results	2	26-Nov-24	02-Dec-24
Procure-Early-1005	Scope Reviews / Prepare Approval Letter	5	02-Dec-24	09-Dec-24
Procure-Early-1010	GCMS BC Review & Approval	5	09-Dec-24	16-Dec-24
Procure-Early-1020	Award Site/Concrete/Steel/Electrical	5	16-Dec-24	23-Dec-24
GMP/Balance of Bid Package Awards		46	27-Nov-24	05-Feb-25
Early Package OSCGR Approvals & Procurement		323	16-Sep-24 A	02-Jan-26
Engineering		258	23-Dec-24	30-Dec-25
Engineer-Early-1000	Mobilization Prep - Site/Electrical	5	23-Dec-24	31-Dec-24
Engineer-Early-1010	Engineering / Submittals / Fab & Deliver - Site/Concrete/Steel/Electrical	80	23-Dec-24	16-Apr-25
Engineer-Balance-1000	Engineering / Submittals / Fab & Deliver - Remaining Trades	240	15-Jan-25	30-Dec-25
Construction		495	02-Jan-25	10-Dec-26
Project Events		442	06-Jan-25	29-Sep-26
Noise/Impactful Work Restricted Times		442	06-Jan-25	29-Sep-26
2025		189	06-Jan-25	30-Sep-25
Event - 1000	Winter District Benchmark - 2025	15	06-Jan-25*	24-Jan-25
Event - 1020	State Standardized Assessment (SBA) - 2025	30	21-Apr-25*	02-Jun-25
Event - 1040	Spring District Benchmark - 2025	15	27-May-25*	16-Jun-25
Event - 1060	Fall District Benchmark - 2025	15	10-Sep-25*	30-Sep-25
2026		189	05-Jan-26	29-Sep-26
Event - 1010	Winter District Benchmark - 2026	15	05-Jan-26*	23-Jan-26
Event - 1030	State Standardized Assessment (SBA) - 2026	30	20-Apr-26*	01-Jun-26
Event - 1050	Spring District Benchmark - 2026	15	26-May-26*	15-Jun-26
Event - 1070	Fall District Benchmark - 2026	15	09-Sep-26*	29-Sep-26
New Building Construction		495	02-Jan-25	10-Dec-26
Phase 1a - Foundations		102	02-Jan-25	23-May-25
Mobilization/Site Logistics/Site Prep		31	02-Jan-25	13-Feb-25
Site Utilities		60	03-Mar-25	23-May-25
Foundations/SOG - Lower Level (LL)		71	30-Jan-25	09-May-25
Foundations/SOG - Upper Level (UL)		60	28-Feb-25	23-May-25
Phase 1b - Summer 2025		45	17-Jun-25	19-Aug-25
Phase 1c - New Building		280	25-Apr-25	03-Jun-26



Actual Work
Remaining Work
Critical Remaining Work
Milestone
Summary

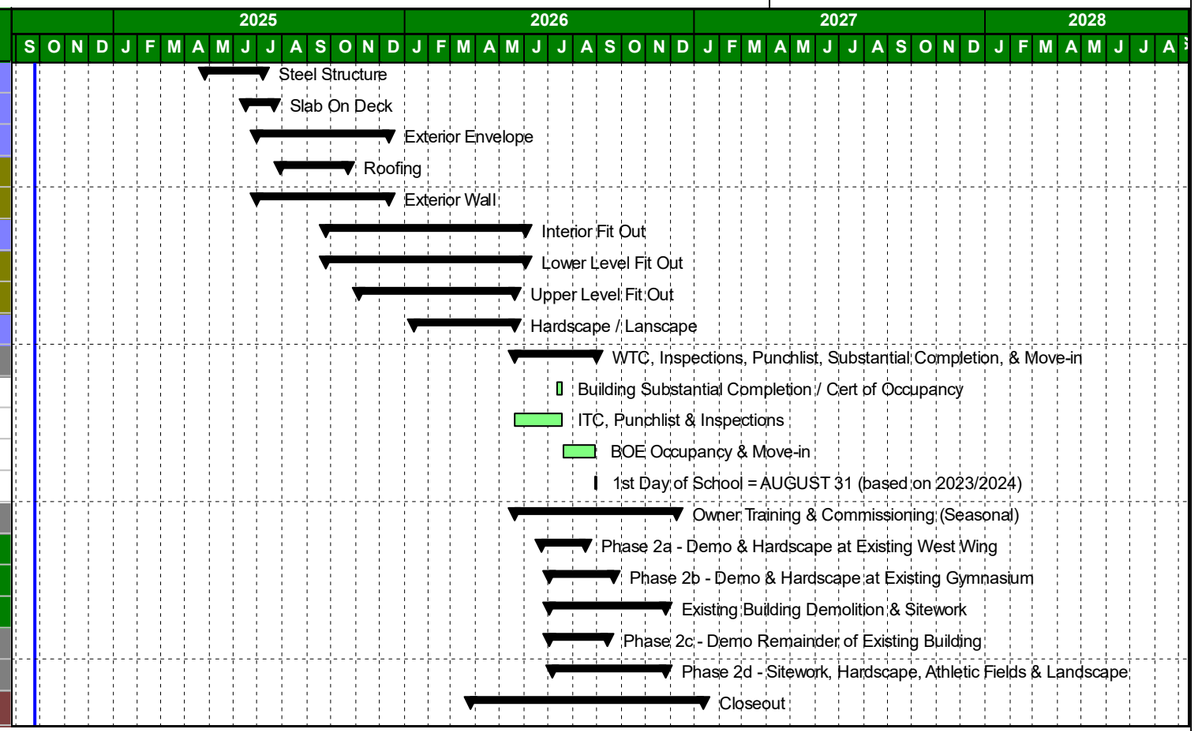
Greenwich CMS - Bid Schedule (PCR Phase 2)

Turner

Layout Name: CT-TEMPLATE-Full Sched
Data Date: 24-Sep-24

Greenwich Central Middle School

Activity ID	Activity Name	Rem. Dur.	Start	Finish
	Steel Structure	50	25-Apr-25	08-Jul-25
	Slab On Deck	25	16-Jun-25	22-Jul-25
	Exterior Envelope	115	30-Jun-25	12-Dec-25
	Roofing	60	29-Jul-25	22-Oct-25
	Exterior Wall	115	30-Jun-25	12-Dec-25
	Interior Fit Out	175	24-Sep-25	03-Jun-26
	Lower Level Fit Out	175	24-Sep-25	03-Jun-26
	Upper Level Fit Out	135	05-Nov-25	19-May-26
	Hardscape / Lanscape	90	13-Jan-26	19-May-26
	WTC, Inspections, Punchlist, Substantial Completion, & Move-in	72	20-May-26	31-Aug-26
Const-COMPL-1000	Building Substantial Completion / Cert of Occupancy	5	13-Jul-26	17-Jul-26
Const-COMPL-1010	ITC, Punchlist & Inspections	40	20-May-26	17-Jul-26
Const-COMPL-1020	BOE Occupancy & Move-in	30	20-Jul-26	28-Aug-26
Const-COMPL-1030	1st Day of School = AUGUST 31 (based on 2023/2024)	1	28-Aug-26	31-Aug-26*
	Owner Training & Commissioning (Seasonal)	140	20-May-26	10-Dec-26
	Phase 2a - Demo & Hardscape at Existing West Wing	40	22-Jun-26	17-Aug-26
	Phase 2b - Demo & Hardscape at Existing Gymnasium	55	02-Jul-26	21-Sep-26
	Existing Building Demolition & Sitework	102	02-Jul-26	25-Nov-26
	Phase 2c - Demo Remainder of Existing Building	50	02-Jul-26	14-Sep-26
	Phase 2d - Sitework, Hardscape, Athletic Fields & Landscape	101	07-Jul-26	25-Nov-26
	Closeout	200	26-Mar-26	12-Jan-27



Actual Work
Remaining Work
Critical Remaining Work
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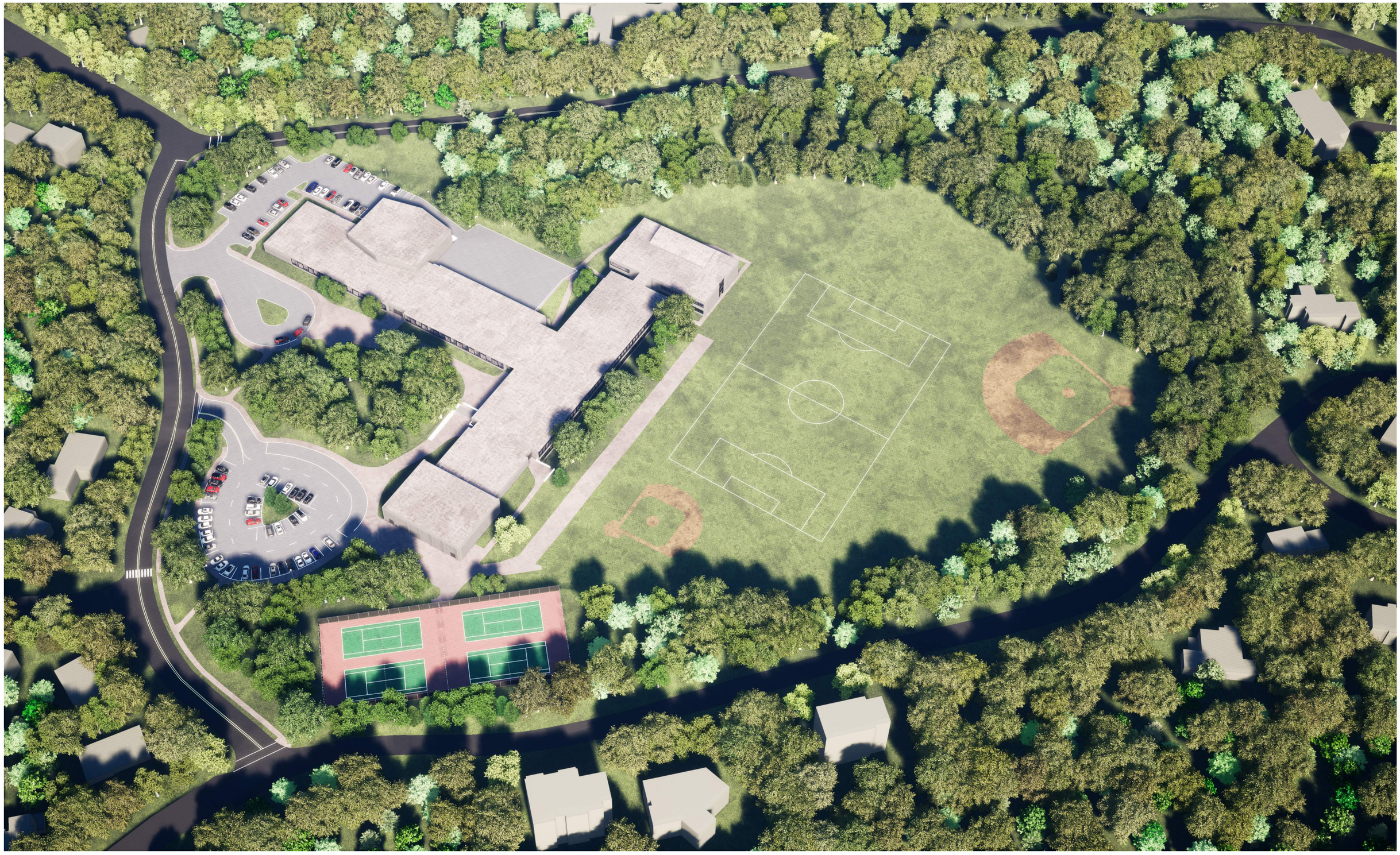
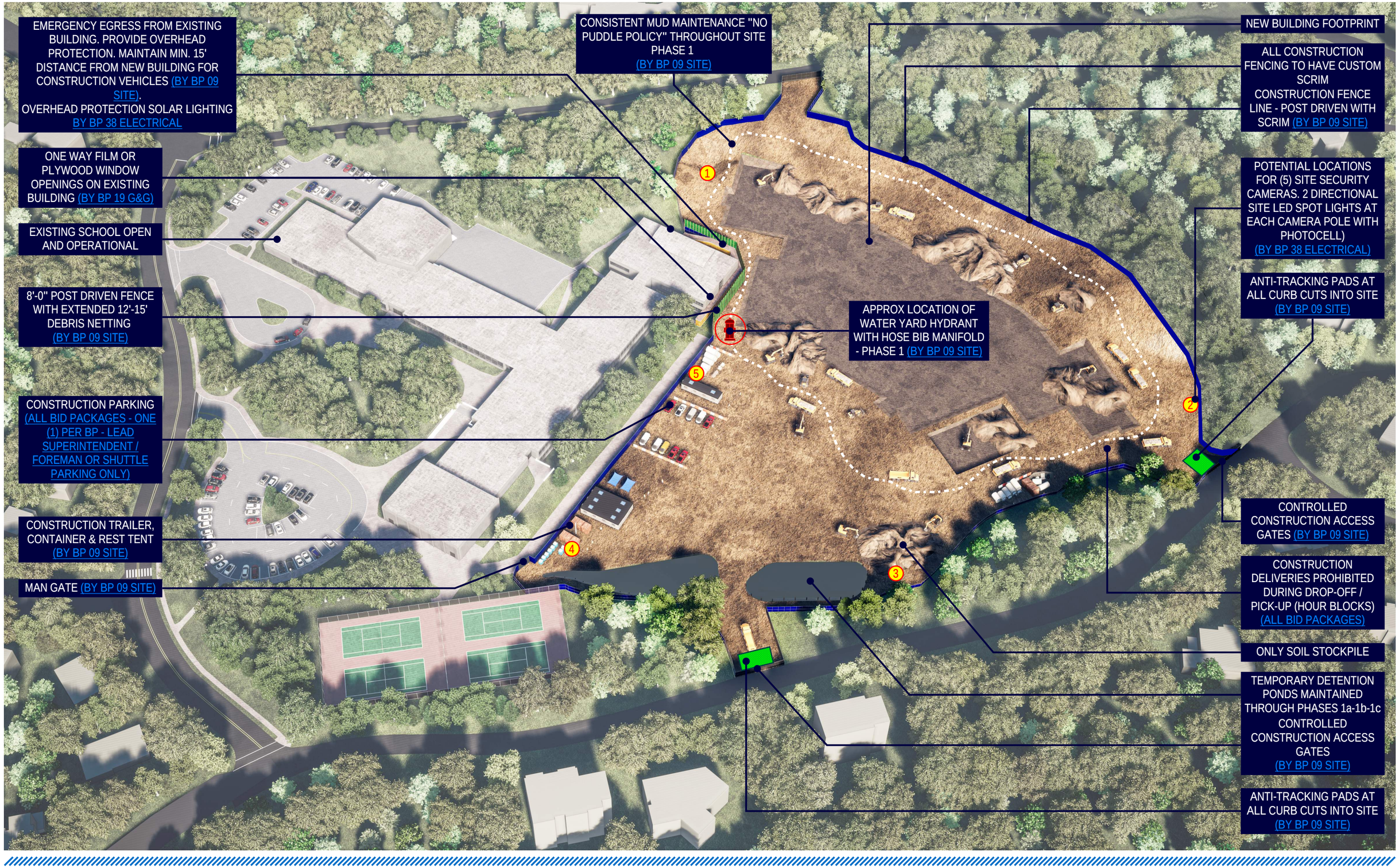
Greenwich CMS - Bid Schedule
(PCR Phase 2)

Turner

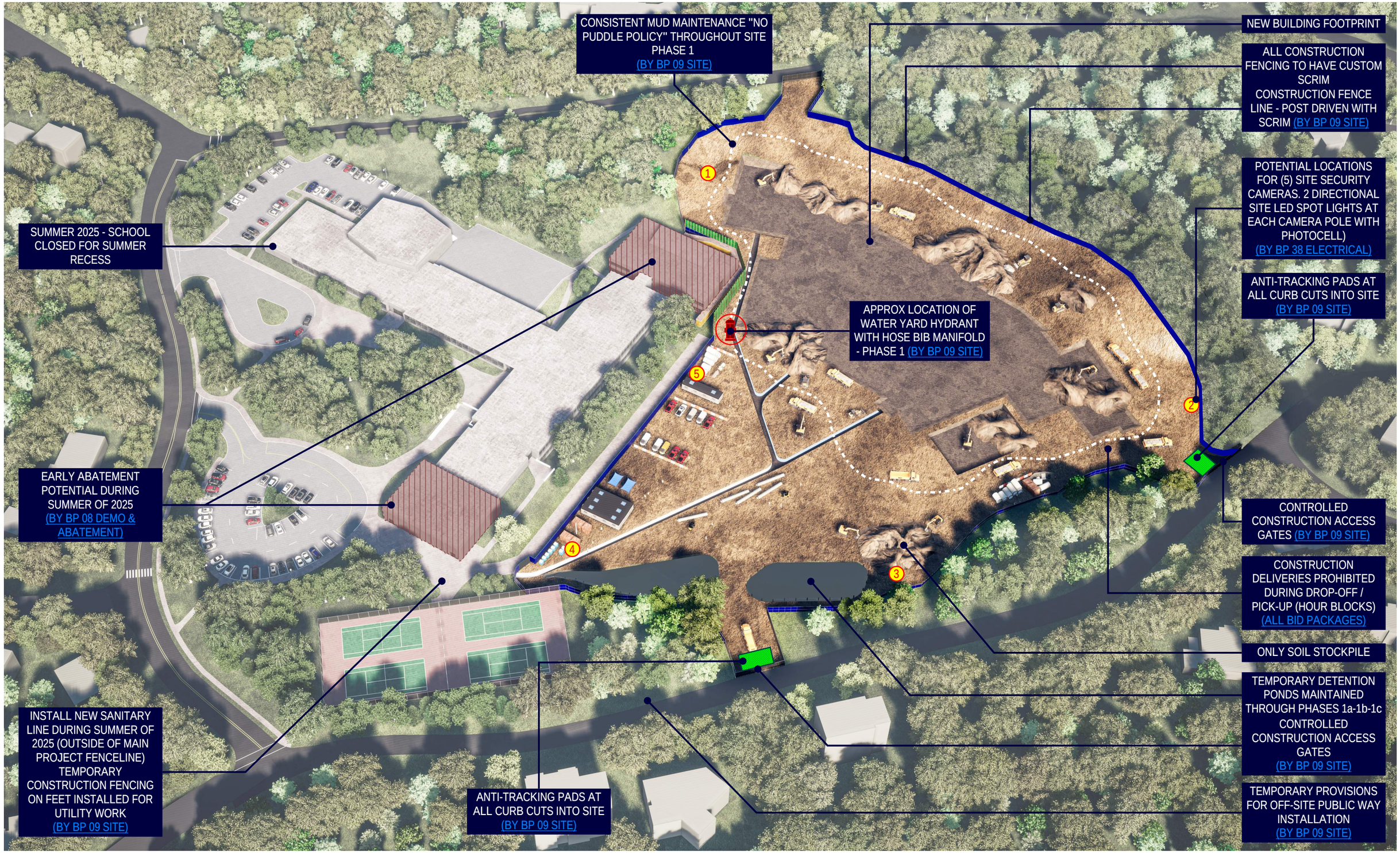
ON-SITE PHASING & LOGISTICS PLANS: Existing Conditions



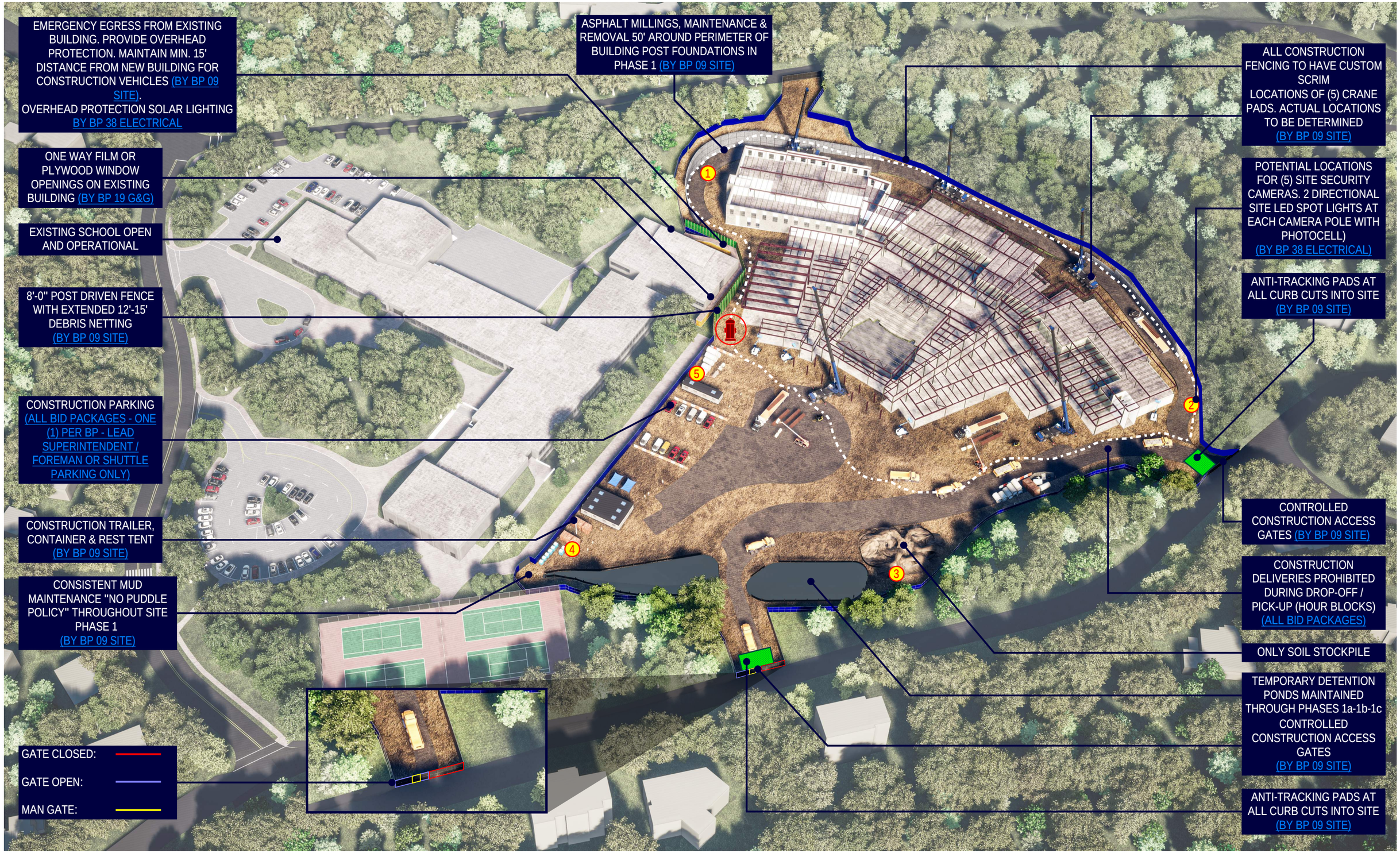
ON-SITE PHASING & LOGISTICS PLANS: Phase 1a - [January 2025 - April 2025] - Mobilization Through Start of Steel Erection



ON-SITE PHASING & LOGISTICS PLANS: Phase 1b "Summer 2025" - [June 2025 - August 2025] - Sanitary Tie-in



ON-SITE PHASING & LOGISTICS PLANS: Phase 1c - [April 2025 - June 2026] - Start of Steel Erection through Substantial Completion / Move-in



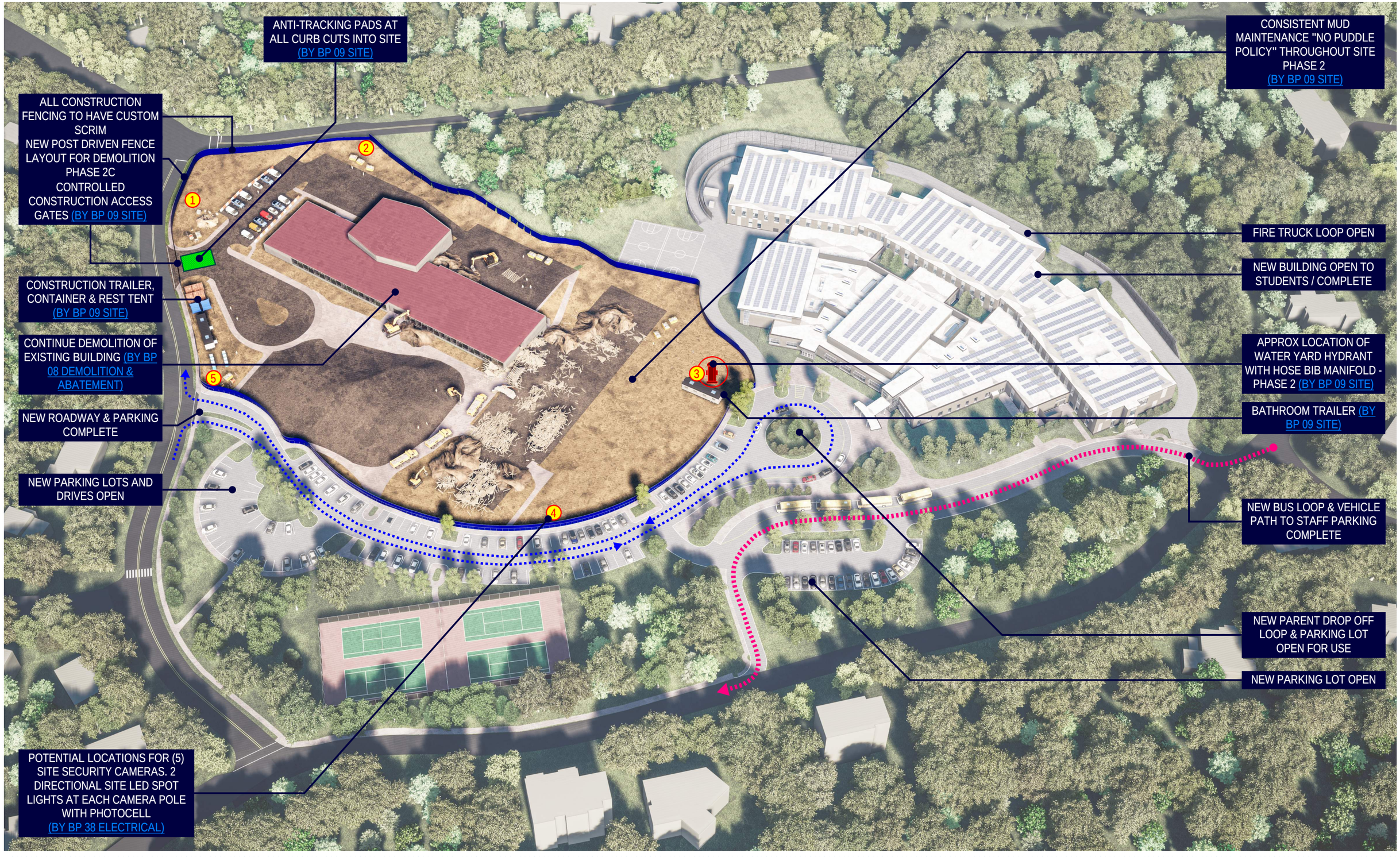
ON-SITE PHASING & LOGISTICS PLANS: Phase 2a - [July 2026 - August 2026] - Complete Abatement & Demo West Wing | Hardscape / Landscape @ Fire Loop & Basketball Courts

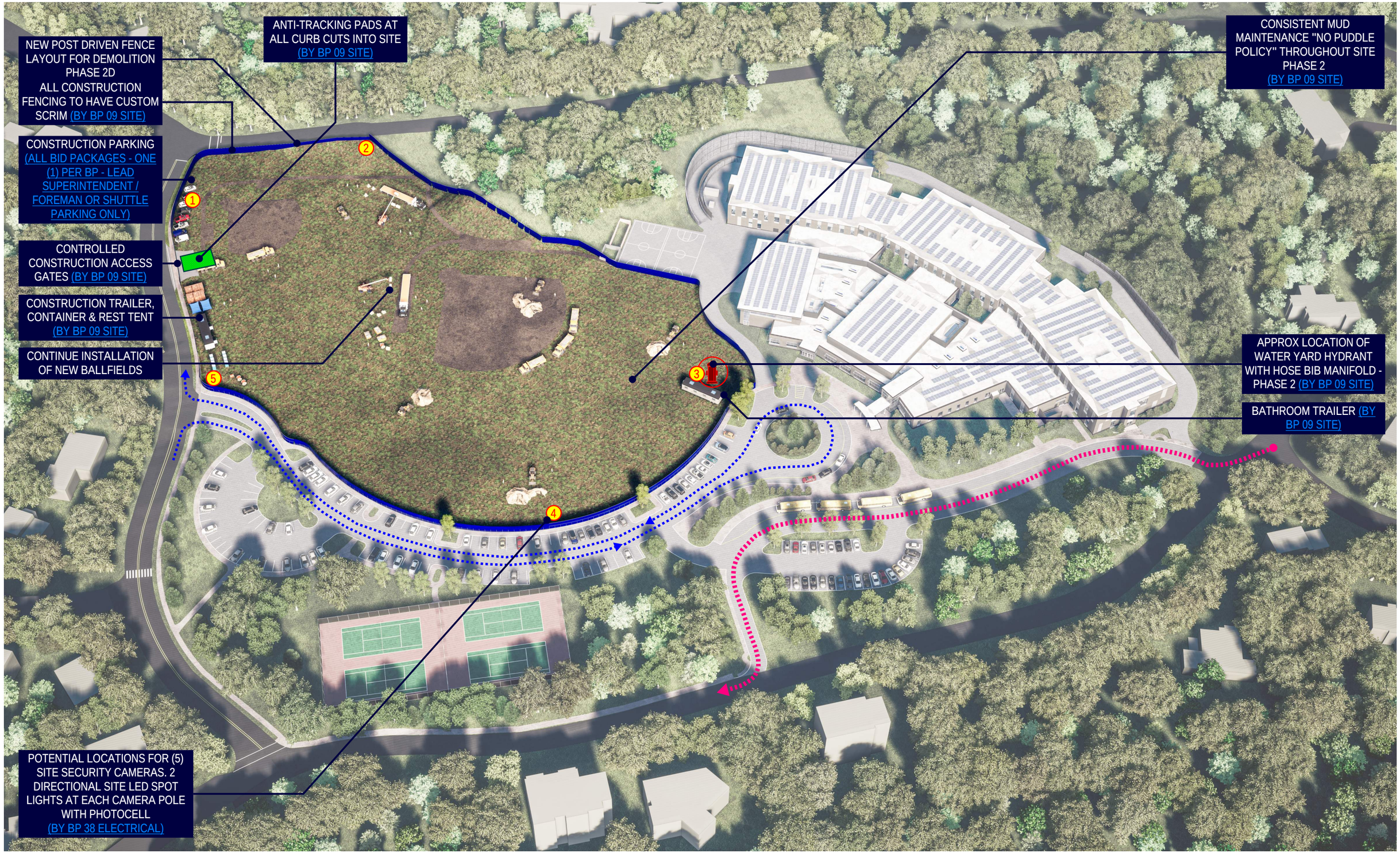


ON-SITE PHASING & LOGISTICS PLANS: Phase 2b - [July 2026 - September 2026] - Complete Abatement & Demo Gymnasium | Hardscape / Landscape @ Parent Entrance / Queuing



ON-SITE PHASING & LOGISTICS PLANS: Phase 2c - [July 2026 - September 2026] - Complete Abatement & Demolition of Existing




NEW POST DRIVEN FENCE LAYOUT FOR DEMOLITION PHASE 2D
ALL CONSTRUCTION FENCING TO HAVE CUSTOM SCRIM (BY BP 09 SITE)
CONSTRUCTION PARKING (ALL BID PACKAGES - ONE (1) PER BP - LEAD SUPERINTENDENT / FOREMAN OR SHUTTLE PARKING ONLY)
CONTROLLED CONSTRUCTION ACCESS GATES (BY BP 09 SITE)
CONSTRUCTION TRAILER, CONTAINER & REST TENT (BY BP 09 SITE)
CONTINUE INSTALLATION OF NEW BALLFIELDS
ANTI-TRACKING PADS AT ALL CURB CUTS INTO SITE (BY BP 09 SITE)
CONSISTENT MUD MAINTENANCE "NO PUDDLE POLICY" THROUGHOUT SITE PHASE 2 (BY BP 09 SITE)
APPROX LOCATION OF WATER YARD HYDRANT WITH HOSE BIB MANIFOLD - PHASE 2 (BY BP 09 SITE)
BATHROOM TRAILER (BY BP 09 SITE)
POTENTIAL LOCATIONS FOR (5) SITE SECURITY CAMERAS. 2 DIRECTIONAL SITE LED SPOT LIGHTS AT EACH CAMERA POLE WITH PHOTOCELL (BY BP 38 ELECTRICAL)
1
2
3
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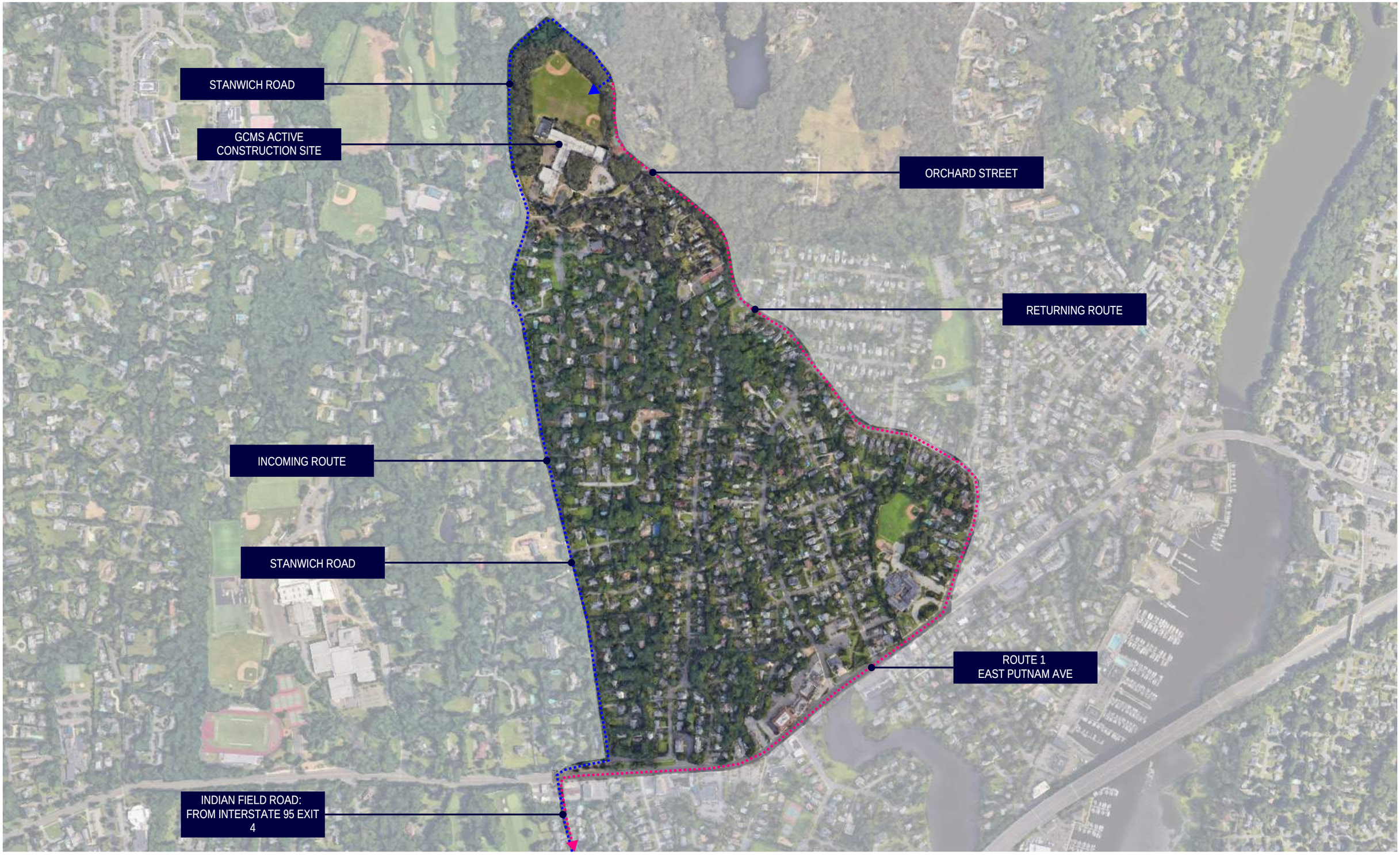
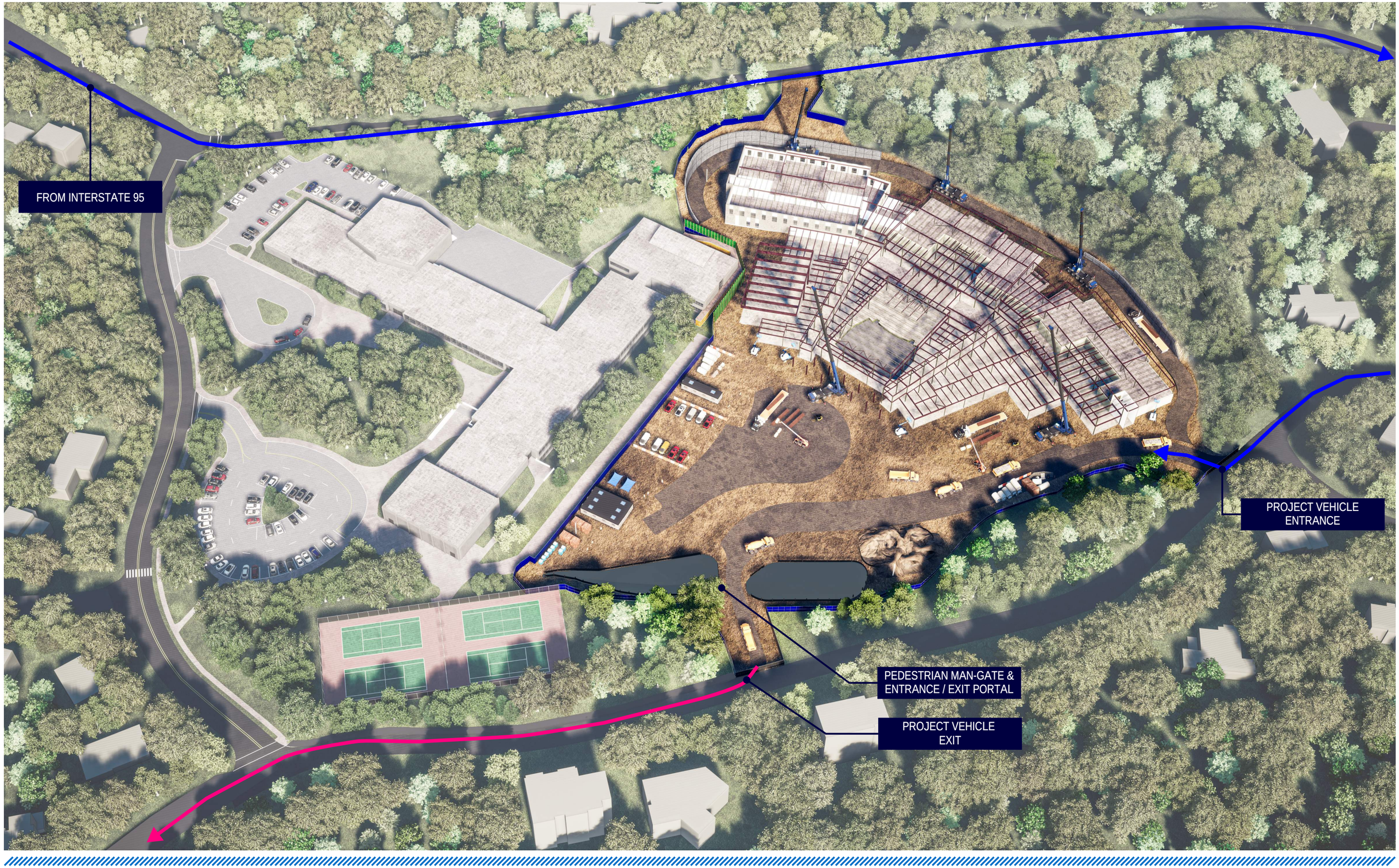
5



ON-SITE PHASING & LOGISTICS PLANS: Phase 1 - Construction Traffic & Delivery Route



ON-SITE PHASING & LOGISTICS PLANS: Phase 1 - Construction Traffic & Delivery Route



ON-SITE PHASING & LOGISTICS PLANS: Phase 2 - Construction Traffic & Delivery Route



ON-SITE PHASING & LOGISTICS PLANS: Phase 2 - Construction Traffic & Delivery Route



Turner

Building L.I.F.E.®

Living Injury Free Every Day

Corporate Environmental, Health, and Safety Policy



CENTRAL MIDDLE SCHOOL
GREENWICH, CONNECTICUT
STATE PROJECT NO. 057-0114N
PHASE 2 OF 3 - CONSTRUCTION
7/08/2024

Disclaimer

All employees using safety documents posted on TKN, including this EHS manual, must utilize the most recent version available. If a document is printed the document must contain a date stamp on the hard document indicating when it was printed and the version date. Employees must regularly check TKN through the course of the project to obtain any updated versions.

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Section

1

TURNER

CORPORATE ENVIRONMENTAL, HEALTH AND SAFETY POLICY

Letter of Introduction

Environmental, Health & Safety Policy

We think of our workplace as “our house.” In our house, we foster a caring environment. We want every person at Turner and every person who steps onto a Turner site to truly believe that they are contributing to, and have a sense of belonging to, something extraordinary. We are focused on maintaining and sustaining the Right Environment where people feel included, engaged, empowered, and connected.

Turner’s safety culture is reflected in the principle of Building L.I.F.E.® (Living Injury Free Every Day) with an expectation that all projects provide the safest workplace possible for our employees, trade partners, clients, and members of the communities in which we work.

Turner’s Building L.I.F.E.® safety program is a continuous improvement process with a focus on upstream risk avoidance and the activities which produce risk. The Building L.I.F.E.® process seeks to increase frontline worker engagement in the safety and planning processes through engaging those closest to the risk in the decision-making process. Building L.I.F.E.® is anchored by a focus on positive reinforcement and feedback on safe behaviors by everyone involved in the delivery of the project.

Building L.I.F.E.® Vision
Create and sustain a culture which promotes an incident-free environment and provides the safest workplace possible to live injury free every day.

Building L.I.F.E.® Guiding Principles

- Injuries are preventable.
- We will coach and practice safe behavior to live injury free every day.
- We will engage and look out for each other to properly plan work.
- We will perform a task only if it is safe.
- We will speak up and stop work if there is an unsafe condition, action, or safer way to perform a task.

Let’s be relentless and keep each other accountable by making sure we pre-plan and discuss risk every day and that we continue to actively care. Thank you for your support and help maintaining a workplace that promotes the Building L.I.F.E.® culture. Together, we will continue to improve our performance and make our projects the safest possible.

Peter J. Davoren
President and Chief Executive Officer
Turner Construction Company

Turner

Section

2

TURNER

CORPORATE ENVIRONMENTAL,

HEALTH & SAFETY POLICY

Administration & Programs

Building L.I.F.E.®

Building L.I.F.E.® is a collection of tools designed to enhance operational staff's ability to engage with trades to improve safety outcomes and measure performance. This program is designed to:

- Enhance the recognition of and reduce risk through better operational planning while increasing safety acumen resulting in fewer incidents and near-misses.
- Encourage all Turner employees, trade partners, clients, and design team to make safety a personal value.

The Building L.I.F.E.® program is a continuous-improvement program aimed at reducing process discrepancies and risks that in turn lead to unplanned events or loss. This program also aims to create a more positive working climate by frequently involving our project teams and subcontractors (including the frontline worker) in many aspects of our safety processes.

Note: Refer to the Turner Building L.I.F.E.® instruction manual for detailed guidance on each aspect of the program.

Program Goals & Objectives

- Implement a more comprehensive continuous improvement model for safety & risk management that supports Lean Construction, Human and Organizational Performance, and ISO 14001 by building continuous improvement cycles into each of our key risk-reduction processes.
- Embed an upstream "systems focus" into our planning and problem-solving tools focusing on risk and the systems that are driving risk.
- Increase the engagement and participation of frontline workers in our processes to increase ownership, change culture and improve results.
- Utilize Human and Organizational Performance principles to provide a more holistic approach to safety management and culture change.

Program Elements

All elements of the Building L.I.F.E.® program are based on engagement and feedback at all stages and levels of the construction process. Key elements of the program are:

- Pre-planning process
- Assessments
- Coaching activities
- Feedback processes

Notes:
Pre-Planning Process: This element is detailed in the "Job Hazard Analysis / Pre-Task Planning" section of this Policy Manual
Assessments: This element is detailed in the "SafetyNet Operational Guidelines" section of this Policy Manual.

I Coaching Activities

CSB Coaching Process

The critical safe behavior coaching process is intended to close a gap in our Safety Management System and bring balance to the "systems-approach." Critical safe behavior coaching is focused on positive and delivering actionable

feedback. We strive for CSB coaching to be a welcome event that draws on workers skills and actions in the construction environment.

These are conducted with the engagement of the those directly performing a task, the supervisor and foreman of the workers, and the Turner Staff Coach.

There are five primary categories considered during this process:

- Visual Focus
- Body Position
- Manual Material Handling
- Organization and Housekeeping
- Elevated Work

The intended outcome of this collaborative activity is process improvement, improving efficiencies and risk reduction.

Staff engagement expectations with CSB Coaching are defined in the “SafetyNet Operational Guidelines” section of this Policy Manual.

Rapid Improvement Events

A rapid improvement event is a continuous improvement process meant to accomplish the following:

- Ensure every major task of work has been optimized for safety, efficiency, and quality, thus reducing all forms of waste.
- Improve the quality of our work plans, such as JHAs and PTPs.
- Taking a systems-based approach
- Engaging the workforce
- Continuous improvement

Unlike a Critical Safe Behavior coaching activity which is task focused, the Rapid Improvement Event takes a much broader look at the overall operation and the context in which the tasks are taking place. These are conducted with the engagement of the those directly performing a task, the supervisor and foreman of the workers, and the Turner Staff Coach.

The intended outcome of this collaborative activity is process and efficiency improvement and risk reduction.

Engagement expectations are to be established at a project level based on scope, size and complexity.

II Feedback Processes

Five Worker Lunches

This feedback-based process supports continual improvement and worker engagement. Turner selects 5 workers from various contractors to have an informal free lunch with Turner site management team and available BU Managers. The Turner facilitator explains to them over lunch that “we need their input so we can continue to assess and improve the effectiveness of our safety program and leadership. Although we will keep notes during the meeting so we can follow up on their feedback and ideas, no names will be attached, and their comments are confidential for the staff in the room only.”

How to select the five workers

Each worker should be from a different subcontractor. Preference should be given to companies that meet the following:

- Program and policy non-conformance issues have been noted.
- New subcontractor to Turner Construction.
- High-risk activities.
- High EMR Risk Management Waiver was executed.

This is a monthly process, at a minimum. 5 workers is a guideline. The feedback received from this meeting should be tracked in meeting minutes. Select items requiring Turner action should be addressed and resolution shared verbally at all-hands safety meetings and noted on “You Said / We Did” boards.

Safety Observation and Recognition Cards (S.O.A.R.)

Safety Observation and Recognition Cards, or SOAR Cards for short, serve two purposes in supporting Building L.I.F.E.®.

- SOAR Cards provide a good avenue for workforce engagement which creates further ownership in our safety program and supports the desired culture shift.

- SOAR is another feedback mechanism supporting continuous improvement - this mechanism focuses on providing feedback to Turner Construction. It allows workers the opportunity to anonymously become extra eyes and ears in the field.

The SOAR Card signs with drop-boxes should be prominently displayed at the entrance to the project. Turner staff should check the drop-box daily.

Observations and recognition submitted should be shared during morning safety meetings to discuss actions taken and to close the loop with the workers, shared verbally at all-hands safety meetings and noted on “You Said / We Did” boards.

III Training Requirements

To ensure the consistent and effective program implementation and integration, training will be completed as defined below:

Turner Field Operations Staff: Attend and actively participate in the Building L.I.F.E.® 5 training module series and complete the learning application activities as delivered and facilitated by a designated program trainer.

Turner Staff (non-field operations): Attend the Building L.I.F.E.® program overview training module delivered by a designated program trainer. (1 hour in duration)

Trade Partner Staff and Craft: A Building L.I.F.E.® overview is presented in the Turner site orientation video.

General Rules

I. This section captures general rules that are not discussed elsewhere in this program.
   i. Where discrepancies exist between this Environmental Health & Safety Program, and other regulations, standards, safety plans and contract documents, the more protective requirement will apply.
   ii. The possession or use of alcohol, marijuana, or any controlled substance by any Turner staff, trade, or any subcontractor on any Turner jobsite is prohibited at any time including non-working hours. Turner sponsored or approved meeting/functions, not located at a Turner Jobsite, may serve alcohol with approval by the BU General Manager or HQ Department Head. However, this does not relieve Turner Employees or Other Workers from possessing or using alcohol responsibly and safely in such situations.
   iii. No one under the age of 18 is allowed to work on the Project property / construction site.
   iv. Turner offices and projects are tobacco-free zones. This includes e-cigs and all forms of tobacco.
   v. No animals are allowed on Turner property. Please contact Headquarters EHS and Human Resources if you are requesting to bring a service animal on Turner property.
   vi. No walking or driving on projects while talking or texting on phone or walkie-talkie.
   vii. All personnel are empowered and encouraged to stop unsafe acts, identify unsafe conditions, and to escort non-construction personnel out of the work areas. Please care for your project teammates.
   viii. No headphones, iPods, radios, etc. are permitted on the job. No streaming of music from the internet. No walking or driving on projects while talking or texting on phone or walkie-talkie.
   ix. A fluent interpreter must be provided and on site for any crew that has one or more non-English speaking workers.
   x. The list of behaviors below, while not inclusive, provides examples of conduct that is prohibited:
      1. Causing physical injury to another person.
      2. Making threatening remarks, verbal abuse, derogatory remarks, racial or bias motivated statements (verbal or in writing).
      3. Aggressive or hostile behavior that creates a reasonable fear of injury to another person or subjects another individual to emotional distress.
      4. Intentionally damaging employer property or property of another

employee.

xi. To the maximum extent permitted by applicable law, the possession on Company premises or while on duty of firearms, clubs, explosives, or other weapons that could be used to cause harm to personnel or property, other than that used to perform specific construction activities, is not permitted. This would include Turner projects and client-owned buildings and facilities we work in, project-provided parking areas, and while in the execution of work duties.

i. Employees must:

1. Perform their work to prevent accidents to themselves, fellow workers, and property.
2. Use Personnel Protection Equipment as required, to meet all Turner, federal, state, and local requirements.
3. Alert supervisors to dangerous situations.
4. Cooperate with principles of the Project Site Specific Safety Program.
5. Utilize all tools and equipment in a safe manner and in accordance with manufacturer's recommendations.
6. Complete project safety orientation before starting work on the jobsite.
7. Acknowledge and abide by the project enforcement rules.

ii. All visitors must sign a visitor release at the project site office or into the visitor logbook when visiting an office. All visitors must be escorted while on site and must adhere to Turner Project Safety Program and be 18 years of age or older.

iii. All trade partner vehicles within the project site fence (including, but not limited to, transportation and construction equipment, delivery trucks and personal or company trucks) shall not idle. The only allowable exceptions to the standard are as follows:

1. Ambient air temperature exceeds 85°F or falls below 32°F (or as defined by local or regional temperature limits, whichever is stricter)
2. Engine idling is required for the function of auxiliary equipment (i.e., cranes, concrete pumps, etc.)

iv. A List of General Hazards by Trade and Region can be found on the reference tool on TKN EH&S Website

Crisis Management Plan

I. Policy Statement

Turner's Crisis Management Plan provides an outline of actions that must be taken to prepare for a crisis and response plan in the event of a crisis. The plan defines the action steps necessary, and the responsibility assigned for such actions. A crisis is any event that has been created and/or may still pose an immediate threat to life, property, or business as usual. This may occur at a jobsite, a Business Unit office or other locations related to our business. The full Crisis Management Plan is available on the Safety SharePoint site.

Such situations may include, but are not limited to:

- Incidents involving serious bodily harm and/or deaths, or property damages,
- Bomb threats, terrorist attacks,
- Collapse of a building or portion of a building,
- Natural disasters and severe weather events
- Fire/explosion, water events,
- Equipment failure such as the collapse of a crane,
- Workplace violence,
- Environmental incidents,
- Extreme business interruption,
- Pandemic Illness,
- Active shooter events
- Bias Motivated Events
- Labor events, protests, immigration.

II. Procedures

1. The following are highlights of the Crisis Management Plan and may be found and viewed in detail in the Safety Section of the SharePoint Document Management System.

    a) Section 1 – General
        - The severity of the event will dictate the appropriate response. Your Business Unit Environmental, Health, and Safety Director (BUEHSD) and Operations Manager must be contacted before reporting a crisis by submitting a New Notification using the AlertMedia! application on your mobile device or go to turner.alertmedia.com OR call 1-866-3-TURNER (1-866-388-7637) or 201-903-4127.

    b) Section 2 – Preparing for a Crisis
        - The key to success in handling a crisis situation is preplanning, prior preparation, organization, and rehearsal / practice drills.
        - Each project and office must have pre-determined Action Plans

and Teams that are ready to react to any crisis situation.

c) Section 3 – Event Response Plans
   - Several immediate and simultaneous actions must take place during a crisis regardless of the type of event.
   - These actions should be directed by the Project Superintendent or, in his/her absence, the Project Safety Manager. Again, it is important to notify your BUEHSD and Operations Manager before submitting a New Notification using the AlertMedia! application on your mobile device or go to turner.alertmedia.com OR call 1-866-3-TURNER (1- 866-388-7637) or 201-903-4127. The Site-Specific Crisis Plan will detail the actions needed.

d) Section 4 – Media Management
   - All inquiries by the media should be referred to the General Manager or Operations Manager.
   - Turner's Corporate Public Relations Group must also be contacted immediately by the Operations Manager or General Manger of the Business Unit.

e) Section 5 – Crisis Preparedness Checklist
   - Turner's level of preparedness for a crisis prior to its occurrence will determine the success of effectively managing such an event.
   - Crisis practice drills must be conducted semi-annually for project sites and offices. These also should occur at the start of every project.
   - Checklists provided on SharePoint will assist in drill preparation.
   - During a pandemic, refer to specific programs for cleaning and disinfecting, PPE, and general guidance documents.
   - Projects should utilize posters, applications, etc. to maintain a level of awareness and preparedness for any crisis that may develop. They are available on the Turner Homepage at the Turner store.

Incident and Near–Miss Investigation and Reporting

I. Incident Reporting

For any incident involving personal injury, the subcontractor will complete their own incident investigation report form and submit it to Turner as soon as reasonably possible (same work shift) but no later than 24 hours after the incident occurred.

The Project Safety Manager and/or Superintendent will notify the Business Unit Claims Coordinator and BU EH&S Director (BUEHSD) as soon as practical after the incident, but no longer than 1 hour. In addition, a Turner Incident Investigation Report will also be completed in Origami by the Turner Project Superintendent and/or Project Safety Manager (if assigned) based on the information collected from witnesses and contractors. All matters pertaining to medical records and reports will be kept strictly confidential by the responsible party.

II. Responsibilities

All incidents resulting in injury or property damage are to be reported at the time of occurrence to the Turner Project Superintendent and/or Project Safety Manager. The Turner Superintendent and/or Project Safety Manager will speak with the worker involved in the incident as well as the subcontractor in charge of the person(s) involved or witnesses to the event. The contractor will complete their own incident investigation report form and will require each craft person involved to complete a written statement whenever such events take place. Turner and or the Owner may require a more detailed investigation and the Subcontractor will comply with theirdirections.

The BUEHSD will notify the Turner Helpline when appropriate. See Turner Incident and Near-Miss Reporting Matrix for reference of when to submit a New Notification using the AlertMedia! application on your mobile device or go to turner.alertmedia.com OR call 1(866) 3-TURNER / 1 (866) 388-7637 OR 201-903- 4127 OSHA's Recordkeeping rule requires employers to report all work-related fatalities within 8 hours and all in-patient hospitalizations, amputations, and losses of an eye within 24 hours of finding out about the incident.

III. Incident Reporting Procedures

1. Near-Miss Event

A Near-Miss is an unplanned event that did not result in injury, illness, or damage – but had the potential to do so. Only a fortunate break in the chain of events prevented an injury, fatality, or damage; in other words, a miss that was nonetheless very near. A faulty process or management system invariably is the root cause for the increased risk that leads to the near miss and should be the focus of improvement. Other familiar terms for these events are a "close call," or "near hit."

It is the responsibility of the Turner Project Superintendent or Project Safety Manager to complete the investigation using the Turner Construction Company Incident investigation report in Origami. This report will include recommendations/ implementation of corrective actions. The report will be submitted as soon as reasonably possible (same work shift) but no later than 8 hours. If the near miss could have resulted in a severe injury or fatality a call must be set up within 4 hours with the EVP, SVP, HQEHSO, GM, OM, BUEHSD, and the project team to review. A gathering of all involved parties will take place within 24 hours of the incident to review the case and determine if the steps taken to remediate the incident were appropriate.

2. First Aid Event

Any first aid event will result in a full incident investigation. TCCO feels that no injury is minor but an opportunity to learn and eliminate like occurrences. Daily records of all first-aid treatments not otherwise reportable will be maintained in Origami for record purposes only. Refer to the Turner Incident and Near-Miss Reporting Matrix for reporting requirements.

3. Medical Treatment Event

It is the responsibility of each subcontractor to immediately notify the Turner Project Superintendent of an injury requiring medical treatment. If the injury is considered an emergency call 911. The Turner Safety Manager or senior TCCO project representative will oversee the completion of required Turner reporting forms in Origami. The Turner Business Unit Environmental, Health, and Safety Director and Claims Manager shall be notified as soon as possible. The Turner Business Unit Environmental, Health, and Safety Director will contact OSHA when required, regardless of the subcontractor's requirement to notify.

The BUEHSD will notify the Turner Helpline when appropriate. See Turner Incident and Near-Miss Reporting Matrix for reporting requirements and when to notify the Turner Helpline.

4. Recordable Injury Event

It is the responsibility of each subcontractor to immediately notify the Turner Project Superintendent of an injury requiring medical treatment. If the injury is considered an emergency call 911. The Turner Safety Manager or senior TCCO project representative will oversee the completion of required Turner reporting forms in Origami. The Turner Business Unit Environmental, Health, and Safety Director and Claims Manager shall be notified as soon as possible. The Turner Business Unit Environmental, Health, and Safety Director will contact OSHA when required, regardless of the subcontractor's requirement to notify. The BUEHSD will notify the Turner Helpline when appropriate. The BUEHSD will set up a call within 24 hours to review the incident/injury with HQ EHSO, SVP, GM, OM, BUEHSD and project team. If the Recordable is considered a SIF or SIFP, a call must be set up within 4 hours of the incident and include HQ EHSO, EVP, SVP, GM, OM, BUEHSD, SHRD, and project team. See Turner Incident and Near-Miss Reporting Matrix for reporting requirements and when to notify the Turner Helpline.

5. Fatality

It is the responsibility of the subcontractor to immediately notify the Turner Project Superintendent or the Turner Safety Manager of an event resulting in a fatality. The Turner Project Superintendent will then implement the Turner Crisis Management Plan. All notifications must follow in accordance with the Turner Crisis Management Plan notifications flowchart. The BUEHSD, BU Claims Manager, General Manager, and Operations Manager must be notified immediately. A call must be set up within 4 hours with the EVP, SVP, HQ EHSO, GM, OM, BUEHSD, and the project team to review the incident. All media inquiries are to be referred to the Owner or as the Site-Specific Crisis Plan dictates. A notification must be made by the employer to OSHA within 8 hours. The BUEHSD will notify the Turner Helpline.

6. Property/Environmental Damage

It is the responsibility of the Turner Project Superintendent to notify the Turner Project Manager and Owner of the incident and assist in the assessment of damages. The Business Unit Environmental, Health, and Safety Director and Claims Manager shall be notified in all cases. The Claims Manager will be responsible for notifying applicable insurance carriers in accordance with policy provisions. Turner Project Superintendent or Safety manager shall input a report into Origami for record purposes only. The BUEHSD will notify the Turner Helpline when appropriate. See Turner Incident and Near-Miss Reporting Matrix for reference of when to notify the Turner Helpline.

7. General Liability Accident

It is the responsibility of the subcontractor to immediately notify the Turner Project

Superintendent of an event involving third parties or the general public. The Turner Project Manager will immediately notify the Owner, BUEHSD and Claims Manager. The subcontractor involved will complete an incident report and submit it to the Turner Superintendent or his/her designee. Turner Project Superintendent or Safety manager shall input a report into Origami for record purposes only. The BUEHSD and Claims Manager will determine if a Third-Party Investigator will be needed. The BUEHSD will notify the Turner Helpline when appropriate. See Turner Incident and Near-Miss Reporting Matrix for reference of when to notify the Turner Helpline. In all cases, including a near-miss, a full investigation will be conducted by TCCO and the contractors to determine potential contributors to the incident in hopes of eliminating the conditions reoccurrence on this or any project. The intent of the investigation is not to affix blame but to learn from the event.

IV. Return to Work Provision

1. Trade partners and tiered contractors must provide a modified return to work program for any of their employees returning from an occupational injury for a minimum of 90 days after the injury date.

2. Failure to provide accommodations to an injured employee may result in a penalty assessment, at Turner Construction's discretion, to the trade partner of $2500 per week until such time as the injured employee is returned to work.

Turner Incident and Near-Miss Reporting Matrix

Serious Injury Fatality (SIF) or Serious Injury Fatality Potential (SIFP)	
Work-related incidents, injuries, illnesses or near misses that caused, or could have caused, a serious injury or fatality. SIF and SIFP Examples: • Any fall or fall exposure 6' or greater (Including fall-catch) • Severe fire or explosion • Active shooter • Loss of a suspended load • Object falling from a building • Collapse of a structure or portion of a structure • Equipment collapse (cranes, scaffolds, etc.) • Bomb threat or terrorist threats/attacks • Trench/Excavation Collapse • Inadequate hole protection • Any in-patient hospitalization of a worker related to a workplace incident • Significant third-degree burns • Amputations (all, including fingertip) • Loss/impairment of body organ function • Loss of an eye • Utility line strike (Gas/Electric) • Loss of hearing • Severe visual impairment to total blindness • Broken bone • Missing or faulty guarding • Deficient or faulty temporary elevated working platforms 6' or above • Other SIF or SIFP incident identified by BUEHSD, OM, GM	BUEHSD Enter into Alert Media/Turner Help Line Immediately BUEHSD sets up a call within 4 hours with EVP, HQ EHSO, SVP, GM, OM, BUEHSD, SHRD, and the Project Team members closest to the incident Enter into Origami.
Recordable Injury (Non-SIF/SIFP)	
Work-related recordable injury or illness that did not cause, or could not have caused, a serious injury or fatality (SIF/SIFP).	Project Team sets up a call within 24 hours of incident with HQ EHSO, SVP, GM, OM, BUEHSD & the project team members closest to the incident Enter into Origami
Other Alert Media Reportable Events	
Events that would not be considered SIF or SIFP and may or may not have resulted in a recordable injury but are required to be reported through Alert Media for Risk Management tracking and support purposes. Examples: • Union or labor issues (i.e., picket) • Utility line strike (sewer, water, phone/data) • Worker is transported to a medical facility via ambulance (workplace related or personal medical) • Environmental crisis, regulatory visit or inquiry (OSHA, EPA, etc.) • Building shutdown due to emergency • Jobsite shutdown due to safety (by owner or Turner) • Workplace violence • Property damage greater than $10,000	BUEHSD or designee enter into Alert Media/Turner Helpline Immediately GM, OM, BUEHSD, or HQ EHSO to determine if a follow up call is needed. BU sets up call if required. Enter into Origami
Minor Injuries	
Minor Injuries that were not a SIFP or a recordable Injury Minor Injury examples: • Mild eye (corneal) abrasions • Minor sprains and strains • Minor lacerations/penetrations • Minor chipping or cracking of a tooth/teeth • Property damage less than 10K • Minor Skin rashes/burns (blistering)	Notify PM/PX, BUEHSD, Claims & Insurance, and OM/GM. Enter into Origami

V. Return to Work Provision

1. Trade partners and tiered contractors must provide a modified return to program for any of their employees returning from an occupational injury for a minimum of 90 days after the injury date.
2. Failure to provide accommodations to an injured employee may result in a penalty assessment, at Turner Construction's discretion, to the trade partner of $2500 per week until such time as the injured employee is returned to work.

VI. Documentation for all Work-Related Incidents, Illnesses and Near-Misses

The following forms must be completed and delivered to the Project EH&S Manager when there is one or to the Superintendent. These will be made available on the site.

- Turner Construction Company Incident Report form in Origami.
- Complete a root-cause investigation.
- Employee Incident Statement(s) (speak with all employees and workers that may have information regarding the incident)
- Subcontractor's Incident Report

All incidents, near-misses, injuries, illnesses, and unusual events that have occurred will be investigated thoroughly.

Projects are responsible for having onsite equipment to document the accident scene. Photos, sketches, schematics, and related evidence/equipment should be collected for report and preservation as soon as practicably possible after an incident. Photos should be taken of the site of loss as soon as practicably possible. Do not take photos of the injured, if at all possible.

Except for rescue and emergency measures, the accident scene shall not be disturbed and should be barricaded until it has been released by the investigating official. The Subcontractor is responsible for obtaining appropriate medical and emergency assistance and to ensure timely response to injured worker orevent.

It is required that the investigation team inspect any equipment involved in the incident and secure it for future use as evidence, if practicable, i.e., ladders, tools, PPE involved in the incident, etc. If the incident involves a ladder, the permit must be collected along with any inspection forms for the ladder.

Incident reports are to be completed in Origami, within 8 hours even though supplementary information may be necessary but not available for a period of time.

"Subcontractor" is intended to mean any contractor working under Turner's inspection, supervision and/or direction whether under contract to Turner or the Owner as on Construction Management. This policy will be used on all projects at all times.

In all cases, the Site-Specific Crisis Management Plan and the Site-Specific Health

and Safety Plan will be the guiding document.

If applicable, a Lessons Learned document will be developed and approved by TCCO to relay any information gathered that may assist in the elimination of a future similar occurrence.

EMR Policy

I. Policy Statement

In our ongoing efforts as the leader in construction safety, Turner has adopted the following policy to ensure that Subcontractors with the best safety performance are contracted to work with us. Subcontractors who have an Experience Modification Rate (EMR) greater than 1.0 will not be allowed to bid or be awarded work for Turner. This policy applies to all secondary tier subs as well. For projects where Turner doesn't hold the agreements, we should recommend the same policy to the Owner, but the final decision is obviously the Owner's. Please refer to TKN/Procurement/Procurement Manual/EMR policy for the specific policy requirements that must be adhered to.

II. Procedures

1. In rare occasions, Turner may issue a waiver to this policy. A one-page waiver request is available from Business Unit Procurement Managers or Business Unit Environmental, Health, and Safety Directors.

2. Every EMR waiver request must be submitted to the Business Unit Environmental, Health, and Safety Director and Business Procurement Manager prior to submittal to the HQ, Chief EHS Officer for approval.

3. Every EMR waiver request must contain a specific Risk Mitigation Action Plan to ensure the subcontractor can perform the scope of work without incident. The Business Unit Environmental, Health, and Safety Director and the Procurement Manager are responsible for developing the plan.

4. If a Subcontractor has been given a waiver based on his current published EMR and the BU wants to award another subcontract to the Subcontractor in the same EMR year, no additional waiver is required as long as the Business Unit Environmental, Health, and Safety Director and Procurement Manager agree that the Subcontractor's safety performance is meeting their expectations. The scope of work must be similar, and the value of the project must be within 50% of the original Subcontractor Approval Request (SAR) value.

5. The Subcontractor Approval Request (S.A.R.) will indicate "see attached previously approved EMR waiver in place" and the previous waiver will be attached to the S.A.R. The same safety measures from the initial waiver will be incorporated in future awards.

6. Once the Subcontractor's new EMR is promulgated, if it increases from the previous year, the waiver process starts over. If it decreases, the old EMR waiver may be used providing that the Procurement Agent and Safety Director review the updated OSHA 300 and 300A's to confirm that the EMR Waiver Risk Mitigation Plan is still valid and does not need to be adjusted based on trending information from the OSHA 300 Logs. If no adjustment is needed, no further approval is required outside of the Business Unit.

7. Each new waiver request must be accompanied with the S.A.R., the OSHA 300 and 300A Forms for the previous 3 years, a Risk Mitigation Action Plan for the Subcontractor on this project and letter(s) from their insurance broker confirming the past three years EMR's and incidence rates and what they are doing to help the subcontractor improve their performance.

8. The subcontractor must clearly submit in writing what they will be doing to lower their EMR to acceptable levels.

9. If the Subcontractor is not going to be onsite, except for supervisory oversight and the onsite installer has an EMR of less than 1.00, then no waiver is necessary.

III. Roles and Responsibilities

1. Turner Procurement Manager & BUEHSD:
   a) Must ensure EMR policy is adhered to by all Turner employees and all processes for waivers are followed prior to subcontractor selection.
   b) Must develop a risk mitigation plan, ensure it is in the subcontract, and conduct pre-planning meetings. They must require the use of Job Hazard Analysis (JHA) and daily Pre-Task Planning (PTP) meetings.

2. Subcontractor Management:
   a) Must comply with and furnish materials necessary to comply with Turnerpolicy.
   b) Must attend and participate in project orientations.
   c) Must participate in any and all required pre-planning meetings, JHA's and PTP meetings.

Recognition/Award Programs and Criteria

I. Policy Statement

Recognition/award programs can be an important tool to promote workplace safety, health, and safe working environments and should serve to encourage and motivate workers to go above and beyond to enhance the current safety culture.

Given OSHA's scrutiny of "incentive" programs that reward workers based on no one getting hurt, all programs should assure they meet certain criteria to ensure its compliance with OSHA's rules. Additionally, there are certain tax and legal implications that must be considered.

II. Guidelines to make the recognition/award program OSHA compliant and more effective:

1. The program should be behavior-based rather than injury-rate-based. Provide recognition/awards to workers practicing safe operating procedures and best practices instead of incentivizing plans based solely on number of incidents.
2. Encourage reporting of near misses, hazardous conditions or behavior, and situations which will prevent future accidents and injuries. (Leading vs. Lagging Indicators)
3. Recognize employees through top management, in a timely manner, and in front of others to acknowledge their safe behavior and encourage others to act in the same manner.
4. Pure monetary (cash) awards should not be utilized. Non-monetary awards are acceptable if they are not based on "reporting an incident". Other best practices include utilizing other awards such as points or an award, safety bucks, certificates, days off, safety pins or challenge coins, lunches, and recognition boards.
5. Recognize workers for a wide variety of safety activities such as providing safety suggestions to daily operating procedures, guiding a co-worker or new hire to perform a task safely, identifying a hazard or participating in safety committees.
6. Programs cannot be vague or limited to the actual reporting of an incident. "No injuries reported" or "hours worked with no lost time incidents" or "Act Safely" (which is too vague) should not be the basis for the recognition/award program, as these metrics give clear motivation for employees not to report injuries, or they are vague and unclear as to what needs to be done to qualify.
7. Direct awards based on worker behavior, and the qualifying metrics/procedures should be documented clearly. A basic example would be "workers must participate and engage in the daily pre task safety huddle, follow all company outlined safety

procedures and day to day tasks as outlined in the pre-task plan to qualify for the recognition/award program."

8. Make sure the program is robust and clear, outlining how employees will conduct themselves and how you want them to perform the key elements of their job (3 points of contact if using a ladder, using all required PPE, observing, and following all posted road/traffic signs, walking only in required and designated walkways, observing Turner project rules, etc.).
9. It is vital to recognize workers equally and fairly. What we want to do is applaud/appreciate the behavior/action evenly across the workforce. This also requires management/supervisors to be engaged and actively observing all the time and then comparing results prior to an award/recognition.
10. Allow workers a voice in setting safety goals and expectations for themselves. This will motivate them to ensure their own buy-in and commitment to safety and work towards achieving it.

III. Tax Implications and recordkeeping:

- Monetary recognition/award to a subcontracting entity
  - The amount required to be reported is $600 or more within the calendar year.
  - Subcontractor employees – once the award is valued over $600, the amount will be required to be reported to the individual on Form 1099 as nonemployee compensation. This would be reportable as other income by the recipient subcontracting entity.
  - If it is not over $600.00 is there any tracking of information required?
    - The $600 is within the calendar year. It would be advisable to track all to ensure no one person receives $600 or greater in awards within a year.
    - The value of the item awarded must be calculated as fair market value.
- What information is required: name, contractor, address, phone number and the Individual's Social Security Number
- Turner employee –the fair market value of the item is expected to be required to be included in taxable wages and is subject to employment taxes (including social security & Medicare tax)
  - The IRS would view this recognition/award as compensation attached to their employment and require it be included in the employee's taxable compensation (Form W-2). The threshold is lower than the $600 for an employee (general rule = $100).
- The recognition/award should be for demonstrating safe behavior and going above and beyond for safety while performing their services on a Turner construction project.
  - For tax purposes, the focus is that the award is attached to their employment and will need to be tracked and, when applicable, report the award to the IRS.

- If the program is legally permissible, it is recommended that an independent group of members, the majority of which will not be officers of Turner would be the decision makers on who receives the recognition/award. Generally, independent is defined as most of the members of a committee consisting of persons who are not able to exercise substantial influence over the relationship with the party receiving the recognition/award.

IV. Legal considerations:

- Do we plan to have the Owner pay for the reward program, or will it be a non-reimbursable expense? If we plan to bill the program to the Owner as a job cost, we should review the relevant contracts to see if that is permitted. Even if it is, it would be a best practice to get the Owner's pre-approval of the expense. If Turner plans to absorb the costs as a non-reimbursable expense, there is no reason to consult the Owner.
- Private jobs. Our compliance policy would not prevent us from providing these rewards to our trade partners.
- Public jobs. We must be mindful of appearances when we give anything of value to an employee of a trade partner, so we should have further discussion about how we manage that before rolling the program out for public jobs.
- Some trade partners might have compliance policies that would prevent their employees from accepting the rewards. We should become familiar with and respect any such prohibitions in our trade partners' policies.

V. OSHA Considerations:

Incentives can be based on injury rates with the right provisions. Rate-based programs that reward employees (or managers) with a prize or bonus for low/no injury rates are permissible as long they "are not implemented in a manner that discourages reporting." If an employer withholds a prize or bonus because of a reported injury, OSHA will not cite the employer under § 1904.35(b)(1)(iv) as long as the employer has implemented adequate precautions to ensure that employees feel free to report an injury or illness.

It may not be sufficient to simply make a statement encouraging reporting or prohibiting retaliation. To stay on the right side of the law, OSHA says that employers using a rate-based incentive program may also want to implement:

- Recognition for workers identifying unsafe conditions,
- Recognition for workers proactive safety performance,

- Training to reinforce reporting rights and responsibilities and non-retaliation policies, and
- A mechanism for accurately evaluating employees' willingness to report injuries and illnesses.

Safety recognition and award programs that judge workplace safety just by the number of accidents can lead to un- and under-reported injuries, especially when teams are rewarded. The peer pressure adds up, meaning employees reluctantly report injuries. No one wants the blame for an entire team losing a reward. Done right and with proper planning and forethought, these programs can have a positive influence on safety and preventing injuries.

If you have questions about how to set up a recognition/award program or these guidelines reach out to: Steve Spaulding II (EH&S) or Regina Fogarty (Finance).

Handheld Unit Use Policy

Mobile Handheld Units are handheld devices, including cell phones, iPhones, Androids, Blackberries, pagers, MP3 players (or equivalent), radios, and other communication devices.

Turner Construction Company and all subcontracted employees are prohibited from using mobile handheld units without a hands-free device (defined as vehicle mounted or headset ear clip) while driving on company time or while conducting Turner business. This Policy includes all calls made from the following types of vehicles on or off all Turner jobsites.

1. Vehicles provided by Turner Construction Company including:
    - Leased vehicles.
    - Golf carts and similar vehicles used for jobsite transportation.
    - Construction equipment to include cranes, scissor and aerial lifts, earthmoving, hauling, and excavating equipment, except for radios, when radios are the primary means of controlling the operation of the equipment.
2. Turner employee personal vehicles if the employee is receiving a vehicle allowance and/or the employee has been issued a company telephone.

Procedures/Expectations:

A driver's first responsibility while on company time or while conducting Turner business, on or off a jobsite, is the safe operation of the vehicle. The Policy should be followed accordingly.

Hands-Free Devices

Hands-free operation does not guarantee 100% safety but will provide drivers with less distraction.

1. Always use the appropriate hands-free device for your Mobile Handheld Unit. For telephones issued by the company, an appropriate hands-free device will also be issued at company expense, or the individual reimbursed for its purchase.
2. Use the Mobile Handheld Unit's speed dial and voice activated functions.
3. Turner employees should keep all calls while driving brief and should end any call that distracts them from the road.
4. Inform regular callers of the best time to reach you based upon your driving schedule.
5. If a hands-free device is not available:
    - Do not use the Mobile Handheld Unit; send calls to voicemail, forward them to another number or turn off the unit.
    - Pull off the road to a safe location to make or receive a call or ask a passenger to make or take the call.
6. Never take notes, type, refer to maps, input information into a global positioning system (GPS), or any materials while operating a vehicle.
7. No walking or driving on projects while talking or texting on phone or walkie-talkie.
8. Check state requirements and follow the law. Example: In California, if you are punching a button, and therefore taking your eyes off the road, you are in violation of the law.

This mobile handheld device use policy is intended to reduce the likelihood of motor vehicle accidents. It may not prevent all motor vehicle accidents from occurring. It does

not address potential compliance issues with Federal, State, local OSHA, or any other regulatory agency standards. Nor is it meant to be exhaustive or construed as legal advice.

Hazard Communication Policy

I. Policy Statement

OSHA's Hazard Communication Standard, also known as HAZCOM, is now aligned with the Globally Harmonized System (GHS) of Classification and Labeling of Chemicals and requires each employer to establish a hazard communication program. GHS is based on major existing systems around the world, including OSHA's Hazard Communication Standard and the chemical classification and labeling systems of other international and US agencies. The result of the collaboration is a document called "The Purple Book." OSHA has modified the Hazard Communication Standard (HCS) to adopt the GHS to improve safety and health of workers through more effective communications on chemical hazards. This program must provide a means to inform employees about the hazards associated with chemicals that they may be exposed to in the workplace. Turner's Hazard Communication Program (HCP) has been established to comply with this standard by ensuring that hazards associated with chemicals in the workplace are communicated to all employees who may be exposed to them. The Turner HCP applies to all employees (Turner and Subcontractor employees) who perform work on projects managed by Turner. The communication of potential hazards associated with chemicals and hazardous materials in the workplace shall be accomplished by means of implementing the following practices on each job site:

1. A written hazard communication program,
2. Use of container labeling,
3. Availability of Safety Data Sheets (SDS),
4. Maintenance of an on-site Chemical Inventory,
5. Employee training.

II. Procedures

A. Written Hazard Communication Program - Each Business Unit shall include the Turner HCP in its safety program and ensure that a site - specific HCP is provided for each job. The jobsite program document must describe the manner in which labeling, SDSs and employee training requirements will be satisfied. The BUEHSD shall assist the Project Staff with development of this program.

B. Chemical Inventory List - A list of chemicals known to be present on the jobsite will be compiled by the Turner Project Staff. This list will be maintained in the Turner project office and will be updated on a monthly basis. The list of the hazardous chemicals must be assigned a unique product identifier (i.e., number scheme) that can be cross-referenced on each corresponding SDS. Each subcontractor will submit an updated Chemical Inventory List to the Turner Project Staff.

C. Safety Data Sheets (SDS) – The Hazard Communication Standard (HCS) requires chemical manufacturers, distributors, or importers to provide Safety Data Sheets (SDSs) to communicate the hazards of hazardous chemical products. As of June 1, 2015, the HCS will require new SDSs to be in a uniform format. The Turner Project

Staff will be responsible for obtaining and maintaining the on-site file of all SDS's supplied by each Subcontractor. Turner project staff should coordinate the exchange of SDSs between the subcontractors when requested. SDS information should be for materials specific to the site. SDSs shall be accessible to all employees on-site. Chemical manufacturers, importers, distributors, or employers who become newly aware of any significant information regarding the hazards of a chemical shall revise the labels for the chemical within six months of becoming aware of the new information and shall ensure that labels on containers of hazardous chemicals shipped after that time contain the new information. As part of the GHS, all SDS's will be uniform in appearance.

D. Container Labeling – A hazard classification will be completed by the manufacturer and the following information is to be provided for each hazard class and category. Labels will require the following elements:

a) Product Identifier (Ingredient Disclosure),
b) Signal words,
c) Hazard Statement,
d) Pictograms,
e) Precautionary Statements,
f) Supplier Identification,
g) Supplemental Information.

Secondary Container Labeling - Employers may choose to label workplace containers either with the same label that would be on shipped containers for the chemical under the revised rule, or with label alternatives that meet the requirements for the standard. However, the information supplied on these labels must be consistent with the revised HCS, e.g., no conflicting hazard warnings or pictograms.

E. Employee Training and Education – Turner Construction Company is responsible for training all Turner employees with regards to the HCP and the GHS label elements (i.e., pictograms, hazard statements, precautionary statements, and signal words) and SDS format. An on-line training module on Turner University titled OSHA Global Harmonizing System Introduction will be required to be taken by all new and experienced Turner Construction hires. The list below contains the minimum required topics for the OSHA Global Harmonizing System Introduction training that must be completed.

1. Label elements
    a. Type of information the employee would expect to see on the new labels, including the product identifier, signal word, pictogram, hazard statement, and precautionary statement.
    b. Name, address and phone number of the chemical manufacturer, distributor, or importer.
    c. How an employee might use the labels in the workplace.
    d. General understanding of how the elements work together on a label.

2. SDS
    a. Standardized 16-section format, including the type of information found in the various sections.
    b. How the information on the label is related to the SDS.
    c. How to read and understand the information provided on the SDS.

3. An overview of the OSHA Hazard Communication Standard (29 CFR 1926.59).

4. The inclusion of welding or burning gases, cement, solvents, glues, wood dust, and soldering fumes as examples of common items to most jobsites, which present hazardous exposures to employees.
5. All employees attending a training class will sign an attendance form to verify that they have been properly trained in the Hazard Communication Program.

F. Hazardous non-routine tasks - Periodically, employees are required to perform hazardous non-routine tasks. An example of hazardous non-routine tasks is confined space entry to check the bottom of caisson. Prior to starting work on such projects, each affected employee will be given information by their supervisor about hazardous chemicals to which they may be exposed during such activity.
    1. This information will include, but not be limited to:
        a. Specific chemical hazards.
        b. Measures that employees will take to prevent exposures.
        c. Measures the company has taken to lessen the hazard, including ventilation, respirators, presence of another employee, and emergency procedures.

G. Demolition / Renovation - When doing renovations or demolition at a jobsite, it is important to know the contents of all unmarked pipes, vessels, tanks, or other type of containers as well as the location of lead, asbestos or other potentially hazardous materials that may be encountered. This information should be obtained from the Phase 1 (and 2 when applicable) Environmental Assessment, Pre-Demolition Hazardous Materials Survey, and/or similar reports provided by the building owner or Environmental Consultant. Once such information is identified, all of the above Hazard Communication program requirements must be enforced in order to communicate appropriate information to employees.

H. Chemical Storage
    1. Turner reserves the right to approve all chemicals and quantities brought on site.
    2. The user of the chemical must provide Turner Construction a Safety Data Sheet prior to bringing the substance on site.
    3. All chemicals and equipment containing chemicals must be stored in approved areas. (i.e., chemical cabinet, bunker)

4. Contractors are responsible for removing all unused chemicals from the Turner Project site at the completion of their contract.
5. All chemical containers must be properly labeled.
6. Chemical/gas cylinders (welding, purging, leak detection cylinders, etc.) must always be secured.
7. All dedicated chemical storage areas must have safety data sheets (SDS) available at the storage location.
8. If you are unsure of appropriate storage areas, contact Turner for directions.

I. Material/Waste Disposal

1. All hazardous waste must be disposed of in accordance with Federal, State, and Local regulations and shall comply with applicable Turner hazardous waste programs.
2. All hazardous waste must be properly labeled.
3. Hazardous waste materials must be discarded into proper disposal containers.
4. Non-hazardous waste must be disposed of into appropriate recycling or disposal containers.
5. Waste separation, recycling and reduction methods are encouraged on all projects and are to be made a part of the project logistics plan.

III. Employee Training Requirements

In compliance with the OSHA Hazard Communication Standard (HCS), Turner Construction Company has developed a Hazard Communication Program. This program is intended to inform employees of the potential hazards of chemical products that they may be exposed to while on the jobsite. By providing this information, our goal is to ensure that proper precautions are taken to minimize the health risks associated with the use of materials used in the construction of any building by Turner.

In accordance with Turner policy, a written Hazard Communication Program (HCP) is prepared and maintained on the job by the Turner Project Staff. Included are specific guidelines concerning requirements of the Federal Law, such as safety data sheets, labeling and personal protection. The following areas must be covered during each training session:

A. Safety Data Sheets - These are information sheets developed by the manufacturer of products (i.e., glues, solvents, paints, insulation), which contain hazardous materials are required to have the standardized 16 sections. SDS's are obtained by Turner for all material brought on the site by Turner or any subcontractor.

B. Labeling - Labels are an appropriate group of written, printed, or graphic information elements concerning a hazardous chemical (i.e., paint, caulk, thinner, glue, or other material) that is affixed to, printed on, or attached to the

immediate container of a hazardous chemical, or to the outside packaging. Labels from the containers should never be removed. Labels must include the product identifier, signal word, pictogram, hazard statement, and precautionary statement.

C. Personal Protective Equipment - If personal protection is required, it will be provided for you by Turner or by subcontractors. In most cases, you will need nothing more complicated than safety glasses or goggles, gloves, or a respirator. The equipment you will need will be determined by the information on the SDS provided by the product's manufacturer.

HCS Pictograms and Hazards

Health Hazard	Flame	Exclamation Mark
		
▪ Carcinogen ▪ Mutagenicity ▪ Reproductive Toxicity ▪ Respiratory Sensitizer ▪ Target Organ Toxicity ▪ Aspiration Toxicity	▪ Flammables ▪ Pyrophorics ▪ Self-Heating ▪ Emits Flammable Gas ▪ Self-Reactives ▪ Organic Peroxides	▪ Irritant (skin and eye) ▪ Skin Sensitizer ▪ Acute Toxicity ▪ Narcotic Effects ▪ Respiratory Tract Irritant ▪ Hazardous to Ozone Layer(Non-Mandatory)
Gas Cylinder	**Corrosion**	**Exploding Bomb**
		
▪ Gases Under Pressure	▪ Skin Corrosion/Burns ▪ Eye Damage	▪ Explosives ▪ Self-Reactives
	▪ Corrosive to Metals	▪ Organic Peroxides
Flame Over Circle	**Environment**	**Skull and Crossbones**
	**(Non-Mandatory)** 	
▪ Oxidizers	▪ Aquatic Toxicity	▪ Acute Toxicity (fatal or toxic)

IV. Roles and Responsibilities

A. Turner Management:
   a) Must conduct inspections of the workplace for compliance with this policy.
   b) Must discuss policy applications during project orientation with subcontractors.

B. Subcontractor Management:
   a) Must comply with and furnish materials necessary to comply with Turner policy.
   b) Must conduct mandatory GHS Training for their employees as required by the revised hazard communication standard.
   c) Must provide their company's Hazard Communication Program with SDS's and chemical inventory list prior to arrival to project.

C. Subcontractor Employees:
   a) Must attend and participate in HCP Training and project orientations.
   b) Must comply with this policy.

Housekeeping Policy

I. Policy Statement

This policy will apply to all work performed by Turner Project employees, contractors and tool vendors including, but not limited to, the following activities: construction, installation, demolition, remodeling, relocation, refurbishment, testing, and servicing or maintenance of equipment or machines. In addition, each contractor working on a Turner project will comply with 29 CFR 1926, Construction Industry Regulations, Subpart C – General Safety and Health Provisions.

II. Procedures

1. Work areas must be kept clear and free of obstructions by material/debris as follows:

   a) Clean-as-you-go practices are required. Do not wait until all work has been completed before cleaning up. Instead, break the work down into smaller tasks and clean the area after each task is completed.

   b) Materials will not be stored in a manner that will block, restrict, impede, or prevent access to an egress path or emergency equipment, such as fire extinguishers, emergency eyewash or shower, emergency shutoff buttons or emergency disconnect devices.

   c) Stairways shall not be used as storage areas.

   d) Work that may temporarily block emergency exits, safety showers, elevators, corridors, and hallways will require prior Turner approval.

   e) Project will enforce Turner's "Nothing Hits the Ground" requirements. All trash, debris, and scrap materials are to be placed into contractor-provided rolling trash hoppers, forklift-mounted hoppers, or other trash collection receptacles (that do not require workers to lift and carry) immediately upon creation. Upon filling any such receptacle, Contractors must remove all its trash/debris and recyclables from the building to the agreed upon roll-off or dumpster. Provide an ample number of trash receptacles to allow each crew/team that generates waste or recyclables to have one. No "piling" will be allowed on the floors. Construction materials, job-boxes and tools must be stored/staged in approved areas, and never in walkways or stairways. Cords, hoses, and welding leads must be kept off the floor at least 8 feet high in walkways, aisles, and stairs and access points.

   f) Housekeeping methods will be specified within your Job Hazard Analysis (JHA) and Pre-Task Plan (PTP).

2. Power Cord and other Utility or Hose Management:

   a) All cords must be inspected before use.

   b) At no time shall cords be strung across exits or in front of emergency equipment.

   c) Run cords overhead in a supported fashion, when feasible.

   d) Run cords around perimeters, when feasible.

   e) Tape cords down or use cord covers if they present a tripping hazard.

   f) Support all cords that run through floors or ceilings with appropriate means.

   g) All cords must be stored and put away after use. (I.e., not coiled up on floor).

   h) All extension cords must be equipped with GFCI protection or be plugged into the wall GFCI outlet.

   i) Provide non-conductive hanger mechanisms or cord/hose pole-stands. Must be anchored to prevent accidental displacement.

   j) If the above-listed safety requirements cannot be met, temporary wiring must be installed to facilitate proper cord management.

3. Material Storage:
   a) Lay-down and storage areas are extremely limited on site. Contractors are not to bring more materials onto site than they will install during a week. All Materials stored in the building must be staged on wheels to allow for quick and easy relocation.

   b) Materials stored in the vicinity of the area where work is performed should be limited to only those materials that will be used in the same shift.

   c) Materials not to be stored in egress paths, stairways or within 10 feet of any opening edge, shaft or side which material could fall to next level.

   d) Any material stored in a work area for longer than 24 hours must be approved by Turner.

   e) Materials should be stacked in a safe and orderly manner. Materials to be secure to prevent accidental displacement.

   f) Material must be stored to promote mobility of material. Pipes, conduits, metal fabrications and steel framing are to be stored on rolling racks or similar conveyance. Bulk material should be palletized to allow for easy mobility using a pallet jack. Store all items neatly on carts, in cabinets or on shelves. Storage

containers to have casters or other mechanism for easy movement of containers.

g) Materials stored should be designed and staged to incorporate ergonomic and mechanical advantage. Material movement and storage methods will be specified within your Job Hazard Analysis (JHA) and Pre-Task Plan (PTP).

h) Gang boxes and toolboxes should not have materials stored on top ofthem.

i) Small tools and materials should be kept on Industrial Carts or the equivalent when not being used. No tools or materials should be left on the ground that could present a trip and fall hazard.

j) If more storage area is needed, contact Turner.

Personal Protective Equipment

I. Policy Statement

All employees of Turner will be provided with the personal protective equipment necessary to complete their jobs safely. A competent person onsite will determine necessary equipment. Each subcontractor working on a Turner project will comply with 29 CFR 1926, Construction Industry Regulations, Subpart E – Personal Protective and Lifesaving Equipment in addition to the following guidelines.

II. Procedures

1. All Turner employees, subcontractor employees and visitors to project sites are required to wear safety glasses that comply with ANSI Z87.1. Dark lenses are not to be worn inside of buildings, in enclosed areas or at night. Prescription eyeglasses and sunglasses that do not comply with ANSI Z87.1 are **prohibited**.

2. High visual, safety vests, shirts or jackets shall be worn as the outermost apparel by all employees, 100% of the time. ANSI Class 2 (0-44 MPH) and Class 3 (45 MPH or more) outerwear must be worn whenever working on or near (within 10 feet) of a roadway.

3. All Turner employees, subcontractor employees and visitors to project sites are required to wear, at a minimum, sturdy work boots. Metatarsal guards must be worn when using jackhammers, tampers or similar equipment which could be dropped or landed on a worker's toes / feet. ANSI-approved safety-toed boots must also be worn by masons, drillers, pile driving, steel erectors, and riggers due to the hazards inherent with their work.

4. Where employees are performing work that could potentially cause materials to become flying objects such as, but not limited to, chipping, welding, grinding, cutting, drilling, and chiseling, they shall utilize a face shield in addition to safety glasses. A face shield shall be worn while using powder-actuated tools and drilling overhead. For above shoulder activities in which dust, metal shaving, fasteners or other similar hazards could fall onto your face, enhanced eye protection such as face shield, spoggles or helmet visor are to be used.

5. Where employees are performing work that could potentially expose them to harmful chemicals or micro airborne particles, they may be required to utilize safety goggles and or a face shield. Please refer to manufacturer SDS for specific requirements. Goggles are required for abrasive actions in which dust can enter the eye.

6. Where necessary, each employee shall use equipment with filter lenses that have a shade number appropriate for the work being performed for protection from injurious light radiation.

7. Anyone entering a Turner Construction Project is required to wear at a minimum cut resistant level 4 protective gloves 100% of the time, unless the competent person can demonstrate to Turner that wearing gloves for a particular task creates a greater hazard. If agreed upon with Turner, this deviation to not wear gloves must be identified on the PTP, reviewed, and acknowledged. Refer to ANSI cut levels for determining the correct glove. Additional hand protection may be required depending on the hazard assessment.

8. Appropriate arm protection is required during operations where the arms are exposed to cut hazards (i.e., Kevlar, Dyneema sleeves, etc.). Examples of these activities are working around metal studs and pull boxes, tight confines such as between wall studs or above ceiling, and all demo activities.

9. Contractors exposed to dust, fumes, and/or gases shall be provided with proper respiratory protection designed to protect against the substance encountered. The Contractor is solely responsible for the proper testing and training per OSHA standards, and to provide the appropriate equipment. Reference Respiratory Protection Program herein.

10. Workers exposed to roofing tar must wear long sleeved shirts and gloves. Workers who are directly exposed to hot tar must also wear a full apron and face shield.

11. Where an employee could be exposed to noise in excess of 85 dBA, their employer will provide hearing protection, which will reduce the noise to an acceptable level. If the noise levels are determined to cause and 8-hour TWA exposure greater than 85 dBA, the subcontractor shall be required to submit a detailed hearing conservation program to Turner. This program shall be approved prior to beginning work.

12. All Turner employees, subcontractor employees and visitors to project sites are required to wear hardhats that comply with ANSI Z89.1. Employees exposed to electrical voltages of 600 V or greater shall wear hardhats that meet the requirements of ANSI Z89.2 Type Hardhats. Turner employees are required to wear one of the currently approved ANSI Type II or EN12492 safety helmet models with an integrated four-point chin strap attached and secured under the chin.

    Trade partner employees, vendors and visitors are required to wear an ANSI Type II or an EN12492 safety helmet (i.e., a safety helmet that meets the requirements of testing against vertical, front, back, and side impacts and penetration) with the four-point chin strap tightly attached and secured under the chin. The chin strap shall be secured with no more than a 2-finger gap between strap and chin.

    No other type of hard hat will be permitted on any Turner Construction Site.

Turner Staff and Hourly Employees Safety Helmet Guidance

Turner staff, Turner employed hourly workers, Trade partner employees, vendors and visitors are required to wear one of the Turner approved safety helmets that meet the requirements of an ANSI Type II or an EN12492 approved safety helmet (i.e., a safety helmet that meets the requirements of testing against vertical, front, back, and side impacts and penetration) with an integrated four-point chin strap tightly attached and secured under the chin with no more than a 2-finger gap between strap and chin.

Turner Construction moved to the use of Type II or EN12492 Safety Helmets for all individuals at our project sites in lieu of Hard Hats or Type I helmets.

Construction workers sustain more traumatic brain injuries than employees at any other type of workplace in the United States, according to a recent report from NIOSH. Traumatic brain injuries represented one-quarter of all construction fatalities during the eight-year study period. According to the report, workers 65 and older were nearly 4 times more likely to sustain a fatal traumatic brain injury than workers 25 to 34 years old. More than half of fatal work-related traumatic injuries are a result of falls – particularly from roofs, ladders, and scaffolds.

Armed with the above data and our commitment to the safety of all individuals, Turner raised the standard for head protection. For years, the traditional Type I hardhat was the first line of defense in preventing the types of head injuries stated above. With new technology and innovation comes added protection and the latest Type II (and EN12492) four-point chin strap safety helmets offer the highest protection standards, while still being comfortable and versatile.

What is the benefit of Safety Helmets that are Type II or EN12492 certified?
These helmets are **designed to reduce impact force as a result of a blow to the top or sides of the head**.

The performance requirements include:

(Type 1 and 2)	**(Type 2/ EN12492)**
Flammability	**Impact Energy Attenuation**
Force Transmission	**Off-Center Penetration**
Apex Penetration	**Chinstrap Retention**
Electrical Classification	**Front, Side, and Rear Impact Protection**

Some additional benefits of the Type II or EN12492 Safety Helmets:

- Four-point, adjustable chin strap - provides a secure fit; easilyremoved/replaced
- Ratchet suspension - easily adjustable, to comfortably fit different headsizes which ensures a precise and comfortable fit around the back of the head.
- Vented, Non-Vented and Short Brim Options
- Universal accessory slots for adding an integrated visor, glasses, or faceshield
- Electric shock protection - Protection against electrical hazards (Check electricalclassification)

FAQS:

Has Turner piloted the new Safety Helmets?
Yes, Turner has spent significant resources in the development and piloting of several Safety Helmets along with providing funding research in conjunction with NIOSH (National Institute for Occupational Safety and Health). Turner will continue to invest in products that provide additional levels of protection for those on our projects. Injuries to the head, either from heights, a simple slip and fall, or dropped

objects, can be irreversible or even fatal. Because of these life threatening/altering consequences, Turner is taking steps to require additional protection for those on our sites.

Why not expect just those working at heights to use these new helmets? Although those working at heights are at greater risk of injuries from falls, certain other activities including material handling and falling objects or simply slipping and tripping can cause the traditional helmet to come off which can lead to serious injuries. In addition, a 4-point strap will assure that the helmet stays in place regardless of the type of task being performed.

Does the chin strap always need to be engaged? Yes, the chinstrap should always be attached and secured under the chin, with no more than a 2-finger gap between the strap and chin.

What is the difference between Type II and EN12492?

See attached fact sheet.

What should I do with my old Hard Hat?

There are several of us who are nostalgic and would like to keep our hard hats and that is great. Adding a chinstrap to your old hard hat will not make it compliant with this new PPE standard.

If you would like to turn it in so that we can recycle your personal hard hat and support our sustainability efforts, we will be providing a location at each of our projects to collect them. The standard hard hat has a stamped expiration date and many of our “favorite” hats have expired.

In Conclusion
Thank you for your dedication in continuing to grow and nurture our Building L.I.F.E. culture. If you have any questions, please reach out to your Turner BUEHSD for any further clarification or questions.

Turner approved Type II or EN12492 Safety Helmets for Turner staff and employed trade workers:

When purchasing Type II or EN 12492 safety helmets for Turner Staff or Trade workers you must purchase the approved helmets below from the approved listed vendor.

Type II or EN12492 Safety Helmets

EN12492 certified: Centurion Height Master – Turner Store
EN12492 certified: Kask Zenith X – Colony Hardware
EN 12492 certified: KASK Zenith X2 Air (Vented)
Type II: Wavecel T2+ Pro (Non-Vented)
Type II: Wavecel T2+Max (Vented)
Type II: Studson SHK-1 Full Brim (Vented)
Type II: Studson SHK-1 Full Brim (Non-Vented)
Type II certified: Milwaukee - Colony Hardware or Turner Store

Turner employees must wear one of these Turner standard white safety helmets:

Centurion—EN 12492
Nexus HeightMaster



Kask—EN 12492
Zenith X HiVis



Milwaukee—Type 2
Front Brim (unvented)



Chinstraps on all types must be “two finger” snug.

Safety Helmet Fact Sheet

NORM COMPARISION			
	EN 12492	ANSI Z89.14 Type1	ANSI Z89.14 Type2
TOP IMPACT	Hemispheric anvil 5 Kg Fall height: 2 mt. Transferred force < 10 KN	Hemispheric anvil 3,6 Kg Fall height: 5,5 m/s (1,6 mt.) Transferred force <4450 N Average transferred force <3780 N	Same as type 1
SIDE IMPACT	Flat position: Front side and rear Fall height: 0,5 mt. Transferred force < 10 KN	Not required	The helmet falls on the hemispherical anvil above the DTL line.5 Kg. Fall height: 3,5 m/s (62 cm.) Max acceleration: 150 g.
TOP PENETRATION	Area: top within a radius of 55 mm. Anvil: cone 3 Kg. Fall height: mt. 1,0.	Cone of 1 Kg. Top in a radius of 75 mm. Cone Fall height: 2.5 (speed 7 m/s)	Same as type 1
RETENTION SYSTEM STRENGTH	Force: from 30 N. (3 kg) to 500 N. (50 kg) Requirement: max. elongation 25 mm.	Not required	Weight: 10 kg. Fall height:10 cm. Max extension: 25 mm.
FRONT AND REAR RETENTION SYSTEM	Weight: 10 kg. Fall height: 175 mm. Requirement: The helmet must not come off the test head.	Not required	Not required
CHINSTRAP WIDTH	> 15 mm	Not required	> 12.7 mm
VENTILATION	Mandatory holes, total area ≥ 4 cm2	Not required	Not required

Job Hazard Analysis / Pre-Task Planning

I. Policy Statement

This policy identifies the method of Job Hazard Analysis and Pre-Task Planning that are required for each work operation not only by Turner but also for each subcontractor, regardless of tier. The Job Hazard Analysis (JHA) will be submitted to the project team for review and comment **prior to starting the work in the field**. Sample forms are available in the forms section of the manual, the Subcontractor Safety Requirements section and in the Safety Section of the TKN Document Management System.

II. Procedures

1. Job Hazard Analysis – JHA
   a) Every subcontractor will prepare a JHA for each phase of work to identify the following:
      - Safety and Health Considerations
      - Description of Steps to be Performed.
      - Hazards Associated with Each Step
      - Required Action to Eliminate or Control the Hazard
      - Supervision Sign-off

   b) Work shall not begin until the JHA for the work activity has been reviewed by Turner Construction and discussed with all engaged in the activity, including the Contractor, subcontractor(s), and other affected on-site representatives at safety pre-construction meetings.

2. Pre-Task Planning – PTP

   The PTP is a formal daily work plan. Each supervisor should meet with their crew, preferably at the place of the work or task, to discuss the tasks to be accomplished and the steps that need to take place to work safely. All workers should review and sign the relevant PTP for their assigned work before beginning the tasks. When the scope of work or conditions change, the PTP should be revised and resubmitted. The main components of the Pre-Task Plan will include the following:

   a) For each task of work a PTP will be completed to identify thefollowing:
      - Evaluating the Work Area
      - What permits and proof of training may be required.
      - Potential Hazard Checklist
      - Description of steps to be performed.
      - Hazards Associated with each step.

- Required Actions to Eliminate or Control the Hazard(s)
- All PPE requirements for the activity, keep in mind that PPE is the last resort.
- Crew Sign-off
- In accordance with Building L.I.F.E., plan out steps and controls to minimize risk using the Hierarchy of Controls, as well as by reducing frequency, likelihood, and severity.

Work shall not begin until the PTP for the work activity has been discussed with all engaged in the activity, including the Contractor, subcontractor(s), and other affected on-site representatives at a safety pre-construction meeting or daily huddle. A copy of the PTP shall be kept near the work location.

The information the supervisors are relaying to the workers is the same that was developed in the JHA however, the PTP will more greatly define the plan for the phase of work that is occurring that day.

Pre-Task Planning is also accomplished on a daily and pre-shift basis through the pre-shift safety huddles. Each crew leader is responsible for ensuring the crew holds a safety huddle prior to the beginning of the shift, and as necessary during the shift, to develop and revise a pre task plan for that day's work. The huddle should be collaborative with input from multiple members of the crew. The hazard analysis is typically captured on a dry-erase board laid out like a JHA/PTP (steps, hazards, controls). Workers sign an attendance record showing they participated.

A copy of the PTP and/or a photo of each huddle board shall be kept near the work location and **will be submitted to Turner daily.** Some states and local municipalities have requirements pertaining to pre-task planning, whichever is more stringent must be followed.

III. Roles and Responsibilities

1. The Subcontractor representative is responsible for submitting JHA's to the Turner Project Superintendent 7 days prior to the start of work. The JHA shall be utilized during the safety pre-planning meetings with subcontractors.

2. The Subcontractor representative is responsible for completion of PTPs and daily hurdles, communications with trade workers, and archiving of the documents. The frontline workers shall be engaged during the creation of the PTP's.

3. The Project Superintendent will ensure that all JHA's and PTP's are completed for all phases of construction activities for Turner, subcontractors, and all tiers. Turner Staff will attend PTP/Daily Huddle

every morning, focus should be placed on the subcontractors with High-Risk Activities.

4. Pre-construction meetings should always be held by the project team and attended by direct supervisory personnel of the subcontractors who will perform the work.

Project Safety Staffing Policy

I. Turner EH&S Staffing Requirements

Full-time Turner project safety staff are required on all projects with an initial contract value of $25 million dollars or greater. It is recommended that the safety staff be assigned prior to the beginning of work, as with other site staff. Additional safety staff may be required when project size is greater, or risk management plan dictates a need. Refer to current job description and CDQ's for requirements, education, and certifications when assigning a full time EHS professional to a project. Consult with the BU EHSD and VP, Chief EHS Officer as needed to assure right staffing requirements are met based on project size and risk.

II. Turner Craft Workforce (SPO/GR) EHS Staffing Requirements

Full time Area EHS Manager (level 4 or higher): Each Business Unit with a sustained SPO crew size of 50 or over shall establish a full time Area EHS Manager SPO. The duties of the Area EHS Manager SPO are the following:

- Help to establish and maintain safe working practices and methods for SPO work.
- Launch and plan upcoming SPO work including pre-construction meetings.
- Perform day 1 onboarding training and full day training for new SPO members.
- Manage and direct activities of any FT project SPO Safety Managers
- Perform Audits of SPO work on each project in the Business Unit to measure compliance against Turner's program.
- Train SPO staff on Building LIFE and perform Process Assessments
- Work with outside stakeholder (Liberty Mutual) assess and improve EHS processes.
- Identify current state, ideal state and perform gap analysis for improvement.
- Participate in Foreman meeting.
- Provide and/or organize training for SPO crew to maintain needed certification/ qualifications, competencies or other OSHA required training.
- Assist in writing and/or reviewing JHA's for SPO work.
- Complete SafetyNet Inspection equal to SafetyNet Inspection Goals for Project EHS Managers.
- Assist in SPO related incident/injury investigation and facilitate co-learning process according to the Incident response matrix.
- Perform case management and work with claims for SPO related injuries.
- Designated Responsible Person Development

Full Time Project Safety Manager: SPO will provide a full time Safety Manager when the field workforce equals or exceeds 25 persons for 5 consecutive days, OR if a particular scope of work is considered "High Risk" (e.g. vertical form work and concrete, high bay work on scaffold of boom lifts etc.)

- The full-time Safety Manager shall not be assigned any other collateral duties and will coordinate all SPO safety efforts. The full- time Safety Manager shall meet the following qualifications detailed in Turner EHS Policy.
- Additional safety manager required at 100 onsite workers engaged in construction activities after the initial requirement at 25 workers.

Full time dedicated Safety Managers required	When Onsite Workers reaches:
1	~~25~~ → 15
2	100

III. Subcontractor Safety Requirements

All subcontractors must have completed an OSHA 30-hour class. One person must be certified for all contracts under $5M, and two people must be certified for contracts over $5M. The 30-hour certified person(s) must be on-site 100% of the time. This OSHA 30-hour certification must be updated through Turner's Safety Update Training every two years through Turner University.

If the subcontractor will exceed 25 employees or more on site, including sub tiers, for more than two weeks, they must provide a full-time Safety Manager for the duration of the project when the workforce exceeds threshold above, who:

a. Is qualified to recognize safety hazards; and
b. Has the authority to take corrective action; and
c. Possesses current certifications in first aid, CPR and AED; and
d. Possesses a recent OSHA 30-hour card (if not within the last three years Turner's 2-year Safety Update Training has been completed and is up to date through Turner University); and
e. Has an academic degree in safety, CSP, ASP, or CHST designation, OR has a minimum three (3) years of prior work history as a designated construction safety manager.

Turner reserves the right to approve or deny the subcontractor's fulltime safety representatives for the project.

f. At a minimum, the Subcontractor Foreman or Safety Manager will be requested to:
    1. Ensure their employees attend jobsite orientation before the start of work on the project.
    2. Take the lead in recognition and abatement of hazardous situations.
    3. Conduct a daily "Safety Huddle" prior to the start of each shift and submit a Daily Pre-Task Plan (PTP). Report each morning prior to the start of work.
    4. Perform and document weekly safety inspections (1 per week at minimum).
    5. Conduct at least one monthly safety tour with their Safety Director and submit findings to Turner.
    6. Ensure that Competent Persons submit, at a minimum, the below listed safety inspections at the designated frequency to the Turner's Project Superintendent or Safety Manager.

Inspection	Frequency
Fall Protection	Before Each Shift
Excavations	Before Each Shift
Scaffold	Before Each Shift
Crane Inspections	Before Each Shift
Confined Space	Before Each Shift
Hot Work	Before Each Shift
Heavy Equipment	Before Each Shift
GFCI	Weekly
Personnel Hoist	Per OSHA Reqs.
Dig Permit	Before Each Shift
Tools Box Talks & Report	Weekly

7. Conduct and document toolbox meetings on a weekly basis.
8. Issue minutes of the weekly toolbox meeting to Turner.
9. Effectively utilize and train employees in pre-planning, recognition, and remediation of hazards.

g. Each subcontractor, regardless of tier, is to submit in writing toolbox meeting minutes containing the following:
    1) Name of subcontractor and date.
    2) Name of Subcontractor Safety Manager.
    3) Name of employees attending.
    4) Name of employees onsite not attending.
    5) Number of employees on their payroll that day.
    6) Subjects discussed.
    7) Safety observations of employees.
    8) Attend project safety meetings.
    9) Enforce disciplinary measures when need arises for their employees.
    10) Each subcontractor is responsible for all of their subcontractors and suppliers, regardless of tier, compliance with the Project Safety Program.

Safety Enforcement Penalty Guidelines

I. Policy Statement

To assist in Turner's efforts to provide a safe workplace, the following three-strike policy is to be enforced on all projects. The Penalty Schedule listed below is to be used at the discretion of the local Business Unit. Once a fine is assessed it must be collected. Money collected is intended to be used for safety recognition or training programs only.

Turner Construction will employ a three-strike policy related to violations of this policy.

1. For first-time non-repeat violations, a verbal warning may be issued.
2. On the second violation, a written warning shall be issued to the employer and a record of the action taken documented in a violation log.
3. On the third violation, the employee will be removed from the project and the removal shall be documented in the violation log.

Turner reserves the right to remove any employee of any company for serious, repeat, willful or egregious violations, skipping the three-strike process listed above. Turner may also require outside third-party training relative to the safety infraction for any employee to be able to return to the site.

Superintendents/Foremen may be held accountable for the actions of their employees, as well.

Penalty Schedule	
Non-serious violations (examples: basic PPE, missing PTP or ladder permit, etc.)	**$500**
Serious safety violations (including but not limited: to fall protection violations, unauthorized energized work, failure to follow Confined Space Procedures, etc.)	**$2,000**
Failure to provide modified duty when authorized by physician.	**$2,500/week**

SafetyNet Operational Guidelines

I. Procedures

It is the responsibility of the Business Unit Environmental, Health, and Safety Director and the Operations Manager to ensure SafetyNet (Predictive Solutions) is fully implemented and used within their Business Unit/Region. The SafetyNet link and new user request link can be found on TKN/Safety/SafetyNet at Turner Resources / Safety. Specific requirements can be detailed in the Business Unit Annual Action Plan. Below is a recommended protocol. In addition, the OM's and PX's are required to review all related inspection information at each ORM or other project-based meeting. Information shall be shared with the entire team and specific action plans shall be developed and implemented as appropriate.

1. Minimum auditing requirements are as follows:

    a) Project and Construction Executives – 1 inspection per month per project
    b) Project Managers – 1 Safety inspection, Building LIFE Process Assessment or CSB Observation per project per month.
    c) Business Unit Environmental, Health, and Safety Directors – Three per week minimum (Safety Inspection or CSB Observation)
    d) Superintendents – 1 Safety inspection per week and 1 CSB Observation per week. May substitute a monthly Building LIFE Process Assessment or Worker Perception Survey for one of the Safety or CSBs.
    e) Project Safety and EHS Managers – minimum of 3 inspections per week (a combination of Safety Inspections, CSB Observations, and at least one Building LIFE Process Assessment.
    f) There may be additional periodic inspections required such as "Quarterly Fall Protection and Rigging" or inspections specific to temporary focus items such as COVID-19 that are not covered in this program, but are required, nonetheless.

Note: the above are minimum requirements and at the Operations Manager's and BUEHSD's discretion, the frequency of inspections will be *increased* if incidents on a given project are trending in a less than favorable direction.

The intent is for every project, regardless of size, to have weekly "Safety Inspections", as well as periodic Critical Safe Behavior Observations (input into SafetyNet). Each project should also perform a Building LIFE Process Assessment at least once a month. On a periodic basis (every one or two months), projects lasting longer than 6 months should perform a Worker Perception Survey and document the findings in SafetyNet.

Utilizing the Data to Drive Continuous Improvement

At least monthly, staff at each project, and at the BU-level, should review data gathered in SafetyNet at a staff meeting to identify trends by observation type, by contractor against incident type; successes and challenges for the purposes of identifying opportunities for improvement. The easiest method to perform this analysis is to use the real-time "Analyze" dashboards in SafetyNet. Reports may be run as well. Some datapoints that may provide opportunities for improvement include, but are not limited to:

- Review most frequent and most severe hazards.
- Review worst-performing contractors.
- Review the Building LIFE Process Assessment
- Review Worker Perception Survey results.
- Review which projects are underperforming the benchmark.
- Review "red flag" matrix.

Document these meetings and develop action plans around your findings.

SafetyNet Inspection Goals

	"Safety" Checklist (Long form)	**"Critical Safe Behaviors"** (short form) w/coaching	**B.L. Process Assessment**
BUEHSD	2/wk.	1/wk.	1/month
Project EH&S	2/wk.	1/wk.	1/month
PM, PX, CX	1/month/project	Weekly if on-site full-time	1/month or delegate
General Super	1/wk.	1/wk. (except the week doing "Safety" checklist)	
Asst. Super(s)	1/wk.	1/wk.	
Engineer (s)	2/month (every other week)	2/month (every other week)	

Other goals:

Each project: conduct a focused quarterly fall protection and rigging inspection using the sections in the "Safety" checklist.

Add new subcontractors to the drop-down menu as they are issued contracts.

Use the new Disciplinary Action Form to document written infractions.

Use the "insert picture" button for each unsafe condition.

Insert comments for each "unsafe." Record location info and worker name if possible.

Close out (correct and document) uncorrected observations promptly.

Give feedback (both appreciative and constructive) to workers after observations.

Designated Responsible Person for Turner Hourly Employees

I. Policy Statement:

Turner cares about the health and wellness of our employees and Safety is our number one value. It is imperative to have a leader to be fully engaged with front line craft to create a safe environment. This policy is to set an expectation for our **D**esignated **R**esponsible **P**erson that is accountable and responsible for leading our Turner craft employees to have safe work production. Each project will work with the SPO Manager to identify the Designated Responsible Person for Turner craft employees.

II. Roles and Responsibilities:

The Designated Responsible Person is accountable for the overall Health and Welfare of any Craft employees under their direct guidance. This will include the following elements:

- Understand the full scope of the work.
- Ensure the development of a Job Hazard Analysis with engagement of the craft employees.
- Identify competent person(s) for specific scope of work.
- Identify training that is needed and coordinate the training.
- Ensure a project specific safety orientation has been completed.
- Ensure that proper tools and equipment have been identified and procured.
- Ensure a Pre-Task Plan is completed and reviewed with craft employee engagement.
- Ensure work is stopped and re-planned if conditions, work, or task changes.
- Ensure that all work has been planned (PDCA) throughout the day.
- Ensure that a daily safety huddle is being attended by craft employees.
    - Periodically review the quality of the engagement
    - Ensure any required permit is completed and followed.
        - To include but not limited to Ladder Permits, Surface Penetration, Hot Work
- Ensure that documented Safety Inspections have been completed for the scope of work in SafetyNet.
- Understand EH&S Policies and provide guidance for any questions or concerns (if applicable)
- Coach and Mentor craft employees; Recognize safe performance and apply disciplinary action policy as appropriate.
- Ensure that all craft employees understand their rights of “Stop Work Authority.”
- Identify and ensure that a translator is available (if applicable) for all of the above

III. Prerequisites to be a Designated Responsible Person:

To positively impact and lead craft employees the following are minimum requirements for the Designated Responsible Person.

- OSHA 30 Hour
- First Aid / CPR

- Turner - Building L.I.F.E.
- Reasonable Suspicion
- Qualified to recognize hazards and has authority to take corrective action.

Safety Training and Education Policy

I. Policy Statement

Turner believes a key component in driving an injury free environment is to develop and maintain a well-trained work force that understands basic safety and health principles. The following are minimal requirements that must be met by all Turner employees.

II. Procedure

1. Required Course Work:

a) Attend Building L.I.F.E. Training – coordinate with the BUEHSD to schedule in the first 30 days of employment.

b) New Employee Orientation – On day one, the employee's supervisor shall provide critical safety and health training for all new or re-hired employees. Information provided shall include:

i. Hazards associated with their job and proper ways to perform the task safely.
ii. Chemical Management & Hazard Communication Program.
iii. Emergency Response Procedures.
iv. PPE Requirements

c) OSHA 30 - All Turner employees in safety sensitive positions are required to have a 30-hour card. It is preferred that Turner's web-based course is utilized to fulfill these requirements. Individuals who already have a 30-hour card must take the Turner Web based Safety Refresher (2-Year Safety Refresher) course within the first six months of placement.

i. The Turner CN and Safety family, due to their interface with subcontractors and clients, is required to take the refresher course, as appropriate, every two years: Logistics, Estimating, Procurement, and Business Development. Also, all new CN family recruits should receive OSHA 30 training regardless of their initial assignment and this training should be completed within the first 90 days of start date. Close coordination with HR for tracking of required training of each person.
ii. The following Turner families are exempt for the OSHA 30 Hour and refresher courses: Cost/accounting, BIM/VDC, Scheduling, Human Resources, Community Affairs, and Administrative. If any of the above staff are assigned to a project and are working from the project site, then they need to follow the policy requirement with respect to the OSHA 30 and Refresher.

d) Subcontractor Substance Abuse Testing & Reasonable Suspicion Training - All Turner employees that interact with subcontractor workforce are required to attend training and adhere to the corporate policy regarding prescreening, random, post incident, and reasonable suspicion drug abuse testing.

e) First Aid/CPR – A minimum of one Turner employee shall be on site per project and office location with an active CPR/FA/BBP/AED certification.

f) OSHA Specific Training - When needed, individuals will be required to attend specific training that will enable Turner to be fully competent and compliant with all applicable regulations. Scaffolds, Traffic Safety, Fall Protection, Hoists/Cranes, are a few examples of specific technical training required to build safety acumen.

g) Storm Water Training – The Business Unit Storm Water Coordinator will assign necessary personnel to attend the Turner University Storm Water Training class. Local or state governments may have additional requirements for stormwater certification. Following Stormwater Training, the Business Unit Storm Water Coordinator will ensure these employees are trained to use EVOCO when required.

h) Pre-Task Plan and Job Hazard Analysis Training – All Turner site staff, and trade foreman trained in how to properly develop a quality pre task plan and execute a daily huddle.

i) All Turner staff shall be trained in the expectations of Turner's EH&S policies, programs, and processes.

i. Ensure enhanced focus on Proper Safety Preplanning, risk management, and worker engagement from the launch of the project through turnover.

Section

3

TURNER

CORPORATE ENVIRONMENTAL, HEALTH AND SAFETY POLICY

Engineering & Technology

Vertical Wall Penetration "Cut Outs"

The following relates to any vertical wall "Cut Outs" that weighs more than 50 lbs. to allow for utilities or other material to pass through. This applies to all Turner projects.

The high risk associated with these "cut outs" necessitates additional proactive management as well as the establishment of procedural elements to reduce the risks involved with these tasks.

Note: These requirements will apply to cuts where vertical wall saw cutting is required (*Reference CSO Alert 1002).*

- It does not apply to core drilling roro openings that weigh less than 50 lbs.
- If opening is less than 50 lbs. a Job Hazard Analysis and Pre-Task Plan (PTP) should address how to safely remove the "cut out."
- For masonry walls, a lintel engineering plan and PTP must be in place.

I. Procedures (to be taken in this order)

1. The following sequence must be followed. These requirements must be taken in the order listed below.
    a) A plan must be discussed with the designer and client that assures block outs for openings will be made at the time of casting.
    b) If block outs cannot be made at the time of casting and must be done in the field, the panel that requires a cut out will be lowered to the ground and placed on dunnage so the sawcut can be made on the ground.
    c) If the block out for the opening cannot be made at the time of casting or the panel cannot be lowered to the ground:
        i. The contractor making the "cut out" will provide an engineered Method of Procedure (MOP) with means and methods that is signed and sealed by a licensed 3rd party engineer.
        ii. The MOP will be submitted to the Engineer of Record for their review and approval.
        iii. The plan will be reviewed by Turner with assistance from TEG as needed. Final comments from this plan review will be incorporated into the plan.

Example of Engineered Solution MOP (Method of Procedure) if "cut outs" were not done at the time of casting and panel cannot be lowered for saw cuts to be made on the ground.

Prior to the cuts being made in the field from a vertical position, the developed MOP which has been reviewed and approved by a 3rd party engineer for the contractor will be reviewed by the Engineer of Record and then reviewed by Turner and any final comments incorporated into the plan. The plan should include (not all inclusive):

a. The JHA and Pre-task plan submitted by the contractor performing the work.
b. Identification of team members, their role and responsibility and qualifications/certifications of those doing the work
c. Description of the item(s) to be cut, how many, location, weight, etc.
d. Cutting equipment that will be used
e. Bracing required
f. Crane or hoisting equipment that will be used (including certifications of operators) to remove "cut outs"
g. Calculations of weight of "cut outs" and crane or hoist equipment limits
h. Weather conditions
i. Location of Controlled Access Zones
j. Rigging procedures
    a. Manufacturers' rigging specifications must be reviewed and followed, if applicable
    b. Worker training and PPE requirements
k. Procedures for removing the "cut out" from the rigging once the load is landed
    a. If blind picking or landing follow the Blind Landing Procedure CSO Alert that was issued in January 2021
        i. Document blind landing procedures and include in High-Risk Activity Pre-Task Planning and communications
        ii. Coordinate a communication meeting between the crane or hoisting operator and signal person
        iii. Facilitate training with all trade workers and partners involved to assure comprehension of the specific procedures for the entire procedure including rigging removal in conjunction with an awareness barrier separating the load and workers

Final approval and review of the engineered plan will be made by the Business Unit Safety Director and Operations Manager.

Concrete and Masonry

I. Policy Statement

Each contractor working on a Turner project will comply with 29 CFR 1926, Construction Industry Regulations, Subpart Q – Concrete and Masonry Construction, in addition to the following guidelines.

II. Procedures

1. General Requirements

    a) Unless otherwise stated in their contract, the concrete or masonry contractor must provide at least two covered entrances into each building or structure during perimeter work. They must also cordon off other means of access/egress.

    b) No load may be placed on a concrete structure unless a qualified person, knowledgeable in structural design, determines that the structure is capable of supporting the load.

    c) Protruding reinforced steel, onto which employees could fall or fall into, must be protected to eliminate the hazard of impalement. The use of mushroom caps is not permitted for impalement hazards.

    d) No worker, except those involved in post tensioning operations, shall be permitted to be behind the jack during tensioning operations. Signs and barricades shall be erected to limit access to the area.

    e) No worker shall be permitted to walk under concrete buckets while it is being elevated or lowered into position.

    f) No worker shall be permitted to apply cement, sand, and water mixture through a pneumatic hose unless the employee is wearing the proper PPE including face protection.

    g) This subcontractor shall provide an eye wash station with at least 15 minutes of eye wash solution within 75 feet of any concrete, painting, or masonry work.

2. Equipment and Tool Requirements

    a) Powered and rotating concrete troweling machines must have a switch that automatically shuts off power whenever the hands of the operator are removed from the machine.

3. Cast-In-Place Concrete Requirements

    a) Formwork must be designed, fabricated, erected, supported, braced, and maintained so it is capable of supporting all lateral and vertical loads anticipated to be applied to it.

b) All shoring equipment must be inspected prior to erection to determine if it meets the requirements specified in the formwork drawings.

c) Erected shoring equipment must be inspected immediately prior to, during and after concrete placement.

    a. An inspection of the shoring prior to, during, and after the concrete pour is an OSHA requirement. The concrete contractor is to determine their means and methods for inspection without placing any person directly under a live concrete pour. A Controlled Access Zone must be established around the live pour so no one can enter. If an individual is assigned to inspect the shoring, they will be positioned outside of the controlled access zone of the concrete being placed and the previous bay where concrete was placed. This type of inspection of a live pour can also be completed with the use of technology. How the inspection is to be completed will be determined in the preconstruction meeting and will be detailed in the JHA and reviewed with all workers prior to the concrete pour. The location of the person inspecting shoring and performing tasks during concrete placement will be detailed on the project-specific Job Hazard Analysis (JHA) and daily Pre- Task Plan. The placement sequence will also be noted in the JHA.

d) A qualified designer must prepare the design of the shoring and re-shoring. A third-party engineer qualified (certified, registered engineer) in structural design shall review the design of the shoring.

e) The designer of the shoring must inspect the (initial) erected shoring to ensure it is installed per design prior to concrete pour. Assignment and training of a minimum of one competent person that must be on site at all times to inspect shoring prior to any concrete pour by the installing contractor. Any change of formwork should be inspected by the designer.

f) Forms and shores must not be removed until the employer determines that the concrete has gained sufficient strength.

g) 100% Fall protection will always be required while accessing or working on temporary outrigger platform systems. Any anchors for outrigger platforms must be cast in place.

h) At building perimeters where the decking steps down to allow for a beam pour, the height of the rails shall be increased accordingly.

i) Areas where form stripping is to be performed must be properly barricaded with tape or fence and signage must be posted on all sides. This should include areas below stripping.

j) Protruding nails should be removed or bent immediately.

k) Where employees must walk across rebar, temporary walkways must be installed to prevent trip hazards.

l) Outrigger platforms used for material movement in and out of the building via a crane or forklift must be designed by an engineer and incorporate 100% fall protection systems.

4. Authorization to Strip Formwork:

a) When given Authorization that the concrete has reached strength in accordance with project specifications by the Structural Engineer of the Project, the written notification from said engineer (third party that does break strength testing) will be forwarded to the structural concrete trade and Turner. Stripping activities regarding formwork and work platforms will not proceed prior to receiving the authorization.
b) If any change in conditions occurs while stripping a work platform or shoring, all work must be stopped. A written notification must be sent by the Structural Concrete subcontractor to Turner Management staff and a review meeting held to assess the change. A revised risk mitigation plan will be established and reviewed with all workers prior to work restarting.

5. Use of Proper Barricades and Signage on the formwork:

a) The use of fixed, physical barricades in lieu of Caution / Danger Tape, where appropriate, to further inform and protect employees from changes in elevation must be utilized.
b) The use of fixed, physical barricades to further inform and protect employees whenever there is a fall hazard must be utilized. Caution / Danger Tape can never be used to barricade for a fall hazard.
c) Additional warning signage that contains the appropriate contact information for the contractor which has installed the barricade must be installed on the barricade.

6. Concrete Core Formwork Systems
a) The business unit must schedule a Teams conference call prior to erecting any concrete core formwork at the project. Ideally this call will be scheduled post concrete interviews but pre award so that the business unit and this team have an understanding of what formwork systems and methodologies will be utilized for the concrete formwork system.

a. This meeting should include Andrew Leone aleone@tcco.com, Jack Dawson jdawson@tcco.com, John Grafrath jgrafrath@tcco.com, Karl Kinsella kkinsella@tcco.com, Steve Garrett srgarrett@tcco.com, and Doug LaPlante dlaplante@tcco.com.

b. The goal of this meeting is to have a peer review done to include new policy elements in the Turner EHS Program in relation to concrete core formwork systems that are above OSHA and industry standards.

c. Please include in the invite to the call.
    - Concrete Core Formwork System Questionnaire
    - Concrete Core Formwork drawing
    - Engineered anchor detail drawing
    - Erection / Dismantle Plan
    - Fall Protection Plan
    - Access Plan

7. Masonry Requirements

a) A limited access zone (LAZ) must be established prior to the start of any masonry work.

b) The zone must be equal to the height of the wall, plus four feet for the entire length of the wall.

c) All masonry walls over 8 feet in height shall be adequately braced and remain in place until the permanent supporting elements of the structure are in place.

d) A top guard rail is required to be installed on the working side of the masonry scaffold unless the height of the installed block is 39” or other suitable fall protective systems used.

Confined Spaces in Construction

I. Policy Statement

This program has been developed to comply, at a minimum, with 29 CFR 1926 Subpart AA Permit-Required Confined Spaces. This program sets forth requirements for practices and procedures to protect employees engaged in construction activities at a worksite with one or more confined spaces. Entering or knowledge of entry into a confined space without all appropriate planning and permits is a zero-tolerance issue for Turner Construction and will be dealt with appropriately.

As a reminder you may be required to also follow the 29 CFR 1910.146 General Industry Confined Spaces Program, but the more stringent of the two will always apply.

II. Definitions

1. Confined space means a space that:
   a) Is large enough and so configured that an employee can bodily enter it.
   b) Has limited or restricted means for entry and exit (definition below); and
   c) Is not designed for *continuous employee occupancy*.

   Confined spaces may include, but are not limited to, the following: Bins; boilers; pits (such as elevator, escalator, pump, valve or other equipment); manholes (such as sewer, storm drain, electrical, communication, or other utility); tanks (such as fuel, chemical, water, or other liquid, solid or gas); incinerators; scrubbers; concrete pier columns; sewers; transformer vaults; heating, ventilation, and air-conditioning (HVAC) ducts; storm drains; water mains; precast concrete and other pre-formed manhole units; drilled shafts; enclosed beams; attics; interstitial spaces; vessels; digesters; lift stations; cesspools; silos; air receivers; sludge gates; air preheaters; step up transformers; turbines; chillers; bag houses; and/or mixers/reactors.
2. *Permit-required confined space* (permit space) means a confined space that has one or more of the following characteristics: (a) Contains or has a potential to contain a hazardous atmosphere; (b) Contains a material that has the potential for engulfing an entrant; (c) Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or (d) Contains any other recognized serious safety or health hazard.
3. *Non-permit required confined space means a confined space that meets the definition of a confined space but does not meet the requirements for a permit-required confined space, as defined in this subpart.*
4. Limited or restricted means for entry or exit means a condition that has the potential to impede an employee's movement into or out of a confined space. Such conditions include, but are not limited to, trip hazards, poor illumination, slippery floors, inclining surfaces, and ladders.
5. Controlling Contractor is the employer that has overall responsibility for construction at the worksite.

6. Attendant means an individual stationed outside one or more permit spaces who assesses the status of authorized entrants and who must perform the duties specified in §1926.1209. Note: the attendant must have knowledge of existing and potential hazards, including signs/symptoms of exposure. Must maintain accurate head count/communication with entrants, is aware of possible behavioral effects of hazard exposure in authorized attendants and assesses activities and conditions inside and outside the space to determine if it is safe for entrants to remain in the space and orders the authorized entrants to evacuate the permit space immediately as required by the standard.
7. Authorized entrant: means an employee who is authorized by the entry supervisor to enter a permit space and must perform the duties found in section VIII.
8. Entry Supervisor means the qualified person (such as the employer, foreman, or crew chief) responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry as required by this standard.

III. General Requirements

Before beginning work at a project site, each contractor must ensure that a competent person identifies all confined spaces in which one or more of the employees it directs may work and identifies each space through consideration and evaluation of the elements of that space, including continuous testing as necessary. All confined spaces that an employee will enter must be classified as either a “permit-required space,” a “non-permit space,” or an “alternate-entry space.” Classification of each type of space must be accomplished using the Turner Confined Space Entry Permit, regardless of classification. If the workplace contains one or more permit-required spaces, the employer who identifies, or who receives notice of, a permit space must:

1. Inform exposed employees of the existence and location of danger posed at each permit space by posting danger signs or any other equally effective means. Post signs in English plus any additional languages spoken by non-English speaking workers.





2. Inform, in a timely manner and in a manner other than posting, its employees' authorized representatives and the controlling contractor of the existence and location of, and the danger posed by, each permit space.
3. Each employer who identifies, or receives notice of, a permit space and has not authorized employees it directs to work in that space must take effective measures to prevent those employees from entering that permit space.
4. If any employer decides that employees it directs will enter a permit space, that employer must have a **written permit confined space program** implemented at the construction site. The written program must be made available prior to and during entry operations for inspection by employees and their authorized representatives.
5. If there is a potential for an atmospheric hazard, then the contractor desiring to perform entry must monitor the atmosphere in the confined space prior to breaking the plane of the entry portal. If you are unsure if monitoring must be done, contact the BU Environmental, Health, and Safety Director. Some examples of situations where an atmospheric hazard might exist would include, but not be limited to, the use of fossil-fuel powered engines and tools in the area; chemicals or paints being used in the area, compressed gases stored or used in the area, etc.

Alternate Entry Procedure

An employer whose employees enter a permit space need not comply with 1926.1204 through 1206 and 1926.1208 through 1211, provided that all of the following conditions are met:

The employer can demonstrate that all physical hazards in the space are eliminated or isolated through engineering controls so that the only hazard posed by the permit space is an actual or potential hazardous atmosphere.

The employer can demonstrate that continuous forced air ventilation alone is sufficient to maintain that permit space safe for entry, and that, in the event the ventilation system stops working, entrants can exit the space safely.

The employer develops monitoring and inspection data that supports the demonstrations required by paragraphs (e)(1)(i) and (ii) of this section.

If an initial entry of the permit space is necessary to obtain the data required by this paragraph the entry is performed in compliance with §§ 1926.1204 through 1926.1211.

The determinations and supporting data required by paragraphs (e)(1)(i), (ii), and (iii) of this section are documented by the employer and are made available to each employee who enters the permit space under the terms of paragraph (e) of this section or to that employee's authorized representative; and

Entry into the permit space under the terms of paragraph (e)(1) of this section is performed in accordance with the requirements of the following section:

The following requirements apply to entry into permit required spaces that meet the Alternate Entry Requirements above:

- Any conditions making it unsafe to remove an entrance cover must be eliminated before the cover is removed.
- When entrance covers are removed, the opening must be immediately guarded by a railing, temporary cover, or other temporary barrier that will prevent an accidental fall through the opening and that will protect each employee working in the space from foreign objects entering the space.
- Before an employee enters the space, the internal atmosphere must be tested, with a calibrated (annual-factory calibration and daily site calibration) direct-reading instrument, for oxygen content, for flammable gases and vapors, and for potential toxic air contaminants, in that order. Any employee who enters the space, or that employee's authorized representative, must be provided an opportunity to observe the pre-entry testing. Only a competent and qualified person may use the air monitor. Submit air monitoring results and calibration records to Turner upon request.
- No hazardous atmosphere is permitted within the space whenever any employee is inside the space.
- Continuous forced air ventilation must be used, as follows:
    - An employee must not enter the space until the forced air ventilation has eliminated any hazardous atmosphere.
    - The forced air ventilation must be so directed as to ventilate the immediate areas where an employee is or will be present within the space and must continue until all employees have left the space.
    - The air supply for the forced air ventilation must be from a clean source and must not increase the hazards in the space.
- The atmosphere within the space must be continuously monitored unless the entry employer can demonstrate that equipment for continuous monitoring is not commercially available or periodic monitoring is sufficient... If continuous monitoring is used, the employer must ensure that the monitoring equipment has an alarm that will notify all entrants if a specified atmospheric threshold is achieved, or that an employee will check the monitor with sufficient frequency to ensure that entrants have adequate time to escape. If continuous monitoring is not used, periodic monitoring is required. All monitoring must ensure that the continuous forced air ventilation is preventing the accumulation of a hazardous atmosphere. Any employee who enters the space, or that employee's authorized representative, must be provided with an opportunity to observe the testing.
- If a hazard is detected during entry:
    - Each employee must leave the space immediately.
    - The space must be evaluated to determine how the hazard developed.
    - The employer must implement measures to protect employees from the hazard before any subsequent entry takes place.

- The employer must ensure a safe method of entering and exiting the space. If a hoisting system is used, it must be designed and manufactured for personnel hoisting; however, a job-made hoisting system is permissible if it is approved for personnel hoisting by a registered professional engineer, in writing, prior to use.
- The employer must verify that the space is safe for entry and that the pre-entry measures have been taken through a written certification that contains the date, location of the space and signature of persons providing the certification. The certification must be made before entry and must be made available to each employee entering the space or to that employee's authorized representative. A copy must be provided to Turner Construction before entry begins.

Reclassifying a Permit Space to a Non-Permit Confined Spaces

A space classified by an employer as a permit-required confined space may only be reclassified as a non-permit confined space when a competent person determines that all of the applicable requirements in paragraphs of this section have been met:

- If the permit space poses no actual or potential atmospheric hazards and if all hazards within the space are eliminated or isolated without entry into the space (unless the employer can demonstrate that doing so without entry is infeasible), the permit space may be reclassified as a non-permit confined space for as long as the non-atmospheric hazards remain eliminated orisolated.
- The entry employer must eliminate or isolate the hazards without entering the space, unless it can demonstrate that this is infeasible. If it is necessary to enter the permit space to eliminate or isolate hazards, such entry must be performed under §§ 1926.1204 through 1926.1211. If testing and inspection during that entry demonstrate that the hazards within the permit space have been eliminated or isolated, the permit space may be reclassified as a non-permit confined space for as long as the hazards remain eliminated or isolated.
    - Note: Control of atmospheric hazards through forced air ventilation does not constitute elimination or isolation of the hazards. Paragraph (e) of this section covers permit space entry where the employer can demonstrate that forced air ventilation alone will control all hazards in the space.
- The entry employer must document the basis for determining that all hazards in a permit space have been eliminated or isolated, through a certification that contains the date, the location of the space, and the signature of the person making the determination. The certification must be made available to each employee entering the space or to that employee's authorized representative.
- If hazards arise within a permit space that has been reclassified as a non-permit space under paragraph (g) of this section, each employee in the space must exit the space. The entry employer must then reevaluate the space and reclassify it as a permit space as appropriate in accordance with all other applicable provisions of this standard.

IV. Permit Space Entry Communication and Coordination

Before entry operations begin, the controlling contractor must obtain the host employer's information about the permit space hazards and previous entry operations and provide the following information to each entity entering a permit space and any other entity at the worksite whose activities could foreseeably result in a hazard in the permit space:

a. The information received from the host employer.
b. Any additional information the controlling contractor has about the space.
c. The precautions that the host employer, controlling contractor, or other entry employers implemented for the protection of employees in the permit spaces.

A boilerplate letter is attached to this program to send to host employers to obtain the necessary information.

The controlling contractor and entry employer(s) must coordinate entry operations when:

a. More than one entity performs permit space entry at the same time:or
b. Permit space entry is performed at the same time that any activities that could foreseeably result in a hazard in the permit space are performed.

After entry operations:

The controlling contractor must debrief each entity that entered a permit space regarding the permit space program followed and any hazards confronted or created in the permit space(s) during entry operations. This debrief needs to happen with the crew performing the entry immediately, or as soon as possible after entry. Document this meeting on the cancelled permit and submit the permit to the BU Environmental, Health, and Safety Director.

The entry employer must inform the controlling contractor in a timely manner of the permit space program followed and of any hazards confronted or created in the permit space(s) during entry operations; and the controlling contractor must apprise the host employer of the information exchanged with the entry entities pursuant to this subparagraph. Submit copies of each cancelled permit and any lessons learned to the Host Employer. Document this was done on the cancelled permit that goes to the BUEHSD.

Unless the controlling contractor has or will have employees in a confined space, it is not required to enter any confined space to collect the information.

V. Permit Required Confined Spaces

1. Permit Required Spaces – If permit spaces are identified, the following program elements must be addressed by the entry contractor's competent person in a **Written Project Specific Confined Space Procedure**. This procedure must be submitted in advance to the Turner project manager.

    a) Job Specific Safety Analysis – Include a review of site-specific hazards and details on how to the control these hazards such as ventilation, protective clothing, respiratory equipment, air testing and monitoring, fire prevention, training, rescue plan, documentation, and access.

    b) Atmospheric Testing – Specify how the space will be tested for oxygen content, combustible gases and vapors, toxic gases, and vapors to ensure that acceptable entry conditions exist. Permit Confined spaces will be continuously monitored while entrants are in the confined space.

    c) Assigned Duties – Provide training for all personnel entering a confined space, attendants and entry supervisors on their duties, the nature of existing and potential hazards in and around the space, precautions to avoid any incidents and the use of personal protective equipment and emergency rescue equipment.

    d) Unauthorized Entry – Procedures they will implement that are necessary to prevent unauthorized entry

    e) Rescue Equipment and Emergency Services

        1. A rescue procedure shall be developed by the subcontractor responsible for entering the space and submitted to Turner prior to commencing a confined space entry. If subcontractor decides to use a rescue service vendor that service must be on site at the beginning of and during the permit space work. Fire and emergency rescue services are not a substitute for a qualified and trained rescue team or vendor service. At a minimum 29 CFR Appendix F to Subpart AA Rescue Team and Rescue Service Evaluation Criteria must be utilized when assessing rescue operations.
        2. A pre-planned rescue procedure shall be developed for the attendant who is stationed outside the space to observe and communicate with the entrant(s). The procedure should discuss how to:
            a. summon the on-site rescue and emergency services.
            b. procedures for rescuing entrants from permit spaces
            c. provide necessary emergency services to rescue employees.
            d. and prevent unauthorized personnel from attempting a rescue.

3. All persons entering a permit-required confined space shall wear a full-body harness with a retrieval system attached. Wristlets may be used in lieu of the chest or full body harness if it can be demonstrated the use of a chest or full body harness is infeasible or creates a greater hazard and that the use of wristlets is the safest and most effective alternative.
4. All retrieval and rescue equipment to meet applicable ANSI or OSHA requirements and be designed for intended operations.
5. A trained attendant with a pre-planned rescue procedure shall be stationed outside to observe (if possible) and/or communicate with the entrant at all times and be capable of putting rescue operations into effect. At a minimum 29 CFR Appendix F to Subpart AA Rescue Team and Rescue Service Evaluation Criteria must be utilized when assessing rescue operations. If a subcontractor decides to use a rescue service vendor, that service must be on-site during the full duration of the permit space work. Fire and emergency rescue services are not a substitute for a qualified and trained rescue team or vendor service, on-site.

f) An **Entry Permit** must be used to record critical data and serve as official Final entry authorization to enter the permit required space and must be implemented prior to entering the space. Develop and implement the means, procedures, and practices necessary for safe permit space entry operations. Identify and evaluate the hazards of permit spaces before employees enter them.

g) Training – documentation of employees expected to enter permit spaces must be provided and reviewed by the Project Superintendent and Project Safety Manager (if assigned) to ensure that they have been trained per the requirements of 29 CFR 1926.1207. Training documentation must be verified for all rescue personnel or rescue service that will be used. Training should also include respirators where they might be used for rescue.

h) If respiratory protection is required, the subcontractor responsible for making entry into the space will submit their Respiratory Protection Plan to Turner Construction for review. The plan shall include identified hazards associated with the space and their concentrations, what respiratory protection is needed, medical screening/fit testing, signs, and symptoms of exposure, what are the cartridge/canister change-out procedures, respiratory training, etc.

Note: any contractor that will self-perform rescue into a confined space that could potentially have a hazardous atmosphere must have the appropriate level of respiratory protection on hand for the number of rescuers assigned. Potentially IDLH atmospheres will necessitate either SCBAs or SARs be provided.

2. Atmospheric Air Monitoring shall occur before entering a confined space. Continuous monitoring, using a four-gas meter, is required. Testing the Atmosphere in the confined space is required by a qualified Entry Supervisor prior to entry. Take samples at all accessible areas of the confined.

space. The qualified person must note the results of the sampling. The atmosphere must meet the following conditions:

a) Oxygen: 19.5 percent minimum, 23.5 percent maximum,

b) Flammable gases and vapors: less than 10 percent,

c) Toxic gases: persons monitoring the atmosphere of permit spaces will adhere to the lowest published exposure limit among OSHA, NIOSH and ACGIH to determine when evacuation from a permit space is necessary. Alarm settings on instruments must never exceed these limits. Additionally, when any toxic gas or vapor reading is above background, but below published exposure limits, the entry supervisor will evaluate.

d) IF the above atmospheric conditions are not attainable, the area is a Permit Required Confined Space. A plan must be developed, and the permit submitted to Turner Construction for review and comments.

e) If the work performed inside the space could generate flammable vapors or produce an oxygen-deficient atmosphere, this space is a Permit Required Confined Space and continuous air monitor is required by the construction standard. Non-sparking tools and intrinsically safe tools and equipment such as lights, radios, and monitors may be necessary when flammability is an issue.

f) Maintain a log of all readings.

3. Welding and Burning: Prior to any spark and/or heat producing activities in a confined space, the subcontractor must obtain a Hot Work Permit and determine there is no danger of flammable atmosphere.
4. Burning / Welding Procedures: When burning or welding inside a confined space, all cylinders and welding machines shall be located outside the confined space. Check hose connections or welding leads prior to entry. Remove all hoses from the confined space at the end of the work shift.
5. All potential confined spaces, both existing and new, shall be marked, labeled, or appropriately identified. The controlling contractor, rather than the host employer, is the primary point of contact for information about permit spaces at the worksite. The host employer must provide information it has about permit spaces at the work site to the controlling contractor, who then passes it on to the employers whose employees will enter the spaces (entry employers). In addition, entry employers must give the controlling contractor information about their entry program and hazards or improvement opportunities they encounter in the space. The controlling contractor will provide the new information on to other entry employers and back to the host. The controlling contractor

will make sure employers outside a space know not to create hazards in the space, and that entry employers in a space at the same time do not create hazards for one another's workers.

VI. Permitting Process

All confined space entries requiring a permit will utilize the Turner Confined Space Entry Permit. Before the entry begins, the Entry Supervisor identified on the permit must sign the entry permit to authorize entry. The completed permit must be made available at the time of entry.

The Entry Supervisor must terminate entry and take the following action when:

- Cancel the permit when the operations associated with the permit are complete.
- Suspend or cancel the permit and fully reassess the permit space before allowing reentry when a condition arises in or near the space that is not allowed under the entry permit.

The Entry Employer must retain each canceled entry permit for at least one year to facilitate the review of the permit-required confined space program. Any problems encountered during an entry operation must be noted on the permit so that the appropriate revisions to the permit space program can be made.

Entry Permit (See Forms Section for Confined Space Permit)

The entry permit document that authorizes entry into a permit space must:

- Identify the permit to be entered,
- Purpose of the entry,
- Date and authorized duration of the entry permit,
- Authorized entrants by name in the permit space,
- Identify the means of detecting an increase of atmospheric hazard levels,
- The person, by name, currently serving as the attendant,
- The individual, by name, currently serving as the Entry Supervisor and the signature or initials of each Entry Supervisor who authorizes entry,
- The hazards of the permit space to be entered,
- The measures used to isolate the permit space and to eliminate or control permit space hazards before entry,
- Identify the acceptable entry conditions,
- The results of tests with the names of the testers and the time the test was performed,
- Identify the rescue and emergency services to be contacted and the means of contacting those services (equipment to use and the numbers to call).
- Identify the communication procedures used by authorized entrants and attendants.

- Identify the PPE that will be utilized, the testing equipment, communication devices, alarm systems and the rescue equipment that will be provided.
- List any additional information necessary for the particular confined space to ensure employee safety.
- List any additional permits required, such as hot work permits, etc. that have been issued to authorize work in the permit space.
- Conduct a meeting with the appropriate parties, including the owner, to review the written site-specific confined space plan and make necessary adjustments before activity begins.

VII. Training

The employer must provide training to each employee and ensure that the employee possesses the understanding, knowledge, and the skills necessary for the safe performance of their assigned duties. The training must result in the understanding of the hazards in the permit space and the methods used to isolate, control or in other ways protect employees from the hazards, and for those employees not authorized to perform entry rescues, in the dangers of attempting rescues.

- The training must be in the language and vocabulary that the employee can understand.
- Training is required before the employee is first assigned duties before there is a change in assigned duties or when there is a change in the permit space entry where an employee has not previously been trained.
- Training is required when there is evidence of a deviation from the permit space entry procedures or there are inadequacies in the employee's knowledge or use of the procedures.
- The employer must maintain training records that training was accomplished. The training records must contain the employee's name, the name of the trainers and the dates of training.

Supervisor's Training (Individual authorizing or in charge of entry):

A. Entry Permit – content and completeness,
B. Procedures, practices, and equipment,
C. Entry operations monitoring,
D. Entry cancellation,
E. Closing procedures after completion,
F. Dealing with unauthorized personnel.

Entrants and Attendants Training:

A. Hazard Recognition:
    a. Type of Hazard,
    b. Signs and symptoms,
    c. Consequence of exposure.
B. Communication

a. Maintain contact between entrant and attendant.
b. Entrant should notify the attendant prior to attempting self-evacuation.
c. Notification of entrants by attendant if:
    - Behavioral changes are observed.
    - Dangerous situations occur in or around the space.
    - Conditions exist that are not consistent with the permit.
    - The attendant must leave the workstation.

C. Protective Equipment:
    a. Appropriate equipment- respirators, clothing, retrieval lines, etc.
    b. Proper use of protective equipment
    c. External protective barriers to prevent unauthorized entries.

D. Self- rescue:
    a. When ordered by attendant to evacuate
    b. If the entrant's monitor alarm sounds
    c. If the entrant perceives danger

E. Rescue:
    a. Attendant will not enter the space to attempt save.
    b. Attendant should be trained in rescue procedures and the proper use of rescue equipment.

Rescue Team Training:

a. Hazard Recognition
b. Proper use of protective equipment including respirator and rescue equipment
c. Rescue Procedures
d. Emergency first aid, CPR and AED
e. Simulated rescue operation drills

VIII. Duties of Authorized Entrants

The entry employer must ensure that all authorized entrants:

- Are familiar with and understand the hazards that they may face during entry.
- Properly use the equipment provided.
- Communicate with the attendant as necessary on their status.
- Alert the attendant if there is a warning sign or symptom of exposure to a dangerous situation or detects a prohibited condition.
- Exit the space when an order to evacuate is given by the attendant or entry supervisor, there is a warning sign or symptom to a dangerous situation, the entrant detects a prohibited condition, or an evacuation alarm is activated.

IX. Duties of Attendants

The entry employer must ensure that each attendant:

- Is familiar with and understands the hazards that may be faced during entry.
- Is aware of possible behavioral effects of hazard exposure of the entrants.
- Continuously maintain an accurate count of entrants in the permit space.
- Remains outside the permit space during entry until relieved by another attendant
- Communicates with entrants as necessary to access the status of the entrant and to alert entrants of the need to evacuate the space.
- Assesses activities and conditions inside and outside the space to determine if it is safe for the entrants to remain in the space. Orders entrants to evacuate the space if there is a prohibited condition, if there are behavioral effects of an apparent hazard exposure, if there is a situation outside the space that could endanger the entrant or if the attendant cannot effectively or safely perform all the duties required.
- Summon rescue or other emergency services if the entrants need assistance.
- Warns all unauthorized persons that they must stay away from the permit space.
- Advises the unauthorized persons that they must exit immediately if they entered the permit space
- Informs the authorized entrants and the entry supervisor if unauthorized person has entered the permit space
- Performs no duties that might interfere with the attendant's primary duty to access and protect the authorized entrants.

X. Duties of the Entry Supervisor

The entry employer must ensure that each entry supervisor:

- Is familiar with and understands the hazards that may be faced during entry.
- Verifies by checking that all the appropriate entries have been made on the permit, that all tests specified by the permit have been conducted and that all procedures and equipment specified by the permit are in place before endorsing the permit and allowing the entry to begin.
- Terminates the entry and cancels or suspends the permit as required by 1926.1205 (e)
- Verifies the rescue services are available and the means of contacting them are operable and the employer will be notified as soon as the services are unavailable.
- Removes unauthorized individuals who enter or attempt to enter the permit space.

XI. Rescue and Emergency Services

- Rescuers must be on-site during the entry.
- If an employer brings in a third party to perform rescue services, the employer shall evaluate the prospective rescuer service's ability, in terms of proficiency with rescue related tasks and equipment, to function properly while rescuing entrants.

- The rescue team or service must be stationed close by the space, on the project, in order to reach the victim promptly and is equipped for and proficient in performing rescue services.
- The employer shall inform each rescue team or service of the hazards that they may confront when called upon to perform a rescue at the site.
- Provide the rescue team or service selected with access to all permit spaces so they can develop an appropriate rescue plan and to practice rescue operations.
- The employer shall train affected employees to perform assigned rescue duties and ensure that such employees successfully complete the training required and establish proficiency as authorized entrants.
- Train each affected employee in the basic first aid/CPR and ensure one member of the rescue team or service has a current first aid/CPR certification available.
- The employer shall ensure that affected employees practice making permit space rescues before attempting an actual rescue at least once every 12 months. This can be done by a simulated rescue operation in which they remove dummies, etc. from an actual permit space.
- Planning and providing for non-entry rescue is required unless the retrieval equipment would increase the overall risk or not contribute to the rescue of the entrant. The employer must still have an on-site rescue team. Each authorized entrant must wear a full body harness with the retrieval line attached to the back. The other end of the retrieval device must be attached to a mechanical device or a fixed point outside the permit space in a manner that a rescue can begin when necessary. Equipment that is unsuitable for retrieval must not be used. The SDS's must be made available to the treating medical facility where the worker is being treated.

XII. Annual Program Review

Each business unit will review cancelled permits and incident reports involving confined spaces from each project's confined space entries to assess the effectiveness of this program, lessons-learned and make appropriate changes to this program if necessary. This review must happen annually.

Sample Letter to "Host Employer" regarding confined space information:

Turner Construction Company [Date]
[Office Street Address]
[City, State, ZIP]

[Recipient Name]
[Recipient Address]
[Recipient City, State, Zip Code]

Dear [Recipient Name]:

I'm writing as a courtesy to make sure you're aware of the new OSHA regulations regarding Confined Spaces in Construction – Subpart AA, and how it may now create obligations for your organization. While the majority of the standard applies directly to the contractors that will perform confined space entry on your site, there are brand new requirements that apply to you, the "host employer." OSHA defines host employer as "the employer that *owns or manages the property* where the construction work is taking place." As required by Subpart AA, the host employer must now provide the "controlling contractor," Turner Construction, with the following information, if it has it:

- The location of each known *permit-required confined space*.
- The hazards or potential hazards in each space or the reason it is a permit space; and
- Any precautions that the host employer, any previous controlling contractor or entry employer implemented for the protection of employees in the permit space.

OSHA defines a Permit-required confined space (permit space) as a confined space that has one or more of the following characteristics:

1. Contains or has a potential to contain a hazardous atmosphere.
2. Contains a material that has the potential for engulfing an entrant.
3. Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or
4. Contains any other recognized serious safety or health hazard.

If you have any of the information requested above, please forward to me at your earliest convenience and we will, in turn, provide the information to any subcontractors that will be performing confined space entry. Thanks for your assistance in this matter.

Sincerely,

[Your Name]

[Title]

Cranes and Derricks in Construction

I. Policy Statement

Each contractor working on a Turner project will comply with 29 CFR 1926, Construction Industry Regulations, Subpart CC – Cranes and Derricks in Construction, in addition to the following guidelines.

II. Procedures

1) General Requirements
   a) An annual third-party inspection is required for all cranes(s). Documentation of the annual third-party inspection and report must be submitted to Turner prior to use. Third party inspectors are required to possess local and federal credentials to which type of crane they are inspecting.
   b) An additional project specific third-party inspection is required for any crane that will be assembled, erected and/or modified on site that requires more than adding counterweights or a seeing on jib. An additional third-party inspection will be required for each modification made to the crane while on site.
   c) Re-inspection may be required if repairs or modifications are required after the initial inspection.
   d) A daily crane inspection, performed by a competent person, is to be documented and those are reports are to be given to Turner when requested.
   e) If the manufacturer's inspection criterion does not exist, a qualified person, familiar with crane design and dynamics, may develop inspection criteria.
   f) Turner requires that all crane operators be certified by an accredited testing organization. Currently there are four organizations offering crane operator certifications. The four are the National Commission for the Certification of Crane Operators (NCCCO); the Operating Engineers Certification Program (OECP); and the National Center for Construction Education and Research (NCCER). Copies of their certifications must be submitted to Turner. In addition, a resume indicating the specific type of crane must be submitted to TCCO supervision prior to operation. Additional certifications for operators by other accredited testing organizations must be vetted by Turner BUEHSD before acceptance.
   g) All operators are required to verify the weight of each load prior to hoisting.
   h) Any lift exceeding 75% of the cranes rated capacity or lifts involving two or more cranes shall be considered a critical lift. In addition, the following factors should be considered when determining whether or not a critical lift plan should be developed:
      - Potential hazards to personnel and the public
      - Hazards in proximity to the work area (i.e., power lines)
      - Complexity of the load (i.e., shifting loads)
      - Adverse impact from environmental conditions (i.e., winds)
      - Adverse commercial impact (i.e., job shutdown and cost to replace)
      - Site requirements / owner requirements

A critical lift plan must be submitted to TCCO supervision for review prior to the lift. A sample plan and checklist has been linked to this document.

i) A pre-planning meeting to discuss the critical lift will be held in the field with the appropriate parties to discuss the lift. At a minimum, the following shall be reviewed:

- The critical lift plan.
- The contingency plan if something goes wrong during the lift.
- The emergency response.

j) Mobile crane movement on site must be in accordance with manufacturer's recommendations.
k) At 20 mph, crane operations need to be evaluated by the competent person regarding the safe operation of the crane & the task associated with the crane. The crane shall not operate outside its wind limitations as stated in the operator's manual.
l) The swing radius of cranes must be properly barricaded at all times while working on site. Tape is not an acceptable barrier.
m) Outrigger pads should be at least 3 times the dimensions of the crane floats. The outrigger pads are to be pre-manufactured. The weight must be determined prior to lifting the load.
n) Wire rope, its attachments, fittings, sheaves, and safety devices must be inspected according to the manufacturer's recommendations. Copies of the inspections must be submitted to Turner.
o) Wedge sockets and fittings must be the proper size to match the wire rope and must move to hold the wire rope under load. The dead end must be terminated according to ANSI B30.5.
p) An anti-two-block or warning device is required on all cranes as specified in ANSI B30.5 for each hoist line. This requirement may be waived by the BUEHSD for certain cycle duty crane operations such as pile driving and drilling rigs.
q) A qualified rigger must inspect the rigging prior to each use.
r) All windows in cabs must be safety glass that produces no visible distortion that will interfere with the safe operation of the machine.
s) Cranes, hoists, boom trucks and derricks shall not be installed or operated within 20' of a power line unless they follow 1926.1408 (a) (2).
t) Assembly/disassembly must be directed by a person who meets the criteria for both a competent person and a qualified person, or by a competent person who is assisted by one or more qualified persons ("A/D director"). See 1926.1404
u) Before commencing assembly/disassembly operations, the A/D director must ensure that the crew members understand all of the following
    1. Their tasks,
    2. The hazards associated with their tasks.
    3. The hazardous positions/locations that they need to avoid.

2) Ground Conditions
    a. Ensure that ground preparations necessary to meet the requirements. The equipment must not be assembled or used unless ground conditions are firm, drained, and graded to a sufficient extent so that, in conjunction (if necessary) with the use of supporting materials, the equipment manufacturer's specifications for adequate support and

degree of level of the equipment are met. The requirement for the ground to be drained does not apply to marshes/wetlands. "Ground conditions" means the ability of the ground to support the equipment (including slope, compaction, and firmness).

b. Inform the user of the equipment and the operator of the location of hazards beneath the equipment set-up area (such as voids, tanks, utilities) if those hazards are identified in documents (such as site drawings, as-built drawings, and soil analyses) that are in the possession of the controlling entity (whether at the site or off-site) or the hazards are otherwise known to that controlling entity.

c. If the A/D director or the operator determines that ground conditions do not meet the requirements in paragraph (a) of this section, that person's employer must have a discussion with the controlling entity regarding the ground preparations that are needed so that, with the use of suitable supporting materials/devices (if necessary), the requirements in paragraph (a) of this section can be met.

3) Signal Person Qualifications
   a. Know and understand the type of signals used. If hand signals are used, the signal person must know and understand the Standard Method for hand signals.

   b. The employer must make the documentation for whichever option is used available (Third party qualified evaluator or Employer's qualified evaluator) at the site while the signal person is employed by the employer. The documentation must specify each type of signaling (*e.g.*, hand signals, radio signals, *etc.*) for which the signal person meets the requirements.

   c. Please refer to 1926.1428 for reference.

Material Handling and Rigging

I. Policy Statement

Material handling and rigging incidents account for a large number of workers compensation claims annually. Each contractor working on a Turner project must comply with 29 CFR 1926, Construction Industry Regulations, Subpart H – Materials Handling, Storage, Use and Disposal, in addition to the following guidelines.

II. Procedures

1. General Material Storage
    a) Aisles and passageways must be kept clear at all times for the safe movement of material handling equipment and employees. Storage areas must be kept free of accumulating materials that contribute to hazards of tripping, fire & pest harborage.

    b) Do not store material within 6’ of any hoist way or interior floor opening.

    c) Do not store material within 10’ of an exterior wall which does not extend above the material.

    d) Subcontractors must ensure each employee is trained in proper lifting techniques. Employees shall not lift more than 50 pounds per person. Mechanical means should be used as much as possible.

2. Rigging
    a) General Requirements
        - A maximum of (3) three members (only beams and similar structural members) may be hoisted per lift. Materials other than structural steel members may not be multiple lift rigged and lifted.
        - Ensure the weight of the load and approximate center of gravity has been obtained.
        - Rig the load in a manner to ensure balance and stability during lifting activities
        - Individuals who rig loads must be qualified by their employer. An employer may not permit an individual to rig loads to be lifted by a crane unless the individual has received training and also has the experience appropriate to their level of work. All riggers must be documented as a qualified person.
        - A competent rigging supervisor must be onsite and engaged in all critical lifts.
        - Subcontractors must provide and maintain a current list of all qualified riggers to the Turner Project Staff.
        - A qualified rigger must inspect all rigging to be used prior to each use. Routes for suspended loads must be pre-planned to ensure that no employee is required to work directly below a load unless they are engaged in the connection of the steel.

- Inspections must also be conducted during use and where additional service conditions warrant.
- Defective or damaged slings must be removed from service immediately. Follow manufacturer's removal criteria.
- Taglines shall be utilized to control the load to minimize worker exposure to swinging loads.
- Review proper rigging requirements when lifting palletized materials.
- Slings in contact with sharp edges or corners should be protected with softeners or materials designed to prevent damage to the sling.

b) Lifting Chains
- Alloy steel lifting chains must have a permanently affixed, durable identification tag stating size, grade, rated capacity and sling manufacturer. Only Grade 8 or better is permitted.
- Job made shop hooks or links, makeshift fasteners formed from rebar or bolts, or other such attachments are not allowed on Turner projects.
- Lifting chain inspection criteria is based upon the frequency of use, the severity of the service conditions, the nature of the lifts being made, and the experience gained on the service life of slings used in similar circumstances. Such inspections shall in no event be at intervals greater than once every 12 months. A written record must be provided to Turner upon request.
- Lifting chains must be visually inspected, prior to each use.

c) Wire Rope Slings
- The manufacturer's safe working loads must be followed at all times. Wire rope slings shall be removed from service if missing sling identification.
- Wire rope must not be used if, in any length of eight diameters, the total number of visible broken wires exceeds 10% of the total number of wires. Follow manufacturer's removal criteria.
- Wire rope must not be used if it shows signs of excessive wear, corrosion, or defects.
- Slings must not be shortened with knots, bolts, or other makeshift devices.
- Slings must be protected from sharp edges with padding, softeners, or similar devices.
- Shock loading of a sling is prohibited, and slings must not be pulled from under a load when the load is resting on the sling.

d) Synthetic Slings
- Each synthetic sling must be identified with the name of the manufacturer, rated capacities and type of material.
- Synthetic slings must be immediately removed from service if any of the following conditions are present; acid or caustic burns, melting or charring of any of the sling surface, snag, puncture, tear or cut, broken, or worn stitches or distorted fittings. Follow manufacturer's removal criteria.

e) Shackles & Eye bolts

- Attachments, including, but not limited to hooks, rings, shackles, oblong links, pear-shaped links or other welded or mechanical links, must have a rated capacity sufficient for the lift.
- Eyebolts not shouldered to the load shall only be used for in-line loads.
- If the shackle is side loaded the rated load should be reduced according to the recommendations from the manufacturer. Each shackle body shall show the name or trademark of the manufacturer rated load and size.

f) Chain-falls / Manual Chain Hoist: Inspected before each use. The hoist chain shall not be wrapped around the load. The load shall be attached to the load hook by suitable means. The load shall not be applied to the point of the hook.

g) Winches: Attachments and anchorages for the winch base shall be capable of withstanding the loads imposed by the hoist during operating conditions.

Hoists and Elevators

1) Crane Suspended Personnel Platforms
   a) The use of a crane suspended personnel platform is prohibited on Turner projects unless the employer can demonstrate that conventional methods to do the work are more hazardous. The BUEHSD shall be notified of each request and must review and approve any deviations to this requirement.

   b) Specific crane operational criteria, listed in 29 CFR 1926, Subpart N, must be followed if it is determined that a suspended personnel platform will be used. The criteria include, but is not limited to, the following:
      - Crane configuration requirements and inspections,
      - Additional crane instrumentation and/or components,
      - Specific platform design, construction and loading requirements,
      - Specific rigging and trial lift guidelines.

2) Material and Personnel Hoists
   a) Material Hoists
      - All entrances to hoists must be protected by substantial gates or bars, which guard the full width of the landing entrance.
      - Operating rules must be posted at the operator's station along with the notice "No Riders Allowed".

   b) Personnel Hoists
      - Hoist way doors or gates shall be at least 6'6" high and shall have a mechanical lock, which cannot be operated from the landing side.
      - All entrances to hoists must be protected by substantial gates or bars, which guard the full width of the landing entrance.
      - Hoists shall be inspected on a weekly basis.
      - All hoists shall be inspected and tested at not more than three-month intervals.
      - All hoists shall have a "No Smoking" sign posted in the car and a fully charged fire extinguisher available for use.
      - No hoist shall be placed into service on a Turner project until inspected and tested and the supplemental reports are submitted to Turner.

Demolition

I. Policy Statement

Each contractor working on a Turner project will comply with 29 CFR 1926, Construction Industry Regulations, Subpart T – Demolition, in addition to the following guidelines.

Prior to mobilizing, all projects must follow the Turner Environmental Operations Program and obtain a hazardous materials pre-demolition survey from the owner. This Survey must be prepared by a qualified third-party environmental firm and shall identify all hazardous materials associated with the affected area.

II. Procedures

1. Preparatory Operations
    a) Prior to initiating demolition activities, an engineering survey of the building must be made by a competent person to determine the condition of the structure and identify areas subject to unplanned collapse. A copy of this inspection must remain onsite.

    b) In select demolition, if the utilities cannot be capped, shut off or locked out, a system must be in place to identify what utilities are active or de-energized. All utilities must be shut off, capped, or locked out of service beyond the building line before demolition work is initiated. A Hazard Assessment must be performed prior to the start of work to identify any hazardous chemicals, gases, explosives, flammable materials, or similarly dangerous substances that may have been used on the property.

    c) Where employees are exposed to fall hazards, guardrail and personal fall arrest systems must be used. Holes and openings must be identified, covered, and secured against accidental displacement, with appropriate “Danger - Hole” markings.

    d) Any openings cut in a floor for the disposal of materials can be no larger than 25% of the aggregate of the total floor area, unless the lateral supports of the removed flooring remain in place.

    e) Employee entrances to multi-story structures being demolished shall be completely protected by installing a canopy or sidewalk shed that is at least 8 feet out from the building with the walkway at least 2 feet wider than the building entrance/exit.

    f) Turner must ensure that the subcontractor has verified that all local ordinances and permitting issues have been addressed as they relate to demolition.

2. Stairs, Passageways and Ladders
    a) Access to a structure being demolished will be restricted to designated means of access and egress. Other access points will be closed at all times.

3. Chutes

a) All openings into the chute must be a minimum of 42" (+ or – 3") above floor elevation or fall prevention/protection must be provided.

b) No material may be dropped to a point outside the building unless a protective barricade is established. The material being dropped cannot be deflected or bounced any closer than 20' to the protective barricade.

c) All chutes must be entirely enclosed except for openings at or slightly above the floor level for the insertion of materials.

d) A substantial gate must be installed in each chute at or near the discharge end. A competent person must be assigned to control the operation of the gate and the backing and loading of trucks.

e) Chutes must be designed and constructed of such strength as to eliminate failure due to the impact of material and debris loaded into them.

f) When machinery will be near a chute opening, floor bumpers 4 inches thick & 6 inches wide are to be utilized, to prevent equipment from getting too close to the edge.

4. Removal of Walls, Floors & Steel
   a) Masonry walls, including sections of walls, will not be permitted to fall onto the floor of the building under demolition unless an engineer has determined that the floor can withstand the imposed load.

   b) No wall section, more than one story in height, will be permitted to stand alone without lateral bracing unless it was designed to stand alone.

   c) Structural or load-supporting members of any floor will not be cut or removed until all stories above such a floor have been demolished or removed.

5. Removal of Walls, Floors and Material with Equipment
   a) Mechanical equipment will not be used on floors unless the floors are of sufficient strength to safely support the equipment.

   b) Mechanical equipment will only be used for its intended purpose according to the manufacturer's recommendations.

6. Mechanical Demolition
   a) No employees will be permitted in an area where "ball" or "clam" work is being performed. Only employees necessary for the performance of the operation may be permitted in this area. The area must be identified with warning barricades and signs.

   b) During this operation continuous observations, by the competent person, must be made to identifying potential areas of failure.

Electrical Hazards Prevention

I. Policy Statement

Use of electricity on the jobsite poses serious hazards, with employees potentially becoming exposed to such dangers as electric shock, electrocution, fires, and explosions. All Turner employees and subcontractors working on a Turner project will comply with NFPA 70E Electrical Safety Practices and 29 CFR 1926, Construction Industry Regulations, Subpart K – Electrical in addition to the following guidelines.

II. Procedures

1. Working On or Near Exposed Energized Parts
   a) It is Turner policy that no one works on live electrical circuits. If a situation arises where it is impossible to perform a task with the circuit de-energized, the Turner Superintendent or Safety Manager shall contact the Business Unit Environmental, Health, and Safety Director prior to performing the work. A formal pre-construction meeting shall occur prior to any such work occurring. All energized electrical work shall comply with NFPA 70E Requirements. This includes exposures related to start-up, testing and commissioning.

   b) Only qualified persons may work on electric circuit parts that have not been de-energized under the procedures of 1910.333.

   c) Such persons must be capable of working safely on energized circuits and shall be familiar with the proper use of special precautionary techniques, personal protective equipment, insulating and shielding materials and insulated tools.

   d) All work must be completed with strict compliance to NFPA 70-E requirements and guidelines.

   e) The subcontractor shall provide proof of training for their workers.

   f) Light switches and receptacles must be protected by permanent or temporary cover plates prior to energizing the circuit.

   g) All boxes containing energized circuits must have a cover in place, regardless of elevation above floor.

   h) Electrical room doors shall be secured prior to energization.

   i) Even when all conducting parts are 100% insulated, entry into all junction and pull boxes will be treated as energized work until made safe by the steps below.
   j) Always de-energize if possible, following the lock-out/tag-out procedure discussed in this plan.

   k) When removing a cover from a junction box, before working, inspect all energized current-carrying parts. Check insulation and splices for damage. This inspection

should be done by journeyman electricians as "energized work," adhering to NFPA 70E practices and using arc-flash gear. Use infrared testing if necessary (for instance, if there is observed damage that appears to be due to excessive heat at a splice or a loose mechanical connection).

l) After inspection, while still adhering to NFPA 70E and wearing appropriate arc flash gear, protect all conductors with blankets or barriers to prevent shock or damage during cable pulling.

m) Care should be taken during the installation/removal of sheaves to prevent contact and damage to energized conductors.

n) If the above steps cannot be taken to control the potential for electrical hazards, then work in the box will require appropriate arc-flash protection.

2. Ground Fault Circuit Interrupters
   a) All 120-volt, single-phase 15 and 20 ampere receptacle outlets which are not part of the permanent wiring of the structure, and which are in use by employees shall have approved GFCI's.

   b) Turner requires that all projects be 100% GFCI compliant.

   c) The installing subcontractor, i.e., the electrical subcontractor, shall test each power receptacle for proper installation including polarity, grounding, etc. The electrical subcontractor will conduct and document monthly tests after the initial installation.

3. Electric Tools
   a) All portable electric tools such as saws, hammers, drills, vibrators, and float machines must bear the label of a Certified Testing Agency, such as Underwriters Laboratories, CSA, ETL, or the like.

4. Extension Cords
   a) Only round, heavy-duty, minimum AWG 12-gauge cords are acceptable for use on site. Extension cords must include, at a minimum, the following designations on the cord jacket: W for outdoor use (or S if indoors), and O when the cord is present in an oily environment.

   b) Cords must be maintained in their original design configuration.

   c) Any cord which is damaged or has the grounding pin removed shall be removed from service.

   d) Plug ends can only be repaired by a qualified electrician.

   e) Whenever a power tool or cord is used where the circuit is not GFCI-protected, a portable GFCI is required at the receptacle.

   f) Extension cords cannot be connected in series. The manufacturer's recommendations must be followed.

g) Extension cords cannot exceed 100’ or run through doorways. The electrical contractor is to install temporary receptacles within 100’ of where any employee might be standing inside the structure.

h) All electrical cords shall be elevated to a minimum 8’ in the air in hallways, corridors, aisles, stairways, doorways, and exit areas where a tripping hazard may occur.

i) If the cords cannot be elevated, they shall be protected from damage by equipment, carts, trucks, and other rolling objects.

j) Extension cords shall not be fastened with staples, hung from nails, or suspended with non-insulated wire.

5. Temporary Wiring
   a) All temporary wiring and lighting must meet current NEC codes. Flat cords (Romex) are not to be used as a flexible cord and are to be hardwired.

   b) Temporary lighting must never be put on the same circuit as temporary receptacles.

6. Temporary Lighting
   a) The minimum illumination level is 5 foot-candles in general areas and 15 in electrical or mechanical rooms, special areas where additional lighting might be needed, or where contractors are placing temporary offices. The electrical contractor is to provide LED lights in every room.

   b) When installing temporary lights and choosing the elevation to hang them, anticipate the future placement of ductwork, piping, etc., that may block and reduce light.

   c) Installation of temporary lighting must be per manufacturer’s specifications and in compliance with OSHA, NFPA, NEC and local codes.

7. Pulling Cable

   a) When blowing line into a conduit to pull wire or cable, follow the manufacturer’s instruction for the tools being used. When pressurizing the conduit, do not exceed the allowed pressure. The assembly must have a pressure release valve set for the maximum pressure not to be exceeded, as well as a pressure gauge. No one should be located where they could be struck by components used to pressurize the conduit or by the plug pulling the line shooting out the other end.

   b) When using a “tugger” (puller motor assembly) to pull cable or wire, first document that all applicable employees have received training on the equipment and then follow the manufacturer’s instructions. The force gauge must be operable and calibrated, and the anti-reversing pawl must be functional. Do not use in a wet environment. Use the correct size rope with the diagramed configuration. Keep the rope away from the operator’s feet and keep body parts

out of pinch points. Never wrap rope around wrists or body parts. Never exceed the load rating.

Turner

Control of Hazardous Energy – LockOut/TagOut (LO/TO) Program

I. Policy Statement

1. This program applies to all Turner Construction personnel and contracted trade partners or vendors and complies with all applicable OSHA regulations, codes, NFPA 70E standards, or other requirements during all project phases.

2. The purpose of this program is to eliminate the potential release of energy that could threaten the safety and health of people or damage equipment. Energy includes, but is not limited to, electrical, mechanical, hydraulic, pneumatic, chemical, thermal, medical gases, gravitational, potential, kinetic and other energy.

3. The intent of this program is to provide practical safe work conditions for employees relative to the hazards and hazardous energy around them. These hazards may arise from different phases including construction, start-up and commissioning, maintenance, operations, troubleshooting, testing, inspections, or another phase of a project.

II. Scope and Requirements

1. Turner Construction personnel and all contracted trade partners, vendors, and other contractors are required to have a written Lockout/Tagout procedure if there is potential for employees to be exposed to a hazardous energy. The LO/TO procedure shall identify the minimum procedural steps necessary to verify a “zero energy state” before any work is started.

2. Turner Construction project staff has the responsibility to ensure a written site-specific LO/TO program is established by its respective contractors who will have personnel potentially exposed to hazardous energy. They will review it for effectiveness and will verify that it addresses all forms of hazardous energy. This includes fixed, permanently installed equipment, temporarily installed equipment, portable equipment, temporary and permanent power.

3. Each contractor working around a potentially hazardous energy will administer their own LO/TO program. Each contractor will designate one or more competent persons who will be responsible for their entire program and will also ensure proper coordination with affected contractors.

4. Appendix E contains Turner Construction’s LO/TO procedure and is the minimum required for a project. As outlined in the regulation, each employer shall implement and document an overall hazardous energy safety program that directs activities appropriate to the risk associated with the hazardous energy.

5. Site specific Environmental Health and Safety Plans may have a more complex LO/TO procedure.

6. All personnel involved in LO/TO shall be trained according to OSHA and NFPA 70E and it shall be documented.

7. All personnel involved in LO/TO shall address employee exposure to hazardous energy with a Pre-Task Plan (PTP) or Method of Operating Procedure (MOP) that incorporates the following:

    7.1. Identify hazards.

    7.2. Assess risks.

    7.3. Implement risk control according to the hierarchy of risk control methods. These include Elimination, Substitution, Engineering Controls, Awareness, Administrative Controls, and PPE.

    7.4. Shall address the potential for human error and its negative consequences on people, processes, the work environment, and equipment.

III. Communication and Responsibility

1. Each employer shall be responsible for the following:

    1.1. Providing the equipment necessary to execute LO/TO procedures.

    1.2. Providing LO/TO training to workers in accordance with OSHA and NFPA70E

        A. The initial LO/TO training shall encompass the LO/TO procedures and.

        B. The employee's responsibility in the execution of the procedures

2. Auditing the LO/TO program in accordance with OSHA and NFPA 70E.

3. Auditing execution of the LO/TO program in accordance with OSHA and NFPA

4. Employee responsibility:

    4.1. The employee shall comply with the safety-related work practices and procedures provided by the employer.

    4.2. Be responsible and have the knowledge and understanding required if directing work, to stop work, identify hazards, read and mark-up applicable drawings for isolation points, review for potential back-feed, walk the system down, LO/TO, or MOP for safe application and use of LO/TO, and removal of all energy controls and isolation devices.

4.3. Shall ensure procedural compliance with the LO/TO procedure for all personnel.

4.4. Ensure coordination with others who are affected.

IV. Training and Documentation

1. Each employee affected by the LO/TO procedure shall be trained in the procedure. Records of training will be kept on site and be made available to Turner Construction upon request.

2. Each employer utilizing LO/TO must establish a program and utilize procedures for affixing appropriate lockout or tagout devices to energy isolating devices, and to otherwise disable machines, piping, or equipment to prevent unexpected release of stored or residual energy in order to prevent injury to employees.

3. Each employee shall be trained in the identification of the lockout / tagout device.

4. A log shall be maintained on site that identifies the following:

    - Date of usage,
    - Number of locks and tags used,
    - Contractors involved,
    - Time of LO/TO initiation,
    - Time of LO/TO removal,
    - Designated competent persons.

5. In the event a lock is left on the lockout device and all of the subcontractors have verified with Turner that the lock should be removed, and the system is safe to energize, a Turner Senior Manager must be notified. After consultation between the BUEHSD and the Turner Senior Manager, the subcontractor owning the lock may remove it.

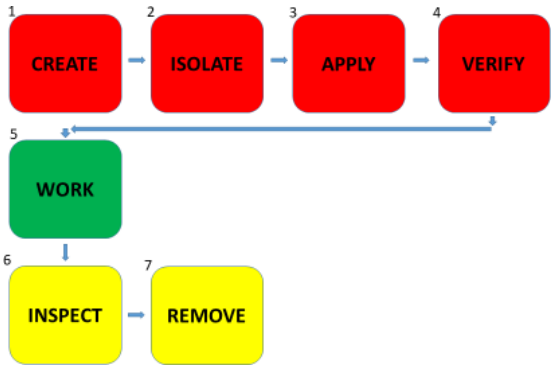
6. This process must be documented to show you have followed all the steps to keep the workforce safe and have used “all reasonable means” to contact the employee who was responsible for the lock.

7. In the event an employee is discovered tampering with or violating the LO/TO procedure, the employee will be removed from the project.

Appendix E: Lockout/Tagout (LO/TO) Procedure

Table of Contents:

1. LO/TO Operations and Log
2. Definitions
3. Competent Person and List
4. Locks, tags, and energy isolating devices (EID)
5. Simple LO/TO and Complex LO/TO Operations
6. Emergency Release
7. Zero Energy State Verification
8. LO/TO Process
9. Discipline and Enforcement





RED / Danger – Perform these steps in order and verify ZERO energy state BEFORE work can begin



GREEN / GO – WORK can begin once a ZERO energy state has been reached for the given work scope AND personnel apply their lock



YELLOW / Caution – Verify work is complete and Inspect equipment is free from hazards before removing LO/TO

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1. LO/TO Operations and Log

1.1. Lockout/Tagout is required per NFPA 70E and OSHA and it is required when an employee is required to place any part of his or her body into an area on a machine or piece of equipment where work is actually performed upon the material being processed (point of operation) or where an associated danger zone exists during a machine operating cycle.

1.2. Personnel who are working around hazardous energy shall use Lockout/Tagout (LO/TO) procedures. Personnel shall affix their personal lock and tag to an energy isolating device (EID) such that the component is isolated and can't be operated or the machine can't be started. The component(s) will be de-energized, isolated, and locked out to obtain a "Zero energy state" before work may start.

1.3. Affected employees shall be notified by the employer or authorized employee of the application and removal of lockout devices. Notification shall be given before the locks are applied, and after they are removed from the machine or equipment.

1.4. The LO/TO Log is used to track the placement and removal of energy isolating devices (EID). Whenever there is a need for an EID or a LO/TO, this log will be used.

1.5. Personnel who are using LO/TO shall sign on to the LO/TO Log when they place their personal lock and tag on an isolation device. They will sign off the LO/TO Log when they remove their personal lock and tag.

1.6. The foreman, first line supervisor, or person directing the work will leave their personal lock(s) and tag(s) on until work is complete.

- Exception, there is a transfer of responsibility of that work scope to another responsible foreman or supervisor. After having a turn-over, walking the work scope and LO/TO down, the new foreman/supervisor may place their personal lock(s) and tag(s) on the identical EIDs of the foreman/supervisor being relieved. Next, the new foreman/supervisor may now sign on to the LO/TO Log and the previous foreman/supervisor may now sign off the LO/TO Log. The responsibility of care and custody of the work scope, the zero-energy state, and the LO/TO has now been transferred.

1.7. The LO/TO Log contains the following information:

- Project Name / Site
- Location: Name of the electrical/mechanical room, floor, level, elevation, building
- Today's Date
- Scope of work – describe the work scope in detail.
- List the Energy Isolating Devices (EIDs) that need to be isolated to obtain a Zero Energy State (Use electrical single one-line diagrams, P&IDs, drawings, and attach to this LO/TO Log).
- Competent person requesting the LO/TO – Did you perform a walk down to verify? Yes or No
- Competent Person Isolating the EIDs and/or verifying Isolation – Did you perform a walk down to verify? Yes or No
- (Print Name/Company): Foreman / Supervisor sign on after they place their lock(s) on. Their lock(s) stay on the EID(s) / isolation point(s) or group LO/TO box until the work is complete.

  - The only exception is a transfer of responsibility to another Foreman / Supervisor who will place their lock on and sign on to the LO/TO Log first.

- Affected Employees sign on and place their lock(s) on before they start work and sign off and remove their lock(s) at the end of their shift, using a time stamp.

1.8. See an example of the LO/TO Log at the end of this procedure.

2. Definitions

2.1. Affected employee: An employee whose job requires him/her to operate or use a machine or equipment on which servicing, or maintenance is being performed under lockout, or whose job requires him/her to work in an area in which such servicing or maintenance is being performed.

2.2. Authorized employee: A person who locks out or tags out machines or equipment in order to perform servicing or maintenance on that machine or equipment. An affected employee becomes an authorized employee when that employee's duties include performing servicing or maintenance covered under this section.

2.3. Capable of being locked out: An energy isolating device (EID) is capable of being locked out if it has a hasp or other means of attachment to which, or through which, a lock can be affixed, or it has a locking mechanism built into it. Other energy isolating devices are capable of being locked out, if lockout can be achieved without the need to dismantle, rebuild, or replace the energy isolating device or permanently alter its energy control capability.

2.4. Complex LO/TO: All complex LO/TO procedures shall require a written plan of execution that identifies the person in charge. It shall vest primary responsibility in an authorized employee for employees working under the protection of a group LO/TO box or device. The person in charge shall be held accountable for safe execution of the complex LO/TO. All complex LO/TO plans shall identify the method to account for all persons who might be exposed to hazardous energy. A complex LO/TO procedure shall be permitted where one or more of the following exists:

- 1) Multiple energy source
- 2) Multiple crews
- 3) Multiple crafts
- 4) Multiple locations
- 5) Multiple employers
- 6) Multiple disconnecting means
- 7) Particular sequences
- 8) Job or task that continues for more than one work period or shift

2.5. Control lock: A padlock used to secure a group LO/TO box or device and ensure the established LO/TO work boundary can't be modified until authorized by the person in charge of the LO/TO procedure. The person in charge of LO/TO maintains control of the control lock keys.

2.6. Energized: Connected to an energy source containing residual or stored energy.

2.7. Energy isolating device (EID): A mechanical device that physically prevents the transmission or release of energy, including but not limited to the following: A manually operated electrical circuit breaker; a disconnect switch; a manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors, and, in addition, no pole can be operated independently; a line valve; a block; and any similar device used to block or isolate energy. Push buttons, selector switches and other control circuit type devices are not energy isolating devices.

2.8. Energy source: Any source of energy includes, but is not limited to, electrical, mechanical, hydraulic, pneumatic, chemical, thermal, medical gases, gravitational, potential, kinetic and other energy.

2.9. Hot tap: A procedure used in the repair, maintenance and services activities which involves welding on a piece of equipment (pipelines, vessels, or tanks) under pressure, in order to install connections or appurtenances. It is commonly used to replace or add sections of pipeline without the interruption of service for air, gas, water, steam, and petrochemical distribution systems.

2.10. Lockout: The placement of a lockout device on an energy isolating device, in accordance with an established procedure, ensuring that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.

2.11. Lockout device: A device that utilizes a positive means such as a lock, either key or combination type, to hold an energy isolating device in the safe position and prevent the energizing of a machine or equipment. Included are blank flanges and bolted slip blinds. Lockout devices shall be substantial enough to prevent removal without the use of excessive force or unusual techniques, such as with the use of bolt cutters or other metal cutting tools.

2.12. Normal production operations: The utilization of a machine or equipment to perform its intended production function.

2.13. Servicing and/or maintenance: Workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying, and maintaining and/or servicing machines or equipment. These activities include lubrication, cleaning or unjamming of machines or equipment and making adjustments or tool changes, where the employee may be exposed to the unexpected energization or startup of the equipment or release of hazardous energy.

2.14. Setting up: Any work performed to prepare a machine or equipment to perform its normal production operation.

2.15. Simple LO/TO: All LO/TO procedures that involve only a qualified person(s) de-energizing one set of conductors, circuit part source, or EIDs for the sole purpose of safeguarding employees from exposure to hazards shall be considered to be a simple LO/TO. Simple LO/TO procedures shall not be required to be written for each application. Each worker shall be responsible for his or her own LO/TO.

- Exception: LO/TO is not required for work on cord and plug connected equipment for which exposure to the hazards of unexpected energization of the equipment is controlled by the unplugging of the equipment from the energy source, provided that the plug is under the exclusive control of the employee performing the servicing and maintenance for the duration of the work.

2.16. Standardized: Lockout devices shall be standardized within the facility in at least one of the following criteria: Color; shape; or size.

3. Competent person and list

3.1. “Competent person” means one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

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3.2. Every trade partner, vendor, contractor, or other company that will have personnel potentially exposed to hazardous energy shall designate at least one person as a competent person relating to LO/TO.

3.3. The LO/TO competent person or designee(s), shall be responsible to control all aspects of the LO/TO procedure per NFPA 70E and OSHA. This includes ensuring training and documentation for the appropriate personnel. The LO/TO competent person will also ensure coordination with other contractors, vendors, and tradesmen.

3.4. Each company's leadership team (Site Manager, Project Manager, etc.) shall list their competent person(s) name(s) and contact information on company letterhead which Turner Construction will procure.

3.5. Turner Construction will compile these contacts in the competent person list which will be conspicuously posted around the jobsite/project (Ex: near hazardous energy, in electrical rooms, in meeting rooms, in offices).

3.6. The purpose of the competent person list is to identify and promote communication amongst personnel which have been deemed competent relating to LO/TO. It also acts as a tool for everyone to use when there is a question pertaining to hazardous energy, LO/TO, or to call and ask for help.

3.7. See an example of the competent person list at the end of this procedure.

4. Locks, tags, and energy isolating devices (EID)

4.1. Lockout devices shall be standardized within the facility in at least one of the following criteria: Color; shape; or size.

4.2. Lockout devices shall be substantial enough to prevent removal without the use of excessive force or unusual techniques, such as with the use of bolt cutters or other metal cutting tools.

4.3. All employee locks are keyed differently.

4.4. A DANGER, "DO NOT OPERATE" (DNO) Tag shall be affixed to employee personal locks at all times (See an example of a "DNO" tag at the end of this procedure).

4.5. All DANGER, (DNO) tags will have the following information on them at a minimum:

- Employee Name
- Contact Number
- Company Name

4.6. Personal locks and tags shall only be used in accordance with the LO/TO procedure.

4.7. All component locks will be the same color but a different color than control locks. They will all be keyed differently.

4.8. All control locks will be the same color but a different color than component locks. They will all be keyed differently.

4.9. An energy isolating device is a mechanical device that physically prevents the transmission or release of energy, including but not limited to the following: A manually operated electrical circuit breaker; a disconnect switch; a manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors, and, in addition, no pole can be operated independently; a line valve; a block; and any similar device used to block or isolate energy.

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4.10. Push buttons, selector switches and other control circuit type devices are not energy isolating devices. The use of software or programming controls, interlocks, or other non-physical disconnecting devices are prohibited from being used to isolate energy.

4.11. See an example of a pictures of the tags at the end of this procedure.

5. Simple LO/TO and Complex LO/TO Operations

5.1. Simple LO/TO Operations

- When work involves all of the following a simple LO/TO may be used.
  - A single employee, and a single EID will remove all hazardous energy, and work will not exceed the employee's shift, a simple LO/TO may be used.
- A simple LO/TO operation is one in which the employee applies their personal lock and tag either to an EID or to a LO/TO device such as a LO/TO hasp that is attached to an EID such that it can't change position or be operated.
- Simple LO/TO does not require completion of a LO/TO Log.
- If the simple LO/TO extends past the work shift when it was applied, has more than one EID, or requires additional people, it shall be made into a group LO/TO.

5.2. Complex LO/TO Operations

- When work involves any of the following a group LO/TO operation shall be used.
  - More than one employee, a vendor, or another contractor, more than one EID to isolate the hazardous energy, or exceeds one shift.
- A complex LO/TO operation is one in which a group LO/TO box and control lock will be used to maintain control of the work boundary and allow employees to attach their personal locks and tags.
- Control lock keys are maintained by the person in charge of the LO/TO procedure.
- All of the component lock keys shall be placed inside the lock box before the control lock is placed on the lock box.
- Before work can begin, all employees who potentially could be entering or crossing the work boundary shall attach their personal lock and tag to the group LO/TO box and sign on to the LO/TO Log. They must all verify the EIDs. Also, they must perform or directly observe verification of zero energy.

6. Emergency Release

6.1. Under extraordinary circumstances, it may be necessary to remove a lock that has been affixed by someone else or without the proper signoff.

6.2. Only the Site Manager/Project Manager or designee (Owner) may authorize the removal of a lock and only in accordance with the following stipulations:

6.2..1. The worker who is responsible for the lock is not present at the facility/project, and all reasonable efforts have been taken to contact the responsible worker and their supervisor.
6.2..2. All measures are taken to notify the worker prior to them resuming work.
6.2..3. In addition, if the lock is on a component, EID, or lock box relating to work or an inspection that is in the construction or startup and commissioning phase, the authorization of the energy marshal and commissioning manager will also be required, respectively. An Emergency Release Authorization form will be kept documenting these authorizations.

7. Zero Energy State Verification

7.1. All machines, equipment, and components shall be treated as energized.
7.2. Never assume that because an electrical disconnect is open / off or a valve handle is in a closed position that the EID is operating properly or verification of zero energy is not needed.
7.3. Each authorized employee will perform these verifications of zero energy or directly observe them in their entirety prior to starting work and will document the verification.
7.4. If a worker is isolating equipment where look-alike equipment is energized in the immediate area, refer to the Electrical Safety Standard.

7.5. Electrical Verification (Live-Dead-Live)

7.6. In the case of isolations above 1,000 volts AC, residual energy shall be discharged, and all conductors must be grounded.
7.7. A tag will be affixed to the ground cluster, and it will be added to the LO/TO Log. The intent is such that after the work is complete and the locks are being removed from the EIDs to close out the LO/TO, these grounds will be un-installed before the locks are removed from the EIDs isolating them.
7.8. When testing for voltage or doing electrical fault finding, all appropriate personal protective equipment (PPE) and insulated hand tools rated for the voltage under test shall be used.
7.9. When testing for the absence of voltage, an appropriate calibrated multi-meter shall be used.
7.10. Live-dead-live checks will be completed using a meter by first testing a known source, then the component within the work boundary, and finally, against the same known energized source to ensure its proper operation (i.e., using a voltage providing unit or equivalent).

7.11. Be sure to check neutral to ground voltage as part of live-dead-live verification. For more information on this process, see the Electrical Safety Standard.

7.12. Mechanical Verification

7.13. These energy sources may be either the primary energy source or can be a residual, or stored energy source. Stored or potential energy still exists when a valve is closed on a pneumatic, or

hydraulic system and must be dissipated properly through the use of vents and/or drains, as applicable. These vents or drains may need to be locked open to prevent system pressure from rising unexpectedly.

7.14. Water storage tanks, even though vented to the atmosphere, could be under pressure at their low points. The amount of pressure is dependent on the height of the water since one foot of water creates .433 PSI / 2.985 kPa of pressure.

7.15. Take caution when working on fan systems such as fan arrays or relief fans to ensure that kinetic, or rotational energy has been mitigated properly. Fans that are not operational can rotate freely and should be blocked by appropriate means.

7.16. Primary or stored energy must be removed, bled down, dissipated, and/or blocked as applicable. Proper means to determine zero energy on mechanical systems may include, but are not limited to, live dead live verification, attempt to start, observing existing and/or applied temperature instruments, or pressure gauges as applicable to the mechanical equipment and the condition of the equipment.

7.17. For mechanical systems, where feasible, high point vents shall be used to verify a system is depressurized and low point drains shall be used to ensure the system is properly drained.

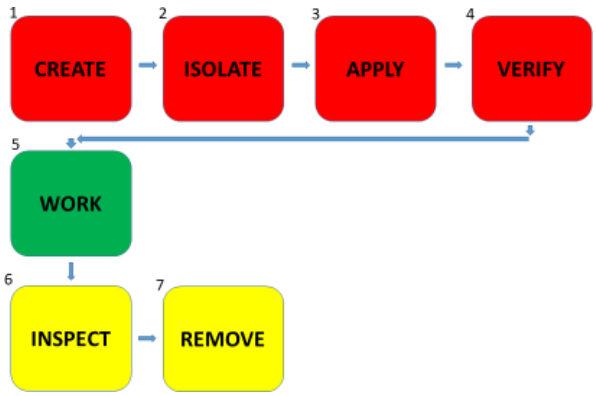
7.18. Drains shall be left in the open position to ensure isolations are holding.

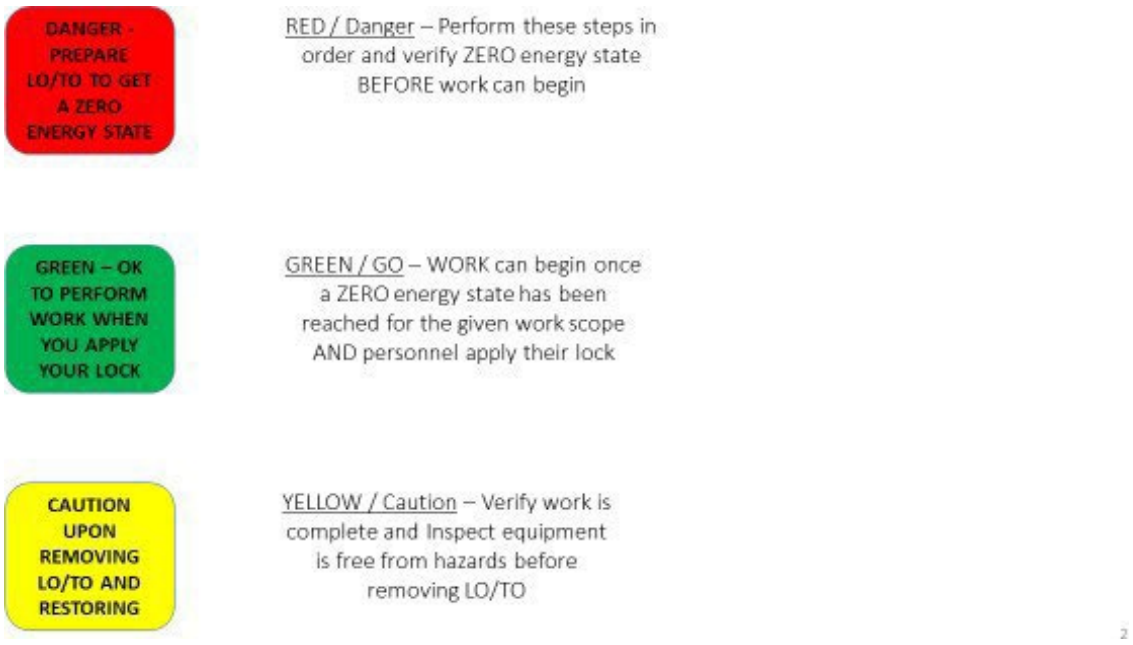
7.19. Check temperature gauges to confirm that thermal energy has been discharged.

7.20. Check pressure gauges to confirm that hydraulic pressures have been discharged.

8. LO/TO Process

LO/TO PROCESS FLOW DIAGRAM





8.1. Create - In this phase it is imperative to:

8.1..1. Understand the point of operation, location, and type of hazardous energy
8.1..2. Understand the work scope and work boundaries
8.1..3. Identify the proper isolation points

8.1..4. Use the correct updated revision of electrical single one-line diagrams, P&IDs, drawings, as-built and other documentation
8.1..5. Physically walking down, the system and components
8.1..6. Competent people communicate and have a LO/TO safety discussion and shall identify and notify all affected parties.
8.1..7. Use the LO/TO Log to document this process, and the documentation used to identify the EIDs shall be attached to the LO/TO Log

8.2. Isolate

8.2..1. Once the LO/TO Log has been created the competent person or an authorized employee shall operate EIDs as needed so they are in the correct position before applying LO/TO.
8.2..2. A competent LO/TO or authorized employee physically installs and attaches the component locks to the EIDs.

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8.2..3. This step can be performed after the entire work boundary is established or after each EID is placed and checked in the correct position.

8.2..4. After the component lock is placed on the EID, the component key is placed into a group LO/TO box.

8.2..5. The component lock is checked to make sure it is locked, and the EID is checked so it can't be operated without removing the component lock.

8.2..6. When all of the component locks are applied, and all of the keys are in a group LO/TO box, then a control lock is placed on the group LO/TO box.

8.2..7. A competent person (Typically the LO/TO Manager, Electrical Superintendent, or coordinator) will maintain care and custody of the control lock.

8.3. Apply

8.3..1. A competent LO/TO or authorized employee physically walks down all of the EIDs and ensures they are in the correct positions and locked out.

8.3..2. The affected employee(s) directing the work scope will attend this walk through and witness the position of the EIDs being checked in the correct position/direction.

8.3..3. The affected employee(s) apply their personal lock to the group LO/TO box, sign on to the LO/TO Log and maintain exclusive control of their personal key.

8.3..4. All personnel applying a lock to either a group LO/TO box or to a LO/TO hasp or device will maintain care and custody of the key(s) to their personal lock(s).

8.3..5. All affected personnel who will be performing work near a point of operation, potentially near hazardous energy, or where an associated danger zone exists, shall place their personal lock and tag on the group LO/TO box and sign on to the LO/TO Log before work begins.

8.4. Verify

8.4..1. Verify adequate isolation of work area prior to releasing and verifying zero energy (e.g., comparison of drawing to established boundaries).

8.4..2. In accordance with approved procedure, release stored hazardous energies still present after LOTO is applied.

8.4..3. Install necessary controls (e.g., blocks) to prevent uncontrolled rotating/moving energy release during work.

8.4..4. Verify absence of hazardous energy (e.g., live-dead-live, open drains, witness pressure drops, etc.).

8.4..5. Each authorized employee entering the work boundary shall perform a walk down to verify EIDs or isolation points prior to commencing work.

8.4..6. Each authorized employee entering the work boundary shall perform or directly observe verification of zero energy tests.

8.5. Work

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8.5..1. Personnel who have their personal locks and tags on the group LO/TO box that has the component keys in it per the LO/TO Log and they are signed on to the LO/TO Log may now begin work.

8.5..2. If the work is not complete when the worker is ready to leave (due to end of their shift, injury/illness, re-assigned to a different foreman or crew or another reason), the worker removes their personal lock(s) and tag(s) from the group LO/TO box and signs off the LO/TO Log

8.5..3. The Foreman/Supervisor directing the work will maintain their personal lock on the group LO/TO box until the work is complete.

8.5..3.1. Exception, there is a transfer of responsibility of that work scope to another responsible foreman or supervisor. After having a turn-over, walking the work scope and LO/TO down, the new foreman/supervisor may place their personal lock(s) and tag(s) on the identical EIDs of the foreman/supervisor being relieved. Next, the new foreman/supervisor may now sign on to the LO/TO Log and the previous foreman/supervisor may now sign off the LO/TO Log. The responsibility of care and custody of the work scope, the zero-energy state, and the LO/TO has now been transferred.

8.5..4. The competent LO/TO or authorized employee may then unlock the control lock with the control key, obtain the component keys, and unlock the component locks clearing the LO/TO

8.6. Inspect

8.6..1. Once the work scope is complete, the Foreman/Supervisor verifies the work is complete and the work area is free of hazards, then they may inspect the work boundary area.

8.7. Remove

8.7..1. When the inspection is satisfactory, the work is complete and there are no hazards the Foreman/Supervisor may remove their personal lock and sign off of the LO/TO Log.

8.7..2. The competent LO/TO or authorized employee may now unlock the control lock on the applicable group LO/TO box.

8.7..3. The competent LO/TO or authorized employee may now unlock the component locks on the EIDs using the LO/TO Log to close the LO/TO.

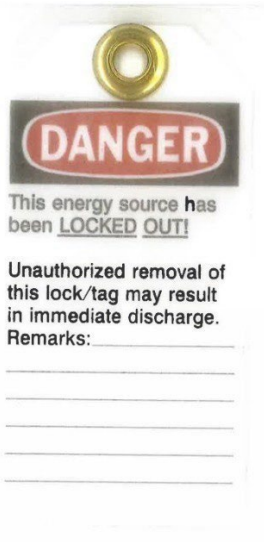
9. Discipline and Enforcement

9.1. Failure to comply with the LO/TO Procedure shall be considered just cause for discharge or removal of the person(s) involved from the job site.

9.2. Examples of failure to comply include the following:

- Operating or working on a component, EID, system, or piece of equipment that is energized or the potential of hazardous energy is present, without obtaining a proper LO/TO. This includes verifying a Zero Energy State for the work area.

- Operating or working on a component, EID, system, or piece of equipment in violation of the lock(s) in place.
- Removing a lock from an EID, component, system, or piece of equipment without proper authorization.










GROUP
LOCK / TAG-OUT


PNL-LE19A
Arc Flash Information
DANGER
DANGER
PANELS ARE
ENERGIZED

Excavations

I. Policy Statement

The intent and purpose of this policy is to limit and/or eliminate the dangers associated with excavation and trenching operations that could expose workers to the possibility of serious injury or death. Each contractor working on a Turner project will comply with 29 CFR 1926, Construction Industry Regulations, and Subpart P – Excavations in addition to the following guidelines.

II. Procedures

1. Specific Excavation Requirements
    a) A comprehensive training program in the recognition, identification, evaluation, and control of excavation hazards must be provided to all workers prior to working in an excavation or trenching operation.

    b) Underground utility installations must be identified and marked prior to beginning any excavation. The Contractor's proposed method for identifying known utilities must be identified as required by Turner Construction's Surface Penetration Request Permit. The Project Superintendent will ensure that JHA's are completed and reviewed for all excavation activities for Turner, subcontractors and all their tiers.

    c) A competent person must be identified and submitted to Turner prior to the start of work.

    d) The competent person will be on-site during all excavation work to determine the soil type and its stability by performing one visual and one manual test in accordance with 29 CFR 1926, Subpart P Appendix A.

    e) Inspections must be conducted daily and after every rainstorm or other hazard-increasing occurrence. Daily inspection reports must be submitted to Turner upon request.

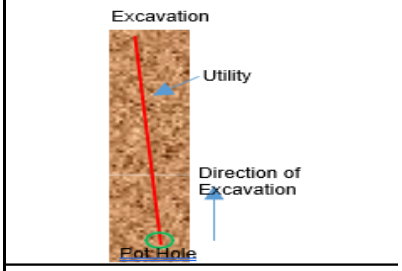
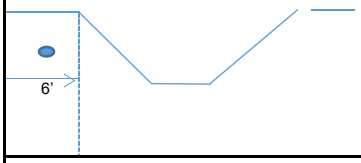
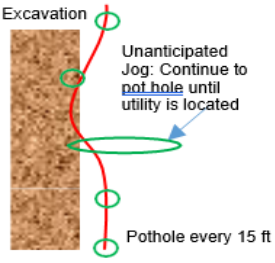
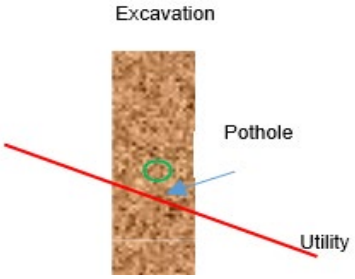
    f) All excavations, regardless of depth, shall be protected by safety fence or guardrails.

    g) Any excavation greater than 4' in depth must have access/egress provided. The maximum travel distance to a means of egress cannot exceed 25'.

    h) A Surface Penetration Permit must be utilized when a sub plans to penetrate the ground at any depth. This should be filled out and utilized for cutting into slabs and coring walls as well.
        - All utilities identified to be located within 6' of excavation must be daylighted by hydro excavating or hand digging.
        - All utilities must be potholed at the start of excavation and every 15' by hydro excavation or hand digging. No machinery is allowed to be used until

known utilities are located.

- In all cases, interior or exterior, surface must be evaluated for appropriate type of scan (GPR, X-Ray, Utility Locator, wand, etc..) in the area of intended excavation.

Condition	Action	Example
Known utility is within excavated/disturbed area and being uncovered as work progresses	• Pothole location at the start of the of the known utility in excavation • Utility must be potholed every 15'. • Note: Utilize non- intrusive methods (hand digging or hydro-excavate) when within 24" of a known utility	
Utility runs parallel and within 6 feet of the edge of excavated/disturbed area. 	• All utilities identified to be located within 6' of excavation must be daylighted by hydro excavating or hand digging. • Pothole at the start location of the excavated/disturbed area and every 15' along the parallel length of the excavated area. • The intent is to verify that the utility does not veer into path of excavated/disturbed area.	
Utility intersects excavated/disturbed area	• Pothole the approximate center of the intended excavated/disturbed area. Follow condition 1 if utility will remain visible while excavating along width of excavated/disturbed area. • Note: Utilize non- intrusive methods (hand digging or hydro-excavate) when within 24" of a known utility.	

2. Requirements for Protective Systems
    a) Excavations greater than 4 feet in depth must be protected by one or more of the following systems:
        - Sloping / benching of sides to allowable configurations and slopes.
        - Cannot bench C type soil.
        - Using tabulated data.
        - Utilizing a trench box or shield.
        - Using a slope or shield system designed by a registered professional engineer. Refer to 29 CFR Subpart P, Appendix B.
            - Shield within 2 feet of the bottom of trench,
            - Employees are not permitted in the trench when the shield is moved,
            - Shield sticks up 18” above the top of slope.

    b) Spoil piles must be kept back no less than two feet from the leading edge of an excavation.

    c) A registered professional engineer must design sloping or benching systems for excavations greater than 20 feet in depth.

    d) Persons walking or working adjacent to an excavation greater than 6 feet in depth. must be protected from fall hazards in accordance with Turner’s 100% Fall Protection Policy.

3. Training Requirements
    a) Each employee affected by the excavation and trenching systems must be trained in the procedures specific to the project, i.e., access / egress points, location of utilities, etc.

    b) Each affected employee must be trained in all sloping, benching, and shoring procedures prior to entering the excavation or trench.

    c) A competent person must be on-site throughout the excavation and/or trenching operation to determine soil type through visual and manual testing, hazard identification, effectiveness of sloping, benching, or shoring procedures, etc.

    d) Atmospheric monitoring, if deemed necessary by the Competent Person or other competent party, must be documented, and conducted by someone trained in the use of atmospheric monitoring equipment.

Fall Prevention

I. Policy Statement

Turner has a Zero Tolerance Policy in effect for violations of our 6' fall prevention policy. Anyone found violating this policy may be permanently removed from the project. Each contractor must designate a competent person trained in fall prevention techniques and submit their qualifications to Turner upon request. Each contractor working on a Turner project will comply with 29 CFR 1926, Construction Industry Regulations, Subpart M - Fall Protection, in addition to the following guidelines.

II. Procedures

1) General Fall Prevention Requirements
   a. Each contractor, with employees exposed to a fall greater than 6', must submit a written fall prevention plan to Turner prior to beginning work on site. The subcontractor and Turner staff will conduct a weekly inspection of their system.

   b. All conditions that will require personal fall protection shall be discussed and documented in the daily Pre-Task Plan and reviewed in the field by the crew leader.

   c. At no time shall a Safety Monitor system be used as a means of fall protection.

   d. With regard to fall of materials, Turner operates with a strict "No Gaps" policy. All working platforms or edge protection must be constructed to ensure there are no gaps which material could fall through. Employees must be protected from falling objects by the installation of toe boards, barricades, safety nets or canopy structures.

      Where a risk of materials falling or being dropped, including during a lifting operation, an exclusion zone must be established. The exclusion zone should be constructed with physical barriers such as wood or metal guardrail systems, cable wire rope or chain or flagging. Danger and Caution tape will not be accepted for use in exclusion zone construction. The exclusion zone must be secured from tipping and signed. The size of the exclusion zone must consider deflection or arc of the falling material.

   e. All tools, materials or equipment which have the potential to breach the perimeter protection must be positively secured back to the worker or structure through the use of tool lanyards or synthetic rope of line (natural fiber rope is not permitted). Lanyards or ropes must be appropriately sized for the weight of the tool, material, or equipment. Anchorages must be snap-hook, carabineer, shackle, or similar device that provides positive locking. The use of knots to secure lanyards is not permitted. Subcontractors must evaluate the size and weight of any object which will be secured to a worker's wrist, belt, etc. to ensure it will not cause injury in the event it is dropped. Tethering also applies when there is falling object exposure for employees in the vicinity of elevated work, even when "exclusion zones" are used.

f. A Personal Fall Arrest System (PFAS) comprised of a full body harness, Leading Edge Retractable (Exception being in scissor lifts), a guardrail and / or safety net system must be in place to protect all employees working above 6 feet.

g. Covers for roof and floor openings shall be capable of supporting, without failure, twice the weight of the employees, equipment and materials that may be imposed on the cover at any one time. All covers shall be secured when installed to prevent accidental displacement by the wind, equipment, or employees. All covers shall be marked with the word "HOLE" or "COVER" to provide warning of the hazard. Turner recommends that holes greater than 18”x 18” be protected by a guardrail system. Protection systems must be sufficient to avoid harm or hazard.

h. Any floor opening 2” or larger must be protected by a cover of sufficient protection to avoid any harm or hazard.

2) Fall Prevention Systems

a. Guardrail Systems

- The top rail height of a guardrail system must be 42”, + or – 3”. Midrails heights must be half of that distance. If stilts are used in the vicinity, the rail must be increased by the height of the stilts used.
- Perimeter cable may be ½” steel cable, but in no situation may they be less than 3/8” steel cable.
- The cable must be flagged at 6’ intervals and must be terminated with three wire rope clips, “Crosby clips” on each end & deflect no more than 3”. The cable rail cannot deflect below 39”.
- The U-bolt clips must have the U-bolt section on the dead or short end of the rope and the saddle on the live or long end of the rope.
- When using cables for perimeter guarding closed turnbuckles are to be used for every 3 bays or 100 feet, whichever is less.
- A Personal Fall Arrest System (PFAS) must not be attached to a guardrail system unless the system is designed by a Professional Engineer to accommodate the PFAS.
- Guardrail systems must be able to withstand a force of 200 lbs. in all directions, without failure, and be smooth surfaced to prevent hand injuries. The use of metal studs or similar is prohibited.
- The sub-contractor installing the perimeter cable guardrail system shall submit a design with details on how the system will be installed and maintained.

b. Fall Protection Net Systems

- Safety netting systems (as a primary means of fall protection for humans) must not be used in lieu of other fall prevention or protection means unless no other means is feasible.
- Safety net systems must be installed as close as practical below the working deck, not to exceed a distance of 30’.

- Safety net systems must be drop tested after initial installation and before being used as a fall prevention system.
- Additional drop tests are required after any repair, whenever the nets are relocated and at 6-month intervals if the nets are left in place.

c. Personal Fall Arrest Systems
   - A PFAS must be used when working from suspended scaffolds, articulating boom lifts or when working above the protective system over floor openings and unprotected floor openings and unprotected perimeter edges.
   - A competent person must ensure that fall distance calculations have been evaluated in each circumstance where a PFAS is used. The competent person must ensure that the intended uses of all PFAS assemblies are reviewed for each application on the project to ensure they are truly fit for the purpose for which they are intended.
   - A PFAS is not required when climbing up or down a ladder. However, if employees are working from a ladder, fall protection is required.
   - Employees must use positive fall prevention devices when working in proximity to any leading-edge work.
   - All leading-edge construction requires the use of a Controlled Access Zone (CAS) or Controlled Decking Zone (CDZ)
   - Exterior plywood, or equivalent, shall be installed around columns where planks or metal decking do not fit tightly. The materials used must be of sufficient strength to provide fall protection for personnel and prevent objects from falling through.
   - All anchorage points must be capable of supporting a load of no less than 5000 lbs. Engineered (PE Stamp) anchorage point and fall protection systems are also authorized.
   - Steel erectors, connectors, and metal decking installers must utilize 100% fall prevention devices at all times when working over 6'.
   - The type of PFAS shall be reviewed prior to beginning work. Lanyard style, nylon, PFAS shall not be used when there is a potential for abrasion.
   - Horizontal lifelines must be designed by an engineer & installed under the supervision of a qualified person. A safety factor of 2 must be maintained. Leading Edge Retractable must be used with HLL.
   - Turner does not allow the use of Safety Monitor Systems.
   - Adequate fall prevention devices must be used at all loading platforms prior to removing existing perimeter protection

d. Warning Line Systems
   - If a warning line is utilized, it must be 15 feet or more back from the edge.
   - If a worker is required to work or enter between the warning line & the edge, 100% fall protection is required.
   - The warning line height must be between 34" & 39" from the walking/working surface.
   - The rope, wire or chain must have a breaking strength of 500 pounds and must be flagged every 6 feet.
   - After erected, the stanchions must be secured from tipping due to wind, etc.

e. Controlled Decking Zone (CDZ)

- Leading-edge workers in a CDZ are required to be protected from fall hazards (personal fall arrest system at a minimum).
- Have completed CDZ training in accordance with 29 CFR 1926.761.
- Employees who are not engaged in leading-edge work and properly trained in the hazards involved are prohibited from entering the CDZ.
- The CDZ is required to:
    1. Be no more than 90 feet wide and 90 feet deep from any leading edge. It may not exceed 3,000 square feet of unsecured decking.
    2. Have designated and clearly marked boundaries with control lines or the equivalent. NOTE: Control lines are commonly used as a marker because they create a highly visible boundary. See requirements below.
    3. Have safety deck attachments placed from the leading edge back to the control line.
    4. Have at least two safety deck attachments for each metal decking panel.
- Final deck attachments and the installation of shear connectors are prohibited from being done in the CDZ.
- Perimeter safety cables must be installed at the final interior and exterior perimeters of multi-story structures as soon as the decking has been installed. This means there should be no unprotected openings or edges on the non-leading-edge side of the "control line."
- A control line for a CDZ must be erected not less than 15 feet nor more than 90 feet from the leading edge. Control Lines must be a physical barrier. This will primarily be a rigid guardrail, tight cable, or flagging. The rope, wire or chain must have a breaking strength of 500 pounds and must be flagged every 6 feet. Caution and Danger tape, and spray-painted lines cannot be used.
- Each line is constructed in such a way that its lowest point (including sag) is not less than 39 inches from the walking/working surface and its highest point is not more than 45 inches from the walking/working surface.

3) Training Requirements
    a. Each employee exposed to a fall hazard must be trained by a competent person in the recognition and avoidance of such a hazard. Proof of training shall be made available to Turner Construction upon request.

    b. Specific training includes, but is not limited to the following:
        - The type of fall exposures expected.
        - The correct procedures for erecting, maintaining, dismantling, and inspecting of any fall prevention system used by the employee.
        - The inspection and use of personal fall arrest systems and anchorage points.

Fire Protection and Prevention

I. Policy Statement

Each subcontractor working on a Turner project must comply with 29 CFR 1926, Construction Industry Regulations, Subpart F – Fire Protection and Prevention, in addition to the following guidelines.

II. Procedures

1. General Requirements
    a) A site-specific fire prevention program shall be developed for each project. The site safety logistics plan and map should include locations of hydrants/FDCs, designated flammable storage locations, designated routes for emergency response vehicles to be maintained, emergency muster points, etc. The plan should discuss site evacuation signals and drills.

    b) Hot work permit procedures, fire watches, shields and blankets must be considered when developing site-specific fire prevention programs. All areas and equipment where hot work is anticipated are to be reviewed in detail by the subcontractor with the Turner Superintendent and/or Safety Manager.

    c) All firefighting equipment must be clearly visible and access to the equipment must be maintained at all times.

    d) A 20 lb. ABC dry chemical fire extinguisher or equivalent must be mounted or on a stand for each 3,000 square feet of protected building area. It is also required that an extinguisher be placed at every stairwell on each level. Travel distance to a fire extinguisher must not exceed 100 feet.

    e) For areas where liquid fuel is stored outside in a tank, at least one 20 lb. ABC dry chemical fire extinguisher must be mounted no closer than 25’ and no farther than 75’ from the tank.

    f) Portable fire extinguishers must be inspected.
        a. Monthly
        b. Annually
        c. Hydrostatic every five years

    In addition, the fire extinguisher must have the pin secured by a safety pull tab to be considered serviceable.

2. Fire Prevention
    a) Temporary offices or trailers, when located inside of a building under construction, must be constructed of fire-retardant materials.

    b) Combustible materials, such as cardboard, wooden pallets, etc., must be removed from the work area as it is created.

3. Flammable and Combustible Liquids
    a) Flammable and combustible liquids must be stored in approved metal safety cans. An approved safety can is a closed container, not more than 5 gallons, with a flash-arresting screen and a spring closing lid. Plastic cans are not permitted onsite.

    b) Store flammable liquids must be in approved flammable storage lockers, outside of the building under construction, unless otherwise permitted by Turner.

    c) Onsite fuel tanks must be double walled, be protected from construction vehicle traffic & have a spill containment system capable of holding all contents of the tank in the event of a leak. Dirt berms & dikes are not permitted.

4. Liquefied Petroleum Gas (LPG)
    a) LPG must never be stored inside buildings. LPG gas must not be used in any building unless authorized by Turner Construction.

    b) When damage to LPG systems from vehicular traffic is possible, precautions must be taken to eliminate the hazard.

5. Temporary Heating Devices
    a) Fresh air must be supplied in quantities sufficient to maintain the health and safety of all employees. If a competent person deems natural airflow inadequate, then mechanical ventilation must be provided.

    b) Solid fuel may not be burned anywhere on a Turner project for heating.

    c) Heaters used in the vicinity of tarpaulins, canvas or similar coverings must be located at least 10’ from the covering and be secured so as to prevent ignition due to wind.

    d) Open fires are not allowed on Turner projects.

    e) Hot Work permits are required for temporary heating devices.

6. Housekeeping is the best defense against fires. Place all trash and debris in proper containers. Place oily and/or paint-soaked rags in a covered metal container.

7. Hot Work Permits
    a. A Turner Construction Hot Work Permit will be filled out by the permit applicant after surveying the area. The applicant must review the area and permit with a Turner Superintendent and/or Safety Manager. One copy will be turned into the Turner Project Superintendent/Safety office and one copy posted in the area where the hot work is being performed prior to beginning any hot work. These activities include any spark or heat producing activity that could be considered an ignition source.
    b. The subcontractor shall provide a fire watch person on duty at all times (i.e., including breaks, lunch, etc.) during hot work operations. A 30-minute minimum fire watch is required after hot work is completed. The fire watch time requirement may need to be increased in sensitive areas (such as

historic buildings, healthcare facilities, etc.) as determined by need and or contract. Each subcontractor is responsible for notifying Turner when the fire watch is complete.

7. The fire watch person is required to be trained as to their duties and responsibilities and has no other duties. Fire watch procedures are to be reviewed with the subcontractor by the Turner Superintendent and/or Safety Manager. In some cases, two or more fire watches may be required.
8. Smoke exhaust equipment (smoke eaters) shall be provided by the subcontractor in occupied buildings or where otherwise required. The exhaust duct should be coordinated through Turner.
9. The disconnecting or disengaging of fire zones or smoke sectors/detectors shall be coordinated with the building owner or manager.
10. Subcontractors installing tarps that may be exposed to sparks are required to use fire retardant material.

Hand and Power Tools

I. Policy Statement

All Turner Employees and Subcontractors working on a Turner project must comply with 29 CFR 1926, Construction Industry Regulations, Subpart I – Tools – Hand and Power, in addition to the following guidelines.

II. Procedures

1. General Requirements
    a) Employees must be trained on each hand and power tools to be used.

    b) All hand and power tools and similar equipment, whether furnished by the employer or the employee, shall be maintained in a safe condition, per the manufacturer's guidelines.

    c) If the tool is designed to accommodate a guard or handlebar, the guard or handlebar must be in place while the tool is being used.

    d) Additional personal protective equipment (PPE), such as a face shield, goggles and/or hearing protection, may be required while operating a tool.

    e) Cutters and knives with automatic self-closing blade-guards, or blades that retract into the handle when the blade loses contact with the cutting surface are the preferred tool of choice for making cuts. If these cannot be used for a certain task or activity it must be outlined in the PTP and reviewed with a Turner Superintendent.

2. Electric Powered Tools
    a) All power tools must be double insulated or provided with a three wire, grounded connection.

    b) All cords are to be inspected prior to their use. Cords having the outer jacket damaged shall be removed from service or must be replaced or repaired per the manufacturer's instructions.

    c) Only a qualified electrician may replace a cord and/or cord end.

    d) All hammer-drills and rotary hammers must have integrated technology, such as a "safety clutch," that will stop drill-bit rotation should the bit bind up in the hole. An example of this is Hilti's Anti-torque control (ATC) technology.

    e) All bandsaws must be equipped with a dual trigger design with triggers located on both the back and front handles to be engaged for safe cutting. Single hand bandsaws must be used according to the

manufacturer's requirements.

3. Pneumatic Power Tools
   a) Each connection on a pneumatic tool and air hose must be secured with a "whip-check" or similar device.
   b) All air hoses, with an inside diameter exceeding ½ inch, must have a flow reduction device at the supply source to reduce pressure in case of hosefailure.
   c) Compressed air must not be used for cleaning unless the pressure is reduced to less than 30 p.s.i. and appropriate guarding and PPE are in place (PPE should include goggles and a face-shield for anyone in the area). Means and methods for using compressed air for cleaning formwork must adhere to the OSHA Silica standard and may not expose employees of other contractors. Use HEPA vacuuming or water in lieu of compressed air, to the extent feasible.
   d) The 30 p.s.i. requirement does not apply to "blowing down" concrete decks or forms; however, a spring loaded "dead man" control must be attached to the blowpipe.
4. Fuel Powered Tools
   a) Fuel powered tools must be stopped and turned off while being refueled, serviced, or maintained.
   b) Combustion powered tools/equipment must not be utilized inside structures unless an evaluation has been conducted to ensure fumes will not affect personnel. The subcontractor who is utilizing the equipment is responsible for testing and monitoring the indoor air quality. Scrubbers and/or mufflers may be required as dictated by the testing.
5. Powder-Actuated Tools
   a) The manufacturer, or their representative, must train employees in the safe use of powder-actuated tools.
   b) The tool must be tested each day, according to the manufacturer's recommendations, before loading to see that safety devices are in proper working condition.
   c) Tools must not be loaded until just prior to the intended firingtime.
   d) Loaded tools must not be left unattended.
   e) All tools must be used with the correct shield, guard or attachment recommended by the manufacturer.
   f) No cartridges are to be used that contain toxic heavy metals such aslead.
   g) Follow the manufacturer's guidelines for storage, disposal and handling of cartridges and tools.
6. Abrasive Wheels and Tools

a) The RPM rating on all grinding machine motors must not exceed the speed rating of the grinding wheel attachment.

b) All abrasive wheels must be closely inspected by the competent person and ring tested before mounting to ensure they are free from cracks or defects.

7. Woodworking Tools

a) All fixed, power-driven woodworking tools must be equipped with a disconnect switch that can be locked out in the off position.
b) All portable, power-driven circular saws must be equipped with guards above and below the base plate or shoe.
c) When the tool is withdrawn from the wood, the lower guard must automatically and instantly return to the covering position.

Motor Vehicles, Mechanized Equipment and Marine Operations

I. Policy Statement

Each contractor working on a Turner project will comply with 29 CFR 1926, Construction Industry Regulations, Subpart O – Motor Vehicles, Mechanized Equipment, and Marine Operations. In addition, the Turner specific requirements as it relates to trucks driven onto Turner projects, the method used to load and unload equipment and materials from trucks on Turner projects and the preplanning needed to establish controlled access zones around trucks to protect workers and the general public, and the use of spotters, must be followed.

II. General Procedures

1. All trade partner vehicles within the project site fence (including, but not limited to, transportation and construction equipment, delivery trucks and personal or company trucks) shall not idle. The only allowable exceptions to the standard are as follows:
   i. Ambient air temperature exceeds 85°F or falls below 32°F (or as defined by local or regional temperature limits, whichever is stricter)
   ii. Engine idling is required for the function of auxiliary equipment (i.e., cranes, concrete pumps, etc.)

2. All operations requiring the use of heavy equipment will require a pre-planning meeting to coordinate and prevent injuries to workers and the public.

3. All subcontractors delivering material and equipment to projects will be required to complete a risk assessment and pre task plan that must be performed prior to any loading/unloading activities to establish safe work procedures for working around trucks and to protect workers and the general public. This includes:

   a) The subcontractor ensures a risk assessment and preplan is conducted.

   b) The risk assessment is completed prior to any work being conducted on the site with Turner safety or superintendent, and if high risk activities are identified, then no work should be completed until measures are taken to reduce or eliminate the risk.

   c) All personnel involved with a loading or unloading operation should assess the potential hazards before the operation begins. A clear understanding of the procedures and communication between workers must be established.

   d) Each project shall maintain a current site logistics plan clearly identifying controlled access or restricted access zones for truck loading and unloading, required traffic controls, and best practices for unloading or loading materials. Logistics plans must be updated regularly to reflect evolving conditions. Controlled access zones or restricted access zones must be flagged /

barricaded on site and kept clean and clear of non-essential materials and personnel.

- Accessing the site
- Parking trucks safely; chock wheels and fully engage the parking brake during loading and unloading.
- Lighting is adequate for the work.
- Unloading procedures are clear and defined.
- The right equipment is chosen for the job.
- Damage reporting procedures are available for reporting incidents and near misses.
- Ensuring documentation is shared with Turner supervision.
- How the driver will be briefed on loading/unloading procedures and understand their responsibilities
- Overhead power lines

4. **High Visibility Vests must be worn by all personnel associated with the loading/unloading operation**.
    a) Truck drivers should wear a high visibility vest whenever they exit theirvehicle.
    b) All personnel working around moving vehicles and mechanized equipment during loading and unloading operations should wear a high visibility vest.
5. Provide drivers a place to wait during the loading/unloading operation.
    a) The driver must be in full view to a forklift operator at all times. All loading or unloading activity must stop if the driver cannot be seen or needs to enter the exclusion zone to inspect a load.
    b) Alternatively, if it is safe to do so, the operation can allow the driver to stay in the truck cab during loading and unloading.
6. Establish a restricted access zone around the truck to prohibit entry into the load/unload area. High visibility “do not enter” tape should be used. “Do not enter” tape is intended to prohibit access and should only be used as a substitute for physicalbarricades.
    a) No worker, except those involved in the load/unload operations shall be permitted to be behind the “Do not enter” area. Signs and barricades shall be erected to restrict access to the area.
    b) The zone must be equal to the area needed to load/unload plus ten feet around the entire truck area.
    c) All designated personnel within the zone must be clear of the load during all loading or unloading operations by at least 30 feet.
    d) A qualified “spotter”, wearing an ANSI approved high visibility traffic vest, must be utilized during the loading/unloading operation. Vehicles must never back “blind” on a Turner project.
    e) Workers on the ground within the zone should never be on the opposite side of a truck from a forklift while it is loading or unloading material.
    f) A rigging plan must be in place if lifting using a crane.
    g) Do not allow workers on top of the truck while any equipment is being used in loading/unloading operations unless the operation requires then a competent person is the only person allowed as described in the pre-task plan.
    h) An all-clear signal (different from an evacuation signal) must be used before the load/unloading operations begin.

i) All workers in the loading zones should be trained in these safe work practices and given refresher training periodically.

7. Truck parking when loading/unloading materials should be:
   a) Safely surfaced.
   b) Clearly marked.
   c) Adequately lit.
   d) Unobstructed

8. Ensure appropriate forklift or equipment selection, and operator training.
   a) Forklift and equipment operators are responsible for the safety of ground personnel at the site as well as themselves. Operators must be trained in safe operation of the equipment, load limits, loading procedures, and communication with other personnel.
   b) All motor vehicles and material handling equipment, with an obstructed view to the rear, must have a reverse signal alarm audible above the surrounding noise.
   c) Forklift operator training records must be submitted to Turner prior to site use. The forks cannot be used for free rigging (straps or slings over forks).
   d) Loads must never be swung over workers or the general public.

9. All motor vehicles and material handling equipment, with an obstructed view to the rear, must have a reverse signal alarm audible above the surrounding noise.

10. Machinery with rubber tires that are capable of driving down a low-speed road (<30 mph) must be equipped with an orange triangle on the back or a vehicle with their blinkers on.

11. A “spotter”, wearing an ANSI approved high visibility traffic vest, may be used in lieu of an alarm, but only if such devices are not routinely supplied on such a vehicle. Vehicle must never back “blind” on a Turner project.

12. Drivers should visually inspect the area around the vehicle/equipment before moving it to ensure all workers are clear prior to movement.
    a) The spotter must be used when backing any vehicle or equipment with a blind spot.
    b) When reversing, the vehicle must be equipped with a functioning audible alarm.

13. Forklift operator training records must be submitted to Turner prior to site use. The forks cannot be used for free rigging (straps or slings over forks). Forklifts with a hook or a winch attached are considered “cranes” per the crane standard.

14. A seatbelt must be provided and used when operating equipment on a Turner project.

15. All windows must be in full working condition. Any equipment with broken glass of any size, including mirrors, will be taken out of service.

16. Each employee working near or crossing a site where equipment is in use must wear High Visibility Clothing.

17. Equipment without a rollover protective structure (ROPS) or seatbelt is not allowed on any Turner project.

18. The use cell phones (talking/texting) shall not be used while operating machinery/equipment or vehicles.

19. No one may work within 20' of motorized equipment like an excavator, backhoe, loader etc. unless that person's presence is fundamental to the operation underway, and the operator can observe the person at all times.

20. All vehicles in use shall be checked at the beginning of each shift to assure that the following parts, equipment, and accessories are in safe operating condition and free of apparent damage that could cause failure while in use: service brakes, including trailer brake connections; parking system (hand brake); emergency stopping system (brakes); tires; horn; steering mechanism; coupling devices; seat belts; operating controls; and safety devices. All defects shall be corrected before the vehicle is placed in service. These requirements also apply to equipment such as lights, reflectors, windshield wipers, defrosters, fire extinguishers, etc., where such equipment is necessary.

21. Cannot operate a machine/equipment within 20 feet of any overhead energized line, unless specifically outlined in the JHA/PTP and reviewed by the Turner Project Superintendent & Project Safety Manager if assigned.

22. Whenever visibility conditions warrant additional light, all vehicles, or combinations of vehicles, in use shall be equipped with at least two headlights and two taillights in operable condition.

23. Pickup trucks driven on site must never have riders in the bed of the truck.

24. Pickup trucks used for hauling material must be inspected by a competent person to ensure the load is secured properly prior to entering, exiting, or moving on site.

25. Third party haulers like concrete trucks and dump trucks must inspect their vehicle prior to leaving the site to ensure there is no debris that can be thrown from the vehicle and that the dump bed is lowered prior to leaving the site. Refer to local regulatory requirements for covering loads.

III. Site Clearing

1. Workers engaged in site clearing shall be protected from hazards, irritant and toxic plants (poison ivy, sumac, etc.)

2. Each worker is to be instructed in the first aid treatment available onsite in regard to irritant and toxic plants.

3. All equipment shall be equipped with rollover protection and shall have overhead protection.

4. The overhead protection on the canopy structure shall not be less than 1/8" steel plate or ¼" woven mesh with no openings greater than 1" or equivalent.

IV. Pile Driving

1. Overhead protection shall not obscure the vision of the operator. The protection shall be equivalent to 2” planking or other solid material of equivalent strength.

2. Stop blocks shall be provided for the leads to prevent the hammer from being raised against the head block.

3. A blocking device, capable of supporting the weight of the hammer, shall be provided for placement in the leads under the hammer at all times when workers are working under the hammer.

4. Guards shall be provided across the top of the head block to prevent the cable from jumping out of the sheaves.

5. When leads must be inclined in the driving of batter piles, provisions shall be made to stabilize the leads.

6. Safety chains or equivalent shall be provided for each hose connection to prevent the line from thrashing around in case the coupling becomes disconnected.

7. Engineers and winchmen shall accept signals only from the designated signal person.

8. All workers shall be kept clear when piling is being hoisted into the leads.

9. When piles are being driven in an excavated pit, the walls of the pit shall be sloped to the angle of repose (type C soil), or sheet piled and braced.

10. An Anti-two block device is not required when using leads in pile driving.

Industrial Vehicles

I. Introduction

The Company has determined that certain powered industrial vehicles are utilized at its projects and has developed this policy to establish the procedures that must be followed for the use of such vehicles at the Company's projects.

II. Purpose

Provide for proper equipment selection, inspection, and operation of certain powered industrial vehicles, including but not limited to All Terrain Vehicles (ATV) or Quads, Three-Wheeler, Four-Wheeler, Gators, Mules, and all other similar vehicles. Only vehicles that have previously been approved by the Operations Manager and BU Environmental, Health, and Safety Director for use at its projects may be utilized at the Company projects and must be in compliance with the policy. This policy also applies to vehicles owned and operated by Subcontractors and Subcontractor employees.

III. Insurance

All vehicles covered under this policy are to be scheduled to Turner's property plant and equipment (contractor's) policy. It is the responsibility of the jobsite project manager & accountants to properly report all equipment under this policy.

IV. Prohibited Vehicles

1. All vehicles with the following features (in combination) are prohibited from all Turner projects:

    1) Typically carry one rider.

    2) Have no rollover protection or seat belts; and

    3) Have a handlebar similar to a motorcycle for navigation.

    These vehicles may be commonly referred to as All-Terrain Vehicles (ATV), Quads, Three Wheelers, or Four Wheelers (or other similar equipment). This prohibition includes vehicles owned by subcontractors as well.

2. All personal (owned by an individual) All-Terrain Vehicles (ATV's), Quads, Three Wheelers, Four Wheelers, Mules, Gators, or other similar equipment are prohibited on all Turner Projects.

V. Regulatory References

OSHA 29 CFR 1910.178, Powered Industrial Trucks, as applicable.

VI. Procedures

1. All powered industrial vehicles must be equipped as follows:

    a. Each vehicle must have legible nameplates and markings that indicate its load limits.

b. Any modifications and additions, which affect capacity and safe operation, must not be performed without the manufacturer's prior written approval. Where modifications and additions are made, the capacity, operation, and maintenance instruction plates, tags or decals must be marked accordingly.

2. Where liquid fuels, such as gasoline, diesel fuel or LPG, are used for powered industrial vehicles the following precautions must be followed:

   a. Appropriate handling and storage safeguards followed.

   b. Fuel tanks must not be filled while the engine is running.

   c. The spillage of oil or fuel must be carefully cleaned up or completely evaporated and the fuel tank cap replaced before restarting engine.

   d. No vehicle may operate with a leak in the fuel system until the leak has been corrected.

   e. No smoking or open flame while refueling; and

   f. Appropriate PPE must be worn while refueling.

   g. Refer to Section IV of the Carbon Monoxide Exposure Prevention program for information regarding requirements for use of equipment with internal combustion engines.

3. Where electric powered industrial vehicles are used, the following precautions must be followed:

   a. Battery charging installations must be located in areas designated for that purpose.

   b. Facilities must be provided for flushing and neutralizing spilled electrolyte.

   c. Facilities must be provided for fire protection.

   d. Facilities must be provided for protecting charging apparatus from damage by trucks.

   e. Facilities must be provided for adequate ventilation for the dispersal of fumes from gassing batteries.

   f. Material handling equipment must be provided for handling batteries.

   g. Reinstalled batteries must be properly positioned and secured in all electric powered trucks.

   h. A carboy tilter or siphon must be provided for handling electrolyte.

   i. When batteries are charged, acid must be poured into water and water is not poured into acid.

   j. Appropriate PPE must be worn when adding acid.

   k. Vehicles must be properly positioned with the brakes applied before their batteries are changed or charged.

l. When batteries are charging, their vent caps must be clear and functioning and the battery (or compartment) cover(s) must be left open to dissipate heat; and

m. Precautions must be taken to prevent smoking and other sources of ignition from coming out of the charging area.

4. Adequate lighting must be provided for all powered industrial vehicle operations.

5. Carbon monoxide concentrations as a result of powered industrial vehicle operations must not exceed the Permissible Exposure Limit of 50 ppm.

6. Powered industrial vehicle drivers must follow appropriate safe operating practices as contained in the manufacturer's manual. Non-authorized associates must never operate powered industrial trucks.

7. Powered industrial trucks must be inspected and repaired as follows:

a. Drivers must conduct pre- and post-operation safety inspections at least at the start of each shift on which the vehicle is used;

b. Any power-operated industrial vehicle not in safe operating condition must be removed from service.

c. All repairs must be made by authorized personnel.

d. Repairs must be made only in a location designated for such repairs.

e. Vehicles in need of repairs to the electrical system must have the battery disconnected prior to such repairs.

f. All replacement parts used on industrial vehicles must be equivalent to the safety features as used in the original design.

g Industrial vehicles must not be altered so that they have different configurations, extra parts, or additional counterweighting, unless approved by the vehicle manufacturer.

h. Any vehicle that emits hazardous sparks or flames from the exhaust system must be immediately removed from service, and not returned to service until the cause for the emission of such sparks and flames has been eliminated.

i. When the temperature of any part of any vehicle is found to be in excess of its normal operating temperature, thus creating a hazardous condition, the vehicle must be removed from service and not returned to service until the cause for such overheating has been eliminated; and

j. Industrial vehicles must be kept in a clean serviceable condition.

VII. Training

1. All authorized drivers must complete training as follows:

   a. Manufacturer requirements (as coordinated through the dealership of the equipment) for the safe operation of the vehicle including use of personal protective equipment, authorized surfaces for operation of the vehicle, weight restrictions, and other operational conditions.

   b. OSHA 29 CFR 1910.178 Powered Industrial Trucks.

   c. This training shall be written formally into the Project Specific Safety Plan by the project team, approved by the BU Environmental, Health, and Safety Director.

   d. A documented sign-off for the authorized driver must be a part of the training manual provided with the training.

2. All non-authorized associates who work in areas where powered industrial vehicles are in operation will be instructed to never operate any powered industrial vehicle and will be instructed in work practices for pedestrians working in those areas.

3. Retraining must be repeated at least every three years and as necessary to maintain the required driver skills and when:

   a. The operator has been observed to operate the vehicle in an unsafe manner.

   b. The operator has been involved in an accident or near-miss incident.

   c. The operator has received an evaluation that reveals that the operator is not operating the vehicle safely.

   d. The operator is assigned to drive a different type of vehicle; or

   e. Conditions in the workplace changes in a manner that could affect safe operation of the vehicle.

Unmanned Aircraft Systems/Drones Policy

I. Policy Statement

In our ongoing efforts as the leader in construction safety, Turner has adopted the following policy to ensure that Unmanned Aircraft Systems (UAS)/Drones are operated in a manner that meets or exceeds all known federal, state & local municipality, Drone Safety Council, Unmanned Safety Institute, FAA & DOT standards & regulations (as of the 3/4/2015 version these are being proposed by congress). The most restrictive guidelines take precedence over our limits. Operators must strictly adhere to all manufacturer operational requirements. Modifications can only be made according to the manufacturer's instructions and approvals. The operator, by federal guidelines, cannot operate a drone for hire without meeting at a minimum FAA regulation Title 14 part 107, and must provide Turner with this documentation.

It is our policy that all drones utilized in Turner Construction must be from a third party, licensed/approved by the FAA to operate in a commercial setting and insured per Turner Limits. TURNER CONSTRUCTION EMPLOYEES WILL NOT OPERATE DRONES. Also, ONLY ONE DRONE CAN BE FLOWN ON A PROJECT AT ANY GIVEN TIME.

A coordination meeting must be held to discuss/plan out use of a drone. Discussions must include other drones that might be in the same area being operated by other entities, FAA rules governing use of the drone under this particular scenario, city or state requirements, privacy issues, insurance requirements, flight plans, safety issues and mitigation plan, operating times, date the drone will be in use, protection of the public and workers, neighborhood concerns, type of drone being used, and overall compliance with this policy's rules and regulations. Meeting minutes and a flight plan will be published. A call will be held with the EH&S Director and Operations Manager to review the plan prior to moving forward. All data obtained during the drone flight should be downloaded securely and not erased or duplicated without written approval.

UAS's/Drones can be hazardous if operated incorrectly and irresponsibly or without following specific safety guidelines and are operated by the young or inexperienced.

II. Procedures

1. A pre-flight Job Hazard Analysis must be developed by the operator at least 7 days prior to flight. The Job Hazard Analysis meeting and job walk must be held with the operator prior to actual operation. Look for sources that may cause RF interference (radio towers, transmitters, etc.). If it's reasonable to anticipate that these sources may cause RF interference, then they must be de-energized during the flight, or no flight may take place.

2. The pilot of the UAS/Drone must do a test flight in a clear area to show they have control of the drone. This must include a roll, yaw, back and forth, and a figure 8. If the pilot cannot maintain control, they cannot not be allowed to operate on site.

3. Only UAS's/Drones powered by battery are permitted. Fuel operated UAS's/Drones are prohibited.

4. UAS's/Drones can only be operated when a remote pilot visual line of sight is maintained throughout the flight. The use of monitoring, corrective lenses like binoculars, and first-person view goggles cannot be used by the operator as they are prohibited by the FAA.

5. UAS's/Drones must be operated between sunrise and sunset. No operating in the dark is permitted. Each drone has temperature requirements for flight. Most require at above 104 degrees Fahrenheit and below 0 degrees Fahrenheit the drones cannot be flown. The manufacturer paperwork detailing these requirements must be submitted to Turner and reviewed at the preplan meeting. All manufacturer recommendations must be followed.

6. UAS's/Drones cannot be flown over 400-foot altitude, unless the small, unmanned aircraft:

    a) Is flown within a 400-foot radius of a structure; and
    b) Does not fly higher than 400 feet above the structure's immediate uppermost limit.

7. **UAS's/Drones will be operated during off hours such as weekends when the pedestrians, employees, vehicles, etc. are absent or minimal. It is NEVER permitted to operate a UAS/Drone over any person. The area below the flight path MUST be completely free of people.**

8. Maintain at least 100 feet between the UAS/Drone and people, vehicles, roadways (unless closed), buildings and electrical lines and power stations. This helps protect these in the event of an unplanned landing. In some areas, such as with a tower crane, 100 feet vertical clearance is not feasible to comply with keeping the drone under a 400-foot altitude. In these areas maintain 100 feet horizontally from the structure and a minimum of 30 feet vertically.

9. During set up and testing of the drone double check the measurement to the top of the highest point of adjacent buildings, cranes, etc. and verify the height. Measure to the top of crane first so flight heights and distances can be evaluated and maintained.

10. AS's/Drones shall not be flown over areas occupied by employees, subs, or pedestrians. Areas where UAS/Drone are to be operated must be closed off with an exclusion zone large enough to anticipate where a UAS could drift/drop, accounting for elevation, wind, and other factors.

11. Automobiles and other moveable pieces of property shall be removed from the flight area prior to launch when feasible. Exclusion zones shall include visible barriers and warning signs. Area monitors shall be assigned to keep people out of the exclusion zone. Take steps to protect non-moveable property and equipment where feasible.

12. Do not operate a UAS/Drone within 5 miles of an airport or where manned aircraft are operated (hospital helipad).

13. UAS's/Drones shall not be permitted to be operated when winds exceed the 10 miles per hour.

14. UAS's/Drones shall not be permitted to be operated when lightning is detected within 10 miles. The only acceptable UAS's/Drones to be operated on a Turner Construction project are those with:

    a) GPS, Radio Controlled (RC) transmitter and low battery fail safe are absolutely required. These must return the unit to its launching point if the GPS or RC Transmitter fail, or the battery reaches 30% charge.

15. The operator must be at least 21 years of age.

16. Only UAS's/Drones that are less than or equal to 10 pounds can be operated on a Turner Construction project.

17. Immediately prior to launch, the operator must verify with a Turner Construction representative that the remaining battery charger is greater than 95%.

III. Roles and Responsibilities

1. Permission to utilize UAS's/Drones by a third party on a Turner Construction project must be granted by the Operations Manager and BUEHSD in the Business Unit.

2. The entire Turner Construction project staff must complete a course of UAS/Drone safety overview.

3. At least 48 hours prior to UAS/Drone use, Turner will notify *in writing* the property owner, architects/engineers, and any other stakeholders of the intended plan for UAS/Drone use and safety precautions to be taken. Stakeholders may include residents in neighboring buildings that may have privacy concerns of a camera-mounted on a UAS/Drone.

4. Within 24 hours prior to flying a UAS, Turner will hold an all-hands safety meeting to discuss the operation with everyone on site. Discuss timing and location of UAS/Drone use, safety measures and precautions.

5. The operator must meet at a minimum FAA regulation Title 14 part 107 *and* have operated in a commercial capacity for at least 1 year. FAA regulations require that all commercial drone operators have a Remote Pilot Certification issued by the FAA. Documentation must be submitted to Turner.

6. Appropriate types and limits of insurance must be obtained and approved by Susan Hughes.

7. Any incidents using drones that the operator has been involved in must be reported.

III. Employee Safety

Superintendent/Safety Manager:

1. Hazards at the site are mitigated:

    a. Wires/cables/utility lines/cranes identified and flagged or identified on flightplan.

    b. Worker areas identified and flight plan adjusted to stay away from workers or workers reassigned to another area.

    c. If you have information that would be helpful to the drone operator, please share that information. They will be coming into your project, and it is up to you to ensure safety in the area.

    d. Turner safety program for drones shared with the operator/company who operates the drone.

    e. Turner visitor agreements signed by operator and orientation held.

    f. Turner safety program reiterated to the operator, all PPE to be worn discussed, work rules discussed and signed off on.

    g. Property in the vicinity that might be impacted is identified and communicated to the drone operator.

    h. Buffer zones were established between aircraft and personnel.

    i. Investigate potential alternative landing sites away from workers in case take-off/landing site is obstructed or compromised.

2. Weather considerations at the project must be taken into consideration: Project staff must verify:

    i. Temperature
    ii. Visibility
    iii. Precipitation
    iv. Wind Speed

3. Notify any workers or nearby property owners of your intentions (permission) – Superintendent… but what is the communication plan.

4. Discuss flight plan with subcontractors at superintendent meeting and workers the day of the flight.

5. Emergency plan:

    a. Crisis management plan in place
    b. First aid kit ready
    c. Communication plan in place

6. Workers

   a. Situational Awareness:
      - At all times stay a minimum of 100’ away from any unmanned aircraft (drone)
      - Act professionally when a drone is flying around. You are a representative of your company, and your actions will be captured on the drone.
      - Know at all times the location of the drone if you are in close proximity to the flight path.

   b. If at any time you feel that continuing to work is unsafe contact your superintendent and you will be reassigned to another area.

   c. If a drone lands in or around your work area contact the superintendent who will notify the operator as to the location. Please note that at no time will the drone be out of site of the operator.

   d. If a drone is flying on your project during your shift, identify safety measures on your pre task plan and discuss at your daily huddle.

   e. Assure you understand emergency procedures and what to do if an emergency arises. Listen for signals (pre identified) and act according to the safety plan discussed in your daily huddle.

   f. Assure you have been debriefed by your superintendent and foreman of drone activity, the flight plan, times of flight, path of travel, and how it will affect your work area and activities.

   g. If you have information that would be helpful to the drone operator, please share that information. They will be coming into your work area, and it is up to you to ensure safety in the area.

Scaffolds

I. Policy Statement

Each Contractor working on a Turner project will comply with 29 CFR 1926, Construction Industry Regulations, Subpart L- Scaffolds, in addition to the following guidelines.

II. Procedures

1. General Requirements
   a) Capacity
      - Scaffolds must be erected under the supervision of a competent person. The competent person shall be designated and submitted to Turner prior to the start of work.
      - Scaffolds and their components must be able to support at least four times the maximum intended load.

   b) Access and Egress
      - Frame and system type scaffolds, including but not limited to masonry and tube & coupler, must be accessed via scaffold stair attachments. Where space does not permit the use of a stair, alternate means of access/egress may be utilized including ladder systems when a Turner Ladder Permit is issued. When ladders are used to access scaffolds, the competent person shall work with Turner to explore the use of personal fall protection systems while ascending/descending the ladder (such as retractable lanyards attached above the scaffold ladder to an OSHA compliant anchor point.

   c) Platform Construction
      - Each working platform on a scaffold must be fully decked or planked. Planking must be sufficient to comply with any statutes or regulatory provisions in the applicable jurisdiction.
      - Any gap in a working platform cannot exceed 1".
      - All planks or platforms must be cleated or overlap a minimum of 6", but no more than 12".
      - Wooden scaffold planks must not be painted.

   d) Supported Scaffolds
      - Supported scaffolds with a height to base width ratio exceeding 4:1 must be stabilized from tipping by a solid connection such as guy wires, bracing, tying or other equivalent means.
      - When scaffolds are erected adjacent to structures, they must be secured to the structure every 26' vertically and 30' horizontally.
      - Scaffold poles, legs, posts, frames, and uprights must be placed on base plates, mudsills, or other adequate firm foundations.
      - "X" or cross bracing is not considered to be a guard rail system. Guard rails

(horizontal top and mid-rails) must be installed when the platform reaches four feet in height.

e) Suspension Scaffolds
- Each suspension rope, including connecting hardware, used on adjustable or non-adjustable suspension scaffolds shall be capable of supporting, without failure, at least 6 times the maximum intended load applied or transmitted to that rope with the scaffold operating at the rated load of the hoist.
- Counterweights must be made of non-flowable material. Sand, gravel, water, or similar material may not be used.
- Counterweights must be secured to the outrigger beams by mechanical means to prevent accidental displacement.
- Outrigger beams that are not bolted to the structure must be secured by tiebacks. The tiebacks must be attached to a structural member of the building. Standpipes, vents, conduit, and other piping systems are not adequate structural members.
- Tiebacks shall be equivalent in strength to the suspension ropes.
- Direct connections to roofs and floors, and counterweights used to balance adjustable suspension scaffolds, shall be capable of resisting at least 4 times the tipping moment imposed by the scaffold operating at the rated load of the hoist.

f) Scaffold Access
- Cross bracing must never be used as a means of access.
- Stair rail and handrail systems must be smooth surfaced to prevent lacerations or puncture wounds.
- A competent person must evaluate safe means of access during erection and dismantlement of the scaffold. Proper access shall be provided to each worker that is working on/off a scaffold.

g) Scaffold Use
- Scaffolds and scaffold components must never be loaded in excess of their maximum intended loads.
- Scaffolds and scaffold components shall not be left loaded with material overnight unless the materials are secured. Materials shall not be left on suspended scaffolds overnight unless the scaffold is grounded.
- A competent person must inspect each scaffold before every shift and after any occurrence that may affect its structural integrity.
- The competent person will “tag” the scaffold “in service” or “out of service” prior to employee use.
- Scaffolds cannot be erected, moved, dismantled, or altered except under the supervision of a competent person.
- Snow, ice, and other slippery conditions must be eliminated before employees are allowed access to a scaffold.

h) Fall Prevention
- A Personal Fall Arrest System or a guardrail system must be in place on all scaffolds exceeding 6’ in height. Mobile scaffolds require guardrails at 4 foot in height. When rails cannot be installed, utilize a Personal Fall Arrest System

(PFAS) anchored overhead.
- Each employee on a single-point or two-point suspension scaffold must be protected by a PFAS and guardrail system, except boatswains' chair which requires PFAS.
- The use of fall prevention devices is required during the erection or dismantling of a scaffold.
- When vertical lifelines are used, they must be protected from surface abrasion.
- When guardrails are used, they must be 42", + or – 3" in height. Mid-rails must be half the distance from the top-rail height to the platform deck. Toe boards should be constructed from 2"x4" material or equivalent and must meet existing state or client requirements.
- "X" or cross bracing is not considered to be a guard rail system. Guard rails (horizontal top and mid-rails) must be installed when the platform reaches four feet in height.

i) Falling Object Protection
- The area below a working scaffold must be barricaded to protect employees from a falling object hazard.

2. Requirements for Specific Scaffold Types
   a) Tube and Coupler Scaffolds
      - Tube and coupler scaffolds, in excess of 125', must be designed by a registered professional engineer (RPE).

   b) Fabricated Frame Scaffolds
      - Frames and panels must be braced by cross, horizontal, or diagonal braces.
      - Frames and panels must be joined together vertically by stacking pins or equivalent couplings.
      - Frame scaffolds, in excess of 125", must be designed by an RPE.

   c) Pump Jack Scaffolds
      - Cannot be used on Turner projects unless approved by the BUEHSD.

   d) Mobile Scaffolds
      - Mobile scaffolds require guardrails at 4 feet in height, unless required at a lower height by the manufacturer.
      - Mobile scaffolds must be braced by cross, horizontal, or diagonal braces based on manufacture's requirements to prevent racking during movement.
      - Wheels must be locked when in use.
      - Workers are not permitted to be on scaffold when it is being moved.
      - Caster and wheel stems must be pinned to the scaffold legs or adjustment screws.
      - The height to base width ratio on a mobile scaffold cannot exceed 2:1 unless it is braced with outrigger frames.

   e) Mast Climber Systems
      - 100% personal fall arrest systems (PFAs) are required when working on a mast climber system.
      - PFAS Anchors shall be located on the building above the work platform

unless it creates a hazard or when performing an activity where there is no structure above.

- PFAS Connectors, ropes or other systems must not interfere with the safe operation of the mast climber. A vertical rope anchor system must be collected into a receptable on the platform so not to “catch” on the platform or cause a hazard to those on the platform.
- In the event the PFAS anchor cannot be connected to the building or structure; a platform integrated PFAS anchor system must be engineered by the mast climber manufacturer and used according to the manufacturer direction and limitations.
- Access to the Mast climber platform must be by stair or established, pre-determined access points at floor levels.

f) Cantilevered and Suspended Work Platforms: Personal Fall Arrest System (PFAS) Policy

- 100% Personal Fall Arrest Systems (PFAS) is required on Cantilevered and Suspended Work Platforms.
- The Cantilevered and Suspended Work Platforms covered under this policy are as follows (but may not be limited to):
  - Jump/climbing formwork systems (all types)
  - Stacker bracket, wall bracket, hanging bracket, bridge bracket and other similar cantilevered systems
  - Wall or waler bracket scaffold platform (typically attached and supported by vertical formwork)
  - Outrigger scaffold platforms
  - Cantilevered loading platforms (retractable and stationary)
  - Suspended scaffold, swing stage, bosun’s chair and other similar suspended systems

General Requirements:

- Guard rail systems must be constructed in accordance with OSHA Regulation and Manufacture’s specifications.
- A PFAS shall be installed and used on all cantilevered and suspended work platforms.
- The complete cantilevered or suspended platform system shall be engineered detailing each component (fastening devices, brackets, working platform, guard rails, PFAS etc) and include guidelines for safe installation/use and limitations of that system.
- Any additional engineering required to adequately assess the compatibility and performance of a PFAS is the performing/installing contractors' responsibility. The performing/installing contractor shall coordinate with all other contractors who will need to access and/or perform work on that system.
- Each trade partner planning on using any of the above systems must give Turner a fall prevention and PFAS plan before installation. At a minimum the plan must include the following:
  - The cantilevered or suspended system intended to be installed
  - Maximum intended deck height of cantilevered or suspended system
  - Maximum number of workers allowed on each cantilevered or suspended system
  - Engineering and/or manufacture’s specification detailing PFAS compatibility and performance criteria/limitations

- Access to cantilevered or suspended system
- Rescue plan in the event of a fall-catch
- Locations with no guard rail and or sequences where guard rail will be removed and/or modified
- PFAS system(s) to be used (including anchor point(s), connecting device(s), harness)
- Training program implementation plan
- For jump/climbing system, the number of “plus” and/or “minus” decks in the system

3. Scaffold Training Requirements
    a) Each employee that works on a scaffold must be trained by a qualified person in the recognition and avoidance of hazards associated with the type of scaffold they will be required to work from.

    b) Each employee that is involved in the erection, dismantling, moving, operating, repairing, maintaining, or inspecting of a scaffold must be trained by a qualified person in the recognition and avoidance of hazards associated with these operations.

4. Temporary work platform access system inspection
    - In addition to manufacturer, OSHA and local jurisdiction inspection requirements; all temporary work platforms and access systems shall be inspected, at a minimum, after initial installation and quarterly by a qualified third party or manufacturer representative.

Mobile Elevated Work Platforms and Safety Procedures for High-Lift Work

I. Purpose and Background

This policy directive is intended to mitigate risks related to elevated work. It reflects current evidence – and experience-based safety enhancements for the use of lifts and requires control guards for all lifts brought onto Turner sites, timely retrofitting of lifts already on site to add control guards, and enhanced procedures for work at 30' or above in lifts.

The Policy directive addresses the following hazards and risks:

A. Inadequate guards over controls which can lead to inadvertent operation of the lift.
B. Risk of crush injuries or entrapment in the ceiling
C. Risk of accidental over-extension and lift tip-over
D. Inability to rescue.

The enhancements to our lift safety policy grew out of a collaboration between Turner and the industry's top scissor lift manufacturers (JLG, Skyjack, and Genie) and purveyors (United, Herc, and Sunbelt). They reflect our unwavering commitment to continuously evaluating and improving our safety program to provide the safest possible work environment for our people.

We know that no safety device can prevent an accident in all circumstances. But, with enhancements and modifications to lift controls, Turner is taking an important step to protect workers against known and preventable hazards.

II. The Policy

All scissor lifts and boom lifts shall have an approved shroud or guard over the joystick/controls, or a timeout feature on the lift/lower and drive selector, which disables the lift/lower and drive functions after several seconds of inactivity *(Reference CSO Alert #1001).* Moreover, boom lifts must be delivered with anti-crush or secondary- guard technology.

Note: Along with the scissor lift and boom lifts policy change, enhanced safety procedures for Mobile Elevated Work Platforms used in High Lift Situations have been developed and incorporated into the policy.

III. Implementing the Policy: Who is Responsible?

Procurement

All Bare Rental Agreements shall reflect Turner's updated policy regarding additional control guards for the safe use of scissor lifts, mobile elevated work platforms, and boom lifts**.**

Safety and Operations Leaders

Ensure that our people are aware of the policy and that they understand their responsibilities as outlined therein.

Site Safety and Field Staff

Conduct a thorough review of all active lifts to determine which must be retrofitted and work with subcontractors and rental companies to complete the necessary modifications as soon as possible. Verify that all lifts brought on site meet the safety requirements of the policy.

1. Mobile Elevated Work Platform (MEWP)

a) All scissor-lifts and aerial-lifts shall have an approved (see below) shroud or guard over the joystick/controls, or a timeout feature on the lift/lower and drive selector, which disables the lift/lower and drive functions after several seconds of inactivity. Moreover, aerial- lifts must be delivered with anti-crush or secondary-guard technology.

b) All Bare Rental Agreements shall reflect Turner's updated policy regarding additional control guards for the safe use of scissor-lifts, mobile elevated work platforms, and aerial-lifts.

c) Prior to mobilizing, all Mobile Elevated Work Platforms (MEWP) must be inspected to ensure compliance with Turner requirements. MEWP's (scissor-lifts, aerial-lifts, and knuckle-booms) must have dual action controls to be approved for use.

d) Dual action controls require that there be two separate actions to activate the lift. If a MEWP arrives on site and does not have dual action controls, then it must remain inoperable until a Dual action control is installed. The dual action control may consist of a button that must be depressed in order for the controls to operate, or a toggle switch that must be activated prior to operating the MEWP controls (The toggle switch must automatically return to the center when released).

e) The contractor is required to complete a daily inspection sheet for all powered lift trucks and mobile elevated work platforms. The inspection includes operational and physical parameters for operation of the equipment being inspected. The inspection form must be posted in a visible location during operations and a copy made available to Turner upon request. An inspection form is available from Turner. Field modifications are not allowed on aerial lifts.

f) Only authorized and trained individuals may operate aerial lifts.

g) When a lift is delivered to the project, the rental company or the owner of the lift shall inspect the lift & provide documentation that the lift is safe to operate onsite. The lift shall be free from any physical defects in new or like new condition with all the safety placards present. The operator's manual and inspection documentation shall be included.

h) Employees must use personal fall arrest systems (PFAS) when working from boom platforms. Employees shall follow the manufacturer's recommendations for the type of (PFAS) when working from an aerial lift.

i) At a minimum, employees shall follow the manufacturer's recommendations for the type of fall arrest/restraint when working from a scissors lift. If scissor lifts are equipped with an attachment point provided by the manufacturer for a restraint system, they are to be used. The intent of this protection is to keep workers within the confines of the passive protective system (rails) so the shortest length of lanyard that allows the task to be completed and keep the worker confined to the walking/working surface is required. Never climb above the work platform. A dedicated spotter is required any time a scissor lift must be moved in an elevated state. The lift shall be inspected daily & documentation provided to Turner upon request. Each worker operating the lift shall have a training card or documented training.

j) Employees must keep both feet on the floor of the basket and not stand on the railing or toe board during operation.

k) If it has been determined by the subcontractor's competent person that there are no feasible means to access an area without leaving the basket of a scissor lift, a modified Pre-Task

Plan must be completed as well as a Fall Protection Plan. This plan must be completed by the competent person with details of the anchorage point outside the scissor lift and above the employee's head. Any worker engaged in the activity should be active in the preplanning of the modified plan. All workers involved must review and sign off on the plan. This must be reviewed with Turner's Superintendent. Each work activity and area will require their own PTP and Fall Protection Plan.

l) If operating in congested areas, MEWP's will require spotters. The spotters will be responsible for ensuring that the area around the MEWP and the travel path are free of obstruction and clear of equipment and personnel.
m) Man baskets such as those utilized from fork truck type vehicles are not allowed on Turner projects.

2. Mobile Elevated Work Platform Use in High Lift Situations (applies to boom lifts with an operating platform height of 30' and above) A dedicated JHA shall be developed for each activity operating a MEWP above 30'.

a) MEWPs often operate in close proximity to each other, and workers may walk through or work close to their operation. A system for managing the affected area below the basket and movement of the MEWP's is necessary to decrease the risk of struck-by hazards.
b) If any of the workers in the Aerial Boom Lifts are incapacitated and incapable of descending, a rescue may be required. Due to the nature of this type of work, it is prudent to establish an emergency response plan which has redundancy built into it.
c) Boom lifts cannot be operated by the basket controls without first depressing a covered, protected foot switch. This causes the operator to be intentional about basket movement and reduces the risk of incidental operations.
d) The lifts should have a pressure actuated auto shut-off across the controls which shuts down the equipment to prevent entrapment.
e) A dedicated ground spotter (with no other collateral duties) shall be in place whose duties are as follows:
    i. Visually verify and communicate via two-way radio that all obstructions are clear of the path of travel at the ground level.
    ii. Visually verify that all obstructions are clear while basket is moving.
    iii. The ground spotter shall be responsible for no more than 1 Controlled Access Zone (CAZ). Additional spotters will be required if MEWP's need to be operated/relocated simultaneously within 1 CAZ (Approximate size and dimension of CAZ is below).
    iv. Spotter Logistics:
        a. If 2 or more lifts are required to operate simultaneously, each operator/spotter team will utilize their own dedicated radio channel or communication method.
        b. The Spotter shall not use a cell phone, headphones or other devices which may distract them from their duties.
        c. The Spotter shall have stop work authority. The spotter shall wear, at a minimum, a Class II High Visibility Vest.
        d. The Spotter/operator team shall perform a "radio" check prior to the commencement of the activity and every 30 minutes thereafter if no communications occur during that time frame.
        e. Operation of MEWP from the basket is prohibited without prior communication with the spotter and an "All Clear" is given.

f) Other Traffic at base of operating MEWP
   a. A Controlled Access Zone will be established in the affected areas of the MEWP operation to include the base and working zone beneath the platform. The CAZ should be constructed with physical barriers such cable, wire rope or chain, or flagging. Danger tape and Caution tape should be the last choice and spray-painted lines will not be accepted. The CAZ must be secured from tipping and signed every 30'. The size of the CAZ must consider deflection or arc of the falling material. Each CAZ will be adequately sized to have a 15- foot buffer zone on each side of the MEWP to include under the platform. Each CAZ will hold no more than 3 boom lifts.
   b. No other equipment or vehicle will be allowed to operate within a dedicated CAZ.
   c. A 30' Wide dedicated path of travel for vehicles and other equipment shall be established using rope, traffic cones, delineators or other clear markings which safely guide other equipment and vehicles around the MEWP CAZ. Any changes in the path of travel must be approved by the Turner Superintendent. Boom lifts shall not operate within or over the traffic zone.
   d. The Spotter shall monitor vehicle traffic and shall have authority to stop work and or vehicle traffic.

g) Emergency Response
   a. There shall be, at a minimum, (2) two MEWPs on site when working in excess of 85 vertical feet. This is to ensure that one could assist another which has the capability to reach the basket in the event of an emergency. (A typical FD ladder truck can reach 85'-90' vertical feet)
      i. Exceptions
         1. There is a means of safely reaching the platform via catwalk or another elevated surface.
         2. There is a means to reach the platform from above via rope, slings, or other climbing type equipment. This equipment is only to be used by trained professionals.
   b. The Spotter shall be trained in how to safely use the ground controls. The ground controls shall be tested prior to work occurring each day and/or shift.
   c. The Local Fire Department Shall be invited to the project site to review conditions and site activities which may have the potential for a "Vertical Rescue" in the event of an emergency.
   d. The emergency response number shall be conspicuously posted.
   e. Turner, the Fire Department and Dispatch shall determine a key phrase or word which indicates that a "Vertical Rescue Team" is required. (These teams have specialized training and equipment to respond to high rescue conditions.)
   f. Pre-lift inspections are to include the review of available fall protection equipment and access to and the condition of anchor points.
   g. Workers on the ground shall stay out of the CAZ and communicate with the spotter if entrance is needed.
   h. A Stop Work must immediately be called when any deviations are observed with fall protection.

h) Address line of fire hazards by following these work practices:

a. Identify and discuss tasks which have the potential for falling tools, materials and/or debris.
b. Workers should avoid positioning themselves, and their equipment, in a line of fire where they could be struck by falling, flying, or moving objects from the overhead platform.
c. Utilize tag lines to maintain positive control of objects being removed or hoisted to ensure the object does not come in contact with the lift.

IV. Approved Guards and Shrouds for Lift Controls

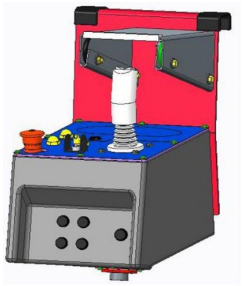
Please see below for examples of approved guards and shrouds for lift controls on Turner projects.

Note: In addition to joystick guard/shrouds, clear messages, proportional lift and drive controls, and symbol-based function selection buttons are required for easy training and operation of lifts.

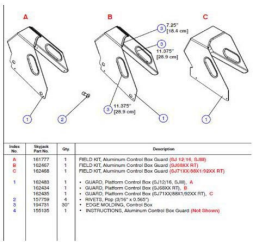
JLG Scissor Lift Guard

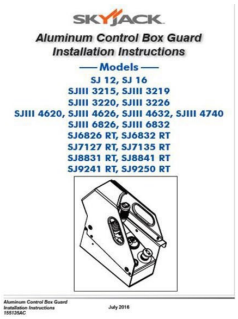


JLG All-Terrain

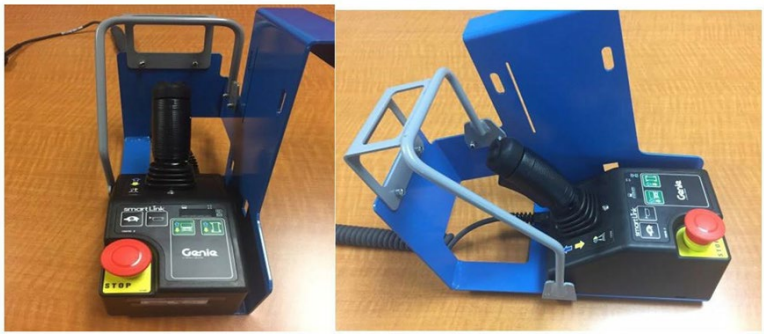


- **Skyjack Scissor Lift**





- **Genie Scissor Lifts**
  The Genie Smart Link control scissor for slab scissors must include a platform control, ground control, and joystick cover as shown below.



3. Aerial Lift Training Requirements
   Only trained and authorized persons are allowed to operate an aerial lift. Training should include:
   a) Explanations of electrical, fall and falling object hazards.
   b) Procedures for dealing with hazards.
   c) Recognizing and avoiding unsafe conditions in the work setting.
   d) Instructions for correct operation of the lift (including maximum intended load and load capacity).
   e) Demonstrations of the skills and knowledge needed to operate an aerial lift before operating it on the job.
   f) When and how to perform inspections; and
   g) Manufacturer's requirements

V. MEWP Safe Operation and "Walking the MEWP"

When operating a mobile elevated work platform (MEWP) operators are required to stay inside the confines of the basket on the platform. Site-specific conditions should be discussed and documented in the Pre-Task Plan or PTP Huddle Board. Prior to driving or walking the MEWP through any entry, doorway, or corridor, the operator must take a mandatory pause to re-evaluate potential hazards such as door heights, overhead hazards, etc.

Ensure Risk Assessments on Pre-Task Plan includes using mobile equipment, and that potential hazards and mitigations are identified. For example:

- Travel path and travel restrictions including doorways, semi-permanent structures, overhead hazards, pinch points, and obstructions.
- Drop-offs/holes and floor/ground obstructions
- Energized power lines
- Pedestrian and vehicle traffic
- Concurrent work (e.g. drop zones)
- Situations that may require additional spotters.

Implement the below controls if it is determined that walking the MEWP provides a safer alternative:

Definition of "WALKING THE MEWP": The term is used when maneuvering or travelling a MEWP using the platform controls from the ground by walking alongside or in the rear of the MEWP. This includes those that use an 'umbilical cord', radio/remote control or fixed point of control at the chassis.

“Walking the MEWP” will be allowed when it is determined by the competent person that there is insufficient/restricted space above the platform to operate safely from the platform, such as through doorways, corridors, or when any other hazard is recognized by the competent person and operator. Hazards should be identified and discussed in the Pre-Task Plan and mitigating factors such as walking the MEWP should be identified. The following precautions shall be taken when the decision to walk a MEWP has been determined:

- Follow manufacturer’s safety recommendations and training.
- Define alternative MEWP equipment and features such as manual push behind lifts & other alternative means of equipment, especially for accessing through doorways and other low clearance openings.
- Prior to driving or walking the MEWP through any entry, doorway, or corridor, the operator must take a mandatory pause to re-evaluate potential hazards such as door heights, overhead hazards, etc.
- Review process of “Walking the MEWP” and site-specific conditions should be discussed and documented in the Pre-Task Plan or PTP Huddle Board. Ensure Risk Assessments on Pre-Task Plan includes using mobile equipment, and that potential hazards and mitigations are identified.
- A spotter is required when walking a MEWP and should be positioned away from the lift in a manner that gives the operator another set of eyes on the side of the MEWP that is difficult for the operator to see.
- The operator should be trained for the MEWP category and familiarized with the MEWP being moved.
- The operator and spotter must walk the path of travel for the MEWP and remove any obstacles and debris from the route.
- The path of travel should be barricaded off or overseen by spotters during this activity.
- The operator and spotter should maximize their stand-off distance from the MEWP during this activity and out of the direction of travel while walking with the controls in hand from behind the MEWP. The activity should not proceed if the MEWP controller does not allow the operator to walk from behind.
- Hold the control box in your hands while operating the MEWP. Do not operate the MEWP while the control box is secured to the machine.
- Select the lowest speed when operating outside of the guardrails.
- Maintain a clear view of the support surface and path of travel.
- Stop the work if additional personnel are needed to perform the MEWP task safely

Signs, Signals and Barricades

I. Policy Statement

All employees of the Turner Construction Company and its subcontractors will comply with 29 CFR 1926, Construction Industry Regulations, Subpart G, Signs, Signals and Barricades, at a minimum, in addition to the following.

II. Procedures

1. Required signs will comply with the OSHA standards described in1926.200.

2. Where areas may require additional awareness or present unique danger, the use of warning tape may be necessary.
   a) The warning tape should have a sign with the nature of the hazard, the contractor who installed the tape with a contact number, and the duration the tape will be in place.
   b) The intent of the warning tape is to notify of hazards that may arise during construction activities. Every effort should be made to correct these situations with permanent solutions in a timely fashion.

3. All flagmen shall be trained on appropriate procedures before controlling traffic, as required by the Manual on Uniform Traffic Control Devices (MUTCD) and any Municipal or State guidelines.

4. All flagmen shall utilize sign paddles and shall be outfitted with high visibility garments, as required by current ANSI standards. All PPE and traffic control equipment shall be outfitted with reflectorized material for night work as required by current ANSI standards.

5. All crane and hoist signals shall comply with applicable ANSI standards.

6. All traffic control devices shall comply with the MUTCD and any applicable Municipal or State guidelines.

7. Emergency communication signage / egress route signage should be posted on floors that include the locations of exits, stairs, fire extinguishers, gates, etc.

Stairways and Ladders

I. Policy Statement

Each contractor working on a Turner project will comply with 29 CFR 1926, Construction Industry Regulations, Subpart X – Stairways and Ladders, in addition to the following guidelines.

II. Procedures

1. General Requirements

a) A stairway must be provided at all personnel points of access where there is a break in elevation of 19" or more.

2. Stairways

a) When doors from an office or storage trailer open directly onto a stairway, a platform must be provided, and the swing of the door must allow an additional 20" to prevent the door from striking an employee.

b) Employees are not allowed to use metal pan stairs unless they have been fitted with wooden filler blocks or poured with concrete.

c) Stairways with four or more risers or rising more than 30", whichever is less, must have a stair rail or handrail along each unprotected side or edge.

d) Handrails that will not be a permanent part of the structure being built shall have a minimum clearance of 3 inches between the handrail and walls, stair rail systems, and other objects. 2x4 blocks are acceptable for spacers.

e) The stair rails are to be free of nails & hazardous projections.

III. Ladders Last Policy Statement

1. Ladder use on Turner Construction projects will be allowed only when it has been determined that it is unfeasible to use all other options to complete the task.

2. If it is determined that a ladder is the only means of performing the job at elevated height, a ladder permit must be submitted prior to starting work. At no time will a ladder be on site without a current permit and safety checklist.

3. For repetitive work, allow for the use of a "multi-day" permit to be issued in lieu of a daily permit. Daily inspections would still occur, but the permit/tag would be modified.

4. Use of job-built ladders is prohibited on Turner Construction Projects. Temporary stair towers or prefabricated stairs shall be used to access different building levels.

IV. Procedures for identifying and responding to all tasks that require the use of a device that allows work from height:

1. Prior to beginning work, the subcontractor or superintendent (for self-perform work) shall evaluate all tasks that require individuals to work at elevated heights. It is the expectation that these tasks will be performed using methods other than a ladder. Use of lifts and portable scaffold devices shall be the preferred method to perform this type of work.

2. If it is determined that a ladder must be used:

   a. The subcontractor shall complete the Turner Construction Ladder Use Permit and have it reviewed and approved by the Turner Superintendent.

   b. When working at a height greater than four (4) feet, 100% fall protection is required. A retractable is the only option in this case.

   c. Prior to starting work each shift, The **Turner Construction Ladder Safety Inspection Checklist** shall be completed affixed to all ladders.

   d. Prior to using a ladder, the Turner Superintendent will review the Job Hazard Analysis, Pre-Task Plan, and Ladder Use Permit.

   e. Only fiberglass ladders are to be utilized. Metal and wood ladders will not be used on Turner projects. Platform ladders shall be the ladder of choice on Turner Construction projects.

   f. At a minimum, only Type IA Heavy Duty (300 lb. limit) ladders (red and orange) may be used on Turner projects.

   g. When employees ascend or descend a ladder, they must maintain a three-point contact and not carry anything that could cause them to lose their balance.

   h. When extension ladders are used to access upper landings, the side rails must extend at least 3 feet above the landing and secure at the top. Install overhead fall protection anchor point where feasible to allow for the use of PFASs while ascending/descending.

   i. Pull ropes should be placed at all access ladders so employees can safely lift tools or equipment to upper levels.

   j. Stepladders must be opened fully and set level when in use.

   k. All ladders must be used for the purpose for which they were designed.

   l. The base of an extension and or straight ladder is to be placed 1 foot horizontal from the face of the surface for every 4 feet vertical.

   m. The area around all ladders must be checked to ensure there are no slippery or uneven conditions or debris in the area before placing the ladder for use. All weight limits must be checked to avoid exceeding the manufacturer's limits.

   n. Weight limits must also be checked to avoid exceedances.

4. Training
    a) Each employee involved in ladder use must be trained by a competent person in the recognition and avoidance of ladder hazards.

Steel Erection

I. Policy Statement

Each contractor working on a Turner project will comply with 29 CFR 1926, Construction Industry Regulations, Subpart R – Steel Erection, in addition to the following.

II. Procedures

1. General Site, Erection and Construction Sequence Requirements
    a) Before authorizing the commencement of steel erection, the controlling contractor shall ensure that the steel erector is provided with the following written notification: the concrete in the footings, piers and walls and the mortar in masonry piers and walls has attained, on the basis of an appropriate ASTM standard test method of field-cured samples, either 75 percent of the intended minimum compressive design strength or sufficient strength to support the loads imposed during steel erection.

    b) The controlling contractor must ensure that site access roads and storage areas are adequate for the safe delivery and movement of cranes, trucks, and other equipment necessary to erect steel. The equipment must not be assembled or used unless ground conditions are firm, drained, and graded to a sufficient extent so that, in conjunction (if necessary) with the use of supporting materials, the equipment manufacturer's specifications for adequate support and degree of level of the equipment are met.

    c) A site-specific erection plan must be developed by a qualified person and submitted to Turner prior to the start of work.

    d) A site-specific fall prevention plan must be developed, submitted to Turner, and administered by a competent person prior to the start of work. The plan must include Job Hazard Analysis' (JHA's) and Pre-Task Planning (PTP) meetings.

    e) The controlling contractor must ensure that state and municipal permitting issues are addressed when off-loading steel and /or materials on public roads.

    f) Steel erection activities such as connecting, bolting, and welding are to be accomplished from aerial or scissor-lifts to the extent feasible.

    g) Structural steel erection is not to be done using forklifts. Small miscellaneous pieces may be lifted if a lift plan is prepared and Turner's Safety Manager (or superintendent if a Safety Manager is not present) allows the lift, the piece does not exceed 70% of the forklift's capacity as configured and is allowed by the load chart. The lift must be made with an attachment designed and/or approved by the forklift's manufacturer. "BUEHSD must review all plans if a contractor intends to use a forklift for steel."

2. Hoisting and Rigging

a) Cranes being used in steel erection must be visually inspected by a competent person prior to each shift.

b) Individuals who rig loads must be qualified. An employer may not permit an individual to rig loads to be lifted by a crane unless the individual has received training and also has the experience appropriate to their level of work.

c) Outrigger pads should be at least 3 times the dimension of the crane float. The outrigger pads are to be pre-manufactured.

d) A qualified rigger must inspect all rigging prior to each use. The qualification of the qualified person must be submitted to Turner for review prior to the start of work.

e) Routes for suspended loads must be pre-planned to ensure that no employee is required to work directly below a load unless they are engaged in the connection of the steel.

f) Multiple lift rigging may be performed when the following conditions are met:
- A multiple lift rigging assembly is used.
- A maximum of **(3) three members** are hoisted per lift.
- Only beams or similar structural members are lifted.
- All employees engaged in the activity have been trained in the specific procedures identified in OSHA Subpart R, 1926.761.

g) See the Cranes and Derricks in Construction and the Material Handling and Rigging section for additional information.

3. Structural Steel Assembly
   a) There should never be more than four floors or 48', whichever is less, of unfinished bolting or welding above the foundation or permanently secured floor. An exception would be if the structural integrity were maintained as a result of the design.

   b) A fully planked or decked floor or nets must be maintained within two stories or 30', whichever is less, directly below where erection work is being performed.

   c) Shear connectors, also known as "Nelson studs", must not be attached to the top of the beam until after the decking has been installed.

   d) Metal decking shall be laid tightly and immediately secured upon placement to prevent accidental movement or displacement.

   e) At the end of each shift, unbundled metal decking shall be secured in place.

4. Beams and Column Anchorage
   a) All columns must be anchored by a minimum of 4 anchor bolts.

   b) All columns must be evaluated by a competent person to determine whether guying or bracing is necessary.

c) During the placing of structural beams, the load must not be released until a minimum of two bolts, per connection, are secured in place.

d) Employees connecting horizontal members shall not use the members as an anchorage point unless they have been secured at two points independent of an active hoist line. (i.e., they shall not walk out onto a member that is only connected on one side and is still attached to the crane).

e) Anchor bolts shall not be repaired, replaced or field modified without the approval of the project structural engineer of record.

f) Prior to the erection of a column, the controlling contractor shall provide written notification to the steel erector if there has been any repair, replacement, or modification of the anchor bolts of that column.

5. Personal Fall and Falling Object Prevention
   a) All material, equipment and tools must be secured against accidental displacement while aloft.

   b) Each employee engaged in a steel erection activity that is on a walking or working surface with an unprotected side or edge 6’ or more above a lower level, must be protected from fall hazards by safety net systems, guardrail systems or personal fall arrest systems. Turner Construction has a 100% Fall Protection ZERO TOLERANCE POLICY. AT NO TIME SHALL ANYONE BE AT A HEIGHT > 6’ WITH OUT BEING PROTECTED. This includes connectors and any employee installing metal decking.

   c) During metal decking installations, only self-retracting lanyards approved by the manufacturer for leading edge work shall be used.

6. Training
   a) All training must be provided by a qualified person, knowledgeable in the recognition and avoidance of hazards associated with steel erection.

   b) Training includes, but is not limited to; fall hazards, multiple lift rigging and steel connection.

Underground Construction, Caissons, Cofferdams and Compressed Air

I. Policy Statement

Each contractor working on a Turner project will comply with 29 CFR 1926, Construction Industry Regulations, Subpart S – Underground Construction, Caissons, Cofferdams and Compressed Air, in addition to the following guidelines.

II. Procedures

1. The employer must control access to all openings to prevent unauthorized entry underground. Unused chutes, man ways, or other openings must be tightly covered, bulk headed, or fenced off and must be posted with warning signs stating, “Keep Out”, or similar in the appropriate languages.

2. The employer must designate in writing the competent person responsible for monitoring the air quality during underground construction.

3. The atmosphere in all underground work must be tested as often as necessary to assure that the atmosphere contains at least 19.5% oxygen, but no more than 23.5% oxygen. Continuous monitoring is recommended. These tests must be conducted before testing for air contaminants.

4. The atmosphere in all underground work must also be tested quantitatively for hazardous materials such as carbon monoxide, nitrogen dioxide, hydrogen sulfide, and other toxic gases, dusts, vapors, mists, and fumes.

5. If an actual or potentially hazardous atmosphere is present, the caisson then becomes a permit required confined space and Turner’s Confined Space Entry Procedure is implemented.

6. The competent person must keep a daily record of all air quality test results and submit those results to Turner, on a weekly basis and/or upon request.

7. The full depth of the shaft must be supported by casing or bracing.

8. The casing or bracing must extend 42” + or – 3” above ground level.

9. This height may be reduced to 12”, provided a standard railing is installed, the ground surrounding the shaft is sloped away from the shaft and effective barriers are in place to prevent mobile equipment from jumping over the 12” barrier.

Welding and Cutting

I. Policy Statement

Each contractor working on a Turner project must comply with 29 CFR 1926, Construction Industry Regulations, Subpart J – Welding and Cutting, in addition to the following guidelines.

II. Procedure

1. Welding, Brazing and Cutting
    a) Transporting, Moving and Storing Compressed Gas Cylinders and bottles
        - Valve protection caps must be in place and secured.
        - Cylinders must be moved by gently tilting and rolling them on their bottom edges.
        - When cylinders are hoisted by cranes, or other mechanical means, magnets or choker slings must not be used.
        - When cylinders are moved by powered vehicles, they must be secured in a vertical position to the vehicles by a metal bracket designed for this purpose.
        - A suitable steadying device must be in place to keep cylinders in a vertical position when in use.
        - Damaged or defective cylinders must be taken out of service immediately.
        - Oxygen cylinders in storage must be separated from fuel gas cylinders by a minimum distance of 20'. A secondary option is to separate the cylinders using a non-combustible barrier at least 5' high that has a fire rating of 30 minutes. All torch carts are required to have a fire rated barrier between the cylinders.
        - There shall be no "soft top welding". The use of head protection is required, at all times.

    b) Placing Cylinders
        - Cylinders must be kept far enough away from the actual welding or cutting operation so that slag, sparks, or flame will not reach them.
        - Cylinders containing oxygen, acetylene or other fuel gas must not be taken into confined spaces.

    d) Use of Fuel Gas
        - The employer must instruct the employee in the safe use of fuel gas.
        - Before a regulator is connected to a cylinder valve, the valve must be opened slightly and closed immediately. This "cracking" of the valve must be done each time before a regulator is connected.
        - Flashback arrestors must be installed at the torch head and at the regulators and used according to manufacturer's recommendations. Under these circumstances, the arrestors are designed to stop the backflow (reverse flow) of unwanted gas and/or flashback into the upstream equipment.

- Flashback arrestors must be routinely inspected, per manufacturer's recommendations.
- All hoses must be routinely inspected, per manufacturer's recommendations. Specific issues include cracking and dry rot.

e) Regulators and Gauges
- Oxygen and fuel gas pressure regulators must be in proper working order, per manufacturer's recommendations, while in use.
- The regulators & gauges must be removed from the cylinders at the end of each shift.

2. Arc Welding and Cutting
   a) Manual Electrode Holders
      - Only manual electrode holders designed for arc welding and cutting, and are capable of handling the maximum current, can be used.
      - Any and all current carrying parts of the holder must be fully insulated.
      - When welding is not taking place, the rod cannot be left in the stinger.

   b) Welding Cables and Connectors
      - All arc welding and cutting cables must be completely insulated, flexible and capable of handling the maximum current necessary to complete the work.
      - The cables must be free from splices or repair, a minimum distance of 10', from the cable end to the electrode holder.
      - Cables in need of repair, beyond the distance noted above, can be repaired using friction or rubber tape, per manufacturer's recommendations.

   c) Machine Grounding
      - The ground return cable must have a current carrying capacity equal to or greater than the maximum specified output of the arc welding or cutting unit.
      - When a single ground is used to service several machines, the current carrying capacity must be equal to or greater than the total maximum specified output of all the machines which it services.

   d) Shielding
      - All arc welding and cutting operations must be shielded by non-combustible or flameproof screens, which protect employees and other persons working in the area from the direct rays of the arc.

3. Fire Prevention
   a) When practical, the object to be welded, cut, or heated should be moved to a designated safe location, away from flammable liquids and other combustibles.

   b) If the object cannot be moved, positive means must be taken to confine the heat, sparks, and slag.

   c) A 20 lb., ABC dry chemical extinguisher or equivalent must be immediately available in the work area and must be maintained in a state of readiness for instant use.

   d) Drums, containers, or hollow structures, which contain toxic or flammable substances, must be filled with water and thoroughly cleaned, ventilated and tested

before welding or cutting them.

e) Hot Work Permits must be used and are valid for one shift only.

f) A fire watch must be maintained during and at least 30 minutes (60 minutes depending on client expectations) after the hot work completion.

Temporary and Permanent Tent Structures

The following alert relates to all tent or similar structures on all Turner Construction Company and Turner Construction JV projects.

Based on the high risks and potential hazards associated with the use of tents including structural failure and/or compromised structural integrity due to weather events, prolonged usage, and fire hazards, additional proactive management as well as the establishment of procedural elements to reduce the risks involved with these tents is necessary.

Definitions:

- **Pop Up Tent:** Any structure that can be assembled and disassembled with minimal effort. Typically, 10x10 or 15x15 and used for shade protection.
- **Temporary Tent:** Structures larger than a pop up, typically required to be secured to the ground with guy wires or ropes and used for worker break areas, cooling structures, and not constructed to be taken down every day, but can be disassembled in severe weather conditions.
- **Permanent Tent:** Large extruded aluminum or steel frame structures that are to be engineered and designed. Erected by 3rd party and used for mass gatherings and erected for most of the project.

The following are applicable to all tents:

1. Tent fabric must be made of fire-resistant material that meets the requirements of NFPA 701. Tents shall be labeled per International Fire Code (IFC) requirements.
2. All Tent Structures shall be inspected daily and documented by the contractor who is responsible for the tent structure.
3. For inclement/severe weather:
    a. Ensure a plan is in place to take down any pop-up tent.
    b. For temporary tents ensure they are fully secured from being displaced. If not, they should be disassembled.
    c. For permanent tents ensure they are fully engineered to prevent displacement.
4. Portable fire extinguishers (min 20 lbs. ABC) need to be provided within 25 ft of the tent premises. Ensure proper quantity based on OSHA CFR 1925.150 regulations.
5. If any electrical equipment or wiring is provided or installed, it needs to comply with **NFPA 70**. Equipment and wiring need to be listed and labeled for outdoor use.
6. Access and egress (pop-up not included) should be provided per IFC tent standards.
7. All tent structures need to comply with your local governing code, if applicable. Local BUs are responsible for knowing this and complying.

Temporary Tents:

1. Follow all manufacturer's instructions for installation and maintenance.
2. Tents should be located on firm soil, gravel base, or concrete pad. Ensure water is not retained on the floor.
3. Fully assembled tents, including their anchorage to the ground, should be rated to resist a **minimum** wind speed of 35 mph.
    a. When snow, sleet, or freezing rain is forecasted, tents should be disassembled, unless the tent is specifically rated for such loading.
4. Lighting, speakers, banners, etc., should not be hung from the tent structure unless specifically permitted by the manufacturer.

Permanent Tents: Additional requirements for Permanent Tents are as follows:

Note: In addition to the below, the above requirements for temporary tents apply to permanent tents.

a. Permit and approval from the city fire code official is typically required. Check with local officials for any permits or requirements such as weather stability, specific fire-resistant fabric, etc.

b. A 3rd party licensed structural engineer is required to be engaged in the design of this type of tent, including how the tent is secured to the ground (blocks, pins, etc.). *See attached example from Big Top Tent engineering.*

c. Permanent tent installations shall be submitted to TEG to review, comment, and make recommendations based on the 3rd party licensed structural engineers' design and drawings. (Geoffrey Morrisey, gmorrissey@tcco.com; Robert Barbera, rbarbera@tcco.com)

d. Bi-annual inspections by third party/manufacturer/installer are required.

Turner

4

TURNER

CORPORATE ENVIRONMENTAL, HEALTH AND SAFETY POLICY

Occupational Health

Blood-borne Pathogen Prevention Policy

I. Policy Statement

This program will apply to all Turner employees who could be "reasonably anticipated", as a result of performing their job duties, to come in contact with blood and other potentially infectious bodily fluids. Turner employees trained and certified in first aid and CPR who might be "reasonably anticipated" to come in contact with bodily fluids also must follow the rules and regulations set forth in this program.

II. Procedures

1. When dealing with blood or other bodily fluids, Turner employees are required to follow Universal Precautions. Accordingly, all human blood and other human body fluids are treated as if known to be infectious for HIV, Hepatitis B, and other blood-borne pathogens.

2. All jobsite and business unit offices are required to provide employees with disposable latex gloves and one-way resuscitation masks.

3. All certified first aid providers are required to wear disposable non-latex gloves and eye protection while performing first aid on an injured individual. If rescue breathing or CPR is performed, a one-way resuscitation mask shall be provided for the protection of the injured and the provider.

4. All blood spills shall be immediately contained and cleaned with an anti-viral solution, or by a solution of 5:1 water to bleach. In the event of a serious accident, Turner should consider contracting with an outside Hazmat firm.

5. Any material saturated with blood must be considered a regulated waste. This means liquid or semi-liquid blood or other potentially infectious materials; contaminated items that would release blood or other potentially infectious materials in a liquid or semi-liquid state if compressed; and items that are caked with dried blood or other potentially infectious materials. Discarded Band-Aids and gauze containing small amounts of blood products are not considered regulated waste. Disposal of all regulated waste shall be the responsibility of emergency medical personnel.

At least one Turner jobsite person shall be trained in First Aid, CPR, AED procedures and shall be trained in the decontamination of blood spills (Universal Precautions). All individuals are encouraged to attend training in emergency first aid procedures at each jobsite. At all times every project will have on site a FA/CPR/AED trained representative from Turner Construction and each subcontractor. Best Practice for each Turner representative to be trained in First Aid, CPR, AED procedures and shall be trained in the decontamination of blood spills (Universal Precautions).

Carbon Monoxide Exposure Prevention

I. Policy Statement

The purpose of this policy is to educate Turner employees and their subcontractors on the hazards associated with carbon monoxide exposure. Carbon monoxide is a highly toxic, flammable, non-irritating, tasteless, colorless, odorless gas that is slightly lighter than air. Carbon Monoxide (CO) interferes with the oxygen-carrying capacity of blood. CO is non-irritating and can overcome people without warning. Many people die from CO poisoning, usually while using gasoline powered tools and generators in buildings or semi-enclosed spaces without adequate ventilation. Some of the common symptoms of carbon monoxide poisoning are shortness of breath, headache, dizziness, muscular weakness, and nausea. ALL fossil fuel (gasoline, diesel, propane, acetylene, etc.) burning equipment, when used where people are working in confined areas, produces carbon monoxide poisoning exposures.

II. Procedures

1. Testing Requirements - Use of any device that discharges the products of combustion into a work area where an employee exposure is possible, requires testing as defined below:

   a) Monitor the work area to determine the concentration of carbon monoxide at least three times during each 8-hour period. Monitoring shall be conducted with a UL approved monitoring device, such as a LEL/0_2/H_2S/CO 4-gas monitor.
   b) Monitor several different points within the area at the working/breathing heights of an employee.

   c) Maintain a record of these tests noting the date, time, and result of each test. Provide the monitoring results to all affected employees within the work area, if requested. Once the project is complete, these records must be archived with the Business Unit Environmental, Health, and Safety Director.

   d) Remove the employees from the area when the concentration of carbon monoxide reaches 20 PPM. Supplemental ventilation and reduction or elimination of the source shall be provided to reduce the concentration below 20 PPM before the employees are allowed to resume work in the area.

   e) Continuous monitoring is required when the concentration of carbon monoxide reaches a steady concentration of greater than 20 PPM in ambient air.

2. Use of Solid Fuel (wood, coal, paper, etc.) for heating is prohibited.

IV. Internal Combustion Engine Equipment

Prevent CO exposure by using tools or vehicles powered by electricity or compressed air. Utilize engineering controls including exhaust scrubbers on equipment and the use of non-CO type equipment. Never use equipment, vehicles, or machinery with internal combustion engines such as generators, cars, trucks, etc. indoors or in enclosed or partially enclosed spaces such as garages, crawl spaces, tunnels and basements without proper controls, ventilation, or air cleaners. Make sure all internal

combustion engine equipment has adequate clear space on all sides and above it to ensure adequate ventilation. Provide air blowers or other types of air exchangers. Do not use internal combustion engines outdoors if placed near doors, windows, vents, air handlers etc. which could allow CO to enter and build up in occupied spaces.

Where any tool or equipment must be used that produces CO in a partially enclosed area, then air quality monitoring must be provided by a qualified person. Readings must be taken at regular intervals and logged.

Hearing Conservation Program

I. Policy Statement

Turner Construction Company recognizes that excessive noise can cause permanent hearing loss if appropriate administrative or engineering controls or personal protective equipment is not used. Limiting exposure to excessive noise through engineering controls is Turner's preferred method of control. The purpose of this policy is to prevent employee exposure to excessive noise exposure during construction activities. Each contractor working on a Turner project must comply with 29 CFR 1910.95 and 1926, Construction Industry Regulations, in addition to the following guidelines.

II. Procedures

Permissible Noise Exposures

Duration per day, hours	Sound level dBA, slow response
8	90
6	92
4	95
3	97
2	100
1 ½	102
1	105
½	110
¼ or less	115

1. Protection against the effects of noise exposure must be provided when the sound levels exceed those shown in the table above. The measurement must be observed on the A-scale of a sound level meter at slow response.

2. When employees are subjected to sound levels exceeding those shown above, feasible administrative or engineering controls must be utilized.

3. If such controls fail to reduce sound levels within the levels shown above, personal protective equipment must be provided and used to reduce noise exposure.

4. In all cases where the sound levels exceed the values shown in the table above, a continuing, effective hearing conservation program must be administered.

5. All subcontractors must provide, when requested by Turner Construction, a comprehensive hearing conservation program prior to beginning work. At a minimum this program shall include:
    i. Noise survey data for typical work they perform.
    ii. Noise dosimetry data for typical exposures from the work they perform.
    iii. Training records for employees working on the Turner Project.

6. Contractors should pre-plan for noisy activities that potentially expose other trades to noise in excess of this policy. These tasks can be done off-hours, outside of structures, or in areas that have added sound attenuation to limit exposure to noise.

Hexavalent Chromium

I. Policy Statement

Hexavalent chromium (Cr(VI)) compounds are widely used in the chemical industry as ingredients and catalysts in pigments, metal plating and chemical synthesis. Hexa-chrom can also be found in the construction industry through welding or other abrasive methods, such as grinding or when the compound is heated on stainless steel or on hexa-chrom painted surfaces. Industrial uses of hexavalent chromium compounds include chromate pigments in dyes, paints, inks, and plastics; chromates added as anticorrosive agents to paints, primers, and other surface coatings; and chromic acid electroplated onto metal parts to provide a decorative or protective coating. The major health effects include lung cancer, nasal septum and skin ulcerations and contact dermatitis. The purpose of this policy is to prevent employee exposure to hexavalent chromium compounds during construction activity. Each contractor working on a Turner project must comply with 29 CFR 1926, Construction Industry Regulations, Subpart Z – Section 1126, Chromium (VI), Subpart D (Occupational health and environmental controls) 1910 Subpart I (PPE and respiratory protection) and Subpart J (Welding and cutting) in addition to the following guidelines.

II. Procedures

1. Permissible Exposure Limit (PEL)
   a) Since this construction activity is limited to specialty work, Turner will direct the Subcontractor to provide specific Job Hazard Analysis (JHA's) and Pre-Task Planning (PTP) meetings to address potential exposure.

   b) The Employer must ensure that no employee is exposed to an airborne concentration Cr(VI) in excess of 5 micrograms per cubic meter of air (5 ug/m3) calculated as an 8-hour time-weighted average (TWA).

   c) Engineering controls will be the preferred method to achieve the Permissible Exposure Limit (PEL).

2. Exposure Determination
   a) The subcontractor must determine the 8-hour TWA exposure for each employee exposed to Cr(VI). This may be accomplished using two options; scheduled or performance-oriented monitoring.

   b) Scheduled Monitoring
      - The subcontractor must perform initial monitoring to determine the 8-hour TWA for each employee on the basis of a sufficient number of personal breathing zone samples.
      - If the subcontractor does representative sampling, it must be conducted on the employee(s) expected to receive the highest exposure.
      - If the monitoring indicates that employee exposures are below the action level (1/2 the PEL or 2.5 ug/m3), the employee may discontinue monitoring.
      - If the monitoring indicates that employee exposures are at or above the action level, the subcontractor must perform periodic monitoring at least every six months.

c) Performance-Oriented Monitoring
- If this option is chosen, the subcontractor must determine the 8-hour TWA for each employee on the basis of any combination of air monitoring, historical data or objective data sufficient to accurately characterize employee exposure to Cr(VI).

3. Methods of Compliance
- As stated previously, engineering and work practice controls must be used to reduce and maintain employee exposure to Cr(VI) to or below the PEL.
- If feasible engineering and work practice controls are insufficient to reduce exposure below the PEL, then respiratory protection must be used.
- The subcontractor will not be allowed to rotate employees to different jobs to achieve compliance with the PEL.

4. Respiratory Protection
a) All Turner employees must comply with the Business Unit Specific Respiratory Protection Program.

b) When needed, the subcontractor must provide a formal respiratory protection program. Examples include:
- Periods necessary to install or implement feasible engineering or work practice controls.
- Work operations where an employer has implemented all feasible engineering and work practice controls and such controls are not sufficient to reduce the PEL.
- Emergencies

5. Protective Work Clothing and Equipment
- Where there may be a hazard to the skin or eyes from exposure to Cr(VI) the subcontractor must provide, at no cost, protective clothing, or equipment for the employee.
- The subcontractor must ensure that the employees remove all clothing and equipment that may be contaminated with Cr(VI) when the work is complete or at the end of the shift.
- The subcontractor must ensure that chromium-contaminated clothing is not removed from the workplace.
- When contaminated protective clothing or equipment is removed for laundering or cleaning, the subcontractor must ensure that it is stored and transported in impermeable bags or containers.
- The subcontractor must inform any person who launders or cleans clothing or equipment of the potential effects of exposure to Cr (VI) and that the clothing or equipment should be laundered or cleaned in a manner that minimizes skin or eye contact.

6. Hygiene Areas and Practices
- Where protective clothing and equipment is required, the subcontractor must provide change rooms that comply with 29 CFR 1926.51.

- Where skin contact may occur, the subcontractor must provide hand-washing facilities that comply with the previously noted standard.

7. Medical Surveillance
   a) The subcontractor must make medical surveillance available, at no cost, to employees who meet the following criteria:
      - Those who are or may be occupationally exposed to Cr (VI) at or above the action level for 30 or more days a year.
      - Those who are experiencing signs or symptoms of adverse health effects associated with Cr (VI) exposure.
      - Those exposed in an emergency.

8. Communication of Chromium
      - Must follow the same communication of hazardous chemicals highlighted in Turner's Hazard Communication Program.

9. Recordkeeping
   a) The subcontractor must maintain the following data records.
      - Air monitoring,
      - Historical monitoring,
      - Objective data,
      - Medical surveillance.

III. Roles and Responsibilities

1. Turner Management:
   a) Conduct inspections of the workplace for compliance with this policy.

   b) Discuss policy applications during project orientations and pre-plan meetings with subcontractors.

   c) Conduct pre-planning meetings and require the use of Job Hazard Analysis (JHA) and Pre-Task Planning (PTP) meetings.

2. Subcontractor Management:
   a) Comply with and furnish materials necessary to meet the requirements of Turner policy.

   b) Attend and participate in any and all project orientations, pre-plan meetings, JHA discussions and PTP meetings.

3. Subcontractor Employees:
   a) Attend and participate in any and all project orientations, pre-plan meetings, JHA discussions and PTP meetings.

   b) Will comply with this policy.

Lead

I. Policy Statement

Turner is not in the business of performing lead abatement work.

It is the policy of Turner to refrain from engaging in the removal or abatement of lead containing materials when performing renovation or building activities. Turner will request that owners have an inspection made by a certified testing company, industrial hygienist, or lead removal contractor prior to the start of work. Where lead is found, the owner must contract for its removal. Turner must obtain certification that the lead has been removed and the area is safe to work.

II. Procedures

1. Prior to the start of work, Turner will request the building owner to provide a pre-demolition survey for lead based materials, prepared by a qualified consultant.

2. All individuals must receive Lead Hazard Awareness Training prior to beginning work in areas that have materials containing lead.

3. If the assessment identifies lead containing material, Turner will request that the owner remove or abate the area of concern and provide written certification (e.g., clean letter) that the ambient condition of the area is below OSHA's action level for lead (<30ug/m3).

4. If lead is encountered during construction activity, Turner will stop work and request that the owner remove or abate the material.

5. Before resuming work, The Turner Superintendent will request a written certification (e.g., clean letter) that the ambient condition of the remediated area is below OSHA's action level for lead (<30ug/m3).

6. If the owner requests that Turner perform the abate work, a contract of convenience must be entered into with Turner and only qualified remediation contractors, who satisfy company pollution liability requirements, will be retained.

7. The Turner Superintendent must notify the Business Unit Environmental, Health, and Safety Director (BUEHSD) and the BU Claims Coordinator. They will then notify the appropriate Turner Risk Management Regional Claims Manager.

8. The BUEHSD will complete the Turner Environmental Risk Investigation Report and submit it to the Business Unit Operations Manager, VP National EH&S Director, and the Risk Management Department Claim Director.

9. If Turner is contractually obligated to manage the remediation the Business Unit must secure written approval from the VP, National EH&S Director and the Risk Management Claim Director as required by the Environmental Operational Policy.

10. A Lead Compliance Plan that includes negative exposure assessments by work activities will be required if Turner or their subcontractors are required to disturb lead based painted surfaces during demolition or renovation activities. This plan includes the requirements for engineering controls, work practice controls, personal protective equipment, HEPA vacuums, respirators, air monitoring and dust controls for protection from exposure to lead. The Plan will provide guidance for complying with the regulatory requirements of 29 CFR 1926.62 Lead.

III. Roles and Responsibilities

1. Turner Management:
   a) Must ensure compliance with this policy.

   b) Must discuss policy applications during project orientation with subcontractors.

   c) Must provide Lead Hazard Awareness Training to all employees working in or around material containing lead.

2. Subcontractor Management:
   a) Must comply with and furnish materials necessary to comply with Turner policy.

   b) Must attend and participate in the Lead Hazard Awareness Training.

3. Subcontractor Employees:
   a) Must attend and participate in project orientations and Lead Hazard Awareness Training.

   b) Must report immediately anytime lead containing material is discovered or disturbed.

A comprehensive sample of Written Lead and heavy metal Program is available in Appendix F of this manual.

Infection Control Policy

I. Policy Statement

During the planning process of the construction project, it is important to remember that a hospital is an occupied critical care facility, whose primary function is that of patient care. A construction project can be intrusive to medically fragile patients. All construction projects have the potential to impact infection control in patient areas.

The purpose of this policy is to minimize the potential acquisition of nosocomial infection in patients during hospital construction activities.

II. Procedures

The following are highlights of Turner's Infection Control Construction Policy. These guidelines are provided as a foundation for developing a site-specific control policy that may mirror or compliment an Owners program. An example may be found in the Engineering and Technology Safety section of the TKN2 document management system and in Appendix G of this manual.

1. Planning Phase
    a) Number and placement of isolation rooms,
    b) All air vents must be blocked off and sealed to prevent contamination of duct system before construction begins,
    c) Air handling systems,
    d) Ventilation shall be a high priority item,
    e) Dust mats must be used at the entrances to all work areas,
    f) Number and placement of hand washing facilities,
    g) Staff and patient traffic patterns for the duration of the project,
    h) Relocation decisions regarding patient care areas, storage areas, etc.
    i) Water supply and plumbing,
    j) Waste containment, transport, and disposal,
    k) Selection of finishes and surfaces that can be effectively cleaned in clinical areas,
    l) Accommodation of personal protective equipment,
    m) Storage of moveable modular equipment.

2. Operational Phase
    a) Medical waste removal,
    b) Integrity of barrier walls,
    c) Environmental control,
    d) Traffic control,
    e) Cleaning,
    f) Contractor personnel requirements,
    g) Environmental monitoring,
    h) Policy implementation.

3. Completion Phase
    a) Ventilation specifications,
    b) Disinfection procedures,
    c) Water line flushing,

d) Water line disinfection.

4. Compliance Monitoring
    a) Air handling,
    b) Integrity of barrier walls,
    c) Dress code,
    d) Environmental control,
    e) Noise,
    f) Traffic control,
    g) Water supply.

III. Roles and Responsibilities

1. Turner management:
    a) Shall hold an infection control specific pre-planning meeting with the owner and affected subcontractors prior to all work that requires an infection control plan.

    b) Shall conduct inspections of the workplace for compliance with policy.

    c) Shall cover policy applications during project orientation with subcontractors.

2. Subcontractor management:
    a) Shall comply with and furnish materials necessary to comply with Turner policy.

    b) Shall attend relevant pre-planning meetings, project orientation, and fully participate in the Job Hazard Analysis program.

A comprehensive sample of the Infection Control Plan 2013 is available in Appendix G of this manual.

Heat & Cold Stress Prevention

I. Policy Statement

Turner Construction expects all subcontractors to provide their employees' areas of relief from the element exposure. The expectation is to utilize the best method of controlling the employee from exposure. Examples are to provide overhead tarps to shield from the sun, misters, heaters, scheduling work activities, job rotation etc. to reduce the exposure. Subcontractors shall ensure that all employees are trained in the warning signs / symptoms of early heat or cold related disorders and instructed on the clothing and work methods best suited to avoid heat and / or cold stress.

II. Procedures

1. Turner and subcontractors must make sure workers exposed to safety and health risks because of hot or cold conditions at the workplace are provided with information, instruction, and training on recognizing and avoiding injury or illness from thermal stress.

2. Turner and subcontractors must make sure all supervisors know about heat and cold related illnesses, symptoms, prevention, and treatment. Supervisors must be able to recognize unsafe conditions and take corrective action immediately. It is the responsibility of the subcontractor to provide engineered prevention to minimize weather hazards.

3. The risk of heat related illnesses can be reduced by preventive and control measures, including engineering controls to provide a cooler workplace; administrative controls to reduce exposure and recognize symptoms of heat related illness; and personal protective equipment, when necessary, to further limit exposure.

4. The risk of cold related injury can be reduced by preventive and control measures, including: using a buddy system or supervision of workers; limit the amount of heavy work; wearing appropriate clothing for cold weather including layering; encourage continuous body movement (minimize sitting and standing still) in cold environments, and protect workers from drafts; educate employees on the symptoms of cold related stress including heavy shivering, uncomfortable coldness, severe fatigue, drowsiness and / or euphoria; and engineering controls can be effective such as using heaters in areas, where practical, shielding work areas from winds and drafts.

A comprehensive Heat & Cold Stress Prevention Plan is available in Appendix H of this manual.

Tobacco Policy

I. Purpose

Use of tobacco products and secondary tobacco smoke is a documented significant health hazard. Smoking activities also provide ignition sources for fires associated with flammable and combustible materials and smokeless tobacco creates sanitation hazards on floors and in working areas. In addition, these activities create a housekeeping problem in the workplace when improper disposal of smoking or smokeless material occurs. With e-cigarettes (with or without nicotine) gaining popularity it is necessary to address those as well and while they may be safer than smoking tobacco the long-term risks and effects of secondhand exposure are still not known. This policy will reduce employee exposure to secondary tobacco smoke, assist in the prevention of fires in the workplace, and help keep the workplace clean.

II. Scope

1. This policy covers the use of smoking tobacco products (i.e., cigarettes, pipe embers, cigars, etc.), smokeless tobacco products (i.e., dip, snuff, chew, etc.) and all forms of electronic cigarettes or e-cigarettes, etc.

2. This policy is to be adhered to by all Turner employees, contractors, and visitors. This policy applies to all offices (Business Unit or project), warehouses, and projects.

III. Policy Statement

1. All tobacco products, smokeless tobacco products, and e-cigarettes as described above are prohibited in all Turner offices, project offices, warehouses, and on projects. The project or office can designate smoking areas that must comply with all ADA, state, and municipal regulations.

2. Certain owners may also have non-smoking policies and Turner employees, subcontractors, and visitors will comply with those policies fully.

3. In order to ensure compliance with the above provisions please do thefollowing:
   a) Prominently display no-smoking signs in offices and on projects,
   b) Inform individuals about this policy and let them know they may be subjectto removal, fines, and penalties (certain state or local fire departmentregulations),
   c) Instruct individuals found using tobacco or e-cigs to immediately stop.

Turner Construction Company recognizes that our employees and workers are our most valuable assets and the most important contributors to our continued growth and success. We are not only concerned about your welfare as a Turner employee, but also the welfare of others who could be put in harm's way by secondary exposure. We are therefore firmly committed to providing a safe work environment for all workers and set forth this policy for the elimination of tobacco and related products in the workplace.

Sanitation Policy

I. Policy Statement

Each contractor working on a Turner project will comply with 29 CFR 1926, Construction Industry Regulations. Employers shall establish and maintain basic sanitation Provisions for all employees in all places of employment as Specified in the following paragraphs.

II. Procedures

1. Drinking water supply
   a) An adequate supply of drinking water shall be provided in all places of employment. Cool water shall be provided during hot weather.
   b) Drinking water shall be provided according to the requirements of the Safe Drinking Water Act, as amended, and all applicable Federal, state, and local regulations. Refer to the most current Version of 40 CFR 141 and 40 CFR 143, for updates to the national drinking water regulations. Refer to individual state and local regulations, as applicable, for updates to those Regulations.
   c) Only approved potable water systems shall be used for the distribution of drinking water.
   d) Drinking water shall be dispensed by means that prevent contamination between the consumer and the source.

2. Portable drinking water dispensers shall be designed, Constructed, and serviced to ensure sanitary conditions; shall be Capable of being closed; and shall have a tap. Containers shall be clearly marked as **"drinking water"** and shall not be used for other purposes. Water shall not be dipped from containers.
   a) Fountain dispensers shall have a guarded orifice.
   b) Use of a common cup (a cup shared by more than one Worker) is prohibited without the cup being sanitized between uses.
   c) Employees shall use cups when drinking from portable water Coolers/containers. Unused disposable cups shall be kept in sanitary containers and a waste receptacle shall be provided for used cups.

3. Non-potable water.

a) Outlets dispensing non-potable water will be conspicuously posted:
"Caution - water unsafe for drinking, washing, or cooking."

   b) Cross-connection - open or potential - between a system
   c) Furnishing potable water and a system furnishing non-potable water is prohibited.

4. Toilets
   a) When sanitary sewers are not available, one of the Following facilities, unless prohibited by local codes, shall be provided: chemical toilets, recirculating toilets, combustion toilets, or other toilet systems as approved by state/local governments.
   b) Each toilet facility shall be equipped with a toilet seat and toilet seat cover. Each toilet facility - except those specifically designed and designated for females - shall be equipped with a metal, plastic, or porcelain urinal trough. All shall be provided with an adequate supply of toilet paper and a holder for each seat.
   c) Toilet facilities shall be so constructed that the occupants shall be protected against weather and falling objects; all cracks shall be sealed, and the door shall be tight-fitting,

self-closing, and capable of being latched.

d) Adequate ventilation shall be provided, and all windows and vents screened; seat boxes shall be vented to the outside (minimum vent size 4 inches (10.1 centimeters) inside diameter with vent intake located 1 in (2.5 cm) below the seat.
e) Toilet facilities shall be constructed so that the interior is lighted.
f) Toilets at construction job sites.
   - At a minimum, toilets shall be provided according to table 2-1. Where toilet rooms may be occupied by no more than one person at a time, can be locked from the inside, and contain at least one toilet seat.
   - Under temporary field conditions, provisions shall be made to assure that at least one toilet facility is available.
   - Toilets should be kept inside the project fence.
g) No Half High / High Rise portable toilets are allowed on Turner projects unless protected by a partition to assure privacy.
h) No graffiti is allowed in permanent or temporary restrooms or anywhere else onsite.

Table 2-1
Minimum toilet facilities (construction sites)

Number of employees	Minimum facilities (per sex)
20 or less	One (unless manufacturer specs for fewer employees)
21 to 199	One toilet seat and one urinal for every 40 workers
200 or more	One toilet seat and one urinal for every 50 workers

h) Each water closet shall occupy a separate compartment with a door that can lock from the inside and walls or partitions, between fixtures, of sufficient height to assure privacy.

i) Provisions for routinely servicing and cleaning all toilets and disposing of the sewage shall be established before placing Toilet facilities into operation. The method of sewage disposal and location selected shall be in accordance with federal, state, and local health regulations.

5. Washing Facilities
   a) Washing facilities shall be provided at toilet facilities and as needed to maintain healthy and sanitary conditions. Washing facilities for persons engaged in the application of paints, coatings, herbicides, insecticides, or other operations where contaminants may be harmful shall be at or near the work site and shall be adequate for removal of the harmful substance.
   b) Each washing facility shall be maintained in a sanitary condition and provided with water (either hot and cold running water or tepid running water), soap, and individual means of drying. However, where it is not practical to provide running water, hand sanitizers may be used as a substitute.
   c) Whenever employees are required by a particular standard to shower, showers shall be provided in accordance with the following:
      - One shower shall be provided for every ten employees (or fraction thereof) of each sex who are required to shower during the same shift.
      - Body soap or other appropriate cleansing agent convenient

- to the shower shall be provided.
- Showers shall have hot and cold running water feeding a common discharge line; and
- Employees using showers shall be provided with individual clean towels.

d) Whenever employees are required by a particular Standard to wear protective clothing, change rooms with storage facilities for street clothes and separate storage facilities for protective clothing shall be provided.
e) Whenever working clothes are provided by an employer and become wet or are washed between shifts, provision shall be made to ensure such clothing is dry before reuse.

6. Food Service

a) All cafeterias, restaurants, mess facilities, and related facilities on areas, projects, or installations shall be established, operated, and maintained in compliance with the health and sanitation recommendations of the United States public health service and applicable state and local regulations.
b) All food service operations shall be carried out in a sound manner. Food shall be free from spoilage and kept uncontaminated throughout the storage, preparation, and serving process.
c) No food or beverage shall be consumed or stored in a toilet room or in any area exposed to toxic material.
d) An adequate number of waste receptacles shall be provided in the food service area receptacles shall be constructed of corrosion resistant or disposable material, provided with solid tight-fitting covers (covers may be omitted where sanitary conditions can be maintained without the use of a cover), emptied at least daily, and maintained in a sanitary condition.

7. Waste Disposal

a) Receptacles used for putrescible or liquid waste material shall be constructed to prevent leakage and to allow thorough cleaning and sanitary maintenance. These receptacles shall be equipped with a solid tight-fitting cover unless it can be maintained in sanitary condition without a cover.
b) Solid and liquid waste shall be removed in a way that avoids creating a menace to health and as often as necessary to maintain a sanitary environment.

8. Vermin Control

Enclosed workplaces shall be constructed and maintained, as far as practical, to prevent the entrance or harborage of rodents, insects, and other vermin. An effective extermination program shall be instituted where the presence of such vermin is detected.

Health and Wellness Program

Wellness *Guidelines* or *Policy*:

At Turner Construction Company, we are committed to promoting the Health and Well-being of our employees through a comprehensive health and wellness program. Administering a scalable wellness program for team members will improve employee health, prevent injuries, manage chronic diseases, proactively address muscle strain and sprain issues, and support behavioral health success.

Mission:

The Wellness Program aims to improve the quality of life of our staff and all workers on our projects, employed by Turner and our trade partners by building a culture of health and wellness through education, motivation, and engagement of all to participate in maintaining healthy and safe employees. Integral to the commitment to a worker's wellness is ensuring injured workers receive prompt and quality injury care.

Goals:

- Make Health and Wellness programs accessible for every project and all site workers and staff.
- Encourage team members to adopt habits and behaviors that promote better health, a safe worksite, and an improved quality of life.
- Provide awareness and understanding of the impact of mental ill health and substance use disorder and signpost workers to national and local resources.
- Create a culture of readiness for medical or behavioral health emergencies.
- Provide prompt, quality medical care for injured workers.

Scope of Services

All Projects:

1. Provide basic first aid treatment and injury triage services for on-site work-related injuries or medical emergencies. Scope includes contacting and coordination with pre-determined off-site treatment and emergency response facilities operated by others (i.e. hospital and/or clinic, 988, 911.)
2. Provide on call (roving) AT/ EMT or telephonic injury response.
3. Contribute to the growth of Turner's Wellness Culture by providing wellness toolbox talks and wellness meetings on various topics.
4. Provide health promotion information stations on site linking workers to wellness activities, Employee Assistance Programs (EAP's), National Hotlines and resources.
5. Participate in stretch and flex to reduce the likelihood of musculoskeletal injuries.
6. Provide a room or space where first aid treatment can be rendered with privacy.

Dedicated On-Site Health and Wellness Professionals

The wellness coach will work closely with employees to provide guidance on injury management, chronic disease prevention, and proactive measures for muscle strain and sprain prevention. Additionally, the wellness coach will have specialized training to support mental health, substance use, and suicide prevention. The program shall have a broad scope offering lifestyle management tools; including health coaching, health education, wellness activities, and information (tips, recipes, news), and allows for comprehensive engagement in health risk assessment, coaching, and incentive achievement outcomes. Employees are encouraged to

utilize the services of the wellness coach to improve their overall health and well-being.

Guidelines for dedicated Health & Wellness Staffing:

- $80M or greater- Full-time on-site AT (Athletic Trainer) or EMT (Emergency Medical Technician)
- $20M up to $80M. Either Full time AT/ EMT or On Call AT/ EMT (roving)
- Under $20M. On Call (roving) AT/ EMT or telephonic incident response
- Regardless of project volume, consideration of the hazardousness or risk involved.
  Note that wellness candidate acceptable credentials may include RN, LPN, PT, OT,

General Health and Wellness Vendor Requirements

1. Maintain compliance with HIPAA, GINA, ADA, ERISA, PDA, COBRA and all other pertinent laws, rules, and regulations.
2. Provide medical treatment under the care of a medical director. Include ability to consult Physician Assistant or Medical Doctor from the wellness trailer (i.e.: tele-medicine or teams, etc.)
3. Participate in the safety orientation process. This **includes** performing brief wellness orientations.
4. Support workers by providing educational materials, toolbox talks and wellness meetings on various topics. A wellness coach is expected to coordinate with trade partners for “wellness talk” times and location (*meet them where they’re at*).
5. Provide basic first aid treatment and injury triage services for on-site work-related injuries or medical emergencies. Include Naloxone (or equivalent) in response plan.
6. In the event of an injury work with the injured employee to develop a customized injury management plan that includes rehabilitation exercises, ergonomic adjustments, and any necessary accommodations to support the employee's recovery. Coordinate with off-site treatment facilities operated by others (i.e. hospital and/or clinic) as required.
7. Include all costs for medical and wellness equipment to provide for the wellness trailer.
8. The on-site Wellness Coach will be certified in MHFA (Mental Health First Aid) or equivalent and assist with creating a safe space for the workforce and promote proactive Behavioral Health (Mental, Substance, and Physical). Be trained to provide mental health support, coaching, and contact information with stakeholder EAP’s and National Crisis Lines.
9. Provide monthly KPI’s to showcase wellness coaching, health risk appraisals, and injury trends.
10. Incentive Design and Administration
    a. Provide customized Wellness Incentive design, offering industry best-practices where appropriate.
    b. Provide administrative tools needed for Wellness Incentive promotion and communication.
11. Provide and maintain emergency contact information for all workers.
12. Offer, Coordinate and Conduct a Health Wellness Assessment (HWA) for workers designed to identify existing and emerging health issues and to provide a baseline for establishing a health improvement maintenance plan.
13. Provide a Health Wellness Report outlining overall health risk score and customized health risk education in both electronic and paper formats to frontline workers.
    a. Include guidance to help prevent and manage chronic diseases such as hypertension, heart disease, and diabetes. Include various nutrition, exercise / strength training, and other biometric tracking logs and plans for participants.
    b. Ensure content privacy, quality, and accuracy.
14. Manage program administration and marketing.
15. Provide countermeasures and support to prevent musculoskeletal and strain / sprain injuries.
    a. Provide workshops, training, and exercise programs to employees on proper lifting techniques, ergonomic practices, and how to reduce the risk of muscle strain and sprain injuries.

b. Lead a daily global exercises/stretching warm up (stretch & flex) program.
c. Provide training designed to educate and prepare Trade partner and Turner representatives to lead "exercises/stretching" warm up (stretch & flex) program.

16. Include implementation / presentation of a program to aid workers in the quitting of tobacco products.
17. Biometrics Screening Management
    a. Conduct biometric screenings in conjunction with administration of a Health Wellness Assessment (HWA) with various methods available (finger stick, venipuncture, etc.)
    b. Blood pressure, height, weight, BMI, waist circumference capabilities.

Medical Malpractice / Medical Liability Insurance

1. For on-site paramedic or other medical professionals, the providers shall provide a medical malpractice insurance that covers liability arising from disputed services or allegations of medical negligence and malpractice that result in patient's injury or death with the minimum required limits of $1,000,000 per each occurrence and $3,000,000 per general Aggregate.

Value added benefits of dedicated on-site health and wellness include:

- Support Return to Work efforts which results in more favorable outcomes.
- Follow up with workers to ensure proper care has been provided.
- Assist in understanding how losses occur and preventing them.
- Provide critical documentation on the cause of loss and exact injury type in the event of litigation or governmental inquiry.
- Provide incident data to support risk mitigation.
- Support site safety efforts.
- Conduct drug and alcohol testing.
- Provide vaccinations (e.g., Flu, Tetanus, etc.)
- Provide potentially lifesaving care.
- Stabilizing severely injured workers
- Reducing the number of potential lost time matters
- Decrease costs arising from larger WC Claims.
- Enhanced productivity by treating minor injuries on site and enabling workers to immediately return to work.

We have partnered with who we perceive as "best in class" on-site medical care vendors. They are Atlético/Pivot, ATS, Wellness Workdays, Amphibious, Banda and On-site Health and Safety.

Engagement Options

The method of engagement for these vendors will be done through a Professional Service Agreement (PSA). Depending on the need and capacity to engage an on-site Wellness Coach AT/EMT for a project, there are options which enable the project team to decide which options are more suitable.

1. Full time onsite AT/ EMT for the duration of the project-start to finish.
2. Full time onsite AT/ EMT during certain periods of time where the risk of injury is greater. The full-time onsite AT/ EMT cost is based on a flat fee for the time period of the contract.

3. Roving or “On Call” AT/ EMT. The roving EMT can respond to a site promptly following an injury. They provide the same level of experience but are not on-site full-time and are deployed on an as needed basis. Roving AT/ EMTs charge on a per visit basis.
4. Telephonic incident response. Site safety person or the responsible Turner personnel contacts an immediately available medical professional upon notice of an injury for guidance / direction.

Respiratory Protection

I. Policy Statement

Turner Construction Company is committed to maintaining an injury and illness free workplace and will make every effort to protect employees from harmful airborne substances. This will be accomplished through engineering controls such as ventilation or substitution with a less harmful substance or through administrative controls limiting the duration of exposure. When these methods are not adequate, Turner will provide training, fit-testing, medical surveillance, and proper respirators to allow Turner employees to breathe safely in potentially hazardous environments.

Turner recognizes that respirators have limitations, and their successful use is dependent on an effective respiratory protection program. Our full Respiratory Protection Program is designed to identify, evaluate, and control exposure to respiratory hazards and to provide for the proper use, care, and maintenance of respiratory equipment. Each Business Unit affected must oversee a written respiratory program. Prior to implementation the Business Unit Environmental, Health, and Safety Director shall approve program elements.

This program is designed for Turner Construction Employees. Subcontractors are required to submit and have accepted by Turner their company's respiratory protection program prior to start of work. Compliance with this policy applies to filtering face-piece respirators (dust masks) as well. All programs shall meet or exceed Federal, State, and Local regulatory requirements.

II. Program Elements

1. Highlights of a Business Unit Specific Program are to include the following:
   a) Program Administration
      - A formal annual audit of the Respiratory program is required for all companies who actively use respirators. A Respirator Program Evaluation Worksheet should be used to document the evaluation and to record recommended changes.

   b) Workplace Exposure Assessment & Ongoing Surveillance
      - Exposure assessment is critical in identifying harmful airborne contaminants, their extent and magnitude and how to control them.
      - Turner Project Staff (TPS) must make every effort through evaluations and training to ensure that employee exposure does not exceed permissible concentrations.
      - Results of these evaluations will be summarized, and a record maintained in the jobsite project files. Additional evaluations are necessary if exposures change due to new materials, process changes or other conditions increasing the degree of employee exposure. Copies of all results shall be sent to the Business Unit Human Resource Manager who shall maintain an archive for 30 years for all Turner employees evaluated.
      - Subcontractors shall provide proof of exposure assessments, training, and medical surveillance for their employees prior to performing work with any material that may require respiratory protection.
      - Subcontractors may not perform any work with chemicals or materials that may cause a respiratory hazard or nuisance odor for Turner Employees, other Subcontractors, or the general public without scheduling the work with Turner. Examples of such activities include

applying hazardous paints or coatings; saw-cutting or grinding concrete, applying spray on fireproofing.

c) Respirator Selection
- In those instances where engineering and administrative means do not achieve the desired control, respirators must be worn. Different types of respirators are available for a variety of applications. Turner must ensure that the proper NIOSH/MSHA approved respirator is selected and used for the kind of work being performed and the hazards involved. Respirator selection information must be completed to document the selection process.

d) Evaluating Respirator Wearer Health Status
- Even with appropriate equipment and adequate training provided, an employee's health status must be considered before allowing respirator use. The wearer's physical and medical condition, duration and difficulty of the tasks, toxicity of the contaminant and type of respirator all affect an employee's ability to wear a respirator while working. Therefore, Turner must ensure that each employee's physical ability to wear a respirator is evaluated.
- Each respirator wearer will be given a medical evaluation. The project will make appropriate arrangements with a proper medical organization to perform the evaluation. The Medical Evaluation and Work Restriction report must be completed for each individual.

e) Respirator Fit Testing & Assignment
- After selection of the appropriate type of respirator and verifying the employee's ability to work while wearing a respirator, Turner will ensure that a qualitative fit test is conducted to choose the best fitting face piece and determine the specific brand, model, and size for each employee. The Qualitative Fit Test Record form will be completed. The form will record test results and document respirator assignment.
- Quantitative fit is the preferred alternative to qualitative fitting. Although it requires specialized equipment and trained personnel, some exposures require a quantitative fit test.

f) Training
- Once the employee is fitted with the correct respirator for the task, that employee must be thoroughly trained in the need, use, limitations, inspection, fit checks, maintenance, and storage of the equipment. This training may be initiated during the fit test.
- The manufacturer of the equipment provides detailed instructions for use and care of the respirator, and this information is to be used in the training. The Respirator User Training and Education Form is to be used as a guide and record of training received.

g) Recordkeeping
- Turner must document each major component of the program to verify that each activity has occurred and evaluate the success of the program to satisfy regulatory requirements.
- These records include the written program, exposure determination, respirator selection, physical status evaluation, fit testing and respirator assignment, training form and program assessment.

- All records that involve Turner employees must be sent to the Business Unit Environmental, Health, and Safety Director and archived for a minimum of 30 years.

A comprehensive sample of the Turner, Asbestos, Lead, Silica and Respirator Management Program is available in Appendix H of this manual.

Crystalline Silica Exposure Prevention

I. Policy Statement

This policy is designed to protect employees who may come into contact with silica during the course of their work. This applies to all occupational exposures to respirable crystalline silica in construction work, except where employee exposure will remain below 25 micrograms per cubic meter of air (25 µg/m3) as an 8-hour time-weighted average (TWA), under any foreseeable conditions.

II. Silica Exposure Prevention & Control: Responsibilities

Due to the risk posed by respirable silica, it is critical that all personnel involved in activities that could potentially create silica dust take specific actions to ensure that, as much as practicable, a hazard is not created. In recognition of this, the following (Silica related) responsibilities have been established and must be adhered to:

The BU EH&S Director is responsible for:

- Ensuring project and/or task specific Exposure Control Plans (SECPs) are developed communicated and effectively implemented as appropriate.
- Ensuring that all employees *(i.e., Managers, Supervisors and Workers)* receive the necessary education and training related to this Policy, as well as project/task specific SECPs.
- Implementing a suitable respirable silica exposure monitoring program, or otherwise ensuring representative exposure monitoring results are available. The purpose of the program will ensure that (over time) Turner has quantifiable silica exposure data available for all regularly occurring, as well as reasonably foreseeable, work activities.
- Regularly evaluating new equipment and technologies that become available, as able/appropriate, purchasing the "best available" equipment/technologies. Equipment/technologies with (silica) dust suppression and/or capture technologies will generally be given preference over equipment/technologies that lack such.
- Maintaining applicable long-term records *(i.e., exposure sampling, inspections, respirator fit tests, training records, etc.)*.
- Conducting a review of this Policy, as well as: (1) project/task specific SECP's, (2) available exposure monitoring data, (3) Industry/Regulatory information, and (4) new/emerging equipment/technologies on a regular *(i.e., annual)* basis.

Safety Managers/Superintendents/Foreman are responsible for:

- Developing or obtaining a copy of the project/task specific Silica Exposure Control Plans (SECPs) and ensuring such are made available at each work site.
- Ensuring that all workers *(under the supervisor's direction and control)* have received the necessary education and training. As appropriate, each supervisor must ensure that workers are available to "demonstrate competency" for identified tasks.
- Coordinating work activities of multiple contractors/crews as required, and/or otherwise implementing the controls necessary to protect others *(i.e., erecting of barricades and signage)* who could be adversely affected.
- Using control measures described in the Risk Control section of this program below, maintain employee exposure to crystalline silica to concentrations as low as possible, and in no event exceed the OSHA Permissible Exposure Limit of 50 micrograms per cubic meter of air (50 µg/m3) as an 8-hour time-weighted average (TWA).

- Ensuring that all the tools, equipment, PPE, and materials *(including water)* necessary to implement the SECP are available *(and in good working order)* prior to allowing work activities to commence.
- Maintaining applicable records (i.e., exposure sampling, inspections, respirator fit tests, training records, etc.) in accordance with [Insert Company Name Here]'s record retention procedures/practices.

III. Silica Exposure Prevention & Control: Risk Identification and Assessment

Turner has conducted extensive employee exposure sampling and obtained "objective data" from other sources and used this information to prepare a "Table 1 Silica Exposure Controls" to help us identify each task or exposure related to silica that our own employees may be subject to, and to specify controls, tools, and PPE to control exposure. Please reference that document at the TKN Safety webpage and use the applicable data to prepare all site-specific Exposure Control Plans for Silica, related to Turner employee exposures.

Each employer that has employees exposed to crystalline silica must prepare and implement a written site-specific Exposure Control Plan (ECP) that identifies tasks that involve exposure and the methods used to protect workers, to include procedures to restrict access to work areas with high exposures. A competent person from each exposing employer, as well as Turner, shall be designated to implement the exposure control plan. A copy of the designation by the employer will be provided to Turner.

Each exposing employer must notify Turner in writing of any activities to be undertaken that could lead to silica exposure above the action limit. Turner will coordinate the activities of all contractors to minimize exposure from one employer to another. These activities should be discussed and planned for in weekly coordination meetings, safety meetings, and huddles. Each employer must utilize control methods that mitigate exposure to the lowest achievable level so as not to expose other employees or subcontractors. Each employer must control access to their area through the use of control zones, DANGER signs, spotters, etc. Certain tasks may have to be done off-hours so as not to expose additional employees.

Risk Identification: Silica is contained in many of the materials and products used/encountered on our projects (i.e., the Lafarge Safety Data Sheets (SDS) for concrete reveals the potential for up to 90% crystalline silica, while the SDS from Aggregate supplier (Mainland Sand & Gravel Ltd.) identifies the potential for between 50-77% Silica in aggregate). Silica dust can be readily released through the various tasks performed by Turner and its contractors. Each contractor must identify sources of exposure for its employees and plan accordingly. Reference safety data sheets and other reference sources to determine silica content. If these sources are not available, samples can be sent to a laboratory or air samples can quantify airborne exposure. Contractors may use a variety of additional methods to assist with the assessment of (possible and actual) silica exposures. These methods will include, but may not necessarily be limited to:

- Reviewing data/reports available in the public domain (i.e. OSHA, NIOSH) and industry associations (including the ABC, AGC).
- Regularly consulting with the Safety Resources/Safety Managers from firms who perform similar work (i.e., through ATAC (Asphalt Technical Advisory Committee).
- Implementing a suitable respirable silica exposure monitoring program. This program will ensure that (over time) Turner has quantifiable silica exposure data available that is representative of all regularly occurring, as well as reasonably foreseeable work activities. Exposure monitoring will

generally, be conducted “in-house”, although assistance (i.e., actual monitoring and/or interpretation of results) may be obtained through outside consultants/hygienists. All data captured, and corresponding reports and findings, must be sent to the Corporate EH&S Department.

Turner will not allow the use of any compound for abrasive cleaning that contains more than 1% silica. Employee sampling must be conducted to verify that concentrations released from the media being finished does not exceed allowable OSHA PEL’s, TLVs, etc. For abrasive blasting, replace silica sand with less toxic materials. The National Institute for Occupational Safety and Health highly discourages the use of sand or any abrasive with more that 1% crystalline silica in it. As an alternative, garnet, slag, and steel grit and shot may be suitable substitutes.

IV. Silica Exposure Prevention & Control: Risk Control

Control Methods: When determining measures to reduce or eliminate worker exposure to silica dust, contractors must select controls in this order of preference:

1. Elimination and Substitution
2. Engineering
3. Administrative
4. Personnel Protection Equipment (PPE)

Substitution and Elimination: Whenever possible, the exposing contractor will substitute products containing silica with products that do not contain (or contain a lower percentage of) crystalline silica. While there have historically been few “substitution” options available, each contractor must recognize the importance of planning work in order to minimize the amount of silica dust generated. During the planning phases of a project, advocate for the use of methods that reduce the need for cutting, grinding, or drilling of concrete surfaces.

Engineering Controls: Engineering controls are those controls which aim to control or otherwise minimize the release of crystalline silica. Two “common” engineering control options are available to in many circumstances. These include the Local Exhaust Ventilation (LEV) and Wet Dust Suppression (WDS) systems. Another could be “Isolation” of the silica creating activity or machine/tool.

Local Exhaust Ventilation Systems: Tools/equipment specific LEV systems are available on some tools and equipment. Such LEV systems are generally comprised of a shroud assembly, a hose attachment, and a vacuum system. Dust-laden air is collected within the shroud, drawn into the hose attachment, and conveyed to the vacuum, where it is filtered and discharged. “Large scale” LEV systems, such those available on some Vacuum Trucks and Mobile Sweepers, may also be employed (at times) on Turner projects.

When/if LEV systems are used, the contractor will employ the following systems and safe work practices:

- Vacuum attachment systems that capture and control dust at its source whenever possible.
- Dust control systems will be maintained in optimal working conditions.
- Grinding wheels will be operated at the manufacturer’s recommended RPM (operating in excess of this can generate significantly higher airborne dust levels).

- HEPA or good quality, multi-stage vacuum units (approved for use with silica dust) will be used in accordance with the manufacturer's instructions. Vacuums with back-pulse filter cleaning cycles are effective at avoiding clogging and maintaining dust capture velocity.
- Whenever possible, concrete grinding will be completed when the concrete is wet (*thus dust release will be significantly reduced*).

Regular fans (such as box-fans, area-fans, etc. do not qualify as an engineering control, by themselves, and may actually increase silica exposures by re-entraining settled particles into the air.

Wet Dust Suppression Systems: Many tools and equipment types are equipped with Wet Dust Suppression (WDS) systems (i.e., on the Milling equipment, sweeper equipped Bobcats, as well as attachments on various handheld/portable, abrasive/cutting equipment). When WDS Systems are not available, (as a standard or retrofitted part of a tool/appliance), similar effects can also be achieved by manually wetting the surface (i.e., with a mister or with a hose).

When WDS systems are used, the contractor will employ the following systems and safe work practices:

- If water is not readily available on the project, the project supervisor will arrange to have a water tank delivered to the site for use.
- Pneumatic or fuel (i.e., gasoline) powered equipment will generally be used instead of electrically powered equipment if water is the method of dust control, unless the electrical equipment is specifically designed to be used in such circumstances.
- Pressure and flow rate will be controlled in accordance with the tool manufacturer's specifications.
- When sawing concrete, tools that provide water directly to the blade will be used if possible.
- Wet slurry will be cleaned from work surfaces when the work is complete, if/when necessary.
- If dust suppression water is recirculated, micron filtration and sanitation must be considered.

Administrative Controls: Administrative controls are those that aim to control or otherwise minimize the release of silica through the use of work procedure and work methods, rather than by affecting the actual physical work. Common examples of administrative controls include, but are not limited to:



- Posting warning signs, similar to the one shown at right, when respirators are required as exposure control.
- Rescheduling of work to avoid the activities of others.
- Relocating unprotected workers away from dusty areas.

When administrative controls are used, the contractor will employ the following systems and safe work practices:

- Suitable exposure control strategies will be discussed and determined. As necessary and appropriate, supplemental (to this policy/procedure) project and task specific Exposure Control Plans will be developed.
- Suitable housekeeping, restricted work area, hygiene practices, training and supervision procedures/standards will be determined and implemented on Turner projects.
- As appropriate, barriers will be erected around known silica dust generating activities, and/or warning signs will be posted.

- As able, work activities will be scheduled to minimize the silica related effect on, and from, others.

Personal Protective Equipment Controls: When used in conjunction with the other *(i.e., Engineering and Administrative)* controls elsewhere identified, personal protective equipment and clothing can help further reduce employee exposure to silica dust. Our first line of defense is to select higher order controls that would eliminate the need for PPE.





An air purifying respirator fitted with HEPA cartridges is the most common piece of PPE that would be used to minimize exposure to silica dust. In some cases, a dust-mask (which is also a respirator) with a NIOSH "N" rating may be acceptable.

Prior to a respirator being used, the employee must be medically cleared to wear a respirator (including dust masks) and fir-tested in accordance with 29 CFR 1910.134 and Turner Construction's Respiratory Protection Program. Employees must have documented training for respiratory protection. In addition to the medical clearance above, for any employee who is required to wear a respirator for silica exposure 30 or more days a year, the employee must have an initial medical exam including x-ray, Pulmonary Function Test, and other requirements, along with ongoing periodic medical surveillance (typically every 3 years). Records of the medical exams and any exposure monitoring records of operations are to be kept by the employer. Respirators are "seal dependent", and thus the users must be "fit tested" annually and clean shaven where the respirator seals to the face.

In addition to respiratory PPE, protective clothing *(i.e., disposable/washable coveralls)* may be used and/or required to help prevent the contamination of the worker's personnel clothing.

General Requirements

Employer shall not allow dry sweeping or dry brushing where such activity could contribute to employee exposure to respirable crystalline silica unless wet sweeping, HEPA-filtered vacuuming or other methods that minimize the likelihood of exposure are not feasible.

Employers who use "Table 1: Specified Exposure Control Methods When Working with Materials Containing Crystalline Silica" (found in the OSHA Silica standard for construction) correctly do not have to provide exposure monitoring of employees and are not subject to the listed PEL. The table spells out the need for respiratory protection (along with minimum assigned protection factors) for certain operations.

If exposure control methods listed in Table 1 are not used, then the employer:

a. must perform an exposure assessment to assess the exposure of each employee who is or may reasonably be expected to be exposed at or above the action level.
b. protects workers from exposures above the permissible exposure limit (PEL) of 50 micrograms per cubic meter of air averaged over an eight-hour day.
c. Dust control measures must be used to protect workers from exposures above the PEL; and

d. Provide respirators to workers when dust controls cannot limit exposures.

For tasks performed indoors or in enclosed areas, provide a means of exhaust as needed to minimize the accumulation of visible airborne dust.

Using wet methods, apply water at flow rates sufficient to minimize release of visible dust.

If performing multiple tasks from Table 1 that in whole exceed 4 hours, use the respiratory protection for each task that's designated for >4 hours' work.

After working with products that contain crystalline silica, each individual will be required to thoroughly wash their hands before eating, drinking, or smoking. Eating, drinking, or smoking near silica or in silica-regulated areas is strictly prohibited.

V. Silica Exposure Prevention & Control: Education and Training

Education and Training: Prior to performing activities or working on project sites where personnel could be exposed to silica dust, ensure that applicable personnel receive suitable education and training. While not necessarily an exhaustive list, education and training may include:

- The hazards and risks associated with exposure to silica dust.
- The signs and symptoms of silica related diseases.
- General and specific silica exposure reduction methods/strategies *(i.e., as detailed in the general/specific exposure control plans)*.
- The use of specific pieces of equipment and control systems *(i.e., LEV and WDS systems)*.
- The use and care of respiratory (and other) personal protective equipment.
- How to seek first aid *(i.e., for respiratory related concerns, including those that may be caused/associated with silica dust exposure)*, and
- How to report items of concern *(i.e., those related to silica dust)*.
- Be sure to reference "Table 1 Silica Exposure Controls".

The education and training detailed will be delivered through a variety of forums, including but not necessarily limited to:

- New Employee Orientations
- Project/Site Orientations
- Equipment/task specific training*, all personnel must be trained to a level of "demonstrated competency" prior to using required tools, equipment, and appliances)*
- Safety huddles and toolbox talks
- Notifications and Bulletins

STANDARD FORMS

1) Project Safe and Sustainable Onsite Orientation
2) Hazardous Chemical Inventory List
3) Site Specific Chemical Inventory List
4) Ladder Safety Inspection Checklist
5) Ladder Permit
6) Mobile Elevated Working Platform Checklist
7) Initial Equipment Safety Inspection: Off-Road Heavy Equipment
8) Initial Equipment Safety Inspection: (Cranes)
9) Critical Crane Lift
10) Energized Electric Work Permit
11) Emergency Release Authorization
12) Confined Space Entry Permit
13) Fall Protection Checklist
14) Surface Penetration Procedure Permit
15) Hot Work Permit
16) Drone Use Approval Request Form
17) Drone Vendor
18) Incident Investigation Report
19) Co-Learning Investigation Form
20) Job Hazard Analysis
21) Pre-Task Planning
22) Concrete Core Formwork System Questionnaire

Turner

Project Safe and Sustainable Onsite Orientation

1. General Information	
NOTE: The signature below documents that the appropriate elements have been discussed to the satisfaction of parties, and that both supervisor and employee accept responsibility for maintaining a safe and healthy work environment. **By signing, I am verifying that I have participated in the COVID-19 orientation and understand and will comply with all additional requirements.**	
Hardhat Sticker #:	**Badge #:**
Print Name:	**Sign Name:**
Company Name:	**Date:**
Supervisor Acknowledgement:	
Emergency Contact Name and Number:	

2. The Message of "Building L.I.F.E ®"

At Turner, we call our safety program and culture "**Building L.I.F.E. ®"** L.I.F.E. is an acronym for *Living Injury Free Every Day*. Our goal here is to create a workplace *free from any level of harm* to our workforce, our clients, and the community we work in. Only with your help and commitment can we all achieve this goal. We are asking that you take an active role in making this the safest project we can, for all of us. If you see a hazard, bring it to our attention if you cannot correct it. If you see a coworker at risk, stop and say something. If someone approaches you because *you* are at risk, accept their help graciously, without attitude, and thank them. If you know a smarter or safer way to accomplish a task, raise it up.

You will be given ample opportunities to play an active role with safety on this project. This includes daily safety hurdles where each team prepares their safe plan of work; it also includes safety committees, safety meetings, and 5-Worker Lunches where we ask for your feedback on how safety is doing on this project. We want to hear about near-misses and incidents, not so we can find someone to blame, but so we can learn from the problems that lead to the event – to prevent recurrence. Like any safety program, we have some policies you need to be familiar with, and many of them are stricter than OSHA, or any other General Contractor/Construction Manager you have worked for. If you have any questions about our expectations or any of the policies you're about to see, please bring them up as we go along.

General	1. No one under the age of 18 is allowed to work on the Project property / construction site. 2. No pets or animals are allowed on site. 3. All trade partner vehicles within the project site fence (including, but not limited to, transportation and construction equipment, delivery trucks and personal or company trucks) shall not idle. The only allowable exceptions to the standard are as follows: A. Ambient air temperature exceeds 85°F or falls below 32°F (or as defined by local or regional temperature limits, whichever is stricter) B. Engine idling is required for the function of auxiliary equipment (i.e., cranes, concrete pumps, etc.)
Initials	4. A minimum 9-panel drug testing is mandatory. A. Your employer must provide the results to Turner in order to attend orientation. B. Pre-employment/prior to receiving a hardhat sticker or ID badge. C. Additional testing may be required post-Incident, for cause or suspicion. D. If tested positive or refuse to test, you will not be allowed on site. 5. Badging / orientation sticker All employees on site must attend orientation after the drug screen and receive an orientation sticker. Many projects require a photo-ID badge per terms of subcontract agreement. 6. Every crew member must participate in a morning safety huddle to develop a safe plan of work for the shift. Throughout the day (or night) if any new tasks or changes come up that weren't planned for at the beginning of the shift, work must stop, and the plan must be revised. 7. All personnel are empowered and encouraged to stop unsafe acts, identify unsafe conditions, and to escort non-construction personnel out of the work areas. Please care for your project teammates. 8. No headphones, iPods, radios, etc. are permitted on the job. No streaming of music from the internet. No walking or driving while talking on phone or walkie-talkie.

	9. Zero use of tobacco policy. Zero tolerance policy for smoking in buildings during construction. No e-cigarettes or smokeless tobacco are allowed either. Turner may elect to establish a "tobacco zone" outside of the project. 10. Eating is allowed only in approved areas. No glass containers are permitted on site. 11. A fluent interpreter must be provided and on site for any crew that has one or more non-English speaking workers. 12. The confined spaces on this project include: _____ 13. I will not enter a confined space unless trained and authorized by my employer. Proof of training must be provided to Turner Construction. 14. The employer entering a permit-required confined space must arrange for an on-site rescue team to be present and provide for continuous air monitoring, and if applicable, monitoring of other hazards (i.e., engulfment). The list of behaviors below, while not inclusive, provides examples of conduct that is prohibited: 15. Causing physical injury to another person. 16. Making threatening remarks. 17. Aggressive or hostile behavior that creates a reasonable fear of injury to another person or subjects another individual to emotional distress. 18. Intentionally damaging employer property or property of another employee. 19. To the maximum extent permitted by applicable law, the possession on Company premises or while on duty of firearms, clubs, explosives, or other weapons that could be used to cause harm to personnel or property, other than that used to perform specific construction activities. This would include Turner. projects and client-owned buildings and facilities we work in, project-provided parking areas, and while in the execution of work duties.
EEO Policy **Initials**	*1.* Turner provides equal employment opportunity (EEO) to all persons based on qualifications and merit, without regard to race, sex, gender identity, sexual orientation, pregnancy, childbirth and other pregnancy-related conditions, color, national origin, ancestry, age, creed, religion, citizenship, marital status (including registered domestic partners), parental status, disabilities, genetic information, status as a recently-separated veteran, Armed Forces service medal veteran, disabled veteran, active duty wartime or campaign badge veteran, or any other protected characteristic or status.
Policy Statement Against Harassment **Initials**	1. Turner will not tolerate unlawful harassment, including sexual harassment or harassment on the basis of race, sex, gender identity, sexual orientation, pregnancy, childbirth and other pregnancy-related conditions, color, national origin, ancestry, age, creed, religion, citizenship, marital status (including registered domestic partners), parental status, disabilities, genetic information, status as a recently-separated veteran, Armed Forces service medal veteran, disabled veteran, active duty wartime or campaign badge veteran, or any other protected characteristic or status. 2. It is our collective responsibility to reject bias-motivated and disrespectful behavior. I agree that I am obligated to uphold Turner's **Zero Tolerance** of bias and hate, including any form of vandalism, physical destruction of property, defacement in the form of any graffiti (e.g., images drawn, sprayed, or etched, stickers, non-work-related posters, etc.) on temporary facilities or in the general workplace. Graffiti that exhibits harassment, hate or intolerance that is motivated by bias against a person's race, religion, disability, sexual orientation, ethnicity, gender, or gender identity will be investigated and will report to the authorities for legal action. ***I acknowledge*** that if found in violation of these rules I will be immediately removed from the work site and will no longer be permitted to work on this project and that it may result in permanent ban from all Turner projects.
Incident Reporting **Initials**	1. Any injuries / illnesses / near misses must be reported to your supervisor immediately after the event, if physically possible. Those supervisors are to verbally report the incident to Turner immediately after stabilizing any injury or making safe any unsafe conditions. 2. An incident investigation report must be filed with Turner within eight (8) hours after an accident. 3. If sent to a doctor for treatment all, follow-up appointments must be kept. 4. A Temporary Modified Duty policy is in place. 5. The worker must strictly follow any and all work restrictions issued by doctor.
100 % 6-Foot Fall Protection **(Regardless of Trade)** **Initials**	1. 100% FALL PROTECTION required where a 6-foot fall exposure exists (includes all trades). See additional ladder rules below. 2. ZERO TOLERANCE – For Fall Violations 3. Snap-hooks on lanyards must be double locking. Self-Retracting Lanyards (SRLs or yo-yos) or fall limiting devices are typically required. Whichever connecting device is used, two connecting devices are required on each harness (twin-leg). Short lanyards may be required in some types of scissor and aerial lifts. The competent person from each trade must specifically identify fall protection methods and equipment on JHAs and PTPs. 4. Gear to be inspected prior to every use. Contact your supervisor immediately if gear is damaged. DO NOT USE DAMAGED GEAR. 5. Warning lines are to be a min. of 15 feet back from the edge. (See criteria in Turner Safety Manual)

	6. Tie-off point must hold 5,000 LBS per person. 7. 100% tie-off when working from extensible / articulating boom aerial lift. 8. Employees must be trained in the use of fall protection. Provide proof of training to Turner. 9. Vertical or horizontal rebar or other impalement hazards shall be protected. 10. Any hole 2" or larger must be covered, secured, labeled (supporting 2X max the intended load) 11. Scaffolds A. Must be built under supervision of competent person who has necessary certifications (w/ 100% Fall Protection while erecting) B. Cross-bracing cannot be used as a ladder, or instead of either a top or mid-rail. You must have both a top and mid-rail. C. Scaffold must be inspected before each shift by the Subcontractors competent person and tagged/dated as safe. If you climb onto a scaffold not tagged and dated as safe, you may be removed from the jobsite. All non-compliant scaffolds must be "red-tagged" out of service. D. 100% tie off when working from all types of lifts that have a manufactured tie off point. Dual action controls require that there be two separate actions to activate the lift. If it arrives on site and does not have dual action controls, then it must remain inoperable until a Dual action control is installed. E. Mobile scaffolds must have the wheels locked when in use and require guardrails at 4 foot in height. F. Scaffold stairs shall be installed instead of a ladder to access frame and system scaffolds. If a ladder is required for some reason, ladder access points must only be at "swing-gates" on the ends of the frames, or through spring-loaded deck-hatches. 12. Standard Railing A. Top edge height of top rail must be 42" above the walking/working level and all systems must include a toe board and midrail. Cable rails must not deflect more than 3" with 200 lbs. applied. B. Guardrails will not be used as a horizontal anchorage for personal fall arrest equipment. Do not tie off to guardrails. C. Guardrails must be provided at floor openings and open sides, or personal fall protection must be used. D. Wood rail stanchions (or posts) shall not be more than 8 feet on center. E. Wire rope guardrails – min 3/8-inch cable, flagged every 6 feet, cannot have more than 3 inches of deflection, 3 clips are required at each termination, no open turnbuckles. 13. Ladders A. Turner's Ladders Last Policy states that ladders are not to be used on this project unless no other means of accessing elevated work is feasible. The tool of choice for elevated work is a mobile elevated work platform (MEWP) such as a scissor of aerial lift. Where MEWPs cannot be used, scaffolds can be used. B. Where ladders must be used, a Ladders Last Permit must be completed by the contractor and approved by Turner. The permit must be hung on the ladder and the ladder inspected daily. C. No aluminum or wood ladders are permitted on the site. D. Never use a stepladder while it's still folded up. E. Never use the top two (2) steps or the top of the ladder. F. Never store material or tools on the ladder G. Use the 3-point rule: 2 hands and a foot or vice versa to be in contact with the ladder at all times. Keep the belt buckle between the side rails. H. Fall protection is also required when above 4' on a ladder, even if three points are maintained. Turner will approve perimeter access points for material handling. Personal fall protection must be installed and used before cables or rails are taken down, or holes uncovered. Barricade the area, place signs, and leave a spotter.
Safety Enforcement **Initials**	1. All personnel are encouraged to ask questions and report actual and perceived hazardous conditions to site supervision. Perceived hazardous conditions may need further clarification and hazard assessment. If you have any questions or concerns, please ask for assistance. 2. There is a "Safety Enforcement" Fine System in place on this project. A. You are accountable for your actions on this project. B. Monetary fines imposed upon your employer for worker safety violations or complacency w/ regard to "minimum" safety rules. C. $250.00 - $5,000.00 – depending upon severity of violation. 3. All OSHA regulations will be strictly enforced. Turner has many policies stricter than OSHA and you need to be familiar with these. 4. Disciplinary Procedures – 3 strikes policy *1.* Verbal =Orientation *2.* Written *3.* Termination *4.* Turner retains the right to have anyone removed from site, based on the nature of the violation, without the 3 strikes

Emergency Procedures **Initials**	1. In the event of an emergency A. Notify job foreman immediately. B. Give the exact nature of the emergency (i.e., broken leg, fire, etc.) C. Give the exact location by area, column number or other easily recognizable terms. D. Stay on the phone until Safety has confirmed that you have provided accurate information. E. If an evacuation is not required, stay on the scene to brief emergency personnel upon their arrival. 2. Evacuation Procedures A. **Our project evacuation signals are:** (example: 3 horn blasts will indicate site is to be evacuated) B. Proceed in a calm, orderly manner to the designated safety zone. ***1.*** **Evacuation Gathering Points are located...** ***2.*** Report to your designated foreman/superintendent in designated area for head count. C. Do not leave the emergency gathering point until instructed to do so by your supervisor. D. All dangerous and/or emergency situations must be reported to Turner staff immediately, if feasible. E. Call 911 for ambulance or fire departments when necessary. F. Where is the location of your first aid kit and fire extinguishers? G. For confined space entry, trained emergency rescuers must be on site during the entry.
Personal Protective Equipment **Initials**	1. 100% Hardhat Protection, Non-Metallic, REQUIRED AT ALL TIMES. ANSI approved. (ANSI Type II or EN12492 with 4-point chin strap) 2. 100% Eye Protection (ANSI Z87.1) REQUIRED AT ALL TIMES. 3. Hard sole safety shoes or boots are required, no sneakers or soft shoes are allowed, ANSI Z41.1. Safety-toed boots and/or metatarsal protectors must be worn as dictated by the hazard assessment. Safety-toed boots required for erection, demolition, masonry and rigging, at a minimum. 4. Long pants in good condition, no shorts allowed. 5. Shirts must have sleeves at least 4" long. 6. ANSI Cut Level 4 Gloves are required at all times unless the Job Hazard Analysis specifically states they are not required because they create a greater hazard (using rotating parts, etc.). Cut-resistant gloves are required when using knives or handling sharp material/objects. Additional hand protection may be required depending on the hazard assessment. Appropriate arm protection is required during operations where the arms are exposed to cut hazards (i.e., Kevlar, Dyneema sleeves, etc.). Examples of these activities are working around metal studs and pull boxes, tight confines as between wall studs or above ceiling and all demo activities. These operations shall be identified on the JHA/PTP. 7. Ear protection as required when exposed to noise above 85 DBA or when noise levels require you to raise your voice when talking to someone 3 feet from you. 8. Face-shields required when cutting / grinding / chipping or working above your shoulders; or when the hazard exists of projectile particles. Goggles are required when there is a splash or dust hazard such as working with chemicals, sawing lumber, and grinding. Both may be required if both hazards exist. 9. No loose clothing or jewelry 10. High visual, safety vests, shirts or jackets shall be worn as the outermost apparel by all employees, 100% of the time. ANSI Class 2 (0-44 MPH) and Class 3 (45 MPH or more) outerwear must be worn whenever working on or near (within 10 feet) of a roadway. 11. Any contractors requiring the use of dust masks and/or respirators must submit a written respiratory protection program Turner. This program must address medical surveillance, fit testing, etc. Voluntary usage of dust mask type respirators used by employees must also be included in the respiratory protection program and shall meet or exceed OSHA standards. 12. Regular utility-cutters (like box-knives) are not allowed. All utility cutters should be equipped with self-closing blade guards or self-retracting blades that engage when the blade loses contact with the cutting surface.
Electrical/LOTO **Initials**	1. Only round, heavy-duty, minimum AWG 12-gauge cords are acceptable. 2. 100% Ground Fault Circuit Interrupter (GFCI) Protection. 3. Inspect all cords and welding leads before each use. 4. All electrical and mechanical systems are to be considered energized. When pressurizing any pipe, vessel, or system, refer to Turner's procedures. 5. All panels, boxes, switches, and receptacles containing live wires must have a cover. 6. NEVER work on live electrical panels or parts without prior approval from Turner. Complete the Turner Energized Work Permit and submit prior to the work taking place. 7. LO/TO – Single-key locks required (cannot have multiple keys for a lock). Each worker must apply a lock when exposed. 8. NFPA 70E compliance is required for energized work. This includes testing and commissioning activities, as well.
Equipment	1. Proper training and certification are required prior to operating any 2. equipment. Speed limit on site is 5 mph.

Equipment **Initials**	3. A spotter is mandatory when a vehicle or equipment has restricted view. A spotter is necessary when backing up any vehicle or equipment on site. 4. Backup alarms must be present on all required vehicles. 5. Horns and lights are recommended for all equipment. 6. Always follow the manufacturer's operating instructions for all equipment and tools used on this project. 7. Seatbelts must be worn at all times. 8. The use of cell phones is prohibited while the machine or vehicle is in motion. 9. The forks of a forklift cannot be used for free rigging. **10.** When off-loading trucks with forks or cranes, no person should be on the truck bed or around the truck after rigging. Set up a safe zone around the truck with tape or barricades. Use a spotter to keep people out
Cranes **Initials**	1. Awareness of overhead loads – listen for horns. Never stand or walk under an elevated load. 2. Awareness of crane swing radius (should be flagged off). 3. Cannot operate a crane within 20' of any power line. 4. Rigging must be inspected before each use by a qualified rigger. Damaged rigging must be removed from service. 5. Crane operator must submit operator certifications (NCCCO or NCCER) 6. Employees cannot signal a crane unless trained and certified, and authorized to do so. **7.** Each rigger & signal person must be qualified & proof of training given to Turner Construction
Barricade Tape **Initials**	1. Barricaded areas must have posted signage on each side of the area. Signage should identify the hazard, the controlling contractor for the area, a point of contact and his or her phone number. 2. Types of Tape A. **Red Danger** – ***Imminent Danger*** exists. Only authorized personnel performing actual work are to be allowed in this barricade tape area. The only exception for entry into a red area is with prior permission of those authorized to work within the area. B. **Yellow Caution** – a hazard exists that would warrant ***Caution***. A yellow area can be accessed by anyone who is authorized to be on the job site, and who stops to observe the existing hazard and takes the proper precautions prior to entering the tape barricade area.
Training Requirements **Initials**	1. Must be trained / certified to operate forklifts, aerial lifts, cranes, and use scaffolding, etc. 2. Contractors are required to provide workers that are trained as required by OSHA standards and site policies. 3. All workers are to be trained by their employer for the task and/or tool/equip being used – ladders, scaffolds, excavations, etc. 4. No worker may lift more than 50 pounds, unassisted. Use mechanical means first.
Hand & Power Tools **Initials**	1. All drills, grinders, etc. that are designed with guards and/or control bars must have them in place when the tool is in use. The grinding wheels must be rated to meet or exceed the RPM specifications of the grinder. 2. Workstations are to be elevated. This includes saws, pipe benders and threaders & other work activities. 3. Powder Actuated Tools - No lead-based shot is permitted onsite. 4. Tools are to be used the way the manufacturer intended. Do not modify any tool. 5. For tools that would normally create dust, Turner requires them to have integrated protective measures to capture or minimize the dust, such as HEPA vacuums or water-spray, etc.
Hot Work **Initials**	1. The contractor performing hot work will be required to have a charged and inspected 20-pound ABC dry chemical fire extinguisher present in the work area. 2. Appropriate permit procedures, shields, and blankets shall be used when developing site specific fire prevention programs. 3. The subcontractor is required to implement a fire-watch during all burning operations and for a minimum of 30 minutes following completion. 4. Hard Hats are required while welding. 5. Safety glasses are required under the shield when chipping or grinding. 6. Cylinder Storage must be stored upright and properly secured. When not in use, disconnect hose/gauge assemblies and cap the cylinder. Stored cylinders must have a ½ hour fire rated barrier 5 feet tall or be stored 20 feet apart. Propane tanks cannot be stored in any building. (Turner must be notified prior to propane being used onsite) All torch carts are to have a fire rated barrier between the cylinders. 7. Anti-flashback devices are to be located at the torch head & at the cylinders. **8.** Hot Work activities must be pre-approved by Turner (Permit to be issued). A fire watch must be present where sparks could fall (multiple levels if necessary).
Excavations **Initials**	1. Any excavation greater than 4' must be sloped, shielded, or benched properly. 2. The bottom of the trench box must be within 2 feet of the bottom of the trench. The top of the trench box must stick up 18 inches above the slope or the bench. The box cannot be moved while workers are inside. 3. Access must be provided by a ramp or stairs. Travel distance to that means of access/egress must not exceed 25 feet. 4. Any excavation (includes trenches) must be barricaded off with orange fence or equivalent, regardless of depth.

	5. You cannot bench Type C soil. 6. Before you dig or drill, complete a Turner "Ground Penetration Request Form." Your utility locator service must be notified days in advance, as well. 7. Fall protection is required at the top of excavations greater than 6 feet deep when the slope is less than 45 degrees.
Hazard Communication / GHS **Initials**	1. This employee, by his initials in this section acknowledges that he/she has been trained by their employer, on hazard communication and, 2. **Turner has reviewed the location of Chemical Inventory Lists and Safety Data Sheets** with me. 3. You must provide Turner with a Safety Data Sheet for any chemical you bring onto the project. 4. Turner will coordinate the sharing of Safety Data Sheets (SDS) between contractors. 5. If you transfer chemicals from one container to another, you must provide a proper chemical label complying with OSHA. **6.** Renovation projects often have health hazards in the form of asbestos, lead, PCBs, Mercury, etc. **The known health hazards on this project include: _____** 7. If this project contains known health hazards, I certify that I was given training on those hazards including their identity, location, hazards of exposure, and control methods used to protect me. If I discover any "suspected" hazardous material, I'll immediately stop work and bring it to the attention of my employer.
Construction Waste Management **Initials**	1. All waste leaving this project is tracked on Turner's Online Waste Tracking (OWT) system. Strict compliance with the project Construction Waste Management Plan (CWMP) is required. The recycling goal is %. The construction and demolition dumpsters on this project are (co-mingled) (site-sorted). Materials recycled include, at a minimum: A. Wood: pallets, wood-framed boxes, temporary lumber, etc. B. Concrete: concrete, block, brick, asphalt C. Metal: scrap metal, metal studs, metal pipe, etc. D. Cardboard, paper E. Drywall: drywall, mold board, (NO Dens-Glass) F. Construction Trash: food waste, sweepings, non-recyclable waste, etc. 2. Collect and sort your construction waste throughout the workday and transport the waste to the appropriate dumpster at the time established by your Foreman or Project Manager. 3. All Subcontractors are required to recycle to the maximum extent possible as a part of their Contracts using Turner's OWT tool. In cases of non-compliance, only the Subcontractor(s) responsible for contaminating dumpsters (placing waste in the wrong dumpster) will be responsible for fines, additional tipping fees, or other penalties as may apply.
Indoor Air Quality **Initials**	1. Strict compliance with the project Indoor Air Quality (IAQ) Management Plan is required. 2. Safety Data Sheets (SDS), along with VOC content, of all adhesives, sealants, coatings, paints, carpets, composite woods, etc. must be submitted for review and approval prior to these products being brought on site. 3. Stored material shall be covered, stored off of the deck, and kept in a dry environment. Quantities should be limited to what can be installed in a reasonable time (e.g., two weeks or less). 4. Changes in finished areas should be treated as renovations. 5. For large changes, install temporary dust protection to separate the work area from the finished space. The work area should be kept negative, and an HEPA filter should be used to filter the air prior to it leaving the space. The temporary protection and filter system should be approved by a Turner superintendent before beginning work. Once the work is complete, the area should be thoroughly cleaned, and the temporary protection should be removed. 6. For small changes, a vacuum with an HEPA filter should be used to collect any dust that is generated, and the areas should be thoroughly cleaned after the work is complete. 7. All subcontractors will be required to use sweeping compounds. 8. All cleaning products used on the project must comply with Green Seal Standard GS - 37 for Industrial and Institutional Cleaners. 9. Mold and moisture control is a key to proper indoor air quality. If possible, drywall activities should not begin until the building is watertight. If drywall must start before the building is watertight, moisture resistant board should be used. 10. Notify Turner if you see any wet building materials (before mold grows).
Stormwater Management	1. The SWPPP requirements including Best Management Practices (BMP's) were reviewed and will be followed as required by the SWPPP. 2. The SWPPP drawings, project sequence and how sequencing will affect BMP locations were reviewed. 3. Notify Turner of any disturbances of the Best Management Practices (BMP's) including silt fences, vehicle mud removal areas, vegetative cover, other sediment, and erosion controls.

Initials	4. Ensure all concrete/cement washout is performed at designated locations and into designated containers, notify Turner personnel immediately if washout is not adequately containing wash water and stop washout activity. 5. All site dewatering must be performed in a manner compliant with the SWPPP and all pump discharge locations must be previously approved by Turner. 6. Inspect all equipment and chemical storage containers for leaks as well as excess grease/grim/oil/fuel, if any of the above are discovered ensure that mechanics are notified (if necessary) and equipment/containers are wiped clean, and containments disposed of properly. 7. Ensure parked equipment and chemical storage containers are parked/stored in locations previously approved by Turner and are identified on the SWPPP map. 8. Use only designated areas for equipment maintenance and washing down. 9. Minimize the generation of dust and the tracking of sediment to off-site paved areas.
Nothing Hits the Ground **Initials**	FABRICATION: 1. All material fabrication shall be performed at a workstation between 30 and 39 inches, off the floor. 2. Workstation shall be mobile and include a fire stop directly behind all chop saws. 3. Rubbish containers shall be mobile and located directly adjacent to the workstation. 4. Mobile rubbish containers must be made available for subcontractors' work. HOUSEKEEPING: 1. All rubbish shall be disposed of as it is generated and be immediately placed in a mobile rubbish container provided by the subcontractor. No trash/scraps to touch the floor. 2. Cordless power tools are required unless the subcontractor can demonstrate a hardship or need to use tools with power cords. 3. The subcontractor is required to elevate off the ground all power cords, hoses, and welding leads in order to minimize tripping hazards on walking/working surfaces. They must be elevated at least 8 feet. Any sub using these is responsible for purchasing/installing their own means of support. 4. Debris is not allowed to be consolidated on the floor. 5. Maintain clear paths to move materials and facilitate emergency egress. 6. When stilts are allowed on a project, the floor must be broom swept with no trip hazards. (Cords, material, screws, and trash). Turner will provide a stilt-use permit where they are allowed. MATERIAL HANDLING/ STORAGE: 1. Material may not be stored within 10 feet of the building perimeter or adjacent to shafts or stairwells. 2. All material laydown areas must be coordinated and designated by Turner. 3. Material must be stored to promote mobility of material. All materials including pipes, conduits, metal fabrications and steel framing are to be stored on rolling racks or similar means of conveyance. Bulk material should be palletized to allow for easy mobility using a pallet jack. 4. Just in Time" delivery required to minimize clutter. Nothing should be stored on a floor that cannot be installed within one week. 5. Heavy material such as glass and drywall must be loaded so as not to overload the structure. The subcontractor is required to do a floor loading analysis for submission to Turner for review and approval. 6. Any contractor creating floor holes must cover those holes with covers capable of supporting 2x the intended load. Covers shall be installed flush to allow easy movement of rolling materials and trash hoppers. There are manufacturers that make these covers for smaller diameter holes ("Paragon" and "Hole Solution" are two). Turner does not endorse any manufacturer or product. 7. The biggest contributor to construction injuries is when we manually handle material (carrying, pushing, and pulling). Our goal is to identify and use mechanical means of moving material and tools whenever possible. This might include cranes, forklifts, dollies, carts, etc. It means never carrying materials up and down stairs. It definitely means right-sizing the loads we *are* handling – such as not lifting more than 50lbs or not overfilling tool buckets or trash cans with heavier materials. Buy smaller bags of grout and mortar instead of the big 80lb bags. Find ways to work smarter. Not harder.
ISO 45001 Safety Management System **Initials**	1. ISO 45001 is an internationally recognized health and safety management system to improve safety performance of a company and control the risks associated with their operations. 2. Turner has received registration in ISO 45001 by the third-party auditor NSF International as of October 2021. 3. Achieving registration through ISO 45001 demonstrates Turner's commitment to elevate the company's already mature and advanced safety standards and programs. ISO 45001 registration also confirms Turner's dedication to improving Occupational Safety and Health performance through control and management of associated risks and hazards in the workplace. 4. Turner truly cares about your well-being while working on this project. 5. Turner wants to see you go home the same way you came to work.

	6. Your opinion matters on this project! If you have a question or concern related to safety and health, please ask a Turner representative.

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Hazardous Chemical Inventory List

1. General Information		
Trade Partner:	**Project:**	**Date:**

2. Inventory

#	On Site	Common Name/Chemical Name	Manufacturer	SDS On File
1				
2				
3				
4				
5				
6				
7				
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18				
19				
20				

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Site Specific Chemical Inventory List

1. General Information		
Trade Partner:	**Project:**	**Date:**

2. Inventory

#	On Site	Common Name/Chemical Name	Manufacturer	SDS On File
1				
2				
3				
4				
5				
6				
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8				
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Turner

Ladder Safety Inspection Checklist

1. General Information	
Inspector:	Date:
Site Location:	Time:

2. Checklist

Instructions:

1) Complete Permit on flipside first
2) Affix completed inspection tag on all ladders passing inspection.
3) Tag defective ladders 'Out of Service' and discard if beyond repair.
4) Note deficiencies/corrective actions in Comment section.
5) Return checklist to Turner Superintendent

☐ YES ☐ NO	1. Broken, bent or missing steps, rungs, cleats, or rails?
☐ YES ☐ NO	2. Steps and rungs free of water, grease, oil, or other slippery substance?
☐ YES ☐ NO	3. Free of splits, cracks, rust, corrosion, and dry rot?
☐ YES ☐ NO	4. Free of sharp edges, cuts, burns, etc.?
☐ YES ☐ NO	5. Loose or bent hinges that can't be fully opened or locked in place?
☐ YES ☐ NO	6. Stable and completely balanced (not shaking or swaying) with all legs resting firmly on the floor?
☐ YES ☐ NO	7. Loose, broken, or missing extension locks to ensure safe overlap of extension ladder sections?
☐ YES ☐ NO	8. Damaged or worn non-slip bases, safety feet, wheels, or casters?
☐ YES ☐ NO	9. Cross-over ladders have railings and non-slip steps?
☐ YES ☐ NO	10. Weight capacity label attached? Type1A?
☐ YES ☐ problems? NO	11. Other structural defects or operating

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Date: **Ladder Permit**

1. General Information	
Consider how work may be accomplished at or from the ground-level to minimize elevated work. Ladders are to only be used where no safer means is feasible to access the work. **M**obile **E**levated **W**ork **P**latforms (scissor and aerial lifts, etc.) are the preferred method. You can alternately consider the use of scaffolds, rolling stairs, etc. **Note: 100% fall protection is required when using ladders when working above 4'.**	
Contractor Company	**Project Number/Name:**
Area(s) Ladder to be used:	
Ladder Competent Person:	**Competent Person Contact #:**

2. Reason Ladder is Only Option
NOTE: Must be approved by the Turner Superintendent and/or Safety Manager.

3. Activity/Task(s) to be Performed from Ladder

4. Ladder Information		
Type of ladder (check one): ☐ **Platform-ladder** ☐ **Fixed**	☐ **Stepladder** ☐ **Trestle**	☐ **Extension** ☐ **Other:**
Ladder weight capacity (300lbs min):	**Ladder Height:**	
Will you be 4' or more above a working surface?	☐ **YES** ☐ **NO**	
If YES, what specific Fall-Arrest System will you use and what will be your anchor point? (Retractable Device is the only appropriate method of fall protection):		
Worker's Name:	**Orientation Sticker #:**	
Worker's Name:	**Orientation Sticker #:**	

5. Permit Reviewer (Turner)	
Name:	**Date:**
Name:	**Date:**

Mobile Elevated Working Platform (MEWP) Checklist

1. General Information	
Name/Type of MEWP:	**Contractor Name:**
Model or Equip No.:	**Contact Number:**
Operator or Inspectors Name (person performing the inspections):	

2. Inspection								
Date:		/	/	/	/	/	/	/
Shift:								
Is the operator trained to operate this MEWP and does the operator have a valid operator's license/card?		☐ **YES** ☐ **NO**	☐ **YES** ☐ **NO**	☐ **YES** ☐ **NO**	☐ **YES** ☐ **NO**	☐ **YES** ☐ **NO**	☐ **YES** ☐ **NO**	☐ **YES** ☐ **NO**
Inspection Item & Description Pass Fail Status		**P/F**	**P/F**	**P/F**	**P/F**	**P/F**	**P/F**	**P/F**
1	Operating and emergency controls are in proper working condition, EMO button or Emergency Stop Device							
2	Upper drive controls interlock mechanism is functional (i.e., foot pedal, spring lock, or two hand controls)							
3	Emergency Lowering function operates, properly							
4	Lower operating controls successfully override the upper controls							
5	Both upper and lower controls are adequately protected from inadvertent operation.							
6	Control panel is clean & all buttons/switches are clearly visible (no paint over spray, etc.)							
7	All switch & mechanical guards are in good condition and properly installed							

8	All Safety Indicator lights work							
9	Drive controls function properly & accurately labeled(up, down, right, left, forward, back)							
10	Motion alarms are functional							
11	Safety decals are in place and readable							
12	All guard rails are sound and in place, including basket chains							
13	Work platform & extension slides are clean, dry, & clear of debris							
14	Work platform extension slides in and out freely with safety locking pins in place to lock setting on models with extension platforms.							
15	Inspect for defects such as cracked welds, fuel leaks, hydraulic leaks, damaged control cables or wire harness, etc.							
16	Tires and wheels are in good condition, with adequate air pressure if pneumatic							
17	Braking devices are operating properly							
18	The manufacturer's operations manual is stored on MEWP (in all languages of the operators)							
19	Crush protection devise, time out switches and/or control covers installed							

Turner

Initial Equipment Safety Inspection: *Off-Road Heavy Equipment*

1. General Information			
Initial Inspection:			
Type of Equipment:	**Make/Model:**	**Owner ID#:**	
Operated By (Name of Operator):		**Employer:**	
Operator Certified? ☐ YES ☐ NO	**Certified By:**	**Date:**	
Inspected By:		**Signature:**	
Title:		**Employer:**	
Inspected By:		**Signature:**	
Title:		**Employer:**	

2. Inspection				
		YES	**NO**	**N/A**
1	Operator has reviewed charts & manuals and understands safe operating practices	☐	☐	☐
2	Operator does a Daily Equipment Inspection at the start of the shift	☐	☐	☐
3	Equipment is in proper condition for street use (turn signals, brake lights, etc.)	☐	☐	☐
4	Back up alarm is functioning and loud enough for the conditions	☐	☐	☐
5	Warning horn is functioning and loud enough for the conditions	☐	☐	☐
6	There is a charged fire extinguisher in the cab	☐	☐	☐
7	The Cab Glass is without cracks	☐	☐	☐
8	Steps and seats are in proper condition	☐	☐	☐
9	Seat belts are provided, and they are used	☐	☐	☐
10	Riders are not permitted where there are no seats with seat belts	☐	☐	☐
11	Rollover protection is provided	☐	☐	☐
12	Overhead protection is provided	☐	☐	☐
13	Protection from flying debris is provided	☐	☐	☐
14	Adequate lighting is provided for work in low light/dark conditions	☐	☐	☐
15	Brakes are functioning properly	☐	☐	☐
16	Beds of dump trucks are equipped with device for locking body in raised position	☐	☐	☐
17	Tires/tracks are in good condition	☐	☐	☐
18	Pulleys, belts, gears, chains, and other nip and shear points are adequately guarded	☐	☐	☐
19	Fuel tanks are located to prevent spills and overflows from hitting hot parts or electrical equipment	☐	☐	☐
20	Windshield wipers are in good condition	☐	☐	☐
21	Exhaust is located/directed so as not to endanger workers or obstruct operator's view	☐	☐	☐
22	Fueling cans used with the equipment are the approved safety type	☐	☐	☐

Turner

Initial Equipment Safety Inspection: Cranes

1. General Information		
Initial Inspection:		**Annual Inspection Expires:**
Type of Equipment:	**Make/Model:**	**Owner ID#:**
Owned By:		**In Use By (Company):**
Operated By (Name of Operator):		**Employer:**
Operator Certified? ☐ **YES** ☐ **NO**	**Certified By:**	**Date:**
Inspected By:		**Signature:**
Title:		**Employer:**
Inspected By:		**Signature:**
Title:		**Employer:**

2. Inspection

NOTE: *Indicates must be verified by and/or submitted to Turner. Items (except #20) marked "NO" must be corrected prior to operation of crane.

		YES	NO	N/A
1*	Current "Annual" Inspection Report with any deficiencies noted as corrected	☐	☐	
2	Operator's Manual	☐	☐	
3*	Daily Operator's Inspections done with Inspection Log up to date	☐	☐	
4	Load Charts	☐	☐	
5*	Chart for hoisting 'over the front'	☐	☐	
6	Signal Chart posted	☐	☐	
7	Operator has reviewed charts & manuals and understands capacities and limitations	☐	☐	
8	Functioning 'Anti-Two-Block' Device as per ANSI B30.5	☐	☐	
9	Boom Angle Indicator	☐	☐	
10	Leveling Device	☐	☐	
11	Operator Controls legibly marked as to function	☐	☐	
12	FAA Light and/or Flag	☐	☐	
13	Cab Glass intact	☐	☐	
14	Functioning Warning Horn	☐	☐	
15	Charged Fire Extinguisher	☐	☐	
16	Adequate Blocking (min. sq. ft. each float = rated capacity of crane / 5)	☐	☐	
17	Floats positively attached to outrigger rams	☐	☐	
18	Block and/or ball have Capacity Plates and hooks have Safety Latches	☐	☐	
19	Wedge Socket termination is proper & not clipped directly to load line	☐	☐	
20	Will or might be Hoisting Personnel	☐	☐	

Turner

Critical Crane Lift Plan

1. General Information		
This plan is to be followed if any of the following apply: ☐ **Load capacity is equal to, or exceeds 75% of load chart rating** ☐ **2 or more cranes will be used during lift** ☐ **Any unusual circumstances (Specify):**		
Employer Name:	**Project Name/Number:**	
Lift Supervisor and Contact Number:	**Assembly/Disassembly Director:** (If Applicable)	**3rd Party Inspector** (Company / Name)
Certified Crane Operator: (Company / Name(s))	**Qualified Rigger(s):** (Company / Name(s))	**Qualified Signal Person(s):** (Company / Name)
Note: All Insurance Certificates, Inspections, Certifications, and Training must be submitted prior to Acceptance and Approval of Critical Lift Plan		
Schedule of Operations		
NOTE: Include time for rigging and equipment inspection:		
	Permit Start Date and Time:	**Permit End Date and Time:**

2. Crane/Lift Information	
Make and Model of Crane/Hoist:	
Serial Number:	**Length of Boom:**
Maximum Operating Radius:	**Planned Operating Radius:**
Boom Angle:	**Height of Lift:**
Description of Item to be Lifted: (Attach Submittal/Specification)	
Load Weight:	**Specify how the load weight was determined and by whom:**
Allowable Load (from load chart):	**Ratio of Lift to Allowable Load:**
Weight of rigging and attachments:	
Description of rigging and attachments:	
Specify how the rigging/attachment weight was determined and by whom:	
Total Weight of Load/Rigging/Attachments/Load Chart Deductions:	

What are the identified lifting points (Factory or Field Installed)?
Is a Spreader Bar required (Y or N), if Yes, what is the size and capacity?

3. Clearance
Clearance between boom and lift: (if Applicable)
Clearance to surrounding objects:
Clearance for Load Movement Sufficient:

4. Stability of Ground	
☐ **Is the ground compact & stable?**	☐ **Are crane mats required?**
☐ **Outriggers in place and cribbing / blocking used?**	☐ **Are there any hazards beneath the equipment set up area? If Yes, What?**

6. Further Information
☐ **Is a lift drawing required for this lift (if so, attach)**
What type of communication will be used by the operator and signal person (Two Way Radios / Hand Signals)
What are the wind and weather conditions? **Temperature:** **Weather Condition(s):** ☐ **If wind speed is over 25mph, do not proceed with lift** ☐ **If wind speed is over 20mph, consider postponing**
Is additional lighting required (Y or N), If Yes, What type of lighting will be required?
Is there a traffic control plan needed for this lift? (If so, attach)
What device(s) will be used to barricade of the counterweight swing radius of the crane?
How will area be kept clear of pedestrian traffic:
Comments:

7. Lift Approval		
Crane Operators Name:	Signature:	Date:
Crane Inspectors Name:	Signature:	Date:
Rigging Supervisors Name:	Signature:	Date:
Lift Supervisors Name:	Signature:	Date:
Signal Persons Name:	Signature:	Date:
Other:	Signature	Date:
Turner Management Review		
Name:	Signature:	Date:

Note: Prior to a critical lift being made, all associated individuals need to review the critical lift plan during their PTP Huddle.

Turner

Energized Electric Work Permit

1. General Information		
NOTE: This permit is to be completed by the electrically qualified persons doing the work.		
Name of Requester:	**Title of Requester:**	**Date:**
Project Name:	**Company Requesting Permit:**	
Specific Location:	**Name of Electrical Work Supervisor:**	
Requested Start and Completion Date:	**Weekend Work Required (Yes / No):**	
Work Scope Overview: (Attach Supporting Documents)		

	Yes	No	N/A	Details:
Facility Equipment or System that will be Affected	☐	☐	☐	
Electrical Utility Equipment	☐	☐	☐	
Emergency Generator System Critical Cooling System	☐	☐	☐	
Non-Critical Cooling System	☐	☐	☐	
Uninterruptible Power Supply System	☐	☐	☐	
Critical Power Distribution System	☐	☐	☐	
Emergency Power Off (EPO) System	☐	☐	☐	
Fire Detection Systems	☐	☐	☐	
Fire Suppression System	☐	☐	☐	
Monitoring System	☐	☐	☐	
Control System	☐	☐	☐	
Security System	☐	☐	☐	
General Power and Lighting System	☐	☐	☐	
Lockout/Tag out Required?	☐	☐	☐	
Other (Please Specify)				

Description of Voltage and Location of Machine or Equipment:

Justification of why the circuit/equipment cannot be de-energized or the work deferred until the next scheduled outage:

Name(s) of Electrically Qualified Person(s):

2. Electrical Workers' Training and Qualifications

NOTE: The employee(s) must have successfully completed formal employer-approved training in the following subjects:

a.	**Electrical Safety**	**Date:**
b.	**Lockout-Tagout**	**Date:**

c.	CPR	Date:
d.	First Aid	Date:
e.	NFPA 70E Standard	Date:

3. Detailed Job Description Procedure to be Used in Performing the Above-Described Work:

Step #	Action	Contractor	Time Star	Time End	Duration
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

4. Back-out Procedures

Step #	Action	Contractor	Time Star	Time End	Duration
1					
2					
3					
4					
5					

5. Description of the Safe Work Practices to be Employed:

6. Results of the Arc Flash Study / Analysis:

7. Determination of Arc Flash Protection Boundaries:

8. Necessary Personal Protective Equipment to Safely Perform the Assigned Task:

Note: All equipment must have current test and/or certification.

☐ **Safety Glasses and/or Face Shield** ☐ **Non-Conductive Hardhats**

☐	Certified Rubber Gloves and Leather Protective	☐	Insulating Sleeves and Aprons
☐	Dielectric Blanket and Insulated Mats	☐	Hearing Protection
☐	Respiratory Equipment	☐	Insulated Tools
☐	Other (Cal rated clothing etc.):		

9. Means Employed to Restrict the Access of Unqualified Persons from the Work Area:

10. Safety Checklist for Live Electrical Work

- ☐ Specific work areas must be cordoned to prevent unauthorized access to the liver work area
- ☐ A minimum of two equally qualified workers must be present when the live work is accomplished
- ☐ An individual certified in First Aid and CPR shall be immediately available to the area
- ☐ All persons in the work areas should remove all jewelry
- ☐ If ladder access if required, only fiberglass ladders are authorized. Although wood ladders are non-conductive, the wood ladders become conductive when water is absorbed into them
- ☐ If access to the live work is in a wet area, place wood planking or its equivalence on the floor
- ☐ Work boots for persons performing the live work should be ANSI approved for electrical work
- ☐ Insulated gloves worn by workers performing the live work must have current dielectric test date
- ☐ All work must comply with OSHA 1926 (Subpart K, NEC, NFPA 70E standards and applicable NIOSH Policies)

11. Do You Agree the Above-Described Work Can Be Done Safely?

☐ YES
☐ NO

If no, return to requester.

12. Contacts

Name	Title	Cell	Company	Email

13. Authorization to Perform the Work While Electrically Energized

Project Executive:	**Signature:**	**Date:**
Project Manager:	**Signature:**	**Date:**
Project Superintendent:	**Signature:**	**Date:**
BU EH&S Director:	**Signature:**	**Date:**
Owner / Building Representative:	**Signature:**	**Date:**

****Note: A Pre-Task Plan along with this EEWP must be produced/reviewed with the individuals performing the work****

Turner

Emergency Release Authorization Form:

1. General Information			
Name of Person Whose Lock Must Be Removed:			
Supervisor's Name:			
Has an attempt been made to contact them?	☐ **YES** ☐ **NO**	**Has an attempt been made to contact their supervisor?**	☐ **YES** ☐ **NO**
Why is it critical to remove this lock now?			
Whom else is affected by removing this lock?			
Are you sure it is safe to remove this lock?	☐ **YES** ☐ **NO**		
Site Manager/Project Manager or designee name:			
Signature:		**Date:**	
(If Needed) Owner or Owner's Representative name:			
Signature:		**Date:**	
(If Needed) Commissioning Manager or designee name:			
Signature:		**Date:**	

Turner

Confined Space Entry Permit

1. General Information		
NOTE: This permit must be completed for "permit-required entries," "alternate entries," and when reclassifying a permit space to "non-permit" required space. The permit must be posted at the entry portal of Confined Space during entry, along with a Pre-Task Plan. **Maintain record of this permit for 1 year**		
Employer Name:	**Project Number/Name:**	
Turner Site Superintendent Name:	**Permit Start Date:**	**Permit End Date:**
Assessment Performed By:	**Permit Start Time:**	**Permit End Time:**
Name of Supervisor Overseeing Work:		**Contact Number:**
Location of Confined Space:		
Description of Task:		
Description of Confined Space (or Confined Space ID Number):		
Description of Hazards in the Space (List chemical, physical, and other hazards):		

4. Atmospheric Sampling		
NOTE: Atmospheric monitoring required prior to and continuously during permit entry.		
Conducted By:	**Signature:**	**Title:**
Monitoring Instrument Manufacturer and Model #:	**Last Factory Calibration Date:**	**Pre-Entry Calibration** Initial if Completed: _____

Sampling Results

NOTE: If levels are outside the below acceptable levels, entry is denied until 3 consecutive tests within the tolerances are completed .Test must be 5 minutes apart and indicate whether the tests are with or without mechanical ventilation More sampling results space is located at the end of this permit.

Monitor in this order	**Acceptable Ratings**		**Result**	**Result**	**Result**	**Result**	**Result**
	Min	**Max**	☐ **AM** ☐ **PM**	☐ **AM** ☐ **PM**	☐ **AM** ☐ **PM**	☐ **AM** ☐ **PM**	☐ **AM** ☐ **PM**
1. Oxygen	**19.5%**	**23.5%**					
2. Combustible	**0%**	**10%LEL**					
3. H2S	**0%**	**5ppm**					
4. Other	**0%**	**___%PPM**					
5. Temperature	**-**	**-**					

5. Ventilation	
NOTE: Required if a potential or actual atmospheric hazard exists.	
☐ **No Ventilation Required**	☐ **Continuous Mechanical Ventilation Required**

6. Engulfment Hazard Early Warning System	
NOTE: Required if a potential for engulfment exists.	
☐ **No Engulfment Hazard**	☐ **Yes – Description:**
If Yes, describe method and location to monitor for Engulfment Hazard:	

Turner

7. Emergency Rescue Personnel Must Be On-Site During Any Permit Entry

NOTE: All requirements below apply:

☐ **Rescuers informed of all hazards** ☐ **Rescue plan developed** ☐ **Current First AID/CPR**
☐ **Rescuers have required training** ☐ **Non-Entry rescue gear (Tripod, Winch, AED, etc.)**
☐ **SCBA or SAR required when potential for IDLH atmosphere exists (Plus med clearance and fit test to use)**
Rescuer Names:

8. Protective Equipment

NOTE: All protective equipment shall be inspected prior to use.

☐ **Harness w/ Retrieval System**	☐ **Hearing Protection**
☐ **Respiratory Protection (specify):**	☐ **Specify Communication Method:**
☐ **Face Shield/Goggles**	☐ **Fire Extinguisher**
☐ **Coveralls or Chem Clothing**	☐ **Other:**
☐ **Intrinsically Safe Equipment or Non-Sparking Tools**	☐ **Barriers to Protect Entrants from Cars/Pedestrians**

9. Isolation of Mechanical, Electrical, Physical or Chemical Energy Sources

NOTE: Required for alternate entry. Measures might include LO/TO, blanking or blinding: removing sections of lines; a double block and bleed system, blocking or disconnecting all mechanical linkages; isolation barriers.

☐ **Not applicable** ☐ **Yes (specify):**

10. Has Space Contained Liquids, Gases or Solids of Toxic, Corrosive or Irritant Nature?

☐ **No** ☐ **Yes (if yes, contact the BUEHSD prior to entry, attach SDS to this permit)**

11. Name(s) of Attendant.	
1.	**2.**
12. Name(s) of Employee(s) Authorized to Enter	
1.	**2.**
3.	**4.**

13. Special Instructions/Equipment

☐ **Alternate Entry Procedure (allowed when all of the following conditions are met)**

☐ **Physical Hazards are eliminated or isolated**
☐ **Continuous forced air ventilation maintains safe air**
☐ **Documentation to support above made available to entrants**
☐ **No Hazardous atmosphere present at any time: Complete Section 4 & 5 above**
☐ **Egress points are easily accessible and easily identified**
Fall Protection system around opening.

Safe means of entry (harness, winch, or other applicable, etc.)

As the competent person, I certify that the space described in section 1 above has been made safe for alternate entry on the date listed above.

Name: **Date:**

14. Reclassification to Non-Permit 1926.1203(g)

☐ **All hazards eliminated or isolated**
above Forced air does not constitute hazard elimination.
☐ **Pre-entry air monitoring captured**

As the competent person, I certify that the space described in section 1 above has been made safe reclassification on the date listed above.

Name: **Date:**

15. Designated Entry Type:

☐ **Permit-Required** ☐ **Alternate Entry** ☐ **Non-Permit-Required**

16. Post-Entry Debrief with Turner Construction (Required)

☐ **Reviewed Hazards Confronted/Created** ☐ **Turner Shared this Info with Host Employer**

17. Permit Cancellation

☐ **Entry Operation Completed** ☐ **Forbidden Condition Arises** ☐ **Alternate Entry on Non-Permit**

Additional Atmospheric Monitoring

NOTE: Atmospheric monitoring required prior to and continuously during permit entry.

MONITOR IN THIS ORDER	ACCEPTABLE RANGES MIN	MAX	RESULT AM PM	RESULT AM PM	RESULT AM PM	RESULT AM PM	RESULT AM PM	RESULT AM PM	RESULT AM PM	RESULT AM PM
1. Oxygen	19.5%	23.5%								
2. Combustible	0%	10%LEL								
3. H2S	0%	5ppm								
4. Other	0%	__%PPM								
5. Temperature	-	-								

Turner

Fall Protection Checklist

1. General Information		
Project Name:		**Project #:**
Trade Partner Name:	**Performed By:**	**Date:**

2. Checklist

Fall Protection Options for Hazardous Exposures	**Look At:**	**Satisfactory**	**Unsatisfactory**	**Non-Applicable**	**Comments**
Working Over Dangers Equipment: Guard rail	**Guard Rails:** Top Rail @ 42" …. Max 3" deflection…. Mid Rail @ 21"…Will withstand 200lbs of force in any direction… Toe boards required… Wire rope flagged every 6' with high visible tape.				
Safety net – personal fall arrest system					
Excavations: Guard rails – fences - barricades					
Floor/Roof Openings: Hole covers – guard rails - Personal fall arrest – fall restraint.	**Vertical Lifelines:** Free from knots…. Anchor to support 5000lbs. Independently secured to structure…Line and rope grab inspected daily for wear &deformities…Breaking strength of 6000lbs…One worker per lifeline				
Formwork & vertical Rebar: Personal fall arrest system –positioning system					
Hoist Areas: Guard rails Personal fall arrest system – fall restraint system	**Tie Off:** Mandatory Tie off at 6' or above, no one ties off to wire rope or wood. Harness (ABC) Anchorage, body-wear. Connection used under the direction of qualified person. Employees must wear approved and inspected equipment. 'D' ring located between shoulder blades. Leg straps intact. No exposure to fall greater than 6' when including lanyard, tie off point expansion, body				
Leading Edge: Guard rails Personal fall arrest system – fall restraint system					

Over-head Work: Guard rails, safety net, Personal fall arrest system, controlled access zone used only to protect worker below from 'struck- by' incidents	height, deployment of shock absorber and/or length of retractable grab point. Lanyard with double locking snap hook, readable mfg.'s tag, no wear and tear no ripped stitching. Is a plan in place for recovering an individual who falls? Self-Retracting Lanyards; inspected daily. After fall or misuse, must be inspected by manufacturer and reset with applicable paperwork supplied.				
Pre-Cast Concrete Erection: Guard rails – safety net Personal fall arrest system					
Roof Work: Guard rails – safety net Personal fall arrest system – fall restraint system -					
Unprotected Sides and Edges: Guard rails – safety net Personal fall arrest system – fall restraint system	**Holes/Openings:** Coverings secured both vertically and horizontally, required for all openings including: Skylights and roof openings capable of supporting 2x intended weight (workers, lifts, vehicles, etc.) Must be ¾ "plywood minimum or guardrail				
Ramps, Runways, Walkways: Guard rails Personal fall arrest system, safety net					
Wall Openings: Guard rails, safety net Personal fall arrest system, fall restraint system.	**Ladders:** Base level and free from debris, no one stands on the top 2 steps. To be provided at points of access 19", inspected by competent person. Non-conductive, slip resistant, job made (cleats 10" to 14" apart and uniform 4 to 1 lean. Work facing ladder.				
Scaffolds: Guard rails – personal fall arrest system (if above guardrail system) 100% PFAS on any suspended or cantilevered scaffold. 100% PFAS on any mast-climber type work platform.					

Steel Erection: Guard rails – safety net	**Scaffolding:** Set-up: Bases, cross bracing, guard rails, toe				

Personal fall arrest system – fall restraint system	boards, mid rails, level, fully planked with scaffold grade planks, protected from tipping, fall protection required for erection, fall protection required at 6' or above, debris removed daily, Access is provided by 'hook- on' ladder, stair tower, ramps, walkway scaffold star. Never overloaded, inspected and tag signed off daily by competent person. Material secure and falling object protection with toe boards, catch platforms, canopy structures, front edge of platform no more than 14" from face. Training required on each type of scaffold worked on.				
Metal Decking: Guard rails – safety net Personal fall arrest system – fall restraint system					
Siding Erection: Guard rails – safety net – personal arrest system					
Glazing & Curtain wall: Guard rails – safety net – personal fall arrest system – fall restraint					
Swing Stages: Guard rails – safety net – personal fall restraint 100% PFAS					
Bosun's chair: Personal fall arrest – fall restraint	**Safety Nets:** Designed by a Registered Professional engineer (RPE) for each application, inspected weekly or after an occurrence. Inspection documented, material removed ASAP, installed not more than 30' from work area. Mesh size no bigger than 6"x6"				
Snorkel Lift: Guard rails – personal fall arrest					
General Questions: Are workers empowered to identify hazards and stop work? Are competent persons designated and on site? Is Turner taking disciplinary action on fall protection offenses? Are bi-lingual provisions in place and being used?					
	Safety Monitor System: Turner does NOT allow a Safety Monitor System under any conditions or circumstances				
	Suspended Scaffold: Independent lifelines. A competent person checks connections, anchorage points and inspects scaffold. Counterweights secured by mechanical means (no				

Have all workers completed orientation? Have Vendors provided Fall Protection Training?	sandbags, masonry units, gravel, rolls of roof felt) Suspension ropes inspected by competent person prior to each shift. **Aerial Lifts:** Tie off required inside boom lift platform per OSHA & Manufacturer's instructions. Stand firmly in basket. Inspected by competent person prior to each shift. **Concrete Work:** 100% tie off at 6' or above, approval using positioning systems on formwork, impalement hazards covered.				
	Steel Erection, Welding, Bolting, Metal Decking: 100% tie off at 6' or above, erection to minimize connectors coming into contact with swinging members. Use lifts to connect, use tags lines. Protection system in place when lifting deck.				

3. Additional Comments

Turner

Initia

Surface Penetration Procedure Permit

1. General Information

NOTE: This request form must be completed and authorized prior to penetrating the ground or penetrating walls and slabs during renovation or demolition (at any depth). The contractor disturbing soil is required to contact the locator and review as-builts. A J.H.A. must be submitted prior to commencing all surface-penetrating activities on site. Prior to the start of the work in the field, the supervisor will conduct a Pre-Task Planning meeting with the crew performing the work.

Employer Name:	**Project Number/Name:**	**Date of Permit Request:**
Site Superintendent Name:	**Date of Safety Pre-Plan Meeting:**	
Permit Start Date:	**Permit Start Time:**	**Permit End Time:**
Name of Supervisor Overseeing Work:		**Contact Number:**
Location of Surface Penetration:		
Purpose of Surface Penetration:		

2. Hazard Assessment – Utilities This is to identify utilities, GPR/scanning or daylighting per policy still required for known utilities in intended area of excavation AND potholing every 15' still required)

NOTE: Method(s) used to Identify potential utility hazards

Proposed method of identifying utilities:

- Public Locates (811) ☐
- Private Locates ☐
- Hand Excavation ☐
- As Builts ☐ _____
- Vacuum Excavating ☐
- Radar/Scanning /X-Ray ☐
- Other (explain) ☐

Utility Locate Organizations

NOTE: All locates expire after 30 days. Valid locates must be present at ALL times.

Utility Locate Organization	Date Locates Completed

Utilities Gas ☐ Data/Comms ☐ Sewer/ ☐ Electrical/ ☐ ☐ ☐

Have ALL utility locates been obtained?	YES NA	Have located utilities been clearly marked?	YES NA

3. Surface Penetration Layout (physically identify the limits of the proposed excavation, "white lining" or other means

NOTE: Attach drawing of work area

*** Pot Holing Requirements**

Surface Penetration Procedure Permit

4. Excavation Hazard Assessment (All items below must be completed prior to activity. NA should only be chosen if they do not exist)

Method of excavation:	

Access and egress points will be stablished within 25 feet of each worker (stairs, ramps, or ladders).	**YES NA**	Sources that may cause an accumulation of water inside an excavation or trench have been identified and controlled.	**YES NA**
Perimeter protection will be put in place for open excavations	**YES NA**	Equipment areas and travel paths have been delineated and signed to prevent foot traffic from entering.	**YES NA**
Material and equipment storage areas will be positioned at least 4ft away from perimeter of excavation.	**YES NA**	A spotter with no other assigned duties will be appointed when operating equipment is in the immediate vicinity of workers.	**YES NA**
Sources that may contaminate the atmosphere inside an excavation or trench have been identified and will be continuously controlled and monitored	**YES NA**	A top person has been appointed (Trench work only).	**YES NA**
A Traffic controller is in place when work involves a roadway or pedestrian path.	**YES NA**	Fall Prevention/Protection Plan in place for excavations deeper than 6 feet	**YES NA**
Depth of excavation:			

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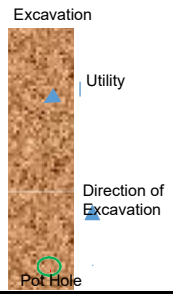
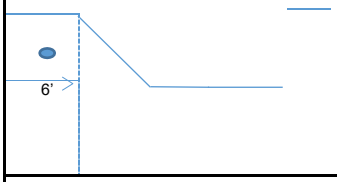
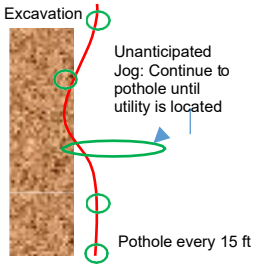
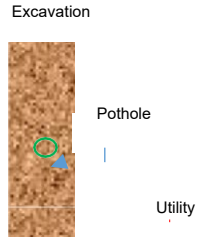
Surface Penetration Procedure Permit

Condition	Action	Example
Known utility is within excavated/disturbed area and being uncovered as work progresses	• Pothole location at the start of the known utility in excavation • Utility must be potholed at a minimum of every 15'. • Note: Utilize non- intrusive methods (hand digging or hydro excavate) when within 24" of a known utility	
Utility runs parallel and within 6 feet of the edge of excavated/disturbed area. 	• All utilities identified to be located within 6' of excavation must be daylighted by hydro excavating or hand digging. • Pothole at the start location of the excavated/disturbed area and every 15' along the parallel length of the excavated area. • The intent is to verify that the utility does not veer into path of excavated/disturbed area.	
Utility intersects excavated/disturbed area	• Pothole the approximate center of the intended excavated/disturbed area. Follow condition 1 if utility will remain visible while excavating along width of excavated/disturbed area. • Note: Utilize non- intrusive methods (hand digging or hydro excavate) when within 24" of a known utility.	

5. Interior/Concrete Penetrations Hazard Assessment (All items below must be completed prior to activity. NA should only be chosen if they do not exist)

Method of Surface Penetration: *Select all that apply*	Chipping	Drilling	Cutting	Coring	Pneumatic	Other

Areas beneath the concrete slabs MUST BE X-rayed, GPRd, or scanned prior to penetration (locates known).	**YES NA**	Slab marked accordingly with locations of embedded utilities (and PT Cables if applicable).	**YES NA**
Can sprinkler system be isolated, valved-off or drained?	**YES NA**	Can sprinkler heads be protected with temporary cage covers?	**YES NA**
Valve shut-off map posted in work area.	**YES NA**	Can utilities be temporarily disconnected during work?	**YES NA**
Active utilities are visually flagged (including sprinkler heads).	**YES NA**	Spill response kit present.	**YES NA**
Area beneath or above work location barricaded and signage present.	**YES NA**	Spotter beneath or above work location with means of communication with work crew.	**YES NA**
Thickness of slab:		Max length of shots to be used:	

6. Permit Review

NOTE: Prior to commencing work, all parties identified must sign to approve this document. By signing this document, I certify that all records of existing utilities in the described area, including but not limited to As-Builts, Marks-Outs, and Utility Coordination Reports have been examined and all known utilities have been marked, identified, and protected from damage. The employer responsible for the work outlined in this permit will be held responsible for any damages resulting from negligence and failure to protect known utilities. This permit may also require a supporting safe work procedure/method of procedure if deemed to be high risk work.

Supervisor Sign-Off:

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Surface Penetration Procedure Permit

Turner Superintendent Review:		
Name:	Signature:	Date:

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Drone Use Approval Request Form

1. General Information	
Business Unit:	**Project Number/Name:**
Date:	**Requested By:**
What is the duration of the project?	

2. Where is the project located? (List any adjacent structures and their use, FAA flight path areas in close proximity to the project, location of the nearest airport, and location of the nearest helipad and a general overview of the neighborhood):

3. Provide an overhead map view of the project and surrounding structures (example: Google Maps):

4. What is the reason your project wants to utilize a drone?

5. Is there any other way to achieve the desired results without using a drone?
6. What is the purpose and scope of the request?
7. How often will the drone fly? And what is the frequency of each flight?
8. How long will this drone use activity continue? (Also provide dates from start to finish)
9. What will they be capturing?
10. Have the local rules, guidelines and laws been researched? And if so, what are their restrictions?
11. What company (from the approved vendor list) will be employed?
12. What is the project plan for controlling and eliminating the risk (including privacy concerns)?

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Drone Vendor

1. General Information		
NOTE: Please respond completely to the questions below (attach supporting documentation if requested or to support your response)		
Legal Name of Company:	Year Company Started:	
Address:		
City:	State:	Zip:
2. Person Filling Out This Questionnaire		
Name:	Title:	
Email Address:	Work Phone:	Cell Phone:
3. Are all operators at least 21 years of age and have obtained a Remote Pilot Certification issues by the FAA.		
4. Do all operators meet the qualifications from an experienced training organization/agency?		
NOTE: All commercial drone operators must meet at a minimum FAA regulation Title 14 part 107, have a valid and current Remote Pilot Certification issued by the FAA and have operated in a commercial capacity for at least one year with a minimum of 100 hours of flight time. There is no exception to this, and documentation must be submitted to Turner.		
5. Please provide copies of insurance certificates to show the Turner required limits have been obtained:		
Drone/UAV Liability: a. Minimum Required Limits: $5,000,000 General Aggregate $5,000,000 Each Occurrence for Bodily Injury/Property Damage. b. Required Terms and Conditions: Turner Construction Company will be included as an additional insured.		
6. Have you flown on a large construction site before? (Provide a list of projects, dates, and scope of work): a. What challenges did you have? b. How did you overcome them?		

7. What companies have you worked with in the past? (Provide any references) a. What is your larges project to date?
8. What equipment do you expect to use on this project and why? a. Please supply the last year of maintenance records. b. Has this drone ever been involved in an accident or incident? If so, please explain the circumstances and what did you change about your safety program to assure it does not happen again.
9. Has your company ever been cited or fined for a violation associated with drone use?
☐ YES ☐ NO — If yes, please list circumstances, fine and outcome:
10. Provide a site checklist you follow before each flight.
11. What software does your company utilize and how familiar are the pilots with the software? (PIX4D, Drone Deploy, other)
12. Provide information to verify and assure Turner that the control connection between the pilot and the drone are done over a secure link to ensure someone else cannot take control of the drone.
13. Provide information to verify and assure Turner that the link that streams video and/or still photos is done over a secure link?

c. Does Turner own the data?

14. Submit a copy of your safety manual.

As a minimum it must include:

a. Federal regulations pertaining to worker safety.
b. Identification of pilot duties and responsibilities for planning, public protection, safety operation and maintenance of the UAS.
c. Requirements for the PIC, visual observed and crewmember (including pilot) qualifications, certifications, and training.
d. Processes and tasks that should be completed before, during and after UAS operations.
e. Pilot responsibilities for inspection, maintenance, and safe uses. In addition, what requirements are in place for pilot to review manufacturers operation, safety, and maintenance manual?
f. General public and worker protection methods during UAS operations.
g. Privacy considerations and guidelines.
h. Flight path considerations.
i. Prohibitions that address non- business use of the UAS.
j. Other requirements that affect the safe use of the UAS, such as the physical and mental conditions of the pilot.
k. Substance abuse testing program and when pilots and crewmembers are tested.
l. Expectations for conducting a preplanning and risk assessment meeting to review the risks and mitigation methods needed for safe use of the UAS. Note preplanning should include at a minimum:
    - Responsibilities of the pilot and observers
    - Pilot and observer qualifications
    - UAS equipment specifications, software, and operating limitations
    - UAS preflight inspection and maintenance requirements
    - Clearance requirements for safety and privacy protection
    - Potential hazards to personnel involved in the UAS activities.
    - Boundaries of the work zone and how to keep workers and the public safe and out of the work area.
    - Training for workers who are not involved in the operations.
    - Work area hazards such as power lines, other UAS, other aircraft, structures or communication devices that could disrupt communication with the UAS flight path and if it necessitates the use of an observer(s), communication methods that will be use between the pilot and observer(s) and other backup methods when needed, weather requirements, anticipated weather, and when to suspend operations.
    - How to protect the public and surrounding structures from loss of control or power to the UAS
    - Notification to all surrounding property owners
    - Emergency landing procedures and how to recover the UAS.
    - Current federal, state, and local regulations on the UAS use.
    - Post flight review meeting to review UAS operation, lessons learned

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Incident Investigation Report

1. General Information		
NOTE: To be completed within 24 hours by supervisor. If incident may be COVID-19 related, complete General and Involved Part information sections and jump to COVID-19 Supplement on last 2 pages and complete that information.		
Date:	**Contract Number:**	
BU Name:	**Project Name:**	
Project Address:		
Program: ☐ **CCIP** ☐ **CORP** ☐ **OCIP** ☐ **Other (Explain):**		
Site Contact Name:	**Phone:**	**Cell:**
Project Executive:	**Superintendent:**	
Date of Incident:	**Time:** ☐ **AM** ☐ **PM**	**Shift:**
Jobsite/Area (refer to columns/beams/drawings as needed):		
Weather Condition:	**Lighting Condition:**	

2. Involved Party Information		
Name:		☐ **Male** ☐ **Female**
Date of Birth:	**Height:**	**Weight:**
Address:		
Home Phone:	**Cell Phone:**	
Employee ID#	**E-mail Address:**	
Employee Job Title:	**Length Employed:**	
Employer Name:	**Supervisor:**	
Supervisor/Employer Cell Phone:	**Employer Address:**	
Shop Steward:	**Shop Steward Cell Phone:**	
Speaks Fluent English: ☐ **YES** ☐ **NO**	**Language:**	

3. Incident Description
NOTE: Describe in detail how the incident occurred, and the task being performed by the involved party when he/she claims to have been injured or became ill including how long and with whom they were performing the task. Include specifics such as equipment, structure, tools, materials, objects (size, shape, and weight), positions, distances, sequence of events, etc. (Facts Only)

Attach a diagram of the incident scene/site layout to better describe the incident

Date:	**Prepared By:**

4. Witness Information

Name:	**Phone:**
Company:	**Cell:**
Name:	**Phone:**
Company:	**Cell:**
Name:	**Phone:**
Company:	**Cell:**
Name:	**Phone:**
Company:	**Cell:**

5. Incident Information

NOTE: Describe the nature and extent of all claimed injury(s)/illness (body part affected, type of injury, etc.)

Was First Aid Administered?	☐ **YES** ☐ **NO**	**By Whom?**
Was Employee/Third Part take to Hospital/Clinic?	☐ **YES** ☐ **NO**	**If yes, list name, phone, and address:**
Name:		**Phone:**
Address:		
Is Employee in a Trade Union?	☐ **YES** ☐ **NO**	**If yes, provide Trade & Local #:**

Additional Comments:

6. Prepared By:

NOTE: All incidents need to be immediately reported to you BU Safety Director & Claim Coordinator. Copy to be submitted to BUEHSD and Claim Coordinator for filing. Original to be kept with job files.

Date:	**Prepared By:**

Co-Learning Investigation Form

Step 1: Author

The author is the person taking responsibility for completing the Co-Learning form and can be a Project Manager, Superintendent or EHS Manager. This person should be experienced in Incident investigation and can take lead in the analysis. Suggested Training/Skill Set: Incident Investigation, Fishbone Causal Analysis, 5-Why Root Cause Analysis

Date:		Investigator Name (Superintendent, EH&S, PM):	

Step 2: Incident Injury or Near Miss

This can be a "cut and paste" from box 3 of the standard incident investigation form. This is intended to be a statement on the direct cause of the incident or injury and physical effect is had. Example: "On Tuesday, April 5th at approximately 10:00 A.M.., a steel erection bolt fell from the third floor and struck a welder below in the back. The welder experienced a deep contusion requiring treatment beyond First Aid. The welder was provided prescription medication and restrictive duty work by the Occupational Doctor."

Step 3: Project Status

Describe background of project -

- Overall sq. ft. of project
- Number of stories
- Current phase (schedule – ahead/behind)
- Trades involved
- Total Number of Trades on project

Provide project context to the incident or near miss which communicates the overall project description, current phase of construction, number of workers on the project, scope of work involved and percent complete for that scope. Example: "Ground up construction of a 3 story, approximately 91,000 Sqft academic University building on an active campus. The Project is currently in the structural steel phase of construction with areas opened up to MEP trades and first floor underground installations. Structural steel is approximately 60% complete with metal decking 40% complete. There are currently 82 workers on site."

Step 4: Current Condition

- Timeline
- Witness Confirmed Facts
- Factual PTP/JHA Efforts
- Turner Policy (Compliance)
- Manufacturer Specs/Details
- Staff Perspective of Incident
- Trade Perspective of Incident
- Weather Conditions

Only include the factual details which "tell the story" of the event. Include relevant pictures, timelines, policy description, planning facts, product data and observations etc. germane to the event.

Note: Copy/paste or screenshot photos and drawings below

Step 5: Target

What do you want to prevent? – (e.g. Prevent objects from falling off building)

Keep this simple. Define what it is we would like to prevent in the future as a result of the learning from the analysis. This can be revisited and refined based on the learning process as the analysis develops. Example: "We want to prevent MEP trades from being under the steel erection crew."

Step 6: Root Cause Analysis

If inexperienced, it is recommended that the team pull in the regional Lean Manager and/or the Business Unit EHS Director to help lead this discussion. It is intended that this is a collaborative process. The Project Project manager, Superintendent, EHS manager and the trade(s) involved are to participate, but need an experienced leader to help guide the conversation.

Fishbone & 5-Why Resources/Templates: Problem-Solving (sharepoint.com)

Identify Causal Factors – Fishbone: Video Tutorial for Fishbone Diagram Approach

Identify Root Cause(s) – 5 Why: 5 Why Funnel Exercise

Step 7: Corrective Actions - Countermeasures

These action items are intended to target the root cause(s) identified in the RCA section. They should be specific, impactful and measurable.

Root Cause	Countermeasures

Step 8: Results

The intention of this section is to ensure that there is an actionable plan to the countermeasures identified. Remember that what gets measured gets done and the effectiveness of the countermeasures should be assessed. The trade/contractor involved will be the main partner in this effort. Consider completing Rapid Improvement Events, Critical Safe Behavior Coaching or similar observation and feedback exercises to evaluate if the countermeasures are meeting their intended purpose.

Countermeasure	Person Responsible to Do	Start / Finish (i.e. 1/30 - 8/05)	Result (Measurable Effect)

Step 9: Follow-Up

- Lateral Learning
- New Standard

This section allows the Author and team to capture any additional notes based on the learning generated from the Co-Learning Process. This is where the need to additional policy considerations or if an A3 is needed to further evaluate a root cause can be captured.

Building L.I.F.E.® JHA (Job Hazard Analysis)

Project: **Date:** **Contractor:** **Page** **of**

Description of Work: **JHA#**

Prepared By:

Permits: - **Hot Work** **-Energized Work** **-Ladders Last Permit** **-Ground Penetration** **-Confined Space**

__ **Roof Access** **-Scaffold**

Risk Reduction Considerations

Hierarchy of Controls

1. Elimination
2. Substitution
3. Engineering
4. Isolation
5. Administration
6. Personal Protective Equip.

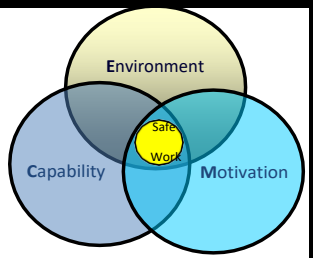
Scan the QR Code for more info.

Systems Approach

E = What we have

C = Our capabilities

M = What we do



Risk Factors

Risk = Frequency x Likelihood x Severity

Consider ways to:

Reduce the Frequency of exposure to a hazard

Reduce the Likelihood of injury

Reduce the potential Severity if the incident happens

Sequence of Basic Job Steps	Hazards Associated with Each Step	E,C,M	Eliminate or Control the Hazard
Step 1: (Example) Cross the street on foot.	Struck by Car	M	Look both ways before crossing.
		M	Wear reflective vest.
		E	Designate crosswalks
	Slip/Trip on walking surface	M	Look for slip/trip hazards
		C	Receive Training on traffic Awareness
Step 2: (example) Load Groceries into car	Strain or sprain lifting the groceries from the cart to the trunk.	M	Lift one or two lower weight bags at a time.
		M	Try not to over-reach or overextend
	Struck by passing car in parking lot	E/M	Pay attention to surroundings and know where to get
			out of the way.
		C	Complete "Lifting Training"
Erase all examples to complete your JHA.			

Document Control: Building LIFE JHA 08 2024

JHA-Cont'd			
Sequence of Basic Job Steps	**Hazards Associated with Each Step**	**E,C,M**	**Eliminate or Control the Hazard**
REVIEW SIGNATURES AND DATE			

Originator _____ Date _____

Contractor Superintendent _____ Date _____

Contractor Project Manager _____ Date _____

Document Control: Building LIFE JHA 08 2024

JHA Documentation of Worker Review at Orientation

JHA Number:
Date of Training:

Review JHA (and revise if necessary) with all workers before they are allowed on site. Submit signature sheet to Turner.

Print Name	Signature	Print Name	Signature

Turner Building L.I.F.E.® Living Injury Free Every Day

PRE-TASK PLAN

Date: **Company:**

Description of Activity:

Supervisor: **Location of Task:**

Safety and Health Considerations

Hierarchy of Controls

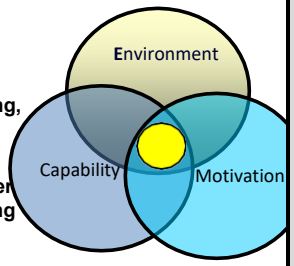
1. Elimination
2. Substitution
3. Engineering
4. Isolation
5. Administration
6. Personal Protective Equip.

Systems Approach

Environment (E): Engineering Controls, Working Conditions

Capability (C): Training, Education, Physical Capabilities

Motivation (M): Worker Actions, Factors driving motivation



Hot Work:	**Yes** ☐	**No** ☐
Energized Systems/LOTO:	**Yes** ☐	**No** ☐
Ladders Last Permit:	**Yes** ☐	**No** ☐
Ground Penetration:	**Yes** ☐	**No** ☐
Confined Space	**Yes** ☐	**No** ☐
Roof Access	**Yes** ☐	**No** ☐
6' Distance can be maintained	**Yes**	**No**

Note: Include measures for Social Distancing within this section for each work activity to allow for 6' distancing between all workers.

Sequence of Basic Job Steps	Hazards Associated with Each Step	E,C,M	Eliminate or Control the Hazard
All persons entering the project, working on site, in the office or in jobsite trailer.	Spread of Covid-19	E	Temperature scanning Required for all personnel entering the site.
All persons entering the project, working on site, in the office or in jobsite trailer.	Spread of Covid-19		At a minimum a cloth face covering that covers the nose and mouth (cotton cloth, bandana, or buff) must be worn. Additionally, a surgical, KN95, or similar mask can be worn in lieu of face coverings. Note: All work must be evaluated for the appropriate minimum PPE required by OSHA.

Sequence of Basic Job Steps	Hazards Associated with Each Step	E,C,M	Eliminate or Control the Hazard

Close Contact Work that does NOT allow for 6' distancing	COVID-19 minimum PPE requirements	E,C,M	Eliminate or Control the Hazard
	Option 1: Surgical mask and goggles worn under full face shield		Training on the task risks and how to properly wear, store and clean personal protection equipment
	Options 2: Surgical mask worn under face shield / goggle combination		Maintain 6-foot distancing whenever possible during the course of work. If PPE requires cleaning or replacement, ensure 6-foot distancing is obtained before removing.
	Option 3. KN95 or similar mask with goggles		
	Task specific gloves.		

List Materials, Tools, Other to be Handled or Moved	List Mechanical Aids to be Used for This	Or for Each *Manual* Handling Task List Safety Controls

PTP - Documentation of Worker Review

Review PTP (and revise if necessary) with all workers before performing the tasks. Submit PTP with signature sheet to Turner. I acknowledge I attended this PTP meeting, was properly equipped and trained for my assignment, and was not injured on site the previous workday without reporting it to Turner Construction. By signing below the line indicates that I was present at the meeting and that I was equipped and trained for the task, and it also indicates that I didn't hurt myself yesterday.

Print Name	Signature	Print Name	Signature

Turner Turner

Hot Work Permit

1. General Information			
NOTE: DO NOT CONDUCT HOT WORK if fire protection is not available. This Hot work Permit is required for any operation involving open flames or producing heat and/or sparks. This includes but is not limited to brazing, cutting, grinding, soldering, thawing pipes, torch applied roofing and welding. Foreman for hot work operation shall complete this form prior to commencement of the hot work. Employees performing hot work shall review this form and display in the area where work is being done. Return form to Turner at the end of shift.			
Permit Holder/Contractor:			**Date:**
Foreman (Name):		**Location (building, floor, room):**	
Devices Disabled:		**Type of Job:**	
Time Started: ☐ AM ☐ PM		**Time Finished:** ☐ AM ☐ PM	
Permit Expires: (1 Shift)	**Date:**	**Time:**	☐ AM ☐ PM

2. Checklist			
NOTE: Prior to beginning any hot work, all potential hazards must be addressed including:			
YES	**NO**	**N/A**	
☐	☐	☐	Life Safety Department has been contacted for any work that will or may impair life safety systems. What will be impaired (circle): Sprinkler heads, detectors, other _____
☐	☐	☐	Available sprinklers, hoses and extinguishers are in service and in good repair.
☐	☐	☐	Fire extinguishers are available at the point of hot work. (Supplied by the Permit Holder)
☐	☐	☐	Work equipment is in good repair.
☐	☐	☐	Worker has all appropriate safety equipment for the hot work (e.g., gloves, shield, respirator etc.) and not defective.
☐	☐	☐	All movable fire hazards in the vicinity have been relocated at a safe distance (at least 35 ft.) from the point of operation or covered with fire resistive barriers if unable to move.
			All wall and floor openings have been covered.
			When working on or near walls, move combustibles away from both sides of walls.
			When working with suspended ceilings, be sure to protect concealed spaces.
			Floors have been swept clean of combustibles.
			Flammable liquids, dust, lint, and oily deposits have been removed.
		☐	The area has been examined to determine if flammable or combustible liquids or vapors could potentially be present. If present, the atmosphere shall be tested using an explosive meter. If quantities are 10% of the lower explosive limit or greater, hot work shall not be performed.
☐	☐	☐	A fire watch is equipped with an appropriate fully charged fire extinguisher and present during hot work operations.
☐	☐	☐	A fire watch will be provided for 30 minutes following the completion of work, including breaks.

3. Final Work Area Check		
Work area monitored following Hot Work and 30-minute fire watch and found safe:	**YES** **NO**	
Name of Fire Watch (Please Print):	**Time Started:**	**AM** **PM**
Craft Person Conducting Task:		
Turner Representative:		
Devices Reactivated:		

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Concrete Core Formwork System Questionnaire:

Date:_____

Business Unit	
Project Name	
Type of Insurance	
Project Executive	
Project Manager	
General Superintendent	

1) What formwork system will be utilized? (Include explanation and methodology of system selected).

2) What will be utilized to access the core formwork? What will be utilized to access the different levels of the core once on the formwork?

3) What is the anticipated cycle/schedule of jumps?

4) When are the interior slabs going to be placed? How will they be constructed?

5) Will there be any partial jumps due to floor height changes?

6) Will there be any over pours do to door layout versus anchor layout?

7) Will modification by required to support work or jump sequencing? (i.e. rolling formwork, opening corners, guardrail modifications

8) Are there any specific weather conditions or limitations? (i.e. wind stoppage limit, temporary out of use wind bracing engineering for screen wall if applicable).

9) Is the tower crane being supported by the core?

10) List the specific fall protection plan to achieve 100% tie off all levels other than the interior 0 and +1 levels)?

11) How will the concrete core formwork system be inspected after initial erection/completion and after each jump?

12) How will the concrete core system be dismantled? How will fall exposure be engineered out?

Meeting Agenda:

Item	Lead	Time
Open Meeting • Team Effort • Continual Improvement • Review new policy	All	5 Minutes
Explanation of Concrete Core Climbing System: • Design • Concrete Formwork Manufacturer • Erection / Dismantle Plan • Schedule • Resume of Concrete Contractor • Inspection Criteria • Access • Fall Protection	Project Team / BU	15 Minutes
Operational Peer Review Comments	Jack Dawson / John Grafrath / Steve Garrett	15 Minutes
Review Corporate Policy Changes	All	10 Minutes
Review Safety Items: • Access • Inspections • Fall Protection • Screen Wall	Karl Kinsella / Andrew Leone / Doug LaPlante	15 Minutes

Turner

CORPORATE ENVIRONMENTAL, HEALTH AND SAFETY POLICY

Drug Free Workplace Program

THE TURNER CORPORATION

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Definitions

- **Adulterated Specimen** – A specimen that contains a substance that is not expected to be present in human urine, or contains a substance expected to be present, but which is at a concentration so high that it is not consistent with human urine, which will obstruct the testing process or results. This type of specimen with a Verified Test Result shall be considered as a Refusal to Test, which is treated the same way as a Positive Test Result.

- **Accident/Incident** – A work-related event which results in personal injury to a Turner Employee or Other Worker or to any other person, damage to property or the workplace, or which could have resulted in personal injury or damage to property or the workplace. An Accident/Incident includes, but is not limited to, any Accident/Incident on Turner Property or at a Turner Facility which results in:
    a) A fatality.
    b) Bodily injury requiring a visit to any medical provider.
    c) Vehicular and/or equipment damage in apparent excess of $1,000.
    d) Non-vehicle property damage in apparent excess 1,000; or
    e) Any work-related event that could have resulted in any of the above.

- **Alterative Program-** An Alternative Program is a substance abuse program administered by an entity other than Turner under procedures equal to or more stringent than this Policy and which has been approved and accepted by Turner, in Turner's sole discretion, as an alternative or reciprocal substance abuse testing program.

- **Alternative Program Administrator –** The individual responsible for drug and alcohol testing and related procedures for all Turner Employees and/or Other Workers covered under an Alternative Program.

- **Annual Screen** – A drug screen which Turner may require of any Turner Employee or Other Worker on a yearly basis in addition to any other screen that was given in the previous twelve-month period, subject to requirements and limitations of a collective bargaining agreement, when applicable, but only to the extent of a conflict therein with performing an Annual Screen.

- **Chain of Custody –** The protocol followed when submitting specimens for drug and alcohol testing. This protocol assures that there is no opportunity for contamination or switching of samples. Elements include signed and witnessed forms, sealed, and initialed containers, and couriers requiring a receipt.

- **Collection Site** – A place where individuals provide specimens to be analyzed for the presence of alcohol or drugs. This site may or may not be owned and/or operated by the laboratory that actually analyzes the specimen.

- **Confirmatory Test** – When testing for drugs, this is the second analytical procedure performed to confirm the presence of a specific drug/metabolite in a urine specimen. This procedure uses a more sophisticated technique (e.g., Gas Chromatography / Mass Spectrometry, EBT) to ensure reliability and accuracy. With breath testing for alcohol, the Confirmatory Test is conducted on an EBT which has the capability to print out the results, date and time, a sequential test number, and the name and serial number of the testing device.

- **Consent** – Written consent for testing is required for all tests. A Donor will be asked to give written consent immediately prior to submitting a drug or alcohol test.

- **Covered Site** – A particular Turner Project or Turner Facility selected for random testing by a Third-Party Provider.

- **Cut-off Level** - A pre-determined amount of drug metabolite, measured in nanograms (ng) per milliliter (ml) of urine, which dictates whether a tested specimen is negative or positive. As to alcohol, a pre-determined amount of blood

alcohol content, which dictates whether a tested specimen is negative or positive. For example, a test would be declared positive if the amount of drug/metabolite or blood alcohol content were equal to or above the Cut-Off Level.

- **Designated Jobsite Turner Representative** – A Turner designated employee and/or his or her designees on a particular Turner Project or at a Turner Facility responsible for coordinating drug and alcohol testing and related procedures.

- **Diluted Sample** – A specimen with creatine and specific gravity values that is lower than expected for human urine. This type of test will always be sent with MRO comments stating, “Recollection suggested no fluids three (3) hours prior to test.” A Donor providing a Diluted Sample will be retested within twenty-four (24) hours and in no case more than forty-eight hours after the Diluted Sample was obtained.

- **Donor** – a Turner Employee or Other Worker giving a urine, breath, blood, or saliva (which is only used for alcohol testing) sample for drug or alcohol testing.

- **Medical Review Officer (MRO)** - A licensed physician responsible for receiving laboratory results generated by a substance abuse screening program who has knowledge of substance abuse disorders and who received appropriate medical training to interpret and evaluate a worker's medical history and other relevant biomedical information. The MRO is certified by either the American Association of Medical Review Officers (AAMRO) or the American College of Occupational and Environmental Medicine (ACOEM).

- **Medical Examination** – An examination conducted by a duly licensed medical provider.

- **Negative Test Result** - A negative screening is obtained if: (1) the screen test indicated the absence of legal or Prohibited Substances below the screen limit, or (2) the screen test indicates the presence of legal or Prohibited Substances, in excess of the screen limit, but the confirming test indicates the absence of legal or Prohibited Substances below the confirming limits.

- **Non-Negative Test Result** - An initial drug or alcohol test result that indicates the presence of legal or Prohibited Substances in excess of the screen limit and is subject to a Confirmatory Test.

- **Other Workers** – All other person, not directly employed by Turner, working on a Turner Project, at a Turner Facility, or working on or otherwise engaged in Turner business. This includes all contractors, subcontractors, consultants, construction managers, and their respective employees or agents working on a Turner Project, at a Turner Facility, or while working on or otherwise engaged in Turner business. The term “Other Worker” includes, but is not limited to, craft personnel, management personnel, temporary personnel and/or consultants.

- **Positive Test Result (Alcohol)**- A Positive Test Result (Alcohol) is obtained if a Confirmatory Test indicates the presence of alcohol at or in excess of the Cut-Off Level of 0.04% blood alcohol content.

- **Positive Test Result (Drugs)** - A Positive Test Result (Drugs) is obtained if the MRO has verified that the test results contain a Prohibited Substance(s) at or above the standard Cut-Off Levels of any of the substances tested and for which there is no valid medical or other explanation.

- **Post-Accident/Incident Testing** – A drug or alcohol test which may be conducted following the occurrence of an Accident/Incident.

- **Pre-Employment Drug Testing** – For Turner Employees, a drug and/or alcohol test which may be conducted prior to employment by Turner or prior to admission to a Turner Project. For Other Workers that do not have, in Turner’s sole discretion, an acceptable substance abuse testing cards, badges, or proof of Negative Testing Results from the last twelve (12) months provided by the respective Other Worker’s employer or trade union, a drug and/or

alcohol test which may be conducted prior to beginning any work on a Turner Project, at a Turner Facility, or working on or otherwise engaging in Turner business.

- **Prohibited Substance -** A substance whose use or possession is controlled by federal law but that is not being used or possessed under the supervision of a licensed health care professional in a manner that is consistent with applicable federal, state, and local law.

- **Quick / Instant Test** – A test that is a qualitative one-step immunochromatographic test panel for the detection of Opiates, Amphetamines, Cocaine, Phencyclidine (PCP), Barbiturates, Benzodiazepines, Propoxyphene, and Methamphetamines 3, 4-Methylenedioxymethamphetamine drugs and/or their metabolites in human urine. This test provides only a preliminary analytical result. A more specific alternate chemical method must be used in order to obtain a confirmed analytical result. The device used for this Quick / Instant Test includes a Lateral Flow (LATFLO) Adulterant Strip (LFAS) for the visual determination of Specific Gravity, Nitrite, Oxidants, and pH to evaluate human urine specimens for adulteration prior to urine testing for drugs.

- **Random**- A system of drug testing imposed without individualized suspicion that a particular individual is using prohibited substances. Random drug testing consists of unannounced substance abuse screens of groups or individuals selected through a neutral randomizing system, subject to requirements and limitations of a collective bargaining agreement, when applicable, but only to the extent of a conflict therein with performing a random test.

- **Refusal to Test** – When a Donor refuses to provide a urine, breath, saliva or (on occasion) blood sample upon reasonable request from Turner or from the Other Worker's employer, based on any circumstances in the "Types of Testing" Section.

- **Reasonable Suspicion**- Reasonable Suspicion of drug or alcohol abuse is based on objective evidence about the Turner Employee's or Other Worker's conduct in the workplace that would cause a reasonable person to believe that the individual is demonstrating signs of impairment. In most cases, the objective evidence giving rise to Reasonable Suspicion will be observed by at least two (2) Turner Employees or Other Workers but recognizing that in certain circumstances the observation may be made by only one (1) such person. Examples of objective evidence include, but are not limited to, odors, difficulty in maintaining balance, slurred speech, erratic or atypical behavior.

- **Screen or Screening** – The initial drug or alcohol test given to screen out potential substance abusers. After the initial screen, a Confirmatory Test will be performed on any Non-Negative Test Result to verify the initial Screen.

- **Screening For Cause** – Drug or alcohol screen which may be ordered when a Turner Employee's or other Worker's Fitness for Duty is in question or following treatment in a drug or alcohol treatment program.

- **Split Specimen Testing** – When a urine sample is taken for drug screen testing, the specimen is split, and one part is used for initial testing and the remainder of the specimen is reserved for additional retesting.

- **Substance Abuse and Mental Health Services Administration (SAMHSA)** - A federal government agency, which certifies substance abuse laboratories.

- **Substance Abuse Administrator** – A Turner designated employee and/or his or her designees responsible for the coordination, implementation, and administration of this Policy.

- **Substituted Test** – A Substituted Test is a urine sample with creatine and specific gravity values that are so diminished that they are not consistent with human urine. This could indicate evidence of a substance other than the Donor's urine being substituted for the urine screen. This type of sample with a Verified Test Result shall be considered as a Refusal to Test, which is treated the same way as a Positive Test Result.

- **Third Party Provider** – A neutral third-party company engaged by Turner or an approved Alternative Program Administrator to manage drug and alcohol testing and to design and/or implement random selection procedures and systems.

- **Turner Employee** – All persons employed directly by Turner, whether staff, corporate, or trade. This includes employees of Turner at any and all Turner Facilities, including business centers, offices, and construction worksites.

- **Turner Project or Turner Facility** – A project or facility which Turner owns, operates, manages, or over which Turner exercises control, including state, federal or other contracts held by Turner, and to which this Policy applies.

- **Turner Property** – Includes, but not is not limited to, all Turner owned or leased buildings, parking lots, recreation areas, vehicles, equipment, desks, lockers, furnishings, and equipment wherever located. It may also include state property at construction projects over which Turner exercises control.

- **Termination**- In the case of a Turner Employee, Termination shall mean termination of employment by Turner. In the case of Other Workers, Termination shall mean the immediate removal of the Other Worker from the Turner Project or Turner Facility by his or her employer and a ban from working at or on a Turner Project or Turner Facility in any capacity to which this Policy applies until the Other Worker has successfully completed Rehabilitation as describe on Page 18.

- **Verified Positive Test Result** – A test result that was positive on an initial immunoassay test or alcohol test, confirmed by a Confirmatory Test using a Gas Chromatography/Mass Spectrum assay for drugs or EBT device for alcohol, and reviewed and verified by the MRO in accordance with this Policy.

- **Verified Test Result** – A test result that is confirmed by a Confirmatory Test using a Gas Chromatography/Mass Spectrum assay for drugs or EBT device for alcohol and reviewed and verified by the MRO in accordance with this Policy.

- **Voluntary Assistance** – Any Turner Employee who feels that he or she has a drug, alcohol, or related issue is encouraged to seek professional help. Turner can refer such Turner Employee to seek voluntary professional assistance. Assistance given to the Turner Employee shall be kept strictly confidential.

The Turner Corporation Drug Free Workplace Program

Importance of Policy to Turner Core Values

To help insure a safe, healthy, and productive work environment for the employees of The Turner Corporation, Turner Construction Company and all Turner subsidiaries (collectively known as “Company” or “Turner”), and other persons on Turner projects or at Turner Facilities, and to protect Company property and ensure efficient operations, Turner has adopted a policy of maintaining a workplace free of drugs and alcohol.

Policy Summary

All Turner Employees and Other Workers are prohibited from using, possessing, distributing, dispensing, manufacturing, or being under the influence of Prohibited Substances and from abusing chemicals, controlled substances, or alcohol while working on a Turner Project, at a Turner Facility, or while working on or otherwise engaged in Turner business. Turner is committed to this Policy on substance abuse to maintain a safe environment for all Turner Employees and Other Workers. This Policy establishes guidelines for acceptable and unacceptable behavior in connection with working on behalf of Turner. Turner will not tolerate substance abuse in violation of this Policy.

Turner reserves the right in its sole discretion to modify, update, and/or replace the Policy’s provisions. Furthermore, at all times, Turner remains solely responsible for the interpretation of the Policy’s provisions and their applications. **All violations may be reviewed, and reasonable accommodation can be made at the discretion of Turner Headquarters EHS and Human Resources.**

The Policy is intended to comply and be construed in a manner so as not to conflict with applicable laws and regulations governing workplace drug testing and substance abuse policies. If any provision of the Policy or the application thereof to any person or circumstance is held invalid or unenforceable to any extent, the remainder of the Policy and the application of that provision shall remain in full force and effect to the maximum extent permitted by law.

Persons to Whom Policy Applies

This Policy specifically applies to all Turner Employees, Other Workers, and any and all employers of Other Workers working on a Turner Project, at a Turner Facility, or while working on or otherwise engaged in Turner business.

This Policy is non-discriminatory and applies equally to all Turner Employees, Other Workers, and their respective employers, as defined above, working on a Turner Project, at a Turner Facility, or while working on or otherwise engaged in Turner business.

Scope and Application

All persons or entities covered by this policy understand and agree that Alternative Programs may be utilized as required by law, contract, or insurance agreement and they will comply with such other Alternative Programs where applicable.

In Turner’s sole discretion, Turner may accept substance abuse testing cards, badges, or proof of Negative Test Results for an Other Worker within the last twelve (12) months that is provided by the respective Other Worker’s employer or trade union. All Other Workers reporting to work on a Turner Project, at a Turner Facility, or while working on or otherwise engaged in Turner business, without substance abuse testing cards, badges, or proof of a Negative Test Results (and ID), will not be permitted to work unless and until such proof is demonstrated or such Other Worker has submitted and successfully passed a Pre-Employment Drug Test.

Additionally, Turner will work with any union representing Turner Employees or Other Workers covered by this Policy. Where any issues in this Policy are otherwise covered by a collective bargaining agreement, the collective bargaining agreement takes legal precedence and must be followed.

This Policy includes pre-employment, post-Accident/Incident, reasonable suspicion, re-employment, medical examination,

annual and random testing, to the extent permissible by law.

Strict Adherence to Policy Required of Turner Employees, Other Workers, and Their Respective Employers

Every Turner Employee and Other Worker is responsible for reviewing and understanding this, Policy. As a condition of employment, all Turner Employees must abide by this Policy. With respect to Other Workers, continued work and engagement on Turner Projects is conditioned on strict adherence to this Policy or an acceptable Alternative Program.

Any and all employers of Other Workers must ensure full compliance with any and all aspects of this Policy or an acceptable Alternative Program, including the compliance of their respective employees.

Designation and Responsibilities of the Substance Abuse Administrator

Turner will designate a Substance Abuse Administrator to be responsible for the administration and implementation of this Policy. Among other things, the Substance Abuse Administrator will:

- Have primary responsibility for the coordination, implementation, and administration of this Policy.
- Coordinate all testing with any appropriate Third-Party Provider(s);
- Receive the test results from the MRO and notify the Designated Jobsite Turner Representative and Turner's safety personnel of the drug results, and notify the tested Turner Employee or Other Worker and the Other Worker's employer of the results; and
- Assure the reliability and confidentiality of testing processes and procedures.

General Substance Abuse Rules

1. Using, possessing, distributing, dispensing, manufacturing, or being under the influence of Prohibited Substances, and/or abusing chemicals or controlled substances while working on a Turner Project at a Turner Facility, or while working on or otherwise engaged in Turner business, is strictly prohibited.
2. Legally prescribed drugs may be permitted, provided that the drugs are prescribed to the Turner Employee or Other Worker by an authorized medical practitioner for current use by the Turner Employee or Other Worker and provided that such legally prescribed drugs do not prevent the safe performance of such person's essential job functions. Please see "Prescription Drugs" on page 11 for further information.
3. The possession or use of alcohol, marijuana, or any controlled substance by any Turner staff, trade, or any subcontractor on any Turner jobsite is prohibited at any time including non-working hours. Turner sponsored or approved meeting/functions, not located at a Turner Jobsite, may serve alcohol with approval by the BU General Manager or HQ Department Head. However, this does not relieve Turner Employees or Other Workers from possessing or using alcohol responsibly and safely in such situations.
4. Refusing to report for or submit consent to drug or alcohol testing is prohibited and may be treated as if a Positive Test Result had been obtained.
5. Adulteration or Substitution of a test is prohibited and may be treated as if a Positive Test Result had been obtained.

Confidentiality

All substance abuse testing will be performed with concern for each Turner Employee's or Other Worker's personal privacy, dignity, and confidentiality. Each Turner Employee and Other Worker will be required to sign a consent and chain of custody form, assuring proper documentation and accuracy. Turner Employee testing records shall not be maintained in personnel files. Records may be kept in a separate confidential file at Turner's office or at the project level for that particular project. Turner Employees shall have the right to a copy of their drug testing results within a reasonable amount of time following a request. Other Workers shall contact the Substance Abuse Administrator if they wish to have a copy of their drug testing results. All actions taken under this Policy will be confidential and disclosed only to those with a need to know.

Protections Related to Drug Screen Testing

- A formal Chain of Custody will be established for every drug test.
- Initial samples (or a split portion thereof) that test non-negative will be retested for verification with a Confirmatory Test, using the Gas Chromatography/Mass Spectrometry ("GC/MS") test,
- GC/MS Positive Test Results will be communicated to the MRO,
- The MRO will receive the GC/MS Positive Test Results and convey the fact of a Verified Positive Test Result to the Substance Abuse Administrator and to the Donor tested and his or her employer.
- Turner Employees or Other Workers who test positive may, within twenty-four (24) hours of being advised of the results, request a retest of the original split-specimen sample by a different SAMHSA certified laboratory, at the Turner Employee's or Other Worker's expense.
- No drug or alcohol test will be conducted without the Turner Employee's or Other Worker's consent. The Donor shall be required to sign a consent form. Refusal to give consent shall be cause for removal/barring from the Turner Project or Turner Facility and may be treated as if a Positive Test Result had been obtained.

Testing Procedures

Procedures for Drug Screen Testing

Urine specimens will be analyzed for the presence of all or some of the following[1]:

- Cocaine
- Opiates/Expanded opiates for Heroin.
- Amphetamines/Methamphetamines
- Phencyclidine
- Barbiturates
- Benzodiazepines
- Propoxyphene
- Methadone
- Ecstasy/MDMA

Turner reserves the right to add additional drugs to this list upon notice of the Turner Employee or Other Worker being tested, including for those situations where it is required by Department of Transportation regulations, on federally funded projects, and/or where federal/state law requirements/contracts to test for cannabinoids (marijuana/THC).

The following chart illustrates the Cut-Off Levels for some of the drugs tested:

Drug	EMIT Screen (ng/ml)	GC/MS Confirmation (ng/ml)
Amphetamines	1,000	500
Cocaine	300	150
Opiates	2,000	2,000
Phencyclidine (PCP)	25	25

Appropriate Cut-Off Levels for all other drugs tested will be determined by the SAMHSA approved laboratory conducting the testing and the Medical Review Officer.

1. Urine drug screen specimens may be collected on-site by a SAMHSA approved laboratory or at an offsite medical facility or clinic. In general, Donors will be permitted to give a urine specimen in privacy and without being observed by collection site personnel. However, a Donor forfeits this right whenever there is a reason to believe that he/she may alter or substitute a specimen.

2. If the Donor does not provide a sufficient amount of urine for a drug test, he/she must drink up to forty (40) ounces of fluid, distributed reasonably through a period of up to three (3) hours, or until the Donor has provided a sufficient urine specimen. If the Donor refuses to make the attempt to provide a new urine specimen or leaves the area where the collections are being done this will be considered a Refusal to Test. If the Donor has not provided a sufficient specimen within three (3) hours of the first attempt. The collector will discontinue the collection and notify

The Substance Abuse Administrator and/or Designated Jobsite Turner Representative or Alternative Program Administrator. After consulting with the MRO, the Donor will be directed to obtain within five (5) business days, an evaluation from a licensed physician. If the Donor proves that he or she has a medical condition that has, or with a high degree of probability could have precluded the Donor from providing a sufficient amount of urine, the MRO will mark the test as "Cancelled" and no further action will be taken. A medical condition includes an ascertainable physiological condition (e.g., a urinary system dysfunction) or a medically documented pre-existing psychological disorder but does not include unsupported assertions of "situational anxiety" or dehydration. If there is not an adequate basis for determining that a medical condition has, or with a high degree of probability could have, precluded the Donor from providing a sufficient amount of urine, the MRO will mark the test as Refusal to Test.

3. Turner Employees and Other Workers will be preliminarily tested using the Quick/Instant Test Drug Test. This system provides results in five (5) minutes.

4. A SAMHSA approved laboratory will confirm screens that test non-negative. All urine samples will be split-specimen tests, ensuring that any required or requested retests can be done using the original sample. A Confirmatory Test will use GC/MS to ensure reliability and accuracy.

5. Before a Donor's test result will be confirmed positive for drugs, the Donor will be given the opportunity to speak with Turner MRO and bear the burden of proof that there was a legitimate medical explanation for the Positive Test Result. If the MRO determines that a legitimate medical reason does exist, the test result will be reported as a Negative Test Result. If the MRO determines that a legitimate medical reason does exist, the test result will be reported as a Negative Test Result. If the MRO determines that a legitimate medical reason does not exist, the test result will be reported as a Verified Positive Test Result. A Positive Test Result will not be reported to Turner until the Confirmatory Test has been completed and the MRO has consulted with the Turner Employee or Other Worker regarding any legitimate medical explanations. Since the Policy is first and foremost concerned with safety, the Donor whose results are pending will not be allowed to work at a Turner Project or Turner Facility until this process is complete.

6. Diluted Samples occur when a Donor drinks large amounts of fluids before the drug test or adds water to the specimen so that it is harder to detect drug abuse. Donors may innocently drink too many fluids before the drug test in order to be able to give a sample. This can be avoided by the Donor not drinking more than twenty-four (24) ounces within three (3) hours of the drug test. It is the responsibility of the Donor to provide Turner with an undiluted sample that can be tested. Turner's Policy regarding Diluted Samples is to retest the Donor one (1) additional time. Ideally, the Turner Employee or Other Worker should be retested within twenty-four (24) hours of receiving the results from the MRO, and in no case more than forty-eight (48) hours after the Diluted Sample was obtained, if the Donor provides a second Diluted Sample, the MRO will conduct a medical interview with the Donor. During the interview process, if it is determined that there is no legitimate medical reason, the Donor's test will be treated as a Positive Test Result.

7. A Verified Positive Test Result shall mean that the verified results are above standard Cut-Off Levels and that there is not a medically valid reason for the result. Any Turner Employee or Other Worker who tests positive for drugs, and who believes the test results are incorrect, may request a test of the original specimen at his/her own cost within twenty-four (24) hours. An equally qualified laboratory shall perform the retest. If the retest is negative and it is determined by the MRO that the initial confirmation screen was incorrect, the Turner Employee or Other Worker shall be allowed to resume work.

8. If the Confirmatory Test or retest for drugs is negative, Turner shall pay the Turner Employee for any lost time that may have occurred and reimburse the Turner Employee for the cost of a negative retest that was borne by the Turner Employee. The employer of an Other Worker whose Confirmatory Test or retest for drugs is negative shall be responsible for paying the Other Worker for any lost time that may have occurred and/or for reimbursing the Other Worker for the cost of a negative retest that was borne by the Other Worker.

9. Turner Employees who are removed from working on a Turner project, at a Turner Facility, or from working on or otherwise engaging in Turner business following a Verified Positive Test Result, may only be returned to work if certain criteria are met (as outlined below in the "Possible Re-Employment with Turner" Section). In all cases, there is no guarantee of re-employment.

Procedures for Alcohol Testing

1. A Department of Transportation (DOT) approved saliva testing device or "collect-only" device will be used for the initial alcohol screen. In cases where a saliva testing device is used for initial alcohol screen, a "handheld" Breathalyzer unit or equivalent device, similar to those used by law enforcement for field sobriety tests must be used for the Confirmatory Test. If a "collect-only" device is used, the sample will be collected and delivered to a SAMHSA approved laboratory for testing. A Confirmatory Test is not required if a "collect-only" device is used. Saliva or alcohol screen collections by breath or their equivalent may be performed on-site. When using a saliva testing device, any initial screens at or in excess of 0.02% blood alcohol content will be tested with a Confirmatory Test performed after a waiting period of at least fifteen (15) minutes, but not more than thirty (30) minutes. A SAMHSA approved laboratory will confirm on-site screens that test non-negative with a Confirmatory Test using an EBT that has the ability to print out the results, date and time, a sequential test number, and the name and serial number of the testing device. Any laboratory test from a "collect-only" device sample or Confirmatory Tests at or in excess of 0.04% blood alcohol content will be considered a Positive Test Result (Alcohol). A laboratory test from a "collect-only" device sample or Confirmatory Test at or above 0.02% but below 0.04% will not be considered either a Negative Test Result nor a Positive Test Result (Alcohol), however, the Donor will be suspended from safety-sensitive functions for at least twenty-four (24) hours following administration of the test.

2. Before a Donor's test result will be confirmed as a Positive Test Result (Alcohol), the Donor will be given the opportunity to speak with Turner's MRO and bear the burden of proof that there was a legitimate medical explanation for the Positive Test Result (Alcohol). If the MRO determines that a legitimate medical reason does exist, the test result will be reported as a Negative Test Result. If the MRO determines that a legitimate medical reason does not exist, the test result will be reported as a Verified Positive Test Result. A Positive Test Result (Alcohol) will not be reported to Turner until the laboratory test from a "collect-only" device sample or Confirmatory Test has been completed and the MRO has consulted with the Donor regarding any legitimate medical explanations. Since the Policy is first and foremost concerned with safety, the Donor whose results are pending will not be allowed on-site until this process is complete.

3. A Positive Test Result (Alcohol) shall mean alcohol levels are recognized as demonstrating alcohol intoxication at or in excess of 0.04% blood alcohol content. Any Turner Employee or Other Worker who tests positive for alcohol, and who believes the test results are incorrect, may request a retest of the original specimen of saliva at his/her own cost within twenty-four (24) hours. An equally qualified laboratory shall perform the retest. If the retest is negative, the MRO will review all data for a final determination. If it is determined that the initial confirmation screen was incorrect, the Donor shall be allowed to resume work.

4. If the Confirmatory Test or retest for alcohol is negative, Turner shall pay Turner Employee for any lost time that may have occurred and reimburse the Turner Employee for the cost of a negative retest that was borne by the Turner Employee. The employer of an Other Worker whose Confirmatory Test or retest is negative shall be responsible for paying the Other Worker for any lost time that may have occurred and/or for reimbursing the Other Worker for the cost of a negative retest that was borne by the Other Worker.

5. Turner Employees or Other Workers who are removed from working on a Turner project, at a Turner Facility, or from working on or otherwise engaging in Turner business following a Verified Positive Test Result, may only be returned to work if certain criteria are met **(as outlined below in the "Possible Re-Employment with Turner" Section)**. In all cases, there is no guarantee of re-employment.

Cost of Testing

Turner will pay the cost of the initial screen and Confirmatory Test for testing Tuner Employees under this Policy. The employers of Other Workers are responsible for the cost of screening and confirmation required under this Policy.

Refusal to Consent or Submit to/Report for Test When Directed

Any Turner Employee who refuses to sign a consent form and/or to submit to or report to a drug or alcohol screening test will be immediately removed from the Turner Project or Turner Facility and will be terminated, with no possibility of reemployment. Other Workers who refuse to sign a consent form and/or to submit to or report to a drug or alcohol screening test will be immediately removed by their employer from the Turner Project or Turner Facility and will further be barred from any subsequent work on Turner Projects or at Turner Facilities.

Prescription Drugs

Reporting to and being at work under the influence of prescribed or over-the-counter drugs, where such use prevents a Turner Employee or Other Worker from performing his or her essential job functions or poses a safety risk to him or her and/or other Turner Employees or Other Workers property, or which has the potential to cause an Accident/Incident, is prohibited. Turner Employees or Other Workers taking a prescription or over-the-counter drug are personally responsible for confirming with their physicians that they may safely perform any job duties while taking such items. Turner Employees or Other Workers taking a legal substance that could impair their safe work must advise their immediate supervisor.

Types of Testing

To the extent consistent with applicable federal, state and local laws and applicable collective bargaining agreements, a Turner Employee or Other Worker may be required to undergo a screening test for the use of Prohibited Substances and non-prescription drugs, or alcohol under any of the following (or other) circumstances which may be determined by Turner management in its sole discretion under this Policy:

1. Pre-employment – After a conditional offer of employment or prior to admission to a Turner Project. All potential Turner Employees will be tested after a conditional offer of employment but prior to the employment commencing. Potential Turner Employees who obtain a Positive Test Result will not be permitted to work on Turner Projects, at Turner Facilities, or otherwise engage in Turner business and the conditional offer of employment will be rescinded and such potential Turner Employees will not subsequently be considered for any other Turner employment opportunities. If a former Turner Employee returns to employment with Turner following an absence longer than one (1) year, Turner will retest such Turner Employee with pre-employment testing prior to the re-employment commencing (former Turner Employees who are re-employed following a violation of this Policy and rehabilitation, however, will be tested as outlined on page 12 in “Re-Employment” Testing). All Other Workers will be tested at their employer(s) expense prior to beginning any work on a Turner Project, at a Turner Facility, or working on or otherwise engaging in Turner business. However, during orientation/training, Turner may accept, from Other Workers, substance abuse testing cards, badges, or proof of Negative Testing Results from the last twelve (12) months provided by the respective Other Worker’s employer or trade union.
2. Post-Accident/Incident – When a Turner Employee or Other Worker is involved in an Accident/Incident (as defined above in “Definitions”). If the Turner Employee or Other Worker is treated in a medical facility which fails to collect a specimen for testing, Turner may require the Turner Employee or Other Worker to be tested within thirty-two (32) hours of the event. A Positive Test Result may result in the denial of Workers’ Compensation for an injury resulting from the Accident/Incident.
3. Reasonable Suspicion – When there is reasonable suspicion, satisfactory to Turner, to believe that a Turner Employee or Other Worker is using, possessing, distributing, dispensing, manufacturing, or is under the influence of Prohibited Substances or abusing chemicals, controlled substances, or alcohol while working on a Turner Project, at a Turner facility, or while working on or otherwise engaged in Turner business, or when there is reasonable suspicion satisfactory to Turner to believe that the Turner Employee or Other Worker has reported to work under the influence of Prohibited Substances, unauthorized controlled substances, alcohol or other intoxicants which could affect the safety of others or of property.

4. Medical Examination – As part of any medical examination or fitness for duty examination provided or required by Turner.

5. Re-Employment – Upon re-employment or re-instatement to a Turner Project, at a Turner Facility, or to work on Turner business following a violation of this Policy and rehabilitation as outlined on page 17 in “Possible Re-Employment with Turner.” Further testing will occur without prior notice for a period of eighteen (18) months following re-employment or re-instatement.

6. Annual – When Turner requires screening on a yearly basis.

7. As needed – As required by Turner/Owner Agreements, other applicable agreements, contractual obligation, or government regulation.

8. Random – Turner will conduct Random Testing as follows:

   - All random selections and test processing will be administered by the Third-Party Provider(s) selected by Turner.
   - Random Testing will be conducted at a predetermined frequency, to be reasonably spaced throughout the calendar year. At least five percent (5%) of Turner Employee will undergo Random Testing on an annual basis.
   - Except to the extent a Turner Project or Turner Facility is otherwise subject to an acceptable or negotiated Alternative Program, all Turner Projects and/or Turner Facilities will be eligible for Random Testing each time Random Testing occurs, regardless of having been selected previously. However, when applicable, the terms of a state, federal, or owner contract regarding frequency of testing and percentage to be tested will control.
   - All eligible Turner Projects and Turner Facilities will be assigned to testing pools distinguished by job-type criteria agreed upon by Turner. Subject to applicable terms of a state, federal, or owner contract regarding frequency of testing and percentage to be tested, the Third-Party Provider’s computerized program will randomly select five percent (5%) of the eligible Turner Projects and Turner Facilities in each group or pool to be Covered Sites. When a selection occurs, the Turner Projects or Turner Facilities that are available for selection will be put on a run list. At the time of selection, the Third-Party Provider shall notify the applicable Substance Abuse Administrator(s) and Turner safety director(s) of the selected Covered Sites.
   - Included in the testing pools will be all Turner Employees and Other Workers on any Covered Site. Subject to applicable terms of a state, federal, or owner contract regarding frequency of testing and percentage to be tested, the Third-Party Provider’s computerized program will randomly select ten percent (10%) of all Turner Employees and Other Workers currently working on each of the Covered Sites as “Primary Random Selections”. Subject to applicable terms of a state, federal, or owner contract regarding frequency of testing and percentage to be tested, the Third-Party Provider’s computerized program will randomly select and assign a random number to an additional ten percent (10%) of all Turner Employees and Other Workers currently working on each of the Covered Sites as “Secondary Random Selections”. The selected lists will be managed by the Third-Party Provider and the Substance Abuse Administrator.
   - The Third-Party Provider will schedule an on-site collector to be dispatched to the selected Covered Site on the arranged date and time, unannounced to the personnel at each of the Covered Site selected. All available Primary Random Selections at the Covered Site are subject to testing at the date and time of the scheduled random testing. Each Turner Employee or Other Worker that is a Primary Random Selection but is not present at the selected Covered Site for any legitimate business reason (e.g., vacation, illness, business travel, etc.) will be considered unavailable for testing and will be replaced, for Random Testing purposes, with a Secondary Random Selection having the lowest randomly generated number.

Company Provided Education and Training

General Provisions

In conjunction with its commitment to a drug-free workplace, Turner will provide education to all Turner Employees. This education will cover substance abuse issues and is intended to help reduce the risk of Accidents/Incidents caused by drugs and/or alcohol. Turner's supervisors will receive additional training which will help them identify and help employees who show signs of alcohol or drug use. Employers of Other Workers shall provide such education and training for their employees as may be required by applicable laws, ordinances or statutes mandated by the local, state, or federal government.

Penalties

Violation of any of the rules associated with this Policy may result in disciplinary action up to and including termination of employment for Turner Employees or the future inability to work on Turner Projects or Turner Business for Other Workers. The following penalties exist for violation of this Policy:

Violation	First Offense	Second Offense
Possession	Turner Employees- Immediate removal from Turner Project or Turner Facility and termination, with no possibility or re-employment.	N/A.
	Other Workers-Immediate removal from Turner Project or Turner Facility by the Other Worker's employer. Barred from any subsequent work on Turner Projects of at Turner Facilities.	N/A.
Distribution of drugs/paraphernalia	Turner Employees-Immediate removal from Turner Project or Turner Facility and termination, with no possibility or re-employment.	N/A.
	Other Workers – Immediate removal from Turner Project or Turner Facility by the Other Worker's employer. Barred from any subsequent work on Turner Projects or at Turner Facilities.	N/A.
Use of Prohibited Substances or Alcohol Abuse (Upon discovery via actions or testing)	Turner Employee - Immediate removal from Turner Project or Turner Facility and termination. Possible re-employment upon proof of successful rehabilitation and re-employment testing. Clean screen required prior to re-employment and continued testing over the eighteen (18) months following re-instatement.	Termination, with no possibility of re-employment.
	Other Workers - Immediate removal from Turner Project or Tuner Facility by the Other Worker's employer. Barred from any subsequent work on Turner Projects or at Turner Facilities until Turner is provided proof of successful rehabilitation and pre-employment testing. Turner does not provide Employee Assistance to Other Workers. Other Workers must approach their respective employers.	N/A.

Violation	First Offense	Second Offense
Use of Prohibited Substances or Alcohol Abuse (Per voluntary request by Turner Employee for help)	Turner Employee - Immediate removal from Turner Project or Turner Facility. Re-instatement upon proof of successful rehabilitation and re-employment testing. Clean screen required prior to returning to work and continued testing over the eighteen. (18) months following the return to work.	Termination with no possibility of re-employment.
	Other Workers - N/A	N/A.
Under the Influence of Prohibited Substances or Alcohol at Work	Turner Employee - Immediate removal from Turner Project or Tuner Facility and termination. Possible re-employment upon proof of successful rehabilitation and re-employment testing. Clean screen required prior to reinstatement and continued testing over the eighteen (18) months following re-instatement.	Termination, with no possibility of re-employment.
	Other Workers - Immediate removal from Turner Project or Turner Facility by the Other Worker's employer, barred from any subsequent work on Turner Projects or at Turner Facilities until Turner is provided proof of successful rehabilitation and pre-employment testing. Turner does not provide Employee Assistance to Other Workers must approach their respective employers.	N/A.
Failure to Report Use of Over-the-Counter Prescription Drugs Which Affect Performance	Turner Employees-Discipline, up to and including termination, with or without the possibility of re-employment.	Termination, with no possibility of re-employment.
	Other Workers - Immediate removal from Turner Project or Turner Facility by the Other Worker's employer. In Turner's sole discretion, Other Worker may be required to provide proof of successful rehabilitation and pre-employment testing prior to any subsequent work on Turner Projects or at Turner Facilities. Turner does not provide Employee Assistance to Other Workers must approach their respective employers.	N/A

Violation	First Offense	Second Offense
Positive Test Following Accident/Incident	Turner Employee - Immediate removal from Tuner Project or Turner Facility and termination. Possible re-employment upon proof of successful rehabilitation and re-employment testing. Clean screen required prior to reinstatement and continued testing over the eighteen (18) months following re-instatement. **May be ineligible for Worker's Compensation.**	Termination with no possibility of re-employment.
	Other Workers - Immediate removal from Turner Project or Turner Facility by the Other Worker's employer, barred from any subsequent work on Turner Projects or at Turner Facilities until Turner is provided proof of successful rehabilitation and pre-employment testing. Turner does not provide Employee Assistance to Other Workers; they must approach their respective employers.	N/A.
Refusal to Consent or Submit to/Report for Test When Directed	Turner Employee - Immediate removal from Turner Project or Turner Facility and termination, with no possibility of re-employment.	N/A.
	Other Workers - Immediate removal from Turner Project or Turner Facility by Another Worker's employer. Barred from any subsequent work on Turner Projects or at a Turner Facility.	N/A.

Notwithstanding the stated penalties, Turner reserves the right to discipline, up to and including termination, any Turner Employee and/or to ban Other Workers from any Turner Project and/or Turner Facility. Nothing herein in any way grants or confers any implied contractual right to any individual with respect to employment with Turner or alters any employment at-will status of a Turner Employee.

Notification of Authorities

In addition to all other remedies or penalties, Turner may report information concerning possession or distribution of any Prohibited Substance or unauthorized controlled substances to law enforcement officials will cooperate fully in the prosecution and/or conviction of any violators of the law.

Employees Convicted of Drug Offenses

Turner Employees or Other Workers must, as a condition of continued employment, notify their "Operations Manager" or employer, respectively, of any conviction of a criminal drug offense within five (5) days after said conviction. IF an employer is notified, then that employer shall notify the Turner Operations Manager immediately. If the Turner Employee or Other Worker convicted of the criminal drug offense is working on federal contract or grant, Turner will notify the Federal Contracting Agency of criminal drug convictions within thirty (30) days after Turner has received notice. Any Turner Employee or Other Worker so convicted must satisfactorily complete a Turner approved drug rehabilitation program and agree to periodic testing any time thereafter, before Re-Employment or a lift on a ban from working the federal contract will

be considered. *Failure to report such a conviction and/or participate in a drug rehabilitation program may result in disciplinary action, up to and including, suspension, barring, and/or termination*.

Employee Assistance Program: Rehabilitation and Treatment

Turner is committed to helping Turner Employees who seek help from Turner for substance or alcohol abuse problems prior to any drug/alcohol testing or Accidents/Incidents.

Any Turner Employee who feels that he or she has a drug or alcohol related problem is encouraged to seek professional help. If a Turner Employee voluntarily notifies a supervisor or manager before testing that he or she may have a drug or alcohol problem, Turner will counsel the Turner Employee voluntarily seeking such help. Such a person will be provided with a list of employee assistance vendors. Any such action by a Turner Employee shall be kept strictly confidential.

In certain circumstances, Turner Employees who have violated this Policy may also be referred to Turner's Employee Assistance Program ("EAP") and be eligible for a leave of absence and re-instatement (for those Turner Employees who have voluntary requested help from Turner for the use of Prohibited Substances or alcohol abuse). Further details regarding the EAP may be found in Turner's Summary Plan Description ("SPD") or by visiting www.turnerbenefits.com and clicking on "Plan Details." In addition, a Turner Employee may contact the EAP directly by dialing 1-877-887-6266 and following the instructions.

Please refer to the Penalties Chart on pages 14-16 for the consequences and re-instatement and re-employment rights for various drug and alcohol violations.

If treatment necessitates a leave of absence, accrued vacation, sick leave time, and/or an unpaid leave of absence may be used, pursuant to the limitations of those respective policies.

Other Workers are not eligible for Turner's EAP. Such a benefit may be provided by Other Worker's respective employers.

Possible Re-Employment with Turner

Employment with Turner is an at-will employment relationship. There is never a guarantee of re-employment with Turner.

Turner Employees who are terminated from working on a Turner Project or at Turner Facility following certain Violations, including Use of Prohibited Substances or Alcohol (Upon discovery via actions or testing), Use of Prohibited Substances or Alcohol (Per voluntary request by Turner for help), Under the Influence of Prohibited Substances or Alcohol at Work, and Positive Test Following Accident/Incident may be returned to work only if following criteria are met:

- The Turner Employee works with an EAP counselor as detailed above and/or successfully completes and provides proof of completing a Turner Certified/Recognized Substance Abuse Rehabilitation Program at their own expense or at the expense of an Alternative Program Administrator if such Alternative program has an accepted program in place.
- The Turner Employee submits a written request to the Business Unit EH&S Director and Loss Control for approval prior to his/her return to work. A copy of the certificate of completion of the program must be attached.
- The Turner Employee submits to a re-employment drug test which has a Negative Test Result; and
- The Turner Employee consents and submits to additional testing without prior notice for a period of eighteen (18) months following re-employment or re-instatement, with all tests having a Negative Test Result.

Rehabilitation of Other Workers

Other Workers who are removed from Turner Project or Turner Facility by the Other Worker's employer and barred from any subsequent work on Turner Projects of at Turner Facilities pursuant to the "Penalties" section of this Policy may work in the future on a Turner Project or Turner Facility only if the following criteria are met(This option for rehabilitation does not apply to an Other Worker with an offense for Possession and/or Distribution of drugs/paraphernalia or Refusal to Consent or Submit to/Report for Test When Directed) :

- The Other Worker successfully completes a Substance Abuse Rehabilitation Program at their own expense or at the expense of their employer if such employer has an accepted program in place and proof of completion of such program is provided to Turner's **Medical Review Officer** and;

- The employer submits a written request to Turner's Director of Safety and Loss Control for approval prior to Other Worker's return to work. A copy of the certificates of completion must be attached and;

- The Other Worker tests negatively for drugs and/or alcohol before returning to the work site.

TSIB®

CENTRAL MIDDLE SCHOOL
GREENWICH, CONNECTICUT
STATE PROJECT NO. 057-0114N
PHASE 2 OF 3 - CONSTRUCTION
7/08/2024

Central Middle School

Greenwich, Connecticut



Turner

Contractor Controlled Insurance Program Manual

Manual Date: July 23, 2024

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Section 1

CCIP Overview

Welcome to the Turner Contractor Controlled Insurance Program (CCIP). Turner Construction Company (Turner) has purchased the coverage and is therefore the Sponsor of the CCIP. A CCIP is a coordinated insurance program where Turner provides specified coverage for enrolled contractors performing work at the project site. Turner Surety and Insurance Brokerage (TSIB) is the administrator for the CCIP.

Bid Instructions

You are required to prepare your bid to exclude the cost of your insurance for onsite Workers' Compensation, Employer's Liability, and Primary & Excess General Liability. You must calculate the cost of insurance to be removed from your bid based on your current insurance rates at the time of bid. Turner may modify bidding and insurance cost identification procedures as necessary based on the specific project requirements.

Conflicts

In the event of a conflict, the provisions of the Subcontract Agreement and any other related Subcontract Agreements shall supersede the provisions of this Manual. Likewise, in cases of conflict regarding CCIP Coverage, the provisions of the policies supersede the provisions of this Manual.

Project Definitions

The following list includes key CCIP definitions:

CCIP

Contractor Controlled Insurance Program.

CCIP Coverage

Workers' Compensation and Employer's Liability Insurance, General Liability Insurance, and Excess Liability Insurance as detailed in the CCIP Insurance policies for the benefit of Turner and Enrolled Parties performing work at the Project Site.

CCIP Administrator

The party that provides Administration Services for the CCIP. Turner Surety & Insurance Brokerage, Inc. (TSIB) is the CCIP Administrator for this project.

CCIP Insurer

The insurance company(s) named on a policy or Certificate of Insurance (COI).

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CCIP Sponsor

The party that purchases the CCIP. On this project, Turner Construction Company (Turner or Turner Construction) is the Sponsor of the CCIP.

California Affirmation Audit

The California Workers' Compensation Insurance Rating Bureau (WCIRB) routinely audits insurers use of limiting and restricting endorsements to ensure compliance with CA regulations. Title 10 of the California Code of Regulations requires insurers to obtain written documentation from the policyholder confirming that other coverage is in place (or is lawfully uninsured/self-insured) for the employees, operations, and locations excluded by a limiting and restricting endorsement. The California WCIRB completes affirmation audits to ensure compliance with Title 10.

California Limiting & Restricting Endorsements

A limiting and restricting endorsement is defined under the California Code as "an endorsement that excludes from coverage some portion of Workers' Compensation Liability for which the Employer is required to secure payment pursuant to the Labor Code." They include officer, operations, and location exclusions. For Enrolled Contractors, this applies to offsite operations.

Contract Agreement

A written agreement between Contractors of any tier.

Contractor

General Contractor and Subcontractor of any tier.

Eligible Parties

Contractors performing labor or services at the CCIP Project Site. Sponsor reserves the right to enroll or exclude any party at its sole discretion.

Enrolled Parties

Those Eligible Parties who have submitted all necessary enrollment information, have been accepted and enrolled into the CCIP, and who have received a Welcome Letter and Certificate of Insurance as evidence of enrollment.

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Excluded Parties

At the discretion of Turner, or subject to state regulations, the following parties are excluded (not eligible) from enrollment in the CCIP:

1. Hazardous materials remediation, removal and/or transport companies and their consultants;
2. Any Subcontractor performing structural demolition which is the moving or relocating of load bearing beams, columns, or walls;
3. Architects, engineers, soil testing engineers, surveyors, and their consultants;
4. Vendors, suppliers, fabricators, material dealers, truckers, haulers, drivers and others who merely transport, pickup, deliver, or carry materials, personnel, parts or equipment or any other items or persons to or from the Project Site;
5. Subcontractors, and any of their respective Sub-subcontractors, who do not perform any actual labor on the Project Site;
6. Building implosion Subcontractors of any tier, or Subcontractors of any tier involved with blasting or the use of explosives;
7. Window washing systems (davit type systems or equivalent).
8. Any Subcontractor of any tier involved with Exterior Insulation Finishing Systems (EIFS)
9. Any other Subcontractor of any tier which Turner, at its sole discretion (and as permitted by law), chooses to exclude from enrollment.

Project Site

The project location designated by the “Sponsor” and on file with the Insurer and as defined as the “Project” in your Contract. Any adjacent or nearby areas as defined in the project documents where incidental operations are performed, excluding permanent locations of any insured party.

Work Description

133,500 SF New Central Middle School Project. The project consists of the construction of a new building including gym, auditorium, cafeteria and classroom spaces.

Wrapworks

The RMIS system used by all Contractors to manage their requirements for the CCIP. wrapup.vuewrapup.com/contractorportal

wrapworks®

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CCIP Project Directory

Below are the contacts you will need while you are Enrolled in the CCIP.

TSIB Administration Team	
Program Manager	Name: Brian Larocque Phone: 347-839-0294 Email: blarocque@tsibinc.com
Wrap Administrator	Name: Liz Rice Phone: 203-945-1766 Email: mrice@tsibinc.com

Turner Construction Project Team	
Project Manager	Name: Timothy Klepps Phone: 203-627-6028 Email: tklepps@tcco.com
Site Safety Manager	Name: Nick Steinbrick Phone: 203-464-5159 Email: nsteinbrick@tcco.com
Project Superintendent	Name: Chris Chila Phone: 860-634-7216 Email: cchila@tcco.com
Project Engineer	Name: Joseph Phelan Phone: 203-410-0874 Email: jphelan@tcco.com
GL Claim Coordinator	Name: Bryan Weisburd Phone: 646-532-8880 Email: bweisburd@tsibinc.com
WC Claim Coordinator	Name: Bryant Bechtel Phone: 380-258-0067 Email: bbechtel@tsibinc.com
CCIP Coordinator	Name: Daman Sachdeva Phone: 347-515-2086 Email: dsachdeva@tsibinc.com

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CCIP Insurance Coverage Summary

This Section provides a brief description of coverage provided by the CCIP. Participants should refer to the actual CCIP insurance policies for details about coverage, exclusions, and limitations.

Disclaimer
Neither Turner nor TSIB assumes any obligation to provide insurance other than what is specified in this Manual and the CCIP insurance policies. Turner's arranging of CCIP coverages shall in no way relieve or limit, or be construed to relieve or limit, Subcontractor or any of its Sub-subcontractors of any responsibility, liability, or obligation imposed by the Contract Agreement or by law, including without limitation any indemnification obligations which Subcontractor or any of its Sub-subcontractors to Turner or any other designated entity thereunder. Turner reserves the right at its option, without obligation to do so, to arrange other insurance coverage of various types and limits provided that such coverage is not less than that specified in the Contract Agreement.

Overview

As the CCIP Sponsor, Turner has arranged with TSIB for this Project to be insured under Turner's CCIP. Eligible Parties performing labor or services at the Project Site are eligible to enroll in the CCIP unless they are an Excluded Party. The CCIP provides Workers' Compensation and Employer's Liability, General Liability, and Excess Liability insurance for the benefit of Enrolled Parties, as summarily described below, in connection with the performance of the Work. CCIP Coverage shall cover only Enrolled Parties. Enrolled Parties are:

- Turner
- Eligible Contractors of any tier
- Any persons or entities that Turner at its sole discretion may designate to enroll in the CCIP

Each Enrolled Party is provided a Welcome Letter and Certificate of Insurance (COI) as evidence of enrollment.

Excluded Parties

Excluded Parties are not granted any insurance coverage under the CCIP. Excluded Parties must meet the insurance requirements in their Contract Agreement and provide evidence of their insurance coverage to both Turner and TSIB.

Excluded Parties shall require each of its Sub-Subcontractors to obtain and maintain the insurance coverage specified in the Contract Agreement. Excluded Contractors are to confirm there **are no Wrap-Up Exclusions on their policies**. Should there be a Wrap-Up Exclusion, a copy must be provided for review.

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Evidence of CCIP Coverage

The Wrap Administrator will provide a COI evidencing CCIP Coverage to include Workers' Compensation, General Liability, and Excess Liability insurance to each Enrolled Party. Each Enrolled Party will be included as a Named Insured to the CCIP General Liability and Excess Liability policies. A copy of the primary General Liability policy can be obtained upon a Contractor's written request to the Wrap Administrator.

Description of CCIP Coverage

The summary descriptions of the CCIP Coverage in this Manual are not intended to alter or amend the actual CCIP Coverage. Rather, the CCIP Coverage and Exclusions summarized in this Manual are set forth in full detail in their respective insurance policy forms. In the event any provision of this Manual conflicts with the CCIP insurance policies, the provisions of the actual CCIP insurance policies shall govern.

CCIP Coverage shall apply only to Enrolled Parties and only for those operations or activities performed at the Project Site in connection with the Work.

CCIP Coverage Summary

Turner will provide the following CCIP Coverage to Enrolled Parties performing Work at the Project Site.

Workers' Compensation & Employer's Liability

A separate Workers' Compensation policy or an endorsement will be issued to each Enrolled Party.

Coverage	Limits
Part One	
Workers' Compensation	Statutory Limit
	Annual Limits
Part Two *(per Enrolled Party)*	
Employer's Liability	
Bodily injury by Accident, each accident	$2,000,000
Bodily injury by disease, each employee	$2,000,000
Bodily injury by disease, policy limit	$2,000,000

Notes:

- This does not cover the offsite operations of any Enrolled Party.
- Primary insurance for all covered occurrences at the Project Site.

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General Liability

A single General Liability policy will be issued for all Enrolled Parties. Each Enrolled Party will be a Named Insured on the CCIP General Liability policy.

Coverage: Third Party Bodily Injury, Property Damage Liability, and Personal & Advertising Liability per the policy terms, conditions, and exclusions.

Primary Policy	Limits
General Aggregate Per Project	$10,000,000
Completed Operations Aggregate Per Project	$10,000,000
Each Occurrence Limit	$5,000,000
Fire Damage Legal Liability (any one fire)	$100,000
Medical Expense Limit (any one person)	$5,000

Terms:

- The General Liability limits are shared amongst all Enrolled Parties.
- General Liability insurance should be issued on an Insurance Services Office (ISO) form or its equivalent.
- Provides primary coverage for all covered occurrences at the Project Site.
- Does not provide coverage to any Insured Party, Vendor, Supplier, offsite Fabricator, Material Dealer, or other party, for any product manufactured, assembled, or otherwise worked on away from the Project Site.
- Does not cover offsite operations or activities of any Enrolled Party.
- Completed Operations coverage is extended with a single non-reinstated aggregate limit for the period beginning from the earliest occurrence of:
    i. when the Project is put to its intended use
    ii. project completion, or
    iii. CCIP policy termination, and ending after the earlier occurrence of
        a. Ten (10) years or
        b. The expiration of the applicable statute of repose established per the civil code or statute of the state where the Project is located. Consult your Insurance Broker and/or legal counsel for additional information regarding the statute of repose for the state where the Project is located.

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Excess Liability

A tower of Excess Liability coverage will be issued, covering all Enrolled Parties.

Coverage	Limits
Each Occurrence Limit (Combined Single Limit)	$100,000,000
Completed Operations Aggregate Per Project	$100,000,000
Annual General Aggregate Limit Per Project	$100,000,000

Coverage NOT provided by the CCIP

The CCIP does not provide Enrolled Parties all of the required coverage that may be needed for their Work at the Project Site. Notably, the CCIP does not provide Automobile Liability, Professional Liability, Pollution Liability, or coverage for any Enrolled Party's rented, owned, leased or borrowed equipment, or materials not included for inclusion in the project. Enrolled Parties should consult with their Broker/Agent to arrange any coverage that may be needed in addition to the CCIP.

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Contractor Obligations & Insurance Requirements

Contractors of any tier are required to provide and maintain coverage to protect against losses that occur away from the Project Site or that are otherwise not covered under the CCIP. All COI's must be submitted to the Wrap Administrator prior to start of Work at the Project Site.

The required coverage must protect the Project Owner, Turner, the Subcontractor, and all others as required by the Contract Agreement. Liability may arise from the Subcontractor of any tier's operations performed away from the Project Site, performed by Excluded Parties, or activities not covered by the CCIP. Insurance coverage must be maintained for the duration defined in the Contract Agreement.

Contractor's CCIP Obligations

Subcontractor shall:

1. Incorporate the terms of this Manual in all Contract Agreements.
2. Within five (5) days of execution of the Contract Agreement, or no less than thirty (30) days before Mobilization onsite:
    - Enroll in the CCIP
    - Maintain enrollment in the CCIP
    - Ensure that Subcontractor's eligible Sub-Subcontractors enroll in the CCIP
3. Comply with all of the administrative, safety, claims management, insurance, and other requirements contained in this Manual, the CCIP insurance policies, and the Contract Agreement.
4. Provide each of its Sub-Subcontractors with a copy of this Manual and ensure Sub-Subcontractor compliance with the provisions of this Manual, the CCIP insurance policies, and the Contract Agreement. The failure of
    - Turner to include this Manual in the bid documents, or
    - Subcontractor to provide each of its eligible Sub-Subcontractors with a copy of it,

    Shall not relieve the Subcontractor or any of its Sub-Subcontractors from any of the obligations contained therein.
5. Provide evidence of required insurance to Turner and the Wrap Administrator at the time of enrollment and/or within 5 business days from the requested notification.
6. Subcontractor shall access Wrapworks and upload copies of their Rate Pages/Declaration Pages for:
    - Workers' Compensation
    - General Liability
    - Excess or Umbrella
    - Deductible Endorsement (if applicable)
    - Other requirements set forth in Section 6 to verify the Insurance Cost calculation.

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7. Be solely responsible for the recovery of any Sub-Subcontractor Insurance Cost attributable to such Sub-Subcontractors' eligibility for participation in the CCIP. If unit pricing is the basis for the Subcontract price, Turner may, at its option, apply a "per unit" Subcontractor Insurance Cost where appropriate.
8. Notify the Wrap Administrator and Turner's Designated Person of all Sub-subcontracts awarded (first tier and subsequent tiers). Accordingly, the Subcontractor shall require all Sub-Subcontractors to submit an online Application for Enrollment and all documents required to verify their Insurance Cost.
9. Provide the estimated onsite payroll amount for their Work and their enrolled Sub-Subcontractors for its Work. Subsequently identify estimated onsite payroll for each Change Order request.
10. Require all of its Sub-Subcontractors to acknowledge in writing, that Turner and TSIB are not the CCIP Insurer nor are they Agents, Partners, or Guarantors of the insurance companies providing coverage under the CCIP and that Turner and TSIB are not responsible for any claims or disputes between or among Subcontractor, its Sub-Subcontractors, and any CCIP Insurer(s). Any type of insurance coverage or limits of liability in addition to the CCIP coverages that Subcontractor or any Sub-Subcontractor requires for its or their own protection, or that is required by applicable laws or regulations, shall be the Subcontractor's or its Sub-Subcontractor's sole responsibility and expense and shall not be billed to Turner, TSIB or the Owner.
11. Cooperate fully with the TSIB and the CCIP Insurers, as applicable, in their administration of the CCIP.
12. Notify the Wrap Administrator immediately of any insurance cancellation or non-renewal of Subcontractor's and Sub-Subcontractor's required insurance and any subsequent reinstatement of coverage.
13. At Turner's discretion**,** Subcontractors may be required to pay a sum of up to $5,000 of each occurrence, including court costs, attorney's fees and costs of defense for Bodily Injury or Property Damage to the extent losses payable under the CCIP General Liability Policy are attributable to Subcontractor's Work, acts or omissions, or the Work, acts or omissions of any of any other entity or party for whom Subcontractor may be contractually or legally responsible.
14. Acknowledge that Turner shall pay the costs of premiums for the CCIP coverages on behalf of all Enrolled Parties and will receive or pay, as the case may be, all adjustments to such costs, whether by way of dividends, retroactive adjustments, return premiums, other moneys due, audits or otherwise. Accordingly, each Subcontractor and each of its Sub-Subcontractors agrees to assign to Turner the right to receive all such adjustments.
15. Subcontractors are required within 24 hours to report a claim or incident to the Turner Site Designated Person; failure to do so may result in a $5,000 penalty.

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Enrollment Procedures

The application for Enrollment is required to be completed online via Wrapworks. Section 2 of this Manual provides the Project's Wrap Administrator's contact information should you require or need assistance. It's important to note that **Enrollment is NOT automatic.**

Each Subcontractor and Sub-Subcontractor shall provide details about its Sub-Subcontractors as necessary during the CCIP enrollment. The information requested on the online application for Enrollment is mandatory for Enrollment. The online application must be completed through Wrapworks and CCIP coverage subsequently confirmed by the Wrap Administrator, prior to mobilization or the start of Work to obtain CCIP Coverage.

A separate online application for Enrollment is required for each eligible Sub-Subcontractor of any tier that performs Work at the Project Site.

The Wrap Administrator will issue each Enrolled Party a Welcome Letter and a CCIP Certificate of Insurance acknowledging acceptance of the applicant into the CCIP.

Late Enrollments/Late Reports

Should the insurance carrier(s) or any regulatory agency assess a fine or penalty for late enrollment and/or late reporting, Turner reserves the right to assess these fines to the Subcontractor. This reservation of rights applies whether fines and/or penalties are due to a Subcontractor or any of its Sub-Subcontractors. If a fine or penalty is assessed to a Sub-Subcontractor, the Prime Tier Subcontractor is solely responsible for recovering the fine or penalty amount from its Sub-Subcontractor(s).

Identifying and Verifying Insurance Costs

Under the CCIP, Turner provides certain insurance (CCIP Coverage) for Enrolled Parties for Work performed at the Project Site and pays the premium for the CCIP Coverage. Accordingly each Enrolled Party will be required to identify their amount of insurance costs that were removed from their bid and submit copies of their policy documents to the Wrap Administrator for verification. The Wrap Administrator will provide the Enrolled Party with the insurance cost calculation once all documents have been provided. This is done by uploading all the required documents to Wrapworks.

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As part of the enrollment process eligible Subcontractors of any tier are required to upload insurance policy pages that document their coverage and insurance rates using Wrapworks. Required documentation includes the following pages from the Workers' Compensation, General Liability, and Excess or Umbrella policies:

- Declaration or Information Page
- Rate Page(s)
- Experience Modification Verification (Workers' Compensation only)

If the Subcontractor is "Self-Insured," and carries a deductible or declares a dividend credit for its Workers' Compensation and/or General Liability program, then the following must also be provided:

- Deductible Page(s)
- Summary- Five (5) Years of loss history for entities that retain losses
- Summary- Five (5) Years of audited payroll by annual total

Until each Subcontractor or Sub-Subcontractor submits all required documentation to enable verification and calculation of the Subcontractor of any tier's Insurance Cost, an Insurance Cost of up to but not greater than 10% of the contract value may be assigned by Turner. Failure to submit the required documentation may result in a higher Final Insurance Cost Adjustment (if applicable).

Payroll Reports

Each Enrolled Party is required to submit payroll and work hour information each month using Wrapworks. Enrolled Parties must report payroll expended at the Project Site for each applicable Workers' Compensation classification that was included in the Subcontractor's application for Enrollment.

A monthly payroll report must be submitted for each month, including months where there was zero payroll or work hours, until completion of the Work under each Subcontract. For those Subcontractors performing Work under multiple Contract Agreements, a separate monthly payroll report is required for each Subcontract.

The monthly payroll report should include reportable payroll for all CCIP qualified employees, including onsite supervisors and onsite clerical personnel. Please follow the required Statutory Guidelines in the state the project is located as to what is reportable.

This is in addition to any Federal, State or Local requirements for the project (i.e. LCP Tracker, Certified Payroll Reports, etc.).

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All payrolls submitted for this project should be excluded from the payroll submitted to your corporate insurance carrier(s) to avoid paying premiums for exposures covered by the Turner CCIP. The COI issued to you for coverage can be used to provide evidence of your enrollment in the Turner CCIP to your corporate insurance carriers.

Insurance Company Payroll Audit

Each Enrolled Party is required to maintain payroll records for each Subcontract. Such records must allocate payroll by Workers' Compensation classification(s). Please follow the required Statutory Guidelines in which the project is located. It is important that you properly classify payrolls, as these are reported to the Rating Bureau for promulgation of future experience modifiers for your firm.

All Enrolled Parties shall make available their:

- Books
- Vouchers
- Contracts
- Documents
- Payroll Records
- Prior Loss History Information
- Safety Records or History
- Certified Copies of Insurance Coverages
- Declaration Pages of Coverages
- Certificates of Insurance
- Underwriting Data
- Insurance Cost Information
- OSHA Citations

Or any other data/information as Turner, TSIB, CCIP Insurers including the CCIP Insurer Auditors, or other Turner Representatives may request in the administration or payroll audit of the CCIP, or as required by this Manual. Availability of records must be for a reasonable time during the policy period, any extension, or during a final audit period as required by the insurance policies.

Withholding of Payments

In the event a Turner audit of a Subcontractor's (of any tier) records reveal a discrepancy in the insurance, payroll, safety, or any other information required by the Contract Agreement, or reveals the inclusion of any Insurance Cost in any payment for the Work, Turner shall have the right to withhold or deduct from the Subcontract price all such Insurance Cost amounts. If the Subcontractor or its Sub-Subcontractor fail to timely comply with the provisions of this Manual, Turner may withhold any payments due Subcontractor and its Sub-Subcontractors until such time as they have met the requirements of the CCIP as outlined this Manual.

Failure to submit any information required by the CCIP may result in the withholding of payments by Turner until required documentation is received.

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Insurance Requirements

A sample COI that includes the requirements for Waiver of Subrogation, Primary and Non-Contributory language, and Additional Insured status is provided at the end of this section of this CCIP Insurance Manual.

The additional insured endorsement utilized for the General Liability policy must provide coverage as broad as that available under the ISO CG 20 10 and CG 20 37 or their equivalent endorsement(s). The insurance obtained by the Subcontractors of all tiers shall not contain any Wrap-Up Exclusion or Wrap-Up Excess Endorsement that would bar or limit available coverage where the Subcontractor is not enrolled in the CCIP, or in instances where liability arises out of Work performed by an Enrolled Subcontractor away from the CCIP jobsite (i.e. offsite activities).

In the event that the law of the state in which the project is located (or another applicable law) limits the indemnity obligations of the Subcontractor, then the indemnity obligations of the Subcontractor shall be enforced to the fullest extent permitted by applicable law, and this Manual shall be read to conform to such law.

Insurance Requirements for Activities/Operations Not Insured Under the CCIP

Refer to your Contract Agreement for limits and coverages.

Workers' Compensation & Employer's Liability

Enrolled Parties will provide evidence of Workers' Compensation insurance coverage for all activities away from the Project Site.

Excluded Parties will provide evidence of Workers' Compensation insurance coverage for all activities at and away from the Project Site.

Coverage	Limits
Part One	
Workers' Compensation	Statutory Limit
Part Two	
Employer's Liability	Annual Limits
Bodily injury by Accident, each accident	$1,000,000
Bodily injury by disease, each employee	$1,000,000
Bodily injury by disease, policy limit	$1,000,000

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California Projects

The California Workers' Compensation Insurance Rating Bureau (WCIRB) routinely audits the insurers' use of limiting and restricting endorsements to ensure compliance with CA regulations. Title 10 of the California Code of Regulations requires insurers to obtain written documentation from the policyholder confirming that other coverage is in place (or is lawfully Uninsured/Self-Insured) for the employees, operations, and locations excluded by a limiting and restricting endorsement. The California WCIRB completes affirmation audits to ensure compliance with Title 10.

A limiting and restricting endorsement is defined under the California Code as *"an endorsement that excludes from coverage some portion of Workers' Compensation Liability for which the employer is required to secure payment pursuant to the Labor Code."* They include officer, operations, and location exclusions. For Enrolled Contractors, this is coverage away from the project site.

In order to comply with Title 10 of the California Code, if Enrolled, you must confirm existence of Workers' Compensation away from the Project Site by entering your current Workers' Compensation coverage information and checking the affirmation box in Wrapworks. If exempt, you must also check the affirmation box to verify you are lawfully Uninsured/Self-Insured.

General Liability/Umbrella or Excess Liability

Enrolled Parties shall provide evidence of General Liability insurance for offsite activities with Turner and other required parties named as Additional Insured (ISO CG 20 10 and CG 20 37 or their equivalent) to the policy. Coverage will apply away from the Project Site.

Excluded Parties shall provide evidence of General Liability insurance applicable to this Project Site and must name Turner and other required parties named as Additional Insured (ISO CG 20 10 and CG 20 37 or their equivalent) to their policy. Coverage will apply both onsite and offsite.

The required General Liability insurance shall include:

- Completed operations,
- Contractual liability insuring against the liability assumed herein
- Personal injury liability
- Broad form property damage (including completed operations), and explosion
- Collapse and underground hazards

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With the following minimum limits:

Primary Policy	Limits
Combined Single Limit	As stipulated in Article XXIV of the Contract Agreement, in the Invitation to Bid, or as otherwise instructed by Turner or your hiring Contractor.

Automobile Liability

Any Auto $1,000,000 Combined Single Limit (CSL).

Property Insurance

The CCIP does not provide coverage for Subcontractor's or Sub-Subcontractor's personal property. Subcontractors of any tier must provide their own insurance for owned, leased, rented and borrowed equipment, whether such equipment is located at a Project Site or in transit. Subcontractors of any tier are solely responsible for any loss or damage to their personal property including, without limitation, property or materials created or provided under the Contract Agreement or Sub-Contract Agreement until installed at the Project Site, Subcontractor tools and equipment, scaffolding and temporary structures.

Other Insurance

Refer to your Contract Agreement for any other project-specific insurance, such as, but not limited to:

- Watercraft and Aircraft Liability
- Professional Liability
- Pollution Liability

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Claims Procedures

Please direct all claims related questions to the Turner Claims Coordinator/Claims Manager or Program Manager listed in Section 2.

General Procedures

Subcontractors and Sub-Subcontractors (of any tier) must immediately report, within 24 hours, all accidents and occurrences of any type, including near misses, to the Site Designated Person.
While all injuries and property damage must be reported immediately, the following list identifies losses which could represent substantial exposure. It is essential that the Site Designated Person be notified immediately of the following events so that a comprehensive investigation can be initiated at once:

- Any injury for which an ambulance is called
- Injury to head or neck
- Possible injury to back or spinal cord
- Unconscious employee
- Possible blindness
- Amputation of limbs
- Fatality
- Heart attack or stroke
- Hospitalization
- Property damage estimated over $1,000
- Near Misses

Subcontractors may be assessed a $5,000 penalty for any claim not reported immediately or within 24 hours of occurrence.

Any involved party should not voluntarily admit liability or responsibility and should cooperate with Turner and the CCIP Insurer Representatives in the accident investigation. The accident should not be discussed with anyone other than Turner Personnel, CCIP Insurer Representatives, or Legal Counsel retained on Turner's and/or the Enrolled Party's behalf.

Turner's Return to Work Program

For information regarding Turner's Return to Work Program, specific claim forms, accident investigation forms, and the Authorization for the Release of Protected Health Information, please refer to the Project's Site Specific Safety Manual for further details.

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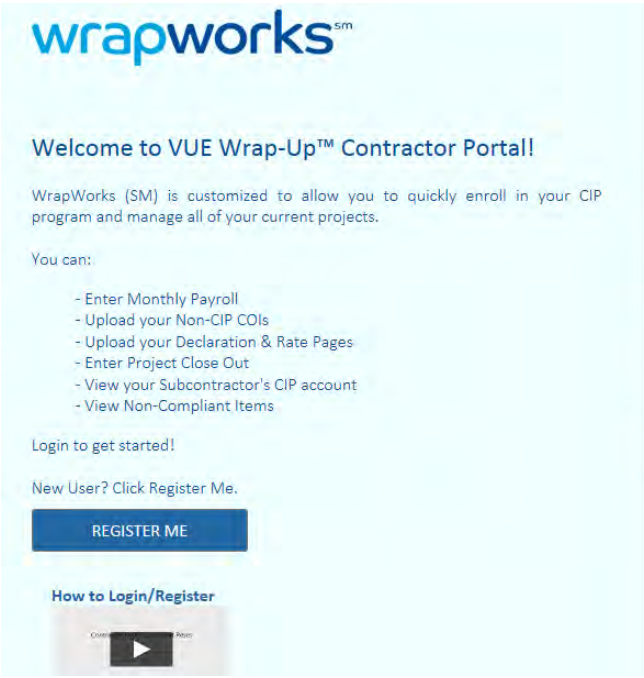
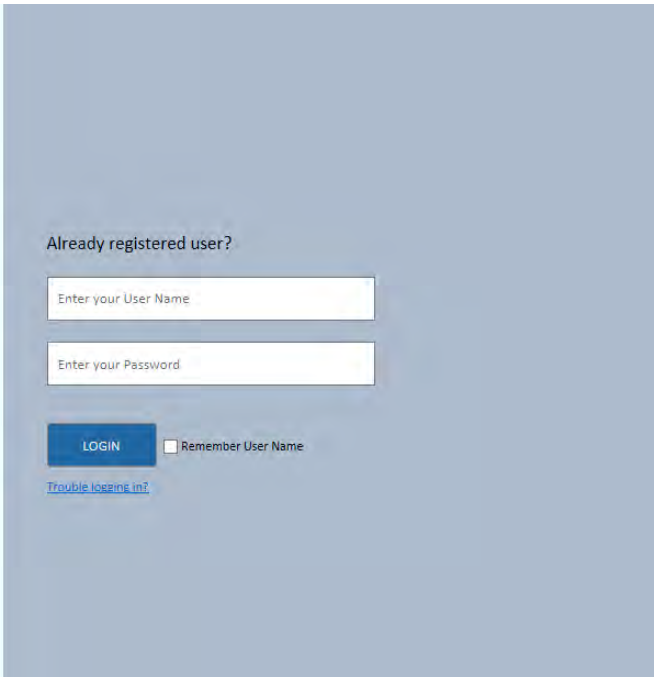
Contractor Portal Instructions

Wrapworks, the Contractor Portal Web Address is: https://wrapup.vuewrapup.com/contractorportal

Notes:

- Everything **must be uploaded**.
- Please have your documents in hand and ready to upload - This will speed up the process. This includes your:
  - Rate Pages from your Workers' Compensation, General Liability, and Excess/Umbrella Policies
  - Deductible Endorsement (if applicable)
  - Non-CCIP Certificate of Insurance (offsite COI)
  - Required Endorsements
- If you know your User ID and Password, then please proceed.
- If you do not have one, then click on **"Register Me".**
  - You will need to know your Federal ID (with the dash).
  - Your User ID and Password information will be emailed to you.





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CCIP Workflow Steps

Enrollment into the CCIP Program is NOT automatic.

1
- General Contractor (GC) distributes the CCIP Manual to the Prime Contractor (Prime Tier) as a Contract Document.
- GC enters Prime Tier's Notice of Award (NOA) information into Wrapworks.

2
- Prime Tier logs into Wrapworks & completes the online Enrollment. Excluded Contractors skip to upload Non-CCIP COI with endosements.
- Enrolled Prime Tiers need to upload all required documents (including Rate Pages & Non-CCIP COI).
- Going forward, Prime Tiers submits monthly payroll reports.

3
- Prime Tiers then enter all of their Subcontractors' (Lower Tier) contract information into Wrapworks, including correct FEIN and contact information.
- Lower Tier completes Enrollment, uploads required documents (including Rate Pages).
- Going forward, Lower Tier submits monthly payroll reports.

4
- All Lower Tiers (of any tier) follow the same procedures as the Prime Tier.

5
- Once TSIB confirms the Enrollment, a Welcome Letter & COI providing Proof of Coverage under the CCIP is sent to the Enrolled Party.
- Enrolled Parties shold advise their Broker/Agent of the coverages that are being provided by the CCIP.
- TSIB will verify the Insurance Costs and Non CCIP COI (if applicable).
- TSIB will monitor each Enrolled Party's CCIP contract for compliance and notify the Enrolled Contractor of any missing information.

6
- Once your work is complete, please submit the close out data & sign via Wrapworks.

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Sample- Certificate of Insurance

Upload to Wrapworks or Email to COI@wrapworks.net.

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME:
Insurance Agency's/Brokerage's Name And Address	PHONE (A/C, No, Ext): / FAX (A/C, No):
	E-MAIL ADDRESS:
	PRODUCER CUSTOMER ID #:
	INSURER(S) AFFORDING COVERAGE / NAIC #
INSURED: Subcontractor's Name and Address	INSURER A:
	INSURER B:
	INSURER C:
	INSURER D:
	INSURER E:

COVERAGES CERTIFICATE NUMBER: REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
	X COMMERCIAL GENERAL LIABILITY						EACH OCCURRENCE	
	CLAIMS-MADE X OCCUR						DAMAGE TO RENTED PREMISES (Ea occurrence)	As required by Agreement
	GEN'L AGGREGATE LIMIT APPLIES PER:	A	A	Policy Number			MED EXP (Any one person)	
	POLICY X PROJECT LOC						PERSONAL & ADV INJURY	
	OTHER						GENERAL AGGREGATE	
							PRODUCTS - COMP/OP AGG	
	AUTOMOBILE LIABILITY						COMBINED SINGLE LIMIT (Ea accident)	$1,000,000
	X ANY AUTO						BODILY INJURY (Per person)	
	X OWNED AUTOS ONLY / SCHEDULED AUTOS	X	X	Policy Number			BODILY INJURY (Per accident)	
	X HIRED AUTOS ONLY / X NON-OWNED AUTOS ONLY						PROPERTY DAMAGE (Per Accident)	
	X UMBRELLA LIAB / OCCUR						EACH OCCURRENCE	
	EXCESS LIAB / CLAIMS-MADE	X	X	Policy Number			AGGREGATE	As required by Agreement
	DED / RETENTION $						PRODUCTS - COMP/OP AGG	
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY Y/N						X PER STATUTE / X OTH ER	
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? N (Mandatory in NH)	N/A	X	Policy Number			E.L. EACH ACCIDENT	$1,000,000
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE EACH EMPLOYEE	$1,000,000
							E.L. DISEASE POLICY LIMIT	$1,000,000
	OTHER: EQUIPMENT FLOATER			Policy Number			Limit equal to Full Coverage of Subcontractor's owned or rented machinery, equipment, tools, & temporary structures not designed to become a permanent part of the Work	

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach Additional Remarks Schedule if more space is required):

All projects involving Turner Construction Company, its wholly owned subsidiaries or parent organization. Additional Insureds include: Turner Construction Company and all other parties as required by any written agreement. In the event that the project is a CCIP in which we are enrolled, then Workers' Compensation and General Liability shall apply only to offsite operations.

Additional Insureds are on a Primary and Non-contributing basis on the General Liability (ISO endorsement CG 20 10 07 04 and CG 20 37 07 04 or their equivalent), Automobile and Excess/Umbrella Liability Policies. Waiver of Subrogation in favor of Additional Insureds applies to all policies.

CERTIFICATE HOLDER	CANCELLATION
Turner Construction Company c/o Turner Surety and Insurance Brokerage, Inc. EMAIL TO: COI@WRAPWORKS.NET Attention: Wrap Administrator	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS. AUTHORIZED REPRESENTATIVE

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Sample- Endorsements

Below are examples of Additional Insured Endorsements for General Liability:

- The first is the CG 20 10, which provides coverage during your time on the Project Site.
- The second is the CG 20 37, which provides coverage after your work has been completed.

POLICY NUMBER:

COMMERCIAL GENERAL LIABILITY
CG 20 10 07 04

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

ADDITIONAL INSURED – OWNERS, LESSEES OR CONTRACTORS – SCHEDULED PERSON OR ORGANIZATION

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

SCHEDULE

Name Of Additional Insured Person(s) Or Organization(s):	Location(s) Of Covered Operations
As required by contract	As required by contract
Information required to complete this Schedule, if not shown above, will be shown in the Declarations.	

A. Section II – Who Is An Insured is amended to include as an additional insured the person(s) or organization(s) shown in the Schedule, but only with respect to liability for "bodily injury", "property damage" or "personal and advertising injury" caused, in whole or in part, by:

1. Your acts or omissions; or
2. The acts or omissions of those acting on your behalf.

POLICY NUMBER:

COMMERCIAL GENERAL LIABILITY
CG 20 37 07 04

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

ADDITIONAL INSURED – OWNERS, LESSEES OR CONTRACTORS – COMPLETED OPERATIONS

This endorsement modifies insurance provided under the following

COMMERCIAL GENERAL LIABILITY COVERAGE PART

SCHEDULE

Name Of Additional Insured Person(s) Or Organization(s):	Location And Description Of Completed Operations
As required by contract	As required by contract
Information required to complete this Schedule, if not shown above, will be shown in the Declarations.	

Section II – Who Is An Insured is amended to include as an additional insured the person(s) or organization(s) shown in the Schedule, but only with respect to liability for "bodily injury" or "property damage" caused, in whole or in part, by "your work"

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Sample- Rate Pages

Below are examples of Rate Pages or Declarations Pages from various policies. **Please make sure that all premiums, modifiers, and exposure bases are clearly defined and left on the pages.** This also includes if your Excess or Umbrella Policy is a flat rate.

Workers' Compensation

NCCI Co. No. [illegible]

Workers Compensation and Employers Liability Insurance Policy Information Page

From 03/09/2020 To 12/15/2020
12:01 am Standard Time at Insured's Mailing Address

EXTENSION OF INFORMATION PAGE State: KENTUCKY

ITEM 4 The premium for this policy will be determined by our Manuals of Rules, Classifications, Rates and Rating Plans. All information required below is subject to verification and change by audit.

Classifications	Code No.	Premium Basis - Total Estimated Annual Remuneration	Rate per $100 of Remuneration	Estimated Annual Premium
Machinery Or Equipment Erection Or Repair NOC & Drivers	3724	10,000.00	5.03	
Premium for Increased Limits Part Two	9812		1.1000	
Total Subject Premium				
Premium Modified to Reflect Experience Mod. Of	9898		.740	
Total Estimated Annual Standard Premium				
Expense Constant	0900			
Terrorism	9740	10,000.00	.02	
Catastrophe (Other than Certified Acts of Terror.)	9741	10,000.00	.02	
Total Estimated Annual Premium				
Assessment (KY)	0935		6.4100	
Total Estimated Cost				

General Liability

COMMON POLICY DECLARATIONS

[redacted] Renewal of Number

Underwritten by: Scottsdale Insurance Company
Home Office:
One Nationwide Plaza • Columbus, Ohio 43215
Administrative Office:
8877 North Gainey Center Drive • Scottsdale, Arizona 85258
1-800-423-7675 • A Stock Company

Policy Number [redacted]

ITEM 1. NAMED INSURED AND MAILING ADDRESS
[redacted]

AGENT NAME AND ADDRESS
[redacted]

Agent No: [redacted] Program No: NONE

ITEM 2. POLICY PERIOD From: 01-01-2020 to 01-01-2021 Term: 1 Year
12:01 A.M., Standard Time at the mailing address shown in ITEM 1.

Business Description: MILLWRIGHT OPERATIONS

In return for the payment of the premium, and subject to all the terms of this policy, we agree with you to provide the insurance as stated in this policy. This policy consists of the following coverage parts for which a premium is indicated. Where no premium is shown, there is no coverage. This premium may be subject to adjustment.

Coverage Part(s)	Premium Summary
Commercial General Liability Coverage Part	$ [redacted]

COMPOSITE RATE ENDORSEMENT

The advance premium for the following coverage(s) ALL COVERAGES is an estimated premium subject to audit. Upon termination of this policy, the earned premium, subject to the minimum policy premium, shall be computed as follows:

Code No.	Rate	Premium Basis	Advance Premium
97222	[redacted]	PER $1,000 RECEIPTS	$ INCLUDED
			$

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Excess Liability

DECLARATIONS
COMMERCIAL EXCESS LIABILITY POLICY

[redacted] Renewal of Number

SCOTTSDALE INSURANCE COMPANY*
Home Office:
One Nationwide Plaza Columbus, Ohio 43215
Administrative Office:
8877 North Gainey Center Drive Scottsdale, Arizona 85258
1-800-423-7675
A STOCK COMPANY

Policy Number: [redacted]

ITEM 1. NAMED INSURED AND MAILING ADDRESS: [redacted]

AGENT NAME AND ADDRESS: [redacted]

[redacted] FEIN: NONE

ITEM 2. POLICY PERIOD: From: 01-01-2020 To: 01-01-2021
12:01 A.M. Standard Time at your mailing address.

In return for the payment of the premium, and subject to all the terms of this policy, we agree to provide you with the insurance as stated in this policy.

ITEM 3. THE NAMED INSURED IS: [ ] Individual [ ] Partnership [X] Corporation [ ] Joint Venture [ ] Other

ITEM 4. LIMIT OF INSURANCE:

A. Each Occurrence $ 1,000,000

B. Aggregate $ 3,000,000

ITEM 5. SCHEDULE OF CONTROLLING UNDERLYING INSURANCE:
See Schedule of Controlling Underlying Insurance

ITEM 6. PREMIUM COMPUTATION:
[redacted] 1.50 / 1000 of 1st $ [redacted]
Subject to Adjustment
Estimated Deposit Premium $ $5,000

Sample- Risk ID

A Risk ID is a number that is given to you by a Rating Bureau. The anniversary rating date is the end of your Workers' Compensation policy term. Examples of Rating Bureaus are: NCCI, Ohio Bureau WC, WCIRB, NJCrib, etc.

WORKERS COMPENSATION EXPERIENCE RATING

Risk Name: [redacted] Risk ID: 914[redacted]

Rating Effective Date: 12/15/2019 Production Date: 11/11/2019 State: INTERSTATE

State	Wt	Exp Excess Losses	Expected Losses	Exp Prim Losses	Act Exc Losses	Ballast	Act Inc Losses	Act Prim Losses

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Online Resources

TSIB has created a variety of online materials if you need further assistance.

Tutorial Videos

Click each link below to view a step-by-step video to help navigate TSIB's Contractor Portal, Wrapworks:

- How to Submit CCIP Payroll
- How to Close Out of your CCIP Contract

If you have additional questions, please reach out to the Project's Wrap Administrator listed on pg. 4.

FAQ

To view the Frequently Asked Questions, click here.

Blogs

What You Need To Know About Risk ID
3 Questions To Ask On A Wrap-Up
4 Tips About Wrap-Up Payroll
Why is Off-Site Coverage Required on Wrap-Up?
Why is an Excess Credit Taken on a Wrap-Up?
The Differences between Certified Payroll and Wrap-Up Payroll
3 Reasons Why Wrap-Up Programs Benefit Trade Contractors

Additional Resources

A General Guide to Surety Bonds
Employee Benefits Programs for Contractors
How A Captive Can Benefit Your Business

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This Agreement, made as of the SDS day of SDS in the year SDS by and between CONTRACTOR and SDS (See Subcontract Data Sheet for this Item and all other Items marked SDS) (hereinafter called the Subcontractor).

Witnesseth, that the Subcontractor and Contractor agree as follows:

Description of Work

ARTICLE I. The Subcontractor shall perform and furnish all the work, labor, services, materials, plant, equipment, tools, scaffolds, appliances and other things necessary for SDS (hereinafter called the Work) for and at the SDS (hereinafter called the Project), located on premises at SDS (hereinafter called the Premises), as shown and described in and in strict accordance with the Plans, Specifications, General Conditions, Special Conditions and Addenda thereto prepared by SDS (hereinafter called the Architect) and with the terms and provisions of the General Contract (hereinafter called the General Contract) between Contractor and SDS (hereinafter called the Owner) dated SDS and in strict accordance with the Additional Provisions, page(s) SDS annexed hereto and made a part hereof.

Plans & Specifications

ARTICLE II. The Plans, Specifications, General Conditions, Special Conditions, Addenda and General Contract hereinabove mentioned, are available for examination by the Subcontractor at all reasonable times at the office of Contractor; all of the aforesaid, including this Agreement, being hereinafter sometimes referred to as the Contract Documents. The Subcontractor represents and agrees that it has carefully examined and understands this Agreement and the other Contract Documents, has investigated the nature, locality and site of the Work and the conditions and difficulties under which it is to be performed and that it enters into this Agreement on the basis of its own examination, investigation and evaluation of all such matters and not in reliance upon any opinions or representations of Contractor, or of the Owner, or of any of their respective officers, agents, servants, or employees.

Contract Documents

With respect to the Work to be performed and furnished by the Subcontractor hereunder, the Subcontractor agrees to be bound to Contractor by each and all of the terms and provisions of the General Contract and the other Contract Documents, and to assume toward Contractor all of the duties, obligations and responsibilities that Contractor by those Contract Documents assumes toward the Owner, and the Subcontractor agrees further that Contractor shall have the same rights and remedies as against the Subcontractor as the Owner under the terms and provisions of the General Contract and the other Contract Documents has against Contractor with the same force and effect as though every such duty, obligation, responsibility, right or remedy were set forth herein in full. The terms and provisions of this Agreement with respect to the Work to be performed and furnished by the Subcontractor hereunder are intended to be and shall be in addition to and not in substitution for any of the terms and provisions of the General Contract and the other Contract Documents.

This Subcontract Agreement, the provisions of the General Contract and the other Contract Documents are intended to supplement and complement each other and shall, where possible, be thus interpreted. If, however, any provision of this Subcontract Agreement irreconcilably conflicts with a provision of the General Contract and the other Contract Documents, the provision imposing the greater duty or obligation on the Subcontractor shall govern.

Contractor hereby advises, and the Subcontractor hereby acknowledges, that Contractor in administering this subcontract will be utilizing an information systems infrastructure to process, deliver, and share and/or, at times, to apply electronic signatures to execute certain project documentation through electronic means. As part of the implementation of this infrastructure, the Subcontractor will be given individual, secure log on codes to access the Contractor systems presenting this electronic information. The Subcontractor hereby agrees that such electronic access and the ability of the subcontractor to print out such electronic documents will be in lieu of requiring the delivery of the contents of such electronic documents on printed or paper based media directly to Subcontractor by Contractor or through means of outside third-party services. Delivery of such electronic documents to Subcontractor will be deemed to have occurred when access to the document is made available to Subcontractor in the infrastructure.

At times, Contractor may, through this electronic infrastructure system, initiate Subcontract Change Order documents that will require that the Subcontractor review and approve or reject each such document applying its electronic signature to the approved document on the Contractor software and thereafter, Contractor will apply the electronic signature of its authorized personnel to execute the approved document and electronically deliver the fully executed document to the Subcontractor. The Subcontractor agrees and acknowledges that granting its on-line approval and electronically executing a Subcontract Change Order also affixes the Subcontractor's electronic signature to such document and in so doing it is agreeing that each such document, when electronically countersigned by Contractor, are valid and authentic and enforceable obligations of both parties and to honor and be bound by such documents as if they had been prepared on hard copy and contained the manually applied autograph signatures of the Subcontractor's and Contractor's authorized personnel. Subcontractor hereby agrees to establish, continuously use and maintain a robust and effective Security System/ID and Passwords to protect its identity when addressing and/or signing any electronic contract related documentation issued or exchanged pursuant to this Article.

Optionally, Contractor may use paper documents, where the Subcontractor reviews the proposed paper document and, if it approves, it manually affixes its autograph signature to the paper document and physically returns the signed paper document to Contractor who completes the execution by applying either its autograph or electronic signature to the Subcontract Change Order and a copy of the executed Subcontract Change Order showing the presence of both signatures is physically delivered to the Subcontractor and such Subcontract Change Order shall likewise be deemed by both parties to be valid and authentic and enforceable obligations of both parties.

Contractor may from time to time issue policies or directives applicable to electronic communications, electronic infrastructure and electronic data and Subcontractor shall comply with such policies and directives whether issued as part of this Subcontract or hereafter, and the cost and expense of such compliance shall be borne by the Subcontractor.

Time of Performance & Completion

ARTICLE III. The Subcontractor shall commence the Work when notified to do so by Contractor and shall diligently and continuously prosecute and complete the Work and coordinate the Work with the other work being performed on the Project, in accordance with those project schedules as may be issued from time to time during the performance of the Work and any other scheduling requirements listed in this Agreement, so as not to delay, impede, obstruct, hinder or interfere with the commencement, progress or completion of the whole or any part of the Work or other work on the Project, and in such a manner as necessary or requested by Contractor from time to time to ensure that Contractor satisfies its obligations in a timely manner under the General Contract.

Planning & Scheduling

The Subcontractor shall participate and cooperate in the development of schedules and other efforts to achieve timely completion of the Work providing information for the scheduling of the times and sequence of operations required for its Work to meet Contractor's overall schedule requirements, shall continuously monitor the project schedule so as to be fully familiar with the timing, phasing and sequence of operations of the Work and of other work on the Project, and shall execute the Work in accordance with the requirements of the project schedule including any revisions thereto. Subcontractor shall abide by all requirements of the General Contract relating to the submission of schedule and other information related to the performance of Subcontractor's Work not less than 14 days prior to the time when Contractor is required to provide such materials to Owner under the General Contract, except where Contractor directs otherwise. Subcontractor shall, at no additional cost, provide updates, additional or further detailed schedules and other information as frequently and in whatever form Contractor may request, including but not limited to (1) manpower and cost loaded schedules; (2) information related to its operations as a whole, including but not limited to identifying lower tier subcontractors and suppliers and the status of payments to such subcontractors and suppliers; (3) unions and related benefit funds associated with labor used in the performance of the Work; (4) credit sources and banks providing financing or loans in connection with the performance of the Work or Subcontractor's operations as a whole and any covenants and requirements imposed upon Subcontractor in connection therewith and the status of Subcontractor's compliance with such covenants and requirements; and (5) the status of orders, fabrication and delivery of materials and arrangements for the provision of labor. The foregoing information shall include names and contact information, and Subcontractor acknowledges and agrees that Contractor may contact any persons or entities as it deems necessary to verify or obtain such information.

Subcontractor shall establish and maintain a reasonable accounting system by which records are kept that enable Contractor to readily identify all of Subcontractor's expenses, costs, payments (including to its workers, subcontractors and suppliers, unions, and benefit funds), obligations, budgets, and other financial information related to the Work or this Subcontract. Such records shall include, but not be limited to, all accounting records, written policies and procedures, subcontract files for all tiers, payment vouchers, ledgers, cancelled checks, contract amendments, change order information, insurance documents, and other similar information. Contractor shall have the right to audit, examine, and make copies of all such records (whether written, electronic or another format) as Contractor may determine, and Subcontractor shall facilitate and cooperate with Contractors efforts in this regard. Subcontractor shall impose similar obligations on its subcontractors and vendors to ensure that comparable records kept and Contractor has the right to audit, examine and copy those records.

Delays by Subcontractor

Should the progress of the Work or of the Project be delayed, disrupted, hindered, obstructed, or interfered with by any fault or neglect or act or failure to act of the Subcontractor or any of its officers, agents, servants, employees, subcontractors or suppliers so as to cause any additional cost, expense, liability or damage to Contractor including legal fees and disbursements incurred by Contractor (whether incurred in defending claims arising from such delay or in seeking reimbursement and indemnity from the Subcontractor and its surety hereunder or otherwise) or to the Owner or any damages or additional costs or expenses for which Contractor or the Owner may or shall become liable, the Subcontractor and its surety shall and does hereby agree to compensate Contractor and the Owner for and indemnify them against all such costs, expenses, damages and liability.

Overtime

If the progress of the Work or of the Project be delayed by any fault or neglect or act or failure to act of the Subcontractor or any of its officers, agents, servants, employees, subcontractors or suppliers, then the Subcontractor shall, in addition to all of the other obligations imposed by this Agreement upon the Subcontractor in such case, and at its own cost and expense, work such overtime as may be necessary to make up for all time lost in the completion of the Work and of the Project due to such delay. Should the Subcontractor fail to make up for the time lost by reason of such delay, Contractor shall have the right to cause other Subcontractors to work overtime and to take whatever other action it deems necessary to avoid delay in the completion of the Work and of the Project, and the cost and expense of such overtime and/or such other action shall be borne by the Subcontractor.

Contractor, if it deems necessary, may direct the Subcontractor to work overtime and, if so directed, the Subcontractor shall work said overtime and, provided that the Subcontractor is not in default under any of the terms or provisions of this Agreement or of any of the other Contract Documents and the direction to work overtime was not due in whole or in part to any fault or failure of Subcontractor, Contractor will pay the Subcontractor only for such actual additional wages paid, if any, at rates which have been approved by Contractor plus taxes imposed by law on such additional wages, plus workers' compensation insurance, liability insurance and levies on such additional wages if required to be paid by the Subcontractor to comply with Subcontractor's obligations under this Agreement. Subcontractor acknowledges that in the event that it may intend to pursue a claim of inefficiency, loss of productivity or other similar or related request for additional compensation, Subcontractor may rely only on evidence indicating the actual inefficiency, loss of productivity or other similar consequence as it occurred on the Project and agrees that no reports, analyses, data, industry or academic studies or any other evidence that do not exclusively rely on and pertain to the Work performed at the Project shall be used or in any way considered, in whole or in part, in connection with the resolution of such a claim, whether by Contractor or any forum for dispute resolution.

Price

ARTICLE IV. The sum to be paid by Contractor, out of funds received from the owner, to the Subcontractor for the satisfactory performance and completion of the Work and of all of the duties, obligations and responsibilities of the Subcontractor under this Agreement and the other Contract Documents shall be **SDS** (Hereinafter called the Price) subject to additions and deductions as herein provided.

The Price includes all Federal, State, County, Municipal and other taxes imposed by law and based upon labor, services, materials, equipment or other items acquired, performed, furnished or used for and in connection with the Work, including but not limited to sales, use and personal property taxes payable by or levied or assessed against the Owner, Contractor or the Subcontractor. Where the law requires any such taxes to be stated and charged separately, the total price of all items included in the Work plus the amount of such taxes shall not exceed the Price.

Progress Payments

On or before the last day of each month the Subcontractor shall submit to Contractor, in the form required by Contractor, a written requisition for payment showing the proportionate value of the Work installed to that date, from which shall be deducted: a reserve of **SDS** ; all previous payments; all amounts and claims against Subcontractor, by Contractor or any third party, for which Subcontractor is responsible hereunder; and all charges for services, materials, equipment and other items furnished by Contractor to or chargeable to the Subcontractor; and the balance of the amount of such requisition, as approved by Contractor and the Architect and for which payment has been received by Contractor from the Owner, shall be due and paid to the Subcontractor on or about the fifteenth (15th) day of the succeeding month or in accordance with the Contract Documents. Contractor shall have the right, at its sole discretion, to issue payments to Subcontractor by way of joint checks to Subcontractor and suppliers and/or vendors of Subcontractor, and Subcontractor agrees to cooperate fully in facilitating the making of such joint payments.

Payments in General

The obligation of Contractor to make a payment under this Agreement, whether a progress or final payment, or for extras or change orders or delays to the Work, is subject to the express condition precedent of payment therefor by the Owner. If Contractor has provided payment or performance bonds or a combination payment and performance bond, the obligation of Contractor and its Surety under any of those bonds to make any payment (whether a progress payment or final payment) to a claimant on that bond is similarly subject to the express condition precedent of payment therefor by the Owner.

The Subcontractor shall submit with its first requisition for payment a detailed schedule showing the breakdown of the Price into its various parts for use only as a basis of checking the Subcontractor's monthly requisitions.

Contractor reserves the right to advance the date of any payment (including the final payment) under this Agreement if, in its sole judgment, it becomes desirable to do so.

The Subcontractor agrees that, if and when requested to do so by Contractor, it shall furnish such information, evidence and substantiation as Contractor may require with respect to the nature and extent of all obligations incurred by the Subcontractor for or in connection with the Work, all payments made by the Subcontractor thereon, and the amounts remaining unpaid, to whom and the reasons therefor.

Final Payment

Final payment to the Subcontractor shall be made only with funds received by Contractor from the Owner, the Construction Lender or the Owner's Agent as final payment for Work under the General Contract. Final payment to Contractor by the Owner shall be an express condition precedent that must occur before Contractor shall be obligated to make final payment to the Subcontractor. In addition, final payment by Contractor to the Subcontractor shall not become due and payable until the following other express conditions precedent have been met: (1) the completion and acceptance of the Work by Contractor and the Architect; (2) provision by the Subcontractor of evidence satisfactory to Contractor that there are no claims, obligations or liens outstanding or unsatisfied for labor, services, materials, equipment, taxes or other items performed, furnished, or incurred for or in connection with the Work; (3) execution and delivery by the Subcontractor, in a form satisfactory to Contractor of a general release running to and in favor of Contractor and the Owner; and (4) complete and full satisfaction of all claims, demands and disputes, and all obligations and responsibilities of Subcontractor, arising out of or related to the Subcontract, including those as between Contractor and Subcontractor as well as those between Subcontractor and any third party. Should there be any such claim, obligation or lien or unsatisfied obligation or responsibility whether before or after final payment is made, the Subcontractor shall pay, refund or deliver to Contractor (1) all monies that Contractor and/or the Owner shall pay in satisfying, discharging or defending against any such claim, obligation or lien or any action brought or judgment recovered thereon and all costs and expenses, including legal fees and disbursements, incurred in connection therewith; and (2) such amounts as Contractor or Owner shall, in their sole discretion, determine to be an amount sufficient to protect Contractor and Owner therefrom (in lieu of payment of such amounts, Subcontractor may, at Owner's and Contractor's sole discretion, deliver a bond satisfactory to Contractor and Owner). Such refund and payment shall be made within ten (10) days of request by Contractor to Subcontractor for same. The final payment shall be due within forty (40) days after all of these express conditions precedent have been met.

Liens by Others

If any claim or lien is made or filed with or against Contractor, the Owner, the Project, the Premises or the Project funds by any person claiming that the Subcontractor or any subcontractor or other person under subcontract to Subcontractor, or any person or entity employed or engaged by or through Subcontractor at any tier, has failed to make payment for any labor, services, materials, equipment, taxes or other items or obligations furnished or incurred for or in connection with the Work, or if any such claim or lien is filed or presented, or if Contractor, in good faith, believes that such a claim or lien may be filed or brought, or if at any time there shall be evidence of such nonpayment or of any claim or lien for which, if established, Contractor or the Owner might become liable and which is chargeable to the Subcontractor, or if the Subcontractor or any subcontractor or other person under subcontract to Subcontractor, or any person or entity employed or engaged by or through Subcontractor at any tier causes damage to the Work or to any other work on the Project, or if the Subcontractor fails to perform or is otherwise in default under any of the terms or provisions of this Agreement, Contractor shall have the right (A) to retain from any payment then due or thereafter to become due an amount which it deems sufficient to (1) satisfy, discharge and/or defend against any such claim or lien or any action which may be brought or judgment which may be recovered thereon, (2) make good any such nonpayment, damage, failure or default, and (3) compensate Contractor and the Owner for and indemnify and hold them harmless against any and all losses, liability, damages, costs and expenses, including legal fees and disbursements, which may be sustained or incurred by either or both of them in connection therewith ; and (B) to demand that Subcontractor provide, within ten (10) days of Contractor's request therefore, proof to the satisfaction of Contractor and Owner that such non-payment, claim or lien has been fully satisfied, dismissed and discharged. Upon the failure of Subcontractor to fulfill the requirements of a demand issued by Contractor pursuant to subsection (B) above, Contractor may, in such manner as Contractor may in its sole discretion determine, secure the satisfaction, dismissal and discharge of such claim, by payment or otherwise, and Subcontractor shall within ten (10) days of demand therefore, be liable for and pay to Contractor all amounts (including legal fees and disbursements) incurred or suffered by Contractor or Owner arising out of or related thereto. Contractor shall, in addition, have the right to apply and charge against the Subcontractor so much of the amount retained as may be required for the foregoing purposes. Subcontractor further agrees to indemnify, hold harmless and defend Contractor and Owner, upon demand, for any and all such claims, liens, and the costs, expenses (including legal fees and disbursements), damages and liabilities arising out of or related thereto. Subcontractor acknowledges (1) that discharge of such liens or claims by bond imposes liability upon a surety and Contractor, and (2) that Contractor is not required to discharge such lien or claims by bond when exercising its rights hereunder. Subcontractor agrees that should there be any amounts due or which may become due to Subcontractor in connection with any other subcontracts between Contractor and Subcontractor or other obligations that Contractor may have to Subcontractor, Contractor shall be entitled to withhold payment under such other subcontract or obligations to the extent that Contractor believes that the unpaid balance of this Subcontract may not be adequate to satisfy Subcontractor’s obligations to Contractor hereunder.

Effect of Payment

No payment (final or otherwise) made under or in connection with this Agreement shall be conclusive evidence of the performance of the Work or of this Agreement, in whole or in part, and no such payment shall be construed to be an acceptance of defective, faulty or improper work or materials nor shall it release the Subcontractor from any of its obligations under this Agreement; nor shall entrance and use by the Owner constitute acceptance of the Work or any part thereof. The failure of Subcontractor to fully perform and satisfy any or all obligations set forth in this Article IV shall constitute a default, entitling Contractor to take action as described in Article XI.

Subcontractor acknowledges and agrees that to the extent that payments received by Subcontractor include amounts for Work performed by subcontractors to Subcontractor or services or materials provided to Subcontractor by suppliers, vendors, workers employed by or through Subcontractor, all such payments received by Subcontractor shall be deemed to have been received by Subcontractor as trustee with those entitled to receive payment from Subcontractor as beneficiaries of such amounts, and Subcontractor shall hold such funds separately and utilize such amounts only for the purpose of making payment to these beneficiaries. In the event that Subcontractor subsequently determines that a beneficiary is not entitled to receipt of payment, Subcontractor shall return such unpaid funds to Contractor.

Extension of Time & Delays

ARTICLE V. Should the Subcontractor be delayed, obstructed, hindered or interfered with in the commencement, prosecution or completion of the Work by any cause including but not limited to any act, omission, neglect, negligence or default of Contractor or of anyone employed by Contractor or by any other contractor or subcontractor on the Project, or by the Architect, the Owner or their contractors, subcontractors, agents or consultants, or by damage caused by fire or other casualty or by the combined action of workers or by governmental directive or order in no way chargeable to the Subcontractor, or by any extraordinary conditions arising out of war or government regulations, or by any other cause beyond the control of and not due to any fault, neglect, act or omission of the Subcontractor, its officers, agents, employees, subcontractors or suppliers, then except where the General Contract has specific requirements at variance with the foregoing, in which case the requirements of the General Contract shall govern, the Subcontractor shall be entitled to an extension of time for a period equivalent to the time lost by reason of any and all of the aforesaid causes; provided, however, that the Subcontractor shall not be entitled to any such extension of time unless the Subcontractor (1) notifies Contractor in writing of the cause or causes of such delay, obstruction, hindrance or interference within forty eight (48) hours of the commencement thereof and (2) demonstrates that it could not have anticipated or avoided such delay, obstruction, hindrance or interference and has used all available means to minimize the consequences thereof. Subcontractor acknowledges that provision of such notice is an essential condition precedent to Subcontractor's rights in connection with any such delays, obstructive hindrances or interferences to Contractor's ability to fully identify, and expeditiously, address and avoid such cause or causes, and, accordingly, Subcontractor expressly waives all rights with respect to any such cause or causes for which notice hereunder was not provided. Notwithstanding the foregoing, if the General Contract is at variance with granting such time extension, then the provisions of the General Contract shall control.

The Subcontractor agrees that it shall not be entitled to nor claim any cost reimbursement, compensation or damages for any delay, obstruction, hindrance or interference to the Work except to the limited extent that Contractor has actually recovered corresponding cost reimbursement, compensation or damages from the Owner under the Contract Documents for such delay, obstruction, hindrance or interference, and then only to the extent of the amount, if any, which Contractor on behalf of the Subcontractor, actually received from the Owner on account of such delay, obstruction, hindrance or interference. Notwithstanding any term or provision herein to the contrary, Subcontractor expressly waives and releases all claims or rights to recover lost profit (except for profit on work actually performed), recovery of overhead (including home office overhead), and any other indirect damages, costs or expenses in any way arising out of or related to the Agreement, including the breach thereof by Contractor, delays, charges, acceleration, loss of efficiency or productivity disruptions and interferences with the performance of the work.

It shall be an express condition precedent to any obligation on the part of Contractor to make payment of any such cost, reimbursement, compensation or damages to the Subcontractor hereunder that Contractor shall first be determined to be entitled to such compensation on behalf of the Subcontractor and then receive such payment from Owner, and Subcontractor expressly acknowledges that Contractor is not obligated or required to pursue Subcontractor claims as against Owner if Contractor, in its sole discretion, after review of Subcontractor's claim, has deemed the claim to lack merit in whole or in part.

The Subcontractor agrees that it shall contribute a fair and proportionate share of the costs of advancing the claims of the Subcontractor for delay, including but not limited to legal and other professional fees.

Freight Charges & Shipments

ARTICLE VI. The Subcontractor in making or ordering shipments shall not consign or have consigned materials, equipment or any other items in the name of Contractor. Contractor is under no obligation to make payment for charges on shipments made by or to the Subcontractor but may, at its option, pay such charges, in which case the Subcontractor shall reimburse Contractor for the amount of such payments plus a service charge of twenty-five percent (25%) of the amount so paid.

Dimensions

ARTICLE VII. Notwithstanding the dimensions on the Plans, Specifications and other Contract Documents it shall be the obligation and responsibility of the Subcontractor to take such measurements as will ensure the proper matching and fitting of the Work covered by this Agreement with contiguous work.

Shop Drawings

The Subcontractor shall prepare and submit to Contractor such shop drawings as may be necessary to describe completely the details and construction of the Work. Approval of such shop drawings by Contractor and/or the Architect shall not relieve the Subcontractor of its obligation to perform the Work in strict accordance with the Plans, Specifications, the Additional Provisions hereof and the other Contract Documents, nor of its responsibility for the proper matching and fitting of the Work with contiguous work and the coordination of the Work with other work being performed on the site, which obligation and responsibility shall continue until completion of the Work.

The Subcontractor’s submission of a shop drawing to Contractor shall constitute the Subcontractor’s representation, upon which Contractor may rely, that the Subcontractor has reviewed the submission for accuracy and compliance with all Contract Documents and that wherever engineering is required to be performed, same has been performed by a qualified and licensed engineer. Furthermore, the review of the Shop Drawing by Contractor shall not constitute an undertaking by Contractor to identify deficiencies in the submission, that being an undertaking within the sole responsibility of the Subcontractor.

Contiguous Work

Should the proper and accurate performance of the Work hereunder depend upon the proper and accurate performance of other work not covered by this Agreement, the Subcontractor shall carefully examine such other work, determine whether it is in fit, ready and suitable condition for the proper and accurate performance of the Work hereunder, use all means necessary to discover any defects in such other work, and before proceeding with the Work hereunder, report promptly any such improper conditions and defects to Contractor in writing and allow Contractor a reasonable time to have such improper conditions and defects remedied. Should Subcontractor fail to comply with the requirements of this Article, Subcontractor shall bear all costs incurred by Contractor, Owner and other subcontractors, and shall not be entitled to extensions of time and adjustments in Price, that could have been avoided by Subcontractor's compliance with the requirements of this Article.

Interpretation of Plans & Specifications

ARTICLE VIII. The Work hereunder is to be performed and furnished under the direction and to the satisfaction of both the Architect and Contractor. The decision of the Architect as to the true construction, meaning and intent of the Plans and Specifications shall be final and binding upon the parties hereto. Contractor will furnish to the Subcontractor such additional information and Plans as may be prepared by the Architect to further describe the Work to be performed and furnished by the Subcontractor and the Subcontractor shall conform to and abide by the same.

The Subcontractor shall not make any changes, additions and/or omissions in the Work except upon written order of Contractor as provided in Article IX hereof.

Change Orders, Additions & Deductions

ARTICLE IX. Contractor reserves the right, from time to time, whether the Work or any part thereof shall or shall not have been completed, to make changes, additions and/or omissions in the Work as it may deem necessary, upon written order to the Subcontractor. The value of the work to be changed, added or omitted shall be stated in said written order and shall be added to or deducted from the Price.

The value of the work to be changed, added or omitted shall be determined by the lump sum or unit prices, if any, stipulated herein for such work. If no such prices are stipulated, such value shall be determined by whichever of the following methods or combination thereof Contractor may elect:

(a) By adding or deducting a lump sum or an amount determined by a unit price agreed upon between the parties hereto.

(b) By adding (1) the actual net cost to the Subcontractor of labor in accordance with the established rates, including required union benefits, premiums the Subcontractor is required to pay for workmen's compensation and liability insurance, and payroll taxes on such labor, (2) the actual cost to the Subcontractor of materials and equipment and such other direct costs as may be approved by Contractor less all savings, discounts, rebates and credits, (3) an allowance of **SDS** for overhead on items (1) and (2) above, and (4) an allowance of **SDS** for profit on items (1), (2) and (3) above.

Should the parties hereto be unable to agree as to the value of the work to be changed, added or omitted, the Subcontractor shall proceed with the work promptly under the written order of Contractor from which order the stated value of the work shall be omitted, and the determination of the value of the work, if not resolved in the normal course, shall be addressed pursuant to the dispute resolution procedures in accordance with Article XIX.

In the case of omitted work Contractor shall have the right to withhold from payments due or to become due to the Subcontractor an amount which, in Contractor's opinion, is equal to the value of such work until such time as the value thereof is determined by agreement or by the Architect as hereinabove provided.

All changes, additions or omissions in the Work ordered in writing by Contractor shall be deemed to be a part of the Work hereunder and shall be performed and furnished in strict accordance with all of the terms and provisions of this Agreement and the other Contract Documents. Subcontractor accepts the responsibility to keep its surety informed of all such modifications to its contract. The obligations of Subcontractor and Subcontractor's Surety shall not be reduced, waived or adversely affected by the issuance of such change orders, additions or deductions even if Subcontractor fails to inform Surety of same and Contractor shall not be required to obtain consent of the Surety to such modifications.

Subcontractor shall provide Contractor with written notice of any circumstance or direction given by Contractor which Subcontractor may regard as a change, addition and/or omission or which may otherwise serve as the basis for a request for an increase in Price or extension of time within 5 days of the receipt of the direction or the occurrence of the event giving rise to such a request. Such written notice shall provide a full explanation of the circumstances or direction and the extent of the increase and extension sought, including a detailed breakdown and analysis supporting such request. Failure of the Subcontractor to provide such written notice shall constitute a waiver of Subcontractor's right to any such increase or extension.

Subcontractor acknowledges that the General Contract may include provisions whereby Contractor is required to provide notice, information, reports and analyses in the event that Contractor intends to pursues or which may affect Contractor's right's to an extension of time or increase in Contractor's price to the Owner, whether by way of change order or otherwise, and that the failure to provide such notice, information, reports and analyses may result in a waiver or forfeiture of the right to such an extension or increase. Accordingly, Subcontractor agrees that Subcontractor shall provide all such notices, information, reports and analyses to Contractor, in the same form, content and manner as Contractor is required to provide to Owner under the General Contract in the event that Subcontractor intends to pursue an extension of time or increase in Price. Subcontractor shall provide all such notices, information, reports and analyses to Contractor not later than 3 business days prior to the time by which Contractor must submit corresponding notice, information, reports and analyses to Owner so that Contractor can pursue like extensions and /or increases in Contractor's price from the Owner. Subcontractor acknowledges that its failure to comply with the terms of this paragraph may result in the loss of or prejudice to Contractor's ability to receive adjustments and extensions time from Owner. Subcontractor therefore agrees that it shall be deemed to have waived and forfeited all such rights in the event that it fails to provide notice, information, reports and analyses to Contractor as required by this Article. The terms and provisions of the paragraph are neither intended to relieve Subcontractor of the obligation to provide timely notices, information, reports and analyses, nor to extend shorter durations, required by the Contract Documents.

Notwithstanding the forgoing, the Subcontractor agrees that it shall not be entitled to nor claim any cost reimbursement, compensation, damages or extensions of time attributable to any changes, additions and/or omissions directed by Contractor except to the limited extent that Contractor has actually recovered corresponding cost reimbursement, compensation, damages or extensions of time from the Owner under the Contract Documents for such changes, additions and/or omissions and then only to the extent of the amount, if any, which Contractor on behalf of the Subcontractor, actually received from the Owner on account of such delay, obstruction, hindrance or interference. The preceding sentence shall not apply in a situation in which Contractor directed the performance of changes, additions and/or omissions by Subcontractor notwithstanding express language in the General Contract clearly indicating that Contractor is not entitled to recover a corresponding cost reimbursement, compensation, damages or extensions of time from the Owner.

Inspection & Defective Work

ARTICLE X. The Subcontractor shall at all times provide sufficient, safe and proper facilities for the inspection of the Work by Contractor, the Architect, and their authorized representatives in the field, at shops or at any other place where materials or equipment for the Work are in the course of preparation, manufacture, treatment or storage. The Subcontractor shall, within twenty-four (24) hours after receiving written notice from Contractor to that effect, proceed to take down all portions of the Work and remove from the premises all materials whether worked or unworked, which the Architect, Contractor, Owner or any of its design consultants shall condemn as unsound, defective or improper or as in any way failing to conform to this Agreement or the Plans, Specifications or other Contract Documents, and the Subcontractor, at its own cost and expense, shall replace the same with proper and satisfactory work and materials and make good all work damaged or destroyed by or as a result of such unsound, defective, improper or nonconforming work or materials or by the taking down, removal or replacement thereof.

Failure to Prosecute, etc.

ARTICLE XI. Should the Subcontractor at any time, whether before or after final payment or completion of the Work, refuse or neglect to supply a sufficiency of skilled workers or materials of the proper quality and quantity, or fail in any respect to prosecute the Work with promptness and diligence, or cause by any act or omission the stoppage, impede, obstruct, hinder or delay of or interference with or damage to the work of Contractor or of any other contractors or subcontractors on the Project, or fail in the performance of any of the terms and provisions of this Agreement or of the other Contract Documents, or should the Architect, Contractor, Owner or any of its design consultants, determine that the Work or any portion thereof is not being performed in accordance with the Contract Documents, or should there be filed by or against the Subcontractor a petition in bankruptcy or for an arrangement or reorganization, or should the Subcontractor become insolvent or be adjudicated a bankrupt or go into liquidation or dissolution, either voluntarily or involuntarily or under a court order, or make a general assignment for the benefit of creditors, or otherwise acknowledge insolvency, then in any of such events, each of which shall constitute a default hereunder on the Subcontractor's part, Contractor shall have the right, in addition to any other rights and remedies provided by this Agreement and the other Contract Documents or by law, at one time or in phases at Contractor's discretion, after three (3) days written notice to the Subcontractor mailed or delivered to the last known address of the latter, (a) to perform and furnish through itself or through others any such labor or materials for all or any portion of the Work and to deduct the cost thereof from any monies due or to become due to the Subcontractor under this Agreement, (b) to terminate the employment of the Subcontractor for all or any portion of the Work, and/or (c) enter upon the premises and take possession, for the purpose of completing all or any portion of the Work,, of all materials, equipment, scaffolds, tools, appliances and other items thereon as Contractor may select, all of which the Subcontractor hereby authorizes Contractor to employ and/or communicate with any person or persons in connection with the completion of the Work and/or to provide all the labor, services, materials, equipment and other items required therefor. In case of Contractor taking action under this Article, including termination of the employment of the Subcontractor, the Subcontractor shall not be entitled to receive any further payment under this Agreement until the Work shall be wholly completed to the satisfaction of Contractor, Owner and the Architect and shall have been accepted by them, at which time, if the unpaid balance of the amount to be paid under this Agreement shall exceed the cost and expense incurred by Contractor in completing the Work, such excess shall be paid by Contractor to the Subcontractor; but if such cost and expense shall exceed such unpaid balance, then the Subcontractor and its surety, if any, shall pay the difference to Contractor. Such cost and expense shall include, not only the cost of completing the Work to the satisfaction of Contractor and the Architect and of performing and furnishing all labor, services, materials, equipment, and other items required therefore, but also all losses, damages, costs and expenses, (including legal fees and disbursements incurred in connection with reprocurement, in defending claims arising from such default and in seeking recovery of all such cost and expense from the Subcontractor and/or its surety), and disbursements sustained, incurred or suffered by reason of or resulting from the Subcontractor's default. Should Contractor take action by effectuating the provisions of this paragraph, and should it subsequently be determined that such action, including a termination effectuated by the terms of this Article, was improper, such termination shall be treated as a termination for convenience pursuant to Article XXI below. Subcontractor hereby transfers and assigns to Contractor the all rights under agreements that Subcontractor may have with subcontractors to Subcontractor, suppliers and vendors in connection with the Work or the Project, which transfers and assignments may be accepted at Contractor's sole discretion in the event that Contractor has taken action under this Article. Subcontractor agrees to fully cooperate with Contractor in pursuing Contractor's rights hereunder and that Contractor shall not be required to defer or delay action taken pursuant to this Article during the pendency of any review, investigation, evaluation or assessment by Subcontractor or its surety.

It is recognized that if the Subcontractor institutes or has instituted against it a case under Title 11 of the United States Code (Bankruptcy Code), such event could impair or frustrate the Subcontractor's performance of this Agreement. Accordingly, it is agreed that upon the occurrence of any such event, Contractor shall be entitled to request of Subcontractor or its trustee or other successor adequate assurances of future performance. Failure to comply with such request within ten (10) days of delivery of the request shall entitle Contractor, in addition to any other rights and remedies provided by this Agreement or by law, to terminate this Agreement. Pending receipt of adequate assurances of performance and actual performance in accordance herewith, Contractor shall be entitled to perform and furnish through itself or through others any such labor, materials or equipment for the Work as may be necessary to maintain the progress of the Work and to deduct the cost thereof from any monies due or to become due to the Subcontractor under this Agreement. In the event of such bankruptcy proceedings, this Agreement shall terminate if the Subcontractor rejects this Agreement or if there has been a default and the Subcontractor is unable to give adequate assurance that it will perform as provided in this Agreement or otherwise is unable to comply with the requirements for assuming this Agreement under the applicable provisions of the Bankruptcy Code.

Subcontractor, in addition to any other rights available to Contractor hereunder, agrees to indemnify, hold harmless and defend Contractor from and against any and all claims, demands, suits, damages, judgments, liabilities, costs and expenses (including legal fees and disbursements) arising out of or related to Subcontractor's breach of any term of the Agreement.

Loss or Damage to Work

ARTICLE XII. Contractor shall not be responsible for any loss or damage to the Work to be performed and furnished under this Agreement, however caused, until after final acceptance thereof by Contractor and the Architect, nor shall Contractor be responsible for loss of or damage to materials, tools, equipment, appliances or other personal property owned, rented or used by the Subcontractor or anyone employed by it in the performance of the Work, however caused.

Builder's Risk Insurance

Contractor or Owner shall effect and maintain All-Risk Builder's Risk insurance in accordance with the Contract Documents upon all Work, materials and equipment incorporated in the Project and all materials and equipment on or about the Premises intended for permanent use or incorporation in the Project or incident to the construction thereof, the capital value of which is included in the cost of the Work, but not including any contractors' machinery, tools, equipment or other personal property owned, rented or used by the Subcontractor or anyone employed by it in the performance of the Work.

A loss insured under Contractor or the Owner's All-Risk Builder's Risk insurance shall be adjusted by the Contractor or the Owner as fiduciary and made payable to Contractor or the Owner as fiduciary for the Insureds, as their interests may appear. Contractor or the Owner shall pay Subcontractors their just shares of insurance proceeds received by Contractor or the Owner, and by appropriate agreements, written where legally required for validity, and shall require Subcontractors to make payments to their subcontractors in a similar manner.

Cleaning Up

ARTICLE XIII. The Subcontractor shall, at its own cost and expense, (1) keep the Premises free at all times from all waste materials, packaging materials and other rubbish accumulated in connection with the execution of its Work by collecting and depositing said materials and rubbish in locations or containers as designated by Contractor from which it shall be removed by Contractor from the Premises without charge, (2) clean and remove from its own Work and from all contiguous work of others any soiling, staining, mortar, plaster, concrete or dirt caused by the execution of its Work and make good all defects resulting therefrom (3) at the completion of its Work in each area, perform such cleaning as may be required to leave the area "broom clean", and (4) at the entire completion of its Work, remove all of its tools, equipment, scaffolds, shanties and surplus materials. Should the Subcontractor fail to perform any of the foregoing to Contractor's satisfaction, Contractor shall have the right to perform and complete such work itself or through others and charge the cost thereof to the Subcontractor.

Ethics & Compliance

ARTICLE XIV. The Subcontractor shall obtain and pay for all necessary permits and licenses pertaining to the Work and shall comply with all Federal, State, Municipal and local laws, ordinances, codes, rules, regulations, standards, orders, notices and requirements, including but not limited to those relating to safety, storm water management, discrimination in employment, fair employment practices, immigration laws or equal employment opportunity, and whether or not provided for by the Plans, Specifications, General Conditions, or other Contract Documents, without additional charge or expense to Contractor and shall also be responsible for and correct, at its own cost and expense, any violations thereof resulting from or in connection with the performance of its Work. Each requisition for payment shall constitute a representation and warranty that Subcontractor is in compliance with applicable law.

The Subcontractor shall at any time upon demand furnish such proof as Contractor may require showing such compliance and the correction of such violations. The Subcontractor agrees to save harmless and indemnify Contractor from and against any and all loss, injury, claims, actions, proceedings, liability, damages, fines, penalties, costs and expenses, including legal fees and disbursements, caused or occasioned directly or indirectly by the Subcontractor's failure to comply with any of said laws, ordinances, rules, regulations, standards, orders, notices or requirements or to correct such violations therefore resulting from or in connection with the performance of Work.

The Immigration and Nationality Act as amended by the Immigration Reform and Control Act of 1986 (IRCA) makes it illegal for employers to knowingly hire persons who are not authorized to work in the United States. For all employees, employers are required to complete an Employment Eligibility Verification form I-9 which requires the prospective employee to produce documentation that establishes identity and employment eligibility. For more information visit www.uscis.gov, or speak to your attorney. Each subcontractor is solely responsible for properly completing Employment Eligibility Verifications for their own employees.

Subcontractor acknowledges represents and warrants that Subcontractor is aware of and understands IRCA, that Subcontractor is in compliance with IRCA, and that Subcontractor is not knowingly employing workers who are not authorized to work in the United States. Subcontractor agrees that Subcontractor will not employ any worker under this subcontract for whom Subcontractor has not completed and maintained I-9 verification. Subcontractor agrees that if Subcontractor acquires knowledge (constructive or otherwise, including receipt of a "no match" letter from Social Security Administration) indicating that one of Subcontractor's workers on this project may not be authorized to work in the United States, despite Subcontractor having conducted a facially valid I-9 verification, that Subcontractor will exercise due diligence as required by law to confirm authorization status and take appropriate action which may include termination of employment. Subcontractor represents and warrants that they will not subcontract to or utilize labor sources that it knows or has reason to know violate IRCA.

Contractor has a longstanding reputation for honesty and integrity in its business dealings and for its corporate policies promoting lawful and ethical behavior. Contractor is committed to upholding that reputation and has adopted a Standard of Business Conduct Policy Statement which governs the actions of all of its employees. Pursuant to that Policy Statement, Contractor employees are prohibited from accepting bribes or kickbacks in any form and, further, are prohibited from accepting goods or services provided by a subcontractor, supplier or vendor for the personal benefit of the employee, his or her relatives, or any entity in which the employee or his or her relatives has a personal interest. This prohibition includes, but is not limited to; work performed on an employee's residence and applies regardless of whether the beneficiary of the goods or services pays for them. Therefore, if the Subcontractor offers or provides a bribe or kickback to any employee, or offers or provides goods or services to any employee, his or her relatives, or any entity in which the employee or his or her relatives has a financial interest, the Subcontractor will be considered to be in material breach of this Subcontract. Subcontractor undertakes the commitment to advise Contractor of any action by any entity or person associated with the project that Subcontractor believes violates any applicable law, rule or regulation. Subcontractor's violation of any of the foregoing shall be considered as Subcontractor's failure to perform its obligations under the terms and conditions of this Agreement. Such failure shall be considered adequate and justifiable grounds for Contractor to effectuate its rights and remedies under the provisions of Article XI of this Agreement.

The provisions of this Article must be incorporated into any subcontract Subcontractor enters into in connection with the performance of the Work.

Harassment

ARTICLE XV. It is the goal of Contractor to promote a work environment at the Project that is free from harassment of any kind. Contractor has ZERO TOLERANCE for harassment, including harassment on the basis of race, sex, gender, gender identity, gender expression, transgender status, sexual orientation, pregnancy, childbirth and other pregnancy-related conditions, color, national origin, ancestry, age, religious creed, citizenship, marital status (including registered domestic partners), parental status, physical disability, mental disability, medical condition, genetic information, military or veteran status (including protected veteran status), or any other characteristic or status protected by law. Subcontractor agrees to be bound by the Policy Statement on Harassment referenced in Article XXIII below, and any violation or suspected violation of such policy by Subcontractor or any of its officers, agents, servants, employees, subcontractors or suppliers shall be considered as Subcontractor's failure to perform its obligations under the terms and conditions of this Agreement. Such failure shall be considered adequate and justifiable grounds for Contractor to effectuate its rights and remedies under the provisions of Article XI of this Agreement. Subcontractor shall actively promote a harassment-free work environment among its officers, agents, servants, employees, subcontractors, and suppliers.

Labor to be Employed

ARTICLE XVI. The Subcontractor shall not employ workers, means, materials or equipment or assign work in any manner which may cause strikes, work stoppages or any disturbances by workers employed by the Subcontractor, Contractor or other contractors or subcontractors on or in connection with the Work or the Project or the location thereof. The Subcontractor agrees that all disputes as to jurisdiction of trades shall be adjusted in the manner or by a process that Contractor may require, including, if Contractor so requires, in accordance with any plan for the settlement of jurisdictional disputes to which Contractor may be bound in connection with the Project which may be in effect either nationally or in the locality in which the Work is being done. Subcontractor agrees that it shall assign work consistent with any such plan and shall be bound and abide by all such adjustments and settlements of jurisdictional disputes, provided that the provisions of this Article shall not be in violation of or in conflict with any provisions of law applicable to the settlement of such disputes. Should the Subcontractor fail to carry out or comply with any of the foregoing provisions, Contractor shall have the right, in addition to any other rights and remedies provided by this Agreement or the other Contract Documents or by law, after three (3) days written notice mailed or delivered to the last known address of the Subcontractor, to terminate this Agreement or any part thereof or the employment of the Subcontractor for all or any portion of the Work, and, for the purpose of completing the Work, to enter upon the Premises and take possession, in the same manner, to the same extent and upon the same terms and conditions as set forth in Article XI of this Agreement.

The Project or General Contract may be subject to Federal prevailing wage requirements, such as the Davis-Bacon Act or the Walsh-Healy Act, or other similar laws, statutes or requirements at a state or local level. Subcontractor shall strictly comply with all applicable prevailing wage laws, statutes or requirements and shall maintain such records as necessary to establish the amount of wages and other compensation paid to workers in connection with the Project and shall submit to Turner, as a condition for payment, certified payrolls in the form prescribed by any such laws, regulations or requirements. Subcontractor expressly agrees that the indemnification obligations set forth in this Agreement shall apply to any violations by Subcontractor of any such laws, statutes or regulations and the failure to maintain records as required herein.

Taxes & Contributions

ARTICLE XVII. The Subcontractor for the Price herein provided, hereby accepts and assumes exclusive liability for and shall indemnify, protect and save harmless Contractor and the Owner from and against the payment of:

1. All contributions, taxes or premiums (including interest and penalties thereon) which may be payable under the Unemployment Insurance Law of any State, Federal Social Security Act, Federal, State, County and/or Municipal Tax Withholding Laws, or any other law, measured upon the payroll of or required to be withheld from employees, by whomsoever employed, engaged in the Work to be performed and furnished under this Agreement.
2. All sales, use, personal property and other taxes (including interest and penalties thereon) required by any Federal, State, County, Municipal or other law to be paid or collected by the Subcontractor or any of its subcontractors or vendors or any other person or persons acting for, through or under it or any of them, by reason of the performance of the Work or the acquisition, ownership, furnishing or use of any materials, equipment, supplies, labor, services or other items for or in connection with the Work.
3. All pension, welfare, vacation, annuity and other union benefit contributions payable under or in connection with labor agreements with respect to all persons, by whomsoever employed, engaged in the Work to be performed and furnished under this Agreement.

In furtherance of, and in addition to the agreements, duties obligations and responsibilities of the Subcontractor with respect to the payment of sales, use, personal property and other taxes set forth in Articles IV and XVII of this Agreement, the Subcontractor agrees to reimburse and otherwise indemnify Contractor and the Owner for any expenses, including legal fees and litigation arising from, or related to the Subcontractor's failure to pay any sales, use, personal property or other taxes based upon labor, services, materials, equipment or other items acquired, performed, furnished or used for or in connection with the Work.

Patents

ARTICLE XVIII. The Subcontractor hereby agrees to indemnify, protect and save harmless Contractor and the Owner from and against any and all liability, loss or damage and to reimburse Contractor and the Owner for any expenses, including legal fees and disbursements, to which Contractor and the Owner may be put because of claims or litigation on account of infringement or alleged infringement of any letters patent or patent rights by reason of the Work or materials, equipment or other items used by the Subcontractor in its performance.

Disputes

ARTICLE XIX. The parties recognize that problems and disputes between them may occur and that it is preferable for them to reach an amicable resolution of same without the need to resort to formal dispute resolution procedures. In that regard, they each pledge to participate in good faith in voluntary and non-binding Alternate Dispute Resolution (ADR) procedures in the form of a mediation conducted by a neutral mediator, or such other form as the parties otherwise agree, as a condition precedent to addressing the dispute in any other forum unless Contractor agrees in writing to waive this condition precedent. The procedure for requesting such an ADR shall begin with a written notice of request for ADR delivered by one party hereto to the other. Within 14 days following the receipt of such notice, lead representatives of Subcontractor and Contractor shall meet in an effort to resolve the dispute. In the event that the dispute remains unresolved after the lead representatives meeting, a meeting shall take place between the President of Subcontractor and the General Manager or Operations Manager of Contractor within 20 days thereafter. In the event that the dispute remains unresolved after the President/Manager meeting, the parties shall proceed with ADR procedures described in the Article. However, in the event that such disputes are not resolved by mediation or another ADR procedure as Contractor and the Subcontractor may agree then such disputes shall be resolved any of following forums selected at Contractor's sole discretion either (1) the forum pursuant to which disputes between the Owner and Contractor are to be

resolved under the terms of the General Contract, (2) arbitration administered by the American Arbitration Association under the rules pertinent to construction disputes then applicable or (3) in litigation. Furthermore, the Subcontractor agrees that Contractor shall have the exclusive right to join the Subcontractor as a party in any dispute resolution procedure (including without limitation ADR procedures, binding arbitration or other judicial or non-judicial proceeding) in which Contractor may be involved arising out of or in connection with the Project, together with such other subcontractors or parties as may be appropriate, where in the judgment of Contractor the issues in dispute are related to the work or performance of the Subcontractor. In the event that relevant law limits or precludes Contractor's sole discretion in selecting the forum, then the dispute shall be resolved in litigation, unless the Subcontractor is to be joined by Contractor in a proceeding with Owner, in which case the forum shall be as stated in the General Contract. Furthermore, the Subcontractor expressly agrees to waive its right to trial by jury in any dispute involving Contractor and or Contractor's surety. Subcontractor further agrees that in the event that it suffers damages, cost or expenses or otherwise intends to pursue a recovery that arises out of or relates to the performance of work by another subcontractor to or under Contractor, Subcontractor's sole remedy shall be as against that responsible subcontractor and Subcontractor shall not pursue a remedy from Contractor.

Subcontractor shall continue with the diligent performance of Work pursuant to this Subcontract and follow and abide by directions and instructions issued by Contractor during the pendency of any dispute, including dispute resolution procedures, ADR procedures, arbitration or litigation.

All claims, suit or demands by Subcontractor as against Contractor or Owner shall be brought within the earlier of one year following Subcontractor's achieving substantial completion for the Subcontractor's Work or within one year of Contractor's notice of default in the event that Contractor has taken any action in accordance with Article XI, and Subcontractor hereby agrees that all relevant statutes of limitations shall be deemed reduced to such time period, to the fullest extent permitted by law.

Mechanics' Liens & Claims

To the fullest extent permitted by law, Subcontractor for itself and for its subcontractors, laborers and materialmen and suppliers and all others directly or indirectly acting for, through or under it or any of them covenants and agrees that no liens or claims, whether a mechanics' lien or an attested account or otherwise, will be filed or maintained against the Project or Premises or any part thereof or any interests therein or any improvements thereon, or against any monies due or to become due from the Owner to Contractor or from Contractor to the Subcontractor, for or on account of any work, labor, services, materials, supplies, equipment, or other items performed or furnished for or in connection with the Work, and the Subcontractor for itself and its Subcontractors, laborers, and materialmen and suppliers and all others above mentioned does hereby expressly waive, release and relinquish all rights to file or maintain such liens and claims and agrees further that this waiver of the right to file or maintain such liens and claims shall be an independent covenant and shall apply as well to work, labor and services performed and materials, supplies, equipment and other items furnished under any change order or supplemental agreement for extra or additional work in connection with the Project as to the Original Work covered by this Agreement.

If any subcontractor, laborer, materialman or supplier of the Subcontractor or any other person directly or indirectly acting for, through or under it or any of them files or maintains a lien or claim, whether a mechanics' lien or an attested account or otherwise, a mechanic's lien or claim against the Project or Premises or any part thereof or any interests therein or any improvements thereon or against any monies due or to become due from the Owner to Contractor or from Contractor to the Subcontractor, for or on account of any work, labor, services, materials, supplies, equipment or other items performed or furnished for or in connection with the Work or under any change order or supplemental agreement for extra or additional work in connection with the Project, the Subcontractor agrees to cause such liens and claims to be satisfied, removed or discharged at its own expense by bond, payment or otherwise within ten (10) days from the date of the filing thereof, and upon its failure to do so Contractor shall have the right, in addition to all other rights and remedies provided under this Agreement and the other Contract Documents or by law, to cause such liens or claims to be satisfied, removed or discharged by whatever means Contractor chooses, at the entire cost and expense of the Subcontractor (such cost and expense to include legal fees and disbursements). The Subcontractor agrees to indemnify, protect and save harmless Contractor and the Owner from and against any and all such liens and claims and actions brought or judgments rendered thereon, and from and against any and all loss, damages, liability, costs and expenses, including legal fees and disbursements, which Contractor and/or the Owner may sustain or incur in connection therewith.

Assignment & Subletting

ARTICLE XX. To the fullest extent permitted by law, Subcontractor agrees that it shall not assign, sell, transfer, delegate or encumber any rights, duties or obligations arising under this Agreement including, but not limited to, any right to receive payments hereunder, without the prior written consent of Contractor in its sole discretion and the giving of any such consent to a particular assignment shall not dispense with the necessity of such consent to any further or other assignments. In the event Subcontractor assigns, sells, encumbers or otherwise transfers its right to any monies due or to become due under this Agreement as security for any loan, financing or other indebtedness (hereafter "Assignment"), notification to Contractor of such Assignment must be sent by certified mail, return receipt requested, to the Procurement Manager in charge of the business unit responsible for the construction of the Project and the Assignment shall not be effective as against Contractor until Contractor provides its written consent to such Assignment. Subcontractor agrees that any such Assignment shall not relieve the Subcontractor of any of its agreements, duties, responsibilities or obligations under this Agreement and the other Contract Documents and shall not create a contractual relationship or a third party beneficiary relationship of any kind between Contractor and such assignee or transferee. Subcontractor further agrees that all of Contractor's defenses and claims arising out of this Agreement with respect to such Assignment are reserved unless expressly waived in writing by a duly authorized corporate officer. Subcontractor hereby agrees to indemnify and hold harmless Contractor from and against any and all loss, cost, expense or damages Contractor or Owner has or may sustain or incur in connection with such Assignment.

Termination for Convenience

ARTICLE XXI. Contractor shall have the right at any time and for any reason, by written notice to the Subcontractor, to terminate this Agreement without cause and require the Subcontractor to cease work hereunder. In the event of such a termination for convenience, the Subcontractor shall be entitled to payment pursuant to the terms of the Agreement only for all Work performed as of the date of termination, together with reasonable costs of demobilization and such other reasonable costs as may be encountered by the Subcontractor and directly attributable to such termination provided that such amount shall be reduced by all amounts for which Subcontractor is liable or responsible hereunder. However, the Subcontractor shall only be entitled to profit on that portion of the Work actually performed and approved for payment to the date of termination together with retainages held upon payments made prior thereto. Subcontractor waives any claim for loss of anticipated profits or other damages in the event Contractor exercises this clause.

Guarantees

ARTICLE XXII. The Subcontractor hereby guarantees the Work to the full extent provided in the Plans, Specifications, General Conditions, Special Conditions and other Contract Documents.

The Subcontractor shall expeditiously remove, replace and/or repair at its own expense and at the convenience of the Owner any faulty, defective or improper Work, materials or equipment existing or discovered within one (1) year from the date of the acceptance of the Project as a whole by the Architect and the Owner or for such longer period as may be provided in the Plans, Specifications, General Conditions, Special Conditions or other Contract Documents.

Without limiting the generality of the foregoing, the Subcontractor warrants to the Owner, the Architect and Contractor, and each of them, that all materials and equipment furnished under this Agreement will be of first class quality and new, unless otherwise required or permitted by the other Contract Documents, that the Work performed pursuant to this Agreement will be free from defects and that the Work will strictly conform with the requirements of the Contract Documents. Work not conforming to such requirements, including substitutions not properly approved and authorized, shall be considered defective. All warranties contained in this Agreement and in the Contract Documents shall be in addition to and not in limitation of all other warranties or remedies required and/or arising pursuant to applicable law. Failure of Subcontractor to honor and satisfy the foregoing and any other warranties or guarantees required of the Subcontractor under the Contract Documents, shall constitute a default by Subcontractor.

Accident Prevention & Other Policies

ARTICLE XXIII. The Subcontractor agrees that the prevention of accidents to workmen and property engaged upon or in the vicinity of the Work is its responsibility. The Subcontractor agrees to comply with all Federal, State, Municipal and local laws, ordinances, rules, regulations, codes, standards, orders, notices and requirements concerning safety as shall be applicable to the Work, including, among others, the Federal Occupational Safety and Health Act of 1970 and the Clean Water Act, as amended, and all standards, rules, regulations and orders which have been or shall be adopted or issued thereunder, and with the safety standards established or imposed during the progress of the Work by Contractor. When so ordered, the Subcontractor shall stop any part of the Work which Contractor deems potentially unsafe, noncompliant or in violation until corrective measures satisfactory to Contractor have been taken, and the Subcontractor agrees that it shall not have nor make any claim for damages growing out of such stoppages. Should the Subcontractor neglect to take such corrective measures, Contractor may do so at the cost and expense of the Subcontractor and may deduct the cost thereof from any payments due or to become due to the Subcontractor. Failure on the part of Contractor to stop unsafe practices shall in no way relieve the Subcontractor of its responsibility therefor.

This Subcontractor acknowledges the receipt of Contractor's "Corporate Safety, Health and Environmental Policy", “Substance Abuse Policy”, "Equal Employment Opportunity" policy and “Policy Statement on Harassment.” Subject to applicable law this Subcontractor further agrees to be bound to these policies as a part of the supplemental and special conditions to the contract for construction of the project, including any amendments or modifications of such policies that Contractor may issue at any time. Subcontractor further acknowledges that Contractor endeavors to employ on its projects robust programs with respect to safety and storm water management, as well as compliance with relevant laws and regulations, including, without limitation, OSHA and the Clean Water Act. Such programs may include aggressive measures and requirements, such as reporting, training of personnel and inspections that may be considerably above and beyond minimum standards. Subcontractor agrees to comply with any and all requirements Contractor may impose in connection with such programs and policies, whether as part of this Subcontract or hereafter, and the cost and expense of such compliance shall be borne by the Subcontractor.

In the event that hazardous substances of a type of which an employer is required by law to notify its employees are being used or stored on the site by the Subcontractor, the Subcontractor’s subcontractors and anyone directly or indirectly employed or otherwise retained by them or either of them, the Subcontractor shall immediately provide written notice of the chemical composition thereof (including, without limitation, a copy of the applicable Material Safety Data Sheet) to Contractor in sufficient time to permit compliance with such laws by Contractor, other subcontractors and other employers on the site. In the event that the Subcontractor encounters on the site material reasonably believed to be hazardous substances (including, without limitation, asbestos or polychlorinated biphenyl) which has not been rendered harmless, the Subcontractor shall immediately stop Work in the area affected and immediately report the condition to Contractor in writing. Work in the affected area shall resume when such hazardous substances have been rendered harmless or removed as determined by Contractor in its sole and absolute discretion. To the extent of Subcontractor’s responsibilities hereunder, Subcontractor does indemnify and save harmless Contractor from and against any and all loss, injury, claims, actions, proceedings, liability, damages, fines, penalties, cost and expenses, including legal fees and disbursements, caused or occasioned directly or indirectly by the Subcontractor in regard to such hazardous substances.

Assumption of Liability & Indemnity

ARTICLE XXIV. Throughout this Agreement, the “Indemnified Party (ies)” means Contractor, the Owner, any party required to be indemnified pursuant to the General Contract, and any of their respective officers, agents, servants, or employees, and affiliates, parents and subsidiaries. The Subcontractor hereby assumes the entire responsibility and liability for any and all actual or potential damage or injury of any kind or nature whatsoever (including death, business interruption or loss of use resulting therefrom) to all persons and entities, whether employees of the Subcontractor or any tier of the Subcontractor, or otherwise; or to all property; or as a result of a perceived risk of such damage or injury (including actions taken to avoid or contain such actual or potential damage or injury, whether required or incurred by a public authority or otherwise); caused by, resulting from, arising out of or occurring in connection with the execution of the Work, or in preparation for the Work, or any extension, modification, or amendment to the Work by change order or otherwise. Should any claims for such actual or potential damage or injury (including death resulting therefrom) be made or asserted, whether or not such claims are based upon an Indemnified Party’s alleged active or passive negligence or participation in the wrong or upon any alleged breach of any statutory duty or obligation on the part of an Indemnified Party, the Subcontractor agrees to indemnify and save harmless the Indemnified Party from and against any and all such claims and further from and against any and all loss, cost, expense, liability, damage, penalties, fines or injury, including legal fees and disbursements, that the Indemnified Party may directly or indirectly sustain, suffer or incur as a result thereof and the Subcontractor agrees to and does hereby assume, on behalf of the Indemnified Party, the defense of any action at law or in equity which may be brought against the Indemnified Party upon or by reason of such claims and to pay on behalf of the Indemnified Party, upon demand, the amount of any judgment that may be entered against the Indemnified Party in any such action. In the event that any such claims, loss, cost, expense, liability, damage, penalties, fines or injury arise or are made, asserted or threatened against the Indemnified Party, Contractor shall have the right to withhold from any payments due or to become due to the Subcontractor an amount sufficient in its judgment to protect and indemnify the Indemnified Party from and against any and all such claims, loss, cost, expense, liability, damage, penalties, fines or injury, including legal fees and disbursements, or Contractor in its discretion may require the Subcontractor to furnish a surety bond satisfactory to Contractor guaranteeing such protection, which bond shall be furnished by the Subcontractor within five (5) days after written demand has been made therefor.

In furtherance to but not in limitation of the indemnity provisions in this Agreement, Subcontractor hereby expressly and specifically agrees that its obligation to indemnify, defend and save harmless as provided in this Agreement shall not in any way be affected or diminished by any statutory or constitutional immunity it enjoys from suits by its own employees or from limitations of liability or recovery under worker's compensation laws.

IN THE EVENT THAT THE LAW OF THE STATE IN WHICH THE PROJECT IS LOCATED (OR OTHER APPLICABLE LAW) LIMITS THE INDEMNITY OBLIGATIONS OF THE SUBCONTRACTOR, THEN THE INDEMNITY OBLIGATIONS OF THE SUBCONTRACTOR SHALL BE ENFORCED TO THE FULLEST EXTENT PERMITTED BY APPLICABLE LAW, AND THIS ARTICLE SHALL BE CONSTRUED TO CONFORM TO SUCH LAW.

Insurance

ARTICLE XXV. Insurance.

A. Required Insurance

Before commencing the Work, the following insurance coverages from insurance companies satisfactory to Contractor shall be in place and maintained until completion and final acceptance of the Work:

1. WORKERS' COMPENSATION in accordance with laws of the State in which the Work is situated, and EMPLOYERS' LIABILITY INSURANCE in the amount of $1,000,000.

2. COMMERCIAL GENERAL LIABILITY INSURANCE INCLUDING COMPLETED OPERATIONS, CONTRACTUAL LIABILITY INSURANCE AGAINST THE LIABILITY ASSUMED HEREINABOVE, and including INDEPENDENT CONTRACTOR'S LIABILITY INSURANCE if the Subcontractor sublets to another all or any portion of the Work, Personal Injury Liability, Broad Form Property Damage (including completed operations), and Explosion, Collapse and Underground Hazards, with the following minimum limits:(Coverage shall be equivalent to current ISO Occurrence Form). No exclusions or restrictions for Crane usage will be permitted.

   $ **SDS** /Occurrence

   $ **SDS** General Aggregate

Subcontractor has elected to obtain the above insurance coverages set forth in paragraphs 1 and 2 above in the manner set forth in the Subcontractor Election A, B or C (with Subcontractor Election B having a further coverage option that is stated in, and may be elected by checking, Sub-Part B-1) that is checked below (Note: only one of Subcontractor Election A, B or C is to be selected, however Subpart B-1 may also be selected but only if Subcontractor Election B is selected):

SDS Subcontractor Election A). The above insurance coverages shall be provided by insurance companies selected by the Subcontractor. Contractor shall have the right, without limitation, to reject any insurance company selected by Subcontractor that has an A.M. Best rating of less than A or Standard and Poor's rating of less than AA or a Moody's rating of less than Aa. This insurance coverage shall include Products and Completed Operations coverage which Subcontractor agrees to maintain for a period equal to the statute of repose in the state in which the project is located. Subcontractor further agrees that it shall require each of its sub-subcontractors to provide the above insurance coverages subject to the terms and conditions set forth below. All costs are included in the Price and are to be paid by the Subcontractor.

or

SDS Subcontractor Election B). The above insurance coverages shall be provided through a consolidated insurance program that insures Subcontractor and its eligible lower tier subcontractors, which program has been made available to Subcontractor by Contractor, as described and with limits of liability, terms and conditions set forth in the Contract Documents, including, but not limited to, the CCIP Manual, and Subcontractor agrees to all terms and conditions therein, and makes all representations and warranties, associated therewith. Subcontractor acknowledges and agrees i) that insurance costs will be incurred to provide the above insurance coverages under the consolidated program; ii) that as opposed to Subcontractor including such insurance costs in the Price and paying such costs directly, the Price does not include insurance costs for the above insurance coverages, iii) that it is more convenient and efficient for Contractor to pay such insurance costs on Subcontractor's and Subcontractor's eligible lower tier subcontractor's behalf, and iv) that Contractor is authorized by Subcontractor to pay such insurance premiums on Subcontractor's behalf and Subcontractor's eligible lower tier subcontractor's behalf.

SDS Sub-Part B-1 to Subcontractor Election B. By checking this further election, Subcontractor agrees that it has selected Subcontractor Election B with respect to providing the above insurance coverages for eligible lower tier subcontractors engaged by or through Subcontractor to the extent permitted by the Contract Documents (including the CCIP Manual), however, Subcontractor agrees that as to Subcontractor itself, the above insurances will be provided by Subcontractor in accordance with the terms and conditions of Subcontractor Election A above. Accordingly, Subcontractor itself shall be deemed an "Excluded Party" with respect to the consolidated insurance program as described in the Contract Documents (including the CCIP Manual). Any other "Excluded Party" lower tier subcontractors (if applicable) with respect to the consolidated insurance program arranged by Contractor shall be required to procure their own insurance coverages at their expense. For Subcontractor's lower tier subcontractors that are not an "Excluded Party", the above insurance coverages shall be provided through the consolidated insurance program as described in Subcontractor Election B to the extent permitted by the Contract Documents (including the CCIP Manual).

Subcontractor represents and warrants that all amounts, information and data that Subcontractor and its lower tier subcontractors has provided or will provide in connection with CCIP applications and other related forms and documents, including estimated payroll and insurance costs, are, or shall be when submitted, true and accurate. Subcontractor represents and warrants that the amount of estimated unburdened payroll (payroll without benefits or overtime, unless the overtime portion is included as required by the regulations of the State in which the project is located) actually used by Subcontractor and its eligible lower tier subcontractors in calculating the Price is $ **SDS** ("Initial Payroll Estimate" or "Estimated On-Site Payroll") (if Sub-Part B-1 is elected, this amount only pertains to Subcontractor's eligible lower tier subcontractors). Subcontractor further agrees that all such amounts, data and information, including the estimated unburdened payroll amount used to calculate the Price, shall be to subject to audit and verification if Contractor or the CCIP Administrator elects to do so and Subcontractor agrees to cooperate fully and provide documents and other records requested in connection with such audit and verification and to cause its lower tier subcontractors to do the same. Subcontractor acknowledges that such amounts, information and data or such other amounts as verified in accordance with the CCIP Manual or through audit may be used to calculate final and interim cost adjustments to the Price and/or payments to Subcontractor (at Contractor's discretion) as described in the CCIP Manual. Contractor and the CCIP Administrator shall not be required to use any amount greater than the foregoing "Estimated On-Site Payroll" as the unburdened payroll amount when calculating such adjustments for Subcontractor and its lower tier subcontractors as described in the CCIP Manual.

or

SDS Subcontractor Election C). The above insurance coverages shall be provided through an Owner Controlled Insurance Program (OCIP) as described and with limits of liability set forth in the Contract Documents and Subcontractor agrees to all terms, and makes all representations and warranties, associated therewith.

Subcontractor acknowledges that if any of the above insurance coverages are provided through a consolidated program arranged pursuant to Subcontractor Election B, Subcontractor Election B-1 or Subcontractor Election C, such coverage will not apply to any operations off of the premises (as defined in the CCIP Policy or Manual or OCIP Policy or Manual) and Subcontractor shall provide and maintain the above insurance coverages with respect to off-premises operations. Subcontractor further agrees that in the event that the insurance coverage provided by a consolidated insurance program (Subcontractor Election B or C) is cancelled prior to the completion of the Work, subcontractor shall provide the insurance coverage (set forth in paragraphs 1 and 2). Subcontractor further acknowledges and represents i) that it was not required to select any particular election provided for above and was free to choose Subcontractor Election A if it preferred to apply for and obtain insurance itself, ii) that Subcontractor has reviewed the other Subcontractor Elections available for this Project and has chosen the election selected above, and iii) that Subcontractor has satisfied itself that the Subcontractor Election checked above is preferable to Subcontractor for reasons of convenience, economics and/or coverage afforded.

3. COMMERCIAL AUTOMOBILE LIABILITY INSURANCE covering all owned, non-owned and hired automobiles used in connection with the Work, with the following minimum limits:

   Combined Single Limit $ **SDS** /accident

4. ALL RISK CONTRACTOR'S EQUIPMENT INSURANCE COVERAGE shall be provided by all Subcontractors utilizing a crane or other equipment in connection with the performance of the Work and insured to the full value of equipment

B. Insurance Conditions

The following terms and conditions are applicable to all insurance:

Before commencing the Work, the Subcontractor shall furnish a certificate(s), satisfactory to Contractor from each insurance company showing that the above insurances (1, 2 Subcontractor Election A, 3 and CGL operations off of the premises under 2 Subcontractor Election B and C, and 4) are in force, stating policy numbers, dates of expiration, and limits of liability thereunder, and further providing that should any of the described policies be cancelled before the expiration date thereof, notice will be delivered in accordance with the policy provisions. Subcontractor shall advise Contractor of the amount of any Deductible or Self-Insured Retention that exists on any policies of insurance on the face of the certificates provided. Subcontractor shall be responsible for and agrees to pay and/or reimburse Contractor for any such Deductible or Self-Insured Retention.

The Subcontractor shall name the Indemnified Parties and such other entities as may be reasonably requested as additional insureds under the policies of insurance listed in paragraph A maintained by the Subcontractor (with the exception of Workers Compensation insurance), whether during the performance of the Work or any time thereafter. The coverage to be provided to the additional insureds shall be for all liability arising out of the Work. Subcontractor will submit a certificate of insurance and a copy of endorsements to the insurance policies listing all parties required to be named by Subcontractor as additional insureds. Subcontractor hereby waives all rights of recovery from Contractor and the Indemnified Parties, including but not limited to rights of subrogation, with respect to any matter, claim or suit that is required to be covered by insurance to be maintained by Subcontractor pursuant to the Contract Documents.

It is expressly agreed by and between Subcontractor and Contractor that all insurance, whether issued on a primary or excess basis, afforded the additional insureds shall be primary insurance to any other insurance available to the additional insureds and that any other insurance carried by the additional insureds shall be excess of all other insurance carried by the Subcontractor and shall not contribute with the Subcontractor's insurance. Subcontractor further agrees that the amount of insurance available to Contractor and the additional insureds shall be for the full amount of the loss up to policy limits of liability and shall not be limited to the minimum requirements of this Subcontract. Subcontractor further agrees to provide endorsements on its insurance policies that shall state the foregoing; however, Subcontractor's failure to provide such endorsement shall not affect Subcontractor's agreement hereunder.

If the Subcontractor fails to procure and maintain such insurance, if required, Contractor shall have the right, but not the obligation, to procure and maintain said insurance for and in the name of the Subcontractor and the Subcontractor shall pay the cost thereof and shall furnish all necessary information to make effective and maintain such insurance or at Contractor's option, Contractor may offset the cost incurred by Contractor against amounts otherwise payable to Subcontractor hereunder. Subcontractor further agrees that in the event of such failure to procure and maintain such insurance, Subcontractor shall be liable for all amounts which would have been payable pursuant to the insurance required by this Subcontract. If, in Contractor's discretion, Contractor is concerned that any insurance company selected by Subcontractor has, at any time, faced diminished financial strength or that the insurance company may no longer provide the same level of financial strength (such as a decline in an A. M. Best, Standard and Poor's or Moody's rating), Contractor may require that Subcontractor provide replacement insurance coverage through an insurance company satisfactory to Contractor.

IN THE EVENT THAT THE LAW OF THE STATE IN WHICH THE PROJECT IS LOCATED (OR OTHER APPLICABLE LAW) LIMITS THE ADDITIONAL INSURED COVERAGE THAT CONTRACTOR MAY REQUIRE FROM SUBCONTRACTOR, THEN SUBCONTRACTOR SHALL BE REQUIRED TO OBTAIN ADDITIONAL INSURED COVERAGE TO THE FULLEST EXTENT OF COVERAGE AND LIMITS ALLOWED BY APPLICABLE LAW AND THIS CONTRACT SHALL BE READ TO CONFORM TO SUCH LAW.

Bonds

ARTICLE XXVI. The Subcontractor shall furnish to Contractor a performance bond in the amount of $ **SDS** and a separate payment bond in the amount of $ **SDS** the form and contents of such bonds and the Surety or Sureties thereon to be satisfactory to Contractor. Such bonds shall be furnished to Contractor within ten (10) calendar days after Subcontractor has executed this Agreement or within such other time period agreed to by Contractor in writing. In the event Subcontractor fails to furnish such bonds to Contractor within the time period as hereinabove provided, such failure shall constitute a default under this Agreement in which event Contractor shall have all of the rights and remedies provided in Article XI hereof with respect to default on the part of Subcontractor including, without limitation, the right to terminate this Agreement.

Without limiting the responsibilities of Subcontractor and its Surety under the terms of this Agreement, Subcontractor and its Surety hereby agree to promptly pay all lawful claims of subcontractors, materialmen, laborers, persons, firms or corporations for labor or services performed or materials, supplies, machinery equipment, rentals, fuels, oils, tools, appliances, insurance and other items furnished, used or consumed in connection with the prosecution of the Work provided for in said Subcontract and any and all modifications thereof, and shall indemnify and save harmless Contractor of and from all liability loss, damage and expense, including interest, costs and attorney fees, which Contractor and/or its Surety may sustain by reason of Subcontractor's or its Surety's failure to do so.

Subcontractor and its Surety hereby agree to execute and deliver to Contractor when requested in connection with the issuance of change orders under this Agreement, Rider "A" amendments (or other documents as Contractor may require) increasing the amount (Penal Sum) of the Payment and Performance Bonds furnished by the Subcontractor. The reasonable premiums or other charges paid by the Subcontractor for the procurement of the Rider "A" amendments will be paid as a change to this Agreement.

Severability

ARTICLE XXVII. In the event that any provision or any part of a provision of this Agreement shall be finally determined to be superseded, invalid, illegal or otherwise unenforceable pursuant to applicable laws by an authority having jurisdiction, such determination shall not impair or otherwise affect the validity, legality, or enforceability of the remaining provisions or parts of provisions of this Agreement, which shall remain in full force and effect as if the unenforceable provision or part were deleted.

Business Enterprise Compliance

ARTICLE XXVIII. In the event that the Project or General Contract is subject to any federal, state, or local program(s) requiring Contractor or its subcontractors to meet certain goals or commitments with regard to the award of subcontracts or supply contracts to small and/or disadvantaged businesses, including but not limited to minority owned, woman owned, veteran owned and local businesses, then the provisions of this Article shall apply. Subcontractor acknowledges that: a) the Federal Small Business Program applies if the General Contract is a direct federal government contracts (*i.e.*, contracts awarded by a federal executive agency); b) the Disadvantaged Business Enterprise Program applies to projects that are funded in whole or in part with federal funds, including those funded through a grant awarded to the Owner; c) there are state and local programs that may apply to public projects that are funded by a state or local government; and d) these programs have different eligibility requirements as well as different methods of counting small business, minority, and other designated categories of participation at all subcontracting levels. Subcontractor agrees that it shall fully understand and comply with the rules and regulations of all such programs to the fullest extent applicable to the General Contract, Subcontract-or this Agreement.

A. If Subcontractor is or otherwise satisfies the qualifications or requirements of any of the following, or if Subcontractor has in any way represented or given Contractor reason to believe that such is the case: (a) a small business under the Federal Small Business Program (*i.e.*, a small business, a small disadvantaged business (SDB), a HUBZone small business, a service-disabled veteran-owned small business (SDVOSB), a veteran-owned small business (VOSB), or a women-owned small business (WOSB)) (hereinafter collectively referred to as an "SBE"); (b) a Disadvantaged Business Enterprise (DBE), Minority Owned Business Enterprise (MBE), or Woman Owned Business Enterprise (WBE), or the functional equivalent under federal, state, or local law (hereinafter collectively referred to as a "DBE"); or (c) a category or status designated by state or local authorities which otherwise classifies or designates certain business entities, collectively referred to as Local Business Enterprises (LBEs); then Subcontractor acknowledges, represents, agrees and warrants that: (i)Subcontractor in fact has such status and has obtained all required federal, state, or local certifications of such status; (ii) Contractor is relying upon such representation and status to fulfill any and all SBE, DBE or LBE goals or commitments Contractor has made to the Owner and/or a government agency or as otherwise required of Contractor; (iii) Subcontractor shall maintain its status as an SBE, DBE or LBE throughout the performance of the subcontract or purchase order; (iv) Subcontractor immediately shall notify Contractor if there is a change in Subcontractor's status as an SBE, DBE or LBE; (v) Contractor has engaged Subcontractor based on Subcontractor's representation that Subcontractor shall perform in such a manner that 100% of Subcontractor's Work and 100% of the Subcontract value shall be eligible for credit towards Contractor's goals and commitments with regard to the award of subcontracts to SBEs, DBEs and/or LBEs; (vi) Subcontractor shall perform in such a manner that Contractor shall be eligible to receive credit towards Contractor's goals and commitments regarding the award of subcontracts to SBEs, DBEs, and/or LBEs for 100% of the Subcontract value; (vii) Subcontractor will not engage in any effort or take any action that would prevent Contractor from receiving 100% credit; (viii) Subcontractor shall engage in a genuine commercially useful function as defined by law and shall not act as a pass-through to sub-subcontractors, suppliers, or vendors who are not SBEs, DBEs or LBEs; (ix) Subcontractor will not engage in

any effort to create the appearance of SBE, DBE or LBE legitimacy or participation when in fact it does not exist; and (x) if Subcontractor awards any of its work through sub-subcontract, purchase order, or otherwise, to an SBE, DBE or LBE, then Subcontractor will do so only in a manner that does not affect the ability to receive credit as described above for 100% of the Subcontract value, including awarding same only to SBE, DBE or LBE sub-subcontractors, suppliers, or vendors if and to the extent necessary to achieve this result.

B. If Subpart A. of this Article is not applicable to Subcontractor, then Subcontractor acknowledges and agrees that the obligations and commitments assumed by Contractor with regard to the award of subcontracts to SBEs, DBEs and/or LBEs, have likewise been assumed by Subcontractor pursuant to this Agreement, including but not limited to meeting or exceeding the same percentage or other requirements or goals for each separate category of SBE, DBE and/or LBE employment in connection with the performance of the Work and satisfying all obligations and responsibilities with respect to reporting and documenting same.

C. The provisions of this Subparagraph C. shall be applicable to all Subcontractors. If or when Subcontractor awards any of its work through sub-subcontract, purchase order, or otherwise, to an SBE, DBE or LBE, to the extent permitted or required by this Agreement, then Subcontractor further acknowledges, represents, agrees and warrants that Subcontractor shall: (i) verify that such SBE, DBE or LBE has such status and has obtained all required federal, state, or local certification of such status; (ii) require its SBE, DBE or LBE sub-subcontractors, suppliers, or vendors to maintain their status as an SBE, DBE or LBE throughout the performance of their sub-subcontract, purchase order, or other agreement; (iii) immediately notify Contractor if there is a change in a sub-subcontractor's, supplier's, or vendor's status as an SBE, DBE or LBE; (iv) require all SBE, DBE or LBE sub-subcontractors, suppliers, or vendors to engage in a genuine commercially useful function as defined by law; (v) ensure that all SBE, DBE or LBE sub-subcontractors, suppliers, or vendors are not acting as a pass-through to another sub-subcontractor, supplier, or vendor who is not a SBE, DBE or LBE; and (vi) not permit a sub-subcontractor, supplier, or vendor to engage in any effort to create the appearance of SBE, DBE or LBE legitimacy or participation when in fact it does not exist.

Subcontractor agrees that: (i) Contractor, or its authorized representative, shall have access to and the right to examine and audit all of Subcontractor's records relating to Subcontractor's Work under this Agreement including, but not limited to, lower-tier subcontracts, equipment leases, purchase orders, and other agreements with third parties; (ii) Subcontractor and its sub-subcontractors, vendors and suppliers shall submit any forms, certifications or documents required by Contractor relating to participation on the Project, regardless of whether such forms or documents have been requested or required by the Owner; (iii) failure to honor and comply with any of the terms or conditions of this Article and/or its failure to comply with any applicable law relating to the award of subcontracts to SBEs, DBEs and/or LBEs shall constitute a material breach of this Agreement; (iv) submission by Subcontractor of a monthly requisition for payment or invoice shall constitute a certification by Subcontractor that each and every representation and warranty set forth in this Article is and remains truthful, accurate, and complete, and that Subcontractor is in full compliance with the terms and conditions of this Article, as of the date such requisition or invoice is submitted to Contractor; (v) Contractor may rely on these certifications in making payment to Subcontractor and in making like representations to others; (vi) Contractor shall have the right to withhold payment from Subcontractor if Contractor has reasonable grounds to believe that Subcontractor is not in full compliance with its obligations set forth in this Article; and (vii) that Subcontractor shall include a provision in all agreements with its sub-subcontractors, vendors and suppliers, whereby such sub-subcontractors, vendors and suppliers acknowledge and agree to conduct their operations and affairs in a manner that ensures that Subcontractor is not in violation of any provision in this Article and to provide forms, certifications and documents as required by Contractor or this Article.

U.S. Government Prime Contract

ARTICLE XXIX. In the event that the General Contract under which this Subcontract is being issued is a General Contract between Contractor and the United States Government or an agency thereof, additional Federal Acquisition Regulation ("FAR") and agency FAR supplemental provisions are applicable to this Agreement. Such FAR and agency FAR supplemental provisions are contained on the attached document entitled "Federal Supplement" and such provisions are hereby incorporated by reference herein as if set forth at length herein. Subcontractor hereby ratifies and re-affirms its Subcontractor Certifications and Disclosures that Subcontractor signed and submitted with its proposal submitted earlier to Contractor and such Certifications and Disclosures are hereby incorporated herein by reference as if set forth at length herein.

Entire Agreement

ARTICLE XXX. This Agreement constitutes the entire agreement between the parties hereto. No oral representations or other agreements have been made by Contractor except as stated in the Agreement. This Agreement may not be changed in any way except as herein provided, and no term or provision hereof may be waived by Contractor except in writing signed by its duly authorized officer or agent. Subcontractor acknowledges and represents that it has completed and submitted to Contractor a prequalification questionnaire, that all statements therein and in the attachments to such questionnaire were true, accurate and complete, and remain true, accurate and complete, and that Contractor has relied on truthfulness, accuracy and completeness of such statements and the contents of the attachments thereto in deciding to enter into this Agreement. The marginal descriptions of any term or provision of this Agreement are for convenience only and shall not be deemed to limit, restrict or alter the content, meaning or effect thereof.

The said parties, for themselves, their heirs, executors, administrators, successors and assigns, do hereby agree to the full performance of all of the terms and provisions herein contained.

In Witness Whereof the parties to these presents have hereunto set their hands as of the day and year first above written.

SUBCONTRACTOR		**CONTRACTOR**
SDS	**By:**	SDS
By: _____		_____
Official title: SDS		Vice- President

Subcontractor's Federal Employers Identification Number (FEIN) SDS

Subcontractor's State Unemployment Ins. No. SDS

(Insert State and Register No. for State in which the Work is to be performed)

Subcontractor's License No. SDS

(Insert License No., if any, for State or locality in which the Work is to be performed)

Subcontractor's State Sales Tax Registration No. SDS

Public Work Rider

Notwithstanding anything in the other Contract Documents to the contrary, all provisions of this Rider shall supersede any conflicting provisions of the other Documents. All other provisions of the Agreement shall remain in full force and effect.

Statute of Limitations

To the fullest extent permitted by the law, the Subcontractor agrees that its liability and /or indemnification obligations set forth in the Contract Documents, including without limitation Article XXIV of the Agreement, shall be extended to the extent that the Contractor's liability and/or indemnification of the Owner is similarly extended for reasons attributable to the Subcontractor and/or its scope of work.

Turner

Turner Construction Company has worked closely with Textura Corporation and Greensill Capital to develop the Turner Accelerated Payment Program™, which provides subcontractors the opportunity to receive accelerated payments thereby improving their cash flow and strengthening their balance sheets.



Get Paid Sooner With The Turner Accelerated Payment Program™

- **Known payment timing** – within five days (usually two to three days) of owner approval of the payment application
- **Get paid before Turner** – you get paid by Greensill before the owner pays Turner, eliminating risk of late payment
- **Improved cash flow** – receiving your payment early strengthens your balance sheet and frees up your debt capacity
- **Convenience** – simply check the box below and click on the Accept button below to enroll
- **Flexibility** – enrollment is voluntary and you may opt out at any time



"The Turner Accelerated Payment Program is awesome! With quick and predictable payment, we don't have to take on the risk that comes with borrowing to fund our materials costs."

Bob Pollock
President, Continental Interiors

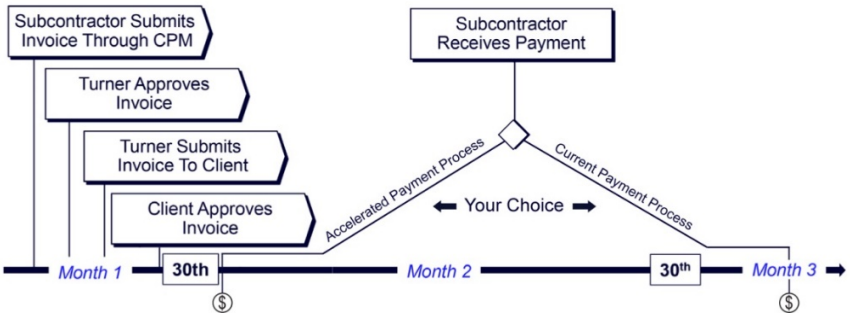
"The Turner Accelerated Payment Program has improved our cash flow tremendously! Receiving payment so quickly after submitting an invoice is very significant for our business, supporting our growth and continued success."

Leigh Ann Barga
Controller, Delaware Glass & Mirror Co.

How the Turner Accelerated Payment Program Works

Any company that has been prequalified to work on Turner projects is eligible to participate in the program and participation is voluntary. The program generally functions as follows:

1. A subcontractor enrolls (easy, one-click) in the Turner Accelerated Payment Program™ online via Textura CPM.
2. Turner reviews the subcontractor's monthly invoice and submits it to the client.
3. Upon client approval of the invoice, Turner authorizes the accelerated payment to the subcontractor prior to Turner receiving payment from the client. Retainage and other amounts, if any, can be withheld from an accelerated payment according to the subcontractor's agreement.
4. In consideration of the accelerated payment service, the subcontractor pays a nominal fee, which is disclosed and agreed upon at the time of enrollment. The fee covers the interest expense, the cost of operating the payment financing facility, and the risks of delayed payment to Turner.



Turner Accelerated Payment Program Benefits for Subcontractors

- Accelerated payments
- Known payment timing
- Improved cash flow
- Strengthened balance sheets
- Enhanced borrowing capacity
- Reasonable fee for service
- Ease of use
- Possibility for early pay discounts from lower-tier subcontractors

Turner

Turner Accelerated Payment Program Partners

Turner is a North America-based, international construction services company and is a leading builder in diverse and numerous market segments. http://www.turnerconstruction.com

Textura is a leading provider of collaboration and productivity tools for the construction industry. Textura will provide the systems platform for this program via its Construction Payment Management™ (CPM™) program. http://www.texturacorp.com

Greensill Capital is an independent financial services firm and principal investor group specializing in structured trade finance, working capital optimization, specialty financing and contract monetization. Greensill Capital provides the funding for the program. http://www.greensill.com

Frequently Asked Questions

Q: Why is Turner offering this program?
A: It expands our service offerings and it increases the financial strength of our subcontractors. Subcontractors can use the accelerated payment to fund work in progress and use their working capital to enhance their business.

Q: How quickly will I be paid?
A: It is our expectation that subcontractors will be paid within five days of pay application approval by the client.

Q: How does the program affect my existing asset-backed loans or other debt facilities?
A: The accelerated payment made to you in return for a fee is not a loan and is therefore not a debt.

Q: What fees will I be charged to receive my accelerated payment?
A: To preserve the non-debt accounting treatment for accelerated payments, Turner is not permitted to discuss the fee with its subcontractors. The fee will be presented to you through the Textura CPM application when you enroll in the program.

Q: How is the fee determined and can it change during the project?
A: The fee is determined by Greensill Capital and takes into account factors such as the market cost of borrowing, the repayment risk of Turner, and the number of days between the subcontractor payment and when Turner is paid by the client.

Scenarios in which the fee might change include:

- Base rates (LIBOR is the benchmark in the US) could move up or down, for example in response to changes by the Fed in its Target Federal Funds Rate, which would affect interest costs for all borrowers.
- Investors' view of Turner's credit risk could change. That said, Turner's credit rating has been stable for many years.
- Turner may revise the number of days used in the fee calculation to reflect the payment behavior of the client.

In the event that the fee for a particular subcontractor and/or project must be revised, the subcontractor will be notified via Textura CPM.

Turner

Q: Why might my fee be different from one Turner project to another?
A: A fee is unique to a project. Different projects may have different fees, which may change over time based on the market factors and scenarios outlined above.

Q: What happens if, after I have been paid early via the program, the Owner is late in remitting payment to Turner?
A: Turner is absorbing the late payment risk, so there is no impact on the subcontractors.

Q: Is the fee charged to enrolled subcontractors, regardless of whether or not they meet all requirements to receive an accelerated payment?
A: No, the fee will only be charged if an accelerated payment is made.

Q: Will lien waivers, releases, etc. be handled differently if we use the program?
A: Lien waivers and releases will still be required prior to payment just as they are today. Early payment will not be made if there is a failure to fulfill all such conditions precedent by the time the client approves the invoice (you will receive a non-accelerated payment per the normal contract terms and the accelerated payment program fee will not be charged).

Q: Will retention payments be accelerated?
A: Once the release of retention has been approved by the client, then the retention payments will be processed through the Turner Accelerated Payment Program in the same way as any other invoice. The Turner Accelerated Payment Program will not accelerate retention payments ahead of client approval.

Q: Do I have to always use the program once I start?
A: You can un-enroll and re-enroll at any time, or use the program for select projects. However, we have offered the program with the expectation that subcontractors will adopt and use it consistently on all their Turner projects.

Q: Do I have to sign an agreement with a financial institution?
A: No. You must simply accept the terms and conditions on the Textura platform when you enroll in the program.

Q: Do I have to install any software or use a new technology platform?
A: The program is offered via the same Textura CPM platform you use today.

Q: How will my day-to-day Textura CPM experience change?
A: The Textura CPM experience will be the same except for the addition of the program enrollment screen.

Q: How will I know if an accelerated payment has been made?
A: You will be notified through Textura CPM when a payment has been made. Textura CPM will also track and store your previous payments.

Q: Where can I find out more information?
A: Please visit www.turnerconstruction.com/turner-accelerated-payment-program for more information. You can also contact Textura at 1-866-TEXTURA or app@texturacorp.com or visit their website, www.texturacorp.com.

CONNECTICUT RIDER - ACCELERATED PAYMENT PROGRAM

This Rider is made part of the Agreement (whether a subcontract, purchase contract or purchase order, rental agreement, professional or non-professional service agreement, as the case may be) by and between Turner Construction Company ("Turner") and the subcontractor, vendor or supplier, as the case may be (hereinafter referred to as "Provider"). This Rider supplements the Agreement to describe an Accelerated Payment Program ("APP") that is available to Provider. The description herein is a summary description only and is not an offer nor, except as otherwise stated herein, does it create any obligations on the part of the parties to the Agreement with respect to the APP or any right of Provider to participate in the APP. The APP is voluntary and at Provider's sole discretion, subject to exclusion as provided herein. Except as otherwise provided herein, the terms and conditions and other requirements of the Agreement are not modified by this Rider, all such provisions of the Agreement remaining in force and effect. To the extent that this Rider conflicts with language in the Agreement that makes payment by the Owner a condition of payment to Provider, such condition is suspended so long as Provider is enrolled in the APP, is in full compliance with all policies, procedures, and requirements of the APP, and an accelerated payment is made.

As part of Turner's commitment to deliver the highest value of construction services to its clients, selected Providers may participate in an APP which will offer Providers the option to receive expedited payment on their invoices. Turner believes the APP will offer Providers substantial benefits including payment timing, a low cost of capital and an alternative source to meet working capital needs. Any Provider that has been pre-qualified by Turner Procurement to work on Turner projects will be eligible to participate in the APP, although Turner reserves the right, at its sole discretion based upon Turner's good faith belief that exclusion is appropriate, to exclude any Provider, at any time, whether before or after Provider's enrollment in the APP. For the avoidance of doubt, to the extent a Provider is no longer eligible to participate in the APP for any reason whatsoever, no modification, amendment or adjustment to the payment terms in the Agreement shall be made. The APP will generally function as follows:

- Provider will apply online to enroll in the APP via Textura CPM for each Turner project approved by Turner for inclusion in the APP.

- Provider will submit its payment application or invoice via CPM.

- When Owner approves Turner’s invoice, Turner will authorize the participating financial institution to pay Provider through the APP, rather than having to wait until Turner receives payment from the Owner, provided that all conditions in the Agreement relating to Turner's obligation to pay Provider remain unchanged. Retainage and other amounts, if any, will be withheld from payment to the extent provided in the Agreement. Turner does not waive any rights or remedies under the Agreement and reserves its rights to recover and/or adjust payments as necessary to conform to the terms of the Agreement.

- Payment to Provider will be made by a financing institution, which will be subsequently repaid from funds payable to Provider from the Owner's payment to Turner.

- In consideration of the accelerated payment service the Provider will pay a nominal fee, which will be disclosed to Provider and agreed upon at the time of enrollment. The fee is to cover the cost of interest, the cost of operating the payment financing facility and the risks of delayed payment to Turner. As such, this fee will be shared by the financing institution, Turner, and the operator of the underlying payments platform, Textura. The Provider will be notified via the CPM system if, during the course of a project, the fee is to be amended (for example, in the event that interest rates rise).

- Provider represents that all information it provides as part of the APP, whether to Turner, the financial institution, or on the SaaS web-based portal and connected systems as provided by Textura Corporation, is truthful, accurate, and up-to-date, including, but not limited to representations made regarding the Provider's identity, existence, and location. Provider acknowledges that Turner will rely on information provided by Provider as being correct, accurate, and up-to-date. To the extent Provider provides incorrect, inaccurate, or out-of-date information, Provider bears all responsibility for any resulting loss or damages and shall indemnify, defend and hold harmless Turner for any resulting loss or damages.

If any withholdings or deductions are required by the applicable law, Provider agrees and understands that Turner will comply with those obligations.

By participation in the APP, Provider hereby waives any claim, right or recourse against Turner, its affiliates, parent companies or subsidiaries, or any officers, directors, employees or representatives for any special, indirect, incidental, exemplary, or consequential damages, including, without limitation, losses of profits, financing and goodwill, resulting or arising from or in connection with the use, refusal or distribution of the APP and any damages whatsoever as they relate to the APP, or the cancellation and/or exclusion from the APP. Provider expressly agrees and understands that it has no right or recourse to any fee that has been paid to Turner or any participant in the APP, irrespective of whether the Provider completes the APP during the course of the project or is excluded before, during, or after the project. Notwithstanding the foregoing, in the event of any liability of Turner to Provider resulting or arising from or in connection with the APP, the sole and exclusive remedy available to Provider shall be recovery of actual direct damages, which in no event shall exceed Turner's share of the fee paid by Provider to participate in the APP.

Notwithstanding anything contained in the Agreement or under law to the contrary, Provider acknowledges: (i) that to the maximum degree possible under law, Provider waives any claim that it may have to contend that Turner owes Provider any trust or fiduciary obligations whatsoever with respect to payments to be made pursuant to this Agreement or otherwise; (ii) that payment to Provider by the financing institution as described herein and in the agreement upon enrollment in the APP, which will exclude the fee disclosed at the time of enrollment (as the fee may be amended from time to time as described herein and in the enrollment agreement), is payment in full of the Provider's applicable payment application; (iii) such payment constitutes payment in full of all amounts due Provider and represents the full amount of Provider's portion of the payment Turner received (or will receive) from the Project's Owner based on the service performed by the Provider.

Minimum Rates and Classifications
for Building Construction

ID#: 24-65489

Connecticut Department of Labor
Wage and Workplace Standards Division

By virtue of the authority vested in the Labor Commissioner under provisions of Section 31-53 of the General Statutes of Connecticut, as amended, the following are declared to be the prevailing rates and welfare payments and will apply only where the contract is advertised for bid within 20 days of the date on which the rates are established. Any contractor or subcontractor not obligated by agreement to pay to the welfare and pension fund shall pay this amount to each employee as part of his/her hourly wages.

Project Number: Project Town: Greenwich
State#: FAP#:
Project: Central Middle School: New Construction

CLASSIFICATION	Hourly Rate	Benefits
1b) Asbestos/Toxic Waste Removal Laborers: Asbestos removal and encapsulation (except its removal from mechanical systems which are not to be scrapped), toxic waste removers, blasters.**See Laborers Group 7**		
1c) Asbestos Worker/Heat and Frost Insulator	47.06	33.30
2) Boilermaker	46.21	29.35
3a) Bricklayer, Cement Mason, Concrete Finisher (including caulking), Stone Masons	41.11	35.68 + a
3b) Tile Setter	38.81	32.20
3c) Tile and Stone Finishers	32.0	26.69
3d) Marble & Terrazzo Finishers	33.0	25.69
3e) Plasterer	44.52	29.63
------LABORERS------		

As of: September 23, 2024

4) Group 1: General laborers, carpenter tenders, concrete specialists, wrecking laborers and fire watchers.	34.5	27.26
4) Group 1a: Acetylene Burners (Hours worked with a torch)	35.5	27.26
4a) Group 2: Mortar mixers, plaster tender, power buggy operators, powdermen, fireproofer/mixer/nozzleman (Person running mixer and spraying fireproof only).	34.75	27.26
4b) Group 3: Jackhammer operators/pavement breaker, mason tender (brick), mason tender (cement/concrete), forklift operators and forklift operators (masonry).	35.0	27.26
4c) **Group 4: Pipelayers (Installation of water, storm drainage or sewage lines outside of the building line with P6, P7 license) (the pipelayer rate shall apply only to one or two employees of the total crew who primary task is to actually perform the mating of pipe sections) P6 and P7 rate is $26.80.	35.5	27.26
4d) Group 5: Air track operator, sand blaster and hydraulic drills.	35.25	27.26
4e) Group 6: Blasters, nuclear and toxic waste removal.	37.5	27.26
4f) Group 7: Asbestos/lead removal and encapsulation (except it's removal from mechanical systems which are not to be scrapped).	37.5	27.26
4g) Group 8: Bottom men on open air caisson, cylindrical work and boring crew.	35.0	27.26
4h) Group 9: Top men on open air caisson, cylindrical work and boring crew.	34.5	27.26
4i) Group 10: Traffic Control Signalman	20.7	27.26
4j) Group 11: Toxic Waste Removers A or B With PPE	37.5	27.26

As of: September 23, 2024

5) Carpenter, Acoustical Ceiling Installation, Soft Floor/Carpet Laying, Metal Stud Installation, Form Work and Scaffold Building, Drywall Hanging, Modular-Furniture Systems Installers, Lathers, Piledrivers, Resilient Floor Layers.	39.54	28.68
5a) Millwrights	40.56	28.87
6) Electrical Worker (including low voltage wiring) (Trade License required: E1,2 L-5,6 C-5,6 T-1,2 L-1,2 V-1,2,7,8,9)	44.0	42.745
7a) Elevator Mechanic (Trade License required: R-1,2,5,6)	64.01	39.19+a+b
-----LINE CONSTRUCTION----		
Groundman	26.5	6.5% + 9.00
Linemen/Cable Splicer	48.19	6.5% + 22.00
8) Glazier (Trade License required: FG-1,2)	41.63	25.80+ a
9) Ironworker, Ornamental, Reinforcing, Structural, and Precast Concrete Erection	45.25	41.27 + a
----OPERATORS----		
Group 1: Crane Handling or Erecting Structural Steel or Stone; Hoisting Engineer (2 drums or over). (Trade License Required)	55.42	28.80 + a
Group 1a: Front End Loader (7 cubic yards or over); Work Boat 26 ft. and Over	50.79	28.80 + a
Group 2: Cranes (100 ton rate capacity and over); Bauer Drill/Caisson. (Trade License Required)	55.03	28.80 + a

As of: September 23, 2024

Group 2a: Cranes (under 100 ton rated capacity).	54.09	28.80 + a
Group 2b: Excavator over 2 cubic yards; Pile Driver ($3.00 premium when operator controls hammer)	50.4	28.80 + a
Group 3: Excavator; Gradall; Master Mechanic; Hoisting Engineer (all types of equipment where a drum and cable are used to hoist or drag material regardless of motive power of operation), Rubber Tire Excavator (Drott-1085 or similar);Grader Operator; Bulldozer Finegrade. (slopes, shaping, laser or GPS, etc.). (Trade License Required)	49.45	28.80 + a
Group 4: Trenching Machines; Lighter Derrick; CMI Machine or Similar; Koehring Loader (Skooper); Goldhofer.	48.97	28.80 + a
Group 5: Specialty Railroad Equipment; Asphalt Spreader, Asphalt Reclaiming Machine; Line Grinder; Concrete Pumps; Drills with Self Contained Power Units; Boring Machine; Post Hole Digger; Auger; Pounder; Well Digger; Milling Machine (over 24 mandrel).	48.22	28.80 + a
Group 5 continued: Side Boom; Combination Hoe and Loader; Directional Driller.	48.22	28.80 + a
Group 6: Front End Loader (3 up to 7 cubic yards); Bulldozer (rough grade dozer).	47.83	28.80 + a
Group 7: Asphalt Roller; Concrete Saws and Cutters (ride on types); Vermeer Concrete Cutter; Stump Grinder; Scraper; Snooper; Skidder; Milling Machine (24" and under mandrel).	47.4	28.80 + a
Group 8: Mechanic; Grease Truck Operator; Hydroblaster; Barrier Mover; Power Stone Spreader; Welding; Work Boat Under 26 ft.; Transfer Machine; Rigger Foreman.	46.9	28.80 + a
Group 9: Front End Loader (under 3 cubic yards); Skid Steer Loader regardless of attachments; (Bobcat or Similar); Forklift, Power Chipper; Landscape Equipment (including Hydroseeder); Vacuum Excavation Truck and Hydrovac Excavation Truck (27 HG pressure or greater).	46.35	28.80 + a

As of: September 23, 2024

Group 10: Vibratory hammer; ice machine; diesel and air, hammer, etc.	43.77	28.80 + a
Group 11: Conveyor, earth roller, power pavement breaker (whiphammer), robot demolition equipment.	43.77	28.80 + a
Group 12: Wellpoint Operator.	43.69	28.80 + a
Group 13: Compressor Battery Operator.	42.97	28.80 + a
Group 14: Elevator Operator; Tow Motor Operator (solid tire no rough terrain).	41.52	28.80 + a
Group 15: Generator Operator; Compressor Operator; Pump Operator; Welding Machine Operator; Heater Operator.	41.01	28.80 + a
Group 16: Maintenance Engineer.	40.19	28.80 + a
Group 17: Portable Asphalt Plant Operator; Portable Crusher Plant Operator; Portable Concrete Plant Operator; Portable Grout Plant Operator; Portable Water Filtration Plant Operator.	45.63	28.80 + a
Group 18: Power Safety Boat; Vacuum Truck; Zim Mixer; Sweeper; (Minimum for any job requiring a CDL license); Rigger; Signalman.	42.57	28.80 + a
Surveyor: Chief of Party	45.87	28.80 + a
Surveyor: Assistant Chief of Party	42.3	28.80 + a
Surveyor: Instrument Man	40.7	28.80 + a
Surveyor: Rodman or Chainman	35.03	28.80 + a

------PAINTERS (Including Drywall Finishing)------

10a) Brush and Roller	38.07	25.80
10b) Taping Only/Drywall Finishing	38.82	25.80
10c) Paperhanger and Red Label	38.57	25.80
10e) Blast and Spray	41.07	25.80
11) Plumber (excluding HVAC pipe installation) (Trade License required: P-1,2,6,7,8,9 J-1,2,3,4 SP-1,2)	49.58	36.15
12) Well Digger, Pile Testing Machine	37.26	24.05 + a
Roofer: Cole Tar Pitch	45.0	23.85 + a
Roofer: Slate, Tile, Composition, Shingles, Singly Ply and Damp/Waterproofing	43.5	23.85 + a
15) Sheetmetal Worker (Trade License required for HVAC and Ductwork: SM-1,SM-2,SM-3,SM-4,SM-5,SM-6)	53.22	46.19
16) Pipefitter (Including HVAC work) (Trade License required: S-1,2,3,4,5,6,7,8 B-1,2,3,4 D-1,2,3,4, G-1, G-2, G-8 & G-9)	49.58	36.15
------TRUCK DRIVERS------		
17a) 2 Axle, Helpers	33.16	32.36 + a
17b) 3 Axle, 2 Axle Ready Mix	33.27	32.36 + a

17c) 3 Axle Ready Mix	33.33	32.36 + a
17d) 4 Axle	33.39	32.36 + a
17e) 4 Axle Ready Mix	33.44	32.36 + a
17f) Heavy Duty Trailer (40 Tons and Over)	35.66	32.36 + a
17g) Specialized Earth Moving Equipment (Other Than Conventional Type on-the-Road Trucks and Semi-Trailers, Including Euclids)	33.44	32.36 + a
17h) Heavy Duty Trailer up to 40 tons	34.39	32.36 + a
17i) Snorkle Truck	33.54	32.36 + a
18) Sprinkler Fitter (Trade License required: F-1,2,3,4)	49.98	32.85 + a
19) Theatrical Stage Journeyman	25.76	7.34

Welders: Rate for craft to which welding is incidental.

Surveyors: Hazardous material removal: $3.00 per hour premium.

*Note: Hazardous waste removal work receives additional $1.25 per hour for truck drivers.

**Note: Hazardous waste premium $3.00 per hour over classified rate

Crane with 150 ft. boom (including jib) - $1.50 extra
Crane with 200 ft. boom (including jib) - $2.50 extra
Crane with 250 ft. boom (including jib) - $5.00 extra
Crane with 300 ft. boom (including jib) - $7.00 extra
Crane with 400 ft. boom (including jib) - $10.00 extra

All classifications that indicate a percentage of the fringe benefits must be calculated at the percentage rate times the "base hourly rate".

Apprentices duly registered under the Commissioner of Labor's regulations on "Work Training Standards for Apprenticeship and Training Programs" Section 31-51-d-1 to 12, are allowed to be paid the appropriate percentage of the prevailing journeymen hourly base and the full fringe benefit rate, providing the work site ratio shall not be less than one full-time journeyperson instructing and supervising the work of each apprentice in a specific trade.

The Prevailing wage rates applicable to this project are subject to annual adjustments each July 1st for the duration of the project.

Each contractor shall pay the annual adjusted prevailing wage rate that is in effect each July 1st, as posted by the Department of Labor.

It is the contractor's responsibility to obtain the annual adjusted prevailing wage rate increases directly from the Department of Labor's website.

The annual adjustments will be posted on the Department of Labor's Web page: www.ct.gov/dol. For those without internet access, please contact the division listed below.

The Department of Labor will continue to issue the initial prevailing wage rate schedule to the Contracting Agency for the project.

All subsequent annual adjustments will be posted on our Web Site for contractor access.

Contracting Agencies are under no obligation pursuant to State labor law to pay any increase due to the annual adjustment provision.

Effective October 1, 2005 - Public Act 05-50: any person performing the work of any mechanic, laborer, or worker shall be paid prevailing wage

All Person who perform work ON SITE must be paid prevailing wage for the appropriate mechanic, laborer, or worker classification.

All certified payrolls must list the hours worked and wages paid to All Persons who perform work ON SITE regardless of their ownership i.e.: (Owners, Corporate Officers, LLC Members, Independent Contractors, et. al)

Reporting and payment of wages is required regardless of any contractual relationship alleged to exist between the contractor and such person.

~~Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clause (29 CFR 5.5 (a) (1) (ii)).

Please direct any questions which you may have pertaining to classification of work and payment of prevailing wages to the Wage and Workplace Standards Division, telephone (860)263-6790.

As of: September 23, 2024

CENTRAL MIDDLE SCHOOL
GREENWICH, CONNECTICUT
STATE PROJECT NO. 057-0114N
PHASE 2 OF 3 - CONSTRUCTION
7/08/2024

ORACLE

Oracle Textura Payment Management

Subcontractor Usage Fee Update 2023

Turner Construction
David Kelly

Safe Harbor Statement

The following is intended to outline our general product direction. It is intended for information purposes only, and may not be incorporated into any contract. It is not a commitment to deliver any material, code, or functionality, and should not be relied upon in making purchasing decisions. The development, release, and timing of any features or functionality described for Oracle's products remains at the sole discretion of Oracle.

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TPM Subcontractor Usage Fee – New Schedule

Subcontractor Usage Fees Effective January 19, 2023

- Price change details
  - Maximum contract value is increasing from $1,704,545 to $2,272,727
    - Max fee will be $5,000 – up from $3,750
  - 0.22% of contract value (no change)
  - Sub-tier subcontractors will still pay a flat $100 fee per contract (no change)
- Updated fee schedule only applies to projects created on or after January 19, 2023
  - Subcontracts added to projects created prior to January 19, 2023 will continue to utilize the existing fee schedule

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TPM Subcontractor Usage Fee – New Schedule

Existing Schedule

Contract Amount	Contract Fee
$0 - $1,704,545	**0.22%**
$1,704,545 or greater	$3,750

New Schedule (January 19, 2023)

Contract Amount	Contract Fee
$0 - $2,272,727	**0.22%**
$2,272,727 or greater	$5,000

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Communication Plan & Next Steps

Subcontractors will be notified starting December 11, 2022 with a notification announcement upon logging in to Oracle Textura

Please disseminate information through your organization

- Inform your teams
- Update Bid Packs & Contracts

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Frequently Asked Questions

When is this fee change taking place?

- The fee change is effective January 19, 2023

Will current projects retain their existing fee structure?

- Yes. Any project created on-system prior to January 19, 2023 will be subject to their existing usage fee schedule

How often do you change your fees? Why are you changing fees now?

- TPM has only increased subcontractor usage fees three times in our 18-year history (2014, 2019 and 2023). We are responding to changing economic and labor market conditions and supporting continued functionality enhancements.

Has this fee change been finalized?

- We have carefully thought through our pricing structure and timing of changes, which are going into effect on January 19, 2023.

How much will a subcontractor pay on the January 19, 2023 rate compared to the current June 13, 2019 rate?

- Example $100,000 contract: $220 current rate, $220 new rate (no change)
- Example $1,500,000 contract: $3,300 current rate, $3,300 new rate (no change)
- Example $2,000,000 contract: $3,750 current rate, $4,400 new rate

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Frequently Asked Questions

What is Oracle's communication plan around these new fees?

- We are communicating this change directly to our owner, general contractor and subcontractor clients through both conversations and TPM announcements.

Why is the new maximum fee $5,000?

- This change reflects increased labor costs, R&D, operating expenses, security services cost increases, and continued investment in ERP integration

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CENTRAL MIDDLE SCHOOL
GREENWICH, CONNECTICUT
STATE PROJECT NO. 057-0114N
PHASE 2 OF 3 - CONSTRUCTION
7/08/2024

MULTIPLE OBLIGEE
LABOR and MATERIAL PAYMENT BOND

Bond # _____

KNOW ALL MEN BY THESE PRESENTS; that _____
(Name of Subcontractor)

a _____ Corporation with principal offices located at _____
(Address)

as Principal (hereinafter "Principal"), and _____
(Name of Surety)

as Surety, a corporation with home offices located at _____
(Address)

(hereinafter "Surety"), are held and firmly bound unto TURNER CONSTRUCTION COMPANY, a New York corporation (hereinafter "Obligee") and _____

(hereinafter individually and collectively referred to as "Obligees") in the sum of _____ Dollars $ (_____)
(which amount, as it may increase as provided herein below, is hereinafter referred to as "Penal Sum") for the payment whereof the Principal and Surety bind themselves, and their respective heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, Principal has by written agreement dated _____ entered into a subcontract with Obligee for the performance of _____ (hereinafter the "Subcontract Work"), for and at the
(Subcontract Work)

_____
(Name of Project)
_____ (hereinafter the "Project) located at _____
(Address)

in accordance with Drawings and Specifications prepared by _____
(Architect/Engineer)

which subcontract is by reference made a part thereof, and is hereinafter referred to as the "Subcontract".

NOW THEREFORE, THE CONDITION OF THIS OBLIGATION is such that, if Principal shall promptly make payment to all Claimants as hereinafter defined for all labor and material used or reasonably required for use in the performance of the Subcontract then this obligation shall be void; otherwise it shall remain in full force and effect subject however to the following conditions:

1) A Claimant is defined as one having a direct contract with the Principal or with a subcontractor of the Principal for labor, material, or both, used or reasonably required for use in the performance of the Subcontract, labor and material being construed to include that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental of equipment directly applicable to the Subcontract.

2) The above named Principal and Surety hereby jointly and severally agree with the Obligees that every Claimant as herein defined, who has not been paid in full before the expiration of a period of ninety (90) days after the date on which the last of such Claimant's work or labor was done or performed, or materials were furnished by such Claimant, may sue on this bond for the use of such Claimant, prosecute the suit to final judgment for such sum or sums as may be justly due Claimant, and have execution thereon. The Obligees shall not be liable for the payment of any costs or expenses of any such suit.

3) No suit or action shall be commenced hereunder by any Claimant:

a) Unless Claimant, other than one having a direct contract with the Principal, shall have given written notice to the surety

named above and one of the following: the Principal and at least one of the Obligees within ninety (90) days after such Claimant did or performed the last of the work or labor, or furnished the last of the materials for which said claim is made, stating with substantial accuracy the amount claimed and the name of the part to whom the materials were furnished, or for whom the work or labor was done or performed. Such notice shall be served by mailing the same by registered mail or certified mail, postage prepaid, in an envelope addressed to the Surety, Principal and one of the Obligees, at any place where an office is regularly maintained for the transaction of business, or served in any manner in which legal process may be served in the state in which the Project is located, save that such service need not be made by a public officer.

b) After the expiration of one (1) year following the date on which the Principal ceased performing Subcontract Work, it being understood, however, that if any limitation embodied in this Bond is prohibited by any law controlling the construction hereof such limitation shall be deemed to be amended so as to be equal to the minimum period of limitation permitted by such law.

c) Other than in a state court of competent jurisdiction in and for the county or other political subdivision of the state in which the Project, or any part thereof, is situated, or in the United States District Court for the district in which the Project, or any part hereof, is situated, and not elsewhere.

4) The initial amount of the Penal Sum set forth herein above corresponds with the Subcontract price as set forth in the Subcontract. In the event that the Subcontract price increases, the amount of the Penal Sum shall increase to correspond with the increased Subcontract price, automatically and without the consent, agreement or approval of Surety; provided, however, that the total increase of the Penal Sum shall not be greater than 25% of the initial amount without the written consent of Surety, which consent shall not be unreasonably withheld.

5) The amount of this Bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder, inclusive of the payment by Surety of mechanics' liens which may be filed of record against said improvement, whether or not claim for the amount of such lien be presented under and against this Bond.

Principal and Surety shall not be liable hereunder to the Claimants in the aggregate in excess of the penal sum above stated.

IN WITNESS WHEREOF, the Principal and Surety have hereunto caused this Bond to be duly executed and acknowledged as set forth below this _____ day of _____ , _____ .

(Impress Corporate Seal)

Principal

_____
(Name of Subcontractor /Principal)

By: _____
(Officer's Name)

Title: _____

ATTEST: _____

(Impress Corporate Seal)

Surety

_____
(Name of Surety)

By: _____
Attorney-in-Fact)

ATTEST: _____

NOTE: An original Power of Attorney bearing same date as Bond must be attached.

ACKNOWLEDGMENT

STATE OF :

: ss.

COUNTY OF :

On this .....day of ....., 20 ... , before me appeared ...., to me known, who being by me duly sworn, did depose and say that he resided in..... .....; that he is the ..... (Officer) of the corporation described in and which executed the foregoing MULTIPLE OBLIGEE LABOR and MATERIAL PAYMENT BOND (hereinafter "Instrument") as Subcontractor/Principal; that he knew the seal of said corporation; that the seal affixed to the foregoing instrument is the corporate seal of said corporation; and that the foregoing instrument was signed, sealed and delivered by him on behalf of said corporation by its authority duly given as the voluntary act and deed of said corporation.

IN WITNESS WHEREOF, the said.....(Name of Officer) has subscribed and sworn to the foregoing oaths before me, and I have hereunto set my hand and affixed my official seal the day and year first above written.

(SEAL)

.....
Notary Public

My Commission Expires:

MULTIPLE OBLIGEE PERFORMANCE BOND

BOND # ……

KNOW ALL MEN BY THESE PRESENTS; that …… a
(Name of Subcontractor)

…… corporation with principal offices located at …….
(Address)

as Principal (hereinafter "**Principal**"), and ……..
(Name of Surety)

as **Surety**, a ……..…… corporation with home offices located at ……..….
(Address)
(hereinafter "**Surety**"), are held and firmly bound unto [**Turner Construction Company**], a [**New York**] corporation

and …….. (hereinafter individually and/or collectively

referred to as "**Obligees**") in the sum of ……

Dollars ($.....), (which amount, as it may increase as provided herein below, is hereinafter referred to as "**Penal Sum**") for the payment whereof the **Principal** and **Surety** bind themselves, and their respective heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, **Principal** has by written agreement dated ……..... entered into a subcontract with **Obligees**

for the performance of …… (hereinafter the "**Subcontract Work**"), for and
(Subcontract Work)

at the ……. (hereinafter the "Project") located at
(Name of Project)

……..in accordance with Drawings and Specifications
(Address)
prepared by …….. which subcontract is by reference made a part thereof, and is
(Architect/Engineer)
hereinafter referred to as the "**Subcontract**".

NOW THEREFORE, THE CONDITION OF THIS OBLIGATION is such that, if **Principal** promptly and faithfully perform said **Subcontract**, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

Surety hereby waives notice of any alteration or extension of time made by **Obligees.**

Whenever **Principal** shall be and declared by **Obligees** to be in default under the **Subcontract**, **Obligees** having performed its obligations thereunder, **Surety** shall within ten (10) days of written notice of default request information from **Obligee** in connection with the default. Within an additional thirty (30) days, **Surety** shall provide a response to **Obligees** with regard to how it intends to promptly cure **Principal's** default. **Surety** may, with **Obligees'** consent, proceed to promptly remedy the default, by the following options:

1) Complete the **Subcontract** in accordance with its terms and conditions; or

2) Obtain a bid or bids for completing the **Subcontract Work** in accordance with **Subcontract's** terms and conditions, and upon determination by **Surety** of the lowest responsible bidder, or if **Obligees** elects, upon determination by **Obligees** and **Surety** jointly of the lowest responsible bidder, arrange for a subcontract between such bidder and **Obligees**.

The subcontract between such bidder and **Obligees** shall include such bidder to provide Obligees with new Performance Bond (hereinafter "**New Bond**") containing the same terms and conditions as **Principals** original Bond to **Obligees**. The **Penal Sum** of the **New Bond** shall be the cost to complete **Project**, including any adjustments thereto. Upon arranging a subcontract between such bidder and **Obligees**, **Surety** shall within ten (10) days of the execution of the subcontract, immediately make available sufficient funds to pay **Obligees** the cost of completion, less the balance of the **Subcontract** price, including other costs and damages for which S**urety** may be liable hereunder. In no event shall the liability of the surety exceed the penal sum of the Bond.The term "**balance of the Subcontract price**," as used in this paragraph, shall mean the total amount payable by **Obligees** to **Principal** under **Subcontract** and any amendments thereto, less the amount properly paid by **Obligees** to **Principal**.

In the event the **Obligees** declare the Principal to be in default of its **Subcontract**, **Obligees**, after written notice to **Surety**, may in its sole and absolute discretion and without limiting its rights or defenses at law, in equity, under this Bond or **Subcontract**, immediately arrange for performance of any or all of **Principal's** obligations under **Subcontract in order to maintain the progress of the Principal's obligations during the Surety's forty (40) day investigatory period**. Failure by **Obligees** to exercise its rights, defenses, etc. under this Bond or **Subcontract** shall not be deemed a waiver of such rights, defenses, etc. Surety shall indemnify and save harmless **Obligees** of and from any and all reasonable and necessary costs, interest, expenses, losses, damages, including but not limited to, reasonable attorney's fees, professional consulting fees or other fees deemed necessary which **Obligees** sustained or incurred in connection with the performance of **Principal's** obligations under the **Subcontract**. Once the **Surety** advises the **Obligees**, in writing, with respect to how it intends to proceed under options 1 or 2 above and work commences thereunder, the **Obligees**, unless otherwise mutually agreed, or as soon as reasonably practicable, will cease from performing further work relating to the **Principal's** obligations under the **Subcontract**. In the event of any conflict between the terms and conditions of this Bond and the **Subcontract**, with respect to the **Obligees** progressing the **Principal's** obligations during the **Surety's** forty (40) day investigatory period, this Bond shall govern.

The initial amount of the **Penal Sum** set forth herein above corresponds with **Subcontract** price as set forth in **Subcontract**. In the event that **Subcontract** price increases, the amount of **Penal Sum** shall increase to correspond with the increased **Subcontract** price, automatically and without consent, agreement or approval of **Surety**; provided, however, that the total increase of the **Penal Sum** shall not be greater than Twenty Five Percent (25%) of the initial amount without the written consent of **Surety**, which consent shall not be unreasonably withheld.

No right of action shall accrue on this Bond to or for the use of any person or corporation other than **Obligees** or their respective heirs, executors, administrators or successors.

Principal and **Surety** shall not be liable to **Obligees** or any of them unless **Obligees** has performed the obligations to the **Principal** in accordance with the terms of the **Subcontract**.

As used in this Bond, the term "**Obligees**" is anyone performing **Obligees'** obligations under **Subcontract** in the event Obligees' failure to do so.

This Bond shall be for the sole benefit of **Obligees**, their respective heirs, executors, administrators or successors.

Notwithstanding anything set forth herein that is or may be construed to the contrary, in no event shall the liability of the Surety exceed the Penal Sum of the Bond.

IN WITNESS WHEREOF, the **Principal** and **Surety** have hereunto caused this Bond to be duly executed and acknowledged as set forth below this ……..day of ……., 20…..

(Impress Corporate Seal) ……., Principal
ATTEST: (Name of Subcontractor/Principal)

……..

By: ……..
(Officer)

Title: ……

(Impress Corporate Seal)

ATTEST: ……., Surety
(Name of Surety)

……..

By: ……..
(Attorney-in-fact)

Note: An original Power of Attorney bearing same date as Bond must be attached.

ACKNOWLEDGMENT

STATE OF **:**
:ss.
COUNTY OF **:**

On this ……. day of ……... , 20 …., before me appeared …….. ,

to me known, who being by me dully sworn, did depose and say that he/she resided in ……..… ;

that he/she is the …… (Officer) of the corporation described in and which executed the foregoing **MULTIPLE OBLIGEE PERFORMANCE BOND** (hereinafter "Instrument") as Subcontractor/Principal; that he/she knew the seal of said corporation; that the seal affixed to the foregoing instrument is the corporate seal of said corporation; and that the foregoing instrument was signed, sealed and delivered by him/her on behalf of said corporation by its authority duly given as the voluntary act and deed of said corporation.

IN WITNESS WHEROF, the said(Name of Officer) has subscribed and sworn to the foregoing oaths before me, and I have hereunto set my hand and affixed my official seal the day and year first above written.

(SEAL) ……
(Notary Public)

My Commission Expires: ……..

Exhibit C-2

2010

SUBCONTRACTOR AFFIDAVIT, RELEASE, AND WAIVER OF LIENS

TO CONTRACTOR: Name: _____

Address: _____

_____

FROM SUBCONTRACTOR: Name: _____

Address: _____

_____

PROJECT _____

_____

OWNER: _____

SUBCONTRACT DATE: _____

Subcontractor Payment Request No.: _____
Period From: _____
To: _____ (hereinafter the "partial Completion Date")
Cross Reference Contractor Application for Payment No.: _____
Subcontractor Payment Request Amount: $ _____

1. **CERTIFICATIONS, AFFIRMATIONS AND WARRANTIES.** The undersigned Subcontractor (hereinafter "the Undersigned"), to support its entitlement to the requested payment, and for and in consideration of payments made by Contractor to the Undersigned, or to a subcontractor, materialman or supplier of the Undersigned, for work, services, materials or equipment provided or performed in the construction of the above-referenced Project, hereby affirms, certifies and warrants as follows:

(a) The Subcontractor Payment Request Amount set forth above represents the actual value of work performed for the above payment request period for which payment is due under the terms of the Subcontract (and all authorized changes thereto) between the Undersigned and the Contractor relating to the Project, including (i) all labor expended or furnished in the design or construction of the Project, (ii) all materials and equipment delivered to the site and either incorporated or to be incorporated in the Project; (iii) all materials, fixtures and equipment for the Project stored off-site to the extent authorized by Contractor and for which payment therefor is permitted by the Subcontract, (iv) all services

furnished or performed in the design or construction of the Project, and (v) all equipment used, or provided for use, in the construction of the Project. All of items (i) through (v) above are hereafter collectively referred to as "work performed in the construction of the Project."

(b) **Except for the Subcontractor Payment Request Amount set forth above, the Undersigned certifies that it has already received payment in full, less retainage, (i) for all prior Subcontractor Payment Requests and (ii) for all work performed in the construction of the Project through the date set forth above (the "Partial Completion Date");** and, except for retainage, the Undersigned has no claims, on its own behalf or on behalf of others, against Contractor, Owner or the Project, based upon or relating to work performed in the construction of the Project through the Partial Completion Date, except for outstanding written requests for change orders, outstanding written notices of possible change orders, or other claims previously submitted in writing by Subcontractor to Contractor.

(c) The Undersigned has not assigned to anyone any claim, any lien, or any right to file or perfect a lien, against Contractor, Owner, or the Project.

(d) Except for the Subcontractor Payment Request Amount set forth above, the Undersigned certifies that it has paid in full all laborers, and, subject to retainage no greater than the percentage retainage held by Contractor, all subcontractors, suppliers, materialman and others with respect to all work performed in the construction of the Project through the Partial Completion Date.

(e) The Undersigned has not given or executed any security interests for or in connection with any materials, equipment, appliances, machines, fixtures or furnishings which have been or are to be installed as part of the Project, and is conveying good title to the same to Contractor.

2. **WAIVER AND RELEASE.** Subject to receipt of payment for the Subcontractor Payment Request Amount set forth above, the Undersigned does hereby forever waive and release in favor of Contractor, Owner, the Project, and the title company or companies examining and/or insuring title to the Project, and any and all successors and assigns of the above, all rights that presently exist or hereafter may accrue to the Undersigned, by reason of work performed in the construction of the Project through the Partial Completion Date, (i) to assert a lien upon the land and/or improvements comprising the Project (whether under the lien statute of any jurisdiction or otherwise), and (ii) to assert or bring, subject to paragraph 1(b) above, any causes of actions, claims, suits and/or demands which the Undersigned ever had or now has against Contractor, Owner, or the Project. Subject to paragraph l(b) above, the Undersigned hereby releases, acquits and forever discharges Owner and Owner's lenders, and their representative partners, directors, officers, employees, agents, successors and assigns, from all claims, liabilities, obligations, causes of action and demands whatsoever, whether known or unknown, arising now or in the future, relating to or arising from the Project, based upon any cause, matter or thing whatsoever, from the beginning of the world through the date of this Release.

3. **INDEMNIFICATION.** The Undersigned hereby agrees to indemnify, defend and hold harmless Contractor, Owner, and their respective successors and assigns, from and against any and all damages, costs, judgments, liabilities, demands, suits and expenses (including reasonable attorney's fees) directly or indirectly relating to any cause of action, claim or lien filed by any person or entity with

respect to (i) any work performed in the construction of the Project through the Partial Completion Date, (ii) any rights waived or released herein, and (iii) any misrepresentation or breach of any certification, affirmation or warranty made by the Undersigned in this document. Upon the request of Contractor, the Undersigned will undertake to defend such causes of actions, claims or liens at its sole cost and expense.

Date: _____

SUBCONTRACTOR: _____

By: _____

Name: _____

Title: _____

UNCONDITIONAL WAIVER AND RELEASE UPON PROGRESS PAYMENT

The undersigned has been paid and has received a progress payment in the sum of _____ _____ for labor, services, equipment or material furnished to _____ on the job of _____ located at _____ , and does hereby waive and release any right to mechanic's lien, stop notice, or bond right the undersigned has on the above-referenced job to the following extent. This release covers a progress payment for labor, services, equipment or material furnished to ___ _____ through the _____ only and does not cover any retentions retained before or after the release date; extras furnished before the release date for which payment has not been received; extras or items furnished after the release date.

Rights based upon work performed or items furnished under a written change order which has been fully executed by the parties prior to the release date are covered by this release unless specifically reserved by the claimant in this release. This release of any mechanic's lien, stop notice, or bond right shall not otherwise affect the contract rights, including rights between parties to the contract based upon a rescission, abandonment, or breach of the contract, or the right of the undersigned to recover compensation for furnished labor, services, equipment, or material covered by this release if that furnished labor, services, equipment, or material was not compensated by the progress payment.

Dated: _____

_____
(Company name)

by: _____
(Signature)

(Title)

On the _____ , before me, _____ ,
personally appeared Textura Admin personally known to me/proved to me on the basis of satisfactory evidence to be the person whose name is subscribed to within the instrument and acknowleged to be that he/she executed the same in his/her authorized capacity, and that by his/her signature on the instrument the person or the entity upon behalf of which person acted, executed the instrument.

WITNESS my hand and official seal.

_____
(Signature of Notary Public)

Commission #
Notary Public -
My Commission Expires:

NOTICE: THIS DOCUMENT WAIVES RIGHTS UNCONDITIONALLY AND STATES THAT YOU HAVE BEEN PAID FOR GIVING UP THOSE RIGHTS. THIS DOCUMENT IS ENFORCEABLE AGAINST YOU IF YOU SIGN IT, EVEN IF YOU HAVE NOT BEEN PAID. IF YOU HAVE NOT BEEN PAID, USE A CONDITIONAL RELEASE FORM.

[Note: this final paragraph must be in type at least as large as the largest type otherwise in the document.]

Add optional text here.

CONDITIONAL WAIVER AND RELEASE ON PROGRESS PAYMENT

NOTICE: THIS DOCUMENT WAIVES THE CLAIMANT'S LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS EFFECTIVE ON RECEIPT OF PAYMENT. A PERSON SHOULD NOT RELY ON THIS DOCUMENT UNLESS SATISFIED THAT THE CLAIMANT HAS RECEIVED PAYMENT..

Identifying Information

Name of Claimant: _____
Name of Customer: _____
Job Location: _____
Owner: _____
Through Date: _____

Conditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job through the Through Date of this document. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. This document is effective only on the claimant's receipt of payment from the financial institution on which the following check is drawn:

Maker of Check: _____
Amount of Check: _____
Check Payable to: _____

Exceptions

This document does not affect any of the following:
(1) Retentions.
(2) Extras for which the claimant has not received payment.
(3) The following progress payments for which the claimant has previously given a conditional waiver and release but has not received payment:
Date(s) of waiver and release: _____
Amount(s) of unpaid progress payment(s): _____
(4) Contract rights, including (A) a right based on rescission, abandonment, or breach of contract, and (B) the right to recover compensation for work not compensated by the payment.

Signature

Claimant's Signature: _____
Claimant's Title: _____
Date of Signature: _____

CONDITIONAL WAIVER AND RELEASE ON FINAL PAYMENT

NOTICE: THIS DOCUMENT WAIVES THE CLAIMANT'S LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS EFFECTIVE ON RECEIPT OF PAYMENT. A PERSON SHOULD NOT RELY ON THIS DOCUMENT UNLESS SATISFIED THAT THE CLAIMANT HAS RECEIVED PAYMENT..

Identifying Information

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: _____

Conditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. This document is effective only on the claimant's receipt of payment from the financial institution on which the following check is drawn:

Maker of Check: _____

Amount of Check: _____

Check Payable to: _____

Exceptions

This document does not affect any of the following:

Disputed claims for extras in the amount of: _____

Signature

Claimant's Signature: _____

Claimant's Title: _____

Date of Signature: _____

UNCONDITIONAL WAIVER AND RELEASE ON PROGRESS PAYMENT

NOTICE TO CLAIMANT: THIS DOCUMENT WAIVES AND RELEASES LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS UNCONDITIONALLY AND STATES THAT YOU HAVE BEEN PAID FOR GIVING UP THOSE RIGHTS. THIS DOCUMENT IS ENFORCEABLE AGAINST YOU IF YOU SIGN IT, EVEN IF YOU HAVE NOT BEEN PAID. IF YOU HAVE NOT BEEN PAID, USE A CONDITIONAL WAIVER AND RELEASE FORM.

Identifying Information

Name of Claimant: _____
Name of Customer: _____
Job Location: _____
Owner: _____
Through Date: _____

Unconditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job through the Through Date of this document. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. The claimant has received the following progress payment:

_____

Exceptions

This document does not affect any of the following:
(1) Retentions.
(2) Extras for which the claimant has not received payment.
(3) Contract rights, including (A) a right based on rescission, abandonment, or breach of contract, and (B) the right to recover compensation for work not compensated by the payment.

Signature

Claimant's Signature: _____
Claimant's Title: _____
Date of Signature: _____

UNCONDITIONAL WAIVER AND RELEASE ON FINAL PAYMENT

NOTICE TO CLAIMANT: THIS DOCUMENT WAIVES AND RELEASES LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS UNCONDITIONALLY AND STATES THAT YOU HAVE BEEN PAID FOR GIVING UP THOSE RIGHTS. THIS DOCUMENT IS ENFORCEABLE AGAINST YOU IF YOU SIGN IT, EVEN IF YOU HAVE NOT BEEN PAID. IF YOU HAVE NOT BEEN PAID, USE A CONDITIONAL WAIVER AND RELEASE FORM.

Identifying Information

Name of Claimant: _____
Name of Customer: _____
Job Location: _____
Owner: _____

Unconditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for all labor and service provided, and equipment and material delivered, to the customer on this job. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. The claimant has been paid in full.

Exceptions

This document does not affect the following:
Disputed claims for extras in the amount of: _____

Signature

Claimant's Signature: _____
Claimant's Title: _____
Date of Signature: _____

TO:

FINAL / GENERAL RELEASE

WAIVER AND RELEASE OF LIENS

The undersigned is a general contractor or subcontractor, materialman or other person furnishing services or labor or material in the construction or repair of improvements upon real estate owned by . and described as follows:

Upon receipt by of a check from Turner Construction Co. in the sum of $ and when the check has been paid by the bank upon which it is drawn, the undersigned does hereby waive, release and quitclaim in favor of the owner or owners of said real estate and in favor of each and every party making a loan on said real estate, as improved and his or its successors and assigns, all right that the undersigned may have to a lien upon the land and improvements above described.

IT IS UNDERSTOOD AND AGREED THAT WAIVER AND RELEASE IS FOR ALL SERVICES RENDERED, WORK DONE AND MATERIAL FURNISHED PRIOR TO THE DATE HEREOF and is for all such services rendered, work done and material furnished and not only for the particular item indicated below.

Witness the following signature and seal this _____day of _____ , 2012.

FIRM:

BY:

TITLE:

_____ $
(Service, labor or material furnished) (Total amount paid to date on contract)

Date:

Subscribed and sworn to before the undersigned, a Notary Public for the County of State of this day of 20__

_____
Notary Public

My Commission expires:

2nd Tier Subcontractors and Supplier List

Project Name:
General Contractor Company Name Project Manager:
Project Address:
General Contractor Company Name Project #:
Pay Application #:

Company Name:
Phone #:
Representative Name:
Representative Title:
Pay Application Date:

2nd Tier Subcontractors and Suppliers							
Tier Subcontractor/Supplier	Contact	Phone Number	Description of Services or Materials Supplied	Contract or PO Amount A	Work Completed/ Materials Supplied B	Previous Amount Paid C	Amount Due this Payment D
TOTALS							

Subcontractor certifies that the above list includes all of Subcontractor's sub-subcontractors, equipment, labor and material suppliers with an anticipated contract value or cost in excess of $5,000.00 and is being pursuant to the obligations contained in the Subcontract. Subcontractor acknowledges its obligation to supplement this list within ten (10) days in the event new sub-subcontractors or equipment, labor or material suppliers having a contract value in excess of $5,000.00 are used by subcontractor in the Project. Subcontractor certifies that this list is true and accurate.

Signature _____ Printed Name & Title _____ Date _____

STATE OF
COUNTY of
Subscribed and sworn to before me this :

Notary Public: _____ My Commission Expires: _____

STATE OF CONNECTICUT
GIFT AND CAMPAIGN CONTRIBUTION CERTIFICATION

Written or electronic certification to accompany a State contract with a value of $50,000 or more, pursuant to C.G.S. §§ 4-250, 4-252(c) and 9-612(f)(2) and Governor Dannel P. Malloy's Executive Order 49.

INSTRUCTIONS:

Complete all sections of the form. Attach additional pages, if necessary, to provide full disclosure about any lawful campaign contributions made to campaigns of candidates for statewide public office or the General Assembly, as described herein. Sign and date the form, under oath, in the presence of a Commissioner of the Superior Court or Notary Public. Submit the completed form to the awarding State agency at the time of initial contract execution and if there is a change in the information contained in the most recently filed certification, such person shall submit an updated certification either (i) not later than thirty (30) days after the effective date of such change or (ii) upon the submittal of any new bid or proposal for a contract, whichever is earlier. Such person shall also submit an accurate, updated certification not later than fourteen days after the twelve-month anniversary of the most recently filed certification or updated certification.

CHECK ONE: ☐ Initial Certification ☐ 12 Month Anniversary Update (Multi-year contracts only.)

☐ Updated Certification because of change of information contained in the most recently filed certification or twelve-month anniversary update.

GIFT CERTIFICATION:

As used in this certification, the following terms have the meaning set forth below:

1) "Contract" means that contract between the State of Connecticut (and/or one or more of it agencies or instrumentalities) and the Contractor, attached hereto, or as otherwise described by the awarding State agency below;
2) If this is an Initial Certification, "Execution Date" means the date the Contract is fully executed by, and becomes effective between, the parties; if this is a twelve-month anniversary update, "Execution Date" means the date this certification is signed by the Contractor;
3) "Contractor" means the person, firm or corporation named as the contactor below;
4) "Applicable Public Official or State Employee" means any public official or state employee described in C.G.S. §4-252(c)(1)(i) or (ii);
5) **"Gift"** has the same meaning given that term in C.G.S. § 4-250(1);
6) "Principals or Key Personnel" means and refers to those principals and key personnel of the Contractor, and its or their agents, as described in C.G.S. §§ 4-250(5) and 4-252(c)(1)(B) and (C).

I, the undersigned, am a Principal or Key Personnel of the person, firm or corporation authorized to execute this certification on behalf of the Contractor. I hereby certify that, no gifts were made by (A) such person, firm, corporation, (B) any principals and key personnel of the person firm or corporation who participate substantially in preparing bids, proposals or negotiating state contracts or (C) any agent of such, firm, corporation, or principals or key personnel who participates substantially in preparing bids, proposals or negotiating state contracts, to (i) any public official or state employee of the state agency or quasi-public agency soliciting bids or proposals for state contracts who participates substantially in the preparation of bid solicitations or request for proposals for state contracts or the negotiation or award of state contracts or (ii) any public official or state employee of any other state agency, who has supervisory or appointing authority over such state agency or quasi-public agency.

I further certify that no Principals or Key Personnel know of any action by the Contractor to circumvent (or which would result in the circumvention of) the above certification regarding **Gifts** by providing for any other Principals, Key Personnel, officials, or employees of the Contractor, or its or their agents, to make a **Gift** to any Applicable Public Official or State Employee. I further certify that the Contractor made the bid or proposal for the Contract without fraud or collusion with any person.

CAMPAIGN CONTRIBUTION CERTIFICATION:

I further certify that, on or after January 1, 2011, neither the Contractor nor any of its principals, as defined in C.G.S. § 9-612(f)(1), has made any **campaign contributions** to, or solicited any contributions on behalf of, any exploratory committee, candidate committee, political committee, or party committee established by, or supporting or authorized to support, any candidate for statewide public office, in violation of C.G.S. § 9-612(f)(2)(A). I further certify that **all lawful campaign contributions** that have been made on or after January 1, 2011 by the Contractor or any of its principals, as defined in C.G.S. § 9-612(f)(1), to, or solicited on behalf of, any exploratory committee, candidate committee, political committee, or party committee established by, or supporting or authorized to support any candidates for statewide public office or the General Assembly, are listed below:

Lawful Campaign Contributions to Candidates for Statewide Public Office:

Contribution Date	Name of Contributor	Recipient	Value	Description

Lawful Campaign Contributions to Candidates for the General Assembly:

Contribution Date	Name of Contributor	Recipient	Value	Description

Sworn as true to the best of my knowledge and belief, subject to the penalties of false statement.

_____ _____

Printed Contractor Name **Printed Name of Authorized Official**

_____

Signature of Authorized Official

Subscribed and acknowledged before me this _____ day of _____, 20___.

_____

Commissioner of the Superior Court (or Notary Public)

_____

My Commission Expires

STATE OF CONNECTICUT
AFFIRMATION OF RECEIPT OF STATE ETHICS LAWS SUMMARY

Written or electronic affirmation to accompany a large State construction or procurement contract, having a cost of more than $500,000, pursuant to Connecticut General Statutes §§ 1-101mm and 1-101qq

---

INSTRUCTIONS:

Complete all sections of the form. Submit completed form to the awarding State agency or contractor, as directed below.

CHECK ONE:

☐ I am a person seeking a large State construction or procurement contract. I am submitting this affirmation to the awarding State agency with my bid or proposal. [Check this box if the contract will be awarded through a competitive process.]

☐ I am a contractor who has been awarded a large State construction or procurement contract. I am submitting this affirmation to the awarding State agency at the time of contract execution. [Check this box if the contract was a sole source award.]

☐ I am a subcontractor or consultant of a contractor who has been awarded a large State construction or procurement contract. I am submitting this affirmation to the contractor.

☐ I am a contractor who has already filed an affirmation, but I am updating such affirmation either (i) no later than thirty (30) days after the effective date of any such change or (ii) upon the submittal of any new bid or proposal, whichever is earlier.

IMPORTANT NOTE:

Within fifteen (15) days after the request of such agency, institution or quasi-public agency for such affirmation contractors shall submit the affirmations of their subcontractors and consultants to the awarding State agency. Failure to submit such affirmations in a timely manner shall be cause for termination of the large State construction or procurement contract.

AFFIRMATION:

I, the undersigned person, contractor, subcontractor, consultant, or the duly authorized representative thereof, affirm (1) receipt of the summary of State ethics laws* developed by the Office of State Ethics pursuant to Connecticut General Statutes § 1-81b and (2) that key employees of such person, contractor, subcontractor, or consultant have read and understand the summary and agree to comply with its provisions.

* The summary of State ethics laws is available on the State of Connecticut's Office of State Ethics website.

_____ _____
Signature Date

_____ _____
Printed Name Title

_____
Firm or Corporation (if applicable)

_____ _____ ____ _____
Street Address City State Zip

_____
Awarding State Agency

Substitute Senate Bill No. 999

Substitute Senate Bill No. 999

PUBLIC ACT NO. 89-255

AN ACT CONCERNING THE RECOMMENDATIONS OF THE GOVERNOR'S BUILDING CONSTRUCTION ADVISORY COMMITTEE.

Section 1. Section 29-252 of the general statutes is repealed and the following is substituted in lieu thereof:

(a) The state building inspector and the codes and standards committee shall, jointly, with the approval of the commissioner of public safety, adopt and administer a state building code for the purpose of regulating the design, construction and use of buildings or structures to be erected and the alteration of buildings or structures already erected and make such amendments thereto as they, from time to time, deem necessary or desirable. The code shall be revised not later than July 1, 1989, to incorporate such revisions adopted by the Building Officials and Code Administrators International in 1988 as they deem necessary, and not more than every four years thereafter to incorporate any necessary subsequent revisions to the code adopted by said organization. The purpose of said building code shall also include, but not be limited to, promoting and ensuring that such buildings and structures are designed and constructed in such a manner as to conserve energy and, wherever practicable, facilitate the use of renewable energy resources. Said building code includes any code, rule or regulation incorporated therein by reference.

(b) The state building inspector shall be appointed by the governor. He shall be an architect or professional engineer licensed by the state of Connecticut, shall have a thorough knowledge of building code administration and enforcement and shall have had not less than ten years practical experience in his profession.

(c) The state building inspector or his designee [, with the approval of the codes and standards committee,] may issue official interpretations of the state building code, including interpretations of the applicability of any provision of the code, upon the request of any person. The state building inspector shall compile and index each interpretation and shall publish such interpretations at periodic intervals not exceeding four months.

(d) The state building inspector or his designee shall review [the interpretation of the state building code] A DECISION by a local building official or a board of appeals appointed pursuant to section 29-266 when he has reason to believe that such official or board has misconstrued or misinterpreted any provision of

[said] THE STATE BUILDING code. If upon review and after consultation with such official or board he determines that a provision of the code has been misconstrued or misinterpreted, he shall issue an interpretation of said code and MAY ISSUE any order he deems appropriate. Any such determination or order shall be in writing and be sent to such local building official or board by registered mail, return receipt requested. Any person aggrieved by any determination or order by the state building inspector under this subsection may appeal to the codes and standards committee within fourteen days after mailing of the decision or order. Any person aggrieved by any ruling of the codes and standards committee may appeal in accordance with the provisions of subsection (d) of section 29-266.

Sec. 2. Section 29-252a of the general statutes is repealed and the following is substituted in lieu thereof:

(a) The state building code, including any amendment to said code adopted by the state building inspector and codes and standards committee, shall be the building code for all state agencies.

(b) On and after July 1, 1989, except as provided in subsection (c), no state building or structure shall be constructed or altered until an application has been filed by the commissioner of public works with the state building inspector and a building permit issued by the state building inspector. [A copy] TWO COPIES of the plans and specifications for the building or structure to be constructed or altered shall accompany the application. The commissioner of public works shall certify that such plans and specifications are in substantial compliance with the provisions of the state building code and, where applicable, with the provisions of the state fire safety code. The state building inspector shall review the plans and specifications for the building or structure to be constructed or altered to verify their compliance with the requirements of the state building code and, within thirty days of the date of application, issue or refuse to issue the building permit. The state building inspector may request that the state fire marshal review such plans to verify their compliance with the state fire safety code.

(c) All state agencies authorized to contract for the construction of buildings or the alteration of existing buildings under the provisions of section 4-126 or 4-131 shall be responsible for substantial compliance with the provisions of the state building code and the regulations lawfully adopted thereunder. SUCH AGENCIES SHALL GIVE WRITTEN NOTICE TO THE STATE

BUILDING INSPECTOR OF THEIR INTENT TO APPLY FOR A CERTIFICATE OF OCCUPANCY AT LEAST THIRTY DAYS PRIOR TO THE ADVERTISEMENT FOR A CONSTRUCTION CONTRACT. Such agencies shall apply to the state building inspector for a certificate of occupancy and shall certify compliance with the state building code to the state building inspector prior to occupancy or use of the facility.

(d) No state building or structure erected or altered on and after July 1, 1989, shall be occupied or used in whole or in part, until a certificate of occupancy has been issued by the state building inspector, certifying that such building or structure substantially conforms to the provisions of the state building code and the regulations lawfully adopted thereunder.

(e) The state building inspector OR HIS DESIGNEE shall inspect OR CAUSE TO BE INSPECTED any construction of buildings or alteration of existing buildings by state agencies. The state building inspector may order any state agency to comply with the state building code.

(f) Any person aggrieved by any refusal to issue a building permit or certificate of occupancy under the provisions of this section or by an order to comply with the state building code may appeal, de novo, to the codes and standards committee within seven days after the issuance of any such refusal or order.

(g) State agencies shall be exempt from the permit requirements of section 29-263 and the certificate of occupancy requirement under section 29-265.

Sec. 3. Section 29-262 of the general statutes is repealed and the following is substituted in lieu thereof:

(a) The state building inspector and the codes and standards committee acting jointly, with the approval of the commissioner of public safety, shall require passage of a written examination and successful completion of a suitable educational program of training as proof of qualification pursuant to section 29-261 to be eligible to be a building official. No person shall act as a building official for any municipality until the state building inspector, upon a determination of qualification, issues a license to such person except that a license shall not be required (1) in the case of a person certified prior to January 1, 1984, or (2) in the case of a provisional appointment, for a period not to exceed ninety days in order to complete such training program and licensure classes, made in accordance with standards established in regulations adopted by the STATE building inspector and the codes and standards committee in accordance with the provisions of chapter 54. The state building

inspector and the codes and standards committee, with the approval of the commissioner of public safety, shall establish classes of licensure that will recognize the varying complexities of code enforcement in the municipalities within the state.

(b) The state building inspector shall prepare and conduct OR APPROVE CONTINUING educational programs designed to train and assist building officials in carrying out the duties and responsibilities of their office. Such educational programs shall be in addition to the program specified under subsection (a) of this section and shall consist of not less than ninety hours of training over [a] CONSECUTIVE three-year [period] PERIODS. Each building official shall attend such training programs and present proof of successful completion to the state building inspector. The state building inspector may, after notice and opportunity for hearing, revoke any license issued under the provisions of subsection (a) of this section for failure on the part of a building official to present such proof.

(c) Each municipality shall be responsible for the full payment of the fees for the educational programs of training required in subsections (a) and (b) of this section and the cost of textbooks for such programs. Any person may participate in the educational programs specified under subsection (b) of this section at his own expense where space is available.

(d) THE CODES AND STANDARDS COMMITTEE MAY SUSPEND OR REVOKE THE LICENSE OF ANY BUILDING OFFICIAL WHO FAILS TO FAITHFULLY PERFORM THE DUTIES OF HIS OFFICE. NO SUCH BUILDING OFFICIAL MAY HAVE HIS LICENSE SUSPENDED OR REVOKED UNLESS HE HAS BEEN GIVEN NOTICE IN WRITING OF THE SPECIFIC GROUNDS FOR SUCH ACTION AND AN OPPORTUNITY TO BE HEARD IN HIS OWN DEFENSE, PERSONALLY OR BY COUNSEL, AT A HEARING BEFORE THE CODES AND STANDARDS COMMITTEE. SUCH HEARING SHALL BE HELD IN ACCORDANCE WITH THE PROVISIONS OF CHAPTER 54. ANY SUCH BUILDING OFFICIAL MAY APPEAL SUCH SUSPENSION OR REVOCATION TO THE SUPERIOR COURT IN ACCORDANCE WITH THE PROVISIONS OF SECTION 4-183. SAID COURT SHALL REVIEW THE RECORD OF SUCH HEARING AND, IF IT APPEARS UPON THE HEARING ON THE APPEAL THAT TESTIMONY IS NECESSARY FOR AN EQUITABLE DISPOSITION OF THE APPEAL, IT MAY TAKE EVIDENCE OR APPOINT A REFEREE OR A COMMITTEE TO TAKE SUCH EVIDENCE AS IT MAY DIRECT AND REPORT THE SAME TO THE COURT WITH HIS OR ITS FINDINGS OF FACT, WHICH REPORT SHALL CONSTITUTE A PART OF THE PROCEEDINGS UPON WHICH THE DETERMINATION OF THE COURT SHALL BE MADE. THE COURT MAY AFFIRM THE ACTION OF THE CODES AND STANDARDS COMMITTEE OR MAY SET THE SAME ASIDE IF IT FINDS THAT SUCH COMMITTEE

ACTED ILLEGALLY OR IN THE ABUSE OF ITS DISCRETION.

[(d)] (e) For purposes of indemnification of any building official against any losses, damages or liabilities arising out of the performance of his official duties, the building official shall be deemed to be acting for the municipality in which he was appointed.

Sec. 4. Section 29-276b of the general statutes is repealed and the following is substituted in lieu thereof:

(a) For the purposes of this section, THE TERM "threshold limit" [as it relates to a structure means] SHALL APPLY TO any [building] STRUCTURE OR ADDITION THERETO (1) having four stories, (2) sixty feet in height, (3) with a clear span of one hundred fifty feet in width, (4) containing one hundred fifty thousand square feet of total gross floor area, OR (5) with an occupancy of one thousand persons. [, or (6) designed to be occupied by more than one family and having one hundred dwelling units.]

(b) The following use groups shall have the following additional threshold limits:

Use Group		Threshold Limit
I - Institutional		
I-1	Residential care	
I-2	Incapacitated care	150 beds or persons
I-3	Restrained, jails and asylums	
R - Residential		
R-1	Residential - hotel/motel	Single structure with 200 rooms
R-2	Residential - multifamily	Single structure with 100 dwelling units
S - Storage		Parking structures with 1,000 cars
S-1	Moderate hazard	250,000 square feet
S-2	Low hazard	250,000 square feet

(c) If a proposed [building] STRUCTURE OR ADDITION will exceed the threshold limit as [defined in subsection (a) or as] provided in [subsection (b) of] this section, the [local] building official of the municipality in which the [building shall] STRUCTURE OR ADDITION WILL be located shall [hire] REQUIRE THAT an independent STRUCTURAL engineering consultant [to] review the STRUCTURAL plans and specifications of the [building] STRUCTURE OR ADDITION to be constructed to determine their compliance with the requirements of the state building code [and to conduct such field inspections as he deems necessary.] TO THE EXTENT NECESSARY TO ASSURE THE STABILITY AND INTEGRITY OF THE PRIMARY STRUCTURAL SUPPORT SYSTEMS OF SUCH STRUCTURE OR ADDITION. ANY MODIFICATIONS OF APPROVED STRUCTURAL PLANS OR DESIGN SPECIFICATIONS SHALL REQUIRE SHOP DRAWINGS

TO THE EXTENT NECESSARY TO DETERMINE COMPLIANCE WITH THE REQUIREMENTS OF THE STATE BUILDING CODE AND SHALL BE REVIEWED BY SUCH CONSULTANT. ANY FEES RELATIVE TO SUCH REVIEW REQUIREMENTS SHALL BE PAID BY THE OWNER OF THE PROPOSED BUILDING PROJECT. THE BUILDING OFFICIAL MAY PREQUALIFY INDEPENDENT STRUCTURAL ENGINEERING CONSULTANTS TO PERFORM THE REVIEWS REQUIRED UNDER THIS SUBSECTION. In the case of such a project, [(1) the local building official or independent engineering consultant may require independent laboratory tests for randomly selected, specially fabricated key structural components to ensure that such components, when delivered to the job site, conform to approved design specifications and drawings, and (2)] each general contractor and major subcontractor shall keep and maintain a daily construction log in a manner prescribed by the state building inspector. The [local] building official [and any architect or engineer of record] shall, upon request, have access at all reasonable times to such log. If a [building] STRUCTURE OR ADDITION exceeds the threshold limit, each architect, professional engineer and general contractor involved in such project shall sign a statement of professional opinion affirming that the completed construction is in substantial compliance with the approved plans and design specifications. If fabricated structural load bearing members and assemblies are used in such construction, the professional engineer licensed in accordance with chapter 391 responsible for the design of such members or assemblies shall sign a statement of professional opinion affirming that the completed fabrication is in substantial compliance with the approved design specifications.

(d) The [local] building official of the municipality in which the [building] STRUCTURE OR ADDITION will be located shall satisfy himself that each architect, professional engineer, general contractor and major subcontractor involved in the project holds a license to engage in the work or occupation for which the [person] APPROPRIATE BUILDING PERMIT has been issued. [a permit.] If fabricated structural load bearing members or assemblies will be used in such construction, the building official shall satisfy himself that each professional engineer responsible for the design of such members or assemblies holds a license issued in accordance with the provisions of chapter 391.

(e) ANY PERSON, FIRM OR CORPORATION PROPOSING TO CONSTRUCT A STRUCTURE OR ADDITION WHICH WILL EXCEED THE THRESHOLD LIMIT AS PROVIDED IN THIS SECTION SHALL GIVE WRITTEN NOTICE TO THE BUILDING OFFICIAL OF THE MUNICIPALITY IN WHICH THE STRUCTURE OR ADDITION IS TO BE LOCATED OF ITS

INTENT AT LEAST NINETY DAYS PRIOR TO ITS FILING AN APPLICATION FOR A BUILDING PERMIT.

[(e)] (f) (1) On and after January 1, [1989] 1990, no laboratory specializing in the testing of construction materials and structures shall be designated by the building official or engineering consultant to perform such testing unless it has been accredited by the National Voluntary Laboratory Accreditation Program of the National Bureau of Standards. [Each such]

(2) ON AND AFTER JANUARY 1, 1989, EACH laboratory SPECIALIZING IN THE TESTING OF CONSTRUCTION MATERIALS AND STRUCTURES shall have a licensed professional engineer certify tests and reports as required.

Sec. 5. Section 29-276c of the general statutes is repealed and the following is substituted in lieu thereof:

If THE PLANS FOR a proposed [building has four or more stories] STRUCTURE OR ADDITION ARE REQUIRED TO BE SEALED BY A LICENSED ARCHITECT OR PROFESSIONAL ENGINEER, [the] EACH architect [and] OR engineer of record shall be RETAINED AND BE responsible for the review of the implementation of its design, including the review of shop drawings [, daily construction logs] and the observation of construction. In the event such architect or engineer is unable to fulfill his review responsibilities, an additional architect or engineer shall be retained and the local building official shall be informed, in writing, of such retainer. If fabricated structural load bearing members or assemblies are used in such construction, the LICENSED professional engineer [licensed in accordance with chapter 391] responsible for the design of such members or assemblies shall be responsible for the implementation of his design by [viewing] REVIEWING the fabrication process to ensure conformance with his design specifications and parameters.

Sec. 6. Section 20-341gg of the general statutes is repealed and the following is substituted in lieu thereof:

(a) On and after July 1, [1989] 1990, no person shall engage in or offer to perform the work of any general contractor or major subcontractor in this state on any [building having four or more stories] STRUCTURE OR ADDITION FOR WHICH PLANS ARE REQUIRED TO BE SEALED BY A LICENSED ARCHITECT OR PROFESSIONAL ENGINEER unless he has first obtained a license as required under the provisions of chapter 393 or 539 or from the department of consumer protection in accordance with the provisions of this section. The department shall furnish to each qualified applicant a license certifying that the holder

thereof is entitled to engage in the work for which the person has been issued a license under this subsection, and the holder of such license shall carry it on his person while engaging in such work. Such license shall be shown to any properly interested person upon request. No such license shall be transferred to or used by any person other than the person to whom the license was issued. The department shall maintain rosters of licensees updated annually and may provide copies of rosters to the public for an appropriate fee. The department may suspend or revoke any license issued by it if the holder thereof is convicted of a felony, is grossly incompetent, engages in malpractice or unethical conduct or knowingly makes false, misleading or deceptive representations regarding his work or violates any regulation established under this section. Before any license is suspended or revoked, such holder shall be given notice and opportunity for hearing as provided in regulations established under subsection (b) of this section.

(b) Not later than January 1, [1989] 1990, the commissioner of consumer protection shall adopt regulations in accordance with the provisions of chapter 54 to implement the provisions of subsection (a) of this section. Such regulations shall (1) establish the licensing requirements for general contractors, structural frame subcontractors and mechanical subcontractors, (2) specify application and license fees, and (3) establish occupational standards for the preservation of the public safety.

Sec. 7. This act shall take effect from its passage.

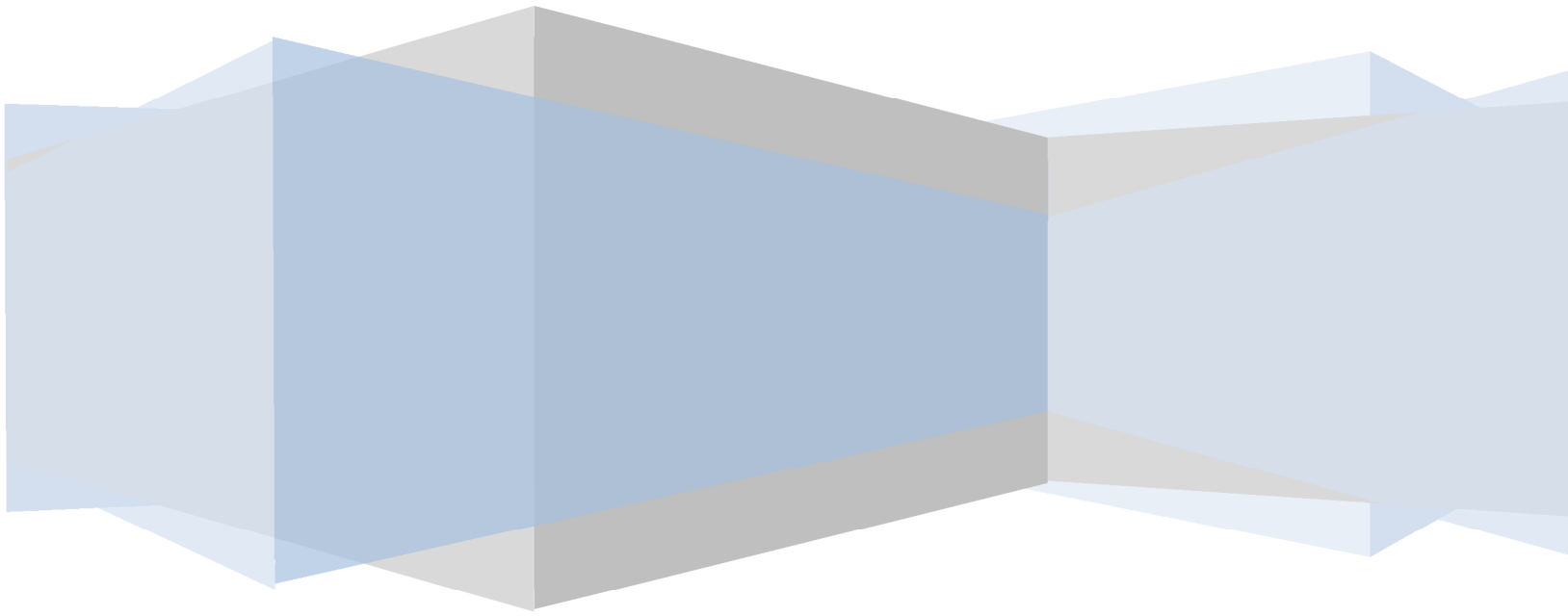
Approved June 16, 1989

CENTRAL MIDDLE SCHOOL
GREENWICH, CONNECTICUT
STATE PROJECT NO. 057-0114N
PHASE 2 OF 3 - CONSTRUCTION
7/8/2024

Turner

TurnerTracker User Guide for Vendors

Version 1: January 2015
Version 2: December 2023 (w/Earthwork Waste Information)



Connecticut BU

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Disclaimer: This reference guide has been developed to implement and manage the standard operation online waste tracking procedures for the Boston Business Unit. Some protocol listed may vary by Business Unit and should be updated to meet the needs of that Business Unit. However, the manner in which data is entered/updated TurnerTracker should remain consistent.

Keep in mind that we are all still learning how functions in TurnerTracker operate. As we learn the way, this reference guide will be revised to accommodate changes.

Overview

Construction and Demolition (C&D) waste accounts for 40% of annual solid waste globally. Turner is leading the construction industry to be more responsible by reporting all waste on every project, then by diverting as much waste as possible from landfills. Our goal is to report waste on every Turner project and recycle a minimum of 50% over all.

Overview
TurnerTracker integrates waste reporting into every project in construction and provides an easy interface between Project Waste Managers and Vendors.

This system will provide efficiency and reduced Project Waste Managers/Vendors time plus many other features:

- Upload, store and organize waste tickets
- Streamlines approving ticket
- Mobile friendly
- LEED friendly
- Easily export Excel and other formats

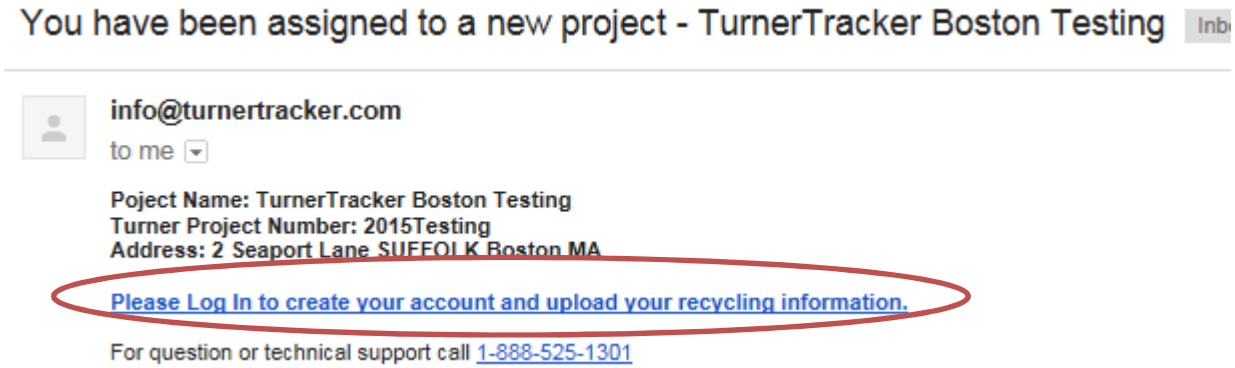
As Turner Project Waste Managers activate new projects, vendors will receive an activation email to activate the vendor's account, and begin entering hauling data and upload tickets. Vendors are required to report and submit a waste ticket for every waste container that leaves the jobsite. These tickets are then submitted to a Turner Project Waste Manager for review. Tickets that have accurate data are approved and submitted into our company-wide database. Tickets with mistakes and/or questionable data are rejected and sent back to the vendor for correction and resubmission.

Data must be entered into the TurnerTracker System by the fifth (5) day of the month following the invoice period. Vendor shall make every effort to maximize percentage of material recycled.

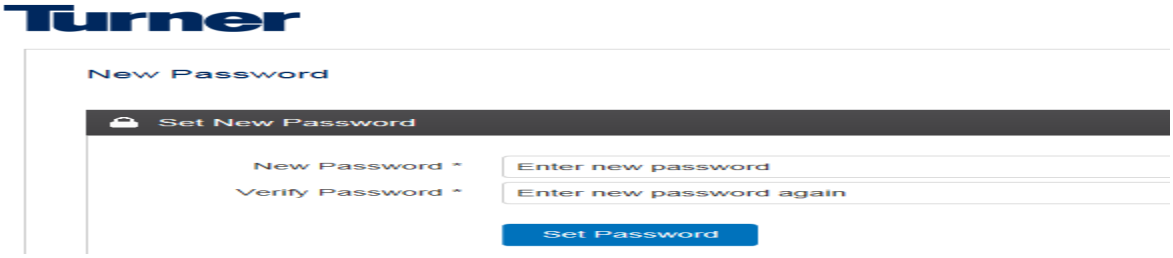
Failure to participate in the TurnerTracker System and submit waste data in a timely manner as required by contract will result in interruptions on progress payments.

Section 1 – Account Activation

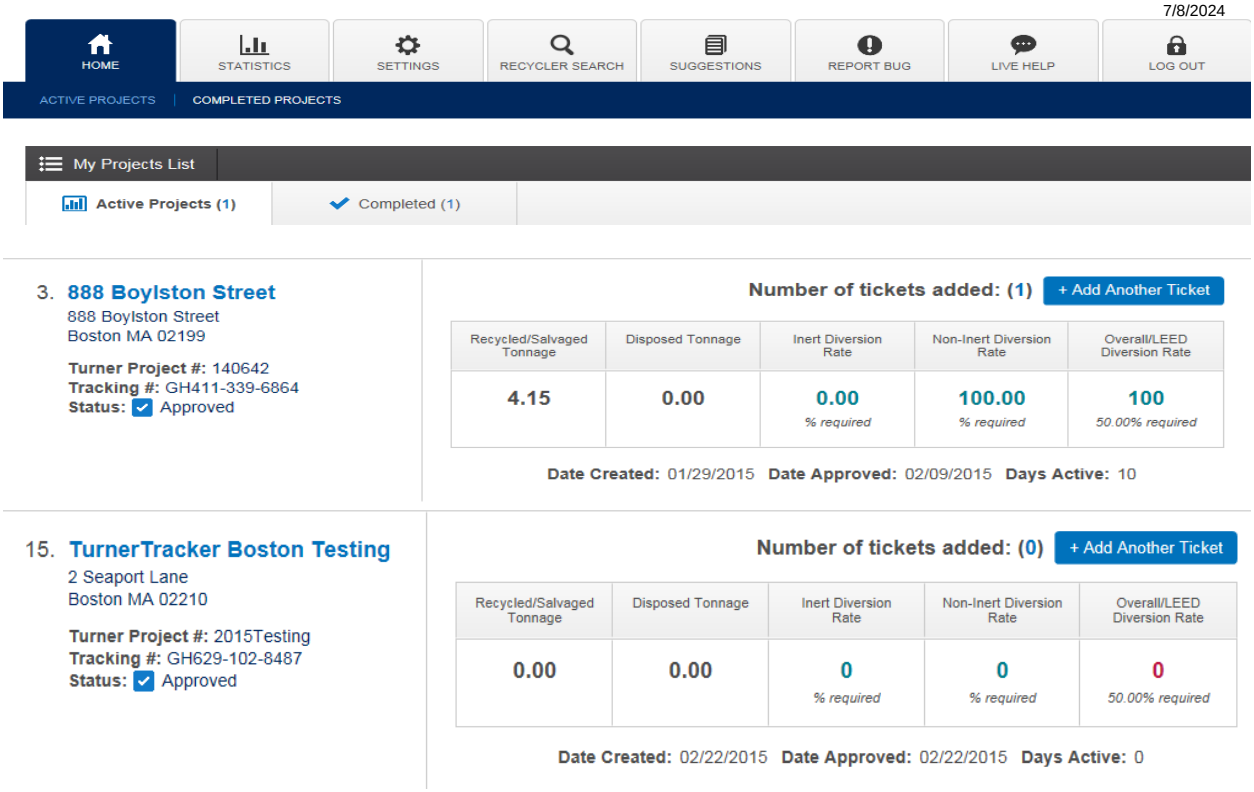
An activated project will initiate a system-generated email from TurnerTracker email address info@turnertracker.com. Click link in email to activate vendor account.



You will be prompt to setup a new password.

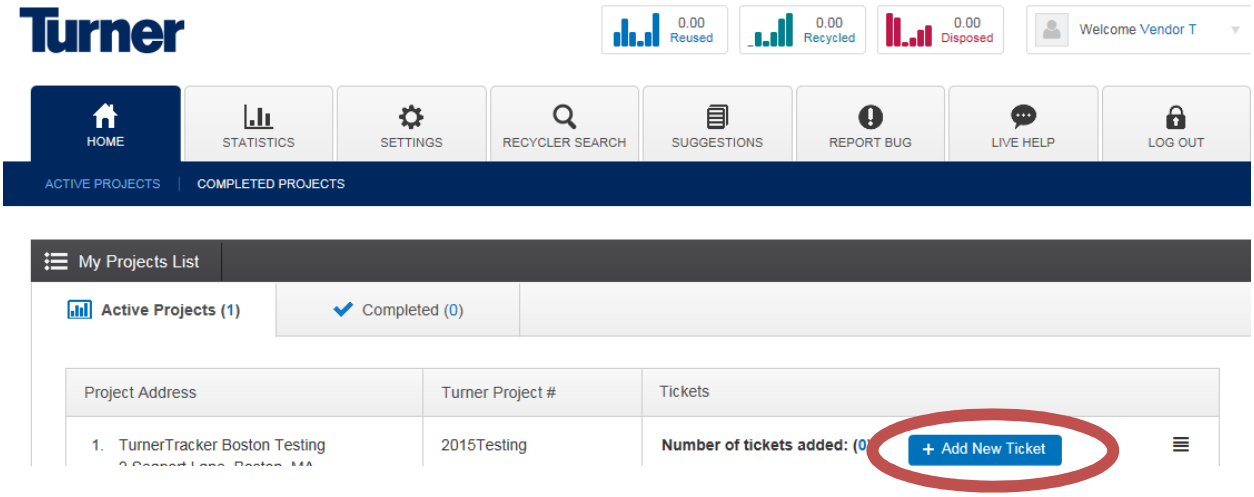


Next screen will appear with “Active” and “Completed” projects your company has been assigned to.

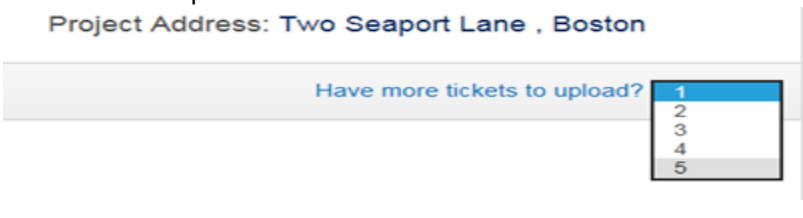


Section 2 – Entering Waste Data

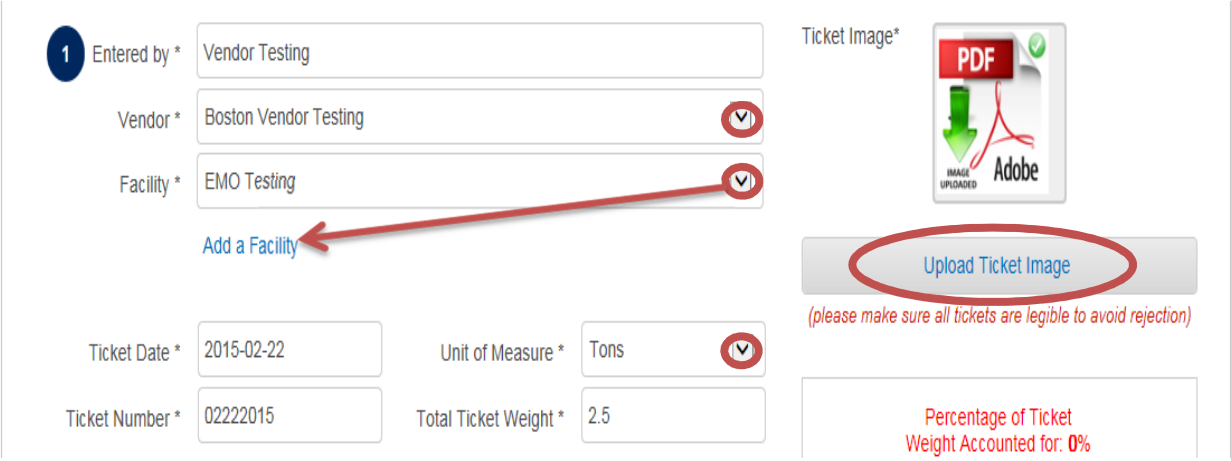
To begin entering waste data locate the project and click on **+Add New Ticket**.



You can enter up to five tickets at the same time.

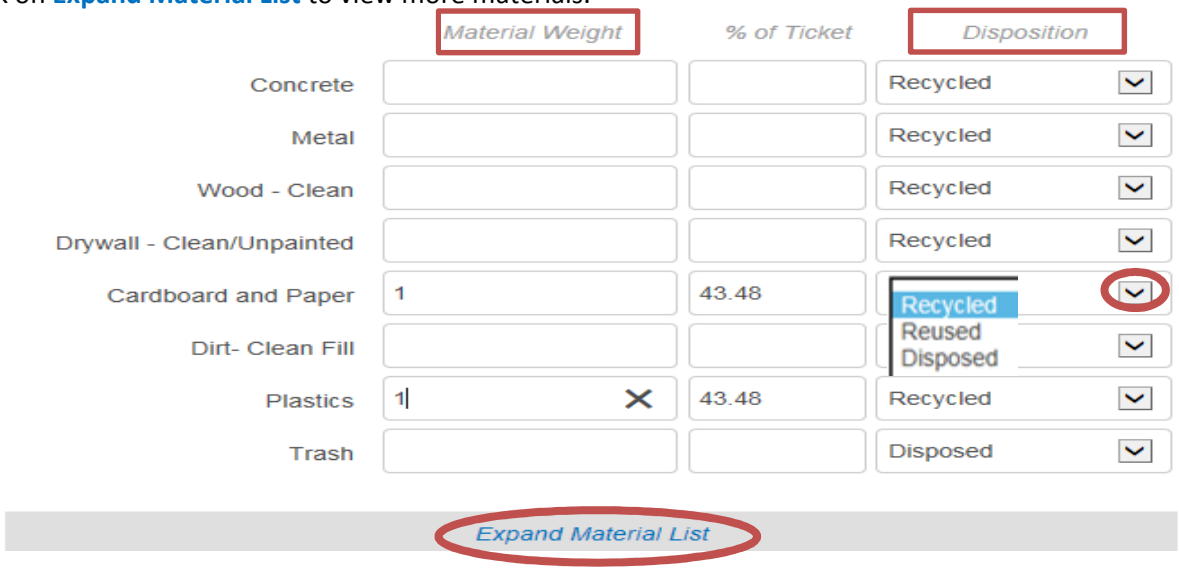


Enter all required (*) data, use drop down list where available to select applicable information. If the dumping facility is not available click on **Add a Facility** and enter applicable data. It is a requirement to upload a copy of the actually ticket being submitted.

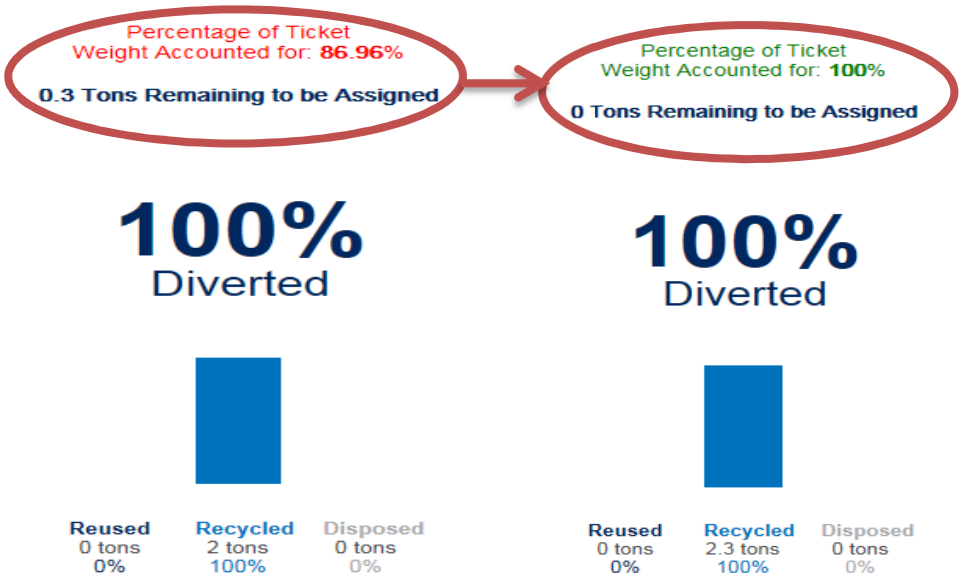




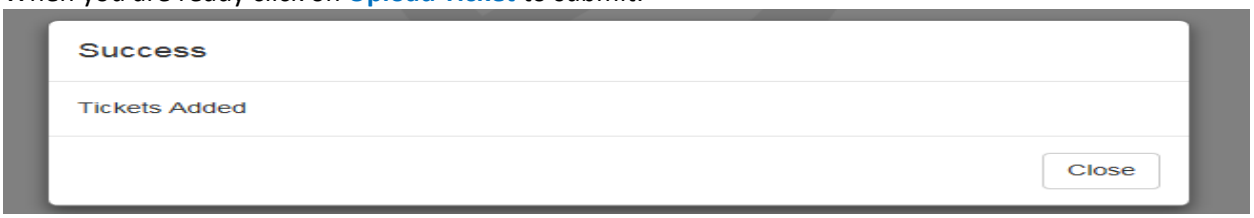
Enter material weight per the ticket information. Select the applicable Disposition from drop down list. Click on **Expand Material List** to view more materials.



You will notice to the right of the material list as you assign the weight the percentage of ticket weight calculates to the weight accounted for. **100%** of weight must be accounted for.



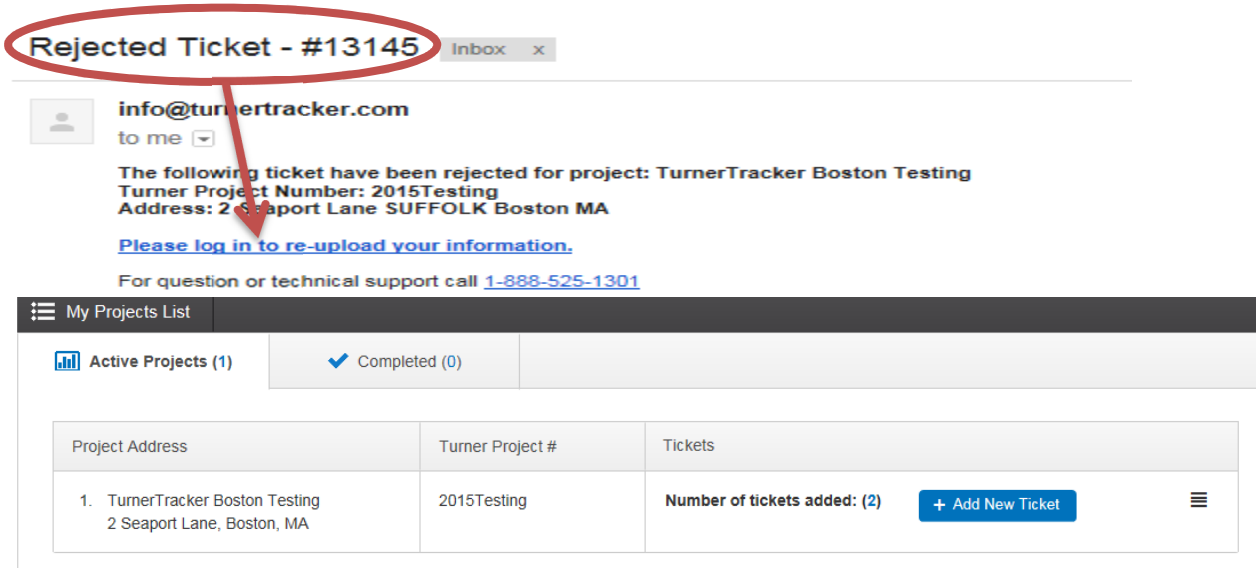
When you are ready click on **Upload Ticket** to submit.



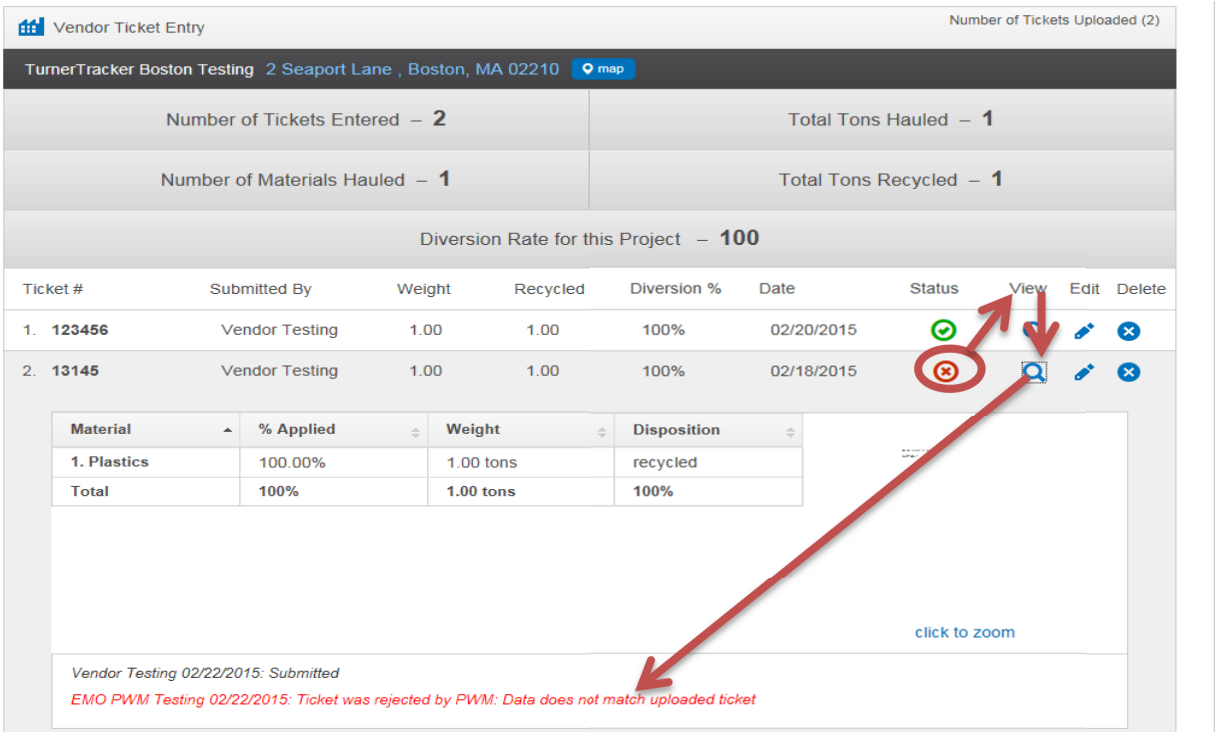
Proceed to enter more tickets if any or if nothing further simple logout. Notification has been sent to the designated Turner Project Waste Manager for review and approval or rejection for further information.

Section 3 – Rejected tickets

If a ticket is rejected a system-generated email notification will be sent. Click on the link within the email to access TurnerTracker.com and click on project name with the rejected ticket.



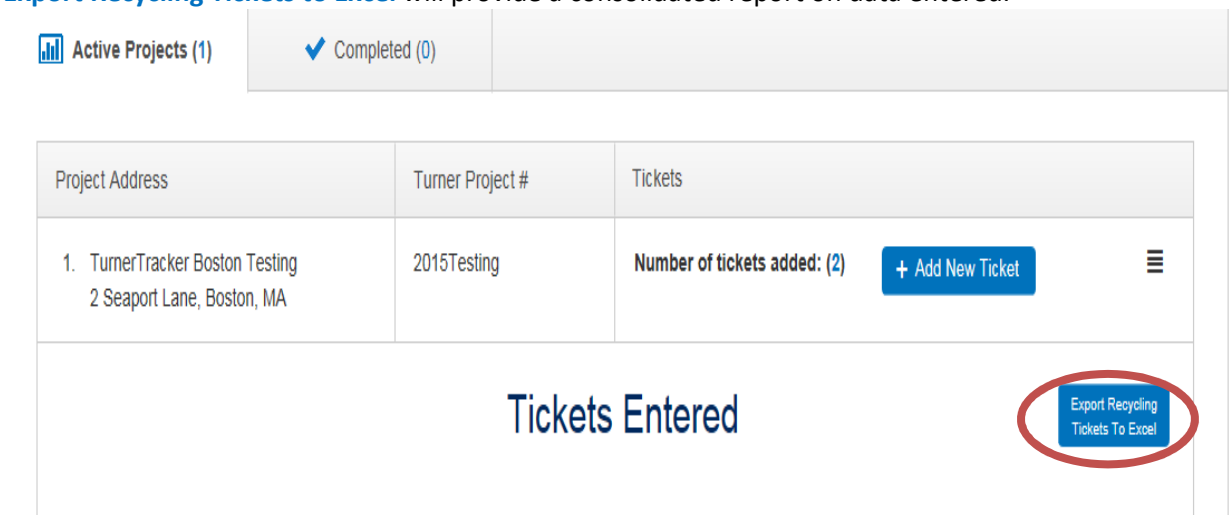
Scroll to the bottom of the page, locate rejected ticket, under **View** click on the **magnifying glass** icon and review comment in red for information on rejected ticket.



Click on the Edit **pencil** icon to update date and resubmit ticket for re-approval.

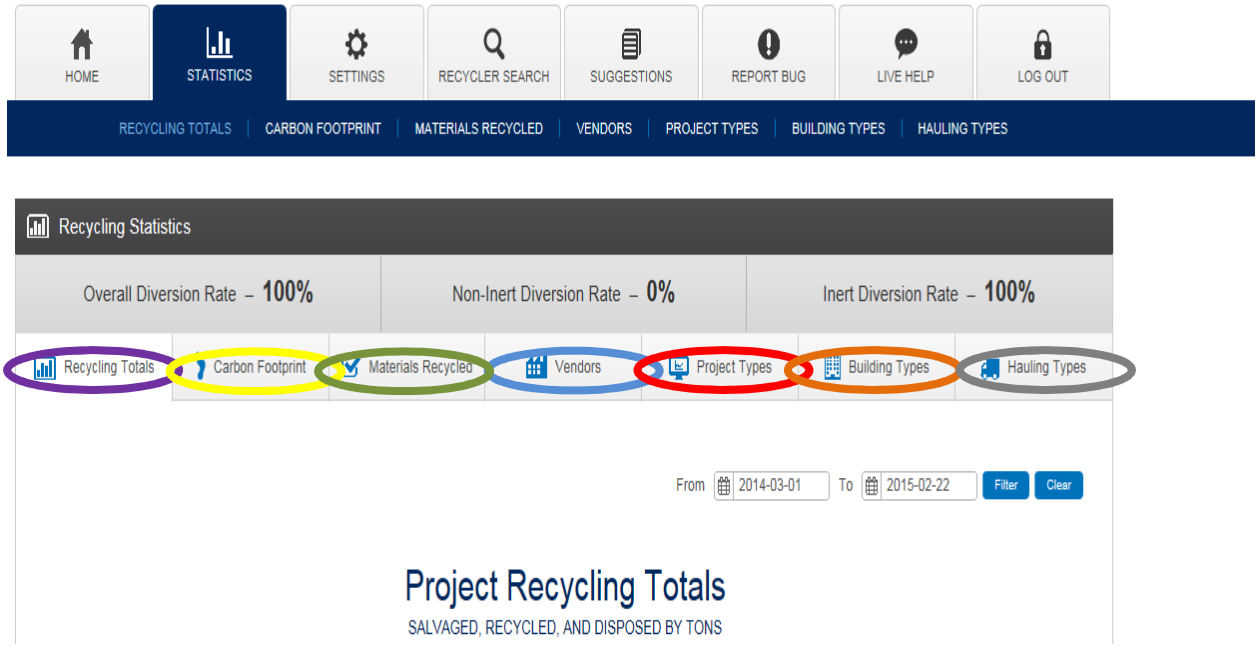
Section 4 – Reports

Export Recycling Tickets to Excel will provide a consolidated report on data entered.



	A	B	C	D	E	F	G	H
1	Ticket#	Submitted By	Weight	Recycled	Diversion %	Ticket Date	Status	Image URL
2	123456	Vendor Testing	1	1	100	2/20/2015	approved	Click Here To View
3	13145	Vendor Testing	1.5	1.5	100	2/18/2015	pending	Click Here To View

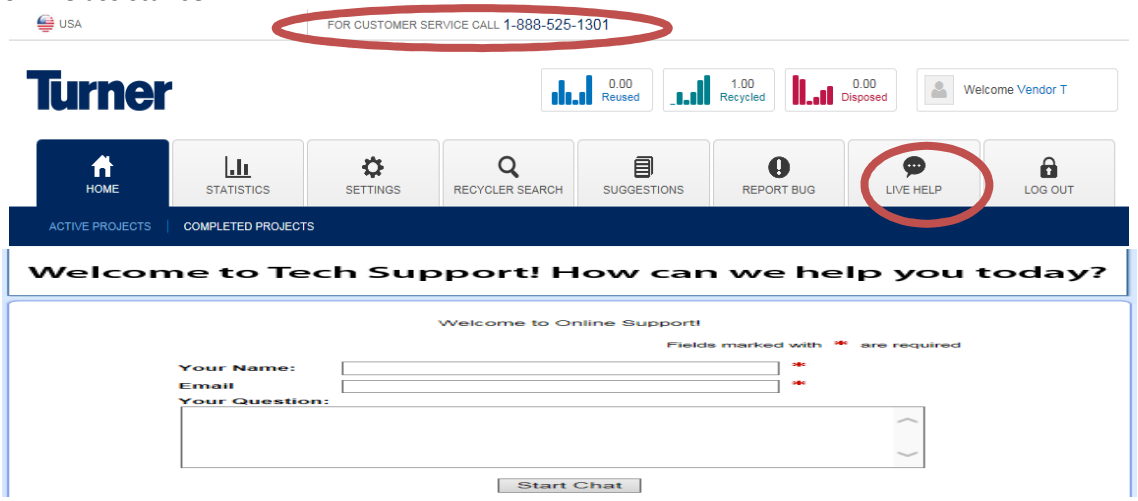
Statistics tab will provide information such as….



Section 5 – Frequent Asked Questions

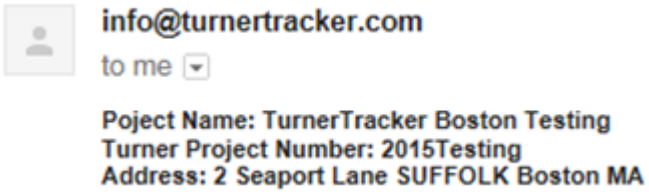
Q: If I have any questions relating to a project or technical issues, whom should I contact?

A: Project specific questions – Contact your Project Waste Manager
Technical issues – Contact Green Halo Customer Service at (888) 525-1301 or click on Live Help for online assistance.



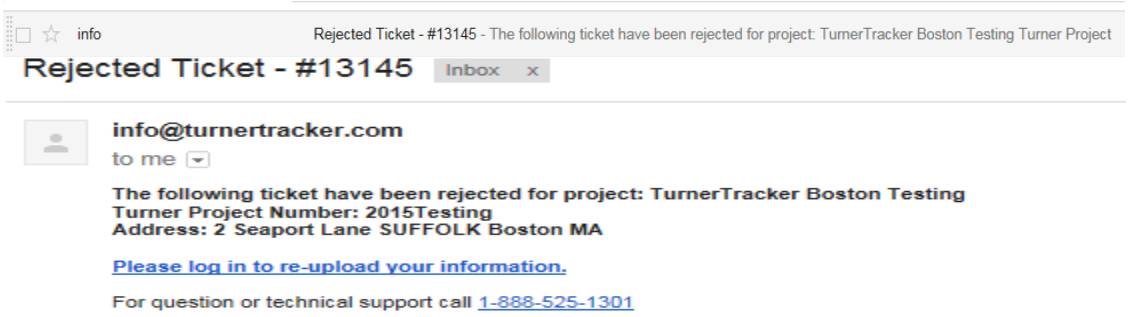
Q: I have multiple projects with Turner, will I be know what new project was awarded to me?

A: Every system-generated email will show the Project Name, Project Number and Project Address.



Q: I have more than one ticket pending with Turner for review. Will the system-generated email notification distinguish what ticket was rejected?

A: Yes. The subject line of email notification references ticket number and project name.



Q: Can I check the status of a ticket?

A: Yes. Log into TurnerTracker.com , select project and scroll down to the bottom of the page to view submitted ticket status.

Ticket #	Submitted By	Weight	Recycled	Diversion %	Date	Status
1. **131313**	Vendor Testing	1.00	1.00	100%	02/18/2015	⊗
2. **123456**	Vendor Testing	1.00	1.00	100%	02/20/2015	✓
3. **13145**	Vendor Testing	1.50	1.50	100%	02/18/2015	Submitted

⊗ = Rejected Ticket

✓ = Approved Ticket

Submitted = Pending Review by Turner Project Waste Manager

Turner Tracker "How To": Supplemental Earthwork Waste Information

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Earthwork: Definitions of Disposal Methods and Examples

Disposal Method:	Reuse (on-site)	Recycle (reuse off-site)	Disposal at Landfill
Definition:	"Materials relocated within the project boundary, if modification is required it must occur on-site."	"Materials removed from site that can be reused elsewhere and not sent to landfill. Materials can remain in their current state or be modified prior to their next use."	"Materials deposited at landfill or utilized as Alternative Daily Cover (ADC)"
Examples:	Cut materials remaining on site to be utilized as fill	Material removed from site and used as fill beyond project boundaries	Soils unsuitable for further use disposed of at landfill
	Trees felled and mulched on site for use within project boundary	Excess earthwork materials stored/stockpiled offsite – capable for reuse elsewhere	Alternative Daily Cover – Material utilized to separate layers of landfill
	Stone extracted, broken up on site then installed as temporary roadway or subbase	Stone extracted, transported off-site, broken up and returned to site to be used as temporary roadway	
		Materials modified prior to being stockpiled off-site: asphalt batching, thermal plant treatment	
		Trees felled whose wood is used to make benches	

Guidance for Supporting Documentation

Turner Tracker requires supporting documentation to be uploaded with each reported haul. Turner project staff review each reported haul and verify the uploaded information matches the supporting documentation.

* If a reported upload represents multiple days of data, be sure to include all available supporting documentation. Material totals can be summarized for that period on a cover sheet and reported accordingly. *

* If multiple hauls are reported in a single upload, limit the reported data to a single month. Do not report September and October haul data in the same upload. *

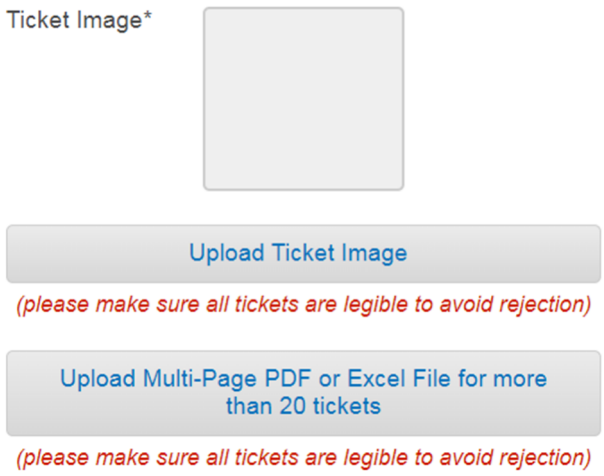
Information to include in supporting documentation:

- Company Name and Address
- Turner Project Name and Address
- Haul/Ticket Number
    - If upload represents multiple dates: reference week or month
        - Ex. Project Number-Oct23-W2
        - Ex. Project Number-Oct23
- Haul Date
    - If upload represents multiple dates: reference the date of last haul
- Material Destination or Processing Facility
    - 'Haul to' location of material(s)
- Haul Total Weight or Cubic Yards
- Haul Total Diversion Percentage from Landfill
    - Diversion: Reuse or Recycle
- Summary of Materials in Haul
    - Material(s)
        - Weight/Cubic Yard (per material)
        - Percentage of Total Haul (per material)
        - Diversion Method (per material)
- Notes or Additional Comments
    - Opportunity to provide additional information, description, or context
- Supplemental Documentation
    - Additional information to substantiate reported totals
        - Quantity Takeoff Exports for Cut/Fill
        - Soil or material testing information
        - Individual haul data if reporting a summary of multiple hauls

Uploading Multiple Page

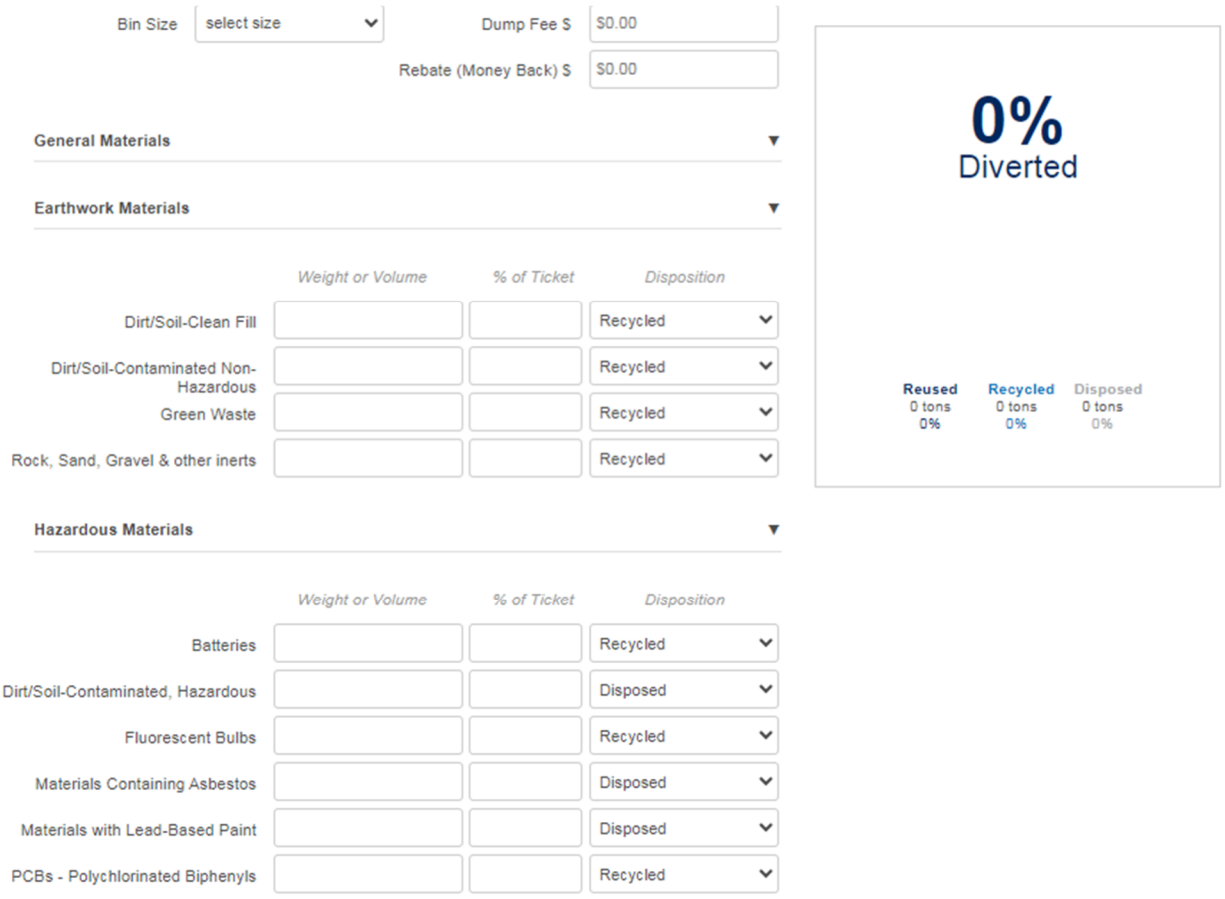
When uploading multiple pages of supporting documentation, it's required to select the "Upload Multi-Page PDF" option shown below. If this option is not available, please ask your Turner project team to enable the feature.

If a multiple page document is uploaded using the "Upload Ticket Image" option, only the first page will display. There will not be way to retroactively view the additional pages without reuploading the document after the "Upload Multi-Page PDF" is enabled.



Reporting Materials

Turner Tracker's ticket entry form displays three (3) categories of materials; General, Earthwork, and Hazardous. Selecting the dropdown arrow at the right of each material group will display the included materials.



Other materials like concrete, asphalt, and metal can be found within the 'General Materials' category dropdown.

Add a Note

Turner Tracker allows you to enter written comments providing additional context to the reported data.

This is an opportunity to communicate with the project team that an upload represents:

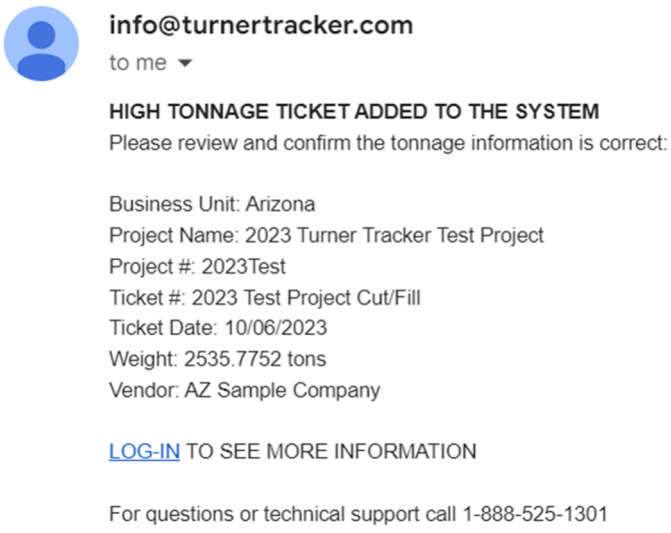
- Cut/fill quantities generated with software
- Explaining specific reuse or recycling diversion strategies

Add a Note:

High Tonnage Ticket Warning Email

Turner Tracker generates an email any time an upload of 100 tons or more is entered to the system. This is an effort to capture potential data entry errors.

These emails are received by not only the individual who uploaded the information but also all Turner staff assigned as Project Waste Managers associated with that project.



info@turnertracker.com
to me

HIGH TONNAGE TICKET ADDED TO THE SYSTEM
Please review and confirm the tonnage information is correct:

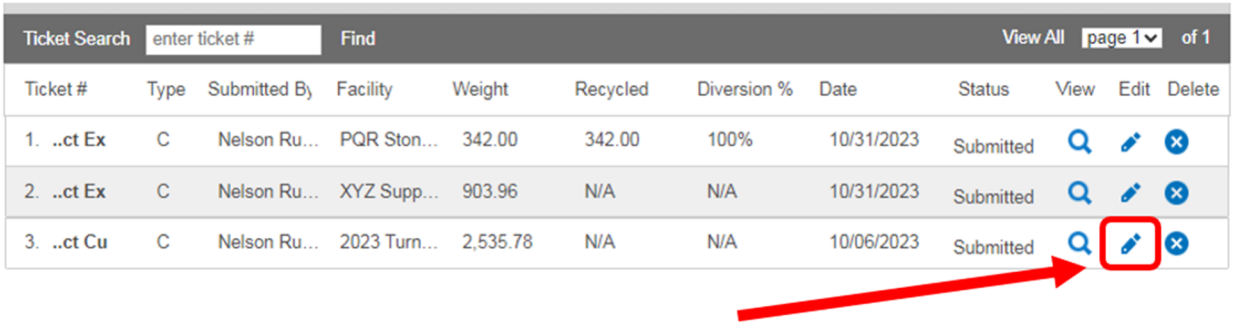
Business Unit: Arizona
Project Name: 2023 Turner Tracker Test Project
Project #: 2023Test
Ticket #: 2023 Test Project Cut/Fill
Ticket Date: 10/06/2023
Weight: 2535.7752 tons
Vendor: AZ Sample Company

LOG-IN TO SEE MORE INFORMATION

For questions or technical support call 1-888-525-1301

If the submitted tonnage is correct the email can be ignored. Otherwise, it is necessary to edit the uploaded tonnage and resubmit the entry.

To edit a submitted entry, select the pencil icon of the desired ticket to open the submission. Make the necessary modifications and reupload the ticket.



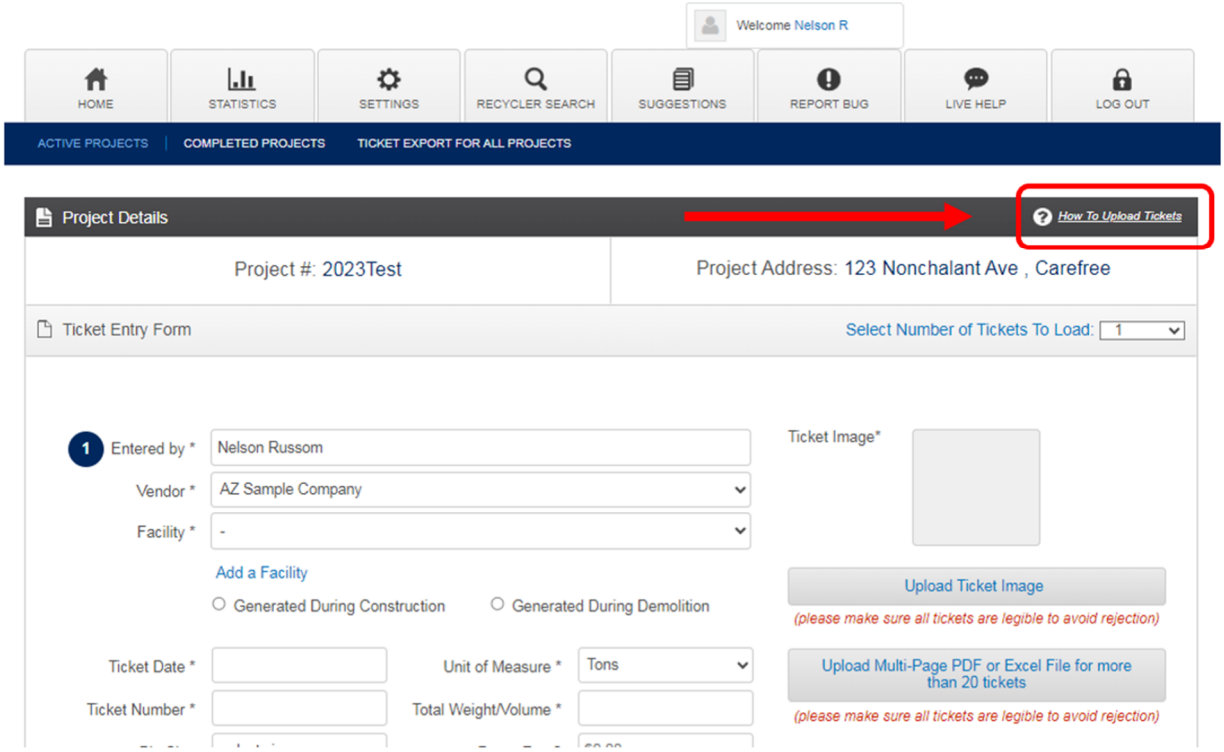
Ticket Search | enter ticket # | Find | View All | page 1 | of 1

Ticket #	Type	Submitted By	Facility	Weight	Recycled	Diversion %	Date	Status	View	Edit	Delete
1. ..ct Ex	C	Nelson Ru...	PQR Ston...	342.00	342.00	100%	10/31/2023	Submitted			
2. ..ct Ex	C	Nelson Ru...	XYZ Supp...	903.96	N/A	N/A	10/31/2023	Submitted			
3. ..ct Cu	C	Nelson Ru...	2023 Turn...	2,535.78	N/A	N/A	10/06/2023	Submitted			

Accessing Additional Turner Tracker "How To" Documents

Turner has another document that outlines the process for data submission into Turner Tracker. This "How To" document can be provided upon request by the project team and is available on Turner Tracker.

On Turner Tracker, within the ticket entry form page in the top right corner, above the Project Address. Selecting the 'How to Upload Tickets' icon will open the "How To" PDF in a new window of the web browser.



Turner

Policy
July 2021

Code of Conduct for Business Partners (US and International)

Turner Construction Company and Turner International (collectively, "Turner") have a long-standing reputation for conducting business in accordance with ethical principles. This reputation is one of the pillars of Turner's success, and preserving it is one of our highest priorities.

This Code of Conduct, in conjunction with the applicable contractual agreement, reflects our standards and expectations of our subcontractors, suppliers and other vendors (collectively, "Business Partners"). These standards apply to all third parties (including their owners, officers, directors, employees, contractors, agents, and others working on their behalf) that provide goods or services to Turner.

Turner reserves the right to modify this Code of Conduct from time to time. Business Partners agree to observe the principles reflected in the Code of Conduct and ensure they are upheld as part of their management practices.

Acceptance of this Code of Conduct is a prerequisite for all contractual agreements between Turner and its Business Partners.

I. Business Integrity

General Principles

Business Partners shall comply with the laws and other legal requirements in effect in the countries and localities where they transact business. Furthermore, Business Partners are expected to demonstrate honesty and fairness and commit to being socially responsible with respect to all of their business activities.

Conflicts of Interest

A conflict of interest exists when personal interest(s) interferes in any way with the interests of Turner. Business Partners must avoid and disclose any actual or potential conflicts of interest in their dealings with Turner.

Anti-Corruption Laws

Business Partners must comply with anti-corruption laws and any other applicable legal requirements, including, without limitation, the Foreign Corrupt Practices Act ("FCPA"), that governs operations in the countries and localities where they transact business. The FCPA prohibits any U.S. person or company, acting anywhere in the world, from providing any item of value to foreign officials directly or indirectly for the purpose of obtaining or keeping business or securing an improper business advantage.

Illegal Payments and Gifts

Offering, promising, or authorizing any gift, meal, ticket, entertainment or other item of value by Business Partners and their employees to public officials as a means of influencing the actions of an individual holding a public or legal duty is not permitted. Business Partners and their employees shall not accept any gift, meal, ticket, entertainment or other item of value in exchange for the purpose of securing an improper business advantage.

Fair Competition

Business Partners are expected to uphold standards of fair business and competition. Business Partners shall not act in a way that is or could be interpreted as unfair, anti-competitive, or abusive. All activities must be in line with current laws that uphold and promote competition, in particular prevailing anti-trust laws as well as laws that regulate competition. In dealing with competitors, Business Partners shall not collude or engage in other activities aimed at influencing prices or conditions, dividing sales territories or customers, or inhibiting free and open competition.

Money Laundering

Business Partners agree to comply with all laws that prohibit money laundering or financing for illegal or illegitimate purposes. Business Partners should endeavor to work exclusively with reputable counterparties involved in legitimate business activities with funds derived from legitimate sources.

Intellectual Property and Protection of Assets

Business Partners must respect confidential information relating to Turner and Turner stakeholders. No information may be disclosed by a Business Partner to any person who does not have a right to that information. Business Partners commit their employees to safeguarding the confidential information of Turner and Turner stakeholders.

Business Partners must also respect the assets of Turner and Turner stakeholders. Business Partners' employees may only use assets belonging to Turner and others when appropriately authorized. Business Partners must not tolerate theft of assets.

Responsible Sourcing

Business Partners must implement measures to ensure the responsible procurement of goods and materials and compliance with related laws and regulations. The purchase and trade of regulated conflict minerals (in particular, tantalum, tin, tungsten, gold or their derivatives considered as conflictive) is not permitted. Specifically, Business Partners must ensure that no items are delivered to Turner that contain metals based on minerals that originate from a conflict region where the purchase directly or indirectly supports or finances armed groups.

II. Management System

Business Partners are required to ensure observance of this Code of Conduct by establishing an appropriate management system or by traceably documenting that all principles contained herein are an integral part of the Business Partner's business culture.

Business Partners are at liberty to adopt their own codes of conduct so long as they do not restrict the standards defined in this Code of Conduct. Business Partners commit to inform their employees of the provisions of this Code of Conduct and the associated obligations.

Turner reserves the right to audit adherence to this Code of Conduct at any time and without prior notification or to have adherence audited by independent third parties.

If Business Partners discover any violations of applicable law or this Code of Conduct, they must inform Turner of such discovery immediately. In the event of any violation of applicable law or this Code of Conduct, Turner reserves the right to terminate the contractual relationship with the respective Business Partner.

III. Labor and Human Rights

Turner requires Business Partners to uphold the human rights of all employees and to treat them with respect and dignity as understood by the International Labor Organization ("ILO"). Business Partners shall support the United Nations Human Rights Conventions and fair working conditions for all persons working on their workplaces and in their supply chain. Business Partners' employees are under an obligation to ensure that these universally recognized fundamental rights are observed.

Forced Labor

Business Partners are required to reject every form of forced labor. No employee may be obliged to work by the direct or indirect use of force and/or intimidation. Only people who voluntarily make themselves available for work may be employed. Turner does not tolerate any kind of slavery, human trafficking, debt bondage or involuntary prison labor in the supply chain.

Child Labor

Business Partners respect the standard of the United Nations on human rights, and in particular on children's rights. Turner requires all Business Partners to have zero tolerance for any kind of child labor in the company and in the supply chain. This refers to all stages of manufacturing. The minimum age for employment must not be below the age at which compulsory schooling ends, and in no case may it be below the age of 15 or below any higher minimum age specified by local law. In particular, Business Partners commit to complying with the ILO convention concerning the prohibition and immediate action for the elimination of the worst forms of child labor. If a national regulation concerning child labor provides for stricter measures, these shall have precedence.

Fair Working Conditions and Remuneration

Business Partners must ensure that wages and benefits of their employees and subcontractors are fair and comply with all national and local laws, applicable prevailing wage laws, statutes, or requirements. Business Partners shall maintain such records as necessary to establish the amount of wages and other compensation paid to workers in connection with all projects. Business Partners will ensure adherence to all applicable laws and regulations related to maximum working hours.

Anti-Harassment and Discrimination

Business Partners must comply with all federal, state, and local laws prohibiting discrimination in employment, including discrimination based on race, sex, gender, gender identity, gender expression, transgender status, sexual orientation, pregnancy, childbirth and other pregnancy-related conditions, color, national origin, ancestry, age, creed, religion, citizenship, marital status (including registered domestic partners), parental status, disabilities (mental or physical), medical condition, genetic information, military or veteran status (including protected veteran status), and any other protected characteristic or status. Turner expects the organizations with which it does business to share this commitment.

Turner has zero tolerance for sexual and other unlawful harassment by or against employees, applicants, interns, volunteers, clients, independent contractors, vendors or non-employees of Turner at a Turner work site. Sexual and other unlawful harassment of employees or other individuals occurring in the workplace or in other settings in connection with their employment or engagement is unlawful and prohibited. This policy applies to all incidents of alleged harassment, including those which occur off premises, or off-hours, whether the alleged offender is a co-worker or a third-party non-employee with whom you may be involved in any business or potential business relationship. This policy applies regardless of an individual's immigration status.

Turner forbids retaliation of any kind (including harassment, intimidation, threats, coercion or discrimination) against any individual who files a charge of discrimination, reports or otherwise objects to harassment or discrimination, assists, testifies, or participates in an equal employment proceeding, or otherwise exercises any other right protected under applicable equal opportunity employment laws.

Freedom of Association

Business Partners must respect their employees' right of association within the bounds of prevailing laws and statutes. Business Partners are required to maintain an open and constructive communication with their employees and employee representatives. In accordance with the National Labor Relations Act, Freedom of Association and local laws, Business Partners shall respect their employees' right to freely associate, nominate employee representatives, join trade unions, and engage in collective bargaining and form works councils. It must be ensured that all employees are able to openly communicate with the management regarding working conditions.

IV. Health and Safety

Business Partners shall continuously strive to develop a work environment that promotes health and safety, and comply with any legal requirements related to workplace and health protection.

Occupational Health and Safety

Turner requires that all Business Partners provide their employees with a safe and healthy environment. On an ongoing basis, Business Partners must identify safety risks and update prevention measures. They are responsible for strict compliance with the Turner Environmental Health and Safety (EH&S) policy and safety standards. Prior to start of work, all employees must receive adequate training and be provided with the proper equipment to safely carry out their work. Furthermore, all employees have the right and the obligation to immediately stop unsafe work.

Prevention and Emergency Preparedness

Turner requires Business Partners to ensure safe working processes, appropriate controls, and preventive maintenance in order to minimize health and safety risks at the workplace. In doing so, Business Partners are expected to evaluate production processes and machinery for health and safety hazards. The impact of identified hazards must be minimized by implementing emergency procedures. All health and safety incidents related to Turner projects, workplaces or construction sites must be reported to Turner immediately.

V. Environmental Protection

Turner believes in utilizing our technical expertise to create a healthy, prosperous, and sustainable future for our people, clients, and the environment. Laws and international standards, as well as customer requirements to protect the environment must be observed.

All required official permits, licenses, and registrations need to be present and maintained. Business Partners must support efforts to minimize adverse impacts on the environment and climate and improve environmental protection. Business Partners must identify environmental risks and set up appropriate prevention measures.

Pollution and Resource Saving

Turner expects Business Partners to save natural resources. Negative impacts on the climate, the environment and animals can be minimized or avoided by reusing and recycling materials, adjusting production processes, and using material substitutes. Business Partners are furthermore expected to engage in the use of climate-friendly products and working methods to support reduction of greenhouse gas emissions.

Hazardous Materials

Biological or chemical materials or any other materials that have the potential to cause harm to humans, animals, or the environment, either by themselves or by interacting with other materials, are to be identified and managed to ensure their safe handling. This applies to storing, moving, using, recycling and disposing of the materials. All information relevant to safety needs to be disclosed to Turner.

Waste Water and Solid Waste

Business Partners shall have systems in place to ensure the safe handling, transport, storage, reuse or recycling of wastewater and solid waste. They are expected to reduce or avoid waste of all types, including energy, for instance by modifications of production processes, maintenance, the use of material substitutes, recycling or reusing. All activities that may have a negative impact on the health of humans, animals or on the environment shall be handled in an appropriate way. Business Partners shall monitor and evaluate all kinds of wastewater and solid waste generated from works prior to discharge or disposal and treat the substances as required by local laws and regulations.

VI. Contractual Counterparties of the Business Partner

Business Partners are expected to communicate the basic principles of this Code of Conduct to their immediate contractual counterparties and to require and promote their compliance with this Code of Conduct.

DUTY TO REPORT

Business Partners are obliged to report to Turner any suspected or known misconduct. Information as to possible offenses, non-compliance with legal or company requirements, environmental, social or safety issues, or other problems within the company can be communicated through Turner's whistleblower hotline, by email, or Turner's web portal, all of which are set forth below. Reports can be made on an anonymous/confidential basis, if desired. Turner evaluates and investigates all reports.

Turner does not retaliate against anyone for submitting, in good faith, a report of suspected or known misconduct, nor do we tolerate others retaliating. Similarly, Business Partners must not retaliate or tolerate retaliation against anyone who, in good faith, reports suspected or known misconduct. "Good faith" means that to the best of a person's knowledge and belief, everything reported is true and that everything known is reported.

Email: compliance@tcco.com
Hotline: 1-888-738-1924
US Web Reporting: https://Turnerconstruction.navexone.com
International Web Reporting: https://iwf.tnwgrc.com/Turnerinternational

Turner

Policy
July 2021

ACKNOWLEDGMENT OF TURNER'S CODE OF CONDUCT FOR BUSINESS PARTNERS

All registered Business Partners are required to have acknowledged Turner's Code of Conduct for Business Partners prior to issuance of any purchase order or contract.

I, on behalf of **Climatec, LLC** (Business Partner name), acknowledge and agree to comply with Turner's Code of Conduct for Business Partners and ensure that the owners, officers, directors, employees, contractors, agents, and others working on behalf of **Climatec, LLC** (Business Partner name) are aware of and agree to abide by the Code of Conduct in preparing and submitting bids and proposals for Turner work, providing goods and services to Turner, and performing all agreements entered into with Turner for such purposes.

Authorized Signatory _____
Name (printed) _____
Title _____
Date _____

Turner Construction
Subcontractor UBE Commitment Plan

A. **As part of Turner's and this Project CHRO Commitments for Underrepresented Business Enterprise Program (UBEs), all Subcontractors are advised they must award a minimum of 25% of their awarded contracts to certified SBE's, and off that amount, a minimum of 25% of that amount (6.25% of the total award) mush be awarded to SBE's that are also MBE's per the State of Connecticut S/MBE requirements.** The subcontractors are responsible for ensuring that they and the SBE firms they have selected are eligible subcontractors and that they meet State of Connecticut SBE and MBE Requirements.

B. **For our purposes, UBEs include Minority, Woman, Small, Disadvantaged, Veteran and LGBTQ+ Business Enterprises.** UBEs shall be given meaningful opportunity to participate in all contracts and services let in connection with the Subcontract. This participation may include qualified UBE Trade Contractors, Suppliers, and Vendors. All efforts to provide this opportunity shall be documented on this form and submitted to Turner. In addition to submitting required Set-Aside package to CHRO for approval of plan, This form shall be submitted on a monthly basis while performing work on site to document participation.

Project: _____ Scope Of Work: _____

Subcontractor: _____ Contract Amount: _____

MBE, WBE, DBE, VBE, LGBTQ+ or any Combination M/W/D/V/LGBTQ+ Subcontracting Plan

Name of Subcontractor/Vendor/Supplier	Scope of Work	Certified MBE,WBE, SBE, DBE VBE or LGBTQ+	Contract Value

**If more space is needed, please attach a 2nd page.

TOTAL UBE BUSINESS PARTICIPATION

MBE $	WBE $	DBE $	VBE $	LGBTQ+ $	SBE $
MBE %	WBE %	DBE %	VBE %	LGBTQ+ %	SBE %

By: _____

Signature of Authorized Owner or Representative Title

Turner

Policy

Equal Employment Opportunity Policy Statement

Turner has long recognized its responsibility to extend Equal Employment Opportunity to all individuals. The Company's Affirmative Action Program supports this policy with positive procedures and objectives to ensure fair employment practices.

The Turner Corporation and its subsidiaries demonstrate and administer strong diversity and affirmative action efforts throughout the organization. Our long-term commitment to provide equal and non-discriminatory employment opportunity to all persons based on qualifications and merit, without regard to race, sex, gender, gender identity, gender expression, transgender status, sexual orientation, pregnancy, childbirth and other pregnancy-related conditions, color, national origin, ancestry, age, creed, religion, citizenship, marital status (including registered domestic partners), parental status, disabilities (mental or physical), medical condition, genetic information, military or veteran status (including protected veteran status), or any other protected characteristic or status has not and will not waver. Non-discriminatory treatment at all levels of employment with regard to recruitment, hiring, training, promotions, benefits, compensation and all other employment-related factors is included in this Company-wide policy. Only the merit of the individual measured against objective and valid job requirements shall be considered.

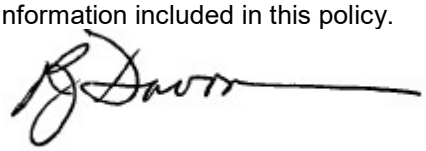
All employees are expected to adhere to this Equal Employment Opportunity Policy. Turner employees must comply with all federal, state, and local laws prohibiting discrimination in employment, including discrimination based on race, sex, gender, gender identity, gender expression, transgender status, sexual orientation, pregnancy, childbirth and other pregnancy-related conditions, color, national origin, ancestry, age, creed, religion, citizenship, marital status (including registered domestic partners), parental status, disabilities (mental or physical), medical condition, genetic information, military or veteran status (including protected veteran status), and any other protected characteristic or status. The Company expects the organizations with which it does business to share this commitment.

Any employee or applicant for employment who feels that he or she has been the victim of discrimination should contact their Operations Manager, Project Executive, or Department Head; local Human Resources Director or Manager; or the Vice President of HR Operations.

The Company forbids retaliation of any kind (including harassment, intimidation, threats, coercion or discrimination) against any individual who files a charge of discrimination, reports or otherwise objects to harassment or discrimination, assists, testifies, or participates in an equal employment proceeding, or otherwise exercises any other right protected under applicable equal opportunity employment laws.

Turner recognizes that progress in diversity and affirmative action efforts requires more than policy statements alone. The Company, therefore, will make every effort to implement the letter and spirit of the law. To further the principle of equal and nondiscriminatory employment opportunity for all, Turner has developed affirmative action plans for minorities, women, individuals with disabilities, and protected veterans. These plans, or relevant portions of them, are available for your inspection upon request. In order to ensure proper implementation of these plans, I have selected Karen Sweeney, Senior Vice President of Diversity, Inclusion and Community, as the Equal Employment Opportunity (EEO) Officer for Turner. Please ask the HR department in your local Turner office for more information regarding these plans.

A copy of this EEO policy and the local EEO policy (where applicable) will be prominently posted at Turner facilities as required. Any applicant or employee may request assistance in reading or otherwise obtaining the information included in this policy.



Peter J. Davoren
President & CEO

Rev. January 2021

Wireless Metering Basics

Components:

- electric meter(s)
- water meters(s)
- Data Acquisition Hub, called the AcquiSuite
- ModHopper(s) (wireless communication tool which transmits data from the meters to the AcquiSuite)

The AcquiSuite will compile and log that water or energy meter data and send to the Lucid dashboard (BuildingOS) for your use.



ModHopper



AcquiSuite



Electric Meter with CT



Dynasonic Wrap Around Water Meter


Inline Water Meter

Wireless Metering Architecture

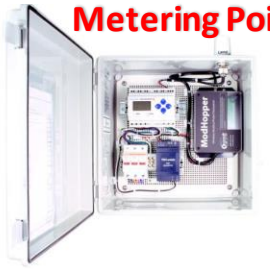
CENTRAL MIDDLE SCHOOL
GREENWICH, CONNECTICUT
STATE PROJECT NO. 057-0114N
PHASE 2 OF 3 - CONSTRUCTION
7/8/2024

Water Metering Point





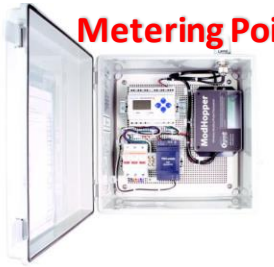
Electric Metering Point





Wireless communication between ModHoppers

Electric Metering Point





Data from the meter is communicated to the ModHopper, which transmits back to the AcquiSuite*

Job Office/Trailer



At the Site Trailer, a ModHopper receives the wireless data from all the site metering points and communicates to the AcquiSuite via Modbus RS485.

The AcquiSuite sends the data to BuildingOS over the trailer's LAN.

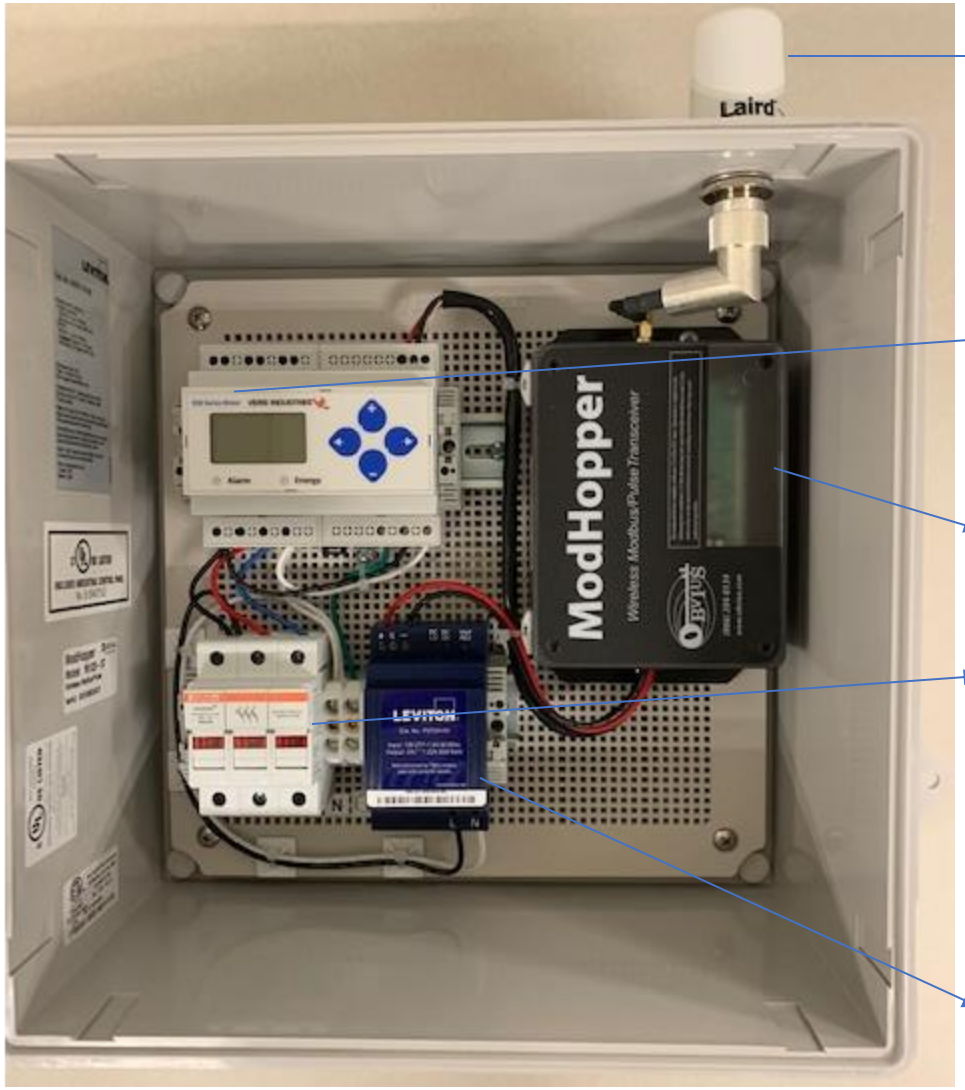
BuildingOS Monitoring Platform



* Repeaters or antennae may be necessary for extended range transmission or signal obstructions

Electric Meter Wiring

CENTRAL MIDDLE SCHOOL
GREENWICH, CONNECTICUT
STATE PROJECT NO. 057-0114N
PHASE 2 OF 3 - CONSTRUCTION
7/8/2024



ModHopper Antenna

Veris E50C2 Power Meter

ModHopper

Fused Disconnect

ModHopper Power Supply

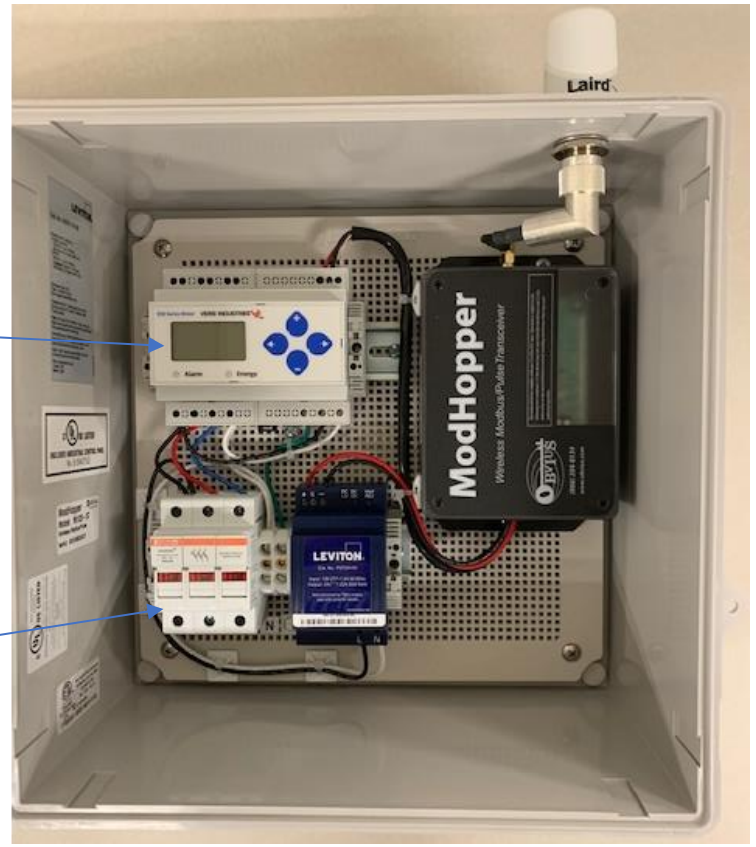
The wireless electric metering panel contains the Veris E51C2A power meter along with our Obvius ModHopper. The primary use case is for power metering in remote locations where a hardwired connection back to a logger/network is not possible or cost effective.

The ModHopper is a 900MHz radio and works via a Mesh Network.
Standard ModHopper Range is 3000 ft through standard building impedance or up to 14mi line of sight.

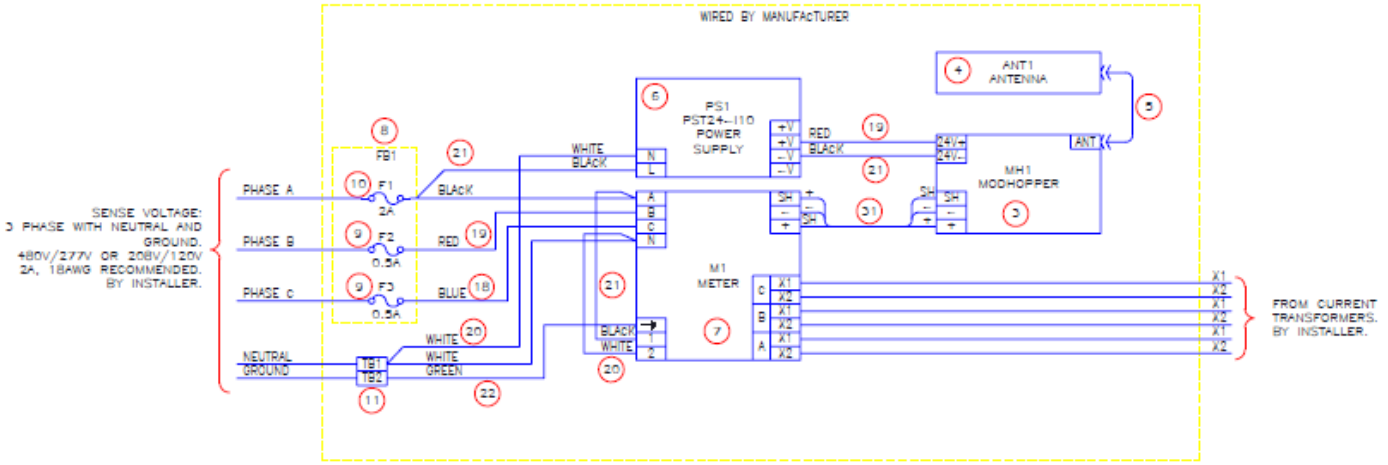
Electric Meter Wiring Cont.

The Veris E51C2A meter comes with 3 Rogowski CT, which connect here.

Voltage inputs to the meter are located at the fused disconnects here



Installation guide provided here
https://www.veris.com/Item/E51C2A.aspx



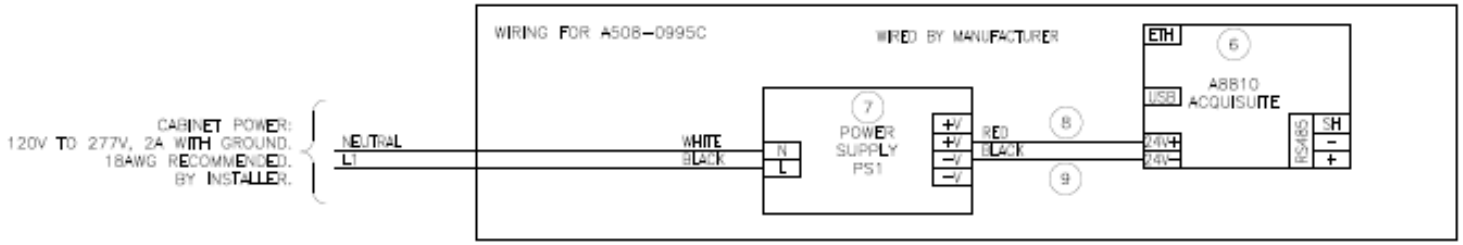
Wiring diagram of the panel
Meter + ModHopper Panel

AcquiSuite A8810 Panel

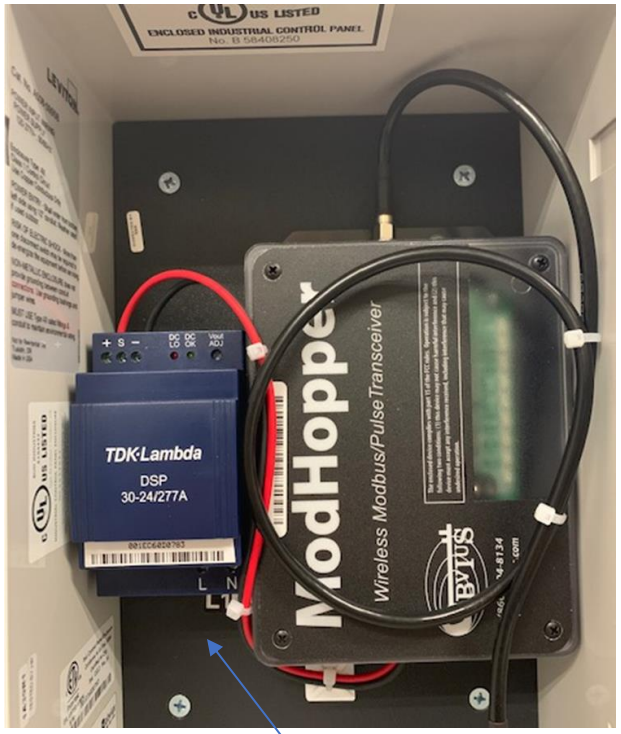


Provide 120-277VAC to embedded power supply.

The AcquiSuite Panel, part A508-0995C, will arrive prewired to an embedded DC power supply. You will need to provide 120-277VAC to the power supply. See below.

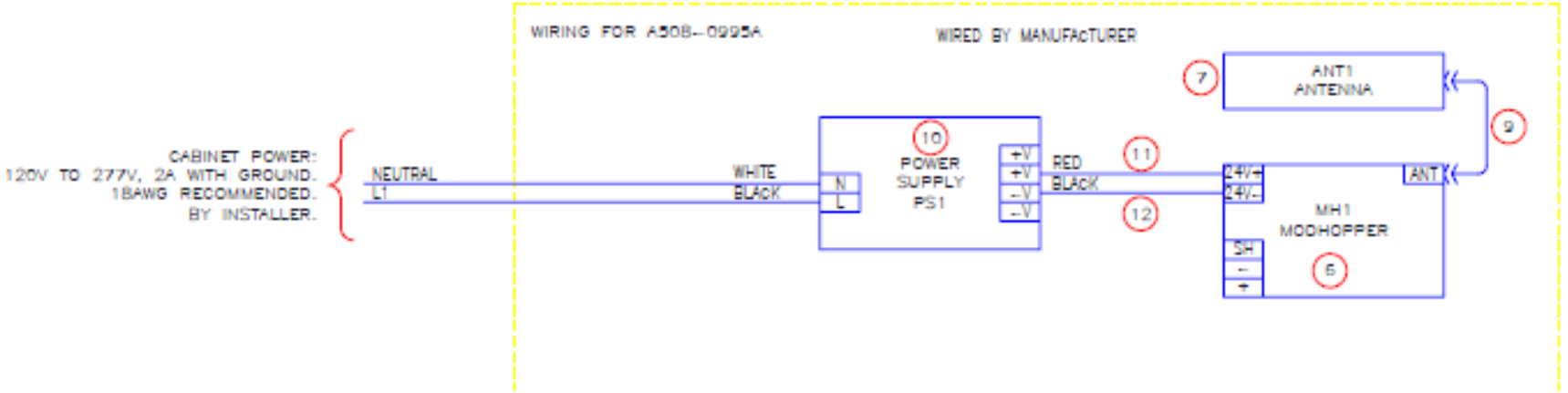


Powering the ModHopper Panel



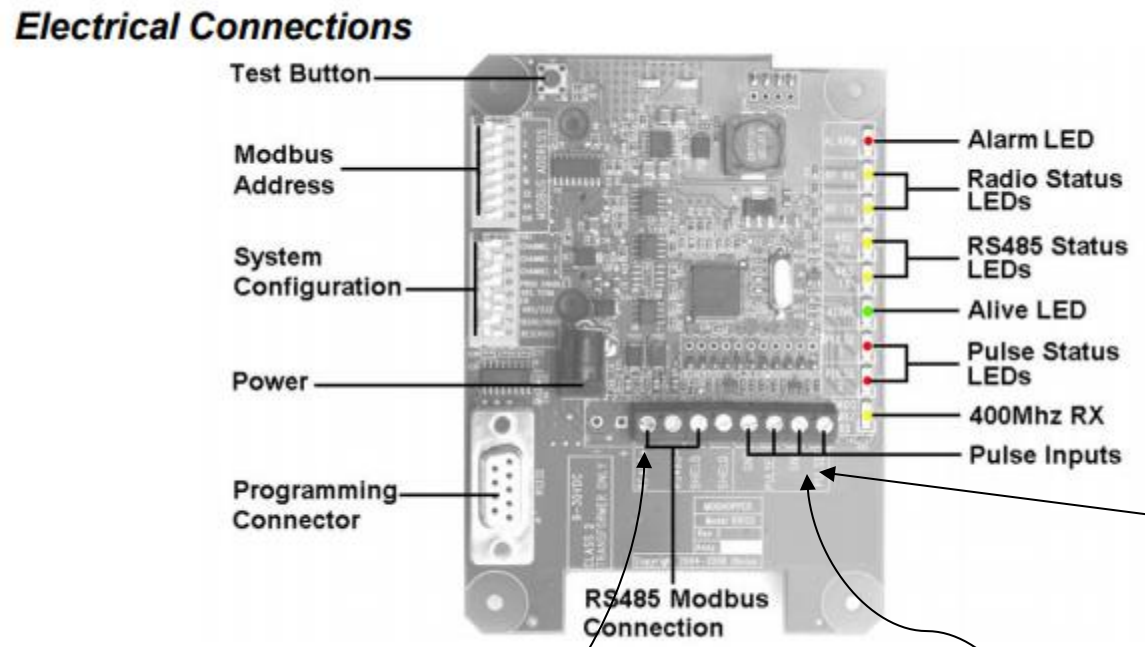
Provide 120-277VAC to embedded power supply.

The ModHopper Panel, part A508-0995A, will come prewired to an embedded DC power supply. You will need to provide 120-277VAC to the power supply. See the wiring diagram below.

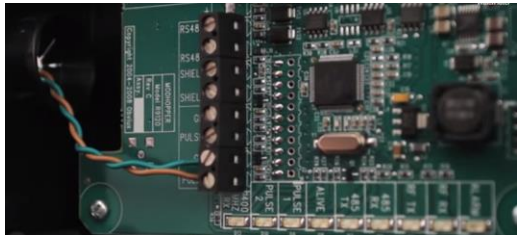


Connecting Meter Communication to the ModHopper

The ModHopper board can take a Modbus RS485 connection, as well as 2 Pulse Input connections.



For each pulse output utility meter, you should have a 2 wire connection as seen below.



The Dynasonic (wrap-around style) meter communicates over Modbus RS485, so it will connect to the ModHopper here

A pulse output water meter (used for inline meter applications) would connect to one of the ModHopper's pulse inputs here.

TFX Water Meter to ModHopper Wiring



RS485 Modbus Comms Wire

The TFX Dynasonic water meter will require a Modbus RTU communication wire from the meter to the ModHopper. The communication wire will be installed by Vitality Energy. What you will need to do is install the Water Meter, install the ModHopper panel, and provide power to both. They should be installed relatively close to each other (within 20' if possible).

When installed and powered, the ModHopper will wirelessly transmit the water meter data back to the AcquiSuite Data Acquisition Hub.

Pulse Output Water Meter



Some Turner sites will have an inline water meter for pipe sizes under 2” or for when power is not available at the water metering location. In these instances, you will have a Pulse Output meter. These also wire to the ModHopper.

Pulse Output Wire

Questions?

Should you have any questions please contact David Perkins at Obvius – David.perkins@obvius.com, or Obvius Technical Support support@obvius.com at (503) 601-2099.

Best practices are to use Vitality Energy for site commissioning. They would require that metering hardware is installed and powered by licensed professionals, but they can take care of the communications and configuration.

Turner

Jobsite Fuel Tracking Log

Contractor Name:	
Scope of Work:	
Submitter Name:	
Month/Year:	
Primary Activities:	

	Month Totals		Equipment Used (ie generators, excavators, compactors, light towers, traffic diversion boards, etc)	Data Collection Method (ie delivery tickets, GPS tracker, estimate)
Primary Fuels				
Diesel		gal		
Biodiesel		gal		
Gasoline		gal		
Propane		gal		
Secondary Fuels				
Acetylene		cub.ft		
Butane		gal		
Compressed Natural Gas		gal		
Fuel Oil (No.1)		gal		
Fuel Oil (No.2)		gal		
Jet Fuel		gal		
Kerosene		gal		
Other:				
			Source (water trucks, onsite tanks, etc.)	**Data Collection Method** (ie delivery tickets, meter, estimate)
Water				
Site Water Use		gal		
Imported Water		gal		

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General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)

New Central Middle School Project
9 Indian Rock Lane
Greenwich, CT 06830

THE OWNER:
(Name, legal status and address)

Board of Education of the Town of Greenwich,
acting through the Central Middle School Building Committee
Havemeyer Building
290 Greenwich Avenue
Greenwich, CT 06830

THE ARCHITECT:
(Name, legal status and address)

The S/L/A/M Collaborative, Inc.
80 Glastonbury Blvd.
Glastonbury, CT 06033

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

For guidance in modifying this document to include supplementary conditions, see AIA Document A503™, Guide for Supplementary Conditions.

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14 TERMINATION OR SUSPENSION OF THE CONTRACT

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement. Conditions of the Contract (General, Supplementary and other Conditions). Drawings. Specifications. Addenda issued prior to execution of the Contract, other documents listed in the Agreement. and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties. (2) a Change Order. (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid. Instructions to Bidders, sample forms. other information furnished by the Owner in anticipation of receiving bids or proposals. the Contractor's bid or proposal, or portions of Addenda relating to bidding or proposal requirements.

§ 1.1.2 The Contract

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations. representations, or agreements. either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor. (3) between the Owner and the Architect or the Architect's consultants, or (4) between any persons or entities other than the Owner and the Contractor.

§ 1.1.3 The Work

The term "Work" means the construction and services required by. or reasonably inferable from, . the Contract Documents. whether performed on or off the site of the Project and whether completed or partially completed. and includes all other labor. materials, equipment, and services provided or to be provided by the Contractor. its Subcontractors, Sub-Subcontractors. material suppliers or any other entity for whom the Contractor is responsible. to fulfill the Contractor's obligations under or pursuant to the Contract Documents. The Work may constitute the whole or a part of the Project.

§ 1.1.4 The Project

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by Separate Contractors.

§ 1.1.5 The Drawings

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans. elevations. sections. details, schedules. and diagrams.

§ 1.1.6 The Specifications

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials. equipment. systems. standards and workmanship for the Work. and performance of related services.

§ 1.1.7 Instruments of Service

Instruments of Service are representations. in any medium of expression now known or later developed. of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include. without limitation. studies, surveys. models. sketches. drawings. specifications. and other similar materials.

§ 1.1.8 Initial Decision Maker

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§1.1.9 CONTRACTOR

The term "Contractor" as used in these General Conditions shall mean the "Construction Manager" as defined in the Agreement.

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§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them. If the Contractor discovers any inconsistency within or between parts of the Contract Documents or between the Contract Documents and any of the Applicable Laws (as defined in Section 2.2.1.1 of the Agreement), the Contractor shall give notice to the Owner and the Architect of such inconsistency and shall, unless otherwise ordered in writing by the Architect or the Owner, provide work or materials of the better quality, greater quantity, or that otherwise complies with applicable standards, codes or ordinances, except as otherwise provided by the GMP Clarifications and Assumptions.

§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case, the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.2.4 Where no explicit quality or standards for materials or workmanship are established for any portion of the Work, the Contractor shall perform such Work in a good and workman like manner and in a manner of good quality for the intended use and consistent with the quality of the surrounding Work and of the construction of the Project generally.

§ 1.2.5 All manufactured articles, materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the manufacturer's written or printed directions and instructions unless otherwise indicated in the Contract Documents. Directions, specifications and recommendations by manufacturers for installation, handling, storing, adjustment, and operation of their materials or equipment shall be complied with, but the Contractor shall nonetheless have the responsibility for determining whether such directions, specifications, and recommendations may safely and suitably be employed in the Work, and for notifying the Architect in advance in writing of any deviation or modification necessary for installation safety or proper operation of the item.

§ 1.2.6 In the event of any conflict, inconsistency or ambiguity among the Contract Documents, such Documents shall have the following priority: (1) Construction Manager's Assumptions and Clarifications; (2) Modifications as defined by Section 1.1.1 of AIA Document A201-2017, as modified herein; (3) this Agreement; (4) modified AIA Document A201-2017, as modified herein; (5) Drawings and (6) Specifications.

§ 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 Interpretation

In the interest of brevity, the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

§ 1.5.1 The Architect and the Architect's consultants shall, except to the extent otherwise provided in the agreement between the Owner and the Architect, be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory

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requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the reserved rights of the owner(s) of such Instruments of Service.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties may use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

§1.8.1 The Owner will direct the Architect to promptly deliver to the Contractor a full operable copy of the Architect's building and building system model(s) in order to facilitate the placement of the features, systems and components that will be supplied by the Contractor's personnel, suppliers and subcontractors.

§ 1.9 CONTRACTOR'S STANDARD OF CARE

The Contractor shall exercise the Contractor's Standard of Care in performing all aspects of the Work and its obligations under the Contract Documents. All references in the Contract Documents to the knowledge, inference, reliance, awareness, determination, belief, observation, recognition or discovery of the Contractor or reference to any similar term shall include the knowledge, inference, reliance, awareness, determination, belief, observation, recognition the Contractor would have obtained or achieved upon the exercise of the Contractor's Standard of Care.

ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority.

§ 2.1.2 The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

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§ 2.2 Evidence of the Owner's Financial Arrangements

§ 2.2.1 Intentionally Omitted.

§ 2.2.2 Intentionally Omitted.

§ 2.2.3 Intentionally Omitted.

§ 2.2.4 Intentionally Omitted.

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and related fees and filings that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure, file and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.3 If the employment of the Architect terminates, the Owner may employ a successor and whose status under the Contract Documents shall be that of the Architect.

§ 2.3.4 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site to the extent required by the Contract Documents. Unless otherwise instructed by the Owner, the Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.3.5 Intentionally Omitted.

§ 2.3.6 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor, the Architect, or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. The Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner at or prior to the date of Final Completion of the Work. The right of the Owner to so carry out such Work pursuant to this Section 2.5 shall not give rise to any duties on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

§ 2.6 ADDITIONAL RIGHTS

§ 2.6.1 The rights stated in this Article 2 shall be in addition to and not in limitation of any other rights of the Owner provided in the Contract Documents, or as may be available to the Owner at law or in equity.

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§ 2.6.2 Any data provided by the Owner to the Contractor concerning the physical characteristics or measurements of the components that comprise the Project site: access to the Project site or staging and storing at the Project site: present obstructions and conditions of structures on or near the Project site; locations and depths of sewers, conduits, pipes, and gas lines on or near the Project site: positions of sidewalks, curbs and pavements on or near the Project site and other data concerning the conditions of the Project site and its surroundings, have been obtained from sources the Owner believes to be reliable. .

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor and Subcontractors of every tier shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall be responsible for performance of the Work in accordance with the Contract Documents. The Contractor shall be responsible to the Owner for the performance, and the acts or omissions, of the Subcontractors, Sub-subcontractors and material or equipment suppliers. Any reference in the Contract Documents to the Contractor's performance, act, or omission, or reference to a similar term, shall include the performance, act, or omission of the Subcontractors, Sub-subcontractors and material or equipment suppliers.

§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.1.4 The Contractor shall comply with all Applicable Laws regarding its performance of the Work including, without limitation, those relating to equal opportunity, labor, wages and employment.

§ 3.1.5 The Contractor shall comply, and shall cause Subcontractors of every tier to comply, with all accounting procedures and record retention policies reasonably requested by the Owner.

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents. The provisions of this Section 3.2.1 shall not be construed to limit the investigative and review responsibilities of the Contractor under any other provisions of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Owner and the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents. The submission of its GMP proposal shall constitute a representation by the Contractor that the Contractor has carefully reviewed the Contract Documents, and visually inspected the Project Site. Construction Manager represents that the GMP includes the sufficient cost and the Project Schedule includes sufficient time for the Construction Manager to complete the Work in accordance with the Contract Documents, except for the changes to the Work as required by Change Orders issued in accordance with the Agreement. The Contractor is not required to ascertain that the Contract Documents are in accordance with all Applicable Laws, but the Contractor shall promptly report to the Owner and the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

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§ 3.2.3 Execution by the Contractor of the Guaranteed Maximum Price Amendment, shall constitute a certification by the Contractor that it has conducted general and reasonably observable inspection of the Site conditions. Failure by the Contractor to visually inspect the Project site conditions, including conditions relating to transportation, handling, storage of materials, availability of labor, water, other known projects in the region, and the character and availability of equipment and facilities needed preliminary to and during the prosecution the Work, shall not relieve the Contractor of its responsibilities under the Contract Documents and shall not constitute a basis for extension of time or any increase in the Contract Sum. Owner assumes no responsibility for any representations concerning conditions made by any of its officers, or employees or representatives, prior to the execution of the Contract, unless such representations are expressly stated in the Contract Documents. The Contractor shall not perform any construction activity it knows constitutes a recognized error, inconsistency, or omission. If the Contractor performs any construction activity knowing it involves a recognized error, inconsistency, or omission in the Contract Documents without reporting the error, inconsistency or omission to the Architect, the Contractor shall assume appropriate responsibility for such performance and shall bear an appropriate amount of the costs of correction.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to this Article 3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to Applicable Law.

§ 3.2.5 If the Contractor fails to fulfill its obligations to report to the Architect or Owner under this Article 3, such failure shall preclude the Contractor from any subsequent Claim arising from or relating to the factors giving rise to the Contractor's obligation to make such report.

§ 3.2.6 The Contractor shall promptly inform the Owner and the Architect if the Contractor believes that a requirement of the Contract Documents is likely to have an adverse effect on the Project.

§ 3.2.7 Contractor is responsible for the safety of the Project Site, including without limitation providing a safety plan in accordance with Applicable Law, during the performance of the Work. Except as set forth in Section 10.3, the Contractor shall be solely responsible for providing safe working conditions in accordance with its safety plan for the performance of the Work that complies with Applicable Law.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's skill and attention in accordance with the Standard of Care. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures. If the Contractor is instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor and said means and methods impact the project, the parties shall resolve any such impact in good faith.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

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§ 3.3.4 The Contractor shall schedule and perform the Work so as not to unreasonably interfere with any other known related or unrelated work being performed by the Owner in or about the Project premises nor shall the Contractor unreasonably interfere with the Owner's school activities or operations on such premises, as identified within the Contract Documents. The Contractor shall coordinate its and its subcontractors' prosecution of the Work with the Owner and Owner's Designated Representative to minimize any such interference.

§ 3.3.5 The Contractor shall protect and prevent damage to all unfinished phases of the Work.

§ 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them. All labor shall be performed by workmen skilled in their respective trades, and workmanship shall be of good quality so that first class work in accordance with the standards of construction set forth in the Contract Documents and the Contractor's Standard of Care will result.

§ 3.4.4 Substitutions

§ 3.4.4.1 When two or more products are specified for an item of Work, any one thereof is acceptable and the choice is left to the Contractor, with prior written notice to the Architect and the Owner. When only one product is specified and the term "or equal" is used in connection with the product, the Contractor may, if it so desires, offer a substitute product, and by so doing, Contractor shall be deemed to represent that the substitute product will completely accomplish the purpose of the Contract Documents. Requests for substitutions of products, materials or processes other than those specified shall be accompanied by evidence showing whether or not the proposed substitution:

.1 is equal in quality and serviceability to the specified item;
.2 will not entail changes in detail and construction of related Work;
.3 will be acceptable in consideration of the required design and artistic effect; and
.4 will not provide a cost disadvantage to the Owner.

The Contractor shall furnish with its request such Drawings, Specifications, samples, performance data and other information as may be required of it to assist the Architect and the Owner in determining whether the proposed substitution is acceptable. The burden of proof of the facts above stated shall be upon the Contractor, and no substitution shall be authorized except upon the prior written approval of Owner and the Architect. Nothing in this Section 3.4.4 shall limit the provisions of Sections 3.4.4.2 or 3.4.4.3.

§ 3.4.4.2 By making requests for substitutions based on Sections 3.4.2 and 3.4.4, the Contractor:

.1 represents that the Contractor has personally investigated the proposed substitute product and determines that it is equal or superior in all respects to that specified;
.2 represents that the Contractor will provide the same warranty for the substitution that the Contractor would for that specified;
.3 certifies that the cost data presented is complete and includes all related costs under this Contract except the Architect's redesign costs, and waives all claims for additional costs related to substitution which subsequently become apparent; and
.4 shall coordinate the installation of the accepted substitution, making such changes as may be required for the Work to be complete in all respects.

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§ 3.4.4.3 Approval by the Owner or Architect of any such substitution shall not relieve the Contractor of responsibility for any additional costs incurred by other trades for changes made necessary to accommodate the substituted item.

§ 3.5 WARRANTIES

§ 3.5.1 The Contractor warrants to the Owner that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 3.5.3 The Contractor shall procure and assign to the Owner at the time of Substantial Completion of the Work any and all Subcontractor, manufacturer or supplier warranties relating to any materials and labor used in the Work. Such warranties shall supplement the warranties provided by the Contractor in Section 3.5.1.

§ 3.5.4 Substitutions not properly approved and authorized and work, materials or equipment which fail to perform under the proper use and normal wear for intended purposes shall be considered defective. If required by the Architect or the Owner, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment to be incorporated in the Work.

§ 3.5.5 The warranties under this Section 3.5 shall be in addition to, and not a substitute for, any other rights of the Owner under the Contract Documents or existing in law or equity.

§ 3.5.6 The warranties set forth in this Section 3.5 shall survive final payment and termination of this Contract.

§ 3.6 Taxes

The Owner is a tax-exempt entity. The Contractor shall be familiar with the current regulations of the Connecticut Department of Revenue Services and the sales or use tax on materials or supplies exempted by such regulations shall not be included as part of the bid or the Contract Sum. A sales tax certificate is available upon written request.

§ 3.7 Permits, Fees, Notices and Compliance with Laws

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, certifications and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and required by Applicable Laws. The Contractor shall provide the Owner and Architect with reproductions of all permits, licenses, permissions, certifications and receipts for payments and, upon final completion, shall deliver all originals of such documents to the Owner with copies to the Architect.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to Applicable Law, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than seven (7) days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect

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determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands or other conditions that would warrant a suspicion that such matters are being encountered during the performance of the Work although they are not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 Allowances

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents.

.1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;

.2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall, unless otherwise stated in the Contract Documents, be included in the Contract Sum but not in the allowances; and

.3 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's prior written consent, which shall not unreasonably be withheld or delayed. The list of all supervisory personnel, including the project manager and superintendent that the Contractor intends to use on the Project and an organizational chart reflecting the chain of command among such personnel, shall be submitted to the Owner for approval prior to the commencement of the Work. The Contractor shall not engage supervisory personnel other than as approved by Owner in writing and shall not change such personnel without the prior written approval of the Owner.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor shall, as required pursuant to the Agreement, prepare and submit for the Owner's and Architect's approval a construction schedule for the Work (as approved by the Owner and the Architect, the "Construction Schedule"). The Construction Schedule (i) shall comply with all of the applicable requirements of, the

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Contract Documents: (ii) shall be revised (which revisions shall be subject to the approval of the Owner and the Architect) at appropriate intervals as determined by the Contractor and as required by the conditions of the Work and the Project; (iii) shall be related to the entire Project to the extent required by the Contract Documents, and (iv) shall provide for expeditious and practicable execution of the Work. The initial Construction Schedule is based on the scheduling requirements of the RFP.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to, and approved by, the Owner and Architect.

§ 3.10.4 The Construction Schedule shall be in such detail and include such content as required by the Owner. If the Owner requires a precedence-style critical path method (CPM), the Construction Schedule shall: (i) provide a graphic representation of all activities and events that will occur during performance of the Work; (ii) identify each phase of construction and occupancy (if applicable); and (iii) set forth dates that are critical in ensuring the timely and orderly completion of the Work (hereinafter referred to as "Milestone Dates"). Upon review and acceptance by the Owner of the Milestone Dates, the Construction Schedule shall be attached to the Agreement as Schedule 2. If not accepted, the Construction Schedule shall be promptly revised by the Contractor in accordance with the recommendations of the Owner and the Architect and resubmitted for acceptance. The Contractor shall monitor the progress of the Work for conformance with the requirements of the Construction Schedule and shall promptly advise the Owner of any delays or potential delays. The accepted Construction Schedule shall be updated to reflect actual conditions ("Progress Reports") as set forth in Section 3.10.1 above or as otherwise requested by the Owner and the final version shall be included as part of the GMP. In the event any Progress Report indicates any delays to the GMP Project Schedule, the Contractor shall propose an affirmative plan to correct the delay, including overtime and/or additional labor, if necessary. In no event shall any Progress Report constitute an adjustment in the Contract Time, any Milestone Date or the Contract Sum unless any such adjustment is agreed to by the Owner and authorized pursuant to Change Order.

§ 3.10.5 In the event the Owner determines that the performance of the Work as of a Milestone Date has not progressed or reached the level of completion required by the GMP Project Schedule because of delays caused by the Contractor, its Subcontractors or those for whom they are responsible, the Owner shall have the right, but not the obligation, to order the Contractor to take corrective measures necessary to expedite the progress of construction, including, without limitation, (1) working additional shifts or overtime, (2) supplying additional manpower, equipment, and facilities, and (3) other similar measures (hereinafter referred to collectively as "Extraordinary Measures"). Such Extraordinary Measures shall continue until the progress of the Work complies with the stage of completion required by the Contract Documents. The Owner's right to require Extraordinary Measures is solely for the purposes of ensuring the Contractor's compliance with the GMP Project Schedule as adjusted for time extensions granted pursuant to Section 8.3. Except as provided in Section 8.3, the Contractor shall not be entitled to an adjustment in the Contract Sum in connection with Extraordinary Measures required by the Owner pursuant to this Section 3.10.5. The Owner may exercise the rights furnished the Owner under or pursuant to this Section 3.10.5 as frequently as the Owner deems necessary to ensure that that Contractor's performance of the Work will comply with any Milestone Date or the Substantial Completion Date, as the same may be extended by Change Order.

§ 3.10.6 The Owner shall have the right to direct a postponement or rescheduling of any date or time for the performance of any part of the Work that may interfere with the Owner's operations. Any postponement, rescheduling or performance of the Work under this Section 3.10.6 may be grounds for an extension of the Contract Time, if permitted under Section 8.3 and an equitable adjustment in the Contract Sum if: (1) the performance of the Work was properly scheduled by the Contractor in compliance with the requirements of the Contract Documents and (2) such rescheduling or postponement is requested by or required for the convenience of the Owner. Without limiting the foregoing, the Contractor will not be entitled to an extension of the Contract Time or an adjustment of the Contract Sum to the extent the interfering Work so interferes as a result of the negligent act or omission of the Contractor or its subcontractors of any tier or the failure of any of the same to perform the Work in a manner consistent with the

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Contract Documents, including Section 3.10.3 hereof, except for Concurrent Delays, for which the Construction Manager's sole remedy shall be a non-compensable extension of time. The term "Concurrent Delays" refers to delays set forth in Section 8.3 that are concurrent with delays caused by Contractor, its subcontractors or those for whom it is responsible.

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed. The Contractor shall coordinate and cooperate with the Architect in the Architect's preparation of the "as constructed" electronics file for the Project.

§ 3.12 Shop Drawings, Product Data and Samples

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors. The Contractor shall be responsible for the Owner's costs associated with the Architect's time for submittal review if any submittal must be reviewed by the Architect more than two (2) times due to the fault of the Contractor, or as otherwise approved by the Owner.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents. The Contractor shall indicate its review of the submittals as evidence of such review and coordination. Submittals made to the Architect without such indication of review may be returned to the Contractor for resubmission.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the

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deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically agreed by the parties as part of the GMP or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means and methods. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional that has been approved by the Owner and that carries such professional liability insurance as required by the Owner, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

§ 3.13 Use of Site

§ 3.13.1 The Contractor shall confine operations at the site to areas permitted by Applicable Laws and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.13.2 The Contract Documents shall provide current location of utilities and utility lines. Contractor shall protect and save from damage or disruption those known utilities and utility services lines of all kinds, either above or below grade found in the areas affected by the Work. The Contractor shall be responsible for all damage caused to such known utilities by the operation of equipment or delivery of materials or as the direct or indirect result of any of the Work and shall repair all such damage at its expense and as part of the Work included in the Contract Documents.

§ 3.14 Cutting and Patching

§ 3.14.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste

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materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project and shall clean and/or remove all stains, spots, marks, blemishes, foreign matter and dirt from surfaces of the Work and from other surfaces not a part of the Work but where such condition resulted from the Contractor's operations.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the Owner shall be entitled to reimbursement from the Contractor for the full cost of such clean up.

§ 3.16 Access to Work

The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress wherever located.

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights, or failure to pay such royalty and license fees, and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for such losses to the Owner unless the Contractor had furnished such information to the Owner and the Architect promptly upon obtaining such knowledge.

§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify, defend and hold harmless the Owner, the Owner's Designated Representative, and the directors, officers, owners, agents and employees of any of them as well as the Building Committee appointed by the Owner for the Project, from and against any and all claims, liens, judgments, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself) except to the extent such injury to or destruction of the Work itself is covered by builder's risk insurance, but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable; provided however that such indemnity obligations shall not include liability for damage arising out of bodily injury to person or damage to property caused by or resulting from the negligence of the indemnitee, such indemnitee's agents or employees. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of compensation acts, disability benefit acts, or other employee benefit acts.

§ 3.19 MEETINGS

§ 3.19.1 A qualified representative of the Contractor shall attend periodic progress meetings held at such time and as such place as the Architect or the Owner shall designate.

§ 3.19.2 The Contractor shall schedule and conduct progress meetings at the site on a bi-weekly basis (or interval appropriate for the level of jobsite activity). Attendance is required of each Subcontractor, supplier or other entity whose portion of the Work is currently the subject of concern or discussion or planning of future construction activities. Owner and Architect shall be provided with forty-eight (48) hour prior notice of each such progress meetings and be permitted to attend and participate in the meetings.

ARTICLE 4 ARCHITECT

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

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§ 4.1.2 Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor, and Architect. Consent shall not be unreasonably withheld.

§ 4.2 Administration of the Contract

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative (i) during construction; (ii) until the date that final payment under the Contract is due and payable; and (iii) with the concurrence of the Owner, during the one-year period described in Section 12.2. The Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that such portion of the Work is, and when the Work is fully completed the entirety of the Work, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for, acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 Communications

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by the Contractor with the Architect's consultants shall be through the Architect. Communications by the Architect with Subcontractors and suppliers shall be through the Contractor. Communications by the Contractor with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.1, 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety

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precautions or of any construction means, methods, techniques, sequences, or procedures that are not specified by the Architect or in the Contract Documents. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives and may order minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract Documents and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or the subcontractors of a Separate Contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to the identity or fee proposal of any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

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§ 5.2.1.1 To facilitate and expedite the investigations of such proposed persons or entities, the Contractor shall, upon the Owner's request, provide to the Owner and Architect a list of the names and addresses of all prospective subcontractors and such other information as may be reasonably requested by the Owner.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner or Architect makes reasonable objection to such substitution. If the Contractor wishes to substitute a different person or entity for a person or entity previously selected and approved as a Subcontractor pursuant to this Section 5.2, the procedure set forth in Section 5.2.1 shall be followed.

§ 5.3 Subcontractual Relations

§ 5.3.1 Any part of the Work performed by a Subcontractor shall be pursuant to a written Subcontract between the Contractor and Subcontractor, which form of Subcontract shall be reasonably satisfactory to the Owner in all respects. Copies of all Subcontractor bids or proposals shall, upon request of Owner, be submitted to the Owner and Architect.

§ 5.3.2 By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by these Documents, assumes toward the Owner. Each subcontract agreement shall preserve and protect the rights of the Owner under the Contract Documents with respect to the Work to be performed by the Subcontractor so that the subcontracting thereof will not prejudice such rights. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, redacted copies of the Contract Documents to which the Subcontractor will be bound. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.3.3 The Contractor shall be fully responsible for coordinating and expediting the work of all Subcontractors and shall employ the necessary and qualified personnel to produce the required quality of labor and materials and to prevent delays in the progress of the Project. The Contractor shall afford each trade with all reasonable opportunities for the installation of its work and for the storage and handling of its materials

§ 5.4 Contingent Assignment of Subcontracts

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to, and in accordance with, Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and

.2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract. The Contractor agrees to execute any and all other documents required to effect this assignment, which form of assignment shall include the indemnity of the Contractor against all claims of Subcontractors that arose prior to the date of assignment, regardless of whether such claims are regarding matters that arose prior to the date of assignment.

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§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity

§ 5.5 Payment of Subcontractors

§ 5.5.1 After payment to Contractor by the Owner, the Contractor shall pay any amounts due any Subcontractor, whether for labor performed or materials furnished, when such labor or material has been included in a requisition submitted by such Contractor and paid by Owner. Such payments shall be made within thirty (30) days after the Contractor receives payment from the Owner. The Contractor shall promptly give notice to the Owner of any claim or demand by a Subcontractor claiming that any amount is due to such Subcontractor or claiming any default by the Contractor in any of the Contractor's obligations to such Subcontractor.

§ 5.5.2 The Contractor shall include in each of the subcontracts a provision requiring each Subcontractor to pay any amounts due to any Sub-Subcontractors, whether for labor performed or materials furnished, within thirty (30) days after such Subcontractor receives a payment from the Contractor which encompasses labor or materials furnished by such Sub-subcontractor and a provision requiring each Subcontractor to promptly give notice to the Contractor of any claim or demand by a Sub-subcontractor claiming that any amount is due to such Sub-Subcontractor or claiming any default by such Subcontractor in any of its obligations to such Sub-subcontractor which notice the Contractor shall promptly relay to the Owner.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each Separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, Separate Contractors, and the Owner until subsequently revised.

§ 6.1.4 Intentionally Omitted.

§ 6.2 Mutual Responsibility

§ 6.2.1 The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

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§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a Separate Contractor because of the Contractor's delays, disruptions to the work of such separate contractor, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a Separate Contractor's delays, disruptions to the Work, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5.

§ 6.2.5 The Owner and each Separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.2.6 Upon the Owner's request, the Contractor shall defend any proceedings brought against the Owner by any separate contractor on account of any damage alleged to have been caused by the Contractor which arises from the Contractor's failure to comply with the terms and conditions of this Section 6.2.

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor, and Architect. A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

§ 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor, and Architect stating their agreement upon all of the following:

.1 The change in the Work;
.2 The amount of the adjustment, if any, in the Contract Sum; and
.3 The extent of the adjustment, if any, in the Contract Time.

§ 7.2.2 A Change Order executed by the Owner and the Contractor shall constitute a final settlement of all matters relating to the subject matter of the Change Order including, without limitation, compensation to be paid in connection with any change in the Work required by the Change Order (provided that the Work that is the subject of such change is performed in a manner consistent with the provisions of the Contract Documents and the applicable Change Order), including but not limited to all direct and indirect costs, profit, overhead, extended overhead, loss of productivity and general conditions associated with such change, and any and all adjustments to the Contract Sum and to the Contract Time. In the event a Change Order affects an increase in the Contract Sum, Contractor shall include the work covered by such Change Order in Applications for Payment for such work as if the work were originally part of the Work as set forth in the Contract Documents.

§ 7.2.3 Notwithstanding anything to the contrary set forth in these General Conditions, if the Agreement sets forth the methodology for calculating adjustments in the Contract Sum associated with a change in the Work, and if, under the terms of the Contract Documents, an adjustment in the Contract Sum would be required, then the adjustment will be based on such methodology unless otherwise mutually agreed by the parties. This paragraph shall be applicable in the case of a change in the Work effected by a Change Order as well as a Construction Change Directive.

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§ 7.2.4 Unless otherwise instructed by the Owner, Change Orders shall be prepared on the form AIA G-701.

§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods as selected by the Architect and approved by the Owner:

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
.2 Unit prices stated in the Contract Documents or subsequently agreed upon;
.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
.4 As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for General Conditions Costs as provided by the A133, overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the Cost of the Work as defined by the Agreement, including without limitation the following:

.1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;
.2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;
.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others, provided, if rented from the Contractor, such rental and the rental rates have been approved by the Owner;
.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and
.5 Costs of supervision and field office personnel directly attributable to the change.

The costs described in Section 7.3.4.1 through and including 7.3.4.5 shall not include any of the following:

.1 Salaries and other compensation of the Contractor's personnel stationed at the Contractor's principal office or offices other than the site office, except as otherwise allowed by the A133;
.2 Expenses of the Contractor's principal office and offices other than the site office;
.3 Overhead and general expenses, except as may be expressly included in this Section or the A133;
.4 The Contractor's capital expenses, including interest on the Contractor's capital employed for the Work;
.5 Costs due to the negligence or failure of the Contractor, Subcontractors, material or equipment suppliers or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable to fulfill a specific responsibility of the Contract Documents; or
.6 Any cost not described in this Section or the A133.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

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§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the actual costs incurred by the Contractor as a result of such Construction Change Directive: provided, however, to the extent such Construction Change Directive is made necessary by the act or omission of the Contractor or of anyone for whom the Contractor is responsible, the Architect shall certify for payment the amount, if any, that the Architect determines, in the Architect's professional judgment, to be necessary for the Contractor to continue the Work. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

ARTICLE 8 TIME

§ 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date Substantial Completion is achieved in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents applicable to the Substantial Completion of the new building and the Milestone dates are of the essence of the Contract. By executing the GMP Amendment, the Contractor confirms that the GMP Project Schedule is a reasonable period for performing the Work.

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§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the GMP Project Schedule, as that may be amended in accordance with the Agreement.

§ 8.2.4 Accelerated GMP Project Schedule

§ 8.2.4.1 Although the RFP Construction Schedule is based on a twenty-seven month duration based on following overlapping phases: (a) Construction, 21 months; (b) Owner move-in and fixtures, furniture and equipment, 5 months; and Demolition and Site Work, 2 months, the Contractor acknowledges and agrees that it may be able to the reduce the duration of the Work: (i) by sequencing the demolition, sitework and closeout phase of the Work immediately after the completion of the Building Construction phase of the Work; and (ii) based on certain assumptions and clarifications set forth in **Attachment 2 to the Agreement** ("Accelerated Schedule").

§ 8.2.4.2 The Contractor further acknowledges and agrees that the Accelerated Schedule, which would result in a reduction of its General Conditions Cost, was a material inducement to the Owner's award of the Agreement.

§ 8.2.4.3 In accordance with said inducement, Contractor agrees that its GMP proposal shall, in addition to a GMP Project Schedule based on RFP Construction Schedule, include an Accelerated GMP Project Schedule proposal which shall be prepared in accordance with **Attachment 2** and designed to achieve the same magnitude of General Conditions Cost savings in its original Accelerated Schedule proposal.

§ 8.2.4.4 The Owner acknowledges and agrees that the Accelerated Schedule will require the Owner to comply with the noted assumptions set forth in **Attachment 2**, including without limitation the delivery date of the issued-for-construction documents. To the extent the assumptions or durations noted in **Attachment 2** require revision at time of the GMP proposal, the parties shall negotiate an alternative accelerated schedule proposal accordingly.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, war, terrorism, incidence of disease or other illness that reaches outbreak, epidemic, endemic and/or pandemic proportions or other causes affecting the area in which the Project is located and/or the Contractor's labor and/or supply chain, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's reasonable control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time, and the GMP may be adjusted for the additional Cost of Work caused by any such delay, as the Architect may determine, provided that (i) the Contractor notifies the Owner and Architect in writing of the alleged cause of such delay within ten (10) days after the Contractor became aware of the delay-precipitating event, and (ii) the Contractor demonstrates by a detailed and substantiated analysis the effects of the delay, if any, upon the construction schedule and Contract Time and GMP.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

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§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, upon the approval of the Owner and the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

§ 9.3 Applications for Payment

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with Contract Documents and the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner, the Architect, or any person or entity providing funding for the Project, may require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents. All Applications for Payment shall be in the form and contain the information and supporting documentation as required in this Section 9.3 and such additional information and documentation and as may be reasonably requested by the Owner.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents or prohibited by any person or entity providing funding for the Project, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner and not prohibited by any person or entity providing funding for the Project, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

§ 9.3.3.1 The Contractor further expressly undertakes to defend the Owner, at the Contractor's sole cost and expense, against any actions, lawsuits, or proceedings brought against Owner as a result of liens filed against the Work, the Project site and any improvements thereon (referred to collectively as "Liens" in this Section 9.3.3), by the Contractor, any Subcontractor, Sub-subcontractor or anyone claiming by, through or under them. The Contractor hereby agrees to indemnify and hold Owner harmless against any such Liens or claims of Liens and agrees to pay any judgment or Lien resulting from any such actions, lawsuits or proceedings. The Contractor's obligations under this Section 9.3.3 are conditioned upon Owner having fulfilled its payment obligations to the Contractor with respect to the Work that is the subject of the Lien or claim and for which indemnification is sought.

§ 9.3.3.2 Commencing with the second Application for Payment, and continuing with each Application for Payment submitted thereafter, the Contractor shall furnish to the Owner a properly executed release and waiver of mechanics

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liens from the Contractor and each Subcontractor and material supplier whose Work was included on the previous Application for Payment for which payment by Owner was made to the Contractor.

§ 9.3.3 Applications for Payment, and invoices in support of the same, shall clearly distinguish between amounts charged for labor and amounts charged for materials.

§ 9.3.4 Unless otherwise required by the Owner, Applications for Payment shall be on AIA documents G702 and G703.

§ 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and, as a representation made by the Architect solely to the Owner, that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.4.3 Notwithstanding anything to the contrary, issuance of a Certificate for Payment by the Architect is a recommendation only and payment to the Contractor of amounts certified in a Certificate for Payment is subject to the Owner's approval.

§ 9.4.4 Certificates for Payment shall be on AIA documents G702 and G703.

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

.1 defective Work not remedied;
.2 uninsured third-party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
.3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
.5 uninsured property damage to the Owner or a Separate Contractor (excluding the Work);
.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
.7 repeated failure to carry out the Work in accordance with the Contract Documents.

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§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

§ 9.5.3 When the reasons for withholding a Certificate for Payment are removed, the Certificate for Payment will be issued as regards amounts previously withheld. The Owner shall not be deemed to be in default by reason of withholding payment while any of the above grounds remained uncured, nor shall any interest accrue or be payable with respect to any payments so withheld.

§ 9.5.4 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Contractor shall reflect such payment on its next Application for Payment.

§ 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

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§ 9.6.9 Any provision in the Contract Documents to the contrary notwithstanding, the Owner shall not be obligated to make payment to the Contractor hereunder to the extent that the Contractor has not performed the Work or supplied the materials, for which payment is requested, in accordance with the Contract Documents.

§ 9.7 Failure of Payment

If the Architect does not issue a Certificate for Payment as required by the Contract Documents, through no fault of the Contractor, within ten (10) days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon ten (10) additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately, and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use. Substantial Completion shall not occur until: (i) the Owner's receipt of certification by the Architect that the Work is Substantially Complete in the form of a Certificate of Substantial Completion; and (ii) the Owner's receipt of a final and unconditional or a Temporary Certificate of Occupancy from the governmental authorities having jurisdiction that the Work has been completed in accordance with Applicable Laws. Notwithstanding the foregoing, if, but for the failure of the building department or governmental authorities having jurisdiction to timely issue the temporary certificate of occupancy for the Project ("Administrative Delay"), the Contractor would have been deemed to have achieved Substantial Completion of the Work within the Contract Time under the terms and conditions of the Contract Documents, the Contractor shall be entitled to an extension of the Contract Time equal to the duration of such Administrative Delay.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance,

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heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled. All warranties and guarantees required under or pursuant to the Contract Documents not previously delivered shall be assembled and delivered by the Contractor to the Owner and Architect as part of the final Application for Payment. The final Certificate for Payment will not be issued by the Architect until all warranties and guarantees and all other close-out deliverables (including those set forth in Section 9.10.2 below) have been received and accepted by the Owner.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of mechanic's liens, claims, security interests, or other encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor shall furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If no such bond is provided, the Owner may, without limiting its remedies under law, in equity, or under the Contract Documents, withhold the portion of final payment claimed to be due by the relevant Subcontractor or supplier until such lien is no longer a viable encumbrance. The Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

§ 9.10.4
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§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

.1 employees on the Work and other persons who may be affected thereby;

.2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and

.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with, and give notices required by, Applicable Law bearing on safety of persons or property or their protection from damage, injury, or loss.

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards. The Contractor shall also be responsible for all measures necessary to protect any property adjacent to the Project and improvements thereon. Any damage to such property or improvements shall be promptly repaired by the Contractor at its cost and expense.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.4.1 When there are indications that the use of explosives or other hazardous materials, equipment or unusual methods is necessary for execution of the Work, the Contractor shall give the Owner and Architect reasonable advance notice of the conditions.

§ 10.2.4.2 The Contractor shall be solely responsible for the handling, storage and use of explosive or other hazardous materials when their use is permitted.

§ 10.2.4.3 The Contractor shall not bring explosives onto the Project site or use such in the Work without the prior written permission of the Architect and the Owner. For such use, the Contractor shall obtain necessary permits with copies to the Architect and the Owner. The Contractor shall furnish the Owner and Architect with certificates indicating proper and adequate insurance.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are separate from, in addition to, and are not to be construed as included as a part of the Contractor's obligations under Section 3.18.

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§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 Injury or Damage to Person or Property
If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.2.9 In the event the Contractor identifies activities or conditions during performance of the Work or at the Project, which, in the Contractor's good faith opinion, pose an unreasonable risk of bodily injury or property damage, whether immediate or in the future, the Contractor shall have the right to immediately take steps to protect its personnel and Subcontractors and stop Work and remove its personnel from the affected area.

§ 10.2.10 The Contractor shall at all times provide protection against weather (rain, wind, storms or heat) so as to maintain all Work, materials, apparatus and fixtures free from damage. At the end of the day's work, all new Work likely to be damaged shall be reasonably protected against such weather.

§ 10.2.11 The Contractor shall provide adequate fire protection for all operations associated with the Work, and such protection must meet all applicable federal (including OSHA), State and municipal regulations.

§ 10.2.12 The Contractor shall remove and replace with new work, at the Contractor's own expense, any Work damaged by failure to provide protection pursuant to Sections 10.2.10 and 10.2.11, provided that this obligation shall not prohibit the Contractor's right to submit a claim with the Project's Builder's Risk or property insurance.

§ 10.2.13 The Contractor shall be responsible, to the extent not covered by insurance, for damage, loss or liability due to theft or vandalism to the Work and stored materials when work is not in progress at night, on weekends or holidays.

§ 10.2.14 The Contractor shall protect and prevent damage to all unfinished phases of the Work.

§ 10.2.15 SECURING THE SITE
The Contractor is responsible for securing, and preventing access by unauthorized individuals to, the Project site from such date as the Contractor, it subcontractors, consultants, or agents commence the Work until the date of Final Completion, unless the Owner and Contractor agree in writing to an earlier date.

§ 10.3 Hazardous Materials and Substances
§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding any material, substance, chemical, waste, product, derivative, compound, mixture, solid, liquid, mineral or gas, whether naturally occurring or manmade, that is hazardous, toxic, or words of similar import or regulatory effect, and any petroleum or petroleum-derived products, radon, radioactive materials or wastes, asbestos in any form, lead or lead-containing materials, urea formaldehyde foam insulation, and polychlorinated biphenyls (collectively, "Hazardous Materials"). If the Contractor believes its Work will disturb or otherwise implicate any actual or suspected Hazardous Material or encounters a Hazardous Material not addressed in the Contract Documents, the Contractor shall not disturb any such Hazardous Material, immediately report the condition to the Owner and the Architect in writing and take all necessary precautions to prevent release of and exposure to the Hazardous Materials and the Contractor shall immediately report the condition to the Owner and the Architect in writing and take all necessary precautions to prevent release of and exposure to the Hazardous Materials and foreseeable bodily injury or death to persons resulting from such Hazardous Material. If such reasonable precautions will be inadequate to prevent release of and exposure to Hazardous Materials, or foreseeable bodily injury and death, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area.

§ 10.3.2 Upon receipt of the Contractor's notice pursuant to Section 10.3.1, of the existence of actual or suspect Hazardous Materials not addressed in the Contract Documents, the Owner shall obtain the services of a licensed

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laboratory to verify the presence or absence of the Hazardous Material reported by the Contractor and, in the event such Hazardous Material is found to be present, to cause it to be rendered harmless or otherwise abated. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the Hazardous Material has been rendered harmless and/or otherwise abated in accordance with all Applicable Laws, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up, except to the extent that the Hazardous Material was exacerbated due to the negligence, willful or intentional misconduct, or breach of contract of the Contractor.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area related to the presence of any actual or suspected Hazardous Materials if in fact such Hazardous Material presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless or otherwise abated, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense was caused by, or resulted from the negligence of, or the intentional or willful misconduct or breach of contract by the party seeking indemnity, or the negligence of, or intentional or willful misconduct or breach of contract by such party's agents (including Subcontractors) or employees.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor, any Subcontractor or any materialman or supplier, or any entity for whom any of them is responsible, brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances or its failure to comply with the Contract Documents. The Contractor agrees not to use any fill or other materials to be incorporated into the Work which are hazardous, toxic or comprised of any items that are hazardous or toxic except to the extent required by the Contract Documents.

§ 10.3.5 To the fullest extent permitted by law, the Contractor shall indemnify, defend and hold harmless the Owner, the Owner's Designated Representative, and the directors, officers, owners, agents and employees of any of them, as well as the Building Committee appointed by the Owner for the Project, and the fee owner of the Project site (if other than the Owner) against claims, damages, losses and expenses, including but not limited to reasonable attorney's fees, resulting from an actual or suspect Hazardous Material or which the Contractor or its agents (including Subcontractors) or employees brings to the site and improperly handles, or from the Contractor's failure to perform its obligations under Section 10.3.1, except to the extent that such damage, loss or expense was caused by, or resulting from the negligence of the indemnitee.

§ 10.3.6 If, without negligence or fault on the part of the Contractor or any party for whose acts the Contractor is responsible, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of properly performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

§ 10.3.7 The Contractor shall perform all required procedures necessary to ensure that there will be no actual or threatened release, discharge, spillage, uncontrolled loss, seepage or filtration (each a "Release") of any Hazardous Material on the site caused by its operations. The Contractor is responsible for any and all costs and liabilities associated with the investigation and remediation of any such Release, or as required by regulating authorities having jurisdiction under any of the Applicable Laws, and holds the Owner, its employees and agents, and the fee owner of the Project site (if other than the Owner), harmless against any current or future liabilities resulting from such incidents.

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§ 10.3.8 All material and equipment furnished under the Contract Documents shall be free of asbestos, lead based paint, and PCBs. Unless otherwise specified in the Contract Documents, any material or equipment containing these, and any other Hazardous Materials shall be considered defective and shall be removed by the Contractor at the Contractor's sole expense.

§ 10.3.9 The Contractor, when it will be providing, using, storing, delivering or disposing of any toxic, hazardous or potentially dangerous materials, shall advise in writing, and receive the written approval of, the Owner of the use of such hazardous materials in advance of conducting any such Work and the Contractor is responsible for protecting its own employees, those of the Owner, and all of its employees and agents from the hazards associated with such materials. The Contractor shall furnish written directions, precautions or training, provided or made available from the supplier of the materials, or other acceptable source, for use by all persons who may be subjected to the hazard. The Contractor shall comply with all Applicable Laws. The Contractor shall dispose of any hazardous or toxic substances in accordance with all Applicable Laws, including E.P.A. and D.O.T. regulations and requirements. The Contractor shall perform all required procedures necessary to ensure that there will be no discharge, spillage, uncontrolled loss, seepage or filtration of any hazardous or toxic waste on the site caused by its operations. The Contractor is responsible for any and all costs and liabilities associated with the clean-up of any such spillage, etc., or as required by regulating authorities having jurisdiction, and holds the Owner and its employees and agents harmless against any current or future liabilities resulting from such incidents.

§ 10.4 Emergencies

In an emergency affecting safety of persons or property, during which it is infeasible for the Contractor to consult with the Owner and/or Architect, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7. The Contractor shall promptly notify insurers as applicable, and the Architect and the Owner of the nature of the emergency. Immediately thereafter, the Contractor shall submit to the Architect and the Owner a written report including description of circumstances of the emergency and details of actions taken.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement, Exhibit B (Insurance and Bonds) or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 11.1.3 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract

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Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

§ 11.2.2 Failure to Purchase Required Property Insurance. If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 Waivers of Subrogation

§ 11.3.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss.

§11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement may be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and

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Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5. All warranties in excess of the one year noted above ("Extended Warranties") shall be assigned to the Owner, after which said assignment the Contractor's liability shall be limited to assisting the Owner with the enforcement of the Extended Warranties.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

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§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.2.6 AUDITS
Upon request of the Owner, the Contractor will cooperate, secure the cooperation of all Subcontractors and Sub-subcontractors and assist the Owner during any audit of the Project conducted by the Owner or one or more Agencies (as defined in Section 2.2.1.2 of the Agreement) at any time after Substantial Completion. Such cooperation shall include providing the Owner with access to all records related to the Project.

§ 12.3 Acceptance of Nonconforming Work
If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS
§ 13.1 Governing Law
The Contract shall be governed by the law of the State of Connecticut.

§ 13.2 Successors and Assigns
§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

§ 13.3 Rights and Remedies
§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law or in equity.

§ 13.3.2 No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

§ 13.4.3 The invalidity of any part or provision of the Contract Documents shall not impair or affect in any manner the validity, enforceability or effect of the remaining parts and provisions of the Contract Documents and the parties agree to substitute for the invalid provision the provision within the bounds of the law which most clearly effectuates the legal and economic intent of the invalid provision.

§ 13.4.4 No provision contained in the Contract Documents shall create or give to third parties any claim or right against the Owner.

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§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by Applicable Law. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense. If the inspections and tests conducted under Section 13.4.1 or this Section 13.4.2 reveal failure in a portion of the Work, the Owner may order the inspection and testing at the Contractor's expense of any and all portions of the Work that are identical or similar to the failing portion.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.4.5 If the Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest as provided in the Agreement.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of sixty (60) consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or any of their respective agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

.1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;

.2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped; or

.3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents and has not notified the Contractor of the reason for withholding payment.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or any of their respective agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in

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Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon fourteen (14) days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment in accordance with the Contract Documents for Work executed in accordance with the Contract Documents and direct costs incurred by reason of such termination.

§ 14.1.4 If the Work is stopped for a period of ninety (90) consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or any of their respective agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters material to the progress of the Work, the Contractor may, upon fourteen (14) additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.1.5 The notice of termination delivered pursuant to Section 14.1.3 or 14.1.4 must state with specificity the means by which the Owner may cure its nonperformance, and the Contractor shall not terminate this Contract if, within the applicable fourteen (14) day period, the Owner substantially takes such curative measures.

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may, without prejudice to any other rights or remedies available to the Owner under the Contract Documents or at law or in equity, terminate the Contract if the Contractor

.1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;

.2 fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;

.3 repeatedly disregards Applicable Law;

.4 otherwise is guilty of substantial breach of a provision of the Contract Documents;

.5 institutes proceedings or consent to proceedings requesting relief or arrangement under the Federal Bankruptcy Act or similar or applicable federal or state law, or a petition under any federal or state bankruptcy or insolvency law is filed against the Contractor and such petition is not dismissed within sixty (60) days from the date of said filing, or the Contractor admits in writing its inability to pay its debts as they become due, or it makes a general assignment for the benefit of its creditors, or a receiver, liquidator, trustee, or assignee is appointed, or a receiver of all or any substantial portion of the Contractor's properties is appointed;

.6 abandons the Work;

.7 submits an Application for Payment, sworn statement, waiver of lien, affidavit or document of any nature whatsoever which is intentionally falsified;

.8 fails to make prompt payment to Subcontractors or for materials or labor in accordance with the respective subcontracts or otherwise breaches its obligations under any subcontract with a Subcontractor; or

.9 if a mechanics or materialman's lien or notice of lien is filed against any part of the Work or the Project site and not promptly bonded or insured over by the Contractor, provided the Owner has paid the Contractor for the Work which is the subject of the lien.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, if the Contractor fails to commence and diligently pursue a cure during such seven (7) day period, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

.1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;

.2 Accept assignment of subcontracts pursuant to Section 5.4; and

.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

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§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance of the Guaranteed Maximum Price, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit (or, as applicable, the Contractor's Fee). No adjustment shall be made to the extent

.1 that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or

.2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, upon ten (10) days prior written notice, without prejudice and without waiving any other unknown right or remedy available to the Owner and Construction Manager under the Contract Documents or at law or in equity, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

.1 cease operations as directed by the Owner in the notice;

.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed in accordance with the Contract Documents, and reasonably and satisfactorily documented direct and demobilization costs and earned Fee as of effective date of termination incurred by reason of the termination, including costs attributable to termination of Subcontracts.

§ 14.5 Payment upon Termination

§ 14.5.1 Except for claims for such payments as the Owner is explicitly required to make upon termination pursuant to this Article 14, the Contractor hereby waives and forfeits all claims for payment and damages, including without limitation, anticipated profits.

§ 14.5.2 When making any payment upon termination required under this Article 14, the Owner shall be credited for (1) payment previously made to the Contractor for the terminated portion of the Work, (2) valid claims which the Owner has against the Contractor under the Contract Documents, and (3) the value of the materials, supplies, equipment or other items that are to be disposed of by the Contractor that are included in the Contract Sum.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

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§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by Applicable Law.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with the performance of its obligations under the Contract Documents and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

§ 15.1.5 Claims for Additional Cost

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction.

§ 15.1.6.3 Notwithstanding anything to the contrary herein or in the Contract Documents, but subject to the Contractor's remedy for Concurrent Delays, neither the Contract Sum nor the Contract Time shall be adjusted if the increased costs or delay underlying the Contractor's claim for adjustment stems from the negligent act or omission of the Contractor, its subcontractors of any tier, or of anyone for whose performance the Contractor is responsible to the Owner, or as a result of the error of any of the same or of the failure of any of the same to comply with, and fulfill their responsibilities under, the Contract Documents.

§ 15.1.7 Waiver of Claims for Consequential Damages

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

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.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

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§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with Applicable Law to comply with the lien notice or filing deadlines.

§ 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in the Contract Documents, shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order.

§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

§ 15.3.4 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 Arbitration

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with Applicable Law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 Consolidation or Joinder

§ 15.4.4.1 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Contract with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

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§ 15.4.4.2 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under the Contract.

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Additions and Deletions Report for
AIA® Document A201® – 2017

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PAGE 1

New Central Middle School Project
9 Indian Rock Lane
Greenwich, CT 06830

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Board of Education of the Town of Greenwich,
acting through the Central Middle School Building Committee
Havemeyer Building
290 Greenwich Avenue
Greenwich, CT 06830

...

The S/L/A/M Collaborative, Inc.
80 Glastonbury Blvd.
Glastonbury, CT 06033

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The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants, or (4) between any persons or entities other than the Owner and the Contractor. ~~The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.~~

...

The term "Work" means the construction and services required ~~by the Contract Documents, whether~~ by, or reasonably inferable from, , the Contract Documents, whether performed on or off the site of the Project and whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by ~~the Contractor to fulfill the Contractor's obligations.~~ the Contractor, its Subcontractors, Sub-Subcontractors, material suppliers or any other entity for whom the Contractor is responsible, to fulfill the Contractor's obligations under or pursuant to the Contract Documents. The Work may constitute the whole or a part of the Project.

...

§1.1.9 CONTRACTOR

The term "Contractor" as used in these General Conditions shall mean the "Construction Manager" as defined in the Agreement.

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§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from ~~them as being necessary to produce the indicated results.~~them. If the Contractor discovers any inconsistency within or between parts of the Contract Documents or between the Contract Documents and any of the Applicable Laws (as defined in Section 2.2.1.1 of the Agreement), the Contractor shall give notice to the Owner and the Architect of such inconsistency and shall, unless otherwise ordered in writing by the Architect or the Owner, provide work or materials of the better quality, greater quantity, or that otherwise complies with applicable standards, codes or ordinances, except as otherwise provided by the GMP Clarifications and Assumptions.

§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such ~~case~~case, the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.
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§ 1.2.4 Where no explicit quality or standards for materials or workmanship are established for any portion of the Work, the Contractor shall perform such Work in a good and workman like manner and in a manner of good quality for the intended use and consistent with the quality of the surrounding Work and of the construction of the Project generally.

§ 1.2.5 All manufactured articles, materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the manufacturer's written or printed directions and instructions unless otherwise indicated in the Contract Documents. Directions, specifications and recommendations by manufacturers for installation, handling, storing, adjustment, and operation of their materials or equipment shall be complied with, but the Contractor shall nonetheless have the responsibility for determining whether such directions, specifications, and recommendations may safely and suitably be employed in the Work, and for notifying the Architect in advance in writing of any deviation or modification necessary for installation safety or proper operation of the item.

§ 1.2.6 In the event of any conflict, inconsistency or ambiguity among the Contract Documents, such Documents shall have the following priority: (1) Construction Manager's Assumptions and Clarifications; (2) Modifications as defined by Section 1.1.1 of AIA Document A201-2017, as modified herein; (3) this Agreement; (4) modified AIA Document A201-2017, as modified herein; (5) Drawings and (6) Specifications.

...

In the interest of ~~brevity~~brevity, the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

...

§ 1.5.1 The Architect and the Architect's consultants ~~shall~~shall, except to the extent otherwise provided in the agreement between the Owner and the Architect, be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the ~~Architect's or Architect's consultants' reserved rights.~~reserved rights of the owner(s) of such Instruments of Service.
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The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties ~~will~~ may use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

...

§1.8.1 The Owner will direct the Architect to promptly deliver to the Contractor a full operable copy of the Architect's building and building system model(s) in order to facilitate the placement of the features, systems and components that will be supplied by the Contractor's personnel, suppliers and subcontractors.

§ 1.9 CONTRACTOR'S STANDARD OF CARE

The Contractor shall exercise the Contractor's Standard of Care in performing all aspects of the Work and its obligations under the Contract Documents. All references in the Contract Documents to the knowledge, inference, reliance, awareness, determination, belief, observation, recognition or discovery of the Contractor or reference to any similar term shall include the knowledge, inference, reliance, awareness, determination, belief, observation, recognition the Contractor would have obtained or achieved upon the exercise of the Contractor's Standard of Care.

...

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. ~~The term "Owner" means the Owner or the Owner's authorized representative.~~

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§ 2.2.1 ~~Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.~~ Intentionally Omitted.

§ 2.2.2 ~~Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.~~ Intentionally Omitted.

§ 2.2.3 ~~After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.~~ Intentionally Omitted.

§ 2.2.4 ~~Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such~~

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~~information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.~~Intentionally Omitted.

...

§ 2.3.1 Except for permits and related fees and filings that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall ~~secure~~ secure, file and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

...

§ 2.3.3 If the employment of the Architect terminates, the Owner ~~shall employ a successor to whom the Contractor has no reasonable objection~~ may employ a successor and whose status under the Contract Documents shall be that of the Architect.

§ 2.3.4 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the ~~site. The~~ site to the extent required by the Contract Documents. Unless otherwise instructed by the Owner, the Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.3.5 ~~The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work, with reasonable promptness after receiving the Contractor's written request for such information or services.~~Intentionally Omitted.

...

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the ~~Contractor~~ Contractor, the Architect, or any other person or entity, except to the extent required by Section 6.1.3.

...

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. ~~Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect~~ The Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference ~~to the Owner.~~ to the Owner at or prior to the date of Final Completion of the Work. The right of the Owner to so carry out such Work pursuant to this Section 2.5 shall not give rise to any duties on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

~~ARTICLE 3 CONTRACTOR~~

§ 2.6 ADDITIONAL RIGHTS

§ 2.6.1 The rights stated in this Article 2 shall be in addition to and not in limitation of any other rights of the Owner provided in the Contract Documents, or as may be available to the Owner at law or in equity.

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§ 2.6.2 Any data provided by the Owner to the Contractor concerning the physical characteristics or measurements of the components that comprise the Project site; access to the Project site or staging and storing at the Project site; present obstructions and conditions of structures on or near the Project site; locations and depths of sewers, conduits, pipes, and gas lines on or near the Project site; positions of sidewalks, curbs and pavements on or near the Project site and other data concerning the conditions of the Project site and its surroundings, have been obtained from sources the Owner believes to be reliable. .

ARTICLE 3 CONTRACTOR

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor and Subcontractors of every tier shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall ~~perform~~ be responsible for performance of the Work in accordance with the Contract Documents. The Contractor shall be responsible to the Owner for the performance, and the acts or omissions, of the Subcontractors, Sub-subcontractors and material or equipment suppliers. Any reference in the Contract Documents to the Contractor's performance, act, or omission, or reference to a similar term, shall include the performance, act, or omission of the Subcontractors, Sub-subcontractors and material or equipment suppliers.

§ 3.1.4 The Contractor shall comply with all Applicable Laws regarding its performance of the Work including, without limitation, those relating to equal opportunity, labor, wages and employment.

§ 3.1.5 The Contractor shall comply, and shall cause Subcontractors of every tier to comply, with all accounting procedures and record retention policies reasonably requested by the Owner.

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents. The provisions of this Section 3.2.1 shall not be construed to limit the investigative and review responsibilities of the Contractor under any other provisions of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Owner and the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents. The submission of its GMP proposal shall constitute a representation by the Contractor that the Contractor has carefully reviewed the Contract Documents, and visually inspected the Project Site. Construction Manager represents that the GMP includes the sufficient cost and the Project Schedule includes sufficient time for the Construction Manager to complete the Work in accordance with the Contract Documents, except for the changes to the Work as required by Change Orders issued in accordance with the Agreement. The Contractor is not required to ascertain that the Contract Documents are in accordance with all Applicable Laws, but the Contractor shall promptly report to the Owner and the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.3 ~~The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.~~ Execution by the Contractor of the Guaranteed Maximum Price Amendment, shall constitute a certification by the Contractor that it has conducted general and reasonably observable inspection of the Site conditions. Failure by the Contractor to visually inspect the Project site conditions, including

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conditions relating to transportation, handling, storage of materials, availability of labor, water, other known projects in the region, and the character and availability of equipment and facilities needed preliminary to and during the prosecution the Work, shall not relieve the Contractor of its responsibilities under the Contract Documents and shall not constitute a basis for extension of time or any increase in the Contract Sum. Owner assumes no responsibility for any representations concerning conditions made by any of its officers, or employees or representatives, prior to the execution of the Contract, unless such representations are expressly stated in the Contract Documents. The Contractor shall not perform any construction activity it knows constitutes a recognized error, inconsistency, or omission. If the Contractor performs any construction activity knowing it involves a recognized error, inconsistency, or omission in the Contract Documents without reporting the error, inconsistency or omission to the Architect, the Contractor shall assume appropriate responsibility for such performance and shall bear an appropriate amount of the costs of correction.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to ~~Sections 3.2.2 or 3.2.3~~ this Article 3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to ~~applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.~~Applicable Law.

§ 3.2.5 If the Contractor fails to fulfill its obligations to report to the Architect or Owner under this Article 3, such failure shall preclude the Contractor from any subsequent Claim arising from or relating to the factors giving rise to the Contractor's obligation to make such report.

§ 3.2.6 The Contractor shall promptly inform the Owner and the Architect if the Contractor believes that a requirement of the Contract Documents is likely to have an adverse effect on the Project.

§ 3.2.7 Contractor is responsible for the safety of the Project Site, including without limitation providing a safety plan in accordance with Applicable Law, during the performance of the Work. Except as set forth in Section 10.3, the Contractor shall be solely responsible for providing safe working conditions in accordance with its safety plan for the performance of the Work that complies with Applicable Law.
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§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's ~~best skill and attention.~~ skill and attention in accordance with the Standard of Care. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures. If the Contractor is instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor and said means and methods impact the project, the parties shall resolve any such impact in good faith.
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§ 3.3.4 The Contractor shall schedule and perform the Work so as not to unreasonably interfere with any other known related or unrelated work being performed by the Owner in or about the Project premises nor shall the Contractor unreasonably interfere with the Owner's school activities or operations on such premises, as identified within the Contract Documents. The Contractor shall coordinate its and its subcontractors' prosecution of the Work with the Owner and Owner's Designated Representative to minimize any such interference.

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§ 3.3.5 The Contractor shall protect and prevent damage to all unfinished phases of the Work.

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§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them. All labor shall be performed by workmen skilled in their respective trades, and workmanship shall be of good quality so that first class work in accordance with the standards of construction set forth in the Contract Documents and the Contractor's Standard of Care will result.

§ 3.4.4 Substitutions

§ 3.4.4.1 When two or more products are specified for an item of Work, any one thereof is acceptable and the choice is left to the Contractor, with prior written notice to the Architect and the Owner. When only one product is specified and the term "or equal" is used in connection with the product, the Contractor may, if it so desires, offer a substitute product, and by so doing, Contractor shall be deemed to represent that the substitute product will completely accomplish the purpose of the Contract Documents. Requests for substitutions of products, materials or processes other than those specified shall be accompanied by evidence showing whether or not the proposed substitution:

.1 is equal in quality and serviceability to the specified item;
.2 will not entail changes in detail and construction of related Work;
.3 will be acceptable in consideration of the required design and artistic effect; and
.4 will not provide a cost disadvantage to the Owner.

The Contractor shall furnish with its request such Drawings, Specifications, samples, performance data and other information as may be required of it to assist the Architect and the Owner in determining whether the proposed substitution is acceptable. The burden of proof of the facts above stated shall be upon the Contractor, and no substitution shall be authorized except upon the prior written approval of Owner and the Architect. Nothing in this Section 3.4.4 shall limit the provisions of Sections 3.4.4.2 or 3.4.4.3.

§ 3.4.4.2 By making requests for substitutions based on Sections 3.4.2 and 3.4.4, the Contractor:

.1 represents that the Contractor has personally investigated the proposed substitute product and determines that it is equal or superior in all respects to that specified;
.2 represents that the Contractor will provide the same warranty for the substitution that the Contractor would for that specified;
.3 certifies that the cost data presented is complete and includes all related costs under this Contract except the Architect's redesign costs, and waives all claims for additional costs related to substitution which subsequently become apparent; and
.4 shall coordinate the installation of the accepted substitution, making such changes as may be required for the Work to be complete in all respects.

§ 3.4.4.3 Approval by the Owner or Architect of any such substitution shall not relieve the Contractor of responsibility for any additional costs incurred by other trades for changes made necessary to accommodate the substituted item.

§ 3.5 ~~Warranty~~WARRANTIES

§ 3.5.1 The Contractor warrants to the Owner ~~and Architect~~ that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

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§ 3.5.3 The Contractor shall procure and assign to the Owner at the time of Substantial Completion of the Work any and all Subcontractor, manufacturer or supplier warranties relating to any materials and labor used in the Work. Such warranties shall supplement the warranties provided by the Contractor in Section 3.5.1.

§ 3.5.4 Substitutions not properly approved and authorized and work, materials or equipment which fail to perform under the proper use and normal wear for intended purposes shall be considered defective. If required by the Architect or the Owner, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment to be incorporated in the Work.

§ 3.5.5 The warranties under this Section 3.5 shall be in addition to, and not a substitute for, any other rights of the Owner under the Contract Documents or existing in law or equity.

§ 3.5.6 The warranties set forth in this Section 3.5 shall survive final payment and termination of this Contract.

The ~~Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.~~Owner is a tax-exempt entity. The Contractor shall be familiar with the current regulations of the Connecticut Department of Revenue Services and the sales or use tax on materials or supplies exempted by such regulations shall not be included as part of the bid or the Contract Sum. A sales tax certificate is available upon written request.

...

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, certifications and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and ~~legally required at the time bids are received or negotiations concluded.~~required by Applicable Laws. The Contractor shall provide the Owner and Architect with reproductions of all permits, licenses, permissions, certifications and receipts for payments and, upon final completion, shall deliver all originals of such documents to the Owner with copies to the Architect.

...

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to ~~applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities.~~ Applicable Law, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

...

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than ~~14~~ seven (7) days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands or other conditions that would warrant a suspicion that such matters are being encountered during the performance of the Work although they are not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization

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required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.
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.2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts ~~shall~~ shall, unless otherwise stated in the Contract Documents, be included in the Contract Sum but not in the allowances; and

...

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's prior written consent, which shall not unreasonably be withheld or delayed. The list of all supervisory personnel, including the project manager and superintendent that the Contractor intends to use on the Project and an organizational chart reflecting the chain of command among such personnel, shall be submitted to the Owner for approval prior to the commencement of the Work. The Contractor shall not engage supervisory personnel other than as approved by Owner in writing and shall not change such personnel without the prior written approval of the Owner.

...

§ 3.10.1 The ~~Contractor, promptly after being awarded the Contract, shall~~ Contractor shall, as required pursuant to the Agreement, prepare and submit for the Owner's and Architect's ~~information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals~~ approval a construction schedule for the Work (as approved by the Owner and the Architect, the "Construction Schedule"). The Construction Schedule (i) shall comply with all of the applicable requirements of, the Contract Documents; (ii) shall be revised (which revisions shall be subject to the approval of the Owner and the Architect) at appropriate intervals as determined by the Contractor and as required by the conditions of the Work and ~~Project,~~ the Project; (iii) shall be related to the entire Project to the extent required by the Contract Documents, and (iv) shall provide for expeditious and practicable execution of the Work. The initial Construction Schedule is based on the scheduling requirements of the RFP.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal ~~schedule,~~ schedule or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted ~~to the Owner and Architect.~~ to, and approved by, the Owner and Architect.

§ 3.10.4 The Construction Schedule shall be in such detail and include such content as required by the Owner. If the Owner requires a precedence-style critical path method (CPM), the Construction Schedule shall: (i) provide a graphic representation of all activities and events that will occur during performance of the Work; (ii) identify each phase of construction and occupancy (if applicable); and (iii) set forth dates that are critical in ensuring the timely and orderly completion of the Work (hereinafter referred to as "Milestone Dates"). Upon review and acceptance by the Owner of the Milestone Dates, the Construction Schedule shall be attached to the Agreement as Schedule 2. If not accepted, the Construction Schedule shall be promptly revised by the Contractor in accordance with the recommendations of the Owner and the Architect and resubmitted for acceptance. The Contractor shall monitor the progress of the Work for conformance with the requirements of the Construction Schedule and shall promptly advise the Owner of any delays or potential delays. The accepted Construction Schedule shall be updated to reflect actual conditions ("Progress

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Reports") as set forth in Section 3.10.1 above or as otherwise requested by the Owner and the final version shall be included as part of the GMP. In the event any Progress Report indicates any delays to the GMP Project Schedule, the Contractor shall propose an affirmative plan to correct the delay, including overtime and/or additional labor, if necessary. In no event shall any Progress Report constitute an adjustment in the Contract Time, any Milestone Date or the Contract Sum unless any such adjustment is agreed to by the Owner and authorized pursuant to Change Order.

§ 3.10.5 In the event the Owner determines that the performance of the Work as of a Milestone Date has not progressed or reached the level of completion required by the GMP Project Schedule because of delays caused by the Contractor, its Subcontractors or those for whom they are responsible, the Owner shall have the right, but not the obligation, to order the Contractor to take corrective measures necessary to expedite the progress of construction, including, without limitation, (1) working additional shifts or overtime, (2) supplying additional manpower, equipment, and facilities, and (3) other similar measures (hereinafter referred to collectively as "Extraordinary Measures"). Such Extraordinary Measures shall continue until the progress of the Work complies with the stage of completion required by the Contract Documents. The Owner's right to require Extraordinary Measures is solely for the purposes of ensuring the Contractor's compliance with the GMP Project Schedule as adjusted for time extensions granted pursuant to Section 8.3. Except as provided in Section 8.3, the Contractor shall not be entitled to an adjustment in the Contract Sum in connection with Extraordinary Measures required by the Owner pursuant to this Section 3.10.5. The Owner may exercise the rights furnished the Owner under or pursuant to this Section 3.10.5 as frequently as the Owner deems necessary to ensure that that Contractor's performance of the Work will comply with any Milestone Date or the Substantial Completion Date, as the same may be extended by Change Order.

§ 3.10.6 The Owner shall have the right to direct a postponement or rescheduling of any date or time for the performance of any part of the Work that may interfere with the Owner's operations. Any postponement, rescheduling or performance of the Work under this Section 3.10.6 may be grounds for an extension of the Contract Time, if permitted under Section 8.3 and an equitable adjustment in the Contract Sum if: (1) the performance of the Work was properly scheduled by the Contractor in compliance with the requirements of the Contract Documents and (2) such rescheduling or postponement is requested by or required for the convenience of the Owner. Without limiting the foregoing, the Contractor will not be entitled to an extension of the Contract Time or an adjustment of the Contract Sum to the extent the interfering Work so interferes as a result of the negligent act or omission of the Contractor or its subcontractors of any tier or the failure of any of the same to perform the Work in a manner consistent with the Contract Documents, including Section 3.10.3 hereof, except for Concurrent Delays, for which the Construction Manager's sole remedy shall be a non-compensable extension of time. The term "Concurrent Delays" refers to delays set forth in Section 8.3 that are concurrent with delays caused by Contractor, its subcontractors or those for whom it is responsible.

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed. The Contractor shall coordinate and cooperate with the Architect in the Architect's preparation of the "as constructed" electronics file for the Project.

...

§ 3.12.5 The Contractor shall review for compliance with the Contract ~~Documents, approve,~~ Documents and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors. The Contractor shall be responsible for the Owner's costs associated with the Architect's time for submittal review if any submittal must be reviewed by the Architect more than two (2) times due to the fault of the Contractor, or as otherwise approved by the Owner.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed ~~and approved~~ them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and

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coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents. The Contractor shall indicate its review of the submittals as evidence of such review and coordination. Submittals made to the Architect without such indication of review may be returned to the Contractor for resubmission.
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§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically ~~required by the Contract Documents for a portion of the Work.~~ agreed by the parties as part of the GMP or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction ~~means, methods, techniques, sequences, and procedures.~~ means and methods. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design ~~professional.~~ professional that has been approved by the Owner and that carries such professional liability insurance as required by the Owner, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

...

~~The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.~~ § 3.13.1 The Contractor shall confine operations at the site to areas permitted by Applicable Laws and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.13.2 The Contract Documents shall provide current location of utilities and utility lines. Contractor shall protect and save from damage or disruption those known utilities and utility services lines of all kinds, either above or below grade found in the areas affected by the Work. The Contractor shall be responsible for all damage caused to such known utilities by the operation of equipment or delivery of materials or as the direct or indirect result of any of the Work and shall repair all such damage at its expense and as part of the Work included in the Contract Documents.

...

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably ~~withhold.~~ withhold from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

...

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about

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the ~~Project.~~Project and shall clean and/or remove all stains, spots, marks, blemishes, foreign matter and dirt from surfaces of the Work and from other surfaces not a part of the Work but where such condition resulted from the Contractor's operations.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the Owner shall be entitled to reimbursement from the ~~Contractor.~~Contractor for the full cost of such clean up.
PAGE 22

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent ~~rights~~ rights, or failure to pay such royalty and license fees, and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for ~~the loss unless the information is promptly furnished to the Architect,~~such losses to the Owner unless the Contractor had furnished such information to the Owner and the Architect promptly upon obtaining such knowledge.

...

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall ~~indemnify and hold harmless the Owner, Architect, Architect's consultants, and~~ indemnify, defend and hold harmless the Owner, the Owner's Designated Representative, and the directors, officers, owners, agents and employees of any of them as well as the Building Committee appointed by the Owner for the Project, from and against any and all claims, liens, judgments, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than ~~the Work itself),~~ the Work itself) except to the extent such injury to or destruction of the Work itself is covered by builder's risk insurance, but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be ~~liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder.~~ liable; provided however that such indemnity obligations shall not include liability for damage arising out of bodily injury to person or damage to property caused by or resulting from the negligence of the indemnitee, such indemnitee's agents or employees. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of ~~damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers'~~ compensation acts, disability benefit acts, or other employee benefit acts.

§ 3.19 MEETINGS

§ 3.19.1 A qualified representative of the Contractor shall attend periodic progress meetings held at such time and as such place as the Architect or the Owner shall designate.

§ 3.19.2 The Contractor shall schedule and conduct progress meetings at the site on a bi-weekly basis (or interval appropriate for the level of jobsite activity). Attendance is required of each Subcontractor, supplier or other entity whose portion of the Work is currently the subject of concern or discussion or planning of future construction activities. Owner and Architect shall be provided with forty-eight (48) hour prior notice of each such progress meetings and be permitted to attend and participate in the meetings.
PAGE 23

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative ~~during construction until the date the~~ (i) during construction; (ii) until the date that final payment under the Contract is due and payable; and (iii) with the concurrence of the Owner, during the one-year

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period described in Section 12.2. The Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become ~~generally~~ familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that ~~the Work, when fully completed,~~ such portion of the Work is, and when the Work is fully completed the entirety of the Work, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible ~~for~~ for, acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

...

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by ~~and~~ the Contractor with the Architect's consultants shall be through the Architect. Communications by ~~and~~ the Architect with Subcontractors and suppliers shall be through the Contractor. Communications by ~~and~~ the Contractor with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

...

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.1, 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or ~~procedures.~~ procedures that are not specified by the Architect or in the Contract Documents. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change ~~Directives.~~ Directives and may order minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

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§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract Documents and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.
PAGE 24

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to the identity or fee proposal of any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.1.1 To facilitate and expedite the investigations of such proposed persons or entities, the Contractor shall, upon the Owner's request, provide to the Owner and Architect a list of the names and addresses of all prospective subcontractors and such other information as may be reasonably requested by the Owner.
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§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner or Architect makes reasonable objection to such substitution. If the Contractor wishes to substitute a different person or entity for a person or entity previously selected and approved as a Subcontractor pursuant to this Section 5.2, the procedure set forth in Section 5.2.1 shall be followed.

...

~~By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that the Contractor, by these Contract Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.~~§ 5.3.1 Any part of the Work performed by a Subcontractor shall be pursuant to a written Subcontract between the Contractor and Subcontractor, which form of Subcontract shall be reasonably satisfactory to the Owner in all respects. Copies of all Subcontractor bids or proposals shall, upon request of Owner, be submitted to the Owner and Architect.

§ 5.3.2 By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by these Documents, assumes toward the Owner. Each subcontract agreement shall preserve and protect the rights of the Owner under the Contract Documents with respect to the Work to be performed by the Subcontractor so that the subcontracting thereof will not prejudice such rights. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, redacted copies of the Contract Documents to which the Subcontractor will be bound. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

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§ 5.3.3 The Contractor shall be fully responsible for coordinating and expediting the work of all Subcontractors and shall employ the necessary and qualified personnel to produce the required quality of labor and materials and to prevent delays in the progress of the Project. The Contractor shall afford each trade with all reasonable opportunities for the installation of its work and for the storage and handling of its materials

...

.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant ~~to~~ to, and in accordance with, Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and

...

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract. The Contractor agrees to execute any and all other documents required to effect this assignment, which form of assignment shall include the indemnity of the Contractor against all claims of Subcontractors that arose prior to the date of assignment, regardless of whether such claims are regarding matters that arose prior to the date of assignment.
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§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other ~~entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.~~entity

§ 5.5 Payment of Subcontractors

§ 5.5.1 After payment to Contractor by the Owner, the Contractor shall pay any amounts due any Subcontractor, whether for labor performed or materials furnished, when such labor or material has been included in a requisition submitted by such Contractor and paid by Owner. Such payments shall be made within thirty (30) days after the Contractor receives payment from the Owner. The Contractor shall promptly give notice to the Owner of any claim or demand by a Subcontractor claiming that any amount is due to such Subcontractor or claiming any default by the Contractor in any of the Contractor's obligations to such Subcontractor.

§ 5.5.2 The Contractor shall include in each of the subcontracts a provision requiring each Subcontractor to pay any amounts due to any Sub-Subcontractors, whether for labor performed or materials furnished, within thirty (30) days after such Subcontractor receives a payment from the Contractor which encompasses labor or materials furnished by such Sub-subcontractor and a provision requiring each Subcontractor to promptly give notice to the Contractor of any claim or demand by a Sub-subcontractor claiming that any amount is due to such Sub-Subcontractor or claiming any default by such Subcontractor in any of its obligations to such Sub-subcontractor which notice the Contractor shall promptly relay to the Owner.

...

§ 6.1.4 ~~Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.~~Intentionally Omitted.

...

§ 6.2.1 The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their ~~activities.~~activities and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.
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§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a Separate Contractor because of the Contractor's delays, disruptions to the work of such separate contractor, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a Separate Contractor's delays, disruptions to the Work, improperly timed activities, damage to the Work or defective construction.

...

§ 6.2.6 Upon the Owner's request, the Contractor shall defend any proceedings brought against the Owner by any separate contractor on account of any damage alleged to have been caused by the Contractor which arises from the Contractor's failure to comply with the terms and conditions of this Section 6.2.

...

§ 7.2.2 A Change Order executed by the Owner and the Contractor shall constitute a final settlement of all matters relating to the subject matter of the Change Order including, without limitation, compensation to be paid in connection with any change in the Work required by the Change Order (provided that the Work that is the subject of such change is performed in a manner consistent with the provisions of the Contract Documents and the applicable Change Order), including but not limited to all direct and indirect costs, profit, overhead, extended overhead, loss of productivity and general conditions associated with such change, and any and all adjustments to the Contract Sum and to the Contract Time. In the event a Change Order affects an increase in the Contract Sum, Contractor shall include the work covered by such Change Order in Applications for Payment for such work as if the work were originally part of the Work as set forth in the Contract Documents.

§ 7.2.3 Notwithstanding anything to the contrary set forth in these General Conditions, if the Agreement sets forth the methodology for calculating adjustments in the Contract Sum associated with a change in the Work, and if, under the terms of the Contract Documents, an adjustment in the Contract Sum would be required, then the adjustment will be based on such methodology unless otherwise mutually agreed by the parties. This paragraph shall be applicable in the case of a change in the Work effected by a Change Order as well as a Construction Change Directive.

§ 7.2.4 Unless otherwise instructed by the Owner, Change Orders shall be prepared on the form AIA G-701.

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§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following ~~methods:~~methods as selected by the Architect and approved by the Owner:

...

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for General Conditions Costs as provided by the A133, overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the Cost of the Work as defined by the Agreement, including without limitation the following:

...

.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or ~~others;~~others, provided, if rented from the Contractor, such rental and the rental rates have been approved by the Owner;

...

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.5 Costs of supervision and field office personnel directly attributable to the change.

The costs described in Section 7.3.4.1 through and including 7.3.4.5 shall not include any of the following:

.1 Salaries and other compensation of the Contractor's personnel stationed at the Contractor's principal office or offices other than the site office, except as otherwise allowed by the A133;
.2 Expenses of the Contractor's principal office and offices other than the site office;
.3 Overhead and general expenses, except as may be expressly included in this Section or the A133;
.4 The Contractor's capital expenses, including interest on the Contractor's capital employed for the Work;
.5 Costs due to the negligence or failure of the Contractor, Subcontractors, material or equipment suppliers or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable to fulfill a specific responsibility of the Contract Documents; or
.6 Any cost not described in this Section or the A133.

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§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the ~~amount~~ actual costs incurred by the Contractor as a result of such Construction Change Directive; provided, however, to the extent such Construction Change Directive is made necessary by the act or omission of the Contractor or of anyone for whom the Contractor is responsible, the Architect shall certify for payment the amount, if any, that the Architect determines, in the Architect's professional judgment, to be ~~reasonably justified.~~ necessary for the Contractor to continue the Work. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

...

§ 8.1.3 The date of Substantial Completion is the date ~~certified by the Architect~~ Substantial Completion is achieved in accordance with Section 9.8.

...

§ 8.2.1 Time limits stated in the Contract Documents applicable to the Substantial Completion of the new building and the Milestone dates are of the essence of the Contract. By executing the ~~Agreement.~~ GMP Amendment, the Contractor confirms that the ~~Contract Time~~ GMP Project Schedule is a reasonable period for performing the Work.

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§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the ~~Contract Time.~~GMP Project Schedule, as that may be amended in accordance with the Agreement.

§ 8.2.4 Accelerated GMP Project Schedule

§ 8.2.4.1 Although the RFP Construction Schedule is based on a twenty-seven month duration based on following overlapping phases: (a) Construction, 21 months; (b) Owner move-in and fixtures, furniture and equipment, 5 months; and Demolition and Site Work, 2 months, the Contractor acknowledges and agrees that it may be able to the reduce the duration of the Work: (i) by sequencing the demolition, sitework and closeout phase of the Work immediately after the completion of the Building Construction phase of the Work; and (ii) based on certain assumptions and clarifications set forth in **Attachment 2 to the Agreement** ("Accelerated Schedule").

§ 8.2.4.2 The Contractor further acknowledges and agrees that the Accelerated Schedule, which would result in a reduction of its General Conditions Cost, was a material inducement to the Owner's award of the Agreement.

§ 8.2.4.3 In accordance with said inducement, Contractor agrees that its GMP proposal shall, in addition to a GMP Project Schedule based on RFP Construction Schedule, include an Accelerated GMP Project Schedule proposal which shall be prepared in accordance with **Attachment 2** and designed to achieve the same magnitude of General Conditions Cost savings in its original Accelerated Schedule proposal.

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§ 8.2.4.4 The Owner acknowledges and agrees that the Accelerated Schedule will require the Owner to comply with the noted assumptions set forth in **Attachment 2**, including without limitation the delivery date of the issued-for-construction documents. To the extent the assumptions or durations noted in **Attachment 2** require revision at time of the GMP proposal, the parties shall negotiate an alternative accelerated schedule proposal accordingly.

...

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, war, terrorism, incidence of disease or other illness that reaches outbreak, epidemic, endemic and/or pandemic proportions or other causes affecting the area in which the Project is located and/or the Contractor's labor and/or supply chain, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's reasonable control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable ~~time as the Architect may determine.~~time, and the GMP may be adjusted for the additional Cost of Work caused by any such delay, as the Architect may determine, provided that (i) the Contractor notifies the Owner and Architect in writing of the alleged cause of such delay within ten (10) days after the Contractor became aware of the delay-precipitating event, and (ii) the Contractor demonstrates by a detailed and substantiated analysis the effects of the delay, if any, upon the construction schedule and Contract Time and GMP.
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Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, ~~unless objected to by~~ upon the approval of the Owner and the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

...

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with Contract Documents and the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the ~~Owner or Architect~~ Owner, the Architect, or any person or entity providing funding for the Project, may require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents. All Applications for Payment shall be in the form and contain the information and supporting documentation as required in this Section 9.3 and such additional information and documentation and as may be reasonably requested by the Owner.

...

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or ~~supplier,~~ supplier unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract ~~Documents.~~ Documents or prohibited by any person or entity providing funding for the Project, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the ~~Owner,~~ Owner and not prohibited by any person or entity providing funding for the Project, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the

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Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

...

§ 9.3.3.1 The Contractor further expressly undertakes to defend the Owner, at the Contractor's sole cost and expense, against any actions, lawsuits, or proceedings brought against Owner as a result of liens filed against the Work, the Project site and any improvements thereon (referred to collectively as "Liens" in this Section 9.3.3), by the Contractor, any Subcontractor, Sub-subcontractor or anyone claiming by, through or under them. The Contractor hereby agrees to indemnify and hold Owner harmless against any such Liens or claims of Liens and agrees to pay any judgment or Lien resulting from any such actions, lawsuits or proceedings. The Contractor's obligations under this Section 9.3.3 are conditioned upon Owner having fulfilled its payment obligations to the Contractor with respect to the Work that is the subject of the Lien or claim and for which indemnification is sought.

§ 9.3.3.2 Commencing with the second Application for Payment, and continuing with each Application for Payment submitted thereafter, the Contractor shall furnish to the Owner a properly executed release and waiver of mechanics liens from the Contractor and each Subcontractor and material supplier whose Work was included on the previous Application for Payment for which payment by Owner was made to the Contractor.

§ 9.3.3 Applications for Payment, and invoices in support of the same, shall clearly distinguish between amounts charged for labor and amounts charged for materials.

§ 9.3.4 Unless otherwise required by the Owner, Applications for Payment shall be on AIA documents G702 and G703.

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§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, ~~and~~ and, as a representation made by the Architect solely to the Owner, that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.4.3 Notwithstanding anything to the contrary, issuance of a Certificate for Payment by the Architect is a recommendation only and payment to the Contractor of amounts certified in a Certificate for Payment is subject to the Owner's approval.

§ 9.4.4 Certificates for Payment shall be on AIA documents G702 and G703.

...

.2 ~~third-party~~ uninsured third-party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;

...

.5 uninsured property damage to the Owner or a Separate ~~Contractor;~~Contractor (excluding the Work);

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§ 9.5.3 When the reasons for withholding ~~certification are removed, certification will be made for amounts previously~~ a Certificate for Payment are removed, the Certificate for Payment will be issued as regards amounts previously withheld. The Owner shall not be deemed to be in default by reason of withholding payment while any of the above grounds remained uncured, nor shall any interest accrue or be payable with respect to any payments so withheld.

...

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract ~~Documents,~~ Documents and shall so notify the Architect.
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§ 9.6.9 Any provision in the Contract Documents to the contrary notwithstanding, the Owner shall not be obligated to make payment to the Contractor hereunder to the extent that the Contractor has not performed the Work or supplied the materials, for which payment is requested, in accordance with the Contract Documents.

If the Architect does not issue a Certificate for ~~Payment,~~ Payment as required by the Contract Documents, through no fault of the Contractor, within ~~seven~~ ten (10) days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon ~~seven~~ ten (10) additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended ~~appropriately~~ appropriately, and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

...

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use. Substantial Completion shall not occur until: (i) the Owner's receipt of certification by the Architect that the Work is Substantially Complete in the form of a Certificate of Substantial Completion; and (ii) the Owner's receipt of a final and unconditional or a Temporary Certificate of Occupancy from the governmental authorities having jurisdiction that the Work has been completed in accordance with Applicable Laws. Notwithstanding the foregoing, if, but for the failure of the building department or governmental authorities having jurisdiction to timely issue the temporary certificate of occupancy for the Project ("Administrative Delay"), the Contractor would have been deemed to have achieved Substantial Completion of the Work within the Contract Time under the terms and conditions of the Contract Documents, the Contractor shall be entitled to an extension of the Contract Time equal to the duration of such Administrative Delay.
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§ 9.10.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled. All warranties and guarantees required under or pursuant to the Contract Documents not previously delivered shall be assembled and delivered by the Contractor to the Owner and Architect as part of the final Application for Payment. The final Certificate for Payment will not be issued by the Architect until all warranties and guarantees and all other close-out deliverables (including those set forth in Section 9.10.2 below) have been received and accepted by the Owner.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract

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Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of mechanic's liens, claims, security interests, or other encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor ~~may~~ shall furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If ~~a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the~~ no such bond is provided, the Owner may, without limiting its remedies under law, in equity, or under the Contract Documents, withhold the portion of final payment claimed to be due by the relevant Subcontractor or supplier until such lien is no longer a viable encumbrance. The Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

...

§ 9.10.4 ~~The making of final payment shall constitute a waiver of Claims by the Owner except those arising from~~
~~.1 liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;~~
~~.2 failure of the Work to comply with the requirements of the Contract Documents;~~
~~.3 terms of special warranties required by the Contract Documents; or~~
~~.4 audits performed by the Owner, if permitted by the Contract Documents, after final payment.~~ Intentionally Omitted.

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§ 10.2.2 The Contractor shall comply with, and give notices required ~~by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities,~~ by, Applicable Law bearing on safety of persons or property or their protection from damage, injury, or loss.

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards. The Contractor shall also be responsible for all measures necessary to protect any property adjacent to the Project and improvements thereon. Any damage to such property or improvements shall be promptly repaired by the Contractor at its cost and expense.

...

§ 10.2.4.1 When there are indications that the use of explosives or other hazardous materials, equipment or unusual methods is necessary for execution of the Work, the Contractor shall give the Owner and Architect reasonable advance notice of the conditions.

§ 10.2.4.2 The Contractor shall be solely responsible for the handling, storage and use of explosive or other hazardous materials when their use is permitted.

§ 10.2.4.3 The Contractor shall not bring explosives onto the Project site or use such in the Work without the prior written permission of the Architect and the Owner. For such use, the Contractor shall obtain necessary permits with copies to the Architect and the Owner. The Contractor shall furnish the Owner and Architect with certificates indicating proper and adequate insurance.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to

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the fault or negligence of the Contractor. The foregoing obligations of the Contractor are separate from, in addition to, and are not to be construed as included as a part of the Contractor's obligations under Section 3.18.
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§ 10.2.9 In the event the Contractor identifies activities or conditions during performance of the Work or at the Project, which, in the Contractor's good faith opinion, pose an unreasonable risk of bodily injury or property damage, whether immediate or in the future, the Contractor shall have the right to immediately take steps to protect its personnel and Subcontractors and stop Work and remove its personnel from the affected area.

§ 10.2.10 The Contractor shall at all times provide protection against weather (rain, wind, storms or heat) so as to maintain all Work, materials, apparatus and fixtures free from damage. At the end of the day's work, all new Work likely to be damaged shall be reasonably protected against such weather.

§ 10.2.11 The Contractor shall provide adequate fire protection for all operations associated with the Work, and such protection must meet all applicable federal (including OSHA), State and municipal regulations.

§ 10.2.12 The Contractor shall remove and replace with new work, at the Contractor's own expense, any Work damaged by failure to provide protection pursuant to Sections 10.2.10 and 10.2.11, provided that this obligation shall not prohibit the Contractor's right to submit a claim with the Project's Builder's Risk or property insurance.

§ 10.2.13 The Contractor shall be responsible, to the extent not covered by insurance, for damage, loss or liability due to theft or vandalism to the Work and stored materials when work is not in progress at night, on weekends or holidays.

§ 10.2.14 The Contractor shall protect and prevent damage to all unfinished phases of the Work.

§ 10.2.15 SECURING THE SITE
The Contractor is responsible for securing, and preventing access by unauthorized individuals to, the Project site from such date as the Contractor, it subcontractors, consultants, or agents commence the Work until the date of Final Completion, unless the Owner and Contractor agree in writing to an earlier date.

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding ~~hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent~~ any material, substance, chemical, waste, product, derivative, compound, mixture, solid, liquid, mineral or gas, whether naturally occurring or manmade, that is hazardous, toxic, or words of similar import or regulatory effect, and any petroleum or petroleum-derived products, radon, radioactive materials or wastes, asbestos in any form, lead or lead-containing materials, urea formaldehyde foam insulation, and polychlorinated biphenyls (collectively, "Hazardous Materials"). If the Contractor believes its Work will disturb or otherwise implicate any actual or suspected Hazardous Material or encounters a Hazardous Material not addressed in the Contract Documents, the Contractor shall not disturb any such Hazardous Material, immediately report the condition to the Owner and the Architect in writing and take all necessary precautions to prevent release of and exposure to the Hazardous Materials and the Contractor shall immediately report the condition to the Owner and the Architect in writing and take all necessary precautions to prevent release of and exposure to the Hazardous Materials and foreseeable bodily injury or death to persons resulting from ~~a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the~~ such Hazardous Material. If such reasonable precautions will be inadequate to prevent release of and exposure to Hazardous Materials, or foreseeable bodily injury and death, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected ~~area and notify the Owner and Architect of the condition.~~area.

§ 10.3.2 Upon receipt of the Contractor's ~~notice,~~ notice pursuant to Section 10.3.1, of the existence of actual or suspect Hazardous Materials not addressed in the Contract Documents, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the ~~material or substance~~ Hazardous Material reported by the Contractor and, in the event such ~~material or substance~~ Hazardous Material is found to be present, to cause it to be rendered ~~harmless.~~ harmless or otherwise abated. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If

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either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the ~~material or substance has been rendered harmless.~~ Hazardous Material has been rendered harmless and/or otherwise abated in accordance with all Applicable Laws. Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and ~~start-up.~~ start-up, except to the extent that the Hazardous Material was exacerbated due to the negligence, willful or intentional misconduct, or breach of contract of the Contractor.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area ~~if in fact the material or substance~~ related to the presence of any actual or suspected Hazardous Materials if in fact such Hazardous Material presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered ~~harmless.~~ harmless or otherwise abated, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense ~~is due to the fault or negligence of the party seeking indemnity.~~ was caused by, or resulted from the negligence of, or the intentional or willful misconduct or breach of contract by the party seeking indemnity, or the negligence of, or intentional or willful misconduct or breach of contract by such party's agents (including Subcontractors) or employees.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the ~~Contractor~~ Contractor, any Subcontractor or any materialman or supplier, or any entity for whom any of them is responsible, brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such ~~materials or substances.~~ materials or substances or its failure to comply with the Contract Documents. The Contractor agrees not to use any fill or other materials to be incorporated into the Work which are hazardous, toxic or comprised of any items that are hazardous or toxic except to the extent required by the Contract Documents.

§ 10.3.5 ~~The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.~~ To the fullest extent permitted by law, the Contractor shall indemnify, defend and hold harmless the Owner, the Owner's Designated Representative, and the directors, officers, owners, agents and employees of any of them, as well as the Building Committee appointed by the Owner for the Project, and the fee owner of the Project site (if other than the Owner) against claims, damages, losses and expenses, including but not limited to reasonable attorney's fees, resulting from an actual or suspect Hazardous Material or which the Contractor or its agents (including Subcontractors) or employees brings to the site and improperly handles, or from the Contractor's failure to perform its obligations under Section 10.3.1, except to the extent that such damage, loss or expense was caused by, or resulting from the negligence of the indemnitee.

§ 10.3.6 If, without negligence ~~on the part of the Contractor,~~ or fault on the part of the Contractor or any party for whose acts the Contractor is responsible, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of properly performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

§ 10.3.7 The Contractor shall perform all required procedures necessary to ensure that there will be no actual or threatened release, discharge, spillage, uncontrolled loss, seepage or filtration (each a "Release") of any Hazardous Material on the site caused by its operations. The Contractor is responsible for any and all costs and liabilities associated with the investigation and remediation of any such Release, or as required by regulating authorities having jurisdiction under any of the Applicable Laws, and holds the Owner, its employees and agents, and the fee owner of the Project site (if other than the Owner), harmless against any current or future liabilities resulting from such incidents.

§ 10.3.8 All material and equipment furnished under the Contract Documents shall be free of asbestos, lead based paint, and PCBs. Unless otherwise specified in the Contract Documents, any material or equipment containing these,

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and any other Hazardous Materials shall be considered defective and shall be removed by the Contractor at the Contractor's sole expense.

§ 10.3.9 The Contractor, when it will be providing, using, storing, delivering or disposing of any toxic, hazardous or potentially dangerous materials, shall advise in writing, and receive the written approval of, the Owner of the use of such hazardous materials in advance of conducting any such Work and the Contractor is responsible for protecting its own employees, those of the Owner, and all of its employees and agents from the hazards associated with such materials. The Contractor shall furnish written directions, precautions or training, provided or made available from the supplier of the materials, or other acceptable source, for use by all persons who may be subjected to the hazard. The Contractor shall comply with all Applicable Laws. The Contractor shall dispose of any hazardous or toxic substances in accordance with all Applicable Laws, including E.P.A. and D.O.T. regulations and requirements. The Contractor shall perform all required procedures necessary to ensure that there will be no discharge, spillage, uncontrolled loss, seepage or filtration of any hazardous or toxic waste on the site caused by its operations. The Contractor is responsible for any and all costs and liabilities associated with the clean-up of any such spillage, etc., or as required by regulating authorities having jurisdiction, and holds the Owner and its employees and agents harmless against any current or future liabilities resulting from such incidents.
PAGE 39

In an emergency affecting safety of persons or property, during which it is infeasible for the Contractor to consult with the Owner and/or Architect, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7. The Contractor shall promptly notify insurers as applicable, and the Architect and the Owner of the nature of the emergency. Immediately thereafter, the Contractor shall submit to the Architect and the Owner a written report including description of circumstances of the emergency and details of actions taken.

...

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the ~~Agreement~~ Agreement, Exhibit B (Insurance and Bonds) or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The ~~Owner, Architect, and Architect's consultants~~ Owner shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.
PAGE 40

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. ~~The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.~~

...

§ 11.5.1 A loss insured under the property insurance required by the Agreement ~~shall~~ may be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.
PAGE 41

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition.

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During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5. All warranties in excess of the one year noted above ("Extended Warranties") shall be assigned to the Owner, after which said assignment the Contractor's liability shall be limited to assisting the Owner with the enforcement of the Extended Warranties.
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§ 12.2.6 AUDITS
Upon request of the Owner, the Contractor will cooperate, secure the cooperation of all Subcontractors and Sub-subcontractors and assist the Owner during any audit of the Project conducted by the Owner or one or more Agencies (as defined in Section 2.2.1.2 of the Agreement) at any time after Substantial Completion. Such cooperation shall include providing the Owner with access to all records related to the Project.

...

The Contract shall be governed by the law of the ~~place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.~~State of Connecticut.

...

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by ~~law.~~law or in equity.

...

§ 13.4.3 The invalidity of any part or provision of the Contract Documents shall not impair or affect in any manner the validity, enforceability or effect of the remaining parts and provisions of the Contract Documents and the parties agree to substitute for the invalid provision the provision within the bounds of the law which most clearly effectuates the legal and economic intent of the invalid provision.

§ 13.4.4 No provision contained in the Contract Documents shall create or give to third parties any claim or right against the Owner.

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by ~~applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities.~~ Applicable Law. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense. If the inspections and tests conducted under Section 13.4.1 or this Section 13.4.2 reveal failure in a portion of the Work, the Owner may order the inspection and testing at the Contractor's expense of any and all portions of the Work that are identical or similar to the failing portion.

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Payments due and unpaid under the Contract Documents shall bear interest ~~from the date payment is due at the rate the parties agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.~~as provided in the Agreement.

...

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of ~~30~~ sixty (60) consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or any of their respective agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

...

.2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped; or

.3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract ~~Documents; or~~

~~.4 The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.~~Documents and has not notified the Contractor of the reason for withholding payment.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or any of their respective agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon ~~seven~~ fourteen (14) days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment ~~for Work executed, as well as reasonable overhead and profit on Work not executed, and~~ in accordance with the Contract Documents for Work executed in accordance with the Contract Documents and direct costs incurred by reason of such termination.

§ 14.1.4 If the Work is stopped for a period of ~~60~~ ninety (90) consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or any of their respective agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters ~~important~~ material to the progress of the Work, the Contractor may, upon ~~seven~~ fourteen (14) additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.1.5 The notice of termination delivered pursuant to Section 14.1.3 or 14.1.4 must state with specificity the means by which the Owner may cure its nonperformance, and the Contractor shall not terminate this Contract if, within the applicable fourteen (14) day period, the Owner substantially takes such curative measures.

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§ 14.2.1 The Owner ~~may~~ may, without prejudice to any other rights or remedies available to the Owner under the Contract Documents or at law or in equity, terminate the Contract if the Contractor

...

.3 repeatedly disregards ~~applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or~~Applicable Law;

.4 otherwise is guilty of substantial breach of a provision of the Contract ~~Documents.~~Documents;

.5 institutes proceedings or consent to proceedings requesting relief or arrangement under the Federal Bankruptcy Act or similar or applicable federal or state law, or a petition under any federal or state

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bankruptcy or insolvency law is filed against the Contractor and such petition is not dismissed within sixty (60) days from the date of said filing, or the Contractor admits in writing its inability to pay its debts as they become due, or it makes a general assignment for the benefit of its creditors, or a receiver, liquidator, trustee, or assignee is appointed, or a receiver of all or any substantial portion of the Contractor's properties is appointed;

.6 abandons the Work;

.7 submits an Application for Payment, sworn statement, waiver of lien, affidavit or document of any nature whatsoever which is intentionally falsified;

.8 fails to make prompt payment to Subcontractors or for materials or labor in accordance with the respective subcontracts or otherwise breaches its obligations under any subcontract with a Subcontractor; or

.9 if a mechanics or materialman's lien or notice of lien is filed against any part of the Work or the Project site and not promptly bonded or insured over by the Contractor, provided the Owner has paid the Contractor for the Work which is the subject of the lien.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, if the Contractor fails to commence and diligently pursue a cure during such seven (7) day period, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

PAGE 45

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid ~~balance.~~ balance of the Guaranteed Maximum Price, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

...

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include ~~profit.~~ profit (or, as applicable, the Contractor's Fee). No adjustment shall be made to the extent

...

§ 14.4.1 The Owner may, ~~at any time,~~ upon ten (10) days prior written notice, without prejudice and without waiving any other unknown right or remedy available to the Owner and Construction Manager under the Contract Documents or at law or in equity, terminate the Contract for the Owner's convenience and without cause.

...

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly ~~executed; costs~~ executed in accordance with the Contract Documents, and reasonably and satisfactorily documented direct and demobilization costs and earned Fee as of effective date of termination incurred by reason of the termination, including costs attributable to termination of ~~Subcontracts; and the termination fee, if any, set forth in the Agreement.~~ Subcontracts.

§ 14.5 Payment upon Termination

§ 14.5.1 Except for claims for such payments as the Owner is explicitly required to make upon termination pursuant to this Article 14, the Contractor hereby waives and forfeits all claims for payment and damages, including without limitation, anticipated profits.

§ 14.5.2 When making any payment upon termination required under this Article 14, the Owner shall be credited for (1) payment previously made to the Contractor for the terminated portion of the Work, (2) valid claims which the

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Owner has against the Contractor under the Contract Documents, and (3) the value of the materials, supplies, equipment or other items that are to be disposed of by the Contractor that are included in the Contract Sum.
PAGE 46

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by ~~applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.~~Applicable Law.

...

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with the performance of its obligations under the Contract Documents and the Owner shall continue to make payments in accordance with the Contract Documents.

...

§ 15.1.6.3 Notwithstanding anything to the contrary herein or in the Contract Documents, but subject to the Contractor's remedy for Concurrent Delays, neither the Contract Sum nor the Contract Time shall be adjusted if the increased costs or delay underlying the Contractor's claim for adjustment stems from the negligent act or omission of the Contractor, its subcontractors of any tier, or of anyone for whose performance the Contractor is responsible to the Owner, or as a result of the error of any of the same or of the failure of any of the same to comply with, and fulfill their responsibilities under, the Contract Documents.

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§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the ~~Claim,~~ Claim or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.
PAGE 48

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with ~~applicable law~~ Applicable Law to comply with the lien notice or filing deadlines.

...

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in ~~Sections 9.10.4, 9.10.5, and 15.1.7,~~ the Contract Documents, shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order.~~If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.~~

...

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§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with ~~applicable law.~~ Applicable Law in any court having jurisdiction thereof.

...

§ 15.4.4.1 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this ~~Agreement~~ Contract with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).
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§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under ~~this Agreement.~~ the Contract.

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NON-COLLUSION AFFIDAVIT OF BIDDER

STATE OF_____

COUNTY OF_____

_____ Being first duly sworn, deposes and says:
(Name of Affiant)

1. That he/she is (owner, partner, officer, representative or agent) of_____;

2. that he/she is fully informed respecting the preparation and contents of the attached Bid and of all pertinent circumstances respecting such Bid;

3. that such Bid is genuine and is not a collusive or sham Bid;

4. that said Bidder nor any of its officers, partners, owners, agents, representatives, employees or parties conspired, connived or agreed, directly or indirectly with any connection with the Contract for which the attached Bid has been submitted or to refrain from bidding in connection with such Contract, or has in any manner, directly, or indirectly, sought by agreement or collusion or communication or conference with any other Bidder, firm or person to fix the price or prices in the attached Bid or of any other Bidder, or to fix any overhead, profit or cost element of the Bid price or the Bid price of any other Bidder, or to secure through collusion, conspiracy, connivance or unlawful agreement any advantage against the ***Town of Greenwich, Turner Construction Company*** or any person interested in the proposed Contract; and

5. that the price or prices quoted in the attached Bid are fair and proper and are not tainted by any collusion, conspiracy, connivance or unlawful agreement on the part of the Bidder or any of its agents, representatives, owner, employees, or parties in interest, including this Affiant.

Signed _____

_____

_____

Title

Subscribed and sworn to before me this_____day of_____, 20__

_____

_____

Title

My commission expires_____, 20___.

END OF
NON-COLLUSION AFFIDAVIT

National Anti-Harassment Policy

Caring for our people is always Turner's most important objective. We are dedicated to creating the right environment that is equitable, inclusive, and free from bias and hate, so we can be at our best at all times. Turner has zero tolerance for sexual and other unlawful harassment or discrimination by or against employees, applicants, temporary workers, gig workers, interns, volunteers, clients, independent contractors, vendors or non-employees of Turner (collectively, "Included Individuals") at a Turner work site or when you are involved in any Turner business relationship as part of your job.[1] Sexual and other unlawful harassment of employees or other individuals occurring in the workplace or in other settings in connection with their employment or engagement is unlawful and prohibited. This policy applies to all incidents of alleged harassment, including those which occur off premises or off-hours (including but not limited to at events, meetings, travel outside the office or work site, communications on personal devices, text or social media, or when working remotely including in virtual meetings or calls), and whether the alleged offender is a supervisor, manager, co-worker or even a third-party non-employee with whom you may be involved in any business or potential business relationship. This policy applies regardless of an individual's immigration status.

To maintain a workplace free from sexual and other unlawful harassment, the following procedures are in place to manage any such inappropriate conduct. Further, any retaliation against an individual who has complained about sexual or other unlawful harassment, or retaliation against individuals for cooperating with an investigation of a harassment complaint, is similarly unlawful. Turner is committed to a work environment where all are treated with respect and dignity. This is what we stand for, and anything less will not be tolerated.

Turner takes allegations of sexual and other unlawful harassment seriously. We will respond promptly to complaints of harassment or discrimination or and where it is determined that such inappropriate conduct has occurred, we will act to eliminate the conduct and impose such corrective action as is necessary, including disciplinary action where appropriate.

Please note that while this policy sets forth our goals of promoting a workplace that is free of sexual and other unlawful harassment or discrimination, the policy is not designed or intended to limit our authority to discipline or take remedial action for workplace conduct which we deem unacceptable, regardless of whether that conduct satisfies the definition of sexual or other unlawful harassment or otherwise violates this policy. Furthermore, the intent of someone's behavior is not a defense to violating this policy. The impact of the behavior is what matters.

SEXUAL HARASSMENT

Definition of Sexual Harassment

Turner specifically prohibits workplace sexual harassment, which it considers a form of employee misconduct. Workplace or work-related sexual harassment, including sex-based or gender-based discrimination is illegal under federal, state and local laws, and will not be tolerated by Turner. The prohibition against sexual harassment applies equally to all individuals regardless of their sex or gender identity. Sexual harassment includes harassment where the harasser and the victim are of the same or different sexes or gender identities.

[1] Issuance of this policy to a non-employee of Turner and/or coverage of a non-employee under this policy in no way creates any employment relationship between Turner and such individual. Furthermore, nothing in this policy in any way grants or confers any implied contractual right to any individual with respect to employment with Turner or alters any employment at-will status of a Turner employee.

Sexual harassment also includes harassment on the basis of sexual orientation, self-identified or perceived sex, gender expression, gender identity and transgender status. Understanding and respecting gender diversity is essential to an inclusive workplace and preventing sexual harassment.[2]

For the purposes of this policy, sexual harassment is defined as unwelcome sexual advances, requests for sexual favors and other verbal or physical conduct of a sexual nature when, for example:

(i) Submission to such conduct is made either explicitly or implicitly a term or condition of an individual's employment or a third party's engagement;

(ii) Submission to or rejection of such conduct is used as or threatened to be used as the basis for employment decisions affecting an individual's employment (such as favorable reviews, salary increases, promotions, increased benefits or continued employment); or

(iii) Such conduct has the purpose or effect of unreasonably interfering with an individual's work performance or creating an intimidating, hostile or offensive environment, even if the complaining individual is not the intended target of the sexual harassment.

Other sexually-oriented conduct, whether intended or not, that is unwelcome and has the effect of creating a workplace environment that is hostile, offensive, intimidating, or humiliating to male or female workers may also constitute sexual harassment.

While it is not possible to list all those additional circumstances that may constitute sexual harassment, the following are some examples of conduct which, if unwelcome, may constitute sexual harassment, depending upon the totality of the circumstances:

- Unwelcome sexual advances, whether they involve physical touching or not;
- Requests for sexual favors in exchange for actual or promised job benefits, such as a favorable review, salary increase, promotion, etc.
- Sexual epithets, slurs, jokes, written or oral references to sexual conduct; gossip regarding one's sex life; comments on an individual's body, comments about an individual's sexual activity, deficiencies, or prowess;
- Displaying sexually suggestive objects, pictures, cartoons;
- Leering, whistling, brushing against the body, sexual gestures, suggestive or insulting comments;
- Sending or circulating, whether in print or electronic form, literature or communications (articles, magazines or e-mails) of a sexual nature;
- Inquiries into one's sexual experiences;
- Discussion of one's sexual activities;
- Sex or gender-based stereotyping, i.e., judging a person's conduct or personality traits because they may not conform to others' ideas or perceptions about how individuals of a particular sex should act or look, including but not limited to: (a) remarks regarding an individual's gender expression; or (b) asking individuals to take on traditionally gendered roles;
- Other conduct directed toward a person because of their gender, gender identity, gender expression, or sexual orientation, including but not limited to: (a) intentional misuse of an individual's preferred pronouns or (b) creating different expectations for individuals based on their perceived identities;
- Other verbal or physical conduct of a sexual nature

[2] The three most common ways people may identify are: (1) cisgender (gender aligns with their sex assigned at birth, which generally aligns with the binary of male or female), (2) transgender (gender is different than the sex they were assigned at birth), and (3) non-binary (the person does not identify exclusively as man or woman; might identify as both, in between, or outside the gender binary).

Complaints of Sexual Harassment

Any of our employees or other included individuals who believe that they have been subjected to or witnessed sexual harassment, should promptly file a complaint, in writing or verbally, with a Turner Project Manager, Operations Manager, Project Executive, Department Head or Human Resources Director/Manager. These individuals are also available to discuss any concerns you may have and provide information about our policy on sexual harassment and complaint process. You can also raise the issue directly with a Turner business unit General Manager or equivalent senior executive, or Senior Human Resources Director. You may also follow Turner's internal complaint and grievance procedure to resolve complaints by contacting compliance@tcco.com or call The Network at 888-738-1924.

Any supervisor or manager who has reason to suspect harassment or retaliation is occurring must notify a Turner Human Resources Director/Manager.

Please be aware that early reporting and intervention have proven to be the most effective methods of resolving actual or perceived incidents of harassment. Turner expects prompt reporting of complaints or concerns so that rapid and constructive action can be taken. We will make every effort to stop alleged harassment, but can only do so with the cooperation of our employees.

The availability of this complaint procedure does not preclude individuals who believe they are being subjected to harassing conduct from promptly advising the offender that his or her behavior is unwelcome and requesting that it stop. Turner also encourages but does not require individuals who believe they are being harassed to promptly notify the offender that his or her behavior is unwelcome.

Retaliating against an individual who has complained about sexual harassment, and/or against individuals for cooperating with an investigation of a sexual harassment complaint, is unlawful and will not be tolerated byTurner. However, if after investigating any complaint of harassment, Turner determines that the complaint is frivolous and was not made in good faith, or that false information regarding the complaint was knowingly provided, disciplinary action may be taken against the employee who filed the bad-faith complaint or who knowingly gave the false information.

All complaints will be kept confidential to the maximum extent possible, and this confidentiality should be maintained whether employees are involved in the complaint or investigation or otherwise become aware of the complaint. There is a duty to report any conduct that they believe violates this policy. In addition, every employee and included individual has a duty to cooperate with any investigation conducted by Turner, regardless of whether the investigation is being conducted by Turner officials or outside parties retained for this purpose.

Bystander Intervention

In the event someone witnesses harassing behavior that violates this policy, there are bystander intervention methods that may be used, including letting the affected individual(s) know how to report the behavior by utilizing Turner's complaint procedures.[3]

Sexual Harassment Investigation

Complaints and allegations will be promptly investigated in a fair, timely, and thorough manner that provides all parties appropriate due process and reaches reasonable conclusions based on the evidence collected. The investigation will be conducted in such a way as to maintain confidentiality to the extent practicable under the circumstances. Our investigation may include a private interview with the person filing the complaint and with any witnesses. We may also interview the person alleged to have committed sexual harassment. When we have completed our investigation we

[3] Employees may also interrupt the harassment by engaging with the victim and distracting them from the behavior, asking another party present to help intervene, and checking in following the incident.

may, to the extent appropriate, inform the person filing the complaint and the person alleged to have committed the conduct of the results of that investigation.

If the result of the investigation indicates that corrective action is called for, such action may include disciplinary measures up to and including immediate termination of the employment of the offender (if a Turner employee) or other appropriate remedial measures (if the offender is not a Turner employee).

Turner's complaint and investigation process strives to maintain confidentiality to the extent practicable, provide timely responses, conduct impartial and timely investigations by qualified personnel, document and track investigations for reasonable progress, engage in appropriate options for remedial actions and resolutions, and provide for timely closures.

OTHER UNLAWFUL HARASSMENT

Turner strongly supports the rights of all its employees and included individuals to work in an environment free from all forms of unlawful harassment, including harassment on the basis of age, ancestry, ethnicity, color, religious creed (including religious dress and grooming practices), disability (mental and physical) including HIV and AIDS, marital status, familial status, partnership status, medical condition (cancer and genetic characteristics), genetic information, citizenship, military and veteran status (including protected veteran status and past, current, or prospective service in the uniformed services), national origin (including language use restrictions), race (including traits historically associated with race, including but not limited to hair texture and protected hairstyles), sex (which includes pregnancy, childbirth, breastfeeding and medical conditions related to pregnancy, childbirth or breastfeeding), sexual and reproductive health decisions, gender (including gender nonconformity and status as a transgender or transsexual individual, gender identity, and gender expression), sexual orientation, caregiver status, criminal history, domestic violence victim status, and any other characteristic protected under applicable federal, state, or city law.

Unlawful harassment is verbal or physical conduct that denigrates or shows hostility or aversion toward an individual because of a protected characteristic, and that:

(a) creates an intimidating, hostile or offensive working environment;
(b) unreasonably interferes with an individual's work performance; or
(c) otherwise adversely affects an individual's employment opportunities.

Unlawful harassing conduct includes, but is not limited to:

- epithets;
- slurs;
- negative stereotyping;
- threatening, intimidating or hostile acts that relate to a protected characteristic;
- written or graphic material that denigrates or shows hostility or aversion toward an individual or group because of a protected characteristic, and that is placed on walls, bulletin boards, or elsewhere on the Turner's premises, or circulated in the workplace on paper or electronically.

Retaliation Is Prohibited

Unlawful retaliation can be any action that could discourage an employee or other included individual from coming forward to make or support a harassment or discrimination claim and is prohibited by federal, state, and local law.

Applicable law protects any individual who has engaged in "protected activity." Protected activity occurs when a person has: made a complaint of harassment or discrimination, either internally or with any government agency; participated in an investigation of a harassment or discrimination complaint; testified or assisted in a proceeding involving harassment or discrimination under applicable law; opposed unlawful harassment or discrimination by making a verbal or informal complaint to management, or by simply informing a supervisor or manager of suspected harassment or

discrimination; reported that another employee or included individual has been harassed or discriminated against; or encouraged a fellow employee or included individual to report harassment or discrimination. Even if the alleged harassment or discrimination does not turn out to rise to the level of a violation of law, the individual is protected from retaliation if the person had a good faith belief that the practices were unlawful. However, this retaliation provision is not intended to protect persons making intentionally false charges of harassment or discrimination.

Examples of retaliation may include, but are not limited to:

- Implementing an unwarranted demotion or termination that is not based on a legitimate business and non-retaliatory reason;
- Issuing an unwarranted performance improvement plan or negative evaluation;
- Directing social isolation;
- Publicly releasing personnel files; or
- Undermining an individual's immigration status.

Retaliation against any employee for reporting discrimination or harassment, supporting another's complaint, or for participating in an investigation of a claim of discrimination or harassment is a serious violation of this policy and will result in the violator being subject to disciplinary action, up to and including termination of employment (if a Turner employee) or other appropriate remedial measures (if the offender is not a Turner employee). Further, retaliating against third parties who have complained about harassment or discrimination or cooperated in an investigation of a harassment or discrimination complaint is strictly prohibited under this policy.

Turner prohibits unlawful harassment, retaliation, and discrimination of any kind. Any violation of this policy should be reported in accordance with the complaint procedure in the Sexual Harassment policy and the complaint will be handled in the manner set forth in that procedure.

If the result of the investigation indicates that corrective action is called for, such action may include disciplinary measures up to and including immediate termination of the employment of the offender (if a Turner employee) or other appropriate remedial measures (if the offender is not a Turner employee).

Employee's Responsibility

- All employees and other included individuals should avoid contributing directly or indirectly to any form of harassment or discrimination in the workplace.
- Report any observed or potential harassment or discrimination promptly and confidentially to Turner management and/or to the Human Resources Director/Manager.
- Cooperate fully in any investigation in a discreet, confidential, and sensitive manner. Failure to cooperate may be grounds for disciplinary action.

Supervisor's Responsibility

- Maintain an open-door policy for employees to communicate potential concerns at an early stage and seek counsel from Turner's Human Resources Director/Manager.
- Take all complaints or concerns of alleged or possible harassment or discrimination seriously, no matter how minor or who is involved.
- Report any alleged incidents or receipt of formal complaints immediately to the appropriate management and to Turner's Human Resources Director/Manager.
- Cooperate fully in any investigation and maintain confidentiality to the extent possible.
- Take appropriate action to prevent retaliation or prohibited conduct from reoccurring during and after any investigations or complaints.

- Communicate support of the policy and guidelines throughout the organization.
- Make sure that all employees and other individuals within your area of responsibility are aware of this policy, ensure that personnel decisions are in compliance with this policy, and initiate corrective action (after consulting with Turner Human Resources Director/Manager, Operations Manager, Project Executive or the Senior Human Resources Director) when improper behavior is observed or reported.

Supervisors who knowingly allow or tolerate harassment, discrimination or retaliation are in violation of this policy and subject to disciplinary action.

Prevention Program

Avoidance of harassment, sexual harassment, and discrimination requires constant supervisory and management awareness. Publication of this policy reaffirms the Turner's desire to eliminate any form of harassment or discrimination. Anti-harassment training is provided to all employees throughout Turner annually, or as otherwise required by state or local law. The resulting work environment should be one sensitive to discrimination, harassment and sexual harassment issues and one positioned to prevent violations. We trust that all our employees will continue to act responsibly to establish and maintain a harassment-free and discrimination-free working environment.

Last Revision – September 2023

Turner

Jobsite & Office Vandalism, Graffiti, and Defacement of Property Policy

August 21, 2020

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Introduction

Turner has zero tolerance for vandalism, graffiti and defacement of property in our workplace. This policy outlines steps to take to prevent incidents. As so much vandalism and graffiti is bias-motivated, we must take swift action if an incident occurs. We will hold ourselves and others accountable to ensure that our workplace is free from harassment, hate and bigotry of any kind.

Policy

Turner Construction Company has ZERO TOLERANCE for graffiti, vandalism, or defacement of property on our projects and in our offices. It damages property and is a crime (examples include images drawn, sprayed, or etched, stickers, non-work-related posters, etc.). The goal is to eliminate these types of incidents and this behavior on our projects.

Any graffiti, vandalism or defacement determined to be motivated by bias against a person's race, religion, disability, sexual orientation, ethnicity, gender, or gender identity or targeted to a specific individual triggers the steps outlined in the Bias-Motivated Events and Potential Hate Crimes Protocol.

Response

Turner's commitment to establishing a safe workplace through the elimination of graffiti, vandalism, or defacement of property should be a topic of discussion in all worker orientations and daily huddles. All graffiti found on our projects must be immediately reported to leadership (Operations Manager, Project Executive and Senior Project Manager) who will determine if it is bias-motivated. If unsure, contact **Rodney Pope at 347-203-4323** for assistance.

- If not bias-motivated, take the following measures:
  - Capture incident with photo(s) in Predictive Solutions or other tracking tool
  - Review the incident to determine the source and if identified, hold the offender(s) accountable
  - Consider a stand down with the entire workforce, principals of the trades and union representatives to discuss the situation and training may also be required
  - Remove the graffiti
- If graffiti is pervasive or continues, one or more of the following measures may be required:

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Jobsite & Office Vandalism, Graffiti, and Defacement of Property Policy

August 21, 2020

a. Contact trades principals, client and property owner (as necessary) and reinforce zero tolerance for any defacement
a. Consider installing a camera(s) to monitor the site. (Type of camera will be project and location specific.)
b. Conduct a project shutdown and training of the entire workforce may be required.
c. If associated with a specific trade partner or individual, they may be removed from the project permanently and possibly be barred from future Turner projects.

- If **Bias-Motivated**, per Turner's Bias-Motivated Events and Potential Hate Crimes Protocols, within one hour of the event, the Environmental Health & Safety Director or Operations Manager must call the Turner Crisis Hotline - **1 (866) 3-TURNER/ 1 (866) 388-7637**.

Temporary Facilities (Port-a-Johns, toilet trailers, built on-site, pedestrian covered walkways, scaffolds, gang boxes, storage trailers, job trailers, etc.)

- Given the historical propensity of graffiti occurring in temporary facilities, project teams must perform an initial visual inspection of all temporary facilities, interior and exterior, prior to their acceptance for use on our projects. This inspection also applies to projects utilizing permanent facilities or field-built temporary facilities. If conditions are found to be unacceptable, the project staff must refuse delivery and notify the third-party vendor or building management immediately.

Contract Language

Include language specific to temporary facilities in the scope of work in the trade partner contract or purchase order to ensure that any facilities delivered to a Turner project will arrive in "like new" condition both inside and outside. **Use the required language below in trade partner contracts or purchase orders:**

> **Insert this language into the scope of work in the contract. Make reference to the harassment language in Form 16 BRA, Article IX.**
> In keeping with the obligations and expectations of Article IX Harassment, this contractor shall inspect portable toilets prior to delivery to the site to ensure that each unit is:
> 1. Clean and in "like new" condition
> 2. Free from any drawings, stickers or graffiti of any type
> 3. Free from any etched markings
>
> Turner will not accept any facility that does not meet the standards listed above. Any cost associated with the removal and replacement of a facility that was delivered in an unsatisfactory condition will be borne by this contractor.

Graffiti Prevention

In order to effectively eliminate defacement of property, the Operations Manager, in collaboration with Project Leadership, will determine implementation of the following and/or additional practices:

Temporary Facilities

After the acceptance of a facility, any graffiti found thereafter is considered to have originated on the project. In order to effectively monitor temporary facilities:

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- Inspect facilities periodically throughout the workday as part of the regular routine and in conjunction with the regular sanitizing by on-site cleaners, on-site labor or Turner staff.
- If graffiti is found to be ongoing and pervasive, increase the frequency of these inspections as necessary.
- Group toilets together while adhering to COVID-19 physical distancing guidelines.
- Avoid placing isolated, standalone units in remote locations on the site whenever possible.
- If pre-existing graffiti previously painted over becomes visible, the unit will be removed.
- Apply anti-graffiti paint or coating to allow easy removal of markings on field-built facilities.

General Workplace

Graffiti is often found in less frequently traveled locations such as machine rooms, stairwells, closets, site fences, etc. Conduct regular inspections of the project to identify any graffiti,

- In addition to the measures above, consider isolating the area(s) of concern and develop a controlled access protocol.

Renovations to Existing Facilities

- Review Turner's Bias-Motivated Events and Potential Hate Crimes Protocol and Graffiti Policy with the client so there is a shared commitment and understanding of how the project will handle graffiti and bias-motivated events should they occur during construction.
- Prior to beginning work on any renovation project, an inspection and documented survey of the existing project is required to ensure the project is graffiti-free. The entire project site is to be inspected including stairwells, mechanical rooms (including inside and outside air handling units), electrical closets and existing building toilets planned to be used by workers during construction.
- Any graffiti found must be brought to the attention of project leadership, the client/building manager, and construction manager (if not Turner). The team must then develop and implement a plan to remove all graffiti prior to construction mobilization/continuation.

Additional Resources

Click here to download the anti-graffiti poster in English and Spanish.

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Inclusive and Respectful Workplace Playbook

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At Turner we will create an environment where everyone can be at their best, be authentic, and be treated with respect and dignity, and eliminate hate and bias every minute of every day. – Peter J. Davoren, CEO and President

Introduction

Turner trusts that if we communicate, model, train and implement consistent high standards for what is acceptable and unacceptable behavior across all worksites, we will ensure that every worker is treated with respect and dignity. Together, with industry partners, clients, and competitors, we can create lasting change in the industry and to the quality of people's work experience.

Purpose, Objective and Ownership

This playbook provides actionable steps during the lifecycle of a project to help inform and guide Turner Project Staff in creating an inclusive and respectful workplace. Worker Experience, Vandalism and Graffiti Policy, and Bias Motivated Events (BME) Protocol documents are included to ensure Turner Staff are promoting an inclusive and respectful workplace.

This Playbook has a shared responsibility for every project team to create an environment where everyone can be at their best, be authentic, and be treated with respect and dignity, and to eliminate hate and bias every minute of every day. Specific responsibilities are defined throughout each phase of the project lifecycle within this document:

Turner Team

The Turner team is responsible to communicate and set the expectations of the Inclusive and Respectful Workplace Playbook. Turner will provide adequate training and resources to Trade Partners. Trade Partners and other project partners will be held accountable to maintain an inclusive and respectful workplace that aligns with this playbook.

Trade Partner Leadership

All Trade Partner Principals will commit and actively engage with the contents of this playbook to communicate expectations and assure implementation to their respective supervisors, crew leads and craftworkers.

Crew Leaders

Turner recognizes that craftworkers on Turner projects will follow their Crew Leaders. Therefore, Crew Leaders must be the primary point for distribution of messaging, modeling desired behaviors, accountability for their crews and delivery of feedback to Trade Partner and Turner Leadership. It is the role of the Trade Partner Leadership and Turner to provide adequate training, resources, and support to assure successful messaging and implementation.

Joint Venture Partners

All Joint Venture Partners (majority or minority) are equally responsible for communicating and setting the expectations of the Inclusive and Respectful Workplace Playbook with Turner. They will commit and actively engage with the contents of this playbook to communicate expectations and assure its implementation on the project.

Project Phase Overview

Project teams should utilize this playbook during each of the five (5) project phases outlined below. See the respective sections for step-by-step guidance.

1	**Project Planning** Turner and Trade Partner responsibilities during the project award phase.
2	**Project Launch** Turner and Trade Partner alignment and implementation of the Playbook during mobilization and project kickoff.
3	**Project Execution** Perform 'Plan – Do – Check – Adjust" approach during the lifecycle of the project to ensure Inclusive and Respectful Workplace Playbook is effectively maintained.
4	**Project Response** Turner and Trade Partner responsibility, actions, and response during a Vandalism and Graffiti or Bias Motivated Event incident.
5	**Project Recovery** Mitigation strategies to ensure no repeat events occur.

#1 - Project Planning

Project Planning Actions - Responsible Party			
Preconstruction & Procurement	**Turner & JV Partners**	**Trade Partner**	**Crew Leaders**
Project team to create an Inclusive and Respectful Workplace project-specific plan and obtain GM/OM approval.	✓		
Preconstruction should include Inclusive and Respectful Workplace commitment and scope outlined in this playbook.	✓		
Alignment meeting with Turner Leadership and bidding Trade Partner Principals to ensure understanding and commitment to Worker Experience, Vandalism and Graffiti Policy, and BME Protocol.	✓	✓	
Project budget and Trade Partner bids and subcontracts to include scope and cost for the Worker Experience document.	✓	✓	

#2 - Project Launch

Project Launch Actions - Responsible Party			
Project Mobilization & Setup	**Turner & JV Partners**	**Trade Partner**	**Crew Leaders**
Plan project setup to include Worker Experience and Vandalism & Graffiti Policy for orientations, videos (Safety Orientation, Empathy, Inclusive and Respectful Workplace), toolbox talks, and posters to ensure inclusive and respectful environment.	✓	✓	
Share approved plan with Trade Partner leadership to ensure alignment and full commitment.	✓	✓	
Review Worker Experience and Vandalism and Graffiti Policy during project kickoff meetings with Turner team and Trade Partner crew leads to ensure commitment and understanding.	✓	✓	✓
Review the Inclusive and Respectful Workplace project-specific plan with Trade Partner crew leads to ensure Trade Partner input and buy-in.	✓	✓	✓
Obtain each Trade Partner's plan to train and support their Crew Leaders.	✓	✓	✓
Obtain each Trade Partner's plan for communicating with their craftworkers.	✓	✓	✓

Project Execution - Responsible Party			
Day-to-day initiatives to promote an Inclusive and respectful workplace	**Turner & JV Partners**	**Trade Partner**	**Crew Leaders**
Conduct regular stand-downs, huddles, and toolbox talks to support the inclusive and respectful workplace.	✓	✓	✓
Crew Leaders to regularly discuss the project environment with their craft workers and provide Turner team with improvement suggestions.		✓	✓
Review Worker Experience and Vandalism and Graffiti Policy documents throughout the life of the project and ensure 'Plan – Do – Check – Adjust' approach to improve and maintain Project Experience. *Minimum of once a quarter.*	✓	✓	✓
Provide training to Crew Leaders identified at launch and throughout the life of the project.		✓	✓
Provide regular updates on communication with craftworkers according to communication plan established during project launch.		✓	✓
Provide feedback on jobsite culture from craftworkers and adjust the project-specific Worker Experience plan as needed.	✓	✓	✓

#4 - Project Response

Project Response - Responsible Party			
BME Event Response	**Turner & JV Partners**	**Trade Partner**	**Crew Leaders**
In the event of an incident, immediately notify Site Leadership or call the Crisis Hotline 888-738-1924.	✓	✓	✓
Ensure all project staff and workforce are safe.	✓	✓	✓
Secure the area. DO NOT remove evidence or disturb the potential crime scene; take photos only.	✓	✓	✓
Initiate the Bias Motivated Event Response Protocol.	✓	✓	
Fully engage Trade Partners in planning and implementation of response.	✓	✓	✓
Once the proper response has been implemented, initiate Project Recovery phase.	✓	✓	✓
Develop and implement talking points and follow-up by Crew Leaders in response to BME event.	✓	✓	✓

Project Recovery - Responsible Party			
Moving Forward Post Event	**Turner & JV Partners**	**Trade Partner**	**Crew Leaders**
Ensure Project Launch and Project Execution Standard actions continue.	✓	✓	✓
Re-visit and update project-specific plans with Crew Leaders to implement any enhanced measures required due to BME event.	✓	✓	✓
Review and gain alignment of revised project-specific plans with PM/PX and GM/Operations Manager.	✓		

Crew Leader Training

Crew leaders who join a Turner site must receive training to help them build, model and maintain the culture we expect on every Turner site. As leaders, they are also expected to share certain trainings with their crews. Following are the minimum trainings required by audience:

Trade Partner Crew Leaders:

Required to take:

- ☐ Inclusive & Respectful Workplace *(10-minute video)*
- ☐ Empathy on the Jobsite *(5-minute video)*

Required training to deliver to crews:

- ☐ Inclusive & Respectful Workplace *(10-minute video)*
- ☐ Empathy on the Jobsite *(5-minute video)*
- ☐ Toolbox Talks *(15-minute huddle trainings)* Series available, suggest holding every 2-3 weeks

STATE OF CONNECTICUT
Contractor Verification
(in accordance with Public Act 16-67)

Directions to Contractor: Connecticut law requires that any contractor applying or bidding for a contract (including individuals who are independent contractors) with a local or regional board of education, a governing council of a state or local charter school, or interdistrict magnet school operator require any employee with the contractor who would be in a position involving direct student contact to supply the contractor with the information provided in this form. Information may be collected either through a written communication or telephonically.

In addition, pursuant to Connecticut General Statutes (C.G.S.) § 10-222c, the contractor is required to contact – either telephonically or through written communication – any current or former employer of an employee if such employer was a local or regional board of education, a governing council of a state or local charter school, or interdistrict magnet school operator or if the employment caused the employee to have contact with children, to request any information concerning whether there was a finding of abuse or neglect or sexual misconduct against the employee. If the contractor receives any information indicating such a finding, or otherwise has knowledge of such a condition, the contractor must immediately forward such information to any local or regional board of education with which the contractor is under contract.

Directions to Employee of Contractor: Pursuant to Connecticut state law, employees of a contractor who would be in a position involving direct student contact must supply all of the information provided in Section 2 of this form.

Section 1 – To be completed by Contractor

Name	
Street address	
City, State, Zip Code	
Contact person	
Telephone number/email address	

Section 2 – To be completed by Employee of Contractor

Part A. On a separate sheet of paper, please list the name, address and telephone number of each current or former employer, if such current or former employer was a local or regional board of education, a governing council of a state or local charter school, or interdistrict magnet school operator, or if such employment otherwise caused you to have contact with children.

Part B. Please complete the questions below in their entirety.

Have you ever:

Y ☐ N ☐ Been the subject of an abuse or neglect or sexual misconduct investigation by any employer, state agency or municipal police department (answer "no" if the investigation resulted in a finding that all allegations were unsubstantiated)?

Y ☐ N ☐ Been disciplined or asked to resign from employment or resigned from or otherwise separated from any employment while an allegation of abuse or neglect was pending or under investigation by the Department of Children and Families (the "department"), or an allegation of sexual misconduct was pending or under investigation or due to an allegation substantiated pursuant to section 17a-101g of abuse or neglect, or of sexual misconduct or a conviction for abuse or neglect or sexual misconduct?

Y ☐ N ☐ Had a professional or occupational license or certificate suspended or revoked or ever surrendered such a license or certificate while an allegation of abuse or neglect was pending or under investigation by the department or an investigation of sexual misconduct was pending or under investigation, or due to an allegation substantiated by the department of abuse or neglect or of sexual misconduct or a conviction for abuse or neglect or sexual misconduct?

Part C – Written Consent and Disclosure Authorization. I hereby authorize the entities I have listed in Section 2 of this form to release to the entity listed in Section 1 of this form the information required to be released by my previous employer pursuant to (C.G.S.) § 10-222c along with any related records. I hereby consent to and authorize disclosure by the State Department of Education of the information requested pursuant to C.G.S. § 10-222c, as amended by Public Act 16-67, and I hereby authorize the release by the State Department of Education of any related records. I further hereby release the above-named employer(s) and the State Department of Education from any and all liability of any kind that may arise from the disclosure or release of records requested pursuant to C.G.S. § 10-222c, as amended by Public Act 16-67.

_____ _____

Signature of Applicant Date

NOTES:

The terms provided below are currently defined in state law as follows. Please note that statutes may be amended from time to time.

Sexual Misconduct means – "any verbal, nonverbal, written or electronic communication, or any other act directed toward or with a student that is designed to establish a sexual relationship with the student, including a sexual invitation, dating or soliciting a date, engaging in sexual dialog, making sexually suggestive comments, self-disclosure or physical exposure of a sexual or erotic nature and any other sexual, indecent or erotic contact with a student." Connecticut General Statutes § 10-222c(k).

Abuse or neglect means – "abuse or neglect as described in Section 46b-120, and includes any violation of Sections 53a-70, 53a-70a, 53a-71, 53a-72a, 53a-72b or 53a-73a." Connecticut General Statutes § 10-222c(k).

The Connecticut State Department of Education is an affirmative action/equal opportunity employer and does not discriminate on the basis of race, color, religion, sex, gender identity or expression, sexual orientation, marital status, national origin, ancestry, age, criminal record, political beliefs, genetic information, intellectual disability, past or present history of mental disability, learning disability, or physical disability, including, but not limited to, blindness or any other basis prohibited by Connecticut state and/or federal nondiscrimination laws.

ATTACHMENT C - COORDINATION MATRIX - BP# 1 - RTUs

Turner

Greenwich Central Middle School – State Project No. 057-0114N
9 Indian Rock Ln. Greenwich, CT
8/13/2024

Material procurement for this project is supplied by Turner Construction. This matrix coordinates responsibility for the scopes identified.

Key	
F	Furnish
I	Install
L	Lead
A	Assist

		CM/GC	SourceBlue	Product Vendor / Rep	Trade Partner- MECH	Trade Partner - ELEC	Trade Partner - BMS	Trade Partner - OTHER	Notes / Includes Manufacturer / Vendor coordination
1	**SUBMITTALS & COORDINATION**								
2	Submit product data	A	A	L, F					
3	Publish material lead times (Production & shipping)		A	L, F					
4	Publish Required on Job (ROJ) Dates	F,L	A	A	A				
5	Provide shop drawings		A	L, F					
6	Submit shop drawings to design team for approval	L, F	A	A					
7	Publish approved Shop Drawings and submittals	L, F	A	A					
8	Review approved submittals and ensure that comments are acceptable	F	A	A	L	L	L	L	
9	Field measurements for coordination or confirmation of shop drawings	L	A	L, F	L	L	L	L	
10	Meet Requirements of Material, Product, Equipment Specification Section	A	A	L					
11	Meet ALL Code and Jurisdictional Requirements of Material, Product, Equipment	A	A	L					
12	Provide ALL Material, Product, Equipment seismic calculations and/or certifications	A	A	L					
13	Provide ALL System/Building/Anchorage seismic calculations and/or certifications	L	A	L	F&I				
14	**MATERIAL ORDERS & PRODUCTION**								
15	Formal notice to release vendor to fabricate	L	F						
16	Vendor's factory or warehouse site visit	A	L	L, F	A	A	A	A	As Required
17	Provide identification on packaging (i.e. shipping labels)	A	A	L, F					
18	**DELIVERY, STORAGE AND HANDLING**								
19	Provide material delivery (protection, ocean, trucking)	A	A	L, F					
20	Publish delivery schedule and delivery locations	A	A	L	L				
21	Provide unloading equipment	L			F				
22	Store equipment in a suitable location as per manufacturers directions for up to a year's time				F				
23	Provide maintenance if equipment is going to sit for more than one month				F&I				
24	Receive deliveries (inspect, inventory, and sign off on Receipt Verification Form)	A	L	A	L,F				SB to verify and inspect with Trade Partner
25	Offload delivered material.				L, F				
26	Make any material breakage claims within 5 calendar days from delivery of the product. After which it is assumed breakage is the responsibility of the installing contractor				L, F				Transfer of care and custody of material
27	**FIELD COORDINATION**								
28	Attend coordination meeting (s)	L	A	A	A	A	A	A	
29	Coordinate installation (including assembly, location and connections)	A	A	A	L	L	L	L	
30	**RTUs**								
31	RTU-1, RTU-2, RTU-3			F	I				
32	Internal seismic vibration isolation as per spec			F&I					
33	Assemble units if shipped in sections (manufacturer to provide direction if needed)			A	F&I	A	L	L	
34	All mechanical/plumbing piping, mechanical ductwork connections, and associated hardware and accessories				F&I				
35	All power conduit, wiring, and terminations					F&I			
36	All Building Automation system controls and interface with equipment, including low voltage wiring						F&I		
37	Housekeeping bad and/or inertia base and submit to A/E for approval	A	A					F&I	Housekeeping pads and/or inertia base furnished and installed by BP#10 Concrete Subcontractor.
38	Disconnect switch			F		I			
39	Duct silencers				F&I				
40	Externally wrapped insulation				F&I				
41	Internal insulation			F&I					
42	Mounting and wiring of any sensors outside of the units including wall, and duct mounted, sensors						F & I		
43	Start up		A	L	A	A	A		
44	Start up reports			F	F	F	F		
45	Engage qualified testing agency to perform tests and inspections				A			A	Owner
46	All field testing referenced in specifications			F	F	F	F		
47	Anchor bolts or welds for installation of unit to curb			F	I				
48	Design and install curb to building structure attachment				F&I				
49	Internal vibration isolation			F & I					
50	Hardware to assemble units shipped in sections			F	I				
51	Assemble components shipped loose: (i.e. filters and mixing boxes)			F	I				
52	provide list of all components shipping loose		A	F					
53	Isolation valves, motorized valves, gauges, actuators and control valves				F & I		F & I		
54	Disconnect switch (Separate from Starter/VFD)					F & I			
55	Duct Smoke detectors					F & I	F & I		
56	Power conduit, wiring, and terminations to Duct Smoke Detectors					F&I			
57	Control conduit, wiring, terminations, and programming to Duct Smoke Detectors						F&I		
58	Fire Smoke / Smoke Dampers				F & I				
59	Fire alarm wiring					F&I			
60	Initial filters and belts			F	I				
61	Spare filters and belts			F	I				
62	Motor alignment			L	L				
63	Check belt tension (if belt driven fan)				L				

ATTACHMENT C - COORDINATION MATRIX - BP# 1 - RTUs

Greenwich Central Middle School – State Project No. 057-0114N
9 Indian Rock Ln. Greenwich, CT
8/13/2024

Material procurement for this project is supplied by Turner Construction. This matrix coordinates responsibility for the scopes identified.

Key	
F	Furnish
I	Install
L	Lead
A	Assist

		CM/GC	SourceBlue	Product Vendor / Rep	Trade Partner- MECH	Trade Partner - ELEC	Trade Partner - BMS	Trade Partner - OTHER	Notes / Includes Manufacturer / Vendor coordination
64	**RTUs Cont.**								
65	Air balancing			A	L	A	A		Balancing Contrator
66	Escutcheons/seal for all Factory penetrations			F&I					
67	Escutcheons/seal for all field penetrations				F&I	F&I	F&I		
68	Balancing of fans at factory			F					
69	Balancing of fans in the field if required				F				
70	Programming and Testing of VFD's			L					
71	VFD installation			F&I					
72	VFD Wiring including power					F&I			
73	UV Light Fixture and Lamps, where specified			F&I					
74	Electrical connections between shipping splits, where required					F&I			
75	Gasket, Tape Sealer, Caulk between shipping splits, where required			F	I				
76	Clean Unit Prior to Start Up and Turn Over				L				
77	Condensate Trap				F & I				
78	Confirm proper depth of trap prior to pad and floor install. Coordinate requirements with Project Superintendent	A			L				
79	DDC Interface, Wiring, programing, and Graphics for RTU controls on DDC Head End						F & I		
80	Programming of Controls						L		
81	Shims for field adjustment of fans and motors			A	F & I				
82	Mounting and wiring of any sensors outside of the units including CO2, wall, and duct mounted, sensors						F & I		
83	Airflow Monitoring Probes				F&I		A		
84	Drain pipes from unit drain pans to roof drain				F&I				
85	Separate devices furnished by manufacturer and not factory installed				F&I				
86	Seismic Curbs			F	I				
87	Linkage and Damper Actuator						F&I		
88	Damper			F	I		A		
89	Duct pressure switch				F&I				
90	**Refrigerant and Filters**								
91	Filter Clips and/or Clamps			F	I				
92	Any and all Field work, and field installed parts, pieces, and/or equipment				F&I				
93	Provide MRE and MRC efficiency values			F					
94	**Electric Duct Mounted Heating**								
95	Duct Mounted heating elements				F&I				
96	Electrical connections for Duct Mounted elements, including power					F&I			
97	**INSTALLATION**								
98	Install the products according to the approved plans, specifications, and Authorities Having Jurisdiction.	A			I	I	I	I	
99	Fill with appropriate volume of Propylene Glycol if needed				F,I				
100	Protect installed material from damage	L			F, I	F, I			
101	Provide for ALL piping, conduit, wiring, connections, power, controls, etc. not provided with Prepurchased Material, Product or Equipment	L	A		F, I	F, I			
102	Provide for ALL housekeeping pad layouts, vibration isolation, Snubbers, bases, anchors, supports, brackets, etc. not provided with Prepurchased Material, Product or Equipment	L	A		F, I				Housekeepign pads are furnished and isntalled by BP#10 Concrete Subcontractor.
103	Provide for ALL gauges, valves, actuators, etc. not provided with Prepurchased Material, Product or Equipment	L	A		F, I				
104	Provide for ALL accessories, hardware, external components, etc. not provided with Prepurchased Material, Product or Equipment	L			F, I	F, I			
105	Provide Onsite Technical Support and Witness of Installation		A	L					As Required
106	**CHANGE ORDERS**								
107	Evaluate contract documents for changes, assemble COR	L	A	F	F	F	F		
108	Assemble material COR's once COR quantities received	L	F						
109	Provide quantities of material changes for each COR	A	A	F	F	F	F		
110	**ACCEPTANCE, WARRANTY AND CLOSEOUT**								
111	Perform Installation Inspection	A	A	A	A	A	A	A	As Required
112	Provide Pre Start Up or Installation Checklist		A	L,F	L,F	L,F	L,F	A	
113	Provide Start Up / Installation / Commissioning Procedure		A	L	A	A	A	A	
114	Perform Start Up. For Plug and Play or Material, confirm product functionality	A	A	L	A	A	A		As Required
115	Attend Pre-commissioning meeting	L	A	A	A	A	A	A	Design team, CxA
116	Provide for Assistance during Commissioning		A	A	L	L	L	L	
117	Provide for Assistance during Field testing		A	A	L	L	L	L	
118	Provide for Assistance during Owner training		A	L	A	A	A		
119	Provide all O&M manuals		A	F					
120	Provide all attic stock and spare parts	A	A	F					
121	Provide for Material/Equipment/Parts warranty		A	F					
122	Provide for Material/Equipment/Labor warranty (Labor for Replacement)		A	F					
123	Provide for Installation labor warranty				F	F	F		
124	Provide for Trouble shooting during warranty period		A	A	L	L	L		
125	Provide for Building controls parts / labor warranty						F,L		
126	Provide Temporary Use Maintenance				F,L	F,L	F,L		
127	Provide for Manufacturer or Specified Warranty Certificates		A	F					

ATTACHMENT C - COORDINATION MATRIX - BP#2 - DOAS

Turner

Greenwich Central Middle School – State Project No. 057-0114N
9 Indian Rock Ln. Greenwich, CT
8/13/2024

Material procurement for this project is supplied by Turner Construction. This matrix coordinates responsibility for the scopes identified.

Key	
F	Furnish
I	Install
L	Lead
A	Assist

		CM/GC	SourceBlue	Product Vendor / Rep	Trade Partner-MECH	Trade Partner - ELEC	Trade Partner - BMS	Trade Partner - OTHER	Notes / Includes Manufacturer / Vendor coordination
1	**SUBMITTALS & COORDINATION**								
2	Submit product data	A	A	L, F					
3	Publish material lead times (Production & shipping)		A	L, F					
4	Publish Required on Job (ROJ) Dates	F,L	A	A	A				
5	Provide shop drawings		A	L, F					
6	Submit shop drawings to design team for approval	L, F	A	A					
7	Publish approved Shop Drawings and submittals	L, F	A	A					
8	Review approved submittals and ensure that comments are acceptable	F	A	A	L	L	L	L	
9	Field measurements for coordination or confirmation of shop drawings	L	A	L, F	L	L	L	L	
10	Meet Requirements of Material, Product, Equipment Specification Section	A	A	L					
11	Meet ALL Code and Jurisdictional Requirements of Material, Product, Equipment	A	A	L					
12	Provide ALL Material, Product, Equipment seismic calculations and/or certifications	A	A	L					
13	Provide ALL System/Building/Anchorage seismic calculations and/or certifications	L	A	L	F&I				
14	**MATERIAL ORDERS & PRODUCTION**								
15	Formal notice to release vendor to fabricate	L	F						
16	Vendor's factory or warehouse site visit	A	L	L, F	A	A	A	A	As Required
17	Provide identification on packaging (i.e. shipping labels)	A	A	L, F					
18	**DELIVERY, STORAGE AND HANDLING**								
19	Provide material delivery (protection, ocean, trucking)	A	A	L, F					
20	Publish delivery schedule and delivery locations	A	A	L	L				
21	Provide unloading equipment	A			F				
22	Store equipment in a suitable location as per manufacturers directions for up to a year's time				F				
23	Provide maintenance if equipment is going to sit for more than one month				F&I				
24	Receive deliveries (inspect, inventory, and sign off on Receipt Verification Form)	A	L	A	L,F				SB to verify and inspect with Trade Partner
25	Offload delivered material.				L, F				
26	Make any material breakage claims within 5 calendar days from delivery of the product. After which it is assumed breakage is the responsibility of the installing contractor				L, F				Transfer of care and custody of material
27	**FIELD COORDINATION**								
28	Attend coordination meeting (s)	L	A	A	A	A	A	A	
29	Coordinate installation (including assembly, location and connections)	A	A	A	L	L	L	L	
30	**DOAS**								
31	Internal seismic vibration isolation as per spec			F&I					
32	Assemble units if shipped in sections (manufacturer to provide direction if needed)			A	F&I	A			
33	For buildings with Aluminum wire, provide approved Aluminum-to-Copper junction					F&I			
34	All mechanical/plumbing piping, mechanical ductwork connections, and associated hardware and accessories				F&I				
35	All power conduit, wiring, and terminations					F&I			
36	All Building Automation system controls and interface with equipment, including low voltage wiring						F&I		
37	Housekeeping bad and/or inertia base and submit to A/E for approval	A	A					F&I	Housekeeping pads and/or inertia base furnished and installed by BP#10 Concrete Subcontractor.
38	BACnet interface			F			I		
39	Motor starters and/or VFD's			F		I			
40	If starter is provided by others, provide coordination to ensure starter/equipment are compatible. For example, torque requirements, size…			A	A	A	A	A	
41	Disconnect switch			F		I			
42	Duct silencers				F&I				
43	Externally wrapped insulation				F&I				
44	Internal insulation			F&I					
45	Check belt tension if needed				L				
46	Assemble units shipped in sections (manufacturer to provide direction if needed)			A	L				
47	Mounting and wiring of any sensors outside of the units including wall, and duct mounted, sensors						F & I		
48	Start up		A	L	A	A	A		
49	Start up reports			F	F	F	F		
50	Engage qualified testing agency to perform tests and inspections				A			A	Owner
51	All field testing referenced in specifications			F	F	F	F		
52	All factory testing referenced in specifications			F&I					
53	Anchor bolts or welds for installation of unit to curb			F	I				
54	Design and install curb to building structure attachment				F&I				
55	External vibration				F&I				
56	Internal vibration isolation			F & I					
57	Hardware to assemble units shipped in sections			F	I				
58	Assemble components shipped loose: (i.e. filters and mixing boxes)			F	I				
59	Cleaning of mechanical equipment and mechanical rooms prior to substantial completion				F				
60	Provide list of all components shipping loose		A	F					
61	Isolation valves, motorized valves, gauges, actuators and control valves				F & I		F & I		
62	Disconnect switch (Separate from Starter/VFD)					F & I			
63	Duct Smoke detectors				I	F			
64	Power conduit, wiring, and terminations to Duct Smoke Detectors					F&I			
65	Control conduit, wiring, terminations, and programming to Duct Smoke Detectors						F&I		
66	Fire Smoke / Smoke Dampers				F & I				
67	Fire alarm wiring					F&I			
68	Installation of all actuators for dampers				F&I				
69	Insulation of coil piping internal to air handling unit			F&I					
70	Drain pan			F & I					
71	Initial filters and belts			F	I				
72	Spare filters and belts			F	I				
73	Motor alignment			L	L				
74	Check belt tension (if belt driven fan)				L				

ATTACHMENT C - COORDINATION MATRIX - BP#2 - DOAS

Greenwich Central Middle School – State Project No. 057-0114N
9 Indian Rock Ln. Greenwich, CT
8/13/2024

Material procurement for this project is supplied by Turner Construction. This matrix coordinates responsibility for the scopes identified.

Key	
F	Furnish
I	Install
L	Lead
A	Assist

		CM/GC	SourceBlue	Product Vendor / Rep	Trade Partner-MECH	Trade Partner - ELEC	Trade Partner - BMS	Trade Partner - OTHER	Notes / Includes Manufacturer / Vendor coordination
75	**DOAS Cont.**								
76	Air balancing			A	L	A	A		
77	Escutcheons/seal for all Factory penetrations			F&I					
78	Escutcheons/seal for all field penetrations				F&I	F&I	F&I		
79	Balancing of fans at factory			F					
80	Balancing of fans in the field if required				F				
81	Programming and Testing of VFD's			L					
82	VFD installation			F&I					
83	VFD Wiring including power					F&I			
84	UV Light Fixture and Lamps, where specified			F&I					
85	Electrical connections between shipping splits, where required					F&I			
86	Gasket, Tape Sealer, Caulk between shipping splits, where required			F	I				
87	Clean Unit Prior to Start Up and Turn Over				L				
88	Condensate Trap				F & I				
89	Confirm proper depth of trap prior to pad and floor install. Coordinate requirements with Project Superintendent	A			L				
90	DDC Interface, Wiring, programing, and Graphics for RTU controls on DDC Head End						F & I		
91	Programming of Controls						L		
92	Shims for field adjustment of fans and motors			A	F & I				
93	Mounting and wiring of any sensors outside of the units including CO2, wall, and duct mounted, sensors						F & I		
94	Airflow Monitoring Probes				F&I		A		
95	Drain pipes from unit drain pans to roof drain				F&I				
96	Separate devices furnished by manufacturer and not factory installed				F&I				
97	Seismic Curbs			F	I				
98	Linkage and Damper Actuator						F&I		
99	Damper			F	I		A		
100	Duct pressure switch				F&I				
101	**Refrigerant and Filters**								
102	Filter Clips and/or Clamps			F	I				
103	Any and all Field work, and field installed parts, pieces, and/or equipment				F&I				
104	Provide MRE and MRC efficiency values			F					
105	**Electric Duct Mounted Heating**								
106	Duct Mounted heating elements				F&I				
107	Electrical connections for Duct Mounted elements, including power					F&I			
108	**INSTALLATION**								
109	Install the products according to the approved plans, specifications, and Authorities Having Jurisdiction.	A			I	I	I	I	
110	Fill units with appropriate volume of Propylene Glycol				F&I				
111	Protect installed material from damage	L			F, I	F, I	F, I		
112	Provide for ALL piping, conduit, wiring, connections, power, controls, etc. not provided with Prepurchased Material, Product or Equipment	L	A		F, I	F, I	F, I		
113	Provide for ALL housekeeping pads, vibration isolation, Snubbers, bases, anchors, supports, brackets, etc. not provided with Prepurchased Material, Product or Equipment	L	A		F, I				Housekeeping pads furnished and installed by BP#10 Concrete Subcontractor.
114	Provide for ALL gauges, valves, actuators, etc. not provided with Prepurchased Material, Product or Equipment	L	A		F, I		F, I		
115	Provide for ALL accessories, hardware, external components, etc. not provided with Prepurchased Material, Product or Equipment	L			F, I	F, I	F, I		
116	Provide Onsite Technical Support and Witness of Installation		A	L					As Required
117	**CHANGE ORDERS**								
118	Evaluate contract documents for changes, assemble COR	L	A	F	F	F	F		
119	Assemble material COR's once COR quantities received	L	F						
120	Provide quantities of material changes for each COR	A	A	F	F	F	F		
121	**ACCEPTANCE, WARRANTY AND CLOSEOUT**								
122	Perform Installation Inspection	A	A	A	A	A	A	A	As Required
123	Provide Pre Start Up or Installation Checklist		A	L,F	L,F	L,F	L,F	A	
124	Provide Start Up / Installation / Commissioning Procedure		A	L	A	A	A	A	
125	Perform Start Up. For Plug and Play or Material, confirm product functionality	A	A	L	A	A	A		As Required
126	Attend Pre-commissioning meeting	L	A	A	A	A	A	A	Design team, CXA
127	Provide for Assistance during Commissioning		A	A	L	L	L	L	
128	Provide for Assistance during Field testing		A	A	L	L	L	L	
129	Provide for Assistance during Owner training	A	A	L	A	A	A		
130	Provide all O&M manuals		A	F					
131	Provide all attic stock and spare parts	A	A	F					
132	Provide for Material/Equipment/Parts warranty		A	F					
133	Provide for Material/Equipment/Labor warranty (Labor for Replacement)		A	F					
134	Provide for Installation labor warranty				F	F	F		
135	Provide for Trouble shooting during warranty period		A	A	L	L	L		
136	Provide for Building controls parts / labor warranty						F,L		
137	Provide Temporary Use Maintenance				F,L	F,L	F,L		
138	Provide for Manufacturer or Specified Warranty Certificates		A	F					

ATTACHMENT C - COORDINATION MATRIX - BP #03 Chillers

Greenwich Central Middle School - State Project No. 057-0114N
9 Indian Rock Lane, Greenwich, CT
8/13/2024

Material procurement for this project is supplied by SourceBlue. This matrix coordinates responsibility for the scopes identified.

Key	
F	Furnish
I	Install
L	Lead
A	Assist

		CM/GC	SourceBlue (SB)	Product Vendor / Rep	Trade Partner - MECH	Trade Partner - ELEC	Trade Partner - BMS	Trade Partner - OTHER	Notes SB column includes Manufacturer/Ven
1	**SUBMITTALS & COORDINATION**								
2	Submit product data	A	A	L, F					
3	Publish material lead times (Production & shipping)		A	L, F					
4	Publish Required on Job (ROJ) Dates	F,L	A	A	A				
5	Provide shop drawings		A	L, F					
6	Submit shop drawings to design team for approval	L, F	A	A					
7	Publish approved Shop Drawings and submittals	L, F	A	A					
8	Review approved submittals and ensure that comments are acceptable	F	A	A	L	L	L		
9	Field measurements for coordination or confirmation of shop drawings	L	A	L, F	L	L	L		
10	Meet Requirements of Material, Product, Equipment Specification Section	A	A	L					
11	Meet ALL Code and Jurisdictional Requirements of Material, Product, Equipment	A	A	L					
12	Provide ALL Material, Product, Equipment seismic calculations and/or certifications	A	A	L					
13	Provide ALL System/Building/Anchorage seismic calculations and/or certifications	L	A	L	F&I				
14	**MATERIAL ORDERS & PRODUCTION**								
15	Formal notice to release vendor to fabricate	L	F						
16	Vendor's factory or warehouse site visit	A	L	L, F	A	A	A		As Required
17	Provide identification on packaging (i.e. shipping labels)	A	A	L, F					
18	**DELIVERY, STORAGE AND HANDLING**								
19	Provide material delivery (protection, ocean, trucking)	A	A	L, F					
20	Publish delivery schedule and delivery locations	A	A	L	L				
21	Provide unloading equipment	L			F				
22	Store equipment in a suitable location as per manufacter's directions for up to 12 months.				F				
23	Receive deliveries (inspect, inventory, and sign off on Receipt Verification Form)	A	L	A	L,F				SB to verify and inspect with Trade Partner
24	Offload delivered material.				L, F				
25	Provide maintenance if equipment is going to sit for more than 1 month (ie: fan rotation, grease bearings, etc)				F&I				
26	Make any material breakage claims within 5 calendar days from delivery of the product. After which it is assumed breakage is the responsibility of the installing contractor				L, F				Transfer of care and custody of material
25	Provide COI for all offsite stored material.				F				
27	**FIELD COORDINATION**								
28	Attend coordination meeting (s)	L	A	A	A	A	A		
29	Coordinate installation (including assembly, location and connections)	A	A	A	L	L	L		
30	**AIR COOLED CHILLERS**								
31	ALL mechanical piping, mechanical connections and associated hardware and accessories.				F&I				
32	ALL power conduit, wiring and terminations					F&I			
33	ALL Building Automation System controls and interface with equipment, including low voltage wiring						F&I		
34	Housekeeping Pad and/or Intertia base and submit to A/E for Approval	A	A					Other (BP 10 Concrete)	BP #10 Concrete - F&I
35	Design and Install Attachment of Unit to Concrete Pad				F&I				
36	Interface card			F&I					
37	Power wiring to Interface Card					F&I			
38	Interconnect Wiring to Interface Card						F&I		
39	Motor starters and/or VFD's			F&I					
40	VFD wiring to Motor			F&I					
41	Power wiring and terminations (VFD to panel)					F&I			
42	Lugs			F		I			
43	Increased junction box size as required to meet conduit bend radius					F&I			
44	Assemble components shipped loose (i.e.: flow switch)			F	I				
45	Remote Evaporator (If applicable)			F	I				
46	Remote Economizer (If applicable)			F	I				
47	Isolation valves				F&I				
48	Motorized valves, temperature and pressure gauges				F&I				
49	Control panel			F&I					
50	Internal Insulation			F&I					
51	Initial charge of refrigerant/oil			F&I					
52	Water-flow sensing device			F	I				
53	Refrigerant monitoring system			F	I				
54	Subcomponents of refrigerant monitoring system including break glass switches, SCBA, remote beacon, alarms, strobes, silence switch, remote reset switch.				F&I				
55	Refrigerant relief valves			F	I				
56	Refrigerant relief piping				F&I				
57	Ducting of purge system				F&I				
58	Air separator				F&I				
59	Expansion tanks				F&I				
60	Chemical treatment				F&I				
61	Water balancing				L	A	A		
62	**INSTALLATION**								
63	Install the products according to the approved plans, specifications, and Authorities Having Jurisdiction.	A			I	I	I		
64	Protect installed material from damage	L			F, I				
65	Provide for ALL piping, conduit, wiring, connections, power, controls, etc. not provided with Prepurchased Material, Product or Equipment	L			F, I	F, I	F, I		
66	Provide for ALL **housekeeping pad layout,** vibration isolation, Snubbers, bases, anchors, supports, brackets, etc. not provided with Prepurchased Material, Product or Equipment	L		F	I			Concrete	Housekeeping pads furnished and installed by BP #10 Concrete Subcontractor.
67	Provide for ALL gauges, valves, actuators, etc. not provided with Prepurchased Material, Product or Equipment	L			F, I		F, I		
68	Provide for ALL accessories, hardware, external components, etc. not provided with Prepurchased Material, Product or Equipment	L			F, I	F, I	F, I		
69	Provide Onsite Technical Support and Witness of Installation		A	L					As Required
70	**CHANGE ORDERS**								
71	Evaluate contract documents for changes, assemble COR	L	A	F	F	F	F		
72	Assemble material COR's once COR quantities received	L	F						
73	Provide quantities of material changes for each COR	A	A	F	F	F	F		
74	**ACCEPTANCE, WARRANTY AND CLOSEOUT**								
75	Perform Installation Inspection	A	A	A	A	A	A		As Required
76	Provide Pre Start Up or Installation Checklist		A	L,F	L,F	L,F	L,F		
77	Provide Start Up / Installation / Commissioning Procedure		A	L	A	A	A		
78	Perform Start Up. For Plug and Play or Material, confirm product functionality	A	A	L	A	A	A		As Required
79	Attend Pre-commissioning meeting	L	A	A	A	A	A	A (design team, CxA)	
80	Provide for Assistance during Commissioning		A	A	L	L	L		
81	Provide for Assistance during Field testing		A	A	L	L	L		
82	Provide for Assistance during Owner training		A	L	A	A	A		
83	Provide all O&M manuals		A	F					
84	Provide all attic stock and spare parts	A	A	F					
85	Provide for Material/Equipment/Parts warranty		A	F					
86	Provide for Material/Equipment/Labor warranty (Labor for Replacement)		A	F	~~A~~	~~A~~	~~A~~		
87	Provide for Installation labor warranty				F	F	F		
88	Provide for Trouble shooting during warranty period		A	L	L	L	L		
89	Provide for Building controls parts / labor warranty						F,L		
90	Provide Temporary Use Maintenance				F,L	F,L	F,L		
91	Provide for Manufacturer or Specified Warranty Certificates		A	F					

ATTACHMENT C - COORDINATION MATRIX - BP #06 Generator & ATS

Greenwich Central Middle School - State Project No. 057-0114N
9 Indian Rock Lane, Greenwich, CT
8/14/2024

Material procurement for this project is supplied by SourceBlue. This matrix coordinates responsibility for the scopes identified.

Key	
F	Furnish
I	Install
L	Lead
A	Assist

		CM/GC	SourceBlue (SB)	Product Vendor / Rep	Trade Partner - MECH	Trade Partner - ELEC	Trade Partner - BMS	Trade Partner - OTHER	Notes SB column includes Manufacturer/Ven
1	**SUBMITTALS & COORDINATION**								
2	Submit product data	A	A	L, F		A	A		
3	Publish material lead times (Production & shipping)		A	L, F					
4	Publish Required on Job (ROJ) Dates	F,L	A	A		A	A		
5	Provide shop drawings		A	L, F					
6	Submit shop drawings to design team for approval	L	A	A					
7	Publish approved Shop Drawings and submittals	L	A	A					
8	Review approved submittals and ensure that comments are acceptable	L	A	A		L	L		
9	Field measurements for coordination or confirmation of shop drawings	L	A	L, F					
10	Meet Requirements of Material, Product, Equipment Specification Section	A	A	L					
11	Meet ALL Code and Jurisdictional Requirements of Material, Product, Equipment	A	A	L					
12	Provide ALL Material, Product, Equipment seismic calculations and/or certifications	A	A	L					
13	Provide ALL System/Building/Anchorage seismic calculations and/or certifications	A	A	L		F&I	F&I		
14	**MATERIAL ORDERS & PRODUCTION**								
15	Formal notice to release vendor to fabricate	L	F						
16	Vendor's factory or warehouse site visit	A	L	L, F	A	A	A		As Required
17	Provide identification on packaging (i.e. shipping labels)		A	L, F					
18	**DELIVERY, STORAGE AND HANDLING**								
19	Provide material delivery (protection, ocean, trucking)	A	A	L, F					
20	Publish delivery schedule and delivery locations	L	A	A		L			
21	Provide unloading equipment	L				F			
22	Receive deliveries (inspect, inventory, and sign off on Receipt Verification Form)	A	L	A		L, F			SB to verify and inspect with Trade Partner
23	Offload delivered material.					L, F			
24	Make any material breakage claims within 5 calendar days from delivery of the product. After which it is assumed breakage is the responsibility of the installing contractor					L, F			Transfer of care and custody of material
25	**FIELD COORDINATION**								
26	Attend coordination meeting (s)	L	A	A	A	A	A		
27	Coordinate installation (including assembly, location and connections)	A	A	A	L	L	L		
28	**TRANSFER SWITCHES**								
29	ATS		F	F		I			
30	ATS controller		F	F		I			
31	ATS remote annunciator		F	F		I			
32	Meeting Code Requirements for Equipment Seismic Certifications		L	L		F&I			
33	Seismic Calculations for Anchorage					F&I			
34	Meeting Seismic Code Requirements for Anchorage and Installation					F&I			
35	Connection Lugs			F&I					
36	Fuses			F&I					
37	Installation of all ship loose materials, including but not limited to main, distribution and branch circuit breakers, fuses, and connection lugs			F		I			
38	Power Monitors		A	F&I					
39	Interface Power Monitoring with Building Controls		A	A			F&I		
40	Customer Metering					F&I	A		
41	Utility Metering and Coordination					F&I	A		
42	Connect Bus Joints and Align Switchgear		A	A		I			
43	All Cabling and Interconnects					F&I			
44	Coordination of Top and Bottom Feeds		A	A		L			
45	Verify Correct CB Trip Settings					L			
46	**GENERATOR PACKAGE**								
47	Accessories (i.e.: terminal blocks, I/O cards, relays)		A	F&I		A			
48	Generator mounted vibration isolators		A	F&I					
49	Meeting Code Requirements for Equipment Seismic Certifications		L	L					
50	Seismic Calculations and hardware for Anchorage	A				L			
51	Meeting Seismic Code Requirements for Anchorage and Installation	A				L			
52	Meeting Sound Code Requirements for Equipment dBA Ratings		L	L					
53	Meeting Emissions Code Requirements for Equipment, Including Sensitive Receptor Particulate Filters per specs.		L	L					
54	Meeting Fuel Code Requirements for Equipment Package		L	L					
55	Permits and other permits required by the project's specifications.					L			
56	Provide equipment required to meet current SCAQMD emissions standards		A	F&I					
57	Generator CBs (unit mounted)		A	F&I					
58	Generator CBs (remote mounted)		A	F		I	I		
59	If unit mounted, batteries, battery charger(s), and battery heaters		A	F&I					
60	If remote mounted, batteries, battery charger(s), and battery heaters		A	F		I			
61	If unit mounted, generator control panel and control panel heater		A	F&I					
62	If remote mounted, generator control panel and control panel heater		A	F		I	I		
63	Generator SCADA system		A	F		I	I		Power by EC, Monitoring points by BAS
64	Generator Remote start/stop		A	F		I			
65	Generator Remote annunciator		A	F		I	I		Power by EC, Monitoring points by BAS
66	Generator Remote monitoring equipment		A	F		I	I		Power by EC, Monitoring points by BAS
67	If generator enclosure, provide and install louvers		A	F&I					
68	If generator enclosure, provide and install space heater		A	F&I					
69	If indoor generator, provide and install space heater		A	F	I	I			
70	If generator enclosure, provide and install raincaps and piping		A	F&I					
71	If generator enclosure, provide and install exhaust silencer/muffler, flex, and associated hardware		A	F&I					
72	If exhaust silencer/muffler, flex, and associated hardware are shipped separately		A	F	I				
73	If indoor generator, exhaust silencer/muffler, flex and associated hardware		A	F	I				
74	Day/ subbase tank (shipped with assembled unit)		A	F&I					
75	If day/ subbase tank is shipped separately due to size restraints		A	F	I				
76	Control wiring and power feeds to remote fuel tank					F&I	F&I		Power by EC, Monitoring points by BAS
77	Fuel flexes		A	F	I				
78	If remote radiator		A	F	I				
79	If unit mounted radiator			F&I					
80	Glycol		A	F					
81	Care, custody, handling and install of glycol				L&I				
82	**INSTALLATION**								
83	Install the products according to the approved plans, specifications, and Authorities Having Jurisdiction.	A			I	I	I		
84	Protect installed material from damage	L				F, I			
85	Provide for ALL piping, conduit, wiring, connections, power, controls, etc. not provided	L				F, I	F, I		
86	Provide for ALL housekeeping pads, vibration isolation, Snubbers, bases, anchors, supports, brackets, etc. not provided with Prepurchased Material, Product or Equipment	L						F, I	Housekeeping pads with concrete subcontractor
87	Provide for ALL gauges, valves, actuators, etc. not provided with Prepurchased	L					F, I		
88	Provide for ALL accessories, hardware, external components, etc. not provided with Prepurchased Material, Product or Equipment	L		A		F, I	F, I		see shipped loose equipment sheet
89	Provide Onsite Technical Support and Witness of Installation		A	L					As Required
90	**CHANGE ORDERS**								
91	Evaluate contract documents for changes, assemble COR	L	A	F	F	F	F		
92	Assemble material COR's once COR quantities received	L	F	F	F	F	F		
93	Provide quantities of material changes for each COR	A	A	F	F	F	F		
94	**ACCEPTANCE, WARRANTY AND CLOSEOUT**								
95	Perform Installation Inspection	A	A	A	A	A	A		As Required
96	Provide Pre Start Up or Installation Checklist		A	L	A	A	A		
97	Provide Start Up / Installation / Commissioning Procedure		A	L	A	A	A		
98	Perform Start Up. For Plug and Play or Material, confirm product functionality	A	A	L					As Required
99	Attend Pre-commissioning meeting	L	A	A	A	A	A		

ATTACHMENT C - COORDINATION MATRIX - BP #06 Generator & ATS

Greenwich Central Middle School - State Project No. 057-0114N
9 Indian Rock Lane, Greenwich, CT
8/14/2024

Material procurement for this project is supplied by SourceBlue. This matrix coordinates responsibility for the scopes identified.

Key	
F	Furnish
I	Install
L	Lead
A	Assist

		CM/GC	SourceBlue (SB)	Product Vendor / Rep	Trade Partner - MECH	Trade Partner - ELEC	Trade Partner - BMS	Trade Partner - OTHER	Notes SB column includes Manufacturer/Ven
100	Provide for Assistance during Commissioning		A	A	L	L	L		
101	Provide for Assistance during Field testing		A	A	L	L	L		
102	Provide for Assistance during Owner training		A	A	L	L	L		
103	Provide all O&M manuals		A	F					
104	Provide all attic stock and spare parts	A	A	F					
105	Provide for Material/Equipment/Parts warranty		A	F					
106	Provide for Material/Equipment/Labor warranty (Labor for Replacement)		A	L	A	A	A		
107	Provide for Installation labor warranty				F	F	F		
108	Provide for Trouble shooting during warranty period		A	A	L	L	L		
109	Provide for Building controls parts / labor warranty						F,L		
110	Provide Temporary Use Maintenance				F,L	F,L	F,L		
111	Provide for Manufacturer or Specified Warranty Certificates		A	F					

ATTACHMENT C - COORDINATION MATRIX - BP#7 - HRV

Turner

Greenwich Central Middle School – State Project No. 057-0114N
9 Indian Rock Ln. Greenwich, CT
8/13/2024

Material procurement for this project is supplied by Turner Construction. This matrix coordinates responsibility for the scopes identified.

Key	
F	Furnish
I	Install
L	Lead
A	Assist

		CM/GC	Pre-purchase Manager	Product Vendor / Rep	Trade Partner-MECH	Trade Partner - ELEC	Trade Partner - BMS	Trade Partner - OTHER	Notes / Includes Manufacturer / Vendor coordination
1	**SUBMITTALS & COORDINATION**								
2	Submit product data	A	A	L, F					
3	Publish material lead times (Production & shipping)		A	L, F					
4	Publish Required on Job (ROJ) Dates	F,L	A	A	A				
5	Provide shop drawings		A	L, F					
6	Submit shop drawings to design team for approval	L, F	A	A					
7	Publish approved Shop Drawings and submittals	L, F	A	A					
8	Review approved submittals and ensure that comments are acceptable	F	A	A	L	L	L	L	
9	Field measurements for coordination or confirmation of shop drawings	L	A	L, F	L	L	L	L	
10	Meet Requirements of Material, Product, Equipment Specification Section	A	A	L					
11	Meet ALL Code and Jurisdictional Requirements of Material, Product, Equipment	A	A	L					
12	Provide ALL Material, Product, Equipment seismic calculations and/or certifications	A	A	L					
13	Provide ALL System/Building/Anchorage seismic calculations and/or certifications	L	A	L	F&I				
14	**MATERIAL ORDERS & PRODUCTION**								
15	Formal notice to release vendor to fabricate	L	F						
16	Vendor's factory or warehouse site visit	A	L	L, F	A	A	A	A	As Required
17	Provide identification on packaging (i.e. shipping labels)	A	A	L, F					
18	**DELIVERY, STORAGE AND HANDLING**								
19	Provide material delivery (protection, ocean, trucking)	A	A	L, F					
20	Publish delivery schedule and delivery locations	A	A	L	L				
21	Provide unloading equipment	A			F				
22	Store equipment in a suitable location as per manufacturers directions for up to a year's time				F				
23	Provide maintenance if equipment is going to sit for more than one month				F&I				
23	Receive deliveries (inspect, inventory, and sign off on Receipt Verification Form)	A	L	A	L,F				SB to verify and inspect with Trade Partner
24	Offload delivered material.				L, F				
25	Make any material breakage claims within 5 calendar days from delivery of the product. After which it is assumed breakage is the responsibility of the installing contractor				L, F				Transfer of care and custody of material
26	**FIELD COORDINATION**								
27	Attend coordination meeting (s)	L	A	A	A	A	A	A	
28	Coordinate installation (including assembly, location and connections)	A	A	A	L	L	L	L	
29	**DOAS**								
30	Internal seismic vibration isolation as per spec			F&I					
31	Assemble units if shipped in sections (manufacturer to provide direction if needed)			A	F&I	A			
32	For buildings with Aluminum wire, provide approved Aluminum-to-Copper junction					F&I			
33	BACnet interface			F			I		
34	All mechanical/plumbing piping, mechanical ductwork connections, and associated hardware and accessories				F&I				
35	All power conduit, wiring, and terminations					F&I			
36	All Building Automation system controls and interface with equipment, including low voltage wiring						F&I		
37	Housekeeping bad and/or inertia base and submit to A/E for approval	A	A					F&I	Housekeeping pads and/or inertia base furnished and installed by BP#10 Concrete Subcontractor.
34	Motor starters and/or VFD's			F&I					
35	If starter is provided by others, provide coordination to ensure starter/equipment are compatible. For example, torque requirements, size…			A	A	A	A	A	
36	Disconnect switch			F		I			
37	Duct silencers				F&I				
38	Externally wrapped insulation				F&I				
39	Internal insulation			F&I					
40	Check belt tension if needed				L				
41	Assemble units shipped in sections (manufacturer to provide direction if needed)			A	L				
42	Mounting and wiring of any sensors outside of the units including wall, and duct mounted, sensors						F & I		
43	Start up		A	L	A	A	A		
44	Start up reports			F	F	F	F		
45	Engage qualified testing agency to perform tests and inspections				A			A	Owner
46	All field testing referenced in specifications			F	F	F	F		
47	All factory testing referenced in specifications			F&I					
48	Anchor bolts or welds for installation of unit to curb			F	I				
49	Design and install curb to building structure attachment				F&I				
48	External vibration				F&I				
49	Internal vibration isolation			F & I					
50	Hardware to assemble units shipped in sections			F	I				
51	Assemble components shipped loose: (i.e. filters and mixing boxes)			F	I				
52	Cleaning of mechanical equipment and mechanical rooms prior to substantial completion				L				
53	Provide list of all components shipping loose		A	F					
54	Isolation valves, motorized valves, gauges, actuators and control valves				F & I		F & I		
55	Disconnect switch (Separate from Starter/VFD)					F & I			
56	Duct Smoke detectors				I	F			
57	Power conduit, wiring, and terminations to Duct Smoke Detectors					F&I			
58	Control conduit, wiring, terminations, and programming to Duct Smoke Detectors						F&I		
59	Fire Smoke / Smoke Dampers				F & I				
60	Fire alarm wiring					F&I			
56	Duct Smoke detectors				I	F			
57	Fire Smoke / Smoke Dampers				F & I				
58	Installation of all actuators for dampers				F&I				
59	Insulation of coil piping internal to air handling unit			F & I					
60	Drain pan			F & I					
61	Initial filters and belts			F	I				
62	Spare filters and belts			F	I				
63	Motor alignment			L	L				
64	Check belt tension (if belt driven fan)				L				

ATTACHMENT C - COORDINATION MATRIX - BP#7 - HRV

Turner

Greenwich Central Middle School – State Project No. 057-0114N
9 Indian Rock Ln. Greenwich, CT
8/13/2024

Material procurement for this project is supplied by Turner Construction. This matrix coordinates responsibility for the scopes identified.

Key	
F	Furnish
I	Install
L	Lead
A	Assist

		CM/GC	Pre-purchase Manager	Product Vendor / Rep	Trade Partner-MECH	Trade Partner - ELEC	Trade Partner - BMS	Trade Partner - OTHER	Notes / Includes Manufacturer / Vendor coordination
65	**DOAS Cont.**								
66	Air balancing				L				
67	Escutcheons/seal for all Factory penetrations			F&I					
68	Escutcheons/seal for all field penetrations				F&I				
69	Balancing of fans at factory			F					
70	Balancing of fans in the field if required				F				
71	Programming and Testing of VFD's			L					
72	VFD installation			F&I					
73	VFD Wiring including power					F&I			
74	UV Light Fixture and Lamps, where specified			F&I					
75	Electrical connections between shipping splits, where required					F&I			
76	Gasket, Tape Sealer, Caulk between shipping splits, where required			F	I				
77	Clean Unit Prior to Start Up and Turn Over				L				
78	Condensate Trap				F & I				
79	Confirm proper depth of trap prior to pad and floor install. Coordinate requirements with Project Superintendent	A			L				
80	DDC Interface, Wiring, programing, and Graphics for RTU controls on DDC Head End						F & I		
81	Programming of Controls						L		
82	Shims for field adjustment of fans and motors			A	F & I				
83	Mounting and wiring of any sensors outside of the units including CO2, wall, and duct mounted, sensors						F & I		
84	Airflow Monitoring Probes				F&I		A		
85	Drain pipes from unit drain pans to roof drain				F&I				
86	Separate devices furnished by manufactrurer and not factory installed				F&I				
87	Seismic Curbs			F	I				
88	Duct pressure switch				F&I				
89	**Refrigerant and Filters**								
#REF!	Filter Clips and/or Clamps			F	I				
#REF!	Any and all Field work, and field installed parts, pieces, and/or equipment				F&I				
#REF!	Provide MRE and MRC efficiency values			F					
#REF!	**Electric Duct Mounted Heating**								
#REF!	Duct Mounted heating elements				F&I				
#REF!	Electrical connections for Duct Mounted elements, including power					F&I			
#REF!	**INSTALLATION**								
#REF!	Install the products according to the approved plans, specifications, and Authorities Having Jurisdiction.	A			I	I	I	I	
#REF!	Fill units with appropriate volume of Propylene Glycol				F&I				
#REF!	Protect installed material from damage	L	A		F, I	F, I	F, I		
#REF!	Provide for ALL piping, conduit, wiring, connections, power, controls, etc. not provided with Prepurchased Material, Product or Equipment	L	A		F, I	F, I	F, I		
#REF!	Provide for ALL housekeeping pads, vibration isolation, Snubbers, bases, anchors, supports, brackets, etc. not provided with Prepurchased Material, Product or Equipment	L	A		F, I				Housekeeping pads and/or inertia base furnished and installed
#REF!	Provide for ALL gauges, valves, actuators, etc. not provided with Prepurchased Material, Product or Equipment	L			F, I		F, I		
#REF!	Provide for ALL accessories, hardware, external components, etc. not provided with Prepurchased Material, Product or Equipment	L			F, I	F, I	F, I	F, I	
#REF!	Provide Onsite Technical Support and Witness of Installation		A	L					As Required
#REF!	**CHANGE ORDERS**								
#REF!	Evaluate contract documents for changes, assemble COR	L	A	F	F	F	F		
#REF!	Assemble material COR's once COR quantities received	L	F						
#REF!	Provide quantities of material changes for each COR	A	A	F	F	F	F		
#REF!	**ACCEPTANCE. WARRANTY AND CLOSEOUT**								
#REF!	Perform Installation Inspection	A	A	A	A	A	A	A	As Required
#REF!	Provide Pre Start Up or Installation Checklist		A	L, F	L, F	L, F	L, F	A	
#REF!	Provide Start Up / Installation / Commissioning Procedure		A	L	A	A	A	A	
#REF!	Perform Start Up. For Plug and Play or Material, confirm product functionality	A	A	L	A	A	A		As Required
#REF!	Attend Pre-commissioning meeting	L	A	A	A	A	A	A	Design Team, CxA
#REF!	Provide for Assistance during Commissioning		A	A	L	L	L	L	
#REF!	Provide for Assistance during Field testing		A	A	L	L	L	L	
#REF!	Provide for Assistance during Owner training		A	L	A	A	A		
#REF!	Provide all O&M manuals		A	F					
#REF!	Provide all attic stock and spare parts	A	A	F					
#REF!	Provide for Material/Equipment/Parts warranty		A	F					
#REF!	Provide for Material/Equipment/Labor warranty (Labor for Replacement)		A	F					
#REF!	Provide for Installation labor warranty				F	F	F		
#REF!	Provide for Trouble shooting during warranty period		A	A	L	L	L		
#REF!	Provide for Building controls parts / labor warranty						F,L		
#REF!	Provide Temporary Use Maintenance				F,L	F,L	F,L		
#REF!	Provide for Manufacturer or Specified Warranty Certificates		A	F					

Turner Connecticut
6 Corporate Drive,
Shelton, CT 06484

Rev. 06.11.2024

RECEIPT VERIFICATION FORM

(for storage of materials at a Subcontractor's facility)

Project Name: _____

Manufacturer/Vendor: _____

Receiving Entity: _____

Equipment / Product: _____

This is to certify that on this day,_____that_____(name of individual) of, _____(receiving entity), has received the materials, goods, or equipment described below or described per the attached bill of lading ("Materials") and found them to be without damage, visible or otherwise. This is to further certify that the Materials that are being received are for the above-named project and in the quantities indicated by the General Contractor.

By signature of this document dated,_____(receiving entity) acknowledges full and total responsibility for the care and custody of these Materials, until final acceptance by the end user or Project Owner, including but not limited to, storage, removal from storage, disposal of debris, protection from the elements, installation, all necessary materials for installation, make ready for startup, startup or assistance as required and warranty support as previously agreed._____(receiving entity) acknowledges that the Materials are the property of the end user or Project Owner and warrants that it will not place any liens, encumbrances, or security interests on the Materials and that it will indemnify and defend SourceBlue, its general contractor, the end user or Project Owner against any claims arising out of any such lien, encumbrances, or security interests.

Delivery Information:

Date of Receipt: _____Quantity of Pallets/Sections/Units: _____

1) Package contents match Shipping List or Bill of Lading? YES NO *If NO, explain below.*

2) Package or content damaged? YES NO *If YES, notify immediately and provide description below.*

Comments: _____

Receiving Entity:

Name: _____

Title: _____

Date: _____

Visible/External Damage to be reported within two (2) Calendar Days. Internal Damage to be reported within fourteen (14) Calendar Days.

If left un-responded, after a duration of five (5) calendar days, we will proceed with this as a confirmation the delivery has been received undamaged and in compliance with the submittals and tickets.

Project Name: **New Greenwich Central Middle School**
Date: **July 8th, 2024**
PX: **Tim Klepps**
Project Superintendent: **Chris Chila**

Project Number: TBD
OM Approver: **Thomas Dutchyshyn**
Sr. PM/PM: **Joseph Phelan**

Project Overview

The project consists of building a brand new, two-story 130,000sqft Public Middle School in Greenwich, CT. Which provides new classroom spaces, a cafeteria, auditorium, gymnasium and ancillary spaces as well. The project is two phases, with the Second Phase consisting of the demolition of the Existing School and building new fields. The Project has a value of $98 million and a project duration of 25 months.

Signage and Communication

All signage must be visible from a distance of 25 to 50 feet away. The below signage will be posted at the construction site main entrances, bathrooms, breakroom, and Turner field office. The Turner project engineer and superintendent will be responsible for receiving and responding to workforce concerns. Note: Signage may be bi-lingual to accommodate the workforce as needed.

All signage is visible and posted in high traffic areas:

1. **Zero tolerance posters**
2. **Anti-graffiti signage**
3. **Turner Worker Commitment**
4. **Physical and Mental wellness – Union EAP QR codes and contacts**
5. **QR code safety surveys**
6. **All signage also available in Spanish**

Facilities

Every person who comes to a Turner site should expect that all facilities are appropriate to their intended use. They must be well-maintained, clean, and always stocked. Facilities will be provided and maintained as noted below.

Break Areas

A break room will be provided within the building for onsite workers throughout the duration of the project. The break room will consist of folding tables and chairs and a general use microwave. Location of the break room will be shifted during construction as needed. All trades people are required to clean up after themselves and dispose of garbage in the designated garbage receptacle

1. **Open Floor Plan Space with Tables and Chairs**
2. **Utilize project heating during the winter months / Fans and small ac-units during the summer months.**

3. **Provide common general use utilities, such as Microwaves, Hydration Station, Handwash Stations etc.**
4. **Provide tents and/or exterior picnic tables outside in designated areas to encourage eating outside the building.**
5. **Provide community shelving and coat hooks to laydown tools and/or hang helmets and vests.**

Toilet Facilities

This project will utilize a mobile restroom trailer for the duration of the project. The Turner Engineer / Superintendent will perform a thorough first inspection on all facilities to ensure they are free from any graffiti or BME symbols, graphics, etchings, or markings before they are put into service. Hot and cold water will be maintained for these spaces throughout the duration of construction. All facilities will be inspected by the Turner Project Team (3) times a day. A Turner Laborer will be assigned to this project, they will be responsible for daily cleanliness and stocking. Each trade partner employee is expected to help maintain cleanliness of toilet facilities.

1. **A Toilet Trailer with water and climate control will available adjacent to the construction space for use.**
2. **A handwashing station with soap to be provided.**
3. **Weekly cleaning of units by the vendor will be provided and modified as needed based on conditions/crew size.**
4. **Turner Personnel will check toilets on a daily basis to ensure conditions of satisfaction are met.**
5. **Cameras will monitor the toilets.**
6. **Each toilet has posted contact information for concerns.**
7. **QR Code Surveys will be provided for Surveys and opportunities for feedback within Toilet(s).**

Special Accommodations

The jobsite will provide special accommodations upon request such as: Mother's room, prayer/meditation, wellness room. The facilities must be well maintained, cleaned, and well stocked. Note: interior jobs or established jobsites may have access to existing space to accommodate these special requests.

1. **The Turner Trailer will have a separate private Wellness Room to accommodate both weekly wellness check-ins, but also facilitate the need for prayer/mediation, or act as a Mother's Room.**
2. **As the Project progresses, Turner may provide a separate lockable space within the Building Footprint to add as an additional Wellness Room.**

Hydration Options

1. **Area of refuge will be the Turner Field Office.**
2. **Hydration Station will be provided with electrolytes.**
3. **Popsicles with electrolytes will be provided in periods of hot weather days.**

4. **Each Trade Partner will be responsible in providing their employees with water, but supplemental electrolytes/water will be provided by Turner if needed.**

Parking and Access Ways

1. **Onsite parking will be available for one Trade Partner vehicle to allow for shuttling of employees to and from the jobsite.**
2. **There will be clear identifiable pathways to and from the Project Building – illuminated pathways.**

Orientations

Project Site Orientation will be performed onsite for new individuals prior to the start of work, instructed by a Turner team member. Upon completion, each attendee will receive a Project Specific Turner Orientation sticker for their helmet.

1. **Orientation is hosted every Tuesday and Thursday for all new employees on the project.**
2. **Discuss Project Specific items and Safety Protocols, along with general understanding of Safety Expectations.**
3. **Offer workers coffee and water during orientation.**
4. **Spanish signature sheets and handouts are available for when applicable.**
5. **Spanish videos are available for orientation as needed.**

Crew Leader and Trade Partner Training

Crew leaders who join a Turner site must receive training to help them build, model and maintain the culture we expect on every Turner site. As leaders, they are also expected to share certain trainings with their crews.

1. **Safety Orientation**
2. **Building L.I.F.E**
3. **Pre -Task Planning**
4. **Toolbox Talks (supplied by office and Turner) – toolbox talks distributed to foreman every Monday by Stephen Scavetta (Intern) and are returned here with crew acknowledgement by Friday each week. Signed toolbox talks are logged onto Procore.**
5. **Empathy on the Jobsite (Orientation)**
6. **Inclusive and Respectful Workplace (Orientation)**
7. **Extended foreman training after orientation on day-to-day operations and requirements**
8. **Training information is being logged through orientation signature sheets and sign in sheets for individual trainings being held**

Turner Crew Leaders*
Required to take the following which will automatically show up in Turner University home page:
- ☐ Safety Orientation (54 minute video includes Inclusive and Respectful Workplace and Empathy on the Jobsite videos).
- ☐ Ethics & Compliance for Crew Leaders *(1-hour web-based course)*
- ☐ Preventing Workplace Harassment for Crew Leaders *(1-hour web-based course)*
- ☐ Lead the Way *(4-hour Business Unit Instructor Led Training)*
- ☐ Pre-Task Planning *(3, 1-hour Business Unit Instructor Led Trainings)*

Required to deliver to crews:
- ☐ Safety Orientation (54 minute video includes Inclusive and Respectful Workplace and Empathy on the Jobsite videos). Click here for English. Click here for Spanish.
- ☐ Turner Proud (30-minute Business Unit Instructor Led Training)
- ☐ Culture of Compliance (30-minute Business Unit Instructor Led Training)
- ☐ Harassment-Free Workplace (30-minute Business Unit Instructor Led Training)
- ☐ Culture of Caring *(30-minute Business Unit Instructor Led Training)*

**Always refer to the Annual National Training Plan for the latest requirements*

Trade Partner Crew Leaders (all sub-tiers):
Required to take:
- ☐ Inclusive & Respectful Workplace *(10-minute video)*
- ☐ Empathy on the Jobsite *(5-minute video)*

Required training to deliver to crews:
- ☐ Inclusive & Respectful Workplace *(10-minute video)*
- ☐ Empathy on the Jobsite *(5-minute video)*
- ☐ Toolbox Talks *(15-minute huddle trainings)* Series available, suggest holding every 2-3 weeks

**Note: additional training requirements to be added if project team deem necessary based on project specific events.*

Worker Engagement Opportunities

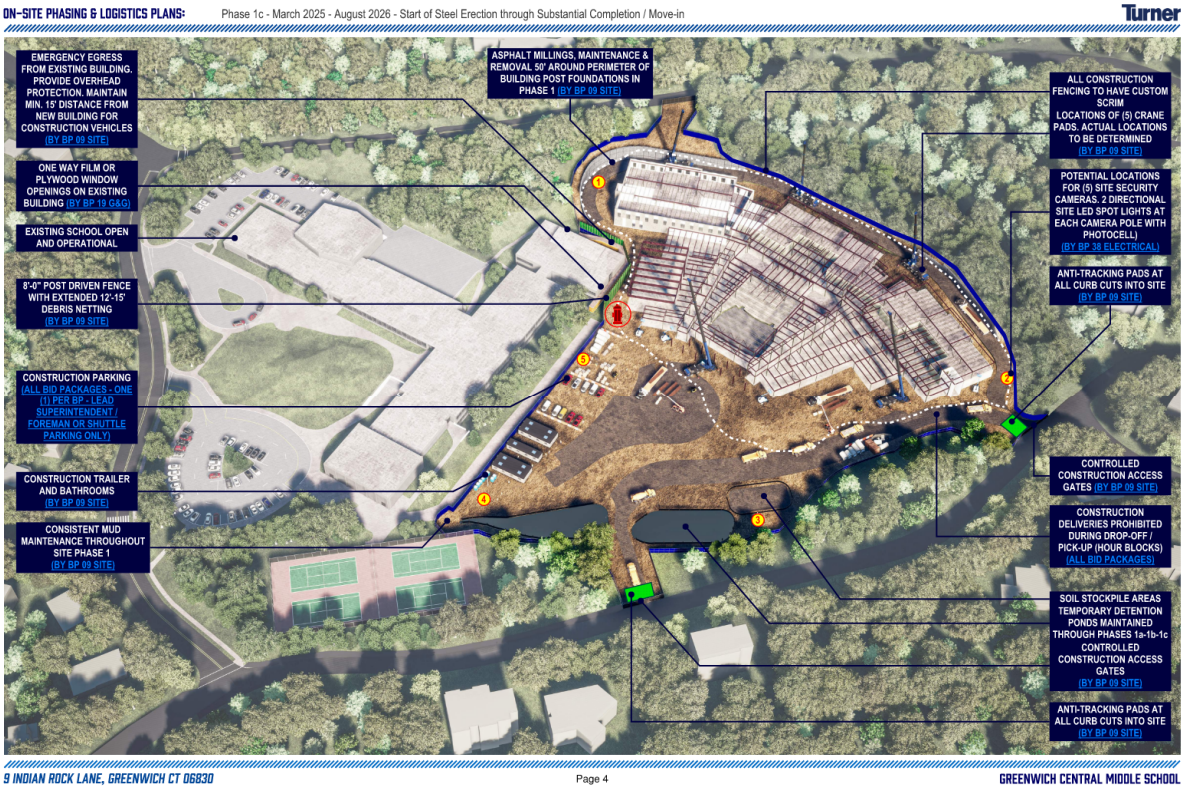
Keeping our workers engaged and connected leads to professional development and an enhanced working environment.

1. **Project leadership will walk the job frequently**
2. **Weekly safety meetings held every Tuesday to gain feedback on site logistics, safety, and engagement**
3. **Routine coffee and donuts will be offered for Trade Partners.**
4. **Every 6 months an evacuation drill is held and lunch supplied to trades after the completion of the drill**
5. **Monthly 5-Worker Lunches**
6. **Hold a "Topping-Out" Lunch for the crew upon milestone completion.**
7. **Hold Quarterly vendor functions – work with local companies that can put on demonstrations.**
    a. **PPE / Fall Protection / New technologies.**

Feedback

Obtaining and responding to feedback is a way to express respect for our workers. Feedback can be obtained in multiple ways including:

1. Five worker lunch
    a. Provide an environment to create open dialog amongst project workers.
2. You Said, We Did
    a. Provides accountability of the Turner Team
3. SOAR (Safety Observation and Recognition) cards
    a. Provides a vehicle for Trade Partners to voice opinions for site improvements, safety concerns, or best practices.
4. QR codes with contact information in break areas, temp. facilities, etc.
5. During weekly coordination meeting, include an agenda item to discuss project environment and review any issue that affect the workforce.



BQ #	Responsible Consultant	Reference	Date	Question	Answer	Date Item Responded	Answered By (Name / Company)	Attachment (SK# or Spec Section)	Status ("Closed")	Date Closed
1	Turner	Procurement Manual	10/1/24	What type of labor is being requested for this project? Union or CT Prevailing wage ? When is the estimated installation of the food service equipment? Substantial completion date ? Do you expect to need BIM Coordination on this project?	As this is a public bid, all work must be Prevailing Wage, there is not a requirement for Union Carpentry on this project. Reference Project manual item 10 – Minimum Rates and Classifications for Building Construction – CT Prevailing Wage Rates dated 9.23.24. Note that the State of Connecticut issues updated required rates each year on July 1. Review project schedule for Lower Level fitout scheduled to start September 2025 through June 2026 specific kitchen development will be within this range. See Additional Provisiosn/Scope of Work for all Subcontractors, item #55. Kitchen equipment to participate in BIM 3D Modeling.	10/1/2024	Turner/ J Phelan		Closed	10/1/2024
2	Turner	Procurement Manual	10/1/24	Is this project being done under Carpenter Union?	As this is a public bid, all work must be Prevailing Wage, there is not a requirement for Union Carpentry on this project. Reference Project manual item 10 – Minimum Rates and Classifications for Building Construction – CT Prevailing Wage Rates dated 9.23.24. Note that the State of Connecticut issues updated required rates each year on July 1.	10/1/2024	Turner/ J Phelan		Closed	10/1/2024
3	SLAM	A111.16	10/1/24	No Basis of Design was found for the Ballistic Level 3 Transaction Window at Entry Vestibule. Please provide basis of design for this product. **Turner Follow-up (10/16/24):** Please provide a spec to cover this item.	BOD will be ARMORTEX Aluminum Transaction Window system w/speaker furnished & installed by BP #19. **Turner Response (10/21/24):** Spec Section 08 5653 has been issued in Addendum #2	10/9/2024	SLAM		Closed	10/21/2024
4	SLAM	Spec -1 3575 & Dwg GC01	10/1/24	Delegated Design Procedure Spec (01 3573) and table on drawing GC01 includes Spec 28 5319, Distributed Antenna System. This spec was not found in document. Please confirm if applicable and provide spec.	Spec section 285319 has been removed. Refer to specification 276010 for distributed antenna system	10/30/2024	CES		Closed	10/31/2024
5	Turner	Procurement Manual	10/2/24	Where can I find the information on Small Business / MWBE participation percentage requirements.	Refer to the Invite to bid for specific package requirements in the Chart on Page 1 and 2. Also, reference the Boilerplate additional provisions item #4 page 3C.	10/2/2024	Turner/ J Phelan		Closed	10/1/2024
6	Turner	Procurement Manual	10/2/24	Is a bid bond required for bid submission?	A bid bond is applicable for bids in excess of $100,000. This information is detailed in the Invitation to Bid document along with additional required information for bid submission.	10/2/2024	Turner/ B Moore		Closed	10/7/2024
7	SLAM	3D/A522	10/3/24	Please confirm that the anchorage at Curtain Wall header is the Anchorage is concealed in mullions per detail 6C/A640.	Confirmed	10/9/2024	SLAM		Closed	10/16/2024
8	SLAM	1D/A640	10/3/24	Please provide clarifying detail of sunshade attachment to storefront mullion. Additionally, clarify how flashing/roof membrane extends around attachment bracket.	The Sunshade is provide by the window manufacture - all attchment detail is per there typical instaltion method for their system. The shade does not interact with the roof or wall membrane flashings as it attached to the window system only.	10/9/2024	SLAM		Closed	10/16/2024
9	SLAM	1C/A640	10/3/24	At South Elevation Main Entrance (5C/A310), there is concern of potential condensation accumulation at metal panel infill. Please confirm that no insulation is required on the inside of the glazed-in metal insulated panel.	There is no condesation concern and no insulation is required.	10/9/2024	SLAM		Closed	10/16/2024

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10	SLAM	A901C	10/3/24	Please confirm that the wall panels (AWP8) in the Media/Production Classroom 1063 & Media Sound Booth are to be full height at all walls.	Per the Finish Product List AWP6 is to be full height. It is only to be installed on the 2 walls per room as shown on the Finish Plan A901C. Furnished & Installed by BP #18.	10/8/2024	SLAM		Closed	10/16/2024
11	SLAM	A122	10/3/24	Please confirm that 3A/A501 is the applicable detail for waterproofing at the elevator pit (A122). Additionally, will waterproofing be required at the interior of the elevator pit? Please provide details.	3A/A501 is the correct detail refernnce for the Elevator Pit. No see 5E/A122 plan refernce tht calls for exterior side waterproofing on all sides of the elevatior pit.	10/9/2024	SLAM		Closed	10/16/2024
12	SLAM	S410, S411, S420, S421, S430	10/3/24	There are details throughout the S400 series of drawings that do no show all the connection types, i.e. bolt sizes, weld types & sizes, etc..for items like hung lintels and perimeter angles. For example see 9/S410 or 15/S410. Are these intended to be delegated design? If so, no loads seem to have been provided. Please advise & provide these connection details where missing. **Turner Follow-up (10/16/24):** Confirm typical welds shown on Detail 1 of same page are adequate for these conditions.	Follow-up - Confirmed	10/28/2024	SLAM		Closed	10/31/2024
13	SLAM	6/S420	10/3/24	Please confirm that the joist bridging, diagonal horizontal bracing, and rigging beam connections to the joists will be a delegated design.	Confirmed.	10/8/2024	SLAM		Closed	10/16/2024
14	SLAM	S302B	10/3/24	Please confirm that the intent is for the basketball hoop supplemental steel supports, attachement to the roof joists, and any associated bracing to be a delegated design.	Basketball hoop supplemental steel supports and attachments to roof joists by basketball supplier (BP #21), inclusive of delegated design.	10/8/2024	SLAM		Closed	10/16/2024
15	SLAM	S302B	10/3/24	It is not clear how motorized partition will be mounted to the roof joists. Please provide details and a section cut. **Turner Follow-up (10/16/24):** Provide detail of mount to roof joists.	Atcahnment to bottom of roof joist is the design intention. This conection is provided by the partiton manufacturer. **Turner Response (10/31/24):** The General Trade Subcontractor (BP #21) shall design, furnish, & install any additional supports necessary to mount the motorized partition.	10/28/2024	SLAM		CLosed	10/31/2024
16	SLAM	A522	10/3/24	Detail 3B/A522 shows CFMF angles attached to the top flange of the steel beams to support the skylight framing. Will CFMF be sufficient to carry this load or will strcutrual steel angles welded to the steel be required?	Detail has been revised in Addendum 4 relocating the steel beams to be centered under the skyligh curb framing, and eliminating the CFMF angles.	10/28/2024	SLAM		Closed	10/31/2024
17	SLAM	GC12	10/3/24	The steel framing between gridlines XB-XC and in front of gridline AK seems to be called out to be galvanized as well as coated in thermal insulative coating and intumescent paint. Are any special primers or prep required for these 3 coating to be applied on top of each other? Please confirm the order these coatings should be applied in.	See Spec section 07 2163, paragraph 3.8. for schedule the Isulative Coatng Schedule. This schedule defines steel prep for regular steel and galvanized steel related to the Insulative Coating. There no additional primers required, as the BOD Insulative Coatings manufacturer can be covered with BOD Intumesent Fire Protection. Where all three occur, order shoudl be Galvanized first, InsulativeCoating Second, as specified, Intumescent last.	11/5/2024	SLAM		Closed	11/6/2024
18	SLAM	S502	10/3/24	Please confirm that all the shear walls shown on S502 are 12" CMU.	See architect plans and arch wall type sheets for wall designations	10/10/2024	SLAM		Closed	10/16/2024
19	SLAM	S401 & A122	10/3/24	No elevator hoist beam size has been provided. Please provide size and bearing details.	This identified on the related structural drawings S302E.	10/10/2024	SLAM		Closed	10/16/2024
20	SLAM	Spec 055000	10/3/24	Please confirm that the "ships ladder" spec also applies to roof hatch ladders in 055000 2.6.c	The refernce to "ships ladder" in this section will be removed and replaced with a fixed ladder revision. **Turner Response (10/21/24):** Revised Spec Section 05 5000 has been issued in Addendum #2	10/16/2024	SLAM		Closed	10/21/2024

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21	SLAM	T400	10/3/24	Please confirm the fiber & copper backbone interconnecting the IDF & MDF rooms is not required to be run in conduit, and that armored cable is sufficient.	Armored cable, as specified, is sufficient. **Turner Additional Response (10/21/24):** Armored cable & supports furnished & installed by BP #39 per scope of work documents.	10/16/2024	DA		Closed	10/21/2024
22	SLAM	T400	10/3/24	Please confirm scope & devices noted on the T set and TY set generally have conduit pathways to above accessible ceilings, unless otherwise noted. And that scope & devices on TA set (AV) have conduit directly to the AV cabinet supporting the space, unless otherwise noted as to be above accessible ceiling. **Turner Follow-up (10/21/24):** Please confirm that AV conduit and rough-in requirements for rooms other than the Gym, Cafeteria, and Auditorium are only what is identified in the AV conduit & cabling schedule on TA000.	Confirmed. **DA Response to Turner Follow Up (11/05/24):** Confirmed. Note that conduit and backbox infrastructure for monitors and interactive displays is shown on T000.	10/16/2024	DA		Closed	11/6/2024
23	SLAM	T101A & T101D	10/3/24	There doesn't appear to be any data, voice, or network connections shown for the fire alarm system on the technology drawings. Please advise and provide details. **Turner Follow-up (10/23/24):** Please advise how the fire alarm reports out without network connections?	No network connections are needed. Dial out is facilitated by the fire alarm panel UDACT and cellular dialer that the district requested.	11/4/2024	CES		Closed	11/6/2024
24	SLAM	T series	10/3/24	There doesn't appear to be any data or network connections shown for the BMS system on the technology drawings. Please advise and provide details.	See data adds for BMS in Addendum 02.	10/16/2024	DA		Closed	10/21/2024
25	SLAM	Spec 276010	10/3/24	Sheet GC0A calls for the DAS to be a delegated design. The spec doesn't explicitly mention any engineering or delegated design requirements or deisgner certifications. **Turner Follow-up (10/16/24):** Spec section 276010 was issued, but is not listed on the delegated design schedule shown on sheet GC0A. Spec section 28 5319 was not issued, but is listed on sheet GC0A. Please advise.	Spec section 285319 has been removed. Refer to specification 276010 for distributed antenna system and its Delegated design rquirments.	10/30/2024	CES		Closed	10/31/2024
26	SLAM	E602-E607	10/3/24	The panel schedules indicate a lot of spares. Are there truly this many spares available?	Spare capacity in panels to remain at this time.	10/10/2024	CES		Closed	10/16/2024
27	SLAM	SU500	10/3/24	Detail 1 and 4 on SU500 reference a concrete encasement detail in Note #4. Has this detail been provided? What sheet is it on? Please add sheet reference to this Note #4. Also, please confirm if any concrete encasement around site conduit is required. **Turner Follow-up (10/16/24):** On C508 ductbank detail notes reference concrete being needed beneath paved areas only. Please confirm. Also please provide spacing and concrete encasement dimensions (i.e. concrete cover).	Refer to CIVIL (Tighe and Bond) drawings for trenching detail requirements. Concrete encasement as required furnished & installed by Site Contractor (BP #09). **T&B response (11/5/2024):** Concrete encasement has been removed from detail on C508 in Addendum No. 6 per coordination with the utility companies. Conduit below paved areas shall be sch80 PVC, conduit below landscape areas shall be sch40 PCV.	10/10/2024	CES		Closed	11/6/2024
28	SLAM	SU500	10/3/24	Sheet SU100 references a detail on SU500 for the primary electric manhole. There is no detail on SU500. Please provide this detail, size, and specifications on the primary electric manhole.	Refer to sheet SU501 for eversource hex manhole detail. References to SU500 will be changed to reference SU501. Site Contractor (BP #09) shall furnish & install the Eversource manhole & associated details, inclusive of coordination with BP #38.	10/10/2024	CES		Closed	10/16/2024
29	SLAM	C301, SU100	10/3/24	Note 28 on C301 alludes to utility company review and the design being subject to change pending utility company review. Have the utility companies reviewed & approved the current design? There is also mention of ultility "design by others". Can you please clarify the intent?	Yes, the utility companies have reviewed the design. The intent of the note 28 make the contractor aware that the design may be modified during construction/installation at the discretion of the governing utility company.	11/5/2024	T&B		Closed	11/6/2024

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30	SLAM	09 6500	10/3/24	RT1, RT2 and RT3 are all listed as 4mm thick. Can you please confirm that they should be listed as 2.5 mm thick to match up to all the other LVT's on the job.	All should be 2.5mm (not 4mm)	10/11/2024	SLAM		Closed	10/16/2024
31	SLAM	09 6500	10/3/24	RT2 and RT3 come with the same wear layer as all the other RT's lised but they are both 40 mill and the warranty is 25 years. This 40 mill and 25 year warranty are specific to the Amtico selections	The minimum wear layer for the resilient tiles is 20 mil and the basic warranty is 15 years - RT2 and RT3 exceed this with 40mil wear layer and a 25 year Warranty which is acceptable but not a requirement.	10/11/2024	SLAM		Closed	10/16/2024
32	SLAM	C301, SU100	10/3/24	Please confirm that the electrical utility company will install conductors from Stanwich Road to the pad mounted transformer. Please confirm that the utility company will also furnish & install the pad mounted transformer. The EC will then provide conductors from the utility transformer to MSB-1 & FP-DS. Please confirm that the telecom service provider will be installing conductors from Stanwich road to a demarcation / box in MDF 1066.	The electric utility company will provide primary cable from the riser pole to the pad mounted transformer. The project will provide the conduit ductbank, pulling structure with proper subgrade and grounding, transformer pad with subgrade and grounding, secondary conductors from the transformer to MSB-1 and FP-DS in conformance with the identified trench detail.The communication utility company will provide service cable from the riser pole to the Telecommunications Equipment Room full length underground.	10/11/2024	CES		Closed	10/16/2024
33	SLAM	Spec 260573	10/3/24	Please confirm all electrical power studies required. Spec section 260573 didn't seem to mention an Arc-Flash study. Is that required? Other spec sections refer to arc-flash labeling. We want to ensure all the studies required is clear.	Electrical studies confirmed, revised spec section issued in Addendum No 4.	11/5/2024	CES		Closed	11/6/2024
34	SLAM	Electrical Specs	10/3/24	We didn't see a spec for electrical infrastructrure vibration & seismic controls. Please confirm that there are no vibration or Seismic requirements for electrical systems. If there are, then please provide the appropriate spec.	Electrical seismic requirements issued as part of Addendum No 6. These are structural in nature and should be part of a delegated design assessment.	11/5/2024	CES		Closed	11/7/2024
35	SLAM	Spec 323120, SU100, TY100	10/3/24	The spec for vehicle barrier gates calls for communiction wiring. SU100 shows power run to the gates, but doesn't explicitly show any communications cabling or infrastructure run to the gates. Please advise and update the drawings to clearly shown interconenctions and/or wiring details.	Refer to keynote E13 and note calling for (1) 2” conduit. Refer to note on site plan “(2) 2” CONDUITS FOR COMMUNICATIONS TO SITE CAMERAS AND EV CHARGING EQUIPMENT.” Refer to EV charging detail for communication conduit requirements. The base electrical contractor (BP #38) shall funrish & install all conduits / pathways. Low voltage contractor (BP #39) to furnish, install, terminate, & test all low voltage cabling.	10/13/2024	CES		Closed	10/16/2024
36	SLAM	Spec 262653 & SU100	10/3/24	The spec calls for the EV charging stations to be networked. There doesn't seem to be any data / LV cabling or connections indicated. Will these be connected via a cellular or wifi signal? Please advise and update the drawings to clearly show network connections required and/or wiring details.	EV charging pedestal communication shall be via Cellular	11/5/2024	CES		Closed	11/6/2024
37	SLAM	Spec 260533	10/3/24	This spec section mentions related spec sections that have not been issued, i.e. 270533 Raceways for Communications Systems. Please advise and provide all specs required. Please ensure all related specs are provided or delete references throughout.	Refernces to 27 0533 in this spec section should be replaced with 27 0536.	10/9/1902	CES		Closed	10/24/2024
38	SLAM	E Series	10/3/24	Please confirm that all motorized shades are intended to be manually & locally controlled. Confirm that they will not be integrated with any lighting controls system or have any automation.	Motorized shade control shall be manual and locally controlled.	10/13/2024	CES		Closed	10/16/2024
39	SLAM	E701 & Spec 262826	10/3/24	This spec mentions an Engine Start Monitoring system that is integrated with the Fire Alarm system. There doesn't appear to be reference to this on the fire alarm riser SOO (E701). Please advise and update accordingly.	Monitoring module for monitoring of the engine start circuit is added to floor plan and riser diagram in Addendum #2.	10/10/2024	CES		Closed	10/21/2024

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40	SLAM	Spec 283100	10/3/24	Please confirm that MC Cable is acceptable for fire alarms systems in all concealed conditions (i.e. within walls and above accessible, finished ceilings), and that conduit is only required in "exposed" installations. Please confirm if areas with "cloud" ceilings are considered "exposed" (i.e. the Cafeteria).	MC Cable is acceptable for fire alarm systems in concealed areas. Areas with cloud ceilings are considered exposed, provide wire in conduit.	10/10/2024	CES		Closed	10/16/2024
41	SLAM	Spec 270536	10/3/24	This spec section mentions delegated design for seismic restraints. Is this required for the small amount of cable tray scope in IDF/MDF rooms? If so, please reference this spec in the delegated design matrix on the GC series of drawings.	Disregard requirement for delegated design for seismic restraints in Specification 27 0536.	10/16/2024	DA		Closed	10/21/2024
42	SLAM	E Series	10/3/24	Is there a spec for the overhead cord reels? Please advise or provide.	Cord reel spec to be “Industrial cord reel, with Hubbell HBL4729C twist-lock input connector, 25’ SJO Cable Jacket, 12/3, Nema 5-20R connector for use by owner. White housing. Shall be provided with the following: Pivot Base Hubbell #HBLI340PH; Mounting Bracket Hubbell #HBLIMB; Ball Stop Hubbell #HLI12BS”. Cord reels shall be furnished & installed by BP #38.	10/11/2024	CES		Closed	10/16/2024
43	SLAM	S421 & A521	10/3/24	Detail 1B on A521 shows CFMF supports for the MCM panel soffit around the Gym. Detail 1 on S421 shows a top chord extension for the roof joists to create a an overhang. What is the profile / shape of this top chord extension because it looks larger than a typical top chord. Also, is the intent for the CFMF to attach to this extension or will the CFMF hang from the roof deck overhang?	Top chord extension & profile (i.e. depth) is by joist fabricator (BP #12) as part of the delegated design process. CFMF is intend to attach to the extended top cord, infilling between members. CFMF furinshed & installed by BP #21.	10/9/2024	SLAM		Closed	10/16/2024
44	SLAM	MEPFS Drawings	10/3/24	Please provide matchlines on all plans.	Will be provided as part of a final conformed set – current drawing key plan provides clarity on part plan location.	11/6/2024	CES		Closed	11/6/2024
45	SLAM	L503 & L504	10/3/24	Please confirm the manufacturer and model number intended to be used for the metal screen fence and black chainlink viynl coated fence shown on L503 & L504.	Please see spec section 12 9300 for METAL SCREEN FENCE – Basis of Design is Pallisade Fortress Screen Fence as provided by Palm SHIELD. Please see spec section 32 3113 for CHAIN LINK FENCE – components called out. B.O.D. EAGLE FENCE or equal. Furnished & installed by BP #09.	10/11/2024	SLAM		Closed	10/16/2024
46	SLAM	TR1 & TR2	10/3/24	Details 7 & 8 seem to show a rigging beam up high and then a pipe batten hung from that beam. Details 3, 5, & 6 on TR1 show "compression tubes" and "strongbacks" between the rigging beam and pipe baten, which are not part of the details on TR2. It is not clear from the sections & details provided what the intended theatrical lighting / rigging assembly should be. Please provide updated or additonal details. **Turner Follow-up (10/29/24):** Please provide detailed section cuts on the TR plans, especially for 3/TR1, 4/TR1, 5/TR1, & 6/TR1, that are similar in level of detail to 6 & 7 on TR2. There are so many light weights that it is not clear what is intended. Please also provide a section cut symbol showing where details 6 & 7 on TR2 apply.	Reference specifications for basis of design products. Note that it different products between detail 6 on TR1 and Details 3 and 5. **SLAM Follow-up Response (11/06/24):** Different theatrical rigging manufacturers have different details for the equipment in question. There are several acceptable ways to achieve design intent. A Revised TR1 drawing for addendum 6 has been issued, adding callouts and providing detail lines and notes about the side curtain track supplemental support.	10/22/2024	CT/SLAM		Closed	11/7/2024
47	SLAM	TR1 & TR2	10/3/24	Please confirm how the curtain tracks shown in Detail 2 on TR1 on the perimeter (adjacent to gridlines CN & CJ) should be supported. Can they be hung directly from the roof deck or is that an issue structurally?	Theatrical rigging contractor (BP #31) to provide intermediate support strut between rigging beams to support track. System is not to be huing directly form the roof deck.	10/9/2024	CT/SLAM		Closed	10/16/2024
48	SLAM	T-Series & A912	10/3/24	It is not clear from the drawings & specs if there will be any owner furnished, contractor installed Low Voltage and/or AV equipment and components (for example network switches, smartboards, etc.). If there is anything, please provide a responsibility matrix indicating this scope. Ideally an OFCI vs. OFOI vs. CFCI matrix should be provided, similar to the specialty equipment matrices on A912.	Refer to scope matrix added to T000, TA000, & TY000 in Addendum 02.	10/16/2024	DA		Closed	10/21/2024

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49	SLAM	Spec 276010	10/3/24	Please confirm that the distributed antena system shown in the bid documents is intended for Emergency Responder Radio Coverage Only. And that there will not be a system for extended cellular coverage.	Confirmed. DAS is intended for Emergency Responder Radio Coverage only.	10/11/2024	CES		Closed	10/16/2024
50	SLAM	E400 & EP101D	10/3/24	It seems like under slab conduit and electrical circuit infrastructure will be required, especially for the kitchen and auditorium spaces. There doesn't appear to be any typcial below slab typical details in the E500 series. Please advise and provide. Also, please confirm it is acceptable to run feeders and branch circuits below the slab on grade generally. **Turner Follow-up (10/16/24):** Please follow-up with a typical below slab conduit detail for within the footprint of the school.	Underslab feeders and branch circuits below slab are acceptable means and methods procedure. **Revised CES Response (11/06/24):** Under slab on grade feeders and branch circuits are allowed per project specifications (i.e. 260533 "raceway & boxes for electrical systems", Section 1.8.D and 2.1), unless otherwise noted on drawings. Typical detial to be provided in Addendum #6. **Turner Follow-up Response (11/07/24):** Trenching, sand bedding, and backfill for interior trenches needed for in floor electrical shown on the contract documents, including but not limited to the media rooms, kitchen & auditorium, shall be performed by the Sitework subcontractor (BP #09) as shown in Detail 2 on E505 issued in Addendum #6. All conduit, electrical components, and accessories to be furnished & installed by the Electrical subcontractor (BP #38).	10/11/2024	CES		Closed	11/7/2024
51	SLAM	E700	10/3/24	E700 shows the PV 1200A NEMA 3R disconnect and meter cabinet as "future" with dashed lines, seeming to indicate it is not part of the scope of work for this project. Is that true? However, E700 shows 1200A feeders from these future cabinets as being part of the scope of work for this project. Is this true? **Turner Follow-up (10/16/24):** Please provided updated drawings showing the (4) 4" empty conduits.	PV disconnect and meter cabinet is future and not part of the scope of work for this project. Space reserved for future PV equipment shown on EP101A, EP101C, EP101E and roof plans. 1200A feeder shown on E700 was intended to just be conduit and pull string. Reference to 1200A feeder will be removed in next addendum and replaced with note for (4) 4" conduits and pull strings, furnished & installed by BP #38. **Turner Follow-up Response (10/24/24):** E700 was updated in Addendum #3.	10/11/2024	CES		Closed	10/24/2024
52	SLAM	E700	10/3/24	Detail 2 on E700 shows a Future PV System Riser Diagram. Please clarify what should be included in the base electrical bids. Will it be empty conduit w/ drag lines only to the general locations indicated.	Yes, base electrical bid (BP #38) will be empty conduit w/ drag lines. Refer to E700 Future PV System Conduit Riser Diagram, and roof plans for conduit stub up locations.	10/11/2024	CES		Closed	10/16/2024
53	SLAM	E700	10/3/24	Please confirm if the submetering shown in the submetering schedule on E700 is the only submetering required. Or is there addition submetering required for mechanical system and/or lighting not currently shown in this schedule? If so, please advise on a full list of submetering.	Confirmed. Submetering shown in schedule is all that is required. If you have specific system you have a question about please submit a more detsiled question. **Turner Follow-up Response (10/21/24):** The electrician (BP #38) to review all bid documents and specifications, and furnish & install all submetering identified therein.	10/16/2024	SLAM		Closed	10/21/2024
54	SLAM	S401 & A121	10/3/24	It is not clear from detail 1/S401 or 3D/A121 how the 2nd floor curtain wall / window will be supported. Please advise and provide the corresponding detail(s).	At the limited width of that window (7'-6) typical CFMF detailing & framing by BP #21 will be required (i.e. box headers and sills - double jamb king suds). Similar to 2D/A641 added in this Addednum	10/9/2024	SLAM		Closed	10/16/2024

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55	SLAM	S211	10/3/24	Detail 1/S211 notes that 1st floor slab needs to be poured prior to backfill. Can you confirm if it is acceptable to backfill prior to pouring slab? Also note that detail 3/S211 does not require slab install prior to backfill. **Turner Follow-up (10/16/24):** Initial SLAM response will provide a hardship to construction sequence & scheduling. Please provide detail and plan locations for keyway at retaining wall footing to eliminate the requirement for placing this SOG prior to backfilling.	Revised detail and plan, at this location was Issued in Addednum No. 2 removing this requirement.	10/28/2024	SLAM		Closed	10/31/2024
New Bidder's Questions as of 10/04/24 Issuance										
56	Turner	Procurement Manual	10/8/24	Will the Turner Pre-Qualification Form be required for the bid, if the potential subcontractor has recently filled out pre-quals with Turner Construction?	Subcontractors who are currently Prequalified with Turner may request Turner provide a letter to verifiy prequalification. Copy of letter can be submitted with Bid in lieu of submission of the "Turner Prequalification Response Form" included within the project manual. Send requests for Prequalified letter Francesca Perugini at fperugini@tcco.com.	10/9/2024	JP/Turner		Closed	10/9/2024
57	Turner	Procurement Manual	10/8/24	What time do te buses arrive in the morning, and when do they pick-up in the afternoon.	CMS Dropoff starts at 7:20 a.m. and Dismissal time is 2:45 p.m.	10/9/2024	JP/Turner		Closed	10/9/2024
58	Turner	Procurement Manual	10/8/24	What percentage of the project is State funded vs. town funds?	Not applicable	10/16/2024	JP/Turner		Closed	10/16/2024
59	Turner	Procurement Manual	10/8/24	Is Turner planning on submitting and self-perform scopes?	Turner Self Perform (SPO) will not be bidding on any of the prime bid packages.	10/9/2024	CL/Turner		Closed	10/9/2024
60	SLAM	C305	10/9/24	There is a Heat Trace system for the grease waste system. The Civil Drawings say to reference details on the MEP drawings, MEP drawings only show HT-1 on the interior and then HT-2 on the portion of the exterior line shown on Drawing P100A. Shall HT-2 extend all the way to the grease trap on the site or just required for the first 10 feet of piping?	HT-2 shall extend all the way to the grease trap per Addendum #2. Heat trace installation shall be coordinated with Civil piping and routing. **Turner Additional Response (10/21/24):** Plumbing subcontractor (BP #36) to furnish heat trace and the Electrician (BP #38) to install per the Turner scope of work documents.	10/16/2024	CES		Closed	10/21/2024
61	SLAM	A902A	10/9/24	Classroom 2019 also does not show roller shades at the counter space. Please confirm if this area is to have roller shades.	Yes shades are required	10/30/2024	SLAM		Closed	10/31/2024
62	SLAM	21 05 33, 22 05 33	10/9/24	There is no Heat Trace Specificaiton for Fire Protection or Plumbing systems. Please provide specifications. **Turner Follow-up (10/21/24):** Please provide a written heat trace specification.	Refer to schedules on plumbing and fire protection drawings for heat trace specification. **SLAM Follow-up Response (10/23/24):** See Addendum #3 for written Heat Trace Specification.	10/16/2024	CES		Closed	10/24/2024
63	SLAM	275313	10/9/24	Is it acceptable to utilize Primex Clocks in lieu of SiteSync IQ by American Time?	No - The Clock system specifed is an approved sole source item for this project.	10/22/2024	SLAM		Closed	10/24/2024

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64	SLAM		10/9/24	Are the site boulders intended to be imported to site or harvested from site? Turner Follow-up (10/28/24): Design Team please provide the intended source to procure the boulders.	~~Although a new specification has been issued, the architect leaves this difficult to quanttify. Turner's direction to the bidding sitework subcontractors is to assume the required boulders sourced from site will either not be acceptable or in the quantity and size required. For these reason, Sitework bidders shall include providing boulders from an off-site location and do not assume the site will yeild the required boulders.~~ SLAM Follow-up Response (11/05/24): Weathered boulders from sections of material harvested by blasting Indian Rock Outcropping and other on-site outcroppings may be submitted to fill the quantities and sizes required. Any sharp angles must be buried or ground down to eliminate safety risk of finished exposed surfaces of boulders. Specification section 32 0529 Glacial Boulders for Exterior Improvements to be updated accordingly. Turner Revised Response (11/06/24): The sitework Bidders shall assume that all boulders & stepping stones will be procured from the site. Bidders shall include off-site storage of the boulders and delivery back to the project once ready for installation.	10/23/2024	JAC/Turner		Closed	11/6/2024
65	SLAM	L404	10/9/24	On drawing L404 the site irrigation plan what is the location of the point of connection to the new building for irrigation piping?	Irrigation will connect in through the Fitness Room 1099. See Plumbing Drawings P101B for more information and updated L404 in Addendum 2.	10/16/2024	SLAM/CES		Closed	10/21/2024
66	SLAM	Spec 08 4413	10/10/24	In regards to the ballistic curtainwall type ICW02, no specification was found for ballistic curtainwall framing. Can you please clarify or provide? Turner Follow-up (10/17/24): The lower section of the frame (3E/A632) has the bullet resistant glass, but not the upper. Typically, if any part of the frame is to have bullet resistant glass in it than the entire frame is to be bullet resistant. The glass doesn't have to be, as it shows in this case, but the frame does. Please clarify if the entire frame is to be bullet resistant. Turner Follow-up (10/31/24): No new spec was provided in Addendum 4. Please provide individual spec for Ballistic Curtainwall frame with acceptable manufactures that provides frames to meet UL 752, Level 3 requirement and that coordinates to the security glazing listed in 08 8000.	A. Balistic Spec has been added in Addednum 4. B. Follow-Up - Confirmed - Entire frame to be the balistic frame. SLAM Follow-up Response (11/05/24): Revise answer to item A to read Ballistic requirement for the BOD manufacturer and BOD system have been added to Spec Section 08 4413 in Addendum No. 4. SLAM Follow-up Response (11/05/24): No additional spec is required as each listed manufacturer has a Ballistic Frame Option. Turner Revised Response (11/06/24): Subcontractor to include a fully tested & UL rated Ballistic system with colors to match curtainwall spec. Profiles to match as close as possible.	10/28/2024	SLAM		Closed	11/6/2024
67	Turner	A924	10/10/24	Please confirm that the masonry for Sign Type R is not within the scope of the signage contractor.	The masonry will be by the Masonry subcontractor (BP #11) and the fiber cement paneling system will be by the drywall subcontractor (BP #21). The flush mount alum. letters will be by the signage contractor (BP #28).	10/16/2024	JM/Turner		Closed	10/16/2024
68	SLAM	A924	10/10/24	Please confirm that halo lit is acceptable for Sign Type S.	Halo/Back Lit lighting is required and meets the Town's Lighting regulation	10/22/2024	SLAM		Closed	10/24/2024
69	Turner	10-1416-1	10/10/24	Is the dedication plaque detailed in Section 10-1415 part of the signage scope?	The millwork subcontractor (BP #18) will be responsible for the Plaques spec section.	10/16/2024	JM/Turner		Closed	10/16/2024
70	SLAM	Existing / As-Built Dwgs	10/10/24	Can drawings of the Existing Building Construction be provided?	See existing drawings issued in Addendum #3	10/24/2024	SLAM	yes - Existing Drawings	Closed	10/24/2024

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71	SLAM	05 2100	10/10/24	Specification section 05 2100-1.3B notes comprehensive engineering analysis of "special joists", signed and sealed by qualified engineer. It appearst the joist sizes are already on the documents, please clarify the intent of what joists are to be delegated design as 'special joists". Are there restrictions on the 'special joists', meaning do portions of the design need to align with sizes provided on the documents?	The SP designation on the framing plans is what defines a "Special Joist". The depth designations on the plans need to be adhered to. The delegated design specified and required, covers all of the rest of the loading criteria that goes into sizing the individual parts and pieces thst make up a typical joist. All of which are defined in the drawing set. See Soo1, Individual Details in the S400 Series and S700 series for loading information and notes. Along with other things that hang from the joists - I.E. Basketball Hoops, divider curtains, motors that move these things....etc. All of these things need to be factored into the delegated desing by the fabricator's engineer (by BP #12)	10/14/2024	SLAM		Closed	10/21/2024
72	SLAM	05 5000	10/10/24	Specification section 05 5000 is identified as delegeted design on sheet GC0A. Reviewign 05 5000-1.5 is notes notes ladders, backstop and elevator beams as delegated design. Please confirm these items are the extents of the delegated design requirements of this specification section 05 5000.	Paragraph 1.5-A says “ladders, backstop and equipment supports, and elevator beams”. Equipment support requiring delegated design should include support for the gym divider curtain, overhead coiling doors and grilles, and cubicle ceiling track support, unless covered by structural in their drawings. **Turner Additional Response (10/21/24):** Each bid package subcontractor is responsible for delegated design of their own scope items and coordination with associated trades for loads imposed. See Turner Scope of Work documents for delineation of scope.	10/16/2024	SLAM		Closed	10/21/2024
73	SLAM	08 4313	10/10/24	Specification section 08 4313 is identfied as delegated design on sheet GC0A. Reviewing the spec section 08 4313-1.5E it appears only to indicated attachments and anchors require delegated engineering analysis. Confirm this is the correct interpretation and that standard manufacturer data for the storefont framing in lieu of delegated design calcs.	Questioner’s interpretation is acceptable. Manufacturer’s published design data is sufficient to describe framing’s structural and physical characteristics.	10/16/2024	SLAM		Closed	10/21/2024
74	SLAM	A911	10/10/24	Finish Schedule doesn’t have a color for PL5 Wilsonart Plam, only a finish. It also shows PL7 Wilsonart Plam with no color or finish. Please advise a color and or finish selection are for these Plastic Laminates.	PL5 is a placeholder for finish on the face and sides of servery equipment only. There is no millwork in the servery. PL5 will match PL1. PL7 please use Formica, Specialty High Pressure Plastic Laminate, Magnetic, Writable Whiteboard surface, stain resistant in Crystal White. Both items have been modified in the Finish Materils list.	10/14/2024	SLAM		Closed	10/21/2024
75	Turner	Millwork SOW	10/10/24	SOW for Millwork and Casework (Scope Item #19) states we own furnish and install of TRM1 through TRM5. Details 1A, 1B, 3B/A805 all show Fry Reglet TRM trim being installed behind either wallcovering or AWP’s, both we don’t own. Shouldn’t this be furnished and installed under the Bid Packages that own the wallcovering and AWP Panels? Of all 5 TRM’s, the only one I see our Bid Package owning would be TRM3 per A911 as this if for the exposed edges tackboard that we do own. Please advise who will own the furnish and install of TRM1, TRM2, TRM4, & TRM5.	~~The Millwork subcontrator (BP #18) shall furnish and install all metal trim as noted in the millworks scope line item 19. The trim shall be coordinated with the adjacted trades material.~~ **Turner Revised Response (10/24/24):** BP18 MIllwork Shall furinish and install TRM2 and TRM3. TRM1 by painter BP27. TRM4 and TRM5 shall be furnished and installed by BP23 Tile. SOW have been updated to clarify. Please review SOW for millwork as AWP ownership is explained on what millwork owns.	10/16/2024	JM/Turner		Closed	10/24/2024

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76	SLAM	1E, 2E, 3E/A805	10/10/24	1E, 2E, & 3E/A805 show what looks like gyp. Panels on the top and bottom of all 3 types of display cases. Please advise if this is the design intent or are the tops and bottoms supposed to be Plam like the side walls? If gyp. on the top and bottom is the design intent, please advise who owns the gyp. furnish and install.	All sides of interior of display cases are to be PL7, this discription has been revised in the Finish Materials list.	10/16/2024	SLAM		Closed	10/16/2024
77	SLAM	64100	10/10/24	Spec Section 064100 – Architectural Wood Casework sub-section 2.9 Hardware states product grade as Grade 2. Since no cabinet door and drawer locks are listed, please confirm Grade 1 locks are not required. Also please advise the specific locks that are required for all cabinet doors and drawers since none are listed. a. 2.9/C states either side mounted recessed metal shelf standards or multiple holes for pin shelf rests with nominal 1in. spacing. Will standard 32mm spacing be acceptable, or are Metal Pilaster shelf standards required? b. 2.9/J calls for soft close door and drawer adjustable dampers. Are dampers required with self close European hinges and drawer slides, or are soft closed hinges and slides acceptable, not requiring the dampers?	Locks: Grade 2 is acceptable, Grade 1 not required. Owner to select specific lock types a: Standard 32mm spacing is acceptable. b. Provde a substitution request for alternate product types. **SLAM Follow-up Response (11/07/24):** Substitution is approved. See mark-ups attached.	10/16/2024	SLAM	yes - substitution request	Closed	11/7/2024
78	SLAM	64100	10/10/24	Architectural Wood Casework sub-section 2.1C states multiple-dovetailed/dovetail joint construction. Please advise if standard hardwood dowel construction is acceptable.	This method is acceptable as long as it conforms to the requirements and standards of AWI Custom Grade casework.	10/16/2024	SLAM		Closed	10/21/2024
79	SLAM	123553.19	10/10/24	Wood Laboratory Casework lists Acid Storage Cabinets, Solvent Storage Cabinets, and Mobile Tables. Please advise where these items are located as nothing is shown on any floor plans or elevations for these items. If these items are not required for this project, please advise if Div. 6 Architectural Wood Casework would be acceptable ilo of Div. 12 Lab Casework, still following hardware materials but using AWI Standard Construction as outlined in Spec Section 064100. Div. 12 Epoxy counters, google cabinets, and drying racks would still be supplied as speced. **Turner Follow-up (10/21/24):** Please provide a revised spec that removes references that are not applicable to this project.	Spec will be revised to remove refrences to Acid Storage, Solvent Storrage, and Mobile Tables as they are not in this projects scope. Both specification section will remain as is otherwise. **Turner Response (10/21/24):** Revised Spec Section 12 3553.19 has been issued in Addendum #2	10/16/2024	SLAM		Closed	10/21/2024
80	SLAM	08 4413	10/10/24	Specification section 08 4413 is identfied as delegated design on sheet GC0A. Reviewing the spec section 08 4413-1.5F and 1.6A it does not indicated any signed and sealed calculations are required. Please clafify the delegated design intent of this specification section.	Delgated design is required for this spec section - langage has been changed to match 08 4313 in Addendum #3.	10/22/2024	SLAM		Closed	10/24/2024
81	SLAM	08 4413	10/10/24	Specification section 08 4413-1.6B seems to indicate an off site mockup performance test. If this is required, additional information is required for testing procedures, size of mockup, etc. Or can standard manufacturer systems specified provide performance testing of the specified systems to meet this requirement. **Turner Follow-up (10/21/24):** Please advise and provide an updated spec removing reference to off-site performance testing. **Turner Follow-up (10/31/24):** Please confirm that a seperate performance mock-up is not required, and that testing at an off-site lab (i.e. Intertek) is not required.	The two required fleld tests are outlined in part 3.4 Field Qulaity Control to be included by BP #19. **SLAM Response to Turner Follow Up (11/05/24):** SLAM to strike the 1.6b requirements form Section 08 4413 **SLAM Response to Turner Follow Up (11/05/24):** The sperate mock up is not required	10/13/2024	SLAM		Closed	11/6/2024

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82	SLAM	12 6613	10/10/24	Specification section 12 6613 is identfied as delegated design on sheet GC0A. Reviewing the spec section 12 6613 and the requirements noted, can the specified manufacturers standard certification statement meet the delegated design requirements, assuming the specified seating meeting the requirements of this specification section.	Delgated design is required of the project specific seating design and layout, by BP #32. **Revised SLAM Response (11/05/24):** The certification would be that the bleachers comply with the specified performance requirements. We're not asking for these to be designed from scratch; they're essentially pre-engineered to meet the specified performance standard but customized to our project.	10/13/2024	SLAM		Closed	10/21/2024
83	SLAM	22 1123	10/10/24	Specification section 22 1123-1.7C seems to indicate delegated design which is not called for on GC0A. Reviewing this spec section it is not clear if delegated design of "design piping system" is intended to included. Please clarify the design requirements of this specification section.	Delegated design for gas piping shall include hangers and supports. Refer to 220529 Hangers and Supports for Plumbing Piping and Equipment for delegated design of hangars and support. See updated GCOA in Addendum #6.	11/6/2024	CES		Closed	11/7/2024
84	SLAM	11 0610	10/10/24	Specification section 11 0610-1.9C seems to indicate delegated design which is not called for on GC0A. Reviewing this spec section it is not clear what portions of the specification section are to be delegated design and associated criteria. Please clarify the design requirements of this specification section.	Spec Section will be added to the GC0A will include this spec section. As identified under 1.9C.f the rigging system, as shown on the drawings is requitred to be part of the delegated design. The Loading criteria is defined in part 2 of the specification for some of the items and the LINESET SCHEDULE, with its assocoated weights are provided on sheet TR1, use this for the remaining weights to be accounted for in the delegated design.	11/5/2024	SLAM		Closed	11/7/2024
85	SLAM	14 2100	10/10/24	Specification section 14 2100-1.6A seems to indicate delegated design which is not called for on GC0A. Reviewing this spec section appears guide rails are to be delegated design. Please confirm the design requirements of this specification section. **Turner Follow-up (10/21/24):** Please provide updated specs.	Paragraph 1.2-C outlines the items requiring delegated design – pit ladder, divider beams [where required], supports for entrances and rails, and hoisting beam (a/k/a machine beam). Paragraph 1.6-A will be revised to include these items; Article 1.5 will be revised to include a delegated design submittal (in coordination with Section 05 5000). **Turner Response (10/21/24):** Revised Spec Section 14 2100 has been issued in Addendum #2. The elevator subcontractor (BP #34) shall provide signed and sealed elevator drawings with supporting calculations for all elevator delegated design, except for the hoist beam, pit ladder, and pit grating. The elevator subcontractor (BP #34) shall design, furnish, & install all steel supports for sills and entrances as required. The hoist beam, pit ladder, & pit grating delegated design shall be performed by the misc metals subcontractor (BP #13), as they are responsible to furnish & install these components. The elevator subcontractor (BP #34) must provide all loads imposed to the misc metals subcontractor (BP #13).				Closed	10/21/2024
86	SLAM	22 0516 & 23 0516	10/10/24	Specification section 22 0516 and 23 0516 seems to indicate delegated design which is not called for on GC0A. Please confirm if these spec sections should be added to GC0A.	Yes these specs shall be added to GC0A in Addendum #6	11/5/2024	CES		Closed	11/7/2024

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87	Turner	A610	10/10/24	Please clarify under which bid package the Sliding Window at the Nurses Office, and the Bullet Resistant Pass Thru Window at the Admin Office fall under. Are there any specification for them?	Per the BP#19 scope of work, the Sliding Window at the Nurses Office and the BR Pass Thru Window at the Admin Office are to be furnished and installed by BP #19 (Glass & Glazing). No specs are provided for these items. A basis of design for the Bullen Resistant Pass Thru Window is referenced in RFI #3. Reference RFI #88 for product information of the sliding window at the Nurse's office.	10/10/2024	BM/Turner		Closed	10/21/2024
88	SLAM	A610	10/10/24	Please provide basis of design and specification of sliding window at the Nurse's office.	See specification issued as part of Addendum #2	10/22/2024	SLAM		Closed	10/24/2024
89	SLAM	10 5113	10/10/24	Please see attached RFI 89 attachments for potential locker substatution request. Please advise if this substitution is acceptable. **Turner Follow-up (10/31/24):** If "approved as noted" please provide the associated notes in the BQ response.	Lockers are Approved as Noted **SLAM Follow-up Response (11/05/24):** All review coments for substitution are provided on the substitution form, which is included as an attachment to this BQ Log.	10/30/2024	SLAM	Yes -- Substitution Request	Closed	11/6/2024
90				BQ NOT UTILIZED					Closed	10/24/2024
91	SLAM	00 3132	10/11/24	The Geotechnical boring information provided within the specification 00 3132 provides limited information at the phase 2 Turnaround (dwg C303) and deep Sanitary sewer roadwork excavation along Indian rock lane(C306, C307). Are Rock elevations known in these areas? What assuptions are to be made?	Limited Rock elevations are known at the intersection of Indian Rock Lane and Stanwich Road. See the attached existing sanitary sewer as-built which shows rock profile. The Rock profile is anticipated to undulate as shown on the as-built profiles and the provided geotechnical data. Encountering rock should be anticipated in contractor's bid.	10/16/2024	T&B		Closed	10/21/2024
92	SLAM	Site Utility	10/11/24	When reviewing the permit application for the Sanitary sewer the town noted the new lines need to be videoed to show the install from within the new pipes/manholes. There does not appear to be a mention of this video documentaiton. Will this be required by the Sitework Subcontractor? If yes please provide the details and specifications.	Sheet C-301 has been revised to include note 35. stating "ALL SANITARY SEWER MAINS AND LATERALS SHALL BE VIDEO RECORDED PER SEWER DIVISION PERMIT REQUIREMENTS AND PER SPECIFICATION 33 31 15." This will be required by the Sitework Contractor (BP#09).	10/16/2024	T&B		Closed	10/21/2024
93	SLAM	Civil Series	10/11/24	There does not appear to be a Storm Water Pollution Prevention Plan included in the contract documents. Please advise if Sitework Subcontractor will be responsible for SWPPP and if so provide aproject specific plan	Sitework Subcontractor (BP #09) is responsible for the SWPCP. See the included Stormwater Pollution Control Plan for the project.	10/16/2024	T&B		Closed	10/21/2024
94	SLAM	05 3100	10/11/24	Detail 1B/A521 calls for Steel plates top and bottom of deck - fasten and seal with continuous butyl. Please confirm these steel plates are to be by the metal deck manfacturer as no plates are shown on the structural documents. Please provide length of steel plates, and the fastening requirements of the steel plates top and bottom. Where should continuous butyl be applied? Is the butyl part of the roofing specification to be installed by the roofer? **Turner Follow-up (10/16/24):** Please confirm that this plate is not structural. Are there any specific fastening requirements for the attachment of these plates?	Structural Steel subcontractor (BP #12) shall furnish & install steel plates called for on A521 and detailed on 1E/A501. See 1E/A501 detail for length requirement of the steel plates. Fastening requirements are to coordinated between the trades by the Contractor. The mason (BP #11) shall furnish & install two lines of butyl sealant & insulation called for on 1E/A501 at all block exterior wall locaitons and the drywall contractor (BP #21) at all other locations. Sealant should be provide at outermost parrallel flute and each perpendicular flute. **SLAM Follow-up Response (11/05/24):** Plates are not structural. The Scope of work delineation shall remain as described in the original response above.	10/13/2024	SLAM		Closed	11/6/2024
95	SLAM	Civil Series	10/11/24	Will Sitework Subcontractor be responsible for to perform the Turbidity tests (as part of a SWPPP) for the stormwater leaving the site which typically is performed by the Geotech engineer/by Owner?	No, turbidity monitoring is no longer required under the current CT DEEP General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities.	10/16/2024	T&B		Closed	10/21/2024

BQ #	Responsible Consultant	Reference	Date	Question	Answer	Date Item Responded	Answered By (Name / Company)	Attachment (SK# or Spec Section)	Status ("Closed")	Date Closed
96	JLL	02 4100	10/11/24	During the site walk through it was clear there was a significant amount of existing tables, chairs, file cabinets, general ffe, etc. throughout the existing building. What is the intent for the removal of this equipment? Can a schedule be provided for what is to be salvaged by the owner and what is to be removed as waste by the demo subcontractor?	The Greenwich Public Schools (GPS) Facilities Department will remove a limited amount of materials, such as door hardware, after the school year. However, they won't store any items for attic stock due to limited space. The demolition contractor shall include the disposal of existing tables, chairs, file cabinets, general FF&E, etc..	11/6/2024	JP/Turner		Closed	11/6/2024
97	JLL	02 4100	10/11/24	During the site walk through it was clear there was a significant amount of exterior items not called to be demolished on the site demolition plans (C402, C403) including chain link backstops, basketball hoops, fenced garden, soccer goals, etc. Can a schedule be provided for what is to be salvaged by the owner and what is to be removed as waste by the Sitework subcontractor?	Subcontractors to include demo & disposal of all existing exterior "loose" items, including but not limited to chain link backstops, basketball hoops, fenced garden, soccer goals, etc. in base bid.	11/6/2024	JP/Turner		Closed	11/6/2024
98				BQ NOT UTILIZED					Closed	10/24/2024
99	SLAM	31 2300	10/11/24	Are reports available regarding the hazardous material clasification of the exiting soils to be removed?	Available reports have been issued in Addendum #2	10/22/2024	SLAM		Closed	10/24/2024
New Bidder's Questions as of 10/11/24 Issuance										
100	SLAM	M601	10/11/24	Remark #5 on the HVLS Fan Schedule on Drawing M601 states the color and finish of the CF-A fans shall be selected by the Architect. Please provide desired color and finish.	Color to be selected by architect form the manufactures full range of standard colors.	11/6/2024	SLAM		Closed	11/6/2024
101	CES	M502	10/11/24	The Mechanical piping floor plans indicate HWS, HWR, MCHWS & MCHWR feeding the active chilled beams, however, Details 6 & 7 on Drawing M502 indicate HWS, HWR, CHWS & CHWR. Please advise which is correct.	Chilled beam details have been updated for Addendum No. 3.	10/22/2024	CES		Closed	10/24/2024
102	SLAM	A200 Series	10/11/24	General Note #12 on the A200 series drawings state nothing other than ceiling systems can be supported from the roof deck where there is no concrete fill. In instances where long duct runs on the roof occur (i.e. from RTU-1 into the building), does this statement still apply? 9/M500 and 9/M501 indicate duct/pipe supports sitting on top of the roof insulation; In most cases, these supports will not be located over structural steel, but solely on top of metal decking. Should curbs/rails be specified? Is there a wind load concern for detail 9/M500 and 9/M501?	A. Roof top supports for duct wrok should be placed over roof structure. B. Roof mounted ductwork and pipe supports/rails shall be securely attached to steel below the roof deck. The details mentioned will be updated to reflect that attachment to steel within the next addendum. Wind load calculations are required for all roof mounted ductwork. **Turner Response (10/31/24):** The HVAC contractor (BP #37) shall design, furnish, & install all roof support structure for duct & HVAC piping including but not limited to wind load calculations.	10/28/2024	CES		Closed	10/31/2024
103	SLAM	003132	10/14/24	Specification Section 003132 Geotechnical Data The contract documents only include the boring locations and data. Please provide the complete Geotechnical report by Tighe & Bond dated 01/26/24 as referenced on drawing S-001 Paragraph C : Foundations and Geotechnical Report.	Geotechnical Report has been provided in Addendum No. 2	10/22/2024	T&B		Closed	10/24/2024
104	SLAM	Civil Series	10/14/24	Will Versa Lok retaining walls be an acceptable substitiion to the specified product? See attached Product Data.	Versa-lock is an acceptable substitution. Contractor to ensure that proposed product can meet design intent with regard to layout and construction. Color to be selected from manufacturer's full range of colors and finishes (including premium). Near vertical batter (1/4").	10/30/2024	SLAM	Yes -- Substitution Request	Closed	10/31/2024
105	Turner	Procurment Manual	10/14/24	Is the request for the bid bond a dual oblige (i.e. Construction and Board of Education of the Town of Greenwich)?	Confirmed Dual Oblige. Turner Construction and "Town of Greenwich"	10/14/2024	JP/Turner		Closed	10/14/2024

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106	Turner	Procurment Manual	10/14/24	Do we need to fill out “35 - Turner Prequal form 1 17 07 format” if we’ve already submitted our prequal online with Turner for this year?	Subcontractors who are currently Prequalified with Turner may request Turner provide a letter to verify prequalification. Copy of letter can be submitted with Bid in lieu of submission of the "Turner Prequalification Response Form" included within the project manual. Send requests for Prequalified letter Francesca Perugini at fperugini@tcco.com.	10/14/2024	JP/Turner		Closed	10/14/2024
107	CES	M503	10/14/24	The following details were ommitted from Drawing M503 between the Phase 2 Set dated 07/08/2024 and the Bidding/Permit Set dated 09/30/2024: - 1 - Boiler - Condensing w/ Pump - 2 - Glycol Make-up Unit - 3 - Expansion Tank and Air Separator - 6 - Pump - Inline - 8 - Low Loss Header - Suspended - 9 - Pump - Base Mount Inline - 10 - Pot Feeder Please confirm these details are no longer required for this project.	The individual details are no longer required as the equipment details are shown on the hot water and chilled water piping diagrams.	10/22/2024	CES		Closed	10/24/2024
108	CES	M700, M701	10/14/24	We cannot locate Control Diagrams for the following pieces of Mechanical equipment on Drawings M700 or M701. Please provide: 1) Heat Recovery Ventilator HRV-1 2) High Volume Low Speed Fan CF-A 3) Dust Collector DC-1 4) Air Filtration Unit AFU-A 5) Heat Exchanger HX-1 6) Exhaust Fan KHEF-1 7) Exhaust Fan DEF-1	Controls diagrams have been updated in Addendum No. 2, all units not shown are outlined with the sequence of operations spcefification 230993.	10/22/2024	CES		Closed	10/24/2024
109	CES	M700	10/14/24	Please confirm Detail 8/M700 should be utilized for both Exhaust Fans EF-1 and EF-2.	Exhaust fan controls diagrams have been updated in Addednum No. 3.	10/22/2024	CES		Closed	10/24/2024
110	CES	23 09 93	10/14/24	We cannot locate a sequence of operations for the following pieces of Mechanical equipment within Specification Section 23 09 93. Please provide: 1) Finned Tube Radiators 2) Dust Collector DC-1 3) Air Filtration Unit AFU-A	Sequences of operation have been added for addendum #3.	10/22/2024	CES		Closed	10/24/2024
111	CES	M601	10/14/24	Please provide a Specification Section for Dust Collector DC-1.	Dust Collector DC-1 specification has been added to section 233400 - HVAC Fans within Addendum No. 3.	10/22/2024	CES		Closed	10/24/2024
112	CES	M602	10/14/24	Please provide a Specification Section for Air Filtration Unit AFU-A.	Air Filtration Unit AFU-A specification has been added to section 233400 - HVAC Fans within Addendum No. 3.	10/22/2024	CES		Closed	10/24/2024
113	CES	23 09 93	10/14/24	Mechanical pump designations were updated on the drawings in the Bidding/Permit set dated 09/30/2024, however, these designations were not updated in Specification Section 23 09 93-3.20. Please update accordingly.	Specification 230993 has been updated in Addendum #4 to reflect these changes.	10/30/2024	CES		Closed	10/31/2024
114	CES	23 09 93	10/14/24	Specification Section 23 09 93-3.20.D identifies Heat Exchanger Pumps HXP-1 and HXP-2, however, we cannot locate these pumps on the mechanical plans or schedules. Please advise.	Specification 230993 has been updated in Addendum #4 to reflect these changes.	10/30/2024	CES		Closed	10/31/2024
115	CES	23 09 93	10/14/24	Specification Section 23 09 93 contains sub-part 3.18 for Boilers as well as sub-part 3.19 for Water Heaters. The Boilers are identified throughout the Plans and Specifications, however, please advise where the Water Heaters are located an specified.	The water heaters are located within Mechanical Room 1060 and are specified under Division 22, specification 223300.	10/22/2024	CES		Closed	10/24/2024
116	SLAM	FS141	10/14/24	Details 1/FS141 shows recessed slab and pourable fill and 2 " concrete topping within the Refrigerator rooms, who is to provide this scope.	Recessed slab, Pourable Fill and 2" concrete topping to be furnihsed and installed by the Concrete Bid Package #10. Concrete Bid Package #10 to also provide the concrete fill shown on 2/FS141	10/14/2024	JP/Turner		Closed	10/14/2024

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117	SLAM	FS141	10/14/24	Detail 2/FS141 calls for back fill by GC below floor pan and grate. Please provide what this backfill material is intended to be?	Backfill material shall be Concrete furnished & isntalled by the Concrete subcontractor (BP #10).	10/28/2024	Crabtree		Closed	10/31/2024
118	Turner	23 7413, 262413, 262416	10/14/24	Can shipping splits and informatoin be provided for the PrePurchsed Equipment	See attached BQ 118 for use in HVAC Bid Package #37 and Electrical Bid Package #38 information for spilts and weights.	10/14/2024	JP/Turner	Yes -- Prepurchased Equip. List & Shipping Splits	Closed	10/14/2024
119	SLAM	096466	10/14/24	Please advise if the attached wood flooring product can be substituted for the current speced out wood flooring.	Approved	10/30/2024	SLAM	Yes -- Substitution Request	Closed	10/31/2024
120	SLAM	L501	10/15/24	The curb detail calls for 6”x20” curb. Greenwich municipal standard is 5”x18” with a buzzed edge. Can you confirm the 6”x20” is correct?	Please use the Greenwich municipal standard for curbs. SLAM will update the detail accordingly. Maintain overall walk widths.	10/28/2024	SLAM		Closed	10/31/2024
121	SLAM	L202C	10/15/24	Please clarify the proposed condition within the chiller pad area on L202C. There is a callout for stone mulch as well as heavy duty concrete pavement.	The proposed condition in the chiller pad area should be heavy duty concrete pavement. The errant leader will be deleted from L202C accordingly.	10/28/2024	SLAM		Closed	10/31/2024
122	SLAM	S210	10/15/24	Please provide a detail for the chiller and generator pads. The detail callout of 7/S210 doesn’t seem to be correct.	The concrete pad in detail 18/S200 will bear on the frost walls indicated and be reinforced per detail 7/S210.	10/28/2024	SLAM		Closed	10/31/2024
123	SLAM	Civil / Landscape Series	10/15/24	Is there supposed to be a warning track along the baseball and softball backstops? If so, please provide a detail for the warning track	Yes, warning track should be provided. Limits are shown on L202 series and are clarified in Addendum #4. Detail of warning track section has been provided on L601.	10/28/2024	SLAM		Closed	10/31/2024
124	SLAM	L601	10/15/24	Please clarify the limits of detail 3C/L601 on the ball fields as well as the limits of sod in alternate #’s 1 & 2	Any athletic field area should utilize detail 3C/L601 for the turf section. This includes run-off areas as shown with a dashed line on the plans. This is also the limit of sod for the alternate. Infield and warning track to be omitted from the turf areas.	10/28/2024	SLAM		Closed	10/31/2024
125	SLAM	Existing / As-Built Dwgs	10/15/24	Please provide existing building drawings to help estimate the existing building slab elevations and the conditions the sitework contractor will be left with after the demolition contractor removed the building slab and foundations	See existing drawings issued in Addendum #3. The demolition subcontractor (BP #08) shall remove all slabs on grade and footings, per the Turner scope of work documents. Sitework Subcontractor (BP #09) shall include all fill as needed based on the existing building elevation changes. The Sitework Subcontractor shall remove any existing gravel course or footing / slab-on-grade subgrade prep materials (assume 12" depth). The demolition subcontractor to cut back any slopes (per Turner EH&S) where foundation walls/retaining walls are being removed. The sitework subcontractor shall backfill sloped and excavated areas to achieve the correct final elevation and conditions.	10/24/2024	SLAM	yes - Existing Drawings	Closed	10/25/2024
126	Turner	Civil / Landscape Series	10/15/24	Please confirm all existing topsoil is to be stripped and exported. None is to be left onsite for reuse a.Please confirm that BP#9 does NOT own furnishing and installing any topsoil or athletic field topsoil mix.	Confirmed. Top soil shall be removed from site by the Sitework Subcontractor (BP #09). Furnishing and installing topsoil is assigned to the Landscape Bid Package (BP #41).	10/15/2024	JAC - Turner		Closed	10/21/2024
127	SLAM	Civil Series	10/15/24	Please provide a detail for the concrete weirs under the porous asphalt	See detail for precast concrete barriers to be used as concrete weirs on C501 issued in Addendum No. 3	10/22/2024	T&B		Closed	10/24/2024
128	SLAM	Geotech Report	10/15/24	I see the boring and soil information, but I do not see a geotechnical report with engineering directives/recommendations. Please provide a complete geotechnical report.	Geotechnical Report has been provided in Addendum No. 2	10/22/2024	T&B		Closed	10/24/2024

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129	SLAM	Scope of Work	10/15/24	BP #9 scope of work item #93 states that the excavation is considered to be unclassified. We will utilize any provided information to include in our bid any and all rock, unsuitable soils, etc. that can be reasonably anticipated. If we encounter soil conditions that could not have been reasonably anticipated based on the contract documents, will extra compensation be paid via change order? a.Please provide a definition of "unclassified" as it relates to all excavation onsite. Confirm that it only applies to the subgrade level and any excavation required beyond subgrade level would be paid via change order.	The Sitework Subcontractor (BP #09) shall use all information available through Project Manual, Drawings, borings and reports provided within the contract documents for quantities of all rock, soils, unsuitable material, etc. encountered during excavation within their base bid. Unclassified does not include unforeseen concrete foundations, slabs or walls. Sitework subcontractor shall be responsible to remove all soil, rock, etc. material to subgrade per elevations required per the contract documents, however, all soils identified as unsuitable per the contract documents shall be removed (and replaced to subgrade elevations) in their entirety unless the alternate for aggregate pier ground improvement is accepted.	11/5/2024	T&B		Closed	11/6/2024
130	SLAM	A600	10/15/24	Can you identify the typical locations that Partition Type B is found within the building/on the drawings? For Type B Partitions - are these to be full height to underside of deck or just above ceiling ?	Wall partition type B1B and B1A are located in the Main Entry Vestibule 1000 and are full height to unerside of roof deck.	10/22/2024	SLAM		Closed	10/24/2024
131	SLAM	S211	10/15/24	As a follow up to Bidder Question #55 - For the portion of SOG that needs to be poured prior to the backfill taking place on the back side of the Retaining Wall, what is the minimum distance off the wall that the SOG needs to be poured?	Revised Structural details have been provided at this condition in Addendum No. 2	10/28/2024	SLAM		Closed	10/31/2024
132	SLAM	Geotech Report	10/15/24	Only page 1 of the boring plan is visible. Page 2 is just a white screen. Please provide page 2 of the boring plan because the plan is cut off at the new baseball fields home plate area.	There is no page 2, the blank page was for the 11x17 to print correctly. See revised Geotech Report issued in Addendum No. 2	10/22/2024	T&B		Closed	10/24/2024
133	Turner	Proj. Schedule/ Logistics Plans	10/15/24	1. Phased Project for Millwork Install? How Many? When do they Start & Complete? 2. Any special delivery times or requirements? 3. Elevator/Hoist available?	1. Please reference the project schedule where it references Start Finishes. 2. No specific delivery requirements other than what is shown on the logistics plans. Each delivery will have to be coordinated/ scheduled with the TCCO super. 3. No elevator/ Hoist available- However there will be access to the second-floor level through the back of the building as it is on grade.	10/15/2024	JM-Turner		Closed	10/16/2024
134	Turner	098416	10/15/24	Does ADC1 found in Spec Section 098416 belong to bid package #22 – Acoustical ceilings?	Yes ADC1 is part of the BP#22 Ceilings package.	10/15/2024	JM-Turner		Closed	10/16/2024
135	Turner	098416	10/15/24	BP#22, Line 18 refers to Spec Section 098416 for SAC1 locations. SAC1 is found in Spec Section 098430. Please Clarify.	BP#22 Ceilings shall furnish and install all Sound absorbing ceiling panels. BP#18 Millwork will install all sound absorbing Wall panels.	10/15/2024	JM- Turner		Closed	10/16/2024
136	Turner	098416	10/15/24	Is BP #22 responsible for work shown in Spec 098416?	Spec section 098416 Fixed Sound Reflective Panels is a shard spec section between BP#22 Ceilings and BP#18 Millwork. See specific scope of work for clarifications.	10/15/2024	JM- Turner		Closed	10/16/2024
137	Turner	098416	10/15/24	Which bid package is responsible for ceiling type ADC1?	Yes ADC1 is part of the BP#22 Ceilings package.	10/15/2024	JM-Turner		Closed	10/16/2024
138	SLAM	A901C	10/15/24	Is AWP8 only to be installed on 2 walls in room #'s 1059 and 1061?	See bidder question #10 response	10/28/2024	SLAM		Closed	10/31/2024
139	SLAM	A901D	10/15/24	Finish plan on A901D calls for AWP11 in rooms 1119 & 1110 while the finish schedule calls for AWP8 in practice rooms. Which is the correct?	The wall panel is tagged incorrectly on the plan and should be AWP8 as noted on the Finish Product List	10/28/2024	SLAM		Closed	10/31/2024
140	SLAM	A901D	10/15/24	Are AWP panels in rooms 1119 and 1110 to extend floor to ceiling?	Practice Rooms get full height/width AWP on walls noted on Finish Plan	10/28/2024	SLAM		Closed	10/31/2024
141	SLAM	095100	10/15/24	Finish schedule on A9111 specifies USG 88983 for APC2. This tile does not have the NRC value specified in Spec Section 095100. USG 86258, however, does meet the specified NRC value. Should 86258 be used instead of the specified 88983?	Revise to be USG # 86258	10/28/2024	SLAM		Closed	10/31/2024
142	SLAM	098416	10/15/24	The finish schedule lists a USG Geometrix product for ADC1 while Spec Section 098416 lists a Kinetics product. Which is correct?	The manufacturer listed on A911 is incorrect and should be Kinetics as listed in the specifications.	10/28/2024	SLAM		Closed	10/31/2024

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143	SLAM	A911	10/15/24	Are perforations and acoustical felt required for ADC1 panels?	Perforations and acoustical felt are not an option for ADC1	10/28/2024	SLAM		Closed	10/31/2024
144	SLAM	A910	10/15/24	The finish schedule lists a specification for AWP7. No AWP7 panels can be located on the architectural drawings. Is this specification relevant to this project?	AWP7 is not used.	10/28/2024	SLAM		Closed	10/31/2024
145	Turner	Logistics Plans	10/15/24	Regarding the debris netting on the Turner Logistics Plans - A site bidder asked what is this 12'-15' feet debris netting? Is this 4 more feet on top of the fence w/ driving range style golf protection? How high? 12 or 15?	This is additional protection on top of the 8ft construction fence for the egress door on that side of the building. It can be an extension of the fence posts, provided it works, or a separate system. Spacing that would prevent a golf ball size object should be sufficient. The height should be 15 feet.	10/15/2024	JAC - Turner		Closed	10/16/2024
146	SLAM	34 0000	10/16/24	Sitework Bid Package includes spec. 34 0000 – Transportation. Can you please clarify are we to trench and backfill for the electrical package or do we own furnish and install of all aspects of the traffic control signal plans? Turner Follow-up (10/21/24): SLAM please provide electrical design for traffic control devices that require power.	Turner Response (10/21/24): Sitework Bidder (BP #09) shall trench and backfill for power requirements, and Electrical Subcontractor (BP #38) shall be responsible for load carrying conductors, raceways and power connections, and Eversource Coordination. Sitework subcontractor shall furnish and install, solar panels, batteries any interconnecting or control wiring for these systems. Turner Updated Response (10/24/24): See updated TC202 issued in Addendum #3	10/22/2024	JAC-Turner		Closed	10/24/2024
147	Turner	Logistics Plans & Sitework Scope	10/16/24	1. Please clarify the reference to 12-15'H debris netting requirements with 8'H driven temp fence. 2. Scope of Work 75 thru 77 - Please confirm this equipment will remain property of Sitework Subcontractor at end of project or if it is to be handed over to Turner/owner permanently? 3. Scope of work 88 - "This subcontractor shall furnish and install all rain gardens and swales..." Is landscaping package responsible for any planting? 4. Scopes of work for utility coordination references "this subcontractor shall include all fees..." Please confirm any new service or connection fees required by utility companies will be paid for by the owner. If this is not the case, please provide appropriate allowance or amounts for bidding purposes. 5. scope of work 123 and 124 - Confirm sitework is to furnish concrete bases, but all anchor bolts, conduit or other embedded items that may be required from other trades' lighting vendors, will be provided to sitework prior to precast.	1. See RFI Response #145 2. These will become property of the Town of Greenwich. 3. Landscaping Bid Package (BP #41) will be reponsible for Plantings. 4. This is will be sitework subcontractors (BP #09) responsibility to include the fees associated with utility tie-ins, tap fees and/or conection fees due to the utility company. 5. Anchor Bolts shall be funished and installed by Sitework Subcontractor (BP #09). Conduit inside concrete bases provided by Sitework Bid Pacakge shall be furnished and installed by Sitework Subcontractor. Furthurmore it is the Sitework Subcontractor's responsibility to cooridnate Anchor Bolt Size and Locations and conduit size and location with Electrical Subcontractor (BP #38 & 39). Additionaly, sitework subcontractor to include delegated design of footings, per the contract documents, including the anchor bolts.	10/16/2024	JAC-Turner		Closed	10/16/2024
148	Langan	28213	10/16/24	Specification Section 028213-1.6 notes that the contractor is to provide Testing Lab Services for asbestos abatement. Please clarify what the extent of these services would be and how this differs from the Testing Lab Services provided by Langan and the Owner.	Contractor is to submit information for laboratories they use for OSHA personal air sampling analysis (asbestos and PCB) as well as additional laboratory information if they are going to send any disposal TCLP samples out for analysis.	10/28/2024	Langan		Closed	10/31/2024
149	Langan	28432	10/16/24	Specification Section 028432-1.6 notes that the contractor is to provide Testing Lab Services for PCB remediation. Please clarify what the extent of these services would be and how this differs from the Testing Lab Services provided by Langan and the Owner.	Contractor is to submit information for laboratories they use for OSHA personal air sampling analysis (asbestos and PCB) as well as additional laboratory information if they are going to send any disposal TCLP samples out for analysis.	10/28/2024	Langan		Closed	10/31/2024

BQ #	Responsible Consultant	Reference	Date	Question	Answer	Date Item Responded	Answered By (Name / Company)	Attachment (SK# or Spec Section)	Status ("Closed")	Date Closed
150	Turner	PSU001	1/16/24	Drawing PSU001 shows the 4" fire protetion line up to Fire Dept. Connection by DIV 21, but Turner's scope of work assigns this to sitework subcontractor. Please clarify	Sitework Subcontractor (BP #09) is responsible for this scope outside of the building up to 5 feet from the building. Itis their responsibility to be licenced to install this scope of work. Fire protection subcontrator (BP #35) will be rsponsible to bring this, and other fire protection services, from 5 feet outside the building into the building including providing the foundation penetration or sleeve / link seal.	10/16/2024	JAC- Turner		Closed	10/16/2024
151	Turner	Scope of Work	10/16/24	Sitework Scope Of Work #133, Furnish & Install Vertical Foundation Insulation Spec. Section 07 21 00; Thermal Insulation; Details 3A/A501 and 5E/A501. Please confirm that BP #14 - Waterproofing is responsible for the 3" thick rigid insulation as shown in details 3A & 5E/A501	The sitework bid package shall be reponsible to furnish and isntall the rigid insulation as described in scope of work item 133 and shall also be responsible to furnish and install the rigid insualiton per details 3A and 5E on drawing A501.	10/22/2024	JAC- Turner		Closed	10/21/2024
152	Turner	Scope of Work	10/16/24	Sitework Scope Of Work #70 states...'This contractor shall furnish, install and maintain asphalt millings, including removal for 50' around perimeter of the building. Does this mean 50 feet in width around the perimeter?? Many areas do not have 50 feet in width available.	The Intent is that the Sitework Subcontractor shall be responsible for providing a uniform and level compacted grade around the building perimeter suitable for the support of scaffolding and lifts. The 50 foot dimension may be deviated from if any obstruction such as a retaining wall, temporary fence, buildiung or similar obstruction exists, however if the 50' dimension is acheiveable, this uniform level comacted grade with millings shall be provided by the Sitework Subcontractor.	10/22/2024	JAC- Turner		Closed	10/21/2024
153	Turner	Scope of Work	10/16/24	Sitework Scope Of Work #28 - Turner's Site Trailer, paragraph (a), refers to 'plans for layout and furniture requirements. Please provide plan for the trailer and the wood platform/stairs.	See attached Layout within BQ Attachments for trailer layout.	10/22/2024	JP - Turner	Yes - Trailer Layout	Closed	10/22/2024
154	SLAM	TC Series	10/17/24	TC Drawings show Solar Powered Rapid Flashing Beacons and specification 344114 page 19, mentions hardwired 100-240VAC connections but no electrical scope is shown on the contract documents for the hardwired connection. Please confirm these units are only solar/battery and no line voltage connection is required. If line voltage is required please provide the electrical information	Confirmed, these units are to be solar powered. No line voltage is required.	10/22/2024	T&B		Closed	10/24/2024
155	Turner	Scope of Work	10/17/24	What bid package is required to wire the rapid flashing beacon	Sitework subcontractor (BP #09) shall be reponsible for all wiring with the exception of line voltage that may be required per RFI#154's response. If line voltage power is required then pathways, conductors, termination, & testing shall be furnished and installed by the base electrician (BP #38). Trenching, backfill, etc. will be by the site contractor (BP #09).	10/16/2024	JAC- Turner		Closed	10/16/2024
156	SLAM	TC Series	10/17/24	TC Drawings show radar speed display and indicate a hardwired connection. No electrical scope is sown on the CDs. If line voltage is required for radar speed display please provide the electrical information	See the revised TC202 in Addendum No. 3	10/22/2024	T&B		Closed	10/24/2024
157	Turner	Scope of Work	10/17/24	What bid package is required to wire the Radar Speed Display?	Sitework subcontractor (BP #09) shall be reponsible for all wiring with the exception of line voltage that may be required per RFI#156's response. If line voltage power is required then pathways, conductors, termination, & testing shall be furnished and installed by the base electrician (BP #38). Trenching, backfill, etc. will be by the site contractor (BP #09).	10/16/2024	JAC- Turner		Closed	10/16/2024
New Bidder's Questions as of 10/16/24 Issuance										
158	SLAM	A311	10/17/24	Exterior elevations Dwg A311, grraphic legends, calls for Masonry Expansion Joint (MVEJ) detailed on 1B/A502. No 1B/A502 exists. Was this detail intended to be detail 1C/A502, Typical Masonry Veneer Movement Joint Detail?	Yes, 1C/A502 was the intended detail. 1C will be renumbered to 1B in the confromed set.	10/22/2024	SLAM		Closed	10/24/2024

BQ #	Responsible Consultant	Reference	Date	Question	Answer	Date Item Responded	Answered By (Name / Company)	Attachment (SK# or Spec Section)	Status ("Closed")	Date Closed
159	SLAM	07 9513	10/17/24	Specification section 07 9513-2.2 I and 2.2J call for Exterior expansion joint types, however, no designation is provided. Please provide designation of this type of Joint and where it would be located on the contract drawings. **Turner Follow-up (10/24/24):** 1) Please confirm that by "AL" series, you are referencing the Architectural Layout Plan drawings. 2) AL series (example: AL102E) calls for "Roof to Wall Expansion Joint" and Architectural Roof Series (example: A103A) calls for "EJ." No designation for this expansion joint is called out that keys it to the associated Expansion Joint Spec (i.e. Exterior Wall Non-Fire Rated or Exterior Wall Fire-Rated Expansion joint). Please clarify what type of exterior wall expansion joint is required in coordination with the specs.	Refer to "AL" series, wall sections and section details for expansion joint types and details. **SLAM Response to Turner Follow Up (11/5/24):** 1. Yes, the AL series refernce is to Architectural Layout Plan drawings, as they are the only AL Series drawings 2. Roof and Roof to wall expansion joints are not “types” and all associated materials are called out in details. The A103A refernce to “EJ” is another Roof to Wall expansion joint. Many of these details were updated and reissued in Addendum No 4 to simplify these roofs to wall expansion joints. 3. Our typical exterior wall expansion joint (EWJ-1) is shown on the AL plans and in the Plan details. None of these exterior walls are rated and the refernce to the Exterior wall Fire-Rated Expansion joint should be ignored.	10/22/2024	SLAM		Closed	11/6/2024
160	SLAM	01 4000	10/17/24	Please provide Statement of Speical inspections identifying the scope of owner testing requirements and frequency for coordination with trade subcontractors. (i.e. Concrete, Masonry, Steel)	Both Architectural and Structural SSI's have been furnished in Addendum 6	11/5/2024	SLAM		Closed	11/7/2024
161	Turner	32 1613.23 & 321640	10/17/24	BP #9 scope of work exclusion #6 states we should exclude all curbing unless otherwise indicated. Listed under exclusive specifications in the scope of work for BP#9 is precast concrete curbing (321613.23) and granite curbing (321640). Please advise as to who owns the curbing (BP#9 or BP #40).	Granite Curbing and Pre-Cast Concrete Curbing shall be furnished and installed by the Sitework Subcontractor **SLAM Follow-up Response (10/23/24):** See the revised TC202 in Addendum No. 3 for Asphalt curbing detail, which shall be furnished & installed by the sitework subcontractor (BP #09).	10/23/2024	JAC/Turner		Closed	10/24/2024
162	SLAM	32 1613.23 & 321640	10/17/24	There is no precast concrete curb shown on the plans nor is there a detail. Please confirm that all curbing is to be granite.	All curbing is granite, as shown on the drawings	10/28/2024	SLAM		Closed	10/31/2024
163	Turner	03 6213	10/17/24	Is masonry to provide non-metallic non-shrinking grouting at the steel column and base plate locations?	The grouting at steel column and base plate locations to be furnished and installed by BP#10 Concrete.	10/17/2024	BM/Turner		Closed	10/17/2024
164	SLAM	A606	10/17/24	Drawing A606 seems to provide both Masonry and steel lintel schedule for masonry openings. Can either option be used at contractor choice for openings or are there specific areas that require masonry lintels and others that require steel?	Contractor Choice. **Turner Follow-up Response (10/24/24):** Masonry subcontractor (BP #11) to furnish & install all masonry or steel lintels indicated on the lintel schedules.	10/22/2024	SLAM		Closed	10/24/2024
165	SLAM	A911	10/17/24	a: Finish Product List A911 calls out “9/16” DXL grid”. USG DXL grid is 15/16”. Please confirm USG DXT 9/16” grid should be utilized for APC-1-4. b: Finish Product List A911 APC-1,3,&4 states 70% recycled content. Please confirm if this is in reference to the tile recycled content, or if high recycled content grid is required?	a. Use 9/16 " DXT Grid b. Recycled content is specifically for the tile not the grid	10/28/2024	SLAM		Closed	10/31/2024
166	SLAM	3A/A520	10/17/24	Details 3A & 4C on A520 seem so show AVB below the window in the cavity behind the insulation at the expansion joint locations. (shown as dashed line). There also appears to show AVB outside of the vertical plywood also at the joint location. Please clarify if there is AVB at both locations or if the dashed line shown outside the plywood is part of the expansion joint. Also, where does the AVB behind the thermal insulation terminate, or confirm it terminates it terminates at the blocking at the steel beam/blocking at SOD?	Refer to revised details in Addendum No. 3 **SLAM Follow-up Response (11/05/24):** This is not AVB at both locations. The AVB is behind the Wall Insulation, the other dashed line is the insulted portion of the expansion joint system (see referenced detail 3E/A53) The AVB terminates on the face of the lowest wood blocking prior to the plywood being applied.	10/22/2024	SLAM		Closed	11/6/2024

BQ #	Responsible Consultant	Reference	Date	Question	Answer	Date Item Responded	Answered By (Name / Company)	Attachment (SK# or Spec Section)	Status ("Closed")	Date Closed
167	SLAM	A911	10/17/24	Substitution request for Certainteed products in lieu of USG. See attached RFI 167 request form. **Turner Follow-up (10/31/24):** If "approved as noted" please provide the associated notes in the BQ response.	Certainteed is Approved as Noted **SLAM Follow-up Response (11/05/24):** All review coments for substitution are provided on the substitution form, which is included as an attachment to this BQ Log.	10/28/2024	SLAM	yes - substitution request	Closed	11/6/2024
168	SLAM		10/17/24	Please advise if the roof joists at the Gym & Auditorium, which are a delegated design, need to account for the loads imposed by a future PV system. If so, please provide those future PV loads that need to be incorporated into the joist design. **Turner Follow-up (10/31/24):** Please confirm that there are no local point loads imposed by the future PV system that needs to be accounted for in the joist delegated design.	See drawing S302B for joist loads. These include PV panel loads. **SLAM Follow-up Response (11/05/24):** As the future system is unknow the design team cannot answer the follow-up question. Design per loads identified on the contract documents.	10/28/2024	SLAM		Closed	11/6/2024
169	SLAM	SOW	10/17/24	Acoustical Ceiling SOW #22 states “This Subcontractor shall design, furnish & install an independent support system for all hung equipment, fixtures, ceiling and piping system that are directly below the metal roof deck. This support system must attach to structural steel framing members as the metal roof deck cannot be utilized for support. Refer to A200 series drawings General Note #12 for criteria.” Note #12B states “a. ACOUSTIC CEILING SYSTEMS (ACT TILES, ETC.) WEIGHING LESS THAN 5 LBS/SF AND HUNG AT 4'-0" O.C. BOTH DIRECTIONS. b. SINGLE LAYER GYPSUM BOARD CEILING SYSTEMS WEIGHING LESS THAN 5 LBS/SF AND HUNG AT 4'-0" O.C. BOTH DIRECTIONS.” Is it acceptable to hang ACT and GWB ceilings from the roof deck?	As long as the ceilings being provided meet the Note A and Note B criteria listed in the question.	10/22/2024	SLAM		Closed	10/24/2024
170	SLAM	3B/A522	10/17/24	Please confirm that the vapor barrier at the skylight system notes to flap to inside face of curb is not required to lap to termination bar at roofing termination. **Turner Follow-up (10/24/24):** Please provide updated details.	The VB has been modified and reissued in Addendum No 4	10/28/2024	SLAM		Closed	10/31/2024
171	SLAM	A126, A911	10/17/24	Drawing A126 does not have any interior layouts of the interior of the elevator cab walls and/or ceiling. Finish drawing A911 calls for Wilsonart Panels, clarify if this is for full height? are rails and/or base required? **Turner Follow-up (10/24/24):** Please provide elevator interior cab elevations, details, and RCP.	Spec section 14 2100, 2.10-A-4 calls out a recessed stainless steel wall bse. **SLAM Follow-up Response (11/05/24):** All interior finishes are called out for and identified in the specification for the interior of the elevator cab, coordinate refences to finish product list.	10/22/2024	SLAM		Closed	11/6/2024
172	SLAM	5B/A805	10/17/24	Detail 5BA805 shows the overall height of the locker and enclosure at 3’-5 ½”. This includes the 4” high Z base and the thickness of the enclosure top. Subtracting the height of the Z base this leaves a total dimension of 37 ½”. The locker itself would need to have an overall height of 37 1/32” leaving 15/32” for the top of the enclosure, and the slight gap between the locker and the top. Is this acceptable?	Detail has been revised in Addendum 4	10/28/2024	SLAM		Closed	10/31/2024
173	SLAM	Speciifcation 105113 2.2 A .8	10/17/24	Speciifcation 105113 2.2 A .8 states to provide sloped top to the extent indicated on drawings. The Corridor Lockers as seen on drawing A111.13 Elevations 4C,4D,4E, & 4F do not show sloped top. Is there supposed to be sloped top for these lockers?	No Sloped tops	10/22/2024	SLAM		Closed	10/24/2024

BQ #	Responsible Consultant	Reference	Date	Question	Answer	Date Item Responded	Answered By (Name / Company)	Attachment (SK# or Spec Section)	Status ("Closed")	Date Closed
174	Turner	Scope of Work & Procurement Manual	10/17/24	1.General Trade Requirements for BP12 - Structural Steel, #7 - will the erectors foreman suffice as representation for the full-time superintendent at the jobsite? 2.Scope of Work BP12 – Structural Steel; #50, can the requirement to furnish and install bituminous paint be removed from this bid package? 3.Scope of Work BP12 – Structural Steel; #63, can the requirement to furnish and install the spray-applied insulative coating system be removed from this bid package?	1. This will be acceptable assuming the foreman has decision making authority for the prime steel contractor. The prime steel contractor must have their own dedicated project manager assigned to the project. And Turner reserves the right to request a full time on-site superintendent from the prime contractor at Turner's discretion, especially if their sub tier is not performing the role accordingly. ~~2. This scope of work item will remain with Structural Steel BP #12.~~ See follow-up response below. 3. This scope of work item will remain with Structural Steel BP #12. **Turner Follow-up Response (10/21/24):** 2. Bituminous paint shall be excluded from the steel subcontractor's scope (BP #12). The concrete subcontractor (BP #10) shall furnish & install the required concrete cover in lieu of bituminous paint. For example, see detail 4 on S200.		CL/Turner		Closed	10/21/2024
175	JLL	MEPD000 & MEPD001	10/18/24	Please advise if there are any existing electrical feeds that originate from the Existing School, which is slated for demolition, that need to remain energized or be re-circuited from another source prior to demolishing the existing school. **Turner Follow-up (10/24/24):** JLL please provide this information per SLAM's response.	Any existing electrical feeds originating from existing school to remain or be recircuited to be identified by Greenwich Public Schools. **JLL Follow-up Response (11/05/24):** The GPS Director of School Facilities states that there is a single circuit responsible for all exterior lighting at CMS, including parking lot lights, building floodlights, and tennis court lighting. The plans for the tennis courts during construction are uncertain. Additionally, there are multiple pumps in the basement that prevent flooding in the Mechanical room. It is crucial to note that once the power is cut, the room will quickly become flooded.	10/22/2024	CES		Closed	11/6/2024
176	SLAM	SU100 & TY301	10/18/24	Detail 7 on TY301 shows a pole mounted secuitry camera. TY100 shows locations of these cameras. They seem to align with SL-3 & SL-4W site lighting fixtures on SU100. Is the intent that the cameras are mounted to the light fixture poles, or are they independent poles?	Cameras are to be mounted to light fixture poles.	10/22/2024	DA		Closed	10/24/2024
177	Turner	Procurement Manual	10/18/24	Please advise if Misc. Metals (BP #13) is a set aside package.	Yes, BP #13 is a set aside package. See the "Invitation to Bid" for a full list of all set aside bid pacakges.	10/18/2024	CL/Turner		Closed	10/18/2024
178	SLAM	12 6100	10/18/24	With regards to specfication section 126100, Subsection 2.2.B.3. To achieve this test, requires treatment of the fabric before it is placed on the chair assembly and then the mock-up is burned. This process is best referred to as CAL 133 (California Bulletin 133). The treatment of the fabric has been determined to have cancer causing agencies. Because of this, CAL 133 is being eliminated. Can this portion of the specification to be omitted?	In lieu of compliance with ASTM E1537, upholstery materials shall comply with requirement set forth in California Bureau of Home Furnishing Technical Bulletin 117-2013 ("TB-117").	10/22/2024	SLAM		Closed	10/24/2024
New Bidder's Questions as of 10/18/24 Issuance										
179	SLAM	C506	10/18/24	Sanitary details on C506 show flexible coupling adapters at existing sanitary sewer lines. Note #13 on C301 calls for "Fernco" syle shield couplings with hardware requirements. Confirm Sitework subcontractors are to follow the noteson C301 in lieu of the details provided.	"Fernco" style shielded couplings shall be used for pipe-to-pipe connections. Details and specifications have been revised in Adendum No. 4 to clarify.	10/29/2024	Tighe & Bond		Closed	10/31/2024

BQ #	Responsible Consultant	Reference	Date	Question	Answer	Date Item Responded	Answered By (Name / Company)	Attachment (SK# or Spec Section)	Status ("Closed")	Date Closed
180	Turner	Scope of Work & Procurement Manual	10/21/24	Who is responsible for the stone mulch to furnish and install?	Per the Landscapeing scope of work see exclusion#9. The Sitework contractor (BP #09) will furnish & install the stone mulch.	10/21/2024	Turner		Closed	10/21/2024
181	BC	Procurement Manual	10/21/24	Can the construction Start time be udjusted to 6 a.m. start Monday-Saturday in lieu of the current 7 a.m. start time?	Reference Greenwich Code of Ordinances, Chapter 6B Noise for requirements.				Closed	10/21/2024
182	SLAM	08 4313 & A611	10/21/24	Aluminum Storefront spec (08 4313) states the doors to be 2" thick where the door schedule (A611) calls for the doors to be 1 3/4" thick. Thermal doors are in actuality 2 1/4". Please confirm to follow the Aluminum Storefront specification for door thickness.	Follow the specification. Product data for the basis-of-design thermally broken EFCO Thermastile D502 indicates that these are 2" thick doors. However, it's understood that thermal door thickness may vary slightly from manufacturer to manufacturer. The 2" dimension may be considered a nominal dimension. The BOD interior doors – EFCO Durastile D518 -- are also 2" thick doors. Similar slight variations in these doors are also expected/acceptable.	10/29/2024	SLAM		Closed	10/31/2024
183	SLAM	TA Series	10/21/24	Please confirm that ceiling mounted AV components in spaces other than the Gym, Cafeteria, & Auditorium will be furnished and installed by the Owner, including their associated support systems. For example, S1 speakers, S2 Speakers, and Plenum Enclosures.	S1 speakers, S2 speakers, and Plenum enclosures will be furnished and installed by Owner, including support systems.	10/29/2024	DA		Closed	10/31/2024
184	SLAM	T Series	10/21/24	Please confirm that Owner furnished WAPs will not require backboxes or supports provided by the Low Voltage subcontractor (BP #39).	Ceiling mounted AP's do not require backbox. Wall mounted AP's do require backbox. Refer to T301/12 & 13.	10/29/2024	DA		Closed	10/31/2024
185	SLAM	T Series	10/21/24	Please confirm it is accepable to use plenum rataed cable supported by J-hooks in areas with "cloud" ceilings for low voltage & security cabling. **Turner Follow-up (10/31/24):** Please confirm that this is acceptable at ares with "Cloud" ceilings also	Low voltage cabling shown on the T series may be run above accessible ceiling in J-Hooks. **DA Response to Turner Follow Up (11/05/24):** Exposed cabling is not acceptable at areas with "Cloud" ceilings. This cable shall be run in Conduit where visible. Refer to 27 100, Section 3.03, D, 1, c.	10/29/2024	DA		Closed	11/6/2024
186	SLAM	E700	10/21/24	Per Note E2 on E700, the electrician (BP #38) is to wire a remote EPO pushbutton for the Generator. Please advise where this EPO is located.	EPO located adjacent to switchboard, generator annunciator panel located in custodial work room per Addendum No. 4.	10/30/2024	CES		Closed	10/31/2024
187	SLAM	TA000	10/21/24	The new responsibility matrix issued in Addendum #2 lists the Gymnasium twice under Section #7 "AV Systems". Please confirm that one of these references was intended to be "Auditorium" instead.	One of these is intended to be Auditorium	10/29/2024	DA		Closed	10/31/2024
188	SLAM	14 2100	10/21/24	Please confirm that the elevator shaft walls were designed to be capable of supporting the elevator rail, entrance, & hoist beam loads imposed. There doesn't appear to be any support steel called for in the drawings. However, the revised 14 2100 spec section issued in Addendum #2 indicates elevator entrance and rail support steel to be a delegated desgin. Please advise. **Turner Follow-up (10/31/24):** If the CMU elevator shaft walls were designed to take the loads imposed by the rails, then please confirm that elevator rail support steel is not needed in addition to the CMU walls.	Confirmed. All steel in the elevator section is by the elevator manufacturer and is to be included in their dlegated design for there elevator. **SLAM Follow-up Response (11/05/24):** Typical installation of elevators in CMU wall construction requires elevator rails to be embedded into the CMU wall construction. The CMU shaft walls are designed to carry the loads imposed by the elevator rails. The elevator subcontractor shall design and furnish the approporiate elevator rail inserts to the Mason (BP #11) to install.	10/28/2024	SLAM		Closed	11/6/2024
189	SLAM		10/22/24	For site pavers, Unilock Artline has (7) different sized blocks. Can you please clarify what size is required?	Please use Unit G – 7 ½" x 17 ¾" x 2 ¾". Specification Section 32 1400 has been updated accordingly and issued with Addendum 4	10/29/2024	SLAM		Closed	10/31/2024
190	SLAM	S002	10/22/24	The decking schedule on S002 calls for the decking to be attached with puddle welds. The 053100 Steel Decking spec calls for roof deck and floor deck to be fastened with powder actuated fasteners. Which is correct?	Either is acceptable. Spec calls for fastening per Drawings. If PAF's are used they need to be fastened for the equivalent strength of the values given in the schedule as noted in Section 05 3100 2.3.E.2.	10/28/2024	SLAM		Closed	10/31/2024

BQ #	Responsible Consultant	Reference	Date	Question	Answer	Date Item Responded	Answered By (Name / Company)	Attachment (SK# or Spec Section)	Status ("Closed")	Date Closed
191	SLAM	GC12, GC13	10/22/24	Per GC12 and GC13 there are multiple members including top chord joist extensions that require multiple coating systems - intumescent paint, galvanizing, and the 3-coat fluid applied insulative coating, or a combination thereof. Please provide detailed instructions as to the process, steps and sequence these different multiple coating systems are to be applied.	See repsonse to BQ #17	11/4/2024	SLAM		Closed	11/6/2024
192	Turner	Procurement Manual	10/22/24	Which bid package is responsible for the pony wall and anchors in detail 7/S210?	Per the Turner Scope of Work Documents, the General Trades subcontractor (BP #21) shall furnish & install all engineered posts and attachments for Pony Walls, for an example see 7/S210.	10/23/2024	CL/Turner		Closed	10/23/2024
New Bidder's Questions as of 10/23/24 Issuance										
193	SLAM	113013	10/23/24	Specificaiton section 11 3013 does not provide a model for EQ02 Frigidare. Also, Models provided for EQ01 - Refrigerator, EQ06-Cloths Washer, EQ07-cloths dryer and EQ08-Range are discontinued. Provide currnet models for inclusion.	EQ01 Refrigerator – Frigidaire, Gallery GRFG2353AF EQ02 Refrigerator – Frigidaire, Gallery GRFN2023AF EQ06 Cloths Washer – GE GFW550SSN/SPN EQ07 Cloths Dryer – GE GFD55EssN/ESPN EQ08 Range – GE JB480ST A912 will be modified	11/5/2024	SLAM		Closed	11/6/2024
194	Turner	General Scope Delineation	10/23/24	If a Turner scope of work line item, or Bidder Question response, contradicts the scope delineation identified by the Design Team in the contract documents, how should the bidders handle this?	In the event that a conflict or contradiction exists between a Turner Scope of work line item (or Bidder Question response) and a scope delineation identified by the Design Team in the contract documents, then the Turner Scope line item and/or Bidder Question response shall govern. For example, detail 2 on FS141 identifies backfill by the "GC", but this scope is identified to be performed by the Concrete subcontractor (BP #10).	10/23/2024	CL/Turner		Closed	10/23/2024
195	SLAM	Structural & Architectural Series	10/23/24	Please verify what steel, if any, should be treated as AESS.	There is no AESS steel on this project.	10/28/2024	SLAM		Closed	10/31/2024
196	SLAM	Structural Series	10/23/24	Please confirm that only the Gym roof will be acoustical cellular deck.	Confirmed	10/28/2024	SLAM		Closed	10/31/2024
197	SLAM	A315	10/23/24	Please advise if any steel supports will be required for the mock-up shown on A315. No steel is currently shown. **Turner Follow-up (10/31/24):** Please provide the steel support requirements and design for the mock-up as this is not a delegated design.	See note on 4E/A315, contrcator to coordinate steel support requirements for mock-up **SLAM Response to Turner Follow Up (11/05/24):** Mock up drawing has been revised in Addendum 6, to include CFMF wall supports. CFMF supports to be furnished & installed by the General Trades Subcontractor (BP #21).	10/28/2024	SLAM		Closed	11/7/2024
198	SLAM	GC11	10/23/24	Please confirm that the only colored galvanizing required is for the HSS canopy columns shown on GC11.	Confirmed	10/28/2024	SLAM		Closed	10/31/2024
199	SLAM		10/23/24	There appear to be cast in place concrete curbs in details but none shown on the site plans. Please clarify if any curbs are cast in place and provide the locations	All curbing to be granite, per Town of Greenwich. Cast-in-place curbing specification has been removed from the project manual with Addendum 4 to eliminate confusion.	10/29/2024	SLAM		Closed	10/31/2024
200	SLAM	Site Material Plans	10/23/24	Site Plans show several locations that appear to be curbs. There is no GC designation on these curbs, if all curbing is granite curbing, please identify the Curbs with GC designation or clarify the curb type.	As noted in item 199 and 162, all curbing to be granite.	10/29/2024	SLAM		Closed	10/31/2024

BQ #	Responsible Consultant	Reference	Date	Question	Answer	Date Item Responded	Answered By (Name / Company)	Attachment (SK# or Spec Section)	Status ("Closed")	Date Closed
201	SLAM	L501 & L202A	10/23/24	Detail 1C on L501 calls for curbs (See detail) but doesn't specify a curb type. Material Plan L202A doesn'tshow curbs at the 1C poruos bituminous pavement. Please clarify this discrepncy. Turner Follow-up (10/31/24): Please confirm that the revised detail 1C on L501 shall utilize granite curbs.	Transitions from one type of bituminous pavement to another (porous, regular duty, heavy duty) do not require curbing. Detail will be added to show this condition and L202A and L202B plan drawings will be updated in Addendum 4. SLAM Follow-up Response (11/05/24):See BQ200 & 201 – all curbs are granite	10/29/2024	SLAM		Closed	11/6/2024
202	SLAM	GC0A	10/23/24	There appear to be more spec sections that have delegated design language within them than what is listed in the delegated design table on GC0A. Below is a list of examples we have found. Please advise and please provide a revised table that includes all delegated design required for the project. 110610 - Stage Rigging & Curtains 142100 - Electric Traction Elevators 220516 - Expansion Fittings and Loops for Plumbing 22 1123 - Fuel Gas Piping 23 0516 - Expansion Fittings and Loops for HVAC Piping 23 0900 - Instrumentation & Controls for HVAC 23 3100 - HVAC Duct & Casings 23 5100 - Breechings, Chimneys, & Stacks 27 0536 - Cable Tray for Communication Systems 276010 - Emergency Responder Radio Coverage System 28 0528 - Pathways for Security Systems 312300 - Excavation, Backfill, Compaction, & Dewatering 316616 - Aggregate Piers 32 3120 - Vehicle Barrier Gates 334419 - Stormwater Treatment System	Delegated design schedule has been updated in addendum no. 6	11/6/2024	SLAM		Closed	11/7/2024
203	SLAM	08 5653	10/23/24	The new spec section 08 5653 issued in Addendum #2 appears to be a sole source for Armortex. Please confirm that this is acceptable with the State.	SLAM email response (10/23/24): The way the spec is written we have provided a BOD and allow for a substitution, this is not a sole source item.	10/23/2024	SM/SLAM		Closed	10/23/2024
204	Turner	A805	10/23/24	Who owns the Locker toe kicks and low wall framing / plywood ?	Locker bases by the locker subcontractors BP29. The low wall framing and plywood will be by Drywall & General Trades BP21.	10/23/2024	JM/ TCCO		Closed	10/23/2024
205	Turner	Procurement Manual	10/23/24	Please confirm if the steel subcontractor (BP #12) or Misc. Metals subcontractor (BP #13) should provide debris nets at shaft openings and stair openings.	The steel subcontractor (BP #12) shall furnish, install, and maintain the debris at all shaft and stair openings per the Turner Scope of Work Document. The steel subcontractor (BP #12) shall remove nets when directed by Turner for other trades to complete their work at shafts and stair openings. The scope of work document for Misc. Metals (BP #13) will be updated to reflect this.	10/23/2024	CL/Turner		Closed	10/23/2024
206	Turner	Procurement Manual	10/24/24	looking at BP#40 for concrete flatwork and noticed a potential scope overlap. BP#9 SOW 120 notes that this package owns furnish and install of concrete pads for generators. BP#40 SOW 16 notes that this package owns all exterior pads including but not limited to the generator pad. Which package should it fall under?	BP#40 - Concrete Flatwork shall furnish and install concrete pads for Transformer(s), Generator(s) and Gas Meter(s). BP#9 Sitework shall exclude furnish and installing these concrete pads. BP#9 Sitework Scope of Work will be updated to reflect this.	10/24/2024	JAC/Turner		Closed	10/24/2024
207	SLAM	1B/ A805	10/24/24	Detail 1B/A805 notes TRM4 at wallcovering. TRM4 is trim that is called out for tile edges. Should this trim be TRM1 being that it is at the edge of wallcovering?	TRM1 is correct code for 1B/A805	11/5/2024	SLAM		Closed	11/6/2024

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208	SLAM	21 0433 / 210533	10/24/24	The new spec section 21 0433 states that the Heat Tracing for Fire Suppression to be delegated design, however 21 0533 - Heat Trace for Plumbing does not have delegated design. Please confirm that only Fire Protection needs to be delegated design and if so please add the specification to GC0A - Code Information	Both fire protection and plumbing heat trace shall be delegated design. Turner Follow-up Response (11/07/24): The subcontractor that furnishes the heat trace system(s) shall perform the delegated design.	11/5/2024	CES		Closed	11/6/2024
209	CES	26 26 53	10/24/24	Please confirm if the installing Subcontractor for the electric vehicle charging equipment is required to be a licensed installer with the manufacturer as well as if the charging equipment itself needs to be registered nationally or on a State level.	The installing sub (BP #38) will be required to be factory trained.	10/30/2024	CES		Closed	10/31/2024
210	SLAM	122401	10/24/24	Please confirm if it acceptable to provide the window shades per the attached Substitution Request Form.	Not Approved - doesn't meet the same level of quality of the BOD and the project specification list 4 acceptable manufacturers	10/30/2024	SLAM	yes - substitution request	Closed	10/31/2024
211	SLAM	A805	10/24/24	Acoustical Panels- Detail 1A/A805 calls for 1-5/8" thick panels, Detail 3B/A805 calls for 3/4", Finish Schedule calls for 1-1/8". Please advise which prevails.	1-1/8", as noted on the finish schedule is the correct panel thickness. A805 has been reissued in Addendum 4	10/29/2024	SLAM		Closed	10/31/2024
212	Turner	Coordination Matrix	10/24/24	Please provide a Responsibility Matrix for the Electrical Gear.	Please refer to the coordination matrix provided in Addendum #2.	10/24/2024	CL/Turner		Closed	10/24/2024
213	JLL	276010	10/24/24	Please confirm what kind of system is needed for the DAS System (i.e. UHF, VHF, 700/800). Turner Follow-up (10/31/24): JLL please provide direction.	Frequencies required for the BDA system have not been provided by the town to the design team - this will need to be coordinated as part of constrcution. Turner & JLL Follow-up Response (11/07/24): The DAS System is a delegated design. The bidders shall provide an appropriate system per the project specifications and the Town of Greenwich.	10/30/2024	CES		Closed	11/7/2024
214	CES	EL101D	10/24/24	There are two closets on the first floor of part D (1119 & 1120) that show switches but no light fixtures. Please advise on the fixture type & quantity required.	Light fixtures in room 1119 and 1120 are shown in addendum 2	10/30/2024	CES		Closed	10/31/2024
215	Turner	Masonry Scope	10/24/24	BP 11 Masonry Scope Item 17 states "Trade Allowance: 80 hours of labor time for 5S…". Please clarify "5S".	Reference Procurement Manual Item #03 - Boiler Plate Additonal Provisions for all Subcontractors (page 3U for "5S"). 5S stands for "Sort, Straighten, Shine, Standardize, & Sustain".	10/25/2025	CL/Turner		Closed	10/25/2024
216	Turner	Masonry Scope	10/24/24	BP 11 Masonry Scope Item 43 indicates to "Furnish and Install Sealant at…….attachments that penetrate the air/Vapor Barrier". Please confirm this applies only to attachments/fasteners required by the work of BP 11, and other attachments/fasteners will be sealed by the trades requiring the attachments.	The Mason (BP #11) is responsible for furnishing and installing sealant at ALL through-wall penetrate and attachments that pentrate the AVB regardless of trade whom installs item that pentrates the AVB. Trades with penetrations through AVB to coordinate and install penetration prior to install of AVB.	10/28/2024	BM/Turner		Closed	10/31/2024
217	Turner	Masonry & Drywall Scope	10/24/24	BP 11 Masonry Scope Item 32 indicates the mason is responsible to furnish and install top of wall anchors as shown on Detail 1B/A605. However, BP 21 Drywall & General Trades Scope Item 77 indicates the General Trades contractor is responsible for all the CFMF 12 GA clips and sheet metal at tops of masonry walls per Details 1C and 1B on A605. Please advise which Bid Package will own these details at the tops of CMU walls.	The Mason (BP #11) is to furnish and install top of wall anchors and plate to support masonry walls per scope of work item 32. Dyrwall & General Trades (BP #21) scope will be updated to exclude furnish and install top of wall anchors for masonry walls. BP 21 to furnish and install beam support at walls including stude brace and bent plate.	10/28/2024	BM/Turner		Closed	10/29/2024

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218	SLAM	07 6200	10/24/24	The specification for Masonry through wall flashing and separate drip edge (Section 076200) is for stainless steel with No. 2D-Dull Finish. There are notes on the elevation drawings indicating “Flashing Color To Match Stone” (ex. 1E/A-311). Details indicate the drip edge is flush with the face of stone and does not protrude out of the wall. Please confirm the SS through wall flashing and drip edge are not colored. Turner Follow-up (10/31/24): Please confirm the Stainless Steel is not colored.	Flashings are to be Stainless Steel with a hemmed edge as detailed on A502. SLAM Follow-up Response (11/5/24): Flashing is not required to be colored. This masonry through wall flashing shall be furnished & installed by the Mason (BP #11).	10/28/2024	SLAM		Closed	11/6/2024
219				BQ NOT UTILIZED					Closed	10/31/2024
220	SLAM	A311 & A502	10/24/24	Please provide a specification and basis of design for the 8” HIGH LIMESTONE BASE (1E/A-311 and 3E/A-502).	04 4313 Specification Section has been added to Addendum No 4	10/28/2024	SLAM		Closed	10/31/2024
221	SLAM	A500	10/24/24	Ref. TYPICAL EXTERIOR ELEVATIONS on A-500: In Assembly Type 06 (3B/A-500) the wall brackets are thermally broken. Do the anchors for the stone veneer in Assembly 01A (5B/A500) also need to be thermally broken? If yes, what is the thermal break material?	No, provide specified anchor system	10/28/2024	SLAM		Closed	10/31/2024
222	SLAM	Drawing Addendum	10/24/24	Reviewing the updated Addendum #2 drawings, can you confirm all of the changes to the drawings have been clouded?	All drawings are clouded and tagged to associated Addedndum's	10/28/2024	SLAM		Closed	10/31/2024
223	SLAM	Geotech Report	10/25/24	Sitework Bidders I have marked up the area scheduled for removal of unsuitable materials and have plotted the boring information from the available boring logs included in the report. The problem is that many of the borings located within the removal area are missing. Please provide the missing borings or provide assumptions sitework bidders may use to complete their takeoff as siteowrk bidders cannot accurately determine the quantity of unsuitable to be removed without this information as can be seen from the attached plan sheet. Specific needs include need TP03,06,07,09,10,12; and also TP 118, 119 and 120.	TP 03 through TP12 are included in the geotechnical report. See page 50-69 of the geotechnical report for test pit information. On Sheets C202, C203, C205, C206 in Addendum No. 4, TP 118 has been relabeled to TP 102, TP 119 has been relabeled to TP 110, and TP 120 has been relabeled to TP 111 . The addition of TP 112 and TP 113 have also been included in the geotechnical report on Page 18 with correspoding Soil Discriptions on pages 43 and 44 . See the geotechnical report for TP 101 through TP 113, see page 32-44 for test pit information. See supplemental Geotechnical Data for TP 101 through TP 120 data.	10/30/2024	Tighe & Bond		Closed	10/31/2024
224	SLAM	126100	10/25/24	Specification section 126100 Fixed Audience Seating Subsection 1.4.A. it refers to 01 3000 – Administrative Requirements and 1.4.J.1. refers to 01 6000 – Product Requirements, both of which mention CTHPB, which we believe FSC plywood is part of CTHPB. Do the chairs require FSC plywood inner back panels?	The applicable credit calls for at least half of wood and wood-based products to be FSC-certified for permanently installed items. If the 50% threshold can be met without using FSC-certfied plwyood seat panels, they are not required. See Section 01 3566.42 -1.1-E.2 for CM/contractor tracking and reporting responsibility.	10/29/2024	SLAM		Closed	10/31/2024
225	SLAM	126100	10/25/24	Specification section 126100 Fixed Audience Seating Subsection 2.2.2. E. Calls for Oval Mechanical Tubing. This is NOT the Traditional Standard as called out in 2.1.A.1.e. The Traditional Steel is more in line with most manufacturer’s Steel Standards, which as rectangular Tubing, a.k.a. – Traditional design. Are Oval Standards required?	That description was taken directly from the Hussey guide spec Section 12610 with footer subtitle "Quattro Traditional Collection Specification", Rev. Date February 2016, page 12, Article A. As such we understood this to be the typical standard material/shape for this chair. If you are submitting a char by one of the other named manufacturers, use the manufacturer's standard tubing shape.	10/29/2024	SLAM		Closed	11/6/2024
226	SLAM	126613	10/25/24	Specification section 126613 Telescoping Bleachers Subsection 1.4.C. CTHPB is referenced, which we believe FSC plywood is part of CTHPB. Does the bleacher require FSC plywood decking?	See response to BQ# 224.	10/29/2024	SLAM		Closed	10/31/2024
227	SLAM	126613	10/25/24	Specification section 126613 Telescoping Bleachers Subsection 2.3.B.2 Calls for 3 tiers, however, drawing A111.4 is showing 4 tier. How many tiers are needed?	There are 4, as shown on the drawing - specifcation have been modified to account for the discrepancy	10/29/2024	SLAM		Closed	10/31/2024
228	SLAM	126613	10/25/24	Specification section 126613 Telescoping Bleachers Subsection 2.4.A Calls for UV Inhibitors. The drawings seem to show no windows. Are UV Inhibitors needed?	There is glazed aluminum curtain wall on the south elevation. UV inhibitors to remain.	10/29/2024	SLAM		Closed	10/31/2024

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229	SLAM	126613	10/25/24	Specification section 126613 Telescoping Bleachers Subsection 2.4.A.6. Calls for Seat numbers and Row Letters. This is unusual for a bleacher used for general assembly. Are SN/RL's required?	Seat numbers and row letters are not required.	10/29/2024	SLAM		Closed	10/31/2024
230	SLAM	126613	10/25/24	Specification section 126613 Telescoping Bleachers Subsection 2.5.A.3. Calls for Top Row Rear Guardrails. This project only required End Rails, which the very top tier is included, therefore, the top rear rails is not required. Confirm this portion should be omitted.	Yes, omit. Bleachers will back right up to and attach to wall.	10/29/2024	SLAM		Closed	10/31/2024
231	Turner	Procurement Manual	10/25/24	What is the address Bids are to be sent?	Per invite to bid: All Bids shall be submitted in a sealed envelope with hard copies in duplicate (2 copies) by mail or in person to 290 Greenwich Ave, Greenwich CT 06830 The envelope shall be labeled by bid package number, GPS number and bid package description. Bidders submitting for multiple bid packages must submit each bid package sealed and labeled separately by bid package. Bids may be submitted at any time leading up to the specified due date and time, and will remain sealed until the specified due date and time. Turner Construction will be conducting a in person public bid opening at 290 Greenwich Ave, Greenwich CT. Bids received after the specified due date and time will not be allowed to be submitted.				closed	10/25/2024
232	Turner	09 8430	10/25/24	Clarification on spec section 09 8430 Sound absorbing wall and ceiling units.	Spec section 098430 Sound- absorbing Wall and Ceiling Units is a shared spec section between the ceiling bid package and the millwork bid package. BP18 Millwork shall be responsible for furnishing and installing all Wall sound absorbing panels and BP22 Ceilings shall be responsible for furnishing and installing all Ceiling sound absorbing panels.	10/25/2025	JM/ Turner		Closed	10/25/2024
233	CES	E604 & E607	10/25/24	There doesn't appear to be a panel labeled OSDPC or OSDPE in the E600 series. Are the two panels on E607 (OSP2C and OSP2E) mislabeled? Those panel designations also appear on E604. Please advise and revise accordingly.	OSDPC and OSDPE added to Addendum 4 drawings.	10/30/2024	CES		Closed	10/31/2024
234	Turner	E700	10/25/24	Please advise what manufacturer will be providing the Pre-Purchased Electrical Distribution equipment that is part of BP #05, and indicated in the BQ #118 prepurchased equipment list attachment.	The intent is for this electrical distribution equipment (i.e. switchgear, panels, transformers, etc.) to be manufactured by Eaton, except for the Generator & ATS's.	10/25/2024	CL/Turner		Closed	10/25/2024
235	CES	E700	10/25/24	Please adivse if all electrical equipment & devices throughout must be sourced from the same manufacturer as the pre-purchased electrical distribution equipment. For example, **FP-DS** is not part of the pre-purchased electrical distribution equipment. Note that the Generator and ATS-1 & ATS-2 will by a different manufacturer as part of Phase 1, BP #06. For reference, see the BQ #118 attachment for a list of the electrical distribution equipment that is part of the pre-purchased equipment (Phase 1, BP #05). Also, see BQ #234 for the intended manufacturer for the pre-purchased electrical distribution equipment.	The bulk of the prepurchase equipment, including disconnect switches, will be the same manufacturer. If the contractor wants to provide any equipment other than the manufacturer of the prepurchase equipment, they should formally submit it in an RFI. **Turner Response (10/31/24):** The electrical subcontractor (BP #38) shall assume Eaton for their base bid.	10/30/2024	CES		Closed	10/31/2024
236	Turner	Procurement Manual	10/25/24	Please clarify the intent of the Concrete foundations noted to start on February 2025 and steel to start on April 25, 2025.	See attached Turner Construction Crew Flow diagrams dated 10.25.24 showing intended month to month crew flow and direction January to June 2025. Subcontractors to include appropriate crews, crew size and equipment to meet project schedule requirements.	10/25/2024	JP/Turner	Yes - TCCO Crew Flow Diagrams	Closed	10/25/2024

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237	SLAM	A901A	10/25/24	According to the finish floor plan drawing A901A in the finish plan graphic legend RS-2 is at the gymnasium only. When referring to the gymnasium drawings there is one window on drawing A111.4 Detail 3B but no call outs for RS-2 can you please provide details on how this roller shade is too be mounted?	Elevation on A111.4 has been revised to include shade locations. The assocoated Wall Section Detail has also been revised. Both revisions are included in Addendum No. 4	10/28/2024	SLAM		Closed	10/31/2024
238	JLL	Procurement Manual	10/25/24	Can you share how much of this project is State funded? I believe the CHRO participation is based on that total, not our contract total.	The State of Connecticut has approved a 20% reimbursement rate for this project.	11/6/2024	JLL		Closed	11/6/2024
New Bidder's Questions as of 10/25/24 Issuance										
239	SLAM	10 2800	10/25/24	According to Spec Section 10 2800 - Toilet Accessories page 6 section 2.6 paragraph D Clothes hook Type T15 is Typical at all offices. It is not clear what rooms are considered offices on the drawings can you please provide a count of robe hooks we should carry.	T15 designations have been added to the Drawing set in Addendum 4	11/4/2024	SLAM		Closed	11/6/2024
240	Turner	Procurement Manual	10/25/24	Question Regarding bonding: 1.Provide us with a completion date or timeframe it will take you to complete this project? 2.Are there any daily liquidated damages for not completing the project in time? How much? 3.Is there a standard 1 year warranty for workmanship? 4.if you are awarded this job, then Turner and the town of Greenwich want to be listed as multiple obligees on the Payment/Performance bonds?	1. Reference Procurement manual document "04 - Project Schedule" Construction Phase 1 New Bldg Substantial completion July 2026, Construction Phase 2 closeout January 2027. 2. Reference Procurement manual document "03 - Boiler Plate Additional Provisions for all Subcontractors" page 3G, item 11. Liquidated damages $6,000/Day. 3. Reference Procurement manual document "08 - Turner Form 36 rev 7-31-20", Article XXII for minimum 1 year Guarantee in addition to any specified warranty within the contract documents. 4. Yes, Turner Construction & the Town of Greenwich are the Dual obligee(s) for Bid Bond and Payment/Performance Bonds.				Closed	10/25/2024
241	SLAM	323223	10/25/24	Specification 32 3223 Segmental Block Retaining Wall Drawings L301A, 301C, 301D and C603 & C604 Detail 1D/L503 The proposed retaining wall will encounter rock between stations 1+50 to 3+0 and 6+0 to 7+50 approximately. The specifications for rock exc and the logistics plan require presplitting or line drilling to provide a smooth exposed surface of the rock. Since the retaining wall design specifies the bottom of wall elevation at approx. the FG of the access driveway which takes precedence? Please provide a detail showing the intersection of the top of rock and the installation of the proposed retaining wall.	Per drawing C.603, rock s to be excavated to a depth of 2' minimum below the fire lane paving section (4' overall depth) so rock will be removed to a depth of approximately 6' below the Fire Lane. The adjacent unit wall system as shown on Detail 1D / L503 indicates that the unit wall system will be set on below grade base coursing which is set on a compacted processed aggregate base to allow the wall to be set true and level. In addition, there is drainage both behind the wall and at the base of the wall adjacent to the fire lane which will be installed as part of the overall design. The design for the wall system is called to be "delegated design". As such, we would assume that the final cross section and detailing will be coordinated with the successful subcontractor for this scope of work in order to meet the requirements necessary to properly accommodate the design intent.	11/5/2024	SLAM		Closed	11/6/2024
242	SLAM	A911	10/25/24	Please advise on a spec section for the "fabric facing" noted on the ADP1 & ADP2 description on the finish schedule.	Fabric facing is inclusive of the overall system. See specification 09 8416.	11/5/2024	SLAM		Closed	11/6/2024
243	SLAM	S410	10/28/24	In Detail 4/S410 please provide the bolt size, type, quantity, and spacing required for the L4x4x1/4" under the windows to the C4x4.5. Also, please provide the 1/4" thick cap plate attachment to the post.	Note will be added, "2-3/4"Ø BOLTS 7" C-C". Minimum weld indicated on S001 general notes in section I.2 is acceptable.	11/1/2024	SLAM		Closed	11/6/2024
244	SLAM	S410	10/28/24	In detail 6/S410, please confirm the weld sizes, type, pattern, etc. of the L4x4x1/4" to the wide flange beam.	See detail 1/S410 for typical weld.	11/1/2024	SLAM		Closed	11/6/2024

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245	SLAM	S410	10/28/24	In detail 8/S410: 1. Please confirm the weld sizes, type, pattern, etc. of the L6x4x5/16" to the wide flange beam. 2. Please provide with the clip sizes and weld sizes, type, pattern, etc. required for the HSS7x5x3/8"	1. See detail 1/S410 for typical weld. 2. Detailed by fabricators's engineer.	11/1/2024	SLAM		Closed	11/6/2024
246	SLAM	S410	10/28/24	In detail 9/S410: 1. Please confirm the weld sizes, type, pattern, etc. of the L4x4x1/4" to the wide flange beam. 2. Please provide with the clip sizes and weld sizes, type, pattern, etc. required for the HSS9x5x1/2"	1. See detail 1/S410 for typical weld. 2. Detailed by fabricators's engineer.	11/1/2024	SLAM		Closed	11/6/2024
247	SLAM	S410	10/28/24	In detail 10/S410: Please confirm the weld sizes, type, pattern, etc. of the L6x4x5/16" to the wide flange beam.	Minimum weld indicated on S001 general notes in section I.2 is acceptable.	11/1/2024	SLAM		Closed	11/6/2024
248	SLAM	S410	10/28/24	In detail 13/S410: Please confirm the weld sizes, type, pattern, etc. of the L5x5x5/16" to the HSS12x8x3/8.	See detail 1/S410 for typical weld.	11/1/2024	SLAM		Closed	11/6/2024
249	SLAM	S410	10/28/24	In detail 14/S410: Please confirm that the 1/4" closure plate for the HSS12x8x3/8 should be a 1/4" fillet weld all around.	Minimum weld indicated on S001 general notes in section I.2 is acceptable.	11/1/2024	SLAM		Closed	11/6/2024
250	SLAM	S410	10/28/24	In detail 14A/S410: Please advise if the "U-Plate" or the HSS12x8x3/8 gets physically fastened to the CMU wall, or is it just bearing on the CMU? Are any bearing plates needed?	U-plate is attached to wall as detailed. No bearing plates are needed.	11/1/2024	SLAM		Closed	11/6/2024
251	SLAM	S410	10/28/24	In detail 15/S410: 1. Please confirm the weld sizes, type, pattern, etc. of the L4x4x1/4"" to the wide flange beam. 2. Please confirm the bolt size, type, quantity, and spacing for the L8x6x7/16" angle to the C6x8.2. 3. Please confirm the HSS7x5x3/8 connection will be the same as clarified in BQ #245 above.	1. See detail 1/S410 for typical weld. 2.Minimum bolts indicated on S001 general notes in section I.2 is acceptable. 3. Correct.	11/1/2024	SLAM		Closed	11/6/2024
252	SLAM	S410	10/28/24	In Detail 16/S410 please confirm the bolt size, type, quantity, and spacing required for the L4x4x1/4" under the windows to the C4x4.5. Also, please provide the 1/4" thick cap plate attachment to the post.	See response to BQ #243. Cap plate will be welded to post.	11/1/2024	SLAM		Closed	11/6/2024
253	SLAM	S411	10/28/24	In Detail 1/S411: 1. Please confirm the weld size, type, pattern, etc. for the L4x4x5/16" angle to the wide flange beam. 2. Please confirm the weld size, type, pattern, etc. for the L3.5x3.5x5/16" angle kicker to the wide flange beam. Is a connection plate or stiffener required at the WF? If so, please provide sizing and attachment detail.	1. Typical weld is indicated. 2.Gusset plate will be sized and detailed by fabricator. Stiffener is not required.	11/1/2024	SLAM		Closed	11/6/2024

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254	SLAM	S411	10/28/24	In Detail 3/S411: 1. Please confirm the weld size, type, pattern, etc. for theL6x4x5/16" angle to the wide flange beam (top & bottom flange) should be the same as shown in detail 2/S411. 2. Please confirm the weld size, type, pattern, etc. for the 1/4" bent plate to the wide flange beam. 3. Please provide with the clip sizes and weld sizes, type, pattern, etc. required for the HSS12x6x3/8".	1. Correct, see detail 2/S411 for typical weld. 2.Minimum weld indicated on S001 general notes in section I.2 is acceptable. 3. Connection is detailed by fabricators's engineer.	11/1/2024	SLAM		Closed	11/6/2024
255	SLAM	S411	10/28/24	In Detail 5/S411: 1. There appears to be an angle along grid line "X12", but no size is annotated or weld information provided. Please advise and provide. 2. Please provide the stiffener plate and cap plate weld sizes, type, pattern, etc. 3. Please confirm the weld size, type, pattern, etc. for the L6x4x5/16" angle to the wide flange beam.	1. Provide L3x3x5/16 continuous. Minimum weld indicated on S001 general notes in section I.2 is acceptable. 2.Minimum weld indicated on S001 general notes in section I.2 is acceptable. 3. See detail 2/S411 for typical weld.	11/1/2024	SLAM		Closed	11/6/2024
256	SLAM	S411	10/28/24	In Detail 6/S411 please provide the bolt size, type, quantity, and spacing required for the L4x4x1/4" under the windows to the C4x4.5. Also, please provide the 1/4" thick cap plate attachment to the post.	See response to BQ #243. Cap plate will be welded to post.	11/1/2024	SLAM		Closed	11/6/2024
257	SLAM	S411	10/28/24	In detail 8/S411, please confirm the 3/4" thick cap plate weld size, type, pattern, etc. to the column.	5/16" fillet weld. The same as column to base plate.	11/1/2024	SLAM		Closed	11/6/2024
258	SLAM	S411	10/28/24	In Detail 1/S411, please provide the weld size, type, pattern, etc. for the L3x3x1/4" angle to the wide flange beam.	See detail 2/S411 for typical weld.	11/1/2024	SLAM		Closed	11/6/2024
259	SLAM	S420	10/28/24	In details 4 & 5 on S420, please provide the weld size, type, pattern, etc. for the 12x6x5/16" bent plates to the wide flange beams.	See details 2 & 3 for typical welds.	11/1/2024	SLAM		Closed	11/6/2024
260	SLAM	S421	10/28/24	In detail 2/S421, please confirm the angle and weld size shown in detail 1/S421 should be utilized along the edge of the metal deck.	Confirmed.	11/1/2024	SLAM		Closed	11/6/2024
261	SLAM	S421	10/28/24	In detail 4/S421, please provide the weld size, type, pattern, etc. for the 10x5x5/16" bent plates to the joist.	See detail 3/S421 for typical weld.	11/1/2024	SLAM		Closed	11/6/2024
262	SLAM	S421	10/28/24	In detail 5/S421, please provide the weld size, type, pattern, etc. for the L6x4x5/16 and the L8x4x7/16.	See similar details on this sheet for typical welds.	11/1/2024	SLAM		Closed	11/6/2024
263	SLAM	S430	10/28/24	In details 2, 3, 4, 5, 6, & 9 on S430, please provide the weld size, type, pattern, etc. for all the L6x4x5/16 and the L4x4x1/4 shown.	See similar details on this sheet for typical welds.	11/1/2024	SLAM		Closed	11/6/2024
264	SLAM	S411	10/28/24	In detail 2/S411: 1. Please provide the clip size and weld details required for the L8x4x7/16 attachment to the "jambs". 2. Please confirm the intent is to cope, extend, & connect the vertical portion of the BP14x4x5/16 Frame up to the HSS12x6x3/8 tube. If so, please provide the weld details for this attachment.	1. Connection is detailed by fabricators's engineer. 2.Confirmed. Connection will be detailed by fabricators's engineer.	11/1/2024	SLAM		Closed	11/6/2024
265	SLAM	S420	10/28/24	For clarity, per the previous BQ #13 response, please confirm that all the kickers, diagonal braces, bridging, rigging beams, etc. shown in details 1, 2, & 6 on S420 should have delegated design connections.	Confirmed.	11/1/2024	SLAM		Closed	11/6/2024
266	SLAM	S420	10/28/24	In detail 7/S420, please provide the weld size, type, pattern, etc. for the L6x6x5/16 brace to the joist top chord.	Minimum weld indicated on S001 general notes in section I.2 is acceptable.	11/1/2024	SLAM		Closed	11/6/2024
267	SLAM	14 2100	10/28/24	Please see attached substitution request for the electric traction elevators and please confirm if acceptable.	Schindler 3300 MRL has been approved as a notes in the formal Substitution Request.	11/1/2024	SLAM	yes - substitution request	Closed	11/6/2024

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268	SLAM	C304	10/28/24	Please provide a detailed drawing with dimensions of the solar system and USA map to be painted on the asphalt	As shown on drawings, painted solar system is approximately 50' x 28' and USA map is approximately 37' x 28'. Full-scale AutoCAD drawings will be provided to the awarded bidder. Please also see Specification section 12 9300 Site Furnishings for detail on painted marking requirements.	11/5/2024	SLAM		Closed	11/6/2024
269	SLAM	321640	10/28/24	The granite curb spec states the curb is to be 6"x30". The detail shows 6"x20". Greenwich municipal spec is 5"x18" with buzzed edge. Please clarify as to which size is desired	See repsonse to BQ120 for size clarification - which should include the "Buzzed Edge"	11/5/2024	SLAM		Closed	11/6/2024
270	SLAM	Specifications	10/28/24	Please provide a spec for the shade enclosures. (ie. Preferred manufacturer)	In spec section 11 6833 "Shade enclosure" are listed as Ballfield Dugouts, wich require delgated design as listedin 2.2 of this spec section. Spec will be revised to change Ballfo\ield Dugouts to Shade Enclosures to match the drawing reference.	11/5/2024	SLAM		Closed	11/6/2024
271	Turner	Procurement Manual	10/28/24	Please clarify the scope of work as relates to the athletic fields between BP#9 & BP#41. a. Shade Structures & Fence – b. Infield Mix & Warning Track Mix c. Furnish & Install Bases d. Root Zone Mix	a. Shade Structures & Fence – The shade structure/dugout is Furnish & installed by BP#41 Landscaping. Part of Athletic Equipment spec. 11 6833. All fencing is by BP#9 Sitework per their scope of work. b. Infield Mix & Warning Track Mix furnish & installed by Sitework (BP #9).Reference spec. 32 1823.17 Natural Infield & warning track surfacing c. Furnish & Install Bases Furnished and installed by Landscaping subcontractor (BP #41) part of spec. 11 6833 Athletic equipment spec. d. Root Zone Mix – Removals by Sitework (BP#9), and furnish & install of Root Zone Mix by Landscaping (BP #41). Turner Follow up: 11.6.24 : In item d. the reason for the removals of the existing soils at the fields by BP#9 is that it is referenced in exclusive spec. 31 1005 Athletic Field Preparation and secondly because schedule wise BP#9 will be on site doing site prep and rock removal in this area. While also mentioned in the Root zone mix exclusive spec for BP#41 to remove the existing soil at the field, it makes more sense schedule/logistics wise for BP#9 to include it as part of sitework.	11/6/2024	PM		Closed	10/29/2024
272	SLAM	L202A	10/28/24	Please provide a specification for Stepping Stones shown on drawing L202A & detail 5C/L501.	Detail has been added to the project manual for stepping stones. Please see Specification section 32 0529 Glacial Boulders for Exterior Improvements.	11/5/2024	SLAM		Closed	11/6/2024
273	SLAM	260519	10/28/24	Please confirm that areas with "Cloud" ceilings are considered exposed and no MC cable for line voltage electrcial power should be utilized in these locations.	Confirmed. Areas with cloud ceilings are considered exposed and MC cable is not permitted in exposed areas.	11/6/2024	CES		Closed	11/6/2024
New Bidder's Questions as of 10/28/24 Issuance										
274	SLAM	A125	10/29/24	In detail 5D/A125 it appears that the stair nosing does not cover the 1/2" thick steel tread. Please advise if the intent is to paint the leading edge of the steel tread.	Yes, leading edge of steel plates to be painted. Painting to be performed by the Painting Subcontractor (BP #27)	11/4/2024	SLAM		Closed	11/6/2024

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275	CES	M0.00	10/29/24	Drawing M0.00 contains a Damper Legend which includes smoke dampers (SD), combination fire/smoke dampers (FSD) and backdraft dampers (BD). We cannot seem to locate where any of these are indicated on the Mechanical ductwork plans. Please review and confirm none are required.	None are required unless called for within specifications and schedules. **CES Follow-up Response (11/06/24):** The mechanical floor plans show all dampers that are required.	11/5/2024	CES		Closed	11/6/2024
276	SLAM	098416	10/29/24	ADC1 panels call for an NRC value of 0.10 in Spec section 098416 Part 2. While this is a low NRC, a solid panel does not achieve any NRC value. The solid wedge shape will only provide sound deflection. To achieve an NRC value, perforations with an acoustical felt backing will be needed but this comes at an additional cost. Are acoustical perforations needed?	ADC1 is a diffusion panel intended to reflect/diffuse sound as our product list description says. The manufacturer spec says the NRC shall be no greater than .10" to make sure it does not absorb sound.	11/5/2024	SLAM		Closed	11/6/2024
277	JLL	A912	10/29/24	Please clarify if any of the OFCI specialty equipment identified on A912 is hard wired. Also, please advise if the owner will be delivering the equipment and setting it in place.	1. Power requirements are identified on sheet and specification - additionally see electrical drawings for connections and hook-up. 2. See A912 Special Equipment Product information Schdeule for identified Owner Installed items. **Turner & JLL Response (11/07/24):** The Owner will furnish, deliver, and set all OFCI items (existing & new) in their final, permanent locations. Any hardwired electrical connections, plumbing connections, or ventilation connections will be by the associated trades.	11/5/2024	SLAM		Closed	11/7/2024
278	Turner	Procurement Manual	10/29/24	Please confirm the following items for bidding: 1.You will need Union labor for all areas that apply, correct? 2.DAS certified 3.PP bond. Do you want this as an add alternative or in our base bid? 4.Tax exempt for new construction 5.Now prevailing wage or chro requirements.	1) See BQ #1 2) DAS certification requirements varies per package. Reference Procurement Manual "00 - Invitation to Bid" for DAS certification requirements. 3) Reference Procurement Manual "03 - Boiler Plate Additional Provisions for All Subcontractors" B-1 for PP bond requirements. PP bond to be included in base bid. 4) This project is tax exempt for new construction; reference Procurement Manual "03 - Boiler Plate Additional Provisions for All Subcontractors" B-2 for tax requirements. 5) Both requirements are applicable. This is a prevailing wage project. Minimum rates are provided in the Procurement Manual. See BQ #1 for further details. Chro requirements varies per package. Reference Procurement Manual "00 - Invitation to Bid" Trade Package Table and SBE/MBE Column for requirements.	10/29/2024	BM/Turner		Closed	10/30/2024
279	CES	23 05 23	10/29/24	Specification Section 23 05 23-2.5.A & B state ball valves can be press type valves. This same specification, but sub-part 3.3.C.1 states ball valves are to be threaded valves. Please verify if ball valves can be Pro-Press type valves.	Pro press is acceptable	11/5/2024	CES		closed	11/6/2024
280	CES	23 82 00	10/29/24	The CUH & UH units do not have Piping Details in any of the project drawings. Please provide Piping Details for these units.	Detail #5/M502	11/5/2024	CES		Closed	11/6/2024
281	CES	MP102C	10/29/24	Drawing MP102C is missing room tags for SPED RES. 2002 and HEARING / VISION IMPAR. 2003. Each of these rooms appear to indicate Radiant Ceiling Panels (one in 2002 and two in 2003), however, are missing the associated pipe routing and connections. Please provide a piping drawing for these rooms.	Drawing has been updated within ADDENDUM NO. 6.	11/5/2024	CES		Closed	11/7/2024
282	CES	MP102C	10/29/24	Drawing MP102C is missing Active Chilled Beam designations in SPED RES. 2002, HEARING / VISION IMPAR. 2003 and FACULTY WORKROOM 2072. Please advise which room will receive which Active Chilled Beam designation.	Drawing has been updated within ADDENDUM NO. 6.	11/5/2024	CES		Closed	11/7/2024

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283	SLAM	L202A	10/29/24	Chain link fence at the garden on L202A (Addendum 2) does not state a height. Please advise.	6’ fence height. Drawing L202A has been updated accordingly in Addendum 6.	11/5/2024	SLAM		Closed	11/7/2024
284	CES	MP102A, MP102C	10/29/24	Drawing MP102A appears to depict two (2) Active Chilled Beams in SPED RES. 2002, however, Drawing MP102C appears to indicate only one (1) Active Chilled Beam in this same room. Please advise which is correct and update drawings accordingly.	Drawing has been updated within ADDENDUM NO. 6.	11/5/2024	CES		Closed	11/7/2024
285	SLAM	L401 series & Spec. 32 9200	10/29/24	Please provide the lawn seed mix for the various grassy areas not considered the ball fields. Spec. 32 9200 says to find the seed mix on the plans but we have not been able to locate this information	Please use the following mix for general lawn areas: Drawing L402 will be updated accordingly in Addendum 6. 25% Falcon IV Turf Type Tall Fescue 20% Ambrose Chewings Fescue 20% Viking H20 Hard Fescue 15% Double Time Tetraploid PRG 10% Mazama KBG 10% Diva KBG	11/5/2024	SLAM		Closed	11/6/2024
286	Turner	EP102D, E504	10/30/24	There are six motorized lighting battens on the plans. On sheet EP102D, a note says "HPP (HOIST POWER PANEL) PROVIDED BY DIV. 11 AND INSTALLED UNDER DIV. 26". This appears to be referencing the junction boxes for the hoist motors. Similarly, the connector strips are noted as “PROVIDED BY THE DIV. 11 RIGGING CONTRACTOR AND WIRED BY THE DIV. 26 CONTRACTOR” on Sheet E504. My question is: are the EC’s providing a theatrical package complete with motorized hoists, rigging and connector strips? Or are they only doing the electrical hookup for the rigging motors? Sometimes the GCs want all theatrical equipment to be handled under one contract. Please confirm the scope delineation.	The electrical subcontractor (BP #38) shall be responsible for all final power connections to the theatrical rigging system, including but not limited to the control & power panel, connector strips, etc. The theatrical rigging subcontractor (BP #31) shall be responsible to furnish & install all theatrical rigging components, including but not limited to all controls & control wiring. The Stage Rigging and Curtains specification 110610 is exclusive to the Theatrical Rigging Subcontractor (BP #31). The electrical subcontractor shall furnish & install all theatrical lighting, supports, & components for a complete system per BP #38 scope of work line items #66 & 67 for example. The Theatrical Lighting Specification 265561 is exclusive to the electrical subcontractor (BP #38).				CLosed	10/30/2024
287	SLAM	323120	10/30/24	Section 1.2 of spec setion 323120 calls for delegated design. However, it seems like specific products are identified in Part 2 of the spec. If the specified products are used can we just submit the manufacturer's literature / product data. It is not clear what specifically needs to be a delegated design. Please advise.	Specification Sections 32 3120 Vehicle Barrier Gates and 32 3118 Metal Fences and Gates have been removed from the project manual in Addendum #6. The delegated design gates and equipment items may be found in 12 9300 Site Furnishings.	11/5/2024	SLAM		Closed	11/7/2024
288	SLAM	334419	10/30/24	Section 1.4 of spec setion 334419 calls for delegated design. However, it seems like specific products are identified in Part 2 of the spec. If the specified products are used can we just submit the manufacturer's literature / product data. It is not clear what specifically needs to be a delegated design. Please advise.	The intent of Section 1.4 is not for a delegated design. Typically, the product manufactures covered in section 334419 generate site specific shop drawings. If an alternative product is submitted design calculation showing equivalency are required.	11/6/2024	SLAM		Closed	11/6/2024
289	SLAM	280528	10/30/24	Section 1.05.B of Spec section 280528 calls for Professional Engineer qualifications. It is not clear from the spec section what needs to be a delegated design or engineered for the security system pathways. Please advise.	This delegated design requirement will be removed from the specification in Addendum #6	11/6/2024	SLAM		Closed	11/7/2024
290	SLAM	280528	10/30/24	Section 1.05.C of Spec section 280528 calls for Seismic Certificates. Are there seismic requirements for the scope covered by this spec section? Per BQ #41 there are no seismic requirements necessary for cable tray. There also doesn't appear to be any seismic requirements for line voltage pathways. Please advise.	This delegated design requirement will be removed from the specification in Addendum #6	11/6/2024	SLAM		Closed	11/7/2024
291	Turner	Procurement Manual	10/30/24	Where is the project schedule located?	The project schedule is included with the Procurment Manual, "04-Project Schedule."	10/30/2024	BM/Turner		Closed	10/30/2024

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292	SLAM	230900	10/30/24	Section 1.10.D of spec section 230900 mentions a Professional Engineer licensed in the state of CT shall perform the design of the system software. It is not clear to us exactly what the delegated design intent is based on this section of the spec. Can you please clarify and provide the specific delegated design requirements.	The delegated design requirements for this section are not required.	11/5/2024	CES		Closed	11/6/2024
293	SLAM	233100	10/30/24	Section 1.4.A of spec section 233100 mentions delegated design for duct construction and sheet metal thicknesses. In our experience this is **not** typical as the EOR already has calculated the static pressure and typically specifies the duct construction. Can you pelase confirm the intent? There also does not appear to be a mention of a professional engineer or their qualifications in this spec section either.	Sheet metal type and thickness is indicated in the specifications. Delegated design includes placing and spacing of hangers and supports and conforming to duct construction means and methods indicated in SMACNA guidelines. No professional engineering qualifications are required in this specification. **CES Revised Response (11/06/24):** The spec has been updated for ADDENDUM NO. 6. Rectangular ductwork shall be constructed based on the ductwork sizes shown on plan and the pressure classes within section 3.8.B in accordance with the SMACNA duct construction standards.	11/5/2024	CES		Closed	11/7/2024
294	SLAM	235100	10/30/24	Section 1.8.A of spec section 235100 states that the stacks shall be designed under the supervision of a structural engineer licensed in the State of CT. Can you please clarify exactly what is intended to be a delegated design? Is it limited to delegated design of vibration and seismic? The size of the vents are shown on the contract drawings and Part 2 identifies the vent materials / products. Please advise.	Requirement of structural engineer is not required.	11/5/2024	CES		Closed	11/6/2024
295	SLAM	221005	10/30/24	On drawing P-100A there is grease waste and vent piping but there is nothing in the plumbing specs for grease waste and vent. Please specify what pipe material to use for this.	Grease waste and vent piping shall be CPVC pipe. Refer to revised specifications in Addendum #6	11/5/2024	CES		Closed	11/7/2024
296	CES	EP101A	10/30/24	We were recently informed by Johnson Controls that the water box heaters and convenience outlets associated with both Chillers CH-1 and CH-2 require separate power wiring. These power requirements are not indicated on Drawing EP101A or the panel schedule drawings. Please provide all pertinent circuiting information including, but not limited to, conduit size, wire size, panelboard, circuit breaker size, etc. The water box heater kits require either 115V/60Hz or 220V/50Hz.	The chillers ordered in Phase 1 are not basis of design, therefore will need to be fully reviewed through shop drawings, which have not been received to this point. The contractor takes responsibility. **Turner Response (11/07/24):** Electrician (BP #38) shall furnish & install additional circuits required as shown in Addendum #6	11/5/2024	CES		Closed	11/7/2024
297	SLAM	321640	10/30/24	There is a conflict between the specs and the drawings. The specs call for 6” x 30” and the plans call for 6” x 20”.	See BQ269 for clarification	11/5/2024	SLAM		Closed	11/6/2024
298	SLAM	S101A	10/30/24	Architectural Drawing A101A illustrates concrete pads on the exterior of the building for two (2) chillers, one (1) generator and one (1) transformer and states to refer to the mechanical, structural and electrical drawings. None of these disciplines appear to indicate pad locations, dimensions or details. Please provide and update drawings accordingly.	Structural drawings will be updated to show the pads and key in specific details. See addendum #6	11/6/2024	SLAM		Closed	11/7/2024
299	CES	23 64 11	10/30/24	Specification Section 23 64 11 - 2.3.C. states the Contractor shall wire separate power to energize heat tape to protect cooler while chiller is disconnected from the main power. Mechanical heat tracing is not specified, please provide. Please also provide all pertinent circuiting information including, but not limited to, conduit size, wire size, panelboard, circuit breakers, etc.	Not applicable to project.	11/5/2024	CES		Closed	11/6/2024
300	SLAM	L501 detail 2A & 2B	10/31/24	Details 2A & 2B on L501 references staining of concrete and that the scope of which sidewalks are stained is reflected in the plans. We cannot locate this delineation nor do we have any information on the staining specification that is required. Please provide.	No staining to be provided. Notes on details have been updated on drawing L501 accordingly in Addendum 6.	11/5/2024	SLAM		Closed	11/7/2024

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301	SLAM	105113-Metal lockers	10/31/24	In Spec Section 105113 - Metal Lockers Page 2 Detail 2.2 Part A states that Type A Lockers are to be 4 Tier but this conflicts with the drawings as indicated on drawing A102C under the floor plan graphic legend it states Type A Lockers are 2 Tier and on drawing A112.2 detail 1E it shows Type A lockers to be two tier. Please confirm if we should carry a two tier locker or 4 tier locker?	2-Tier - See revised specification issued in Adendum 4	11/4/2024	SLAM		Closed	11/6/2024
302	SLAM	SWPCP	10/31/24	Within the Addendum #2 Stormwater Pollution Conrol Plan, the Permittee section 1-1 is not completed. Please identifty the Permitee for the SWPCP and complete associated form. Note Permittee shall hold meeting with qualified professional, qualified inspector conducting inspections and site contractor and subcontractor Per item (16)-A on page 18 of 49 of General Permit. Turner Follow-up (11/6/24): Please confirm qualified inspector is hired by the Owner.	The Town of Greenwich is the Permittee and their Owner's Representative will be acting on their behalf. The project has not received its General Permit at this time and the SWPCP has been included for bidder's to understand its content. Once the General Permit has been granted, Section 1-1 will be filled completed as well as the certifications for the contractors and subcontractors. The SWPCP is a live document and will be updated with the contactor information and qualified inspector's reports throughout construction. SLAM / JLL Follow-up Response (11/06/24): Confirmed	11/6/2024	SLAM		Closed	11/6/2024
303	SLAM	SWPCP	10/31/24	Within the Addendum #2 Stormwater Pollution Conrol Plan, the General permit for Discharge of Stormwater and Dewatering from Construction Activities was effective Dec. 31, 2020 and expires 12/20/25 (prior to the completion of construction activities. Please confirm that the Owner's consultant will update per current project schedule.	The Issuance dates referred to are for the General Permit itself. CT DEEP will be issuing a new GP that will be effective before this program is concluded. The Project has applied for their General Permit and the Final SWPCP and General Permit information will be provided at that time.	11/6/2024	SLAM		Closed	11/6/2024
304	SLAM	L202A, L202B, & L202C	10/31/24	Confirm Mateiral type 1E added in parking areas within Addendum #4 and not shown within Site Material Legend on same sheets (L202A, L202B, L202C) is intended to be Bituminous Concrete pavement (Porous asphalt) per detail 1E on Drawing L501.	Confirmed. This material is Bituminous concrete pavement (porous) per detail 1E on L501.	11/5/2024	SLAM		Closed	11/6/2024
305	CES	M103B, M103D	10/31/24	Drawings M103B & M103D issued in Addendum #4 added notes to provide stair dunnage for walking pathway over roof mounted ductwork associated with RTU-1 and RTU-2 as well as to coordinate with the Architectural Drawings. Drawings A103B or A103D do not indicate any stairs at these locations. Nor does Drawings S301B and S301D indicate any structural steel members for this "dunnage". Typically, dunnage is furnished and installed by the Sturtural Steel or Misc. Metals disciplines, not HVAC. Please provide details indicating these stairs, included roof details, supports, etc. as well as confirm which discpline should furnish and install.	Stair dunnage will not be provided. Mechnaical drawings have been updated in ADDENDUM NO. 6.	11/5/2024	CES		Closed	11/7/2024
306	Turner	Procurement Manual	10/31/24	BP12 Scope number 13 of D. Safety Additional Provisions says install stairways with pace of erection. Stairs are in BP13.	For BP12 this is referring to the temporary stair towers identified in safety scope of work line item #01.	10/31/2024	CL/Turner		Closed	10/31/2024
307	SLAM	220523	10/31/24	Is the use of grooved Butterfly valves acceptable in lieu of Gate valves for grooved domestic water size 2-1/2" and larger,	Butterfly valves are acceptable for isolation and shut off on pipes 2" and larger as long as they are lead free ductile iron, indicating, and has a 10 position lever handle. Furnish chain-wheel operators for valves mounted over 8 feet above floor. Acceptable manufactures are Victaulic, Milwaukee Valve Company, NIBCO, Watts, and American Valve co	11/6/2024	CES		Closed	11/6/2024
308	Turner	P100A	10/31/24	Alt #7 asks for a gas generator vs a diesel fuel generator, ref P100A & P500 which shows gas to a generator. If a diesel generator is needed please provide spec's and details on piping ect.	The alternate was accepted during phase 1 for a gas generator. Please inculde gas piping as shown on contract documents.	10/31/2024	TB/Turner		Closed	10/31/2024

BQ #	Responsible Consultant	Reference	Date	Question	Answer	Date Item Responded	Answered By (Name / Company)	Attachment (SK# or Spec Section)	Status ("Closed")	Date Closed
309	Turner	Scope of Work	10/31/24	In reference to BP 15 Scope of Work #14, please provide detail/s of that specific requirement for the roofer to furnish and install associated with Future PV Array installation.	See BQ #52 for conduit scope for future PVs. BP 15 shall patch roof as required.	10/31/202	BM/Turner		Closed	10/31/2024
310	Turner	A091-A093	10/31/24	Please provide locations of building expansion joints	See Slab edge plans (A091-A093) for locations where EJ is Marked.	10/31/202	TB/Turner		Closed	10/31/2024
311	SLAM	078100	10/31/24	078100-2.3.A.1 states “not mineral fiber based” however, basis of design names Cafco Blaze Shield HP which is a mineral fiber based product. Please confirm mineral based products are excluded and products such as Cafco 400 or GCP Z106HY are acceptable.	The product data for CAFCO Blaze Shield HP describes it as Portland-cement based. That’s what we are looking for, as also indicated on the Fireproofing/Architectural Treatment Legend on drawings GC11, GC12, and GC13.	11/5/2024	SLAM		Closed	11/6/2024
312	SLAM	078100	10/31/24	078100-2.3.C.1 states “not mineral fiber based” however, basis of design names Cafco Blaze Shield II HS which is a mineral fiber based product. Please confirm mineral based products are excluded and gypsum products such as Cafco 300HS or GCP MK10HB are acceptable.	See response to BQ 311 above. The product data for CAFCO Blaze Shield II HS describes it as Portland cement based. All SFRM on the project is to be Portland cement based.	11/5/2024	SLAM		Closed	11/6/2024
313	SLAM	078100	10/31/24	Bond strength of low density fireproofing 078100 2.3.C.2 states bond strength of 600psf. This higher bond strength is required on building greater than 75’ in height. Can 200lb psf standard bond strength low density fireproofing be utilized? Cafco 300/Monokote MK6 vs. Cafco 300HS/Monokote MK10HB	Yes, we acknowledge that the building code only requires 150 psf bond strength for a building with highest occupied floor at 75’ above grade or less. A cementitious SFRM that meets minimum bond strength from one of the named alternate manufacturers is acceptable. Note that CAFCO 300 is gypsum-based and would not be an acceptable alternative.	11/5/2024	SLAM		Closed	11/6/2024
314	Turner	Scope of Work	10/31/24	In reference to BP 15 Scope of Work #31, please clarify what particular roof curb/s and metal covers does the Roofer will furnish and install. Does the roofer responsible in furnishing and installing large RTU/ HVAC curbs?	Mechanical equipment will have prefabricated curbs. BP 15 is to extend the roofing system up the prefabricated curb and furnish and install insulation and drywall as required, for example 4D/A530.	11/4/2024	BM/Turner		Closed	11/4/2024
315	Turner	Scope of Work	10/31/24	In reference to BP 15 Scope of work #35, please clarify further the inclusion of custom fabricated galvanized bent plate to the Roofing scope. (Typically, this is owned by the Steel/Structural sub.) Also, detail 3E/A511 is a wall detail. How is this related to the roofing scope?	BP 15 to provide RWL and RWL attachments (spec 07 7100), for example on 3E/A511. Scope to be revised. The mason (BP 11) to furnish and install custom galvanized plate and clips at Recessed RWL. BP 11 to reference & follow the appropriate specification for colored galvanized steel. BP 15 to exclude the colored galvanized plate at the Recessed RWL. BP 15 must provide RWL and attachments to the galvanized plate.	10/31/202	BM/Turner		Closed	10/31/2024
316	Turner	Scope of Work	10/31/24	Please confirm whether all stair towers, engineered over-head protection, temporary access stairs are all included in the Roofing Scope of Work. Note: These items are not typically carried by the Roofing Contractor as these safety equipment are commonly used by all other trades (for liability insurance issues).	These are required scope of work items for the Roofer (BP #15) per the Turner Scope of Work document for use by all Trades, Turner, Inspectors, etc.	11/6/2024	Turner		Closed	11/6/2024
317	Turner	Scope of Work	10/31/24	Who furnishes and installs VFD's?	VFD's are to be furnished by the Bid Package purchasing the equipment requiring a VFD. VFD's to be furnished to BP#38 for installation and wiring.	10/31/202	BL/Turner		Closed	10/31/2024
318	Turner	Schedule	10/31/24	Can you expand the schedule to show MEP durations?	Milestones dates must be maintained and achieved. Field team to coordate with subcontractors through pull planning and per the sequencing outlined in the Turner Crew Flow documents issued as part of the BQ #236 response in Addendum #3.	11/6/2024	JP/Turner		Closed	11/6/2024
319	Turner	Scope of Work	10/31/24	Will the electrician wire equipment splits?	Yes. BP #38 Electrical and Fire Alarm shall make all internal connections between shipping splits needed for mechanical equipment.	10/31/202	BL/Turner		Closed	10/31/2024

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320	Turner	Scope of Work	10/31/24	Please confirm that the gym floor will be protected by others, so lifts, etc., can be driven over it for MEP installs.	MEP and overhead infrastructure / equipment should be installed prior to finished flooring. If installed after the associated subcontractor shall provide flooring protection and ensure not to exceed allwoable loads on the finished floor system.	11/6/2024	JP/Turner		Closed	11/6/2024
321	Turner	Scope of Work	10/31/24	Please confirm we are NOT furnishing any "T-bars" associated with the ceilings. Ref BP#37 pg 5, SOW #28.	Confirmed. BP #38 shall not be furnishing or installing and "T-bars" associated with the ceilings, however, will need to furnish and install "T-bars" associated with the assembly of the hydronic radiant ceiling panels and active chilled beam units. For instance, between each unit where multiple units are adjacent to one another.	10/31/202	BL/Turner		Closed	10/31/2024
322	Turner	Scope of Work	10/31/24	Ref BP#37 pg 5 item #33, we can only include dampers as shown on our mechanical drawings. We are not the design engineers and the sheet metal union will not take that responsibility. This is always agreed to on every project to date.	Understood and agreed. Turner will amend BP #37, SOW #33 accordingly. BP #37 to furnish and install all fire, smoke and combination dampers with actuators at locations indicated on the Contract Documents.	10/31/202	BL/Turner		Closed	10/31/2024
323	Turner	Scope of Work	10/31/24	Ref BP#37 pg 6 #45, please clarify is this just for equipment? If not please define what exactly is to be included	This scope of work shall include cleaning of all major mechanical equipment including DOA's, RTU's, HRV-1, Chillers, Boilers, Dust Collector DC-1, Cabinet Unit Heaters, Unit Heaters, and Split Systems.	10/31/2024	BL/Turner		Closed	10/31/2024
324	CES	Scope of Work	10/31/24	Please provide a specification for VFD's.	All VFD's provided are integral to the equipment. There are no loose VFD's.	11/5/2024	CES		Closed	11/6/2024
New Bidder's Questions as of 10/31/24 Issuance										
325	Turner	Scope of Work	11/1/24	Ref BP#37 pg 6 #47. Please state a date when early equipment use to start for heating and cooling. Please confirm filter changes during this period to occur 2 times per month.	Early equipment use to start for heating and cooling to commence the beginning of April 2026. Confirmed, filter changes during the early equipment use period to occur two (2) times per month.	11/1/2024	BL/Turner		Closed	11/1/2024
326	Turner	Scope of Work	11/1/24	Ref BP#37 pg 9 #72, The electrician should furnish and install all the wiring conduit ect for the ansul system?. Please confirm	The electrician (BP #38) shall furnish & install all conduit and wiring required for power & fire alarm integration. HVAC subcontractor (BP #37) shall furnish & install all control wiring from the Ansul system to mechanical & plumbing components & equipment.				Closed	11/6/2024
327	Turner	Scope of Work	11/1/24	Ref BP#37 pg9 #75, please provide a list of pre purchased equipment and there corresponding storage durations	Reference BP#37 SOW #73 as well as the SourceBlue Coordination Matrices for a list of all pre-purchased equipment. BP #37 SOW #75 includes storage durations.	11/1/2024	BL/Turner		Closed	11/1/2024
328	CES	Scope of Work	11/1/24	Please provide a refrigeration piping specification.	Refrigerant piping specification has been added to spec section 238126 in ADDENDUM NO. 6	11/5/2024	CES		Closed	11/7/2024
329	CES	23 05 29	11/1/24	Specification section 013573 list delegated design for 230529. What needs this requirement as it is not listed in that spec section.	Spec 230529 is not part of delegated design.	11/5/2024	CES		Closed	11/6/2024
330	CES	23 21 23	11/1/24	Will an authorized pump manufactures rep be acceptable to align pumps in lieu of a millwright? Ref 232123.1.4.B	Yes	11/5/2024	CES		Closed	11/6/2024
331	Turner	23 64 11	11/1/24	Please confirm the maintenance service for the chiller has been included by Source Blue. Ref 236411.1.11. It is typical for that manufacture to provide that service	The chiller maintenance service, outlined in 236411-1.11 has been excluded by SourceBlue. Bp#37 to also exclude. Turner will update the scope of work accordingly.	11/1/2024	BL/Turner		Closed	11/1/2024
332	Turner	Scope of Work	11/1/24	Please confirm all attic stock for the PP equipment has been included by Source Blue, this would include all filters needed and per the project additional provisions.	All attic stock listed in the Specification Sections associated with the pre-purchased equipment has been included by SourceBlue.	11/1/2024	BL/Turner		Closed	11/1/2024
333	SLAM	23 3100	11/1/24	Specification Section 23 3100 pages 4 & 5 (Duct Liner) calls out for Fibrous Glass Duct Liner and Elastromeric Duct Liner but does not specify where to use each one. Please Clarify.	Spec 233100 has been updated to clarify within ADDENDUM NO. 6	11/5/2024	CES		Closed	11/7/2024
334	SLAM	23 3100	11/1/24	Specification Section 23 3100 – 16 (Duct Liner Schedule) calls out for Duct Liner 10' downstream of VAV Boxes. In many cases there are Round Branch Take-offs within that 10', are these to be also lined or is it just the Trunk Line? Please Clarify	Just the main duct truncks shall be lined.	11/5/2024	CES		Closed	11/6/2024

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335	SLAM	23 3100	11/1/24	Specification Section 23 3100 – 15 (Duct Material Schedule) calls out for both Galvanized & Aluminum for Supply, Return, Relief and General Exhaust Duct. Can you please clarify where to use both listed types.	Provide aluminum grilles in bathroom groups, and kitchen area. All other areas can receive galvanized grilles.	11/5/2024	CES		Closed	11/6/2024
336	SLAM	10 1100	11/1/24	Tackboards (TB1)- For tackboards, are manufacture standard profile for aluminum frames acceptable? If not, please provide a proposed detail for the tackboard aluminum frames.	Yes standard frame profile for prefabricated tackboards (and whiteboards) is acceptable.	11/5/2024	SLAM		Closed	11/6/2024
337	SLAM	M500, M501	11/1/24	1. In Addendum 4 new roof mounted equipment details were provided (12/M500, 9/M501) showing the supports bearing directly onto steel framing below. Please advise if the intent is to stop and start the metal deck at these curb / support locations. This is how it seems based on this detail. This would require curbs & supports to be installed prior to metal deck being installed. Also, it is not clear if this would leave enough flange width for metal deck minimum bearing on each side.of the curb. 2. What if curbs are running perpendicular to steel framing? Will supplemental steel framing need to be installed the full length of the curbs? If so, please provide those beam sizes as needed on the structural drawings.	M500 and M501 details have been updated and will be provided as part of Addendum No 6	11/5/2024	CES		Closed	11/7/2024
338	SLAM	A092	11/1/24	Drawing A092 shows metal roof deck between grid lines XC & CE and CS & ZB at the low roof. S301D shows concrete on deck in areas between these grid lines (Type F1). Please confirm that the structural drawings govern and update A092.	These is concrete on deck per structural drawings and per A103D. All roof types desigantion for the project are identified on the roof plans. The Intent of the A090-Series is to identify opening sizes and locations in the roof (Edge of deck/Edge of Slab)	11/5/2024	SLAM		Closed	11/6/2024
339	Turner	07 2726	11/1/24	BP11 Masonry Scope of Work #41 states this Contractor shall furnish and install ALL fluid-applied membrane air barriers as shown on the Contract Documents, including but not limited to mason, FCP, skylight, louvers, curtainwall/Storefront, rainscreen system, and metal panel locations with a minimum 1-foot overlap , etc. BP 19 Glass, Glazing & Metal Panels #26 has this Scope of work include's metal composite panel, cold form metal hat channels, insulation, Fluid applied membrane air vapor barrier, cladding support system, etc. Can the areas of who own's the AVB be clarified? Typically we would own the AVB in our Veneer Cavity.	BP 11 Masonry to furnish & install all AVB per Scope of work #34. BP 19 Glass & Glazing scope of work #25 & #26 to be revised to tie-in AVB as required.	11/1/2024	BM/Turner		Closed	11/6/2024
340	SLAM	3C/A521 & 1C/A640	11/1/24	Please clarify the intent of the box-header in between the insulated metal panel and aluminum closure panel on detail 3C/A521. What is this box-header supporting? Additionaly, this box header is calling for flashing attachment. This flashing requirement is in contradicition to BQ#9 response. Please clarify this requirement and the attachment of the flashing. Lastly, is the box header intended to connect or fasten to vertical curtain wall mullions?	1. Box header is there for the termination bar to have place to screw into behind the insulated wall panel. 2. Flashing to be installed behind the termnation bar and over the vertical roof membrane extension. 3. Yes, use standard CFMF framing accessories to attach the horizontal box header to the vertical CW mullions. CFMF shall be furnished & installed by General Trades (BP #21) and coordianted with BP #19.	11/5/2024	SLAM		Closed	11/6/2024
341	SLAM	A910	11/1/24	Drawing A901B & A903 show RT9 to be installed. The finish schedule A910 does not note a RT9. Please advise on a product type, spec section etc. for RT9.	RT9 shown on A901B should be RT4, and RT9 shown in 1B/A903 should be RT7.	11/5/2024	SLAM		Closed	11/6/2024

BQ #	Responsible Consultant	Reference	Date	Question	Answer	Date Item Responded	Answered By (Name / Company)	Attachment (SK# or Spec Section)	Status ("Closed")	Date Closed
342	SLAM	07 1400	11/1/02	Please provide clarification on the fluid-applied waterproofing material. Basis of Design is Procor by GCP, however no specific product by the other manufacturers are listed. Please provide the specific waterproofing material by the other manufacturers that are listed in the spec that would be acceptable for use on the project.	Per standard practice, we identifed a BOD product and listed acceptable alternative manufactures that can meet the specification.	11/5/2024	SLAM		Closed	11/6/2024
343	CES	23 34 00	11/1/24	Please advise if the roof curbs for exhaust fans need to be pre-faricated as well as insulated.	Exhaust fan roof curbs shall be pre-fabricated and insulated	11/5/2024	CES		Closed	11/6/2024
344	SLAM	L502 Details 1C & 1E	11/1/24	In details 1C & 1E on L502 the accessable ramp construction shows a concrete curbing as part of this ramp. Is it to be concrete or is it Granite like all the other curbs?	Granite curbing	11/5/2024	SLAM		Closed	11/6/2024
345	CES	23 74 13	11/1/24	Please confirm the pre-fabricated equipment curbs for the DOA's, RTU's and HRV-1 do NOT need to be insulated.	The roof curbs shall be insulated	11/5/2024	CES		Closed	11/6/2024
346	JLL	11 5410	11/1/24	Spec 11 5410 Para 2.A – We have multiple questions regarding the Owner finishing this equipment for Rooms 1038 & 1039. Some questions deal with the equipment being new, and others whether the items are existing and must be brought to the new school. Note, both rooms in the new school have only a single man door entry. **A. Assuming all equipment is new:** i. Confirm the Owner will deliver this equipment to the rooms. ii.Please clarify who UNBOXES and ASSEMBLES all this new equipment. **B. Assuming all equipment is existing:** i.Confirm the Owner is delivering the equipment to the rooms. ii. If the Owner is NOT bringing the existing items to the jobsite and the contractor is, please address the following: 1. What address are the items located at? 2. What floor are the items located on? 3. How do you get to that floor? Stairs,ramps,elevator? 4. Is disassembly required to get any of the equipmentout of the existing room AND the building ie doorways, etc. 5. Confirm the elevator can be used by the Contractortor remove the items.	**Turner & JLL Response (11/07/24):** The Owner will furnish, deliver, and set all OFCI items (existing & new) in their final, permanent locations. Any hardwired electrical connections, plumbing connections, or ventilation connections will be by the associated trades. Also, the new elevator within the middleschoool is not intended for any trade's use. Access to each level provided from grade.	11/5/2024	SLAM/Turner		Closed	11/7/2024
347	Turner	329119.23 &	11/1/24	1 - On line item #40 on BP#09 - Sitework it states that they are responsible for removing any preexisting materials from the athletic field area as indicated on the contract documents including but not limited to the specification section 31 1005 Athletic Field site prep. - On Exclusive Specifications on BP#41 we have 323313.29 Athletic Field Root Zone, please clarify the extent of which bid package owns what on this. 2. Please clarify what the Landscape contractor is responsible for on the fields and what the sitework contractor is responsible for on the fields	Item#1 Refer to Turner response to RFI#271. Item#2 : The BP#9 Sitework contractor owns all removals of existing amenities and existing soil & Rock in the areas of the ball fields. BP#9 Sitework also owns all fencing, backstops and safety netting including footings for this work. BP#9 Sitework owns the skinned infield and warning track surfaces per exclusive specification 32 1823.17. This includes the concrete edge drain as well shown on L601. BP#41 Landscape contractor owns furnishing and installing the root mix soil & seed per spec. 32 9113.29. BP#41 owns all athletic equipment per exclusive spec. 11 6833 for the fields including but not limited to all base ball bags, pitchers mound, the shade enclosure structure and benches and spectactor benches for a complete installation.	11/5/2024	Pm/Turner		Closed	11/6/2024

BQ #	Responsible Consultant	Reference	Date	Question	Answer	Date Item Responded	Answered By (Name / Company)	Attachment (SK# or Spec Section)	Status ("Closed")	Date Closed
348	SLAM	S301B, S301D	11/1/24	Drawings M103B and M103D indicate ductwork pentrations below DOA-5, RTU-3 and HRV-1, however, Structural Steel Drawings S301B and S301D do not indicate any supplemental structural steel for these penetrations. Please either confirm none are required or add them to the Contract Drawings.	Openings are indicated on the A90-Series Roof Slab Edge Plans. Specific sizes are not indicated since they are manufacturer dependent and yet to be determined. Typical roof opening framing for such items are covered with detail 5/S400 and coordinated with the typical mechanical roof curb detail 4D/A530. Supplemental steel needed for these openings shall be furnished & installed by the Steel subcontractor (BP #12) and cooridnated with the mechanical subcontractors.	11/6/2024	SLAM		Closed	11/6/2024
349	SLAM	A103 Series	11/1/24	The Architectural Roof Drawings do not appear to indicate furnishing and/or installing roof insulation or membrane below any of the DOA's, RTU's or HRV-1. Please confirm none are required or update Contract Drawings to include.	Drawimgs have been updated to identify where insulation is required per 4E/A530 in Addendum #6	11/5/2024	SLAM		Closed	11/7/2024
350	CES	M103B, M103D	11/1/24	Drawings M103B and M103D indicate ductwork pentrations below DOA-5, RTU-3 and HRV-1. After the associated equipment curbs are installed and the units are landed, how is the Mechanical Subcontractor supposed to make mechanical piping and ductwork connections below the unit?	Mechanical contractor means and methods. This is a typical rooftop unit installation with ductwork connections on the bottom of the unit.	11/5/2024	CES		Closed	11/6/2024
351	Turner	BP 16 Scope of Work	11/1/24	Specific scope items (4) out of sequence (7) access/protection are impossible to figure as defined. Please further clarify or create an allowance for these items.	These are required scope of work items for the Fireproofing Subcontractor (BP #16) per the Turner Scope of Work documents.	11/6/2024	Turner		Closed	11/6/2024
New Bidder's Questions as of 11/01/24 Issuance										
352	JLL	Specifications	11/1/24	Please advise what percentage of the project will be state funded to meet our CHRO requirements.	The State of Connecticut has approved a 20% reimbursement rate for this project.	11/6/2024	JLL		Closed	11/6/2024
353	Turner	A521	11/1/24	Many window details on A521, A640 and similar call for “SHIM SPACE - FILL ALL VOIDS W/ SPRAY FOAM”. Please confirm this insulation is provided by BP 19 Glass, Glazing & Metal Panels	Glass & Glazing subcontractor (BP #19) shall furnish & install all spray foam required within shim spaces of their own systems, including at perimeter of curtain wall.	11/6/2024	Turner		Closed	11/6/2024
354	SLAM	07 2119	11/1/24	Spec 07 2119 Para 2.1B1a – please clarify where closed cell spray foam is intended in deck flutes. Spec 07 2119 Para 2.2B – please clarify where intumescent coating for spray foam is intended.	1.Spray foam in the deck flutes is not used, see details 1B & 2B on A521, which shows preformed mineral wool deck plugs. Same spec section identified Hilti Deck Plugs as the BOD. 2.Any spray foam insulation that is exposed to the interior of the building is required to have the Intumescent coating to meet the building code.	11/6/2024	SLAM		Closed	11/6/2024
355	SLAM	3B/A131	11/1/24	Plan View 3B/A131 Custodial 2095 calls out tag T23. Spec 10 2800 does not call out tag T23. Please clarify what this accessory. Is T23 the Owner furnished Dilution and Dispensing System?	Yes it is. Per Drawing A701, accessory type T23 is a cleaning chemical dispenser. It is included in 10 2800 at 2.8-A, without the T23 tag. It’s noted there as OFCI.	11/5/2024	SLAM		Closed	11/6/2024
356	SLAM	10 2800	11/1/24	Spec 10 2800 Para 2.5E tags mirrors T4. Enlarged Toilet Plans A130 (and similar) tag the mirrors as T5. Please clarify the difference.	All the individual framed lavatory mirrors are tagged as T4, in alignment with Section 10 2800. T5 is intended designation for unframed, wall-to-wall mirror glass at multi-sink counters.	11/5/2024	SLAM		Closed	11/6/2024
357	Turner	11 4000	11/1/24	Please confirm the Food Service Package is providing the following items noted on FS001 and specified in Spec 114000, because the General Trade package is responsible for these items outside of the Kitchen: a.Fire Extinguisher, Items #36a b.Roll Down Shutter, Item #86	Spec 11 4000 is an exclusive spec to the Food Service subcontractor (BP #30). All items specified therein shall be furnished & installed by the Food Service Subcontractor.	11/6/2024	Turner		Closed	11/6/2024
358	SLAM	11 3013	11/1/24	Spec 11 3013 Para 2.1H calls outs the Cooking Exhaust as EQ14. Drawing A912 has E14 as laser printer, which is OFOI. Please clarify the Cooking Exhaust EQ number. Is the Cooking Exhaust EQ number intended to be EQ10.	Range hoods at student stations are EQ03. EQ10 is only at the Instructor station above the island mounted EQ09 range.	11/5/2024	SLAM		Closed	11/6/2024

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359	Turner	11 5400	11/1/24	Spec 11 5400 Para 2.3 – please confirm the following: a.BP 21 Drywall & General Trades will furnish and deliver the Kiln Exhaust Vent Kit ONLY b.BP 37 HVAC & Controls will install ALL Kiln Exhaust Vent Kit c.BP 37 HVAC & Controls will provide other necessary materials	General Trades (BP #21) shall furnish (including all accessories & kits) & install the kiln. The HVAC subcontractor (BP #37) shall receive and install all necessary components to connect the kiln to proper exhaust. The HVAC subcontractor shall provide all ductowork necessary not included with the vent kit. The electrician (BP #38) shall furnish and install all electrical circuits and make final power connections.	11/6/2024	Turner		Closed	11/6/2024
360	SLAM	11 5400	11/1/24	Spec 11 5400 Para 2.2A8a - Are you sure the Dynatrol controller is intended? We do not know of many who want the old Dynatrol controller. L&L has made changes so that "All Easy-Fire Kilns include Genesis Touchscreen Multi-Zone Control" now. Please clarify the intended controller.	Provide the standard Genesis Touchscreen Control in lieu of the Dynatrol controller. Spec section to be updated accordingly in Addendum #6	11/6/2024	SLAM		Closed	11/7/2024
361	SLAM	11 5400	11/1/24	Spec 11 5400 does not include a furniture kit. Please provide a spec for the intended furniture kit, because the kiln has little value without a kit.	Provide furniture kit #H-E-K23T/3H by L&L Kilns per Addendum #6 spec updates.	11/6/2024	SLAM		Closed	11/7/2024
362	SLAM	11 5400	11/1/24	1. Spec 11 5410 Para 2.2A refer to Equipment Labels EC01-EC13. Equipment Drawing A912 lists EC12 and EC13 and EC14 as Owner Furnish/Owner install (OFOI). Please confirm EC12 and EC13 and EC 14 are all OFOI. 2. Spec 11 5410 Para 2.2A refer to Equipment Labels EC01-EC13. 3. Equipment Drawing A912 lists EC10 as Contractor Furnish/Contractor install (CFCI). Drawing A912 provide the product spec. a.Please confirm EC10 is CFCI. b.Turner – if CFCI, please clarify which BP will provide EC10. c.Turner – if CFCI, please confirm BP 37 HVAC & Controls willprovide all venting for EC10.	1. E12-E14 will be modified in Addendum #6 on A912 to be Owner Furnished/Contractor Installed. 2. 2.2A should read "EC01-EC14" 3. Confirming EC10 in Contractor Furnish/Contractor install by the General Trades subcontractor (BP #21). The HVAC subcontractor (BP #37) shall furnish and install all necessary components to connect the kiln to proper exhaust. The electrician (BP #38) shall furnish and install all electrical circuits and make final power connections.	11/6/2024	SLAM		Closed	11/6/2024
363	SLAM	11 5400	11/1/24	Spec 11 5410 calls for submittals, quality assurance, warranty, adjusting, cleaning, closeout, training, etc. that are typically associated with furnishing the materials. Since the Owner is furnishing all this equipment, please confirm BP21 is ONLY installing and has no responsibility for these other portions of the spec.	This portion of this spec will be required for EC-10 and its associated venting. For the rest of the EC items, this portion of the spec will only apply to the connection required to make the Owner Furnished equipment functional. Ensuring the Contractor Installation side of the effort is done correctly as these spec requirements are not exclusive to furnishing the equipment.	11/6/2024	SLAM		Closed	11/6/2024
364	SLAM	11 5400	11/1/24	Spec 11 7300 Para 2.1B and 2.1D both refer to Equipment Label EH01. Please confirm Para 2.1B is Equipment Label EH04 to match Equipment Drawing A912.	The sharps (or biohazard) container should be EH04.	11/5/2024	SLAM		Closed	11/7/2024
365	Turner	A641	11/1/24	Detail 1B/A641 and similar conditions – please confirm that BP11 Masonry will provide the metal sill flashing … to match the stone.	BP 11 (Mason) to provide metal sills / through wall flashing for locations where masonry occurs, (to match stone).	11/6/2024	CC/Turner		Closed	11/7/2024

BQ #	Responsible Consultant	Reference	Date	Question	Answer	Date Item Responded	Answered By (Name / Company)	Attachment (SK# or Spec Section)	Status ("Closed")	Date Closed
366	SLAM	A641	11/1/24	Detail 1D/A641and similar conditions – there are two notes pointing at what seems to be same piece of metal. The first is the manufacturer provide FCP flashing … and the second is the metal trim fabrication from 1/8" bent metal alum plate… a.Can this detail be clarified further to define the two pieces? b.Turner – please confirm that the manufacturer provide FCP flashing… is by BP21. c.Turner – please confirm that the metal trim fabrication from 1/8" bent metal alum plate… is by BP19.	**Slam Response (11/07/24):** A. The Manufacturer Flashing is Typically a "Z" Shape see 1C/A641, the arrow is pointing at the cut "Z" which is now an "L" sitting on top of the projected bent aluminum flashing which fastens to the Z-Furring and PT blocking. The Bent Aluminum is a longer, projected piece, right below the cut "Z" which fastens back at the window head blocking. **Turner Responses (11/07/24):** B. Yes BP 21 to provide Manufacturer FCP Flashing as indicated on drawings. C. – Yes 1/8" bent metal alum. Plate to be provided by BP 19 Glass and Glazing.	11/7/2024	SLAM		Closed	11/7/2024
367	Turner	A641	11/1/24	Detail 1D/A641 and similar conditions – there are multiple caulk joints in the detail. The two concealed, inbound are assumed to be provided by BP19. Please confirm that BP 19 also provide the exposed "perimeter joint sealant" between the aluminum head and the AVB/wood. Detail 1E/A641 and similar conditions – there are multiple caulk joints in the detail. The two concealed, inbound are assumed to be provided by BP19. Please clarify which BP (19 or 21) is to provide the exposed "perimeter joint sealant" between the aluminum head and the FCP.	Caulk joints similar to 1D and 1E that are adjacent to Curtain Wall systems to be provided BP 19.	11/6/2024	CC/Turner		Closed	11/7/2024
368	Turner	A641	11/1/24	Detail 2F/A641 and similar sill conditions – please confirm that BP 19 Glass, Glazing & Metal Panels will provide the typical aluminum 1/8" plate sill…	BP 19 to provide 1/8" aluminum sill at sills of Storefront/Curtain walls	11/6/2024	CC/Turner		Closed	11/7/2024
369	Turner	07 2726	11/1/24	07 2726 Fluid-Applied Membrane Air Barrier (shared) is assigned to both BP 21 and BP11. BP11 Scope Item #46 says to provide all AVB including at FCP (fiber cement panel). a.Please confirm that BP 11 is providing the AVB at all the FCP. b.What is the "shared" scope for BP21?	Masonry (BP #11) shall furnish & install all AVB, including behind FCP areas (Reference BQ #359 & BQ #216).	11/7/2024	CC/Turner		Closed	11/7/2024
370	Turner	Scope Item	11/1/24	BP 21 Item #76 (regarding overhead coiling doors) – please confirm that the Electrical BP will provide the line voltage power, and BP 21 is only responsible for low voltage control wiring.	Confirmed	11/6/2024	CC/Turner		Closed	11/7/2024
371	SLAM	08 3326	11/1/24	Spec 08 3326 Para 2.2A calls for stainless steel grilles. A611 Door Schedule calls for aluminum OH2 1085A, 1085C & OH3 1086C. Please clarify the intended material.	As scheduled, these are intended to be Aluminum, spec section 08 3326 has been revised in Addendum 6.	11/7/2024	SLAM		Closed	11/7/2024

BQ #	Responsible Consultant	Reference	Date	Question	Answer	Date Item Responded	Answered By (Name / Company)	Attachment (SK# or Spec Section)	Status ("Closed")	Date Closed
372	SLAM	MEP Series	11/1/24	1. Please confirm that the intent is to run mechanical systems through the roof joists and not below them at the Gymnasium and Auditorium. 2. If the mechanical systems need to run through roof joists but cannot be supported from the metal roof deck directly, please advise on the intent for supporting these systems. How should supplemental unistrut supports be attached to the roof joists? Please provide a typical detail showing the intent. 3. Please confirm that the roof joist openings and cross braces have been fully coordinated with the ductwork and other mechanical systems (including insulation) to ensure that they will fit through the joists.	1. Confirmed. 2. Standard unistrut style connection to top cords of the roof joists. 3. The project has been coordinated.	11/4/2024	SLAM		Closed	11/7/2024
373	SLAM	27 1000	11/1/24	Spec section 27 1000-7 2.04 B-2 references plenum rated category 6A, Print T000 references category 6A shielded cable for AP's and category 6 for data and voice. Please confirm cable type for each?	AP's shall have Cat6A shielded cable and 6A 8P8C shielded jacks. Voice & Data shall have Category 6 cable and Category 6 8P8C jacks. All cabling shall be plenum rated.	11/5/2024	DA		Closed	11/6/2024
374	SLAM	27 1000	11/1/24	Spec Section 27 1000-8 F.1. Patch cords are mentioned but not lengths and quantities. Can this be provided?	Patch cords, other than patch cords to connect cameras to jacks in the field (refer to TY000) and patch cords specified on the TA drawings, are not required and will be Owner furnished.	11/5/2024	DA		Closed	11/6/2024
375	SLAM	27 6010	11/1/24	Will a design be provided or is the Low Voltage subcontractor (BP #39) providing a design to be approved?	Low voltage sub-contractor to submit design for approval by engineer based on specification 27 6010 and detail 4/E502.	11/6/2024	CES		Closed	11/6/2024
376	Turner	EY Series	11/1/24	Does the Fire Alarm trade perform the ties into the paging system?	The electrical & fire alarm subcontractor (BP #38) shall furnish & install all fire alarm devices / modules and make all tie-ins & final connections to systems required to be monitored or integrated with the fire alarm system. The low voltage subcontracotr (BP #39) must coordinate with the electrician for making these tie-ins.	11/7/2024	Turner		Closed	11/7/2024
377	Langan	01 2201	11/1/24	The bid asks for unit pricing for selective items; however, no quantities were provided. Can quantities be provided for the following materials: Ceiling/Deck Caulking Compound – Miscellaneous Material (Located at Ceilings/Deck Panels and Metal Beams/Columns) (Adjacent Materials/Substrates are Contaminated) (Assumed PCB Bulk Product Waste > 50 ppm also)	Unit pricing needs to be filled out by each bidder (42 of them). The contractor is required to assume full containments throughout the entire building per the specifications. This material is sporadic throughtout and impossible to quantify without performing ceiling, wall, selective demolition throughout the entire building first. Contractor owns all of the material throughout the second floor and needs to fill out unit pricing in case it is also found hidden on the lower floor.	11/5/2024	Langan		Closed	11/7/2024
378	Langan	01 2201	11/1/24	The bid asks for unit pricing for selective items; however, no quantities were provided. Can quantities be provided for the following materials: Interior Window Glazing Compounds – Miscellaneous Materials (Adjacent Materials/Substrates are Contaminated) (Assumed PCB Bulk Product Waste > 50 ppm also)	Unit pricing needs to be filled out by each bidder (42 of them). The locations of this material is listed clearly in the specifications and contractor can see them clearly at site. Unit pricing to be filled out in case additional locations are identified.	11/5/2024	Langan		Closed	11/7/2024

BQ #	Responsible Consultant	Reference	Date	Question	Answer	Date Item Responded	Answered By (Name / Company)	Attachment (SK# or Spec Section)	Status ("Closed")	Date Closed
379	Langan	01 2201	11/1/24	The bid asks for unit pricing for selective items; however, no quantities were provided. Can quantities be provided for the following materials: Interior Wall/Wall and Wall/Column Caulking Compounds – Miscellaneous Materials (Multiple Layers/Types of Materials and Adjacent Materials/Substrates are Contaminated) (Assumed PCB Bulk Product Waste > 50 ppm also)	Unit pricing needs to be filled out by each bidder (42 of them). The contractor is required to assume full containments throughout the entire building per the specifications. This material is sporadic throughtout and impossible to quantify without performing ceiling, wall, selective demolition throughout the entire building first. Contractor owns all of the material throughout the building and locations are listed in specifications.	11/5/2024	Langan		Closed	11/7/2024
380	Langan	01 2201	11/1/24	The bid asks for unit pricing for selective items; however, no quantities were provided. Can quantities be provided for the following materials: Interior/Exterior Window/Wall/Column/Window Walls/Door Caulking and Glazing Compounds – Miscellaneous Materials (Multiple Layers/Types of Materials and Adjacent Materials/Substrates are Contaminated) (Assumed PCB Bulk Product Waste > 50 ppm also)	Unit pricing needs to be filled out by each bidder (42 of them). The contractor is required to assume full containments throughout the entire building and exterior ground protection per the specifications. Contractor owns several line items that have locations/quantities listed in specs and all the perimeter walls/window walls and the materials are visible at the site.	11/5/2024	Langan		Closed	11/7/2024
381	Langan	01 2201	11/1/24	The bid asks for unit pricing for selective items; however, no quantities were provided. Can quantities be provided for the following materials: Exterior Wall/Wall Expansion and Column Caulking Compounds – Miscellaneous Materials (Multiple Layers/Types of Materials and Adjacent Materials/Substrates are Contaminated) (Assumed PCB Bulk Product Waste > 50 ppm also) Roofing Penetration Flashing Materials (Tar on Wood – Bottom Layer) – Miscellaneous Material (Adjacent Materials/Substrates are Contaminated)	Unit pricing needs to be filled out by each bidder (42 of them). The exterior wall/wall expansion/column sealant compounds, contractor can see them clearly at site. The contractor shall assume all roof penetration flashing is asbestos (quantity cant be determined until select demolition occurs). Contractor owns all the material.	11/5/2024	Langan		Closed	11/7/2024
382	Langan	01 2300	11/1/24	How should the lump sums be broken down for Alternates 10 and 11? Do the alternates assume all painted material will be characterized the same for each alternate, when in reality the material could be a mix of PCBs less than and greater than 50ppm?	Normally paint results are consistent and will fall into less than 1ppm, less than 50 ppm or greater than 50 ppm. Bidding alternates should be assuming all the paint will be characterized the same.	11/5/2024	Langan		Closed	11/7/2024
383	Langan	01 2201	11/1/24	Please confirm that during exterior abatement the exterior of the existing building requires two layers of 10-mil poly and one layer of plywood twenty feet out from the building. Is its expected that we will provide the same level of protection around the building in alternates 10 and 11?	The poly and plywood is required for removing exterior asbestos and assumed PCB containing materials. It is not required for the building demolition debris in alternates 10 and 11	11/5/2024	Langan		Closed	11/7/2024

BQ #	Responsible Consultant	Reference	Date	Question	Answer	Date Item Responded	Answered By (Name / Company)	Attachment (SK# or Spec Section)	Status ("Closed")	Date Closed
384	Langan	Project Manual	11/1/24	In the Additional Provisions/Scope of Work, under the paragraph for Insurance, items 6 & 7, Item 6 calls out for bid packages excluded from the CCIP to provide minimum insurance of $5,000,000 for General Liability, $2,000,000 for Employers Liability, $2,000,000 for Disease Limit, $2,000,000 Disease-Policy Limit and $2,000,000 for Automobile Liability. Any subcontractor performing Structural Demolition to include $20,000,000.00 for General Liability limit. Item 7 calls out for a Pollution Liability insurance limit of $5,000,000 per occurrence and $10,000,000 aggregate. These policy limits are more than what is typically required on State of Connecticut demolition and abatement projects. Most SBE/MBE/WBE subcontractors required to meet CHRO inclusion requirements will not have this kind of coverage. Will bidders be required to meet these insurance rates?	Limits are in line with the requirements of the Town of Greenwich for the project and are to be maintained accordingly.	11/1/2024	JP/Turner		Closed	11/1/2024
385	Langan	Abatement	11/1/24	Will pre-waste disposal testing for hazardous materials of demolished materials be allowed by contractor if consultant or owner elect to assume paints, caulks, and glazing as PCB?	The sealant compounds are asbestos and assumed PCB bulk product waste and must be disposed of as such (will NOT be tested). The painted building materials will be tested by the consultant to see if they contain > 50 ppm PCB, < 50 ppm PCB or less than 1 ppm PCB. Should the contractor be required by the hauler/landfill to perform PCB TCLP sampling, that would need to be discussed first before testing occurs	11/5/2024	Langan		Closed	11/7/2024
386	Langan	Abatement	11/1/24	What role will the consultant have in determining the waste categorization for removed building debris?	See answer in BQ#385	11/5/2024	Langan		Closed	11/7/2024
387	Langan	Abatement	11/1/24	The alternate pricing for disposal as >50 PCB and <50PCB only address paint to be tested, are we to assume that testing will be performed?	See answer in BQ#385	11/5/2024	Langan		Closed	11/7/2024
388	Langan	Abatement	11/1/24	The PCB spec bullet points out suspect assumed materials to contain PCBs. With these materials, primarily caulk and glazing, be tested prior to demolition by the consultant?	See answer in BQ#385	11/5/2024	Langan		Closed	11/7/2024
389	SLAM	12 6613	11/1/24	See attached Substitution request for Telescoping Bleachers	Rejected	11/7/2024	SLAM	yes - substitution request	Closed	11/7/2024
390	SLAM	12 6100	11/1/24	See attached Substitution request for Fixed Seating	Rejected	11/7/2024	SLAM	yes - substitution request	Closed	11/7/2024
391	SLAM	A901B	11/1/24	Per the drawings there is RB4 listed in the fitness room, but not listed on the finish schedule. Please advise what flooring type RB4 is intended to be?	The RB in the Fittness room should be RB2 in lieu of RB4	11/5/2024	SLAM		Closed	11/6/2024
392	SLAM	A910	11/1/24	Please confirm with architect the 'Vented Wall Base' RB2 which is to be installed in the gym/auditorium is not manufactured by Burke/Mannington (confirmed with Rep)	BOD Vented Base manufacturer should be Johnsonite/Tarkette	11/5/2024	SLAM		Closed	11/6/2024
393	CES	M102B	11/1/24	Is the 32" and 26" round duct in the Gymnasium on Drawing M102B single wall, double wall or lined?	Ducts shall be double wall insulated round ductwork	11/5/2024	CES		Closed	11/6/2024
394	Turner	A530	11/1/24	Is Detail 4E on Drawing A530 required on this project for the roof curb mounted RTU's and DOA's? If so, what bid packages are responsible for the insulation and gypsum board inside the curb?	Yes, Detail 4E on Drawing A530 is required on this project. Bi Package #15 - Roofing shall furnish and install the insulation and gypsum board within/under the equipment curbs.	11/4/2024	BL/Turner		Closed	11/4/2024

BQ #	Responsible Consultant	Reference	Date	Question	Answer	Date Item Responded	Answered By (Name / Company)	Attachment (SK# or Spec Section)	Status ("Closed")	Date Closed
395	SLAM	S200 Series	11/1/24	Please provide typical foundation wall penetration details for items such as mechanical piping, conduit, etc. including but not limited to mechanical requirements (i.e. link seals or simialr).	See 5B/A501, 6/M501, and 3/S200 for typical detail	11/5/2024	SLAM		Closed	11/6/2024
396	Turner	Scope Item	11/1/24	Please clarify where to find scope item #13 b, d, f & g for the concrete flatwork scope of work .	Scope item #13: b. should be omitted from Concrete Flatwork Scope as the concrete beneath the spectator benches is with the Landscaper per exclusive spec. 11 6833 Athletic field equipment, d. The concrete utility pads are all pads shown outside the building footprint namely the chillers, the generator and the transformer as shown on drawings included but not limited too L201C, A101A, M101A, EP101A & S101A , detail 18 on S200. f & g. The concrete edge and drain on the warning track in detail 1A on L601 is by BP#9 Sitework	11/5/2024	PM/Turner		Closed	11/7/2024

RFI 77 ATTACHMENT

SUBSTITUTION REQUEST
(During the Bidding/Negotiating Phase)

PROJECT: Greenwich Central Middle School

SUBSTITUTION REQUEST NUMBER:

FROM:

TO:

DATE: November 01, 2024

A/E PROJECT NUMBER: State Project No: 057-0114 N

RE:

CONTRACT FOR:

SPECIFICATION TITLE: 06 4100 - Architectural Wood Casework **DESCRIPTION:** Self-Close Door and Drawer Damper

SECTION: 2.9 **PAGE:** 496 **ARTICLE/PARAGRAPH:** J.

PROPOSED SUBSTITUTION: Tiomos Grade 1 Soft Close European Hinge

MANUFACTURER: Grass **ADDRESS:** 1202 NC Hwy 66S Kernersville, NC 27284 **PHONE:** 1-800-334-3512

TRADE NAME: Architectural Millwork **MODEL NO.:** GRT160FSCD

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.
Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The Undersigned certifies:
- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

SUBMITTED BY:

SIGNED BY:

FIRM:

ADDRESS:

TELEPHONE:

A/E's REVIEW AND RECOMMENDATION:

- [x] Approve Substitution—Make submittals in accordance with Specification Section 01 33 00 Submittal Procedures.
- [ ] Approve Substitution as noted—Make submittals in accordance with Specification Section 01 33 00 Submittal Procedures.
- [ ] Reject Substitution—Use specified materials.
- [ ] Substitution Request received too late—Use specified materials.

SIGNED BY: Stephen Martocchio **DATE:** 11/6/2024

SUPPORTING DATA ATTACHED: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐

CSI Form 1.5C (August 2020 version)

RFI 77 ATTACHMENT

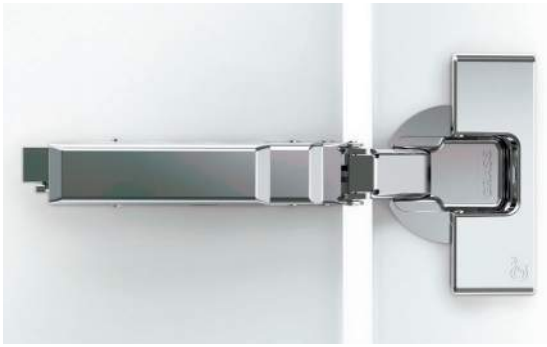


TIOMOS

G*GRASS®

TIOMOS HINGE SYSTEM

Integrated Soft-close, stylish design, maximum stability.
The best possible hinge solution for cabinet doors.



RFI 77 ATTACHMENT



RFI 77 ATTACHMENT



Tiomos, an elegant hinge system today that meets the technical and functional requirements of tomorrow.

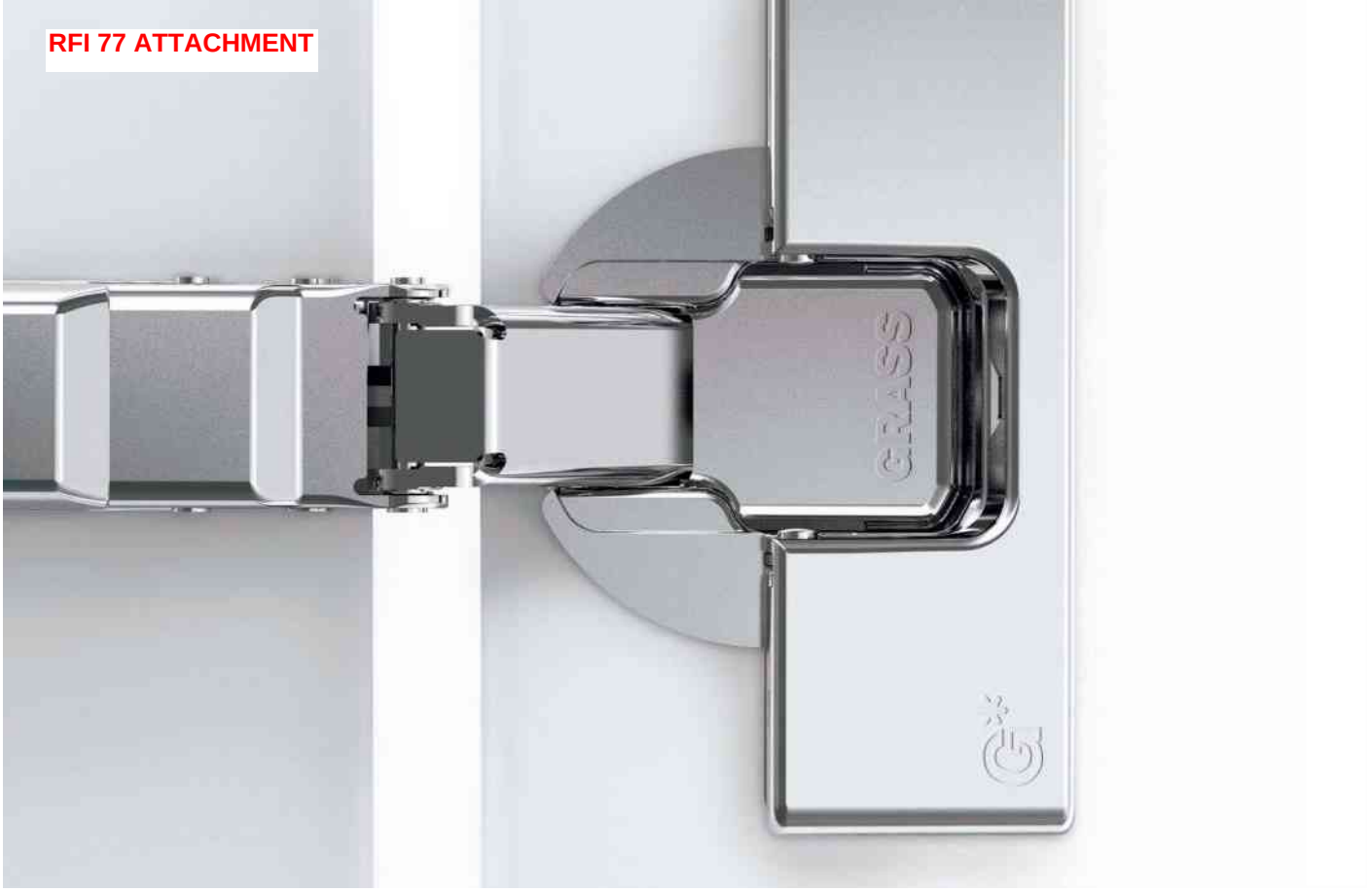


Our developers set out to create a completely new hinge system. The result is Tiomos. Not only does Tiomos outperform any other hinge in the industry, it offers a timeless design as well as its own individual character.

The product range covers virtually every application, from standard doors to wide angle doors, from frameless applications to face frame applications. The Tiomos offers two closing actions: the standard Self-close and the popular Soft-close. The Soft-close offers a three tier adjustable mechanism, which is fully integrated and concealed in the hinge arm. The Soft-close mechanism remains active through the duration of the close, resulting in an extremely smooth action. With the superb engineering and design, size and weight of the door will not be a factor. The doors pull open with ease and minimal gaps can be achieved due to the design of the hinge.

Tiomos - the ideal solution to the ever increasing requirements of today's manufacturers.

RFI 77 ATTACHMENT



Tiomos - One hinge system to cover all applications.

Meet Tiomos, an evolutionary hinge system that offers the best possible movement for cabinet doors.

Tiomos provides perfect movement for essentially every application, from standard doors to wide angle doors, from diagonal corner hinges to pie-cut corner hinges, and from frameless applications to face frame applications. Tiomos is available in a 45mm or 42mm boring pattern for dowelled hinges and 45mm for screw-on hinges. The Tiomos Impresso, the ever popular tool-free version, is available in a combined 42/45mm pattern.



TIOMOS HINGE SYSTEM

One hinge system featuring a multitude of innovative aspects.



Soft-close technology is concealed within the hinge arm.

Three levels of closing pressure are available with the Tiomos adjustable Soft-close mechanism, which is fully integrated and concealed in the hinge arm. The hinges arrive with the adjustment lever in the horizontal position. A turn to the left or the right will adjust the Soft-close mechanism to your individual requirements.



For stronger damping action, turn the adjustment lever by 90° to the right.



Perfect alignment with a twist of the hand.

For fine adjustment, the Tiomos hinge system offers 3-dimensional adjustment. Depth adjustment (+3/-2mm) is based on the worm screw principle and is continuous and self-locking. Depending on the type of base plate chosen, height adjustment (± 2mm) can be achieved via a worm screw or through elongated holes (± 2.5mm). Side adjustment (± 2mm) is on the hinge arm.



Tiomos hinges leave the factory with the adjustment lever in the horizontal position.



The kinematics inside Tiomos.

The complex inner workings of this high-tech hinge are hidden from view, but they are most impressive when working as one. With the kinematics in place the doors are extremely easy to open. This mechanism makes alignment with the smallest of gaps and reveals possible, opening up new possibilities to cabinet designers.



For a gentler closing action, the adjustment lever of the Soft-close damper is turned to the left by 90°.

RFI 77 ATTACHMENT

Tiomos

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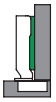
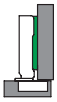
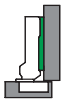
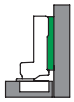
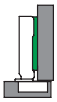
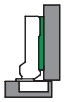
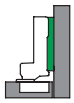
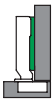
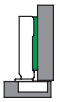
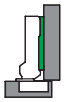
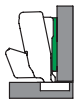
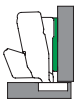
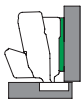
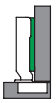
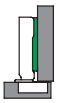
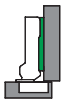
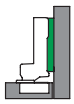
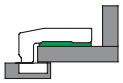
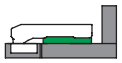
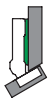
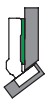
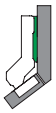
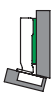
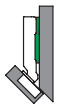
		Technical Information					10
110°		**Tiomos 110** • Optimal reveals up to 24mm door thickness • Convenient depth adjustment via worm screw					16
110°		**Tiomos 110 Tipmatic Plus** • Push to open for handle-free doors • Works with Grass Tipmatic Pin system					17
120°		**Tiomos 120** • Optimal reveals up to 24mm door thickness • Convenient depth adjustment via worm screw					20
155°		**Tiomos 155** • Optimal reveals up to 32mm door thickness • Zero protrusion • For cabinets with inset drawers or pull-out shelves					22
95°		**Tiomos 95** • Optimal reveals up to 36mm door thickness • Convenient depth adjustment via worm screw					26
110°		**Tiomos 110/90** • Hinge for blind corner cabinets • Convenient depth adjustment via worm screw					28
110°		**Tiomos 110/30A** • For 30° angled cabinets, overlay • Convenient depth adjustment via worm screw					30
110°		**Tiomos 110/45A** • For 45° angled cabinets, overlay • Convenient depth adjustment via worm gear					32
110°		**Tiomos 110/45E** • For 45° angled cabinets, inset • Convenient depth adjustment via worm screw			Corner Angle 		34
120°		**Tiomos 120/-15A** • For -15° angled cabinets, overlay • Convenient depth adjustment via worm screw					36
120°		**Tiomos 120/-45A** • For -45° angled cabinets, overlay • Convenient depth adjustment via worm screw					38
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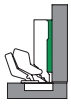
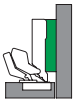
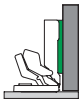
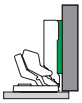
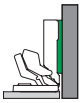
Opening Angle		Description	Full Overlay	Overlay	Half Overlay	Inset	Page
110°		**Tiomos M9** • For door thicknesses from 12mm (15/32") to 28mm (1 1/8") • Convenient depth adjustment via worm screw					42
125°		**Tiomos M0** • For door thickness from 6mm (1/4") to 10mm (3/8") • Convenient depth adjustment via worm screw					46
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90°		**Tiomos Flap Hinge** • For fold down flap • For Flap thickness up to 21mm (13/16") • Overlay up to 19mm (3/4")					54
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Features and Benefits

Tiomos

Features



- Adjustable 3-tier Soft-close mechanism integrated and concealed in the hinge arm
- Continuous, smooth closing action from the degree that the Soft-close is activated until the door is completely closed
- Uniform closing action regardless of the door size, weight, or materials
- Soft-close mechanism can be adjusted easily and without tools, even after doors are installed
- Wide selection of hinges and specialty hinges cover all application needs
- Increased applications:
  - Full overlay from 24 - 13.5mm
  - Overlay from 19 - 11.5mm
  - Half Overlay from 12.5 - 5mm
  - Inset

Integrated damper adjustment
with 3 Soft-close settings. Adjustment system is concealed in the hinge arm.

Depth adjustment (+3/-2mm)
is smooth and self-locking via worm screw.

Easy height adjustment (± 2mm)
via hinge arm on baseplate

Side adjustment (±2mm)
with overturn stop

Ergonomic clip
release with audible locking





3 Soft-close settings
adjust to meet your individual Soft-close requirements.



Height adjustment
is based on the worm screw principle that is continuous and self-locking.

Features

- One hinge type for all door thicknesses up to 24mm
- 3-dimensional adjustment with suitable base plate
  - Depth adjustment +3/-2mm via self-locking worm screw
  - Height adjustment +/-2mm on base plate via hinge arm
  - Side adjustment with overturn stop +/-2 via hinge arm
- Soft-close or Self-close hinges are available
- For face frame or frameless applications
- Impresso for tool-free application
- 42mm and 45mm boring patterns



Impresso Hinges
for tool-free application
Insertion instructions on page 14.

Improved Kinematic
reduces opening force and minimizes reveals.



Tiomos Styles
42mm pattern, Dowelled
45mm pattern, Screw-on and Dowelled
42/45mm pattern, Impresso

Cup depth
12.6mm (1/2")



Dowelled and Screw-on
cup attachments. Dowelled available in both 42mm and 45mm patterns. Screw-on available in 45mm pattern.



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Technical information

For Tiomos

Number of Hinges Per Door

The number of hinges is determined by the door height, door weight, quality of the door material, and the fixing of the cup and base plate.

The load and height data refer to 24" standard door widths.

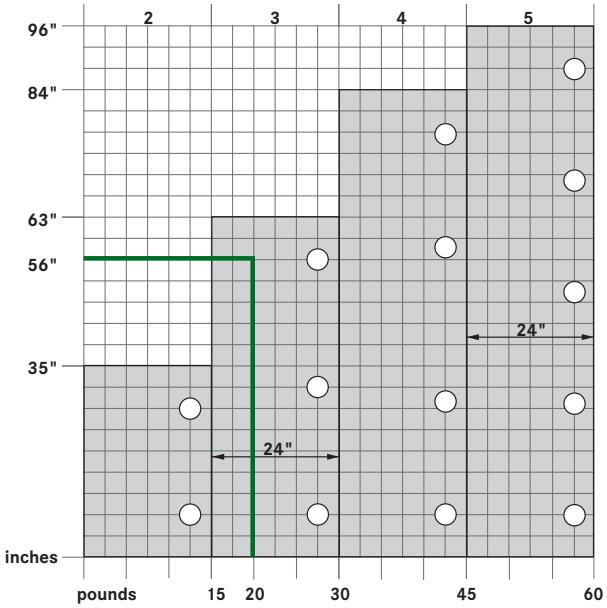
The table refers to hinges with and without integrated dampers.
Grass strongly recommends a trial mount for all hinges and base plates.

Attach base plates using all available screw holes.

Example:
For doors measuring 56" x 24" and weighing 19 lb, Grass recommends the installation of 3 hinges.

Note: The distance between the top and bottom hinge must be greater than the width of the door.

The **Tiomos** hinge meets and exceeds the minimum requirements of ANSI/BHMA A156.9 Standard.



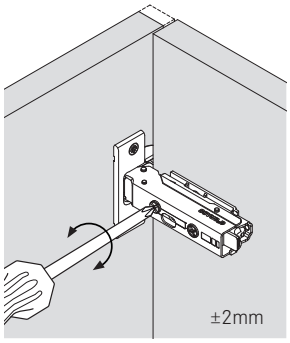
Adjustments

The options for height adjustment depend on the type of base plate. All adjustments can be made independent of one another.

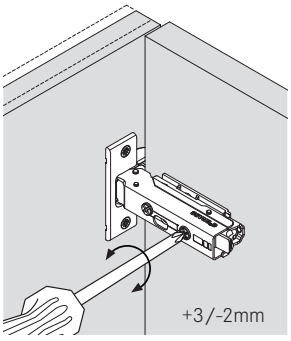
For depth adjustment, select base plates have worm screw adjustment access through the hinge arm.

Use a #2 POZI drive screwdriver for hinge adjustments.

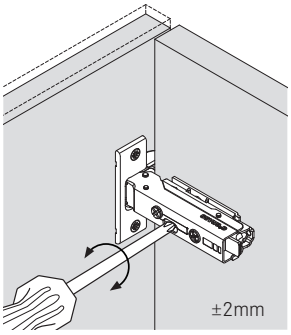
Attach base plates using all available screw holes.



Side adjustment



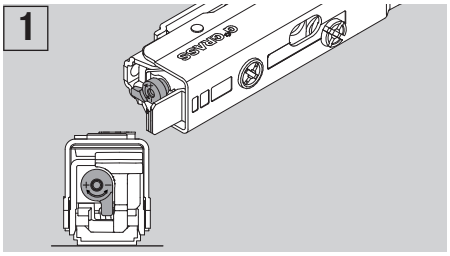
Depth adjustment
via worm screw



Height adjustment
via base plate

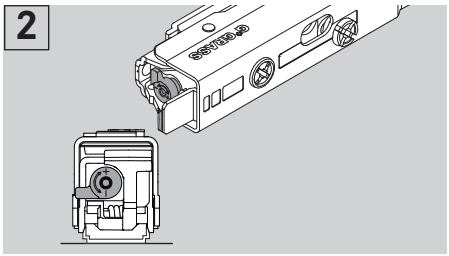
Tool-free Soft-close Adjustment

Soft-closing performance can be regulated for any door size and weight with the Tiomos adjustable integrated Soft-close.
Depending upon the requirement, the Soft-close settings can be adjusted easily and without tools. With 2 hinges there are 6 Soft-close settings.



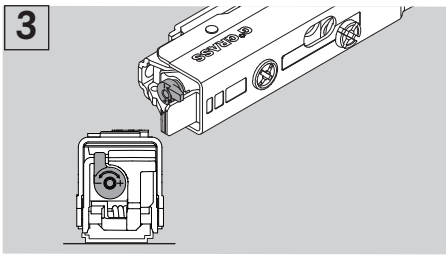
Light setting
Adjustment lever points toward the cabinet wall

Appropriate for:
- Small, light doors



Medium setting (factory setting)
Adjustment lever is parallel to the cabinet wall.
This setting covers 80% of door applications.

Appropriate for:
- Standard doors

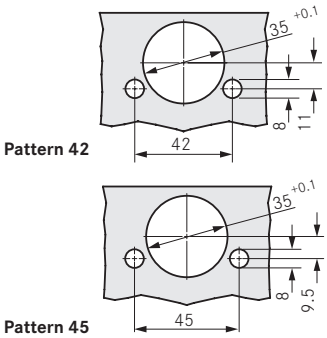


Strong setting
Adjustment lever points toward the cabinet interior

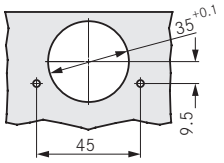
Appropriate for:
- Large, heavy doors

Tiomos Drilling Patterns

Dowelled



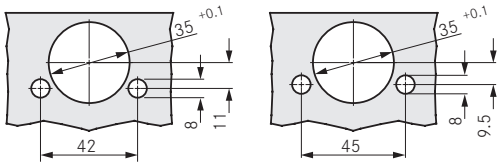
Screw-on



Tiomos Impresso Drilling Patterns

Impresso 42/45 hinges accommodate cup drilling patterns of both 42mm and 45mm.

Pattern 42 and 45

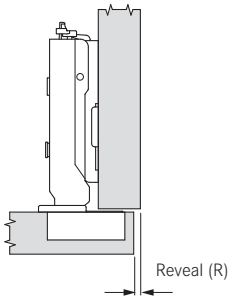


Reveal

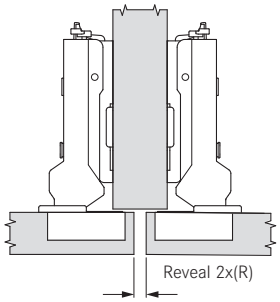
The reveal (R) is the distance required between two doors or between the door and side wall of the cabinet to allow sufficient space for opening the door. The required reveal width (R) depends on the thickness of the door.

Most cabinet makers prefer a reveal (R) of between 3mm and 6mm.

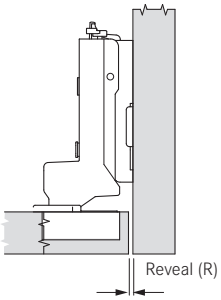
Full Overlay Door



Half Overlay Door



Inset Door



Reveal for Full Overlay, Overlay, and Half Overlay Doors

The table shows the reveal necessary between two doors or between door and side wall to allow enough space for opening the door.

Example:
For a door thickness of 19mm and a drilling distance of 6mm, a reveal of 0.9mm is needed.

Door thickness (DT) \ Drilling Distance (DD)	3	4	5	6	7
24	2.4	2.1	2.1	2.1	2.0
21	1.6	1.6	1.6	1.5	1.5
21	1.4	1.3	1.3	1.3	1.3
20	1.1	1.1	1.1	1.5	1.1
19	0.9	0.9	0.9	0.9	0.9
18	0.7	0.7	0.7	0.7	0.7
17	0.6	0.6	0.6	0.6	0.6
16	0.6	0.6	0.6	0.6	0.6
	Reveal min. (R)				

Reveal for Inset Door

The table shows the minimum reveal for an inset door, depending on the drilling distance and base plate height.

Example: A drilling distance of 6mm results from using a base plate with height 03 in a reveal of 1mm.

Minimum Reveal (R) \ Drilling Distance (DD)	3	4	5	6	7
0		0		2	3
.5					3.5
1	0		2	3	
1.5				3.5	
2		2	3		
3	2	3			
4	3				
	Base Plate Height (BPH)				

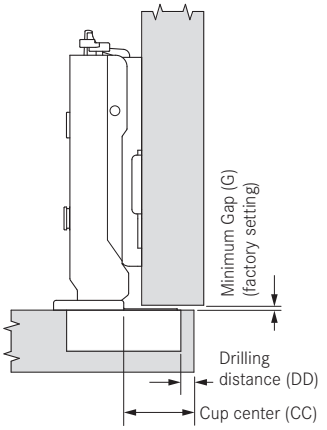
Note:
Reveal dimensions were determined with a door edge radius of 1mm. Hinge dimensions and calculation of gap with factory setting.

IMPORTANT

To determine the correct application Grass strongly recommends a trial mounting for all hinges and base plates.

Minimum Gap

The Minimum Gap (G) is the gap between the closed door and the front of the cabinet.



Drilling Distance

Drilling Distance (DD)		Cup Center (CC)	
1/8"	3	13/16"	20.5
5/32"	4	27/32"	21.5
3/16"	5	7/8"	22.5
1/4"	6	15/16"	23.5
9/32"	7	31/32"	24.5
5/16"	8	1"	25.5

The Drilling Distance (DD) is the distance between the edge of the door and the edge of the cup hole.

The Cup Center (CC) is the distance of the cup drilling distance plus 1/2 of the cup diameter.

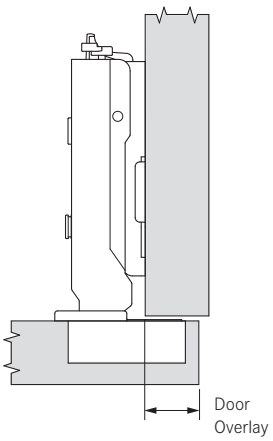
Example:
For a door thickness (DT) of 17mm and a drilling distance (DD) of 6mm a minimum gap of 1mm is needed.

Door Thickness (DT) \ Drilling Distance (DD)	3	4	5	6	7
24	1.0	1.0	1.0	1.2	2.1
22	1.0	1.0	1.0	1.0	1.5
21	1.0	1.0	1.0	1.0	1.2
20	1.0	1.0	1.0	1.0	1.0
19	1.0	1.0	1.0	1.0	1.0
18	1.0	1.0	1.0	1.0	1.0
17	1.0	1.0	1.0	1.0	1.0
16	1.0	1.0	1.0	1.0	1.0

Minimum Gap (G)

Door Overlay

The door overlay is the part of the cabinet side wall or face frame that is covered by the door on the hinge side.



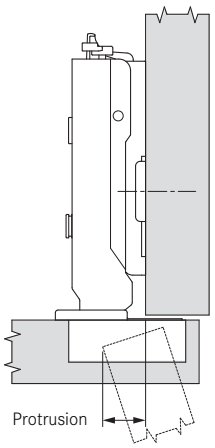
Example:
For a hinge with a cranking of 03, a base plate height (BPH) of 2mm, and a drilling distance (DD) of 4mm, the door overlay is 14mm.

Door Overlay \ Drilling Distance (DD)	3	4	5	6	7
19					0
18				0	
17			0		2
16.5					
16		0		2	3
1.5					3.5
15	0		2	3	
14.5				3.5	
14		2	3		
13.5			3.5		
13	2	3			
12.5		3.5			
12	3				
11.5	3.5				

Base Plate Height (BPH)

Door Edge Protrusion

The door edge protrusion is the amount by which the edge of the open door protrudes into the opening and varies depending on the type of hinge and method of fixing. It is stated on the respective catalog page and refers to the stated base plate for the factory setting. It can be changed by changing the height of the base plate and adjusting the lateral adjustment.

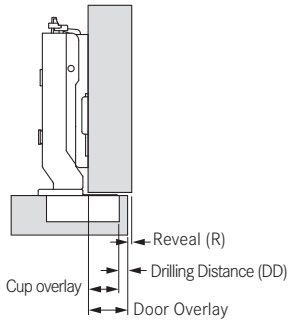


Door Positions

Achieve overlay with hinge cranking

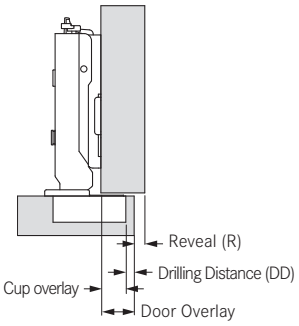
Full Overlay (Cranking 00)

The cup overlay (factory setting) plus drilling distance determines the door overlay. Dimensions can be found in a table on the respective page of the catalog.



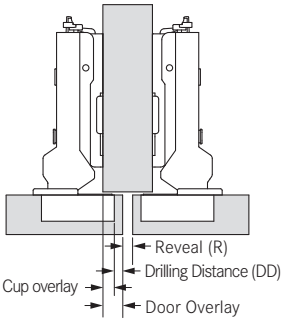
Overlay (Cranking 03)

The cup overlay (factory setting) plus drilling distance determines the door overlay. Dimensions can be found in a table on the respective page of the catalog.



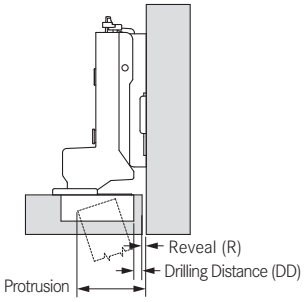
Half Overlay (Cranking 9.5)

The cup overlay (factory setting) plus drilling distance determines the door overlay. Dimensions can be found in a table on the respective page of the catalog.



Inset (Cranking 19)

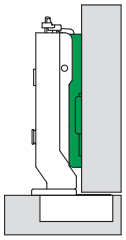
There is no door overlay. The reveal between the side of the cabinet and the door depends on the base plate height (BPH) and the drilling distance (DD). Dimensions can be found in a table on the respective page of the catalog.



Achieve overlay with base plate

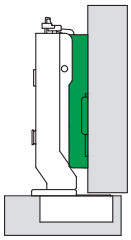
Full Overlay

Using a hinge with a cranking of 00 and a base plate height (BPH) 00



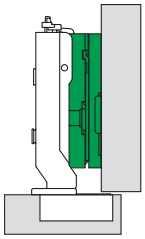
Overlay

Using a hinge with a cranking of 00 and a base plate height (BPH) 03



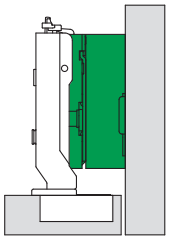
Half Overlay

Using a hinge with a cranking of 00 and a base plate height (BPH) 9.5



Inset

Using a hinge with a cranking of 00 and a base plate height (BPH) 21



RFI 77 ATTACHMENT

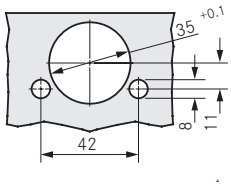
Insertion instructions

Tiomos Impresso

Tiomos Impresso



The Tiomos Impresso is a high quality, performance hinge with superior strength. For the best results for cup insertion into a door, please follow the guide shown below.



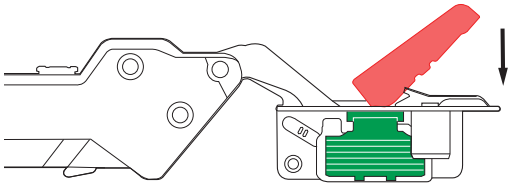
IMPORTANT

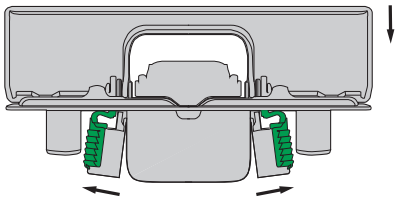
Cup bore hole diameter must be within 35mm - 35.1mm range.

Instructions for Impresso Insertion

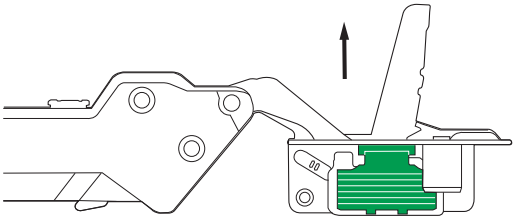
Begin with hinge in the open position and not mounted on door.

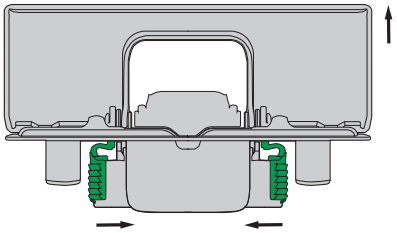
If the hinge cup flap is partially closed due to shipping and handling, lift flap to upright position before inserting into door as illustrated.



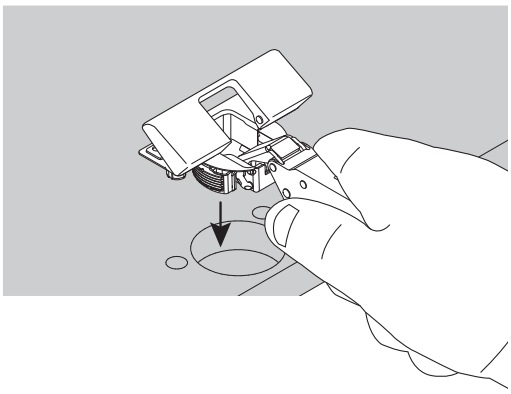


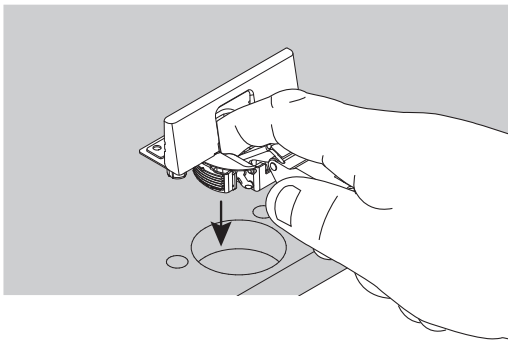
Ensure that expanding green brackets are in loose/neutral position before inserting into door.





For fast and easy insertion, use index finger to push cup into door.





Testing information

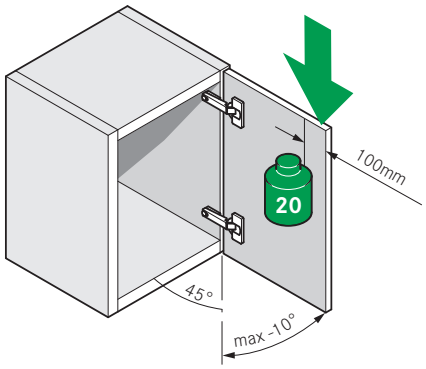
Tiomos

Functional Test

Static Load - vertical

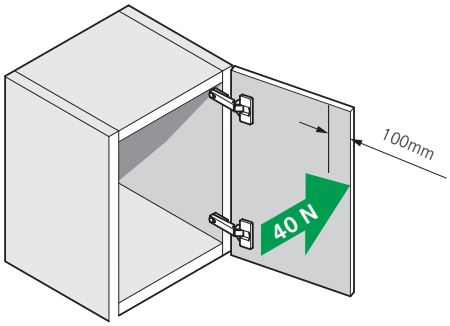
Additional load: 44 lb (20 kg)

Opening angle: max -10°



Static Load - horizontal

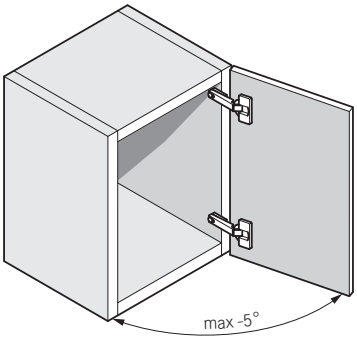
Force: 40 N



Endurance Test

Opening angle: max -5°

Open and close movements: 100,000

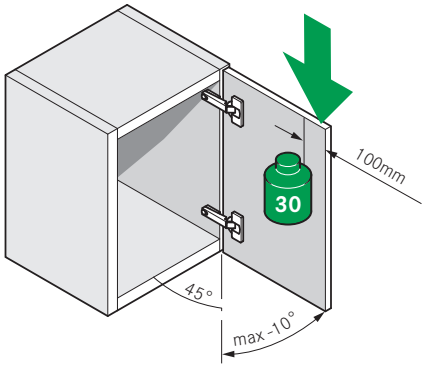


Overload Testing

Vertical

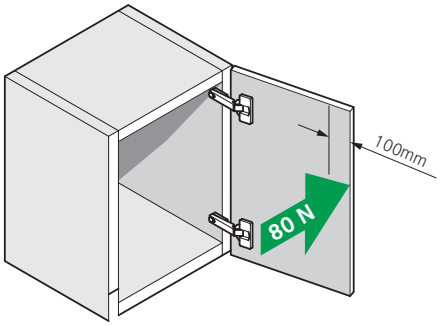
Additional load: 66 lb (30 kg)

Opening angle: max -10°



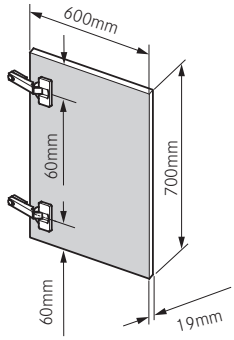
Horizontal

Force: 80 N



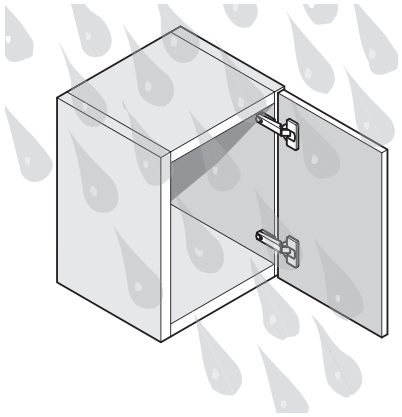
Test Door

Weight approximately 11.5 lb (5.2 kg)



Salt Spray and Humidity Test

Based on DIN ISO 9227 and DIN 6270-2



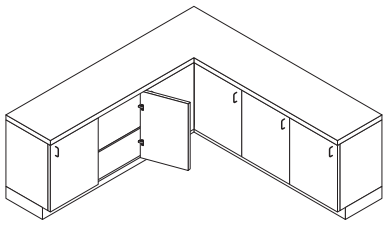
RFI 77 ATTACHMENT

Tiomos 110

110° hinge for standard doors

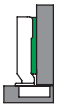
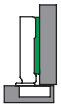
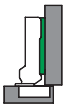
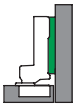


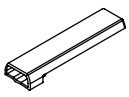
- 3-dimensional adjustment with suitable base plate
- Accommodates overlays up to 24mm (15/16")
- Optimal reveal up to 24mm door thickness
- Soft-close or Self-close hinges available
- For face frame or frameless cabinets
- Convenient depth adjustment with worm screw



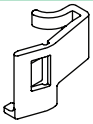




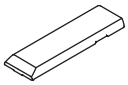
Tiomos 110 Opening Angle 110°		Impresso				Screw-On	Dowelled	
Full Overlay	**Cranking 00**	**Pattern**	**Type**	**Item No.**	**PU**	**Pattern**	**Type**	**Item No.**	**Item No.**	**PU**
	Hinge cup: steel, nickel-plated Hinge arm: steel, nickel-plated	42/45	Soft-close	**F017**139**414**228	150	45	Soft-close	**F028**138**519**228	**F028**138**523**228	150
		42/45	Self-close	**F034**139**385**228	150	45	Self-close	**F045**138**457**228	**F045**138**461**228	150
						42	Soft-close	-	**F028**138**341**228	150
						42	Self-close	-	**F045**138**279**228	150
Overlay	**Cranking 03**	**Pattern**	**Type**	**Item No.**	**PU**	**Pattern**	**Type**	**Item No.**	**Item No.**	**PU**
	Hinge cup: steel, nickel-plated Hinge arm: steel, nickel-plated	42/45	Soft-close	**F017**139**415**228	150	45	Soft-close	**F028**138**520**228	**F028**138**524**228	150
		42/45	Self-close	**F034**139**386**228	150	45	Self-close	**F045**138**458**228	**F045**138**462**228	150
		42/45	Free-swing	**F035**139**443**228	150	42	Soft-close	-	**F028**138**342**228	150
						42	Self-close	-	**F045**138**280**228	150
Half Overlay	**Cranking 9.5**	**Pattern**	**Type**	**Item No.**	**PU**	**Pattern**	**Type**	**Item No.**	**Item No.**	**PU**
	Hinge cup: steel, nickel-plated Hinge arm: zinc, nickel-plated	42/45	Soft-close	**F017**139**416**228	150	45	Soft-close	**F028**138**521**228	**F028**138**525**228	150
		42/45	Self-close	**F034**139**387**228	150	45	Self-close	**F045**138**459**228	**F045**138**463**228	150
		42/45	Free-swing	**F035**139**444**228	150	42	Soft-close	-	**F028**138**343**228	150
						42	Self-close	-	**F045**138**281**228	150
Inset	**Cranking 19**	**Pattern**	**Type**	**Item No.**	**PU**	**Pattern**	**Type**	**Item No.**	**Item No.**	**PU**
	Hinge cup: steel, nickel-plated Hinge arm: zinc, nickel-plated	42/45	Soft-close	**F017**139**417**228	150	45	Soft-close	**F028**138**522**228	**F028**138**526**228	150
		42/45	Self-close	**F034**139**388**217	50	45	Self-close	**F045**138**460**228	**F045**138**464**228	150
						42	Soft-close	-	**F028**138**344**217	50
						42	Self-close	-	**F045**138**282**228	150

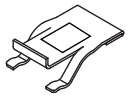
Cover Cap with Clip Protector	Item No.	PU
 Plastic, black	**F072**140**504**247	1000

For installation see page 57

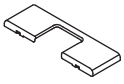
Hinge Clip Protector	Item No.	PU
 Plastic, grey	**F072**135**807**540	500

For installation see page 57

Cover Caps	Item No.	PU
 Steel, nickel-plated	**F072**135**500**247	1000

Opening Angle Reduction Clip to 85°	Item No.	PU
 Steel, nickel	**F072**135**751**517	50

For installation see page 56

Hinge Cup Cover Cap	Item No.	PU
 Steel, nickel-plated	**F072**135**503**228	150

Wood Screw, Nickel-plated	Item No.	PU
 #6 x 5/8" FHP, NI	81001-43	500

PU - Packaging unit

Dimensions in millimeters, fractional inch equivalents as noted.

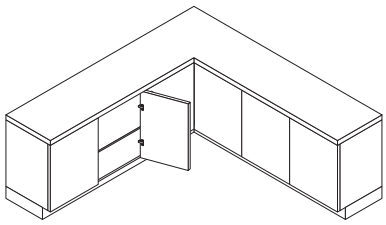
RFI 77 ATTACHMENT

Tiomos 110 Tipmatic Plus

110° hinge for handle free doors

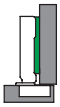


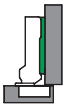
- Integrated spring in hinge arm assists Tipmatic Pin for handle-free door opening
- Extended opening angle
- Works with Tipmatic Pin system (page 54-55)
- 3-dimensional adjustment with suitable base plate
- Compatible with all Tiomos base plates

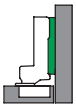


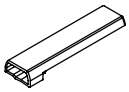


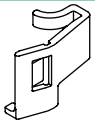
Tiomos 110 Tipmatic Plus Opening Angle 110° — Screw-On

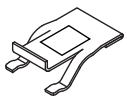
Overlay	Cranking 03	Pattern	Type	Item No.	PU
	Hinge cup: steel, nickel-plated; Hinge arm: steel, nickel-plated	45	TT Plus	**F046**140**360**213	25

Half Overlay	Cranking 9.5	Pattern	Type	Item No.	PU
	Hinge cup: steel, nickel-plated; Hinge arm: zinc, nickel-plated	45	TT Plus	**F046**140**365**213	25

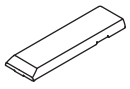
Inset	Cranking 19	Pattern	Type	Item No.	PU
	Hinge cup: steel, nickel-plated; Hinge arm: zinc, nickel-plated	45	TT Plus	**F046**140**366**213	25

Cover Cap with Clip Protector		Item No.	PU
	Plastic, black	**F072**140**504**247	1000
		For installation see page 57	

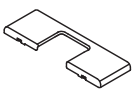
Hinge Clip Protector		Item No.	PU
	Plastic, grey	**F072**135**807**540	500
		For installation see page 57	

Opening Angle Reduction Clip to 85°		Item No.	PU
	Steel, nickel	**F072**135**751**517	50
		For installation see page 56	

Tipmatic Pin	Item No.	PU
	**F069**135**396**513	25

Cover Caps		Item No.	PU
	Steel, nickel-plated	**F072**135**500**247	1000

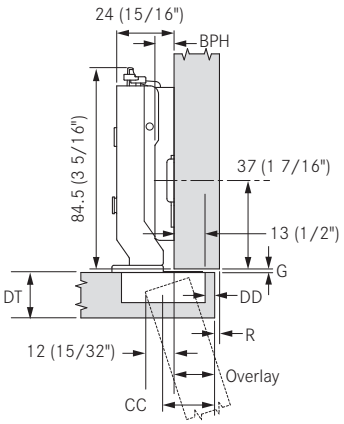
Important Note:
Tiomos Tipmatic Plus works with our recommended Tipmatic Pin. Grass does not accept any liability if a different system other than the recommended system is used. Before the Tipmatic Pin is inserted for gluing, the surface must be thoroughly cleaned and free from grease. Complete Tipmatic Pin System is shown on page 52-53.

Hinge Cup Cover Cap		Item No.	PU
	Steel, nickel-plated	**F072**135**503**228	150

Wood Screw, Nickel-plated		Item No.	PU
	#6 x 5/8" FHP, NI	81001-43	500

PU - Packaging unit

Full Overlay

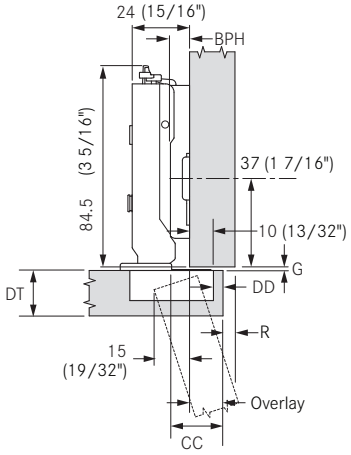


Drawings show Tiomos with a base plate, **(BPH) 02**.

Drilling Distance (DD)

Door Overlay	3	4	5	6	7	
22.0					0	
21.0				0		
20.0			0		2	
19.0		0		2	3	
18.5					3.5	
18.0	0		2	3		
17.5				3.5		
17.0		2	3			
16.5			3.5			
16.0	2	3				
15.5		3.5				
15.0	3					
14.5	3.5					
		Base Plate Height (BPH)				

Overlay



Drawings show Tiomos with a base plate, **(BPH) 02**.

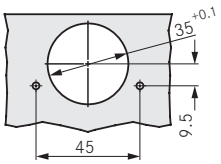
Drilling Distance (DD)

Door Overlay	3	4	5	6	7	
19.0					0	
18.0				0		
17.0			0		2	
16.5						
16.0		0		2	3	
15.5					3.5	
15.0	0		2	3		
14.5				3.5		
14.0		2	3			
13.5			3.5			
13.0	2	3				
12.5		3.5				
12.0	3					
11.5	3.5	Base Plate Height (BPH)				

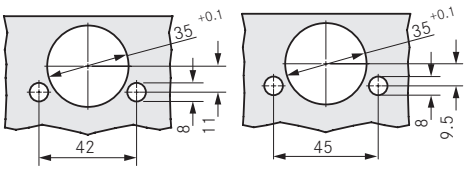
Legend

BPH = Base Plate Height
CC = Center Cup
DD = Drilling Distance
DT = Door Thickness
G = Gap
R = Reveal
X = Base Plate Setback

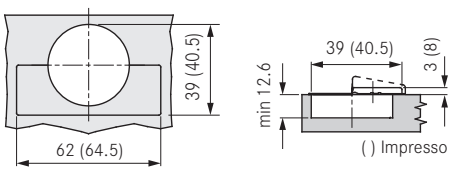
Screw-on



Impresso and Dowelled

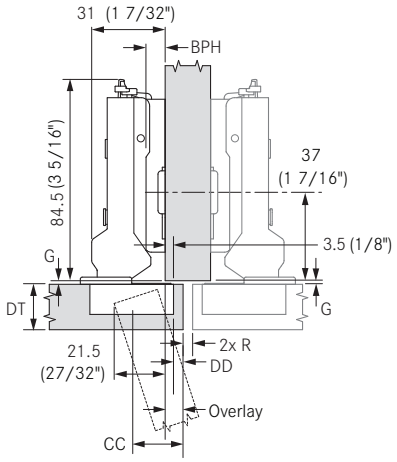


Cup Dimensions



Dimensions in millimeters, fractional inch equivalents as noted.

Half Overlay

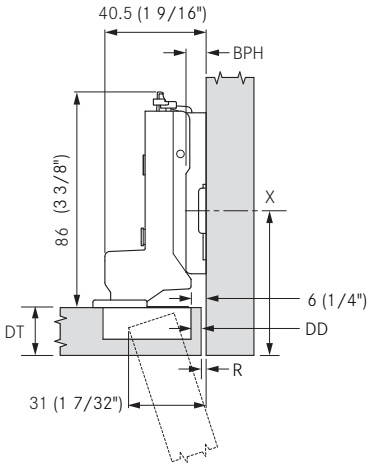


Drawings show Tiomos with a base plate, **(BPH) 02**.

Drilling Distance (DD)

Door Overlay	3	4	5	6	7
12.5					0
11.5				0	
10.5			0		2
10					
9.5		0		2	3
9.0					3.5
8.5	0		2	3	
8.0				3.5	
7.5		2	3		
7.0			3.5		
6.5	2	3			
6.0		3.5			
5.5	3				
5.0	3.5	Base Plate Height (BPH)			

Inset



Drawings show Tiomos with a base plate, **(BPH) 02**.

X= 38.5 + DT

Drilling Distance (DD)

Reveal (R)	*3	4	5	6	7
0.0		0		2	3
0.5					3.5
1.0	0		2	3.5	
1.5				3.5	
2.0		2	3		
3.0	2	3			
4.0	3				
	Base Plate Height (BPH)				

Note: A door stop is needed to prevent overclose.

Minimum Gaps

Drilling Distance (DD)

Door Thickness (DT)	3	4	5	6	7
24	1.0	1.0	1.0	1.2*	2.1*
22	1.0	1.0	1.0	1.0	1.5*
21	1.0	1.0	1.0	1.0	1.2*
20	1.0	1.0	1.0	1.0	1.0
19	1.0	1.0	1.0	1.0	1.0
18	1.0	1.0	1.0	1.0	1.0
17	1.0	1.0	1.0	1.0	1.0
16	1.0	1.0	1.0	1.0	1.0
	Minimum Gap (G)				

The minimum gap is the gap between the closed door and the front of the cabinet.
*Only achievable with 85° angle reduction clip.

Reveal

Drilling Distance (DD)

Door Thickness (DT)	3	4	5	6	7
24	2.4	2.1	2.1	2.1	2.0
22	1.6	1.6	1.6	1.5	1.5
21	1.4	1.3	1.3	1.3	1.3
20	1.1	1.1	1.1	1.1	1.1
19	0.9	0.9	0.9	0.9	0.9
18	0.7	0.7	0.7	0.7	0.7
17	0.6	0.6	0.6	0.6	0.6
16	0.6	0.6	0.6	0.6	0.6
	Reveal (R)				

Note: Reveal dimensions were determined with an edge radius (of the door) of 1mm. Hinge dimensions and reveal calculation based on factory setting.

IMPORTANT

To determine the correct application Grass strongly recommends a trial mounting for all hinges and base plates.

Reveal with 85° Angle Reduction Clip

Drilling Distance (DD)

Door Thickness (DT)	*3	4	5	6	7
36.0	11.1	10.3	9.7	9.1	8.5
30.0	5.4	4.8	4.4	4.3	4.2
28.0	3.7	3.6	3.5	3.4	3.3
26.0	2.9	2.8	2.8	2.7	2.6
24.0	2.2	2.1	2.1	2.1	2.0
22.0	1.6	1.6	1.6	1.5	1.5
21.0	1.4	1.3	1.3	1.3	1.3
20.0	1.1	1.1	1.1	1.1	1.1
19.0	0.9	0.9	0.9	0.9	0.9
18.0	0.7	0.7	0.7	0.7	0.7
16.0	0.6	0.6	0.6	0.6	0.6
	Reveal (R)				

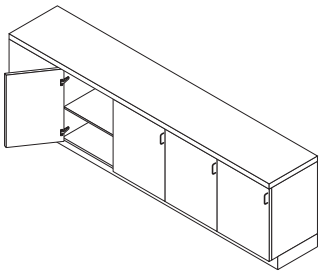
RFI 77 ATTACHMENT

Tiomos 120

120° hinge for standard doors

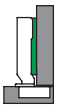
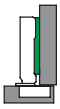
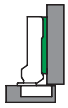


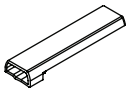
- 3-dimensional adjustment with suitable base plate
- Accommodates overlays up to 24mm (15/16")
- Optimal reveal up to 24mm door thickness
- Soft-close or Self-close hinges available
- For face frame or frameless cabinets
- Convenient depth adjustment with worm screw

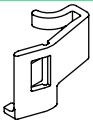


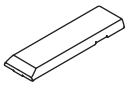


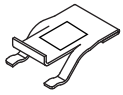


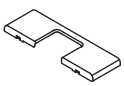
Tiomos 120 Opening Angle 120°		Impresso				Screw-On	Dowelled	
Full Overlay	**Cranking 00**	**Pattern**	**Type**	**Item No.**	**PU**	**Pattern**	**Type**	**Item No.**	**Item No.**	**PU**
	Hinge cup: steel, nickel-plated Hinge arm: steel, nickel-plated	42/45	Soft-close	F017139**428**228	150	45	Soft-close	F028138**547**228	F028138**551**228	150
		42/45	Self-close	F034139**399**228	150	45	Self-close	F045138**485**228	F045138**489**228	150
						42	Soft-close	-	F028138**369**228	150
						42	Self-close	-	F045138**307**228	150
Overlay	**Cranking 03**	**Pattern**	**Type**	**Item No.**	**PU**	**Pattern**	**Type**	**Item No.**	**Item No.**	**PU**
	Hinge cup: steel, nickel-plated Hinge arm: steel, nickel-plated	42/45	Soft-close	F017139**429**228	150	45	Soft-close	F028138**548**228	F028138**552**228	150
		42/45	Self-close	F034139**400**228	150	45	Self-close	F045138**486**228	F045138**490**228	150
						42	Soft-close	-	F028138**370**228	150
						42	Self-close	-	F045138**308**228	150
Half Overlay	**Cranking 9.5**	**Pattern**	**Type**	**Item No.**	**PU**	**Pattern**	**Type**	**Item No.**	**Item No.**	**PU**
	Hinge cup: steel, nickel-plated Hinge arm: zinc, nickel-plated					45	Soft-close	F028138**549**228	F028138**553**228	150
						45	Self-close	F045138**487**228	F045138**491**228	150
						42	Soft-close	-	F028138**371**228	150
						42	Self-close	-	F045138**309**228	150

Cover Cap with Clip Protector	Item No.	PU
 Plastic, black	F072140**504**247	1000
	For installation see page 57	

Hinge Clip Protector	Item No.	PU
 Plastic, grey	F072135**807**540	500
	For installation see page 57	

Cover Caps	Item No.	PU
 Steel, nickel-plated	F072135**500**247	1000

Opening Angle Reduction Clip to 85°	Item No.	PU
 Steel, nickel	F072135**751**517	50
	For installation see page 56	

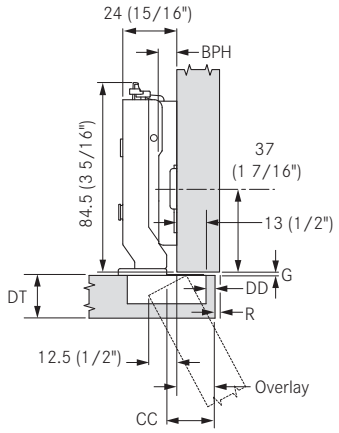
Hinge Cup Cover Cap	Item No.	PU
 Steel, nickel-plated	F072135**503**228	150

Wood Screw, Nickel-plated	Item No.	PU
 #6 x 5/8" FHP, NI	81001-43	500

PU - Packaging unit

Dimensions in millimeters, fractional inch equivalents as noted.

Full Overlay

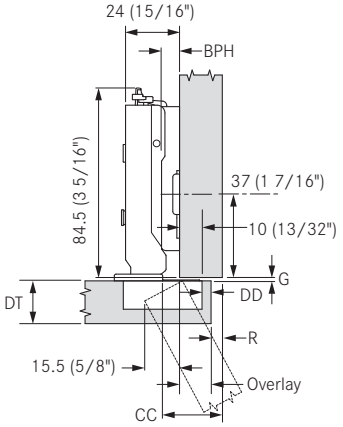


Drawings show Tiomos with a base plate, **(BPH) 02**.

Drilling Distance (DD)

Door Overlay	3	4	5	6	7
22.0					0
21.0				0	
20.0			0		2
19.0		0		2	3
18.5					
18.0	0		2	3	
17.5				3.5	
17.0		2	3		
16.5			3.5		
16.0	2	3			
15.5		3.5			
15.0	3				
14.5	3.5				
Base Plate Height (BPH)					

Overlay

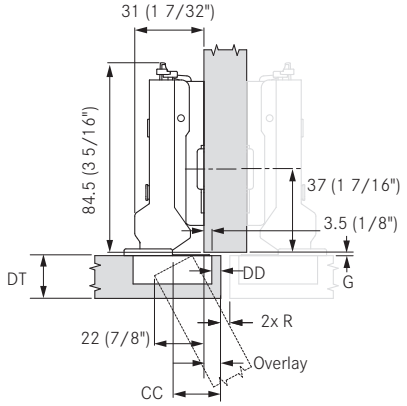


Drawings show Tiomos with a base plate, **(BPH) 02**.

Drilling Distance (DD)

Door Overlay	3	4	5	6	7
19.0					0
18.0				0	
17.0			0		2
16.5					
16.0		0		2	3
15.5					3.5
15.0	0		2	3	
14.5				3.5	
14.0		2	3		
13.5			3.5		
13.0	2	3			
12.5		3.5			
12.0	3				
11.5	3.5	Base Plate Height (BPH)			

Half Overlay



Drawings show Tiomos with a base plate, **(BPH) 02**.

Drilling Distance (DD)

Door Overlay	3	4	5	6	7
12.5					0
11.5				0	
10.5			0		2
10.0					
9.5		0		2	3
9.0					3.5
8.5	0		2	3	
8.0				3.5	
7.5		2	3		
7.0			3.5		
6.5	2	3			
6.0		3.5			
5.5	3				
5.0	3.5	Base Plate Height (BPH)			

Minimum Gaps

Drilling Distance (DD)

Door Thickness (DT)	3	4	5	6	7
24	1.2	2.1	3.0	3.9	4.7
22	1.0	1.1	2.0	2.9	3.8
21	1.0	1.0	1.6	2.4	3.3
20	1.0	1.0	1.1	2.0	2.9
19	1.0	1.0	1.0	1.5	2.4
18	1.0	1.0	1.0	1.0	1.9
17	1.0	1.0	1.0	1.0	1.5
16	1.0	1.0	1.0	1.0	1.0
Minimum Gap (G)					

The minimum gap is the gap between the closed door and the front of the cabinet.

Reveal

Drilling Distance (DD)

Door Thickness (DT)	3	4	5	6	7
24	6.4	5.4	4.4	3.4	2.4
22	3.0	2.0	1.5	1.5	1.5
21	1.4	1.3	1.3	1.3	1.3
20	1.1	1.1	1.1	1.1	1.1
19	0.9	0.9	0.9	0.9	0.9
18	0.7	0.7	0.7	0.7	0.7
17	0.6	0.6	0.6	0.6	0.6
16	0.6	0.6	0.6	0.6	0.6
Reveal (R)					

Note: Reveal dimensions were determined with an edge radius (of the door) of 1mm. Hinge dimensions and reveal calculation based on factory setting.

IMPORTANT

To determine the correct application Grass strongly recommends a trial mounting for all hinges and base plates.

Reveal with 85° Angle Reduction Clip

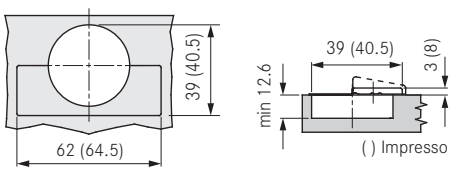
Drilling Distance (DD)

Door Thickness (DT)	3	4	5	6	7
36.0	11.1	10.3	9.7	9.1	8.5
30.0	5.4	4.8	4.4	4.3	4.2
28.0	3.7	3.6	3.5	3.4	3.3
26.0	2.9	2.8	2.8	2.7	2.6
24.0	2.2	2.1	2.1	2.1	2.0
22.0	1.6	1.6	1.6	1.5	1.5
21.0	1.4	1.3	1.3	1.3	1.3
20.0	1.1	1.1	1.1	1.1	1.1
19.0	0.9	0.9	0.9	0.9	0.9
18.0	0.7	0.7	0.7	0.7	0.7
16.0	0.6	0.6	0.6	0.6	0.6
Reveal (R)					

Legend

BPH = Base Plate Height
CC = Center Cup
DD = Drilling Distance
DT = Door Thickness
G = Gap
R = Reveal
X = Base Plate Setback

Cup Dimensions



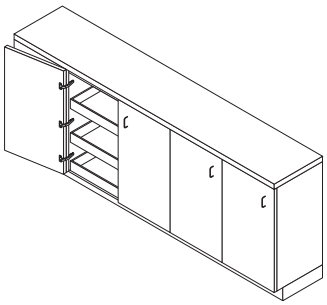
RFI 77 ATTACHMENT

Tiomos 155

155° wide angle hinge



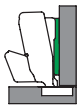
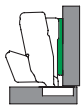
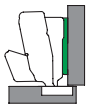
- 3-dimensional adjustment with suitable base plate
- Accommodates overlays up to 23.4mm (15/16")
- Soft-close or Self-close hinges available
- For face frame or frameless cabinets
- Convenient depth adjustment with worm screw
- Zero protrusion when door is opened 90°
- 10mm cup depth
- For door thicknesses up to 32mm (1 1/4")
- Minimal reveal

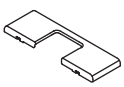


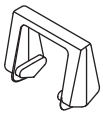






Tiomos 155 Opening Angle 155°		Impresso				Screw-On	Dowelled	
Full Overlay	**Cranking 00**	**Pattern**	**Type**	**Item No.**	**PU**	**Pattern**	**Type**	**Item No.**	**Item No.**	**PU**
	Hinge cup: steel, nickel-plated Hinge arm: steel, nickel-plated	42/45	Soft-close	**F017**139**435**217	50	45	Soft-close	**F028**138**561**217	**F028**138**564**217	50
		42/45	Self-close	**F034**139**406**217	50	45	Self-close	**F045**138**499**217	**F045**138**502**217	50
						42	Self-close	-	**F045**138**320**217	50
Overlay	**Cranking 03**	**Pattern**	**Type**	**Item No.**	**PU**	**Pattern**	**Type**	**Item No.**	**Item No.**	**PU**
	Hinge cup: steel, nickel-plated Hinge arm: steel, nickel-plated	42/45	Soft-close	**F017**139**436**217	50	45	Soft-close	**F028**138**562**217	**F028**138**565**217	50
		42/45	Self-close	**F034**139**407**217	50	45	Self-close	**F045**138**500**217	**F045**138**503**217	50
						42	Soft-close	-	**F028**138**383**217	50
						42	Self-close	-	**F045**138**321**217	50
Half Overlay	**Cranking 9.5**	**Pattern**	**Type**	**Item No.**	**PU**	**Pattern**	**Type**	**Item No.**	**Item No.**	**PU**
	Hinge cup: steel, nickel-plated Hinge arm: zinc, nickel-plated					45	Soft-close	**F028**138**563**217	**F028**138**566**217	50
						42	Self-close	-	**F045**138**322**217	50

Hinge Cup Cover Cap		Item No.	PU
	Steel, nickel-plated	**F072**135**503**228	150

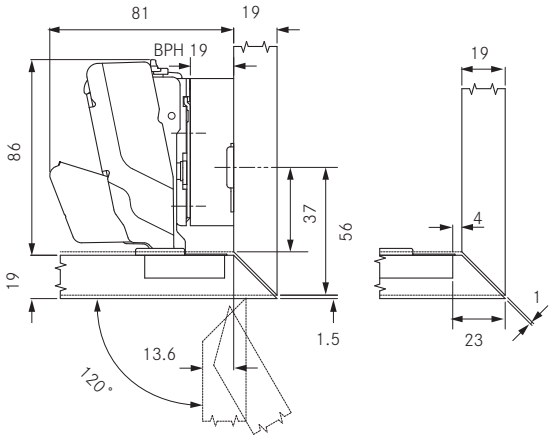
Angle Reduction Clip to 120°		Item No.	PU
	Plastic, black	**F072**135**753**517	50

For installation see page 56

PU - Packaging unit

Dimensions in millimeters, fractional inch equivalents as noted.

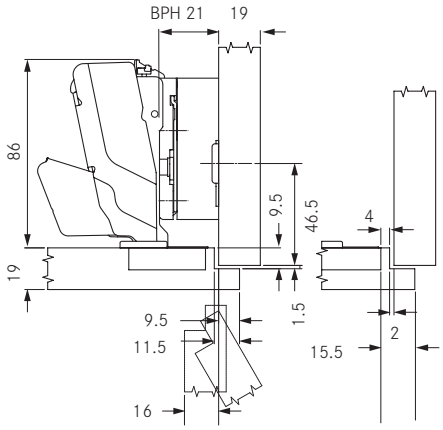
Mitered Corner Application



Use Full overlay hinge (00 Cranking) with 19mm base plate.

Mitered door application is now possible without using the 120° opening angle reduction clip.

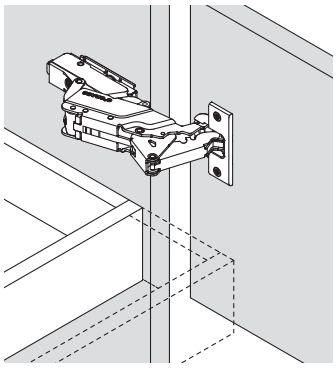
3/8" Lip Door Application



Use Full overlay hinge (00 Cranking) with 21mm base plate.

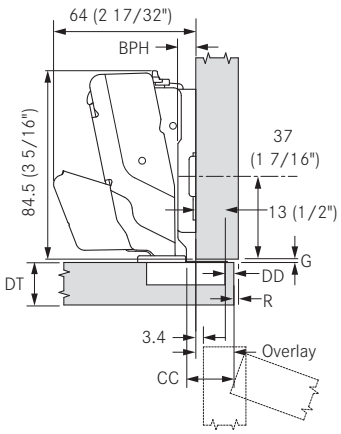
Use 120° opening angle reduction clip. Prevents doors from bumping with the cabinet side in inset applications and mitered corner applications.

Zero Protrusion at 90°



At 0 cranking, and with all mounting plate thicknesses, the door protrudes inwards at 90°. With cranking size 3 and mounting plate height 3mm, the door will be flush with the cabinet.

Full Overlay

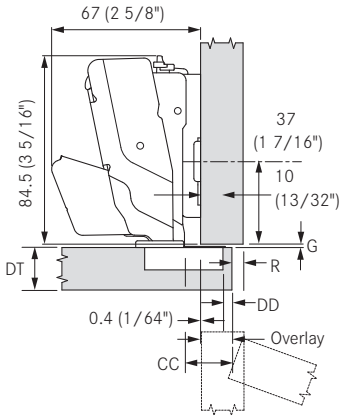


Drawings show Tiomos with a base plate, **(BPH) 02**.

Drilling Distance (DD)

Door Overlay	3	4	5	6	7	8
23.0						0
22.0					0	
21.0				0		2
20.0			0		2	3
19.0		0		2	3	
18.5					3.5	
18.0	0		2	3		
17.5				3.5		
17.0		2	3			
16.5			3.5			
16.0	2	3				
15.5		3.5				
15.0	3					
14.5	3.5					
	Base Plate Height (BPH)					

Overlay



Drawings show Tiomos with a base plate, **(BPH) 02**.

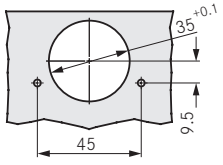
Drilling Distance (DD)

Door Overlay	3	4	5	6	7	8
20.0						0
19.0					0	
18.0				0		2
17.0			0		2	3
16.5						3.5
16.0		0		2	3	
15.5					3.5	
15.0	0		2	3		
14.5				3.5		
14.0		2	3			
13.5			3.5			
13.0	2	3				
12.5		3.5				
12.0	3					
11.5	3.5					
	Base Plate Height (BPH)					

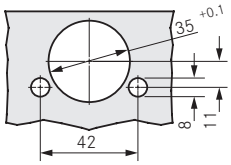
Legend

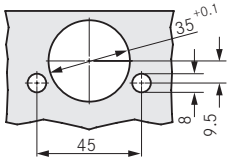
BPH = Base Plate Height
CC = Center Cup
DD = Drilling Distance
DT = Door Thickness
G = Gap
R = Reveal
X = Base Plate Setback

Screw-on

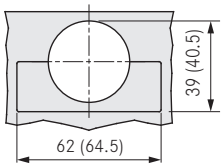


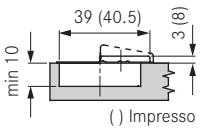
Impresso and Dowelled





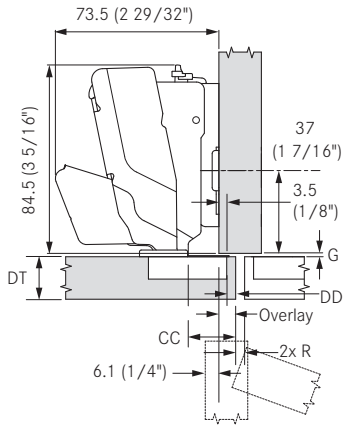
Cup Dimensions





Dimensions in millimeters, fractional inch equivalents as noted.

Half Overlay

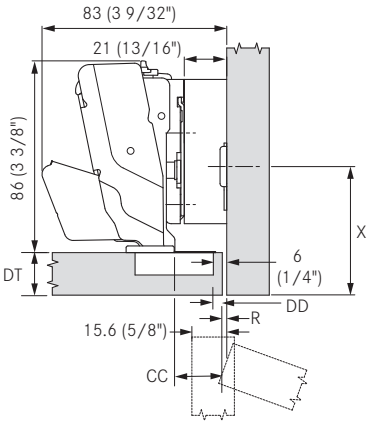


Drawings show Tiomos with a base plate, **(BPH) 02**.

Drilling Distance (DD)

Door Overlay	3	4	5	6	7	8
13.5						0
12.5					0	
11.5				0		2
10.5			0		2	3
10.0						3.5
9.5		0		2	3	
9.0					3.5	
8.5	0		2	3		
8.0				3.5		
7.5		2	3			
7.0			3.5			
6.5	2	3				
6.0		3.5				
5.5	3					
5.0	3.5	Base Plate Height (BPH)				

Inset



Drawings show Tiomos with a cranking 00 hinge & base plate, **(BPH) 21**.
X= 38.5 + DT

Drilling Distance (DD)

Reveal (R)	3	4	5	6
1.0	19		21	
2.0		21		
3.0	21			
	Base Plate Height (BPH)			

Note: A door stop is needed to prevent overclose.

Minimum Gaps

Drilling Distance (DD)

Door Thickness (DT)	3	4	5	6	7	8
32	1.0	1.0				
31	1.0	1.0	1.0			
30	1.0	1.0	1.0			
29	1.0	1.0	1.0	1.0	1.0	1.0
28	1.0	1.0	1.0	1.0	1.0	1.0
26	1.0	1.0	1.0	1.0	1.0	1.0
25	1.0	1.0	1.0	1.0	1.0	1.0
24	1.0	1.0	1.0	1.0	1.0	1.0
22	1.0	1.0	1.0	1.0	1.0	1.0
21	1.0	1.0	1.0	1.0	1.0	1.0
20	1.0	1.0	1.0	1.0	1.0	1.0
18	1.0	1.0	1.0	1.0	1.0	1.0
16	1.0	1.0	1.0	1.0	1.0	1.0
	Minimum Gap (G)					

The minimum gap is the gap between the closed door and the front of the cabinet.

IMPORTANT

To determine the correct application Grass strongly recommends a trial mounting for all hinges and base plates.

Reveal

Drilling Distance (DD)

Door Thickness (DT)	3	4	5	6	7	8
32	0.2*	0.2*				
31	0.2*	0.2*	0.2*	0.2*		
30	0.2*	0.2*	0.2*	0.2*	0.2*	
29	0.2*	0.2*	0.2*	0.2*	0.2*	0.2*
28	0.0	0.0	0.0	0.0	0.0	0.0
26	0.0	0.0	0.0	0.0	0.0	0.0
25	0.0	0.0	0.0	0.0	0.0	0.0
24	0.0	0.0	0.0	0.0	0.0	0.0
22	0.0	0.0	0.0	0.0	0.0	0.0
21	0.0	0.0	0.0	0.0	0.0	0.0
20	0.0	0.0	0.0	0.0	0.0	0.0
18	0.0	0.0	0.0	0.0	0.0	0.0
16	0.0	0.0	0.0	0.0	0.0	0.0
	Reveal (R)					

Note: Reveal dimensions were determined with an edge radius (of the door) of 1mm. Hinge dimensions and reveal calculation based on factory setting.

*Only achievable with 120° angle reduction clip.

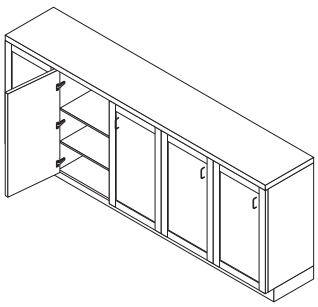
RFI 77 ATTACHMENT

Tiomos 95

95° hinge for thick doors

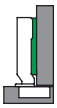
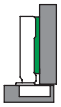
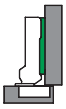
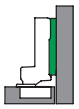


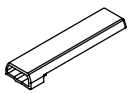
- 3-dimensional adjustment with suitable base plate
- Accommodates overlays up to 24mm (15/16")
- For door thicknesses up to 36mm (1 7/16")
- Soft-close or Self-close hinges available
- For face frame or frameless cabinets
- Convenient depth adjustment with worm screw



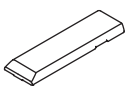


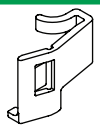


Tiomos 95 Opening Angle 95°		Impresso				Screw-On		Dowelled	
Full Overlay	**Cranking 00**	**Pattern**	**Type**	**Item No.**	**PU**	**Pattern**	**Type**	**Item No.**	**Item No.**	**PU**
	Hinge cup: steel, nickel-plated	42/45	Soft-close	**F017**139**438**217	50	45	Soft-close	**F028**138**567**228	**F028**138**571**228	150
	Hinge arm: steel, nickel-plated	42/45	Self-close	**F034**139**409**228	150	45	Self-close	-	**F045**138**509**228	150
Overlay	**Cranking 03**	**Pattern**	**Type**	**Item No.**	**PU**	**Pattern**	**Type**	**Item No.**	**Item No.**	**PU**
	Hinge cup: steel, nickel-plated	42/45	Soft-close	**F017**139**439**217	50	45	Soft-close	**F028**138**568**228	**F028**138**572**228	150
	Hinge arm: steel, nickel-plated					45	Self-close	**F045**138**506**228	-	150
						42	Self-close	-	**F045**138**328**228	150
Half Overlay	**Cranking 9.5**	**Pattern**	**Type**	**Item No.**	**PU**	**Pattern**	**Type**	**Item No.**	**Item No.**	**PU**
	Hinge cup: steel, nickel-plated	42/45	Soft-close	**F017**139**440**228	150	45	Soft-close	**F028**138**569**228	**F028**138**573**228	150
	Hinge arm: zinc, nickel-plated					45	Self-close	-	**F045**138**511**228	150
Inset	**Cranking 19**	**Pattern**	**Type**	**Item No.**	**PU**	**Pattern**	**Type**	**Item No.**	**Item No.**	**PU**
	Hinge cup: steel, nickel-plated	42/45	Soft-close	**F017**139**441**217	50	45	Soft-close	**F028**138**570**228	**F028**138**574**228	150
	Hinge arm: zinc, nickel-plated	42/45	Self-close	**F034**139**412**228	150	45	Self-close	**F045**138**508**228	-	150

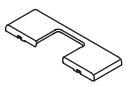
Cover Cap with Clip Protector		Item No.	PU
	Plastic, black	**F072**140**504**247	1000

For installation see page 57

Cover Caps		Item No.	PU
	Steel, nickel-plated	**F072**135**500**247	1000

Hinge Clip Protector		Item No.	PU
	Plastic, grey	**F072**135**807**540	500

For installation see page 57

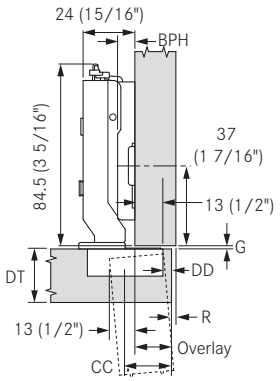
Hinge Cup Cover Cap		Item No.	PU
	Steel, nickel-plated	**F072**135**503**228	150

Wood Screw, Nickel-plated		Item No.	PU
	#6 x 5/8" FHP, NI	81001-43	500

PU - Packaging unit

Dimensions in millimeters, fractional inch equivalents as noted.

Full Overlay

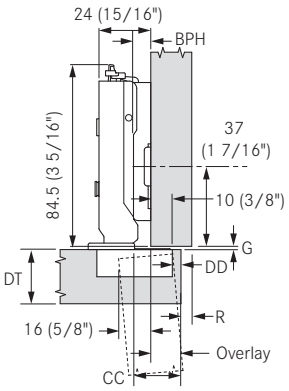


Drawings show Tiomos with a base plate, **(BPH) 02**.

Drilling Distance (DD)

Door Overlay	3	4	5	6	7
22.0					0
21.0				0	
20.0			0		2
19.0		0		2	3
18.5					3.5
18.0	0		2	3	
17.5				3.5	
17.0		2	3		
16.5			3.5		
16.0	2	3			
15.5		3.5			
15.0	3				
14.5	3.5				
		Base Plate Height (BPH)			

Overlay

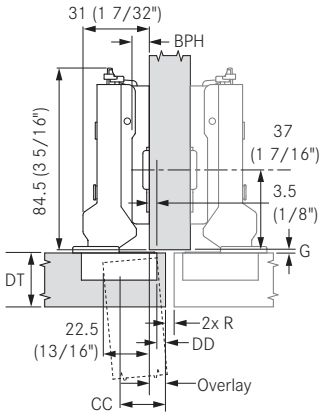


Drawings show Tiomos with a base plate, **(BPH) 02**.

Drilling Distance (DD)

Door Overlay	3	4	5	6	7
19.0					0
18.0				0	
17.0			0		2
16.5					
16.0		0		2	3
15.5					3.5
15.0	0		2	3	
14.5				3.5	
14.0		2	3		
13.5			3.5		
13.0	2	3			
12.5		3.5			
12.0	3				
11.5	3.5				
	Base Plate Height (BPH)				

Half Overlay

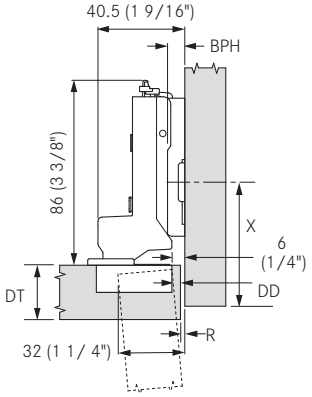


Drawings show Tiomos with a base plate, **(BPH) 02**.

Drilling Distance (DD)

Door Overlay	3	4	5	6	7
12.5					0
11.5				0	
10.5			0		2
10.0					
9.5		0		2	3
9.0					3.5
8.5	0		2	3	
8.0				3.5	
7.5		2	3		
7.0			3.5		
6.5	2	3			
6.0		3.5			
5.5	3				
5.0	3.5	Base Plate Height (BPH)			

Inset



Drawings show Tiomos with a base plate, **(BPH) 02**. X= 38.5 + DT

Drilling Distance (DD)

Reveal (R)	3	4	5	6	7
0.0		0		2	3
0.5					3.5
1.0	0		2	3	
1.5				3.5	
2.0		2	3		
3.0	2	3			
4.0	3				
	Base Plate Height (BPH)				

Note: A door stop is needed to prevent overclose.

Minimum Gaps

Drilling Distance (DD)

Door Thickness (DT)	3	4	5	6	7
36	1.0	1.0	1.0	1.4	2.4
30	1.0	1.0	1.0	1.0	1.9
28	1.0	1.0	1.0	1.0	1.7
26	1.0	1.0	1.0	1.2	1.5
24	1.0	1.0	1.0	1.0	1.4
22	1.0	1.0	1.0	1.0	1.2
20	1.0	1.0	1.0	1.0	1.0
18	1.0	1.0	1.0	1.0	1.0
16	1.0	1.0	1.0	1.0	1.0
	Minimum Gap (G)				

The minimum gap is the gap between the closed door and the front of the cabinet.

Reveal

Drilling Distance (DD)

Door Thickness (DT)	3	4	5	6	7
36	10.6	9.6	8.6	7.6	6.7
34	8.0	7.0	6.5	5.9	6.4
32	6.0	5.0	4.5	3.9	4.4
30	4.5	3.5	2.5	2.5	1.5
28	2.0	1.5	1.5	1.3	1.3
26	1.0	1.0	1.0	1.0	1.0
24	0.6	0.6	0.6	0.6	0.6
22	0.5	0.5	0.5	0.5	0.5
20	0.3	0.3	0.3	0.3	0.3
18	0.2	0.2	0.2	0.2	0.2
16	0.2	0.2	0.2	0.2	0.2
	Reveal (R)				

Note: Reveal dimensions were determined with an edge radius (of the door) of 1mm. Hinge dimensions and reveal calculation based on factory setting.

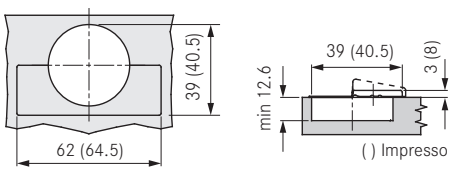
IMPORTANT

To determine the correct application Grass strongly recommends a trial mounting for all hinges and base plates.

Legend

BPH = Base Plate Height
CC = Center Cup
DD = Drilling Distance
DT = Door Thickness
G = Gap
R = Reveal
X = Base Plate Setback

Cup Dimensions



RFI 77 ATTACHMENT

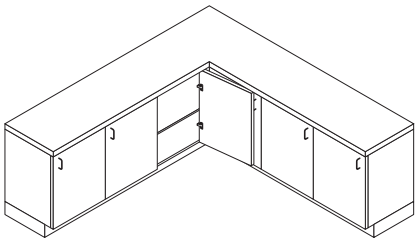
Tiomos 110/90

110° blind corner hinge





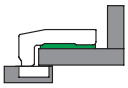
- For blind corner construction
- 110° opening angle
- 3-dimensional adjustment with suitable base plate
- Soft-close or Self-close hinges available
- Convenient depth adjustment with worm screw

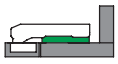


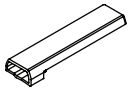




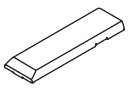


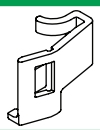
Tiomos 110/90A Opening Angle 110°		Screw-On		Dowelled	
Overlay		**Pattern**	**Type**	**Item No.**	**Item No.**	**PU**
	Hinge cup: steel, nickel-plated Hinge arm: zinc, nickel-plated	45	Soft-close	**F028**138**535**223	**F028**138**545**213	100
		45	Self-close	-	**F045**138**483**223	100

Tiomos 110/90E Opening Angle 110°		Impresso				Screw-On			Dowelled	
Inset		**Pattern**	**Type**	**Item No.**	**PU**	**Pattern**	**Type**	**Item No.**	**Item No.**	**PU**
	Hinge cup: steel, nickel-plated Hinge arm: zinc, nickel-plated	42/45	Soft-close	**F017**139**427**223	100	45	Soft-close	**F028**138**536**223	**F028**138**546**223	100
		42/45	Self-close	-	-	45	Self-close	-	**F045**138**484**223	100
		42/45	Self-close	**F034**139**398**213	25	45	Self-close	**F045**138**474**213	-	25

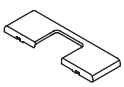
Cover Cap with Clip Protector		Item No.	PU
	Plastic, black	**F072**140**504**247	1000

For installation see page 57

Cover Caps		Item No.	PU
	Steel, nickel-plated	**F072**135**500**247	1000

Hinge Clip Protector		Item No.	PU
	Plastic, grey	**F072**135**807**540	500

For installation see page 57

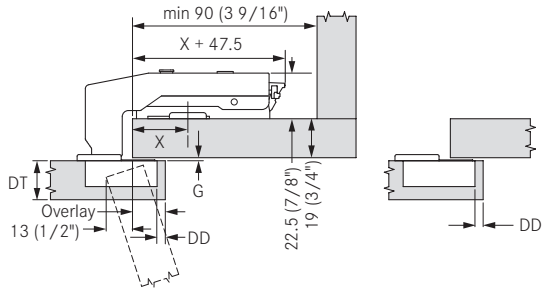
Hinge Cup Cover Cap		Item No.	PU
	Steel, nickel-plated	**F072**135**503**228	150

Wood Screw, Nickel-plated		Item No.	PU
	#6 x 5/8" FHP, NI	81001-43	500

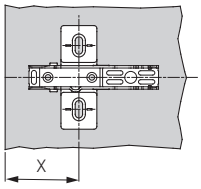
PU - Packaging unit

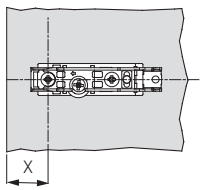
Dimensions in millimeters, fractional inch equivalents as noted.

Overlay



Drawings show Tiomos with a base plate, **(BPH) 00**.





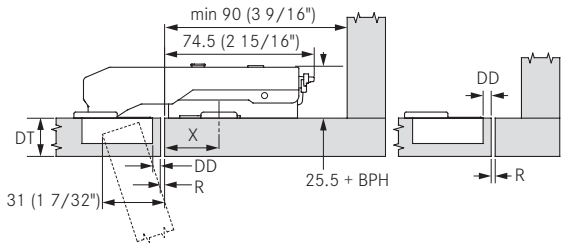
Wing Base Plate Position (X) / Drilling Distance (DD) — Door Overlay

	3	4	5	6	7
30	18	19	20	21	22
29	17	18	19	20	21
28	16	17	18	19	20
27	15	16	17	18	19
26	14	15	16	17	18

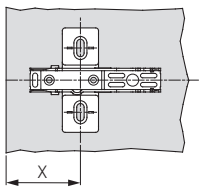
Straight Base Plate Position (X) / Drilling Distance (DD) — Door Overlay

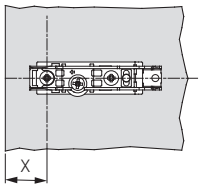
	3	4	5	6	7
13	18	19	20	21	22
12	17	18	19	20	21
11	16	17	18	19	20
10	15	16	17	18	19
9	14	15	16	17	18

Inset



Drawings show Tiomos with a base plate, **(BPH) 03**.





Wing Base Plate Position (X) / Drilling Distance (DD) — Reveal (R)

	3	4	5	6	7
28	2	1	0		
27	3	2	1	0	
26	4	3	2	1	0

Straight Base Plate Position (X) / Drilling Distance (DD) — Reveal (R)

	3	4	5	6	7
11	2	1	0		
10	3	2	1	0	
9	4	3	2	1	0

Minimum Gaps

Door Thickness (DT) / Drilling Distance (DD) — Minimum Gap (G)

	3	4	5	6	7
24	1.0	1.0	1.0	1.2	2.1
22	1.0	1.0	1.0	1.0	1.5
21	1.0	1.0	1.0	1.0	1.2
20	1.0	1.0	1.0	1.0	1.0
19	1.0	1.0	1.0	1.0	1.0
18	1.0	1.0	1.0	1.0	1.0
17	1.0	1.0	1.0	1.0	1.0
16	1.0	1.0	1.0	1.0	1.0

The minimum gap is the gap between the closed door and the front of the cabinet.

IMPORTANT

To determine the correct application Grass strongly recommends a trial mounting for all hinges and base plates.

Reveal

Door Thickness (DT) / Drilling Distance (DD) — Minimum Reveal (R)

	3	4	5	6	7
24	2.4	2.1	2.1	2.1	2.0
22	1.6	1.6	1.6	1.5	1.5
21	1.4	1.3	1.3	1.3	1.3
20	1.1	1.1	1.1	1.1	1.1
19	0.9	0.9	0.9	0.9	0.9
18	0.7	0.7	0.7	0.7	0.7
17	0.6	0.6	0.6	0.6	0.6
16	0.6	0.6	0.6	0.6	0.6

Note: Reveal dimensions were determined with an edge radius (of the door) of 1mm. Hinge dimensions and reveal calculation based on factory setting.

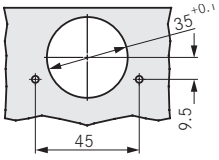
IMPORTANT

To determine the correct application Grass strongly recommends a trial mounting for all hinges and base plates.

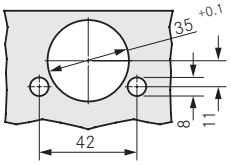
Legend

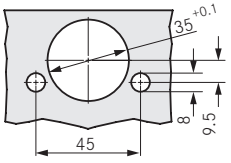
BPH = Base Plate Height
CC = Center Cup
DD = Drilling Distance
DT = Door Thickness
G = Gap
R = Reveal
X = Base Plate Setback

Screw-on

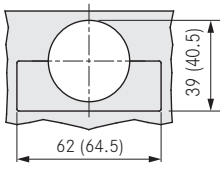


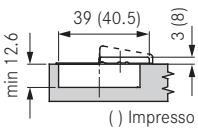
Impresso and Dowelled





Cup Dimensions





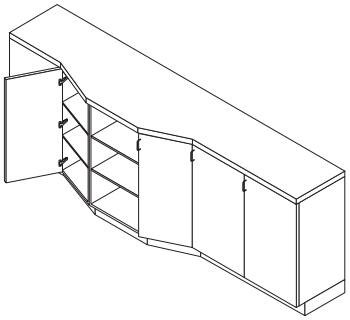
RFI 77 ATTACHMENT

Tiomos 110/30A

+30° angle corner cabinet hinge for overlay doors

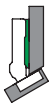


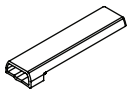
- For 30° angle corner cabinets
- 110° opening angle
- 3-dimensional adjustment with suitable base plate
- Self-close hinges available
- Convenient depth adjustment with worm screw



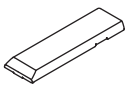


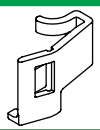
Tiomos 110/30A Opening Angle 110° — Screw-On

Overlay		Pattern	Type	Item No.	PU
	Hinge cup: steel, nickel-plated Hinge arm: zinc, nickel-plated	45	Self-close	**F045**138**467**223	100

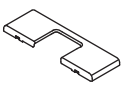
Cover Cap with Clip Protector		Item No.	PU
	Plastic, black	**F072**140**504**247	1000

For installation see page 57

Cover Caps		Item No.	PU
	Steel, nickel-plated	**F072**135**500**247	1000

Hinge Clip Protector		Item No.	PU
	Plastic, grey	**F072**135**807**540	500

For installation see page 57

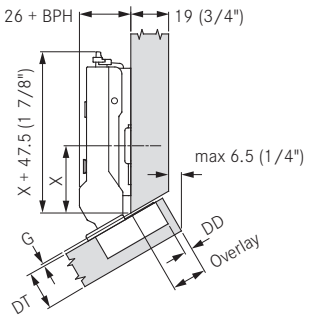
Hinge Cup Cover Cap		Item No.	PU
	Steel, nickel-plated	**F072**135**503**228	150

Wood Screw, Nickel-plated		Item No.	PU
	#6 x 5/8" FHP, NI	81001-43	500

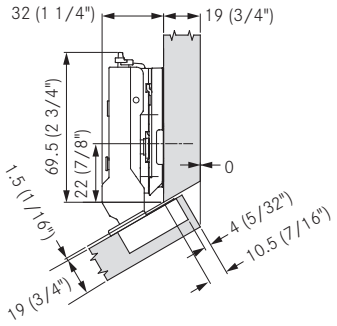
PU - Packaging unit

Dimensions in millimeters, fractional inch equivalents as noted.

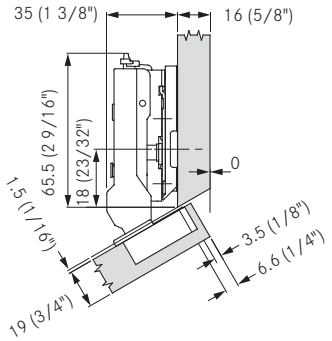
Overlay



Drawings show Tiomos with a base plate, **(BPH) 0**.



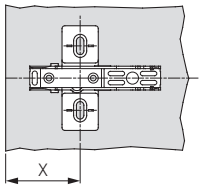
Drawings show Tiomos with a base plate, **(BPH) 6**.



Drawings show Tiomos with a base plate, **(BPH) 9.5**.

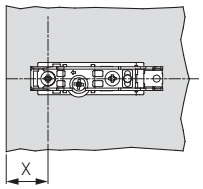
Drilling Distance (DD)

Door Overlay	3	4	5	6	7
20.5					0
19.5				0	
18.5			0		2
17.5		0		2	3
16.5	0				3.5
16.0			2	3	
15.5				3.5	
15.0		2	3		
14.5			3.5		
14.0	2	3			
13.5		3.5			
13.0	3				
12.5	3.5			6	
11.5			6		
10.5		6			
	Base Plate Height (BPH)				



Base Plate Height (BPH)

	0	2	3	3.5	6
X	34.0	33.0	32.0	32.0	30.5
	Wing Base Plate Position (X)				



Base Plate Height (BPH)

	0	2	3	3.5	
X	17.0	16.0	15.0	15.0	
	Straight Base Plate Position (X)				

Minimum Gaps

Drilling Distance (DD)

Door Thickness (DT)	3	4	5	6	7
24	1.0	1.0	1.0	1.2	2.1
22	1.0	1.0	1.0	1.0	1.5
21	1.0	1.0	1.0	1.0	1.2
20	1.0	1.0	1.0	1.0	1.0
19	1.0	1.0	1.0	1.0	1.0
18	1.0	1.0	1.0	1.0	1.0
17	1.0	1.0	1.0	1.0	1.0
16	1.0	1.0	1.0	1.0	1.0
	Minimum Gap (G)				

The minimum gap is the gap between the closed door and the front of the cabinet.

Reveal

Drilling Distance (DD)

Door Thickness (DT)	3	4	5	6	7
24	2.4	2.1	2.1	2.1	2.0
22	1.6	1.6	1.6	1.5	1.5
21	1.4	1.3	1.3	1.3	1.3
20	1.1	1.1	1.1	1.1	1.1
19	0.9	0.9	0.9	0.9	0.9
18	0.7	0.7	0.7	0.7	0.7
17	0.6	0.6	0.6	0.6	0.6
16	0.6	0.6	0.6	0.6	0.6
	Reveal (R)				

Note: Reveal dimensions were determined with an edge radius (of the door) of 1mm. Hinge dimensions and reveal calculation based on factory setting.

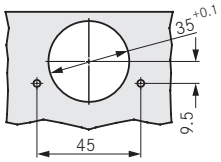
IMPORTANT

To determine the correct application Grass strongly recommends a trial mounting for all hinges and base plates.

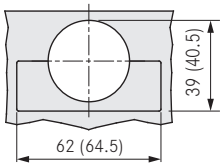
Legend

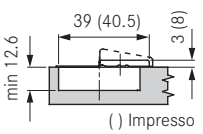
BPH = Base Plate Height
CC = Center Cup
DD = Drilling Distance
DT = Door Thickness
G = Gap
R = Reveal
X = Base Plate Setback

Screw-on



Cup Dimensions





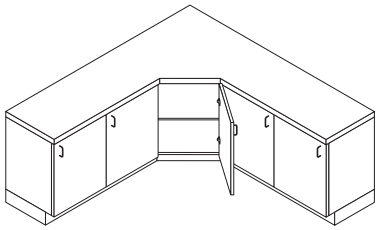
RFI 77 ATTACHMENT

Tiomos 110/45A

+45° angle corner cabinet hinge for overlay doors



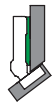
- For 45° angle corner cabinets
- 110° opening angle
- 3-dimensional adjustment with suitable base plate
- Soft-close hinges available
- Convenient depth adjustment with worm screw

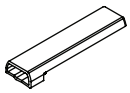




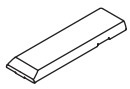


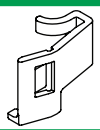


Tiomos 110/45A	Opening Angle 110°			Impresso			Screw-On	Dowelled
Overlay	Cranking 03	Pattern	Type	Item No.	PU	Pattern	Type	Item No.	Item No.	PU
	Hinge cup: steel, nickel-plated Hinge arm: zinc, nickel-plated	42/45	Soft-close	**F017**139**424**223	100	45	Soft-close	**F028**138**533**223	**F028**138**543**223	100

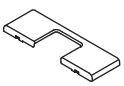
Cover Cap with Clip Protector		Item No.	PU
	Plastic, black	**F072**140**504**247	1000

For installation see page 57

Cover Caps		Item No.	PU
	Steel, nickel-plated	**F072**135**500**247	1000

Hinge Clip Protector		Item No.	PU
	Plastic, grey	**F072**135**807**540	500

For installation see page 57

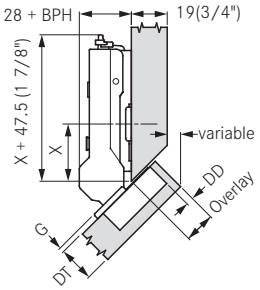
Hinge Cup Cover Cap		Item No.	PU
	Steel, nickel-plated	**F072**135**503**228	150

Wood Screw, Nickel-plated		Item No.	PU
	#6 x 5/8" FHP, NI	81001-43	500

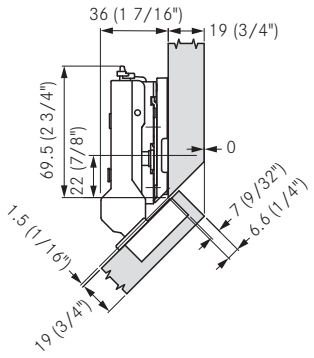
PU - Packaging unit

Dimensions in millimeters, fractional inch equivalents as noted.

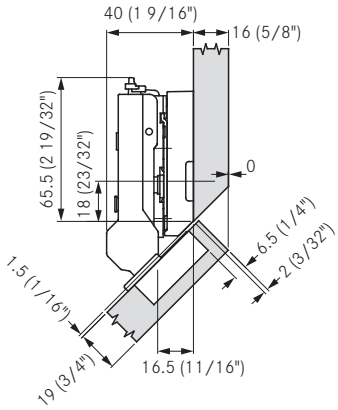
Overlay



Drawings show Tiomos with a base plate, **(BPH) 0**.



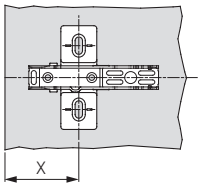
Drawings show Tiomos with a base plate, **(BPH) 9.5**.



Drawings show Tiomos with a base plate, **(BPH) 12**.

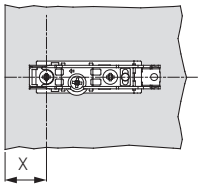
Drilling Distance (DD)

Door Overlay	3	4	5	6	7
19.5					0
19.0					
18.5				0	
18.0					
17.5			0		
17.0					
16.5		0			2
16.0					
15.5	0			2	
15.0					3
14.5			2		3.5
14.0				3	
13.5		2		3.5	
13.0			3		
12.5	2		3.5		
12.0		3			
11.0	3				6
10.0				6	
		Base Plate Height (BPH)			



Base Plate Height (BPH)

	0	2	3	3.5	6	9.5	12
X	30.5	28.5	27.5	27.0	24.5	21.0	18.5
	Wing Base Plate Position (X)						



Base Plate Height (BPH)

	0	2	3	3.5	
X	13.5	11.5	10.5	10.0	
	Straight Base Plate Position (X)				

Minimum Gaps

Drilling Distance (DD)

Door Thickness (DT)	3	4	5	6	7
24	1.0	1.0	1.0	1.2	2.1
22	1.0	1.0	1.0	1.0	1.5
21	1.0	1.0	1.0	1.0	1.2
20	1.0	1.0	1.0	1.0	1.0
19	1.0	1.0	1.0	1.0	1.0
18	1.0	1.0	1.0	1.0	1.0
17	1.0	1.0	1.0	1.0	1.0
16	1.0	1.0	1.0	1.0	1.0
	Minimum Gap (G)				

The minimum gap is the gap between the closed door and the front of the cabinet.

Reveal

Drilling Distance (DD)

Door Thickness (DT)	3	4	5	6	7
24	2.4	2.1	2.1	2.1	2.0
22	1.6	1.6	1.6	1.5	1.5
21	1.4	1.3	1.3	1.3	1.3
20	1.1	1.1	1.1	1.1	1.1
19	0.9	0.9	0.9	0.9	0.9
18	0.7	0.7	0.7	0.7	0.7
17	0.6	0.6	0.6	0.6	0.6
16	0.6	0.6	0.6	0.6	0.6
	Reveal (R)				

Note: Reveal dimensions were determined with an edge radius (of the door) of 1mm. Hinge dimensions and reveal calculation based on factory setting.

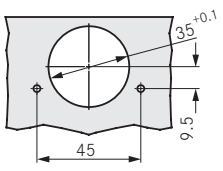
IMPORTANT

To determine the correct application Grass strongly recommends a trial mounting for all hinges and base plates.

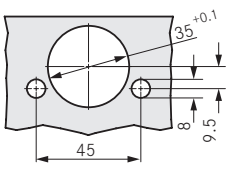
Legend

BPH = Base Plate Height
CC = Center Cup
DD = Drilling Distance
DT = Door Thickness
G = Gap
R = Reveal
X = Base Plate Setback

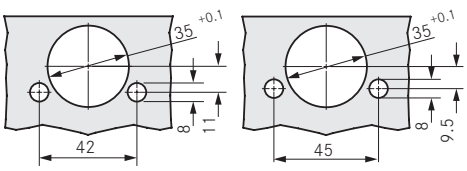
Screw-on



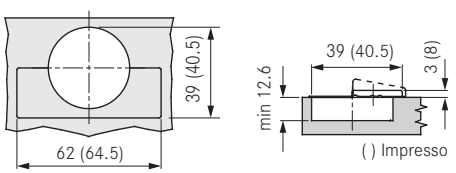
Dowelled



Impresso



Cup Dimensions



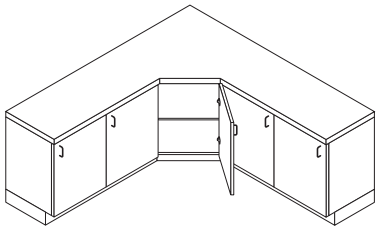
RFI 77 ATTACHMENT

Tiomos 110/45E

+45° angle corner cabinet hinge for inset doors



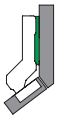
- For 45° angle corner cabinets
- 110° opening angle
- 3-dimensional adjustment with suitable base plate
- Soft-close or Self-close hinges available
- Convenient depth adjustment with worm screw

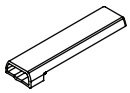


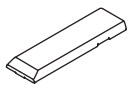


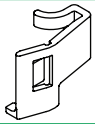


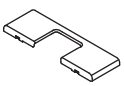


Tiomos 110/45E Opening Angle 110°		Impresso				Screw-On	Dowelled	
Inset		Pattern	Type	Item No.	PU	Pattern	Type	Item No.	Item No.	PU
	Hinge cup: steel, nickel-plated Hinge arm: zinc, nickel-plated	42/45	Soft-close	**F017**139**425**213	25	45	Soft-close	-	**F028**138**544**223	100
						45	Self-close	-	**F045**138**482**223	100
						45	Self-close	**F045**138**472**213	-	25

Cover Cap with Clip Protector		Item No.	PU
	Plastic, black	**F072**140**504**247	1000
		For installation see page 57	

Cover Caps		Item No.	PU
	Steel, nickel-plated	**F072**135**500**247	1000

Hinge Clip Protector		Item No.	PU
	Plastic, grey	**F072**135**807**540	500
		For installation see page 57	

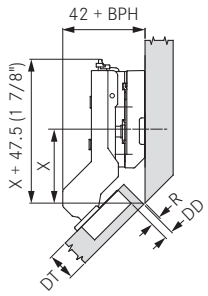
Hinge Cup Cover Cap		Item No.	PU
	Steel, nickel-plated	**F072**135**503**228	150

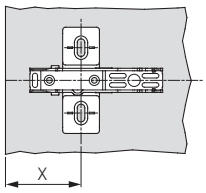
Wood Screw, Nickel-plated		Item No.	PU
	#6 x 5/8" FHP, NI	81001-43	500

PU - Packaging unit

Dimensions in millimeters, fractional inch equivalents as noted.

Inset





Drawings show Tiomos with a base plate, **(BPH) 12**.

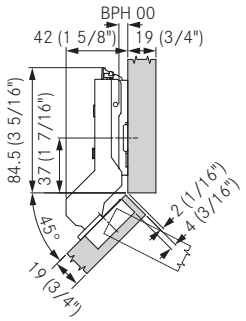
Drilling Distance (DD)

Door Overlay	3	4	5	6	7
22.0					
21.0					
20.0					
19.0	12				
18.0		12			
17.0			12		
16.0				12	
15.0					12
	Base Plate Height (BPH)				

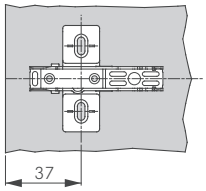
Drilling Distance (DD)

Door Overlay	3	4	5	6	7
22.0					
21.0					
20.0					
19.0	52.0				
18.0		50.5			
17.0			49.0		
16.0				47.5	
15.0					46.0
	Wing Base Plate Position (X)				

Corner Angle



Drawings show Tiomos with a base plate, **(BPH) 03**.



Reveal

Drilling Distance (DD)

Door Thickness (DT)	3	4	5	6	7
24	2.4	2.1	2.1	2.1	2.0
22	1.6	1.6	1.6	1.5	1.5
21	1.4	1.3	1.3	1.3	1.3
20	1.1	1.1	1.1	1.1	1.1
19	0.9	0.9	0.9	0.9	0.9
18	0.7	0.7	0.7	0.7	0.7
17	0.6	0.6	0.6	0.6	0.6
16	0.6	0.6	0.6	0.6	0.6
	Reveal (R)				

Note: Reveal dimensions were determined with an edge radius (of the door) of 1mm. Hinge dimensions and reveal calculation based on factory setting.

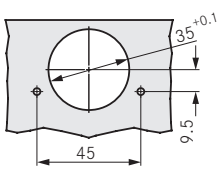
IMPORTANT

To determine the correct application Grass strongly recommends a trial mounting for all hinges and base plates.

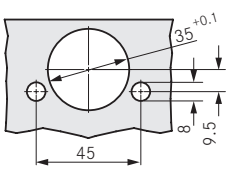
Legend

BPH = Base Plate Height
CC = Center Cup
DD = Drilling Distance
DT = Door Thickness
R = Reveal
X = Base Plate Setback

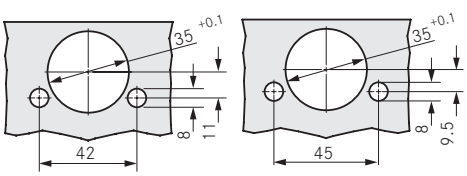
Screw-on



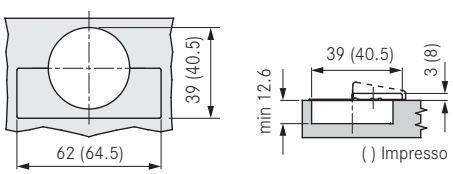
Dowelled



Impresso



Cup Dimensions



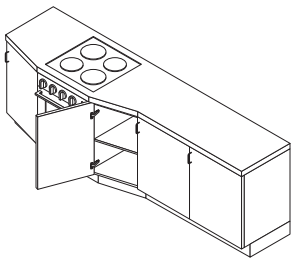
RFI 77 ATTACHMENT

Tiomos 120/-15A

-15° angle corner cabinet hinge for overlay doors



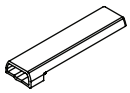
- For -15° angle corner cabinets
- 120° opening angle
- 3-dimensional adjustment with suitable base plate
- Self-close hinges available
- Convenient depth adjustment with worm screw



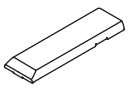


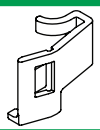
Tiomos 120/-15A Opening Angle 120° — Screw-On

Overlay		Pattern	Type	Item No.	PU
	Hinge cup: steel, nickel-plated Hinge arm: zinc, nickel-plated	45	Self-close	**F045**138**493**223	100

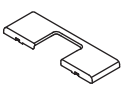
Cover Cap with Clip Protector		Item No.	PU
	Plastic, black	**F072**140**504**247	1000

For installation see page 57

Cover Caps		Item No.	PU
	Steel, nickel-plated	**F072**135**500**247	1000

Hinge Clip Protector		Item No.	PU
	Plastic, grey	**F072**135**807**540	500

For installation see page 57

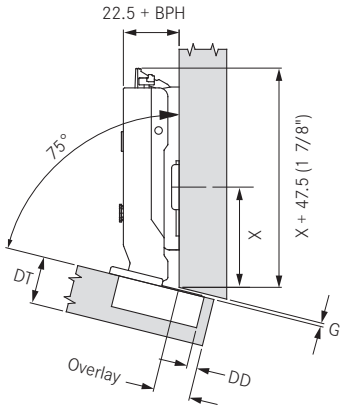
Hinge Cup Cover Cap		Item No.	PU
	Steel, nickel-plated	**F072**135**503**228	150

Wood Screw, Nickel-plated		Item No.	PU
	#6 x 5/8" FHP, NI	81001-43	500

PU - Packaging unit

Dimensions in millimeters, fractional inch equivalents as noted.

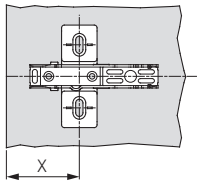
Overlay



Drawings show Tiomos with a base plate, **(BPH) 0**.

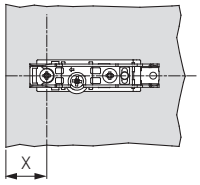
Drilling Distance (DD)

Door Overlay	3	4	5	6	7
18.0					0
17.0				0	
16.0			0		
15.0		0			
14.5				2	3
14.0	0				3.5
13.5			2	3	
13.0				3.5	
12.5		2	3		
12.0			3.5		
11.5		3			6
11.0		3.5			
10.5	3			6	
10.0	3.5				
9.5			6		
8.5		6			
		Base Plate Height (BPH)			



Base Plate Height (BPH)

	0	2	3	3.5	6
X	40.0	40.5	40.5	41.0	41.5
	Wing Base Plate Position (X)				



Base Plate Height (BPH)

	0	2	3	3.5	
X	23	23.5	23.5	24	
	Straight Base Plate Position (X)				

Minimum Gaps

Drilling Distance (DD)

Door Thickness (DT)	3	4	5	6	7
24	6.4	5.4	4.4	3.4	2.4
22	1.6	1.6	1.6	1.5	1.5
21	1.4	1.3	1.3	1.3	1.3
20	1.1	1.1	1.1	1.1	1.1
19	0.9	0.9	0.9	0.9	0.9
18	0.7	0.7	0.7	0.7	0.7
17	0.6	0.6	0.6	0.6	0.6
16	0.6	0.6	0.6	0.6	0.6
	Minimum Gap (G)				

The minimum gap is the gap between the closed door and the front of the cabinet.

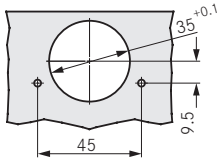
IMPORTANT

To determine the correct application Grass strongly recommends a trial mounting for all hinges and base plates.

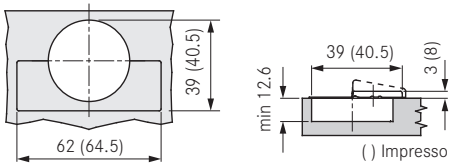
Legend

BPH = Base Plate Height
CC = Center Cup
DD = Drilling Distance
DT = Door Thickness
G = Gap
R = Reveal
X = Base Plate Setback

Screw-on



Cup Dimensions



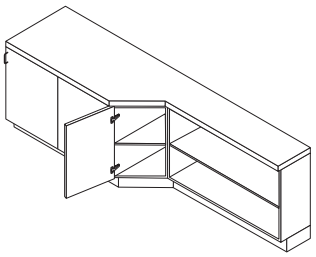
RFI 77 ATTACHMENT

Tiomos 120/-45A

-45° angle corner cabinet hinge for overlay doors

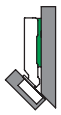


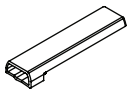
- For -45° angle corner cabinets
- 120° opening angle
- 3-dimensional adjustment with suitable base plate
- Soft-close or Self-close hinges available
- Convenient depth adjustment with worm screw



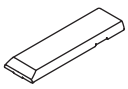


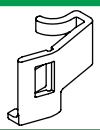


Tiomos 120/-45A Opening Angle 120°		Impresso				Screw-On			
Overlay		Pattern	Type	Item No.	PU	Pattern	Type	Item No.	PU
	Hinge cup: steel, nickel-plated	42/45	Soft-close	-	-	45	Soft-close	**F028**138**557**213	25
	Hinge arm: zinc, nickel-plated	42/45	Self-close	**F034**139**405**223	100	45	Self-close	**F045**138**495**213	25

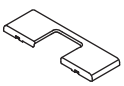
Cover Cap with Clip Protector		Item No.	PU
	Plastic, black	**F072**140**504**247	1000

For installation see page 57

Cover Caps		Item No.	PU
	Steel, nickel-plated	**F072**135**500**247	1000

Hinge Clip Protector		Item No.	PU
	Plastic, grey	**F072**135**807**540	500

For installation see page 57

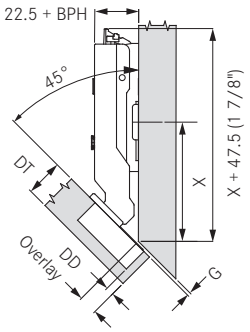
Hinge Cup Cover Cap		Item No.	PU
	Steel, nickel-plated	**F072**135**503**228	150

Wood Screw, Nickel-plated		Item No.	PU
	#6 x 5/8" FHP, NI	81001-43	500

PU - Packaging unit

Dimensions in millimeters, fractional inch equivalents as noted.

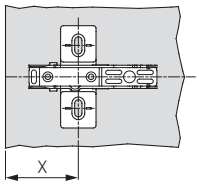
Overlay



Drawings show Tiomos with a base plate, **(BPH) 02**.

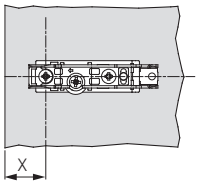
Drilling Distance (DD)

Door Overlay	3	4	5	6	7
12.0					0
11.5				0	
10.5			0		
9.5		0			2
8.5	0			2	
8.0					3
7.5			2		3.5
7.0				3	
6.5		2		3.5	
6.0			3		
5.5	2		3.5		
5.0		3			
4.5		3.5			
4.0	3				6
3.5	3.5				
3.0				6	
2.0			6		
1.0		6			
0.0	6				
		Base Plate Height (BPH)			



Base Plate Height (BPH)

	0	2	3	3.5	6
X	60.5	62.5	63.5	64	66.5
	Wing Base Plate Position (X)				



Base Plate Height (BPH)

	0	2	3	3.5	
X	43.5	45.5	46.5	47	
	Straight Base Plate Position (X)				

Minimum Gaps

Drilling Distance (DD)

Door Thickness (DT)	3	4	5	6	7
24	6.4	5.4	4.4	3.4	2.4
22	3.0	2.0	1.5	1.5	1.5
21	1.4	1.3	1.3	1.3	1.3
20	1.1	1.1	1.1	1.1	1.1
19	0.9	0.9	0.9	0.9	0.9
18	0.7	0.7	0.7	0.7	0.7
17	1.0	1.0	1.0	1.0	1.5
16	1.0	1.0	1.0	1.0	1.0
	Minimum Gap (G)				

The minimum gap is the gap between the closed door and the front of the cabinet.

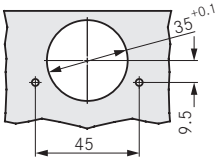
IMPORTANT

To determine the correct application Grass strongly recommends a trial mounting for all hinges and base plates.

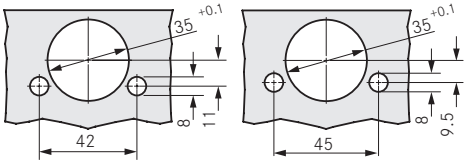
Legend

BPH = Base Plate Height
CC = Center Cup
DD = Drilling Distance
DT = Door Thickness
G = Gap
R = Reveal
X = Base Plate Setback

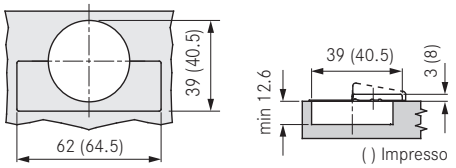
Screw-on



Impresso



Cup Dimensions



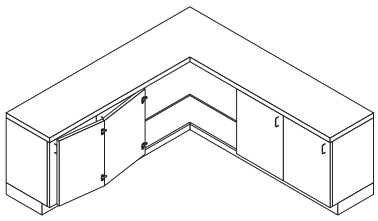
RFI 77 ATTACHMENT

Tiomos PCC

Pie-cut corner cabinet hinge



- 3-dimensional adjustment with suitable base plate
- Designed for folding doors in corner cabinets
- For door thicknesses 14mm to 24mm
- Self-close hinges available
- Used in conjunction with Tiomos 155 hinges
- 35mm full cup drill hole





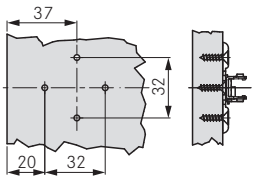


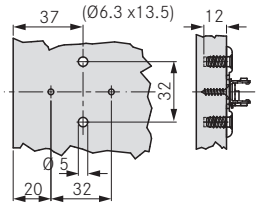
Tiomos Pie-cut Corner Hinge		Screw-On	Dowelled	
	Pattern	Type	Item No.	Item No.	PU
Hinge cup: steel, nickel-plated; Hinge arm: zinc, nickel-plated	42	Self-close	-	**F045**138**336**228	150
	45	Self-close	**F045**138**517**228	**F045**138**518**228	150

Base Plates for PCC — **Wing Base Plate, 4-Point Fixing**









Door Thickness	Screws	Height	Item No.	PU
14mm-24mm	For wood screws	0	**F058**139**746**228	150
14mm-24mm	With pre-mounted Euro screws	0	**F058**139**761**228	150

Cover Cap with Clip Protector	Item No.	PU
Plastic, black	**F072**140**504**247	1000

For installation see page 57

Cover Caps	Item No.	PU
Steel, nickel-plated	**F072**135**500**247	1000

Hinge Clip Protector	Item No.	PU
Plastic, grey	**F072**135**807**540	500

For installation see page 57

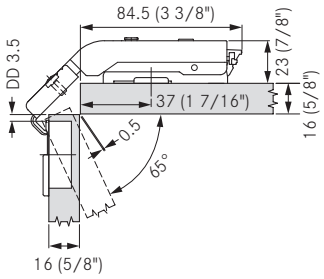
Hinge Cup Cover Cap	Item No.	PU
Steel, nickel-plated	**F072**135**503**228	150

Wood Screw, Nickel-plated	Item No.	PU
#6 x 5/8" FHP, NI	81001-43	500

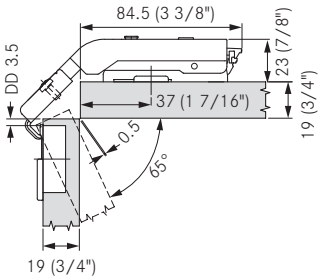
PU - Packaging unit

Dimensions in millimeters, fractional inch equivalents as noted.

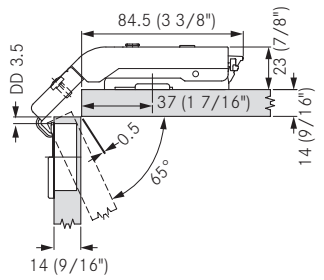
Hinge Application



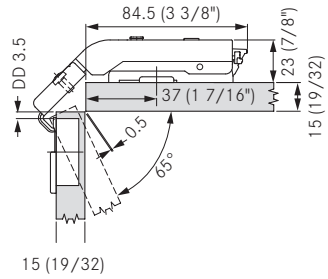
16mm door thickness with base plate height **(BPH) 0**.



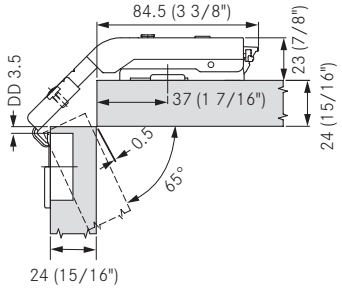
19mm door thickness with base plate height **(BPH) 0**.



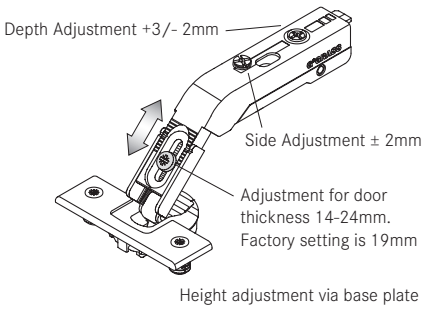
14mm door thickness with base plate height **(BPH) 0**.

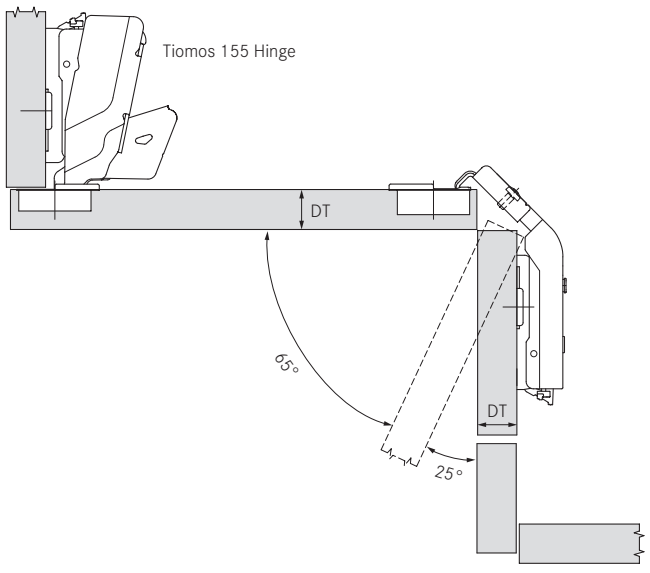


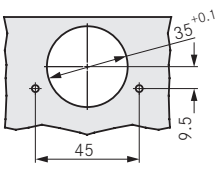
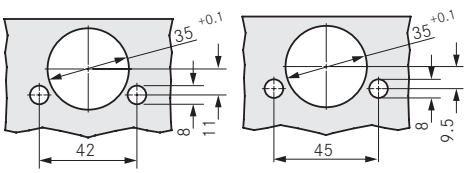
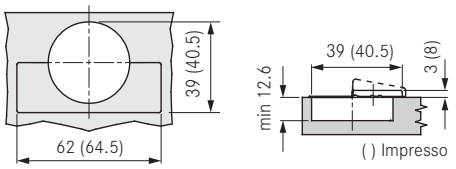
15mm door thickness with base plate height **(BPH) 0**.



24mm door thickness with base plate height **(BPH) 0**.

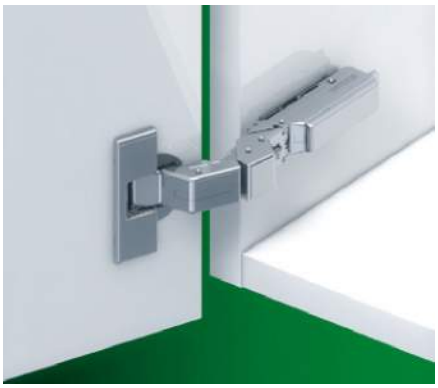




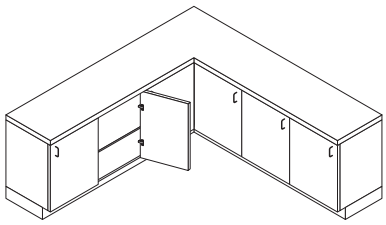
Legend	Screw-on	Dowelled	Cup Dimensions
BPH = Base Plate Height CC = Center Cup DD = Drilling Distance DT = Door Thickness R = Reveal X = Base Plate Setback			

Tiomos M9

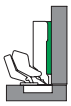
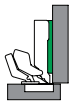
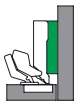
110° hinge for 12mm-28mm door thicknesses

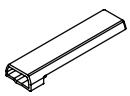


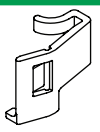
- Accommodates overlays up to 25mm (1")
- For door thicknesses from 12mm (15/32") to 28mm (1 1/8")
- Soft-close and self-close hinges available
- For face frame or frameless cabinets
- 3-dimensional adjustments with suitable base plate
- Shallow cup depth of 9mm

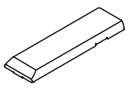


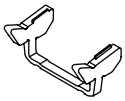


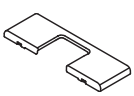
Tiomos M9 Opening Angle 110°				Screw-On		
Overlay	Half Overlay	Inset	Cranking 14	Pattern	Type	Item No.	PU
			Hinge cup: zinc, nickel-plated Hinge arm: zinc, nickel-plated	45	Soft-close	**F029**140**338**217	50
				45	Self-close	**F047**140**339**217	50

Cover Cap with Clip Protector	Item No.	PU
 Plastic, black	**F072**140**504**247	1000
	For installation see page 57	

Hinge Clip Protector	Item No.	PU
 Plastic, grey	**F072**135**807**540	500
	For installation see page 57	

Cover Caps	Item No.	PU
 Steel, nickel-plated	**F072**135**500**247	1000

Opening Angle Reduction Clip to 85°	Item No.	PU
	**F072**135**871**517	50

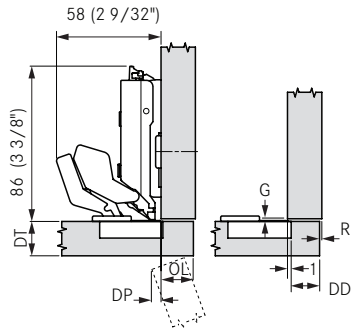
Hinge Cup Cover Cap	Item No.	PU
 Steel, nickel-plated	**F072**135**503**228	150

Wood Screw, Nickel-plated	Item No.	PU
 #6 x 5/8" FHP, NI	81001-43	500

PU - Packaging unit

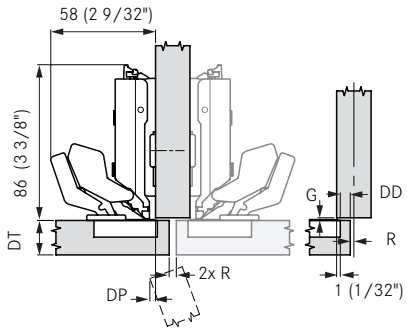
Dimensions in millimeters, fractional inch equivalents as noted.

Overlay



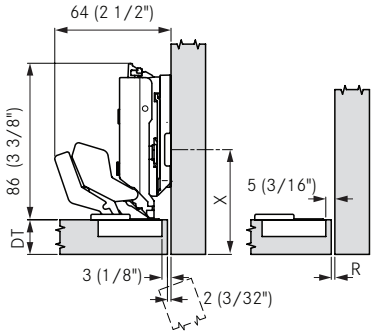
Drawings show Tiomos with a base plate, **(BPH) 0**.

Half Overlay



Drawings show Tiomos with a base plate, **(BPH) 0**.

Inset



Drawings show Tiomos with a base plate, **(BPH) 06**.

X= 38.5 + DT

Note: A door stop is needed to prevent overclose.

Minimum Gap and Minimum Reveal

Application Data	Drilling Distance (DD)	3		4		5		6		7		8		9		10		11		12		13	
	Door Protrusion (DP)	0.8		1.1		1.5		1.8		2.2		2.5		2.9		3.2		3.5		3.9		4.2	
	Door Overlay (OL)	4		5		6		7		8		9		10		11		12		13		14	
	Min Reveal (R)/ Gap (G)	R	G	R	G	R	G	R	G	R	G	R	G	R	G	R	G	R	G	R	G	R	G
Door Thickness (DT)	12-20	1.0	1.5	1.0	1.5	1.0	1.5	1.0	1.5	1.0	1.5	1.0	1.5	1.0	1.5	1.0	1.5	1.0	1.5	1.0	1.5	1.0	1.5
	22	1.0	1.5	1.0	1.5	1.0	1.5	1.0	1.5	1.0	1.5	1.0	1.5	1.0	1.5	1.0	1.5	1.5	1.5	1.7	1.5	4.0	1.5
	24	1.0	1.5	1.2	1.5	1.3	1.5	1.5	1.5	1.7	1.5	2.0	1.5	2.4	1.3	3.3	1.5	8.3	1.5	7.7	1.5	6.9	1.5
	26	2.2	1.5	2.4	1.5	2.7	1.5	3.1	1.5	3.6	1.5	4.7*	1.5	12*	1.5	11.8	1.5	10.9	1.5	9.9	1.5	8.9	1.5
	28	3.9	1.5	4.3	1.5	5.1	1.5	6.3*	1.5	16*	1.5	16*	1.5	15*	1.5	14*	1.5	13*	1.5	12*	1.5	11*	1.5

Application Data	Drilling Distance (DD)	14		15		16		17		18		19		20		21		22		23		24	
	Door Protrusion (DP)	4.6		4.9		5.3		5.6		5.9		6.3		6.6		7		7.3		7.6		8	
	Door Overlay (OL)	15		16		17		18		19		20		21		22		23		24		25	
	Min Reveal (R)/ Gap (G)	R	G	R	G	R	G	R	G	R	G	R	G	R	G	R	G	R	G	R	G	R	G
Door Thickness (DT)	12-20	1.0	1.5	1.0	1.5	1.0	1.5	1.0	1.5	1.0	1.5	1.0	1.5	1.0	1.5	1.0	1.5	1.0	2.0	1.0	2.0	1.0	2.0
	22	4.0	1.5	3.5	1.5	3.0	1.5	2.2	1.5	1.7	1.5	1.3	1.5	1.0	1.5	1.0	1.5	1.0	2.0	1.0	2.0	1.0	2.0
	24	6.0	1.5	5.2	1.5	4.5	1.5	4.0	1.5	3.3	1.5	3.0	1.5	2.5	1.5	2.1	1.5	1.9	2.0	1.6	2.0	1.5	2.0
	26	8.0	1.5	7.2	1.5	6.4	1.5	5.8	1.5	5.1	1.5	4.6	1.5	4.1	1.5	3.7	1.5	3.3	2.0	3.0	2.0	2.6	2.0
	28	10*	1.5	9.2	1.5	8.4	1.5	7.6	1.5	6.9	1.5	6.4	1.5	5.8	1.5	5.3	1.5	4.9	2.0	4.5	2.0	4.2	2.0

Note:

Reveal dimensions were determined with an edge radius (of the door) of 1mm.

Hinge dimensions and reveal calculation based on factory setting.

*Only achievable with 85° angle reduction clip.

IMPORTANT

To determine the correct application Grass strongly recommends a trial mounting for all hinges and base plates.

Legend

BPH = Base Plate Height

DD = Drilling Distance

DP = Door Protrusion

DT = Door Thickness

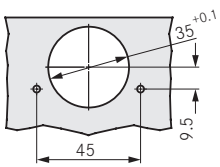
G = Gap

OL = Overlay

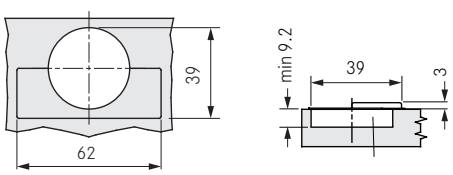
R = Reveal

X = Base Plate Setback

Drilling Pattern

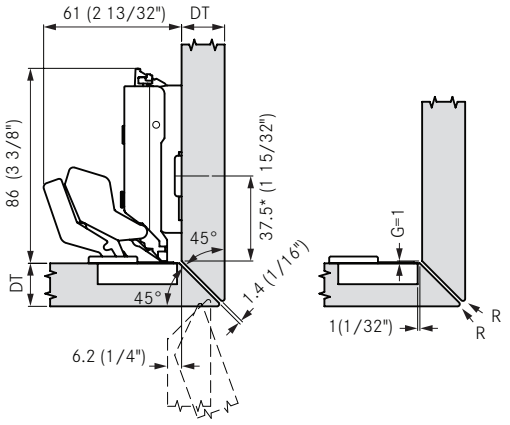


Cup Dimensions



Installation Information

Mitered Application - Circumferential and Lateral

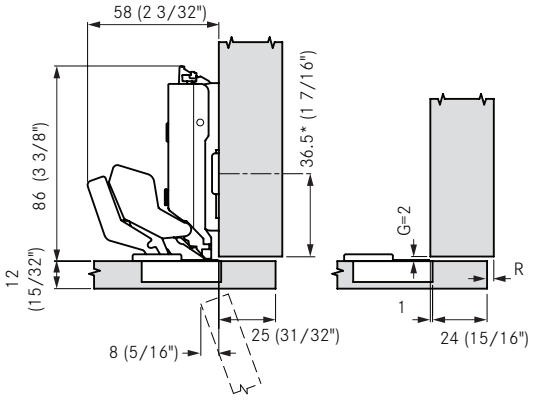


Drawings show Tiomos with a base plate, **(BPH) 3**.

Door Thickness (DT)	Mitered Application Circumferential	Mitered Application Lateral
	R (min)	R (min)
12-17	0	0
18	0.2	0
19	1.0	0.4
20	1.5	1.0
21	2.2	1.8
22	3.0	2.5
24	4.3	4.1

Note:
With circumferential mitered application all sides 1.4mm reveal

Maximum Overlay



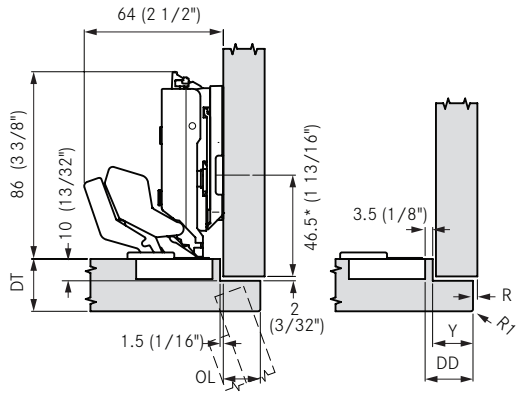
Drawings show Tiomos with a base plate, **(BPH) 0.**

*Dimension is calculated using a base plate that requires a 37mm hole setback. This dimension will vary if a base plate requiring a different standard setback is used.

Installation Information

Rabbet Applications

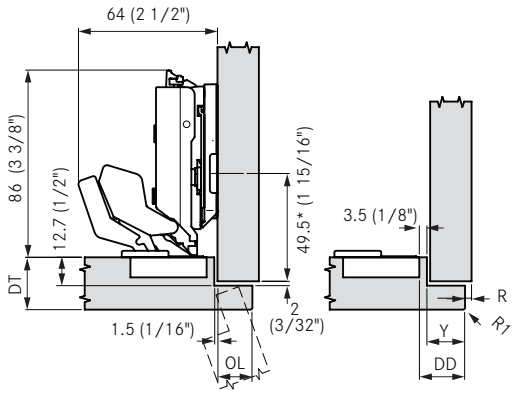
10mm (3/8")



Drawings show Tiomos with a base plate, **(BPH) 6**.

Cabinet Wall Location	DT (max)	OL (max)	Y (max)	DD (max)	R (max)
	20	17	18.5	22	1
	28	17	18.5	22	See reveal table page 45
	38	17	18.5	22	

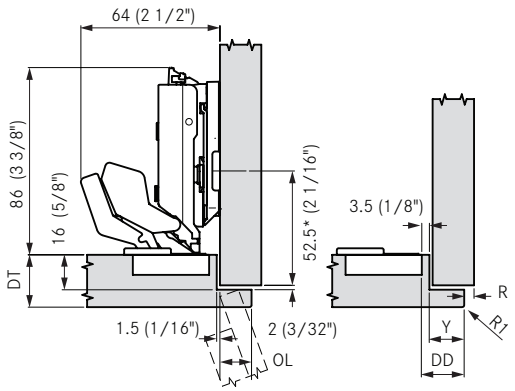
12.7mm (1/2")



Drawings show Tiomos with a base plate, **(BPH) 6**.

Cabinet Wall Location	DT (max)	OL (max)	Y (max)	DD (max)	R (max)
	20	16	17.5	21	1
	28	16	17.5	21	See reveal table page 45
	35	14	15.5	19	

16mm (5/8")



Drawings show Tiomos with a base plate, **(BPH) 6**.

Cabinet Wall Location	DT (max.)	OL (max.)	Y (max.)	DD (max.)	R (max.)
	20	14.5	16	19.5	1
	26	14.5	16	19.5	See reveal table page 45
	32	12.5	14	17.5	

*Dimension is calculated using a base plate that requires a 37mm hole setback.
This dimension will vary if a baseplate requiring a different standard setback is used.

Legend

BPH = Base Plate Height
DD = Drilling Distance
DP = Door Protrusion
DT = Door Thickness
G = Gap
OL = Overlay
R = Reveal
Y = Rabbet

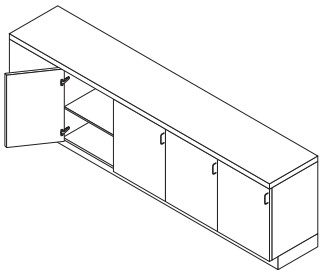
RFI 77 ATTACHMENT

Tiomos M0

125° hinge for thin doors (6-10mm)

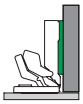
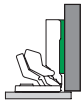
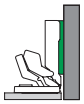


- No cup hole necessary
- Door thickness of 6mm (1/4") to 10mm (3/8")
- Accommodates door overlays up to 25.4mm (1")
- Soft-close hinges
- Works with a variety of door material - wood, aluminum, MDF, mineral composite, HPL (laminate), chipboard, solid surface
- Special fasteners for hinge attachment to door
- Compatible with Tiomos base plates

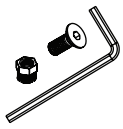




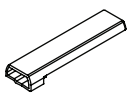
Tiomos M0 Opening Angle 125° — Screw-On

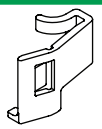
Overlay	Half Overlay	Inset		Pattern	Type	Item No.	PU
			Hinge cup: zinc, die-cast Hinge arm: steel, nickel-plated	45	Soft-close	**F029**140**331**217	50

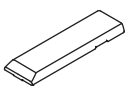
Fastening Options

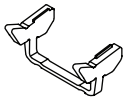
Fasteners	Description	Item No.	PU
	Countersunk screw PH2, M5 x 6mm For a minimum door thickness of 6mm For aluminum, HPL, mineral composite	**F072**135**923**223	100
	Set: 100 Countersunk screw M4 x 8mm, 100 sleeve M4 x 5.5mm, 1 internal hex key For a minimum door thickness of 8mm, for chipboard, MDF, mineral composite, HPL	**F072**135**928**201	1

Material	Material thickness		
	6mm	8mm	10mm
Aluminum	**F072**135**923**223		
HPL (laminate)	**F072**135**923**223	**F072**135**928**201	
Mineral Composite	**F072**135**923**223		
Chipboard	–	**F072**135**928**201	–
MDF	–	**F072**135**928**201	–

Cover Cap with Clip Protector	Item No.	PU
 Plastic, black	**F072**140**504**247	1000
	For installation see page 57	

Hinge Clip Protector	Item No.	PU
 Plastic, grey	**F072**135**807**540	500
	For installation see page 57	

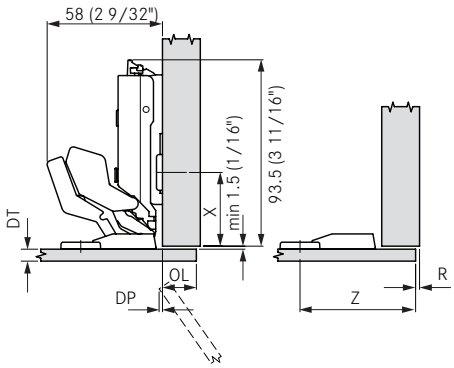
Cover Caps	Item No.	PU
 Steel, nickel-plated	**F072**135**500**247	1000

Opening Angle Reduction Clip to 85°	Item No.	PU
	**F072**135**871**517	50

PU - Packaging unit

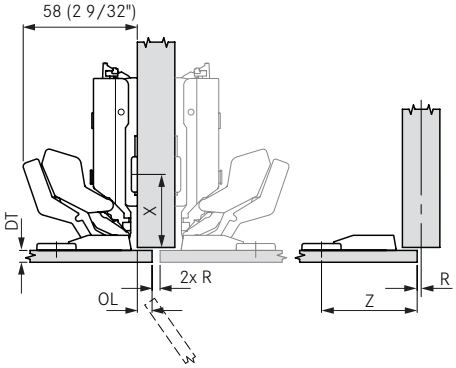
Dimensions in millimeters, fractional inch equivalents as noted.

Overlay



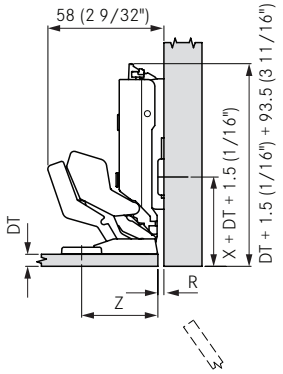
Drawings show Tiomos with a base plate, **(BPH) 0**.

Half Overlay



Drawings show Tiomos with a base plate, **(BPH) 0**.

Inset



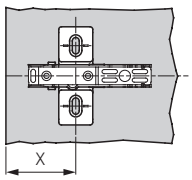
Drawings show Tiomos with a base plate, **(BPH) 0**.

Minimum Gap and Reveal

Hinge Attachment (Z)	38		39		47		49		51		53		55		56		58		60		61		63		64		66	
Door Protrusion (DP)	0		0		0		0		0		0		0		0.5		1.5		3.0		3.4		0		0		0	
Door Overlay (OL)	-3		-2		6		8		10		12		14		15		17		19		20		22*		23*		25*	
Min Reveal (R)/ Gap (G)	R	G	R	G	R	G	R	G	R	G	R	G	R	G	R	G	R	G	R	G	R	G	R	G	R	G	R	G
Door Thickness 6-10 (DT)	2.0	1.5	2.0	1.5	2.0	1.5	2.0	1.5	2.0	1.5	2.0	1.5	2.0	1.5	2.0	1.5	2.0	1.5	2.0	1.5	2.0	1.5	2.0	2.5	2.0	3.0	2.0	4.0

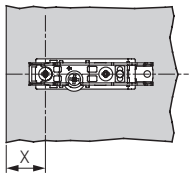
*Only achievable with 85° angle reduction clip.

Wing Base Plate



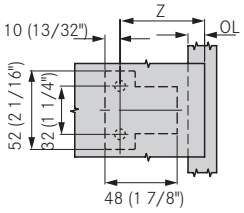
Setback	Base Plate Height 0
X	46

Straight Base Plate



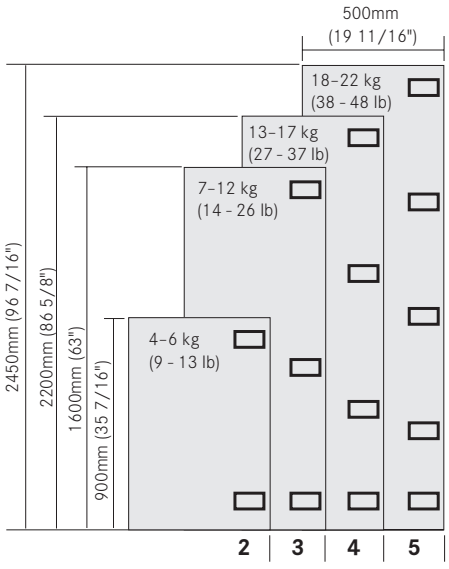
Setback	Base Plate Height 0
X	29

Hinge Attachment



Setback	Base Plate Height 0
Z	OL + 41
OL	25 max

Number of Hinges Per Door



Installation Information

Countersunk screw M5 x 6mm

(except for aluminum)**:**

1. Drill a Ø 4.8mm hole
2. Cut a Ø 5mm thread
3. Position the hinge and secure with the screws

Countersunk screw M4 x 8mm with sleeve M4 x 5.5mm:

1. Drill a Ø 5mm hole
2. Slightly countersink the edge of the hole
3. Insert the sleeve
4. Knock in the sleeve with a hammer
5. Position the hinge and secure with the screws

Notes

An inset application is achieved with the base plate (X) and a low housing screwing distance (Z).

Depending on the type and thickness of the base material the pull-out resistances can vary with the same fastening method. For information regarding the selection and processing of the base material please contact the base material supplier.

Liability claims: Please note that Grass cannot accept any liability for damage resulting from unsuitable fastening materials or methods.

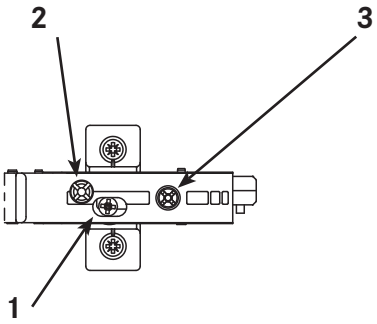
IMPORTANT

To determine the correct application Grass strongly recommends a trial mounting for all hinges and base plates.

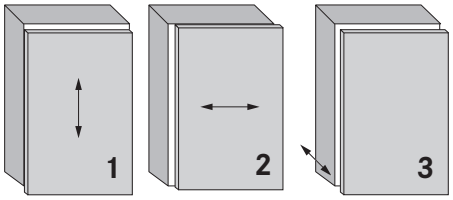
RFI 77 ATTACHMENT

Tiomos Base Plates

For Tiomos hinges



- Steel, nickel plated
- Depth adjustment via worm screw
- Height adjustment via worm screw or elongated hole
- Side adjustment via hinge
- Use a #2 Pozi drive screwdriver for hinge adjustment
- Attach base plates using all available screw holes



Height adjustment via base plate
Via worm screw ± 2mm

Side adjustment ±2mm

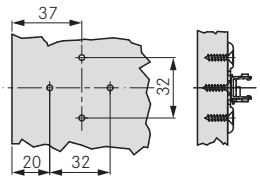
Depth adjustment +3/-2mm

All adjustment options can be made independently of one another

Wing Base Plate, 4 Point Fixing — 37/32 — For Wood Screws



- Height adjustment via worm screw

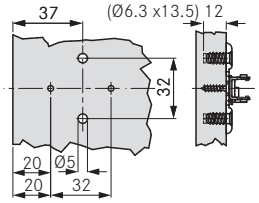


Height	Item No.	PU
0	**F058**139**746**228	150
2	**F058**139**747**228	150
3	**F058**139**748**228	150
3.5	**F058**139**749**217	50

Wing Base Plate, 4 Point Fixing — 37/32 — For Euro Screws



- Height adjustment via worm screw

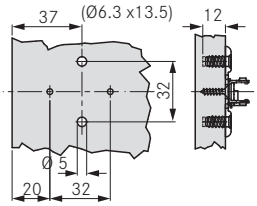


Height	Item No.	PU
0	**F058**139**756**228	150
2	**F058**139**757**228	150
3	**F058**139**758**228	150
3.5	**F058**139**759**228	150

Wing Base Plate, 4 Point Fixing — 37/32 — Pre-mounted Euro Screws (13.5mm)



- Height adjustment via worm screw

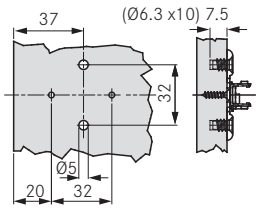


Height	Item No.	PU
0	**F058**139**761**228	150
2	**F058**139**762**228	150
3	**F058**139**763**228	150
3.5	**F058**139**764**228	150

Wing Base Plate, 4 Point Fixing — 37/32 — Pre-mounted Euro Screws (10mm)



- Height adjustment via worm screw
- For twin application



Height	Item No.	PU
0	**F058**139**863**228	150
2	**F058**139**864**228	150
3	**F058**139**865**228	150

PU - Packaging unit

Dimensions in millimeters, fractional inch equivalents as noted.

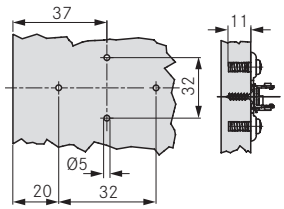
Tiomos Base Plates

For Tiomos hinges

Wing Steel Base Plate, 4 Point Fixing | 37/32 | Expanding Dowels (5mm)



- Height adjustment via worm screw

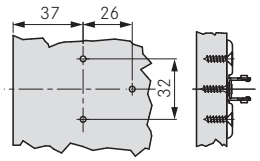


Height	Item No.	PU
0	**F058**139**766**228	150
2	**F058**139**767**228	150
3	**F058**139**768**228	150

Wing Steel Base Plate, 3 Point Fixing | 37/32 | For Wood Screws



- Height adjustment via elongated screw holes

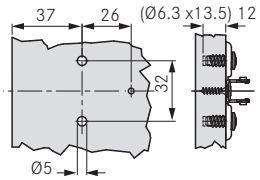


Height	Item No.	PU
0	**F058**139**721**228	150
2	**F058**139**722**228	150
3	**F058**139**723**228	150

Wing Steel Base Plate, 3 Point Fixing | 37/32 | Pre-mounted Euro Screws (13.5mm)



- Height adjustment via elongated screw holes

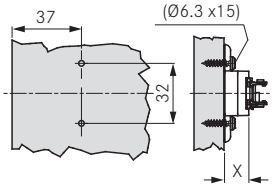


Height	Item No.	PU
0	**F058**139**736**228	150
2	**F058**139**737**228	150
3	**F058**139**738**228	150

Wing Base Plate, 2 Point Fixing | 37/32 | For Wood Screws



- Zinc die-cast/Steel, nickel plated
- Height adjustment via worm screw

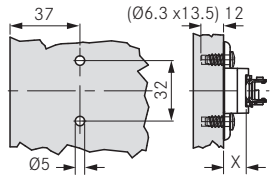


Height	Item No.	PU
6	**F058**139**892**217	50
9.5	**F058**139**888**217	50
12	**F058**139**893**217	50
15	**F058**139**890**217	50
19	**F058**139**894**217	50
21	**F058**139**895**217	50

Wing Base Plate, 2 Point Fixing | 37/32 | Pre-mounted Euro Screws (13.5mm)



- Zinc die-cast/Steel, nickel plated
- Height adjustment via worm screw

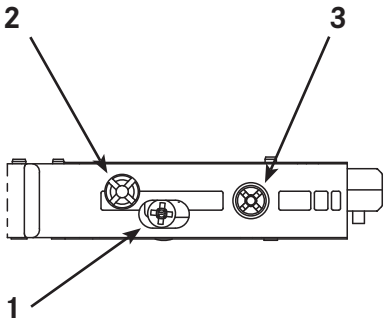


Height	Item No.	PU
6	**F058**139**873**217	50
9.5	**F058**139**882**217	50
12	**F058**139**874**217	50
19	**F058**139**875**217	50
21	**F058**139**896**217	50

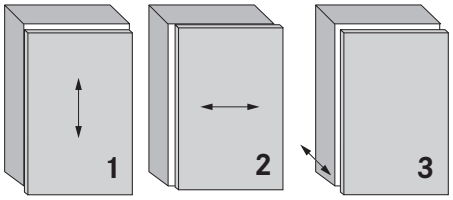
PU - Packaging unit

Tiomos Base Plates

For Tiomos hinges



- Steel, nickel plated
- Height and depth adjustment via worm screw
- Side adjustment via hinge
- Use a #2 Pozi drive screwdriver for hinge adjustment
- Attach base plates using all available screw holes



Height adjustment via base plate
Via worm screw ± 2mm

Side adjustment ±2mm

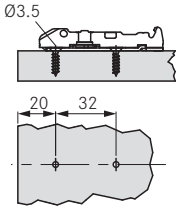
Depth adjustment +3/-2mm

All adjustment options can be made independently of one another

Straight Base Plate, 2 Point Fixing — 20/32 — For Wood Screws



- Height adjustment via worm screw

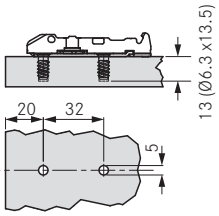


Height	Item No.	PU
0	**F059**139**701**228	150
2	**F059**139**702**228	150
3	**F059**139**703**228	150

Straight Base Plate, 2 Point Fixing — 20/32 — Pre-mounted Euro Screws



- Height adjustment via worm screw



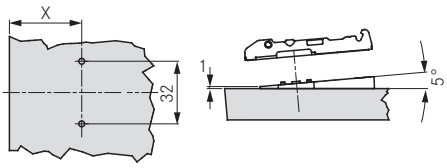
Height	Item No.	PU
0	**F059**139**711**228	150
3	**F059**139**713**228	150

Spacers

+5° Wedge for Screw Fixing — 37/32 — For Wood Screws



- Zinc, nickel plated
- For placing under wing base plates
- Can be stacked (max 3)

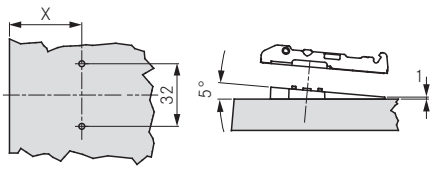


Height	Item No.	PU
	F072135**757**217	50

-5° Wedge for Screw Fixing — 37/32 — For Wood Screws



- Zinc, nickel plated
- For placing under wing base plates
- Can be stacked (max 3)

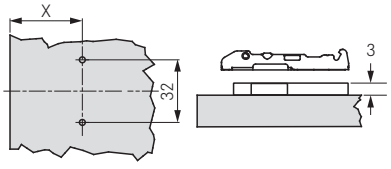


Height	Item No.	PU
	F072135**758**217	50

3mm Universal Spacer — 37/32



- For use with Nexis or Tiomos base plate applications
- Snap-to-fit breakaway section for Nexis applications
- For placing under wing base plates
- Can be stacked (max 2)



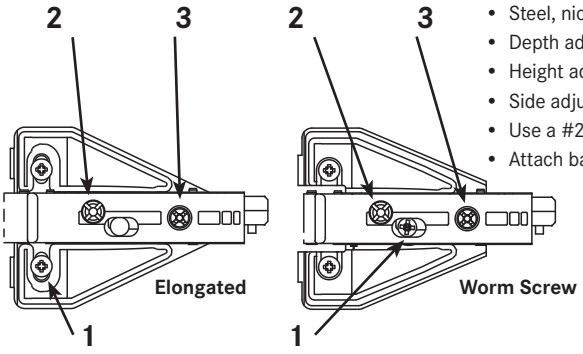
Height	Item No.	PU
3	13461-41	50

PU - Packaging unit

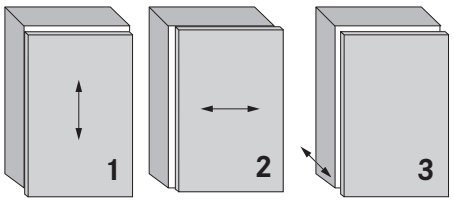
Dimensions in millimeters, fractional inch equivalents as noted.

Tiomos Base Plates

For Tiomos hinges



- Steel, nickel plated
- Depth adjustment via worm screw
- Height adjustment via worm screw or elongated hole
- Side adjustment via hinge
- Use a #2 Pozi drive screwdriver for hinge adjustment
- Attach base plates using all available screw holes



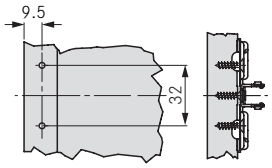
Height adjustment via base plate ± 2mm | Side adjustment ±2mm | Depth adjustment +3/-2mm

All adjustment options can be made independently of one another

FFA Base Plate, 2 Point Fixing — 9.5/32 — For Wood Screws



- Height adjustment via elongated screw holes

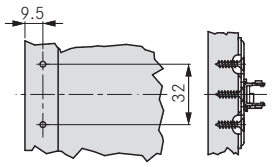


Height	Item No.	PU
1.5	**F058**139**821**228	150
3.5	**F058**139**822**228	150

FFA Base Plate, 2 Point Fixing — 9.5/32 — For Wood Screws



- Height adjustment via worm screw

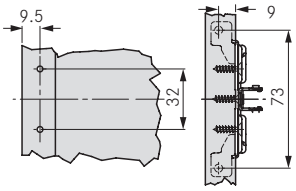


Height	Item No.	PU
1.5	**F058**139**825**228	150
3.5	**F058**139**826**228	150
4.5	**F058**139**827**228	150
5	**F058**139**828**228	150

FFAL Base Plate With Flange, 4 Point Fixing — 9.5/32 — For Wood Screws



- Height adjustment via elongated screw holes



Height	Item No.	PU
3.5	**F058**139**829**228	150

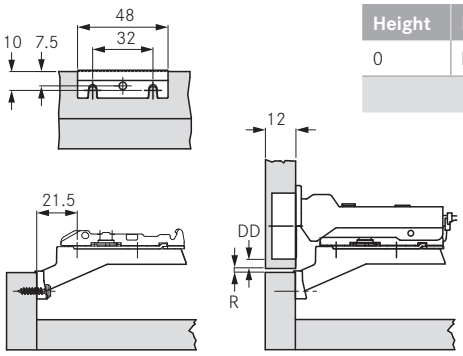
Inset FFA Base Plate, 3 Point Fixing — 10/32 — For Wood Screws



- Steel, diecast, nickel plated
- Height adjustment via worm screw
- Note: Requires a 9.5 crank hinge (half-overlay)

Drilling Distance (DD)

Door Thickness (DT)	3	4	5	6
28	4.0			
26	4.0	3.0		
24	4.0	3.0	2.0	
22	4.0	3.0	2.0	1.0
20	4.0	3.0	2.0	1.0
19	4.0	3.0	2.0	1.0
18	4.0	3.0	2.0	1.0
16	4.0	3.0	2.0	1.0
	Reveal (R)			



Height	Item No.	PU
0	**F058**139**831**228	150

PU - Packaging unit

Tipmatic

For handle-free wooden doors

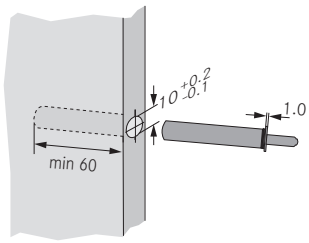


- Gently tapping the front causes the doors to open to a convenient angle
- Use with Tiomos 110 Tipmatic Plus or with Nexis and Tiomos free-swinging hinges
- Large magnet catch range – holds door closed securely
- Gap adjustment from 2.5 to 5.5mm with integrated, self-locking and tool-free depth adjustment feature
- Mount on the front side of the cabinet or with an adapter plate

Tipmatic Pin — For Drilling



- Incl. Tipmatic mechanism:
  - Stick on strike plate
  - Screw on strike plate
- Hole drilled from the front
- Plastic RAL 7036, platinum grey

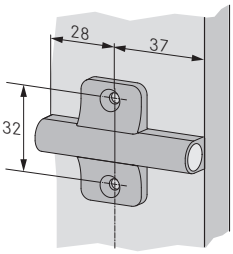


Item No.	PU
F069135**396**513	25

Adapter Plate for Line Boring — For Euro Screws



- Suitable for line boring 28 and 37mm
- Attach with Euro screws (6.3 x 13.5)
- Plastic RAL 7035, light grey

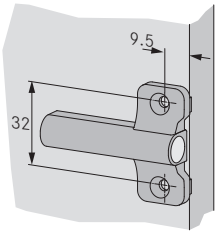


Item No.	PU
F069063**310**213	25

Face Frame or Standard Adapter Plate — For Wood Screws



- Quick upgrade installation
- Attach with wood screws (3.5 x 13)
- Plastic RAL 7035, light grey

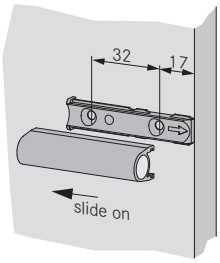


Item No.	PU
F069073**697**213	25

Linear Adapter Plate — For Wood Screws



- Design solution – also suitable for inset door applications
- Attach with wood screws (3.5 x 13)
- Plastic RAL 7035, light grey



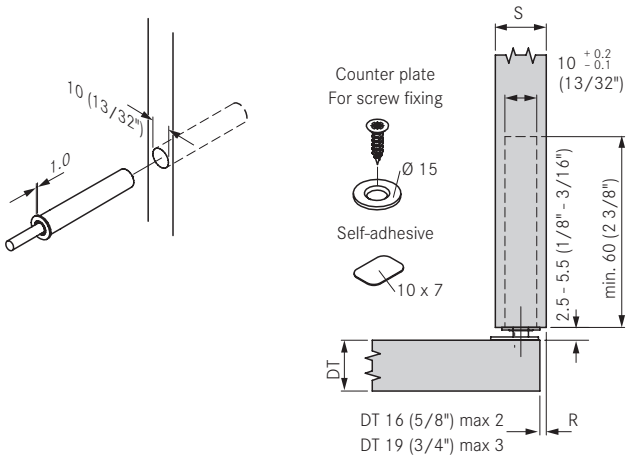
Item No.	PU
F069149**398**523	25

PU - Packaging unit

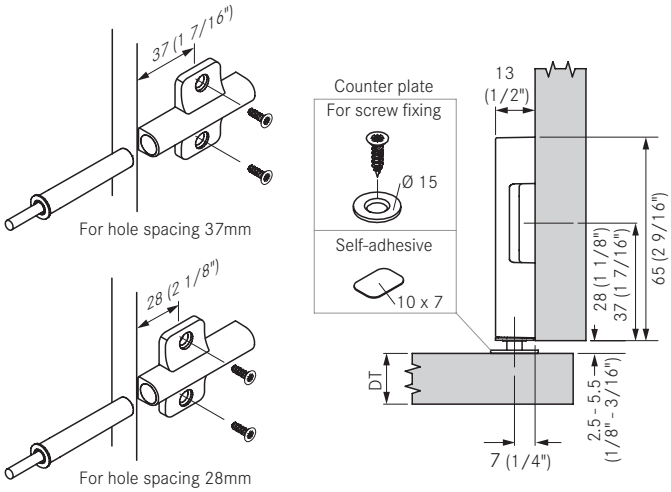
Dimensions in millimeters, fractional inch equivalents as noted.

Mounting Dimensions

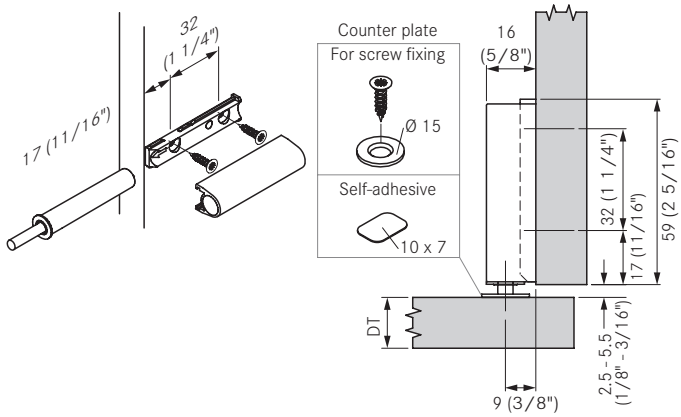
Tipmatic Pin



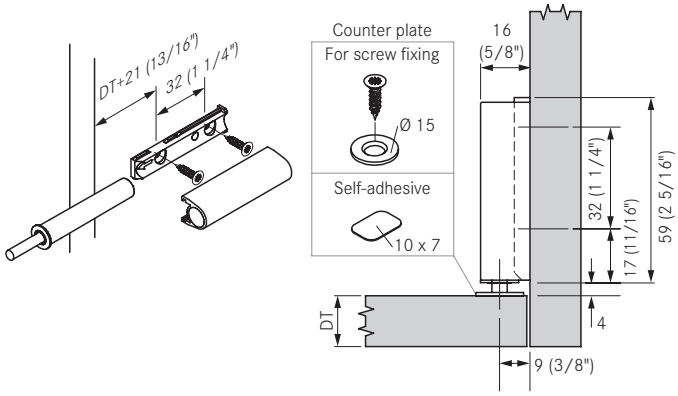
Adapter Plate for Line Boring



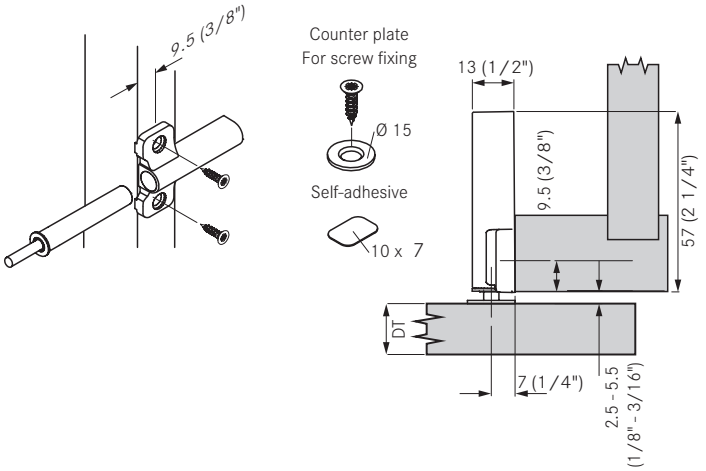
Linear Adapter Plate, Overlay



Linear Adapter Plate, Inset



Face Frame Plate



Legend

DT = Door Thickness

R = Reveal

S = Cabinet Sidewall

RFI 77 ATTACHMENT

Tiomos Flap Hinge

90° hinge for flap door



- Sleek modern design
- 90° opening angle
- For flap thicknesses of up to 30mm (1 3/16")
- Narrow joint
- Large overlay of up to 19mm (3/4")
- 3-dimensional adjustment
- Compatible with Tipmatic pin system
- Compatible with Kinvaro D-M/D-S flap system



Tiomos Flap Hinge Opening Angle 90° — **Screw-On**

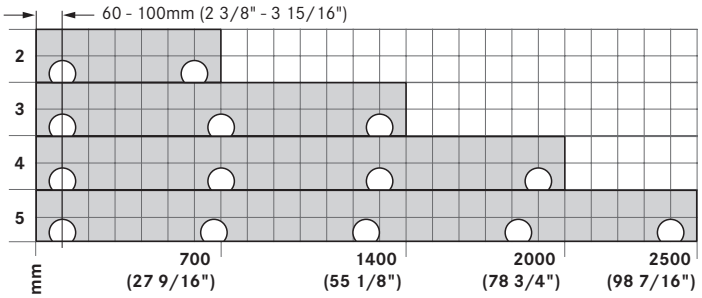
Overlay	For Flap Thickness 14-21mm	Color	Cup Depth	Item No.	PU
	Hinge: zinc die-cast, nickel-plated	Nickel	12mm	**F053**139**671**223	100
	Hinge: zinc die-cast, night	Night	12mm	**F053**139**677**223	100

Overlay	For Flap Thickness 22-28mm	Color	Cup Depth	Item No.	PU
	Hinge: zinc die-cast, nickel-plated	Nickel	17mm	**F053**139**672**223	100
	Hinge: zinc die-cast, night	Night	17mm	**F053**139**678**223	100

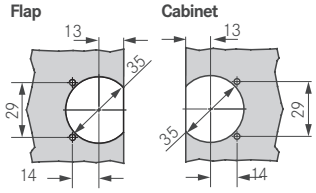
Cover Cap for Flap Hinge		Item No.	PU
	Steel, nickel plated	**F053**139**675**223	100
	Steel, night	**F053**139**683**223	100

1.5mm Spacer for Tiomos Flap Hinge		Item No.	PU
	Steel, nickel plated	**F053**139**676**223	100
	Steel, night	**F053**139**684**223	100

Number of Hinges per Door



Drilling Pattern



PU - Packaging unit

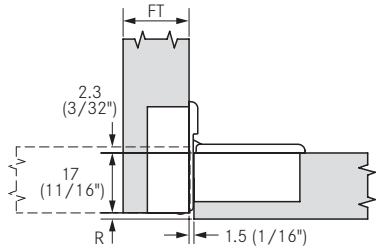
Dimensions in millimeters, fractional inch equivalents as noted.

RFI 77 ATTACHMENT

Tiomos Flap Hinge

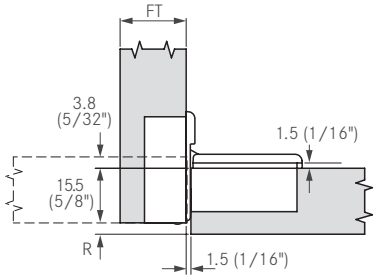
90° hinge for flap door

Overlay, Without Spacer, 12mm Cup Depth



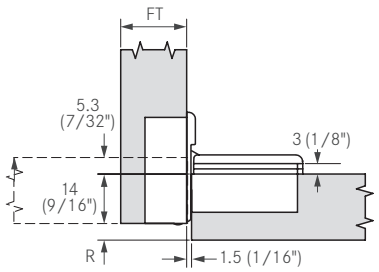
Flap Thickness (FT)								
	21	20	19	18	17	16	15	14
Min Reveal (R)	2.5	1.5	1	1	1	1	1	1

Overlay, with 1 Spacer, 12mm Cup Depth



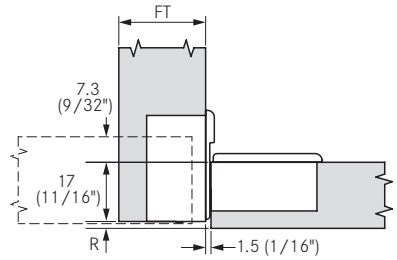
Flap Thickness (FT)								
	21	20	19	18	17	16	15	14
Min Reveal (R)	2.5	1.5	1	1	1	1	1	1

Overlay, with 2 Spacers, 12mm Cup Depth



Flap Thickness (FT)								
	21	20	19	18	17	16	15	14
Min Reveal (R)	2.5	1.5	1	1	1	1	1	1

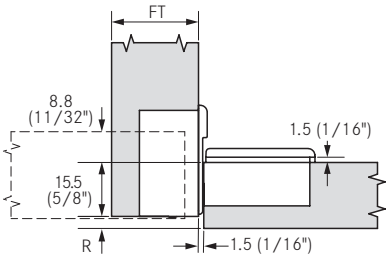
Overlay, Without Spacer, 17mm Cup Depth



Flap Thickness (FT)									
	30	29	28	27	26	25	24	23	22
Min Reveal (R)	6.5	5.5	4.5	3.5	2.5	1.5	1	1	1

Note: Hinge dimensions and reveal calculation based on factory setting.

Overlay, with 1 Spacer, 17mm Cup Depth

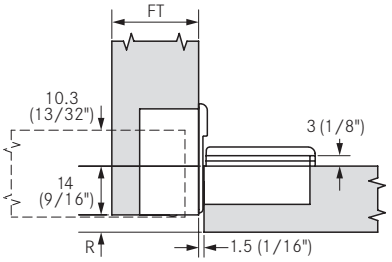


Flap Thickness (FT)									
	30	29	28	27	26	25	24	23	22
Min Reveal (R)	6.5	5.5	4.5	3.5	2.5	1.5	1	1	1

IMPORTANT

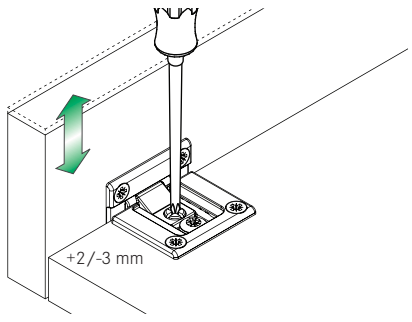
To determine the correct application Grass strongly recommends a trial mounting for all hinges and base plates.

Overlay, with 2 Spacers, 17mm Cup Depth

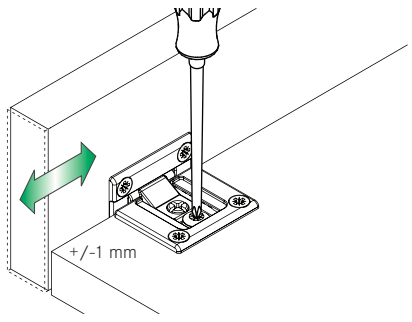


Flap Thickness (FT)									
	30	29	28	27	26	25	24	23	22
Min Reveal (R)	6.5	5.5	4.5	3.5	2.5	1.5	1	1	1

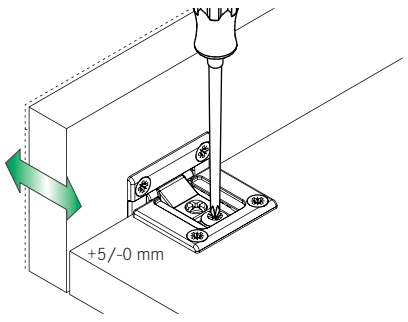
Height Adjustment



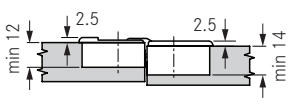
Side Adjustment



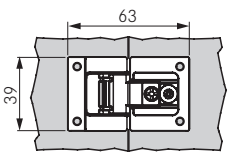
Depth Adjustment



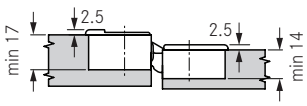
Cup Dimensions, 12mm Cup Depth



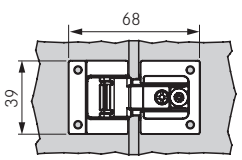
Hinge Dimensions, 12mm Cup Depth



Cup Dimensions, 17mm Cup Depth



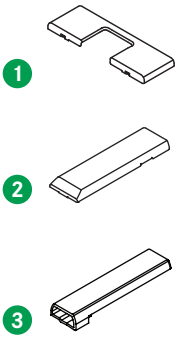
Hinge Dimensions, 17mm Cup Depth



Accessories and Assembly Aids

Tiomos

Cover Caps



Hinge Cup Cover Cap:
- Steel, nickel plated, without imprint

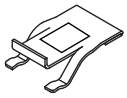
Hinge Arm Cover Cap Long:
- Steel, nickel plated, without imprint
- Imprinting available upon special request

Hinge Arm Cover Cap with Clip Protection:
- Plastic, black, without imprint
- Also serves as clip protection for the back release

	Description	Item No.	PU
1	Hinge cup cover cap	**F072**135**503**228	150
2	Hinge arm cover cap	**F072**135**500**247	1000
3	Cover Cap with Clip Protector	**F072**140**504**247	1000

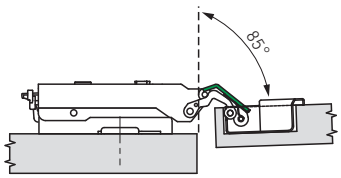
Angle Reduction Clips

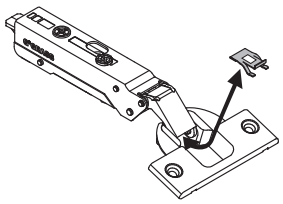
Angle Reduction Clip to 85°

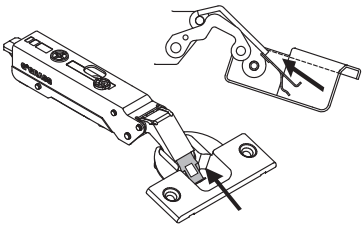


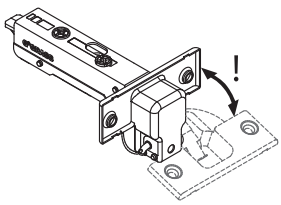
Works for all Tiomos 110° and 120° standard hinges. Reduces the opening angle to 85° to prevent doors from bumping fronts or walls in corner installations.

Description		Item No.	PU
Angle reduction clip, 85°	Steel, nickel	**F072**135**751**517	50

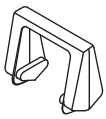






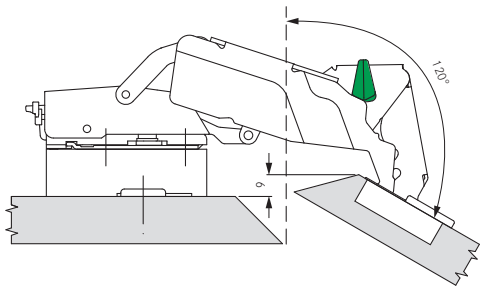


Angle Reduction Clip to 120°



Works for all Tiomos 155° standard hinges. Reduces the opening angle to 120° to prevent doors from bumping the cabinet side in inset and mitered corner applications.

Description		Item No.	PU
Angle reduction clip, 120°	Plastic, black	**F072**135**753**517	50



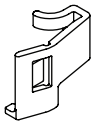
PU - Packaging unit

Dimensions in millimeters, fractional inch equivalents as noted.

Accessories and Assembly Aids

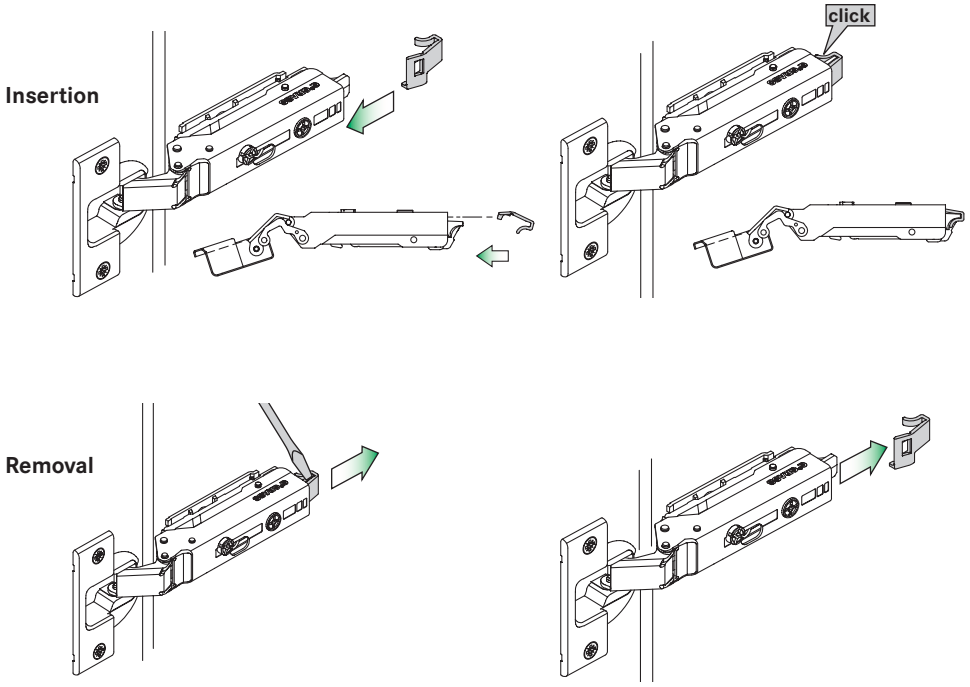
Tiomos

Hinge Clip Protector

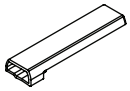


Prevents accidental release of the hinge from the base plate. For use in lockers, wardrobes, office furniture or similar applications.

Description		Item No.	PU
Hinge clip protector	Plastic, grey	**F072**135**807**540	500

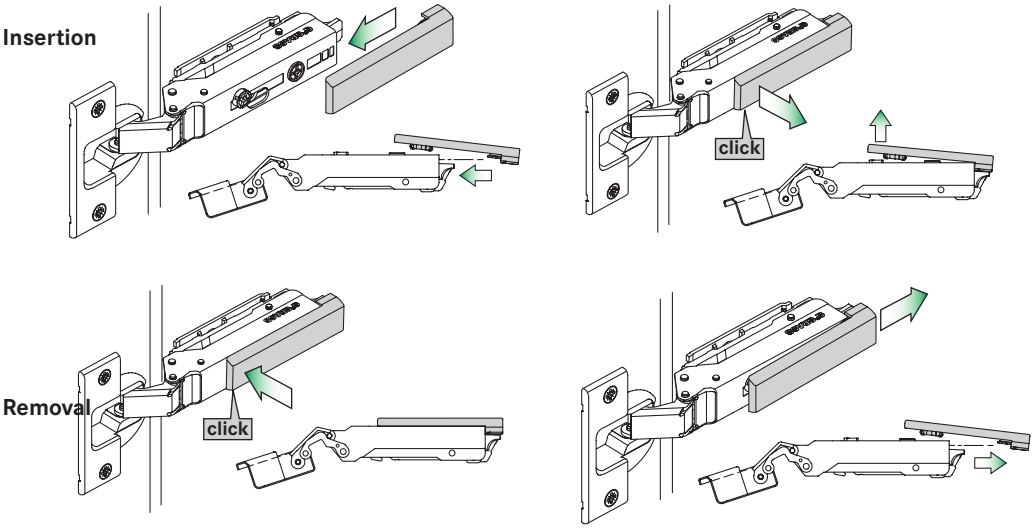


Cover Cap with Clip Protector



Prevents accidental release of the hinge from the base plate. For use in lockers, wardrobes, office furniture or similar applications.

Description		Item No.	PU
Cover Cap with Clip Protector	Plastic, black	**F072**140**504**247	1000



Accessories and Assembly Aids

Tiomos

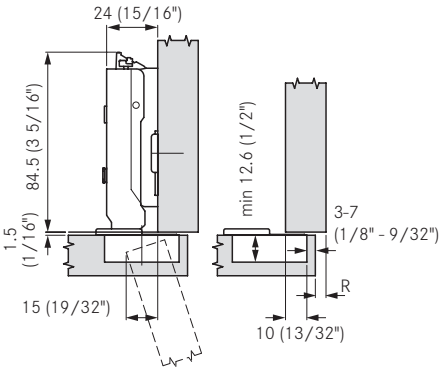
Tiomos Spacer Ring



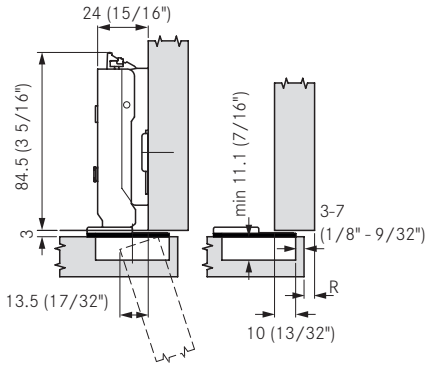
- Permits the use of standard hinges for thinner doors
- Simple installation
- Can be double-stacked
- Suitable for all Tiomos hinges

Description	Item No.	PU
Tiomos spacer ring, 1.5 height	**F072**135**885**228	150

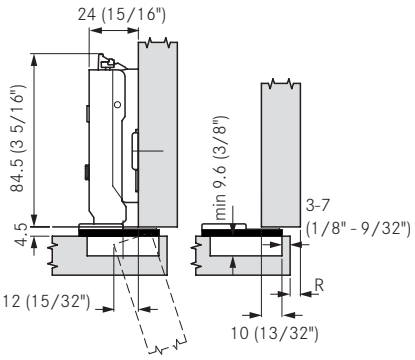
Without Spacer Ring



1 Spacer Ring

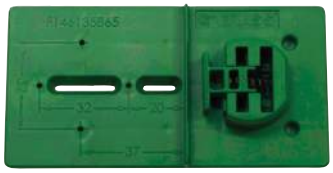


2 Spacer Rings



Tiomos Marking Aids

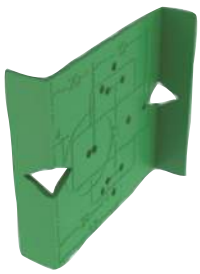
Tiomos Marking Jig



- Easy to use
- Cup distance 3-5mm
- Hinge cup positioning
- Straight base plate positioning
- Wing base plate positioning

Description	Item No.	PU
Tiomos marking jig	**F146**135**865**202	1

Tiomos Marking Template



Easy marking and pre-drilling for:

- 45mm pattern hinges
- Wing base plates
- Straight base plates

Description	Item No.	PU
Tiomos marking template	**F146**135**787**217	1

PU - Packaging unit

Dimensions in millimeters, fractional inch equivalents as noted.

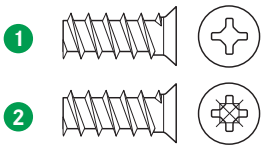
RFI 77 ATTACHMENT

Tiomos

Screws and Dowels

Euro Screw, Nickel-plated





	Description	Item No.	PU
1	13mm Euro Screw (1/2")	81015-43	500
	18mm Euro Screw (11/16")	83000-43	500
	7.5mm Euro Screw (5/16")	83001-43	500
2	Euro Screw 11mm (7/16") Pozi	499.360.61.1015	500
	Euro Screw 13mm (1/2") Pozi	499.360.61.3015	500

Wood Screw, Nickel-plated

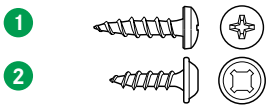




Description	Item No.	PU
#6 x 1/2" FHP, NI	81014-43	500
#6 x 5/8" FHP, NI	81001-43	500
#6 x 3/4" FHP, NI	81003-43	500
#6 x 1" FHP, NI	81004-43	500

Wood Screw, Nickel-plated

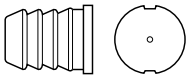




	Description	Item No.	PU
1	#10 x 3/4" PHP	81007-43	500
2	#8 x 5/8" Quad Round	81017-43	500

Dowels, Plastic





Description		Item No.	PU
Dowel, TEC Hinge	8mm	00102-43	500
Spax screw for TEC Hinge Dowel		02445-43	500
Dowel, Nexis	8mm	**F069**073**390**256	500
Dowel, Tiomos	8mm	**F072**135**773**247	1000
Dowel, VZ Hinge Cup	8mm	04885-43	500
Dowel, Zargen / ZBox	10mm	05853-42	100
Dowel and screw set Zargen	10mm	12768-37	1
Dowel, base plate	10mm	05404-43	500
Dowel, pilaster dowel	8mm x 16mm	00395-43	500

Pozidrive Screwdriver



#2 Pozidrive screwdriver for hinges

Description	Item No.	PU
Pozidrive screwdriver	98000-01	1
Pozidrive screwdriver	98000-08	50

Accessories and Assembly Aids

Tiomos

Shelf Supports





	Description	Item No.	PU
1	H-802 plastic, square, clear	00036-43	500
2	Shelf support 7006/9.5, nickel	**F069**073**460**253	2500

Bumper Pads

Bumper Pads, Self-adhesive



Description	Height	Diameter	Item No.	PU
Bumper pad, clear	2.5mm	10mm	63407-99	288
Bumper pad, clear	2.5mm	10mm	63407-47	7200

AirSoft Bumper Pads, Self-adhesive



Description	Height	Diameter	Item No.	PU
AirSoft Bumper pad, clear	5mm	12.7mm	63481-43	500
AirSoft Bumper pad, clear	5mm	12.7mm	63483-30	5000

Bumper Pads, Self-adhesive



Description	Height	Diameter	Item No.	PU
Bumper pad, clear	4mm	12mm	630.000.02.1250	5000

Bumper Pads, Self-adhesive



Description	Height	Diameter	Item No.	PU
Bumper pad, clear	3mm	12.7mm	31002-43	500
Bumper pad, clear	1.5mm	12.7mm	31004-43	500

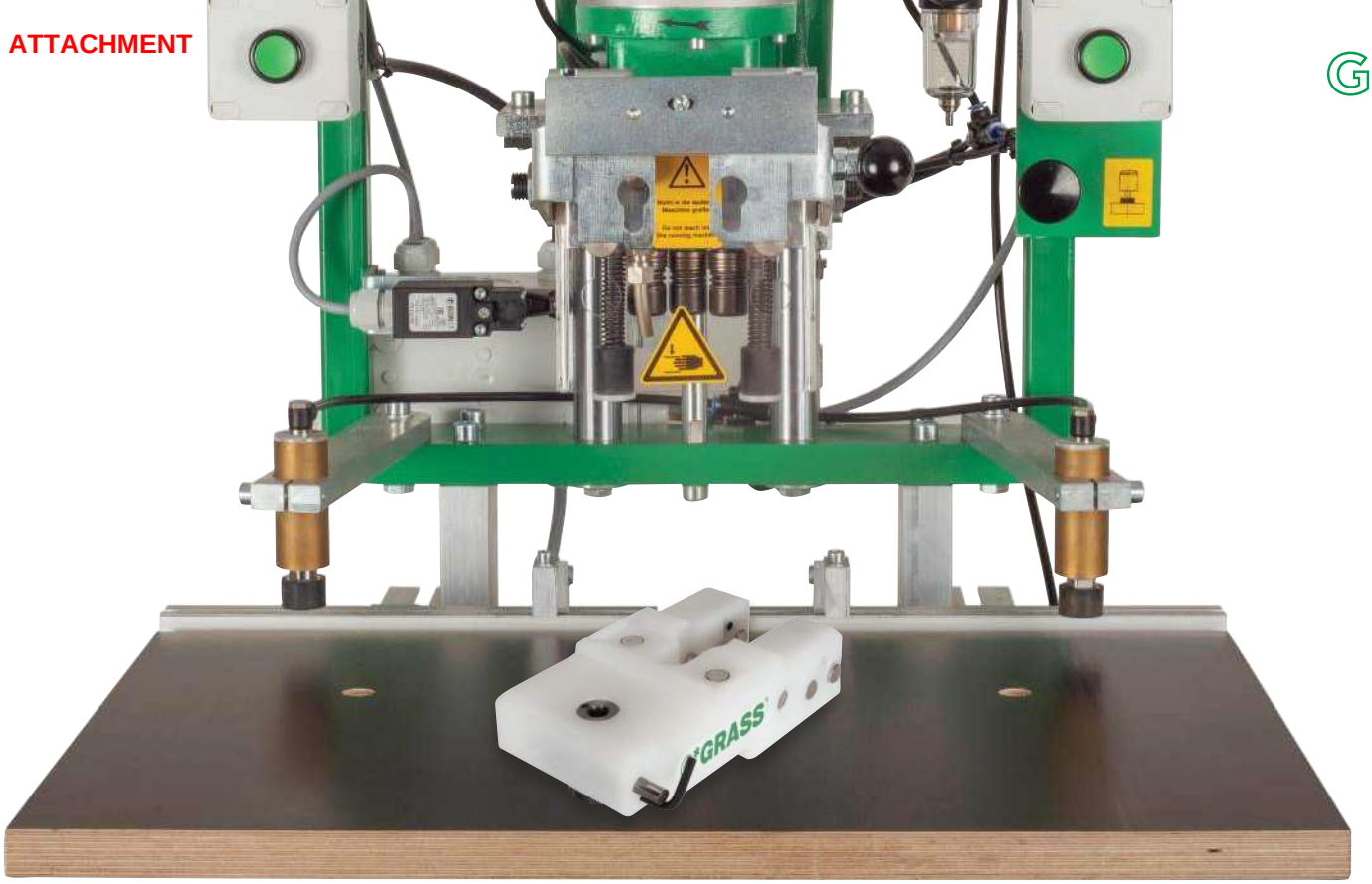
Door Stop



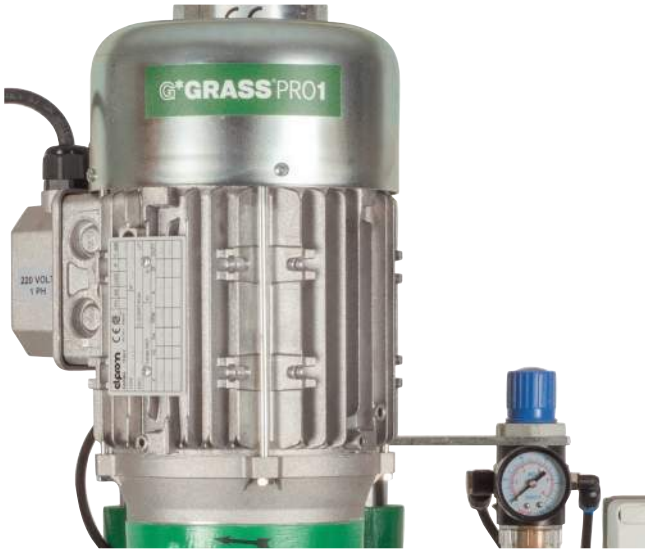
Description	Item No.	PU
H-950 door stop, clear	00068-43	500

PU - Packaging unit

Dimensions in millimeters, fractional inch equivalents as noted.



GRASS PRO1 drilling and insertion machine for 45mm boring pattern



One machine can do the job. Whether it's drilling, boring, or inserting for hinges or installing slides for drawer boxes, GRASS PRO1 has it covered. Constructed from the highest quality materials and precision assembled, the GRASS PRO1 is designed for the demands of everyday use. Designed for use with Grass products, every unit is supported by Grass technicians and engineering.

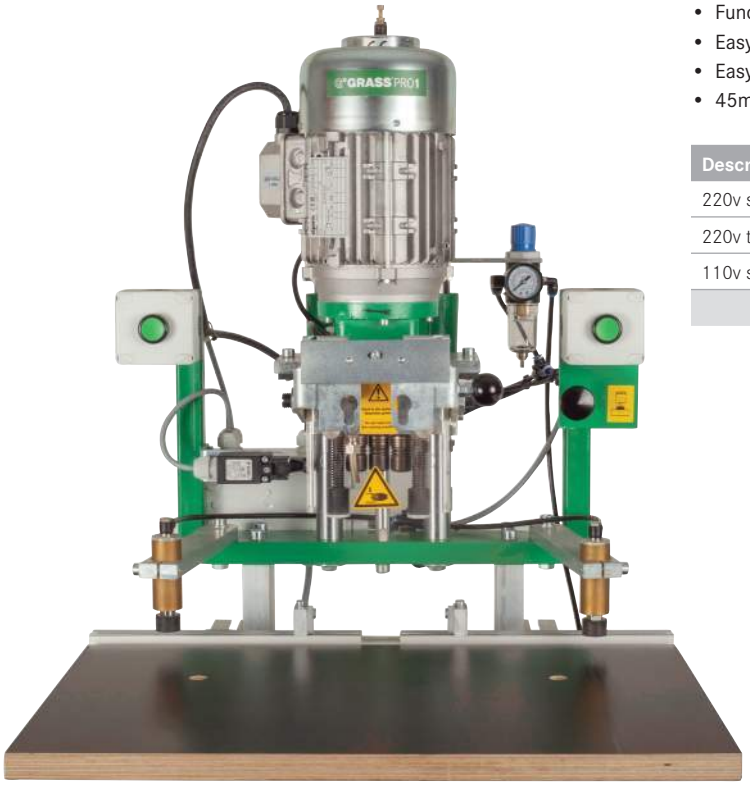
- Bore depth automatically adjusts to material thickness
- Functional design
- Easy, fast and efficient operation
- Easy maintenance

RFI 77 ATTACHMENT

Machinery

GRASS PRO1 drilling and insertion machine for 45mm boring pattern

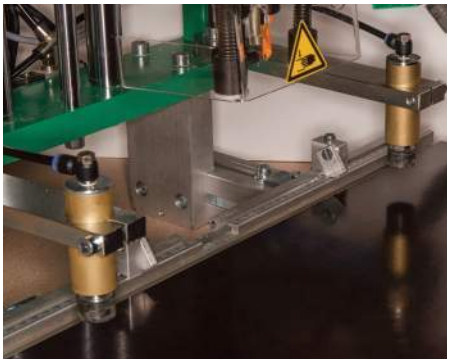
GRASS PRO1



- Depth stop can be adjusted to material thickness
- Functional design
- Easy, fast, and efficient operation
- Easy maintenance
- 45mm boring pattern

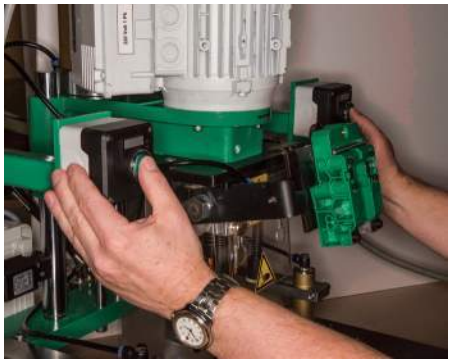
Description	Item No.	PU
220v single phase pneumatic	94559-01	1
220v three phase pneumatic	94560-01	1
110v single phase pneumatic	94561-01	1

GRASS PRO1 Features



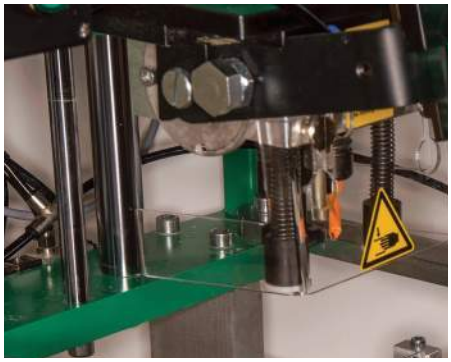
Adjustable hold-down devices

Adjustable hold-down devices are suitable for a wide range of material thicknesses.
Holds door firmly in place for drilling and insertion and features manual release.



Pneumatic controls

Two-hand start button controls for safe drilling and insertion functions.



Quick change chucks

Easy drill bit removal and insertion using quick change chucks.

PU - Packaging unit

Dimensions in millimeters, fractional inch equivalents as noted.

RFI 77 ATTACHMENT

Machinery

GRASS PRO1 accessories

Drill Bits





	Description	Direction	Item No.	PU
1	35mm bit	RH	00077-01	1
2	8mm bit	LH	00160-01	1
	American Bit Set for Hinge Drilling		00213-01	1

Set consists of:

1 - 35mm bit, RH

2 - 8mm bit, LH

Fence Stops





	Description	Item No.	PU
1	Additional fence stop	949.200.21.0000	1
2	Universal fence stop	949.200.21.0100	1

Insertion Dies









	Description	Item No.	PU
1	Tiomos Universal Insertion Die 110°/120°/160°	80039	1
2	TEC Insertion Die	92617	1
3	Nexis Insertion Die 110°/125°	04216-01	1
4	Nexis Insertion Die 170°	04218-01	1

Extension Fence



Description	Item No.	PU
Extension fence 300mm to 1550mm	88612-01	1

PU - Packaging unit

RFI 77 ATTACHMENT

G*GRASS®

GRASS America Inc.
1202 NC Highway 66 South
Kernersville, NC 27284

Phone: 1-800-334-3512
Fax: 1-800-525-8406

www.grassusa.com
info@grassusa.com

TÜV SÜD ISO 9001

Item #02006-TC-2.5M-JSKH-11/22 OL_V1_02/23)

RFI 89

SUBSTITUTION REQUEST
(During the Bidding/Negotiating Phase)

CSI®

PROJECT: Greenwich Central Middle School

SUBSTITUTION REQUEST NUMBER: 1

FROM:

TO: Turner Construction

DATE: 10/10/24

A/E PROJECT NUMBER:

RE:

CONTRACT FOR:

SPECIFICATION TITLE: Metal Lockers

DESCRIPTION: Metal Locker & Bench

SECTION: 10 5113

PAGE: 2,3,4

ARTICLE/PARAGRAPH: 2.1-A, 2.2-A, 2.2-B 2.2-C, 2.4-A

PROPOSED SUBSTITUTION: Metal Lockers & Bench

MANUFACTURER: List Industries **ADDRESS:** Deerfield Beach, FL **PHONE:** 1-800-776-1342

TRADE NAME: Metal Lockers & Benches **MODEL NO.:** Classmate Corridor Bench Tops & Pedistals

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.
Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The Undersigned certifies:
- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

SUBMITTED BY:

SIGNED BY:

FIRM:

ADDRESS:

TELEPHONE:

A/E's REVIEW AND RECOMMENDATION:

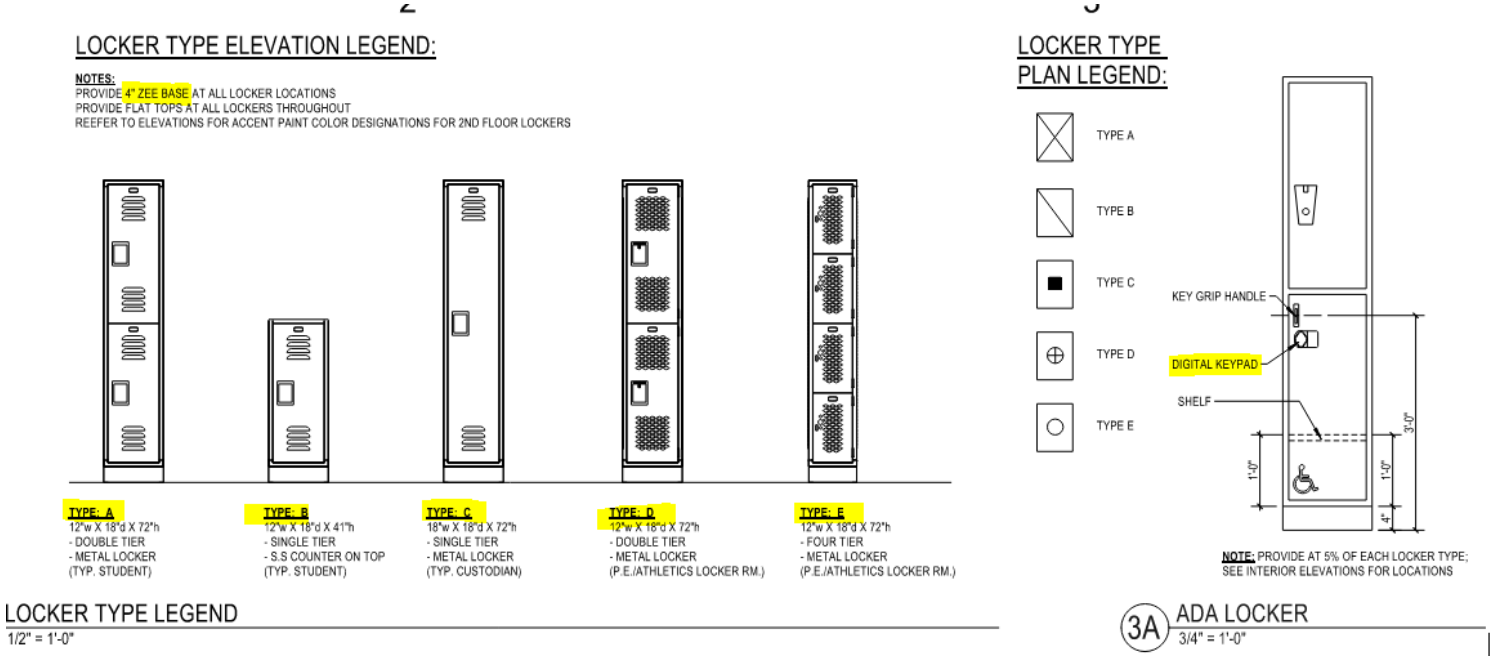
- ☐ Approve Substitution—Make submittals in accordance with Specification Section 01 33 00 Submittal Procedures.
- ☒ Approve Substitution as noted—Make submittals in accordance with Specification Section 01 33 00 Submittal Procedures.
- ☐ Reject Substitution—Use specified materials.
- ☐ Substitution Request received too late—Use sp

LOCKERS - Needs to be able to meet the A911 Color requirements(does not acknowledge project specific colors). Product needs to meet all Accessibility requirements in the Specification including Built-In Digital Keypad Locking (information missing)
BENCHES - See comments

SIGNED BY: Stephen Martocchio - SLAM **DATE:** 10/30/24

SUPPORTING DATA ATTACHED: ☑ Drawings ☑ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____

RFI 89



FROM A911

3. Substitutions: See Section 01 6000 - Product Requirements.

2.2 LOCKER APPLICATIONS

A. Student Lockers: **Types A and B**. Metal lockers, free-standing with matching closed base.
   1. Width: 9 inches 12 inches.
   2. Depth: 15 inches 18 inches.
   3. Height:
      a) Type A: 72 inches.
      b) Type B: 40 inches, nominal.
   4. Configurations: As indicated below.
      a) **Type A**: Four-tier. DOUBLE
      b) **Type B**: Single-tier.
   5. Fittings: Size and configuration as indicated on drawings.
      a) Provide additional shelf for accessibility compliance, as indicated on drawings. Provide at 5% of each locker type, or (1) minimum, whichever is greater.
      b) Hooks: One single prong.
   6. Ventilation: Louvers at top and bottom of door panel.
   7. Locking: Recessed lift handles with built-in padlock hasp.
      a) Accessible Lockers: Provide a built-in digital keypad lock.
   8. Provide sloped top, to the extent indicated on drawings.
   9. Color: To be selected from manufacturer's full range by Architect and allow for (3) additional custom accent colors, as indicated on the "Finish Product List - Finishes for Miscellaneous Items" on the drawings.

B. Custodial Lockers: **Type C**. Metal lockers, free-standing with matching closed base.
   1. Width: 18 inches.
   2. Depth: 18 inches.
   3. Height: 72 inches.
   4. Configuration: Single tier.
   5. Fittings: Size and configuration as indicated on drawings.
      a) Hat shelf.
      b) Hooks: One single prong.

4. Metal Lockers
   a. General Lockers: Basis of Design, Penco, Canvas 054, Interior and any exposed sides of locker to match exterior paint color.
   b. Color Accent Lockers at Right Side Classroom Pod: Custom Color to Match P10, interior of locker any exposed sides to match exterior paint color.
   c. Color Accent Lockers at Center Classroom Pod: Custom Color to Match P11, interior of locker any exposed sides to match exterior paint color.
   d. Color Accent Lockers at Left Side Classroom Pods: Custom Color to Match P12, interior of locker any exposed sides to match exterior paint color.
   e. Athletic Rooms: Basis of Design; Penco 052 Reflex Blue, To be selected from manufacturer's full range, interior of locker to match exterior paint color. Flat top and exposed sides to match exterior paint color.
   f. Custodial Room: Basis of Design; Penco 052 Reflex Blue, To be selected from manufacturer's full range, interior of locker to match exterior paint color. Flat top and exposed sides to match exterior paint color.

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Approved Substitution - SLAM

SUPERIOR®
Bench Top and Pedestal Specifications

Maple

Benchtops: To be 9-1/2" wide x 1-1/4" thick and made from laminated ~~hardwood~~. Benchtops are to be finished with one coat deep penetrating sealer and two coats of heavy body high impact hot hydraulically applied lacquer. Benches up to 8'-0" in length have two pedestals. Benchtops longer than 8'-0" up to 12'-0" are supplied with three pedestals.

No. 4805 Heavy-Duty Steel Pedestal: Fabricated from 1-1/2" diameter 14 gauge steel tube welded to top and bottom 11 gauge formed flanges. Each flange to have three anchoring holes. Color: #729 Parchment.

No. 4810 Extra Heavy Duty Cast Iron Pedestal: One piece cast iron pedestal to include 6" diameter top and bottom flanges. Each flange to have three anchoring holes. Multiple piece constructed pedestal are not acceptable. Color #729 Parchment.

No. 4820 Standard Moveable Pedestal: Fabricated of extruded aluminum providing four anchoring holes at bottom. Pedestal is designed to be moveable type if desired. Color #729 Parchment.

No. 4825 Stainless Steel Pedestal: Fabricated from 16 gauge stainless steel. Pedestal is designed to be moveable but includes 4 holes for anchoring to floor if desired. Unpainted

No. 8032 Pedestal: Adjustable height pedestal consisting of a cast aluminum base, threaded pipe nipple and steel pipe flange at the top. Anchoring thru the cast aluminum base is concealed.
Color #729 Parchment.

UNIBODY ALL-WELDED CORRIDOR LOCKERS

WHAT IS UNIBODY ALL-WELDED?

- Superior unibody all-welded corridor lockers include our double vertical frame design adding strength, integrity, durability and visual appeal.
- First we start with prime grade cold rolled sheet steel. 16 gauge for all body components except backs which are 18 gauge. Doors are heavy 14 gauge.
- Sides are formed to be an integral part of the front vertical locker frame which locks into the bottom for precise alignment and added strength.
- We MIG weld an additional channel shaped vertical frame member between doors providing a continuous door strike at both the hinge and latch side of the door.
- The top and bottom are flanged downward at the front to form a 1-1/2" high channel shaped top and bottom horizontal frame member continuous across the multiple column unit up to 60" wide.
- The base is a full 1-1/2" high keeping locker contents away from moisture on the floor and/or wood/concrete base.
- Front-to-back channel stiffeners are welded into the base under each side panel providing a strong anchor bearing surface for installation and increasing overall unit strength.
- Horizontal tier dividers for double and triple tier models project through to the face of the locker forming a horizontal cross member between doors for maximum strength.
- Guaranteed in writing by our lifetime warranty.

THE CLASSMATE™ CORRIDOR LOCKERS

Our unique double frame, unibody all-welded design provides a durable locker with a classic appearance that is backed by our life-time warranty.



Single Tier 3-Wide

Double Tier 3-Wide

Triple Tier 3-Wide



UPGRADE

INTEGRAL SLOPE TOP *is fabricated of heavy 16 gauge steel, runs continuous across a multiple column unit and is MIG welded at the factory replacing welded locker unit flat top. Sides are sloped at top providing rigid support beneath the slope top between each locker column.*



UPGRADE

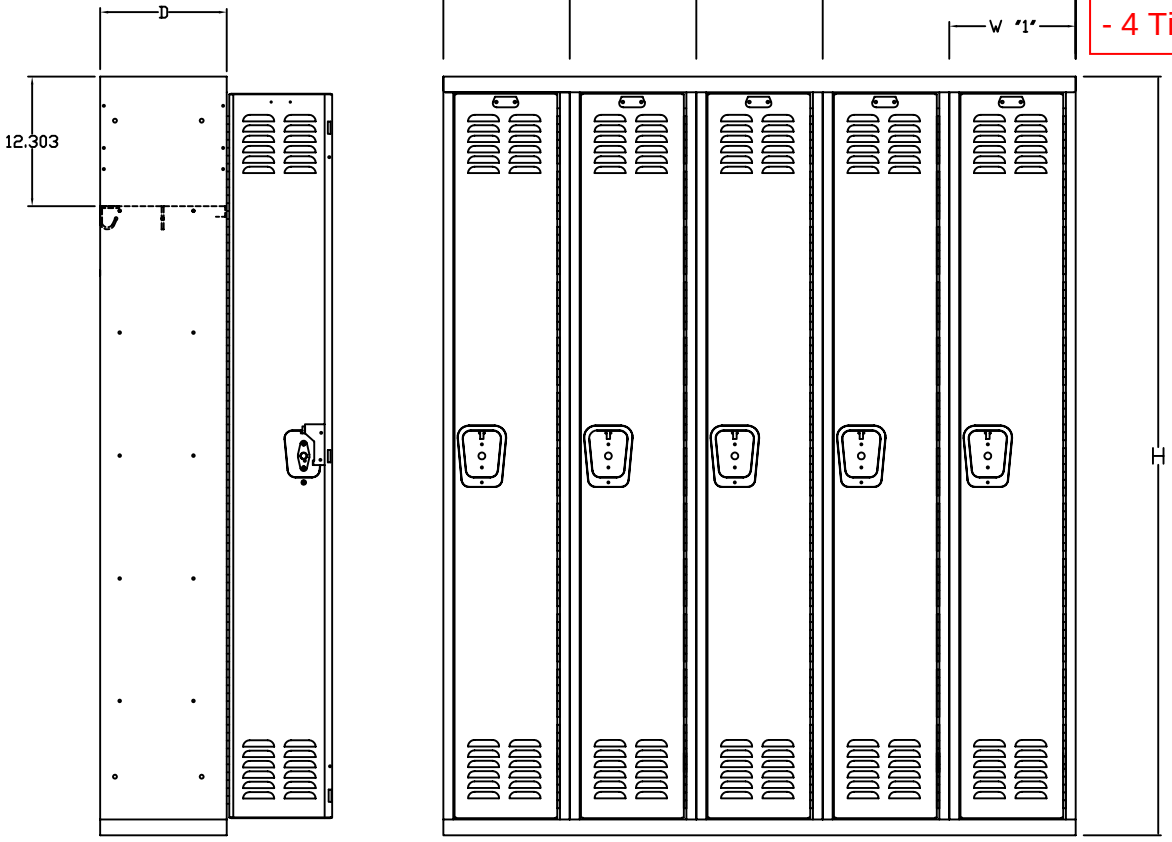
PREMIER SERIES CLASSMATE *which includes a 3" wide 18 gauge full height door stiffener spot welded to the inner door face and MIG welded to the hinge side as well as to the top and bottom door flanges providing a rigid torque-free door. A 1-1/2" wide stiffener will be furnished for 9" wide Premier doors. 18" and 24" all-welded lockers are only available in Premier Series.*

FOR MORE INFO GO TO LISTINDUSTRIES.COM

RFI 89

LIST "CLASSMATE" WELDED SINGLE TIER LOCKER (9" TO 15") (PRODUCT No. LUC _ _ _ -1)

ELEVATION ' '



SIDE VIEW

FRONT VIEW

Lockers can also be:
- 2 Tier
- 3 Tier
- 4 Tier

LOCKER DETAILS:

EXTERIOR COLOR =
INTERIOR COLOR = SAME AS EXTERIOR
TOP =
HANDLE = LIFT (S.S. RECESSED DRAWN)
DOOR VENTILATION = 3" LOUVER
SIDE VENTILATION = SOLID
BASE =
LOCKS =
HINGE = 16ga. CONTINUOUS PIANO TYPE HINGE WELDED TO DOOR & RIVETED TO FRAME

CONTRACTOR NOTE

ALL CONCRETE BASES SHOULD BE LEVEL AND TROWELED SMOOTH TO ASSURE PROPER INSTALLATION OF THE LOCKERS. ALL FLOORING MATERIAL ATTACHED TO THE FACE OF THE BASE SHOULD BE RECESSED AT LEAST 1/4" FROM THE TOP EDGE OF THE BASE. LOCKERS MUST BE ANCHORED TO WALL.

GAUGES

DOOR =	14 GA., C.R.S.
FRAME =	16 GA., C.R.S
TOP =	16 GA., C.R.S.
BOTTOM BASE =	16 GA., C.R.S.
SHELVES =	16 GA., C.R.S.
SIDES =	16 GA., C.R.S.
BACKS =	18 GA., C.R.S.

LATCHING: (WARDROBE) THREE POINT RECESSED ON LOCKER DOORS 48" AND OVER, TWO POINT RECESSED ON ON LOCKER DOORS 36" TO 20". AUTOMATIC LOCKING DEVICE WITH LIFT-TYPE PADLOCK HASP.

SUPERIOR

THIS DRAWING AND THE INFORMATION ON IT IS THE CONFIDENTIAL PROPERTY OF LIST INDUSTRIES, INC. AND SHALL NOT BE COPIED OR DISCLOSED TO OTHERS WITHOUT WRITTEN PERMISSION. ONLY LIST INDUSTRIES RESERVES THE RIGHT TO ALTER ANY DESIGN. ANY UNAUTHORIZED MODIFICATIONS RELEASES LIST INDUSTRIES FROM ALL LIABILITIES.

TOLERANCES UNLESS SPECIFIED:
FRACTIONS: ±1/32 DECIMALS: ±.010 DEGREES: ±1°

Customer: CUSTOMER
Customer Order Number: PO#
Description: JOB NAME
JOB LOCATION

Drawn By:	Checked By:	Date:	Scale:
DRAFTER		DATE	NONE

Acad Number: PAGE NUMBER | Sheet # Of # | Revision:

Drawing Number: FOLDER NUMBER

LUC-1 11-21-12

RFI 89

SUPERIOR®
Classmate Corridor™
Unibody All-Welded Lockers

General: Lockers shall Be **"Superior Classmate Corridor Unibody All-Welded Lockers**" as manufactured by List Industries Inc. or approved equal. All lockers shall be factory-assembled, of all MIG welded construction, in multiple column units to meet job conditions. **Assembly of locker bodies by means of bolts, screws, or rivets will not be permitted. Welding of knockdown locker construction is not acceptable.** Grind exposed welds and metal edges flush and make safe to touch.

Lockers shall be **GREENGUARD Gold Certified**℠.

Finishing: All locker parts to be cleaned and coated after fabrication with a seven stage zinc/iron phosphate solution to inhibit corrosion, followed by a coat of high grade custom blend powder electrostatically sprayed and baked at 350 degrees Fahrenheit for a minimum of 20 minutes to provide a tough durable finish. Color to be selected from manufacturer's standard list of colors. **Two-Tone Color Combination: Shall be at no additional cost with the locker body, frame and trim chosen from one color and the doors may be one of any other color chosen from manufacturers standard selection.**

Classmate Wardrobe Doors: Doors 20" high and over and 15" wide and under shall be fabricated from single sheet prime 14 gauge with single bends at top and bottom and double bends at the sides. The channel formed by the double bend at the latch side is designed to fully conceal the lock bar. Doors to be louvered.

Seamless Drawn Stainless Steel Recessed Locker Handle: All locker doors shall have a seamless drawn not less than 304 stainless steel recessed handle shaped to receive a padlock or built-in combination lock. The recess pan shall be deep enough to have the lock be completely flush with the outer door face. A finger lift/padlock hasp shall protrude through the top of the handle for easy opening of the locker door.

Latching: The latching mechanism shall be finger lift control type constructed of 14 gauge (minimum) steel with a nylon cover that has a generous finger pull. Spring activated nylon slide latches shall be completely enclosed in the lock channel allowing doors to close with the lock in the locked position. Lock bar shall be hot dip galvanized and installed after paint to ensure proper paint coverage and lock bar operation. Locking devise shall be designed for use with either built-in combination locks or padlocks. Latch hooks shall be 12 gauge (minimum) and shall be MIG welded to vertical frame member. Provide three latch hooks for doors 48" and over and two for doors under 48".

Hinges: Hinges shall not be less than 16 gauge continuous piano type hinges riveted to the frame and welded to the door. All doors shall be right hand side hinged.

Twin-Frame / Vertical Side Panels: Shall be of integral frame and side wall construction manufactured from solid 16 gauge sheet steel. The one-piece side/frame shall be formed to provide a continuous door strike on the hinge side. An additional continuous vertical door strike shall be achieved at the latch side by MIG welding a 16 gauge full height channel frame member to the integral locker side producing a rigid torque-free welded locker body. The frame shall include a tab which engages a slot in the base locking the side panel and frame into position.

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SUPERIOR® Classmate™ Corridor Unibody All-Welded Lockers (Page 2)

Integral Frame Locker Base: 16 gauge formed sheet steel with double return flanges at the front and rear. A full depth horizontal channel shall be MIG welded under the locker bottom front-to-back at the left and right side of each welded locker unit as well as beneath each vertical side panel for maximum rigidity.

Flat Tops: Shall be formed of one piece of 16 gauge cold rolled sheet steel and shall be an integral part MIG welded to each vertical side panel frame member and be continuous to cover the full width of a multiple locker unit.

Hat Shelves, Intermediate Shelves And Bottoms: Shall be 16 gauge sheet steel, have double bends at front and shall be MIG welded to the sides.

Backs: Shall be 18 gauge cold rolled sheet steel, be continuous to cover a multiple twin-framed unit and be welded to each vertical side panel.

Locks (If Required): Shall be master keyed to one system for the entire project. (See lock use chart for suggested lock application).

Equipment: Furnish each locker with the following items, unless otherwise shown.

Single tier lockers: Openings 60” and 72” shall include one hat shelf, one double prong ceiling hook and a minimum of two single prong hooks.

Double and Triple tier lockers: Openings 20” thru 36” high shall include one double prong ceiling hook and a minimum of two single prong hooks.

Lifetime Warranty: Superior Unibody All-Welded Lockers are covered against all defects in materials and workmanship excluding finish, damage resulting from deliberate destruction and vandalism under this section **for the lifetime of the facility**.

RFI 89

PEDESTAL AND BENCH TOP INSTALLATION INSTRUCTIONS

General Instructions

1. Check material received against the packing list. First, check the number of packages received and then check the contents of each package.

2. Check the material received for damage. If damage has occurred, secure a "damage notation" from the carrier

3. Identify each part as it is unpacked and put like parts together as close as possible to the working area where they are to be assembled.

4. Be careful to use the correct hardware as specified in the assembly instructions.

CAUTION

In the interest of safety, all lockers must be securely anchored to the floor and/or wall. For safety, handle all components carefully and wear work gloves when assembling lockers. Install all units plumb and tighten all hardware securely. Retain instruction for future reference.

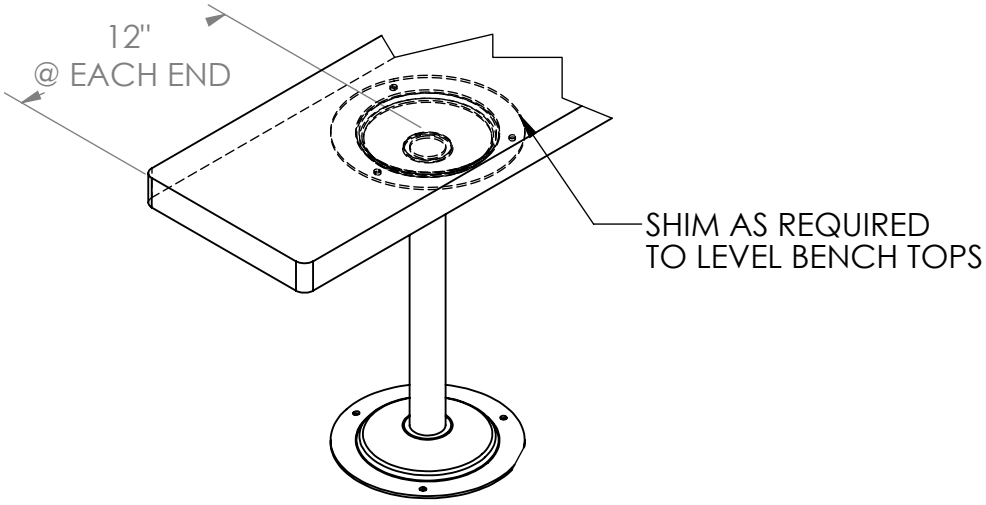
LIST INDUSTRIES INC.®

800-776-1342
info@ListIndustries.com
www.ListIndustries.com

RFI 89

GENERAL ASSEMBLY FOR PEDESTALS

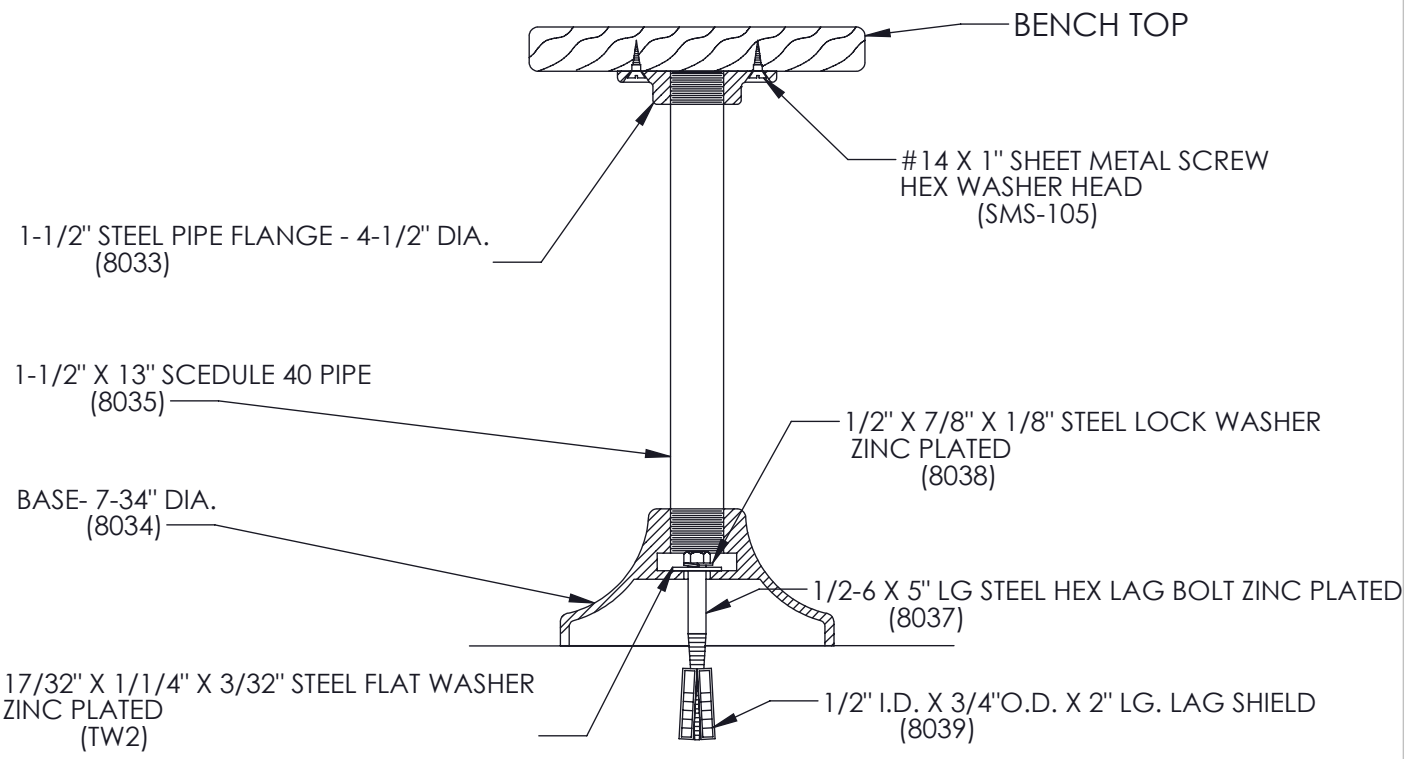
USING THE PEDESTAL AS A TEMPLATE, LOCATE CENTERS. DRILL 3/16" HOLES AND ATTACH WITH THE SCREWS PROVIDED. FLOOR ANCHORS ARE PROVIDED BY THE INSTALLER. RECOMMENDED HILTI ALUMINUM HIT ANCHORS CAT. NO. 5400192 OR 1/4" X 2" TAP-COM.



PEDESTAL ARRANGEMENT

ALL PEDESTALS TO BE LOCATED 12" FROM EACH END WITH A MAXIMUM OF 6'0" SPACING.
ON BENCH LENGTHS GREATER THAN 8'0", (3) PEDESTALS ARE REQUIRED.

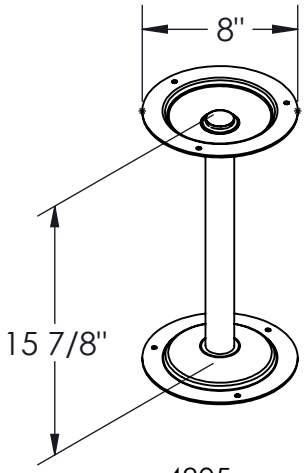
8032 PEDESTAL ANCHORING



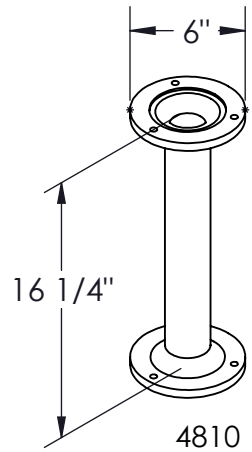
SA0754-1

RFI 89

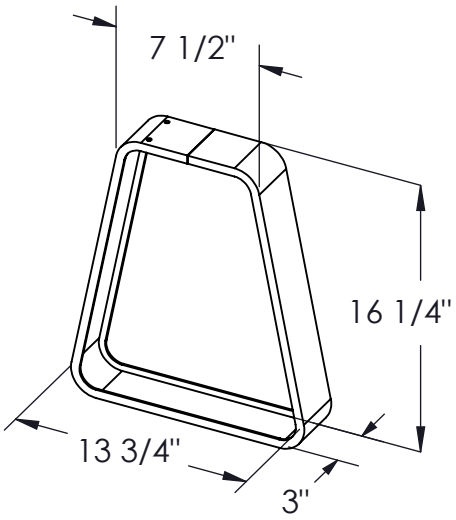
PEDESTAL TO BENCH TOP ATTACHMENT HARDWARE



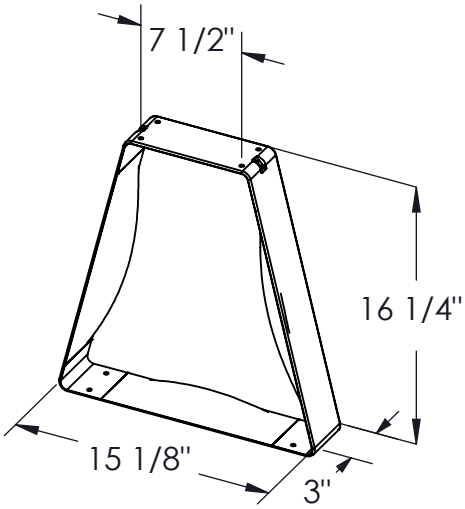
4805
(3)#14 X 1" HEX WASHER
HEAD SHEET
METAL SCREW



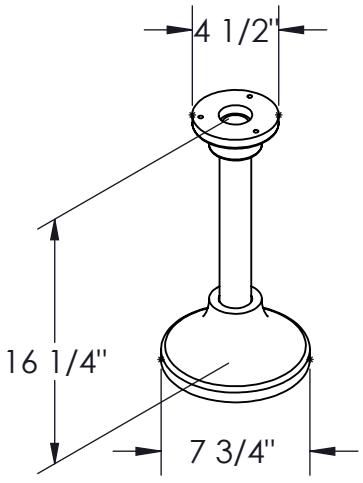
4810
(3)#14 X 1-1/2" HEX
WASHER
HEAD SHEET
METAL SCREWS



4820
(4)#14 X 1" HEX WASHER
HEAD SHEET
METAL SCREWS



4825
(4)#14 X 1" HEX WASHER
HEAD SHEET
METAL SCREW



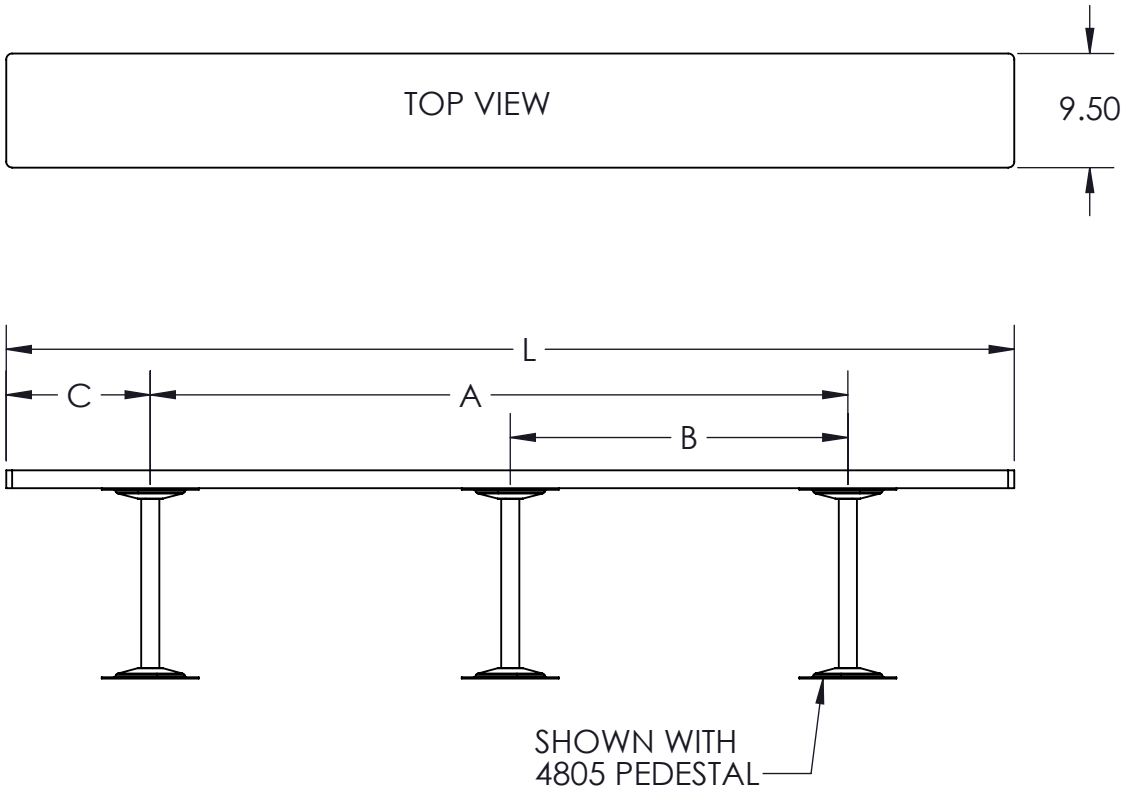
8032
(3)#14 X 1-1/2" HEX
WASHER
HEAD SHEET
METAL SCREW

NOTE: FLOOR ANCHORS
SUPPLIED BY OTHERS

SA0754-2

RFI 89

BENCHES & TOPS



QTY. OF PEDESTALS	
3 FT.	2
4 FT.	2
5 FT.	2
6 FT.	2
7 FT.	2
8 FT.	2
9 FT.	3
10 FT.	3
11 FT.	3
12 FT.	3
13 FT.	3
14 FT.	3
15 FT.	4

LENGTH	L	A	B	C
3 FT.	36"	24"	X	6"
4 FT.	48"	32"	X	8"
5 FT.	60"	40"	X	10"
6 FT.	72"	48"	X	12"
7 FT.	84"	60"	X	12"
8 FT.	96"	72"	X	12"
9 FT.	108"	84"	42"	12"
10 FT.	120"	96"	48"	12'
11 FT.	132"	108"	54"	12"
12 FT.	144"	120"	60"	12"
13 FT.	156"	132"	66"	12"
14 FT.	168"	144"	72"	12"
15 FT.	180"	156"	52"	12"

BQ#104 Attachment

SUBSTITUTION REQUEST
(During the Bidding/Negotiating Phase)

CSI®

PROJECT: Greenwich Central Middle School
State Project No. 057-0114N

TO: Turner Construction Company

RE: BP-9 Sitework Retaining Walls

SUBSTITUTION REQUEST NUMBER: 001

FROM:

DATE: 10/14/24

A/E PROJECT NUMBER:

CONTRACT FOR:

SPECIFICATION TITLE: Segmental Retaining Walls

DESCRIPTION:

SECTION: 323223 **PAGE:** 6 of 10

ARTICLE/PARAGRAPH: 2.2 Segmental Retaining Wall

PROPOSED SUBSTITUTION: Versa-Lok Square Foot

MANUFACTURER: Versa-Lok

ADDRESS: 5 Northern Blvd #15
Amherst, NH 03031

PHONE: (603)883-3042

TRADE NAME:

MODEL NO.: Square Foot

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.
Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The Undersigned certifies:
- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

SUBMITTED BY:

SIGNED BY:

FIRM:

ADDRESS:

TELEPHONE:

Versa-lock is an acceptable substitution. Approval contingent on contractor to ensuring that proposed product can meet design intent with regard to layout and construction, as well as warranty and compatibility. Color to be selected from manufacturer's full range of colors and finishes (including premium). Near vertical batter (1/4"). - SLAM

A/E's REVIEW AND RECOMMENDATION:

- ☐ Approve Substitution—Make submittals in accordance with Specification Section 01 33 00 Submittal Procedures.
- ☒ Approve Substitution as noted—Make submittals in accordance with Specification Section 01 33 00 Submittal Procedures.
- ☐ Reject Substitution—Use specified materials.
- ☐ Substitution Request received too late—Use specified materials.

SIGNED BY: Kathryn Packtor - SLAM **DATE:** 10.30.2024

SUPPORTING DATA ATTACHED: ☒ Drawings ☒ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____

CSI Form 1.5C (August 2020 version)

BQ#104 Attachment

VERSA-LOK SQUARE FOOT

RETAINING WALL SYSTEM

VERSA-LOK®
Retaining Wall Systems
Solid Solutions.™



AFFORDABLE & ATTRACTIVE WALLS BY THE FOOT.

VERSA-LOK® Square Foot™ units are engineered to provide the construction flexibility you need in a large retaining wall project, making it a smart, low-cost alternative for public works, institutional and commercial projects. At 87-pounds each, the Square Foot unit is a unique hybrid design, combining the versatility of VERSA-LOK's top-pinning technology with cost-effective hollow-core unit construction. No mortar or concrete footings are needed, so Square Foot walls remain flexible in climates that experience freeze-thaw cycles. And its thick face affords better durability than other cored systems.

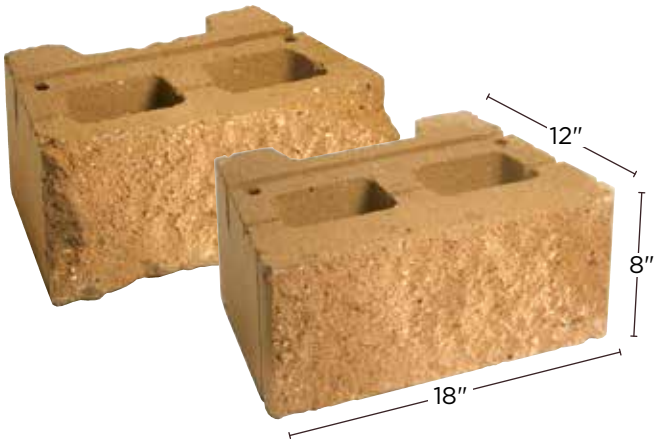
Square Foot's top-pinning system allow for variable bond construction, quick accurate alignment, tighter vertical joints and easy installation. Its trapezoidal design enables inside and outside curves with one of the tightest radiuses in the industry (4' 6"). Square Foot retaining walls can be built with a traditional 1-inch setback or near-vertical, and will accommodate geogrid reinforcement to build walls to any height. The maximum stable unreinforced Square Foot wall is 3 feet, depending on soil, site and loading conditions (including terraces). Square Foot walls can be finished off with VERSA-LOK cap units.

BQ#104 Attachment

VERSA-LOK SQUARE FOOT

RETAINING WALL SYSTEM

VERSA-LOK® Retaining Wall Systems
Solid Solutions.™

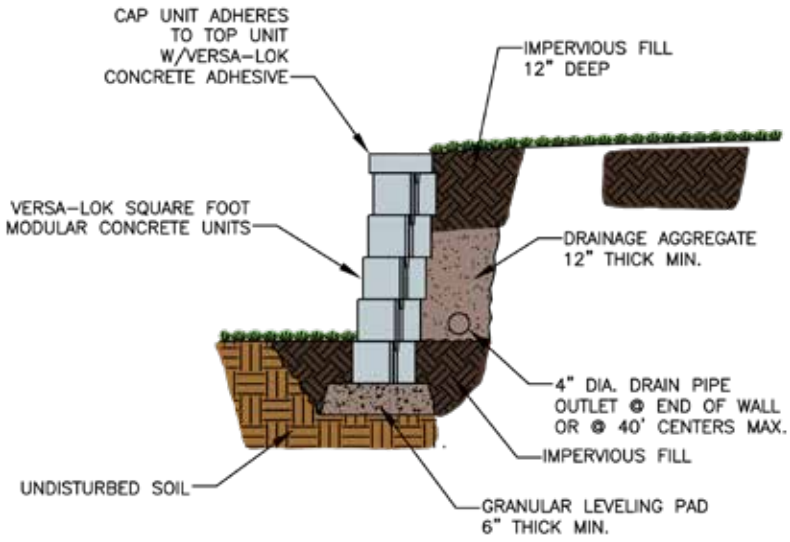


SPECIFICATIONS

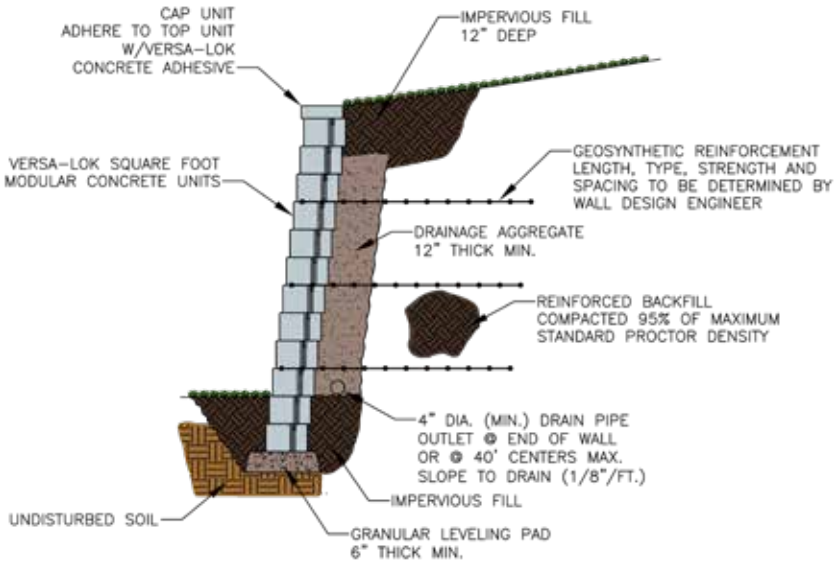
Height	8″
Width (face)	18″
Depth	12″
Face area	1 sq. ft.
Weight	87 lbs.
Weight (w/ aggregate fill)	115 lbs.
Minimum outside radius	4′ 6″
Setback	1″ (7 degrees)
	or 1/4″ (1.8 degrees)
Pins	2 per unit



UNREINFORCED*



SOIL-REINFORCED



***Please note:** The maximum height for an unreinforced Square Foot retaining wall is 3 feet. Taller walls up to 50 feet+ require soil reinforcement and engineering assistance. Individual site, soil and loading conditions (including terraces) may limit unreinforced wall heights to less than 3 feet. Check your local building code requirements. Please contact your supplier or VERSA-LOK representative for assistance.

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Square Foot™

Design & Installation Guidelines









Building a reputation.
One square foot at a time.





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WELCOME

This guide is intended to illustrate design and construction capabilities of Square Foot™ retaining walls. There are many variables to consider, however, when planning or constructing any retaining wall. Soil types, drainage, loading, topography, and height each need to be addressed on every project to ensure safe, trouble-free installation.



Walls that support heavy loads or exceed three feet in height require special soil reinforcement and often professionally designed plans. Consult a qualified engineer if unsure about any construction, site, or soil conditions.

A variety of technical support is available including in-house engineering assistance and reference literature. The following Technical Bulletins* are for VERSA-LOK® Standard units, however, the general principles also apply to Square Foot units.

Please call **(800) 770-4525** with questions or to request any of the following:

- **Technical Bulletin #1** *Shoreline, Waterway and Retention Pond Protection*
- **Technical Bulletin #3** *Curves and Corners*
- **Technical Bulletin #4** *VERSA-LOK® Caps*
- **Technical Bulletin #5** *Base Installation*
- **Technical Bulletin #7** *Tiered Walls*
- **Technical Bulletin #8** *Fences, Railings, and Traffic Barriers*
- **Technical Documentation for VERSA-Grid® Soil Reinforcement**

**Technical Bulletins are also available for download online at www.versa-lok.com.*

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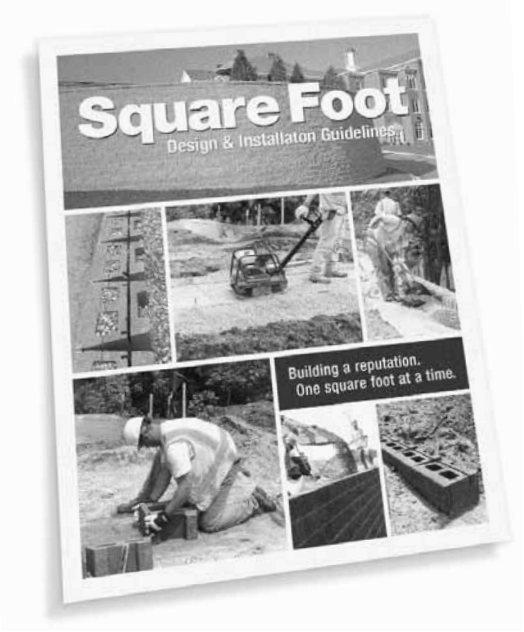

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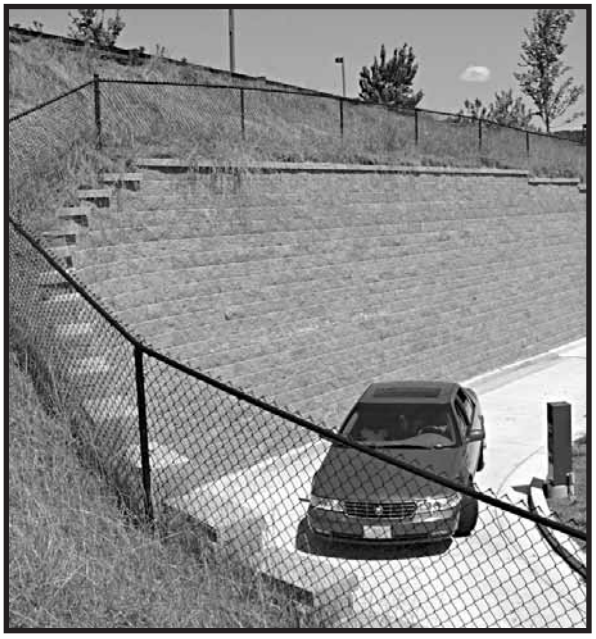
INTRODUCTION & UNIT SPECIFICATIONS

1

Square Foot™ retaining walls are a permanent, attractive, preferred alternative to ordinary retaining wall types. They have a natural split-face texture to complement any environment and because they are made of concrete, are environmentally safe.



Square Foot retaining walls are economically installed without mortar and do not require concrete footings. In addition, each unit covers one square foot of wall face, making Square Foot retaining walls an economical choice for large commercial and agency projects.

Square Foot retaining walls have rapidly earned approval from architects, engineers, and contractors. It may be easily installed by contractors, grounds maintenance personnel, or municipal construction crews. Matching concrete caps are available to attractively finish any Square Foot retaining wall.

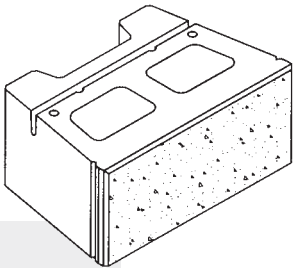
Square Foot units are routinely used by many state transportation departments. Properly designed, walls may be constructed to heights in excess of 40 feet.

Square Foot units are made from high-strength, low-absorption concrete on standard block machines. Holes and slots molded into units accept VERSA-TUFF® non-corrosive, nylon/fiberglass pins. Pins interlock units and help provide consistent alignment. This unique hole-to-slot pinning system permits easy variable-bond construction—keeping vertical joints tight.

1 INTRODUCTION & UNIT SPECIFICATIONS

SQUARE FOOT™ UNIT

(Actual unit size and weight may vary slightly by region.)



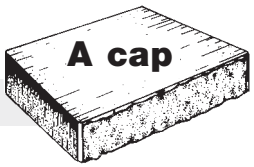
Height:	8 inches	(203.2 mm)
Width (face)**:**	18 inches	(457.2 mm)
Width (rear)**:**	14 inches	(355.6 mm)
Depth:	12 inches	(304.8 mm)
Face Area:	1.0 foot^2	(0.093 m^2)
Weight:	87 lbs.	(39.46 kg)

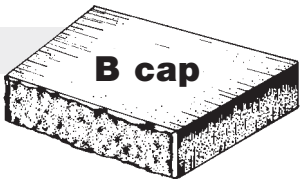
VERSA-TUFF® PIN



Length:	6.8 inches	(172.7 mm)
Diameter:	0.48 inches	(12.2 mm)
Material:	Glass-Reinforced Nylon	

CAP UNITS





Height:		3-5/8 inches	(92.1 mm)
Width (face)**:**		14 inches	(355.6 mm)
Width (rear)**:**	**A** cap	12 inches	(304.8 mm)
	B cap	16 inches	(406.4 mm)
Depth:		12 inches	(304.8 mm)
Weight:	**A** cap	40 lbs.	(18.14 kg)
	B cap	50 lbs.	(22.68 kg)

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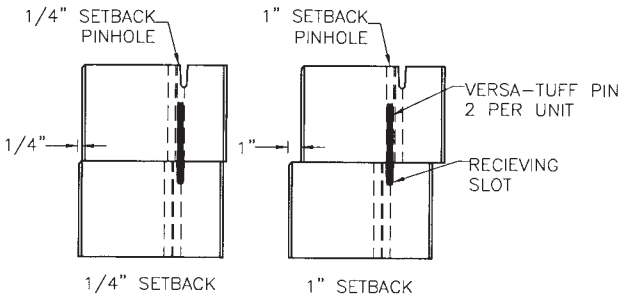
Pinning

Square Foot™ units interlock with non-corrosive VERSA-TUFF® pins (two per unit). As wall courses are installed, pins are inserted through holes in uppermost course units and are received in slots of adjacent lower course units. Receiving slots allow pinning for near vertical (1/4" setback) or canted (1" setback) walls.

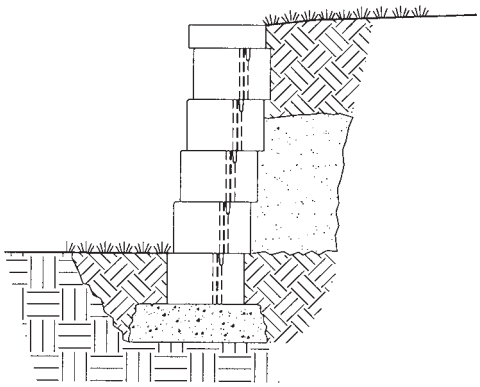


PINNING DETAIL

Unreinforced Walls

For shorter walls, Square Foot retaining walls work purely as gravity systems—unit weight alone provides resistance to earth pressures. Batter setback of wall faces offers additional resistance against overturning.

Maximum allowable wall height for gravity walls varies with soil and loading conditions. Generally, with level backfill, good soils and no excessive loading, Square Foot gravity walls are stable to heights of three feet.



Reinforced Walls

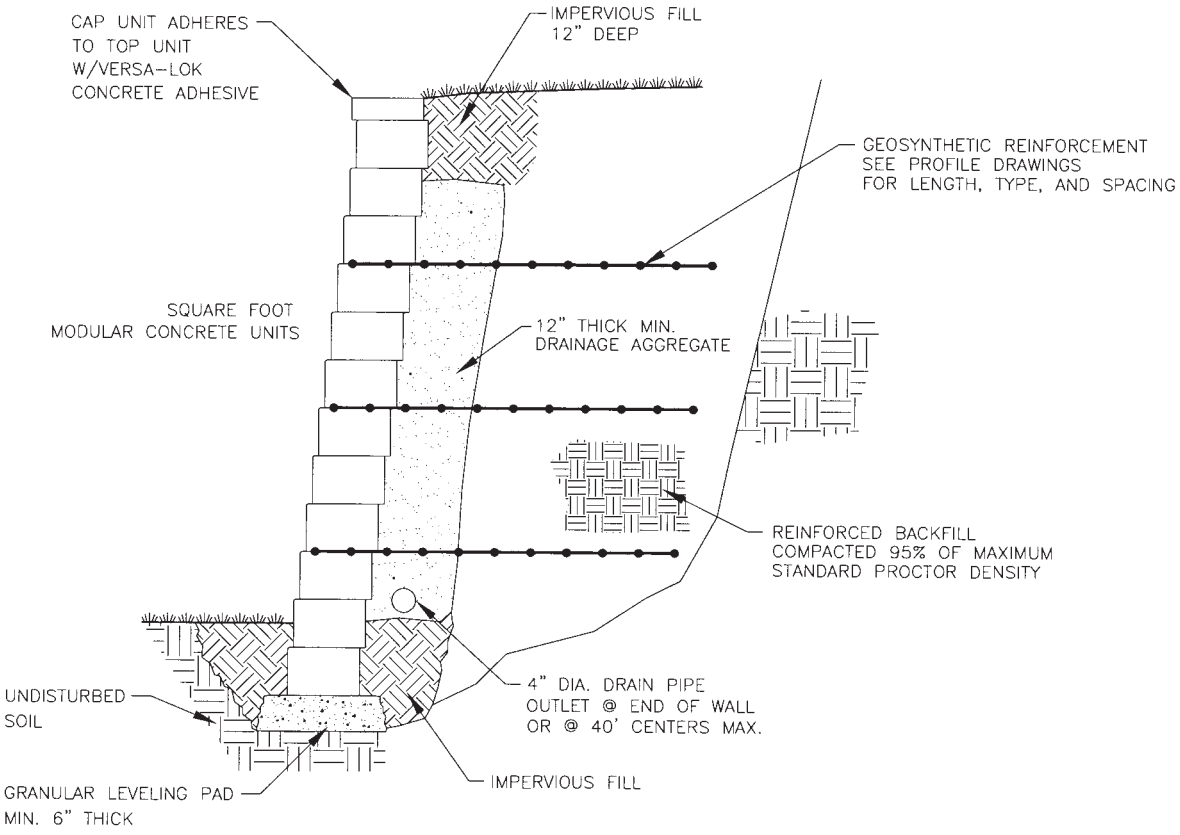
When weight of units alone is not enough to resist soil loads, horizontal layers of geosynthetics are used to reinforce soil behind walls. With proper soil reinforcement and design, Square Foot retaining walls can be constructed to heights in excess of 50 feet. Geosynthetics and soil combine to create reinforced soil structures that are strong and massive enough to resist forces exerted on them.

2 SYSTEM OVERVIEW

Reinforced Wall Typical Section

(The need for design of soil reinforcement and drainage materials is site/soil dependent.)

A Square Foot™ retaining wall has a number of components: the Square Foot modular concrete facing units, geosynthetic reinforcement (if required), leveling pad, backfill, drainage features, and retained soil.



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Foundation

Foundation soils on which walls will rest must be stiff, firm, and have sufficient capacity to support wall system weight. Any loose, soft, or compressible material must be removed and replaced with properly compacted backfill. The bearing capacity of the foundation soils should be addressed by a soils engineer.

Square Foot™ retaining walls are installed on leveling pads consisting of well-graded angular gravel. The most commonly used material for leveling pads is that which is used locally as road base aggregate. Granular leveling pads provide stiff, yet somewhat flexible, bases to distribute wall weights.

Rigid concrete footings extending below frost are not required or recommended. Because Square Foot units are installed without mortar, they are free to move slightly in relation to each other. Flexibility of the leveling pad and wall units accommodates freeze/thaw cycles without damage to structures. Square Foot walls, installed on granular leveling pads, have been successfully used on projects throughout North America—including shoreline applications and walls exceeding 50 feet in height.

If a contractor chooses to form leveling pads using concrete, unreinforced pads should be made of lean concrete mix (200-300 psi) and no more than two inches thick. To ensure correct Square Foot unit alignment, special care needs to be taken to construct concrete pads that are exactly level. In rare situations where rigid, reinforced-concrete footings are required, they should be placed below seasonal frost depths.

Embedment

Square Foot retaining walls usually have one-tenth of exposed wall heights embedded below grade. For example, a wall with 20 feet of height exposed above grade would have a minimum of 2.0 feet buried below grade—making a total wall height of 22.0 feet. Embedment should be increased for special conditions such as slope at the toe of walls, soft foundation soils, or shoreline applications. Embedment provides enhanced wall stability and long-term protection for leveling pads.

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3 WALL COMPONENTS

Soils and Compaction

With proper design, segmental walls can be constructed within a wide variety of soil conditions. Granular soils are preferred as fill in the areas reinforced with geosynthetics. However, fine-grained soils such as clays are acceptable, too. Usually, coarse soils require less soil reinforcement and are easier to compact than fine soils. Problem materials like expansive clays, compressible soils, or highly organic soils (top soil) should be avoided or properly addressed in designs.

Proper compaction of foundation and backfill soil is critical to long-term performance of retaining wall systems. Loose backfill will add pressure on walls, collect water, cause settlement, and will not anchor soil reinforcement materials properly.

Foundation and backfill materials should be compacted to at least 95 percent of standard Proctor density. (Proctor density is the maximum density of the soil achieved in a laboratory using a standard amount of compaction effort.) Generally, construction observation and testing for proper soil type and compaction is provided by the project's soils engineer.

Drainage Within Walls

Segmental retaining walls are designed assuming no hydrostatic pressure behind walls. Drainage aggregate (angular gravel, clear of fines) placed behind walls helps eliminate water accumulation. Because no mortar is used in Square Foot™ wall construction, water is free to weep through joints of installed units. For walls taller than three feet high, a perforated drain pipe is recommended at the base of the drainage aggregate to quickly remove large amounts of water.

If high groundwater levels are anticipated or if the wall is along a shoreline, additional drainage materials behind and below reinforced fill may be required. Filter fabric may be required to prevent unwanted migration of fine soil particles into the drainage aggregate.

Surface Drainage

Wall sites should be graded to avoid water flows, concentrations, or pools behind retaining walls. If swales are designed at the top of walls, properly slope them so water is removed before it can flow down behind walls.

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Give special attention to sources of stormwater from building roofs, gutter downspouts, paved areas draining to one point, or valleys in the topography. Be sure to guide flows from these areas away from retaining walls. Slope the soil slightly down and away from wall base to eliminate water running along base and eroding soil.

If finish grading, landscaping, or paving is not completed immediately after wall installation, temporarily protect the wall from water runoff until adjacent construction and drainage control structures are completed.

Geosynthetic Reinforcement

Geosynthetics are durable, high-strength polymer products designed for use as soil reinforcement. Horizontal layers of geosynthetic provide tensile strength to hold the reinforced soil together, so it behaves as one coherent mass. The geosynthetic reinforced soil mass becomes the retaining wall. Sufficient length and strength of geosynthetics can create a reinforced soil mass large enough and strong enough to resist destabilizing loads. Geosynthetic layers also connect the Square Foot units to the reinforced soil.

Geosynthetics are made from several types of polymers that resist installation damage and long-term degradation. Geosynthetics are designed to interact with the soil for anchorage against pullout and resistance to sliding. Geogrids, the most common soil reinforcement for walls, are formed with an open, grid-like configuration. Geotextiles (solid fabrics) are also used. Product-specific testing determines the durability, soil interaction, and strength of each type of geosynthetic. The interaction of various geosynthetics with Square Foot units (connection strength) has also been thoroughly tested.

Geosynthetic layers must be nominally tensioned and free of wrinkles when placed. Geosynthetics are generally stronger in one direction—the roll direction. It is important that the high-strength direction is placed perpendicular to the wall face, in one continuous sheet (no splices). Along the wall length and parallel to the face, adjacent sections of reinforcement are placed immediately next to each other without overlap to create 100-percent coverage with no gapping, and with special details for curves and corners.

The required type, length, vertical spacing, and strength of geosynthetic vary with each project depending on wall height, loading, slopes, and soil conditions. A professional Civil Engineer (P.E.) should prepare a final, geogrid-reinforced wall design for each project.

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4 ENGINEERING

Square Foot™ retaining walls are designed as traditional gravity walls. For unreinforced walls, the stabilizing weight of the battered wall units is compared to the loading on the walls to ensure stability against overturning and sliding. *(Figure **1A**)* When the loading exceeds the stability of the units alone, a larger gravity mass is created from reinforced soil. *(Figure **1B**)*

To ensure stability of a reinforced retaining wall, the wall engineer must design a reinforced soil mass large enough to resist loads from outside the wall system (external stability) and with enough layers of proper strength geosynthetic to keep the reinforced soil mass together (internal stability). In addition, the design must have sufficient geosynthetic layers to keep units stable and properly connected to the reinforced soil mass (facial stability).

For internal stability, the geosynthetic layers must resist loads that could pull apart the reinforced soil mass. *(Figure **2**)* The wall design engineer must ensure the geosynthetic has enough anchorage length to resist pullout from the stable soils and enough strength to resist overstress (breakage). The geosynthetic also must be long enough to resist sliding along the lowest layer.

For external stability, the reinforced soil mass must have sufficient width to resist sliding and overturning. *(Figure **3**)* The wall design engineer increases geosynthetic lengths until the reinforced soil is massive enough to provide required stability. The project geotechnical engineer should review the wall design and site soil conditions for external stability against bearing failures, settlement, or slope instability. *(Figure **4**)* Often, the wall design engineer can address any such global stability concerns by increasing geosynthetic lengths.

For facial stability, the wall design engineer must ensure wall units can resist loads at the face of the wall and stay connected to the reinforced soil mass, stay interlocked between geosynthetic layers, and not overturn at the top of the wall.

Loading on segmental walls is dependent on soil conditions, surcharges, slopes, water conditions, and wall heights. Accurate knowledge of each of these properties is needed for a proper design. Soil properties required for a segmental retaining wall design include the internal friction angle (ϕ) and soil unit weight (γ). Generally, the cohesion (c) of any fine-grained soils is conservatively ignored to simplify the design.

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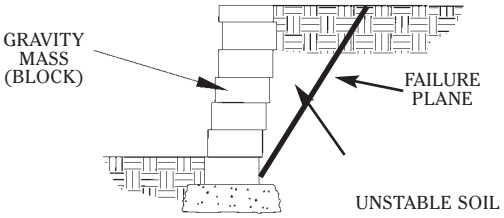
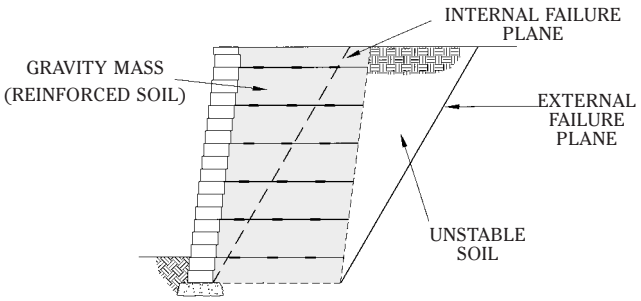
Stability Analysis

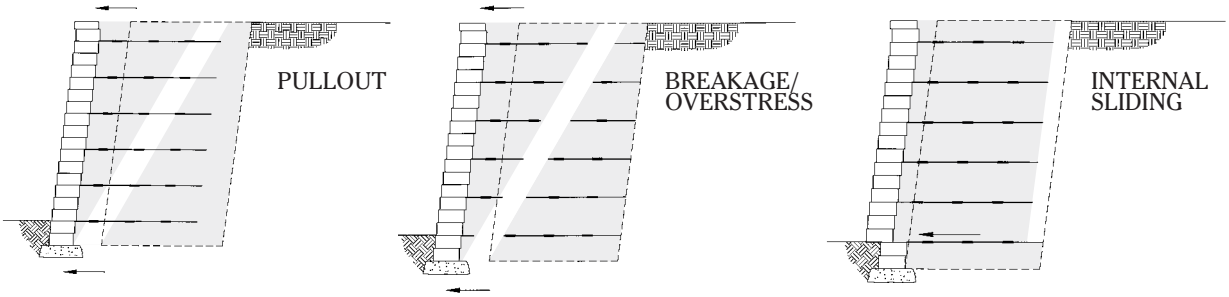
Unreinforced Wall *(Figure 1A)*



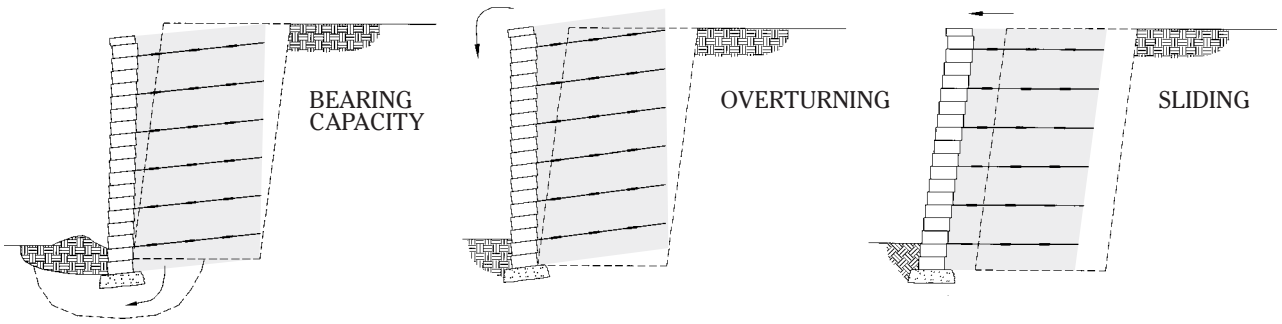
Reinforced Wall *(Figure 1B)*



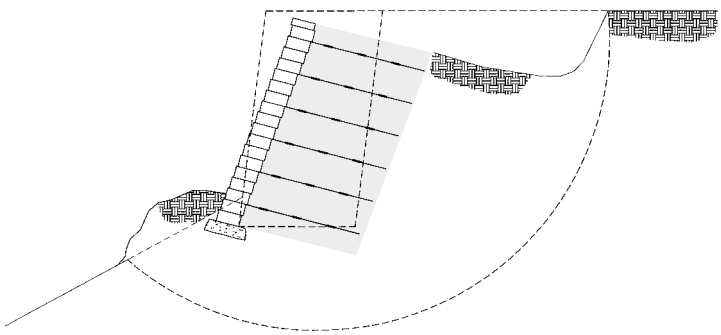
Internal Stability *(Figure 2)*



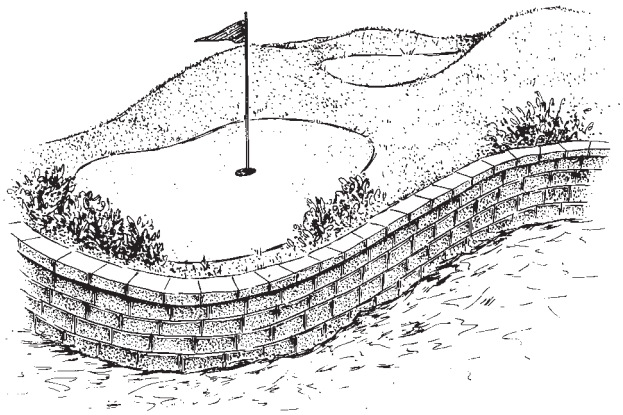
External Stability *(Figure 3)*



Global Stability *(Figure 4)*



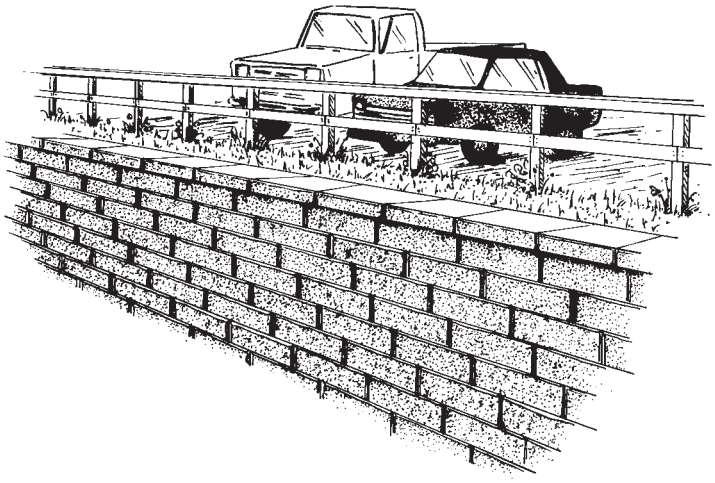
5 SPECIAL DESIGN CONSIDERATIONS



Shorelines

Square Foot™ retaining walls perform well in shoreline applications. However, special design considerations are often necessary to ensure that water pressures do not build up behind walls. Special provisions may include granular reinforced backfill, additional drainage aggregate, drainage behind reinforced soil masses, and filter fabric. Protection of bases from water scour, wave action,and ice may also be necessary.

! *See VERSA-LOK® Technical Bulletin #1 for more information regarding shoreline and retention pond protection.*



Loads Behind Walls

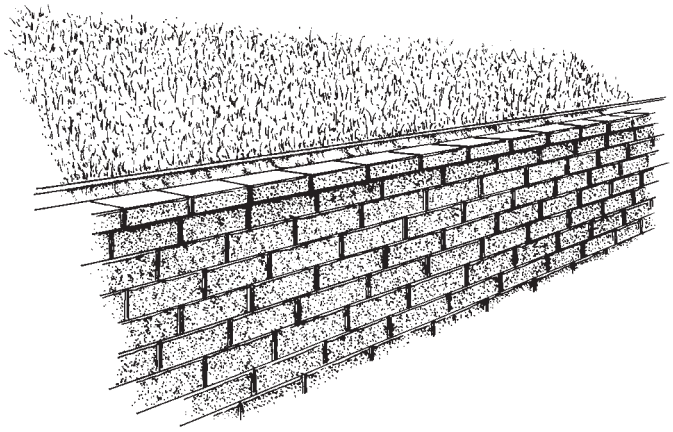
Surcharge loads behind walls can substantially increase amounts of required soil reinforcement. Common surcharge loads include: parking areas, driveways, roads, and building structures. For design purposes, permanent loads like buildings are considered to contribute to both destabilizing and stabilizing forces acting on walls. Dynamic forces like vehicular traffic are considered to contribute to destabilizing forces only.

BQ#104 Attachment

Often, the highest surcharge loads are caused by grading or paving equipment during construction. Heavy equipment should be kept at least three feet behind the back of retaining wall units. Soil reinforcement designs should accommodate all anticipated surcharge loads—even if they will occur infrequently or just once.

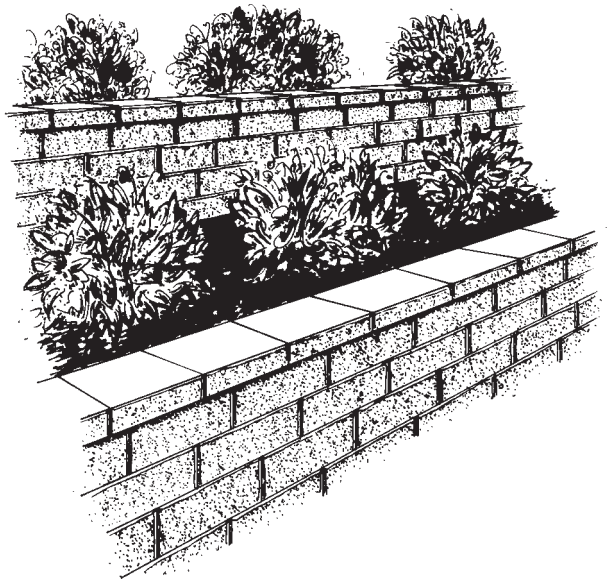
Slopes

Slopes behind walls increase pressures, sometimes doubling soil loads compared to level backfills. Steep slopes below walls can decrease stability of wall foundations. Slopes can increase the amount of soil reinforcement needed, especially the length. Generally, slopes above or below walls should be no steeper than 2:1 (horizontal:vertical).



Tiering

Aesthetically, dividing large grade changes into tiered wall sections may sometimes be desirable. However, upper wall tiers can add surcharge loads to lower walls and necessitate special designs. To avoid loading lower walls, upper walls must be set back horizontally at least twice the height of the lower walls. If walls are placed closer, lower walls must be designed to resist the load of upper walls.



! Several closely spaced tiered walls can create steep, unstable slopes. If tiered walls make a grade change steeper than 2:1 (horizontal:vertical), global slope stability may need to be reviewed by a qualified soils engineer. See VERSA-LOK® Technical Bulletin #7 for more information regarding tiered wall construction.

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6 PLANNING, ESTIMATING, & FINAL DESIGNS

Planning

Careful planning is critical to successful projects. Prior to design, accurate information needs to be gathered including soil conditions, proposed wall heights, topography, groundwater levels, and surface water conditions. Proper permits, owner approvals, utility clearances, and temporary easements should also be obtained in advance.

Planned wall alignments should be reviewed for feasibility. Make sure that layouts account for minimum curve radii, wall setback, and area needed for geosynthetic soil reinforcement. Be sure that all wall components fit within property constraints. Verify that temporary construction excavations will not undermine foundation supports of any existing structures or utilities. Considerations should also be given to site access for equipment and materials.

Estimating

Accurately estimate and order required materials including Square Foot™ units, VERSA-TUFF® pins, cap units, VERSA-LOK® Concrete Adhesive, imported backfill, leveling pad materials, geosynthetic soil reinforcement, drainage aggregate, and additional drainage materials. See the Material Estimation Worksheet on page 28 to help determine Square Foot quantities.



For reinforced-wall projects, the VERSA-Grid® estimating charts on page 29 provide approximate amounts of geogrid soil reinforcement necessary to construct walls in various soil and loading conditions. For tall walls or complex situations, our staff engineers can prepare project-specific preliminary designs to be used for estimation purposes.

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Final Designs

For walls more than four feet tall, most building codes require a final wall design prepared by a licensed Civil Engineer (P.E.) registered in that state. Square Foot™ retaining wall manufacturers have a network of licensed civil engineers who are familiar with segmental retaining wall design. These individuals are available for referrals to architects, engineers, or contractors with final wall design needs.

Final wall designs may be provided prior to putting projects out for bidding. Alternatively, wall portions of projects can be specified design/build. With design/build projects, engineers/architects provide wall layout information (line and grade) but not final engineering for the wall. Contractors submit bids based on this layout including estimated labor, materials, and final engineering costs. Contractors who are awarded projects retain licensed engineers to prepare final wall designs and submit shop drawings for approval from project engineers/architects.

As with all proposed construction, a soils report prepared by a qualified geotechnical engineer is required to provide adequate information for proper design. The soils report should address overall stability of planned grade changes and allowable bearing capacity of foundation soils. The report should also include information about reinforced and retained soil properties.

For assistance in specifying, designing and engineering Square Foot retaining walls, standard design/build specifications and sample construction details are provided on pages 30 to 41. This information is also available in electronic format on a Square Foot Construction Details disk. Technical staff is also available to assist with planning, layout, preliminary engineering, and referrals for final engineering.

BQ#104 Attachment

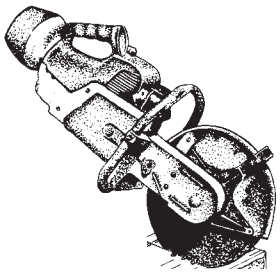
7 WALL CONSTRUCTION

Tools

The following tools may be helpful during construction of Square Foot™ retaining walls.

- **Safety Protection**
- **Shovel**
- **Four-Foot Level**
- **Smaller Level**
- **Four-Pound Sledge Hammer**
- **Masonry Chisel**
- **Brick Hammer**
- **Tape Measure**
- **Hand Tamper**
- **Vibratory-Plate Compactor**
- **Caulking Gun**
- **String Line**
- **Finishing Trowel**
- **Broom**
- **Diamond-Blade Concrete Saw**
- **Transit or Site Level**
- **Backhoe or Skid-Steer Loader**

Unit Modification



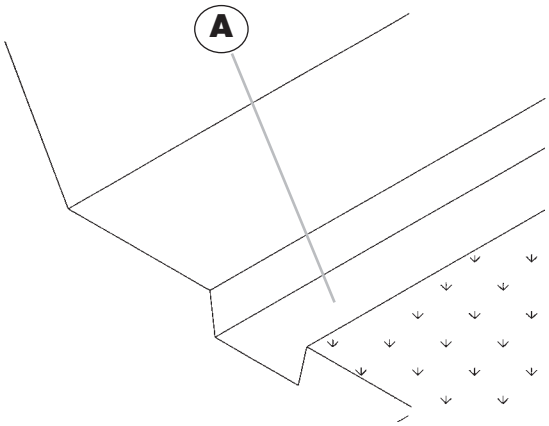
Saw-cuts are normally made using a gas-powered cut-off saw with a diamond blade. To cut a unit, mark desired path of cut on all unit sides. Stand the unit with its face up and cut two to three inches deep along the front path. Reposition the unit and complete the cut by cutting the remainder of the unit along top and bottom paths. Cutting first into the front face ensures a straight, square edge which will likely have to fit closely next to the straight edge of an adjacent unit. Remember to always wear proper safety protection when performing cutting operations.

BQ#104 Attachment

Excavation

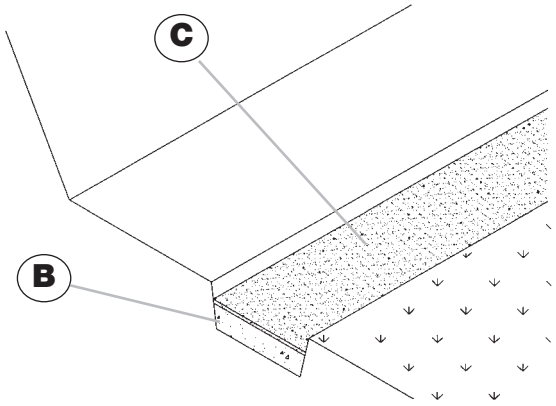
Excavate just deeply enough to accommodate the leveling pad (usually six inches) and required unit embedment below grade. (A) When necessary, also excavate areas where geosynthetic soil reinforcement will be placed. Required unit embedment varies with wall height and site conditions. Generally, if grade in front of the wall is level, one-tenth of the exposed wall height should be buried (embedded) below grade. Additional embedment may be required for special conditions including slopes in front of walls, soft foundation soils, and water applications.

Compact soil at the bottom of excavation. Do not place wall system on loose, soft, wet, or frozen soil—settlement may result. If the wall will sit on a previously backfilled excavation such as a utility line trench, be sure the entire depth of existing backfill is well compacted. If necessary, over-excavate soft soils and replace with properly compacted backfill.



Leveling Pad

Place granular leveling pad material and compact to a smooth, level surface. (B) Leveling pad should be at least six inches thick and 24 inches wide. It should consist of 3/4-inch crushed gravel. Use a thin layer of fine sand on top of the leveling pad for final leveling. (C)



To quickly construct long sections of leveling pad, create forms by leveling and staking rectangular metal tubing along both sides of the planned pad. Place and compact granular material within these leveled forms and screed off excess. See VERSA-LOK® Technical Bulletin #5 and video for more tips about leveling pad construction.

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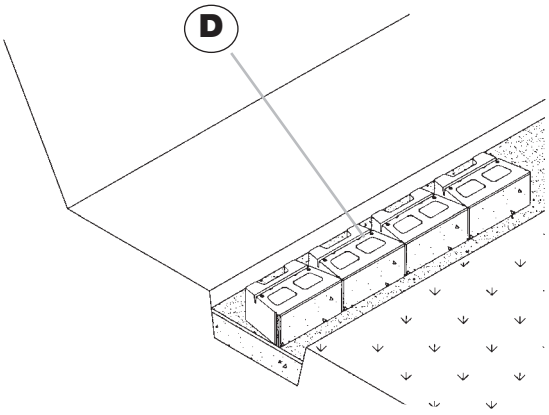
7 WALL CONSTRUCTION

If the planned grade along wall front will change elevation, the leveling pad may be stepped in eight-inch increments to match the grade change. Always start at the lowest level and work upward.

Step the leveling pad often enough to avoid burying extra units while maintaining required unit embedment.



Base Course

Make sure that the leveling pad is level and begin placing base course units. (D) If the leveling pad is stepped, begin at the lowest course before proceeding to next course.

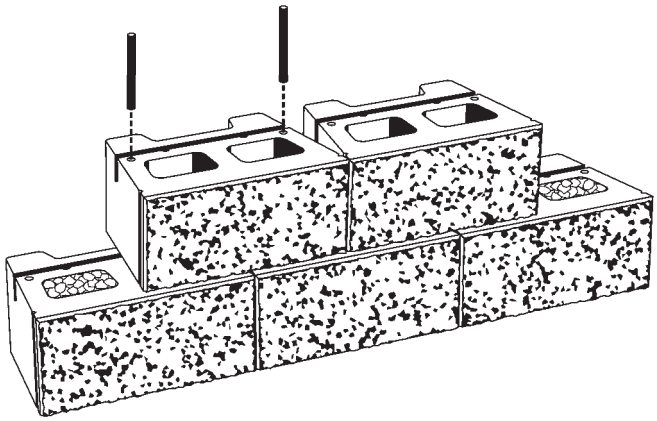
Align units using their backs or slot rather than their irregularly textured front faces. String lines may be helpful when aligning straight walls. Refer to pages 24 and 25 for tips on curve and corner alignment. Place units on the leveling pad, side-by-side. Front faces on adjacent units should fit tightly and unit bottoms should contact the leveling pad completely. Using a four-foot level, level units front-to-back, side-to-side with adjacent units. Tap high points with a mallet or hand tamper until level. Take time to ensure a level base course. Minor unevenness in the base course will be amplified and difficult to correct after several course have been installed.

After positioning the base course, fill the voids (cores) of the units with crushed gravel. To avoid clogging the pinning slots, use gravel that is 1.0 to 1.5 inches in diameter. Crushed gravel is suggested in the base course core fill because free-draining aggregate core fill may allow water to flow down to the base. Place and compact soil backfill behind the units. Also replace and compact over-excavated soil in front of the units. The backfill behind and in front of embedded units should consist of soil—do not use drainage aggregate.



BQ#104 Attachment

Additional Courses



Sweep off tops of installed units to remove any debris that may interfere with additional courses. Place the next course of units by setting them a short distance away from their final position and slide them into place. Sliding helps remove imperfections and debris from the top surface of installed units.

A unique hole-to-slot pinning system allows units to be installed on variable bond. (Square Foot™ units do not need to be placed exactly halfway over the two lower course units.) Vertical joints can wander in relation to other joints throughout walls. Do not try to install walls on half bond by leaving gaps in vertical face joints. Because the bond can vary, vertical face joints can and always should be tight.

Pin Square Foot units with a one-inch setback (7 degree cant) or a 1/4-inch setback (near vertical). Use the one-inch setback unless the near vertical setback is specifically required. (Near-vertical walls require more geogrid than setback walls). For the one-inch setback, use the front pin holes (outside holes). For the near vertical setback, use the pin holes within the slots (inside holes). Insert two VERSA-TUFF® pins through the appropriate holes of the upper units into the receiving slots in the lower units. The two pins should engage two separate units in the course below. Make sure the pins are fully seated in the lower unit slots. If necessary, seat pins using a mallet and another pin. Avoid dropping pins into holes in the slots.

Pull the units forward to remove any looseness in the pin connection. Check unit alignment and levelness—adjust if necessary. If length of a course must fit into a limited space or if vertical joints begin to line up with joints below, adjust by installing partial units. Create partial units by saw-cutting whole units into pieces at least four inches wide.

Fill the voids (cores) of each course of units with angular, free-draining gravel before stacking the next course. Stack no

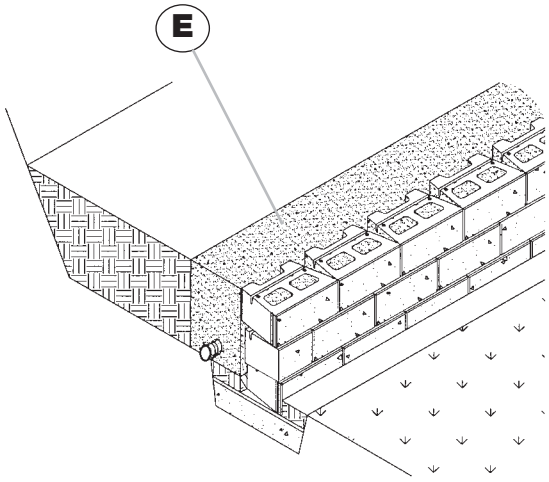
BQ#104 Attachment

7 WALL CONSTRUCTION

more than two courses before backfilling. If units are stacked too high, they may push out of alignment during placement of backfill.

Drainage Aggregate

Beginning at the level of planned grade in front of the wall, place drainage aggregate (1-1.5-inch clear, free-draining, angular gravel) between and directly behind units to a minimum of 12 inches. Drainage aggregate must be free of fine dirt or soil. Do not place drainage aggregate behind units that will be embedded. (E)



Drainage aggregate is critical to wall performance because it keeps water pressures from building up behind the wall face.

For walls over three feet in height, perforated drain pipes should be used to collect water along the base of the drainage aggregate. Drain pipes help to quickly remove large amounts of water.

For some projects, especially shoreline applications, a geosynthetic filter fabric may be required behind the drainage aggregate. Filter fabric prevents soils or sands (fines) from migrating into the drainage aggregate and wall face joints.

Compacted Soil Backfill

Proper placement and compaction of backfill is critical to the stability of a segmental wall. Poorly compacted backfill puts extra pressures on a wall—especially when it becomes wet.

Place soil backfill beginning directly behind drainage fill in layers (lifts) no thicker than six inches. Compact soil backfill—making sure that backfill is neither too wet nor dry. The amount and type of effort needed for adequate backfill compaction varies with soil type and moisture content. Generally, hand-operated vibratory-plate compactors can be used to achieve adequate compaction of granular soils—even on big projects. Fine soils such as clays should be compacted with kneading-type equipment like sheepsfoot rollers.

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To avoid pushing wall units out of alignment, do not use heavy self-propelled compaction equipment within three feet of the wall face.

At the end of the day's construction, protect the wall and the reinforced backfill from possible rainstorm water damage. Grade the soil backfill so water will run away from wall face and direct runoff from adjacent areas away from project site.

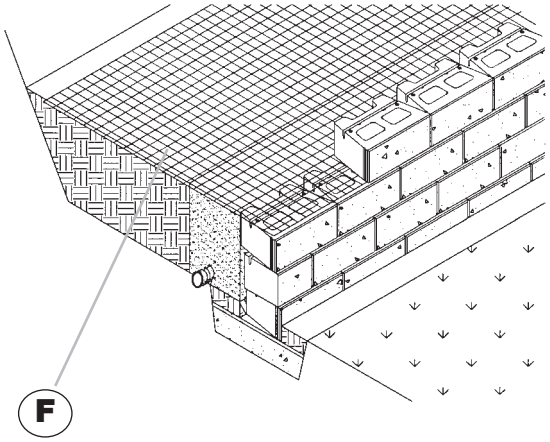
Geosynthetic Soil Reinforcement

Geosynthetic soil reinforcement, like VERSA-Grid®, is used to reinforce soil backfill when weight of Square Foot™ units alone is not enough to resist soil pressures. Soil reinforcement type, length, and vertical spacing will vary for each project and should be specified in a final wall design prepared by a licensed Civil Engineer (P.E.).

Prepare to install soil reinforcement materials by placing Square Foot units and backfilling up to the height of the first soil reinforcement layer specified on construction drawings. Lay soil reinforcement horizontally on top of compacted backfill and Square Foot units. (F) Geosynthetic layers should be placed about one inch from the front of Square Foot units.

Geosynthetics are usually stronger in one direction. It is very important to place them in the correct direction.

The strongest direction of the geosynthetic must be perpendicular to the wall face. For correct orientation, follow the geosynthetic manufacturer's directions carefully.



To ensure stability during construction, vertical spacing between geosynthetic layers should never exceed two feet. See VERSA-Grid® estimating charts on page 29 for assistance with preliminary material estimating.

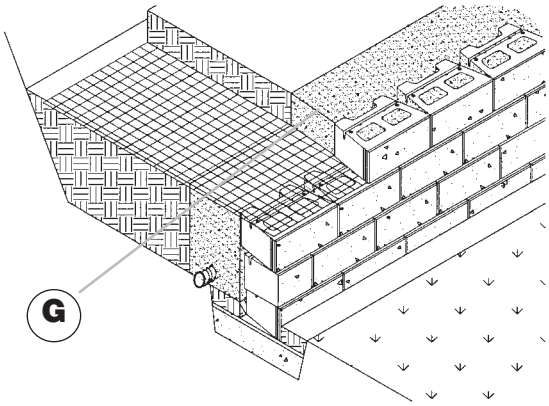
After positioning soil reinforcement, place the next course of Square Foot units on top of soil reinforcement. Insert pins through Square Foot units and into lower course units. Place drainage aggregate against back of the units and on top of soil reinforcement. Remove slack by pulling soil reinforcement away from the wall face and anchoring at back ends.

7 WALL CONSTRUCTION

(G) Beginning at the wall face, place and compact soil backfill. Keep soil reinforcement taut and avoid wrinkles.

Place a minimum of six inches of soil backfill before using any tracked equipment on top of soil reinforcement. Follow manufacturer's construction guidelines to avoid damage to soil reinforcement.

Placing soil reinforcement behind curves and corners requires special layout and overlapping procedures. Never overlap soil reinforcement layers directly on top of each other. Slick surfaces of geosynthetics will not hold in place properly when placed directly on top of one another. Always provide at least three inches of soil fill between overlapping soil reinforcement layers.



! *See VERSA-LOK® Technical Bulletin #3 and geosynthetic manufacturer's instructions for more curve/corner soil reinforcement details.*

More, More, More ...

Continue placing additional courses, drainage material, compacted soil backfill, and geosynthetic soil reinforcement as specified until desired wall height is achieved.

! *For walls more than four feet high, most building codes require a final wall design prepared by a licensed Civil Engineer (P.E.) registered in that state. Square Foot™ and its manufacturers have a network of licensed civil engineers who are familiar with segmental retaining wall design. These individuals are available for referrals to architects, engineers, or contractors with final wall design needs.*

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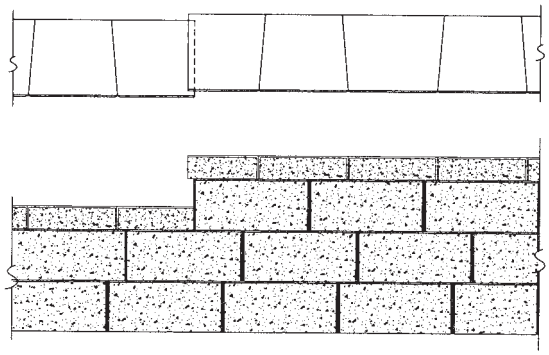
Caps

Finish the wall by placing cap units along the top. Two cap unit types are available—A and B. Alternate A and B caps on straight walls. Use A caps for convex (outside) curves. Use B caps for concave (inside) curves.



If cap layout does not exactly match the wall radius, adjust spacing at the back of the caps—do not gap caps at the front. To completely eliminate gapping, it may be necessary to saw-cut sides of cap units.

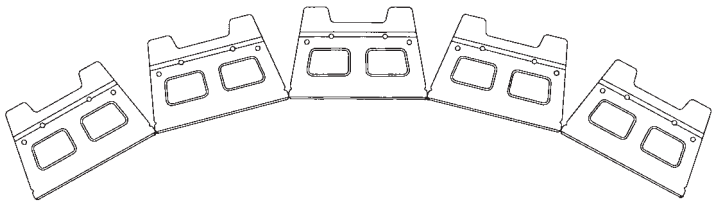
Front faces of caps may be placed flush, set back, or slightly overhanging faces of Square Foot™ units. It is preferred to overhang cap units approximately 3/4-inch to create an "eyebrow" on top of the wall. Overhanging cap units will create a small shadow on wall units and help hide minor imperfections in wall alignment.

! *All cap units should be arranged before securing with VERSA-LOK® Concrete Adhesive. Secure caps by placing two, continuous, 1/4-inch beads of adhesive along the top course of wall units. Set caps on prepared wall units. Do not secure caps using mortar or adhesives that become rigid. A Square Foot wall may move slightly (especially in areas subject to freeze/thaw cycles) causing a rigid cap adhesive to fail. Do not place caps if the units are too wet for the adhesive to stick. In cold weather, keep the adhesive tubes warm until just prior to use. For more information about capping, see VERSA-LOK Technical Bulletin #4.*

BQ#104 Attachment

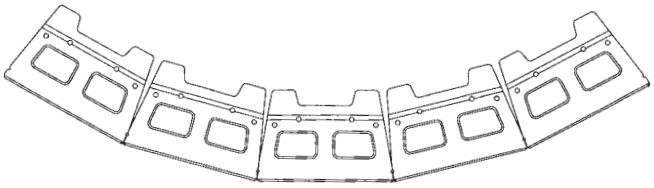
8 WALL DESIGN ELEMENTS

Curves



The trapezoidal shape of Square Foot™ units permits construction of concave and convex curves. Construct curves by increasing or decreasing spaces between the backs of the units—always keeping the front joints tightly aligned. The recommended minimum radius for both convex (outside) and concave (inside) curves is 4’ 6” (4.5 feet), measured from the front face of the units.

See VERSA-LOK® Technical Bulletin #3 for proper placement of geosynthetic soil reinforcement.



For convex curves, plan ahead to make sure the upper courses do not get tighter than the minimum radius. Because each course sets back, the radius of a convex curve becomes smaller as each course is stacked. To calculate minimum base course radius of a convex curve, add up the setback (either 1/4 or one inch) for each course needed. For example, minimum base course radius for a wall that will have six one inch setbacks (including embedded units) will be (6 x 1") + 4'6" = 5.0".

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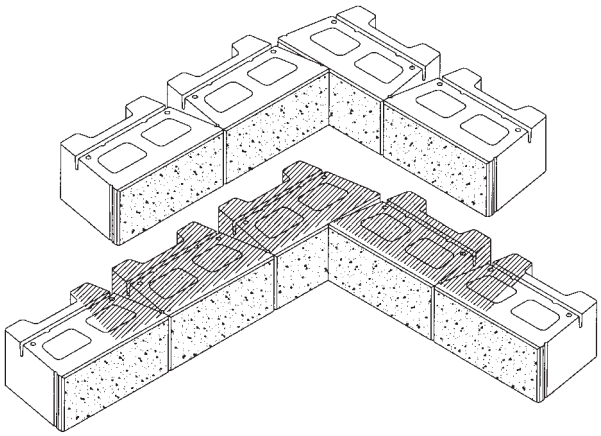
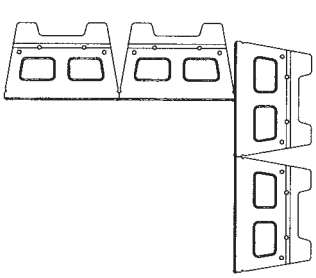
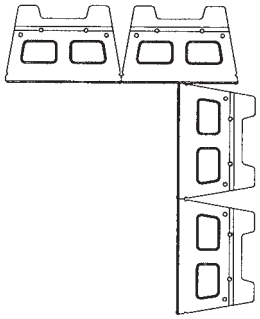
Corners

Inside 90-degree corners can be easily installed with no unit modification. For the first course, abut the unit from one side of the corner against a unit on the other side that runs past the corner. On the next course, simply reverse which side abuts and which side runs long.





UPPER COURSE



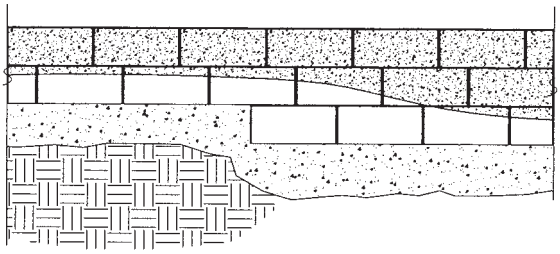
LOWER COURSE

A special corner unit is needed for an outside 90-degree corner and is available only in limited markets. Check with your local Square Foot™ supplier. For ease of installation, it is suggested to replace outside corners with a tight radius convex curve whenever possible.

8 WALL DESIGN ELEMENTS

Stepped Base Elevations

If the final grade along the front of the wall changes elevation, the leveling pad and base course may be stepped in eight-inch increments to match the grade change. Always start at the lowest level and work upward.



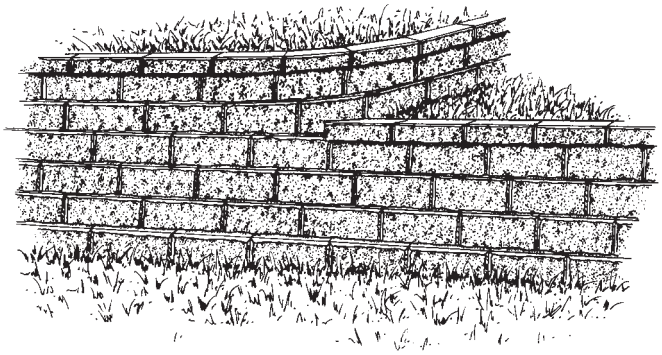
Step the leveling pad often enough to avoid burying extra units while maintaining required unit embedment.

Returns

As an option to stepping wall tops, grade changes at the top of a wall can be accommodated by creating returns that turn into slopes behind a wall.

Returns create a terraced appearance instead of several small steps along the top of a wall.

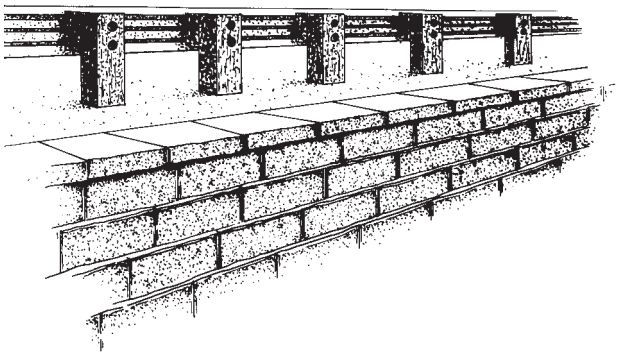
! *See VERSA-LOK® Technical Bulletin #7 for more information on tiered walls.*



BQ#104 Attachment

Guide Rails, Railings, and Traffic Barriers

For safety purposes, a variety of barriers may be placed behind Square Foot™ walls, including fences, railings, and guide rails. Barriers should be placed several feet behind wall faces to provide post foundations. Posts may penetrate geosynthetic soil reinforcement layers in accordance with the manufacturer's and engineer's recommendations.



When space is limited, properly designed, reinforced concrete barriers can be placed directly on top of walls. Expansion joints and bond breaks should be provided to accommodate differential movement between rigid barriers and flexible wall faces. Cantilevered supports extending behind walls stabilize the barriers against overturning.

! *For more information about guide rails, railings, and traffic barriers see VERSA-LOK® Technical Bulletin #8 or Construction Details Disk—available FREE by calling (800) 770-4525.*

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MATERIAL ESTIMATION WORKSHEET

Square Foot™ Units

Area of Wall (SF) x 1.0 Units per SF = Number of Units

_____ SF x 1.0 = _____ Units Needed

VERSA-TUFF® Pins

Units x 2 Pins per Unit = Number of Pins

_____ Units x 2 = _____ Pins Needed

NOTE: *Pins will not be used on the base course.*

Cap Units

Lineal Feet of Wall (LF) x .86 = Number of Caps

_____ LF x .86 = _____ Caps Needed

straight walls - use half **A** caps and half **B** caps
inside curves - use **B** caps
outside curves - use **A** caps

Additional caps may be needed for special splits or cuts.
Gradual curves may require a combination of A & B caps.

VERSA-LOK® Concrete Adhesive

11 oz. Tube: _____ LF ÷ 14 LF per Tube = _____ Tubes

For estimating purposes, the tables on the following page provide approximate amounts of geogrid soil reinforcement needed to construct walls in certain soil and loading conditions. For tall walls or complex situations, in-house staff engineers can prepare project specific preliminary designs to be used for estimation purposes.

VERSA-GRID® ESTIMATING CHARTS

These tables are provided for **estimating purposes only**. *They should not be used or relied upon for any application without verification of accuracy, suitability, and applicability for the use contemplated, which is the sole responsibility of the user. A final, project-specific design should be prepared by a qualified, licensed, professional Civil Engineer (P.E.) based on actual site conditions. Preparation of these tables did not include consideration or analysis of global slope stability or allowable bearing capacity of foundation soils. These must be reviewed for each project by a qualified Geotechnical Engineer.*

There are three tables provided in this guide to help estimate geogrid for different wall loading situations—level backfill, sloping backfill, and surcharges. To estimate geogrid quantities, first look under the **column** *appropriate for project soils, determine the height (H) of the proposed wall and read across the* **row** *(under appropriate soil column) to approximate geogrid type, number of layers, and lengths of each layer.*

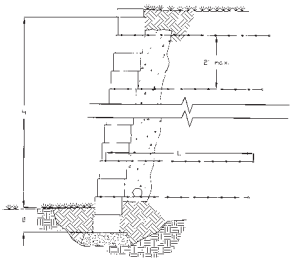
These design charts assume the following conditions:

- Uniform soil conditions
- Stable foundation soils
- Level grade in front of the wall
- No groundwater/water loads
- Slopes and loads behind the wall as shown
- No additional loading behind wall *(such as tiered walls, building loads, etc.)*

Design standards and properties used to develop these charts were:

- Design methodology - in general accordance with NCMA Design Manual for SRWs
- Unit weight of soil (γ) 120 pcf
- Internal friction angle of soil (ϕ) as shown on charts
- Long term design strength of the geogrid (LTDS)
  - **VERSA-Grid VG 3.0 - 1250 lb/ft**
  - **VERSA-Grid VG 5.0 - 1875 lb/ft**

LEVEL BACKFILL



Gravel (ϕ = 34°)

H (feet)	D (feet)	L (feet)	layers	Versa-Grid
4	0.5	n/a	n/a	n/a
5	0.5	3.5	2	VG 3.0
6	0.5	4.0	2	VG 3.0
7	1.0	5.0	3	VG 3.0
8	1.0	5.5	4	VG 3.0
9	1.0	6.0	4	VG 3.0
10	1.0	6.5	5	VG 3.0
12	1.0	8.0	6	VG 3.0

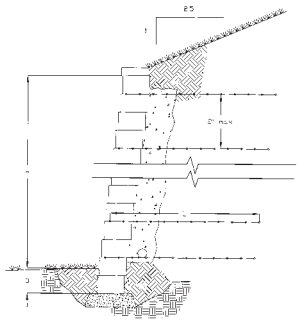
Sand (ϕ = 30°)

H (feet)	D (feet)	L (feet)	layers	Versa-Grid
4	0.5	4.0	1	VG 3.0
5	0.5	4.0	2	VG 3.0
6	0.5	4.5	2	VG 3.0
7	1.0	5.5	3	VG 3.0
8	1.0	6.0	4	VG 3.0
9	1.0	6.5	5	VG 3.0
10	1.0	7.0	5	VG 3.0
12	1.0	8.5	7	VG 3.0

Clay (ϕ = 28°)

H (feet)	D (feet)	L (feet)	layers	Versa-Grid
4	0.5	4.0	1	VG 3.0
5	0.5	4.5	2	VG 3.0
6	0.5	5.0	2	VG 3.0
7	1.0	5.5	3	VG 3.0
8	1.0	6.0	4	VG 3.0
9	1.0	6.5	5	VG 3.0
10	1.0	7.0	6	VG 3.0
12	1.0	8.5	7	VG 3.0

SLOPING BACKFILL



Gravel (ϕ = 34°)

H (feet)	D (feet)	L (feet)	layers	Versa-Grid
4	0.5	4.0	1	VG 3.0
5	0.5	4.0	2	VG 3.0
6	0.5	4.5	3	VG 3.0
7	1.0	5.5	4	VG 3.0
8	1.0	6.0	4	VG 3.0
9	1.0	6.5	5	VG 3.0
10	1.0	7.5	6	VG 3.0
12	1.0	8.5	7	VG 3.0

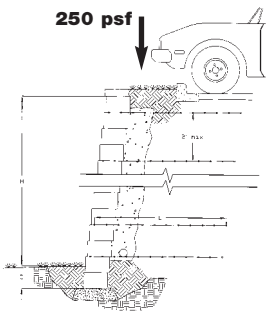
Sand (ϕ = 30°)

H (feet)	D (feet)	L (feet)	layers	Versa-Grid
4	0.5	4.5	1	VG 3.0
5	0.5	4.5	2	VG 3.0
6	0.5	5.5	3	VG 3.0
7	1.0	6.5	4	VG 3.0
8	1.0	7.0	5	VG 3.0
9	1.0	8.0	6	VG 3.0
10	1.0	8.5	6	VG 3.0
12	1.0	10.0	7	VG 5.0

Clay (ϕ = 28°)

H (feet)	D (feet)	L (feet)	layers	Versa-Grid
4	0.5	4.5	2	VG 3.0
5	0.5	5.5	2	VG 3.0
6	0.5	6.0	3	VG 3.0
7	1.0	8.0	4	VG 3.0
8	1.0	9.5	5	VG 3.0
9	1.0	11.0	6	VG 3.0
10	1.0	12.0	6	VG 5.0
12	1.0	15.0	7	VG 5.0

SURCHARGE BACKFILL



Gravel (ϕ = 34°)

H (feet)	D (feet)	L (feet)	layers	Versa-Grid
4	0.5	4.0	2	VG 3.0
5	0.5	4.5	2	VG 3.0
6	0.5	5.0	3	VG 3.0
7	1.0	6.0	4	VG 3.0
8	1.0	6.5	4	VG 3.0
9	1.0	7.0	5	VG 3.0
10	1.0	7.5	5	VG 3.0
12	1.0	9.0	7	VG 3.0

Sand (ϕ = 30°)

H (feet)	D (feet)	L (feet)	layers	Versa-Grid
4	0.5	4.5	2	VG 3.0
5	0.5	5.5	2	VG 3.0
6	0.5	6.0	3	VG 3.0
7	1.0	7.0	4	VG 3.0
8	1.0	7.5	5	VG 3.0
9	1.0	8.5	5	VG 3.0
10	1.0	9.0	6	VG 3.0
12	1.0	10.0	7	VG 5.0

Clay (ϕ = 28°)

H (feet)	D (feet)	L (feet)	layers	Versa-Grid
4	0.5	5.5	2	VG 3.0
5	0.5	6.0	2	VG 3.0
6	0.5	6.5	3	VG 3.0
7	1.0	7.5	4	VG 3.0
8	1.0	8.0	5	VG 3.0
9	1.0	9.0	5	VG 3.0
10	1.0	9.5	6	VG 3.0
12	1.0	11.0	7	VG 5.0

*Geogrids with similar LTDS and connection strengths with Square Foot™ units can also be estimated using these charts. With some variations, the VERSA-Grid VG 3.0 charts also generally estimate quantities for Miragrid 3XT, Stratagrid 300, and Raugrid 4/2. The charts for VERSA-Grid VG 5.0 generally estimate quantities for Miragrid 5XT, Stratagrid 500, and Raugrid 6/3.

Miragrid is a registered trademark of Nicolon Corporation. • Stratagrid is a registered trademark of Strata Systems, Inc.
Raugrid is a trademark of Lückenhaus Technische Textilien GmbH and Lückenhaus North America, Inc.

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SQUARE FOOT™ SPECIFICATIONS

PART 1: *GENERAL*

1.01 DESCRIPTION

A. *Work includes furnishing and installing segmental retaining wall (SRW) units to the lines and grades designated on the project's final construction drawings or as directed by the Architect/Engineer. Also included are furnishing and installing appurtenant materials required for construction of the retaining wall as shown on the construction drawings.*

1.02 REFERENCE STANDARDS

A. *Segmental Retaining Wall Units*
   1. **ASTM C 1372**
      - Standard Specification for Segmental Retaining Wall Units
   2. **ASTM C 140**
      - Standard Test Methods of Sampling and Testing Concrete Masonry Units

B. *Geosynthetic Reinforcement*
   1. **ASTM D 4595**
      - Tensile Properties of Geotextiles by the Wide-Width Strip Method
   2. **ASTM D 5262**
      - Test Method for Evaluating the Unconfined Creep Behavior of Geosynthetics
   3. **GRI:GG1**
      - Single Rib Geogrid Tensile Strength
   4. **GRI:GG5**
      - Geogrid Pullout

C. *Soils*
   1. **ASTM D 698**
      - Moisture Density Relationship for Soils, Standard Method
   2. **ASTM D 422**
      - Gradation of Soils
   3. **ASTM D 424**
      - Atterberg Limits of Soil

D. *Drainage Pipe*
   1. **ASTM D 3034**
      - Specification for Polyvinyl Chloride (PVC) Plastic Pipe
   2. **ASTM D 1248**
      - Specification for Corrugated Plastic Pipe

E. *Engineering Design*
   1. "NCMA Design Manual for Segmental Retaining Walls," Second Edition

F. *Where specifications and reference documents conflict, the Architect/Engineer shall make the final determination of applicable document.*

1.03 SUBMITTALS

A. **Material Submittals**: *The Contractor shall submit manufacturers' certifications two weeks prior to start of work stating that the SRW units and geosynthetic reinforcement meet the requirements of Section 2 of this specification.*

B. **Design Submittal**: *The Contractor shall submit two sets of detailed design calculations and final retaining wall plans for approval at least two weeks prior to the beginning of wall construction. All calculations and drawings shall be prepared and sealed by a professional Civil Engineer (P.E.) – (Wall Design Engineer) experienced in SRW design and licensed in the state where the wall is to be built.*

1.04 DELIVERY, STORAGE AND HANDLING

A. *Contractor shall check materials upon delivery to assure that specified type and grade of materials have been received and proper color and texture of SRW units have been received.*

B. *Contractor shall prevent excessive mud, wet concrete, epoxies, and like materials that may affix themselves, from coming in contact with materials.*

C. *Contractor shall store and handle materials in accordance with manufacturer's recommendations.*

D. *Contractor shall protect materials from damage. Damaged materials shall not be incorporated into the retaining wall.*

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SQUARE FOOT™ SPECIFICATIONS

PART 2: *MATERIALS*

2.01 SEGMENTAL RETAINING WALL UNITS

A. *SRW units shall be machine-formed, Portland Cement concrete blocks specifically designed for retaining wall applications. SRW units currently approved for this project are:* Square Foot™ units as manufactured by _____.

B. *Color of SRW units shall be* _____.

C. *Finish of SRW units shall be split face.*

D. *SRW unit faces shall be of straight geometry.*

E. *SRW unit height shall be 8 inches.*

F. *SRW units (not including aggregate fill in unit voids) shall provide a minimum weight of 80 psf wall face area.*

G. *SRW units shall be interlocked with connection pins, designed with proper setback to provide 8:1 vertical to horizontal batter (a 7 degree cant from vertical) or near vertical (2 degree cant from vertical).*

H. *SRW units shall be capable of being erected with the horizontal gap between adjacent units not exceeding 1/8 inch.*

I. *SRW units shall be sound and free of cracks or other defects that would interfere with the proper placing of the unit or significantly impair the strength or permanence of the structure. Cracking or excessive chipping may be grounds for rejection. Units showing cracks longer than 1/2" shall not be used within the wall. Units showing chips visible at a distance of 30 feet from the wall shall not be used within the wall.*

J. *Concrete used to manufacture SRW units shall have a minimum 28 days compressive strength of 3,000 psi and a maximum moisture absorption rate, by weight, of 8 percent as determined in accordance with ASTM C140. Compressive strength test specimens shall conform to the saw-cut coupon provisions of ASTM C140.*

K. *SRW units' molded dimensions shall not differ more than ± 1/8 inch from that specified, in accordance with ASTM C1372.*

2.02 SEGMENTAL RETAINING WALL UNIT CONNECTION PINS

A. *SRW units shall be interlocked with VERSA-TUFF® connection pins. The pins shall consist of glass-reinforced nylon made for the expressed use with the SRW units supplied.*

2.03 GEOSYNTHETIC REINFORCEMENT

A. *Geosynthetic reinforcement shall consist of geogrids or geotextiles manufactured as a soil reinforcement element. The manufacturers/suppliers of the geosynthetic reinforcement shall have demonstrated construction of similar size and types of segmental retaining walls on previous projects. The geosynthetic type must be approved one week prior to bid opening. Geosynthetic types currently approved for this project are:* **VERSA-Grid® Geogrids.**

B. *The type, strength, and placement location of the reinforcing geosynthetic shall be as determined by the Wall Design Engineer, as shown on the final, P.E. sealed retaining wall plans.*

2.04 LEVELING PAD

A. *Material for leveling pad shall consist of compacted sand, gravel, or combination thereof (USCS soil types GP, GW, SP, & SW) and shall be a minimum of 6 inches in depth. Lean concrete with a strength of 200 to 300 psi and three inches thick maximum may also be used as a leveling pad material. The leveling pad should extend laterally at least a distance of 6 inches from the toe and heel of the lowermost SRW unit.*

2.05 DRAINAGE AGGREGATE

A. *Drainage aggregate shall be angular, clean stone or granular fill meeting the following gradation as determined in accordance with ASTM D422*

Sieve Size	Percent Passing
1 inch	100
3/4 inch	75-100
No. 4	0-60
No. 40	0-50
No. 200	0-5

SQUARE FOOT™ SPECIFICATIONS

2.06 DRAINAGE PIPE

A. *The drainage collection pipe shall be a perforated or slotted PVC, or corrugated HDPE pipe. The drainage pipe may be wrapped with a geotextile to function as a filter.*

B. *Drainage pipe shall be manufactured in accordance with ASTM D 3034 and/or ASTM D 1248*

2.07 REINFORCED (INFILL) SOIL

A. *The reinforced soil material shall be free of debris. Unless otherwise noted on the final, P.E. sealed retaining wall plans prepared by the Wall Design Engineer, the reinforced material shall consist of the inorganic USCS soil types GP, GW, SW, SP, SM meeting the following gradation, as determined in accordance with ASTM D422:*

Sieve Size	Percent Passing
4 inches	100
No. 4	20-100
No. 40	0-60
No. 200	0-35

B. *The maximum particle size of poorly-graded gravels (GP) (no fines) should not exceed 3/4 inch unless expressly approved by the Wall Design Engineer and the long-term design strength (LTDS) of the geosynthetic is reduced to account for additional installation damage from particles larger than this maximum.*

C. *The plasticity of the fine fraction shall be less than 20.*

PART 3: *DESIGN PARAMETERS*

3.01 SOIL

A. *The following soil parameters, as determined by the Owner's Geotechnical Engineer shall be used for the preparation of the final design:*

	Unit Weight (γ) (pcf)	Internal Friction Angle (ϕ) (degrees)	Cohesion (c)
REINFORCED FILL:	_____	_____	0
RETAINED SOIL:	_____	_____	0
FOUNDATION SOIL:	_____	_____	_____

(If internal friction angles are not available for the above section, the specifier can provide the USCS soil type classification for the reinforced, retained, and foundation soils and/or attach the geotechnical investigation report for this project.)

B. *Should the actual soil conditions observed during construction differ from those assumed for the design, design shall be reviewed by the Wall Design Engineer at the Owner's Geotechnical Engineer's direction.*

3.02 DESIGN

A. *The design analysis for the final, P.E.-sealed retaining wall plans prepared by the Wall Design Engineer shall consider the external stability against sliding and overturning, internal stability, and facial stability of the reinforced soil mass and shall be in accordance with acceptable engineering practice and these specifications. The internal and external stability analysis shall be performed in accordance with the "NCMA Design Manual for Segmental Retaining Walls", using the recommended minimum factors of safety in this manual.*

B. *External stability analysis for bearing capacity, global stability, and total and differential settlement shall be the responsibility of the Owner and the Owner's Geotechnical Engineer. The Geotechnical Engineer shall perform bearing capacity, settlement estimates, and global stability analysis based on the final wall design provided by the Wall Design Engineer and coordinate any required changes with Wall Design Engineer.*

C. *While vertical spacing between geogrid layers may vary, it shall not exceed 2.0 feet maximum in the wall design.*

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D. *The geosynthetic placement in the wall design shall have 100-percent continuous coverage parallel to the wall face. Gapping between horizontally adjacent layers of geosynthetic (partial coverage) will not be allowed.*

PART 4: CONSTRUCTION

4.01 INSPECTION

A. *The Owner or Owner's Representative is responsible for verifying that the Contractor meets all the requirements of the specification. This includes all submittals for materials and design, qualifications, and proper installation of wall system.*

B. *Contractor's field construction supervisor shall have demonstrated experience and be qualified to direct all work at the site.*

4.02 EXCAVATION

A. *Contractor shall excavate to the lines and grades shown on the project grading plans. Contractor shall take precautions to minimize over-excavation. Over-excavation shall be filled with compacted infill material, or as directed by the Engineer/Architect, at the Contractor's expense.*

B. *Contractor shall verify location of existing structures and utilities prior to excavation. Contractor shall ensure all surrounding structures are protected from the effects of wall excavation. Excavation support, if required, is the responsibility of the Contractor.*

4.03 FOUNDATION PREPARATION

A. *Following the excavation, the foundation soil shall be examined by the Owner's Engineer to assure actual foundation soil strength meets or exceeds the assumed design bearing strength. Soils not meeting the required strength shall be removed and replaced with infill soils, as directed by the Owner's Engineer.*

B. *Foundation soil shall be proofrolled and compacted to 95 percent standard Proctor density and inspected by the Owner's Engineer prior to placement of leveling pad materials.*

4.04 LEVELING PAD CONSTRUCTION

A. *Leveling pad shall be placed as shown on the final, P.E.-sealed retaining wall plans with a minimum thickness of 6 inches. The leveling pad should extend laterally at least a distance of 6 inches from the toe and heel of the lower most SRW unit.*

B. *Granular leveling pad material shall be compacted to provide a firm, level bearing surface on which to place the first course of units. Well-graded sand can be used to smooth the top 1/4- to 1/2-inch of the leveling pad. Compaction will be with mechanical plate compactors to achieve 95-percent of maximum standard Proctor density (ASTM D 698).*

4.05 SRW UNIT INSTALLATION

A. *All SRW units shall be installed at the proper elevation and orientation as shown on the final, P.E.-sealed retaining wall plans and details as directed by the Wall Design Engineer. The SRW units shall be installed in general accordance with the manufacturer's recommendations. The specifications and drawings shall govern in any conflict between the two requirements.*

B. *First course of SRW units shall be placed on the leveling pad. The units shall be leveled side-to-side, front-to-rear and with adjacent units, and aligned to ensure intimate contact with the leveling pad. The first course is the most important to ensure accurate and acceptable results. No gaps shall be left between the front of adjacent units. Alignment may be done by means of a string line or offset from base line to the back of the units.*

C. *The voids (cores) of the base course units shall be filled with crushed gravel. The cores of additional courses shall be filled with free-draining aggregate.*

D. *All excess debris shall be cleaned from top of units and the next course of units installed on top of the units below.*

E. *Two VERSA-TUFF® connection pins shall be inserted through the pin holes of each upper course unit into receiving slots in lower course units. Pins shall be fully seated in the pin slot below. Units shall be pushed forward to remove any looseness in the unit-to-unit connection.*

F. *Prior to placement of next course, the level and alignment of the units shall be checked and corrected, where needed.*

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SQUARE FOOT™ SPECIFICATIONS

G. *Layout of curves and corners shall be installed in accordance with the wall plan details or in general accordance with SRW manufacturer's installation guidelines. Walls meeting at corners shall be interlocked by overlapping successive courses.*

H. *Procedures "C" through "F" shall be repeated until reaching top of wall, just below the height of the cap units. Geosynthetic reinforcement, drainage materials, and reinforced backfill shall be placed in sequence with unit installation as described in Section 4.06, 4.07, and 4.08.*

4.06 GEOSYNTHETIC REINFORCEMENT PLACEMENT

A. *All geosynthetic reinforcement shall be installed at the proper elevation and orientation as shown on the final, P.E.-sealed retaining wall plan profiles and details, or as directed by the Wall Design Engineer.*

B. *At the elevations shown on the final plans, (after the units, drainage material, and backfill have been placed to this elevation) the geosynthetic reinforcement shall be laid horizontally on compacted infill and on top of the concrete SRW units. It shall be placed to within one inch of the front face of the unit below. Embedment of the geosynthetic in the SRW units shall be consistent with SRW manufacturer's recommendations. Correct orientation of the geosynthetic reinforcement shall be verified by the Contractor to be in accordance with the geosynthetic manufacturer's recommendations. The highest strength direction of the geosynthetic must be perpendicular to the wall face.*

C. *Geosynthetic reinforcement layers shall be one continuous piece for their entire embedment length. Splicing of the geosynthetic in the design strength direction (perpendicular to the wall face) shall not be permitted. Along the length of the wall (parallel to the face), horizontally adjacent sections of geosynthetic reinforcement shall be butted in a manner to assure 100-percent coverage parallel to the wall face.*

D. *Tracked construction equipment shall not be operated directly on the geosynthetic reinforcement. A minimum of 6 inches of backfill is required prior to operation of tracked vehicles over the geosynthetic. Turning should be kept to a minimum. Rubber-tired equipment may pass over the geosynthetic reinforcement at slow speeds (less than 5 mph).*

E. *The geosynthetic reinforcement shall be free of wrinkles prior to placement of soil fill. The nominal tension shall be applied to the reinforcement and secured in place with staples, stakes, or by hand tensioning until reinforcement is covered by 6 inches of fill.*

4.07 DRAINAGE MATERIALS

A. *Drainage aggregate shall be installed to the line, grades, and sections shown on the final P.E. sealed retaining wall plans. Drainage aggregate shall be placed to the minimum thickness shown on the construction plans between and behind units (a minimum of 1 cubic foot for each exposed square foot of wall face unless otherwise noted on the final wall plans).*

B. *Drainage collection pipes shall be installed to maintain gravity flow of water to outside the reinforced soil zone. The drainage collection pipe shall daylight into a storm sewer manhole or along a slope at an elevation lower than the lowest point of the pipe within the aggregate drain.*

4.08 BACKFILL PLACEMENT

A. *The reinforced backfill shall be placed as shown in the final wall plans in the maximum compacted lift thickness of 10 inches and shall be compacted to a minimum of 95-percent of standard Proctor density (ASTM D 698) at a moisture content within 2-percent of optimum. The backfill shall be placed and spread in such a manner as to eliminate wrinkles or movement of the geosynthetic reinforcement and the SRW units.*

B. *Only hand-operated compaction equipment shall be allowed within 3 feet of the back of the wall unit. Compaction within the 3 feet behind the wall unit shall be achieved by at least three (3) passes of a lightweight mechanical tamper, plate, or roller.*

C. *At the end of each day's operation, the Contractor shall slope the last level of backfill away from the wall facing and reinforced backfill to direct water runoff away from the wall face.*

D. *At completion of wall construction, backfill shall be placed level with final top-of-wall elevation. If final grading, paving, landscaping, and/or storm drainage installation adjacent to the wall is not placed*

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immediately after wall completion, temporary grading and drainage shall be provided to ensure water runoff is not directed at the wall nor allowed to collect or pond behind the wall until final construction adjacent to the wall is completed.

4.09 SRW CAPS

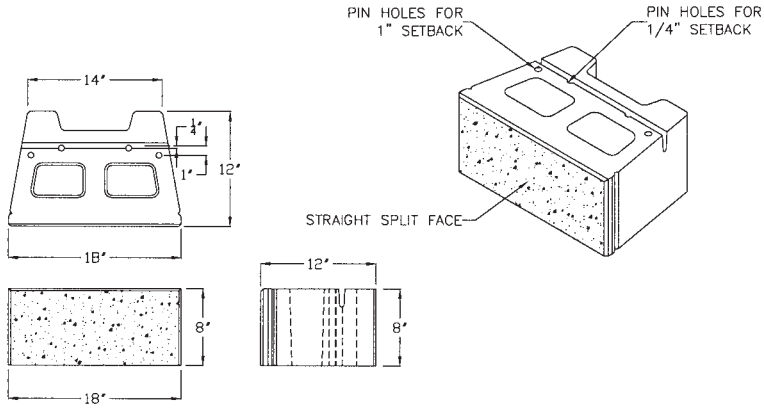
A. *SRW caps shall be properly aligned and glued to underlying units with VERSA-LOK® Concrete Adhesive, a flexible, high-strength concrete adhesive. Rigid adhesive or mortar are not acceptable.*

B. *Caps shall overhang the top course of units by 3/4- to 1-inch. Slight variation in overhang is allowed to correct alignment at the top of the wall.*

4.11 CONSTRUCTION ADJACENT TO COMPLETED WALL

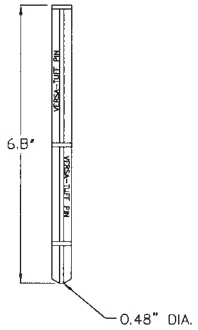
A. *The Owner or Owner's Representative is responsible for ensuring that construction by others adjacent to the wall does not disturb the wall or place temporary construction loads on the wall that exceed design loads, including loads such as water pressure, temporary grades, or equipment loading. Heavy paving or grading equipment shall be kept a minimum of 3 feet behind the back of the wall face. Equipment with wheel loads in excess of 150 psf live load shall not be operated within 10 feet of the face of the retaining wall during construction adjacent to the wall. Care should be taken by the General Contractor to ensure water runoff is directed away from the wall structure until final grading and surface drainage collection systems are completed.*

CONSTRUCTION DETAILS



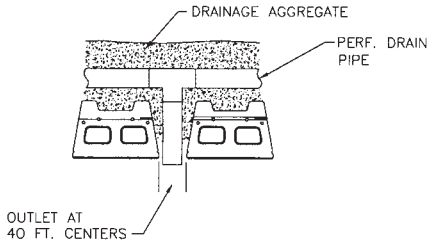
VERSA-LOK SQUARE FOOT UNIT

UNIT DIMENSIONS
SCALE: NONE



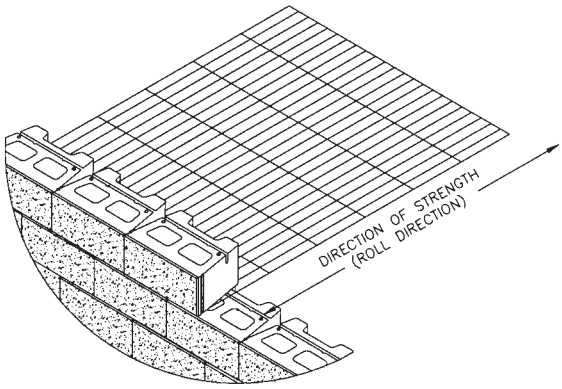
VERSA-TUFF PIN

PIN DIMENSIONS
SCALE: NONE



DRAIN DETAIL

WALLS OVER 3'
SCALE: NONE

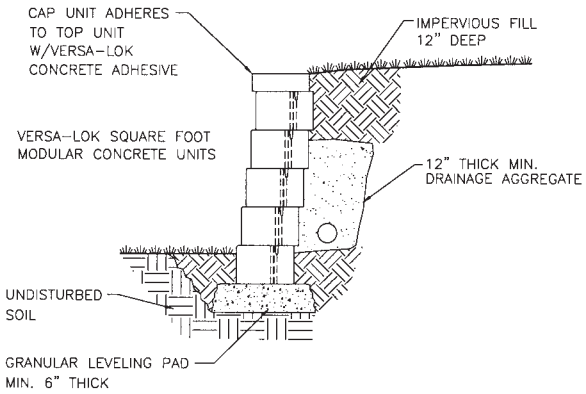


NOTE:
1. FOLLOW GEOSYNTHETIC GRID MANUFACTURER'S INSTALLATION INSTRUCTIONS AND SPECIFICATIONS
2. GEOGRID LENGTH AND ELEVATION PLACEMENT SHALL BE DETERMINED BY PROJECT ENGINEER

GEOSYNTHETIC INSTALLATION DETAIL

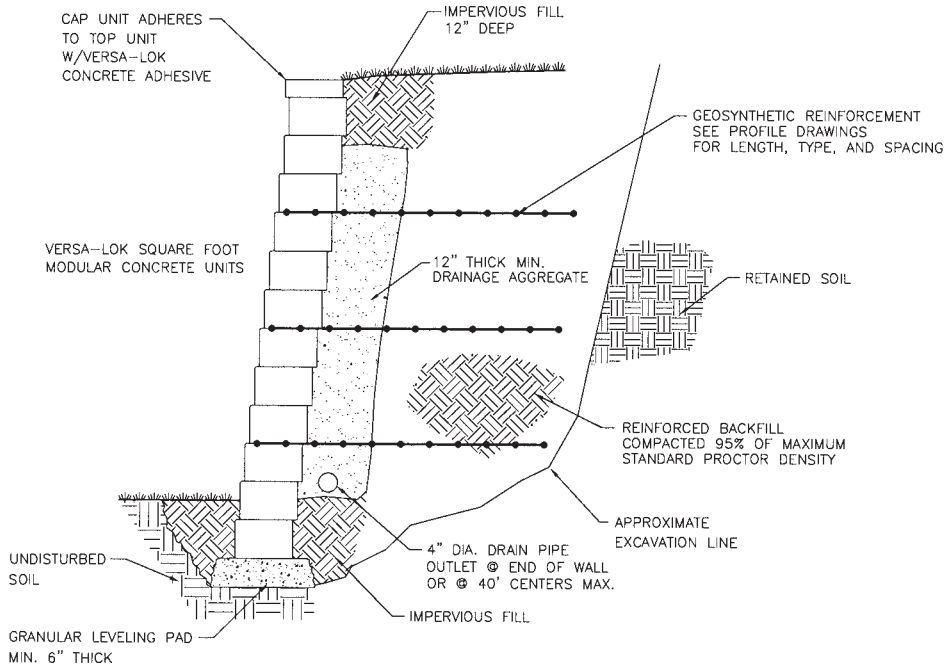
SCALE: NONE

CONSTRUCTION DETAILS



TYPICAL SECTION – UNREINFORCED RETAINING WALL

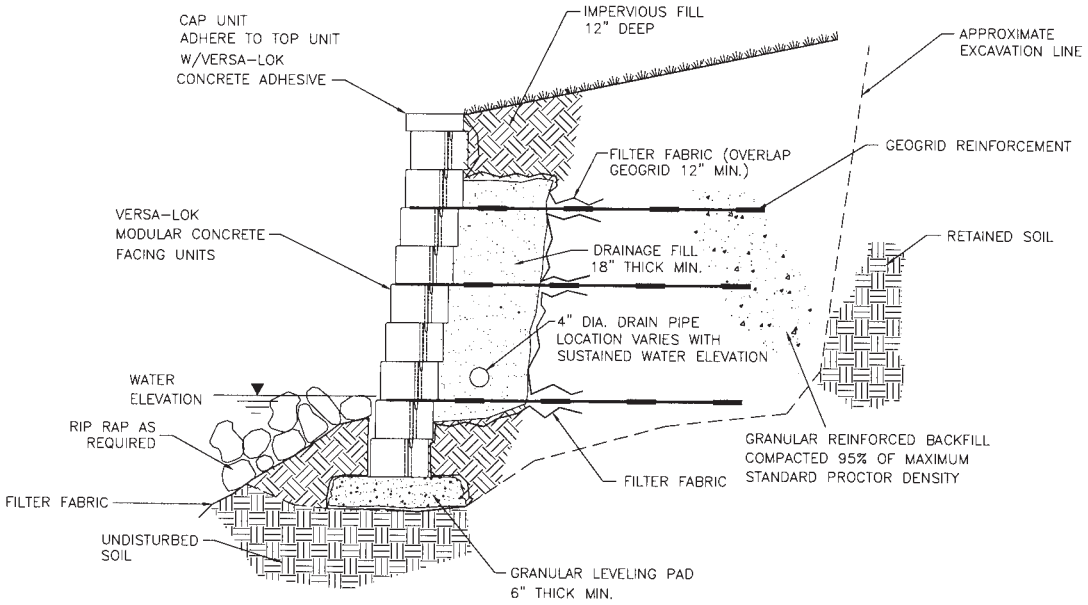
SCALE: NONE



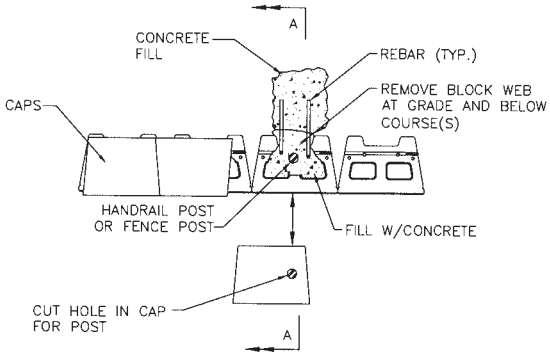
TYPICAL SECTION – REINFORCED RETAINING WALL

SCALE: NONE

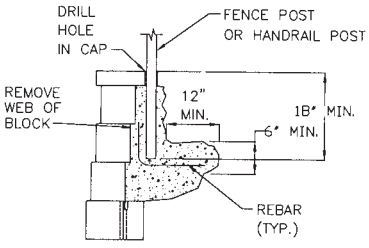
CONSTRUCTION DETAILS



TYPICAL SECTION-REINFORCED SHORELINE WALL
SCALE: NONE

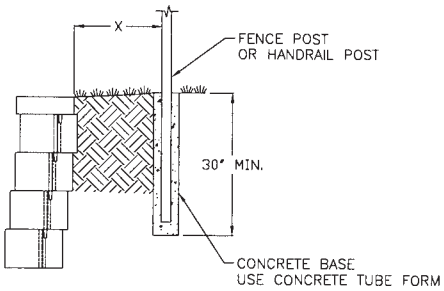


POST DETAIL- PLAN VIEW
TYPICAL HANDRAIL AND/OR FENCE POST
SCALE: NONE



POST DETAIL- SECTION A-A
TYPICAL HANDRAIL AND/OR FENCE POST
SCALE: NONE

CONSTRUCTION DETAILS

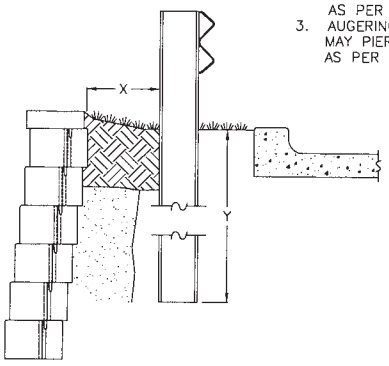


POST DETAIL

TYPICAL HANDRAIL AND/OR FENCE POST
SCALE: NONE

GUARD RAIL NOTES:

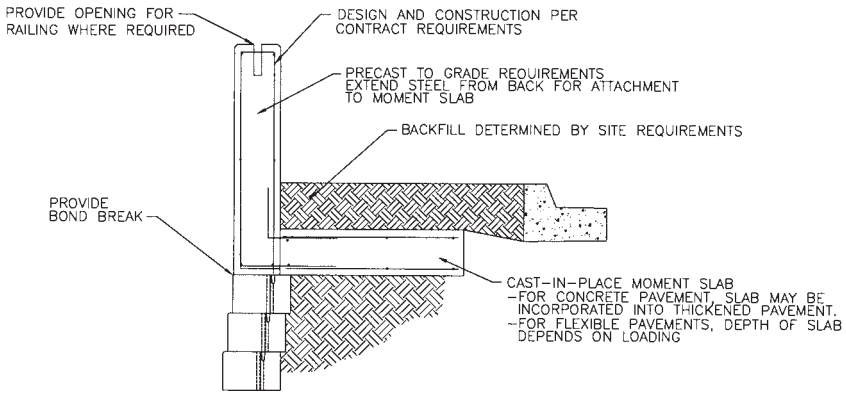
1. DISTANCE X AND Y TO BE DETERMINED BY ENGINEER BASED ON SOIL AND LOADING CONDITIONS.
2. INSTALL H-PILE OR WOOD POST AS PER MANUFACTURER'S RECOMMENDATIIONS.
3. AUGERING OR DRIVING OF POST MAY PIERCE UPPER LAYER OF GEOSYNTHETIC AS PER ENGINEER'S DESIGN.



GUARD RAIL DETAIL

TYPICAL GUARD RAIL
SCALE: NONE

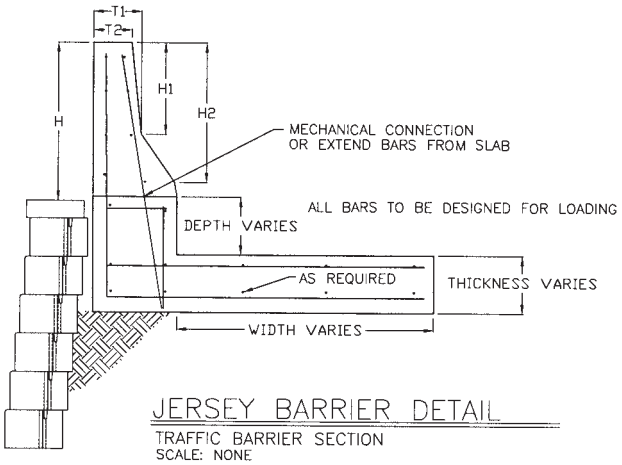
CONSTRUCTION DETAILS



COPING DETAIL
TRAFFIC BARRIER SECTION
SCALE: NONE

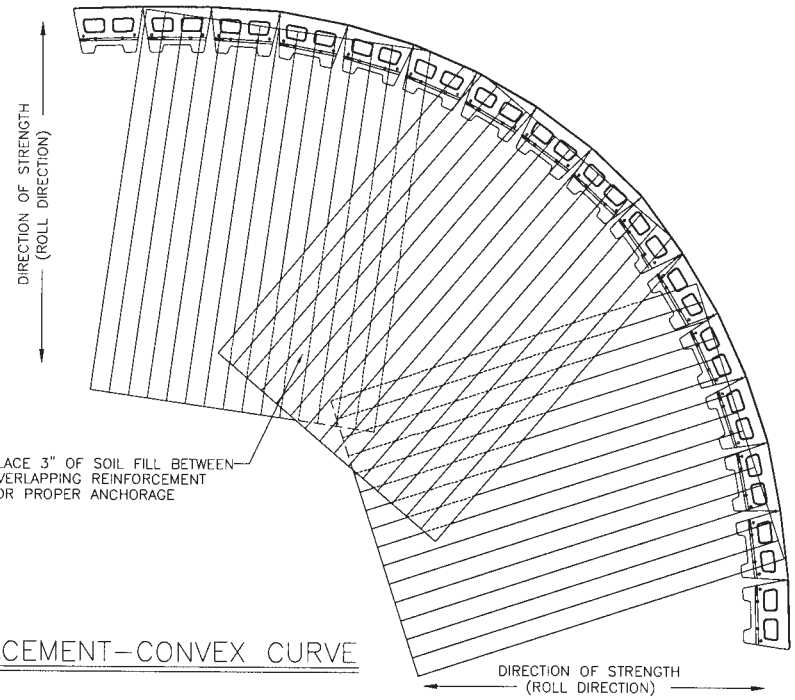
BARRIER NOTES:

1. BARRIERS MAY BE SET ON TOP OF OR BEHIND WALL.
2. BARRIERS ON TOP OF WALL SHALL BE DESIGNED TO ACCOMODATE DIFFERENTIAL MOVEMENT OF RETAINING WALL.
3. STEEL DESIGN AND COPING GEOMETRY WILL VARY WITH SITE LOADINGS. DESIGN MUST BE PROJECT SPECIFIC.
4. DURING PLACEMENT OF CONCRETE, PRECAUTIONS SHOULD BE TAKEN TO REDUCE LATERAL PRESSURES ON THE VERSA-LOK WALL. FORMING AND/OR TEMPORARY BRACING MAY BE REQUIRED.



JERSEY BARRIER DETAIL
TRAFFIC BARRIER SECTION
SCALE: NONE

CONSTRUCTION DETAILS

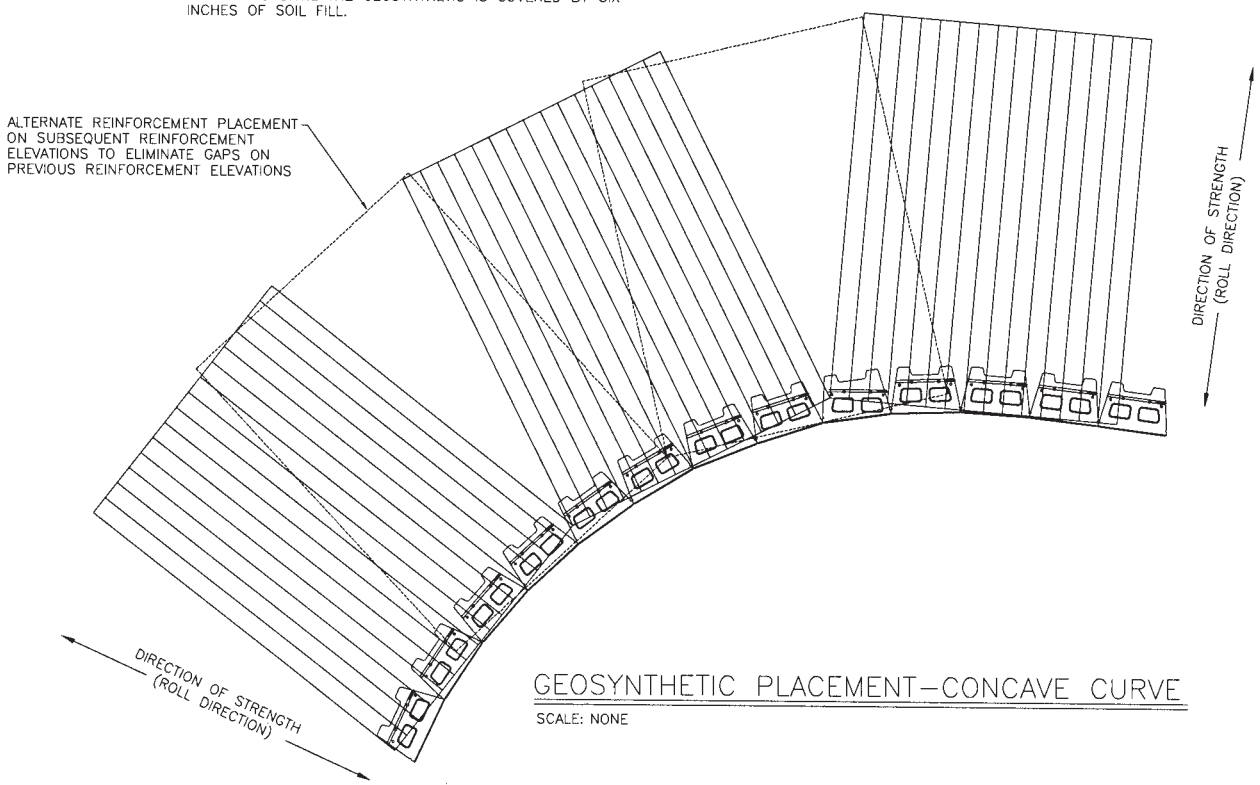


GEOSYNTHETIC PLACEMENT–CONVEX CURVE

SCALE: NONE

GENERAL NOTES FOR GEOSYNTHETIC REINFORCEMENT

1. AT THE ELEVATIONS SHOWN ON THE CONSTRUCTION PLANS, THE GEOSYNTHETIC SHALL BE LAID HORIZONTALLY ON COMPACTED SOIL FILL AND PLACED ON TO THE VERSA–LOK UNITS.
2. CORRECT ORIENTATION (ROLL DIRECTION) OF THE GEOSYNTHETIC SHALL BE VERIFIED BY THE CONTRACTOR TO BE IN ACCORDANCE WITH THE GEOSYNTHETIC MANUFACTURER'S RECOMMENDATIONS.
3. THE GEOSYNTHETIC SHALL BE IN TENSION AND FREE OF WRINKLES PRIOR TO PLACEMENT OF SOIL FILL.
4. NOMINAL TENSION SHALL BE APPLIED TO THE GEOSYNTHETIC AND SECURED IN PLACE WITH STAPLES, STAKES OR BY HAND TENSIONING UNTIL THE GEOSYNTHETIC IS COVERED BY SIX INCHES OF SOIL FILL.



GEOSYNTHETIC PLACEMENT–CONCAVE CURVE

SCALE: NONE



VERSA-LOK® Retaining Wall Systems · A Division of Kiltie Corporation
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(651) 770-3166 · (800) 770-4525 · (651) 770-4089 fax · www.versa-lok.com

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U.S. Patent D319,885, U.S. Patent D321,060, U.S. Patent D341,215,
U.S. Patent D346,667, U.S. Patent D378,702, U.S. Patent D391,376,
U.S. Patent D430,680, U.S. Patent D435,302, U.S. Patent D452, 332 and other U.S. patents pending; Canadian Industrial Design Registration No. 63929, No. 71472, No. 73910, No. 73911, No. 73912, No. 77816, No. 79058, No. 82288, and No. 89084.

THE INFORMATION, INCLUDING TECHNICAL AND ENGINEERING DATA, FIGURES, TABLES, DESIGNS, DRAWINGS, DETAILS, SUGGESTED PROCEDURES, AND SUGGESTED SPECIFICATIONS, PRESENTED IN THIS PUBLICATION IS FOR GENERAL INFORMATION ONLY. WHILE EVERY EFFORT HAS BEEN MADE TO ENSURE ITS ACCURACY, THIS INFORMATION SHOULD NOT BE USED OR RELIED UPON FOR ANY APPLICATION WITHOUT VERIFICATION OF ACCURACY, SUITABILITY, AND APPLICABILITY FOR THE USE CONTEMPLATED, WHICH IS THE SOLE RESPONSIBILITY OF THE USER. A FINAL, PROJECT SPECIFIC DESIGN SHOULD BE PREPARED BY A QUALIFIED, LICENSED, PROFESSIONAL ENGINEER BASED ON ACTUAL SITE CONDITIONS. *VERSA-LOK RETAINING WALL SYSTEMS DISCLAIMS ANY AND ALL EXPRESS OR IMPLIED WARRANTIES OF MERCHANTABILITY FITNESS FOR ANY GENERAL OR PARTICULAR PURPOSE, TRADEMARK, OR COPYRIGHT IN REGARD TO INFORMATION OR PRODUCTS CONTAINED OR REFERRED TO HEREIN.*

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BQ#118 Attachment

GCMS SB Pre-Purchased Equipment & Shipping Splits									10/9/2024
		Section Specs				Overall Unit Specs			
Equipment Tag	Number of Sections	Max Height	Max Length	Max Width	Max Weight	Height	Length	Width	Total Weight
RTU-1	5	87"	181"	72"	3,053 lbs	86.75"	305"	72"	6,600 lbs
RTU-2	5	127"	195"	80"	4,380 lbs	126.75"	325"	80"	8,300 lbs
RTU-3	5	102"	185"	72"	3,255 lbs	101.75"	310"	72"	7,200 lbs
Curbs: RTU-1,2,3	3 (Prefabricated)								
DOA-1	6	102"	79"	72"	1,616 lbs	102"	310"	72"	8,200 lbs
DOA-2	8	109"	79"	80"	1,543 lbs	109.25"	310"	80"	9,300 lbs
DOA-3	8	110"	80"	80"	1,543 lbs	109.25"	310"	80"	9,400 lbs
DOA-4	8	110"	79"	80"	1,543 lbs	109.25"	310"	80"	9,600 lbs
DOA-5	8	102"	79"	72"	1,475 lbs	102"	315"	72"	9,000 lbs
Curb: DOA-5	1 (Prefabricated)								
HRV-1	1					61"	190"	63"	3,500 lbs
CH-1	1					92.8"	335.2"	88.3"	17,271 lbs
CH-2	1					92.8"	335.2"	88.3"	17,271 lbs
Generator	1					108"	181"	58"	8,750 lbs
ATS-1	1								
ATS-2	1								

BQ#118 Attachment

GCMS SB Pre-Purchased Equipment & Shipping Splits									10/9/2024
		Section Specs				Overall Unit Specs			
Equipment Tag	Number of Sections	Max Height	Max Length	Max Width	Max Weight	Height	Length	Width	Total Weight
MSB-1	4	90"	45"	36"	2,400 lbs	90"	156"	36"	6,815 lbs

Transformers	QTY
T2 - 15KVA	1
T3 - 30 KVA	1
T4 - 45 KVA	3
T5 - 75 KVA	2
T7 - 150KVA	1
T8 - 225 KVA	1
T9 - 300 KVA	1
Electrical Panels	**QTY**
GP1A-F	6
GDP	1
GDPC	1
GDPE	1
GP2A, C, E	3
GP-CL	1
GP-WS	1
MHDP	1
MP1A-1E	5
OSDP	1
OSDPC & OSDPE	2
OSP1A-F	6
OSP2A, 2C, 2E	3
OSKP	1
ELDP	1
LP1B-E	4
SHP	1
SLP	1
KHP	1
KP	1
ELP1B-E	4
TLCP-1	1
EVLP1	1
EVLP2	1
EVHP	1
LDP	1
Secondary Overcurrent Protection	12
Utility Meter	1

RFI 119

SUBSTITUTION REQUEST
(During the Bidding/Negotiating Phase)

PROJECT: Greenwich Middle School

SUBSTITUTION REQUEST NUMBER: 1

FROM:

TO: Joseph Matta

Turner Construction Company

DATE: 10/14/2024

A/E PROJECT NUMBER:

RE: Aacer Power Play Panel equal to basis of design

CONTRACT FOR: Aacer Sports Flooring

SPECIFICATION TITLE: Wood Athletic Flooring

DESCRIPTION: Wood Athletic Flooring

SECTION: 096466 **PAGE:** 3

ARTICLE/PARAGRAPH: 2.1,A,1

PROPOSED SUBSTITUTION: Aacer Power Play Panel

MANUFACTURER: Aacer Sports Flooring **ADDRESS:** 701 E. Elm St, Crandon, WI 54520 **PHONE:** (877)-582-1181

TRADE NAME: Aacer Sports Flooring LLC **MODEL NO.:**

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.
Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The Undersigned certifies:
- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

SUBMITTED BY:

SIGNED BY:

FIRM:

ADDRESS:

TELEPHONE:

A/E's REVIEW AND RECOMMENDATION:

- [X] Approve Substitution—Make submittals in accordance with Specification Section 01 33 00 Submittal Procedures.
- [ ] Approve Substitution as noted—Make submittals in accordance with Specification Section 01 33 00 Submittal Procedures.
- [ ] Reject Substitution—Use specified materials.
- [ ] Substitution Request received too late—Use specified materials.

SIGNED BY: Stephen Martocchio - SLAM **DATE:** 10/30/24

SUPPORTING DATA ATTACHED: [ ] Drawings [X] Product Data [ ] Samples [ ] Tests [ ] Reports [ ]

RFI 119

PowerPlay™ Panel

FIXED RESILIENT SYSTEM

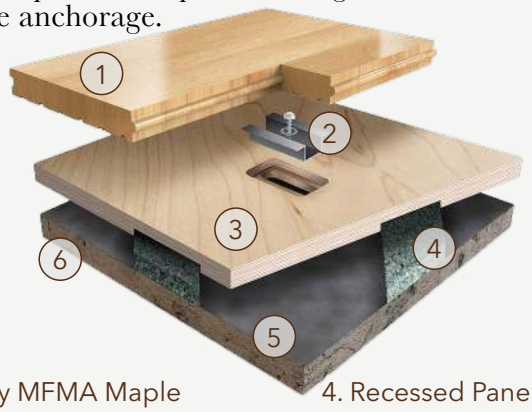
AACER SPORTS FLOORING
an Infinity Wood Floors Company

Prefabricated PowerPlay Panels provide lineal cushions contributing to uniform high shock absorption and ball rebound value and offer athletic response equivalent to full blanket floors with the added advantage of subfloor ventilation and resilient pad protection. Sectional steel channel anchorage contributes to added stability and uniformity while allowing for lateral movement.



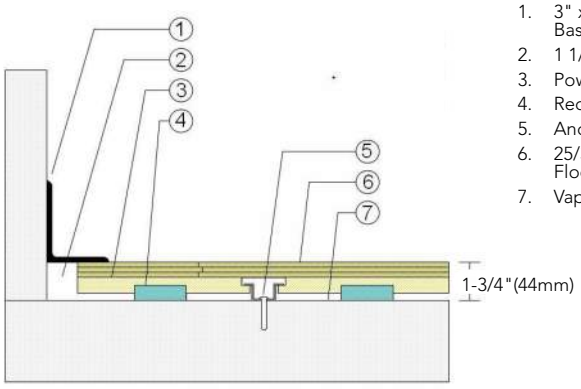
PowerPlay™ Panel RFI 119

PowerPlay Panel provides desired shock absorption, basketball rebound, protective pad housing, airflow, and stabilizing steel concrete anchorage.



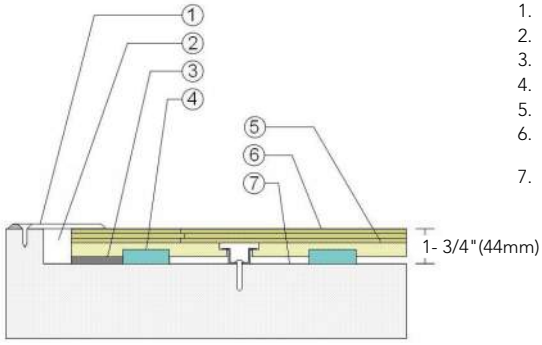
1. Infinity MFMA Maple
2. Sectional Steel Channel Anchor
3. Pre-manufactured Panel
4. Recessed Panel Cushion
5. Vapor Retarder
6. Concrete Substrate

WALL BASE



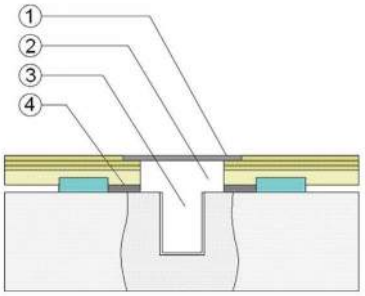
1. 3" x 4" (76mm x 101mm) Vent Cove Base
2. 1 1/2" (38mm) Min. Expansion Space
3. PowerPlay™ Panel Subfloor
4. Recessed Resilient Cushion
5. Anchored Steel Channel Section
6. 25/32" (20mm) MFMA Maple Flooring
7. Vapor Retarder

THRESHOLD



1. 1/4" (6mm) Aluminum Threshold
2. 1 1/2" (38mm) Min. Expansion Space
3. Solid Blocking at Doorway
4. Recessed Resilient Cushion
5. PowerPlay™ Panel Subfloor
6. 25/32" (20mm) MFMA Maple Flooring
7. Vapor Retarder

EQUIPMENT



1. Floor Plate
2. 1 1/2" (38mm) Min. Expansion Space Required at all Insert & Electrical Penetrations
3. Concrete Floor Penetration
4. Solid Blocking at Insert

Anchorage	Sectional Channel
Certified	MFMA PUR COMPLIANT
Green Status and LEED Contributors	• FSC® Certified Maple - MR • FSC® Certified Subfloor Components - MR • Environmental Quality - EQ • Regional Materials - MR
Resilience	3/4" (19mm) Open-Cell Polyurethane Foam
Slab Depression	• 25/32" (20mm) flooring –1 3/4" (44mm)
Optional PowerPlay™ Systems	PowerPlay™ Edge PowerPlay™ Cradle PowerPlay™ Trax PowerPlay™ TP
Subfloor Construction	Pre-manufactured panels
System Type	Fixed Resilient
Testing Laboratory Partners	ASET SERVICES, ISSS, USSL

It is the policy of Infinity Wood Floors to continuously improve its line of products. Therefore, Infinity Wood Floors reserves the right to change, modify or discontinue systems, specifications and accessories of all products at any time without notice or obligation to purchaser.

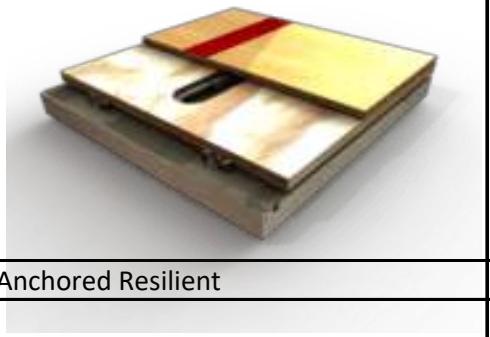
see us at Sweets.com

Jan2024

RFI 119

System Comparison Chart

AACER

Aacer PowerPlay Panel to Robbins Bio-Channel Star SB				
System Feature	Aacer PowerPlay Panel	Robbins Bio-Channel Star SB	Verdict	Comments
Cross Section				
System Type	Anchored Resilient	Anchored Resilient	Equal	Same
Slab Depression	1-3/4" with 25/32" Maple	1-3/4" with 25/32" Maple	Aacer Advantage	Aacer system provides a lower profile
Surface Vapor Retarder	In compliance with product specification	In compliance with product specification	Equal	Same
Resilient Pad	Open cell rebonded polyurethane 8pcf density foam	Open cell rebonded polyurethane 8pcf density foam	Aacer Advantage	Aacer lineal pads allow subfloor wall to wall airflow
Recessed Pad Support	Designed to address heavy non athletic loads. Protected recessed pads create lower profile.	Competitors subfloor doesn't provide recessed component and pad protection	Aacer Advantage	Aacer subfloor system provides pad and sytem support protection under aggressive loads
Steel Channel	16 Gauge Steel Hat Channel with steel anchor pin	16 Gauge Steel Hat Channel with steel anchor pin	Equal	Same
Wood Subfloor	23/32" thick pre-manufactured subfloor panels, MFMA PUR compliant.	23/32" thick pre-manufactured subfloor panels, MFMA PUR compliant.	Equal	Same
Maple Flooring	25/32" MFMA-RL graded and stamped Maple Flooring	25/32" MFMA-FJ graded and stamped Maple Flooring	Equal	Same

RFI 119

System Comparison Chart

AACER

Aacer PowerPlay Panel vs. Robbins Bio-Channel Star				
System Feature	Aacer	Robbins	Verdict	Comments
Sanding	Machine sanded with course, medium and fine paper to a smooth even and uniform surface	Machine sanded with coarse, medium and fine paper to a smooth even and uniform surface	Equal	Both systems are sanded the same
Sealers	oil modified polyurethane	oil modified polyurethane	Equal	Same products
Finishes	oil modified polyurethane	oil modified polyurethane	Equal	Same products
Game lines	game line paint compatible with sealers and finish	game line paint compatible with sealers and finish	Equal	Same products
Wall Base	3" x 4" vented cove base with premolded corners	3" x 4" vented cove base with premolded corners	Equal	Same products
Threshold	6" x 6' or 10' aluminum plate or 8" x 6' or 10' aluminum plate	6" x 6' or 10' aluminum plate or 8" x 6' or 10' aluminum plate	Equal	Same products

Minimum Furniture Schedule:
(38) - Stackable Chairs
(15) - Rolling Desk Office Chairs
(31) - 30"x60" Tables
(15) - Rolling File Cabinets (For Under Desks)

Minimum Furniture Schedule (Cont...):
(7) - Front Privacy Shields
(13) - Side Privacy Shields
(9) - Large White Boards (LWB)
(5) - Medium White Boards (MW

REMOVE AND CAP EXSITING PLUMBING FIXTURES, IF APPLICABLE

WALL MOUNTED DATA JACK PATCH PANEL WITH SHELF ABOVE.

INTERIOR WALLS:
TYPE '2R' - 2x4 STUD WALLS AT 16"o.c. & ACOUSTIC INSULATION WITH 1/2" GYPSUM WALL BOARD, EACH SIDE
ALTERNATE 1: TACKABLE DEMOUNTABLE PANELED WALL SYSTEM (ACOUSTIC INSULATION)

Wellness/Mother's Room/prayer/meditation

Storage

LWB
LWB
ALIGN
NEW CARPET
LWB
REMOVE EXISTING TRAILER WALLS
CONFERENCE
FLOOR MOUNTED DATA & POWER JACKS, TYP.
LWB
2R
LWB
REMOVE EXISTING TRAILER WALLS
20' - 0"

CONFERENCE
MWB
42" A.F.F WORK SURFACE
2R
VIRTUAL PLAN TABLE /HUDDLE AREA
CLOSET
RECEPTI
5' - 6"
18' - 8"

NEW CARPET

1
2
3
4
5
6
7
8
9
10
11

Coffee/Snacks/Copier & Supplies

OPEN SHELVING AND CASEWORK FOR DISPLAYING SUBMITTALS, MATERIAL SAMPLES, FIELD PANELS, ETC...

Turner

TRIPLE 12x60 - TOILET (15 STAFF)

TYPE 'D.1'

1/4" = 1'-0"

BQ#153 sketch

RFI 167

SUBSTITUTION REQUEST
(During the Bidding/Negotiating Phase)

PROJECT: Greenwich Central Middle School

SUBSTITUTION REQUEST NUMBER: 1

FROM:

TO: Turner Construction

DATE: 10/17/24

A/E PROJECT NUMBER:

RE: Ceiling Substitutions

CONTRACT FOR:

SPECIFICATION TITLE: Acoustical Ceilings

DESCRIPTION: Acoustical Ceilings

SECTION: 09 51 00

PAGE: 2

ARTICLE/PARAGRAPH: 2.1 - A & B

PROPOSED SUBSTITUTION: Utilize Certainteed ceiling tile and grid

MANUFACTURER: Certainteed

ADDRESS: 5015 Oakbrook Pkwy
Norcross, Georgia 30093

PHONE:

TRADE NAME: Acoustical Ceilings

MODEL NO.: Various

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.
Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The Undersigned certifies:
- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

SUBMITTED BY:

SIGNED BY:

FIRM:

ADDRESS:

TELEPHONE:

Approved as Noted – missing the trim pieces we have noted in the spec to provide to create a full system, ie floating ceiling 4" trim etc. 095100 2.5 Accessories. C. - SLAM 10/30/2024

A/E's REVIEW AND RECOMMENDATION:

- ☐ Approve Substitution—Make submittals in accordance with Specification Section 01 33 00 Submittal Procedures.
- ☒ Approve Substitution as noted—Make submittals in accordance with Specification Section 01 33 00 Submittal Procedures.
- ☐ Reject Substitution—Use specified materials.
- ☐ Substitution Request received too late—Use specified materials.

SIGNED BY: Stephen Martocchio - SLAM

SUPPORTING DATA ATTACHED: ☐ Drawings ☒ Product Data ☐ Samples ☐ Tests ☐ Reports ☐

Samples can be provided on request.

RFI 167

USG Ceiling Solutions

USG MARS™ HIGH-NRC/HIGH-CAC ACOUSTICAL PANELS

CLIMAPLUS™ PERFORMANCE WITH PLANT-BASED BINDER[9]

Basis of Design



USG Mars™ High-NRC Acoustical Panels with ClimaPlus™ Performance, and USG Donn® Brand Centricitee™ DXT™ Acoustical Suspension System Lowell Justice Center in Lowell, MA, Architect: Finegold Alexander Architects, Photo: ©Anton Grassi

TO ORDER SAMPLES, GO TO USG.COM OR CGCINC.COM

PREMIUM COLORS

Dawn 3679 | Old Stone 3691 | Sea Shell 3678 | Light Brown 3690 | Nut Brown 3680 | Peat 3682

Shale 3683 | Ocean Ridge 3684 | Atmosphere 3681 | Laguna 3685 | Grass 3688 | Tangy Taleia 3689

Deep Cranberry 3687 | Deep Violet 3686 | Deep Berry 3693 | Deep Blue 3692 | Flat Black 205

STANDARD COLOR

Flat White 050

CUSTOM COLOR

Unlimited Color Options

FEATURES AND BENEFITS

- Balanced Acoustics. Wide range of options. Sound absorption NRC up to 0.90 and sound attenuation CAC up to 40 with 0.95 NRC coming soon.
- High light-reflective finish (LR-0.90 White products).
- Washable and scrubbable finish.[6]
- Impact and scratch resistant.[6]
- Coordinates visually with USG Halcyon™ Acoustical Panels for open- or closed-plan applications.
- Nondirectional, monolithic visual reduces installation time and waste.
- ClimaPlus™ 30-year limited system warranty against visible sag, mold and mildew.
- GREENGUARD Gold certified for low emitting performance.
- USG Mars™ High-NRC/High-CAC Acoustical Panels are part of the Ecoblueprint™ portfolio — meeting today's sustainability standards. For sustainability documentation go to USG.com or CGCInc.com.

APPLICATIONS

- Offices
- Healthcare
- Classrooms and corridors
- Reception areas and lobbies
- Department stores and retail
- Restaurants and hospitality

SUBSTRATE

- Wet-formed mineral fiber

Fine-Textured Panel

USG CGC

IT'S YOUR WORLD. BUILD IT.™

RFI 167

USG MARS™ HIGH-NRC/HIGH-CAC ACOUSTICAL PANELS

CLIMAPLUS™ PERFORMANCE WITH PLANT-BASED BINDER[9]

PRODUCT CERTIFIED FOR LOW CHEMICAL EMISSIONS: UL.COM/GG UL 2818

30 YEAR LIMITED SYSTEM WARRANTY
- No Visible Sag
- Mold/Mildew Protection

BALANCED ACOUSTICS

HRC HIGH RECYCLED CONTENT

PREMIUM COLOR PALETTE

CUSTOM COLOR

Plant-Based Binder

ECOBLUEPRINT

Declare

ORDER SAMPLES/LITERATURE
USG: usg.com or samplit@usg.com
CGC: contact Sales Representative

TECHNICAL SERVICES
800 USG.4YOU (874-4968)

FOR MOST UP-TO-DATE TECHNICAL INFORMATION AND LEED REPORT TOOL
usgdesignstudio.com
cgcdesignstudio.com

	Edge	Panel Size	Fire Rating	Item No.	UL Classified[5] NRC	CAC Min.	LR[2]	Color	Grid Options	VOC Emissions	Anti-Mold & Mildew/Sag Resistance	Recycled Content[1]	Panel Cost
USG MARS™ HIGH-NRC PANELS 95/30 Plant-Based Binder **COMING SOON**	SQ	2′x2′x1.3″	Class A	88280	0.95	30	0.90	White	A, B, C	Low	✓	27%	$$$
		2′x4′x1.3″	Class A	88281	0.95	30	0.90	White	A, B	Low	✓	27%	$$$
		30″x30″x1.3″	Class A	88282	0.95	30	0.90	White	A, B	Low	✓	27%	$$$
	SL	2′x2′x1.3″	Class A	88285	0.95	30	0.90	White	I	Low	✓	27%	$$$
		2′x4′x1.3″	Class A	88286	0.95	30	0.90	White	I	Low	✓	27%	$$$
		30″x30″x1.3″	Class A	88287	0.95	30	0.90	White	I	Low	✓	27%	$$$
	FL	2′x2′x1.3″	Class A	88290	0.95	30	0.90	White	J, K, L, M	Low	✓	27%	$$$
		2′x4′x1.3″	Class A	88291	0.95	30	0.90	White	J, K, L, M	Low	✓	27%	$$$
		30″x30″x1.3″	Class A	88292	0.95	30	0.90	White	J, K, L, M	Low	✓	27%	$$$
USG MARS™ HIGH-NRC PANELS 90/30 Plant-Based Binder	SQ	2′x2′x1″	Class A	88137	0.90	30	0.90	White, color[7]	A,B,C	Low	✓	67%	$$$
		2′x4′x1″	Class A	89137	0.90	30	0.90	White	A,B	Low	✓	67%	$$$
		30″x30″x1″	Class A	80213	0.90	30	0.90	White	A,B	Low	✓	67%	$$$
		30″x60″x1″	Class A	89143	0.90	30	0.90	White	A,B	Low	✓	67%	$$$
	SLT	2′x2′x1″	Class A	88138	0.90	30	0.90	White, color[7]	D	Low	✓	67%	$$$
		2′x4′x1″	Class A	89138	0.90	30	0.90	White	D	Low	✓	67%	$$$
		30″x30″x1″	Class A	80239	0.90	30	0.90	White	D	Low	✓	67%	$$$
		30″x60″x1″	Class A	89144	0.90	30	0.90	White	D	Low	✓	67%	$$$
	FLB	2′x2′x1″	Class A	88139	0.90	30	0.90	White, color[7]	E,F,G,H	Low	✓	67%	$$$
		2′x4′x1″	Class A	89139	0.90	30	0.90	White	E,F,G,H	Low	✓	67%	$$$
		30″x30″x1″	Class A	80265	0.90	30	0.90	White	E,F,G,H	Low	✓	67%	$$$
		30″x60″x1″	Class A	89145	0.90	30	0.90	White	E,F,G,H	Low	✓	67%	$$$
USG MARS™ HIGH-NRC PANELS 85/35 Plant-Based Binder	SQ	2′x2′x7/8″	Class A	88134	0.85	35	0.90	White, color[7]	A,B,C	Low	✓	69%	$$$
		2′x4′x7/8″	Class A	89134	0.85	35	0.90	White	A,B	Low	✓	69%	$$$
		30″x30″x7/8″	Class A	80113	0.85	35	0.90	White	A,B	Low	✓	69%	$$$
		30″x60″x7/8″	Class A	89140	0.85	35	0.90	White	A,B	Low	✓	69%	$$$

Low Emissions (VOC)
Third party (GREENGUARD Gold) certified for low-emitting performance, meets California Department of Public Health's (CDPH) Standard Method v1.2 - 2017 (CA Section 01350). 'Certificates of Compliance' for Low VOC Emissions are available on usg.com and at spot.ul.com.

ClimaPlus™ Warranty Performance[3]
Contains a broad-spectrum antimicrobial additive on the face and back of the panel that provides resistance against the growth of mold and mildew. Includes sag-resistance performance.

High Recycled Content
USG classifies High Recycled Content as greater than 50%. Total recycled content is based on product composition of postconsumer and preconsumer (postindustrial) recycled content per FTC guidelines.

USG CGC

RFI 167

USG MARS™ HIGH-NRC/HIGH-CAC ACOUSTICAL PANELS

CLIMAPLUS™ PERFORMANCE WITH PLANT-BASED BINDER[9]

ORDER SAMPLES/LITERATURE
USG: usg.com or samplit@usg.com
CGC: contact Sales Representative

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FOR MOST UP-TO-DATE TECHNICAL INFORMATION AND LEED REPORT TOOL
usgdesignstudio.com
cgcdesignstudio.com

PRODUCT CERTIFIED FOR LOW CHEMICAL EMISSIONS: UL.COM/GG UL 2818

30 YEAR LIMITED SYSTEM WARRANTY
• No Visible Sag
• Mold/Mildew Protection

BALANCED ACOUSTICS

HIGH RECYCLED CONTENT

PREMIUM COLOR PALETTE

CUSTOM COLOR

Plant-Based Binder

ECOBLUEPRINT

Declare

UL Classified

Edge	Panel Size	Fire Rating	Item No.	NRC	CAC Min.	LR[2]	Color	Grid Options	VOC Emissions	Anti-Mold & Mildew/Sag Resistance	Recycled Content[1]	Panel Cost	
				NRC	CAC								
USG MARS™ HIGH-NRC PANELS 85/35 Plant-Based Binder													
SLT	**2′x2′x7/8″**	Class A	**88135**	0.85	35	0.90	White, color[7]	D	Low	✓	69%	**$$$**	
	2′x4′x7/8″	Class A	**89135**	0.85	35	0.90	White	D	Low	✓	69%	**$$$**	
	30″x30″x7/8″	Class A	**80139**	0.85	35	0.90	White	D	Low	✓	69%	**$$$**	
	30″x60″x7/8″	Class A	**89141**	0.85	35	0.90	White	D	Low	✓	69%	**$$$**	
FLB	**2′x2′x7/8″**	Class A	**88136**	0.85	35	0.90	White, color[7]	E,F,G,H	Low	✓	69%	**$$$**	APC-3
	2′x4′x7/8″	Class A	**89136**	0.85	35	0.90	White	E,F,G,H	Low	✓	69%	**$$$**	APC-1/4
	30″x30″x7/8″	Class A	**80165**	0.85	35	0.90	White	E,F,G,H	Low	✓	69%	**$$$**	
	30″x60″x7/8″	Class A	**89142**	0.85	35	0.90	White	E,F,G,H	Low	✓	69%	**$$$**	
USG MARS™ HIGH-NRC/ HIGH-CAC PANELS 80/40 Plant-Based Binder													
SQ	**2′x2′x1″**	Class A	**86345**	0.80	40	0.90	White	A,B,C	Low	✓	71%	**$$**	
	2′x4′x1″	Class A	**88345**	0.80	40	0.90	White	A,B	Low	✓	71%	**$$**	
SLT	**2′x2′x1″**	Class A	**86346**	0.80	40	0.90	White	D	Low	✓	71%	**$$**	
	2′x4′x1″	Class A	**88346**	0.80	40	0.90	White	D	Low	✓	71%	**$$**	
FLB	**2′x2′x1″**	Class A	**86347**	0.80	40	0.90	White	E,F,G,H	Low	✓	71%	**$$**	
	2′x4′x1″	Class A	**88347**	0.80	40	0.90	White	E,F,G,H	Low	✓	71%	**$$**	
USG MARS™ HIGH-NRC PANELS 80/35 Plant-Based Binder													
SQ	**2′x2′x7/8″**	Class A	**86100**	0.80	35	0.90	White	A,B,C	Low	✓	70%	**$$**	
	2′x4′x7/8″	Class A	**86300**	0.80	35	0.90	White	A,B	Low	✓	70%	**$$**	
	30″x30″x7/8″	Class A	**86426**	0.80	35	0.90	White	A,B	Low	✓	70%	**$$**	
	30″x60″x7/8″	Class A	**86429**	0.80	35	0.90	White	A,B	Low	✓	70%	**$$**	
SLT	**2′x2′x7/8″**	Class A	**87200**	0.80	35	0.90	White	D	Low	✓	70%	**$$**	
	2′x4′x7/8″	Class A	**89600**	0.80	35	0.90	White	D	Low	✓	70%	**$$**	
	30″x30″x7/8″	Class A	**86500**	0.80	35	0.90	White	D	Low	✓	70%	**$$**	
	30″x60″x7/8″	Class A	**86466**	0.80	35	0.90	White	D	Low	✓	70%	**$$**	
FLB	**2′x2′x7/8″**	Class A	**87100**	0.80	35	0.90	White	E,F,G,H	Low	✓	70%	**$$**	
	2′x4′x7/8″	Class A	**89500**	0.80	35	0.90	White	E,F,G,H	Low	✓	70%	**$$**	
	30″x30″x7/8″	Class A	**86400**	0.80	35	0.90	White	E,F,G,H	Low	✓	70%	**$$**	
	30″x60″x7/8″	Class A	**86497**	0.80	35	0.90	White	E,F,G,H	Low	✓	70%	**$$**	

Low Emissions (VOC)
Third party (GREENGUARD Gold) certified for low-emitting performance, meets California Department of Public Health's (CDPH) Standard Method v1.2 - 2017 (CA Section 01350). 'Certificates of Compliance' for Low VOC Emissions are available on usg.com and at spot.ul.com.

ClimaPlus™ Warranty Performance[3]
Contains a broad-spectrum antimicrobial additive on the face and back of the panel that provides resistance against the growth of mold and mildew. Includes sag-resistance performance.

High Recycled Content
USG classifies High Recycled Content as greater than 50%. Total recycled content is based on product composition of postconsumer and preconsumer (postindustrial) recycled content per FTC guidelines.

USG CGC

RFI 167

USG MARS™ HIGH-NRC/HIGH-CAC ACOUSTICAL PANELS

CLIMAPLUS™ PERFORMANCE WITH PLANT-BASED BINDER[9]

ORDER SAMPLES/LITERATURE
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CGC: contact Sales Representative

TECHNICAL SERVICES
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FOR MOST UP-TO-DATE TECHNICAL INFORMATION AND LEED REPORT TOOL
usgdesignstudio.com
cgcdesignstudio.com

PRODUCT CERTIFIED FOR LOW CHEMICAL EMISSIONS: UL.COM/GG UL 2818

30 YEAR LIMITED SYSTEM WARRANTY
• No Visible Sag
• Mold/Mildew Protection

BALANCED ACOUSTICS

HIGH RECYCLED CONTENT

PREMIUM COLOR PALETTE

CUSTOM COLOR

Plant-Based Binder

ECOBLUEPRINT

Declare

USG MARS™ HIGH-CAC PANELS 60/40

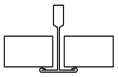
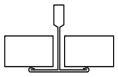
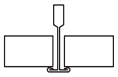
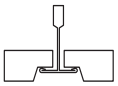
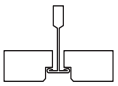
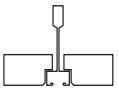
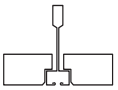
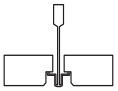
Edge	Panel Size	Fire Rating	Item No.	UL Classified NRC	UL Classified CAC Min.	LR[2]	Color	Grid Options	VOC Emissions	Anti-Mold & Mildew/Sag Resistance	Recycled Content[1]	Panel Cost
SQ	**2'x2'x3/4"**	Class A	**86186**	0.60	40	0.90	White, color[7]	A,B,C	Low	✓	70%	**$$$**
	2'x4'x3/4"	Class A	**87187**	0.60	40	0.90	White	A,B	Low	✓	70%	**$$$**
SLT	**2'x2'x3/4"**	Class A	**86786**	0.60	40	0.90	White, color[7]	D	Low	✓	70%	**$$$**
	2'x4'x3/4"	Class A	**88786**	0.60	40	0.90	White	D	Low	✓	70%	**$$$**
FLB	**2'x2'x3/4"**	Class A	**86986**	0.60	40	0.90	White, color[7]	E,F,G,H	Low	✓	70%	**$$$**
	2'x4'x3/4"	Class A	**88986**	0.60	40	0.90	White	E,F,G,H	Low	✓	70%	**$$$**

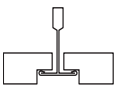
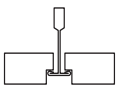
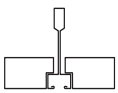
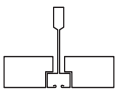
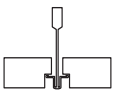
Low Emissions (VOC)
Third party (GREENGUARD Gold) certified for low-emitting performance, meets California Department of Public Health's (CDPH) Standard Method v1.2 - 2017 (CA Section 01350). 'Certificates of Compliance' for Low VOC Emissions are available on usg.com and at spot.ul.com.

ClimaPlus™ Warranty Performance[3]
Contains a broad-spectrum antimicrobial additive on the face and back of the panel that provides resistance against the growth of mold and mildew. Includes sag-resistance performance.

High Recycled Content
USG classifies High Recycled Content as greater than 50%. Total recycled content is based on product composition of postconsumer and preconsumer (postindustrial) recycled content per FTC guidelines.

GRID PROFILE OPTIONS

A **USG DX®**	B **USG DXW™**	C[4] **USG Centricitee™ DXT™**	D **USG DX®**	E **USG Centricitee™ DXT™**	F **USG Fineline® DXF™**	G[8] **USG Fineline® 1/8 DXFF™**	H **USG Identitee® DXI™**
							

I **USG DX®**	J **USG Centricitee™ DXT™**	K **USG Fineline® DXF™**	L **USG Fineline® 1/8 DXFF™**	M **USG Identitee® DXI™**
				

PHYSICAL DATA/ FOOTNOTES

Product literature
Data sheet: SC2487

ASTM E1264 classification
ASTM E1264-22: Type IV, Form 1 and 2, Pattern E, G
ASTM E1264-23: Type A, Form A2.1 and A2.2, Pattern E, G

ASTM E84 and CAN/ULC S102 surface-burning characteristics
Class A
Flame spread: 25 or less
Smoke developed: 50 or less

Weight
1.09 - 1.36 lb./sq.ft.

Online tools
usgdesignstudio.com or cgcdesignstudio.com

Thermal resistance
R-2.2 (3/4" panel)
R-4.5 (1.3" panel)

Maximum backloading
See *USG 30-Year Limited System Warranty Commercial Applications* (SC2102).

Maintenance
Can be cleaned easily with a soft brush or vacuum. To clean white panels, use a clean, white cloth with water or a mild detergent and wipe surface.

Metric sizes available
Contact sales for minimum quantities and lead times.

Notes
1. For details, see USG Sustainability tool at usgdesignstudio.com or cgcdesignstudio.com.
2. LR values are shown as averages.
3. For details, see *USG 30-Year Limited System Warranty Commercial Applications* (SC2102).
4. Maximum 2'x2' with SQ edge panels.
5. Acoustic values are for white only. Colored values are lower depending on specific color selected.
6. White panels only.
7. Available in Premium and Custom Colors.
8. Not available in Premium or Custom Colors.
9. All USG Mars™ High-NRC Acoustical Panels with a "plant-based binder" label contain up to 65% plant-based material in the binder. For more information, please refer to the USG Mars Acoustical Panels Health Product Declaration, available at www.usg.com.

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Safety First! Follow good safety/industrial hygiene practices during installation. Wear appropriate personal protective equipment. Read SDS and literature before specification and installation.

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RFI 167

USG Ceiling Solutions

USG MARS™ HEALTHCARE ACOUSTICAL PANELS CLIMAPLUS™ PERFORMANCE WITH CLEAN ROOM, HIGH-NRC AND AIRCARE™ COATING OPTIONS



Basis of Design

USG Mars™ Healthcare Acoustical Panels with ClimaPlus™ Performance/USG Donn® Brand DX®/DXL™ Acoustical Suspension System

Photo this page:
Chinook Regional Hospital
Architect: Perkins + Will / KRA / Group2 / Stuart Olson
Photo: © Andrew Latreille

TO ORDER SAMPLES, GO TO USG.COM OR CGCINC.COM

White 050

Fine-Textured Panel

FEATURES AND BENEFITS

- Water-repellent membrane designed to be durable and safe with common disinfectants.**
- Washable and soil-resistant fi nish. Impact and scratch resistant.
- Acoustics and cleanability exceed FGI guidelines for healthcare.
- Meets USDA/FSIS guidelines for use in food-processing areas.
- Achieves FDA standards for smoothness, durability and cleanability.
- Clean Room tested to ISO 5 (Class 100) (Items 86169CR, 88189CR, 86684CR, 88683CR).
- ClimaPlus™ 30-year limited system warranty against visible sag, mold and mildew.
- AirCare™ coating applied to face and back reduces 75% of formaldehyde over a 10-year period.[4]
- GREENGUARD Gold certified for low emitting performance.
- Balanced Acoustics. High-NRC and High-CAC provide excellent sound control that assist in addressing HIPAA standards.
- USG Mars™ Healthcare Acoustical Panels is part of the Ecoblueprint™ portfolio — meeting today's sustainability standards. For sustainability documentation go to USG.com or CGCInc.com.

APPLICATIONS

- Kitchen and food-prep areas
- Lavatories and restrooms
- Laboratories and Clean Rooms
- Nurses' stations/ waiting rooms
- Treatment/patient rooms

SUBSTRATE

- Wet-formed mineral fiber

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usgdesignstudio.com
cgcdesignstudio.com

PRODUCT CERTIFIED FOR LOW CHEMICAL EMISSIONS: UL.COM/GG UL 2818

30 YEAR LIMITED SYSTEM WARRANTY
• No Visible Sag
• Mold/Mildew Protection

BALANCED ACOUSTICS

HIGH RECYCLED CONTENT

AIRCARE™

Plant-Based Binder

ECOBLUEPRINT

Declare.

UL Classified

Edge	Panel Size	Fire Rating	Item No.	NRC	CAC Min.	LR[2]	Color	Grid Options	VOC Emissions	Anti-Mold & Mildew/Sag Resistance	Recycled Content[1]	Panel Cost
				NRC	CAC						HRC	$
USG MARS™ HEALTHCARE HIGH-NRC PANELS 85/35 Plant-Based Binder[6]												
SQ	**2′x2′x7/8″**	Class A	**86256**	0.85	35	0.90	White	A,B,C,D,E,F	Low	✓	70%	**$$**
	2′x4′x7/8″	Class A	**88256**	0.85	35	0.90	White	A,B,D,E,F	Low	✓	70%	**$$**
SLT	**2′x2′x7/8″**	Class A	**86257**	0.85	35	0.90	White	G,H,I,J	Low	✓	70%	**$$**
FLB	**2′x2′x7/8″**	Class A	**86258**	0.85	35	0.90	White	K,L,M,N	Low	✓	70%	**$$**
USG MARS™ HEALTHCARE HIGH-NRC/ HIGH-CAC PANELS 80/40 Plant-Based Binder[6]												
SQ	**2′x2′x1″**	Class A	**86115**	0.80	40	0.90	White	A,B,C,D,E,F	Low	✓	71%	**$$**
	2′x4′x1″	Class A	**88115**	0.80	40	0.90	White	A,B,D,E,F	Low	✓	71%	**$$**
SLT	**2′x2′x1″**	Class A	**86343**	0.80	40	0.90	White	G,H,I,J	Low	✓	71%	**$$**
	2′x4′x1″	Class A	**88343**	0.80	40	0.90	White	G,H,I,J	Low	✓	71%	**$$**
FLB	**2′x2′x1″**	Class A	**86344**	0.80	40	0.90	White	K,L,M,N	Low	✓	71%	**$$**
	2′x4′x1″	Class A	**88344**	0.80	40	0.90	White	K,L,M,N	Low	✓	71%	**$$**
USG MARS™ HEALTHCARE HIGH-NRC PANELS 80/35 Plant-Based Binder[6]												
SQ	**2′x2′x7/8″**	Class A	**86152**	0.80	35	0.90	White	A,B,C,D,E,F	Low	✓	70%	**$$**
	2′x4′x7/8″	Class A	**86340**	0.80	35	0.90	White	A,B,D,E,F	Low	✓	70%	**$$**
SLT	**2′x2′x7/8″**	Class A	**86470**	0.80	35	0.90	White	G,H,I,J	Low	✓	70%	**$$**
FLB	**2′x2′x7/8″**	Class A	**86750**	0.80	35	0.90	White	K,L,M,N	Low	✓	70%	**$$**
USG MARS™ HEALTHCARE PANELS 75/35												
SQ	**2′x2′x3/4″**	Class A	**86169**	0.75	35	0.90	White	A,B,C,D,E,F	Low	✓	69%	**$$**
	2′x4′x3/4″	Class A	**88189**	0.75	35	0.90	White	A,B,D,E,F	Low	✓	69%	**$$**
SLT	**2′x2′x3/4″**	Class A	**86684**	0.75	35	0.90	White	G,H,I,J	Low	✓	69%	**$$**
	2′x4′x3/4″	Class A	**88683**	0.75	35	0.90	White	G,H,I,J	Low	✓	69%	**$$**
FLB	**2′x2′x3/4″**	Class A	**86984**	0.75	35	0.90	White	K,L,M,N	Low	✓	69%	**$$**
	2′x4′x3/4″	Class A	**88983**	0.75	35	0.90	White	K,L,M,N	Low	✓	69%	**$$**
USG MARS™ HEALTHCARE HIGH-CAC PANELS 60/40												
SQ	**2′x2′x3/4″**	Class A	**86270**	0.60	40	0.90	White	A,B,C,D,E,F	Low	✓	71%	**$$**
	2′x4′x3/4″	Class A	**88271**	0.60	40	0.90	White	A,B,D,E,F	Low	✓	71%	**$$**
SLT	**2′x2′x3/4″**	Class A	**86272**	0.60	40	0.90	White	G,H,I,J	Low	✓	71%	**$$**
FLB	**2′x2′x3/4″**	Class A	**86273**	0.60	40	0.90	White	K,L,M,N	Low	✓	71%	**$$**
	2′x4′x3/4″	Class A	**88273**	0.60	40	0.90	White	K,L,M,N	Low	✓	71%	**$$**

APC-2

Low Emissions (VOC)
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ClimaPlus™ Warranty Performance[3]
Contains a broad-spectrum antimicrobial additive on the face and back of the panel that provides resistance against the growth of mold and mildew. Includes sag-resistance performance.

High Recycled Content
USG classifies High Recycled Content as greater than 50%. Total recycled content is based on product composition of postconsumer and preconsumer (postindustrial) recycled content per FTC guidelines.

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PRODUCT CERTIFIED FOR LOW CHEMICAL EMISSIONS: UL.COM/GG UL 2818

30 YEAR LIMITED SYSTEM WARRANTY
• No Visible Sag
• Mold/Mildew Protection

BALANCED ACOUSTICS

HIGH RECYCLED CONTENT

AIRCARE™

Plant-Based Binder

ECOBLUEPRINT

Declare.

UL Classified

	Edge	Panel Size	Fire Rating	Item No.	NRC	CAC Min.	LR[2]	Color	Grid Options	VOC Emissions	Anti-Mold & Mildew/Sag Resistance	Recycled Content[1]	Panel Cost
					NRC	CAC						HRC	$
USG MARS™ HEALTHCARE WITH AIRCARE™ COATING[4] 75/35	SQ	**2′x2′x3/4″**	Class A	**86169AIR**	0.75	35	0.90	White	A,B,C,D,E,F	Low	✓	69%	**$$**
		2′x4′x3/4″	Class A	**88189AIR**	0.75	35	0.90	White	A,B,D,E,F	Low	✓	69%	**$$**
	SLT	**2′x2′x3/4″**	Class A	**86684AIR**	0.75	35	0.90	White	G,H,I,J	Low	✓	69%	**$$**
		2′x4′x3/4″	Class A	**88683AIR**	0.75	35	0.90	White	G,H,I,J	Low	✓	69%	**$$**
	FLB	**2′x2′x3/4″**	Class A	**86984AIR**	0.75	35	0.90	White	K,L,M,N	Low	✓	69%	**$$**
		2′x4′x3/4″	Class A	**88983AIR**	0.75	35	0.90	White	K,L,M,N	Low	✓	69%	**$$**
USG MARS™ HEALTHCARE CLEAN ROOM PANELS 75/35	SQ	**2′x2′x3/4″**	Class A	**86169CR**	0.75	35	0.90	White	O	Low	✓	68%	**$$**
		2′x4′x3/4″	Class A	**88189CR**	0.75	35	0.90	White	O	Low	✓	68%	**$$**
	SLT	**2′x2′x3/4″**	Class A	**86684CR**	0.75	35	0.90	White	P	Low	✓	68%	**$$**
		2′x4′x3/4″	Class A	**88683CR**	0.75	35	0.90	White	P	Low	✓	68%	**$$**

Low Emissions (VOC)
Third party (GREENGUARD Gold) certified for low-emitting performance, meets California Department of Public Health's (CDPH) Standard Method v1.2 - 2017 (CA Section 01350). 'Certificates of Compliance' for Low VOC Emissions are available on usg.com and at spot.ul.com.

ClimaPlus™ Warranty Performance[3]
Contains a broad-spectrum antimicrobial additive on the face and back of the panel that provides resistance against the growth of mold and mildew. Includes sag-resistance performance.

High Recycled Content
USG classifies High Recycled Content as greater than 50%. Total recycled content is based on product composition of postconsumer and preconsumer (postindustrial) recycled content per FTC guidelines.

RFI 167

USG MARS™ HEALTHCARE ACOUSTICAL PANELS

CLIMAPLUS™ PERFORMANCE — NEW CLEAN ROOM, HIGH-NRC AND AIRCARE™ COATING OPTIONS

ORDER SAMPLES/LITERATURE
USG: usg.com or samplit@usg.com
CGC: contact Sales Representative

TECHNICAL SERVICES
800 USG.4YOU (874-4968)

FOR MOST UP-TO-DATE TECHNICAL INFORMATION AND LEED REPORT TOOL
usgdesignstudio.com
cgcdesignstudio.com

PRODUCT CERTIFIED FOR LOW CHEMICAL EMISSIONS: UL.COM/GG UL 2818

30 YEAR LIMITED SYSTEM WARRANTY
- No Visible Sag
- Mold/Mildew Protection

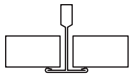
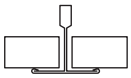
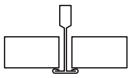
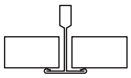
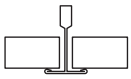
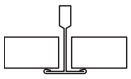
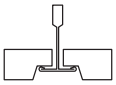
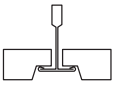
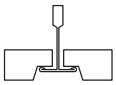
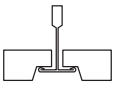
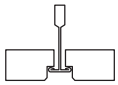
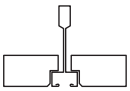
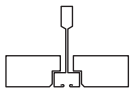
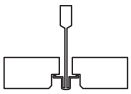
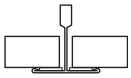
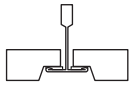
BALANCED ACOUSTICS

HIGH RECYCLED CONTENT

AIRCARE™

Plant-Based Binder

GRID PROFILE OPTIONS

A USG DX®	B USG DXW™	C[5] USG Centricitee™ DXT™	D USG DXLA™
			
E **USG ZXLA™**	**F** **USG AX™**	**G** **USG DX®**	**H** **USG DXLA™**
			
I **USG ZXLA™**	**J** **USG AX™**	**K** **USG Centricitee™ DXT™**	**L** **USG Fineline® DXF™**
			
M **USG Fineline® 1/8 DXFF™**	**N** **USG Identitee® DXI™**	**O** **USG CE™**	**P** **USG DXCE™**
			

PHYSICAL DATA/ FOOTNOTES

Product literature
Data sheet: SC2585

ASTM E1264 classification
ASTM E1264-22 Type IV, Form 1 & 2, Pattern E & G
ASTM E1264-23 Type A, Form A2.1, Pattern E & G

ASTM E84 and CAN/ULC S102 surface-burning characteristics Class A
Flame spread: 25 or less
Smoke developed: 50 or less

Weight
1.03-1.24 lb./sq. ft.

Thermal resistance
R-2.2

Maximum backloading
See *USG 30-Year Limited System Warranty Commercial Applications* (SC2102).

Online tools
usgdesignstudio.com or cgcdesignstudio.com

ASTM D2486 scrubbability test
(standard test)

ASTM D4828 washability test
(modified test)

Water repellency
Cobb method (Tappi T441 om-84) Water Drop Test

****Maintenance**
To clean panel, use a clean, white cloth with water or a mild detergent and wipe surface. To disinfect panel, lightly spray surface and wipe clean with a clean, white cloth. Acceptable colorless disinfectants include:
- Hydrogen peroxide
- Isopropyl alcohol
- Quaternary ammonium
- Sodium hypochlorite

Do not mix cleaners. Follow cleaner manufacturer's recommendations.

USG Mars™ Healthcare Clean Room
- Field-cut edges of USG Mars™ Healthcare Clean Room panels may be sealed with white latex paint. Use square edge panels for all lay-in field-cut perimeter panels.
- Clean Room-rated applications require a suspension system with gasketed tee flanges such as USG Donn® Brand CE™.
- Tested to ISO Class 5 particle emissions, per ISO 14644, by UL Environment. Rating may decrease to ISO Class 7 or greater with airflow above 1 ACH, pressure fluctuations, or vibrations in the ceiling system.
- For more information, please reference test report from UL Environment.

Metric sizes available
Contact sales for minimum quantities and lead times.

Footnotes
1. For details, see USG Sustainability tool at usgdesignstudio.com or cgcdesignstudio.com.
2. LR values are shown as averages.
3. Panel face and back surfaces treated with a proprietary broad-spectrum antimicrobial standard formulation that inhibits and retards the growth of mold and mildew. For details, see *USG 30-Year Limited System Warranty Commercial Applications* (SC2102).
4. AirCare™ coating removes formaldehyde by an average of 75% over 10 years at an average indoor concentration of 13 ppb.
5. Maximum 2'x2' with SQ edge panels.
6. All USG Mars™ High NRC Acoustical Panels with a "plant-based binder" label contain up to 65% plant-based material in the binder. For more information please refer to the USG Mars™ Acoustical Panels Health Product Declaration, available at www.usg.com
7. Mars™ Healthcare should not be mixed with non-Healthcare products in the same ceiling plane.
8. Product with Aircare™ coating should not be mixed with non-Aircare™ coated products.

Notice
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550 West Adams Street
Chicago, IL 60661

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Safety First! Follow good safety/industrial hygiene practices during installation. Wear appropriate personal protective equipment. Read SDS and literature before specification and installation.

RFI 167

SYMPHONY *m* HIGH NRC
SYMPHONY *m* HIGH CAC
SYMPHONY® *m*

Proposed Substitution

MINERAL FIBER
SMOOTH



The Symphony line provides a full range of ultra-durable acoustic solutions with a consistent, smooth visual, coupled with excellent durability.

FEATURES AND BENEFITS

- Excellent sound absorption (NRC 0.75-0.85) and sound blocking (CAC 33-42)
- Certified clean room component to ISO Class 4 (highest among comparable products)
- Tested to 1,000 wash cycles and compatible with most sanitizing solutions
- Exceeds FGI Guidelines for cleanability and acoustic performance (≥ 1.0 lbs/s.f.)
- **SmartFit panels available** – fully fabricated off-the-shelf solution to accommodate linear lighting, ventilation and utility areas with standard components
- **CertaSize® program** – non-standard sizes made to order on select products. Lead time varies. Contact your local sales rep or Customer Support

ATTRIBUTES

NRC UP TO 0.85

SAG RESISTANT

BIOSHIELD® MOLD/MILDEW RESISTANT

LOW VOC
EMISSION COMPLIANT CERTIFIED

WASHABLE W/ SANITIZING CHEMICALS

LR 0.90

CERTIFICATIONS & PRODUCT DECLARATIONS

EPD AVAILABLE

HPD AVAILABLE

USDA CERTIFIED BIOBASED PRODUCT

Declare℠
Living Building Challenge Red List Free®
Declare℠ is a service mark of The International Living Future Institute.

LEED® v4

RECYCLED CONTENT	62%	
	PRE: 60%	POST: 2%

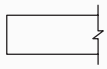
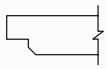
- ✓ EQ: Optimize Energy Performance
- ✓ EA: Prereq. Min. Energy Performance
- ✓ EQ: Interior Lighting
- ✓ MR: PBT Source Reduction (Healthcare)
- ✓ EQ: Acoustic Performance
- ✓ EQ: Prereq. Min. Acoustic Performance (Schools)
- ✓ EQ: Low-Emitting Materials
- ✓ EQ: Daylight
- ✓ MR: Material Ingredients (HPDs)
- ✓ MR: Sourcing Raw Materials
- ✓ MR: Environmental Product Declarations (EPDs)
- ✓ MR: Construction and Demolition Waste Management Planning

LEED® is a registered trademark of the U.S. Green Building Council.

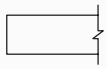
RFI 167

SYMPHONY *m* HIGH NRC | SYMPHONY *m* HIGH CAC
SYMPHONY® *m*

SYMPHONY *m* HIGH NRC

			FORMAT	DIMENSIONS (IN.)	NRC	CAC	RECYCLED CONTENT	PIECES/ CARTON	SQ. FT./ CARTON	LBS./ CARTON	CARTONS/ PALLET	
TRIM												
	NRC .85	1222-85-1	Panels	24 x 24 x 7/8	0.85	35	62%	14	56	64	16	
		1220-85-1	Panels	24 x 48 x 7/8	0.85	35	62%	8	64	74	14	
		1223-85-1	Panels	30 x 30 x 7/8	0.85	35	62%	8	50	58	28	
		1221-85-1	Planks	24 x 60 x 7/8	0.85	35	62%	8	80	92	14	
		1228-85-1	Planks	24 x 72 x 7/8	0.85	35	62%	8	96	110	14	
REVEAL												
	NRC .85	1222BB-85-1	Panels	24 x 24 x 7/8	0.85	35	62%	14	56	64	16	
		1220BB-85-1	Panels	24 x 48 x 7/8	0.85	35	62%	8	64	74	14	
		1221BB-85-1	Planks	24 x 60 x 7/8	0.85	35	62%	8	80	92	14	
		1228BB-85-1	Planks	24 x 72 x 7/8	0.85	35	62%	8	96	110	14	
NARROW REVEAL												
	NRC .85	1222BF-85-1	Panels	24 x 24 x 7/8	0.85	35	62%	14	56	64	16	APC-3
		1220BF-85-1	Panels	24 x 48 x 7/8	0.85	35	62%	8	64	74	14	APC-1/4
		1221BF-85-1	Planks	24 x 60 x 7/8	0.85	35	62%	8	80	92	14	
		1228BF-85-1	Planks	24 x 72 x 7/8	0.85	35	62%	8	96	110	14	

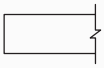
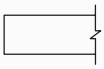
SYMPHONY *m* HIGH CAC

			FORMAT	DIMENSIONS (IN.)	NRC	CAC	RECYCLED CONTENT	PIECES/ CARTON	SQ. FT./ CARTON	LBS./ CARTON	CARTONS/ PALLET
TRIM											
	NRC .80	1222-80-1	Panels	24 x 24 x 7/8	0.80	40	62%	14	56	64	16
		1220-80-1	Panels	24 x 48 x 7/8	0.80	42	62%	8	64	74	14
		1221-80-1	Planks	24 x 60 x 7/8	0.80	42	62%	8	80	92	14
		1228-80-1	Planks	24 x 72 x 7/8	0.80	42	62%	8	96	110	14
		1223-80-1	Panels	30 x 30 x 7x8	0.80	40	62%	8	50	58	28
REVEAL											
	NRC .80	1222BB-80-1	Panels	24 x 24 x 7/8	0.80	40	62%	14	56	64	16
		1220BB-80-1	Panels	24 x 48 x 7/8	0.80	42	62%	8	64	74	14
		1221BB-80-1	Planks	24 x 60 x 7/8	0.80	42	62%	8	80	92	14
		1228BB-80-1	Planks	24 x 72 x 7/8	0.80	42	62%	8	96	110	14
NARROW REVEAL											
	NRC .80	1222BF-80-1	Panels	24 x 24 x 7/8	0.80	40	62%	14	56	64	16
		1220BF-80-1	Panels	24 x 48 x 7/8	0.80	42	62%	8	64	74	14
		1221BF-80-1	Planks	24 x 60 x 7/8	0.80	42	62%	8	80	92	14
		1228BF-80-1	Planks	24 x 72 x 7/8	0.80	42	62%	8	96	110	14

RFI 167

SYMPHONY *m* HIGH NRC | SYMPHONY *m* HIGH CAC
SYMPHONY® *m*

SYMPHONY *m*

			FORMAT	DIMENSIONS (IN.)	NRC	CAC	RECYCLED CONTENT	PIECES/ CARTON	SQ. FT./ CARTON	LBS./ CARTON	CARTONS/ PALLET
TRIM											
	NRC .75	1222-75-1	Panels	24 x 24 x 3/4	0.75	38	62%	14	56	57	16
		1220-75-1	Panels	24 x 48 x 3/4	0.75	40	62%	8	64	65	16
		1223-75-1	Panels	30 x 30 x 3/4	0.75	38	62%	8	50	51	28
		1229-75-1	Panels	30 x 60 x 3/4	0.75	40	62%	8	100	101	16
		12220-60-75-1	Planks	20 x 60 x 3/4	0.75	40	62%	8	66	67	24
		1221-75-1	Planks	24 x 60 x 3/4	0.75	40	62%	8	80	81	16
		1228-75-1	Planks	24 x 72 x 3/4	0.75	40	62%	8	96	97	16
REVEAL											
	NRC .75	1222BB-75-1	Panels	24 x 24 x 3/4	0.75	38	62%	14	56	57	16
		1220BB-75-1	Panels	24 x 48 x 3/4	0.75	40	62%	8	64	65	16
		12220-60BB-75-1	Planks	20 x 60 x 3/4	0.75	40	62%	8	66	67	24
		1221BB-75-1	Planks	24 x 60 x 3/4	0.75	40	62%	8	80	81	16
		1228BB-75-1	Planks	24 x 72 x 3/4	0.75	40	62%	8	96	97	16
NARROW REVEAL											
	NRC .75	1222BF-75-1	Panels	24 x 24 x 3/4	0.75	38	62%	14	56	57	16
		1220BF-75-1	Panels	24 x 48 x 3/4	0.75	40	62%	8	64	65	16
		12220-60BF-75-1	Planks	20 x 60 x 3/4	0.75	40	62%	8	66	67	24
		1221BF-75-1	Planks	24 x 60 x 3/4	0.75	40	62%	8	80	81	16
		1228BF-75-1	Planks	24 x 72 x 3/4	0.75	40	62%	8	96	97	16
METRIC TRIM											
	NRC .75	1220-60-75-1M	Panels	500 x 1500 x 19	0.75	40	62%	8	6	96	16
		1220-75-1M	Panels	600 x 1200 x 19	0.75	40	62%	8	5.8	49	32
		1222-75-1M	Panels	600 x 600 x 19	0.75	38	62%	14	5	55	16
		1229-75-1M	Panels	750 x 1500 x 19	0.75	40	62%	8	9	64	24
		1223-75-1M	Panels	750 x 750 x 19	0.75	38	62%	8	4.5	62	16

APC-2

SYMPHONY *m* SmartFit

			FORMAT	DIMENSIONS (IN.)	RECYCLED CONTENT	PIECES/ CARTON	SQ. FT./ CARTON	LBS./ CARTON	CARTONS/ PALLET
TRIM									
	SMARTFIT	12204-24-FIT-1	SmartFit	4 x 24 x 3/4	62%	84	56	58	16
		12204-48-FIT-1	SmartFit	4 x 48 x 3/4	62%	48	64	66	16
		12204-60-FIT-1	SmartFit	4 x 60 x 3/4	62%	48	80	82	16
		12206-24-FIT-1	SmartFit	6 x 24 x 3/4	62%	56	56	58	16
		12206-48-FIT-1	SmartFit	6 x 48 x 3/4	62%	32	64	66	16
		12206-60-FIT-1	SmartFit	6 x 60 x 3/4	62%	32	80	82	16
		12212-24-FIT-1	SmartFit	12 x 24 x 3/4	62%	28	56	58	16
		12212-48-FIT-1	SmartFit	12 x 48 x 3/4	62%	16	64	66	16
		12212-60-FIT-1	SmartFit	12 x 60 x 3/4	62%	16	80	82	16

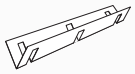
RFI 167

SYMPHONY *m* HIGH NRC | SYMPHONY *m* HIGH CAC
SYMPHONY® *m*

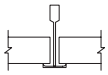
SYMPHONY *m* SmartFit continued

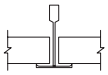
			FORMAT	DIMENSIONS (IN.)	RECYCLED CONTENT	PIECES/ CARTON	SQ. FT./ CARTON	LBS./ CARTON	CARTONS/ PALLET
REVEAL									
	SMARTFIT	12204-24BB-FIT-1	SmartFit	4 x 24 x 3/4	62%	84	56	58	16
		12204-48BB-FIT-1	SmartFit	4 x 48 x 3/4	62%	48	64	66	16
		12204-60BB-FIT-1	SmartFit	4 x 60 x 3/4	62%	48	80	82	16
		12206-24BB-FIT-1	SmartFit	6 x 24 x 3/4	62%	56	56	58	16
		12206-48BB-FIT-1	SmartFit	6 x 48 x 3/4	62%	32	64	66	16
		12206-60BB-FIT-1	SmartFit	6 x 60 x 3/4	62%	32	80	82	16
		12212-24BB-FIT-1	SmartFit	12 x 24 x 3/4	62%	28	56	58	16
		12212-48BB-FIT-1	SmartFit	12 x 48 x 3/4	62%	16	64	66	16
		12212-60BB-FIT-1	SmartFit	12 x 60 x 3/4	62%	16	80	82	16
NARROW REVEAL									
	SMARTFIT	12204-24BF-FIT-1	SmartFit	4 x 24 x 3/4	62%	84	56	58	16
		12204-48BF-FIT-1	SmartFit	4 x 48 x 3/4	62%	48	64	66	16
		12204-60BF-FIT-1	SmartFit	4 x 60 x 3/4	62%	48	80	82	16
		12206-24BF-FIT-1	SmartFit	6 x 24 x 3/4	62%	56	56	58	16
		12206-48BF-FIT-1	SmartFit	6 x 48 x 3/4	62%	32	64	66	16
		12206-60BF-FIT-1	SmartFit	6 x 60 x 3/4	62%	32	80	82	16
		12212-24BF-FIT-1	SmartFit	12 x 24 x 3/4	62%	28	56	58	16
		12212-48BF-FIT-1	SmartFit	12 x 48 x 3/4	62%	16	64	66	16
		12212-60BF-FIT-1	SmartFit	12 x 60 x 3/4	62%	16	80	82	16

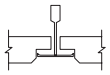
ACCESSORIES

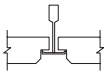
SYMPHONY m ACCESSORIES		PRODUCT NAME	PIECES/ CARTON	USE
	1170-SEL-1	Mineral Fiber Edge Sealant	1	For re-sealing cut edges; 1 quart container
	STBAR-2	2´ Stabilizer Bar	40	Recommended one pc/panel for all 2x5 and 2x6 narrow reveal installations
	STBAR-4	4´Stabilizer Bar	40	Recommended one pc spanning two panels in 2x5 and 2x6 narrow reveal installations

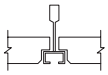
EDGE DETAILS

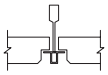

Trim
9/16" EZ Stab
Elite Narrow


Trim
15/16" EZ Stab
Classic


Reveal Corner Bevel
15/16" EZ Stab
Classic


Narrow Reveal
Corner Bevel
9/16" EZ Stab
Elite Narrow


Narrow Reveal
Corner Bevel
9/16" EZ Stab
Bolt Slot


Narrow Reveal
Corner Bevel
9/16" EZ Stab
Tier Drop

PHYSICAL DATA

MATERIAL
Mineral Fiber

FIRE CLASS (ASTM E1264)
All are Class A per ASTM E84 & CAN/ULC S102
Flame Spread: 25 or less
Smoke Developed: 50 or less

ASTM E1264 CLASSIFICATION
Type IV, Form 2, Pattern E

VOC EMISSIONS
Independently certified compliant with California Department of Public Health CDPH/EHLB/Standard Method Version 1.2, 2017.

MOLD/MILDEW RESISTANCE
BioShield treatment included for added mold and mildew resistance.

APPLICATION CONSIDERATIONS
Clean panel using a sponge/cloth dampened with water and mild liquid detergent solution. Do not soak panel. Cleanable with sanitizing chemicals.

WARRANTY
10-year 104/90 Limited Warranty increases to 15 years when installed with CertainTeed suspension systems. Full warranty information can be found at certainteed.com/warranty.

SAINT-GOBAIN

CertainTeed ARCHITECTURAL

METAL • WOOD • FELT • FIBERGLASS & MINERAL FIBER • GYPSUM • SUSPENSION & INTEGRATED SYSTEMS

20 Moores Road, Malvern, PA 19355 800-233-8990 certainteed.com/architectural

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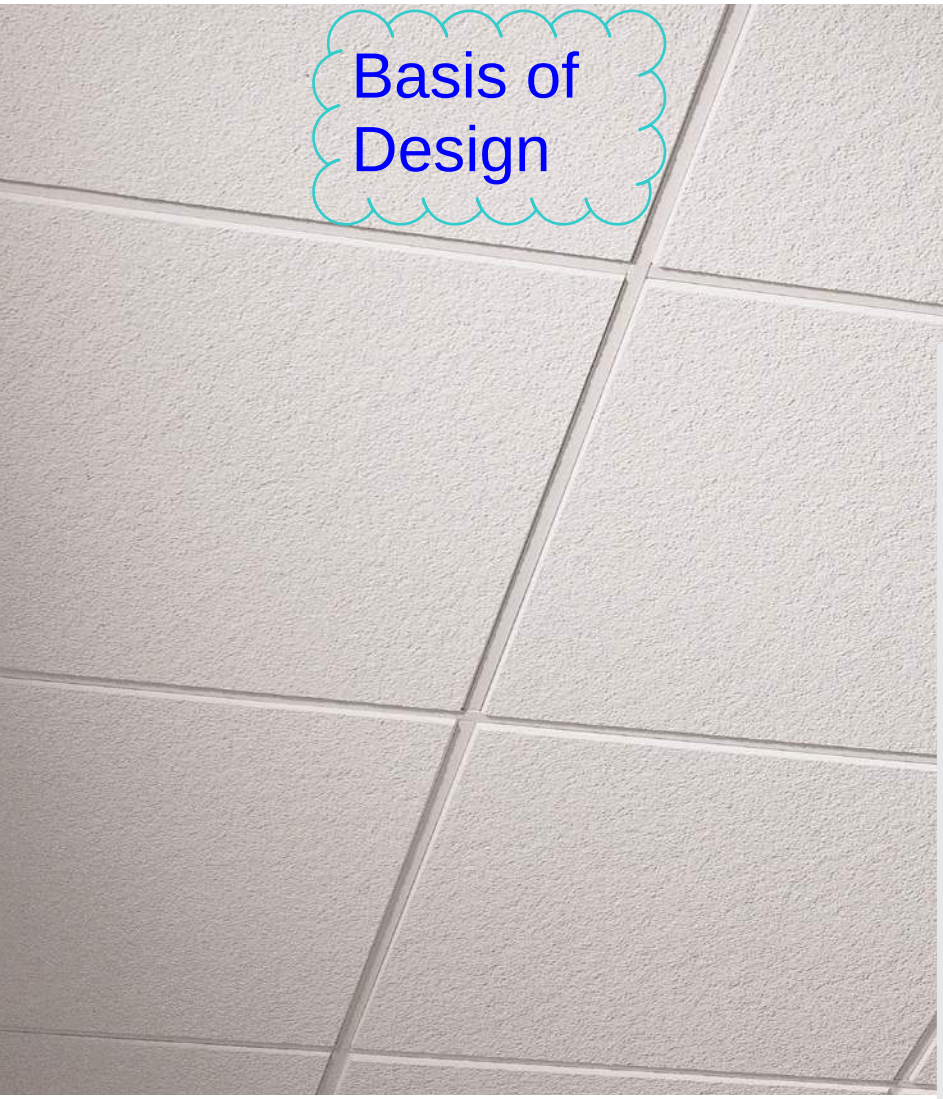
RFI 167

USG Ceiling Solutions

USG DONN® BRAND CENTRICITEE™ DXT™/DXLT™ ACOUSTICAL SUSPENSION SYSTEM

Basis of Design



USG Donn® Brand Centricitee™ DXT™ Acoustical Suspension System/ USG Eclipse™ Acoustical Panels

TO ORDER SAMPLES, GO TO USG.COM OR CGCINC.COM

STANDARD COLORS

Flat White 050 · Parchment 103 · Manila 246 · Straw 143 · Sandstone 090 · Taupe 107 · Charcoal 534

Flat Black 205 · Silver Satin 002 · Reserve White 4250

ADVANTAGE COLORS

Breeze 2659 · Blue Gray 564 · Azure 2660 · Slate 568 · Spruce 567 · Tuscany 2663 · Sorbet 2658

Squash 2661 · Safari 2662 · Redwood 566 · Sienna 565 · Halo 206 · Mist 053 · Nectar 546

Quartz 082 · Beige 142 · Silvertone 052

PREMIUM COLORS

Dawn 3679 · Old Stone 3691 · Sea Shell 3678 · Light Brown 3690 · Nut Brown 3680 · Peat 3682 · Shale 3683

Ocean Ridge 3684 · Atmosphere 3681 · Laguna 3685 · Grass 3688 · Tangy Taleia 3689 · Deep Cranbury 3687 · Deep Violet 3686

Deep Berry 3693 · Deep Blue 3692

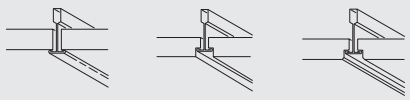
POWDER-COATED FINISH

Powder White 3767

PROFILE



EDGE DETAIL



Square Edge · Fineline · Fineline Bevel

FEATURES AND BENEFITS

- 9/16" exposed grid provides a clean aesthetic.
- Compatible with USG Logix™ Integrated Ceiling Systems.
- Cross-tee override-ends resist twisting and ensure a finished look.
- Proprietary Quick-Release™ cross tees.
- High recycled content (HRC) available.
- Seismic installation designs validated in ICC-ES Evaluation Report ESR-1222.
- Premium and custom colors available.
- Some items available in metric sizes.
- USG Donn® Brand Centricitee™ DXT™/DXLT™ Acoustical Suspension System is part of the Ecoblueprint™ portfolio — meeting today's sustainability standards. For sustainability documentation go to USG.com or CGCInc.com.

APPLICATIONS

- Interior general-use areas
- Fire-rated interior general-use areas
- USG Logix™ Integrated Ceiling Systems

USG CGC

IT'S YOUR WORLD. BUILD IT.™

RFI 167

USG DONN® BRAND CENTRICITEE™ DXT™/DXLT™ ACOUSTICAL SUSPENSION SYSTEM

ORDER SAMPLES/LITERATURE
USG: usg.com or samplit@usg.com
CGC: contact Sales Representative

TECHNICAL SERVICES
800 USG.4YOU (874-4968)

FOR MOST UP-TO-DATE TECHNICAL INFORMATION AND LEED REPORT TOOL
usgdesignstudio.com
cgcdesignstudio.com

30 YEAR LIMITED SYSTEM WARRANTY
• No Visible Sag
• Mold/Mildew Protection

HRC HIGH RECYCLED CONTENT

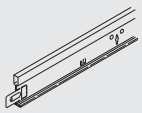
ECOBLUEPRINT

Declare®

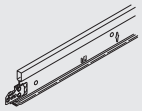
Declare® Labels on select finishes, see usg.com for more details and documentation.

9/16″ TEE SYSTEM[3,4]

Main Tee



Cross Tee 1-1/2″[3,4]



ASTM Class	Length	Height	Item No.	Fire Rating	Color[5]	Seismic Design Category[1,6] IBC	Seismic Design Category[1,6] ICC-ES Evaluated Installation	Rated Load[2] 4′ Hanger Spacing	Rated Load[2] 5′ Hanger Spacing
				🔥			〰		
Intermediate Duty	**10′** 3000 mm	**1-1/2″** 38 mm	**DXT24-10**	Class A	SC, AC, PC	A, C	7/8″ Molding ACM7 Clip	12 lb./LF	6.3 lb./LF
	12′ 3600 mm	**1-1/2″** 38 mm	**DXT24**	Class A	SC, AC, PC	A, C	7/8″ Molding ACM7 Clip	12 lb./LF	6.3 lb./LF
			DXT24HRC HRC						
			DXLT24	🔥	SC, AC, PC	A, C	7/8″ Molding ACM7 Clip		
Heavy Duty	**12′** 3600 mm	**1-5/8″** 42 mm	**DXT26**	Class A	SC, AC, PC	A, F	7/8″ Molding ACM7 Clip	16 lb./LF	8.1 lb./LF
			DXT26HRC HRC						
	1′	**1-1/2″**	**DXT122**	Class A	SC, AC, PC				
	2′ 600 mm	**1-1/2″** 38 mm	**DXT222**	Class A	SC, AC, PC				
			DXT222HRC HRC						
			DXLT222	🔥	SC, AC, PC				
	30″	**1-1/2″**	**DXT3022**	Class A	SC, AC, PC				
	4′ 1200 mm	**1-1/2″** 38 mm	**DXT422**	Class A	SC, AC, PC				
			DXT424	Class A	SC, AC, PC				
			DXT424HRC HRC						
			DXLT424	🔥	SC, AC, PC				
			DXT426	Class A	SC, AC, PC				
	5′	**1-1/2″**	**DXT524**	Class A	SC, AC, PC				
	6′	**1-1/2″**	**DXT624**	Class A	SC, AC, PC				
	8′	**1-1/2″**	**DXT824**	Class A	SC, AC, PC				

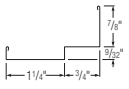
Low Emissions (VOC)
CDPH 01350 v1.2-2017 compliance on select finishes, see usg.com for more details and documentation.

High Recycled Content
USG classifies High Recycled Content as greater than 50%. Total recycled content is based on product composition of postconsumer and preconsumer (postindustrial) recycled content per FTC guidelines.

Firecode®

MOLDING[2]

Shadowline

Wall Angle	Length	Item No.	Color
	**12′** 3600 mm	**M9**	Flat White, Standard, Advantage, Premium
		M9HRC HRC	Flat White, Standard, Advantage, Premium
	**12′**	**MS125**	Flat White, Standard, Advantage, Premium
	**12′**	**MS174**	Flat White, Standard, Advantage, Premium
		MS174HRC HRC	
	**10′**	**MS274** 2″ shelf for seismic	Flat White

PHYSICAL DATA/ FOOTNOTES

Product literature and samples
Data sheet: AC3040, USG Logix™ system guide: IS268 USG Logix™ architectural design guide: IS287, USG Logix™ critical system dimensions: IS609, Sample: 206564

Material
Min. G30 hot-dipped galvanized steel body and cap. Baked on polyester paint or powder-coated finish.

Installation
Install according to ASTM C636, ASTM E580, CISCA and USG requirements. Alternate installation methods may be used when approved by the authority having jurisdiction.

Online tools
usgdesignstudio.com or cgcdesignstudio.com

Air diffusers
Refer to: AC272

Limitations
Refer to specific ceiling panel for limitations with square edge panels.

ICC Evaluation Service, LLC Report Compliance
For areas under ICC jurisdiction, see ICC-ES Evaluation Report ESR-1222 for allowable values and conditions of use. Reports are subject to reexamination, revision and possible cancellation. Refer to usg.com for most current version.

ASTM Load Compliance
Classified as Light, Intermediate or Heavy Duty when tested in accordance with ASTM C635.

Notes
1. All USG main tees, cross tees and main tee-hanger wire connections meet AC 368 and ASTM E580 requirements for tension and compression strength, as tested per ASTM E3090.
2. Rated Load expressed in lb./LF based on simple span tests in accordance with ASTM E3090 with deflection limit of L/360. Duty rating is assigned based on rated load per ASTM C635.
3. Panels must be specified to be field-cut to size and field-revealed to provide as wide a lay-on edge as possible.
4. Metric sizes shown available with standard lead times. Other metric sizes available by RTQ.
5. SC = Standard Color, AC=Advantage Color, PC=Premium Color
6. Seismically tested in accordance with ASTM E3118.

Notice
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Chicago, IL 60661

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Safety First! Follow good safety/industrial hygiene practices during installation. Wear appropriate personal protective equipment. Read SDS and literature before specification and installation.

USG CGC

MAI RFI 167



CROSS TEE



9/16" WALL ANGLE



7/8" WALL ANGLE



Suspension Systems

Proposed Substitution

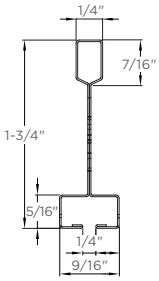
9/16" EZ Stab Elite Narrow System

The slim face width complements modern design and offers flexibility and added strength.

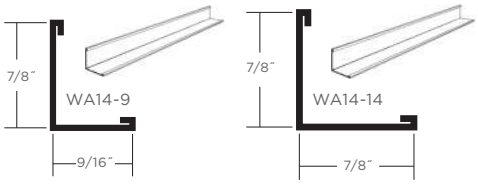
Features & Benefits

- Increased frequency (3" O.C.) of patented Latitude Holes™ provides installation flexibility
- Narrow style 9/16" (15 mm) face integrates with narrow reveal edge panels
- EZ Stab clip technology allows for a fast and strong connection on cross tees with enhanced removability
- Centering tabs prevent gaps around the edge, enabling integration with trim edge panels
- Enhanced stitching increases stiffness, reducing bending or twisting
- Suitable for all seismic applications
- ICC certified (ESR-3336) and City of Los Angeles Building Code compliant via ESR-3336 LABC Supplement
- Grid features G30 hot-dipped galvanized steel web construction for corrosion resistance
- Intermediate- and heavy-duty load-bearing capabilities/classification
- Available in Standard White and Black. Additional color options are offered through our Post-Paint process.

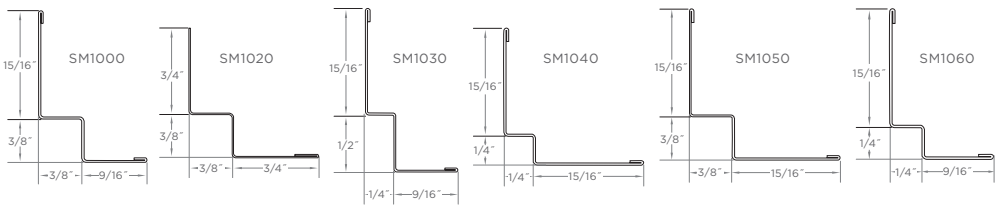
Main Runner



Wall Angle



Shadow Molding



LEED® v4

RECYCLED CONTENT	up to 86%
✓	MR: PBT Source Reduction (Healthcare)
✓	MR: Material Ingredients (HPDs)
✓	EQ: Low-Emitting Material
✓	MR: Sourcing Raw Materials
✓	MR: Environmental Product Declarations (EPDs)
✓	MR: Construction and Demolition Waste Management Planning

LEED® is a registered trademark of the U.S. Green Building Council.

CERTIFICATIONS & PRODUCT DECLARATIONS

UL CERTIFIED ENVIRONMENTAL PRODUCT DECLARATION UL.COM/EPD

EPD AVAILABLE

hpd

HPD AVAILABLE

Declare℠
Living Building Challenge Red List Free®

certainteed
SAINT-GOBAIN

RFI 167

9/16" EZ Stab Elite Narrow System

	GRID FACE (IN.)	DIMENSIONS (IN.)	SLOT SPACING (IN.)	PIECES/ CARTON	FT./ CARTON	SEISMIC DESIGN CATEGORY	STRUCTURAL CLASSIFICATION (ASTM C635)	RECYCLED CONTENT PRE*	RECYCLED CONTENT POST*	RECYCLED CONTENT TOTAL*	ALLOWABLE UNIFORM LOAD (PLF)	ALLOWABLE CONCENTRATED LOAD AT MIDSPAN (LBF)**
Main Runners												
EZES12-12-18	9/16	144 x 1-1/2 x 9/16	6 O.C.	20	240	A-C	ID	25%	35%	60%	13.15	32.88
EZES12-12-19	9/16	144 x 1-11/16 x 9/16	6 O.C.	20	240	A-F	HD	25%	34%	59%	17.97	44.93
Cross Tee												
EZES0.33-12-12	9/16	4 x 1-1/2 x 9/16	—	60	20	—	—	25%	34%	39%	—	—
EZES0.5-12-12	9/16	6 x 1-1/2 x 9/16	—	60	30	—	—	25%	34%	39%	—	—
EZES1-12-12	9/16	12 x 1-1/2 x 9/16	—	60	60	—	—	25%	34%	59%	210.53	131.58
EZES2-12-12	9/16	24 x 1-1/2 x 9/16	—	60	120	—	—	24%	36%	60%	27.97	34.96
EZES2-12-19	9/16	24 x 1-11/16 x 9/16	—	60	120	—	HD	25%	34%	59%	50.00	62.50
EZES2.5-12-12	9/16	30 x 1-1/2 x 9/16	—	60	150	—	—	24%	36%	60%	—	—
EZES4-12-12	9/16	48 x 1-1/2 x 9/16	12 O.C.	60	240	—	—	24%	36%	60%	8.44	21.09
EZES4-12-19	9/16	48 x 1-11/16 x 9/16	12 O.C.	60	240	—	HD	25%	34%	59%	17.97	44.93
EZES5-12-12	9/16	60 x 1-1/2 x 9/16	12 O.C.	20	100	—	—	24%	36%	60%	4.44	13.88
EZES5-12-12-5s	9/16	60 x 1-1/2 x 9/16	6, 20, 30, 40, 54	20	100	—	—	24%	36%	60%	—	—
EZES6-12-12	9/16	72 x 1-1/2 x 9/16	12 O.C.	20	120	—	—	24%	36%	60%	2.76	10.35
EZES8-12-12	9/16	96 x 1-1/2 x 9/16	12 O.C.	20	160	—	—	24%	36%	60%	1.00	5.00
Wall Angle												
WA14-9	9/16	144 x 7/8 x 9/16	—	40	480	—	—	19%	69%	88%	—	—
WA14-14	7/8	144 x 7/8 x 7/8	—	40	480	—	—	19%	69%	88%	—	—
WA14-14-10	7/8	120 x 7/8 x 7/8	—	40	400	—	—	19%	69%	88%	—	—
WA32-32	2	120 x 2 x 2	—	20	200	—	—	19%	69%	88%	—	—
WA32-32-12	2	144 x 2 x 2	—	20	240	—	—	19%	69%	88%	—	—
WA32-15	2	120 x 15/16 x 2	—	20	200	—	—	19%	69%	88%	—	—
WA32-15-12	2	144 x 15/16 x 2	—	20	240	—	—	19%	69%	88%	—	—
Flexible Wall Angle*												
FWA14-9	9/16	96 x 1-1/8 x 9/16	—	63	504	—	—	19%	69%	88%	—	—
FWA14-14	7/8	96 x 1-1/8 x 7/8	—	63	504	—	—	19%	69%	88%	—	—

*Flexible Wall Angle is made of Rigid PVC

Shadow Molding												
SM1000	—	120 x 15/16 x 3/8 x 3/8 x 9/16	—	40	400	—	—	19%	69%	88%	—	—
SM1020†	—	120 x 3/4 x 3/8 x 3/8 x 3/4	—	40	400	—	—	19%	69%	88%	—	—
SM1030	—	120 x 15/16 x 1/2 x 1/4 x 9/16	—	40	400	—	—	9%	44%	53%	—	—
SM1040	—	120 x 15/16 x 1/4 x 1/4 x 15/16	—	40	400	—	—	9%	44%	53%	—	—
SM1050	—	120 x 15/16 x 3/8 x 3/8 x 15/16	—	40	400	—	—	9%	44%	53%	—	—
SM1060	—	120 x 15/16 x 1/4 x 1/4 x 9/16	—	40	400	—	—	9%	44%	53%	—	—

	GRID FACE (MM)	DIMENSIONS (MM)	SLOT SPACING (MM)	PIECES/ CARTON	FT./ CARTON	SEISMIC DESIGN CATEGORY	STRUCTURAL CLASSIFICATION (ASTM C635)	RECYCLED CONTENT PRE*	RECYCLED CONTENT POST*	RECYCLED CONTENT TOTAL*	ALLOWABLE UNIFORM LOAD (PLF)	ALLOWABLE CONCENTRATED LOAD AT MIDSPAN (LBF)**
Main Runner Metric												
EZES3600M-12-18	14	3600 x 38 x 14	150	20	72	—	ID	25%	35%	60%	13.15	32.88
Cross Tee Metric												
EZES1200M-12-12	14	1200 x 38 x 14	300	60	72	—	ID	25%	35%	60%	8.66	21.31
EZES600M-12-12	14	600 x 38 x 14	0	60	36	—	ID	25%	35%	60%	29.68	36.51

†SM1020 is not hemmed along 3/4˝ side
*Maximum recycled content percentage. Recycled content varies by manufacturing location.
**Allowable concentrated loads at midspan are determined in accordance with AC368 Section 3.2.

For each framing member, the allowable concentrated load must not be combined with the allowable uniform load.
To specify Main Runners, Cross Tees, Wall Angles or Shadow Molding in black, order by item number followed by BLK.
Example EZES12-12-18 BLK
Flex Wall Angle will fit a 5-1/2" radius or larger

RFI 167

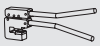
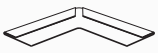
9/16" EZ Stab Elite Narrow System

Maximum Fixture Weight

ITEM NUMBER	CONFIGURATION A	CONFIGURATION B	FIXTURE A	FIXTURE B	HANGER SPACING A	HANGER SPACING B	MAXIMUM WEIGHT A	MAXIMUM WEIGHT B
Main Runner to Main Runner – Drawing Key: Main Runner (|) Cross tee (- - -) Hanger wire (✚)								
EZES4-12-12			24" x 48"	24" x 48"	48"	48"	41.00 lbs.	32.00 lbs.
EZES4-12-19			24" x 48"	24" x 48"	48"	48"	56.00 lbs.	56.00 lbs.
EZES4-12-12			24" x 48"	24" x 48"	48"	48"	41.00 lbs.	32.00 lbs.
EZES4-12-19			24" x 48"	24" x 48"	48"	48"	56.00 lbs.	56.00 lbs.
EZES4-12-12			24" x 24"	24" x 24"	48"	48"	26.00 lbs.	26.00 lbs.
EZES4-12-19			24" x 24"	24" x 24"	48"	48"	53.50 lbs.	56.00 lbs.

Cross tees tested as follows: EZES4-12-12 tested at 8.44 lbs/LF to 1/360 of 4' span; EZES4-12-19 tested at 17.97 lbs/LF to 1/360 of 4' span.

Accessories

		ITEM NUMBER	PRODUCT NAME	DIMENSIONS L" X W" X H" (MM)	COLOR	PIECES/ CARTON	LBS./ CARTON
SEISMIC		SLEEVE916	9/16" Sleeve	4 x 9/16 x 1/64 (102 x 15 x 1)	White	100	1
		CTSPC-2	Seismic Perimeter Clip	3-1/16 x 2-1/4 x 1-1/16 (78 x 58 x 27)	Metal	100	9
		CTSTJ	Seismic Transition Joint Clip	3-1/2 x 3-1/2 x 1-3/16 (89 x 89 x 31)	Metal	100	10
STANDARD		AHD	Adjustable Hold Down Clip	1-1/8 x 1/2 x 1-11/16 (29 x 13 x 43)	Black	1000	16
		HW12	Hanger Wire 12´ (3660 mm) 12 Gage (2.05 mm)	144 x 12 gage x 12 gage (3658 x 12 gage x 12 gage)	Metal	141	50
		EZSLOTTER	Slot Punch	11 x 3-1/4 x 1 (280 x 83 x 26)	Metal	1	2.5
		SFYK	SmartFit Yoke	8.55 x 1.25 x 9.56 (217 x 32 x 243)	Metal	20	9
		IC-9	9/16" Inside Corner	3 x 3 x 1/16 (76 x 76 x 1.52)	White	100	10
		OC-9	9/16" Outside Corner	3 x 3 x 1/16 (76 x 76 x 1.52)	White	100	10

RFI 167

9/16" EZ Stab Elite Narrow System

Physical Data

CROSS TEE/MAIN RUNNER MATERIAL
Hot dipped galvanized steel (G30)

FACE DIMENSION
9/16"

CROSS TEE/MAIN RUNNER INTERFACE
Stepped-end/Override

DUTY CLASSIFICATION
Heavy duty and Intermediate duty per ASTM C635

CROSS TEE/MAIN RUNNER SURFACE FINISH
Painted Steel Cap

PROFILE HEIGHT
ID: 1-1/2"
HD: 1-11/16"

VOC EMISSIONS
Independently certified compliant with California Department of Public Health CDPH/EHLB/Standard Method Version 1.2, 2017.

END DETAIL
Main Runner: Integral Stab
Cross Tee: Staked-on Stab Clip

SEISMIC CATEGORY
A, B, C, D, E ,F

WARRANTY
10-year Limited Suspension Systems warranty increases to 30 years when installed with CertainTeed ceiling panels. Full warranty information can be found at certainteed.com/warranty

Seismic Performance

MAIN RUNNERS:
All main runners

MINIMUM LBS. TO PULLOUT COMPRESSION/TENSION:
180 lbs.

CROSS TEES:
All cross tees

ICC Evaluation Service, Inc., Report Compliance

Suspension systems manufactured by CertainTeed ceilings have been reviewed and are approved by listing in ICC-ES Evaluation Report ESR-3336. CertainTeed suspension systems have been reviewed and are approved by listing in the City of Los Angeles Building Code ESR-3336 LABC Supplement. Evaluation Reports are subject to reexamination, revision and possible cancellation. Refer to certainteed.com for current reports.

SAINT-GOBAIN

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20 Moores Road, Malvern, PA 19355 800-233-8990 certainteed.com

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BQ #210 Attachment

SUBSTITUTION REQUEST
(During the Bidding/Negotiating Phase)

CSI

PROJECT: Greenwich Central Middle School

SUBSTITUTION REQUEST NUMBER: 1

FROM:

TO: Turner Construction

DATE:

A/E PROJECT NUMBER:

RE:

CONTRACT FOR:

SPECIFICATION TITLE: Window Shades

DESCRIPTION: Window Shades

SECTION: 12 2401

PAGE: 3

ARTICLE/PARAGRAPH: 2.1 - A, 2.2 - A & B

PROPOSED SUBSTITUTION: Window Shades

MANUFACTURER: Spring Window Fashions

ADDRESS: 8467 Route 405 Highway South montgomery Pa

PHONE: 844 - 782 - 0002

TRADE NAME: Window shades

MODEL NO.: - Z - Wave Motorized - Roller shade manual

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.
Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The Undersigned certifies:
- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

SUBMITTED BY:

SIGNED BY:

FIRM:

ADDRESS:

TELEPHONE:

A/E's REVIEW AND RECOMMENDATION:

- ☐ Approve Substitution—Make submittals in accordance with Specification Section 01 33 00 Submittal Procedures.
- ☐ Approve Substitution as noted—Make submittals in accordance with Specification Section 01 33 00 Submittal Procedures.
- ☒ Reject Substitution—Use specified materials.
- ☐ Substitution Request received too late—Use specified materials.

Roller shades – the proposed product appears to be residential and not of the same quality. The submittal is lacking in detail on materials used for the housing etc. Project Specification lists four acceptable manufacturers - SLAM

SIGNED BY: Stephen Martocchio - SLAM

DATE: 10/30/24

SUPPORTING DATA ATTACHED: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____

BQ #210 Attachment

GRABER | DELIGHT IN EVERY DETAIL



Graber Solar Shades
English/US Price Guide

May 2024

BQ #210 Attachment

ROLLER SOLAR

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PLEASE NOTE:

Photos and illustrations are for inspiration only.
Not all product configurations are available in all countries.

Window blinds with a damaged or loose tension device or retractable cord that fails to fully retract pose a strangulation risk to children. To avoid this potential strangulation risk, consider purchasing cordless products or products with inaccessible cords.

GRABER®

MAY 2024

(5/24) 24-519200

Features

Summary

Graber® Roller and Solar Shades offer a great selection of light and temperature controlling shades.

Roller Shades
- Wide variety of colors
- Wide variety of textures and designs
- Improved temperature control

Solar Shades
- 1% to 12% openness
- Excellent outward visibility
- Glare control

Features	Benefits
UltraLite Cordless Lift	• Precision placement — lower and raise the shade by moving the hem bar exactly where you want it. Ideal system for aligning shade height for multiple shades on the same wall • Light and smooth lift for all shade sizes • Aesthetically beautiful mounting hardware that hides mechanics • Shade is spring-loaded on each end and will self-center between brackets when installed • Streamlined appearance with no chains; ideal for homes with children or pets • Optional contour valance, cassette valance with fabric insert, fascia, flat valance, or wood cornice
UltraLite Dual Lift (U.S. ONLY)	• Precision placement with two ways to operate the shade — lower and raise the shade by moving the hem bar exactly where you want it, or lower and raise by pulling on the chain or cord • Light and smooth lift for all shade sizes • Choice of bead chain or fabric cord • One pull of the chain will raise the entire shade • Aesthetically beautiful mounting hardware that hides mechanics • Shade is spring-loaded on each end and will self-center between brackets when installed • Beaded chain (or optional cord) remains at same length, regardless of chain position • Choose from five colors for the plastic chain, or stainless steel chain • Hold down device keeps chain taut for enhanced safety • Choose left or right chain or cord location • Optional contour valance, cassette valance with fabric insert, fascia, flat valance, or wood cornice
Enclosed Loop Dual Lift (Canada ONLY)	• Precision placement with two ways to operate the shade: 1) lower and raise shade by moving the hem bar exactly where you want it, or 2) raise the shade by moving the plastic grip toward the top of the window, then hold down the up-arrow button, while simultaneously pulling the grip down. Once you are at the bottom, release the button, reset the grip at the top, and repeat until your shade is at the desired height. To lower the shade, hold the down-arrow button and follow the same instructions. • Light and smooth lift for all shade sizes • Aesthetically beautiful mounting hardware that hides mechanics • Shade is spring-loaded on each end and will self-center between brackets when installed • Beaded chain remains at same length, regardless of chain position • Choose left or right chain location • Optional contour valance, cassette valance with fabric insert, fascia, flat valance, or wood cornice
Enclosed Loop Lift (Canada ONLY)	• Spring-loaded idle for easy install • Enclosed Loop Lift features a cord cover and sliding handle to operate the chain loop easily and safely • Four clutch sizes depending on shade size • Beaded chain remains at same length, regardless of shade position • Choose left or right chain location • Optional contour valance, cassette valance with fabric insert, fascia, flat valance, or wood cornice
Continuous-Loop Lift (U.S. ONLY)	• Spring-loaded idle for easy install • Beaded chain and clutch system make raising and lowering shade easy • Four clutch sizes depending on shade size • Beaded chain remains at same length, regardless of shade position • Choose from five colors for the plastic chain or stainless steel chain • Hold down device keeps chain taut for enhanced safety • Choose left or right chain location • Optional contour valance, cassette valance with fabric insert, fascia, flat valance, or wood cornice

Features

Summary

Graber® Roller and Solar Shades offer a great selection of light and temperature controlling shades.

Roller Shades
- Wide variety of colors
- Wide variety of textures
- Improved temperature control

Solar Shades
- 1% to 12% openness
- Excellent outward visibility
- Glare control

Features	Benefits
Cordless Lift	• Streamlined appearance with no chains; ideal for homes with children or pets • Shade raises and lowers smoothly and easily due to a unique dual braking system • Tension can be manually adjusted so shade always raises at desired speed • Color coordinated tassels facilitate easy operation and keep fabrics clean (wood tassels in Natural, Walnut, and Golden Oak are optional) • Optional clear hem grip available (not available with scallop option) • Optional contour valance, cassette valance with fabric insert, flat valance, or wood cornice
Smart Pull Lift	• Convenient easy glide lift system with a wand • Shade is lowered automatically with a single pull of the wand • Shade is raised to the desired placement with simple pull of the wand • Optional contour valance, cassette valance, flat valance or wood cornice
Motorized Lift	• Window treatments can be operated from virtually anywhere in the home • Provides easy operation of hard-to-reach or larger windows • Operate multiple window treatments simultaneously or individually
Dual Shade (U.S. ONLY) or Enclosed Loop Dual Shade (Canada ONLY)	• Two shades are combined onto one bracket for complete privacy and light control • Each shade may be configured with roller and/or solar fabrics • Maximizes view to the outside with solar or sheer fabrics • Maximizes privacy with roller fabrics • Improves energy efficiency • Optional large cassette
Options	• Each operating system offers multiple valance and cornice options (surcharge applies) • Turning fabric width for height and seaming accommodates larger windows; available on select fabrics • Reverse roll: fabric rolls over the front of tube; standard: material rolls over the back • Hem bar: fabric-wrapped (standard) or sealed (optional with Continuous-Loop Lift, Enclosed Loop Lift and Motorized Lift) • Projection brackets for Smart Pull Lift and Cordless Lift (no charge) • Hold down brackets (no charge) • Bay or corner shade • Motorized Lift • Fascia available in 3" and 4" heights
Commercial Solutions	• Side and sill channels (optional with Enclosed Loop Lift, Continuous-Loop Lift and Motorized Lift) • Low voltage motorized coupled shades • Pockets and closure plates
Total Room Coordination	• Total room fabric coordination of many fabrics for roller, solar, sliding panels, verticals, and pleated shades • Coordinate a room by using a single fabric for a mixture of window types and sliding doors • Cut yardage available
Scallop, Gimp, and Trims	• Create a customized look for roller shades
Warranty	• Limited lifetime warranty; five-year warranty on motorization components

Features

Roller Shade Fabrics

- Offer a solution for light control (sheer to blackout fabrics)
- Any room or decorating style
- Block damaging UV rays
- Coordinate with other product lines (vertical blinds, pleated shades, and sliding panels)
- "Fabric Width" is only a representation of the unfinished roll's usable width. See max/min tables for product size offerings.

Fabric Styles and Information: Roller Shade Fabrics

Style Name	Opacity Level	Fabric Composition	Fabric Width (inches)	Oeko-Tex® Certified	Can be Turned Width for Height	Sealed Hembar Option	Color to Street Side	Color Number	Can be Seamed
Aberdeen BO	Blackout	100% Polyester	92	•			White	All colors	
Aberdeen LF	Light Filtering	100% Polyester	92	•	•		Same front and back	All colors	
Arboretum BO	Blackout	100% Polyester	91¾	•	•		White	All colors	
Arboretum LF	Light Filtering	100% Polyester	91¾	•	•		Base color of front	All colors	
Bravado BO	Blackout	100% Polyester	108¼	•		•	Varies by colorway	All colors	
Bravado LF	Light Filtering	100% Polyester	108¼	•			Same front and back	All colors	
Canyon Ridge BO	Blackout	100% Polyester	92	•			White	All colors	
Canyon Ridge LF	Light Filtering	100% Polyester	92	•	•		Same front and back	All colors	
Cambridge LF	Light Filtering	100% Polyester	76	•	•		Same front and back	11103	
Cambridge LF	Light Filtering	100% Polyester	120	•	•		Same front and back	All colors except 11103 & 11114	
Cambridge RD	Room Darkening	100% Polyester	76	•	•	•	White	11203	
Cambridge RD	Room Darkening	100% Polyester	118	•	•	•	White	All colors except 11203 & 11214	
Cloud Frost	Light Filtering	100% PES	120	•			Same front and back	All colors	
Conservancy LF	Light Filtering	18% cotton/82% polyester	115	•			Same front and back	All colors	
Conservancy BO	Blackout	18% cotton/82% polyester	115	•		•	White	All colors	
Consummate Silk	Blackout	20% Cotton/80% Polyester	77¼				White	All colors	
Debonair	Light Filtering	3.1% Flax/4.3% Cotton/ 92.6% Polyester	106	•			Same front and back	All colors	
Delphine BO	Blackout	100% Polyester	108	•		•	White; except Mythical Gray: gray	All colors	
Delphine LF	Light Filtering	100% Polyester	108	•			Same front and back	All colors	
Destin BO	Blackout	2% Nylon/98% Polyester	114	•			White	All colors	
Emerson	Blackout	100% Polyester	118	•			White	All colors	
Empirical	Light Filtering	100% Polyester	95¾	•			Same front and back	All colors	
Emporium	Light Filtering	100% Polyester	95⅛	•			Same front and back	All colors	
Essential*	Blackout	25% Fiberglass/75% PVC	69⅞		•	•	Varies by colorway	All colors	•
Flock BO	Blackout	100% Polyester	110	•			White	All colors	
Flock LF	Light Filtering	100% Polyester	110	•			Same front and back	All colors	
Gleam	Blackout	100% Polyester	91¾	•		•	White	All colors	
Harmony	Light Filtering	100% Polyester	91¾	•			Same front and back	All colors	
Inkblot	Light Filtering	100% Polyester	120	•			Same front and back	All colors	
Jacinta	Light Filtering	100% Polyester	112	•			Same front and back	All colors	
Kindred	Light Filtering	100% Polyester	112	•			Same front and back	All colors	
Manifest LF	Light Filtering	100% Polyester	92½	•			Same front and back	All colors	
Manifest BO	Blackout	100% Polyester	92½	•			White	All colors	
Mayfair	Sheer	100% Polyester	107	•			Same front and back	All colors	
Northshore	Light Filtering	100% Polyester	110¾	•			Same front and back	All colors	
Paving Stone	Blackout	100% Polyester	117	•	•		White	All colors	
Providence BO	Blackout	100% Polyester	115	•		•	White	All colors	
Providence LF	Light Filtering	100% Polyester	115	•			Same front and back	All colors	
Regent	Sheer	100% Polyester	114¾	•			Same front and back	All colors	
Renaissance	Light Filtering	100% Polyester	91¾	•			Lighter Version of Front	All colors	
Riverbend	Light Filtering	100% Polyester	71½	•			Same front and back	All colors	

*Material is FR rated.
NOTE: A black line may appear on front and back side of shade due to fabric and seaming process.

Features

Roller Shade Fabrics

- Offer a solution for light control (sheer to blackout fabrics)
- Any room or decorating style
- Block damaging UV rays
- Coordinate with other product lines (vertical blinds, pleated shades, and sliding panels)

Fabric Styles and Information: Roller Shade Fabrics

Style Name	Opacity Level	Fabric Composition	Fabric Width (inches)	Oeko-Tex® Certified	Can be Turned Width for Height	Sealed Hembar Option	Color to Street Side	Color Number	Can be Seamed
Sahara Ridge	Light Filtering	95.8% Polyester/ 2.5% Cotton/ 1.7% Flax	106	●			Same front and back	All colors	
Sanguine	Blackout	100% Polyester	78				White	All colors	
Santorini	Light Filtering	100% Polyester	76	●			Same front and back	All colors	
Shadow*	Blackout	100% Polyester	119¼	●		●	White	All colors	●
Sheffield	Light Filtering	100% Polyester	108	●			Same front and back	All colors	
Shiloh	Sheer	100% Polyester	114¾	●			Same front and back	All colors	
Solana BO	Blackout	100% Polyester	113⅜	●			White	All colors	
Spring Bloom	Light Filtering	100% Polyester	92	●			Same front and back	All colors	
Suburban II	Light Filtering	100% Polyester	71½	●	●		Same front and back	All colors	
Tattered Husk BO	Blackout	100% Polyester	111	●			White	All colors	
Tattered Husk LF	Light Filtering	100% Polyester	109				Same front and back	All colors	
Terrain	Light Filtering	100% Polyester	106	●			Same front and back	All colors	
Thesis	Blackout	100% Polyester	69½	●			White	All colors	
Tuvalu	Sheer	100% Polyester	106	●			Same front and back	All colors	
Vancouver	Light Filtering	100% Polyester	110¾	●			Same front and back	All colors	
Wayfarer	Sheer	100% Polyester	91¾	●			Same front and back	All colors	
Whitcomb	Light Filtering	100% Polyester	107½	●			Same front and back	All colors	
Whitehall	Blackout	100% Polyester	120	●	●	●	White	All colors	
Whittaker BO	Blackout	100% Polyester	113⅜	●			White	All colors	

*Material is FR rated.
NOTE: A black line may appear on front and back side of shade due to fabric and seaming process.

Features

Light Control and Privacy: Roller Shade Fabrics

Sheer*: Allows the most amount of light into the room for a minimum amount of privacy and a view to the outside. Objects in the room can be seen quite clearly through shades.
Privacy Level: Minimal

Light Filtering*: Allows light to gently filter through and provides privacy. Images and shapes may be seen through these shades, but details are not visible. Deep fabric colors provide moderate light control, while light colors provide lower light control.
Privacy Level: Moderate

Room Darkening*: Allows some light to filter into the room and provides privacy. Objects in a lit room seen through these shades appear as vague shapes. Deep fabric colors darken a room; light colors filter and diffuse bright sunlight.
Privacy Level: Complete

Blackout: Prohibits light from shining through and provides maximum privacy. Prevents shadows and silhouettes from showing through the fabric. All fabric colors provide maximum light control.
Privacy Level: Complete

Light Gaps: For optimal light and glare control, outside mount is recommended, or you may add a secondary soft window treatment (drapery or curtain) to hide the light gap on an inside mount. (Refer to light gap chart in this section.)
Privacy Level: Moderate

*These fabrics are translucent and their colors may be influenced by changing light conditions. Colors may appear to vary depending upon the time of day and type of lighting, as well as whether the shade is partially or fully lowered.
NOTE: Select roller weaves may have “pinpricks” of light showing through.

Features

Solar Shade Fabrics

Maintain an Outward View
- Filter and diffuse light while maintaining an outward view
- In general, the higher the openness factor and darker the fabric, the clearer the view

Manage Glare
- Minimize glare on televisions and home office computers
- The darker the fabric color, the better the glare control and the better the view to the outside

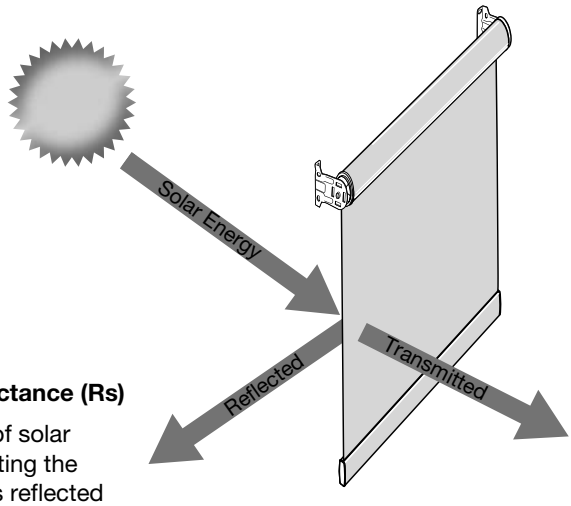
Block Damaging UV Rays
- The amount of UV ray blockage is the inverse of a fabric's openness factor (e.g., a fabric with 10% openness blocks 90% of UV rays)
- Protect your furniture, carpets, artwork, etc., from fading due to harmful UV rays

Reduce the Temperature
- Fabrics reduce heat transmittance, keeping rooms cooler and increasing the comfort level in the home
- The lighter the fabric color, the better the temperature control

NOTE: Solar shades do not offer nighttime privacy; lighted interiors allow inward visibility. If complete privacy is desired, a Dual Shade or secondary treatment is necessary.

Solar Optical Properties

When solar radiation reaches the shading fabric it is either reflected, absorbed, or transmitted. The sum of these values equals 100% of the solar energy hitting the fabric.



Solar Reflectance (Rs)

Proportion of solar radiation hitting the fabric that is reflected by the fabric.

Solar Absorption (As)

Percentage of the solar radiation hitting the fabric that is absorbed by the fabric.

Solar Transmittance (Ts)

Percentage of solar radiation hitting the fabric that is transmitted through the fabric, illuminating the interior space.

Features

Fabric Styles and Information: Solar Shade Fabrics

Style Name	Openness	UV Blockage	Fabric Composition	Fabric Width (inches)	GREENGUARD® Certified	anti-microbial	anti-fungal	FR Rated	Can Be Turned Width for Height	Color Numbers	Can Be Seamed	Sealed Hembar Option
Bradley	8%	92%	16% Polyester/ 84% PVC	96	●	●	●	●		All colors		
Broadcast	1%	99%	25% Polyester/ 75% Vinyl on Polyester	116	●	●	●	●	●	All colors	●	●
Chronicles	4%	96%	15% Polyester/ 85% Vinyl on Polyester	96	●	●	●	●		All colors	●	●
Complex	5%	95%	30% Polyester/ 70% Vinyl on Polyester	96	●	●	●	●		All colors	●	●
Earth Synergy	5%	95%	16% Linen/ 18% Polyester/ 66% PVC	116	●	●	●	●		All colors		●
EcoEncore	5%	95%	100% PET recycled polyester	99½	●			●		All colors		
Ellington 1%	1%	99%	22% Polyester/ 78% PVC	124	●	●	●	●	●	All colors	●	●
Ellington 3%	3%	97%	22% Polyester/ 78% PVC	124	●	●	●	●	●	All colors	●	●
Ellington 5%	5%	95%	22% Polyester/ 78% PVC	124	●	●	●	●		All colors	●	●
EnviroINFUSION	5%	95%	100% Polyester	114¾	●	●	●	●		All colors		
Exposition	8%	92%	26% Polyester/ 74% Vinyl on Polyester	96	●	●	●	●		All colors	●	●
Guildhall	5%	95%	26% Polyester/ 74% Vinyl on Polyester	96	●	●	●	●		All colors	●	●
Harmonics	5%	95%	100% Polyester	114¾	●	●	●	●		All colors		
LiveWell	2%	98%	20% Polyester/ 80% PVC	95 1/8	●	●	●	●	●	All colors		
Merit	4%	96%	15% Polyester/ 85% Vinyl on Polyester	96	●	●	●	●		All colors	●	●
Momentum	5%	95%	17% Polyester/ 83% PVC	94	●	●	●	●		All colors	●	●
Monticello	7%	93%	23.8% Polyester/ 76.2% Vinyl on Polyester	96	●	●	●	●	●	All colors		
Nantucket	8%	92%	17% Polyester/20% PP/63% PVC	96	●					All colors		
Pannier	10%	90%	85% PVC/ 15% Polyester	96	●	●	●	●		All colors		
PlanetSafe	3%	97%	100% PET recycled polyester	103⅛	●			●		All colors		
Plexus 1%	1%	99%	19% Polyester/ 81% Vinyl on Polyester 25% Polyester/ 75% Vinyl on Polyester	116	●	●	●	●	●	47612, 47611 47610, 47604, 47606, 47613, 47609, 47608, 47603, 47602, 47605, 47607	●	●
Plexus 3%	3%	97%	19% Polyester/ 81% Vinyl on Polyester 25% Polyester/ 75% Vinyl on Polyester	116	●	●	●	●	●	47712, 47711 47710, 47704, 47706, 47713, 47709, 47708, 47703, 47702, 47705, 47707	●	●
Plexus 5%	5%	95%	13% Polyester/ 87% Vinyl on Polyester 25% Polyester/ 75% Vinyl on Polyester	116	●	●	●	●	●	47812, 47811 47810, 47804, 47806, 47813, 47809, 47808, 47803, 47802, 47805, 47807	●	●
Porter	11%	89%	16% Polyester/ 84% PVC	96	●	●		●		All colors		
Quintessence	7%	93%	25% Polyester/ 75% PVC	116	●	●	●	●		All colors	●	●
Sabine	3%	97%	25% Polyester/ 75% PVC	96	●	●	●	●		All colors	●	●
SafeSync	12%	88%	16% Polyester/ 84% PVC	96	●	●		●		All colors		
Sakura	5%	95%	28% Polyester/ 72% PVC	96⅜	●	●		●		All colors		

*Oeko-Tex® certified.

Features

Fabric Styles and Information: Solar Shade Fabrics

Style Name	Openness	UV Blockage	Fabric Composition	Fabric Width (inches)	GREENGUARD® Certified	anti-microbial	anti-fungal	FR Rated	Can Be Turned Width for Height	Color Numbers	Can Be Seamed	Sealed Hembar Option
Standard Weave 1%	1%	99%	21% Polyester/ 79% Vinyl on Polyester 24% Polyester/ 76% Vinyl on Polyester 25% Polyester/ 75% Vinyl on Polyester	124	•	•	•	•	•	47907, 47908, 47905 47901, 47906 47902, 47903, 47904	•	•
Standard Weave 3%	3%	97%	18% Polyester/ 82% Vinyl on Polyester 21% Polyester/ 79% Vinyl on Polyester 24% Polyester/ 76% Vinyl on Polyester	124	•	•	•	•	•	48202, 48203, 48204 48207, 48208, 48205 48201, 48206	•	•
Standard Weave 5%	5%	95%	16% Polyester/ 84% Vinyl on Polyester 21% Polyester/ 79% Vinyl on Polyester 24% Polyester/ 76% Vinyl on Polyester	124	•	•	•	•	•	48302, 48303, 48304 48307, 48308, 48305 48301, 48306	•	•
Standard Weave 10%	10%	90%	16% Polyester/ 84% Vinyl on Polyester 21% Polyester/ 79% Vinyl on Polyester 24% Polyester/ 76% Vinyl on Polyester	116	•	•	•	•	•	48402, 48403, 48404 48407, 48408, 48405 48401, 48406	•	•
Steel House	8%	92%	70% PVC/ 30% Polyester	96	•			•		All colors		
Tableaux	1%	99%	23% Polyester/ 77% PVC	96	•	•	•	•		All colors	•	•
Unison	5%	95%	100% Polyester	114¾	•	•	•	•		All colors		
Vanguard 1%	1%	99%	21% Polyester/ 79% Vinyl on Polyester 24% Polyester/ 76% Vinyl on Polyester 25% Polyester/ 75% Vinyl on Polyester	124	•	•	•	•	•	47914, 47912, 47917, 47913, 47918 47909, 47915, 47911, 47916 47910	•	•
Vanguard 3%	3%	97%	18% Polyester/ 82% Vinyl on Polyester 21% Polyester/ 79% Vinyl on Polyester 24% Polyester/ 76% Vinyl on Polyester	124	•	•	•	•	•	48210 48214, 48212, 48217, 48213, 48218 48209, 48215, 48211, 48216	•	•
Vanguard 5%	5%	95%	16% Polyester/ 84% Vinyl on Polyester 21% Polyester/ 79% Vinyl on Polyester 24% Polyester/ 76% Vinyl on Polyester	124	•	•	•	•	•	48310 48314, 48312, 48317, 48313, 48318 48309, 48315, 48311, 48316	•	•

Features

Fabric Recommendations

Order all shades for the same room at the same time to ensure color consistency and minimize dye lot variation.

When displaying multiple shades in the same room, we recommend all shades be ordered with the same fabric orientation for a consistent look.

Fabric Disclaimers

Due to the nature of the weaving process, some imperfections in the weave are normal.

NOTE: Select roller weaves may have "pinpricks" of light showing through.

Roll direction cannot be reversed after a shade is ordered. Fabric appearance can vary based on changing light conditions in the room.

Fabric Width

The fabric width is narrower than the finished shade width of the tube and its components.

Light Gap

Control Type	Light Gap per Side (inches)
UltraLite Cordless Lift	⅜
UltraLite Cordless Lift with Cassette	½
UltraLite Cordless Lift with Contour Valance	⅜
UltraLite Cordless Lift with Fascia	⅜
UltraLite Cordless Lift with Flat Valance	⅜
UltraLite Dual Lift or Enclosed Loop UltraLite Dual Lift	½
UltraLite Dual Lift or Enclosed Loop UltraLite Dual Lift with Cassette	½
UltraLite Dual Lift or Enclosed Loop UltraLite Dual Lift with Contour Valance	½
UltraLite Dual Lift or Enclosed Loop UltraLite Dual Lift with Fascia	½
UltraLite Dual Lift or Enclosed Loop UltraLite Dual Lift with Flat Valance	½
Enclosed Loop Lift or Continuous-Loop Lift	9/16 to ⅞
Enclosed Loop Lift or Continuous-Loop Lift with Contour Valance	9/16 to ⅞
Enclosed Loop Lift or Continuous-Loop Lift with Flat Valance	9/16 to ⅞
Enclosed Loop Lift or Continuous-Loop Lift with Fascia	9/16 to ⅞
Enclosed Loop Lift or Continuous-Loop Lift with Cassette	9/16 to 1 1/16
Dual Shade or Enclosed Loop Dual Shade Lift	9/16 to 1 1/16
Dual Shade or Enclosed Loop Dual Shade with Cassette	9/16 to ⅞
Cordless Lift	⅜ to ¾
Cordless Lift with Contour Valance	⅜ to ¾
Cordless Lift with Flat Valance	⅜ to ¾
Cordless Lift with Cassette	7/16 to 1 3/16
Smart Pull Lift	9/16 to 15/16
Smart Pull Lift with Contour Valance	9/16 to 15/16
Smart Pull with Flat Valance	9/16 to 15/16
Smart Pull Lift with Cassette	⅝ to 1

Cleaning and Care Information

Roller shade fabrics are virtually maintenance free. If the shade is dusty, simply vacuum over it using an upholstery attachment. A dusting cloth can also be used to gently remove dust. Shades may also be gently wiped with a clean damp cloth. Allow the shade to dry completely before raising. Do **NOT** completely immerse.

Solar shade fabrics are virtually maintenance free. Only periodic vacuuming and an occasional cleaning using a mild detergent, soft brushing, and thorough rinsing is required. Allow the shade to dry completely before raising. Do **NOT** completely immerse.

Large Window Sizing

Fabrics can be turned 90° clockwise (width for height) to accommodate wider windows. In these cases some solar fabrics can be seamed for longer heights. Fabrics turned width for height (referred to as railroaded) may curl along the edge. Springs Window Fashions performs extensive testing to ensure our customers receive high quality shades. On extremely wide shades, a slight V shape may appear in the center of the shade. This occurs due to the weight of the fabric and should be considered a normal characteristic.

Seams may be added to solar fabrics to accommodate long shade requirements. Seams are placed as close to the tube as possible; seam location is determined by the manufacturer. Seams may be visible when the shade is fully extended. Seaming is not available for Cordless Lift or Smart Pull Lift shades.

Pattern Alignment

Exact alignment of the fabric pattern across side-by-side shades is not possible. Vertical alignment of the shade fabric with cassettes is not possible. Fabrics with large repeat patterns are not centered on the shade.

Fabric Certifications

GREENGUARD Indoor Air Quality Certified® Fabrics: Many Graber® fabrics have been certified by GREENGUARD Environmental Institute (GEI) to be low chemical- and particle-emitting fabrics, which provides a healthier indoor air quality. The process used for certification complies with established indoor air quality standards and is performed by a third party lab. Please see baliblinds.com for more information.

Cradle to Cradle Certified Design: Cradle to Cradle certification aims to transform all industries through ecologically intelligent design. That means the certified textiles are globally recognized to be safer and more sustainable.

Oeko-Tex® Standard 100 certifies that our fabrics are free of halogen, lead, formaldehyde, allergenic dyes, pesticides, phenols, and heavy metals, and meets all VOC content limits.

GREENGUARD Indoor Air Quality Certified is a registered trademark of the GREENGUARD Environmental Institute.

Oeko-Tex is a registered trademark of the Oeko-Tex Association.

Size Considerations

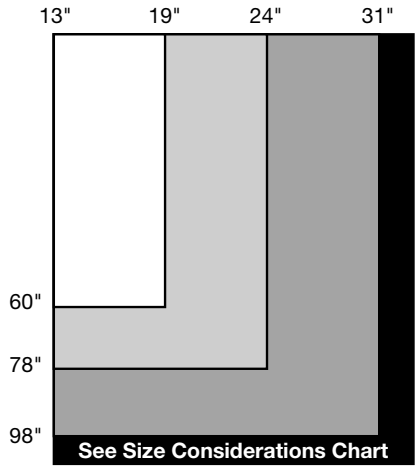
Maximum Shade Size

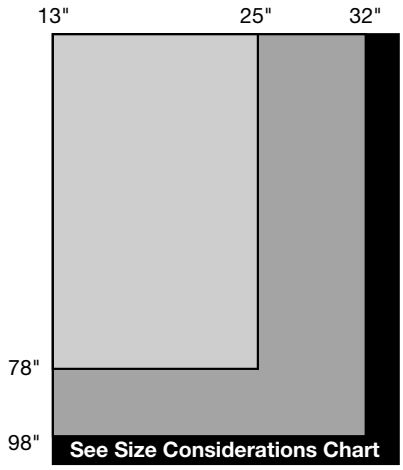
Cordless Lift Shade Maximum Size

If Shade Width Is at Least (inches)	Maximum Height of Shade (inches)
13 but less than or equal to 19	60
19⅛ but less than or equal to 24	78
24⅛ but less than or equal to 31	98
For shades greater than 31", see size considerations charts	

Smart Pull Lift Shade Maximum Size

If Shade Width Is at Least (inches)	Maximum Height of Shade (inches)
13 but less than or equal to 25	78
25⅛ but less than or equal to 32	98
For shades greater than 32", see size considerations charts	





Follow these easy steps to determine maximum shade size and valance size from the maximum shade size tables:

1. Determine your fabric style, shade size, control type, and cassette valance (or no cassette valance) requirement.
2. Find the fabric in the first column.
3. Follow the fabric row to the appropriate control type section (UltraLite Cordless Lift, UltraLite Dual Lift, Enclosed Loop UltraLite Dual Lift, Enclosed Loop Lift, Continuous-Loop Lift, Dual Shade, Motorized Lift, Cordless Lift, or Smart Pull Lift).
4. Determine if your shade size is within the normal fabric orientation size range.
5. Identify the appropriate size valance for your shade size.
6. If your shade size is larger than either the maximum width or height range, your fabric may be able to be turned width for height for larger shades. Use the fabric turned width for height tables to determine this maximum size.

EXAMPLE 1: Determine the maximum allowable shade size and cassette valance for normal orientation shades. The example shade is 72" x 100", Arboretum BO fabric, Cordless Lift, with cassette valance.

1. Go to the Cordless Lift section.
2. Find Arboretum BO in the first column.
3. The maximum width and maximum height available for this configuration is 78" x 120".
   NOTE: Both width and height must be less than the maximum width and height segment to fit the normal shade orientation.
4. Follow this segment to the top of the table. This segment is within the medium cassette valance size, indicating that the smallest segment cassette valance size available for this shade is a medium size cassette valance.

EXAMPLE 2: Determine the maximum allowable shade size and cassette valance for a continuous-loop shade. The example shade is 79" x 80", Exposition fabric, Enclosed Loop Lift with a large cassette valance. First, determine if the shade size is available with the requested fabric and control type.

1. Go to the continuous-loop section.
2. Find Exposition in the first column.
3. The maximum width and maximum height available for this configuration is 96" x 144". The 79" x 80" size does not exceed the Enclosed Loop Lift segment.
4. The 79" x 80" size does not exceed either the medium or large cassette segments. The smallest cassette valance size available for this shade is the medium cassette valance.

Dual Shades

The maximum size for Dual Shades is found using the Dual Shade column. Because two shades must fit into a single cassette valance, the Dual Shade requires the large cassette valance. Small and medium cassette valances are not available for Dual Shades.

Recommendation: For a consistent look in a single room, we recommend the same size cassette valance be used for every shade. Use the largest shade to determine the smallest available cassette valance size for that room. For example, if the largest shade in the room requires a medium cassette valance, then it is recommended all shades in the room use a medium cassette valance. The cassette valance size can be specified during ordering.

BQ #210 Attachment

GRABER | DELIGHT IN EVERY DETAIL



Graber Z-Wave
English/US Price Guide

January 2024

BQ #210 Attachment

MOTORIZATION FEATURING BLUETOOTH AND Z-WAVE TECHNOLOGIES

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GRABER®

MAY 2023

(4/23) 23-426800

Motorization Features

Motorized Shades

Refer to individual product information guide for specific option for the product being ordered. See price charts for pricing.

Radio Frequency (RF)

Graber motorized shades feature advanced Bluetooth and Z-Wave radio technology that provides reliable, effortless operation of window coverings. Graber motorized shades are quiet, simple to install and adjust, and simple to operate. These automated shades also feature:

Bluetooth Radio Frequency Features

Bluetooth technology allows you to control your shades directly from your phone without a hub or gateway. Any iOS or Android device is compatible.

- Control your shades directly from your phone or tablet without a gateway
- Operate your shades within Bluetooth range
- Create and schedule routines to automate your window coverings
- A safer alternative to accessible cords; ideal for homes with children and pets
- Provides easy operation for hard to reach or large windows

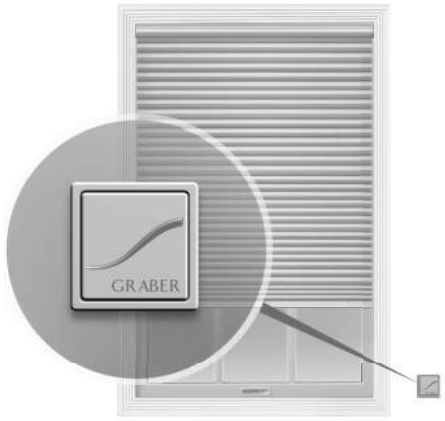
Z-Wave Radio Frequency Features

- Operates your shades virtually anywhere within 65 feet
- Supported by an alliance of countless smart home products and home automation providers making integration simple and inexpensive.
- Easily integrate with voice control devices
- A safer alternative to accessible cords; Ideal for homes with children and pets.
- Provides easy operation for hard to reach or large windows.

Motorization Size Considerations

CrystalPleat® Cellular Shades Motorized Lift

Order Entry: 12V Z-Wave and Bluetooth Motor



Refer to individual product information guide for specific option for the product being ordered.
See page 2 for benefits of using Bluetooth & Z-wave motorization.

Product Specifications

- Motor located on right side within headrail
- Available as corner and bay window application
- Available with Wood Cornice and Valance
- Available with reversible fabric at time of order
- Available with lightblocking strip
- Available with Fabric Wrapped headrail.
- Rail colors can be specifided at time of order
- Available with room-darkening channels
- Not available with top down continuous-loop, sun up/sun down, combination shades, SkyTrack™ Skylight, specialty shapes or multiple shades on one headrail
- Not available with hold down brackets or side mount brackets

Control and Power Options

- Multiple control and power options available; see Z-Wave options for availability

NOTE: Motorization components and accessories have a five-year limited warranty, excluding batteries.

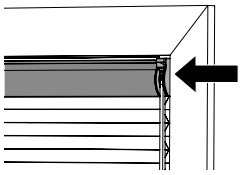
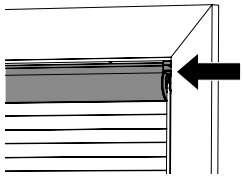
Size Considerations	**Minimum Width‡** (inches)	**Maximum Width** (inches)	**Minimum Height** (inches)	**Maximum Height** (inches)
Cellular Shades	20	144*	9	144 *
Bottom up/Top Down	28 5/8	120	9	86

*This is the shade size maximum limit for this motor type, shades size limit may be smaller based on specific fabric type.

Cell Size	**Collection Name**	**Maximum Shade Size** (square inches)	**Bottom up/Top Down Maximum Shade Size** (square inches)
½" Double Cell	Sanctuary	10,000	6,000
½" Double Cell	Splendor	12,500	8,200
¾" Single Cell	Champagne Toast, Couture LF and BO, Enchantment BO, Infuse LF and BO, Kinsley LF and BO, Montage BO, Prestige BO, Sanctuary, Scroll FR, Valletta BO	12,500	8,200
¾" Single Cell	Enchantment LF, Montage LF, Prestigue LF, Splendor LF	17,000	9,600
¾" Single Cell	Discovery, Endeavor, Simply Sheer, Valletta LF	20,800	10,600
9/16" Single Cell	Discovery	12,500	N/A
9/16" Single Cell	Endeavor	17,000	N/A
1 ¼" Single Cell	Splendor	14,000	9,200
1 ¼" Single Cell	Champagne Toast, Sanctuary, Valletta LF and BO	12,500	8,200

NOTE: For all inside mount applications, ⅜" deduction is taken by manufacturer on overall width.

Depth Requirements

Cell Size	**Headrail Dimensions** (inches)	 Partially recessed headrail in window casing/ molding. **Minimum Depth Mount** (inches)	 Fully recessed headrail in window casing/ molding. **Flush with Casing** (inches)
¾" single cell ½" double cell	1 9/16 x 2⅜	⅝	2⅝
9/16" single cell	1 9/16 x 2⅛	⅝	2⅜
1¼" single cell	1⅝ x 3 3/16	1⅜	3⅜

Size Considerations

Pleated Shades Motorized Lift

Order Entry: 12V Z-Wave and Bluetooth Motor



Refer to individual product information guide for specific option for the product being ordered.
See page 2 for benefits of using Bluetooth & Z-wave motorization.

Product Specifications

- Motor located on right side within headrail
- Available as corner and bay window application
- Available with Wood Cornice and Valance
- Available with Dayliner or Midnight liner
- Available with lightblocking strip
- Rail colors can be specified at time of order
- Not available with bottom up/top down, sun up/sun down, combination shades, SkyTrack™ Skylight, specialty shapes or multiple shades on one headrail
- Not available with hold down brackets, side mount brackets or room-darkening side channels

Control and Power Options

- Multiple control and power options available; see Z-Wave options for availability

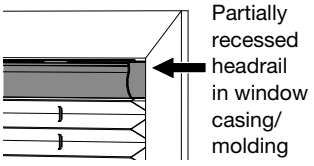
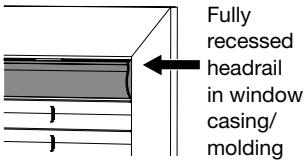
NOTE: Motorization components and accessories have a five-year limited warranty, excluding batteries.

Size Considerations	Minimum Width‡ (inches)	Maximum Width (inches)	Minimum Height (inches)	Maximum Height (inches)
1" FashionPleat®	20	144*†	9	96
1" EvenPleat®	20	120*†	6	96
2" EvenPleat	20	144*†	12	144*

*This is the shade size maximum limit for this motor type, shades size limit may be smaller based on specific fabric type.
†Based on fabric width with overlaps.
‡For all inside mount applications, ⅜" deduction is taken by manufacturer on overall width.

Pleat Size	Collection Name	Maximum Shade Size (square inches)
1" Pleated	Aberdeen, Canyon Ridge, Cloud Metal, Debonair, Desert, Grasscloth, Marina, Prescott, Sahara Ridge, Serendipity, Spring Bloom, Terrain	9,000
1" Pleated	Allure, Inkblot, Sheer Linen	11,500
1" Pleated	Blackout and Privacy Liner Only	13,000
2" Pleated	Aberdeen, Cloud Metal, Debonair, Desert, Sahara Ridge, Serendipity, Spring Bloom, Terrain	7,500
2" Pleated	Sheer Linen	11,500
2" Pleated	Blackout and Privacy Liner Only	13,000

Depth Requirements

Shade Type	Headrail Dimensions (inches)	 Minimum Depth Mount (inches)	 Flush with Casing (inches)
1" Pleat	1 9/16 x 2⅛	⅝	2⅜
2" Pleat	1 9/16 x 2⅜	⅝	2⅝

Size Considerations

Fresco® Roman Shades Motorized Lift

Order Entry: 12V Z-Wave and Bluetooth Motor



Refer to individual product information guide for specific option for the product being ordered.
See page 2 for benefits of using Bluetooth & Z-wave motorization.

Product Specifications

- Motor located on right side within headrail
- Available with both flat and looped styles
- Available as corner and bay window application
- Available with fabric valances and fabric valance trims
- Not available with bottom up/top down or multiple shades on one headrail
- Not available with hold down brackets or side mount brackets

Control and Power Options

- Multiple control and power options available; see Z-Wave options for availability

NOTE: Motorization components and accessories have a five-year limited warranty, excluding batteries.

Roman Size Considerations	**Minimum Width*** (inches)	**Maximum Width** (inches)	**Minimum Height** (inches)	**Maximum Height** (inches)
Roman Shades: Classic Flat or Looped	20	76†	18	96

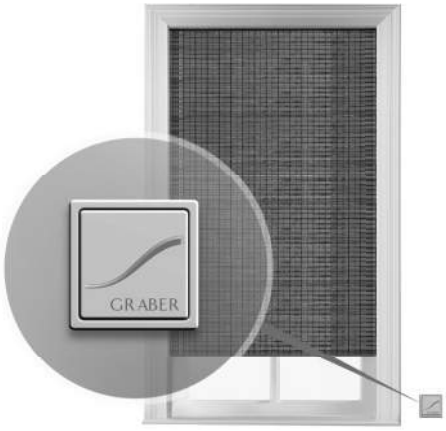
*For all inside mount applications, ⅜" deduction is taken by manufacturer on overall width.
†Based on fabric width.

Lift Option and Shade Style	**Headrail Dimensions** (inches)	 Partially recessed headrail in window casing/ molding **Minimum Depth Mount** (inches)	 Fully recessed headrail in window casing/ molding **Flush with Casing** (inches)
Motorized Lift: Flat	1½ x 2	⅝	2 ½
Motorized Lift: Looped	1½ x 2	⅝ (fabric loops will overhang approximately 3" into the room)	2½ (fabric loops will overhang approximately 3" into the room)

Size Considerations

Tradewinds® Natural Shades Motorized Lift

Order Entry: 12V Z-Wave and Bluetooth Motor



Refer to individual product information guide for specific option for the product being ordered.
See page 2 for benefits of using Bluetooth & Z-wave motorization.

Product Specifications

- Motor located on underside of hardwood headrail on right side
- Available with Standard Roman and Old Stle Roman styles
- Available with multiple shades on one headrail; each panel will have a motor and power source and there will be ½" gap between panels
- Available with 9" standard valance, 9" premiere valance, or 9" deco-trim valance
- Available with: fabric edge banding, hem options, privacy and room-darkening liners
- Available with deco-trim hems and accent gimp
- Available as corner and bay window application
- Available with Wood Cornice and Valance
- Not available with bottom up/top down, cut outs, turned headrail or specialty shapes
- Not available with hold down brackets or side mount brackets

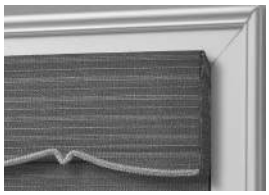
Control and Power Options

- Multiple control and power options available; see Z-Wave options for availability

NOTE: Motorization components and accessories have a five-year limited warranty, excluding batteries.

Natural Shades Size Considerations

Style	Minimum Width (inches)	Maximum Size	
		Shade (square inches)	With Liner (square inches)
Inan, Moniz, Lipo, Revelry, Serenity, Toushan II	18	2,755	2,333
Denver, Brooklyn, Stateside, Reminisce	18	4,493	3,466
Bellamy, Seasons	18	5,194	3,878
Boardwalk, Merino, Sarto	18	6,058	4,330
Bayport, Beachfront, Hadley, Kelton, Oxford, Paralian, Verity, Wild Haven	18	6,854	4,723
Berwick, Cameron, Cherish, Interlude, Olympia, Purcell, Rowen, Saterra, Selene, Ventura, Tatum, Terrestrial, Zishan	18	9,149	5,712

Headrail Dimensions (inches)	 Partially recessed valance in window casing/ molding **Minimum Depth Mount** (inches)	 Fully recessed valance in window casing/ molding **Flush with Casing** (inches)
⅝ x 2¼	¾	Standard valance 3³⁄₁₆

Size Considerations

Artisan Roman Shades Motorized Lift

Order Entry: 12V Z-Wave and Bluetooth Motor



Refer to individual product information guide for specific option for the product being ordered.
See page 2 for benefits of using Bluetooth & Z-wave motorization.

Product Specifications

- Motor located on underside of hardwood headrail on right side
- Fabric wrapped headrail for a beautifully finished look; returns are standard on outside mount shades
- Available as pleat styles: Looped, Classic Flat, Seamless, or Relaxed
- Available with Liner styles: Standard, Water Repellent, Thermal, Flannel-back
- Available finishing options: Inset banding, edge banding, decorative tape
- Not available with multiple shades on one headrail, bottom up/top down, turned headrail, balloon shade or blackout lining
- Not available with hold down brackets or side mount brackets

Control and Power Options

- Multiple control and power options available; see Z-Wave options for availability

NOTE: Motorization components and accessories have a five-year limited warranty, excluding batteries.

Artisan Roman Shades Size Considerations

Width		Length	
Minimum (inches)	**Maximum** (inches)	**Minimum** (inches)	**Maximum** (inches)
24	96	18	Classic Flat, Seamless and Relaxed – 120, Looped – 103

Motorized Maximum Shade Area in Square Inches

Fabric Name	**Standard or Water Repellent** (square inches)	**Thermal** (square inches)	**Flannel-Back** (square inches)
Candor, Cloud Metal, Enchanting, Liana, Meredith, Piazza, Stanton	4,209	3,719	3,450
Absolute, Alea, Arcadia, Artesso, Aspirational, Beach Chalet, Bianca, Bisque, Bloomscape, Brandywine, Brooke, Callahan, Countryside, Diversions, Esperance, Gratitude, Grayson, Harmonious, Heilene, Hypnotic, Iconic, Kazlo, Manning, Newleaf, Pageantry, Palatial, Rainfall, Raleigh, Sea Paisley, Seafront, Spargel, Undertones, Valor, Whimsical	3,569	33,254	3,000
Affinity, Ainslie, Avid, Bountiful, Burnham, Casita, Chalkdust, Conceptual, Confidence, Downpour, Dreamscape, Florabar, Focus, Frond Mist, Gjusta, Hama, Ibiza, Imagination, Kelsey, Kings Garden, Kingsbury, Maisonette, Meadowlark, Mikado, Mysterious, Mystical, Painterly, Pastoral, Posy, Primavera, Reflection, Refuge, Richland, Rutherford, Sustained, Symbiotic, Textile, Tyrell, Uplifting, Venetian, Wonder, Woodblock	2,921	2,859	2,550
Assurance, Athens, Birch, Bursche, Carver, Checkerloom, Circumference, Cloverleaf, Cooperative, EarthWise, EnviroLiving, Environment, Garden, Meditations, Monorail, Skipping Rocks, Soliloquy, Steward, Thistlerock, Wexler	2,489	2,423	2,130

If fabric not listed, it is not avaialble with the motorized lift option.
NOTE: Area is ordered width x ordered height in square inches.

Headrail Dimensions (inches)	 Partially recessed headrail in window casing/ molding **Minimum Depth Mount** (inches)	 Fully recessed headrail in window casing/ molding **Flush with Casing** (inches)
2¼ D x ⅝ L	¾	2⅞

Size Considerations

Mezzanine Layered Shades Motorized Lift

Order Entry: 12V Z-Wave and Bluetooth Motor



Refer to individual product information guide for specific option for the product being ordered.
See page 2 for benefits of using Bluetooth & Z-wave motorization.

Product Specifications

- Motor located on right or left side; standard is on right
- Fabric wrapped cassette standard and creates a cohesive appearance in the window
- Static-guard is necessary during dry conditions to prevent static build up
- Available as corner and bay window application
- Not available with hold down brackets or side mount brackets
- Not available with Wood Cornice or Valance

Control and Power Options

- Multiple control and power options available; see Z-Wave options for availability

NOTE: Motorization components and accessories have a five-year limited warranty, excluding batteries.

Light Gap

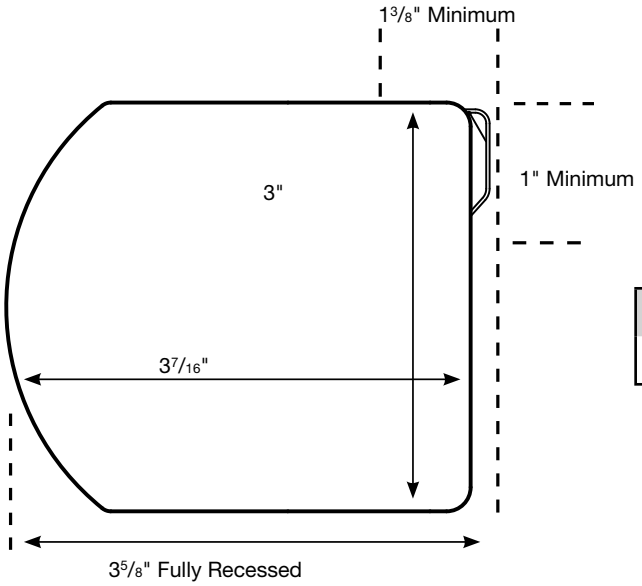
The fabric width is narrower than the finished shade width of the tube and its components. See chart below for light gap.

Motor End		Idle End	
Inside Mount (inches)	**Outside Mount** (inches)	**Inside Mount** (inches)	**Outside Mount** (inches)
11/16	1	3/4	11/16

Layered Shades Size Considerations

Style Name	Maximum Width* (inches)	Maximum Height* (inches)	Style Name	Maximum Width* (inches)	Maximum Height* (inches)
Atlantic Waves	100	75	Herard	97	77
Bernina	96	110	Linen Dream	95	72
Coastal Collection	98	75	Oceanfront	99	60
Coastal Ridge	98	60	Palmetto	97	100
Cordillera	85	75	Papyrus	98	60
Cottonwood	101	100	Refreshed	93	84
Crestones	97	84	Riptide	100	110
Culebra	95	110	Seascape	98	77
Glorieta	98	110	Seaside Resort	99	110
Glorieta Sheen	98	110	Spascape	100	77
Heathered	95	77	Vanoise	91	95

Minimum width: 16".
Minimum length: 12".
*If the height is shorter than the maximum, a slightly larger width may be available to order. Maximum width is 102".



Fabric-Wrapped Cassette

Minimum Mounting Depth	1 3/8"
Minimum Mounting Depth, Flush Mount	3 5/8"

Size Considerations

Overture Sheer Shades Motorized Lift

Order Entry: 12V Z-Wave and Bluetooth Motor



Refer to individual product information guide for specific option for the product being ordered.

See page 2 for benefits of using Bluetooth & Z-wave motorization.

Features

- Motor located on right or left side; standard is on right
- Fabric wrapped cassette standard and creates a cohesive appearance in the window
- Available as corner and bay window application
- Not available with hold down brackets or side mount brackets
- Not available with Wood Cornice or Valance

Control and Power Options

- Multiple control and power options available; see Z-Wave options for availability

NOTE: Motorization components and accessories have a five-year limited warranty, excluding batteries.

Light Gap

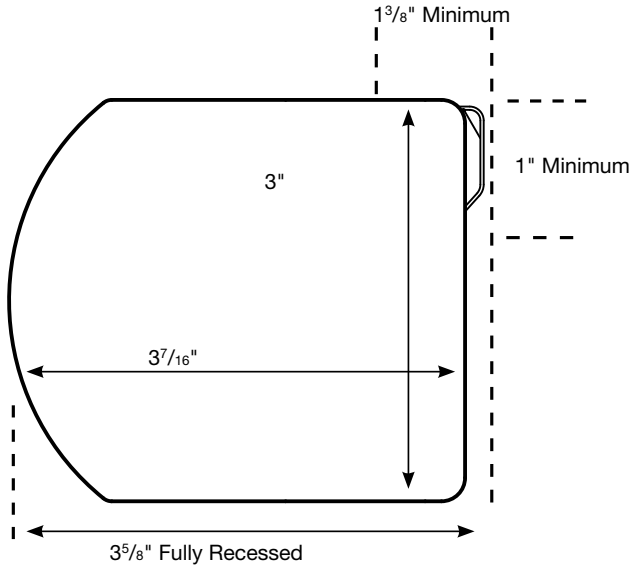
The fabric width is narrower than the finished shade width of the tube and its components. See chart below for light gap.

Motor End		Idle End	
Inside Mount (inches)	**Outside Mount** (inches)	**Inside Mount** (inches)	**Outside Mount** (inches)
1	15/16	11/16	5/8

Sheer Shades Size Considerations

Style Name	Maximum Width* (inches)	Maximum Height* (inches)	Style Name	Maximum Width* (inches)	Maximum Height* (inches)
Alpine 2"	79	110	Modern Grid 1" 5302, 5303, 5304	98	87
Coastal Waves 2"	96	105	Modern Grid 1" 5300	94	75
Deco Diamond 2"	96	105	Roslin 1"	94	75
Deco Diamond 3"	96	65	San Simeon 3"	96	65
Evening Star 2"	71	85	Starlight 2"	96	105
Glessner 2"/Glessner 3"	96	105	Starlight 3"	96	65
Glessner Sheen 2"/Glessner Sheen 3"	98	110	Sun Reflections 2"	96	105
Glessner Woven 2"/Glessner Woven 3"	96	110	Surfside 2"	96	105
Lustrous 1"	102	69	Surfside 3"	96	65
Lustrous 2"	96	105	Winchester 1"	97	87
Marisco 2"/Marisco 2 3/4"	94	99	Winchester Sheen 1"	102	69
Modern Grid 1" 5301	102	69	Winchester Woven 1"	97	87

Minimum width: 16".
Minimum length: 12" .
*If the height is shorter than the maximum, a slightly larger width may be available to order. Maximum width is 102".



Fabric-Wrapped Cassette

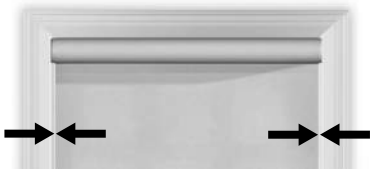
Minimum Mounting Depth	1 3/8"
Minimum Mounting Depth, Flush Mount	3 5/8"

Size Considerations

Lightweaves® Roller and Solar Shades Motorized Lift

Order Entry: 12V Z-Wave and Bluetooth Motor





Inside Mount Light Gap
Refer to Light Gap Chart

Refer to individual product information guide for specific option for the product being ordered.
See page 2 for benefits of using Bluetooth & Z-wave motorization.

Product Specifications

- Motor located on right or left side; standard is on right
- Available with standard or reverse roll; reverse roll not available with any valance option
- Available with valance styles: cassette, contour, fascia, wood valance and wood cornice
- Available as corner and bay window application
- Available with fabric rotated 90° (width for height) and seaming
- Available with as Dual Shade (integrates two fabrics that can be independently raised and lowered as needed); each shade requires a power source)
- Available with finishing options: scallops, gimp trim, bead trim
- Available with side and sill channels and pocket
- Not available with hold down brackets

Control and Power Options

- Multiple control and power options available; see Z-Wave options for availability

NOTE: Motorization components and accessories have a five-year limited warranty, excluding batteries.

Light Gap		
Valance Type	**Motor End (Inside Mount)**	**Idle End (Inside Mount)**
Contour, Fascia, Flat, No Valance	9/16	7/8
Cassette - all sizes	9/16	1
Dual - No Cassette	9/16	7/8
Dual with Cassette	9/16	1

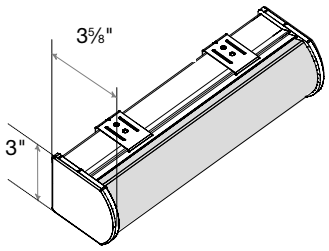
Size Considerations	
Minimum Width (inches)	**Minimum Height** (inches)
16	13

NOTE: See size charts on following pages.

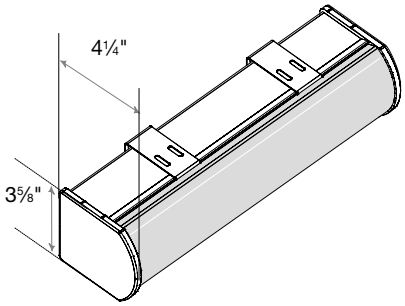
Size Considerations

Motorized Lift, and Dual Shade: Mounting Depth Illustrations

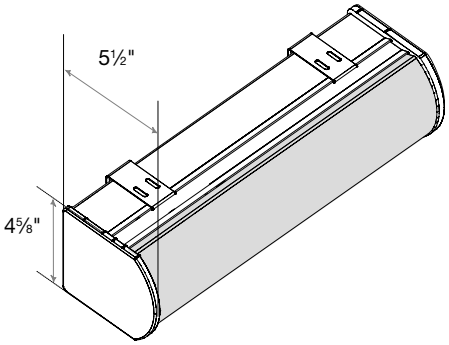
The following diagrams illustrate the mounting depth requirements for shades mounted inside window casements.



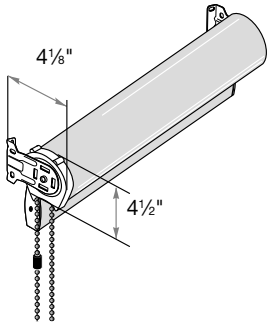
Small Cassette Valance
1⅜" Minimum Inside Mount



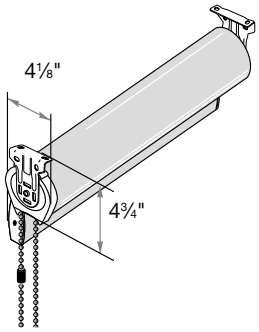
Medium Cassette Valance
1¾" Minimum Inside Mount



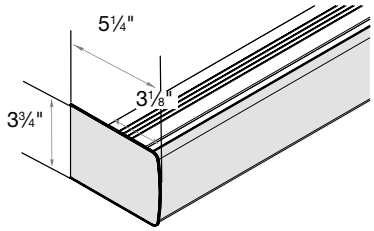
Large/Dual Cassette Valance
1¾" Minimum Inside Mount



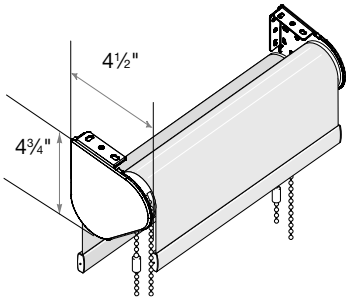
No Valance*
¾" Minimum Inside/Side Mount



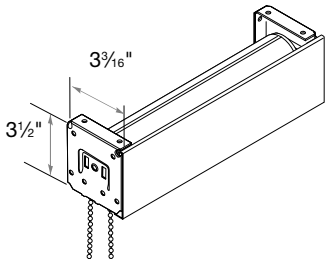
No Valance*
4⅛" Minimum Inside/Top Mount



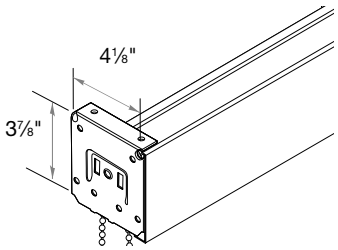
Contour Valance
2⁷⁄₁₆") Minimum Inside Mount
(return can be trimmed)



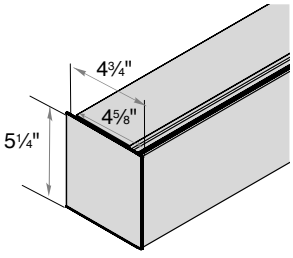
Dual Shade—No Cassette Valance
2" Minimum Inside/Top Mount
¾" Minimum Inside/Side Mount



3" Fascia
2¾" Minimum Inside/Top Mount
¾" Minimum Inside/Side Mount



4" Fascia
3¾" Minimum Inside/Top Mount
1½" Minimum Inside/Side Mount



Flat Valance
2¹⁵⁄₁₆ Minimum Inside Mount
(return can be trimmed)

12V Non-Rechargeable
Non-rechargeable Motor
Minimum Width: 16"
Minimum Height: 13"

Features and Size Considerations

Lightweaves Roller and Solar Shades: 12-Volt Motor Maximum Shade Size

Valance Type	Normal Fabric Orientation										Fabric Turned Width for Height (railroaded)									
	Small Cassette		Medium Cassette		Large Cassette/ Contour Valance/ No Cassette/ No Valance		3" Fascia		4" Fascia		Small Cassette		Medium Cassette		Large Cassette/ Contour Valance/ No Cassette/ No Valance at Maximum Width		3" Fascia		4" Fascia	
Fabric	**Width** (inches)	**Height** (inches)	**Width** (inches)	**Height** (inches)	**Width** (inches)	**Height** (inches)	**Width** (inches)	**Height** (inches)	**Width** (inches)	**Height** (inches)	**Width** (inches)	**Height** (inches)	**Width** (inches)	**Height** (inches)	**Width** (inches)	**Height** (inches)	**Width** (inches)	**Height** (inches)	**Width** (inches)	**Height** (inches)
Aberdeen BO(Ingenue Pearl; Effervescene; Pristine; Dulcet Graphite)	66	114	65	126	65	126	65	126	65	126	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Aberdeen LF(Ingenue Pearl; Effervescene; Pristine; Dulcet Graphite)	92	127	92	137	92	137	92	137	92	137	83	84	83	84	83	84	83	84	83	84
Arboretum BO(Serene; Monarch; Sirius; Distinguished)	87	97	82	131	82	131	82	131	82	131	75	84	75	84	75	84	75	84	75	84
Arboretum LF(Serene; Monarch; Sirius; Distinguished)	90	136	90	136	90	136	90	136	90	136	82	84	82	84	82	84	82	84	82	84
Bradley(Antique Silver; Hearthstone; Midas; Azurine; Majesty; Everest)	71	85	79	111	79	111	81	101	79	111	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Bravado BO(Magnolia; Elusive Ecru; Tumbled Stone; Canterbury Night)	73	93	82	125	82	125	84	111	82	125	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Bravado LF(Magnolia; Elusive Ecru; Tumbled Stone; Canterbury Night)	79	113	91	133	91	133	91	133	91	133	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Broadcast(Constellation; Sonnet; Cashmere; Alfresco; Motif; Taliesin; Austere; Continental; Simplicity; Genuine; Gourmet; Serenade)	70	79	77	100	77	100	79	95	77	100	70	79	77	100	77	100	79	95	77	100
Cambridge LF(White; Off White; Inkwell; Clay; Hawaiian Blue; Academy; Mirage; Vernal Pond; Ivory)	94	121	94	121	94	121	94	121	94	121	95	110	95	110	95	110	95	110	95	110
Cambridge RD(Hawaiian Blue; Academy; Mirage; Vernal Pond; White; Off White; Inkwell ; Clay ; Ivory; Misty)	85	114	82	139	82	139	82	139	82	139	86	108	86	108	86	108	86	108	86	108
Cloud Frost(Fading Nimbus; Shell; Creamy Mocha)	80	120	80	120	80	120	80	120	80	120	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Cloud Frost(Sea Stone)	82	102	80	120	80	120	80	120	80	120	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Complex(Couture; Chance; Oceans; Visage)	71	84	79	110	79	110	80	103	79	110	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Conservancy -LF(Edelweiss; Feather Grass; Golden Morel; Flowering Ash; Silver Maple; Black Peony; Sea Salt)	74	91	72	118	72	118	72	118	72	118	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Conservancy-BO(Edelweiss; Feather Grass; Golden Morel; Flowering Ash; Silver Maple; Black Peony; Sea Salt)	56	87	63	114	63	114	64	103	63	114	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Consummate Silk(Opalescence; Posh Platinum ; Bright Champagne; Pale Gold; Sandstone; Seafoam)	79	96	79	144	79	144	79	138	79	144	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Debonair(Weekender Twill; Tan Gaberdine; Natural White; Harberdasher Gray)	92	106	89	132	89	132	89	132	89	132	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Delphine BO(Mythical Gray; Evocative White; Island Paradise; Dark Earth)	72	101	82	123	82	123	82	120	82	123	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR

NOTES: Due to continuous manufacturing improvements, minimums and maximums are subject to change. Please call customer service for up to date size considerations.See dual shade section for motorization information.

12V Non-Rechargeable
Non-rechargeable Motor
Minimum Width: 16"
Minimum Height: 13"

Features and Size Considerations

Lightweaves Roller and Solar Shades: 12-Volt Motor Maximum Shade Size

Valance Type	Normal Fabric Orientation										Fabric Turned Width for Height (railroaded)									
	Small Cassette		Medium Cassette		Large Cassette/ Contour Valance/ No Cassette/ No Valance		3" Fascia		4" Fascia		Small Cassette		Medium Cassette		Large Cassette/ Contour Valance/ No Cassette/ No Valance at Maximum Width		3" Fascia		4" Fascia	
Fabric	**Width** (inches)	**Height** (inches)	**Width** (inches)	**Height** (inches)	**Width** (inches)	**Height** (inches)	**Width** (inches)	**Height** (inches)	**Width** (inches)	**Height** (inches)	**Width** (inches)	**Height** (inches)	**Width** (inches)	**Height** (inches)	**Width** (inches)	**Height** (inches)	**Width** (inches)	**Height** (inches)	**Width** (inches)	**Height** (inches)
Delphine LF(Mythical Gray; Evocative White; Island Paradise; Dark Earth)	94	118	94	119	94	119	94	119	94	119	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
EcoEncore(Mint Condition; Lunar Light; Cocoa Powder)	95	119	95	119	95	119	95	119	95	119	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Empirical(White Shimmer; Complex Carbon; Modern Gray; Classic Khaki)	93	123	93	123	93	123	93	123	93	123	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Emporium(Bookplate White)	88	120	88	124	88	124	88	124	88	124	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Emporium(Silver Dollar ; Vintage Letterpress ; Sheet Music; Stepping Stone)	74	115	85	133	85	133	85	133	85	133	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Emporium(Sepia Snapshot)	88	98	82	144	82	144	82	141	82	144	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Essential(Classic White; Creamy Beige; Taupe; Smokey; Black; Black on Black; Forest Green; Canyon ; Beige ; Stone; Black)	70	144	70	144	70	144	70	144	70	144	77	62	77	62	77	62	77	62	77	62
Exposition(Consummate; Genesis; Wishlist; Resonance)	75	67	82	104	80	116	71	92	80	116	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Gleam(Gold Rush; Ebony Glimmer; Silver Shine; Glistening Waterfall)	78	106	76	122	76	122	76	122	76	122	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Harmony(Pebble ; Tassel; Marina; Shiplap; Cityscape ; Harvest; Lavender)	91	132	91	133	91	133	91	133	91	133	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
LiveWell(Dew Kissed; Finely Frosted; Succulent; Sandbar; Icelandic; Seaspray)	70	89	79	109	79	109	79	109	79	109	70	87	83	86	83	86	83	86	83	86
Manifest BO(Freshwater Pearl; Flint Rock; Savvy Gray; Lifting Fog; Ciabatta; Cream Filled)	82	140	82	144	82	144	82	144	82	144	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Manifest LF(Freshwater Pearl; Flint Rock; Savvy Gray; Lifting Fog; Ciabatta; Cream Filled)	92	144	92	144	92	144	92	144	92	144	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Momentum(Soft Seashell; Parisian Cream; Luxe Leather; Etched Brown; Brushed Pewter; Toasted Spice)	71	94	80	120	80	120	81	113	80	120	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Monticello(Mist; Burro; Dune; Tikki; Rust)	73	71	79	108	79	109	84	84	79	109	73	71	83	86	83	86	84	84	83	86
Nantucket(Vintage Veil; Taupe Utopia; Rich Sable; Spice)	77	64	84	98	80	122	72	89	80	122	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Pannier(Black Dahlia; Creamy Mocha; Feather White; Riverbed Brown)	75	67	81	104	80	111	71	89	80	111	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Paving Stone BO(Bechamel; Pale Adobe; Eventide; Almond Butter)	81	112	79	126	79	126	79	126	79	126	82	105	82	105	82	105	82	105	82	105
PlanetSafe(French Pastry; Gray Perfection; Cool Cave)	94	122	94	122	94	122	94	122	94	122	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Plexus 1%(Renewal; Provisions; Chalcedony; Stately; Landmark; Travertine; Penumbra; Nutley Pier; Black Granite; Niche)	68	74	72	89	72	89	74	86	72	89	68	74	72	89	72	89	74	86	72	89

NOTES: Due to continuous manufacturing improvements, minimums and maximums are subject to change. Please call customer service for up to date size considerations.
See dual shade section for motorization information.

12V Non-Rechargeable
Non-rechargeable Motor
Minimum Width: 16"
Minimum Height: 13"

Features and Size Considerations

Lightweaves Roller and Solar Shades: 12-Volt Motor Maximum Shade Size

	Normal Fabric Orientation										Fabric Turned Width for Height (railroaded)									
Valance Type	**Small Cassette**		**Medium Cassette**		**Large Cassette/ Contour Valance/ No Cassette/ No Valance**		**3" Fascia**		**4" Fascia**		**Small Cassette**		**Medium Cassette**		**Large Cassette/ Contour Valance/ No Cassette/ No Valance at Maximum Width**		**3" Fascia**		**4" Fascia**	
Fabric	**Width** (inches)	**Height** (inches)	**Width** (inches)	**Height** (inches)	**Width** (inches)	**Height** (inches)	**Width** (inches)	**Height** (inches)	**Width** (inches)	**Height** (inches)	**Width** (inches)	**Height** (inches)	**Width** (inches)	**Height** (inches)	**Width** (inches)	**Height** (inches)	**Width** (inches)	**Height** (inches)	**Width** (inches)	**Height** (inches)
Plexus 3%(Renewal; Provisions; Chalcedony; Stately; Landmark; Travertine; Penumbra; Nutley Pier; Black Granite; Niche)	68	75	73	92	73	92	75	89	73	92	68	75	73	92	73	92	75	89	73	92
Plexus 5%(Renewal; Provisions; Chalcedony; Stately; Landmark; Travertine; Penumbra; Nutley Pier; Black Granite; Niche)	68	82	73	96	73	96	73	96	73	96	68	82	73	96	73	96	73	96	73	96
Quintessence(White Enchantment; Flecked Gray; Gilded Linen; Gray Alloy; Black Facet)	65	96	74	125	74	125	75	114	74	125	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Regent(First Frost; Smoky Taupe; Fossil; Lulling Storm; Magnetic)	95	118	95	125	95	125	95	125	95	125	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Sahara Ridge(Vapor ; Alabaster; Birch Grove)	81	84	89	129	89	130	77	115	89	130	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Sakura(White Lattice; Zen Gray; Craftsman)	67	58	73	89	71	103	63	80	71	103	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Sanguine(Blue Pueblo; White Serenity; Misty Morning; Gray Estate; Montauk Slate)	73	63	78	96	76	100	68	87	76	100	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Santorini(Desert Sands; Unexpected Umber; Evocative Ivory)	76	144	76	144	76	144	76	144	76	144	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Shadow(White; Beige; Tan; Light Gray; Dark Gray)	84	97	80	123	80	123	80	123	80	123	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Sheffield(Chelsea; Henley; Windsor; Tuscon; Eclipse; Weathered; Meadow; Manor)	78	126	91	136	91	136	91	136	91	136	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Solana BO(Drift ; Blue Breeze; Dandelion Wish; Brown Tint; Black Whirlwind; Sweet Dreams)	64	87	72	114	72	114	73	103	72	114	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Spring Bloom(Kissed Olive; Cultivated Kalamata; Tropical Garden; Sunmeadow; Botanical Garden; Cherry Blossom)	92	140	92	140	92	140	92	140	92	140	84	84	84	84	84	84	84	84	84	84
Standard Weave 1%(Calcite; Polished)	83	89	79	116	79	116	79	116	79	116	83	89	80	111	80	111	80	111	80	111
Standard Weave 1%(Veranda; Café Doppio; Chiseled)	82	94	79	112	79	112	79	112	79	112	82	94	79	112	79	112	79	112	79	112
Standard Weave 10%(Calcite; Polished)	84	106	82	124	82	124	82	124	82	124	84	106	84	106	84	106	84	106	84	106
Standard Weave 10%(Veranda; Café Doppio; Chiseled)	84	101	81	121	81	121	81	121	81	121	84	101	83	106	83	106	83	106	83	106
Standard Weave 3%(Calcite; Polished)	83	96	80	120	80	120	80	120	80	120	83	96	81	113	81	113	81	113	81	113
Standard Weave 3%(Veranda; Café Doppio; Chiseled)	82	96	79	116	79	116	79	116	79	116	82	96	79	114	79	114	79	114	79	114
Standard Weave 5%(Calcite; Polished)	84	96	81	121	81	121	81	121	81	121	84	96	82	114	82	114	82	114	82	114
Standard Weave 5%(Veranda; Café Doppio; Chiseled)	82	101	80	120	80	120	80	120	80	120	82	101	81	113	81	113	81	113	81	113
Steel House(Cavern Floor; Cloud ; Buff; Chocolate Souffle)	72	99	82	121	82	121	82	118	82	121	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Tableaux(White Tranquility; Stately Gray ; Gray Opulence; Craftsman Brown; Provincial Plum; Ivory Cameo)	74	55	80	85	72	96	69	77	72	96	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR

NOTES: Due to continuous manufacturing improvements, minimums and maximums are subject to change. Please call customer service for up to date size considerations.
See dual shade section for motorization information.

12V Non-Rechargeable
Non-rechargeable Motor
Minimum Width: 16"
Minimum Height: 13"

Features and Size Considerations

Lightweaves Roller and Solar Shades: 12-Volt Motor Maximum Shade Size

Valance Type	Normal Fabric Orientation										Fabric Turned Width for Height (railroaded)									
	Small Cassette		Medium Cassette		Large Cassette/ Contour Valance/ No Cassette/ No Valance		3" Fascia		4" Fascia		Small Cassette		Medium Cassette		Large Cassette/ Contour Valance/ No Cassette/ No Valance at Maximum Width		3" Fascia		4" Fascia	
Fabric	**Width** (inches)	**Height** (inches)	**Width** (inches)	**Height** (inches)	**Width** (inches)	**Height** (inches)	**Width** (inches)	**Height** (inches)	**Width** (inches)	**Height** (inches)	**Width** (inches)	**Height** (inches)	**Width** (inches)	**Height** (inches)	**Width** (inches)	**Height** (inches)	**Width** (inches)	**Height** (inches)	**Width** (inches)	**Height** (inches)
Terrain(Gray Frost; Pale Adobe ; Pale Rhino)	78	112	89	135	89	135	89	135	89	135	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Thesis(Weathered Stone; Bluebook White; Summer Khakis; Oxford Blue; Macho Macchiato; Dusky Titanium)	70	93	70	142	70	144	70	126	70	144	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Tuvalu(Wisteria White; Silver Tree; Dusky Botanical)	94	121	94	121	94	121	94	121	94	121	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Vanguard 1%(Authentic; Gentle Beige; Chrome; Pendulum)	83	89	79	116	79	116	79	116	79	116	83	89	80	111	80	111	80	111	80	111
Vanguard 1%(Elusive; Macedonia; Dew; Homage; Peloton)	82	94	79	112	79	112	79	112	79	112	82	94	79	112	79	112	79	112	79	112
Vanguard 3%(Authentic; Gentle Beige; Chrome; Pendulum)	83	96	80	120	80	120	80	120	80	120	83	96	81	113	81	113	81	113	81	113
Vanguard 3%(Elusive; Macedonia; Dew; Homage; Peloton)	82	96	79	116	79	116	79	116	79	116	82	96	79	114	79	114	79	114	79	114
Vanguard 5%(Authentic; Gentle Beige; Chrome; Pendulum)	84	96	81	121	81	121	81	121	81	121	84	96	82	114	82	114	82	114	82	114
Vanguard 5%(Elusive; Macedonia; Dew; Homage; Peloton)	82	101	80	120	80	120	80	120	80	120	82	101	81	113	81	113	81	113	81	113
Wayfarer(Sultry White; Maldives Gray)	92	144	92	144	92	144	92	144	92	144	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Whitcomb(Paloverde; Invitation; Juniper)	90	118	89	132	89	132	89	132	89	132	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Whitehall(Veranda; Wolverine; Nectar; Westminster; Seattle Mist)	87	106	82	144	82	144	82	144	82	144	87	106	87	108	87	108	87	108	87	108

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Features and Size Considerations

This table provides the maximum shade size available by fabric, control type, and valance style.
Fabric turned width for height (railroaded) may curl along its edge. This is not a defect in the product.

Only the large cassette valance is available for the dual shade.
Small and medium cassette valances are not available.

Lightweaves Roller and Solar Shades: Dual Shades Maximum Shade Size

Valance Type	Normal Fabric Orientation				Fabric Turned Width For Height (railroaded)							
	12V Motor No Cassette/ No Valance		12V Motor Large Cassette		12V Motor No Cassette/No Valance at Max Length		12V Motor No Cassette/ No Valance at Max Width		12V Motor Large Cassette at Max Length		12V Motor Large Cassette at Max Width	
Fabric	**W** (in)	**H** (in)	**W** (in)	**H** (in)	**W** (in)	**H** (in)	**W** (in)	**H** (in)	**W** (in)	**H** (in)	**W** (in)	**H** (in)
Aberdeen BO (Ingenue Pearl; Effervescene; Pristine; Dulcet Graphite)	67	108	68	97	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Aberdeen LF (Ingenue Pearl; Effervescene; Pristine; Dulcet Graphite)	92	123	92	109	83	84	98	82	83	84	98	82
Arboretum BO (Serene; Monarch; Sirius; Distinguished)	72	108	73	101	75	84	89	82	75	84	89	82
Arboretum LF (Serene; Monarch; Sirius; Distinguished)	90	136	91	121	82	84	96	82	82	84	96	82
Bradley (Antique Silver; Hearthstone; Midas; Azurine; Majesty; Everest)	71	83	72	75	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Bravado BO (Magnolia; Elusive Ecru; Tumbled Stone; Canterbury Night)	74	90	75	82	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Bravado LF (Magnolia; Elusive Ecru; Tumbled Stone; Canterbury Night)	79	110	81	98	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Broadcast (Constellation; Sonnet; Cashmere; Alfresco; Motif; Taliesin; Austere; Continental; Simplicity; Genuine; Gourmet; Serenade)	70	77	71	70	70	77	87	62	71	70	88	55
Cambridge LF (White; Off White; Inkwell; Clay; Hawaiian Blue; Academy; Mirage; Vernal Pond; Ivory)	94	121	94	121	95	110	95	110	95	110	95	110
Cambridge RD (Hawaiian Blue; Academy; Mirage; Vernal Pond; White; Off White; Inkwell ; Clay ; Ivory; Misty)	86	109	87	97	86	108	86	108	87	97	87	97
Cloud Frost (Fading Nimbus; Shell; Creamy Mocha)	80	120	80	119	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Cloud Frost (Sea Stone)	82	99	83	88	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Complex (Couture; Chance; Oceans; Visage)	71	84	72	76	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR

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Features and Size Considerations

This table provides the maximum shade size available by fabric, control type, and valance style.
Fabric turned width for height (railroaded) may curl along its edge. This is not a defect in the product.
Only the large cassette valance is available for the dual shade.
Small and medium cassette valances are not available.

Lightweaves Roller and Solar Shades: Dual Shades Maximum Shade Size

Valance Type	Normal Fabric Orientation				Fabric Turned Width For Height (railroaded)							
	12V Motor No Cassette/ No Valance		12V Motor Large Cassette		12V Motor No Cassette/No Valance at Max Length		12V Motor No Cassette/ No Valance at Max Width		12V Motor Large Cassette at Max Length		12V Motor Large Cassette at Max Width	
Fabric	**W** (in)	**H** (in)	**W** (in)	**H** (in)	**W** (in)	**H** (in)	**W** (in)	**H** (in)	**W** (in)	**H** (in)	**W** (in)	**H** (in)
Conservancy -LF (Edelweiss; Feather Grass; Golden Morel; Flowering Ash; Silver Maple; Black Peony; Sea Salt)	74	88	63	97	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Conservancy-BO (Edelweiss; Feather Grass; Golden Morel; Flowering Ash; Silver Maple; Black Peony; Sea Salt)	56	84	58	74	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Consummate Silk (Opalescence; Posh Platinum ; Bright Champagne; Pale Gold; Sandstone; Seafoam)	71	112	72	102	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Debonair (Weekender Twill; Tan Gaberdine; Natural White; Harberdasher Gray)	76	125	77	113	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Delphine BO (Mythical Gray; Evocative White; Island Paradise; Dark Earth)	72	98	74	88	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Delphine LF (Mythical Gray; Evocative White; Island Paradise; Dark Earth)	95	110	79	126	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
EcoEncore (Mint Condition; Lunar Light; Cocoa Powder)	95	119	95	119	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Empirical (White Shimmer; Complex Carbon; Modern Gray; Classic Khaki)	93	123	93	123	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Emporium (Bookplate White)	89	115	75	119	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Emporium (Silver Dollar ; Vintage Letterpress; Sheet Music; Stepping Stone)	74	115	75	105	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Emporium (Sepia Snapshot)	73	111	74	104	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Essential (Classic White; Creamy Beige; Taupe; Smokey; Black; Black on Black; Forest Green; Canyon; Beige; Stone; Black)	70	144	70	144	77	62	91	60	77	62	91	60
Exposition (Consummate; Genesis; Wishlist; Resonance)	76	65	77	59	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR

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Features and Size Considerations

This table provides the maximum shade size available by fabric, control type, and valance style.
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Small and medium cassette valances are not available.

Lightweaves Roller and Solar Shades: Dual Shades Maximum Shade Size

Valance Type	Normal Fabric Orientation				Fabric Turned Width For Height (railroaded)							
	12V Motor No Cassette/ No Valance		12V Motor Large Cassette		12V Motor No Cassette/No Valance at Max Length		12V Motor No Cassette/ No Valance at Max Width		12V Motor Large Cassette at Max Length		12V Motor Large Cassette at Max Width	
Fabric	**W** (in)	**H** (in)	**W** (in)	**H** (in)	**W** (in)	**H** (in)	**W** (in)	**H** (in)	**W** (in)	**H** (in)	**W** (in)	**H** (in)
Gleam (Gold Rush; Ebony Glimmer; Silver Shine; Glistening Waterfall)	78	102	80	90	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Harmony (Pebble ; Tassel; Marina; Shiplap; Cityscape ; Harvest; Lavender)	92	124	93	112	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
LiveWell (Dew Kissed; Finely Frosted; Succulent; Sandbar; Icelandic; Seaspray)	70	89	71	82	70	87	86	73	71	82	88	65
Manifest BO (Freshwater Pearl; Flint Rock; Savvy Gray; Lifting Fog; Ciabatta; Cream Filled)	84	131	85	119	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Manifest LF (Freshwater Pearl; Flint Rock; Savvy Gray; Lifting Fog; Ciabatta; Cream Filled)	92	144	92	144	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Momentum (Soft Seashell; Parisian Cream; Luxe Leather; Etched Brown; Brushed Pewter; Toasted Spice)	71	92	72	83	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Monticello (Mist; Burro; Dune; Tikki; Rust)	74	68	75	62	74	68	91	54	75	62	92	48
Nantucket (Vintage Veil; Taupe Utopia; Rich Sable; Spice)	77	62	78	56	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Pannier (Black Dahlia; Creamy Mocha; Feather White; Riverbed Brown)	75	65	76	59	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Paving Stone BO(Bechamel; Pale Adobe; Eventide; Almond Butter)	82	106	83	95	82	105	82	105	83	95	83	95
PlanetSafe (French Pastry; Gray Perfection; Cool Cave)	94	122	94	122	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Plexus 1% (Renewal; Provisions; Chalcedony; Stately; Landmark; Travertine; Penumbra; Nutley Pier; Black Granite; Niche)	68	72	70	65	68	72	85	57	70	65	87	50

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Features and Size Considerations

This table provides the maximum shade size available by fabric, control type, and valance style.
Fabric turned width for height (railroaded) may curl along its edge. This is not a defect in the product.
Only the large cassette valance is available for the dual shade.
Small and medium cassette valances are not available.

Lightweaves Roller and Solar Shades: Dual Shades Maximum Shade Size

Valance Type	Normal Fabric Orientation				Fabric Turned Width For Height (railroaded)							
	12V Motor No Cassette/ No Valance		12V Motor Large Cassette		12V Motor No Cassette/No Valance at Max Length		12V Motor No Cassette/ No Valance at Max Width		12V Motor Large Cassette at Max Length		12V Motor Large Cassette at Max Width	
Fabric	**W** (in)	**H** (in)	**W** (in)	**H** (in)	**W** (in)	**H** (in)	**W** (in)	**H** (in)	**W** (in)	**H** (in)	**W** (in)	**H** (in)
Plexus 3% (Renewal; Provisions; Chalcedony; Stately; Landmark; Travertine; Penumbra; Nutley Pier; Black Granite; Niche)	69	73	70	66	69	73	85	58	70	66	87	51
Plexus 5% (Renewal; Provisions; Chalcedony; Stately; Landmark; Travertine; Penumbra; Nutley Pier; Black Granite; Niche)	68	80	69	72	68	80	84	64	69	72	86	56
Quintessence (White Enchantment; Flecked Gray; Gilded Linen; Gray Alloy; Black Facet)	66	93	67	84	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Regent (First Frost; Smoky Taupe; Fossil; Lulling Storm; Magnetic)	96	114	81	124	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Sahara Ridge (Vapor; Alabaster; Birch Grove)	81	82	82	74	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Sakura (White Lattice; Zen Gray; Craftsman)	67	56	69	50	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Sanguine (Blue Pueblo; White Serenity; Misty Morning; Gray Estate; Montauk Slate)	74	61	75	54	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Santorini (Desert Sands; Unexpected Umber; Evocative Ivory)	76	144	76	132	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Shadow (White; Beige; Tan; Light Gray; Dark Gray)	84	93	71	97	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Sheffield (Chelsea; Henley; Windsor; Tuscon; Eclipse; Weathered; Meadow; Manor)	78	122	80	109	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Solana BO(Drift ; Blue Breeze; Dandelion Wish; Brown Tint; Black Whirlwind; Sweet Dreams)	64	84	66	76	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Spring Bloom (Kissed Olive; Cultivated Kalamata; Tropical Garden; Sunmeadow; Botanical Garden; Cherry Blossom)	92	140	92	127	84	84	98	82	84	84	98	82

NOTES: Due to continuous manufacturing improvements, minimums and maximums are subject to change. Please call customer service for up to date size considerations.
Seams may be added to fabrics to accommodate long shade requirements. Seams will be placed as close to the tube as possible; seam location is not selectable. Seams are visible when the shade is fully extended. Not available with RU28 rechargeable motor or RU30 Simple RTS motor.

Features and Size Considerations

This table provides the maximum shade size available by fabric, control type, and valance style.
Fabric turned width for height (railroaded) may curl along its edge. This is not a defect in the product.

Only the large cassette valance is available for the dual shade.
Small and medium cassette valances are not available.

Lightweaves Roller and Solar Shades: Dual Shades Maximum Shade Size

Valance Type	Normal Fabric Orientation				Fabric Turned Width For Height (railroaded)							
	12V Motor No Cassette/ No Valance		12V Motor Large Cassette		12V Motor No Cassette/No Valance at Max Length		12V Motor No Cassette/ No Valance at Max Width		12V Motor Large Cassette at Max Length		12V Motor Large Cassette at Max Width	
Fabric	**W** (in)	**H** (in)	**W** (in)	**H** (in)	**W** (in)	**H** (in)	**W** (in)	**H** (in)	**W** (in)	**H** (in)	**W** (in)	**H** (in)
Standard Weave 1% (Calcite; Polished)	84	86	71	87	84	86	84	86	71	87	86	76
Standard Weave 1% (Veranda; Café Doppio; Chiseled)	82	91	68	101	82	91	82	91	68	101	84	80
Standard Weave 10% (Calcite; Polished)	85	102	71	110	85	102	85	102	71	108	87	90
Standard Weave 10% (Veranda; Café Doppio; Chiseled)	84	98	71	101	84	98	84	98	71	101	86	86
Standard Weave 3% (Calcite; Polished)	84	92	70	101	84	92	84	92	70	101	86	82
Standard Weave 3% (Veranda; Café Doppio; Chiseled)	83	92	71	87	83	92	83	92	71	87	85	82
Standard Weave 5% (Calcite; Polished)	85	92	71	101	85	92	85	92	71	101	87	82
Standard Weave 5% (Veranda; Café Doppio; Chiseled)	83	97	85	86	83	97	83	97	85	86	85	86
Steel House (Cavern Floor; Cloud ; Buff; Chocolate Souffle)	72	96	74	87	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Tableaux (White Tranquility; Stately Gray; Gray Opulence; Craftsman Brown; Provincial Plum; Ivory Cameo)	74	53	76	47	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Terrain (Gray Frost; Pale Adobe ; Pale Rhino)	78	110	79	99	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Thesis (Weathered Stone; Bluebook White; Summer Khakis; Oxford Blue; Macho Macchiato; Dusky Titanium)	70	90	70	82	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Tuvalu (Wisteria White; Silver Tree; Dusky Botanical)	94	121	95	107	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Vanguard 1%(Authentic; Gentle Beige; Chrome; Pendulum)	84	86	71	87	84	86	84	86	71	87	86	76
Vanguard 1%(Elusive; Macedonia; Dew; Homage; Peloton)	82	91	68	101	82	91	82	91	68	101	84	80

NOTES: Due to continuous manufacturing improvements, minimums and maximums are subject to change. Please call customer service for up to date size considerations.
Seams may be added to fabrics to accommodate long shade requirements. Seams will be placed as close to the tube as possible; seam location is not selectable. Seams are visible when the shade is fully extended. Not available with RU28 rechargeable motor or RU30 Simple RTS motor.

Features and Size Considerations

This table provides the maximum shade size available by fabric, control type, and valance style.
Fabric turned width for height (railroaded) may curl along its edge. This is not a defect in the product.
Only the large cassette valance is available for the dual shade.
Small and medium cassette valances are not available.

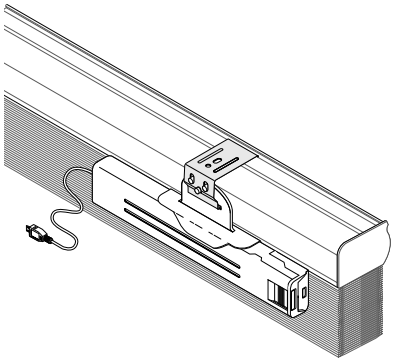
Lightweaves Roller and Solar Shades: Dual Shades Maximum Shade Size

Valance Type	Normal Fabric Orientation				Fabric Turned Width For Height (railroaded)							
	12V Motor No Cassette/ No Valance		12V Motor Large Cassette		12V Motor No Cassette/No Valance at Max Length		12V Motor No Cassette/ No Valance at Max Width		12V Motor Large Cassette at Max Length		12V Motor Large Cassette at Max Width	
Fabric	**W** (in)	**H** (in)	**W** (in)	**H** (in)	**W** (in)	**H** (in)	**W** (in)	**H** (in)	**W** (in)	**H** (in)	**W** (in)	**H** (in)
Vanguard 3% (Authentic; Gentle Beige; Chrome; Pendulum)	84	92	70	101	84	92	84	92	70	101	86	82
Vanguard 3% (Elusive; Macedonia; Dew; Homage; Peloton)	83	92	71	87	83	92	83	92	71	87	85	82
Vanguard 5% (Authentic; Gentle Beige; Chrome; Pendulum)	85	92	71	101	85	92	85	92	71	101	87	82
Vanguard 5% (Elusive; Macedonia; Dew; Homage; Peloton)	83	97	85	86	83	97	83	97	85	86	85	86
Wayfarer (Sultry White; Maldives Gray)	92	144	92	144	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Whitcomb (Paloverde; Invitation; Juniper)	91	114	76	126	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR	NO RR
Whitehall (Veranda; Wolverine; Nectar; Westminster; Seattle Mist)	88	102	73	114	88	102	88	102	73	109	89	90

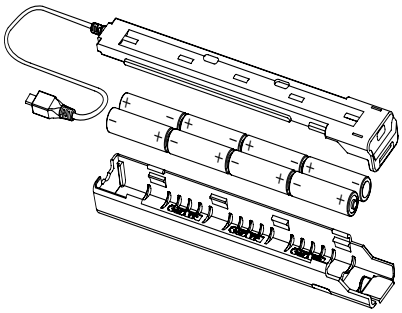
NOTES: Due to continuous manufacturing improvements, minimums and maximums are subject to change. Please call customer service for up to date size considerations.
Seams may be added to fabrics to accommodate long shade requirements. Seams will be placed as close to the tube as possible; seam location is not selectable. Seams are visible when the shade is fully extended. Not available with RU28 rechargeable motor or RU30 Simple RTS motor.

Options

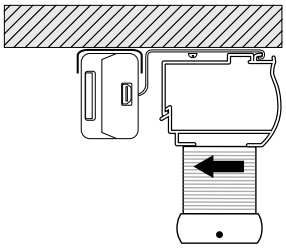
Power Considerations



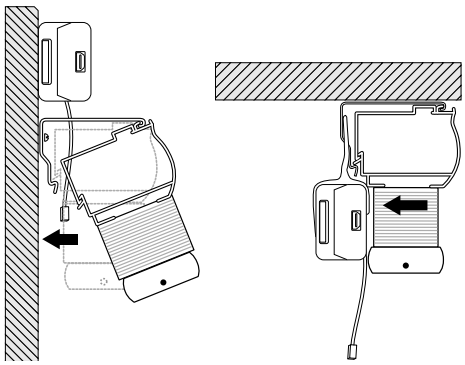
Cellular and Pleated
Battery Consideration



Battery Case (non-rechargeable solution)
Dimensions: 9 1/4" x 1 1/4" x 7/8"

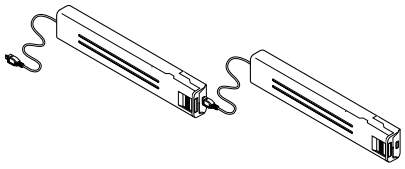


Ceiling/Inside Mount



Outside Mount

Inside Mount



Dual Battery Cases

Motors can be powered by non-rechargeable AA lithium batteries, rechargeable battery pack, plug-in transformer, or multi-motor power supply. Each shade requires a motor and appropriate power source.

Power Considerations
Larger shades consume more power while operating. When choosing the appropriate power source based upon the shade size we recommend the following power sources for the best performance.

Shade Size square inches	**Non-Rechargeable Recommended Power Source**	**Rechargeable Battery Pack Estimated Battery Life Before Recharge* Single Pack Only**
0 to 3,600	Batteries (single or dual), plug-in, or multi-motor power supply	~12 Months
3,600 to 7,200	Dual battery cases, plug-in, or multi-motor power supply	~6-12 Months
>7,200	Plug-in or multi-motor power supply only	~6 Months or Less

Battery Case Considerations
Battery power recommended for maximum of 10 shades for best battery performance.
Battery cases are installed in space outside of the product and can be a challenge to hide in some windows.

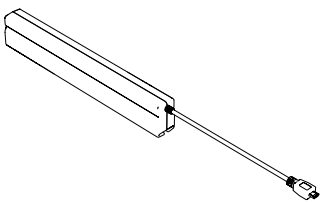
For Inside Mounts
- The cleanest and simplest method available for cellular and pleated shades is the integrated battery case hanger; this hanger attaches directly to a shade bracket to support the battery case while allowing the case to be removed for battery changes; additional recessed space will be needed

For Outside Mounts
- For outside mounts, battery cases can be installed above or to the side of the shade

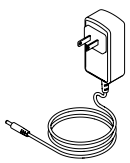
NOTE: For best performance with non-rechargeable solutions, use only AA lithium batteries.

Dual battery cases installed end-to-end: require 21" of space (including connectors)

Battery case minimum recessed space (installed with bracket): product minimum recessed space + ¾"



Rechargeable Battery Pack
Dimensions: 8 9/16" x 1 7/16" x 15/16"



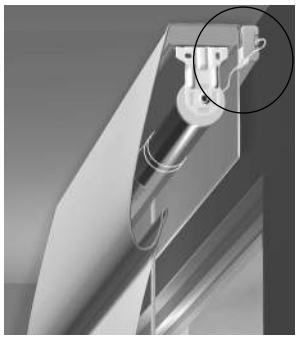
Li-Ion Charger

Options

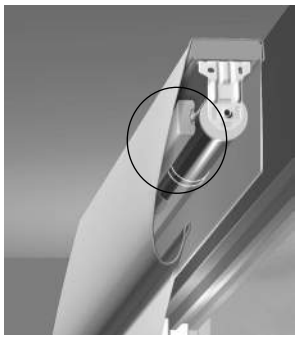
Power Considerations

Solar/Roller, Natural Shades, Artisan Roman, Layered, and Sheer Shade Battery Considerations

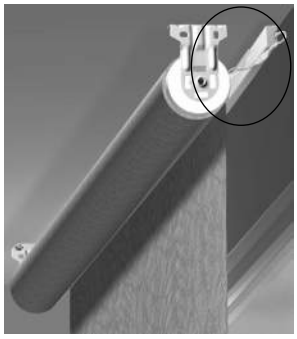




Artisan Roman/Natural Shades
Battery Pack
Mounted Behind



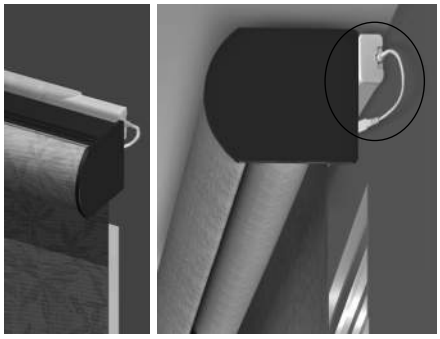
Artisan Roman/Natural Shades
Battery Pack
Mounted on Headrail



Solar Shades
Outside Mount
Battery Pack



Solar Shades
Inside Mount Battery Pack

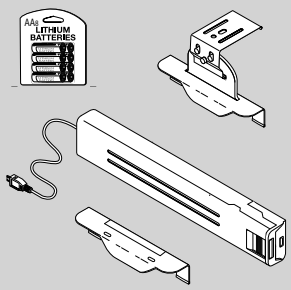


Solar, Layered, and
Sheer Shades with Cassette
Battery Pack

Motorization Power Options

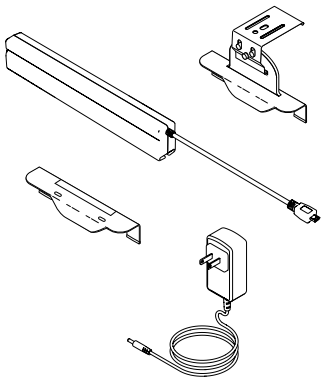
Power Components

NOTE: These power supplies are not compatible with Radio Technology Somfy motors.



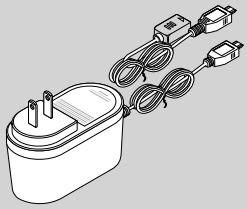
Reloadable Battery Case

- Reloadable: available with or without batteries
- Multiple mounting options provided
- Simple case design allows for easy battery replacement
- Recommend shades greater than 3,600 square inches utilize two single battery cases (dual cases) to extend battery life
- For best performance, use only AA lithium batteries (each case requires 8 AA lithium batteries)
- 48" and 96" extensions available, maximum of 2 per motor
- Battery power recommended for maximum of 10 shades for best battery performance



Rechargeable Battery Pack

- The rechargeable battery pack comes as a sealed pack with the batteries already included. Batteries are charged by plugging the charger into the pack.
- Multiple mounting options provided.
- 48" and 96" motor-to-battery extensions available, maximum of 2 per motor
- Rechargeable battery packs ship at 30% charge and must be fully charged prior to installation
- Dual pack configuration is not available or necessary for the rechargeable battery packs
- One Lithium-Ion Charger is required per order; sold separately
- Lithium-Ion charger cable is 6 feet
- Lithium-Ion charger has an LED that turns red to indicate charging and green to indicate fully charged
- Fully charging the rechargeable battery pack takes an average of 5 hours



Plug-In Transformer

- Eliminates the need for batteries
- Small plug profile
- Cord can be concealed behind curtains or along trim
- 72" power cord and 96" extension cable (power cord and extension cable cannot be cut to length)
- 48" and 96" extensions available, maximum of 2 per motor
- We recommend shades greater than 7,200 square inches utilize a transformer to eliminate changing batteries frequently
- Available in white only

Transformer Dimensions

- 3¼" wide x 2" deep (not including plug) x 1½" tall (as you look at the plug in the outlet)
- Wire management components are not included with your motorized shade system
  - Refer to 12 volt power considerations for further details



Multi-Motor Power Supply

- Used when direct wiring the motorized window coverings
- Each motor is “home run” wired back to the multi-motor power supply using 16 gauge 2 conductor wire (must be purchased locally; Graber® does not supply)
- Power supply includes connectors
- Must be mounted indoors, NEMA rated
- Dimensions: 12" wide x 6" deep x 12" high
- Input: 100-120v AC / 200-240V AC at 3.3 amps
- Output: 10 amps; each shade port - 2 amp fused

NOTE: Due to the many variations of installations, wire management components are not included with your motorized shade system. There are numerous wire management products available at your local hardware store or home improvement center to help disguise the power cord when using a plug-in transformer. An example of a popular wire management accessory is wire channel. Wire channel is a vinyl sheathing that can be placed along the window casing or wall that will house and conceal exposed wiring for a clean and professional appearance.

Z-Wave Control Options

Z-Wave Motorization Controls

NOTE: These controls are not compatible with Radio Technology Somfy motors.



Standard Remote

The standard remote is meant to control an individual shade (one to one). This helps assure simple, reliable control as well as simplifying the process of readjusting pre-set positions should it become necessary—without removing power from adjacent shades. However, the standard remote can be paired to multiple shades to provide group control (onsite programming step).

- Not available for sheer or layered shades
- Includes convenient mounting hardware
- Battery included—CR2430
- Available in white
- Not available with Bottom Up/Top Down



Plus Remote

- Used to control single shades or a group of shades simultaneously
- Set and use an intermediate position for your shades
- Includes convenient mounting hardware
- Battery included—CR2430
- Available in white
- Not available with Bottom Up/Top Down



Plus Remote Decorator Wall Plate Kit (single-channel remote sold separately)

- Provides attractive mounting option to match look of existing light switches
- Locates the remote where most convenient for the user
- Helps prevent misplacing of remote when not in use
- Mounts flush to wall with included anchors, no cutting of drywall needed
- Available in white



Premium Remote (12-channel)

- 12-channel remote, controls up to 24 shades
- Control single shades on each channel or group shade performing the same function
- Control Bottom Up/Top Down cellular shades
- Shades are added to the remote fro the manufacture. Channel assignment will need to be done at time of install.
- Convenient display provides easy programming
- Set and use an intermediate position for your shades
- Includes mounting wall plate and hardware; mounts to wall with anchors (see multi-channel remote mounting options)
- Batteries included—2 AAA
- Available in white





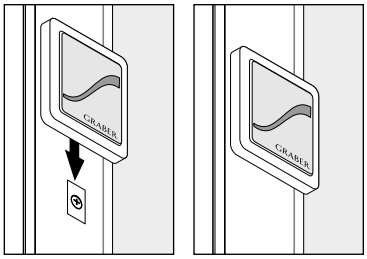
Graber Motorization Gateway

The Graber Motorization Gateway takes your motorized shades to the next level. The gateway allows you to control your shades away from your home, integrate with third party services, and schedule routines based on sunrise and sunset.

- Controls up to 10 devices (shade motors and remotes)
- Average Home Coverage: appox. 2,500 square feet depending on a variety of factors including number of walls and material of walls
- Mulitple gateways can be added to an account on the Graber Motorization App to extend coverage and number of devices
- Control single shades individually with the abiltiy to group shades in rooms for additional functionality
- Integrate directly with Amazon Alexa and Google Assistant for voice control
- Create routines routines to control multiple shades with the ability to schedule based on sunrise and sunset
- Set and use favorite positions
- Compatible with Apple and Android devices
- Gateway (shown in the image to the left) plugs directly into your wall outlet.
- Requires a 2.4Ghz, password protected, Wi-Fi network
- Multiple users can be added to an account with the option to assign different permission levels

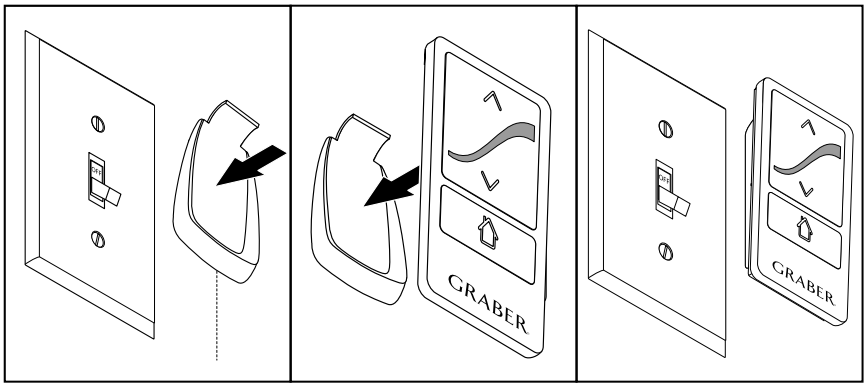
Motorization Features

Standard Remote Mounting Options

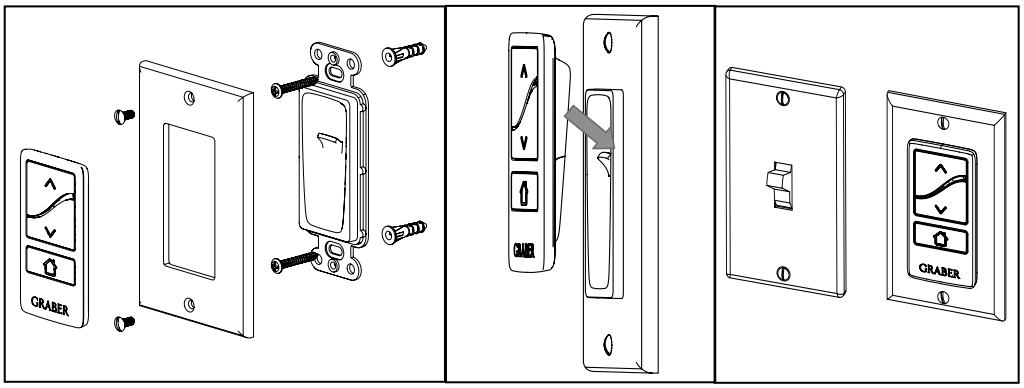


Z-Wave Standard Remote

Single-Channel Remote Mounting Options

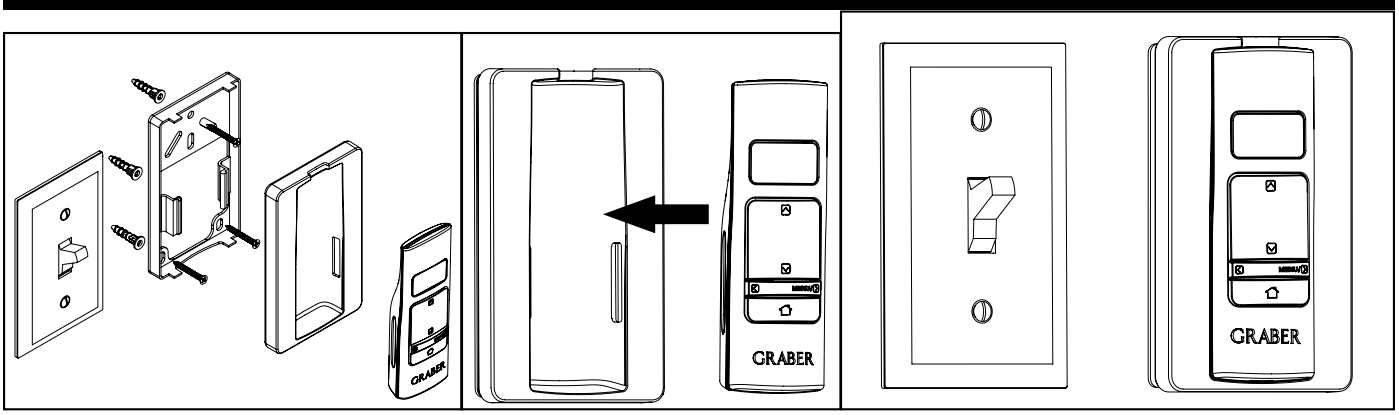


Z-Wave Plus Remote



Optional Decorator Wall Plate Mount
(see options for details)

Multi-Channel Remote Mounting Options



Z-Wave Premium Remote

GRABER

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GRABER.

Graber Motorization

Designer US Price List — Effective January 2024

Motorization

See product information guide for illustrations of power and control items listed below. Select motor package and add to price of shade.

Motor Pricing

See options section for descriptions and illustrations of items listed below.
For motorized lift dual shades, one (1) motor, and one (1) power source are required for each motorized shade (total of two motors and two power sources if both shades of the dual shade are motorized lift).

A. Motor Pricing

Add price of motor to blind or shade price.
Order Entry: 12V BLE and ZW Motor without Remote (option 14)

Motor Options	
Cellular, Pleated, and Classic Roman Shades	451
Roller, Solar, Layered, Artisan Roman and Sheer Shades	451
Natural Shades*	451
Cellular Bottom Up, Top Down	646

*Motor on a natural shade is priced per panel and can be ordered with multiple shades on one headrail.
NOTE: For all other non-motorization options, see individual price list for specific blind or shade.

B. Motorization Power Sources

Choose one (1) battery option or one (1) transformer per motor.

12-Volt Power Options	
Battery Cases	
Single Non-Rechargeable, Reloadable Battery Case (empty)	48
Single Non-Rechargeable, Reloadable Battery Case (filled) (Includes 8 AA lithium batteries)	115
Dual cases recommended for shades over 3,600 square inches (2.3 square meters) to extend battery life.	
Dual Non-Rechargeable, Reloadable Battery Case (empty)	95
Dual Non-Rechargeable, Reloadable Battery Case (filled) (Includes 16 AA lithium batteries)	230
Other Power Options	
48" (121.9 cm) Extension Cable	21
96" (243.8 cm) Extension Cable	26
12 Volt DC Plug-In Transformer (includes 96" (243.8 cm) extension)	115
Multi-Motor Power Supply Kit (Up to 10 motors per power supply)	1179
12-Volt Rechargeable Power Options	
12-Volt Rechargeable Battery Pack	187
12-Volt 6 foot (1.9 m) Li-ion Charger	21

NOTE: For woven wood shades, surcharge is per panel.

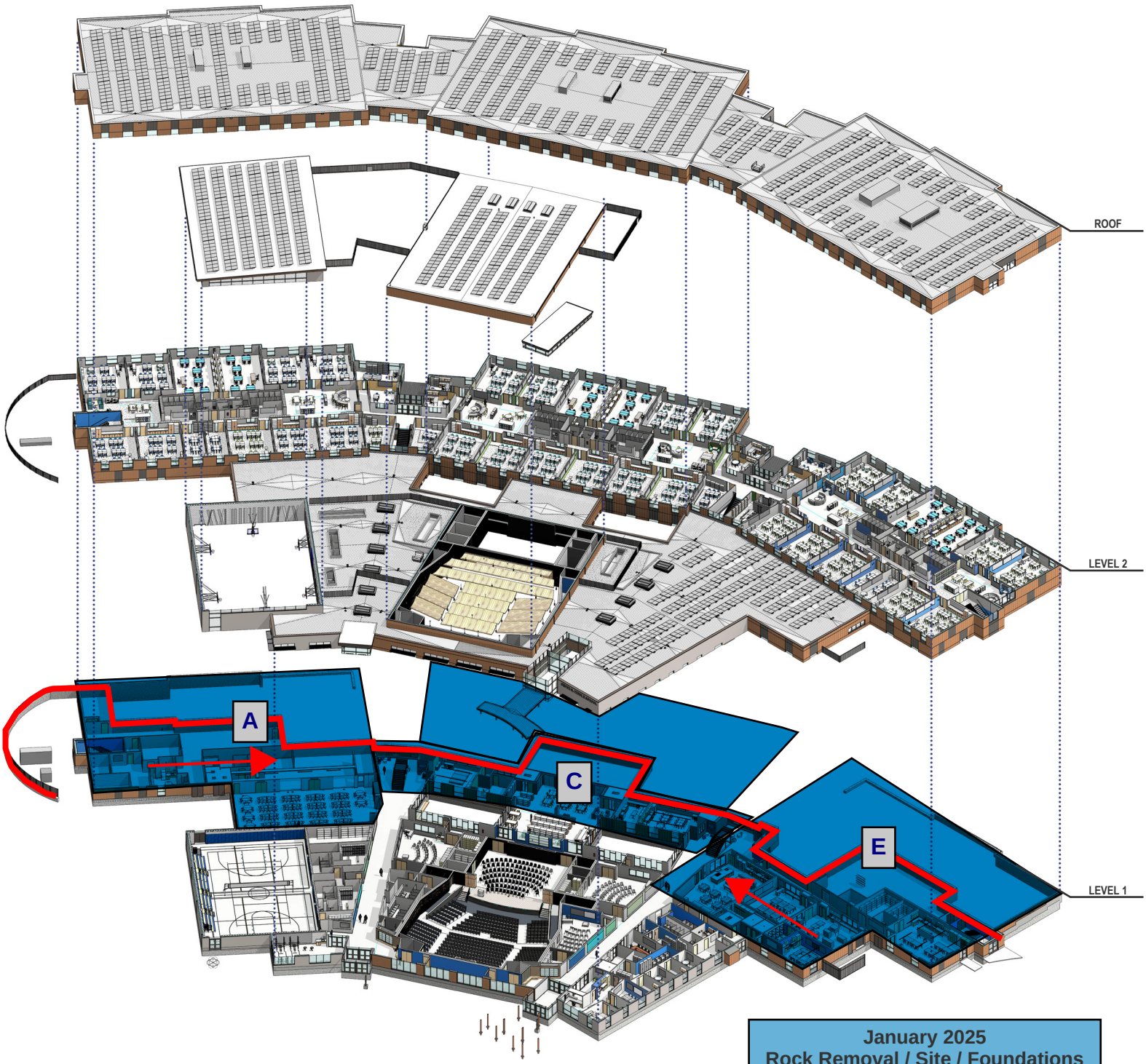
C. Z-Wave Motorization Controls

Choose one or more remotes per order. Controllers are wire-free, battery and mounting hardware is included. App & Gateway are wire-free and do not require batteries.

Radio Frequency Remote Controls	
Standard Remote	152
Plus Remote Single Channel	175
Plus Remote Decorator Wall Plate	18
Premium Remote Multi-Channel (includes wall mount and hardware)	310
Graber Motorization App and Gateway	315

Turner Construction
Greenwich Central Middle School
Crew Flow
10.25.24

Bid RFI #236
Response



January 2025
Rock Removal / Site / Foundations

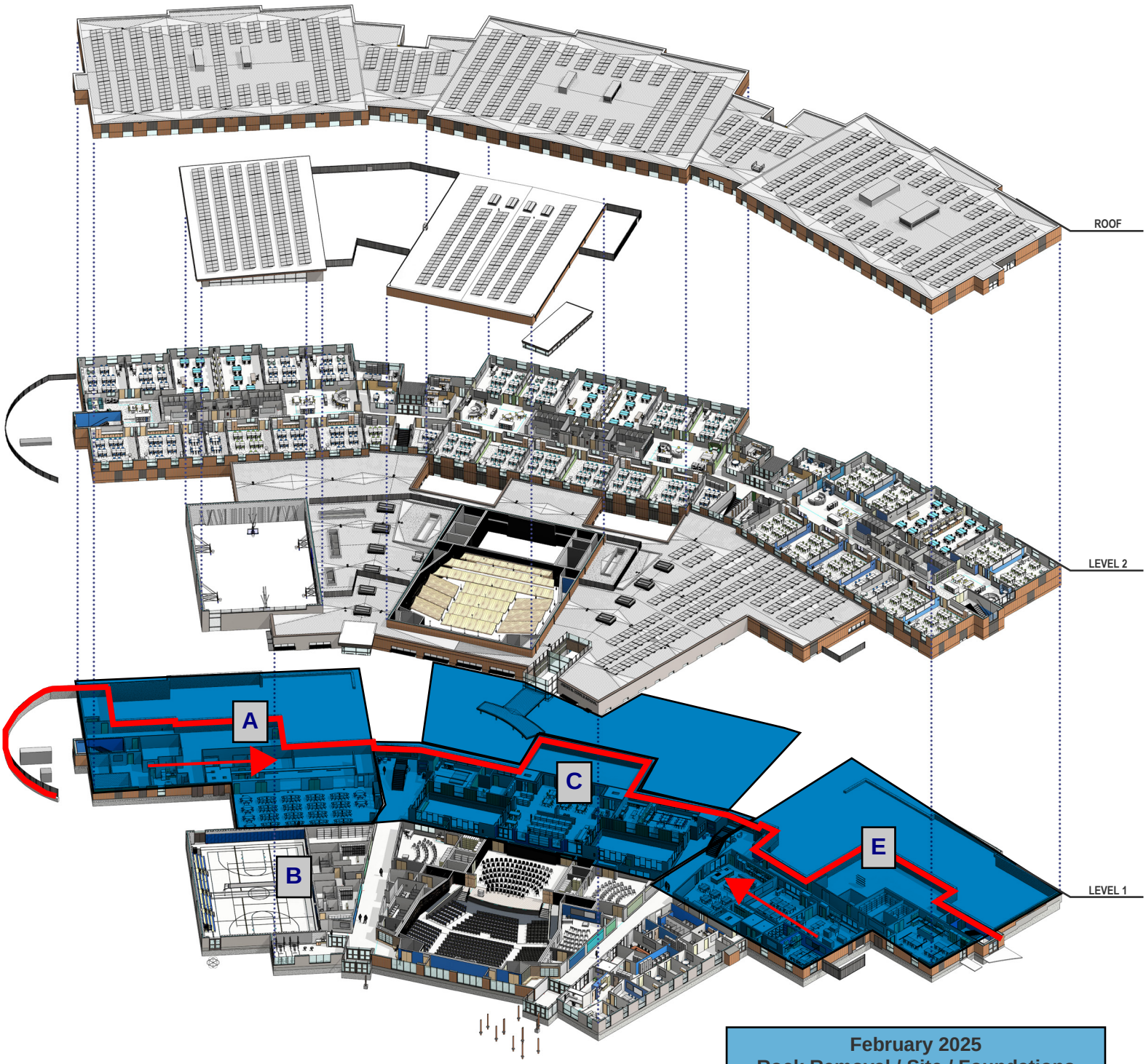
Rock Removal: A / C / E
Excavate: A / E
Retaining Wall: E

Greenwich Central Middle School
New Construction [AXON]

Turner

Turner Construction
Greenwich Central Middle School
Crew Flow
10.25.24

Bid RFI #236
Response



February 2025
Rock Removal / Site / Foundations

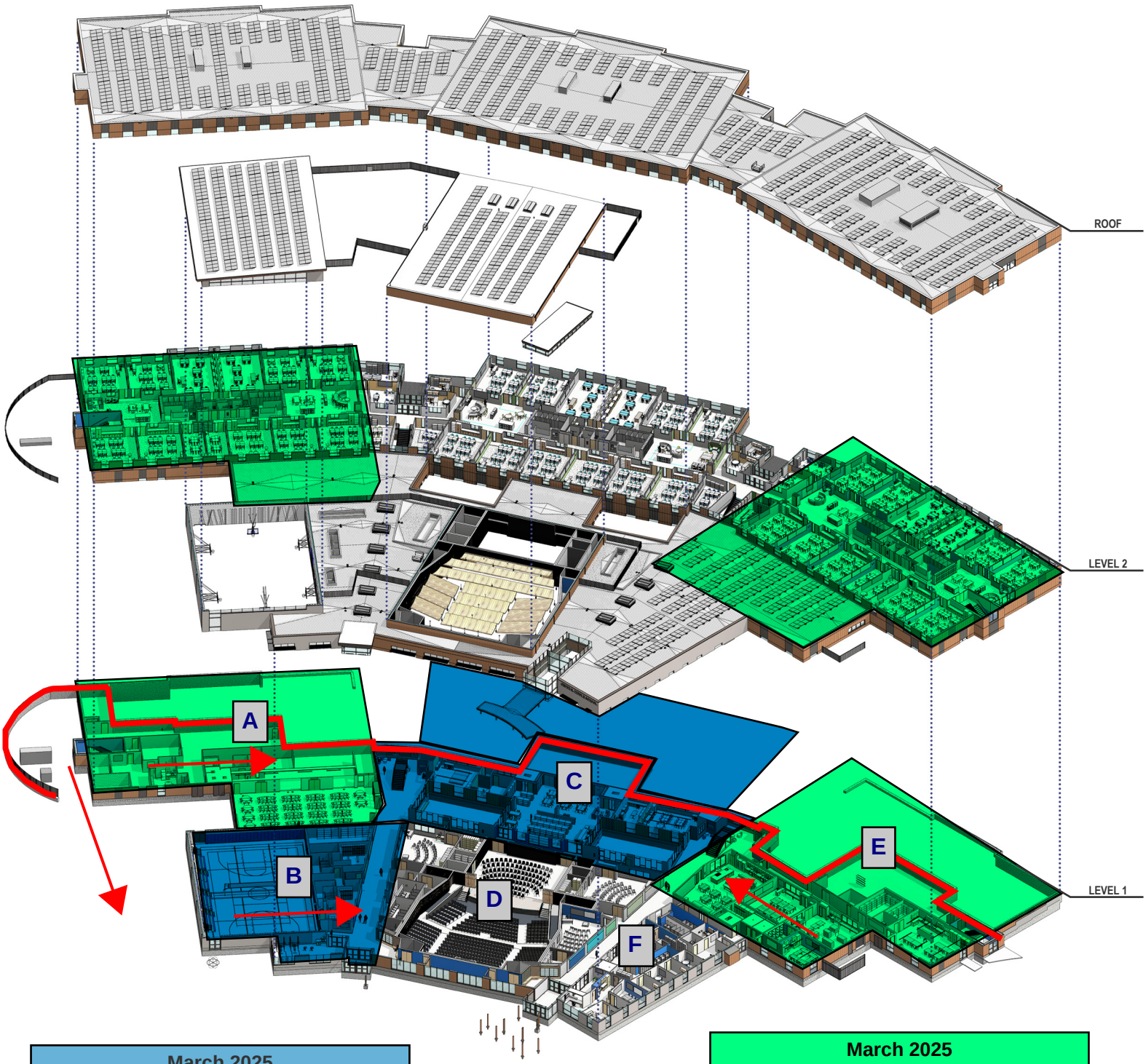
Excavate: A / E / C
Retaining Wall: A / C / E
Foundation Walls & Spread Footings: A / E

Greenwich Central Middle School
New Construction [AXON]

Turner

Turner Construction
Greenwich Central Middle School
Crew Flow
10.25.24

Bid RFI #236
Response



March 2025
Site / Foundations

Excavate: C / B
Foundation Walls & Spread Footings: C

March 2025
Foundations /Backfill / MEP Underground / SOG

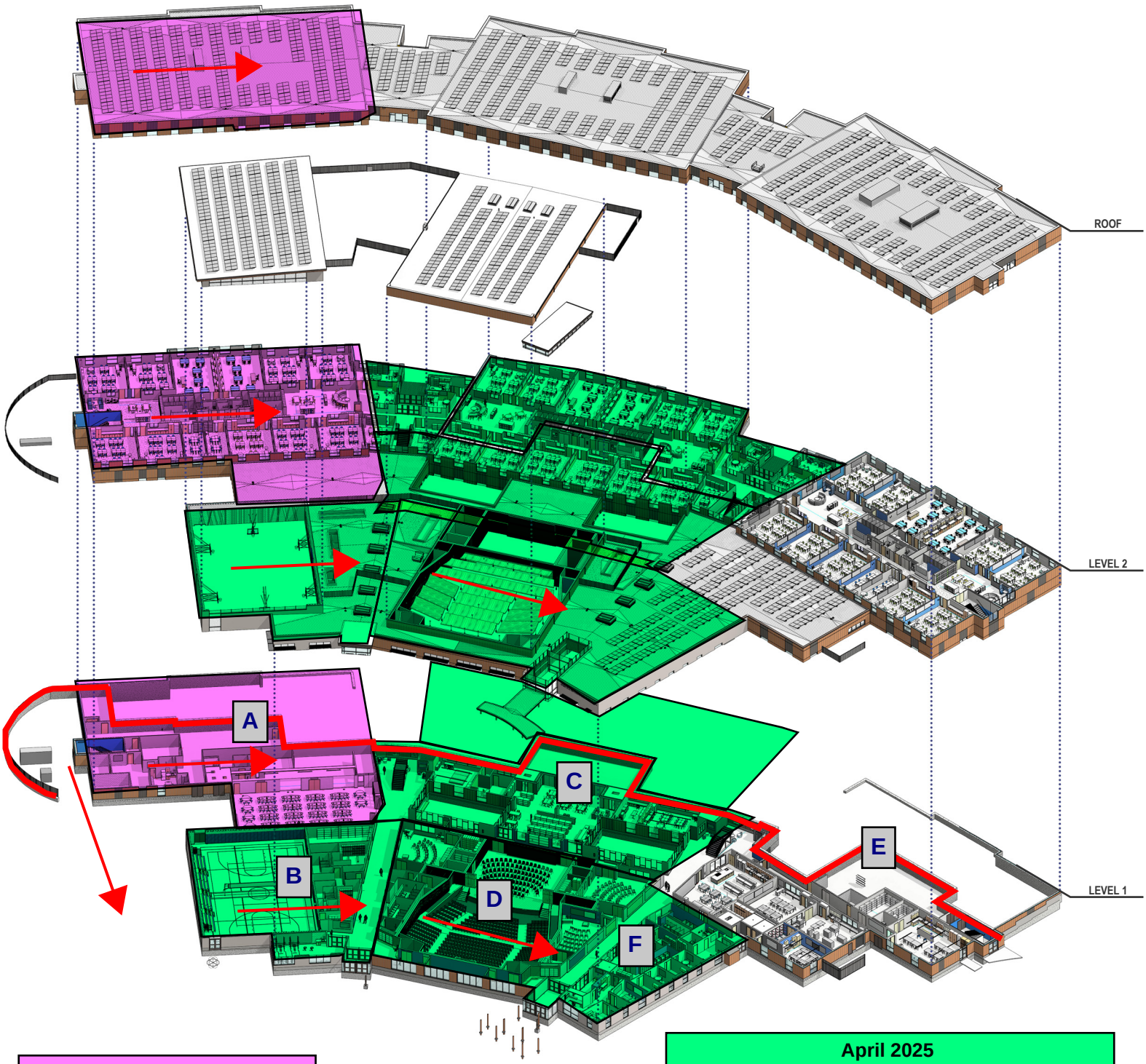
Foundation Walls & Spread Footings: A / E
Backfill: A / E
MEP Underground: A / E
SOG: A / E

Greenwich Central Middle School
New Construction [AXON]

Turner

Turner Construction
Greenwich Central Middle School
Crew Flow
10.25.24

Bid RFI #236
Response



April 2025
Steel Erection

Steel Erection: A

April 2025
Site / Foundations /MEP Underground / SOG

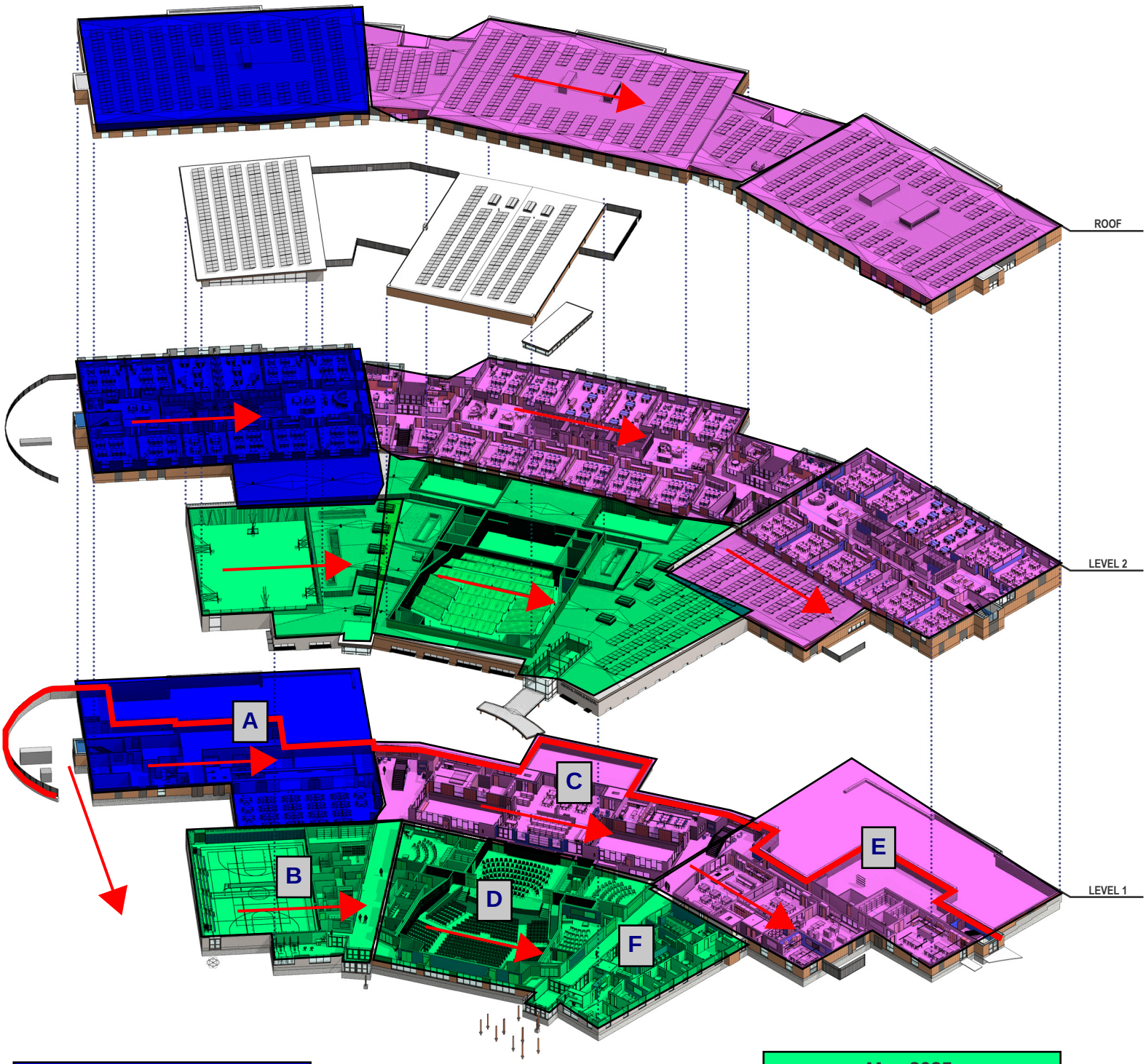
Excavate: D / F
Foundation Walls: B / D / F
Spread Footings: B / D / F
MEP Underground: B
SOG: C

Greenwich Central Middle School
New Construction [AXON]

Turner

Turner Construction
Greenwich Central Middle School
Crew Flow
10.25.24

Bid RFI #236
Response



May 2025
Steel Erection / Slab on Deck
Steel Erection: A
SOD: A

May 2025
Steel Erection
Steel Erection: C/ E

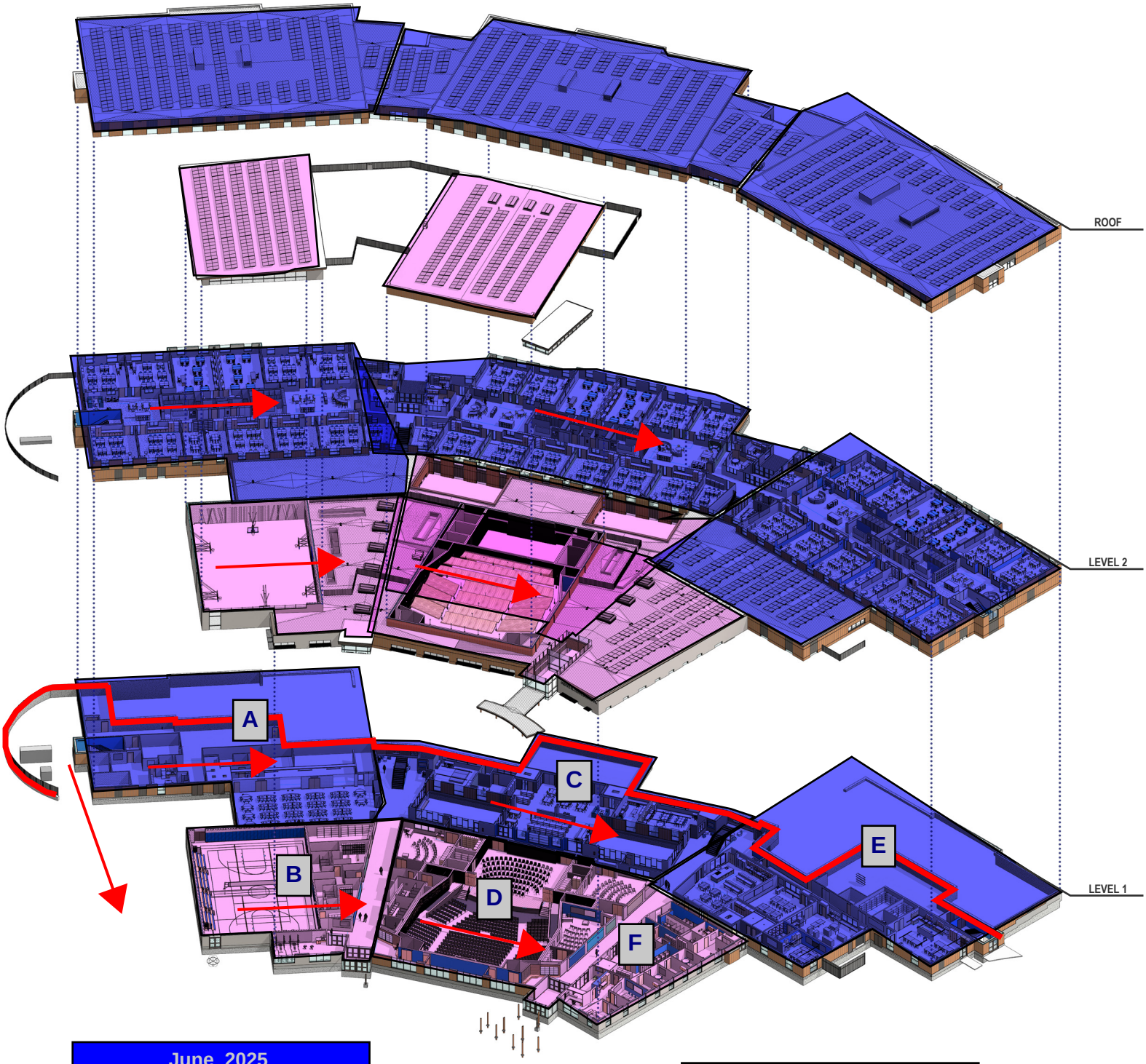
May 2025
Underground MEP / SOG
MEP Underground: B / D / F
SOG: B
Masonry Walls: B

Greenwich Central Middle School
New Construction [AXON]

Turner

Turner Construction
Greenwich Central Middle School
Crew Flow
10.25.24

Bid RFI #236
Response



June 2025
Exterior Envelope / Steel Detailing / SOD

Exterior Envelope: A
Steel Detailing: C / E
SOD: C / E

June / July 2025
SOG / Steel Erection

SOG: D / F
Steel Erection: D / F

Greenwich Central Middle School
New Construction [AXON]

Turner

BQ #267 Attachment

SUBSTITUTION REQUEST
(During the Bidding/Negotiating Phase)

CSI®

PROJECT: Greenwich Central Middle School

SUBSTITUTION REQUEST NUMBER:

FROM:

TO: Bridget Moore

DATE: 10/28/24

Turner Construction

A/E PROJECT NUMBER:

RE: Approved Elevator Manufacturer

CONTRACT FOR: Greenwich Central Middle School

SPECIFICATION TITLE: Electric Traction Elevators

DESCRIPTION: Manufacturers

SECTION: 142100

PAGE: 5

ARTICLE/PARAGRAPH: 2.1/A./1&2

MODEL NO.: 3300 MRL

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.
Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The Undersigned certifies:
- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

SUBMITTED BY:

SIGNED BY:

FIRM:

ADDRESS:

TELEPHONE:

A/E's REVIEW AND RECOMMENDATION:

☐ Approve Substitution—Make submittals in accordance with Specification Section 01 33 00 Submittal Procedures.

☒ Approve Substitution as noted—Make submittals in accordance with Specification Section 01 33 00 Submittal Procedures.

☐ Reject Substitution—Use specified materials.

☐ Substitution Request received too late—Use specified materials.

Approved as Noted - needs to meet the full specification, limited information is provided to review other than max weight and travel speed - SLAM

SIGNED BY: Stephen Martocchio - SLAM

DATE: 10/30/24

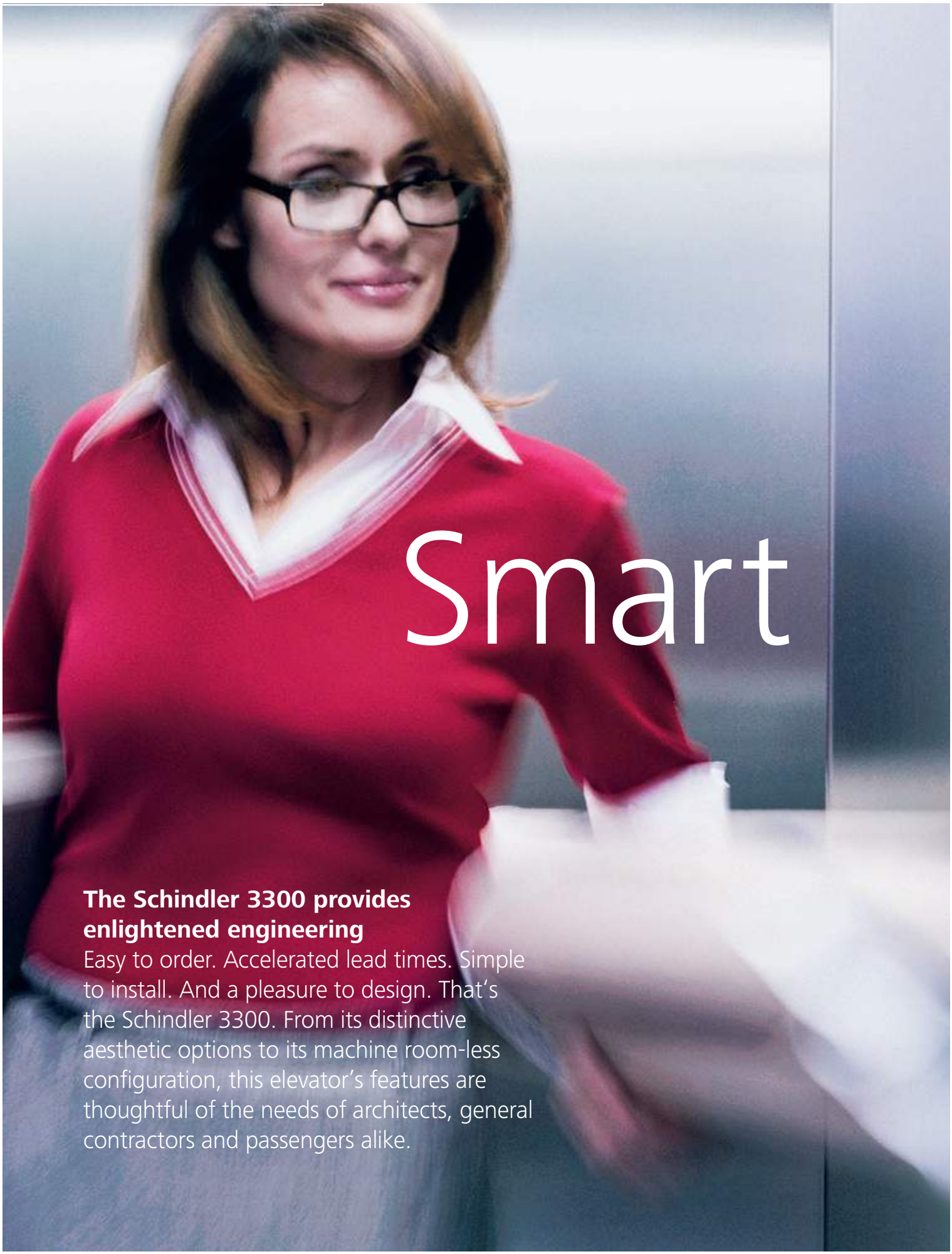
SUPPORTING DATA ATTACHED: ☐ Drawings ☒ Product Data ☐ Samples ☐ Tests ☐ Reports ☐



Schindler 3300

Distinctive design. Cost-effective solution. Green technology made easy.

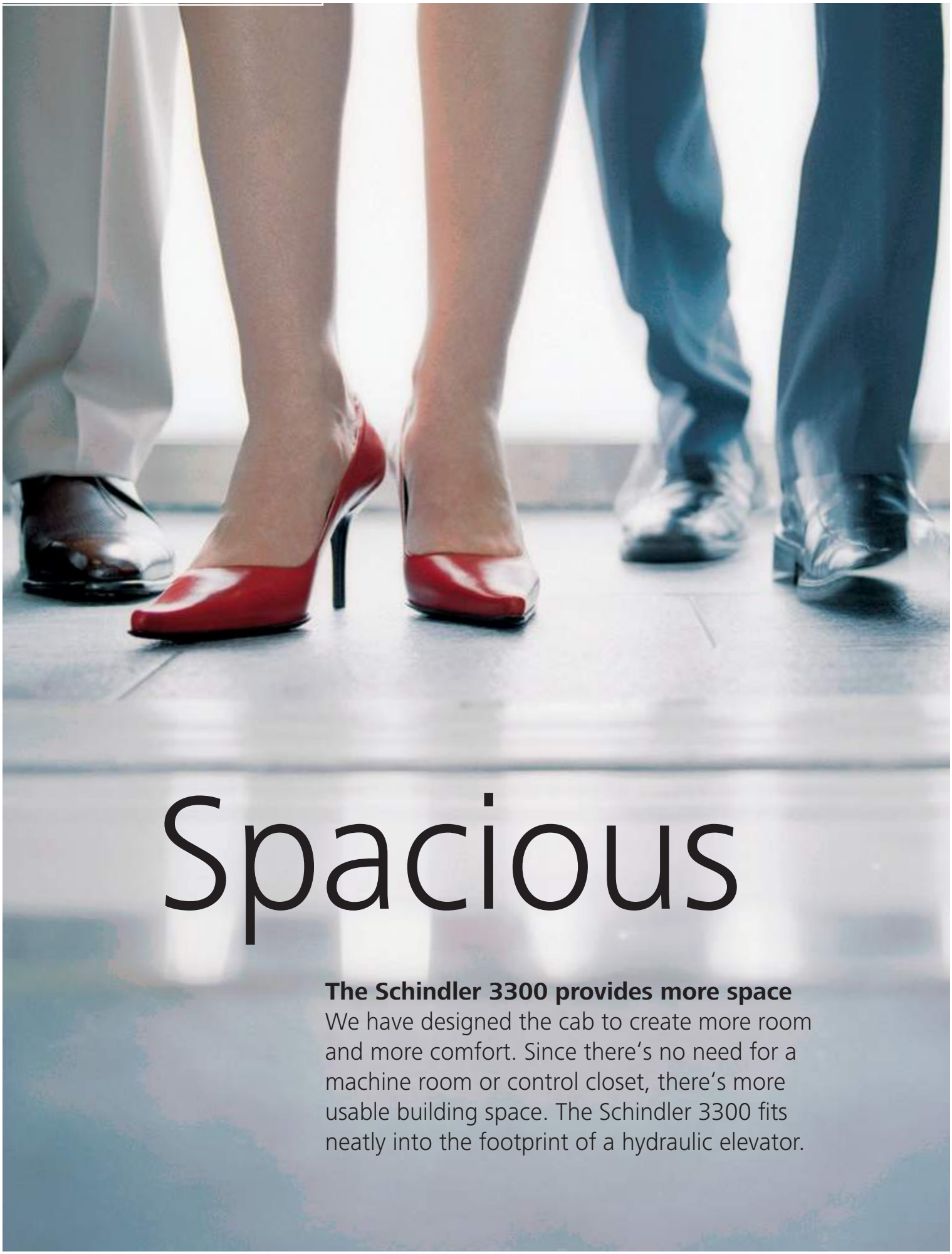
Schindler



Smart

The Schindler 3300 provides enlightened engineering

Easy to order. Accelerated lead times. Simple to install. And a pleasure to design. That's the Schindler 3300. From its distinctive aesthetic options to its machine room-less configuration, this elevator's features are thoughtful of the needs of architects, general contractors and passengers alike.



Spacious

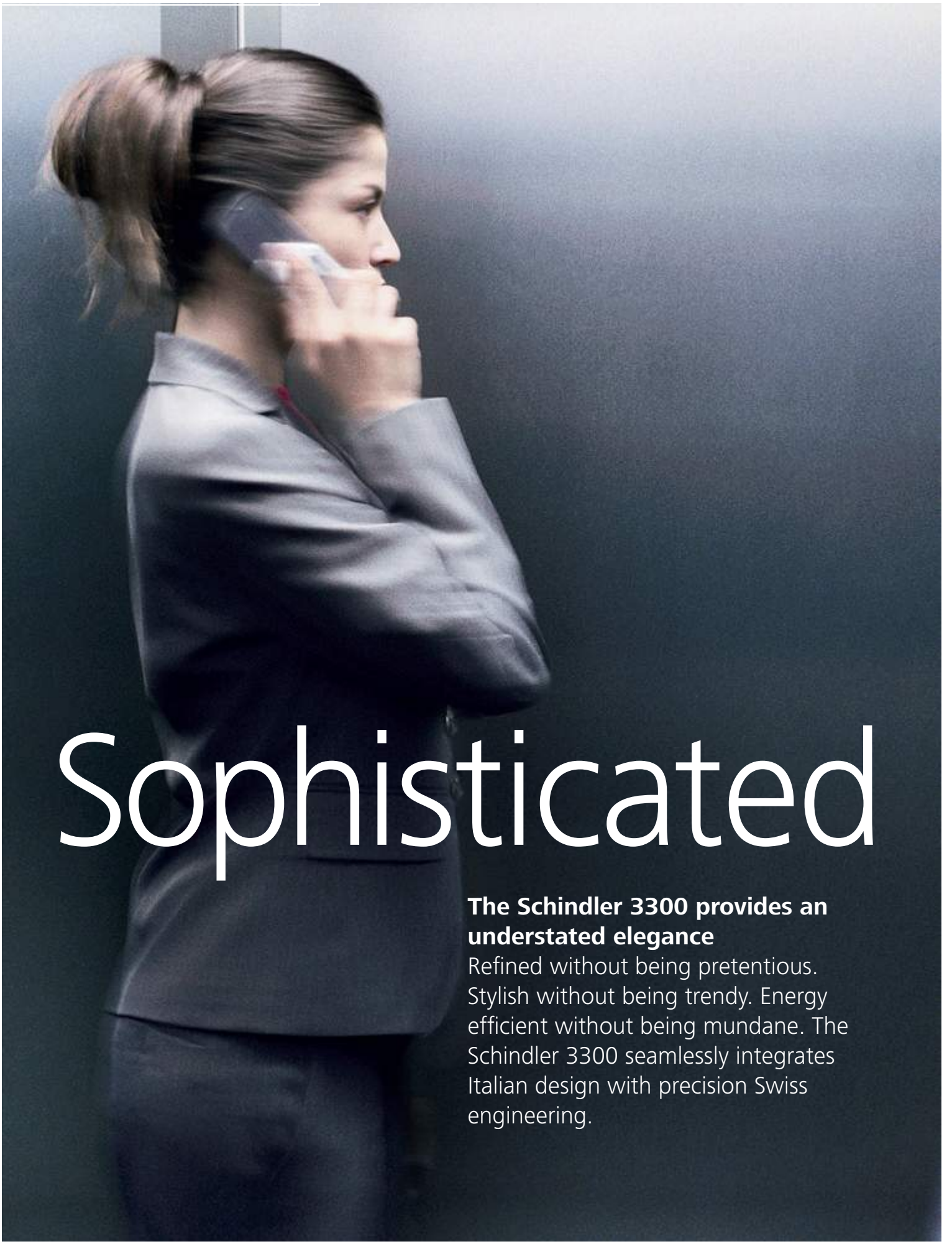
The Schindler 3300 provides more space
We have designed the cab to create more room and more comfort. Since there's no need for a machine room or control closet, there's more usable building space. The Schindler 3300 fits neatly into the footprint of a hydraulic elevator.



Smooth

The Schindler 3300 provides a more comfortable ride

Noticeably quiet. Beautifully fluid. Reliably safe. Schindler's exclusive engineering provides smooth, quiet operation for the most comfortable ride experience – floor by floor, stop by stop.



Sophisticated

The Schindler 3300 provides an understated elegance

Refined without being pretentious. Stylish without being trendy. Energy efficient without being mundane. The Schindler 3300 seamlessly integrates Italian design with precision Swiss engineering.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B

Value has a new, intelligent design

The world's most enlightened elevator
The Schindler 3300 has proven itself globally as the smartest choice for low- to mid-rise commercial and residential buildings.

That's because it is engineered like no other everyday elevator. It offers a distinctive range of design and aesthetic options along with an amazingly smooth performance that uses less energy and makes less noise. All in a smaller, easy to fit footprint.

It's setting the new global standard.

More room. More usable space.
As architects and engineers around the world can attest, the Schindler 3300 is designed to minimize the space required for technical equipment, while maximizing the square footage of the cab interior.

Thanks to our new easy-to-install suspension traction media, hoistways designed for a hydraulic elevator can now accommodate a more spacious traction elevator.

Also, because the control is distributed throughout the system, and inspection and test panels are located in the top landing hoistway door jamb, the Schindler 3300 needs no machine room. What's more, it requires minimum overhead, eliminating unsightly structures on your roof. All told, the Schindler 3300 gives you more space and reduces construction costs.

Smooth to the eyes and ears
Schindler cabs are constructed using only high-quality materials. And with standard palettes that are anything but "standard," we can provide exceptional looks, while keeping lead times and costs down. From stainless steel to a distinctive collection of attractive color laminates, your design choices are easier than ever before.

To add to the aura, we are also working to reduce noise. Our suspension traction media enables the Schindler 3300 to glide peacefully through your building. Elevator movements go virtually unnoticed – which will certainly be appreciated by guests in your building.

Sophisticated design for our passengers and our planet
With automatic evacuation, we've elevated our focus on safety. In the event of a power failure, you will be taken safely to the next floor.

We're also setting a new standard in conservation. The Schindler 3300 is economical in its use of energy, which contributes to lower operating costs and a smaller carbon footprint. The effects are highly visible.

Fast facts

Capacity	2100–3500 lbs., 14-23 passengers
Travel height	Max. 98'-5", max. 8 stops
Door width	36-42 inches
Door height	84 inches
Drive	Gearless/frequency controlled
Speed	100/150 FPM
Control	Selective collective
Interior	Baked enamel, plastic laminate or brushed stainless steel



Efficient mobility
Sustainable technology

In architecture, in engineering, in everyday life, there is a global movement toward sustainability. There is a growing demand for solutions that benefit the planet as much as they do people. At Schindler, we are proud to be at the forefront of this initiative. In every facet of our business, we are looking for ways to become better stewards of the planet.

The Schindler 3300 is the hallmark of our environmental efforts. When designing this elevator, sustainability was not an afterthought, but the driving force behind every decision we made. As a result, the Schindler 3300 offers more eco-friendly features than one might have thought possible.

Drive
- Gearless machine designed to save energy and avoid power loss
- Stable start uses energy more efficiently and reduces electric costs
- Frequency converter with standby power mode allows elevator to return safely to nearest floor in the event of a building power outage
- Compact, lightweight and durable design.

Control
- Controls automatically switch car lights to standby mode to save energy
- Car panel and floor indicators all operate with low power, LED lights
- Multi-bus control architecture reduces cabling, material and waste
- Smart controls provide more efficient passenger transportation.

Cab and hoistway
- Car lighting equipped with energy-efficient lamps
- Central guiding system reduces friction and overall energy consumption
- Door drive with standby mode uses less electricity
- Overall design provides more usable space for enhanced passenger comfort.

Environmentally-responsible company
We are working to make our entire operation more eco-friendly. We have instituted more ecologically responsible production systems and material usage. We are able to manage installations faster and more efficiently. And our products and services are designed to provide energy-efficient and eco-friendly options to architects, contractors, building owners and managers.

What's more, Schindler is a member of the U.S. Green Building Council and supports the LEED® Green Building Rating System.

The following categories of the LEED rating system are areas where Schindler can assist you in obtaining the necessary credits for accreditation.

ISO9001 • ISO14001

LEED RATING SYSTEM VERSIONS 3 AND 2.2

Energy and Atmosphere	Materials and Resources	Indoor Environmental Quality
Prerequisite 1 Fundamental Commissioning of the Building Energy Systems	Credit 2.1 and 2.2 Construction Waste Management	Credit 4.1 Low – Emitting Materials: Adhesives and Sealants
Credit 1 Optimize Energy Performance		Credit 4.2 Low – Emitting Materials: Paints and Coats
		Credit 4.4 Low – Emitting Materials: Composite Wood and Agrifiber Projects

Technology advanced
Perfection attainable

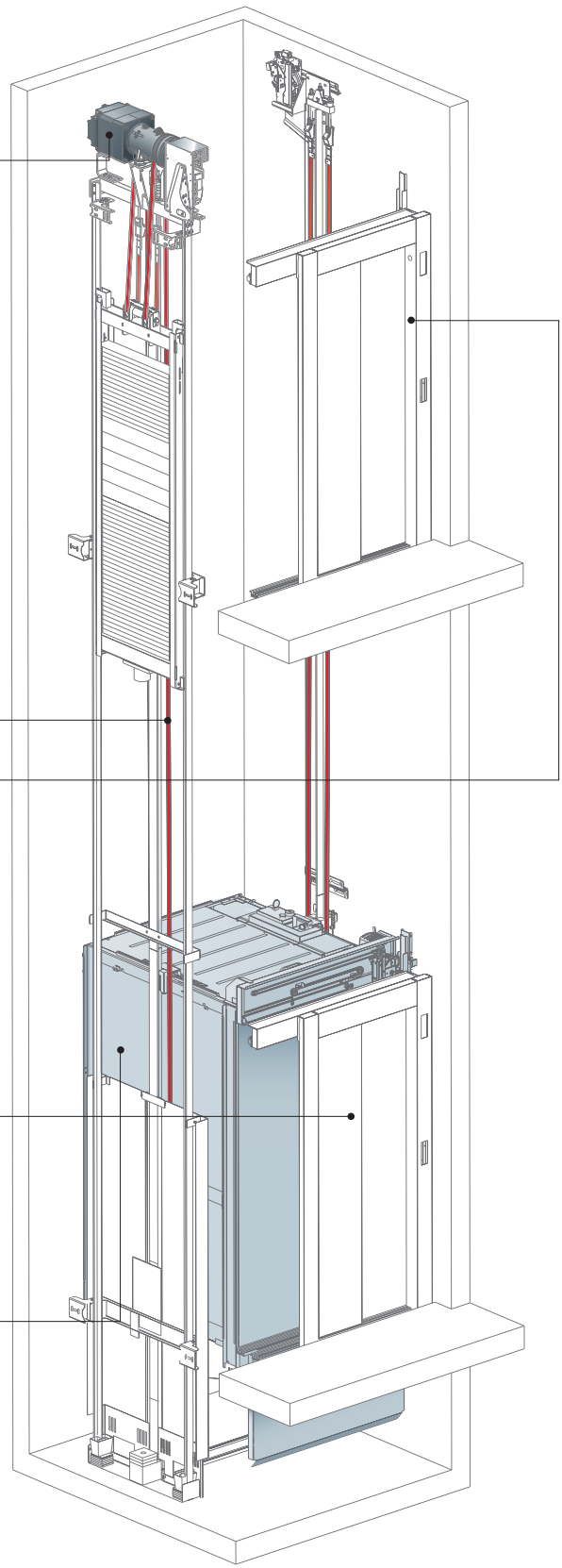
Drive system
The Schindler 3300 requires a small hoist machine and inverter. This saves more space compared to previous drive systems; it is installed directly in the overhead and does not require a separate machine room. The system stops the car with precision. Cab and landing floor line up very accurately to ensure that passengers get in and out safely. The system is economical in energy consumption and causes minimal noise due to the material of the suspension traction media (STM) in the elevator and in the entire building. Real comfort.

Suspension Traction Media (STM)
The STM consists of thin metal cables sheathed in a non-circular EPDM (Ethylene Propylene Diene Monomer) jacket. They replace conventional steel cables, weigh less, require less space and run quieter. Thanks to the STM, there is room for the machine and drive directly in the elevator hoistway, allowing hydraulic-sized shafts to be utilized.

Inspection and test panel
In the Schindler 3300, the inspection and test panel is built directly into a standard door frame at the top landing. This highly functional solution is a vital achievement. It simplifies elevator installation, provides practical handling and saves space.

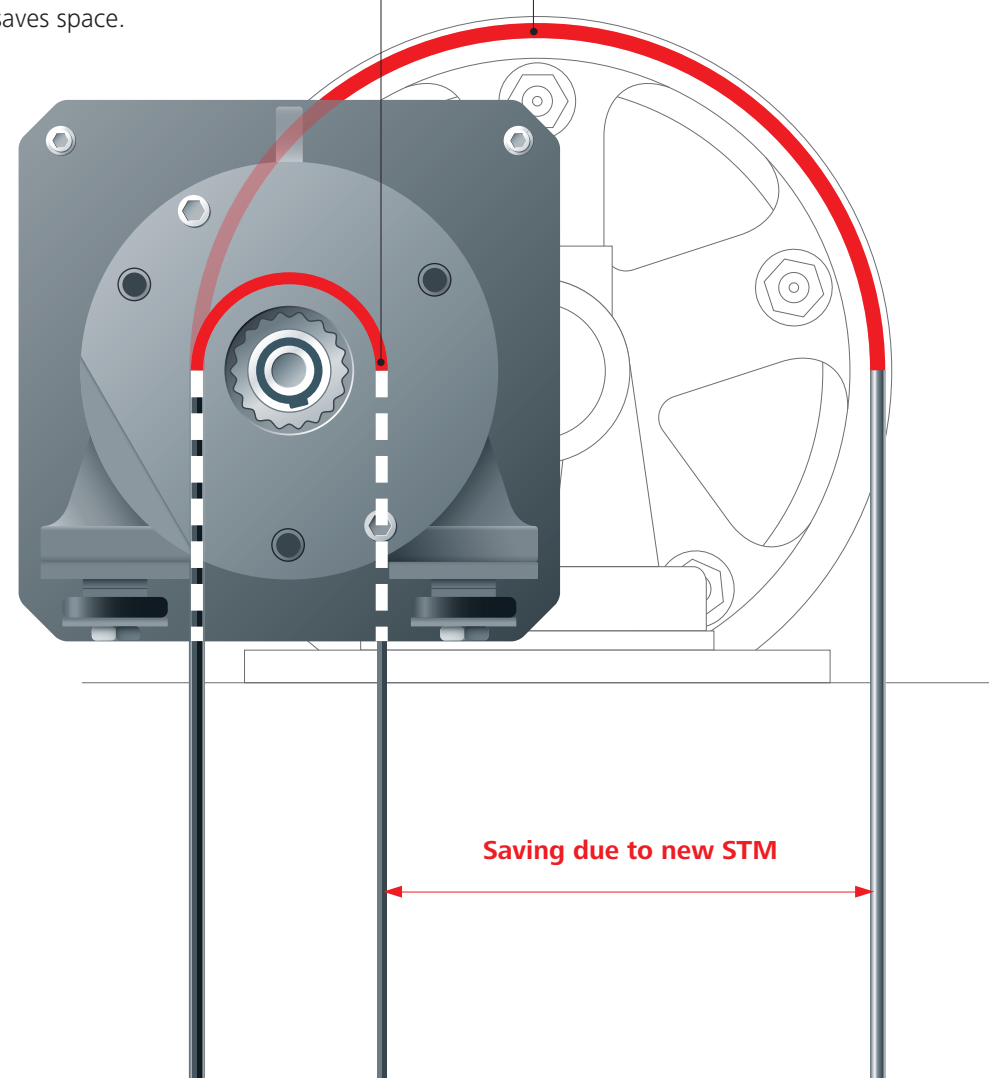
Doors
Doors are equipped with a frequency-controlled drive for fast and reliable operations. Two-speed side-opening doors opening to the left or right, as well as single-speed center-opening doors are available.

Cab
Technology does not take much space in the Schindler 3300. This is an obvious benefit that allows hydraulic elevator-sized shafts to be utilized while providing a larger cab interior. This is a striking advantage.



Previously: steel cables
Steel cables are relatively inelastic. They need a traction sheave diameter of at least 12 inches with the cable diameters required for elevators. The complete conventional motor, including drive gears, must be large enough to match. A system that requires space.

New: Suspension Traction Media (STM)
Suspension traction media are flexible. They use a much smaller traction pulley diameter than steel cables. 4.25 inches is enough, requiring a much smaller motor. A design that saves space.



We put a premium on design, without charging a premium

All around the world, architects and designers are discovering a new creative outlet. Conceptualized by an Italian designer, the Schindler 3300's sleek cab design is impressive yet understated. Simple, yet refined, with design palettes to suit any style or building décor.

– Cab walls are available in stainless steel, baked enamel or a choice of plastic laminates.

– The unique ceiling design is available in a choice of brushed stainless steel or silver-metallic baked enamel.

– Ceiling lighting is refined, yet illuminating, with compact fluorescent light fixtures.

– The elegant curved handrail is available in painted, brushed or polished aluminum finishes.

– Landing doors are available in brushed stainless steel, various colors of durable baked enamel or primer. Doors are available in center-opening or side-opening configurations, with left-hand or right-hand openings.

– Hall fixtures are composed of tempered safety glass panels, back-printed in white, to give the Schindler 3300 a contemporary, modern look.

Note: For more information on the high fashion details we designed into the Schindler 3300, be sure to ask for a copy of our Deco brochure, which includes all décor and accessory options. The car specifications, options and colors in this brochure are representative only and are subject to change. Sample shown may vary from the original in color and material.



Laminate – Long Beach Blue



Brushed stainless steel



Landing doors - Available in 11 baked enamel colors or stainless steel



Ceiling lighting



Hall fixtures



Handrails

If you can envision it, you can create it

From the fun, fresh colors of Tribeca to the subdued natural tones of Willamette, the Schindler 3300 gives you a wide selection of durable baked enamel or colorful laminate finishes, as well as a sleek brushed stainless steel cab. Create a look and feel that is truly one of a kind.

Tribeca

Fresh, flashy and multifaceted



Montreal Blue



Baked enamel colors

South Beach

Warm, distinguished and genuine



Tampa Tangerine



Matte finish laminates with subtle, wavelike design

River Walk

Clean, cool and cutting edge



Miami Bottle Glass



Matte or gloss finish laminates with glassy sheen; swatches are a representation of the gloss finish.

Great Lakes

Steely, sophisticated and elegant



Toronto Grey



Choose from gloss finish laminates with subtle, monochromatic patterns or a distinctive brushed stainless steel cab.

Willamette

Rich, natural and classic



Baltimore Cherry



Matte and gloss finish laminates with rich, wood-grain colors; swatches are a representation of the gloss finish.

The perfect fusion of people-centered design and technology

The features and components of the Schindler 3300 are smartly designed to enhance the rider experience, improve safety and minimize downtime. From the low-energy multiprocessor controls to the stylish, tempered safety glass operating panels, you'll find the latest technological advances.

Control
The control system is based on low-energy multiprocessor technology. The compact main inspection and test panel of the decentralized system is integrated in the door frame.

Control functions
– Miconic® NX microprocessor
– On-board diagnostics, self testing
– Light curtain
– Overload detection
– Two-way, hands-free emergency communication
– Firefighter's Service operation
– Independent service
– Automatic car light
– Automatic evacuation to nearest floor.

Schindler Remote Monitoring™
Supports Schindler predictive maintenance, anticipating difficulties before they occur and allowing rapid response to service calls.

Fixtures
The stylish, tempered safety glass panels are back-printed in white to give the elevator a contemporary, modern look while meeting all applicable codes. Please refer to our deco brochure for more information on all decor and accessory options.



State-of-the-art planning, installation and support



Planning
The Schindler 3300 requires no machine room. For you, this means less planning. Only one space, the elevator shaft, has to be designed. Standardized plans simplify the process, making it fast and efficient.



Order
The design of the Schindler 3300 is sophisticated, yet simple. The key factors are quickly established. Since there are no complicated specifications, it is easy to place an order. You will quickly and effortlessly find the product that fits your needs.



Delivery
We deliver the Schindler 3300 complete and all at once, just in time for when the building is ready for the elevator installation.



Installation
The elevator is quickly installed. No cranes or scaffoldings are required. The system is ready in about two weeks. A well-thought-out process.

Keeping it all running smoothly

The Schindler 3300 combines proven engineering and smooth performance with the best service in the industry, from our integrated maintenance delivery technology to our highly trained technicians. So you can be confident of fewer callbacks, fewer inconveniences and less downtime.

– On-board sensors monitor your equipment 24 hours a day with Schindler Remote Monitoring™ (SRM). It's a powerful diagnostic tool that can identify a problem, map out a solution and dispatch a technician to your site – often before you're even aware of the issue.

– One toll-free call to the Schindler Customer Service Network (SCSN) provides fast dispatching at any time, day or night.

– Schindler FieldLink™ gives your technician unlimited access to virtually any information needed to complete your maintenance quickly and accurately.

– Genuine manufacturer's replacement parts from extensive local and national inventories are available within 24 hours if need be.

– Exclusive Schindler Customer Score Card™ allows you to track trends, view performance reports and service records in real time at www.us.schindler.com.




FIREFIGHTERS'
OPERATION

Ever greener



Keeping the environment in mind

Schindler is committed to helping you reduce the environmental footprint of your buildings and qualify for LEED® certification by incorporating sustainable green features into our elevator and escalator systems. Improving the environmental impact of our products and processes, particularly our consumption of energy and materials, is fundamental to our corporate responsibility as an industry leader. Schindler 3300 is a prime example of our continuing commitment to improve mobility while preserving resources.

LEED is a registered trademark of the U.S. Green Building Council.

For more information, including location of the Schindler office nearest you, please visit:

U.S. Headquarters
Morristown, New Jersey
Tel. 973.397.6500
www.us.schindler.com

Canada Headquarters
Scarborough, Ontario
Tel. 416.332.8280
www.ca.schindler.com

Schindler is a member organization of the U.S. Green Building Council.

Schindler has received renewal to ISO 14001:2004 and ISO 9001:2008 certificates.

Schindler prints with vegetable-based ink on paper containing post-consumer waste fiber.

Mixed Sources
Product group from well-managed forests, controlled sources and recycled wood or fiber
www.fsc.org Cert no. SGS-COC-005547
©1996 Forest Stewardship Council

© Schindler Elevator Corporation

A1105
BRN-1018

SUBSTITUTION REQUEST
(During the Bidding/Negotiating Phase)

CSI®

PROJECT: New Central Middle School Project
State Project No. 057-0114 N

TO: Joseph Phelan
Turner Construction Company

RE: Telescoping Bleachers

SUBSTITUTION REQUEST NUMBER: 1

FROM:

DATE: October 30, 2024

A/E PROJECT NUMBER: 22367.00

CONTRACT FOR: Telescoping Bleachers

SPECIFICATION TITLE: Telescoping Bleachers at Gym

DESCRIPTION: Seating

SECTION: 126613 **PAGE:** 1051 - 1064 **ARTICLE/PARAGRAPH:** 2.7.A

PROPOSED SUBSTITUTION: Telescoping Bleachers

MANUFACTURER: Sheridan Seating Inc. **ADDRESS:** 290 W. St. South Orillia, ON, Canada L3V 5G8 **PHONE:** (705) 326-7463 x238

TRADE NAME: Sheridan Seating Inc. **MODEL NO.:** M200

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.
Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The Undersigned certifies:
- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

SUBMITTED BY:

SIGNED BY:

FIRM:

ADDRESS:

TELEPHONE:

A/E's REVIEW AND RECOMMENDATION:

☐ Approve Substitution—Make submittals in accordance with Specification Section 01 33 00 Submittal Procedures.

☐ Approve Substitution as noted—Make submittals in accordance with Specification Section 01 33 00 Submittal Procedures.

☒ Reject Substitution—Use specified materials.

☐ Substitution Request received too late—Use specified materials.

SIGNED BY: Stephen Martocchio **DATE:** 11/6/2024

SUPPORTING DATA ATTACHED: ☒ Drawings ☒ Product Data ☐ Samples ☐ Tests ☐ Reports ☒ See Table of Contents

PRODUCT SUBSTITUTION REQUEST
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Telescopic Bleacher Specifications

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Warranty Information

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Design and Performance Criteria

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Dimension Chart

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Bleacher Industry Data Chart

14
Operation & Maintenance Manual

22
Product Literature

51
Manufacturer Qualifications

Bid RFI #389

SHERIDAN SEATING INC.

TELESCOPIC BLEACHER SPECIFICATIONS

PART 1 GENERAL

1.1 Description

A. Scope

1. Telescopic seating systems comprised of multi-tiered rows of seats, deck components and risers on interconnected, retractable, supporting structure. Telescopic seating operation shall be by means of manual or electric operation. Telescopic seating system shall be wall attached (typically), recessed, telescoping or portable. System shall be floor attached where reverse folding.

B. Manufacturer's Design Criteria

1. Gymnasium seat assembly is designed to support, in addition to its own weight, a live load in excess of 120 lbs. per linear foot or 100 lbs. per square foot (whichever affect is greater), front to rear sway in excess of 10 lbs. per linear foot and a parallel sway load in excess of 24 lbs. per linear foot of row.
2. Guard railings are engineered to withstand a load of 200 lbs. per foot at top rail and an intermediate load of 150 lbs. per foot.
3. Steel structure must be free standing when installed and include 4 steel columns per row, per section. Those manufacturers which only include 2 columns per row, per section are not acceptable.
4. Steel columns must be fabricated from structural high tensile steel tubing; minimum size of tubing will be 1 ½'' x 3'' x 10 ga. Those manufacturers providing formed steel or angle iron columns in place of structural tubing are not acceptable. Maximum spacing between columns shall be 11'-6".
5. Two row locks per row, per bleacher section manufactured from ¼'' hot rolled steel to prevent racking of bleachers as they are retracting are required.
6. Footboards shall be produced from ¾'' plywood with top facing. Voids or boat patching on top facing is not acceptable. Top facing shall receive 3 coats of colored, opaque, catalyzed epoxy coating. Aluminum trim shall be installed on all exposed edges. Extruded aluminum joiners shall be placed between adjacent footboards.
7. Optional Upgrade – Panelam decking on ¾" plywood.
8. Optional Upgrade – Bronzed aluminum decking.

9. Wood seat boards shall be full 4/4" finished size, kiln dried, select pine with rounded edges. Seat boards shall be sealed on all surfaces and three coats of polyurethane on top and sides.
10. Molded seats shall be 18" wide of high density polyethylene structural foam with full perimeter interlock and concealed mounting hardware. End caps shall be provided at all ends, aisle ways and ADA locations. Colors are bright without excessive streaking. "Waterfall" coloring will not be acceptable. Indents for numbers and letters shall be standard.
11. No less than 4" diameter x 1 ¼" soft faced, non marking rubber wheels to support understructure system shall be provided with sintered metal bearings and clips for easy replacement.
12. Nose beam shall be formed from 14 ga. minimum galvanized steel. Steel shall have G90 galvanized coating or better. These will encapsulate ¾" plywood decks.
13. Rear riser shall be formed from 14 ga. minimum galvanized steel. Steel shall have G90 galvanized coating or better.
14. Handicap seating provisions: Provide recoverable first tier cutouts as required by ADA. Include manufacturer's standard front guardrail and closure panel below. Shop drawings will reflect locations.

1.2 Quality Assurance

A. Acceptable Manufacturer

1. The manufacturer shall be a firm experienced in the manufacturing of telescoping bleacher seating systems.
2. The telescopic seating system specified herein shall comply with the International Code 2000 Edition, Standard for Assembly Seating, Tents and Membrane Structures; and specifically with Chapter 5, Folding and Telescopic Seating, except where additional requirements are indicated or imposed by authorities having such jurisdiction.
3. The telescopic seating system manufacturer shall employ a registered, professional engineer to certify that equipment to be supplied meets and/or exceeds the design criteria of these specifications.
4. The telescopic seating system manufacturer shall have all welding done in a CWB/AWB certified shop.
5. It will be the responsibility of the bidder to furnish with his bid a list clarifying any deviation from these specifications, written or implied.

B. Acceptable Installer

1. Installers to be recognized, trained and certified by the telescoping bleacher seating manufacturer.

1.3 Submittals

A. Submit six copies of each of the following:
   1. Manufacturer's shop drawings
   2. Manufacturer's standard 1-year warranty and limited 20 year warranty
   3. Manufacturer's Operation and Maintenance instructions

B. Submit seating and deck samples, as required.

1.4 Warranty

A. Submit manufacturers standard warranty form for Telescopic seating systems.
   1. The manufacturer shall guarantee all work performed under these specifications to be free from defects for a period of one (1) full year.
   2. Replacement structural steel components, nuts, bolts, axles, and wheels as necessary to maintain the integrity of the original installation, will be provided at no charge for a period of twenty (20) years.
   3. The guarantee shall be limited to the fair use of the Telescopic Seating System and shall not include acts of vandalism, fire, flood or other situations that do not fall into the general use requirements of the bleachers.
   4. A yearly inspection and required maintenance must be performed to maintain the extended 20-year warranty.

PART 2 PRODUCT

2.1 Manufacturers

A. The basis of design for the gymnasium seating shown on the plans and detailed in these specifications is by Sheridan Seating Inc. Other manufacturers desiring to bid shall submit detailed product literature and specifications a minimum of ten (10) days prior to bid.
   1. Model: W100 Wood Seats or M200 Molded Seats
   2. Aisle Type: Foot level Aisles with center aisle railings with curved top rail terminations.
   3. End rails: Typically self-storing ready rails.
   4. Operation: Integrally powered friction electric operation or manual operation.
   5. Product Requirements:
      a. System to be wall attached. System shall be floor attached where reverse folding.

b. Bank length as required by specifications.
c. Total number of rows as required by specifications.
d. Row rise: 10'', 11 5/8'', or as required by specifications
e. Row spacing: 22'', 24'', 26'' or as required by specifications.

6. Accessories:
   a. Handicap seating provisions: Provide first tier handicap cutouts to comply with American Disabilities Act (ADA). All handicap cutouts shall have required railings. Double center cutouts will be recoverable.
   b. Scorers table 15'' X 96''. Table shall be self-supporting and portable to be used anywhere within the bleacher system or on the gymnasium floor.
   c. Self–storing End Rails: All railings to receive powder-coating finish (black).
   d. P Rails: Every other deck shall have an intermediate pedestal mounted railing. These railings shall have a round handrail and shall be self-storing without the need of dismantling. Railings to receive powder-coated finish (black).
   e. Obstructions: Note any obstructions (columns, drainage pipes, overhead ducts, etc.) on final shop drawings.

2.2 Fabrication

A. Understructure System

1. Structural high-tensile steel columns fabricated from minimum size 1 ½'' x 3'' x 10-gauge structural tubing.
2. Bracing: 1 ½'' square, structural tubing
3. Row Locks: Provide two per each row, per bleacher section made of ¼'' plate, hot rolled steel.
4. Wheels shall be 4'' diameter x 1 ¼'' width.
5. Maximum spacing between columns shall be 11'–6".
6. Finish: Provide manufacturers black, semi-gloss, machinery enamel

B. Deck System

1. Footboards shall be ¾'' plywood with top facing. All surfaces shall be thoroughly sealed. Top facing shall receive three coats of colored, opaque, catalyzed epoxy coating. Aluminum trim shall be installed on exposed edges. Adjacent foot boards shall be joined by means of extruded aluminum joiner beam sized for ¾'' footboards.
2. Optional Upgrade – Panelam decking on ¾" plywood.
3. Optional Upgrade – Aluminum decking.
4. Provide thru-bolt fastening through galvanized steel riser beams at locations of splices in rear riser. Front deck connection shall be provided using front steel nose beams.

C. Decking and Riser Supports
   1. Decking and riser supports shall form rigid closed deck structure. Tapered deck stiffeners shall be bolted through the front and back.

D. Seat System
   1. Molded Structural Foam: Provide one-piece, high density structural polyethylene foam. Scuff resistant, textured solid color with anatomically correct tops. Color(s) for the seat modules shall be determined by the Architect by providing color charts. Contrasting color effects can be created with custom colors.
   2. Wood: Provide full 4/4" kiln dried, select southern yellow pine with rounded edges. Provide sanding sealer and three coats of clear polyurethane finish on top and sides.

E. Electrical System
   Tractor Drive System: A series of electric drives are located under the first row in sufficient quantities necessary to move the system in and out effortlessly. Each tractor drive consists of two 12" wide x 6" diameter cylinder wheels covered with a specially formulate white 60 durometer soft-faced rubber grooved for positive grip and low wear while reducing stress on floor.

   The tractor is operated by a minimum ¼" HP gear reduction motor built into a height adjustable steel framework and containing additional weight plates for added traction where necessary. These drives operate from one central control box and a single plug-in, hand-held, low-voltage remote pendant controller which has, in addition to an in-and-out button, a left and a right jog button used to always allow for straight and true steering (steering provided where required). The standard system operates with 3 phase, 208 volt, 60 Hz power. Optional power source can be supplied as required.

PART 3 EXECUTION

3.1 General

A. Manufacturer's representative or bleacher system installer shall demonstrate the proper method of operation of the bleacher system to the Owner and Architect upon completion of the work.
B. Telescopic Seating Subcontractor shall verify that all areas are free of impediments interfering with the installation and that substrates are acceptable to receive seating in accordance with the manufacturer's recommendations.

C. Electrical wiring within the building as required for power operation of the bleachers shall be provided by others.

3.2 Installation

A. Seating shall be installed in accordance with the manufacturer's instructions and final shop drawings. Telescopic Seating Subcontractor will install all accessories, anchors, inserts and other items for installation of seating and for permanent attachment to adjoining construction.

B. Adjustment and Cleaning: Upon completion of installation, Telescopic Seating Subcontractor shall adjust each seating assembly to operate in compliance with manufacturer's recommendations. Telescopic Seating Subcontractor shall clean installed seating on exposed or semi-exposed surfaces and touch-up all exposed finishes.

C. The manufacturer reserves the right to incorporate design changes and material substitutions as it sees fit to improve the overall product.

All rights reserved, Sheridan Seating Inc.

Sheridan Seating Warranty

Sheridan Seating Inc., “Sheridan”, warrants, the “Owner” that its new Telescopic Bleachers, “the Product”, will be free from defects in material and workmanship as per the specification for 10 years from Substantial Completion under conditions of normal use and that have been maintained as per Sheridan’s requirements, except as noted below. If such a defect causes failure of the Product or a portion of the product, Sheridan, at its option and sole discretion, will either repair or replace the defective Product or portion of the Product at no charge to the customer. Replacement structural steel components, hardware, axles, and wheels as necessary to maintain integrity of the original installation, will be provided, at no charge, for a period of 20-years.

This guarantee is limited to fair use of the system and does not include vandalism, fire, flood, other acts of dog or situations that do not fall into the general requirements of our bleacher. This guarantee is contingent up the client arranging an annual maintenance program carried out by a Sheridan certified maintenance company.

This warrant is the customer’s exclusive remedy for product defects and does not apply to products altered or modified by the user, or their agents, or to user attached accessories.

There are no warranties except as expressly stated above whether expressed or implied including, but not limited to any warranty of merchantability or fitness for any particular purpose. Sheridan shall not be liable for consequential or incidental damage arising from any product defect.

(705) 326.7463 info@sheridanseating.com sheridanseating.com
290 West Street South, Orillia, ON, Canada, L3V 5G8

Sheridan Product Certification

Sheridan Seating Inc. products meet or exceed the customer specific requirements detailed in the “Bleacher Specifications” distributed to initiate product quotations and the build thereafter.

The product meets or exceeds the applicable codes listed here:

ADA & ABA 2004 USA, IBC 2021 USA, NFPA-102 2021 USA, ANSI-300 2017 USA & CANADA, BOCA USA & CANADA, NFC Canada 2020, NBC Canada 2020, 2017 ICC 300, Accessible Canda Act.

Where requested the product will meet or exceed load requirements and can be verified by 3rd party engineering firms for any State, Province, or Territory in North America.

Robert White
Owner, Director of Quality & Sales
robert@sheridanseating.com

m. (705) 326-7463 Ext. 222
c. (705) 323-4709

290 West Street South, Orillia, ON, Canada, L3V 5G8

www.sheridanseating.com

Sheridan's Understructure Advantage:

- Sheridan seating uses a 4 column freestanding understructure which makes our understructure easier to assemble than many of the competitors in the industry.
- The four vertical columns and connecting braces create a "box-frame" and provide great rigidity to the understructure.
- Sheridan understructure is made with 100% North American steel for unparallelled strength and durability.

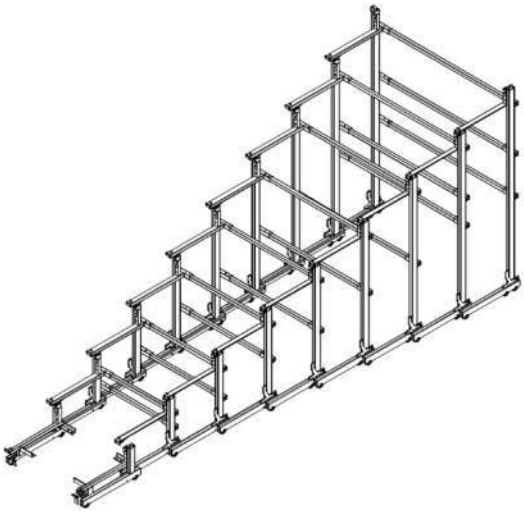


Figure 1:Sheridan 4 Column System

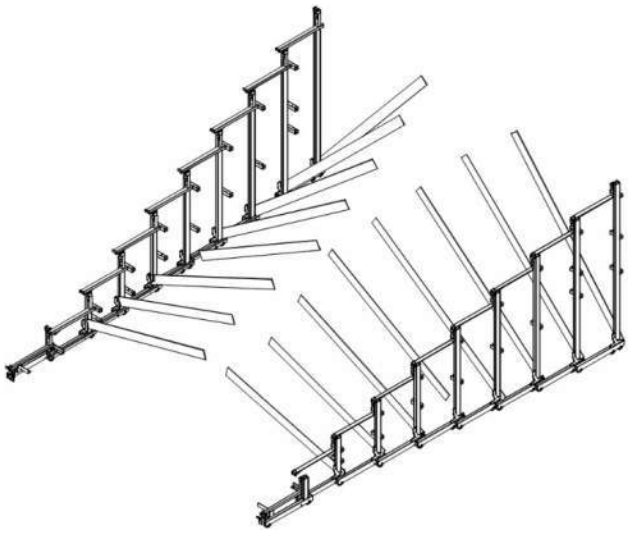


Figure 2: Competitor System

Sheridan's Design Advantage:

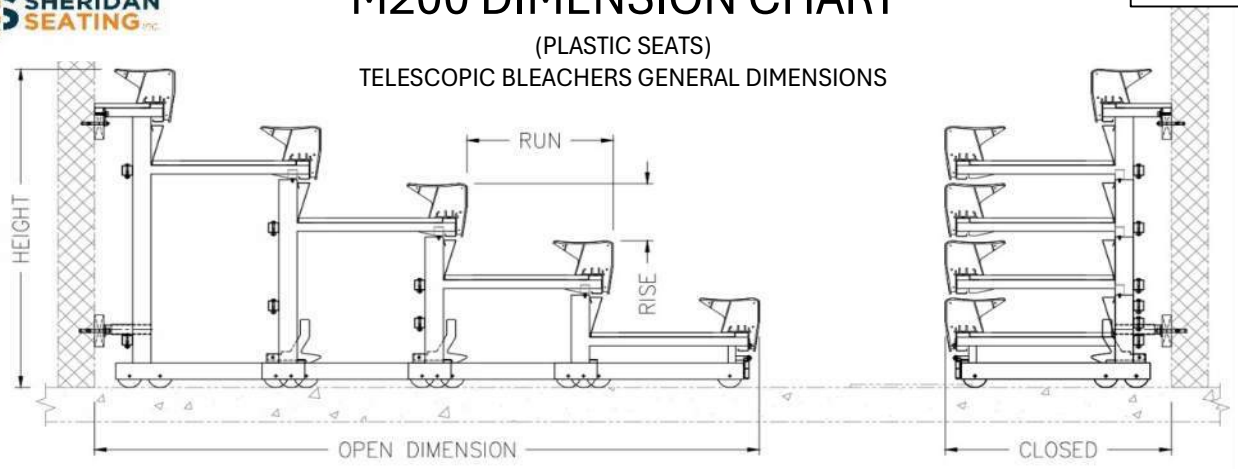
- Every project is unique, and we understand the importance of creating customized solutions for our customers. Our design and fabrication teams work closely with our clients to bring their visions to life.
- Sheridan build and design our products around your facility, we do not drive our customers to design their facility around our designs.
- From selecting the finest materials to incorporating personalized features and finishes, we strive to exceed expectations on every project. Whether it's an intimate auditorium or large arena, we have the expertise and equipment needed to fabricate the perfect solution, every time.
- We would be pleased to help design and set up your new facility. We will provide you with the necessary resources and experience needed to optimize the end results of your project.

M200 DIMENSION CHART

Oct 2024

(PLASTIC SEATS)

TELESCOPIC BLEACHERS GENERAL DIMENSIONS



OPEN DIMENSIONS IMPERIAL (mm)

Row	22" SPACING	24" SPACING	26" SPACING	33" SPACING
3	4' 9 1/8 " (1451)	5' 1 1/8 " (1553)	5' 5 1/16 " (1653)	6' 7 1/16 " (2008)
4	6' 7 1/8 " (2010)	7' 1 1/8 " (2162)	7' 7 1/8 " (2315)	9' 4 1/8 " (2848)
5	8' 5 1/8 " (2569)	9' 1 1/8 " (2772)	9' 9 1/8 " (2975)	12' 1 1/8 " (3686)
6	10' 3 1/8 " (3127)	11' 1 1/8 " (3381)	11' 11 1/8 " (3635)	14' 10 1/8 " (4524)
7	12' 1 1/8 " (3686)	13' 1 1/8 " (3991)	14' 1 1/8 " (4296)	17' 7 1/8 " (5363)
8	13' 11 1/8 " (4245)	15' 1 1/8 " (4601)	16' 3 1/8 " (4956)	20' 4 1/8 " (6201)
9	15' 9 1/8 " (4804)	17' 1 1/8 " (5210)	18' 5 1/8 " (5617)	23' 1 1/8 " (7039)
10	17' 7 1/8 " (5363)	19' 1 1/8 " (5820)	20' 7 1/8 " (6277)	25' 10 1/8 " (7877)
11	19' 5 1/8 " (5921)	21' 1 1/8 " (6429)	22' 9 1/8 " (6937)	28' 7 1/8 " (8715)
12	21' 4 1/8 " (6504)	23' 2 1/8 " (7063)	25' 0 1/8 " (7622)	31' 5 1/8 " (9577)
13	23' 2 1/8 " (7063)	25' 2 1/8 " (7672)	27' 2 1/8 " (8282)	34' 2 1/8 " (10416)
14	25' 0 1/8 " (7622)	27' 2 1/8 " (8283)	29' 4 1/8 " (8942)	36' 11 1/8 " (11268)
15	26' 10 1/8 " (8180)	29' 2 1/8 " (8891)	31' 6 1/8 " (9603)	39' 8 1/8 " (12092)

HEIGHT IMPERIAL (mm)

10" RISE	11 5/8" RISE	16" RISE
2' 11 9/16 " (903)	3' 4 13/16 " (1037)	4' 3 1/8 " (1299)
3' 9 9/16 " (1157)	4' 4 7/16 " (1332)	5' 7 1/8 " (1705)
4' 7 9/16 " (1411)	5' 4 1/16 " (1627)	6' 11 1/8 " (2111)
5' 5 9/16 " (1665)	6' 3 11/16 " (1922)	8' 3 1/8 " (2518)
6' 3 9/16 " (1919)	7' 3 5/16 " (2218)	9' 7 1/8 " (2924)
7' 1 9/16 " (2173)	8' 2 15/16 " (2513)	10' 11 1/8 " (3331)
7' 11 9/16 " (2427)	9' 2 9/16 " (2808)	12' 3 1/8 " (3737)
8' 9 9/16 " (2681)	10' 2 3/16 " (3104)	13' 7 1/8 " (4143)
9' 7 9/16 " (2935)	11' 1 13/16 " (3399)	14' 11 1/8 " (4550)
10' 5 9/16 " (3189)	12' 1 7/16 " (3694)	16' 3 1/8 " (4956)
11' 3 9/16 " (3443)	13' 1 1/16 " (3989)	17' 7 1/8 " (5363)
12' 1 9/16 " (3697)	14' 11/16 " (4285)	18' 11 1/8 " (5769)
12' 11 9/16 " (3951)	15' 5/16 " (4580)	20' 3 1/8 " (6175)

CLOSED DIMENSIONS IMPERIAL (mm)

22" SPACING	24" SPACING	26" SPACING	33" SPACING
2'-11 1/8" (892)	3'-1 1/8" (943)	3'-3 1/8" (994)	3'-10 1/8" (1172)

Notes:

- Wall Obstructions may affect the open and close dimensions.
- Please contact Sheridan Seating for accurate dimensions.
- Reverse fold or portable bleachers may have slight changes.
- Exceeding 15 rows requires additional engineering.

BLEACHER INDUSTRY DATA CHART

CATALOG STANDARDS		SHERIDAN BLEACHERS	IRWIN	HUSSEY	INTERKAL
RISE	BASIC RISE	**10"**	10"	9 5/8"	10 1/4"
	HIGH RISE	**11 5/8"**	12"	11 5/8"	11 1/2"
	VERY HIGH RISE	**CONSULT FACT**	CONSULT FACT	16"	16"
ROW SPACING STANDARD		**22"/24"/26"**	22"/24"/26"	22"/24"/26"	22"/24"/26"
ROW SPACING LARGE		**30"/31"/33"**	31"/33"	30"/32"/33"	30"/32"/33"
MAXIMUM NUMBER OF ROWS		**30**	30	30	30
MAX. "SINGLE STACK" ROWS		**16**	20	20	20
CONTOUR SEAT MATERIAL		**POLYETHYLENE STRUCTURAL FOAM**	BLOW-MOLDED POLYETHYLENE	POLYETHYLENE STRUCTURAL FOAM	POLYETHYLENE STRUCTURAL FOAM
CONTOUR SEAT DEPTH		**10" & 12"**	10" & 12"	10" & 12"	10" & 12"
MAX. CONTOUR SEAT LENGTH		**18"**	18"	18"	18"
FOOT ROOM		**20 1/4"**	22"	20 1/4"	20 1/2"
SEAT SIZE (ACTUAL)		**10" & 12"**	10" & 12"	10" & 12"	10" & 12"
SEAT MATERIAL		**WOOD (5/4)**	WOOD (4/4 or 5/4)	WOOD (4/4)	WOOD (3/4 or 5/4)
SEAT FINISH - WOOD		**POLYURETHANE**	POLYURETHANE	POLYURETHANE	POLYURETHANE
DECKING	THICKNESS & MATL	**3/4" PLYWOOD**	5/8" or 3/4" PLYWOOD	5/8" PLYWOOD	5/8" PLYWOOD
	UPGRADE MATERIAL	**PANLAM, ALUMINUM**	PANLAM, ALUM, CARPET	PANLAM, ALUM, CARPET	
	PLYWOOD GRADE	**AC**	AC	AC	CD
	PLYWOOD FINISH	**MODIFIED URETHANE**	CLEAR URETHANE	CLEAR URETHANE	MODIFIED URETHANE
POST MATERIAL		**STRUCTURAL**	STRUCTURAL	STRUCTURAL	STRUCTURAL
POST SIZE		**TUBE 1 1/2" x 3"**	TUBE 2" x 3"	TUBE 1 1/2" x 3"	TUBE 1 1/2" x 2"
BRACING TYPE		**HORIZ. CROSS TUBES**	X	DIAGONAL	DIAGONAL
DECKING SPLICE		**ALUMINUM "H"**	TONGUE AND GROOVE	TONGUE AND GROOVE	ALUMINUM "H"
WHEEL SIZE		**4" D X 1 1/4" W MINIMUM**	4" X 1"	4" X 1"	3' 1/2" X 1"
STANDARD WHEEL TYPES		**SOFT**	SOFT	SOFT	SOFT
# OF COLUMNS - MANUAL		**4**	2	2	2
# OF COLUMNS - ELECTRIC		**VARIES**	2	2	2
NO. OF WHEELS PER COLUMN		**6**	4 OR MORE	4	4 OR MORE
REAR RISER SHAPES		**MODIFIED Z**	CUSTOMIZED STRAIGHT	CUSTOMIZED STRAIGHT	C
REAR RISER MATERIALS		**GALVANIZED**	GALV./POWDER COAT	GALVANIZED	GALVANIZED
REAR RISER FINISH		**ELECTROPLATED**	ELECTROPLATED		
RAILS		**POWDER COATED**	POWDER COATED	BAKED ENAMEL	POWDER COATED
SEAT HEIGHT (STD. RISE)		**16 1/2"**	16 1/2"	15 1/2"	16 1/2"
MAX. SEC. LENGTH (MANUAL)		**20'**	20'	20'	20'
FOOT LEVEL AISLES		**YES**	YES	YES	YES
AISLE CLOSURES		**YES**	YES	YES	YES
SELF STORING RAILS		**YES**	YES	YES	YES
POWER OPERATION TYPES		**FRICTION ROLLER**	ROLLER	ROLLER	ROLLER & PUSH CHAIN

OPERATION AND MAINTENANCE

INSTRUCTIONS

BOTH OPERATION AND MAINTENANCE SHALL BE TRANSMITTED TO THE OWNER

BY SHERIDAN SEATING INC. OR THEIR REPRESENTATIVE.

SERVICE

OPERATION AND MAINTENANCE OF THE BLEACHER SHALL BE THE

RESPONSIBILITY OF THE OWNER OR THEIR DULY AUTHORIZED

REPRESENTATIVE, AND SHALL INCLUDE THE FOLLOWING:

1. IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.

2. ONLY ATTACHMENTS SPECIFICALLY APPROVED BY THE MANUFACTURER FOR

THE SPECIFIC INSTALLATION SHALL BE ATTACHED TO THE BLEACHER.

3. AN ANNUAL INSPECTION AND REQUIRED MAINTENANCE OF EACH BLEACHER SYSTEM SHALL BE PERFORMED TO ENSURE SAFE CONDITIONS. THE INSPECTION SHALL BE PERFORMED BY A TRAINED FACTORY INSTALLER, QUALIFIED SERVICE PERSONNEL OR A REGISTERED BLEACHER INSPECTION COMPANY.OPERATING INSTRUCTIONS FOR ELECTRIC OPERATION

USING PENDANT HAND CONTROL

THE MOST IMPORTANT ASPECT OF OPERATING BLEACHER PLATFORMS IS THERE NOT BE

ANY OBSTRUCTIONS ON THE FLOOR WHILE THE UNITS ARE TRAVELLING IN AND OUT.

TO OPEN BEACHERS

(1) CHECK IN FRONT OF THE BLEACHER PLATFORMS TO ENSURE THAT NO OBSTRUCTIONS ARE

IN THE WAY.

(2) PLUG IN THE PENDANT HAND CONTROL. THE FEMALE PLUG IS LOCATED IN THE CENTRE OF THE BLEACHER IN THE FIRST ROW SKIRTBOARD. CARE SHOULD BE TAKEN WHEN INSERTING THE PENDANT CONTROL PLUG TO ENSURE THAT THE PINS LINE UP CORRECTLY. THERE IS AN ALIGNMENT PIN IN THE PLUG.

(3) STEP BACK AND, HOLDING THE PENDANT CONTROL, TURN THE BUTTON TO THE OUT

POSITION TO PLACE THE BLEACHER IN MOTION. WALK FORWARD WITH THE BLEACHER AS IT MOVES.

(4) AS THE BLEACHER MOVES FORWARD, KEEP YOUR EYES IN LINE WITH THE FIRST ROW TO ENSURE THAT THE BLEACHER IS MOVING OUT IN A STRAIGHT LINE. IT HELPS TO USE THE GAME LINES ON THE FLOOR AS A GUIDE. IN A CASE WHERE THERE ARE NO GAME LINES, IT WILL BE NECESSARY TO USE ALTERNATE MARKINGS. THE FIRST ROW MUST REMAIN PARALLEL TO THE BACK WALL AT ALL TIMES TO PREVENT PLATFORM FROM TRACKING.

(5) THE ROW LOCKS SHOULD RELEASE ONE AT A TIME AND LOCK INTO PLACE WHEN FULLY EXTENDED. THIS ALSO PREVENTS THE BLEACHER FROM TRACKING.

(6) DURING THE OPERATION IT IS POSSIBLE FOR A SECTION TO MOVE MORE QUICKLY ON ONE SIDE THAN THE OTHER DUE TO FLOOR CONDITIONS OR THE MECHANICAL DRAG FACTORS IN THE TELESCOPIC BLEACHER SYSTEM. THIS IS A NATURAL CONDITION TO ALL TELESCOPIC SEATING AND IS OVERCOME BY THE OPERATOR CONTINUOUSLY MONITORING THE MOVEMENT OF THE FIRST ROW TO ENSURE THAT IT IS ALWAYS STRAIGHT. IF THE UNIT BEGINS TO GET OUT OF ALIGNMENT IT WILL BE NECESSARY FOR THE OPERATOR TO USE THE JOG BUTTON TO BRING THE PLATFORM BACK INTO ALIGNMENT. (THE JOG OPTION DOES NOT APPLY TO SYSTEMS UNDER 8 ROWS)

(7) TO JOG THE BLEACHER BACK INTO POSITION, TURN THE PENDANT CONTROL BUTTON TO THE OFF POSITION. THE CONTROLLER IS SPRING LOADED. OUR SYSTEM HAS JOG LEFT AND JOG RIGHT. JOG LEFT WILL MAKE THE MOTORS ON THE LEFT SIDE OF THE PLATFORM RUN FORWARD AND THE MOTORS ON THE RIGHT GO IN REVERSE. THE JOG RIGHT BUTTON WILL DO THE EXACT OPPOSITE. USING THE IN-OUT CONTROL, YOU CAN REVERSE THE MOTOR SEQUENCE. USING THE JOG BUTTONS, IT IS NOW POSSIBLE TO REALIGN THE PLATFORMS. WHEN PLATFORMS ARE MOVED BACK INTO ALGINMENT, YOU CAN SHUT DOWN THE JOG FEATURE AND AGAIN RUN THE PLATFORMS OUT USING THE IN-OUT BUTTON ONLY.

(8) CONTINUE MOVING FORWARD WITH THE BLEACHER UNTIL IT IS FULLY EXTENDED.

(9) REMOVE PENDANT HAND CONTROL AND STORE AWAY.(10) INSTALL REMOVABLE END RAILS. THE END RAILS ARE ALL INTERCHANGEABLE EXCEPT FOR
THE TOP ROW. THEY SLIDE INTO THE RAILING SOCKETS WITH SOME SIDE-TO-SIDE MOTION. WHEN RAILS ARE COMPLETELY INSERTED IN SOCKETS, THERE ARE SET SCREWS AT THE

SIDE OF THE SOCKET THAT REQUIRES TIGHTENING WITH A 3/16” ALLEN KEY.

(11) IF BLEACHER PLATFORMS ARE EQUIPPED WITH SELF-STORING READY RAILS, THEY ARE NOT REMOVED.

(12) IF BLEACHER PLATFORMS ARE EQUIPPED WITH “P” RAILS IN THE AISLES THEY NEED TO BE TURNED 180 DEGREES TO THE USER POSITION. DEPRESS THE LOCK PIN (LOCATED FRONT AND TOP OF POST) AND TURN RAIL. PIN WILL AUTOMATICALLY LOCK INTO CORRECT POSITION.

(13) BEFORE BLEACHER PLATFORMS ARE USED, VISUALLY CHECK THAT ALL ROW LOCKS ARE ENGAGED.

(14) WHEN INTERMEDIATE AISLE STEPS ARE INCLUDED, THE FIRST STEP WILL BE HINGED TO THE NOSING BEAM. FLIP THE STEP DOWN INTO USER POSITION.

(15) FINALLY, SHUT DOWN POWER SOURCE AT DISCONNECT.TO CLOSE BLEACHERS

(1) TO CLOSE THE BLEACHER PLATFORM REVERSE THE PROCESS, STARTING WITH THE REMOVABLE END RAILS. THESE RAILS WILL NEED TO BE STORED.

(2) IF BLEACHER PLATFORMS ARE EQUIPPED WITH SELF-STORING READY RAILS, THEY ARE NOT REMOVED.

(3) IF AISLES HAVE “P” RAILS, THESE NEED TO BE TURNED TO THE NON-USER POSITION. THIS IS AGAIN DONE BY DEPRESSING THE LOCK PIN AND TURNING RAIL 180 DEGREES.

(4) IF AISLES HAVE INTERMEDIATE STEPS, THE FIRST STEP WILL BE HINGED TO THE NOSING BEAM AND WILL NEED TO BE FLIPPED UP INTO POSITION.

(5) MAKE A VISUAL INSPECTION UNDER THE BLEACHERS TO ENSURE THAT THERE ARE NO OBSTACLES IN THE OPERATING AREA.

(6) VISUALLY CHECK THE ROW LOCKS. IT IS IMPERATIVE THAT EACH AND EVERY ROW LOCK IS ENGAGED! IF ONE OR MORE ROW LOCKS ARE NOT IN PLACE, THE BLEACHER WILL NOT

TRACK INTO THE WALL OR POCKET PROPERLY.

(7) TO MAKE SURE ROW LOCKS ARE LOCKED IN PLACE, RUN THE BLEACHER OUT AS FAR AS IT WILL GO.

(8) TURN POWER SOURCE ON AT DISCONNECT.

(9) PLUG IN THE PENDANT HAND CONTROL. FEMALE PLUG IS LOCATED IN CENTRE OF BLEACHER IN FIRST ROW SKIRT BOARD.

(10) STEP BACK AND, HOLDING THE PENDANT HAND CONTROL, TURN THE BUTTON TO THE IN POSITION. THIS WILL PLACE THE BLEACHER INTO MOTION GOING BACK TOWARDS THE WALL.

(11) AS THE BLEACHER MOVES BACK, THE OPERATOR MUST KEEP HIS EYES ON THE FIRST ROW TO ENSURE THE BLEACHER IS MOVING BACK IN A STRAIGHT LINE. AGAIN HE SHOULD USE THE GAME LINES ON THE FLOOR AS A GUIDE (IF THERE ARE NO LINES, IT WILL BE NECESSARY TO USE ALTERNATE MARKINGS). THE FIRST ROW MUST ALWAYS REMAIN PARALLEL TO THE BACK WALL AT ALL TIMES TO PREVENT TRACKING.

(12) THE ROWS MUST RELEASE ONE AT A TIME, STARTING WITH THE FIRST ROW AND GOING BACK. IF, FOR ANY REASON, A ROW FURTHER BACK STARTS TO CLOSE, STOP IMMEDIATELY AND CHECK FOR A ROW LOCK THAT HAS RELEASED PREMATURELY ON THIS ROW. AFTER INSPECTION, THE BLEACHER WILL HAVE TO BE MOVED “FORWARD” COMPLETELY AND THE REVERSING PROCESS STARTED OVER. AGAIN, PLEASE MAKE SURE ALL ROW LOCKS ARE ENGAGING. IF THE ABOVE CONDITION OCCURS, THE OPERATOR SHOULD MAKE A THOROUGH INSPECTION UNDER THE BLEACHER, LOOKING FOR THE OBSTRUCTION OR THE CAUSE WHICH WOULD HAVE MADE THIS CONDITION HAPPEN.

(13) AGAIN, IN THIS CASE, IT IS POSSIBLE FOR ONE SIDE OF THE BLEACHER TO MOVE MORE QUICKLY THAN THE OTHER. THE JOG BUTTON MUST BE USED TO KEEP THE FIRST ROW STRAIGHT AND PREVENT THE PLATFORM FROM RACKING.

(14) CONTINUE MOVING REARWARD WITH THE BLEACHER UNTIL IT IS FULLY CLOSED.

(15) REMOVE THE PENDANT HAND CONTROL AND STORE AWAY.

(16) SHUT DOWN POWER SOURCE AT DISCONNECT.OPERATING INSTRUCTIONS FOR MANUAL OPERATION

(1) TO OPEN BLEACHER PLATFORMS, LIFT THE FRONT RISER BOARD SO THAT THE FRONT ROW LOCKS ARE DEACTIVATED. THE SKIRTBOARD WILL HAVE A CHEST HANDLE TO ASSIST IN LIFTING THE SKIRTBOARD. THE FRONT SKIRTBOARD AND THE FIRST ROW LOCKS ARE MECHANICALLY ATTACHED.

(2) WITH A PERSON AT EACH END AND AN OPERATOR HANDLE INSERTED UNDER THE FRONT SKIRTBOARD, MAKING SURE PULLING CHANNEL IS PULLING ON NOSING BEAM AND NOT SKIRTBOARD, PULL OUT EVENLY. ROWS WILL RELEASE ONE AT A TIME AND ROW LOCKS WILL ACTIVATE. CONTINUE UNTIL BLEACHER PLATFORMS ARE COMPLETELY OUT. PUSH SKIRTBOARD BACK DOWN TO LOCK FRONT ROW LOCK AND SKIRTBOARD IN PLACE.

(3) IT IS NECESSARY TO PULL THE BLEACHER OUT EVENLY TO HELP PREVENT BLEACHER SECTIONS FROM TRACKING.

(4) INSTALL REMOVABLE END RAILS. THE END RAILS ARE ALL INTERCHANGEABLE EXCEPT FOR THE TOP ROW. THEY SLIDE INTO THE RAILING SOCKETS WITH SOME SIDE-TO-SIDE MOTION. WHEN RAILS ARE COMPLETELY INSERTED IN SOCKETS, TIGHTEN THE SET SCREWS AT THE SIDE OF THE SOCKETS WITH A 3/16” ALLEN KEY.

(5) IF BLEACHER PLATFORMS ARE EQUIPPED WITH SELF-STORING READY RAILS, THEY ARE NOT REMOVED.

(6) IF BLEACHER PLATFORMS ARE EQUIPPED WITH “P” RAILS IN THE AISLES, THEY NEED TO BE TURNED 180 DEGREES TO THE USER POSITION. DEPRESS THE LOCK PIN (LOCATED FRONT AND TOP OF POST) AND TURN “P” RAIL. PIN WILL AUTOMATICALLY LOCK INTO CORRECT POSITION.

(7) WHEN INTERMEDIATE AISLE STEPS ARE INCLUDED, THE FIRST STEP WILL BE HINGED TO THE NOSING BEAM. FLIP THE STEP DOWN INTO POSITION.

(8) TO CLOSE BLEACHER PLATFORMS REVERSE PROCEDURE AND PUSH STEADILY SO THAT ROWS ARE STRAIGHT AND NOT JAMMING OR RACKING. CONTINUE UNTIL FULLY CLOSED AND

PUSH DOWN ON RISER TO LOCK IN PLACE.

CAUTION

THE FIRST ROW ACTIVATES THE LOCKING MECHANISM. DO NOT TRY TO PUSH UPPER ROWS AHEAD OF FIRST ROW.

THE USE OF THE OPERATOR HANDLES WILL PROLONG THE LIFE OF THE BLEACHER PLATFORMS AND HELP PREVENT BACK INJURIES TO OPERATORS.MAINTENANCE INSTRUCTIONS FOR TELESCOPIC BLEACHER

IT IS MOST IMPORTANT WITH TELESCOPIC BLEACHERS TO NEVER ALLOW PEOPLE TO CLIMB OR SIT ON THE BLEACHER WHEN IT IS IN A CLOSED POSITION. EACH TIME THE TELESCOPIC BLEACHER IS USED THE FOLLOWING SHOULD BE DONE TO KEEP IT IN A SMOOTH RUNNING CONDITION.

(1) ENSURE THAT NO OBSTRUCTIONS ARE ON THE FLOOR WHILE THE UNIT IS TRAVELLING IN OR OUT.

(2) BEFORE CLOSING THE BLEACHERS, THERE SHOULD BE A VISUAL INSPECTION UNDER THE BLEACHERS TO ENSURE NO OBSTACLES ARE IN THE OPERATING PATH.

(3) THE TOP OF THE PLATFORMS SHOULD ALSO BE VISUALLY INSPECTED BEFORE MOVING.

(4) THE ROWS RELEASE ONE AT A TIME AND LOCK INTO PLACE WHEN FULLY EXTENDED. ROW LOCKS MUST BE VISUALLY CHECKED AND IT IS IMPERATIVE THAT EACH AND EVERY ROW LOCK IS ENGAGED. IF ONE OR MORE ROW LOCK IS NOT IN PLACE, THE BLEACHER WILL NOT TRACK PROPERLY “IN” OR “OUT” FROM THE WALL.

(5) WHEN VISUALLY CHECKING ROW LOCKS, CHECK TO ENSURE ROW LOCK DOES NOT MAKE SIDE-TO-SIDE MOVEMENT.

(6) WHEN CLOSING, IF FOR ANY REASON A ROW FURTHER BACK STARTS TO CLOSE “STOP” IMMEDIATELY AND CHECK FOR A ROW LOCK THAT HAS RELEASED PREMATURELY ON THIS ROW. AFTER INSPECTION, THE BLEACHER WILL HAVE TO BE MOVED “FORWARD”

COMPLETELY AND THE REVERSING PROCESS STARTED OVER. AGAIN, PLEASE MAKE SURE ALL ROW LOCKS ARE ENGAGING. IF THE ABOVE CONDITION DOES OCCUR, THE OPERATOR SHOULD MAKE A THOROUGH INSPECTION UNDER THE BLEACHER, LOOKING FOR THE OBSTRUCTION OR CAUSE WHICH WOULD HAVE MADE THIS CONDITION HAPPEN.

IT IS CONSIDERED GOOD PRACTICE TO INSPECT THE FOLLOWING ON A YEARLY BASIS. THIS WILL ADD TO THE EXPECTED LIFE OF THE BLEACHER AND MUST BE DONE TO INSURE EXTENDED WARRANTIES.

(A) ENSURE THAT ALL CARRIAGE BOLTS USED TO SECURE THE PLYWOOD FLOOR AND LUMBER AREAS ARE CHECKED FOR TIGHTNESS.

(B) ALL BOLTS USED TO FASTEN STEEL-TO-STEEL PIECES ARE CHECKED FOR TIGHTNESS.

.

(C) ALL AREAS WHERE GREASE HAS BEEN PLACED FOR LUBRICATION SHOULD BE WIPED CLEAN AND RE-LUBRICATED. (RUB BARS AND RAMPS)

(D) ALL LUMBER, PLASTIC AND PLYWOOD CAN BE WASHED USING A MILD DETERGENT AND LUKE WARM WATER.

(E) IF ELECTRIC, ALL WIRING CHECKED AND ALL CONNECTIONS CHECKED AND SECURED.

(F) WALL BUCKS ARE SECURE AND NO ANCHORING HAS COME LOOSE.MAINTENANCE INSTRUCTIONS FOR FIXED BLEACHER

ON A YEARLY BASIS:

(A) ENSURE ALL CARRIAGE BOLTS USED TO SECURE PLYWOOD RISERS AND LUMBER AREAS ARE CHECKED FOR TIGHTNESS.

(B) ALL BOLTS USED TO FASTEN STEEL-TO-STEEL PIECES ARE CHECKED FOR TIGHTNESS.

(C) ALL SEATS SHOULD BE INSPECTED FOR MOVEMENT OR VANDALISM AND

TIGHTENED OR REPLACED.

(D) ALL LUMBER AND SEATS CAN BE WASHED USING A MILD DETERGENT AND

LUKE WARM WATER.

(E) WALL BUCKS ARE SECURE AND NO ANCHORING HAS COME LOOSE.

(F) ENSURE RAILINGS ARE INTACT AND FUNCTIONING PROPERLY. IF THERE IS A FUNCTIONAL FAILURE, CALL FACTORY REPRESENTATIVE IMMEDIATELY AND DISCONTINUE USE UNTIL AFTER INSPECTION AND/OR REPAIR.

(705) 326.7463 info@sheridanseating.com sheridanseating.com
290 West Street South, Orillia, ON, Canada, L3V 5G8

SHERIDAN SEATING inc.

SEAT COLOURS & FINISHES

15 Standard Colours. Endless Possibilities.

Available in 15 standard colours and endless custom hues, your venue's formed-poly seats will be the star of the show. Incorporate patterns, symbols or your home team's initials into your seating system design by using contrasting colours of seats.

Standard Colours & Finishes

ORANGE S-07
RED S-08
BURGUNDY S-09
LIGHT BLUE S-10
MED. BLUE S-11
DARK BLUE S-12
PURPLE S-13
GREEN S-14
DARK GREEN S-15

Classic Wood Finishes

Our classic Southern Yellow Pine & Clear Pine bench finishes are triple-sanded and finished with two coats of semi-gloss polyurethane. Sheridan's wooden seats offer a classic look and are tough on wear and tear.



Custom Colours

Choose any custom hue to match your venue's palette, brand or team colours. Available for an additional fee.




S-08 & S-12


S-10, S-11 & S-12


S-08


S-31


S-11 & S-08


S-12

Visit our website for more design ideas!

SHERIDAN SEATING inc.

Sheridan Seating
290 West Street South,
Ontario, Canada L3V 5G8

Phone: 705-326-7463

www.SheridanSeating.com

Get In Touch!
sales@sheridanseating.com

Bid RFI #389

SHERIDAN SEATING inc.

Delivering the best seat in the house for every guest



TELESCOPIC SEATING SOLUTIONS

Bid RFI #389

Delivering the Best Seat in the House

Since 1978, Sheridan Seating has been designing, manufacturing and innovating new seating solutions for venues across North America from our home plant in Ontario, Canada. We're proud to bring that home-town conscientiousness to everything we do. From delivering the best seats in the house for every venue to cheering on the home team in every town, Sheridan Seating is your partner in telescopic seating solutions.

Interested in learning more? Let's keep in touch!

Sheridan Seating Inc.

@SheridanSeating

@SheridanSeating

Your Local Sheridan Seating Dealer:

Sales & Quotes: sales@sheridanseating.com

General Info: info@sheridanseating.com

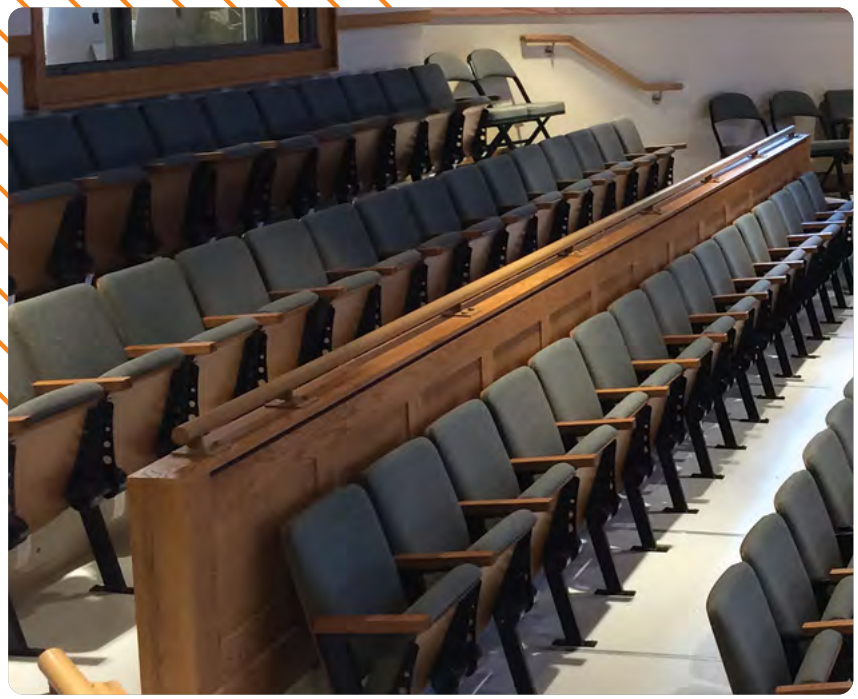
Customer Services: customerservice@sheridanseating.com

SHERIDAN SEATING inc.

Delivering the Best Seat in the House.

At Sheridan Seating, we know that a seat is more than just a chair. It's a place where people sit to learn, worship, support and cheer. A place where they can show up for the home team, hear an idol sing and share in collective experiences.

That's why we're committed to delivering the best seat in the house for every guest, customized to meet your venue's unique needs.

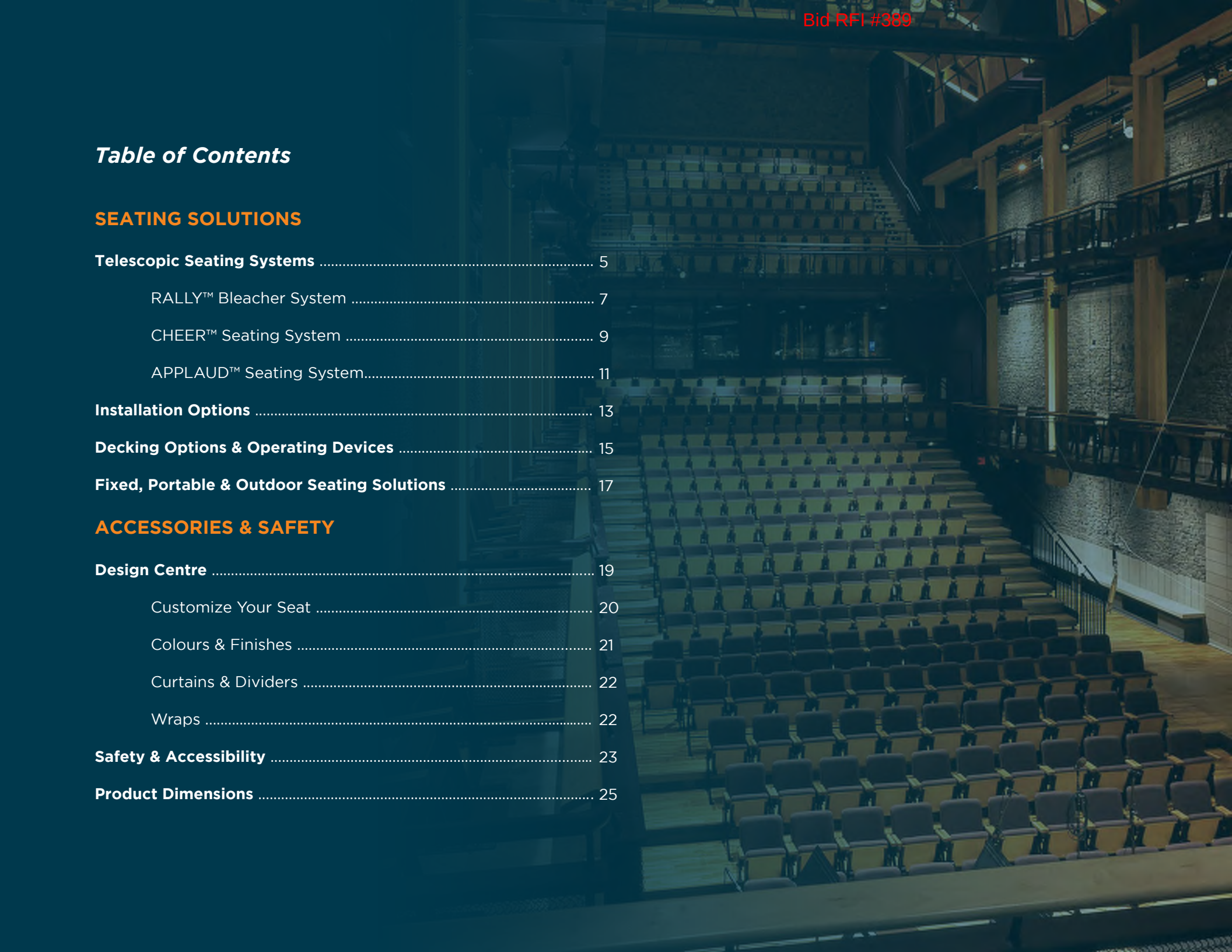




Serving multi-use facilities ranging in size from intimate corporate spaces and local arenas to large theatres, Sheridan Seating's line of high-quality, flexible and fully customizable seating and retractable stage solutions will inspire your audience with style and comfort.

Interested in delivering the best seat in the house for every guest? Let's work together to bring your venue's vision to life.

Bid RFI #389



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Bid RFI #389

TELESCOPIC SEATING SOLUTIONS

Bid RFI #389



Always Custom.
Never Cookie Cutter.

At Sheridan Seating, we know your space needs a solution that fits. That's why we're committed to delivering a seating system that maximizes flexibility, style and safety.

From schools and auditoriums, to sports arenas and more, our reliable and easy-to-use telescopic seating systems are uniquely designed to play a supporting role in your facility so your performances can shine.

Our seating systems are fully customizable, so you'll never have to design your venue around our products.

The best part? We're proud to back our products with a 20-year warranty. Visit us online for full warranty details.

Rugged Engineering.
North American Made.

We design products that look great and are built to last. We source our materials and components from North American suppliers so that you can feel 100% confident in our products.

Our rugged bleacher understructure is made with 100% North American steel for unparalleled strength and durability. Engineered with 3/4" decking and 10 gauge tubing, and supported by four support columns instead of only two, you'll never question the toughness of your Sheridan Seating system.

All of our telescopic seating systems are powered by an industry-leading 4 horsepower motor so your recoverable space will always be available at the touch of a button.

We proudly design and manufacture our seating systems in our home plant in Ontario, Canada, where we stringently test and inspect each component before it leaves our facility to ensure a safe, top-quality product is delivered and installed every time.

Bid RFI #389

RALLY™ BLEACHER SYSTEM

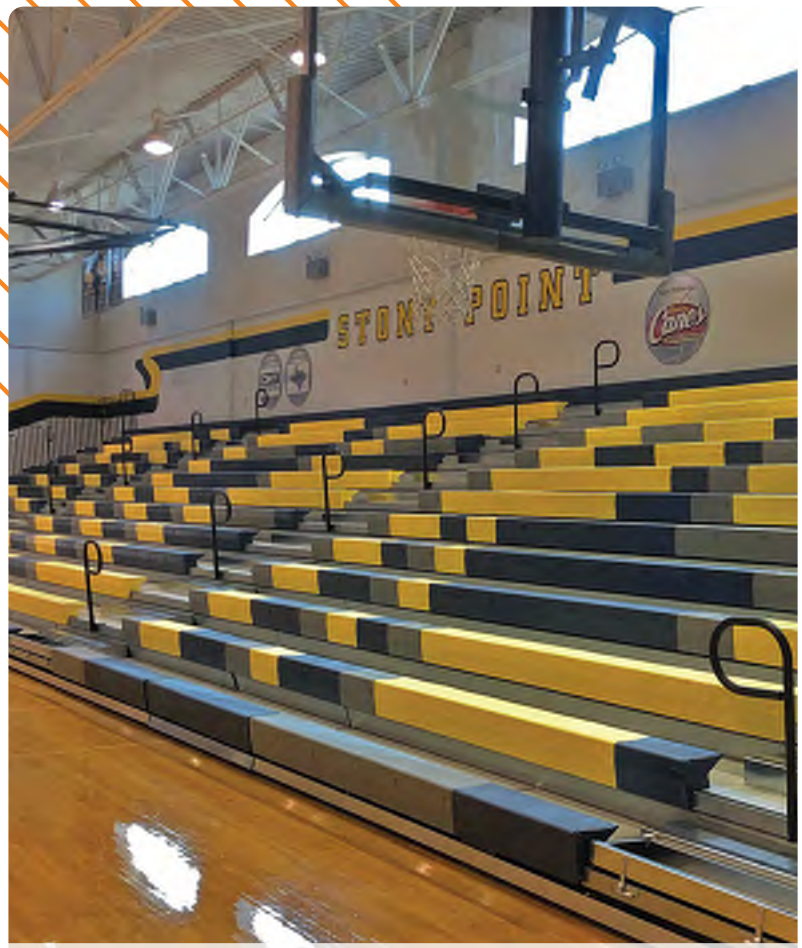
(TL6000, TL6100)

Perfect for:
Gymnasiums, E-sports, Auditoriums, Local Arenas, and more.

At the Front of the Action

Blur the line between fans and action with our fully customizable RALLY™ bleacher seating system.

Budget-friendly and big on style, RALLY™'s sleek bench-style seating handles a crowd with ease and, when performances are over, tucks neatly away to make space for whatever your venue has planned next.



GYMNASIUM, STONY POINT HIGH SCHOOL, ROUND ROCK ISD, TEXAS, US



Durable polyethylene, wood or upholstered bench seats

Optimized rise/run for maximum seating capacity

Narrow profile to recover maximum floor space

Comfortable ergonomic benches & custom backrests

Your most cost-effective seating solution

EASY TO OPERATE CUSTOM BLEACHERS

With great looks and easy operating solutions, and supported by our industry-leading engineering, RALLY™ is available in custom and variable rise and run to maximize seating while still delivering big on experience and durability.

COMFORTABLE ERGONOMIC SEATS

Available in ergonomic formed-polyethylene plastic, stylish wood or plush upholstered bench seats, RALLY™ can be fabricated in custom lengths to suit your needs. If you're looking to amp up comfort for your guests, add a custom backrest to any style bench.



Bid RFI #389

CHEER™ BLEACHER SYSTEM

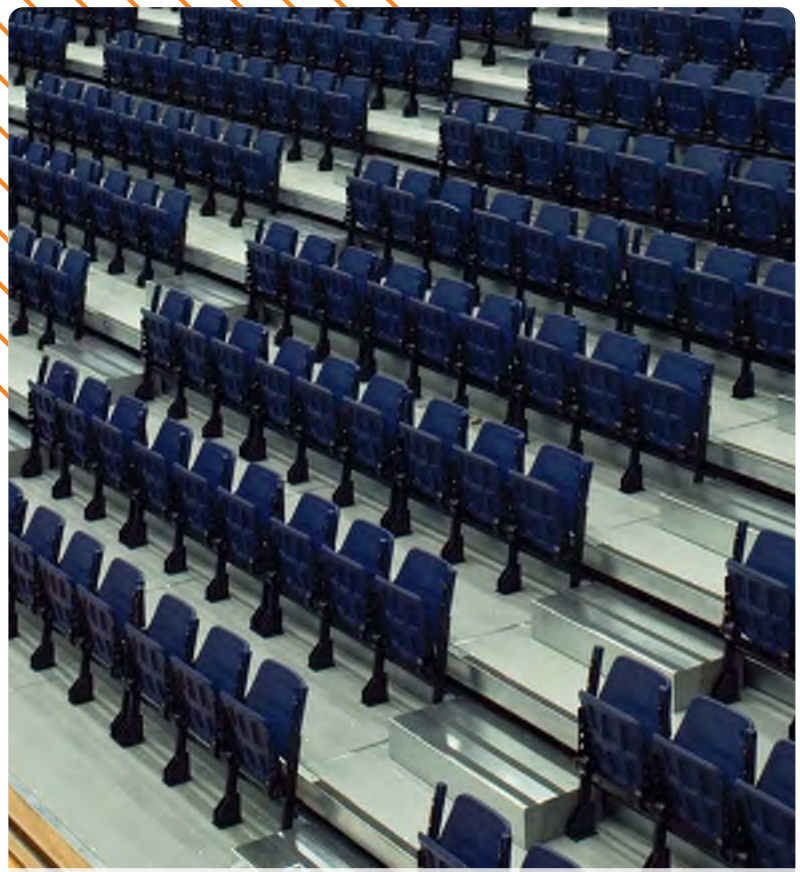
(TL7000)

Perfect for:
Casinos, Arenas, Gathering Spaces, Lecture Halls, and more.

Where Flexibility Meets Style

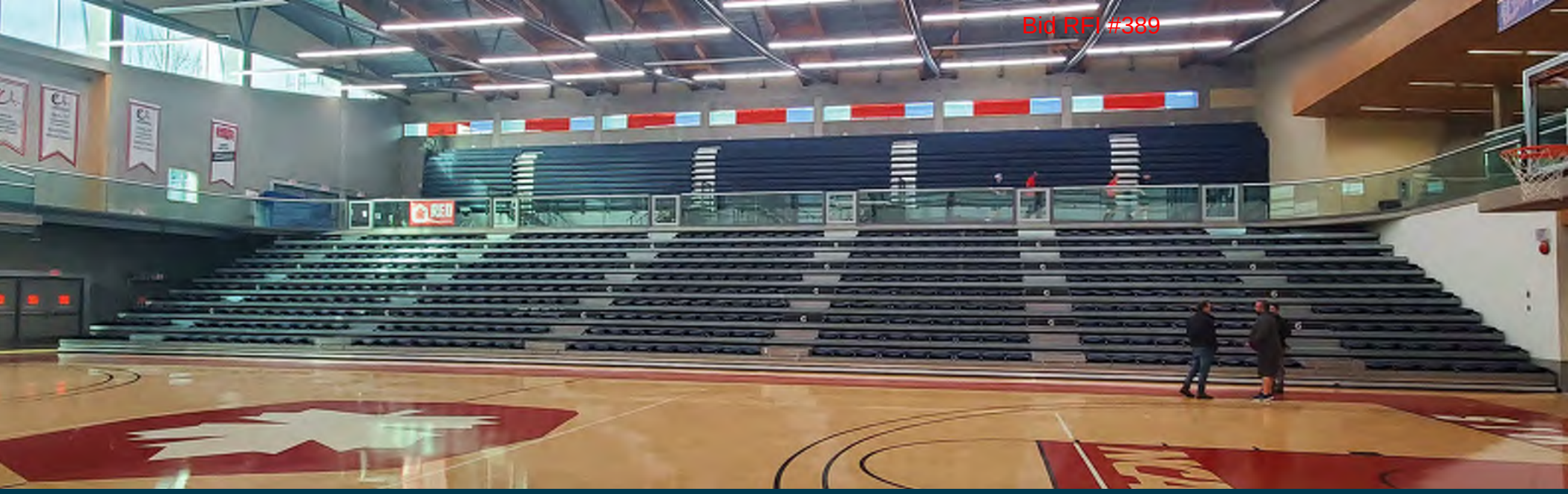
Never sacrifice comfort or functionality with Sheridan Seating's CHEER™ platform seating system. This fully customizable solution is available in a variety of decking, seat and accessory options to suit any sized facility or budget.

Our sales representative would be happy to design a hassle-free operating solution that makes changing the configuration of your venue a breeze.



SIMON FRASER UNIVERSITY,
BRITISH COLUMBIA, CANADA

Bid RFI #389



Durable polyethylene, wood* or upholstered bench or chair

Robust seating capacity with generous leg room

Recover maximum floor space (10% less than the RALLY™ line)

Comfortable ergonomic chairs with armrest or benches

Your most customizable seating solution

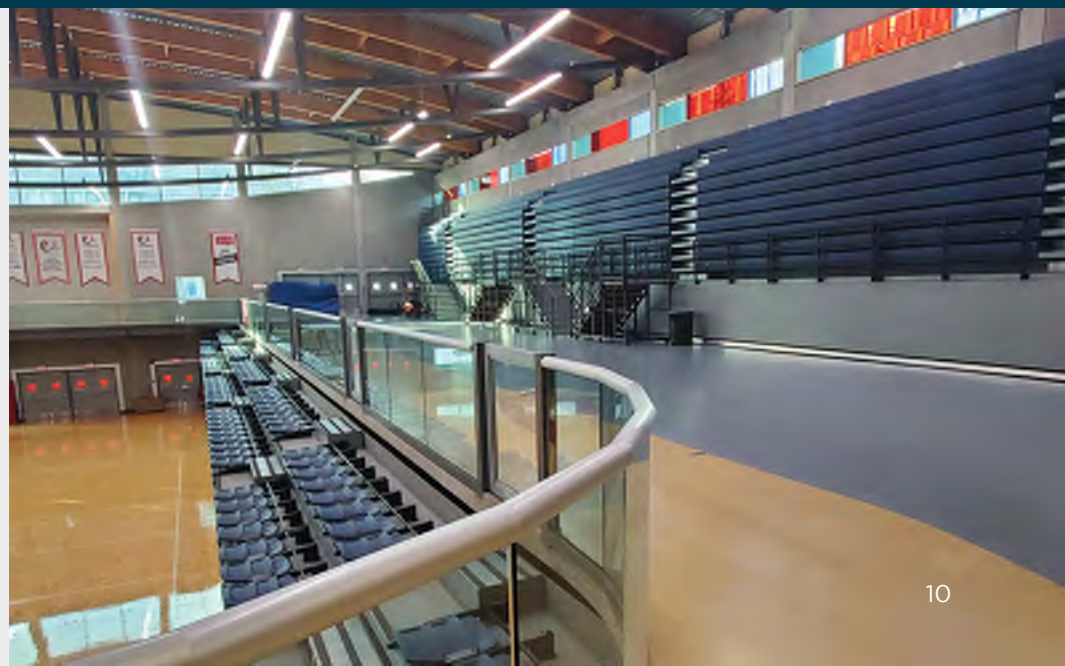
SUPERIOR COMFORT AND SPACIOUS SEATING

Available with our full line of ergonomic modular bench or folding seats, CHEER™ is great for venues looking to offer a more spacious seating experience. Our CHEER™ platform can fit seats that are 10” or 12” wide and are available with or without armrests, meaning superior comfort for your guests and premium flexibility for your multi-use space.

HASSLE-FREE ELECTRIC OPERATING

Take your facility from full capacity to intimate crowd with the touch of a button when you choose an electric operating device for your custom seating solution.

**Wood finish available for bench only.*



Bid RFI #389

APPLAUD™ BLEACHER SYSTEM

(TL8000)

Perfect for:
Performing Arts Centres, Civic Centres, Corporate Spaces, Theatres, and more.

Maximum Comfort and Class

Our largest and most luxurious platform seating solution, APPLAUD™ offers premium comfort and sophisticated style for your guests.

Suitable for even the most refined audience, this system is designed to support the deepest row spacing and most generous legroom while delivering an exceptional seating experience on world-class upholstered seats. Plus, Sheridan Seating's rugged understructure engineering ensures this seating solution is built to last.



CHARLES W. STOCKEY CENTRE AT THE BOBBY ORR HALL OF FAME, ONTARIO, CANADA

IMAGE COPYRIGHT © BONNY ORR HALL OF FAME

Bid RFI #389



Plush & sophisticated with generous seat size

Seating capacity for maximum comfort and leg room

Designed with seating as a priority

Luxurious upholstered chairs with armrests

Delivers the best seating experience

HUNDREDS OF PREMIUM SEAT OPTIONS

With access to world-leading luxury seat suppliers, your Sheridan Seating sales expert or dealer will guide you through the chair selection process so you can find the perfect fit for your venue.

DESIGNED FOR THE BEST SEATING EXPERIENCE

The designer elegance of APPLAUD™ means your seats will impress your audience as much as your venue's atmosphere and talent.



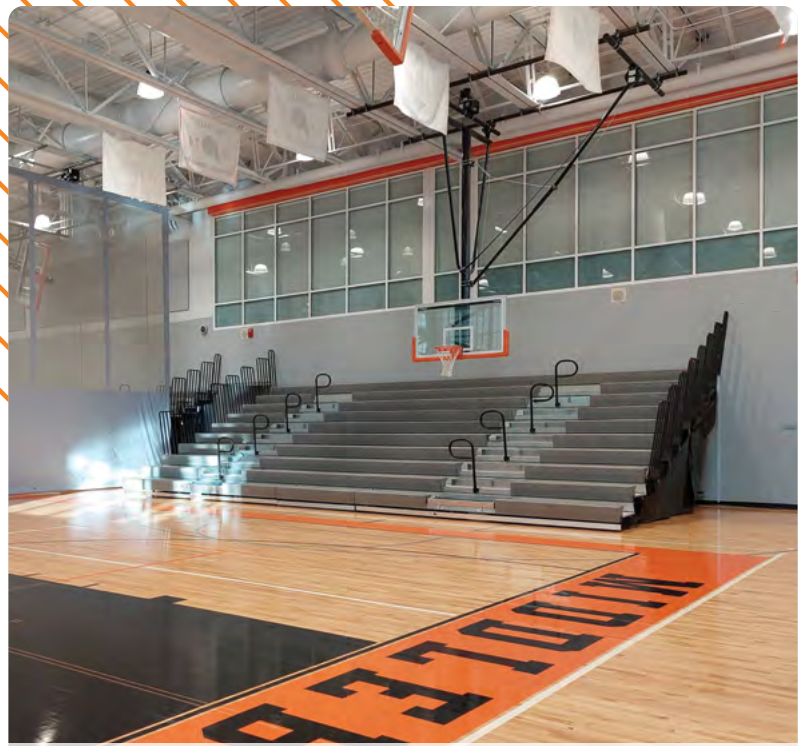
Bid RFI #389

CUSTOM SOLUTIONS FOR YOUR SPACE

DESIGNING A SYSTEM THAT FITS

At Sheridan Seating, we know every venue has unique needs, and we love finding the right solution for the job. From understanding your venue's seating capacity to coordinating with your facility's maintenance team, we excel at putting your needs centre stage and delivering a customized seating system that's designed to last.

We also know that creating a functional space takes creativity and ingenuity. Sheridan Seating's selection of installation options and configurations means that your telescopic seats can function how you need them to – on and off game day.



MIDDLEBOROUGH HIGH SCHOOL, MASSACHUSETTS, US

INSTALLATION OPTIONS

Don't miss out on recoverable space when your seating system is retracted. Choose from one of Sheridan Seating's three installations options designed to maximize your venue's space efficiency. With each option, Sheridan Seating's custom understructure can seamlessly accommodate up to 50 telescoping rows.

Wall Attached: Adaptable and efficient, a wall-attached configuration ensures your space is easily recoverable and quick to turn over so you can get the most out of your facility. Easy to install in an existing venue, this option is great for retrofits and renovations.



Recessed: Hide your closed seats within a discrete wall pocket, such as under a balcony overhang or mezzanine, to maximize floor space and aesthetics when your bleachers or seats are stacked.





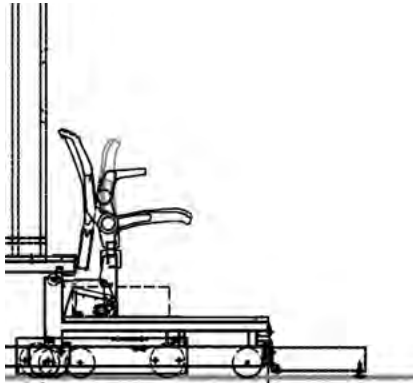
Reverse Fold: Choose a reverse fold configuration when you need to create additional space behind your seating set-up or divide your venue. Think practice space, dressing area or additional storage. Need a cleaner look? Add back panels and end curtains to hide the understructure and mechanics.



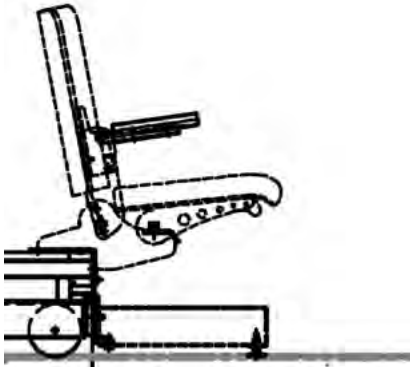
CHAIR MOUNT OPTIONS

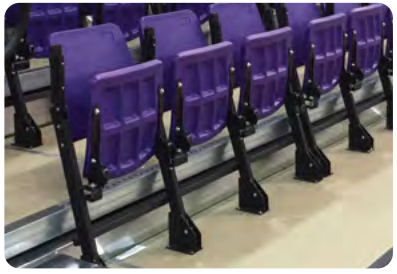
Choose from one of two standard chair mount options designed to meet your venue's space and configuration needs.

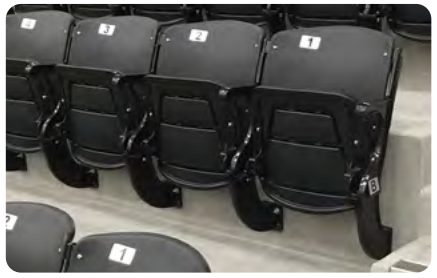
Deck Mount: Mounted on the surface of your platform, this chair style allows for easy folding to stow away seats between rows. Available with an optional semi-automatic fold down device, chairs can be folded as the system is closed. Once opened, chairs are locked into place for safe and secure seating.



Nose Mount: Mounted to the nose of each platform level, these seats offer a chair with ergonomic construction that fits into a narrow envelope for low-rise retractable platforms. Sheridan's upholstered nost mount style allows for additional seat padding for maximum comfort.







Bid RFI #389

FLEXIBLE OPTIONS. EASY OPERATION.

DECKING OPTIONS

Don't let the decking for your telescopic seating system be an afterthought. We provide three decking offerings that give you durability level and price point choices.

Plywood decking is an economical option and is included with standard bleacher systems. Available in Tan, Grey, Clear or Custom Hues.

Looking for more colour options? For a small premium, Panelam decking provides various colour choices, durability and style.

To maximize durability, Sheridan offers a premium aluminum decking option. While the most expensive solution, you know it's built to last.





OPERATING DEVICES

Whether a fully manual or electric drive system is within your vision and budget, Sheridan Seating can recommend and install the best operating device for the job.

Manual:

Manual operation is available for seating systems up to 7 rows deep, and are installed with a standard operator handle. Easy to use, the operator handle hooks under the first row of bleachers and is used to guide the system sections in or out.

Manual systems can be upgraded with an optional Portable Power Tractor Mule. This bleacher mule is a safe and economical way for one person to make the job of opening and closing the bleachers easier and more efficient. Sheridan Seating's Portable Power Tractor Mule operates on standard 115 volt 20 amp service.

Electric Friction Power:

Our most requested operating system, Sheridan Seating's friction drive system is the strongest on the market, able to push or pull up to 8,000 lbs. With higher horsepower and larger than average drive wheels (12" vs. industry-standard 4"), Sheridan's friction drive system will ensure your venue turnover is quick and seamless - every time. Operable from a hand-held pendant control box with 208 volt, 3 phase or 110 volt, single phase, 60 Hz power and a left and right jog button, this option offers straight and true steering when opening or closing the system. Recommended for seating systems over 7 rows.

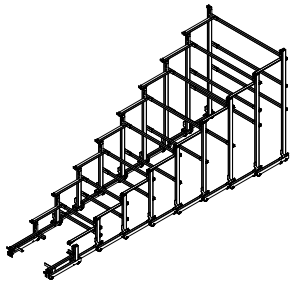
Electric Non-Friction Power:

This fully automated power system operates wall-attached, recessed or reverse-fold telescopic bleachers with the touch of a button. Typically recommended for larger telescopic seating systems, Sheridan's non-friction drive system can move more rows faster and with less hassle than other options on the market - all without the need for traction force on your venue's floor.

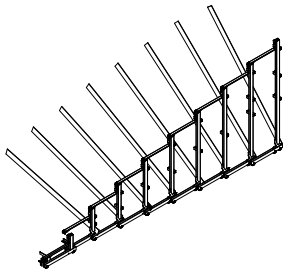
UNDERSTRUCTURE

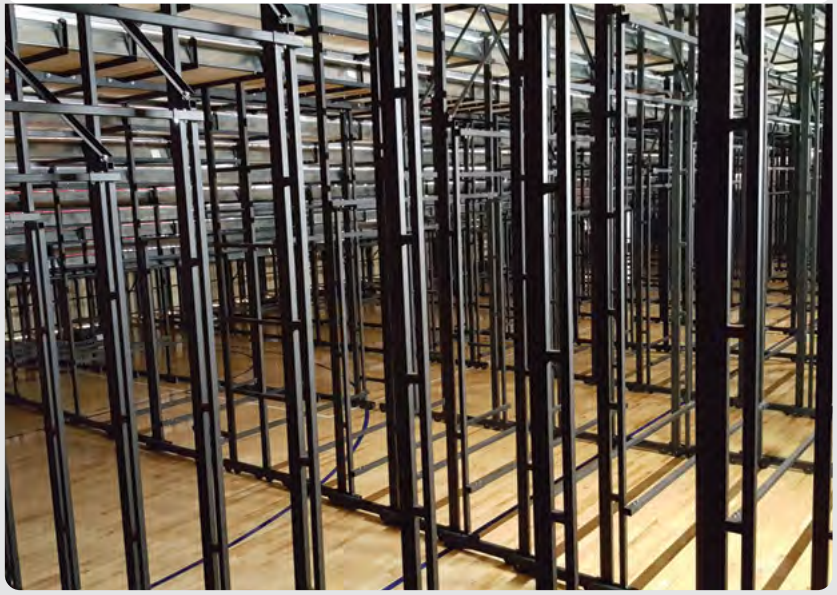
Our rugged understructure is made with 100% North American steel for unparalleled strength and durability. Engineered with 3/4" decking and 10 gauge tubing, and supported by four support columns instead of only two, you'll never question the toughness of your Sheridan Seating system - designed to meet or exceed industry standards.

Sheridan Frame Assembly



Competitor Frame Assembly





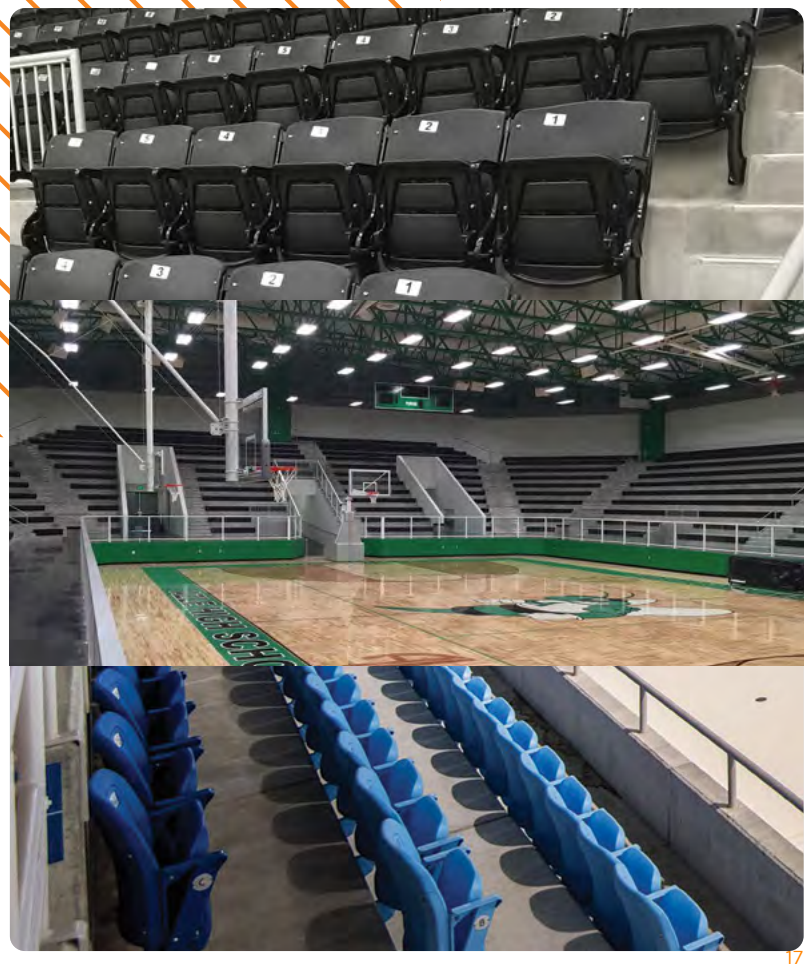
SEATING SYSTEMS

FIXED SEATING FOR A DEPENDABLE AUDIENCE

Whether you're looking to install a new fixed seating system in your venue or replace existing seats on your current steel, wood or concrete platform, Sheridan Seating can help.

From performing arts centres and theaters to casinos and arenas, our fully customizable seating options will fit your venue's needs perfectly - every time.

Available in our full range of seat style and finish options, inspire your guests with a cohesive look and feel from the moment they walk into your venue.



PORTABLE SEATS FOR ENDLESS LAYOUTS

Does your venue need extra seats when hosting bigger events?

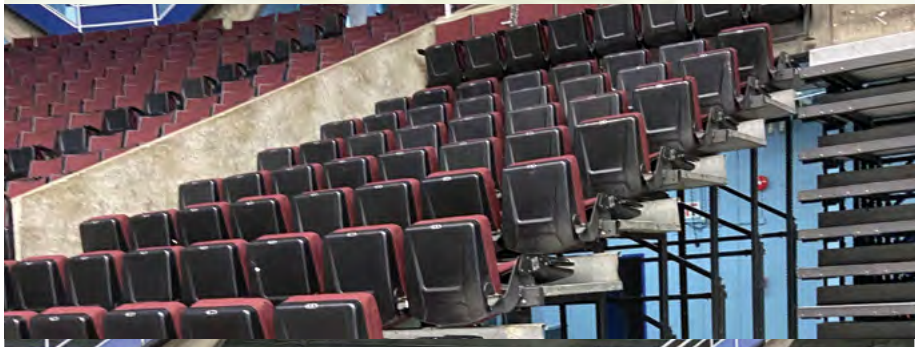
Add portable bleachers or chairs to your facility's seating solution to easily accommodate more guests when and where you want them, creating a custom seating layout for any event.

With Sheridan Seating's portable equipment, you can quickly and easily move and store your additional seats with zero hassle and maximum flexibility.

Available operating devices include:

- Hydraulic Lift Cart
- Portable Power Tractor Mule







SEATING A CROWD OUTDOORS

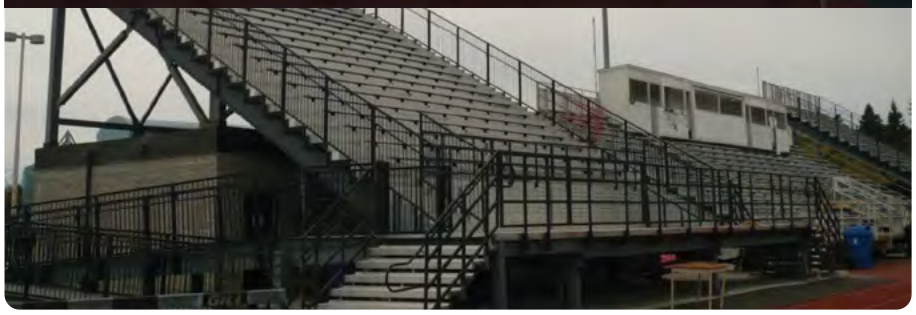
Invite your fans to cheer from the sidelines with Sheridan Seating's fixed outdoor seating system.

Manufactured with our signature galvanized steel understructure with aluminum decking and seats, this rugged system can withstand the wear and tear of the elements and your fans' excitement.

Choose from a nearly endless selection of custom sizes, colours and finishes to really turn up the spirit - on and off the field.







Bid RFI #389

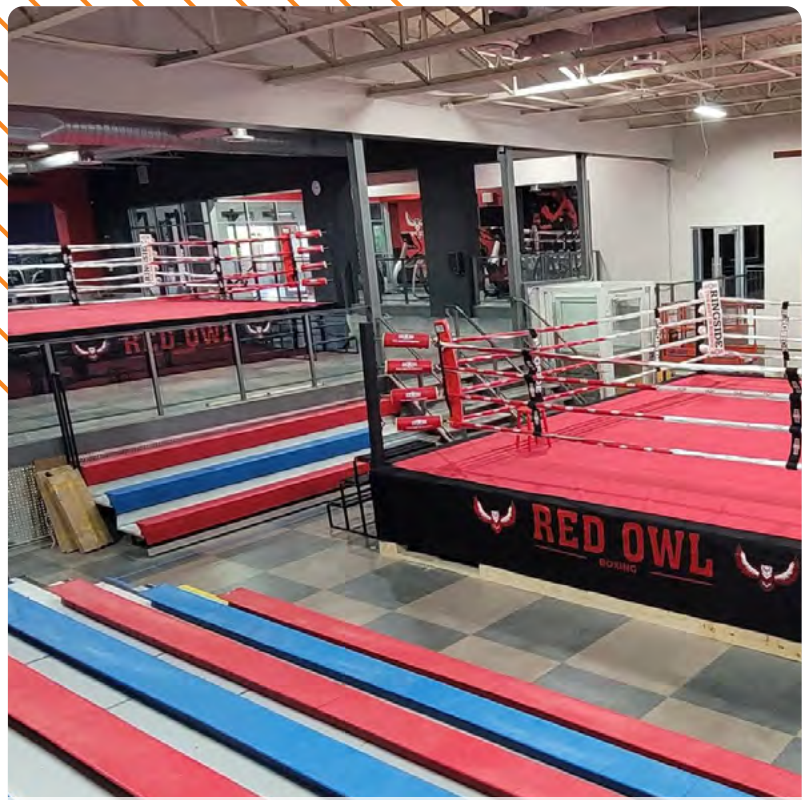
DESIGN CENTRE

Let's bring your venue's vision to life!

DESIGN YOUR SYSTEM IN 4 STEPS

Available in a wide range of styles, colours and finishes, Sheridan Seating's seat and accessory options deliver the finishing touches your venue needs to take it from little league to world class.

With nearly endless customizations available, you'll never have to sacrifice functionality or comfort. Whether your seating system is fixed or telescopic, and no matter which style of seat you choose, your venue's vision will extend from reception hall to centre stage.



RED OWL BOXING BRAMPTON, ONTARIO, CANADA.

IMAGE COPYRIGHT © RED OWL BOXING

Bid RFI #389

Bench

Standard with the RALLY™ seating system, Sheridan Seating's bench-style seats are made from colour-fade and scuff-resistant polyethylene. Ergonomically formed, these polyethylene seats are easy on your bottom and your bottom line. The bench seat's compact design allows for the maximum number of seated guests in your venue. Also available with an optional backrest.





Depth:
10" or 12"
Materials:
Polyethylene Plastic or Wood
Finishes:
15 Standard Colours + Custom Hues
Options:
Backrest, row letters and seat numbers

Available with: RALLY™ Bleacher System, Fixed Seating Systems, Portable Seating Systems

Chair

Sheridan Seating's arena-style seat is available with both the CHEER™ and APPLAUD™ seating systems. With full back and arm rests, the arena seat will fit in almost anywhere - from school auditorium to sophisticated lecture hall.

Available in a wide variety of colours, styles and finishes, this ergonomic option delivers a refined seating experience while efficiently seating guests. Finish options include polyethylene, upholstered and wood, with optional cup holders, row number plates, and more.



Depth:
18"
Materials:
Polyethylene Plastic, Upholstered and Wood
Finishes:
15 Standard Colours + Custom Hues (Plastic)
Options:
Cup holders, row number plates, and more

Available with: CHEER™ Seating System, APPLAUD™ Seating System, Fixed Seating Systems, Portable Seating Systems

Chair XL

Looking for the most luxurious seat on the market? We can help! When manufacturing a custom-built APPLAUD™ seating system for our clients, Sheridan Seating partners with exceptional seat suppliers to source the right chair for the job. With this seat, you can customize every detail, from the finish and fabric stitching right down to the screw holes.



Depth:
22"
Materials:
Wide range of fabric and leather choices
Finishes:
Seat/logo stitching and more
Options:
Cup holders, row letter plates, seat numbers, and more

Available with: APPLAUD™ Seating System, Fixed Seating Systems, Portable Seating Systems

Bid RFI #389

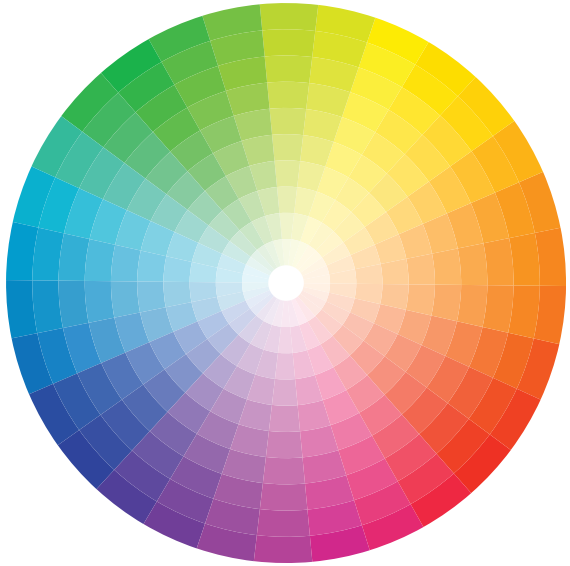
DESIGN CENTRE

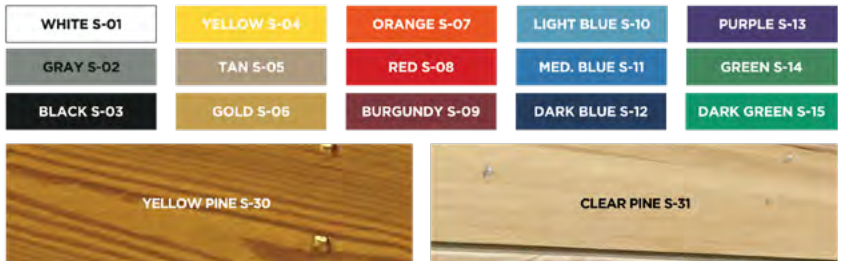
Let's bring your venue's vision to life!

COLOURS & FINISHES

15 Standard colours. Endless possibilities.

Available in 15 standard colours and endless custom hues, your venue's formed-poly seats will be the star of the show. Incorporate patterns, symbols or your home team's initials into your seating system design by using contrasting colours of seats.*





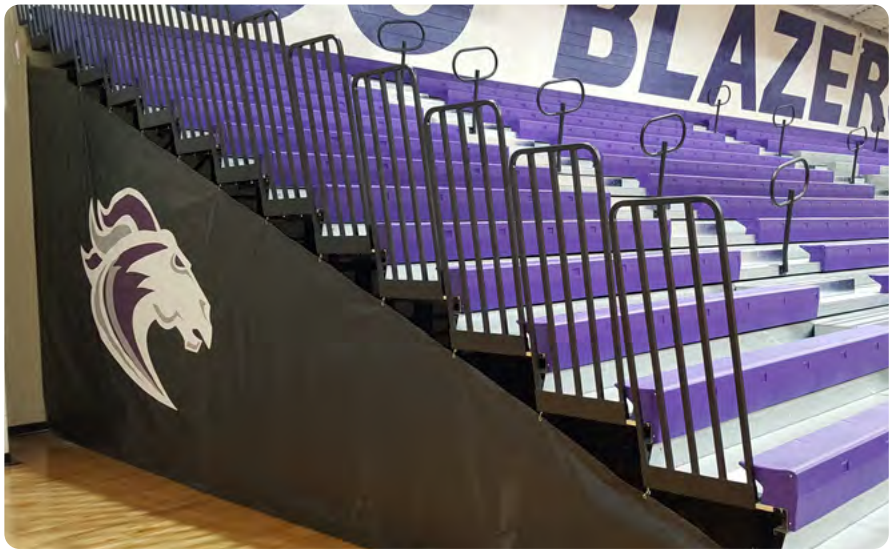
If you're looking for a more traditional look, we offer classic Southern Yellow Pine and Clear Pine bench finishes. Triple-sanded and finished with two coats of semi-gloss polyurethane, Sheridan's wooden seats look great and are tough on wear and tear.

*Available at a premium.

CURTAINS & DIVIDERS

End Curtains

Neatly cap off the end of your telescopic or fixed seating system with an end curtain. Available in 18 oz or 50 oz vinyl fabric and an endless selection of custom colours.



Divider curtains

Easily divide one space into two with a Sheridan Seating divider curtain. Choose from three different styles and endless combinations of vinyl and mesh to enhance the look and feel of your facility. Available in 18 oz or 50 oz vinyl fabric.

Electric Fold-Up Curtain
Sheridan's electric fold-up curtain can be installed onto any existing platform truss - telescopic or fixed. Operated with a key-activated electric switch, the curtain raises or lowers with the touch of a button. Available in single-wall or double-wall models.

Walk-Draw Curtain
The most economical divider curtain to purchase and maintain, Sheridan's walk-draw curtains can be operated and stacked in a small building recess or flat again the wall. Available in vinyl, nylon mesh or any combination of the two.

360° GRAPHICS

Custom Vinyl Wraps

Wrap your venue in 360° of style with Sheridan Seating's custom vinyl wraps. Available in vibrant, full-colour customizations, these eye-catching finishes are sure to inspire every guest.





Bid RFI #389

SAFE SEATING FOR EVERY GUEST

No one should have to miss out on the thrill of a moving performance, game-winning goal or inspiring presentation. That's why Sheridan Seating proudly meets or exceeds industry standards in safety and accessibility on every install.

Not only that, but our fully ADA or RADA-compliant sections are safe and stylish. Available in the painted finish of your choice, your seating system can be accented by a punch of colour in every row, or supporting by safety rails in muted tones that fade into the background.



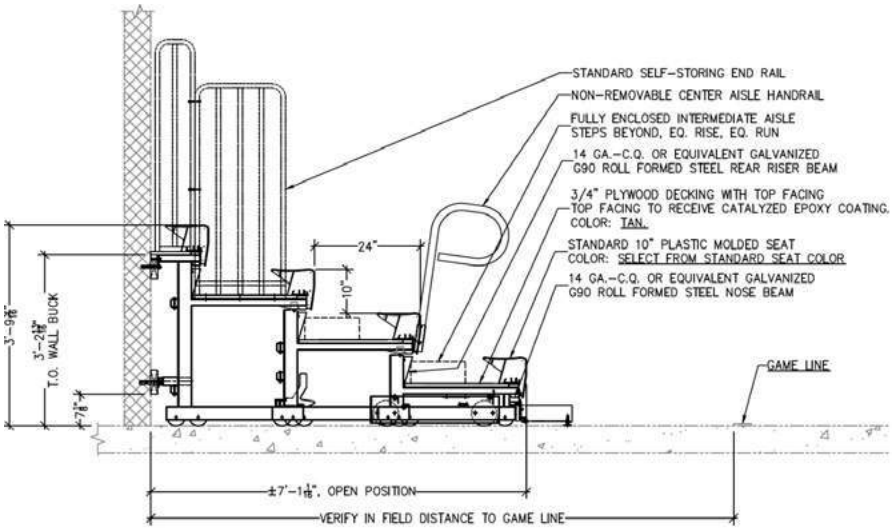
MORTON RANCH HIGH SCHOOL, KATY ISD, TEXAS, US

Bid RFI #389

SAFETY RAILS

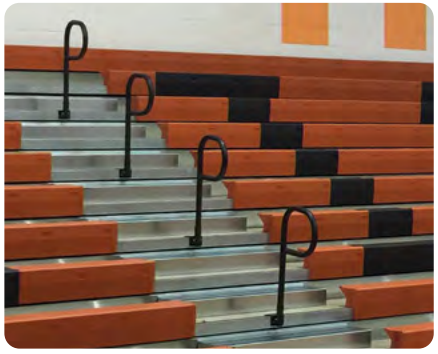
End Rails

Sheridan Seating telescopic seating systems are installed with standard non-removable, self-storing rails for the ends of the bleacher platform systems.



Center Aisle Hand Rails

Available in P or D style, Sheridan Seating's centre aisle hand rails are sturdy and user friendly. No removal required, they're operable with the push of a button or in a simple pick-up and turn model. Removable options available when space limitations are a concern.





Back/Front Rails

Required for use on portable or reverse fold bleachers, back rails fill the space anywhere that the bleacher is not directly against the wall.

Removable ADA Rails

This rail is used for ADA spaces that are recoverable when needed for standard seating. Simply remove the rail and the space can be converted to standard seating.

Non-Removable ADA Rails

The NRADA rail is permanently attached to prevent falls from the deck behind permanent ADA seating. All of Sheridan's ADA rails meet required American Disabilities Act codes.

SAFETY ACCESSORIES

Delay Action Frame

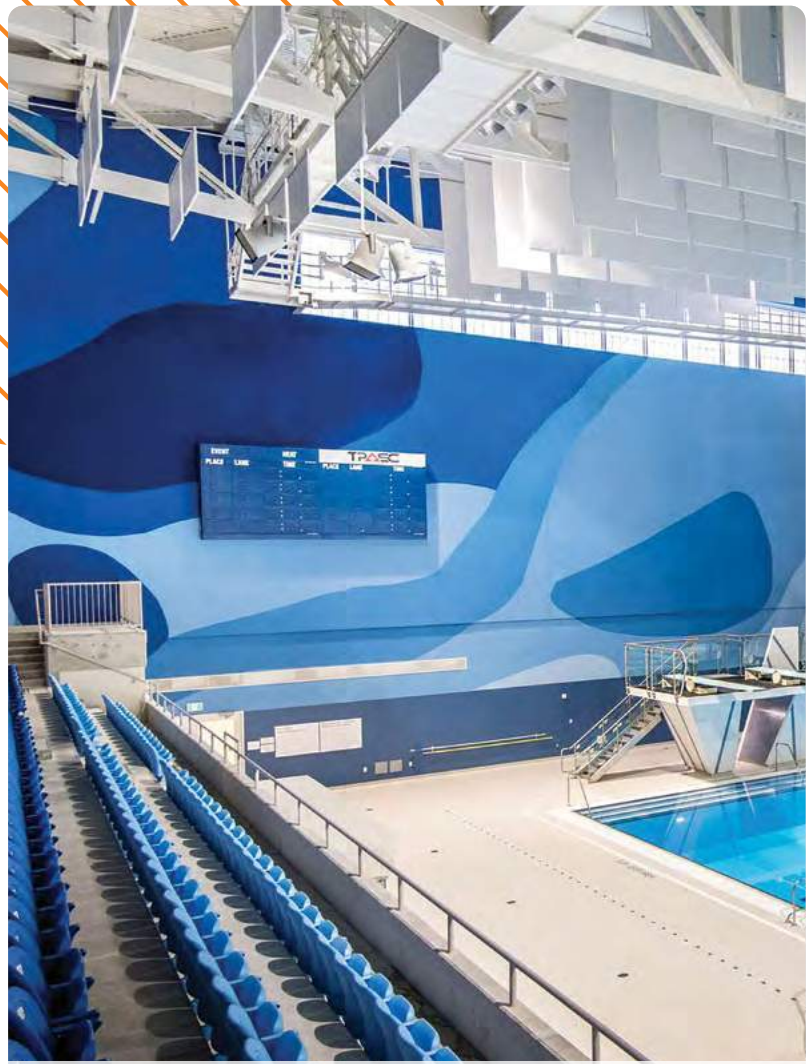
The Delay Action Frame is a great option for venues that want an extra level of protection on their seating system. This frame operates on a time lag before the bleachers begin to move into the open or closed position.

Row Lock

Sheridan's Row Lock is operated by gravity, with no springs needed. The row locking mechanism allows for the securement of any row in the open position so you can choose how many seats you'd like to make available. To prevent unwanted movement, the system is only operable upon unlocking and moving the first row of seats.

PRODUCT DIMENSIONAL DATA

At Sheridan Seating, delivering custom telescopic seating solutions is our specialty. But, to help get you started with your project, our products are available in the following standard sizes, with custom rise and run dimensions available to meet your unique needs.



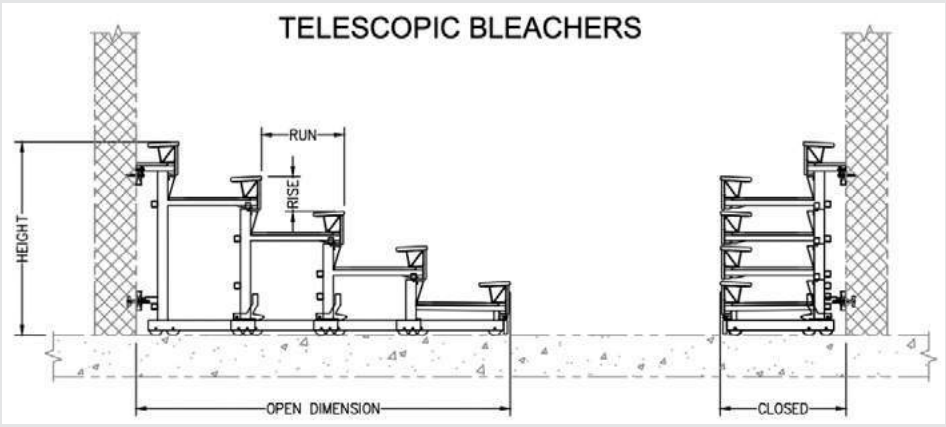
AQUATIC CENTRE, TORONTO PAN AM CENTRE, ONTARIO, CANADA.

IMAGE COPYRIGHT © ENTRO.COM

Dimensional Data

Row	Open Dimensions (mm) 22" Spacing	24" Spacing	26" Spacing	33" Spacing	Height (mm) 10" Rise	11 5/8" Rise	16" Rise
3	4'-9 1/16" (1449)	5'-1 1/16" (1551)	5'-5 1/16" (1653)	6'-7 1/16" (2008)	2'-11 5/8" (905)	3'-4 7/8" (1038)	4'-3 1/8" (1299)
4	6'-7 1/16" (2008)	7'-1 1/16" (2161)	7'-1 1/16" (2313)	9'-4 1/16" (2846)	3'-9 5/8" (1159)	4'-4 1/2" (1334)	5'-7 1/8" (1705)
5	8'-5 1/16" (2567)	9'-1 1/16" (2770)	9'-9 1/16" (2973)	12'-1 1/16" (3685)	4'-7 5/8" (1413)	5'-4 1/8" (1629)	6'-11 1/8" (2111)
6	10'-3 1/16" (3126)	11'-1 1/16" (3380)	11'-11 1/16" (3634)	14'-10 1/16" (4523)	5'-5 1/8" (1667)	6'-3 3/4" (1924)	8'-3 1/8" (2518)
7	12'-1 1/16" (3685)	13'-1 1/16" (3989)	14'-1 1/16" (4294)	17'-7 1/16" (5361)	6'-3 5/8" (1921)	7'-3 3/8" (2219)	9'-7 1/8" (2924)
8	13'-11 1/16" (4243)	15'-1 1/16" (4599)	16'-3 1/16" (4955)	20'- 4 1/16" (6199)	7'-1 3/8" (2175)	8'-3" (2515)	10'-11 1/8" (3331)
9	15'-9 1/16" (4802)	17'-1 1/16" (5209)	18'-5 1/16" (5615)	23'-1 1/16" (7037)	7'-11 5/8" (2429)	9'-2 5/8" (2810)	12'-3 1/8" (3737)
10	17'-7 1/16" (5361)	19'-1 1/16" (5818)	20'-7 1/16" (6275)	25'-10 1/16" (7876)	8'-9 5/8" (2683)	10'-2 1/4" (3105)	13'-7 1/8" (4143)
11	19'-5 1/16" (5920)	21'-1 1/16" (6428)	22'-9 1/16" (6936)	28'-7 1/16" (8714)	9'-7 5/8" (2937)	11'-1 7/8" (3400)	14'-11 1/8" (4550)
12	21'-4 1/16" (6504)	23'- 2 1/16" (7063)	25'-0 1/16" (7622)	31'-5 1/16" (9577)	10'-5 5/8" (3191)	12'-1 1/2" (3696)	16'-2 1/8" (4956)
13	23'-2 1/16" (7063)	25'-2 1/16" (7672)	27'-2 1/16" (8282)	34'-2 1/16" (10416)	11'-3 5/8" (3445)	13'-1 1/8" (3991)	17'-7 1/8" (5363)
14	25'-0 1/16" (7622)	27'-2 1/16" (8283)	29'-4 1/16" (8942)	36'-11 1/16" (11268)	12'-1 5/8" (3699)	14'-0 3/4" (4286)	18'-11 1/8" (5769)
15	26'-10 1/16" (8180)	29'-2 1/16" (8891)	31'-6 1/16" (9603)	39'-8 1/16" (12092)	12'-11 5/8" (3953)	15'-0 3/8" (4582)	20'-3 1/8" (6175)

Closed Dimensions (mm) 22" Spacing	24" Spacing	26" Spacing	33" Spacing
2'-11 1/16" (891)	3'-1 1/16" (941)	3'-3 1/16" (992)	3'-10 1/16" (1170)



Notes

- Open and closed dimensions will be affected by pilasters or other projections in the wall that exceed 3". In these cases, please contact Sheridan Seating for accurate dimensions.

- Reverse fold or portable bleachers may have slightly different open and closed dimensions.

- Exceeding 15 rows may require special engineering. In this case, please contact Sheridan Seating directly to discuss the best solution for your venue.

Our Dealer Network

Ready to get started and bring your venue's vision to life? Sheridan Seating works with experienced vendors across North America who can support you from project conception to installation and beyond. Visit our website to learn more about the areas we serve and to connect with an approved Sheridan Seating dealer near you.

www.sheridanseating.com

Sheridan Seating is proudly certified by the following standards organizations:

Notes

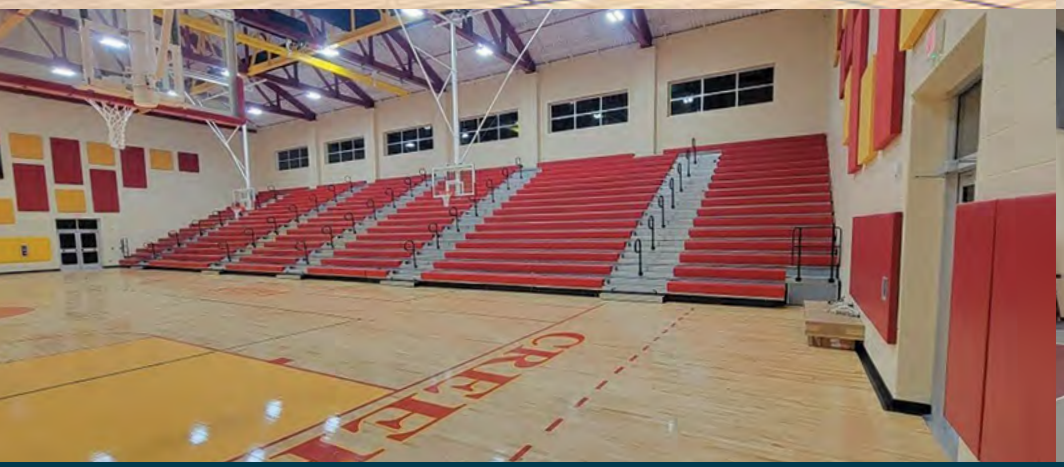
Bid RFI #389

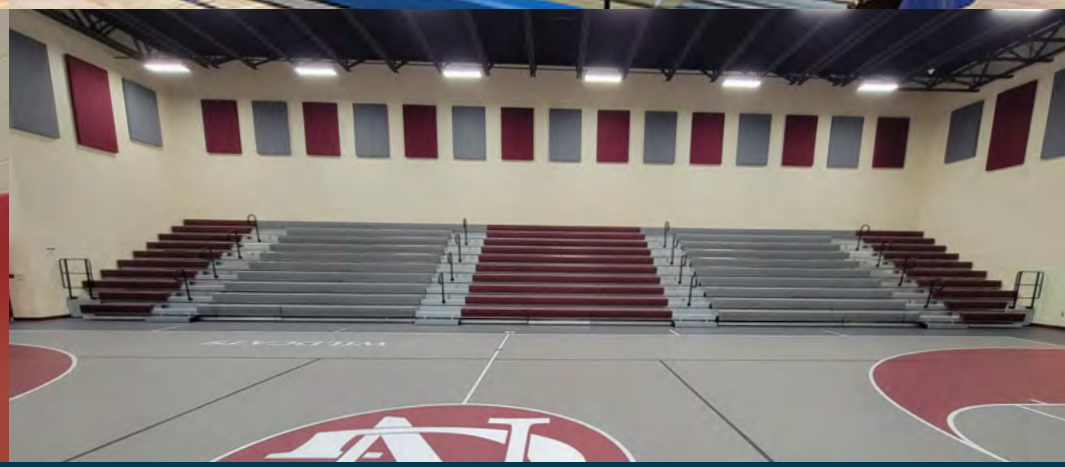












SHERIDAN SEATING inc.

For more bleacher designs inspiration visit us at **sheridanseating.com**

Sheridan Seating Inc. Manufacturer's Qualifications

Sheridan Seating Inc., has been manufacturing Telescopic Bleachers since 1978 for sporting, educational, instutional, places of worship and private facilities throughout North America.

The Sheridan products meet all the North American required standards; ADA & ABA 2004 USA, IBC 2021 USA, NFPA-102 2021 USA, ANSI-300 2017 USA & CANADA, BOCA USA & CANADA, NFC Canada 2020, NBC Canada 2020, 2017 ICC 300, Accessible Canda Act. as well as CWB – Canadian Welding Bureau which is equivalaent to AWS – American Welding Society and all electrical components are UL, UL-C, UL-US certified.

Upon request this letter accompanies a listing of comparable installation completed in the last 5 years.

Should you require further information do not hesitate to contact us.

Thank you.

Robert White
Owner, Director of Quality & Sales
robert@sheridanseating.com
m. (705) 326-7463 Ext. 222

290 West Street South, Orillia, ON, Canada, L3V 5G8
www.sheridanseating.com

SUBSTITUTION REQUEST
(During the Bidding/Negotiating Phase)

PROJECT: New Central Middle School Project
State Project No. 057-0114 N

SUBSTITUTION REQUEST NUMBER: 2

FROM:

TO: Joseph Phelan
Turner Construction Company

DATE: October 30, 2024

A/E PROJECT NUMBER: 22367.00

RE: Fixed Seating Substitution

CONTRACT FOR: Fixed Seating

SPECIFICATION TITLE: Fixed Seating at Gym

DESCRIPTION: The Ovation Seat - Fixed Seating

SECTION: 126100 **PAGE:** 1051 - 1064 **ARTICLE/PARAGRAPH:** 2.7.A

PROPOSED SUBSTITUTION: Fixed Seating

MANUFACTURER: Sheridan Seating Inc. **ADDRESS:** 290 W. St. South **PHONE:** (705) 326-7463 x238

TRADE NAME: Sheridan Seating Inc. Orillia, ON, Canada L3V 5G8 **MODEL NO.:** CT300

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.
Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The Undersigned certifies:
- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

SUBMITTED BY:

SIGNED BY:

FIRM:

ADDRESS:

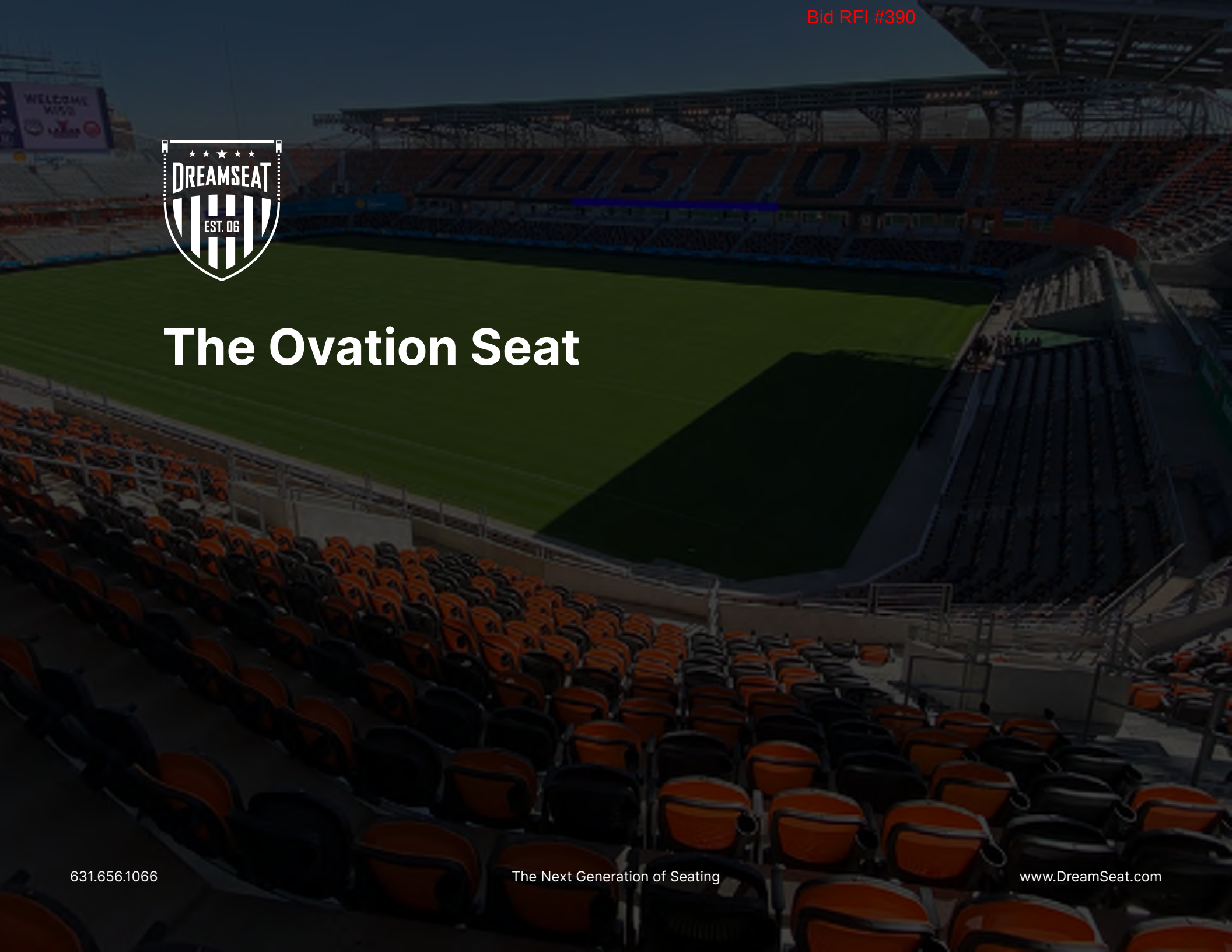
TELEPHONE:

A/E's REVIEW AND RECOMMENDATION:

- ☐ Approve Substitution—Make submittals in accordance with Specification Section 01 33 00 Submittal Procedures.
- ☐ Approve Substitution as noted—Make submittals in accordance with Specification Section 01 33 00 Submittal Procedures.
- ☒ Reject Substitution—Use specified materials.
- ☐ Substitution Request received too late—Use specified materials.

SIGNED BY: Stephen Martocchio **DATE:** 11/6/2024

SUPPORTING DATA ATTACHED: ☒ Drawings ☒ Product Data ☐ Samples ☐ Tests ☐ Reports ☒ See Table of Contents



The Ovation Seat

Table of Contents

3 — The Ovation Seat

7 — Accessories

8 — Color Options

10 — The Rail System

11 — Power Rail

12 — Perfect Pairings

13 — Gallery

The Ovation Seat

The seat modules are attached to the extruded aluminum rail profile using a simple clamp system, meaning seats can be spaced out evenly during installation before being tightly secured.

The Ovation range is applicable to both stadiums and arena environments. The unit comprises of a seat and backrest molded from premium grade polypropylene co-polymer. Gas injection molding technology is used to create a ridged perimeter to the seat and backrest components which provides unparalleled strength and durability. Spring housings and backrest supports are injection molded from glass reinforced polyamide, and the assembly is designed so that there is no visible fixing hardware.

Available Ovation Models



CT300

Ovation Seat
Plastic Back
Plastic Bottom

Available Sizes:
450mm
460mm
480mm



CT301

Ovation Seat
Plastic Back
Padded Bottom

Available Sizes:
450mm
460mm
480mm



CT302

Ovation Seat
Padded Back
Padded Bottom

Available Sizes:
450mm
460mm
480mm



CT322

High Back Ovation
Padded Back
Padded Bottom

Available Sizes:
450mm
460mm
480mm



CT350

Zephyr
Mesh Back
Mesh Bottom

Available Sizes:
Only 450mm



CT350FXHB

Zephyr Max
Mesh Back
Mesh Bottom

Available Sizes:
450mm
510mm

About The Ovation Seat

— *CT300 / CT301 / CT302*

Ovation is an ergonomic beam mounted stadium chair that is taking the sporting world by storm! More comfortable and cost effective than traditional stadium seats the Ovation provides ease of install and maintenance along with a flexible finished installation. Available for projects large and small the Ovation is a favorite for stadium and arena projects across North America.



Plastic Back and Bottom



Padded Back and Bottom

— *Warranty*

5 year warranty on structural components and mechanical features

— *Available Sizes*

450 mm
460 mm
480 mm

— *Accessories*

Fixed Arm
Tip Up Arm
Rear Mount Cup
Flippy Cup
Armrest With Cup Holder
Seat Lock
Seat Numbers & Row Letters

— *Plastic & Vinyl Colors*



About The High Back Ovation Seat

— *CT322*

The high-back ovation is the more VIP cousin of our budget friendly Ovation chair, utilizing the same beam design and ergonomics but incorporating a thick padded bottom and a higher 39" padded back. This is the perfect seat for a club area or suite where you have tight spaces but are looking for a VIP level seat that will keep your fans coming back. More comfortable and cost effective than traditional stadium seats the Ovation provides ease of install and maintenance along with a flexible finished installation.



— *Warranty*

5 year warranty on structural components and mechanical features

— *Available Sizes*

450 mm
460 mm
480 mm

— *Accessories*

Fixed Arm
Tip Up Arm
Rear Mount Cup
Flippy Cup
Armrest With Cup Holder
XZipit Logo System
Seat Numbers & Row Letters

— *Plastic & Vinyl Colors*

About The Zephyr Seat

— *CT350 / CT350FXHB*

Our newest innovation, the Zephyr, is designed for areas in stadium that get the most sun. Designed to provide air flow and a cooler seated experience, the Zephyr is a welcome addition to the DreamSeat line of offerings.



— *Warranty*

5 year warranty on structural components and mechanical features

— *Available Sizes*

450 mm
510 mm (Zephyr Max Only)

— *Accessories*

Fixed Arm
Tip Up Arm
Rear Mount Cup
Armrest With Cup Holder
Seat Numbers & Row Letters

— *Mesh Colors*



Accessories

Armrests

Ovation has a choice of two armrest options, basic and deluxe. Both options are attached independently to the rail as opposed to the seat module.

Deluxe is a more substantial armrest, its fold back function allows it to be used on telescopic platforms, folding automatically on contact with the deck.

Cup Holders

The only cupholder that's pretty much indestructible, and wont leave your patrons with a bruised leg as an overriding memory of what was an otherwise great event experience.

Our cupholders are moulded from a semi ridged polymer and designed to be – yes, as close as it gets to indestructible!



Fixed Armrest

Available for All Ovation Models



Deluxe Tip Up Armrest

All Ovation Models



Rear Mounted Cup Holder

All Ovation Models



Flippy Cup

Not Available on the Zephyr Model



Armrest with Cup Holder

All Ovation Models



Seat Lock

Only Available for Plastic Ovation Seat



Seat Numbers

Available for All Ovation Models



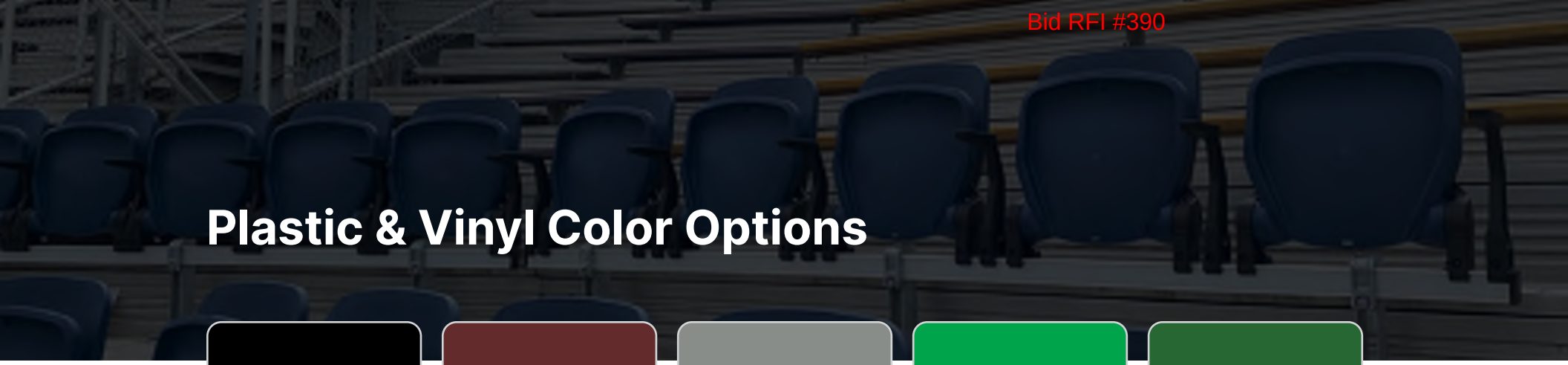
Aisle / Row Letters

Available for All Ovation Models



XZipit Logo System

Available for High Back Ovation Only



Plastic & Vinyl Color Options

C01 Black

C02 Brown

C03 Neutral Grey

C04 Signal Green

C05 Dark Green

C06 Light Blue

C07 Signal Blue

C08 Galaxy Blue

C09 Purple

C10 Burgundy

C11 Cardinal Red

C12 Orange

C13 Gold

C14 Beige

C15 Off White Sand

C16 White

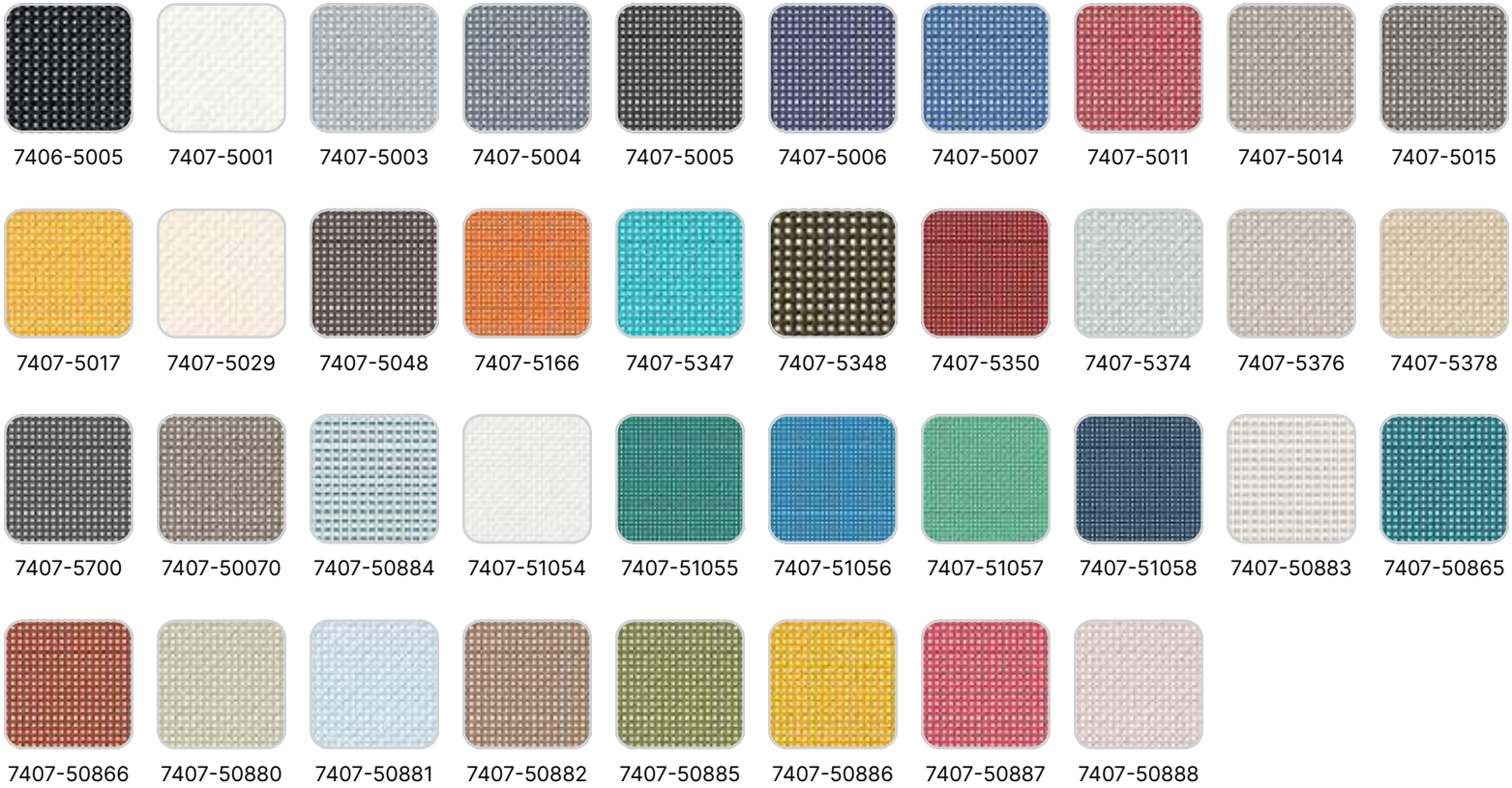
C17 Signal Yellow

Note: Full range of standard plastic colors and custom colors available on large projects.

Mesh Color Options

Note: Only available for the Zephyr model.

Batyline Iso is the industry standard for outdoor sling furniture. Its long life is due to extremely simple implementation, excellent resistance to weather conditions and dimensional stability. This range, stocked in 31 colors (3 in the fire retardant range), is the broadest on the market.



Bid RFI #390

The Rail System

Are all rail mounted seats the same?

Our competitors would like you to believe so!

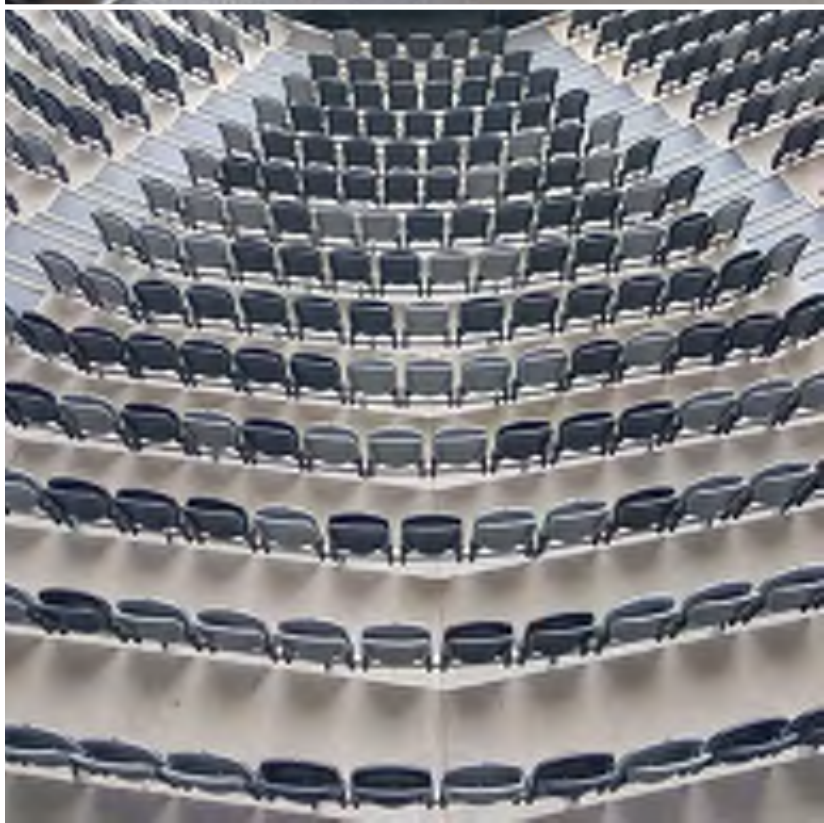
DreamSeat models are fitted to the same rail system, meaning that any Ovation can be interchanged anywhere in the facility, making upgrades and future proofing as simple as switching out the seats.

20+ years of experience and continuous improvement has resulted in, quite simply; the best. Our extruded aluminum rail profile is constrained into support fabrications on all four faces by a galvanised steel clamp.

The only system on the market that can be formed into a curve on the job site...

This has the advantage that the rail does not have to be installed in shorter straight sections, which in turn allows seat modules to be installed with beautifully even spaces between them, the result can be seen in the picture to the right.





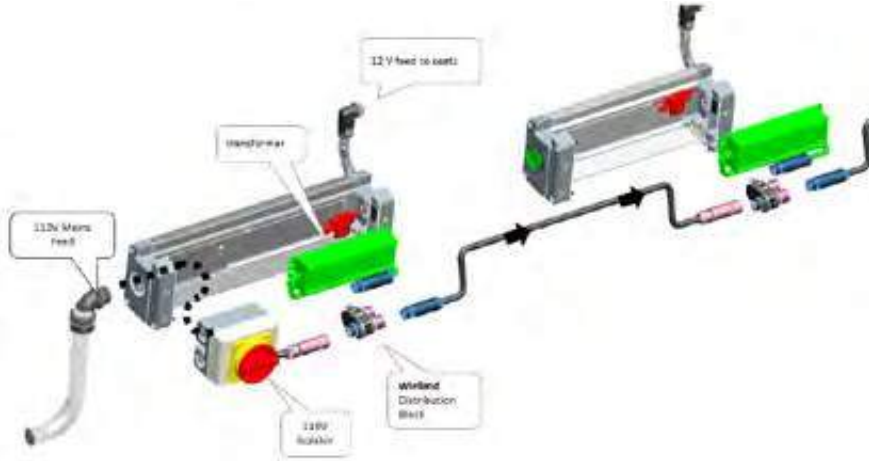


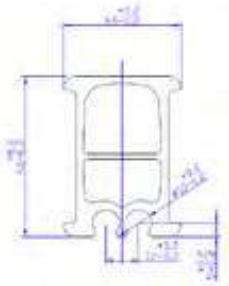


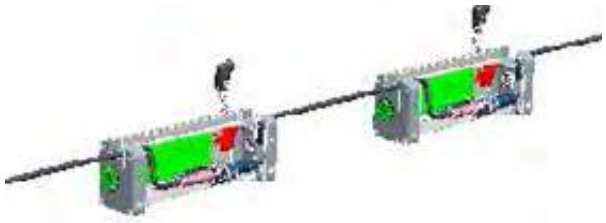
DREAMSEAT

Power Rail

Power Rail Available With USB, USBc, and Traditional Power Outlets







Perfect Pairings For Your Ovation

Grid System

The new design creates an even easier and quicker install experience with a quick glide in install system. The chairs line up straight every time and do not move or serpentine as folding chairs tend to do.

- Chair Locked into Sled Base
- Faster Install than Folding Chairs
- 31.5” of Row Spacing (Customizable)
- Sled Lays Flat On Ground
- 15-20% More Seating In Same Footprint
- Compact Storage Racks

Featured: Fantasy Springs Casino



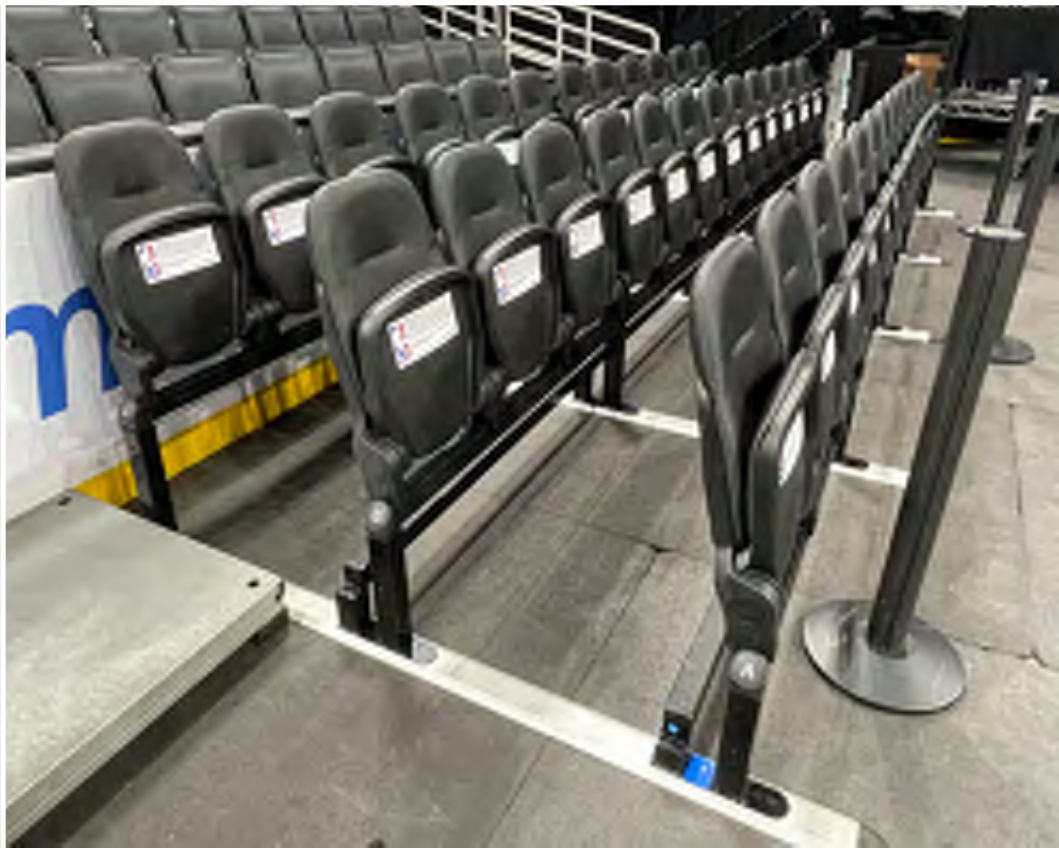
Grid Rise

The Grid Rise is simply the evolution of floor seating and provides the most benefits to both the venue and spectators. It utilizes a patented system that allows venues to implement tip up seats on the floor of the arena while allowing for changes in seat elevation to produce better sightlines.

All features of the Grid System with the addition of:

- Varying Seat Heights without a Platform
- Added Footrest

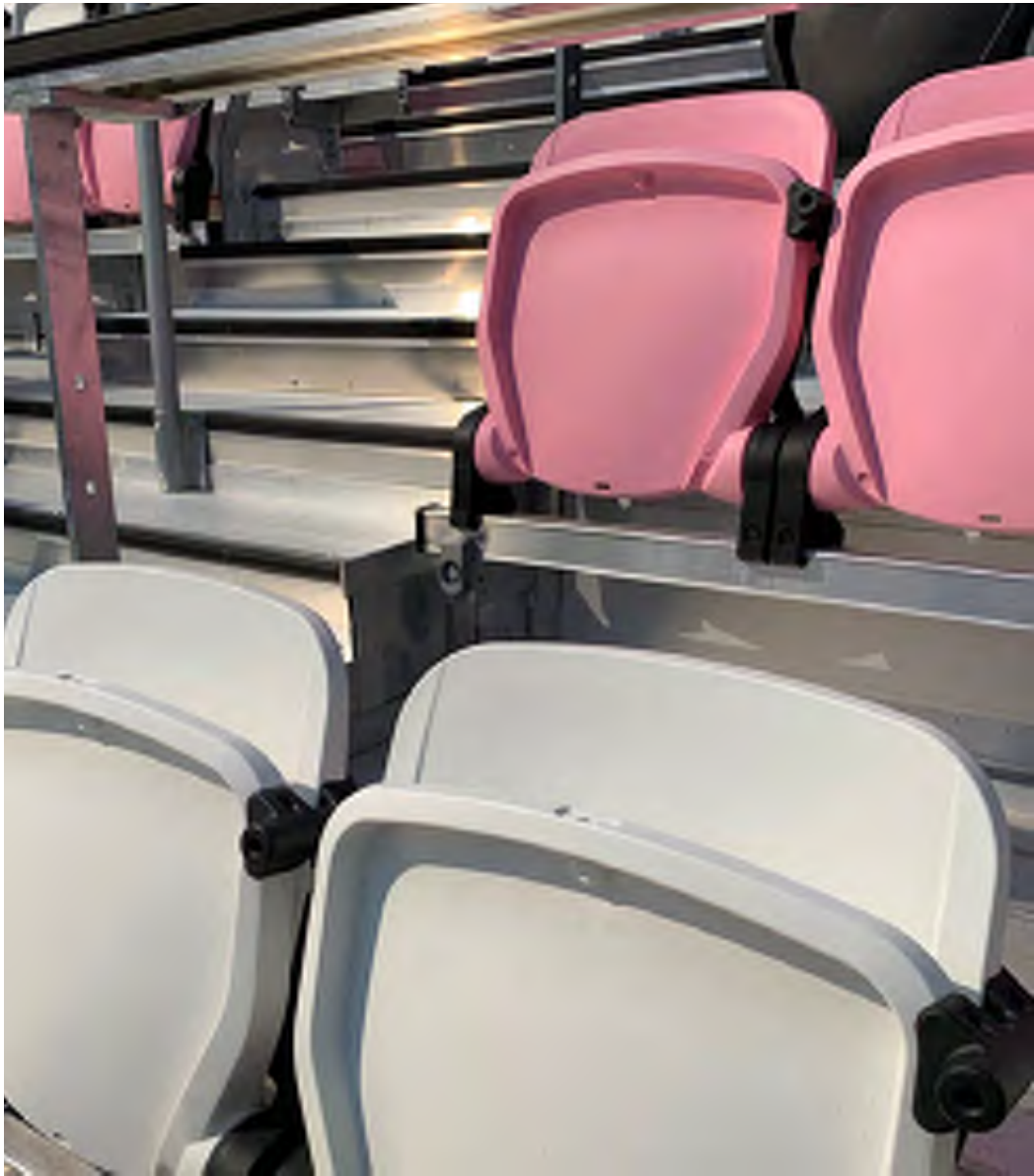
Featured: TD Garden / Boston Celtics



Gallery

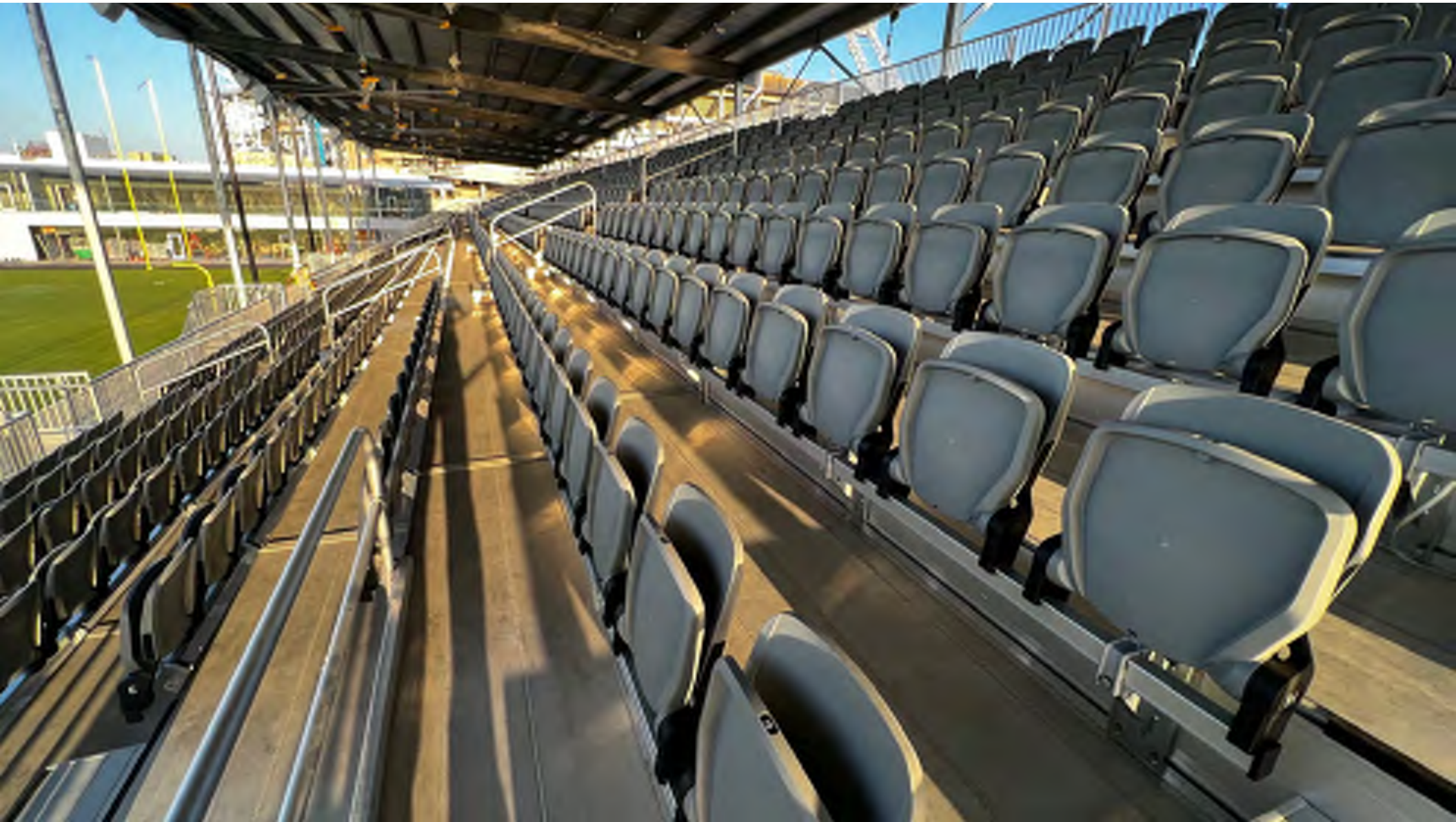
Inter Miami CF
Ovation Seat with Seat Lock Preview





Gallery

Jacksonville Jaguars
Ovation Seat



Gallery

Marshall University
Ovation Seat



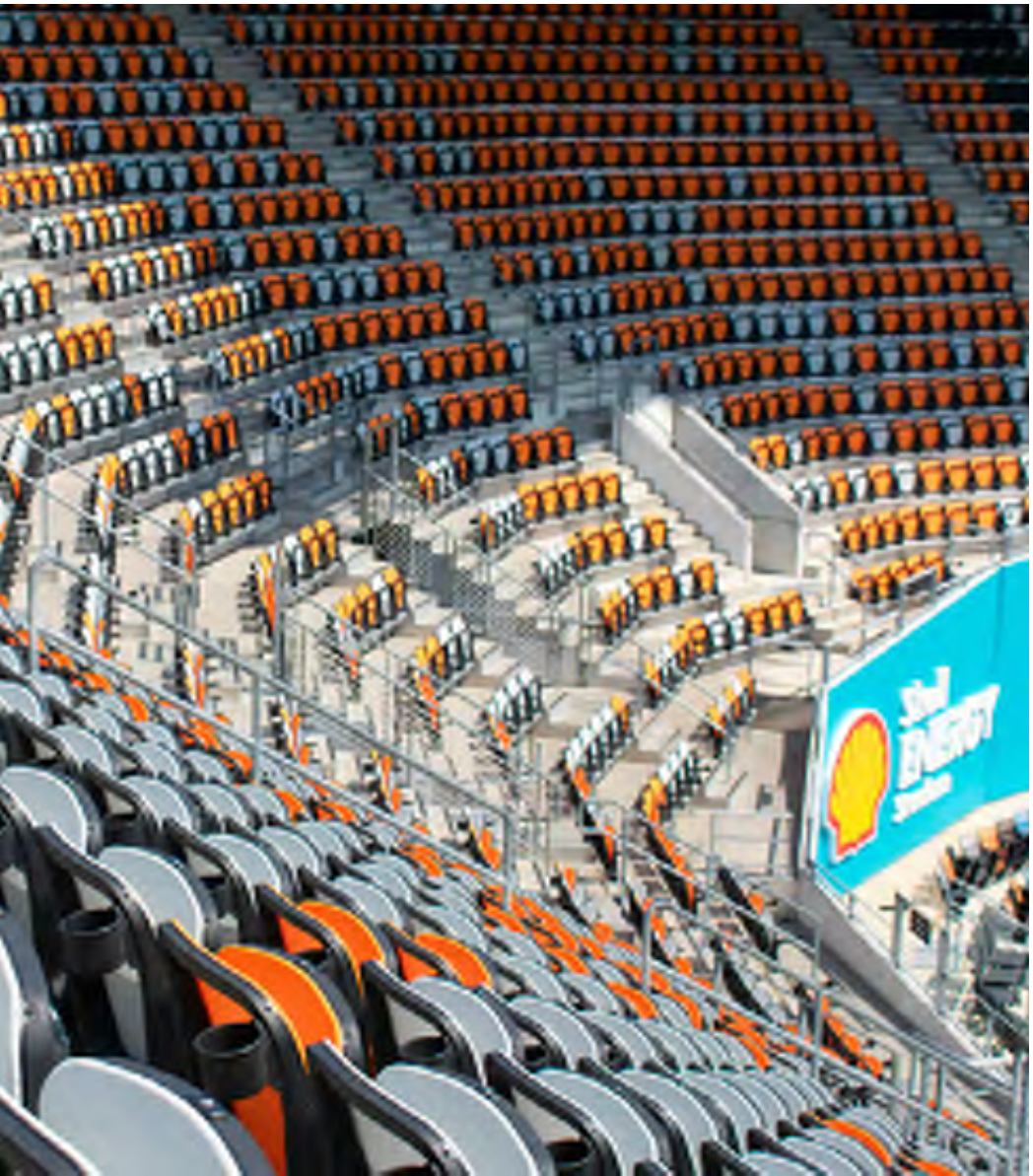
Gallery

Houston Dynamo
Zephyr



Gallery

Houston Dynamo
Zephyr





Gallery

Staten Island Ferry Hawks
High Back Ovation Seat



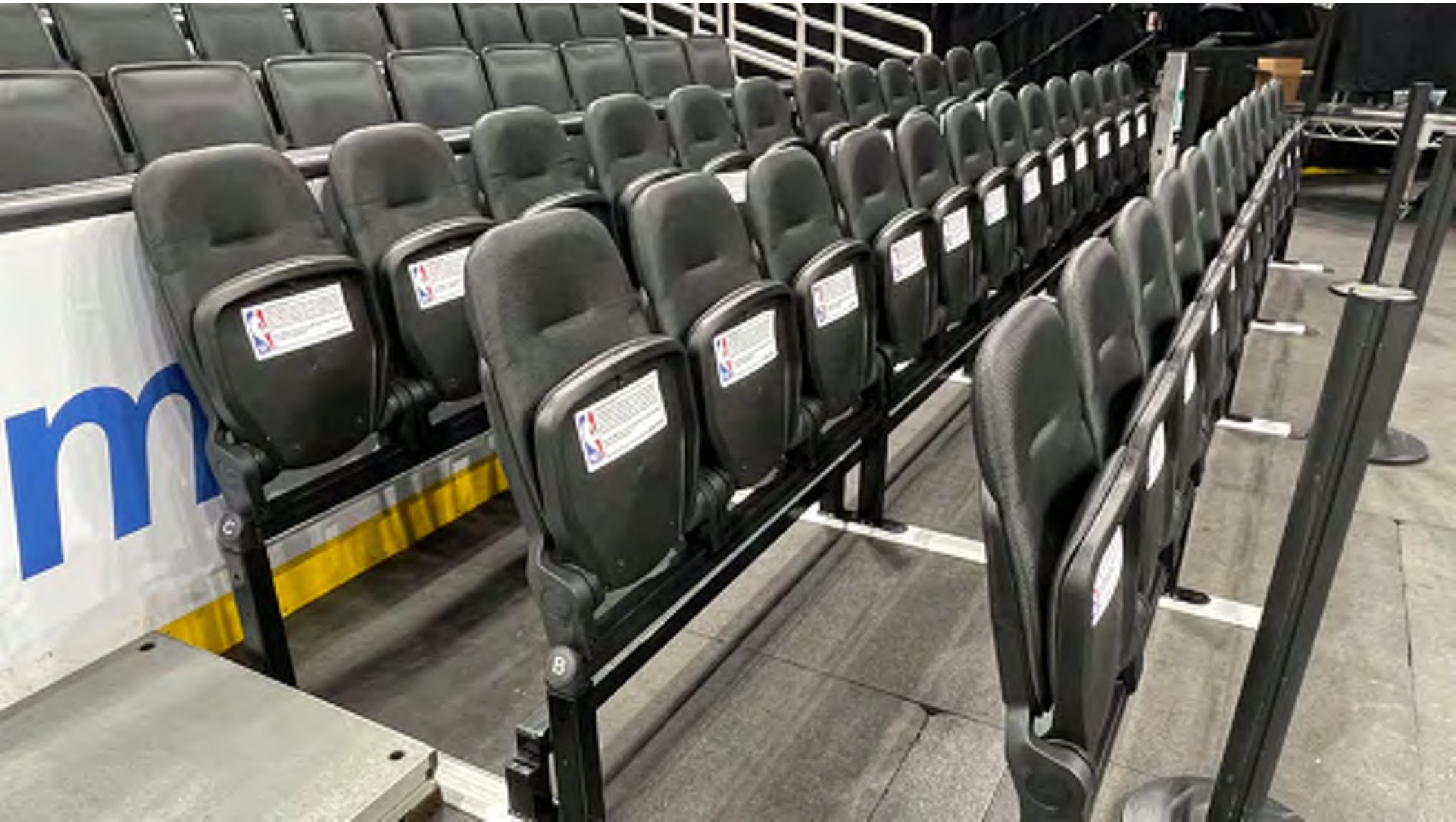
Gallery

Staten Island Ferry Hawks
Ovation Seat



Gallery

Boston Celtics
High Back Ovation Seat



Gallery

St. John’s University
Ovation Seat



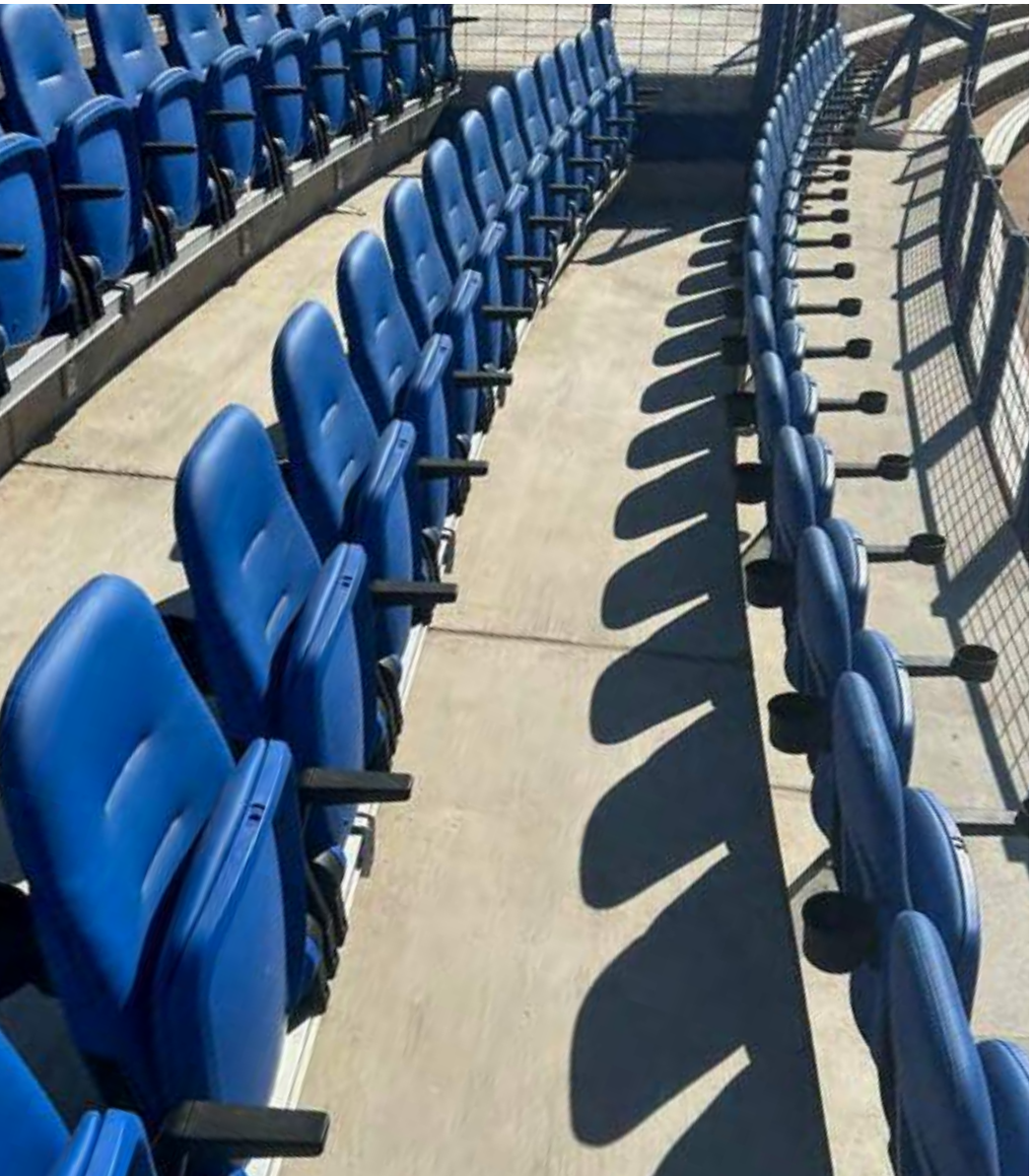
Gallery

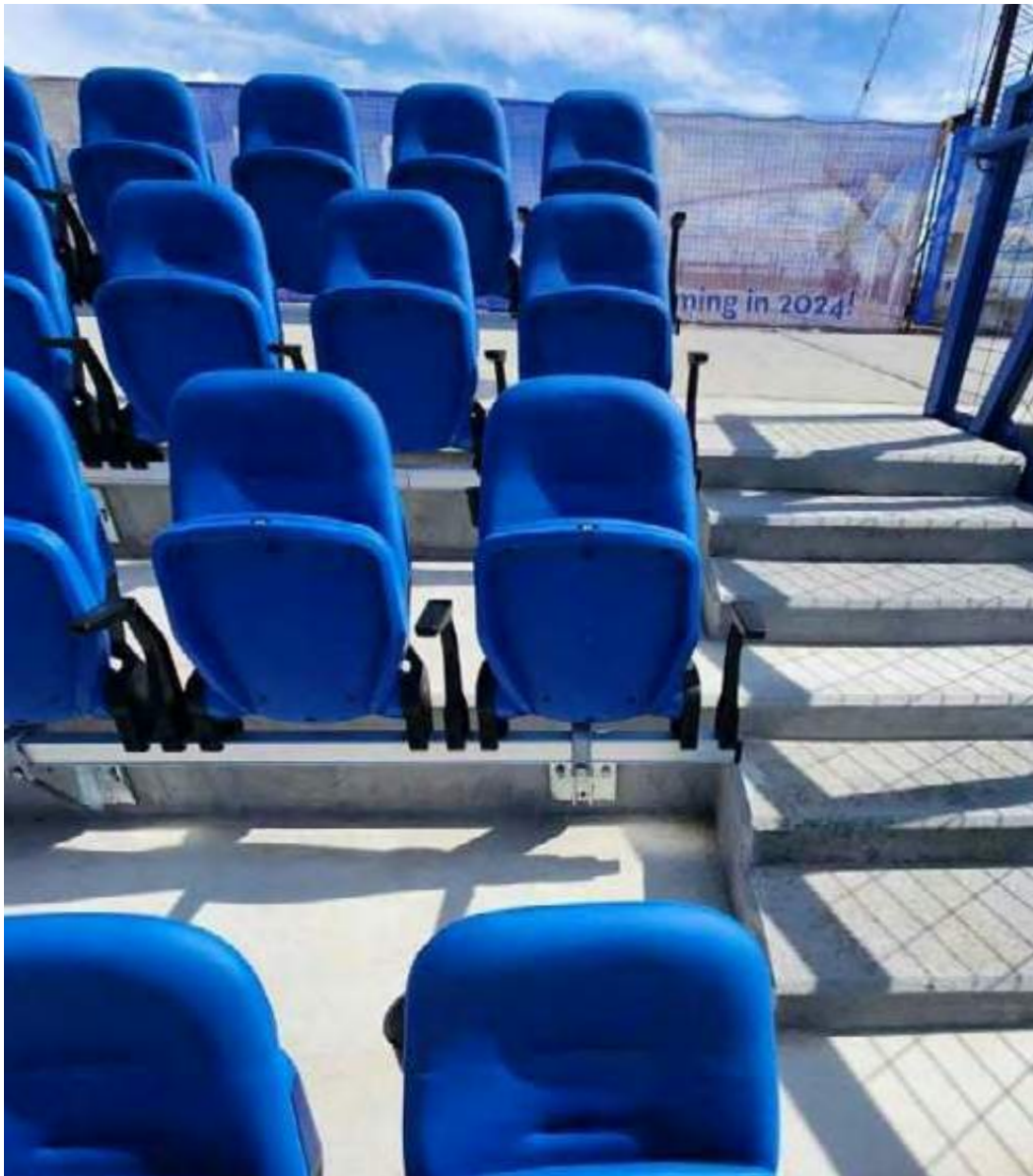
Sporting Kansas City
Ovation Seat



Gallery

United States Air Force Academy
High Back Ovation Seat





Gallery

University of Kansas
Zephyr

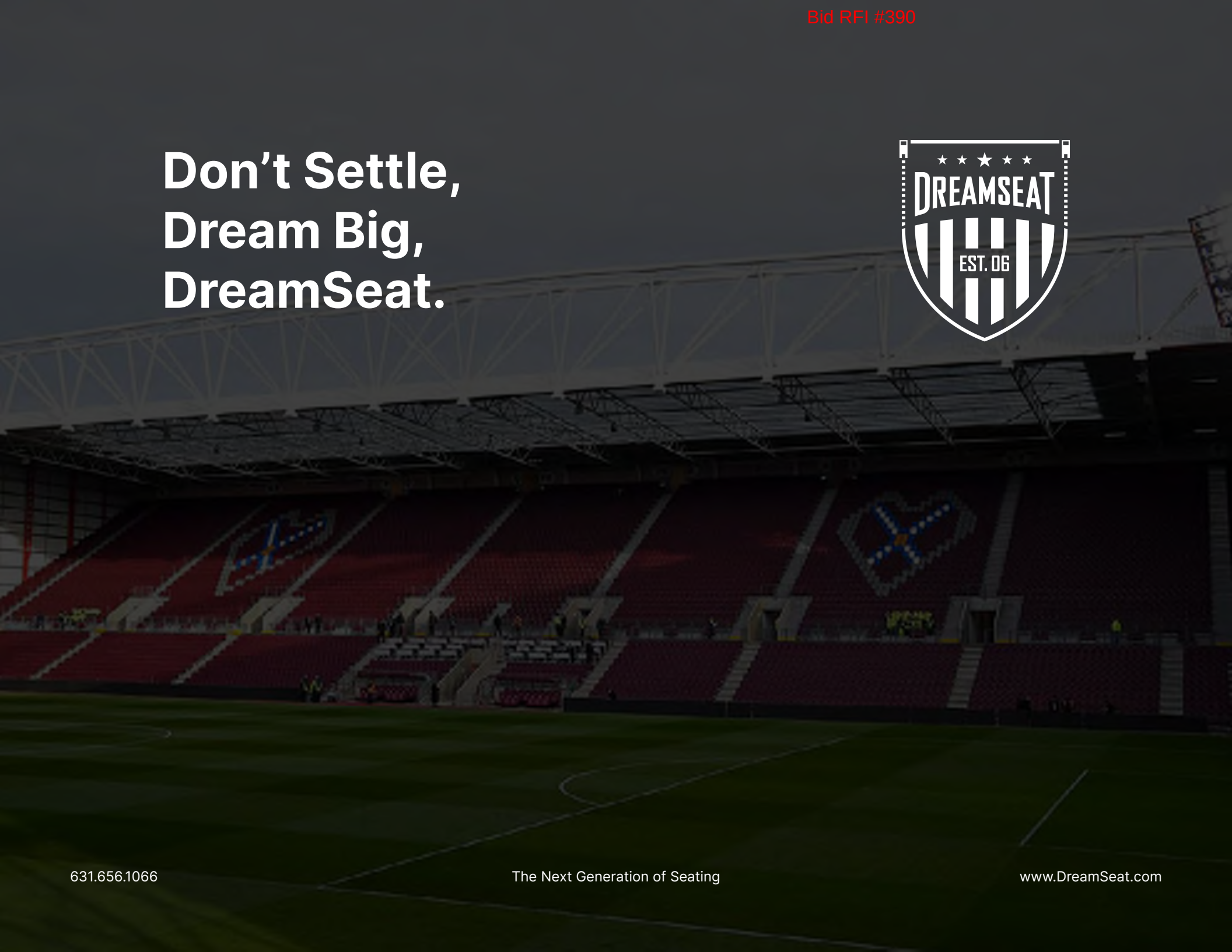


Gallery

Marshall University
Zephyr Max



Don’t Settle, Dream Big, DreamSeat.



BQ #70 & 125 Attachment

NOTE:
6" water main and 3" gas main located on west side of Stanwich Road.

STANWICH ROAD

Edge of existing asphalt pavement

Construct Post & Wire fence 6' high

W.M. Pit

Construct catch basin style "C-1" with trap style "T-2". Connect to manhole with 12" R.C.P.

Adjust manhole head to grade

Walk at street to end 5' wide with back edge 1' from property line

Construct #4 Rapid Drainage Pipe Seepage Drain and connect to manhole.

Construct concrete curb and 2½" asphalt pavement on 6" gravel base

Construct catch basin style "C-1" with trap style "T-2". Connect to manhole with 12" R.C.P.

Construct concrete curb and asphalt drive

Adjust existing sewer manhole to grade

Construct catch basin style "C-1" with trap style "T-2". Connect to manhole with 12" R.C.P.

12" R.C.P. Spur for future connection

WALK TO BE USED AS DRIVEWAY ACCESS TO PARKING AREA

Connect 6" V.T.P. Sewer to existing manhole and rebuild invert

Culvert and headwalls by Town of Greenwich

Construct Post & Wire fence 6' high on property line starting at rock ledge

New road to be constructed by others

PARKING AREA A

PARKING & PLAY AREA

Lawn

Canopy Cover

Construct Asphalt Walk

Flagpole

Lawn Frame

Rock Knoll to remain in natural state except for clearing brush and relocating loose rock as directed.

Carry asphalt walk to rock

Lawn & Plant

See building plans for retaining walls

See building plans for platform and steps

This sewer to be abandoned. Plug at manhole on main sewer

Construct Concrete Platform and Ramp

Construct Asphalt Walk

Construct Asphalt Walk on Gravel Base

Construct catch basin style "C-1" with trap style "T-2". Connect to manhole with 12" R.C.P.

Construct Headwall with screen as per detail

Construct & V.T.P. drain from leaders to 36" R.C.P.

Construct 6" V.T.P. San. Sewer

See Dwg. #850-W1

18" R.C.P. Relief Drain

Concrete Curb

Lawn

Construct catch basin style "C-4" with trap style "T-2".

Construct Asphalt Walk

Rip-rap Slope

15'x15' Pole Vaulting Pit

Construct #4 Rapid Drainage Pipe Seepage Drain

Backstop

SOFT BALL

Stripped Area (Alternate 34.05)

Construct catch basin style "C-1" with trap style "T-2".

Manhole

Construct 12" R.C.P. Seepage Drain as per detail.

Stripped Area (Alternate 34.05)

HARD BALL

Backstop

Manhole F.L. 45.55

Construct catch basin style "C-1" with trap style "T-2". Connect to manhole with 12" R.C.P.

Existing Concrete Pavement

Construct manhole over existing culvert. Tunnel tree roots

Mag. Dek.

True North

BOYS FIELD 240'x150'

GIRLS FIELD 240'x150'

7'x25' Broad Jumping pit (Alternate 34.01)

RUNNING TRACK 355' long

Gravel seepage drains in main drains

Construct catch basin style "C-4" with trap style "T-2".

Backstop

SOFT BALL

Stripped Area (Alternate 34.05)

27" R.C.P.

Bottom of Slope

Construct catch basin style "C-1" with trap style "T-2".

TENNIS COURTS (alternate 34.102)

240'

120'

6 gates

Post & Wire Fence around tennis courts 10' high

Pave courts with 2½" asphalt on 6" Gravel Base

Net strap anchors

Net Posts as per detail set 3' from playing line

ORCHARD STREET

NOTE:
Figures in circles are elevations of finished surface at point indicated.
T.C. = Top of Curb
F.L. = Flow Line of Pipe

SITE & DRAINAGE PLAN

CENTRAL JUNIOR HIGH SCHOOL

L1

30 APR 57 | 1" = 50'-0"

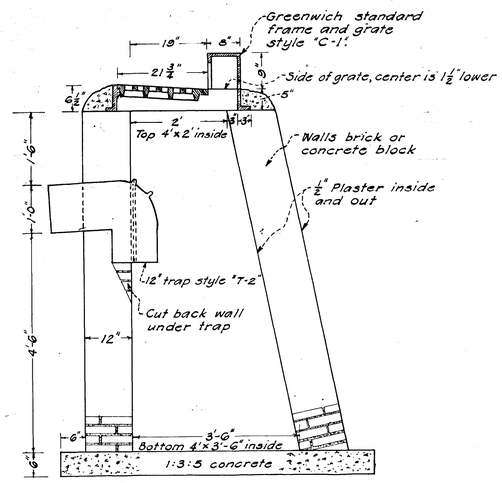
SHERWOOD, WELLS AND SMITH
Architects and Engineers

S.E. MINOR & CO.
CONSULTING ENGINEERS
GREENWICH, CONN.

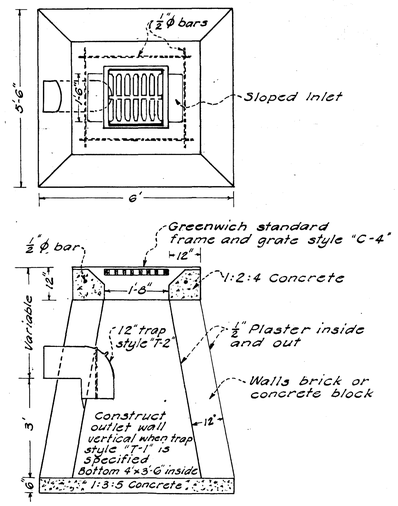
BYE & HERRMANN
LANDSCAPE CONSULTANTS, RYE, N.Y.

46

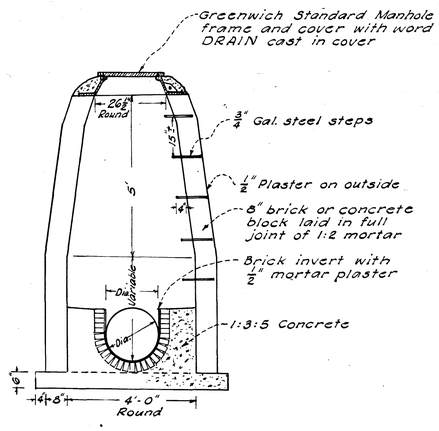
BQ #70 & 125 Attachment



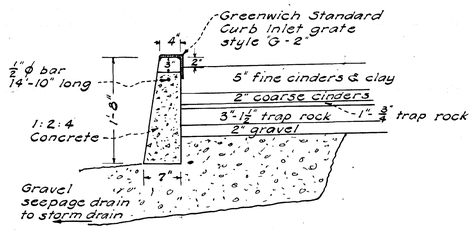
DETAIL OF CATCH BASIN STYLE "C-1"
SCALE: ¾" = 1'-0"

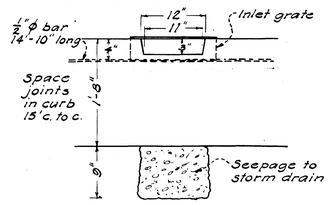


DETAIL OF CATCH BASIN STYLE "C-4"
SCALE: ½" = 1'-0"

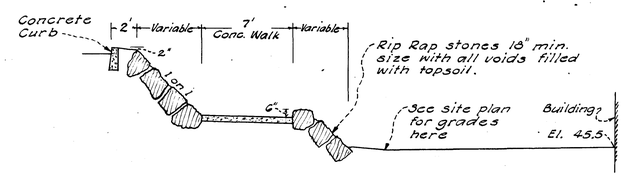


DETAIL OF DRAIN MANHOLE
SCALE: ½" = 1'-0"

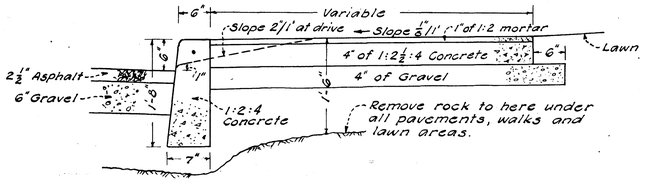




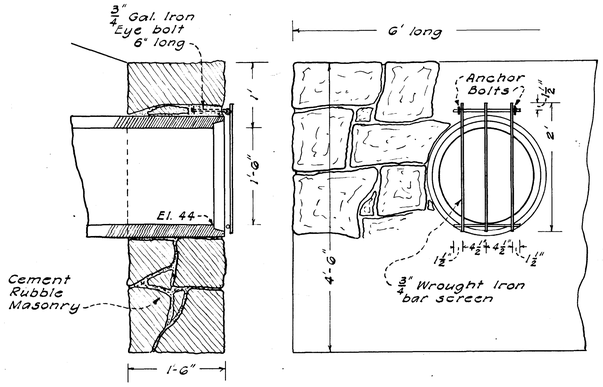
DETAIL OF INLET, CURB & RUNNING TRACK
SCALE: 1" = 1'-0"



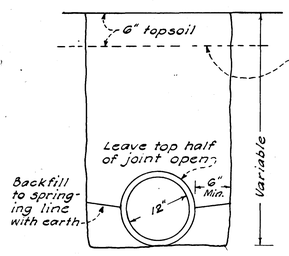
DETAIL OF RIPRAP PAVING AT SECTION A-A
SCALE: 1" = 5'-0"



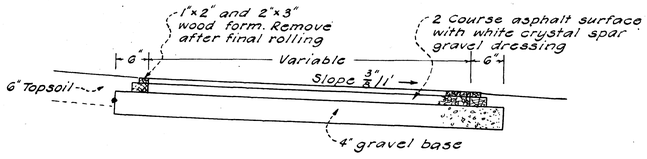
DETAIL OF PAVEMENT, CONCRETE CURB & WALK
SCALE: 1" = 1'-0"



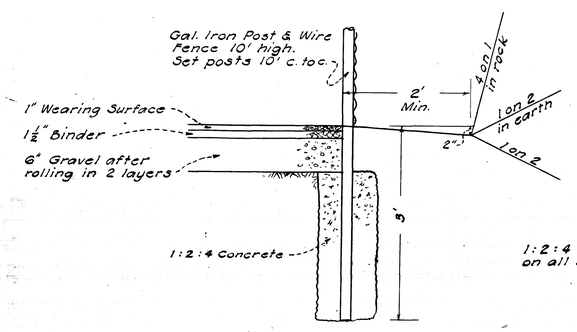
DETAIL OF HEADWALL & SCREEN
SCALE: 1" = 1'-0"



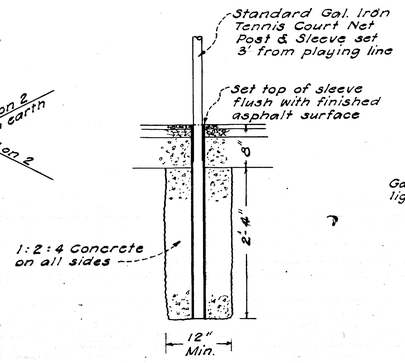
DETAIL OF SEEPAGE DRAIN
SCALE: 1" = 1'-0"



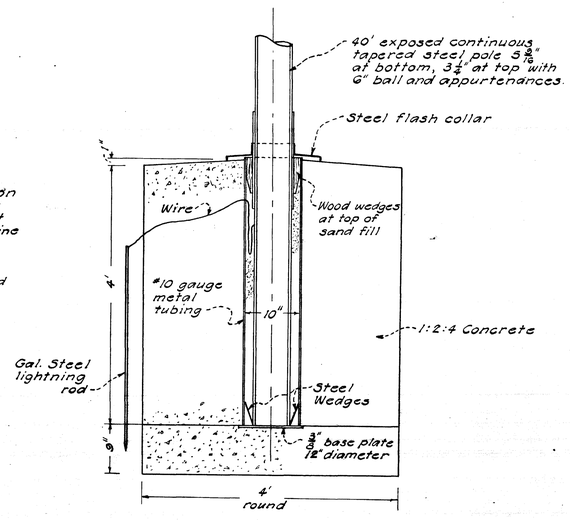
DETAIL OF ASPHALT WALK
SCALE: 1" = 1'-0"



DETAIL OF TENNIS COURT PAVEMENT & FENCE
SCALE: 1" = 1'-0"



DETAIL OF NET POSTS
SCALE: 1" = 1'-0"



DETAIL OF FLAGPOLE
SCALE: 1" = 1'-0"

SITE WORK DETAILS

30 APR

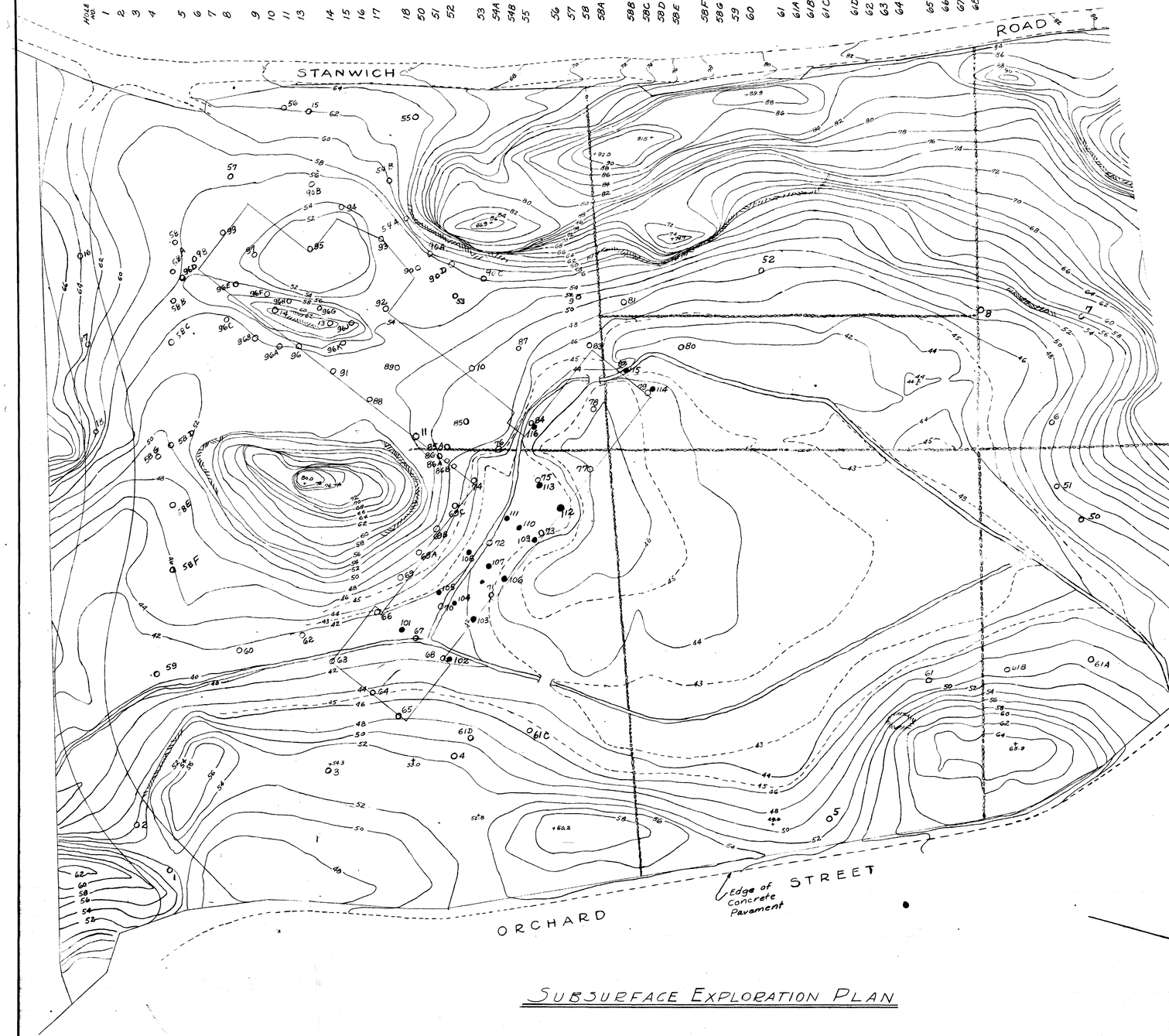
SHERWOOD
Architects

BQ #70 & 125 Attachment

SOUNDING DATA

NOTE: UNIT PRESSURES WITH 2" PISTON, WATER TABLE N.R. UNLESS NOTED

HOLE NO.	DEPTH TO ROCK	DEPTH OF HOLE
1	4' TO ROCK	6' N.R.
2	4' " "	4' 7" "
3	5' " "	5' TO ROCK
4	6.5' NR	6' 3" "
5	6' TO ROCK	6' 9"
6	1" " "	6' "
7	ROCK EXPOSED	6' "
8	6' TO ROCK	6' "
9	7' TO ROCK	8' N.E.
10	8' N.R.	6' "
11	9.5' TO ROCK	6' "
13	ROCK EXPOSED	6' "
14	ROCK EXPOSED	6' N.E.
15	8' N.R.	6' "
16	4' TO ROCK	6' "
17	7' " "	6' "
18	1' TO ROCK	6' N.E.
50	6' N.E.	6' "
51	2' TO ROCK	6' "
52	3' N.E.	9.5' TO ROCK
53	2.5' 3.5' TO ROCK	9.5' TO ROCK
54A	DRY 1' " "	6' " "
54B	1.2' 4.5' " "	5.5' " "
55	0.5' 5.5' N.E.	9' N.E.
56	3.0' 4.5' TO ROCK	6' N.E.
57	1.7' 3.5' N.E.	DRY 6' "
58	2.0' 7.0' TO ROCK	6' TO ROCK
58A	6.5' " "	5' " "
58B	5' TO ROCK	25' TO ROCK
58C	8' N.E.	25' N.E.
58D	1.5' TO ROCK	6' "
58E	5.5' " "	6' "
58F	5' N.E.	5' TO ROCK
58G	4' TO ROCK	6' N.E.
59	5.5' N.E.	4.5' TO ROCK
60	6' N.E.	6' N.E.
61	4.5' TO ROCK	6' N.E.
61A	5.5' " "	1.5' TO ROCK
61B	6' N.E.	2' " "
61C	6' "	15' " "
61D	4.5' TO ROCK	3' TO ROCK
62	5.5' N.E.	3' " "
63	6' "	5' " "
64	4.1' 5' "	25' " "
65	6' TO ROCK	2.5' TO ROCK
66	1.7' 6' N.E.	4' " "
67	6' "	25' " "
68	6' "	3' " "
90A	DRY 25' TO ROCK	
90B	25' N.E.	
90C	3.0' 6' "	
90D	3.5' 6' "	
91	5' TO ROCK	
92	4.0' 6' N.E.	
93	5.5' N.E.	4.5' TO ROCK
94	0.9' 6' N.E.	
95	6' N.E.	
96	1.5' TO ROCK	
96A	2' " "	
96B	15' " "	
96C	DRY 3' TO ROCK	
96D	3' " "	
96E	5' " "	
96F	25' " "	
96G	2.5' TO ROCK	
96H	4' " "	
96J	25' " "	
96K	DRY 3' " "	
97	1.7' 6' N.E.	
98	6' "	
99	1.1' 6' "	



SUBSURFACE EXPLORATION PLAN

BORINGS

NOTE: ▽ INDICATES GROUND WATER TABLE
VERTICAL SCALE: 1" = 4'

FS = Fine Sand
MS = Medium "
CS = Coarse "

HOLE #115: TOPSOIL; MOTTLED GRAY TAN CLAYEY SILT; GRAY BROWN SAND & GRAVEL & COBBLES

HOLE #114: TOPSOIL & ROOTS; GRAY BROWN SAND, GRAVEL & COBBLES

HOLE #116: TOPSOIL & COBBLES; DARK BLUE GRAY CLAY, SAND & GRAVEL & COBBLES; GRAY-TAN SILT & FS SOME GRAVEL

HOLE #113: ORGANIC CLAY → TOPSOIL; MOTTLED CLAYEY SILT; MOTTLED CLAYEY SILT W/SOME FS, FEW COBBLES; GRAY SILT & FS + THE CLAY GRAVELLY MATERIAL

HOLE #112: TOPSOIL; MOTTLED CLAYEY SILT; ▽ MOTTLED CLAYEY SILT W/SOME FS FEW COBBLES; GRAY SILT & FS LITTLE CLAY (SOFT); GRAVELLY MATERIAL

HOLE #111: TOPSOIL; GRAY FS & SILT; BOULDER

HOLE #110: TOPSOIL; MOTTLED SILT & CLAY; BLACK ORGANIC CLAY; GRAY CLAY & SILT; GRAY FS & SILT

HOLE #109: TOPSOIL; SAND & GRAVEL

HOLE #108: TOPSOIL; GRAY-BROWN SAND & GRAVEL, FEW COBBLES

HOLE #107: TOPSOIL; ORGANIC CLAY; MOTTLED CLAYEY SILT; GRAY BROWN SAND & GRAVEL, FEW COBBLES

HOLE #106: TOPSOIL; GRAY BROWN GRAVEL & SAND (COMPACT)

HOLE #105: TOPSOIL; GRAY CLAY & SILT; SAND & GRAVEL

HOLE #104: TOPSOIL; GRAY CLAY & SILT; GRAY SILT & FS LITTLE GRAVEL; SAND & GRAVEL

HOLE #103: ▽ TOPSOIL; GRAY SILT & FS LITTLE GRAVEL

HOLE #101: TOPSOIL; MOTTLED CLAY & SILT, TRACE ROOTS; M TO FS (FIRM); M TO CS (FIRM)

HOLE #102: TOPSOIL; MOTTLED CLAY & SILT; M TO FS; GRAY-BROWN SILT & FS TRACE ORGANIC



PLAN OF ROCK CONTOURS

This is to certify that the subsurface information on this sheet is substantially correct

Philip Keene
Civil Engineer, "204"

SUBSURFACE EXPLORATION PLAN

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

830-L4

Date: 30 APR 57 | Scale: 1" = 5

SHERWOOD, MILLS AND SMITH
Architects 65 Broad Street, Stamford, Connecticut

PHILIP KEENE
MIDDLETOWN, CONN.

BQ #70 & 125 Attachment

SCHEDULE OF DRAWINGS

830-L1 SITE & DRAINAGE PLAN
830-L2 GRADING PLAN
830-L3 SITE WORK DETAILS
830-L4 SUBSURFACE EXPLORATION PLAN

830-1 ROOF & MODULE PLANS
830-2 BASEMENT PLAN
830-3 FIRST FLOOR PLAN AREA A
830-4 FIRST FLOOR PLAN AREA B
830-5 FIRST FLOOR PLAN AREAS C & D
830-6 ELEVATIONS
830-7 ELEVATIONS
830-8 ELEVATIONS & LETTERING DETAILS
830-9 WALL SECTIONS 1
830-10 WALL SECTIONS 2
830-11 WALL SECTIONS 3
830-12 WALL SECTIONS 4
830-13 STAIRS
830-14 ENTRANCE DETAILS
830-15 TOILET ROOMS
830-16 TYPICAL CLASSROOMS
830-17 CORRIDOR ELEVATIONS
830-18 CORRIDOR ELEVATIONS & DETAILS
830-19 GYMNASIUM DETAILS
830-19A ALTERNATE GYMNASIUM
830-20 AUDITORIUM DETAILS
830-21 SCIENCE ROOMS
830-22 ARTS & CRAFTS ROOMS
830-23 HOMEMAKING ROOMS
830-24 LIBRARY
830-25 KITCHEN
830-26 SHOPS
830-27 MUSIC ROOMS

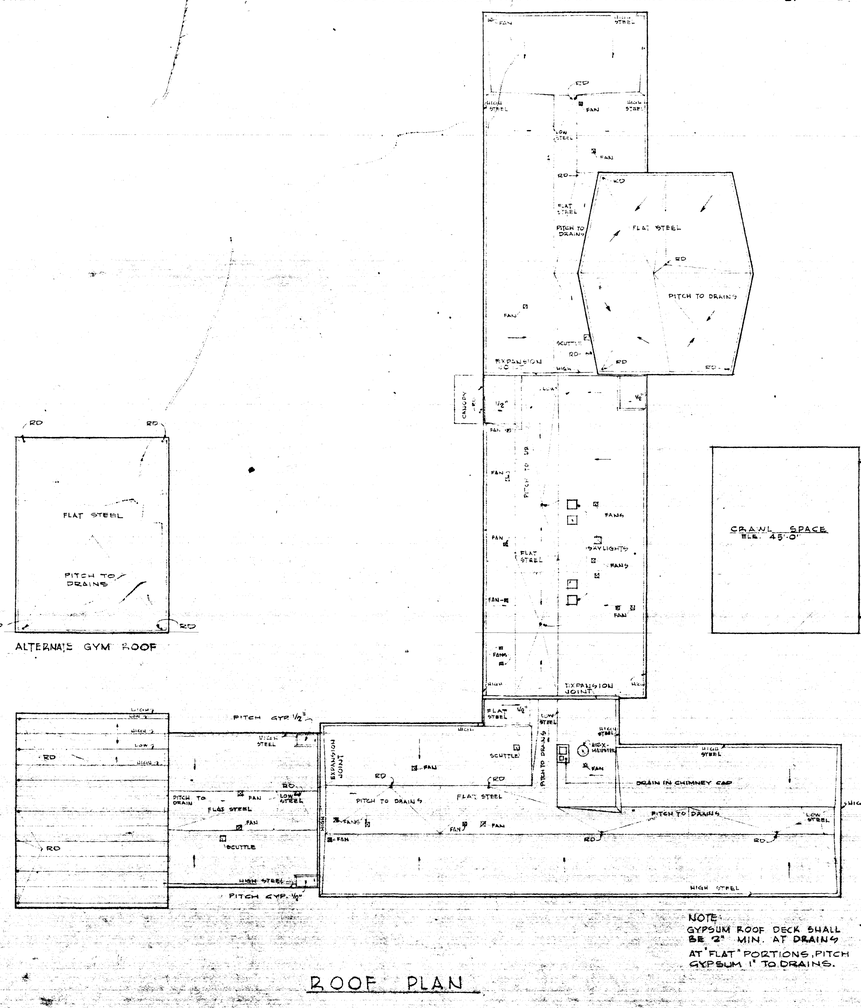
830-D1 WINDOW DETAILS
830-D2 GYMNASIUM WINDOW DETAILS
830-D3 SPECIAL HOLLOW METAL BUCKS & DETAILS
830-D4 DOOR, BUCK & SADDLE TYPES
830-D5 METHODS OF BUCK ATTACHMENT
830-D6 METHODS OF BUCK ATTACHMENT & LIBRARY PART.
830-D7 WOOD BUCK & PARTITION DETAILS
830-D8 DOOR SCHEDULE
830-D9 DOOR SCHEDULE
830-D10 DOOR SCHEDULE
830-D11 DOOR SCHEDULE
830-D12 DOOR SCHEDULE
830-D13 DOOR SCHEDULE
830-D14 DOOR SCHEDULE
830-D15 FINISH SCHEDULE
830-D16 FINISH SCHEDULE
830-D17 FINISH SCHEDULE
830-D18 FINISH SCHEDULE
830-D19 FINISH SCHEDULE
830-D20 FINISH SCHEDULE
830-D21 MISCELLANEOUS DETAILS
830-D22 ADMINISTRATION COUNTER & MAIL BOXES
830-D23 MISCELLANEOUS DETAILS
830-D24 GYMNASIUM COURT MARKING DETAILS

830-S1 FOUNDATION AREA A
830-S2 FOUNDATION & BASEMENT FLOOR FRAMING AREA B
830-S3 FOUNDATION & FIRST FLOOR FRAMING AREAS C&D
830-S4 STRUCTURAL DETAILS & SCHEDULES
830-S5 FIRST FLOOR FRAMING AREA A
830-S6 FIRST FLOOR FRAMING AREA B
830-S7 ROOF FRAMING AREA A
830-S8 ROOF FRAMING AREA B
830-S9 ROOF FRAMING AREAS C & D
830-S10 STRUCTURAL DETAILS

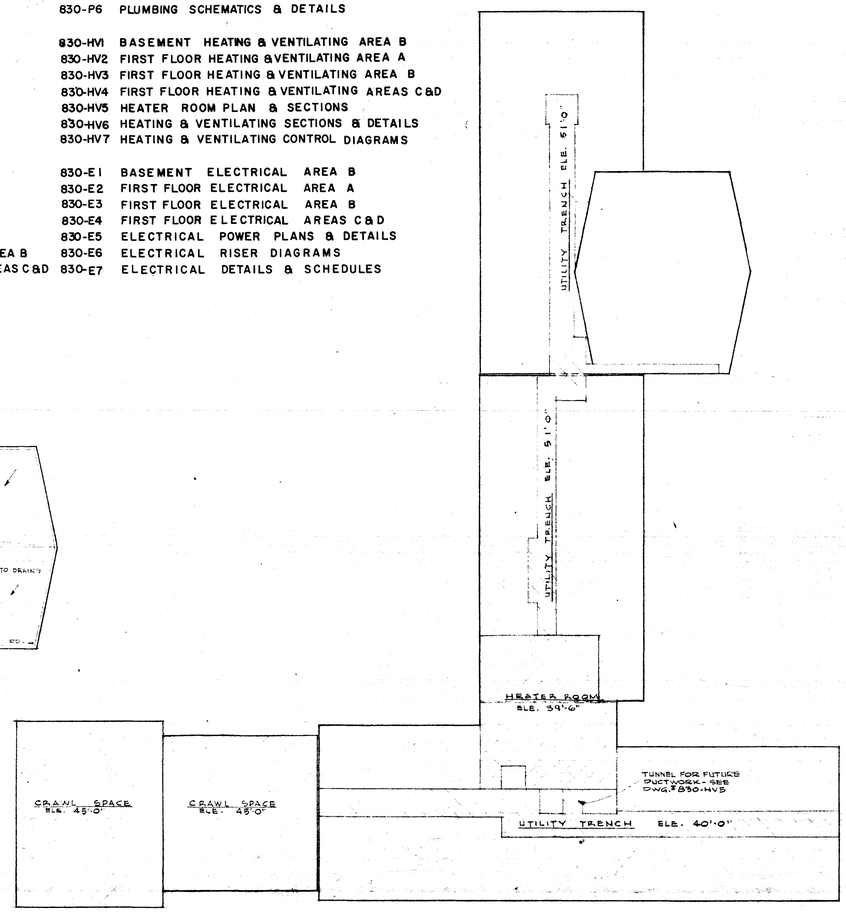
830-U1 SITE UTILITY PLAN
830-P1 BASEMENT PLUMBING AREA B
830-P2 FIRST FLOOR PLUMBING AREA A
830-P3 FIRST FLOOR PLUMBING AREA B
830-P4 FIRST FLOOR PLUMBING AREAS C & D
830-P5 PLUMBING SCHEDULES & KITCHEN PLANS
830-P6 PLUMBING SCHEMATICS & DETAILS

830-HV1 BASEMENT HEATING & VENTILATING AREA B
830-HV2 FIRST FLOOR HEATING & VENTILATING AREA A
830-HV3 FIRST FLOOR HEATING & VENTILATING AREA B
830-HV4 FIRST FLOOR HEATING & VENTILATING AREAS C&D
830-HV5 HEATER ROOM PLAN & SECTIONS
830-HV6 HEATING & VENTILATING SECTIONS & DETAILS
830-HV7 HEATING & VENTILATING CONTROL DIAGRAMS

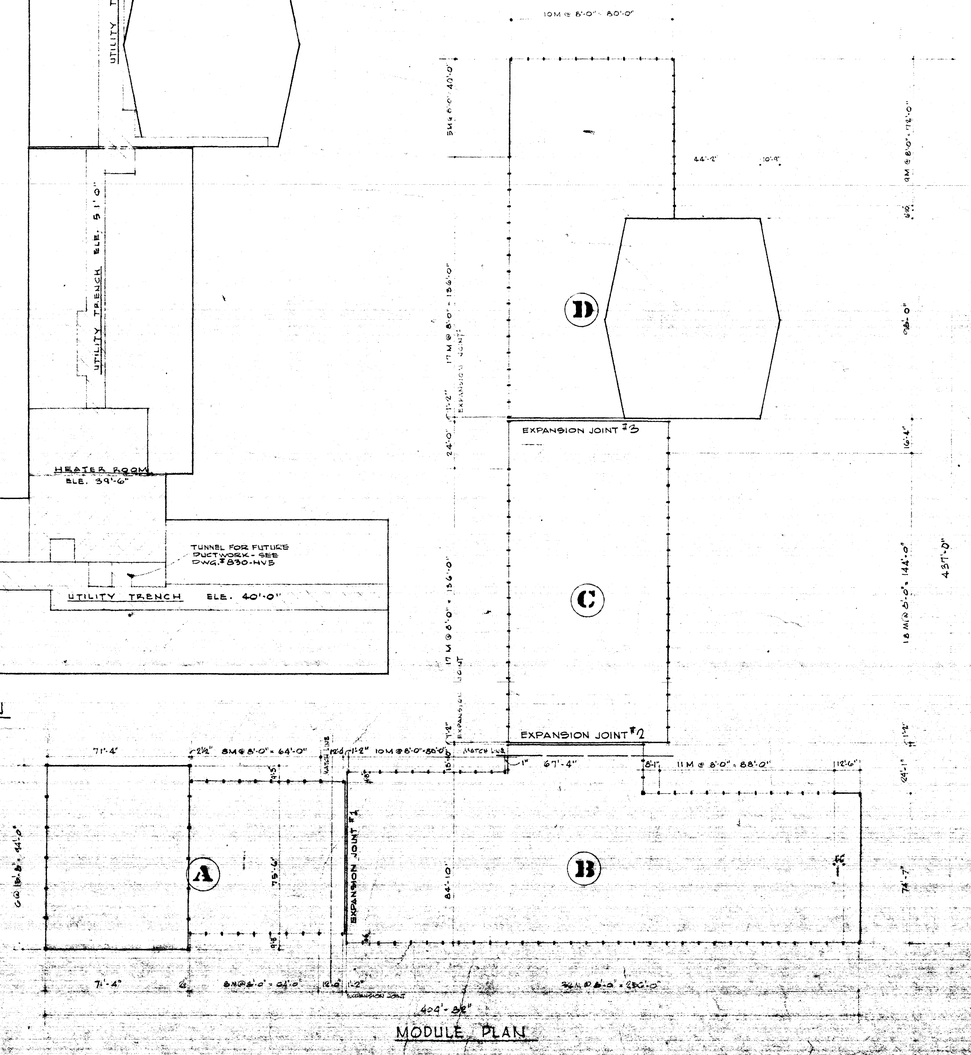
830-E1 BASEMENT ELECTRICAL AREA B
830-E2 FIRST FLOOR ELECTRICAL AREA A
830-E3 FIRST FLOOR ELECTRICAL AREA B
830-E4 FIRST FLOOR ELECTRICAL AREAS C&D
830-E5 ELECTRICAL POWER PLANS & DETAILS
830-E6 ELECTRICAL RISER DIAGRAMS
830-E7 ELECTRICAL DETAILS & SCHEDULES



ROOF PLAN



SUB-FLOOR PLAN



MODULE PLAN

DATE	ISSUE OR REVISION	No.

MATERIAL LEGEND
- CONCRETE
- CONCRETE BLOCK
- BRICK
- STEEL
- FORMBOARD, TILE
- FINISH WOOD
- ROUGH WOOD
- PLYWOOD
- GYPSUM, PLASTER
- INSULATION
- GRAVEL

MODULE PLAN
ROOF PLAN

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

830-1
Date 30APR 57 Scale 1/32" = 1'-0"

SHERWOOD, MILLS AND SMITH
Architects 65 Pacific Street, Stamford, Connecticut

BQ #70 & 125 Attachment

DATE	ISSUE OR REVISION	No.

KEY PLAN

BASEMENT PLAN
AREAS B&C CLASSROOMS

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

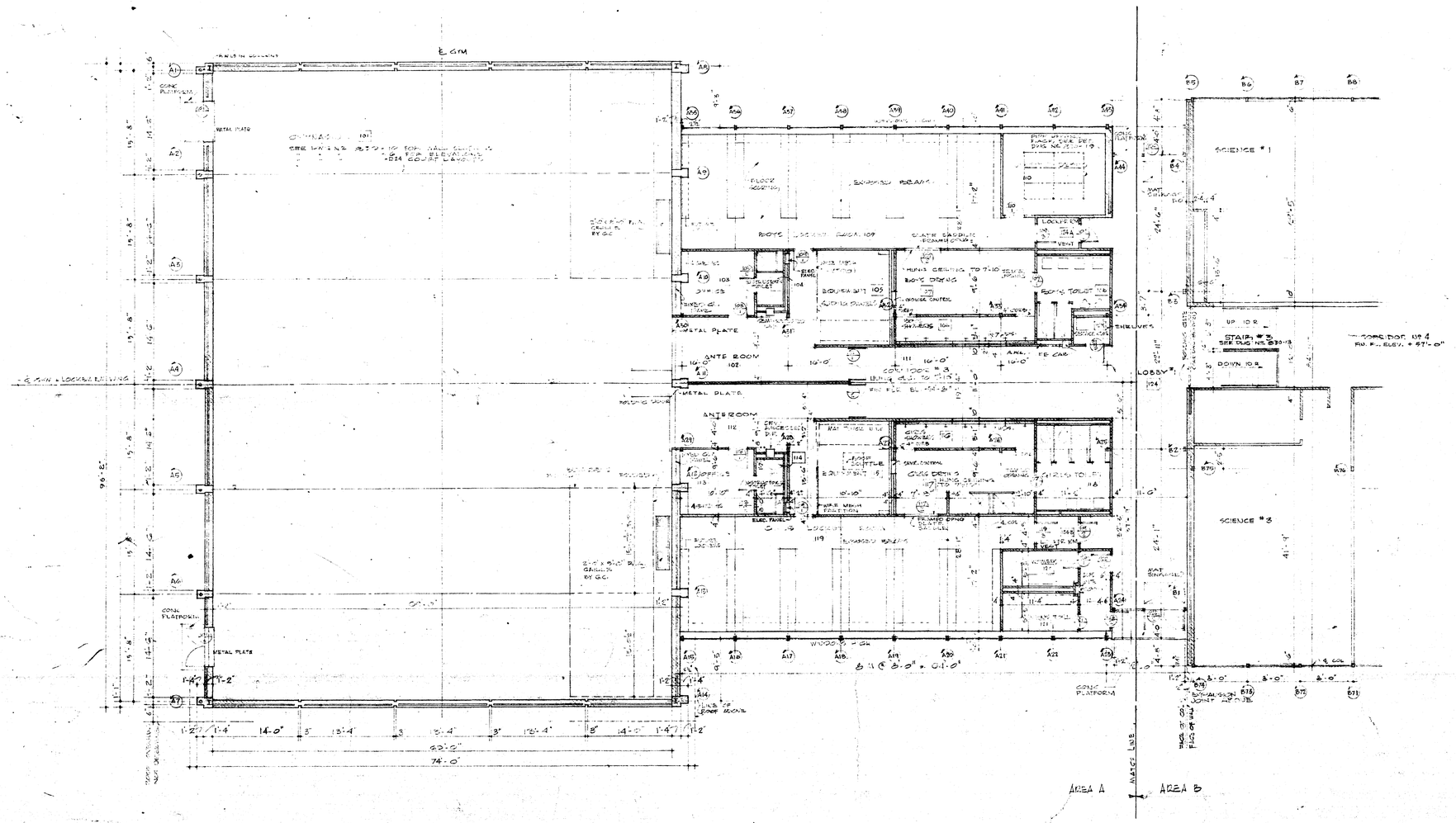
830-2

Date: 30APR 57 | Scale: 1/8" = 1'-0"

SHERWOOD, MILLS AND SMITH
Architects 65 Broad Street, Stamford, Connecticut

BQ #70 & 125 Attachment

DATE	ISSUE OR REVISION	No.



KEY PLAN

FIRST FLOOR PLAN
AREA A - GYM + LOCKER RMS.

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

330-3

30 APR57

Scale 1/8" = 1'-0"

SHERWOOD, MILES AND SMITH
Architects 93 Broad Street, Stamford, Connecticut

BQ #70 & 125 Attachment

DATE	ISSUE OR REVISION	No.

SCIENCE ROOM No 1 125
SEE DWG 850-21

PREPARATION No 1 127

SCIENCE ROOM No 2 126
SEE DWG 850-21

TEACHER'S CLOSET

DUCT SPACE

TRACHER'S CLOSET

DARK ROOM 128

PAPER T.H. VACT

48 LOCKERS

SCIENCE ROOM No 3 129

LIBRARY 161
SEE DWG 850-24

CONF. No 1 138

CONF. No 2 134

CORRIDOR No 4 156

TRACHERS ROOM 124

TOILET 123

CAFETERIA No 1 162

CLASSROOM No 1 141

CLASSROOM No 2 142

CLASSROOM No 3 143

CLASSROOM No 4 144

CLASSROOM No 5 145

CLASSROOM No 6 146

CLASSROOM No 7 147

CLASSROOM No 8 148

CLASSROOM No 9 149

CLASSROOM No 10 150

CLASSROOM No 11 151

CORRIDOR No 5 155

AREA 'A'

AREA 'B'

KEY PLAN

FIRST FLOOR PLAN
AREA B CLASSROOMS

CENTRAL JUNIOR
HIGH SCHOOL
Greenwich, Connecticut

830-4

Date 30 APR 57

Scale 1/8" = 1'-0"

SHERWOOD, MILLS AND SMITH
Architects 65 Field Street Stamford, Connecticut

BQ #70 & 125 Attachment

DATE	ISSUE OR REVISION	No.

KEY PLAN

FIRST FLOOR PLAN
AREAS C & D

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

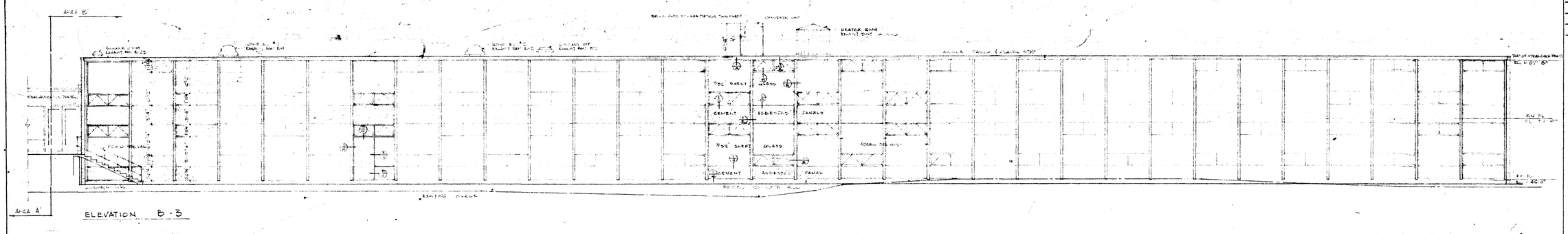
830-5

Date 30APR 57 | Scale 1/8"=1'-0"

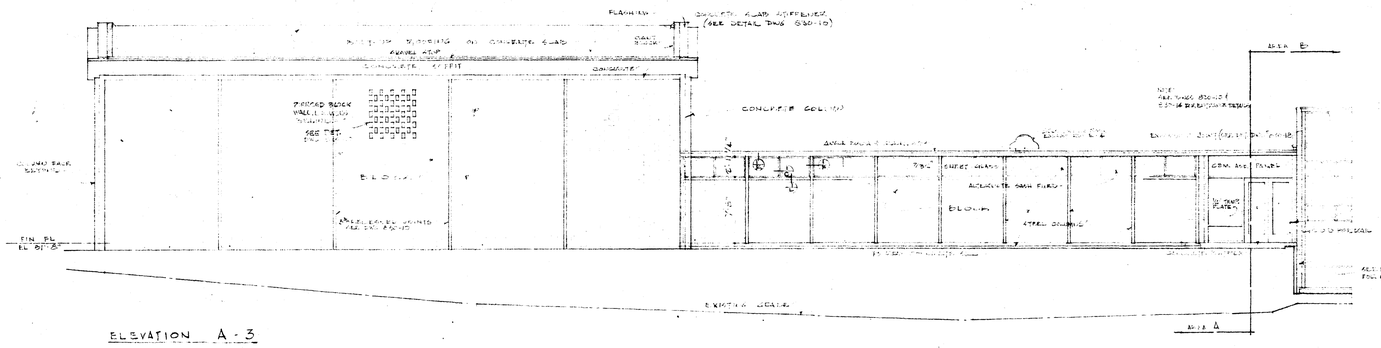
SHERWOOD, WELLS AND SMITH
Architects 65 Broad Street, Stamford, Connecticut

BQ #70 & 125 Attachment

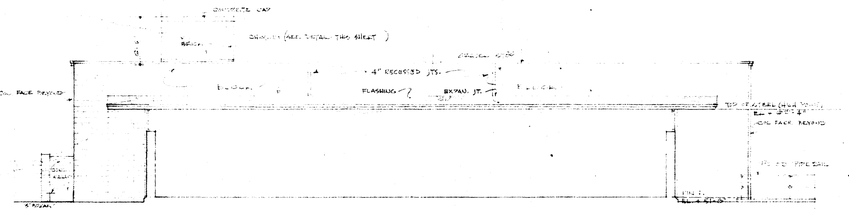
DATE	ISSUE OR REVISION	No.



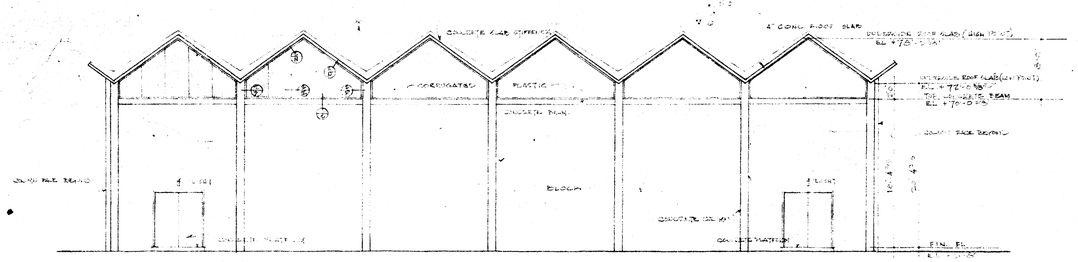
ELEVATION B-3



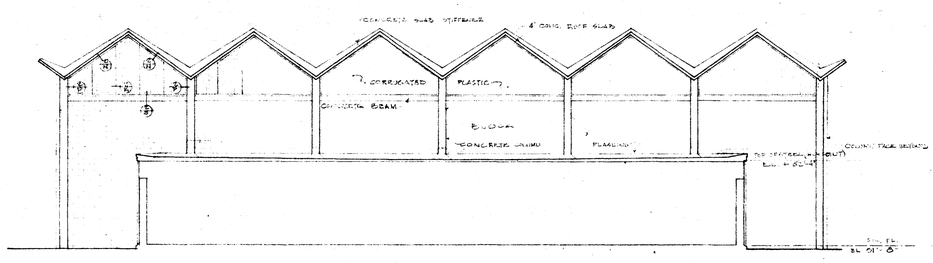
ELEVATION A-3



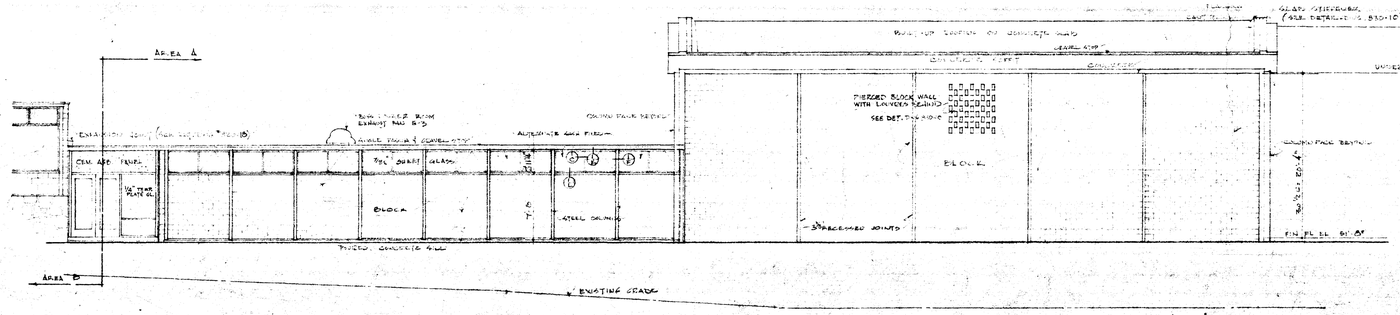
ELEVATION B-2



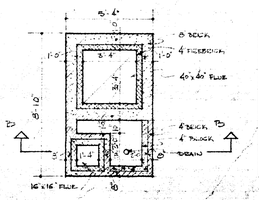
ELEVATION A-2



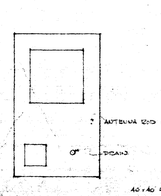
ELEVATION A-4



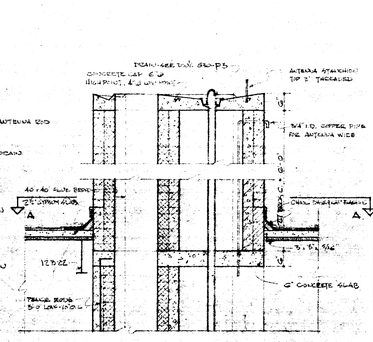
ELEVATION A-1



SECTION A-A
SCALE - 1/4"=1'-0"

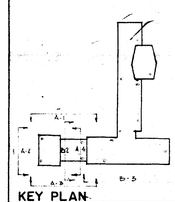


CHIMNEY CAP PLAN
SCALE - 1/4"=1'-0"
NOTE:
GIVE SPLITS AT EDGE OF CHIMNEYS & FLUES. SLOPE TO LEAD POINT @ DRAIN



CHIMNEY DETAILS
SCALE - AS LISTED

SECTION B-B
SCALE 1/2" = 1'-0"



KEY PLAN

ELEVATIONS

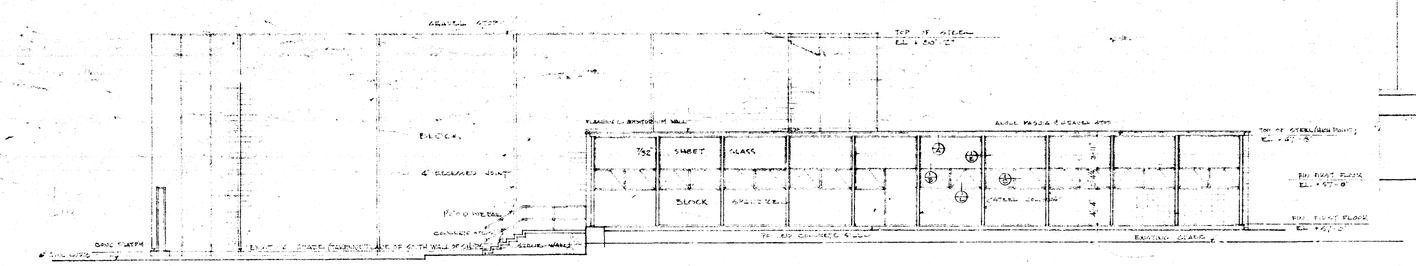
CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

830-6

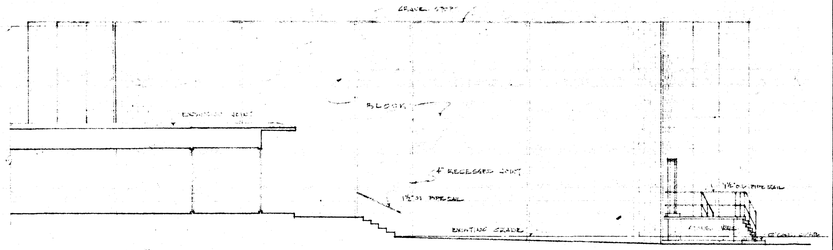
Date: 30 APR 57 | Scale: 1/8"=1'-0"

SHERWOOD, MILLS AND SMITH
Architects 65 Broad Street, Stamford, Connecticut

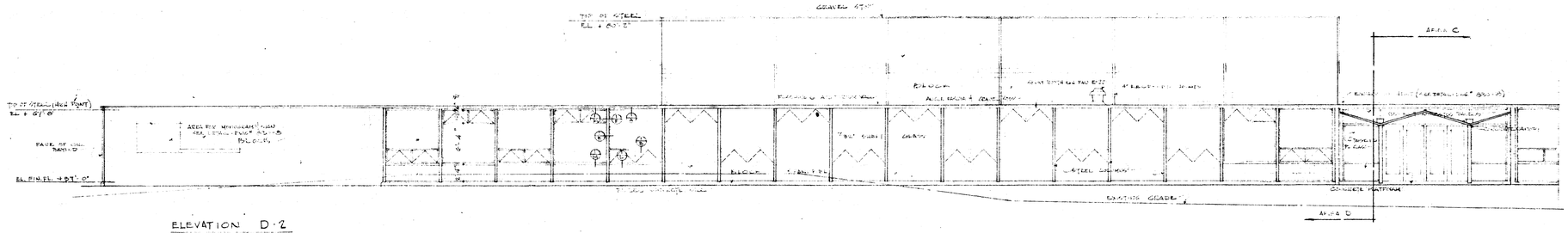
BQ #70 & 125 Attachment



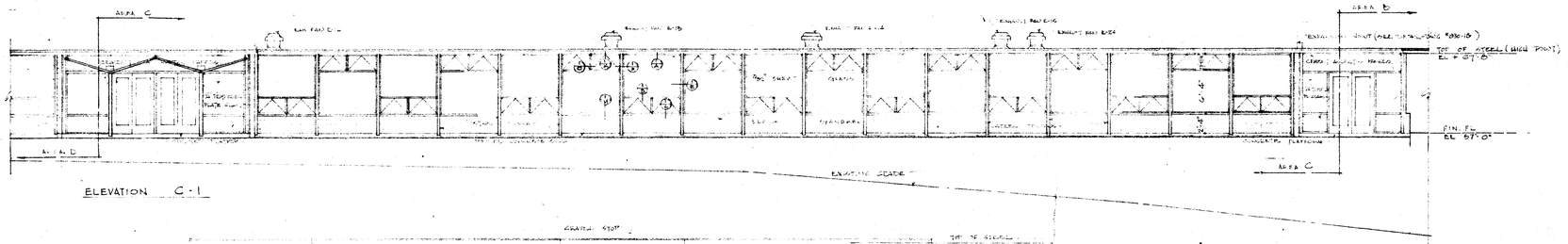
ELEVATION D-1



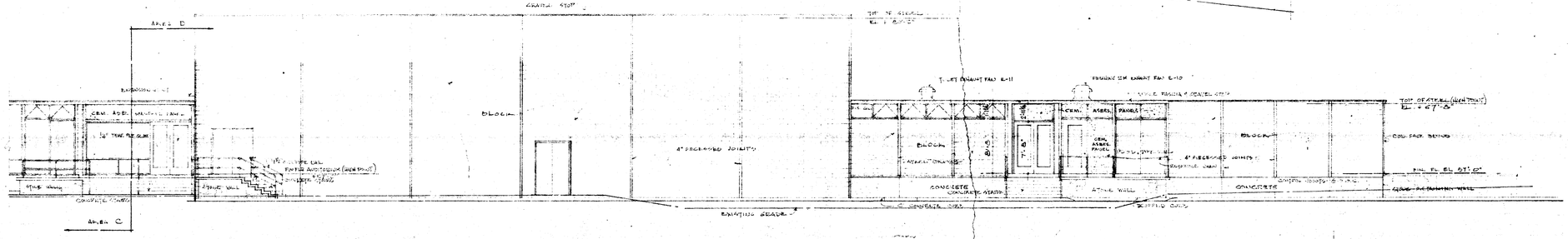
ELEVATION D-3



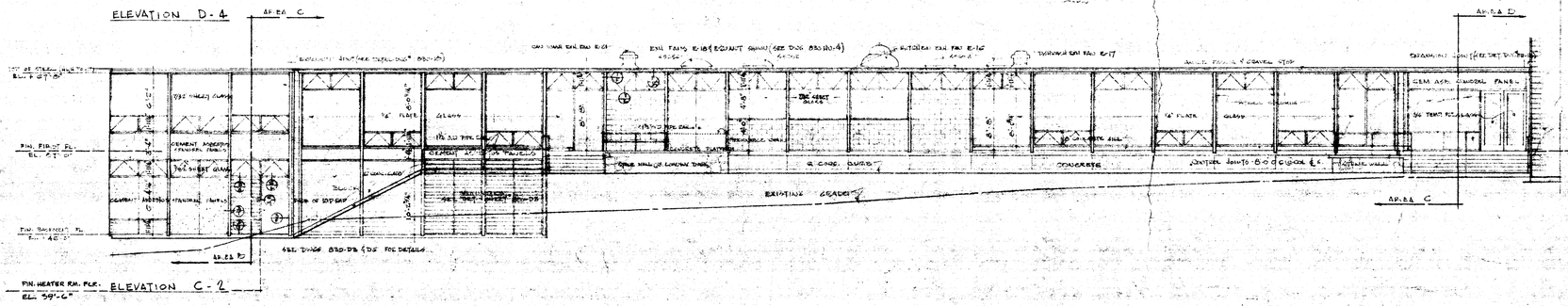
ELEVATION D-2



ELEVATION C-1

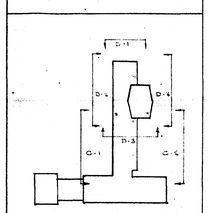


ELEVATION D-4



ELEVATION C-2

DATE	ISSUE OR REVISION	No.



KEY PLAN

ELEVATIONS

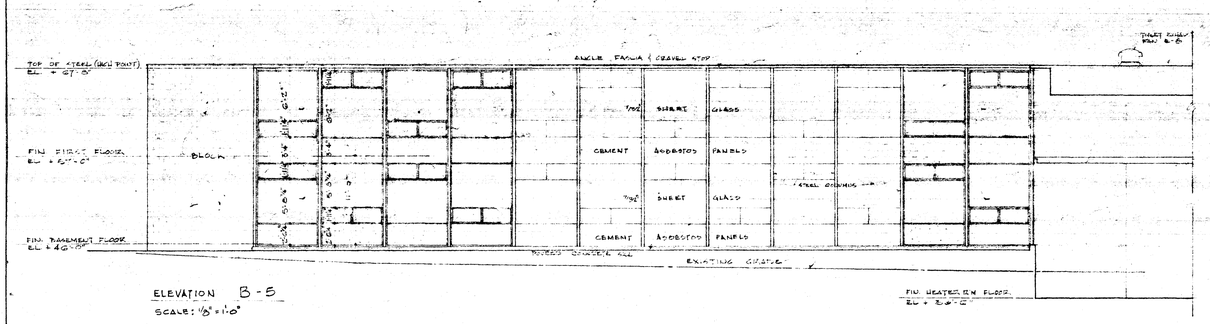
CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

830-7

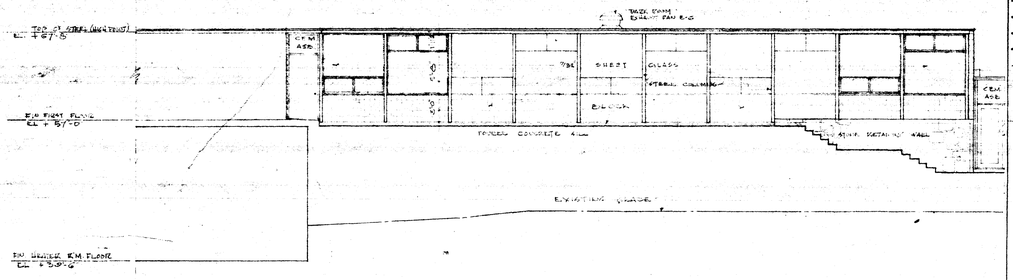
Date	Scale
30APR 57	1/8"=1'-0"

SHERWOOD, MILLS AND SMITH
Architects 65 Broad Street, Stamford, Connecticut

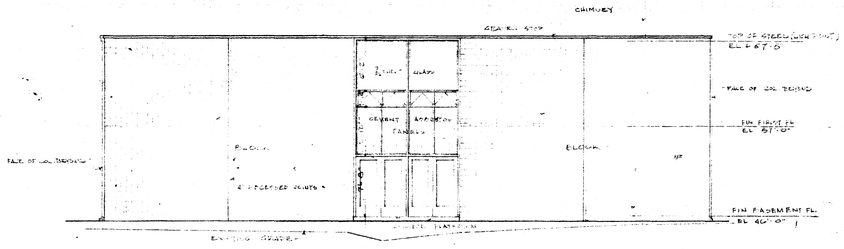
BQ #70 & 125 Attachment



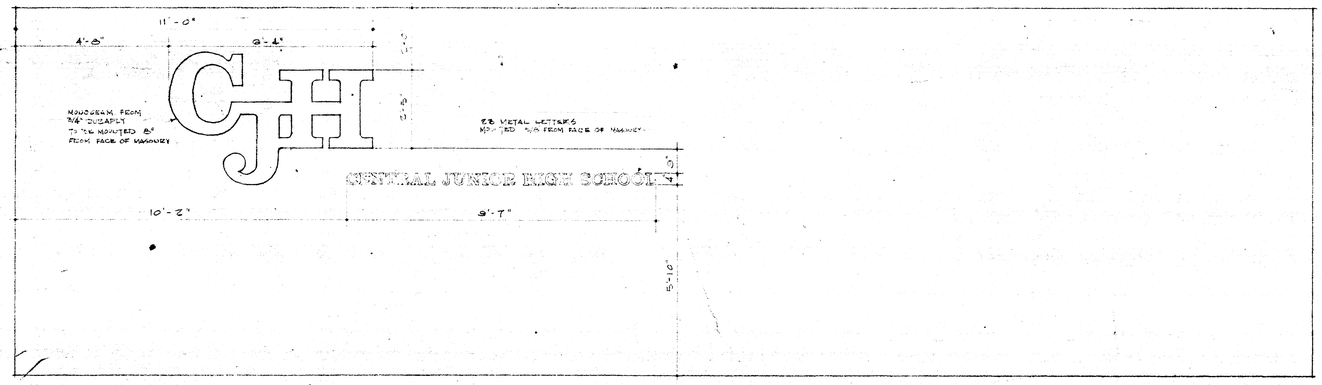
ELEVATION B-5
SCALE: 1/8" = 1'-0"



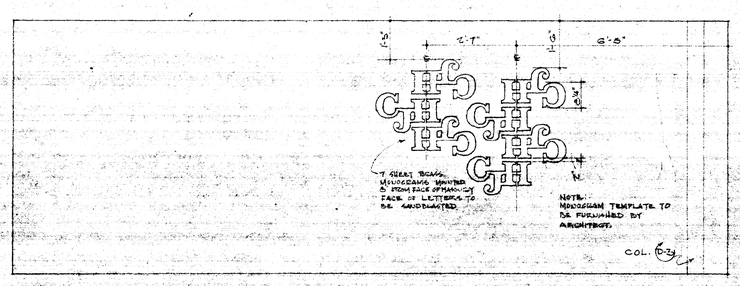
ELEVATION B-1
SCALE: 1/8" = 1'-0"



ELEVATION B-4
SCALE: 1/8" = 1'-0"



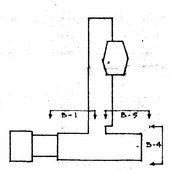
EXTERIOR LETTERING (SEE ELEVATION D-2, DRAWING 830-7)
SCALE 1/2" = 1'-0"



INTERIOR LETTERING (SEE SECTION A-A THROUGH AUDITORIUM LOBBY #2, DRAWING 830-14)
SCALE 1/2" = 1'-0"

DATE	ISSUE OR REVISION	No.





KEY PLAN

ELEVATIONS

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

830-8

Date	Scale
30APR 57	AS NOTED

SHERWOOD, MILLS AND SMITH
Architects, 55 Broad Street, Stamford, Connecticut

BQ #70 & 125 Attachment

DATE	ISSUE OR REVISION	No.

DETAIL 830-9-J
3" = 1'-0"

DETAIL 830-9-K
SCALE 3" = 1'-0"

DETAIL 830-9-L
SCALE 3" = 1'-0"

PLAN SECTION A-A
SCALE 3" = 1'-0"

DETAIL 830-9-W
SILL AT WINDOW PANELS
(TO STOP FLUSH WITH 3'-0" DIM. OF COLUMN AT EXTERIOR DOORS)

DETAIL 830-9-X
SILL AT SPANDREL PANELS

DETAIL 830-9-Y
SILL AT KITCHEN BLK PANELS

DETAIL 830-9-Z
PLAN AT EXTERIOR CORNER
(SEE ALSO DETAIL 'S')

ELEVATION OF TYPICAL BLOCK PANEL
3/8"=1'-0"

SCALE OF DETAILS: 1½"=1'-0"

DETAIL 830-9-R
PLAN AT END OF WALL

DETAIL 830-9-S
PLAN AT RECESSES

DETAIL 830-9-T
PLAN AT OUTER VESTIBULE CORS.
(CONDITION AT INNER CORS & COL. = C.4 SIMILAR)

DETAIL 830-9-U
PLAN AT STEEL COLUMNS

DETAIL 830-9-V
PLAN AT PARTITIONS
SEE DET. 830-D1-N.A. CORS. FOR INTERSECTION

DETAIL 830-9-M
SILL AT 12" CAVITY WALL

DETAIL 830-9-N
SILL AT RECESSES

DETAIL 830-9-P
SILL AT OUTER VESTIBULE CORS.
(FOR DETAILS AT VESTIBULE #2 SEE DWG. #830-12)

DETAIL 830-9-Q
SILL AT BLOCK PANEL WALL

NOTE:
AT DF CAVITY WALLS USE 8" STANDARD WALL TIES.
AT 12" CAV. WALLS USE SPECIAL 10" WALL TIES WITH LEGS 4" LONG AT ONE END

830-9-A
TYPICAL TWO STORY BLOCK END WALL UNIT "B" CLASSROOMS

830-9-B
TYPICAL TWO STORY SPANDREL PANEL UNIT "B" CLASSROOMS

830-9-C
BLOCK SIDE WALL UNIT "D" SHOPS

830-9-D
BLOCK & WINDOW PANEL WALL UNIT "D" SHOPS

830-9-E
BLOCK & WINDOW PANEL WALL UNITS "C" & "D" ADMIN., ARTS, CHARTS, & MUSIC ROOMS

830-9-F
WINDOW PANEL WALL UNIT "C" CAFETERIA #2 & FACULTY DINING

830-9-G
BLOCK & WINDOW PANEL WALL UNIT "C" KITCHEN

830-9-H
BLOCK & WINDOW PANEL WALL UNIT "B" SCIENCE ROOMS & BSMT STORAGE

KEY PLAN

WALL SECTIONS

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

830-9
Date: 30 APR 57
Scale: 3/4" = 1'-0" AS NOTED

SHERWOOD, MILLS AND SMITH
Architects 65 Broad Street, Stamford, Connecticut

BQ #70 & 125 Attachment

DATE	ISSUE OR REVISION	No.

STATE OF CONNECTICUT * REGISTERED ARCHITECT * No. 832

STATE OF CONNECTICUT * REGISTERED ARCHITECT * No. 532

STATE OF CONNECTICUT * REGISTERED ARCHITECT * No. 832

KEY PLAN

WALL SECTIONS

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

830-10

Date 30APR 57 | Scale 3/4"-1'-0" & AS NOTED

N

SHERWOOD, MILLS AND SMITH
Architects 65 Broad Street, Stamford, Connecticut

830-10-A
NORTH WALL
SOUTH WALL SIMILAR

830-10-B
EAST WALL AT
DOORS #101, 2

830-10-C
WEST WALL AT
ANTEROOM #2

830-10-D
SOUTH WALL BOYS' LOCKER RM
GIRLS' SIMILAR

830-10-E
Boys' SHOWER ROOM
GIRLS' SIMILAR

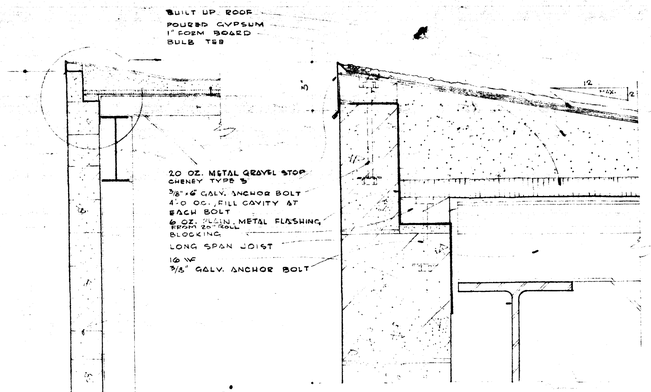
830-10-F
LOBBY #1 AT
STAIR #3

830-10-G
Boys' TOILET #108
& LAUNDRY #1

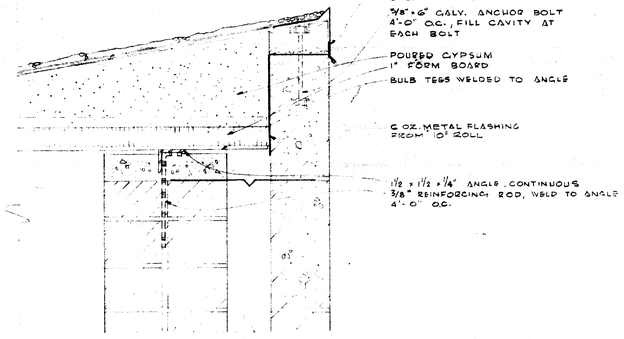
830-10-H
LOBBY #1
& STORAGE #001

BQ #70 & 125 Attachment

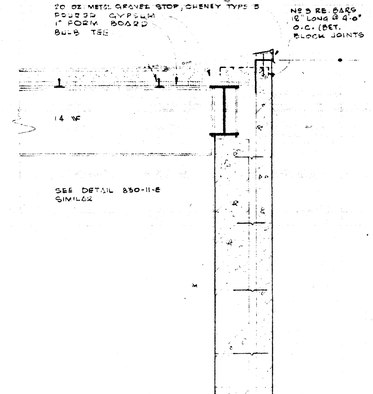
DATE	ISSUE OR REVISION	No.

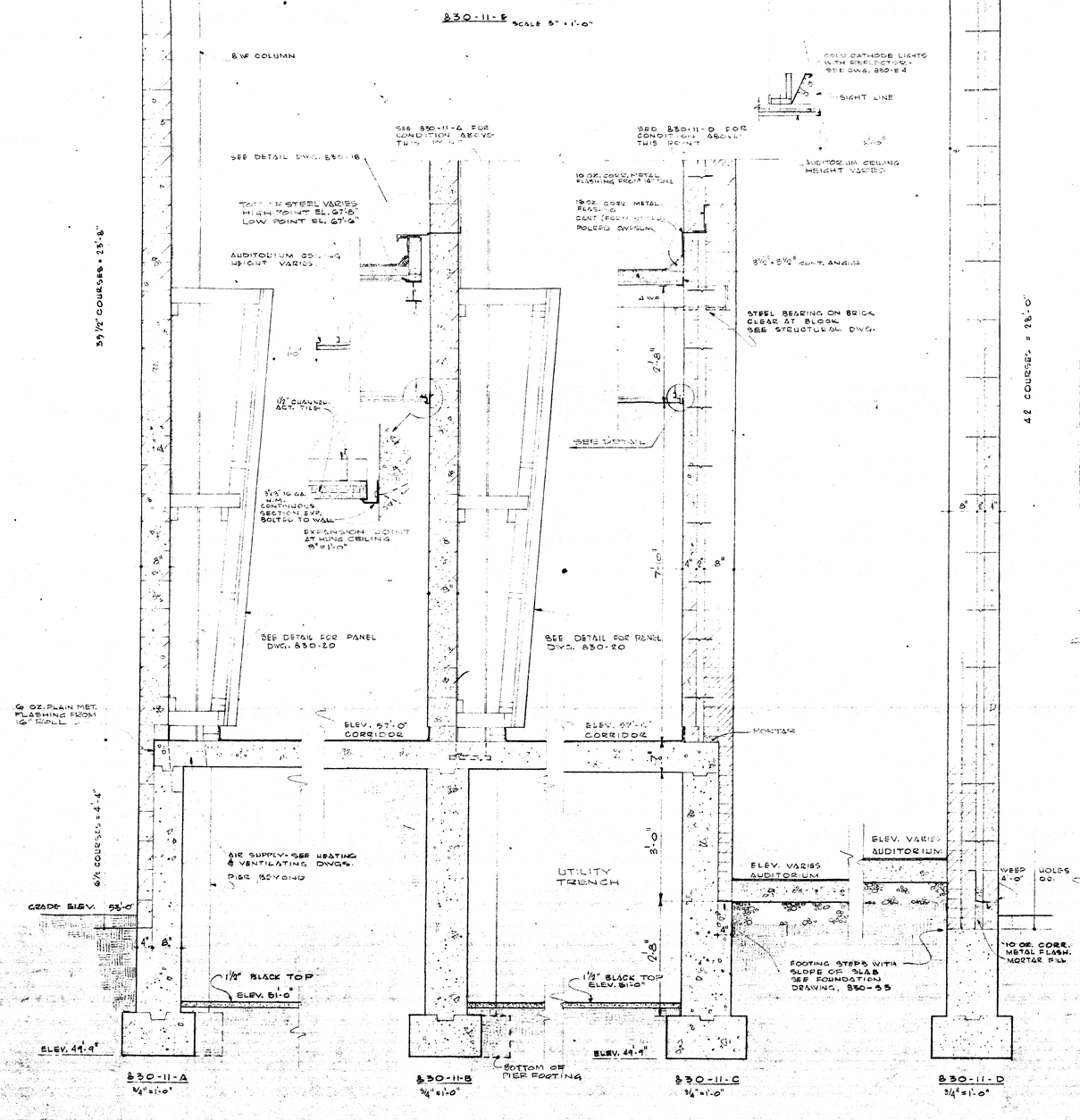


830-11-E SCALE 3" = 1'-0"

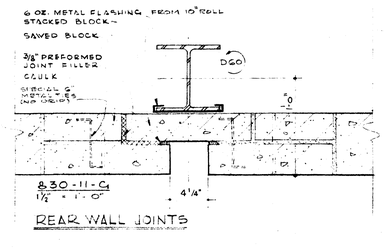


830-11-F SCALE 3" = 1'-0"



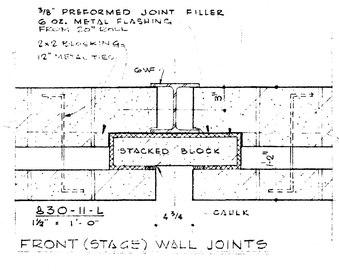


830-11-A 3/4"=1'-0" | 830-11-B 3/4"=1'-0" | 830-11-C 3/4"=1'-0" | 830-11-D 3/4"=1'-0"



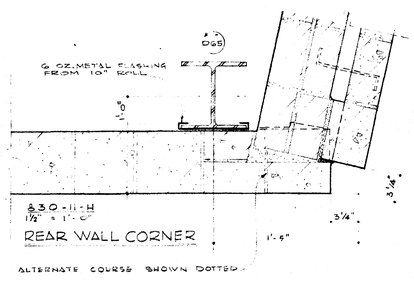
830-11-G 1½" = 1'-0"

REAR WALL JOINTS



830-11-L 1½" = 1'-0"

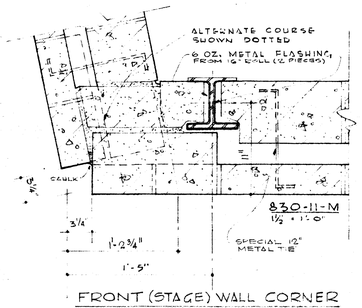
FRONT (STAGE) WALL JOINTS



830-11-H 1½" = 1'-0"

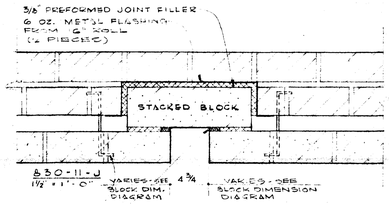
REAR WALL CORNER

ALTERNATE COURSE SHOWN DOTTED



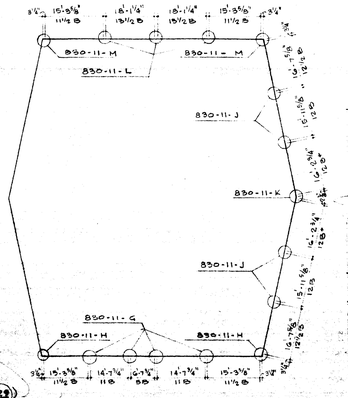
830-11-M 1½" = 1'-0"

FRONT (STAGE) WALL CORNER

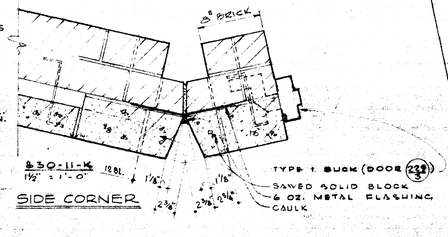


830-11-J 1½" = 1'-0" VARIES-SEE BLOCK DIM. DIAGRAM 4¾ VARIES-SEE BLOCK DIMENSION DIAGRAM

SIDE WALL JOINT

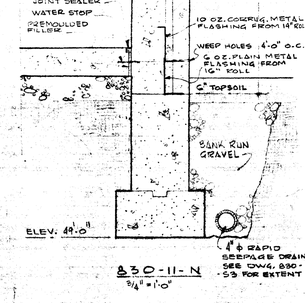


BLOCK DIMENSION DIAGRAM SCALE: 1"=20'-0" (APROX.)



830-11-K 1½" = 1'-0"

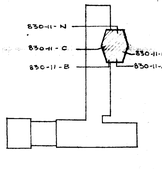
SIDE CORNER



830-11-N 3/4"=1'-0"

NOTE: SEE DET. 830-10-E FOR SIMILAR CONDITION AT ROOF BEYOND





KEY PLAN

WALL SECTIONS

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

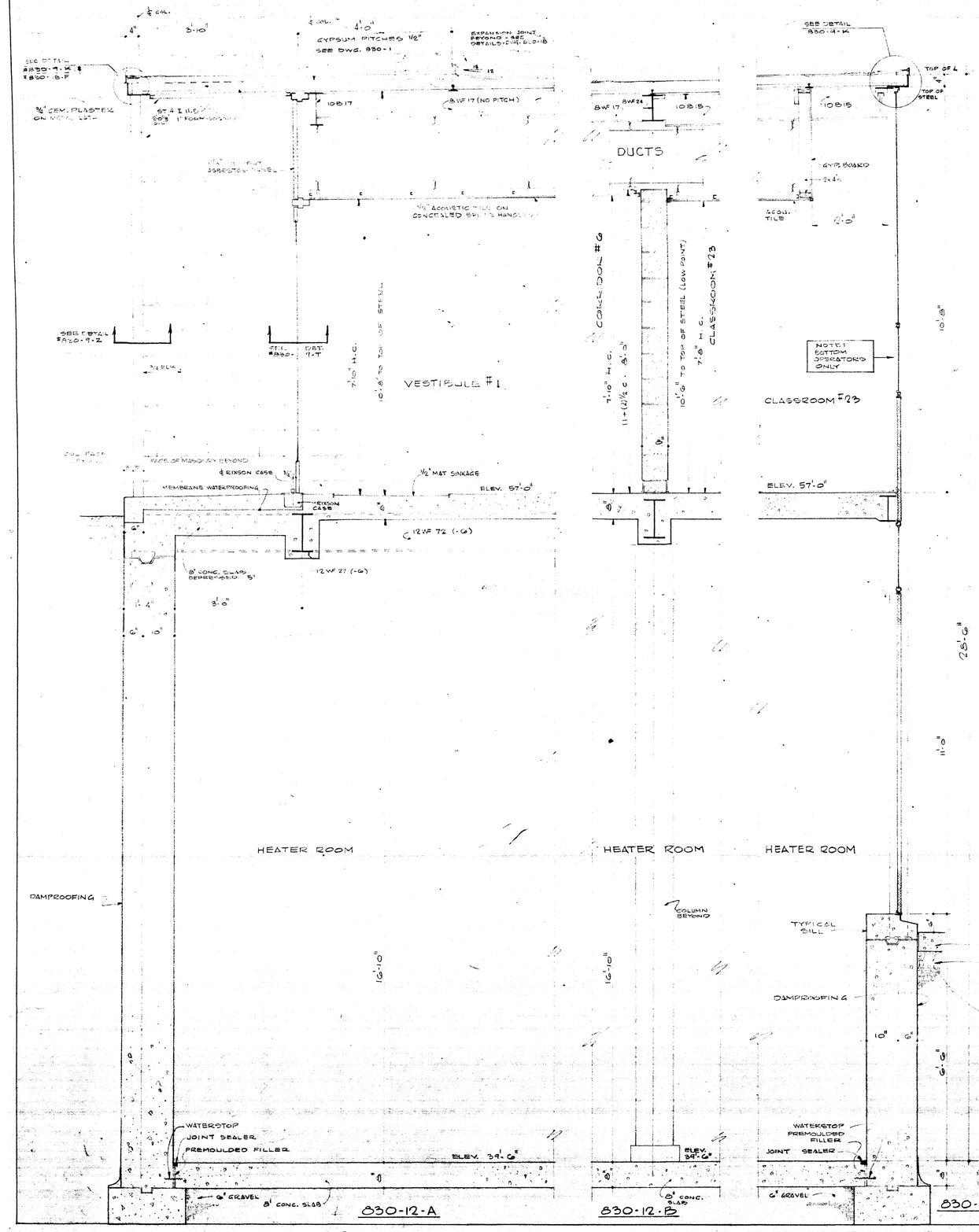
830.11

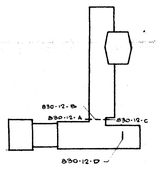
Date 30APR57 Scale AS NOTED

SHERWOOD, MILLS AND SMITH
Architects 65 Broad Street, Stamford, Connecticut

BQ #70 & 125 Attachment

DATE	ISSUE OR REVISION	No.





KEY PLAN

WALL SECTIONS

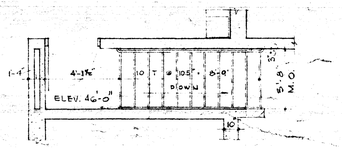
CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

830-12
Date: 30 APR 57
Scale: 3/4" = 1'-0"

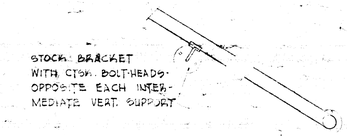
SHERWOOD, MILLS AND SMITH
Architects 69 Broad Street, Stamford, Connecticut

BQ #70 & 125 Attachment

DATE	ISSUE OR REVISION	No.

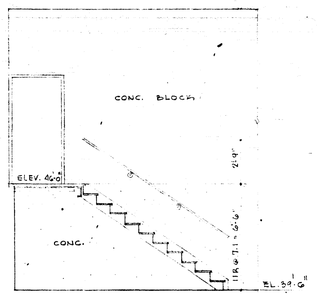


STAIR #4

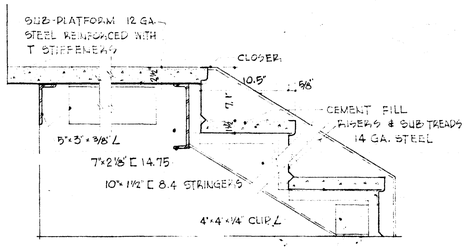


STOCK BRACKET WITH CTSK. BOLTHEADS OPPOSITE EACH INTERMEDIATE VERT. SUPPORT

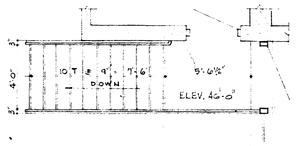
WALL RAIL DETAIL
TYPICAL FOR ALL STAIRS



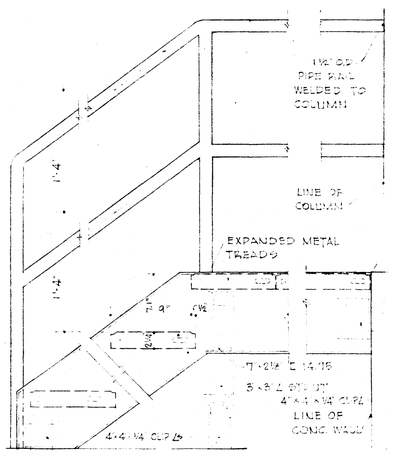
SECTION 4



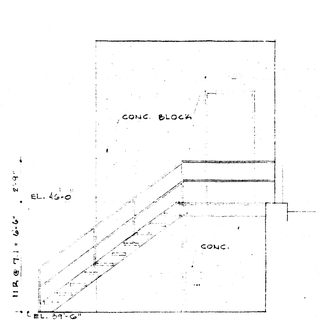
DETAIL SECTION 4



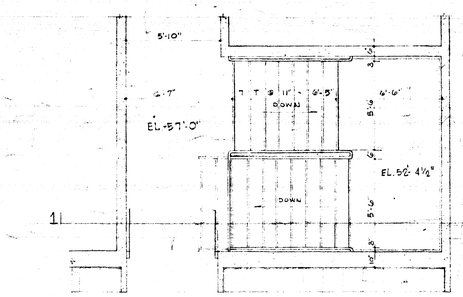
STAIR #5



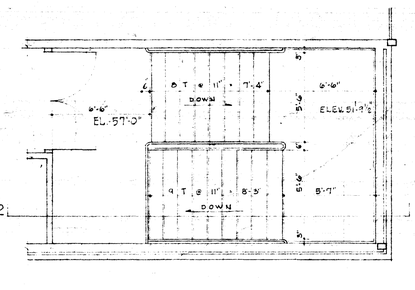
DETAIL SECTION 5



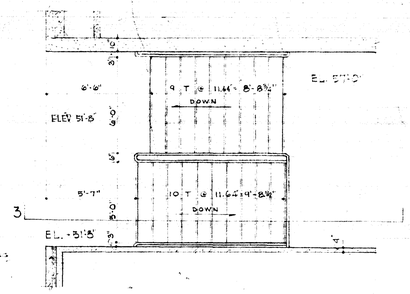
ELEVATION 5



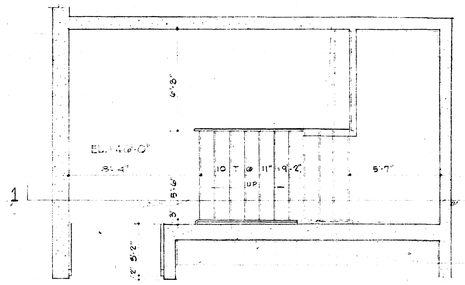
STAIR #1 PLAN AT FIRST FLOOR



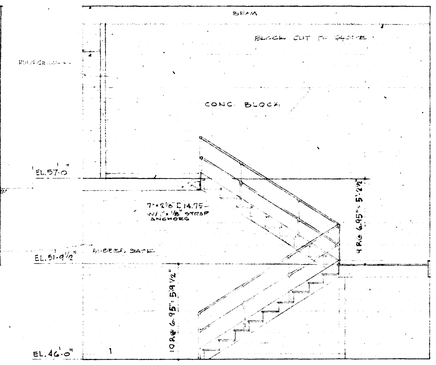
STAIR #2 PLAN AT FIRST FLOOR



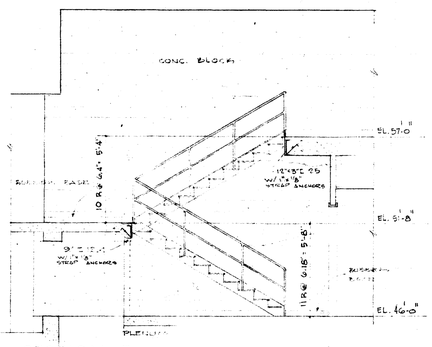
STAIR #3 PLAN AT FIRST FLOOR



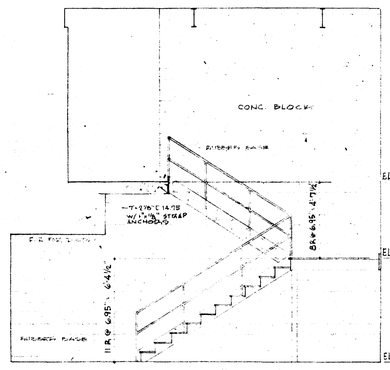
STAIR #1 PLAN AT BASEMENT



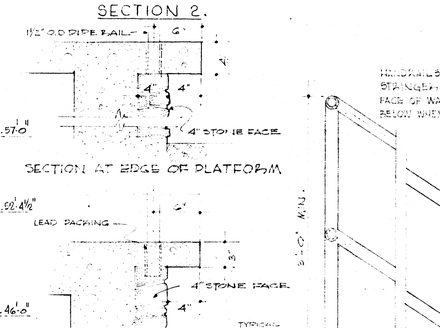
SECTION 2.

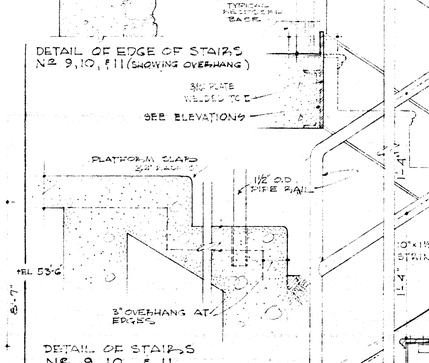


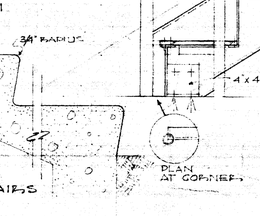
SECTION 3



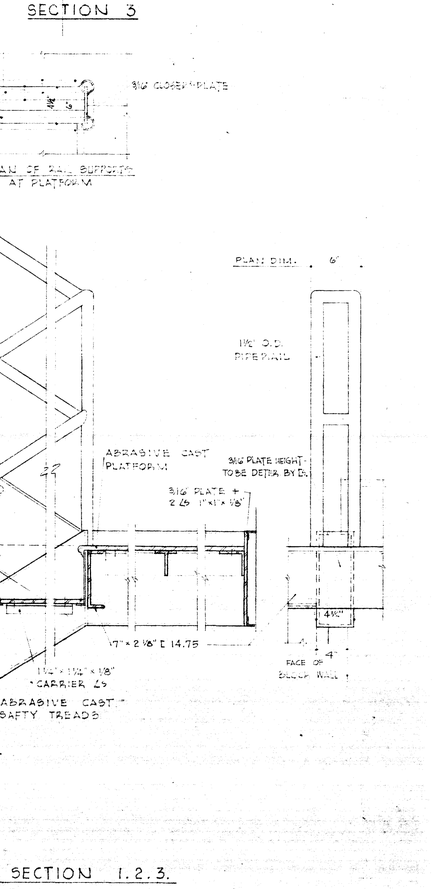
SECTION 1



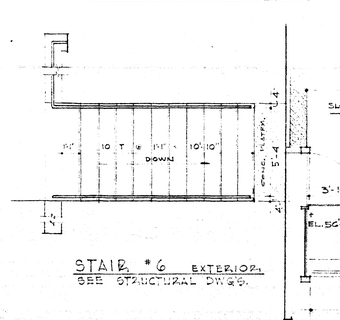




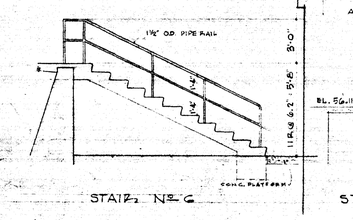
DETAIL OF STAIRS Nº 6, 7 & 8



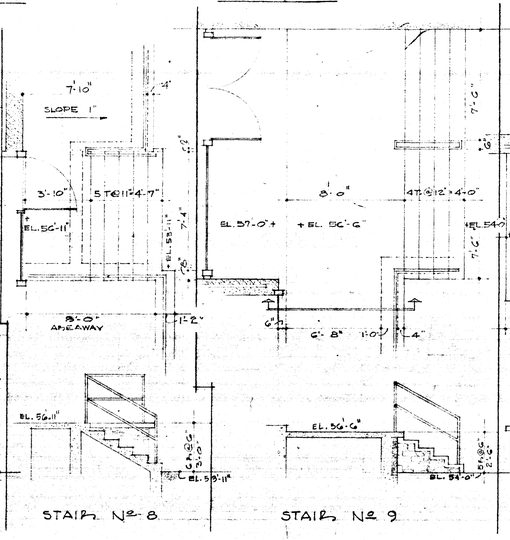
DETAIL SECTION 1.2.3.



STAIR #6 EXTERIOR
SEE STRUCTURAL DWGS.

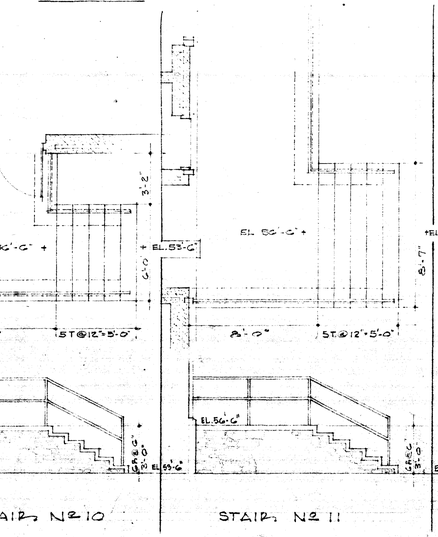


STAIR Nº 6



STAIR Nº 8

STAIR Nº 9



STAIR Nº 10

STAIR Nº 11

NOTE:
STAIR #7 - SEE DWGS. #830-4 & #830-14. SEE DETAIL OF TREAD & RISER AT LEFT.

STAIRS

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

830-13

Date 30APR 57

Scales 1/4" = 1'-0" 1/2" = 1'-0"

SHERWOOD, MILLS AND SMITH
Architects 65 Broad Street, Stamford, Connecticut

BQ #70 & 125 Attachment

DATE	ISSUE OR REVISION	No.

AUDITORIUM LOBBY * 2

SECTION "AA" THRU AUDITORIUM LOBBY * 2

ELEVATION "A"
AUDITORIUM LOBBY * 2

NORTH ENTRANCE LOBBY * 1

EXTERIOR ELEV. SOUTH ENTRANCE TO LOBBY * 1

EXTERIOR ELEVATION SOUTH ENTRANCE TO LOBBY * 1

SOUTH ENTRANCE LOBBY * 1

EAST ENTRANCE TO AUDITORIUM LOBBY

WEST ENTRANCE TO AUDITORIUM LOBBY

VESTIBULE * 1

EXTERIOR ELEVATION
VESTIBULE * 1 ENTRANCE

NOTES:
A. TOP OF 4" COURSE OF BLOCK SLICED 3/8" FOR MORTAR JOINT.

ENTRANCE DETAILS

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

830-14

Date 30 APR 57 | Scale 1/4" = 1'-0"

SHERWOOD, MILLS AND SMITH
Architects 65 Broad Street, Stamford, Connecticut

BQ #70 & 125 Attachment

DATE	ISSUE OR REVISION	NO

INSTRUCTORS TOILET 104
(INSTL FOR LH SIMILAR TO OPPOSITE HAND)

PRINCIPAL'S TOILET 183
KITCHEN TOILET SIMILAR

CLINIC TOILET 170

WOMEN'S TOILET 161

MEN'S TOILET 199

SHOWER 116
DRYING 117
GIRLS 118
GIRLS GYMNASIUM TOILET
BOYS SIMILAR

WOMEN 120
ANTE ROOM 122
MEN 121

BOYS TOILET 108

PUBLIC TOILETS

DRYING 117-S

GIRLS 118-S

GIRLS 118-N

DRYING 117-N

GIRLS 118-W

119-W

WOMEN 120-W

MEN 121-W

MEN 121-S

GIRLS DRYING 117-E

UNIFORM STORAGE 228
BOYS TOILET 225
SERVICE CLOS 226
GIRLS TOILET 224

GIRLS TOILET 224-N

SERV. CL. 226

BOYS TOILET 225-N

STOR. 225

BOYS TOILET 137
GIRLS TOILET 138
SERVICE CLOS 139
140
SEMI-RECESSED CAB.

BOYS TOILET 137-E

BOYS TOILET 137-S

BOYS TOILET 137-W

GIRLS TOILET 138-E

BOYS TOILET 007
GIRLS TOILET 008

BOYS TOILET 007-S

GIRLS TOILET 008-S

TOILET ROOMS

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

830-15

Date 30APR 57 | Scale 1/4"-1'-0"

SHERWOOD, MILLS AND SMITH
Architects 65 Broad Street, Stamford, Connecticut

BQ #70 & 125 Attachment

DATE	ISSUE OR REVISION	No.

ELEVATION 1

ELEVATION 2

ELEVATION 3

ELEVATION 4

TYPICAL 1ST FLOOR CLASSROOM
SCALE 1/4" = 1'-0"

ELEVATION 5

ELEVATION 6

TYPICAL BASEMENT FLOOR CLASSROOM
SCALE 1/4" = 1'-0"

TYPICAL CROSS-SECTION THROUGH AREA "B"
SCALE 1/4" = 1'-0"

TYPICAL SECTION THROUGH CLASSROOM BOOKSHELVES

TYPICAL CLASSROOMS

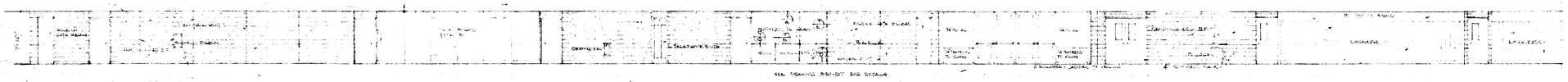
CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

830-16

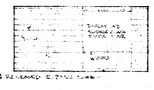
Date: 30APR 57 | Scale: 1/4"=1'-0"

SHERWOOD, MILLS AND SMITH
Architects 65 East Main Street, Stamford, Connecticut

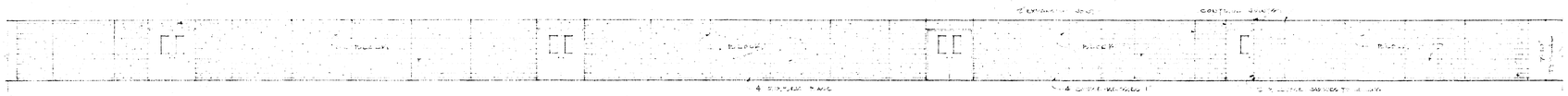
BQ #70 & 125 Attachment



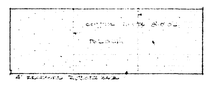
CORRIDOR *147 - EAST WALL - *147



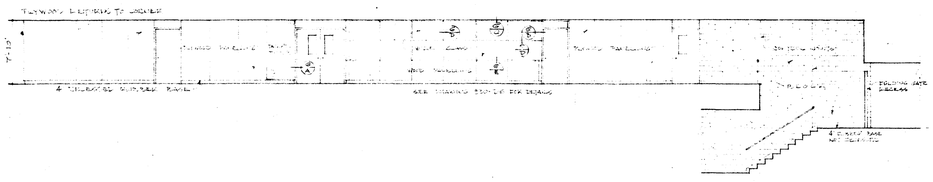
CORRIDOR *3 - SOUTH WALL - *216



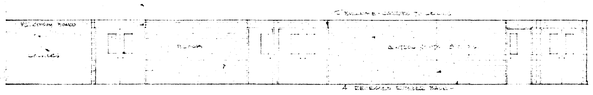
CORRIDOR *3 - WEST WALL - *157



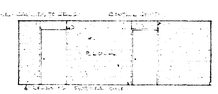
CORRIDOR *6 SOUTH WALL - *220



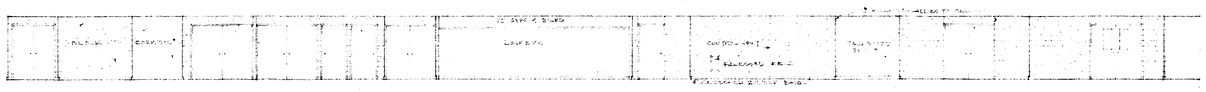
CORRIDOR *4 - NORTH WALL - *176



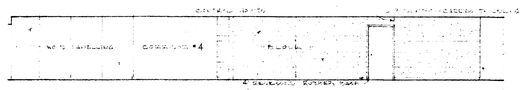
CORRIDOR *7 - EAST WALL - *202



CORRIDOR *6 - NORTH WALL - *220



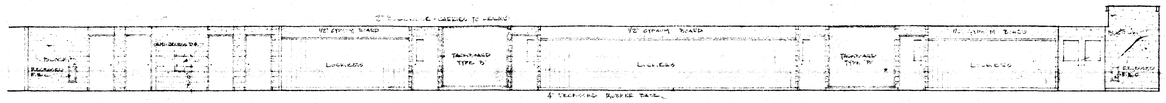
CORRIDOR *7 - WEST WALL - *202



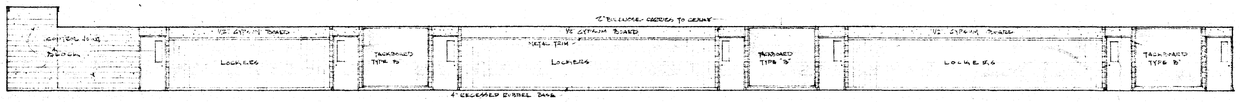
CORRIDOR *5 - EAST WALL - *153



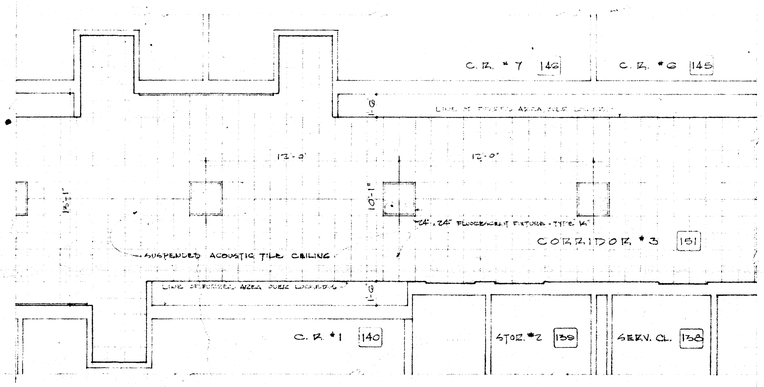
CORRIDOR *4 - SOUTH WALL - *156



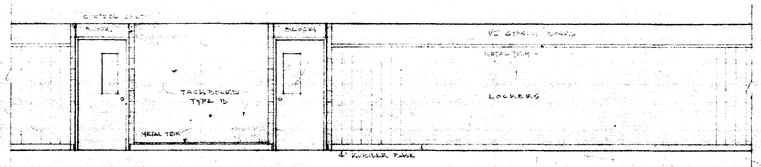
CORRIDOR *5 - SOUTH WALL - *153



CORRIDOR *5 - NORTH WALL - *153



TYPICAL CORRIDOR REFLECTED CEILING PLAN



CORRIDOR ELEVATION @ CLASSROOM ENTRANCE

DATE	ISSUE OR REVISION	No.

CORRIDOR ELEVATIONS

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

830-17

Date 30APR57 | Scale 1/4" = 1'-0" 1/8" = 1'-0"

SHERWOOD, MILLS AND SMITH
Architects 65 Broad Street, Stamford, Connecticut

BQ #70 & 125 Attachment

DATE	ISSUE OR REVISION	No.

LOCKER ROOM LOBBY WEST WALL - #124

LOCKER ROOM LOBBY - EAST WALL - #134

CORRIDOR #3 - SOUTH WALL - #111

CORRIDOR #3 - NORTH WALL - #111

SEE DWG #830-B-12 FOR CONTROL JOINT DETAILS

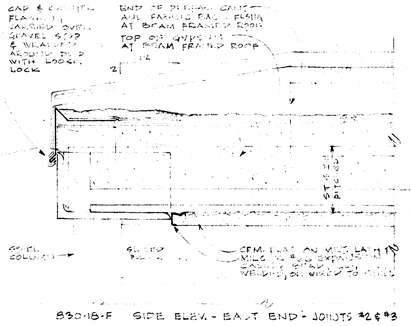
CORRIDOR #1 & #3 - SOUTH WALL - #128

CORRIDOR #1 - NORTH WALL - #128

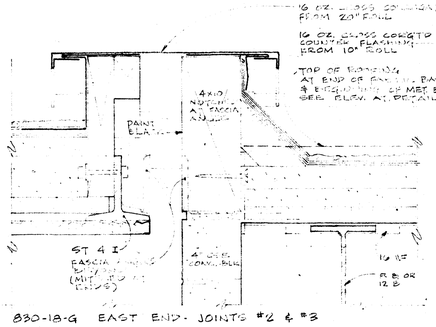
KITCHEN WEST WALL
ELEVATIONS - SCALE: 1/8"=1'-0"

KITCHEN NORTH WALL

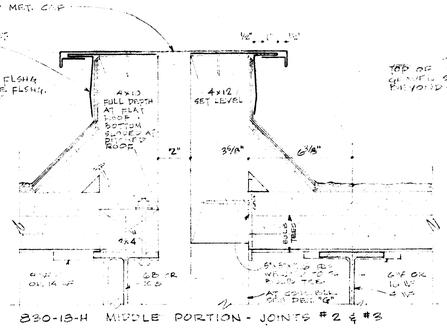
KITCHEN SOUTH WALL



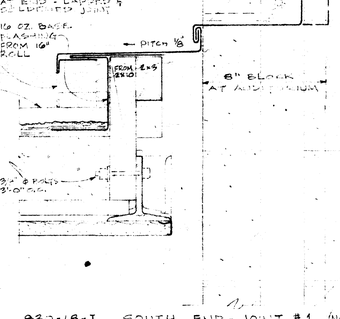
830-18-F SIDE ELEV. - EAST END - JOINTS #2 & #3



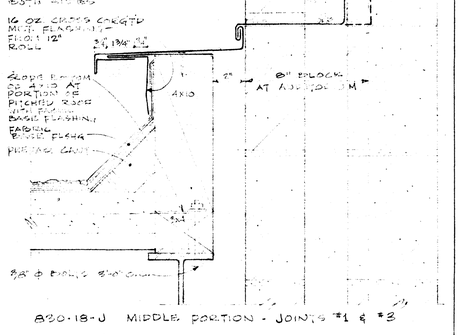
830-18-G EAST END - JOINTS #2 & #3



830-18-H MIDDLE PORTION - JOINTS #2 & #3

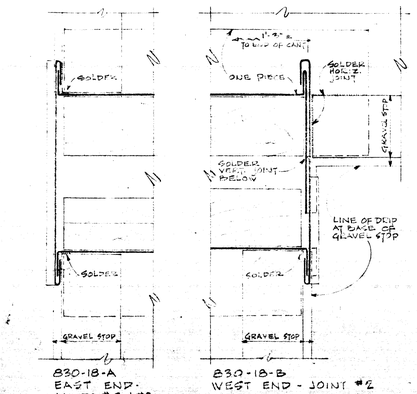


830-18-I SOUTH END - JOINT #1 (NORTH REV.)
WEST END - JOINT #3, REVERSED



830-18-J MIDDLE PORTION - JOINTS #1 & #3

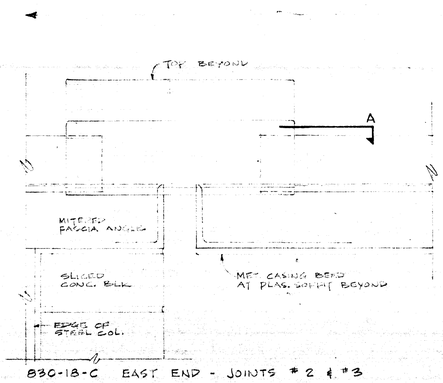
SECTIONS



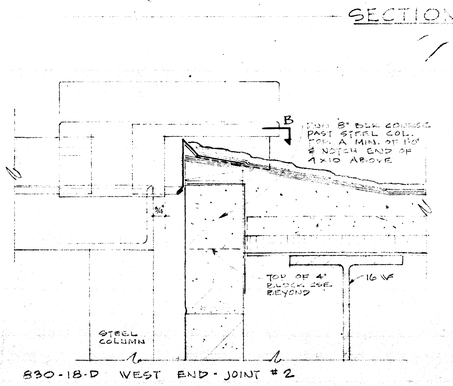
830-18-A
EAST END -
JOINTS #2 & #3

830-18-B
WEST END - JOINT #2

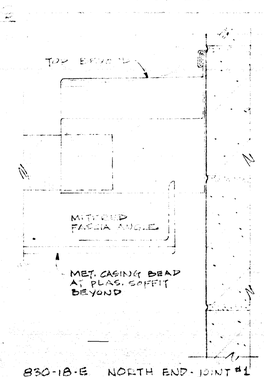
PLAN SECTIONS
ROOFING NOT SHOWN



830-18-C EAST END - JOINTS #2 & #3



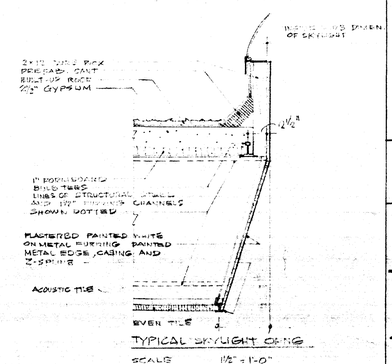
830-18-D WEST END - JOINT #2



830-18-E NORTH END - JOINT #1
(SOUTH REVERSED)
WEST END - JOINT #3

ELEVATIONS

EXPANSION JOINT DETAILS AT ROOF
SCALE: 3"=1'-0"



TYPICAL SKYLIGHT OPNG.
SCALE 1½"=1'-0"

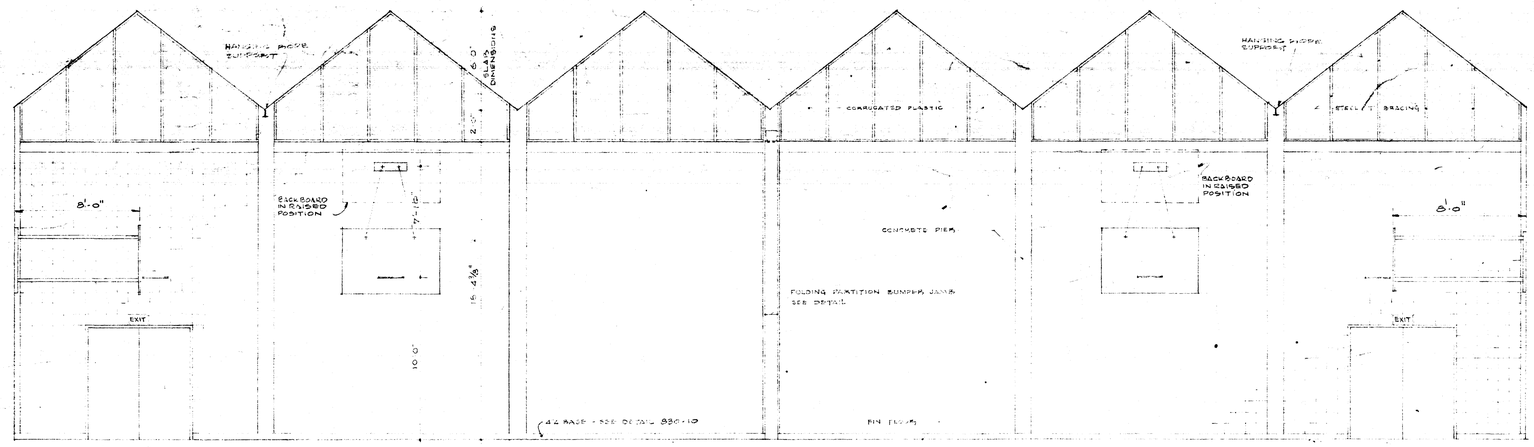
CORRIDOR & ELEVATIONS DETAILS

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

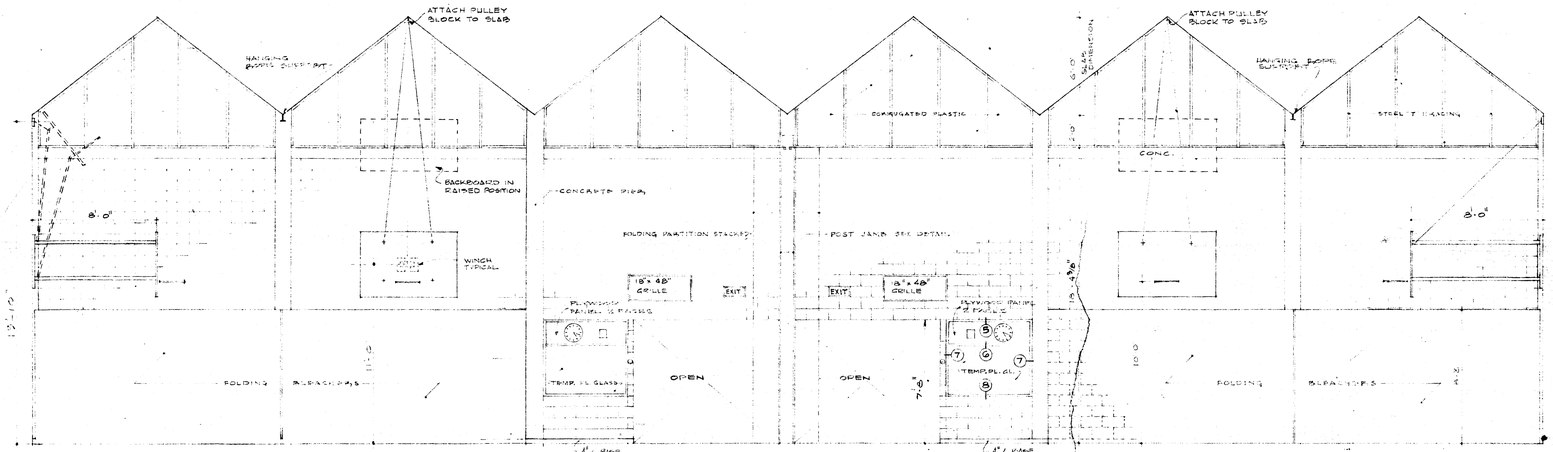
830-18
Date 30APR 57 Scale AS SHOWN

SHERWOOD, MILLS AND SMITH
Architects 65 Broad Street, Stamford, Connecticut

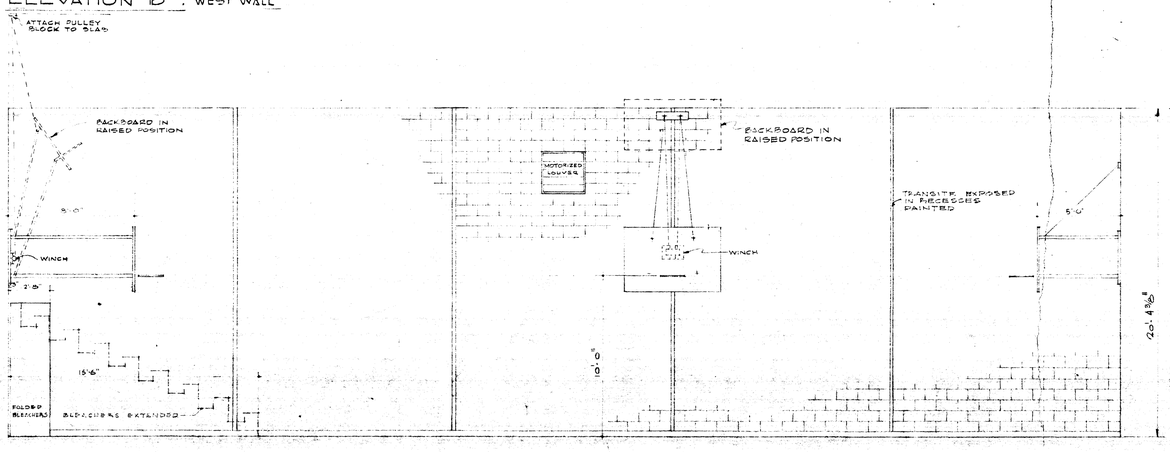
BQ #70 & 125 Attachment



ELEVATION "A" : EAST WALL

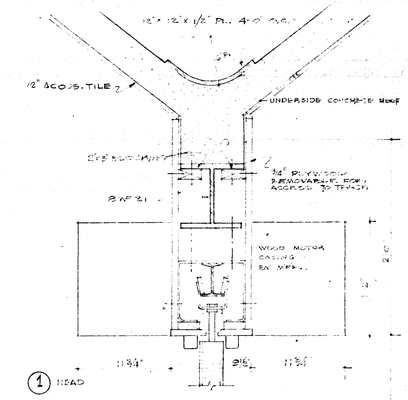


ELEVATION "B" : WEST WALL



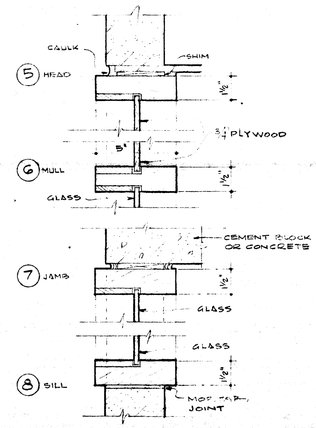
ELEVATION "C" : NORTH WALL SHOWN
SOUTH WALL SIM. TO OPP. HAND

SEE WALL SECTIONS & DETAILS, DWG. 830-10



UNIFORM DRYING RACK
SCALE: ¼"=1'-0" SEE DWG. 830-5 SPACE NO. 119

FOLDING PARTITION DETAILS
SCALE: 1½"=1'-0"



GLASS PARTITION DETAILS
SCALE: 3"=1'-0"

DATE	ISSUE OR REVISION	No.

GYM DETAILS

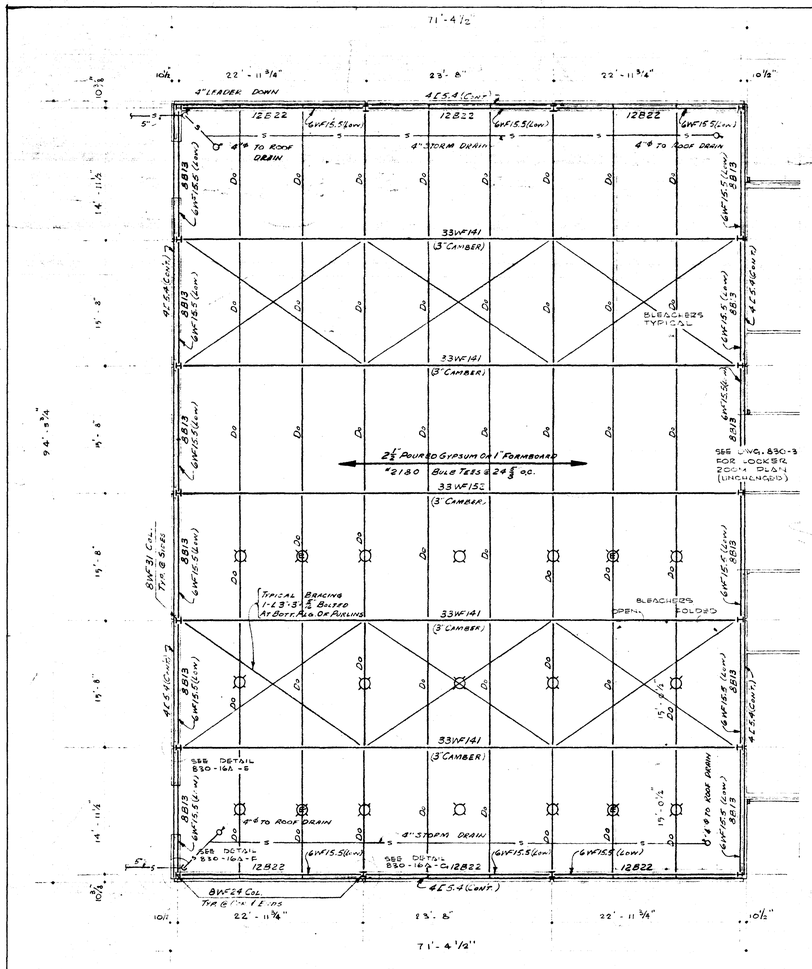
CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

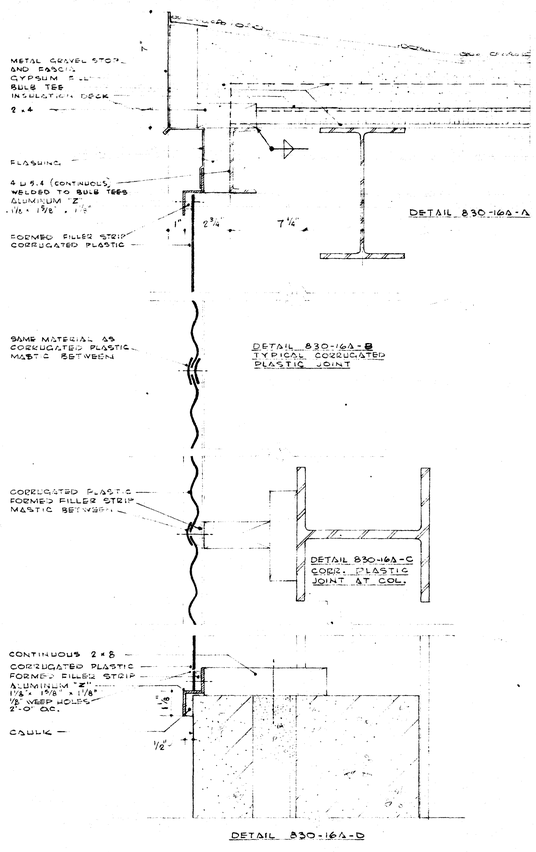
830-19

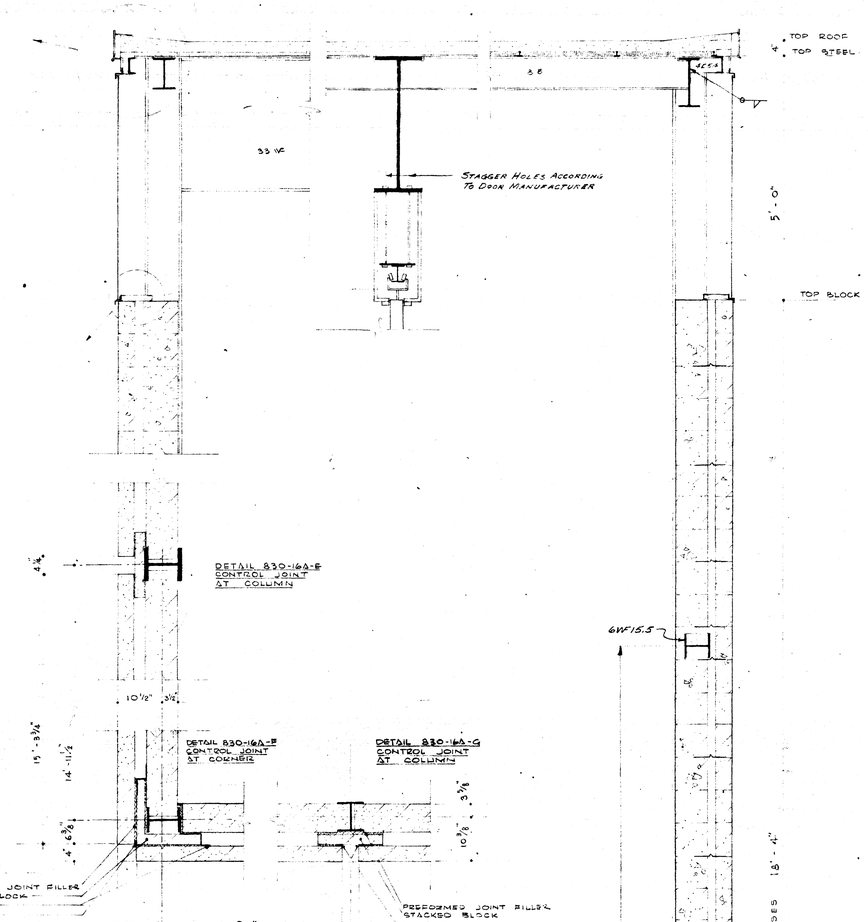
Date: 30 APR 57 | Scale: AS SHOWN

SHERWOOD, MILLS AND SMITH
Architects 65 Broad Street, Stamford, Connecticut

BQ #70 & 125 Attachment

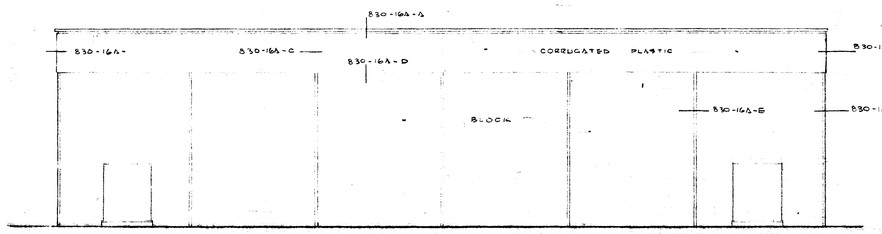




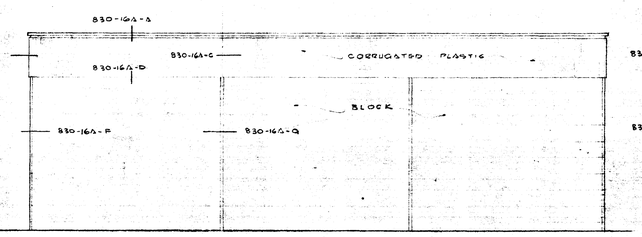


NOTES.

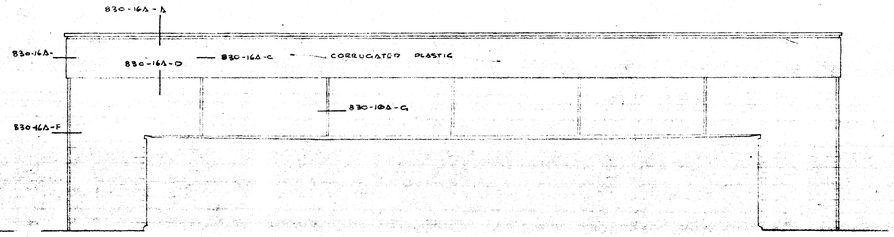
1. THE FOUNDATION PLAN OF GYMNASIUM (DWG. B30-5), MAY BE USED TO SHOW DIMENSIONS & DETAILS FOR THIS ALTERNATE.
2. SHOWN BOILERS, PIPING, AND OTHER EQUIPMENT FOR THIS ALTERNATE ARE SAME AS SHOWN IN BASE BID.
3. HEAT IS INSTALLING NEW CONTROLS FOR THIS ALTERNATE TO MAKE AS SHOWN IN BASE BID.
4. PLUMBING IS AS SHOWN ON THIS DRAWING.
5. LIGHTING PANEL FOR SOUTH SIDE IS SIMILAR TO LIGHTING PANEL FOR NORTH SIDE.
6. CONDITION OF EXISTING SAME AS SHOWN ON DWG. B30-1&2
7. ELECTRICAL CONNECTIONS SHALL CONFORM AND CONNECTED INSOFAR AS SHOWN IN BASE BID.
8. PLUMBING: VERTICAL RAIN LEADERS (2) GALVANIZED IRON PIPE WITH CAST IRON FITTINGS.



ELEVATION "A"



ELEVATION B & C



ELEVATION D

DATE	ISSUE OR REVISION	No.

KEY PLAN

ALTERNATE GYMNASIUM

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

N

830-19A

Date: 30APR 57 | Scale: AS NOTED

SHERWOOD, MILLS AND SMITH
Architects 65 Broad Street, Stamford, Connecticut

BQ #70 & 125 Attachment

DATE	ISSUE OR REVISION	No

CROSS SECTION OF AUDITORIUM SHOWING WALLS AT WIDEST POINT AND ALL OF SUSPENDED CEILING - LOOKING TOWARD STAGE

SCALE 1/8" = 1'-0"

CENTER LINE SECTION AT XX

SCALE 1/8" = 1'-0"

REFLECTED CEILING PLAN

SCALE 1/8" = 1'-0"

SECTION ATTIC

SCALE 1½" = 1'-0"

PLAN SECTION "A"

SCALE 1½" = 1'-0"

SECTION THROUGH STAGE AT "U"

SCALE 1½" = 1'-0"

SECTION AT "E" THROUGH STAGE STAIRS

SCALE 3/4" = 1'-0"

SECTION AT Y-Y SHOWING REAR WALL

SCALE 3/4" = 1'-0"

SECTION THROUGH REAR WALL OF AUDITORIUM SHOWING ACOUSTIC TREATMENT. SEE SECTION 830-11-A

SCALE 3/4" = 1'-0"

DETAIL OF WOOD BASE AT JUNCTURE OF STAGE FLOOR AND MASONRY WALLS

SCALE 3" = 1'-0"

LOUDSPEAKER ENCLOSURE FOR LOCATION ABOVE AUDITORIUM CEILING

TYPICAL CORNER DETAIL "F"

NOTE: AUDITORIUM SEATING TO BE FURNISHED & INSTALLED BY OWNER. STAGE CURTAINS TO BE FURNISHED & INSTALLED BY OWNER.

AUDITORIUM DETAILS

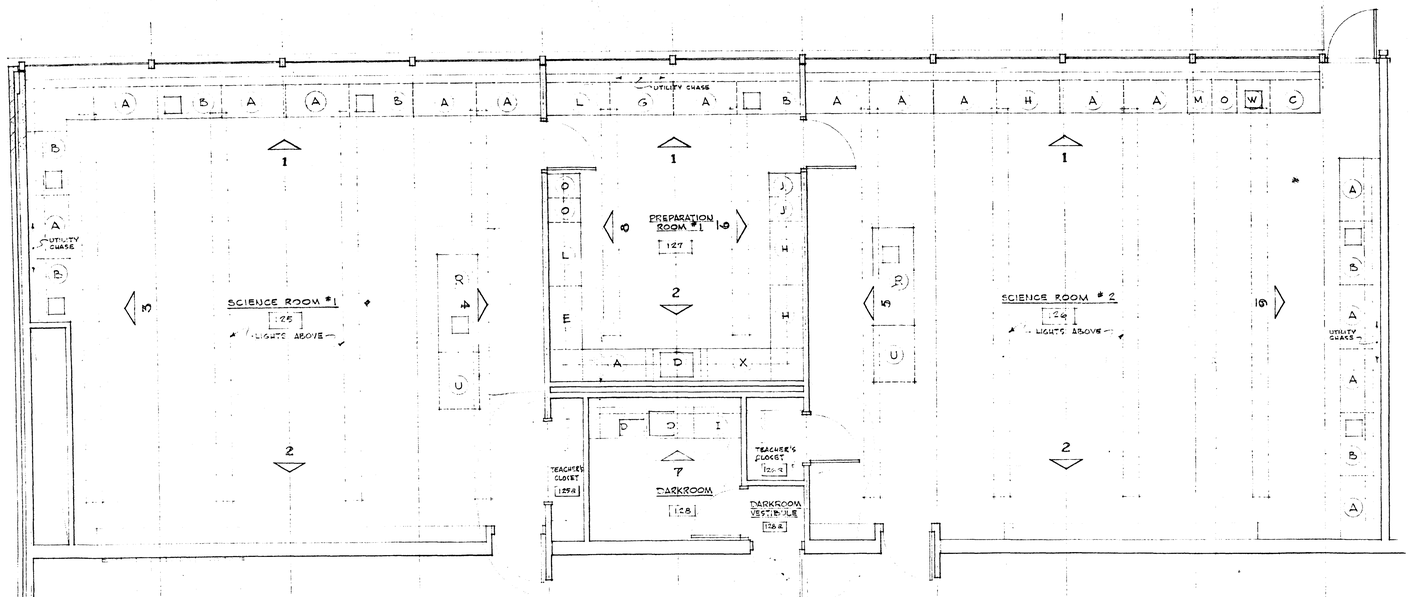
CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

830-20

Date 30 APR 57 | Scale AS NOTED

SHERWOOD, MILLS AND SMITH
Architects 65 Broad Street, Stamford, Connecticut

BQ #70 & 125 Attachment



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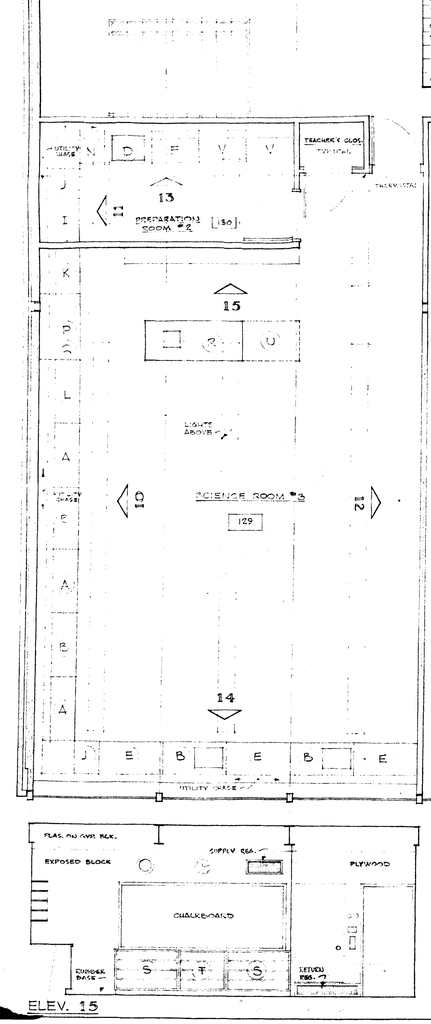
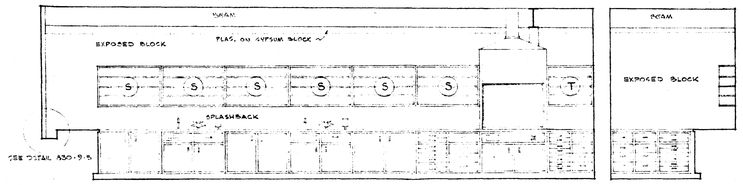
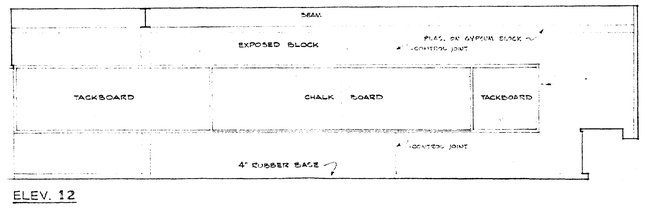
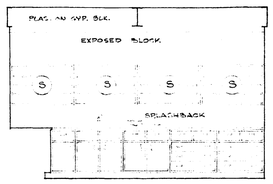
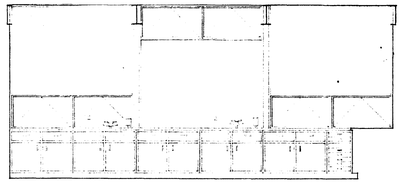
B	BASE CABINET & SINK	DO	#647	I	DO	DO	#687	P	FUME HOOD	DO	#MCT47	W	BASE CABINET & SINK	DO	#687
C	BASE CABINET	DO	#1347	J	DO	DO	#6M17	Q	FUME HOOD BASE	DO	#FCR47-AS	X	BASE CABINET	DO	#147-AS
D	BASE CABINET & SINK	DO	#2347	K	DO	DO	#6M37	R	INSTRUCTOR'S TABLE	DO	#57CO				
E	BASE CABINET	DO	#347	L	DO	DO	#6M47	S	OPEN SHELVING UNIT	DO	#WC-247-30"h				
F	DO	DO	#337	M	DO	DO	#3x17	T	DO	DO	#WC-235-30"h				
G	DO	DO	#647	N	DO	DO	#3-517	U	INSTRUCTOR'S DESK	OWNER	N.I.C.				

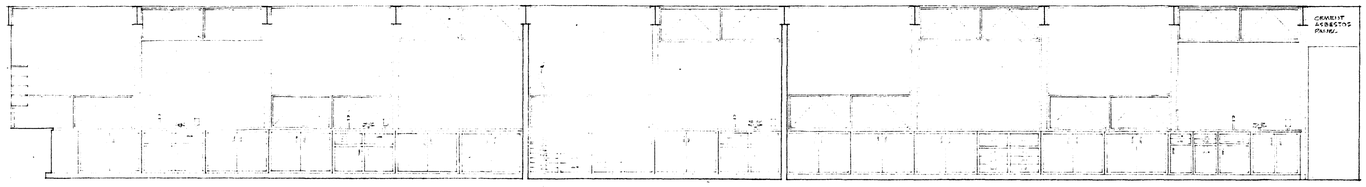


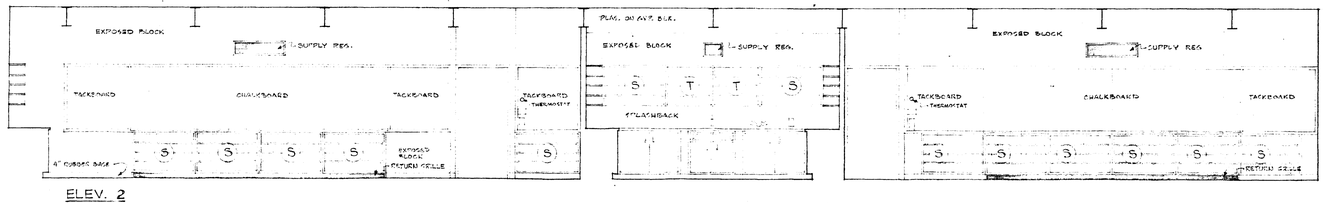


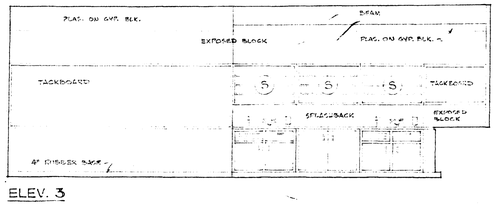


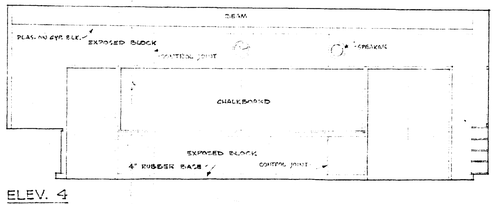


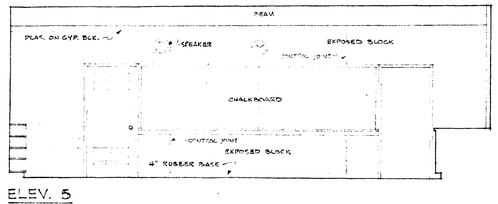


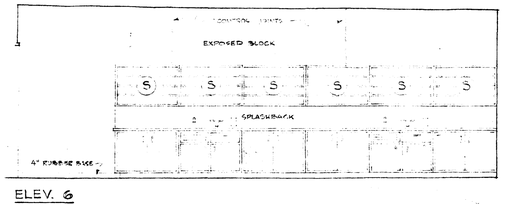


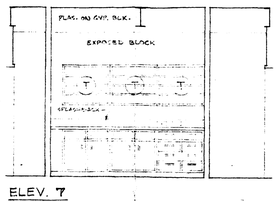


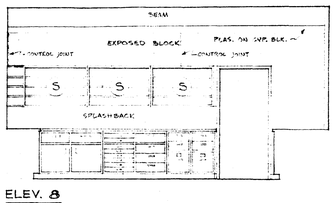


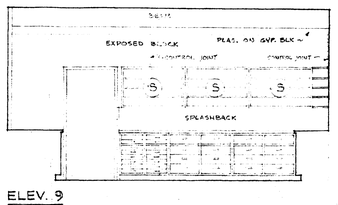












DATE	ISSUE OR REVISION	No.

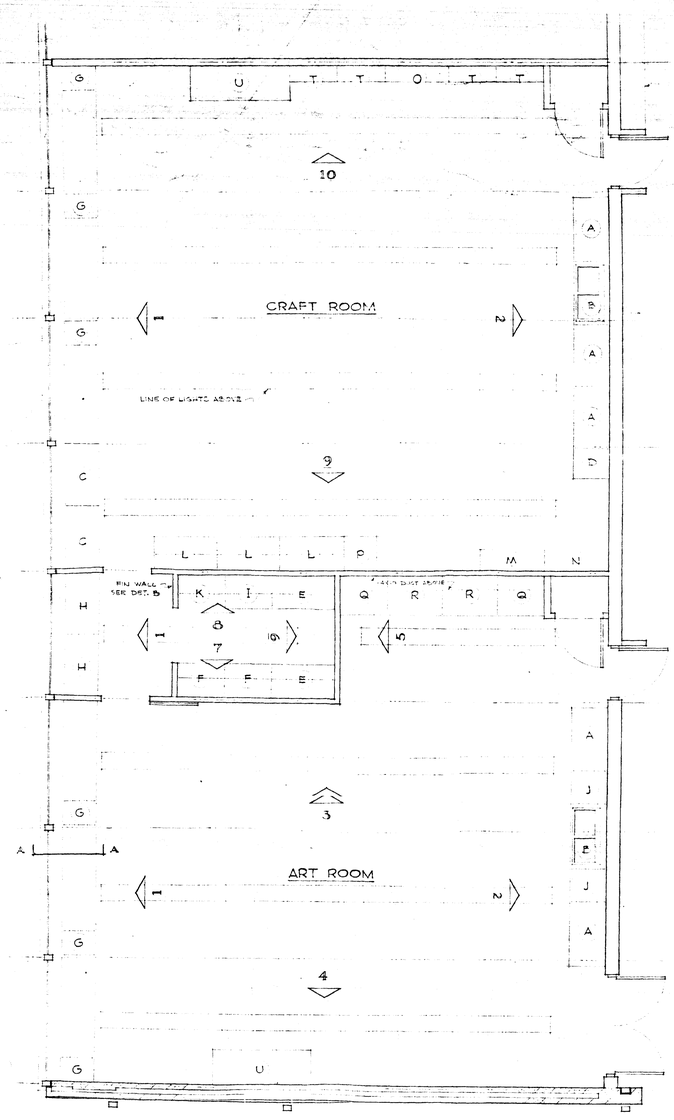
SCIENCE ROOMS

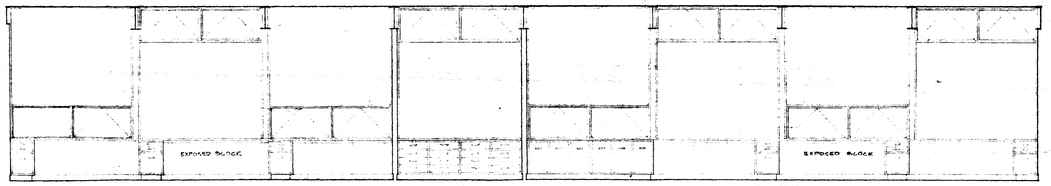
CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

330-21
30APR57
1/4"=1'-0"

SHERWOOD, MEAD AND SMITH
Architects

BQ #70 & 125 Attachment





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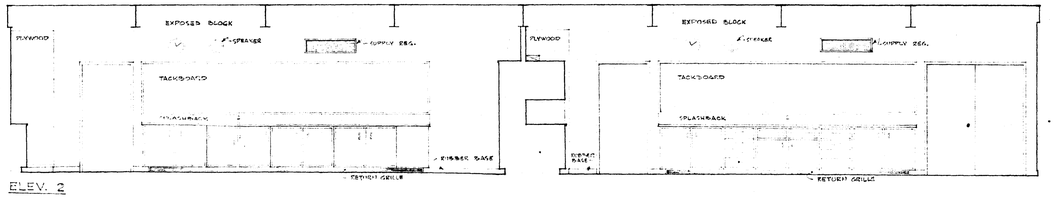

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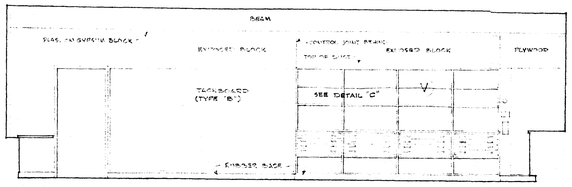

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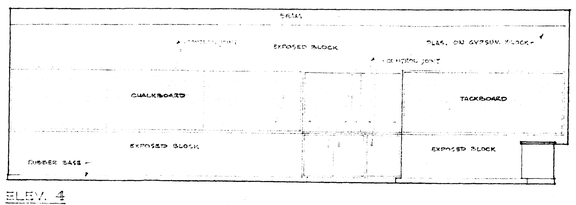

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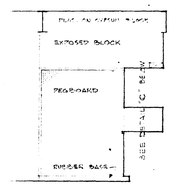

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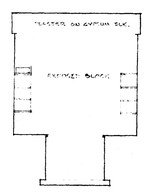

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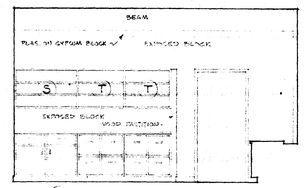

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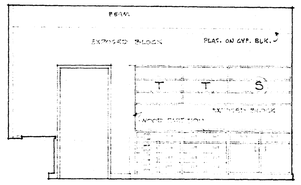

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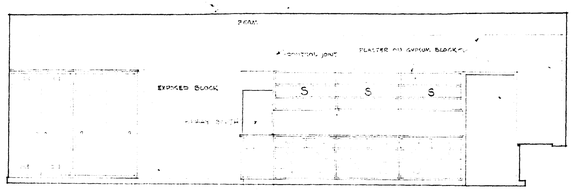
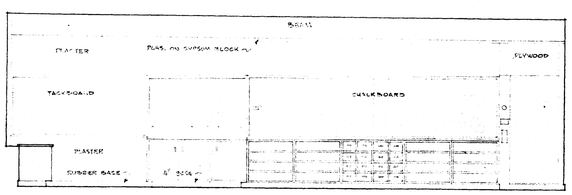


ELEV. 9



ELEV. 10

ITEM	DESCRIPTION	FURNISHED BY	CAT. Nº	ITEM	DESCRIPTION	FURNISHED BY	CAT. Nº	ITEM	DESCRIPTION	FURNISHED BY	CAT. Nº	ITEM	DESCRIPTION	FURNISHED BY	CAT. Nº
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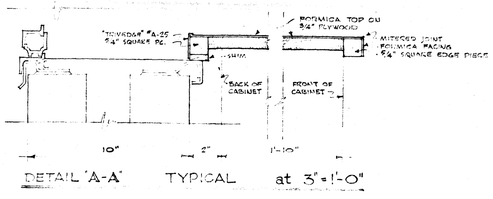
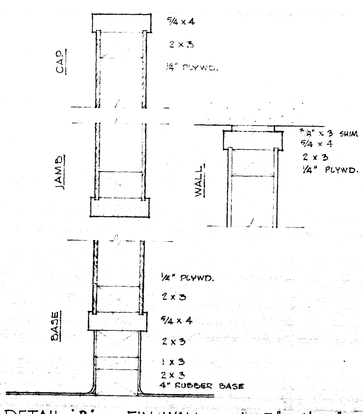
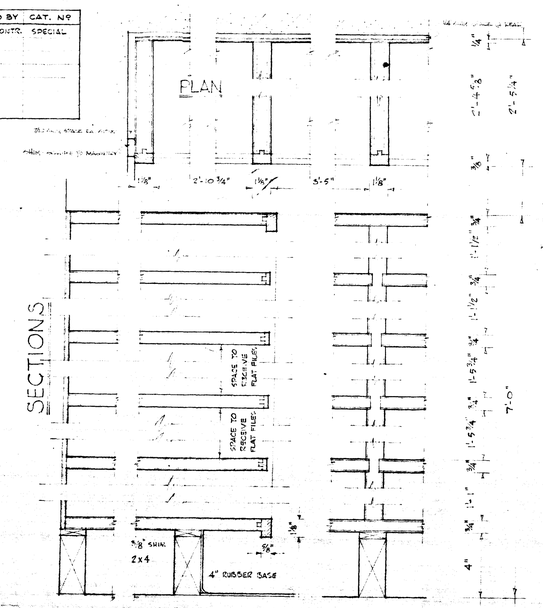
B	DO	DO	#247	I	DO	DO	#837	P	SPRAY BOOTH	DO	SPECIAL				
C	DO	DO	#141	J	DO	DO	#827	Q	FLAT FILE		B 2531				
D	DO	DO	SPECIAL	K	DO	DO	#SM37	R	FLAT FILE		B 3726				
E	DO	DO	#347	L	DO	DO	#947	S	OPEN SHELVING	EQUIP. MANUF.	WC-247-30"A				
F	DO	DO	#LD37	M	STORAGE CAB.	DO	#2640	T	DO	DO	WC-235-30"A				
G	DO	DO	#8X11	N	STORAGE CAB.	DO	#2920	U	TEACHING CENTER	DO	SPECIAL				



DETAIL 'A-A' TYPICAL at 3"=1'-0"



DETAIL 'B' FIN WALL at 3"=1'-0"



DETAIL 'C' FILE CABINETS at 3"=1'-0"

DATE | ISSUE OR REVISION

ART & CRAFT ROOMS

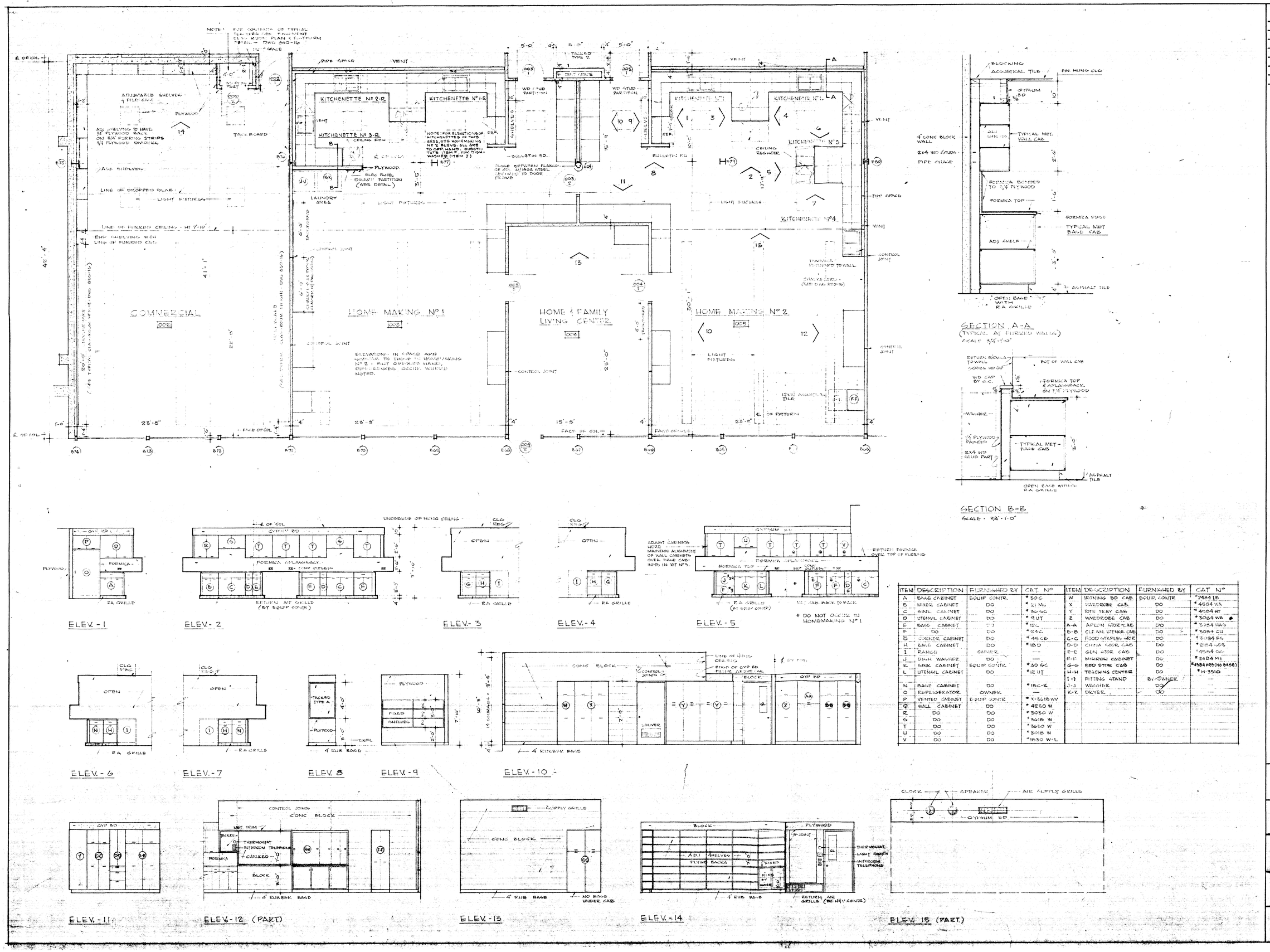
CENTRAL JUNIOR HIGH SCHOOL

330-22

30APR57 | 1/4"=1'-0"

SHERWOOD, MILLS AND SMITH

BQ #70 & 125 Attachment



ITEM	DESCRIPTION	FURNISHED BY	CAT. Nº	ITEM	DESCRIPTION	FURNISHED BY	CAT Nº
A	BASE CABINET	EQUIP CONTR.	*30C	W	IRONING BD CAB	EQUIP. CONTR	*2484 LB
B	MIXER CABINET	DO	*21 MC	X	WARDROBE CAB.	DO	*4584 WA
C	SINK CABINET	DO	*36 SC	Y	TOTE TRAY CAB	DO	*4584 HT
D	UTENSIL CABINET	DO	*9 UT	Z	WARDROBE CAB	DO	*3084 WA
E	BASE CABINET	DO	*12C	A-A	APRON STOR CAB	DO	*3084 HAS
F	DO	DO	*24C	B-B	CLEAN UTENSIL CAB	DO	*3084 CU
G	CORNER CABINET	DO	*45 CB	C-C	FOOD STAPLES STOR	DO	*3084 FS
H	BASE CABINET	DO	*18D	D-D	CHINA STOR CAB	DO	*2184 SD3
I	RANGE	OWNER	—	E-E	GEN STOR CAB	DO	*4584 GG
J	DISH WASHER	DO	—	F-F	MIRROR CABINET	DO	*2484 MI
K	SINK CABINET	EQUIP CONTR	*30 SC	G-G	BED STOR CAB	DO	*4584 HS(NO BASE)
L	UTENSIL CABINET	DO	*12 UT	H-H	TEACHING CENTER	DO	*H-3510
				I-I	FITTING STAND	BY OWNER	—
N	BASE CABINET	DO	*18C-K	J-J	WASHER	DO	—
O	REFRIGERATOR	OWNER	—	K-K	DRYER	DO	—
P	VENTED CABINET	EQUIP CONTR	*X-3618 WV				
Q	WALL CABINET	DO	*4230 W				
R	DO	DO	*3030 W				
S	DO	DO	*3618 W				
T	DO	DO	*3630 W				
U	DO	DO	*3018 W				
V	DO	DO	*1830 W-L				

DATE	ISSUE OR REVISION	No.

HOMEMAKING ROOMS

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

830-23

Date 30 APR 57 | Scale 1/4" = 1'-0"

SHERWOOD, MILLS AND SMITH
Architects 65 Broad Street, Stamford, Connecticut

BQ #70 & 125 Attachment

DATE	ISSUE OR REVISION	No.

SCALE-DETAILS: 1½" = 1'-0"

TACKBOARD, TYPE "B"
METAL TRIM
RUBBER BASE
SECTION A-A

METAL BEAD
TACKBOARD TYPE "B"
TYPICAL CORNER DETAIL

DUCT SPACE
DISPLAY COUNTER, SHELF OVER
OUTLET IN COUNTER
LINE OF HUNG CEILING AT 7'-10"±
ELEC. PANEL
DUCT SPACE
TACKBOARD
CONF. RM. #1
133
DISPLAY CASE SEE DETAIL-C ON DWG. A30-D23
CHALKBOARD
AUDIO-VISUAL STORAGE
135
STEEL ADJUSTABLE SHELVES
CEILING GRILLE
¾" PLYWOOD
2"x4" HARDWD TRIM
STEEL BOOK SHELVES
EXPOSED BEAMS
LIBRARY
131
FUTURE BOOK SHELVES
SHELVES
CONTROL JNT.
LIBRARIAN'S OFFICE & WORK ROOM
132
CONTROL JOINT
DUCT DN.
WOOD ADJUSTABLE SHELVES
COUNTER
SHELVES
SINK
10"x12" VENT ENCLOSURE
CHALKBOARD
TACKBOARD
CONTROL JOINT
CONF. RM. #2
134
SCRIBE TO COLUMNS
8 @ 6'-0" = 64'-0"

TILE PATTERN
6'-0 LONG SURFACE MOUNTED FLUORESCENT FIXTURES
EXHAUST GRILLE & DUCT
ACOUSTIC TILE
12'-0" LONG SURFACE MOUNTED FLUORESCENT FIXTURES
CEILING GRILLE
TILE PATTERN

REFLECTED CEILING PLAN — CONFERENCE ROOM #1 133 & OFFICE & WORK ROOM 132

PLAN

TOP OF STEEL
CORRIDOR HUNG CLG.
14 WF
LINTEL, WELD TO COL.
CONTROL JOINTS
PLASTER
PAINTED BLOCK
METAL STANDARDS & BRACKETS
ADJUSTABLE SHELVING
VINYL TOP
FIXED SHELVES
FIN. FLR.
DISPLAY CASS SEE DETAILS ON DWG. A30-D23
4" RUBBER BASE
PLYWOOD

ELEV. #1

HUNG CLG.
PLYWOOD PANELS
GLASS ¼" HEAVY SHEET
INTERCOM 'PHONE
FIN. FLOOR
4" RUBBER BASE

ELEV. #5

GYPSUM BOARD
METAL TRIM
AIR SUPPLY GRILLE
PLYWOOD
GLASS, ¼" HEAVY SHEET
CHALKBOARD
TACKB'D TYPE "A"
4" RUBBER BASE
RETURN AIR GRILLE BY H & V CONTR.

ELEV. #8

PLASTER
CONTROL JOINTS
PAINTED BLOCK
PLYWOOD
VINYL TOP
FIXED SHELVES
COL.
BOOKSHELVES
WD. ENDS

ELEV. #2

PLYWOOD
FIXED SHELVES
GLASS ¼" HEAVY SHEET
OUTLET
DUCT SPACE
4" RUBBER BASE

ELEV. #6

PAINTED BLOCK
FORMICA BACKSPLASH & COUNTER
PLYWOOD
ADJUSTABLE SHELVES
4" RUBBER BASE

ELEV. #7 (PART.)

1 BTM OF ROOF PLANK; FLANGE OF 14 WF; GYPSUM BOARD; 14 WF PUNCH FOR NAILER
2
3 GYPSUM B'D. IN 134 WITH METAL TRIM; LINE OF JOINT BETWEEN GYP. BD. & PLYWOOD AT 9'-0" IN 134; AC. TILE AT 7'-10" IN 132
4 CAULK AT COUNTER; TOP OF COUNTER IN 132; ¼" PLYWOOD (OR MICARTA IN 132 AT JAMBS)
5 L.M. BUCK AT DR. 132/2
6 ¼" PLYWOOD; RUBBER BASE

WOOD WALL DETAILS
SCALE: 3" = 1'-0"

SPEAKER; CLOCK
AIR SUPPLY GRILLE
GYPSUM BOARD
CONC. BLOCK
PLYWOOD
STEEL BOOK SHELVES
WIRE GLASS
H.M. FRAME SEE DETAILS ON DWG. A30-D6
VINYL TOP
FIXED SHELVES
FLOOR LIGHT
PLYWOOD
TILESMO. ½" POL. PL. GL. SHELVES METAL BRACKETS & STANDARDS
SWITCH
PLYWOOD
4" RUBBER BASE
CONT. RETURN AIR GRILLE IN BASE BY H & V CONTR.

ELEV. #3

VINYL TOP
FIXED SHELVES
4" RUBBER BASE

ELEV. #4

LIBRARY

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

830-24
Date 30APR 57
Scale AS SHOWN

SHERWOOD, MILLS AND SMITH
Architects 60 Broad Street, Stamford, Connecticut

BQ #70 & 125 Attachment

K.E.C. DENOTES KITCHEN EQUIPMENT CONTRACTOR
G.C. " GENERAL CONTRACTOR
S/S " STAINLESS STEEL
G/I " GALVANIZED IRON
C/P " CHROMIUM PLATED

SYMBOL & ABBREVIATION SCHEDULE

PLUMBING-HEATING		ELECTRICAL	
C	COLD WATER	HP	MOTOR HORSEPOWER
H	HOT WATER	KW	KILOWATTS
W	WASTE	EO	ELECTRIC CONNECTION
IW	INDIRECT WASTE	EL	ELECTRIC LIGHT
G	GAS	DR	DUPLEX RECEPTACLE
FD	FLOOR DRAIN	SW	SWITCH
S	STEAM SUPPLY	SP	SWITCH AND PILOT LIGHT
R	STEAM RETURN		JUNCTION BOX
AF	ABOVE FINISHED FLOOR		SPECIAL PURPOSE OUTLET

SCHEDULE OF EQUIPMENT AND CONNECTIONS

ITEM NO.	Q'TY	DESCRIPTION	H	C	W	IW	G	HP	KW	EL	EO	DR	VOLT.	PH.	REMARKS
1	3	RANGES, SHELF AND FAUCET	¾"	¾"			15/16								270,000 BTU - FAUCET BY K.E.C.
2	1	OVEN					¾"								88,000 BTU.
3	1	VEGETABLE STEAMER	¾"				¾"								160,000 BTU-¾" STEAM CONNECT
4	1	TILTING KETTLE & FAUCET	¾"	¾"											CONNECTIONS TO #3 BY OTHERS
5	1	MIXER						1				1	208	3	BY OWNER
6	1	HOOD OVER RANGES, OVEN, ETC.							0.8	8	1		120	1	9800 C.F.M. FAN
7	1	COOK'S TABLE & SINK	¾"	¾"	1½"								120	1	CONVEYANCE DR.
8	1	FAN & UTENSIL RACK													CEILING TYPE
9	1	PORTABLE SLICER TABLE													
10	1	SLICER							¼				120	1	CORD & PLUG BY OWNER
11															
12	1	VEGETABLE SINK & DRAINBOARD	3/4"	3/4"	2"										
13	1	PEELER & TRAP		¾"	3"			½			1		120	1	SOLID CONNEC. NON-IW to FD
14	1	TABLE										1	120	1	CONVENIENCE DR.
15	1	POT SINK & DRAINBOARDS	3/4"	3/4"	2"										
16															
17	1	BAKER'S TABLE & PANS										1	120	1	CONVENIENCE DR.
18	2	PASS-THRU REFRIGERATORS			1"		½				2		120	1	CORD & PLUG EACH/BY OWNER
19															
20	2	UPRIGHT FREEZERS					½				2		120	1	CORD & PLUG EACH/BY OWNER
21	1	WALK-IN REFRIGERATOR					¾					1	1 SOL	3	REFRIGERATION UNIT / BY OWNER
													1 SOL	3	BLOWER COIL & MOTOR
22	2	DISHWASHERS	180°F	¾"	2"		½	1			2		208	3	40,000 BTUH EACH WASHING
23	2	HOT WATER BOOSTERS	¾"				15.0				2		208	3	EACH - SOLID CONNECTIONS
24	2	SETS OF DISHTABLES & SINKS	3/4"	3/4"	2½"										EACH SET: SOILED DISH PASS OPENING BOOK & DOOR BY K.E.C.
25	1	HOODS OVER DISHWASHERS													750 CFM EACH
26	2	CAFETERIA COUNTERS													
A	2	TRAY & SILVER SECTIONS													
B	2	HOT FOOD TABLES							3.6		2		120	1	EACH - SOLID CONNECTIONS
C	2	PROTECTOR CASES													
D															
E	2	DISPLAY CASES													
F	2	REFRIGERATED MILK DISPENSERS			1"		½				2		120	1	CORD & PLUG EACH
G	2	CASHIER SECTIONS									2		120	1	CONVENIENCE DRS
H	2	TRAY SLIDE													
27	3	WATER COOLERS		¾"	1½"						1		120	1	CORD & PLUG - EACH
28															
29	1	CAFETERIA COUNTER													
J	1	HOT FOOD TABLE							2.4		1		120	1	SOLID CONNECTION
K	1	PROTECTOR CASE													
L	1	BREAD DRAWER													
M	1	REFRIGERATOR UNDER							¼			1	120	1	CORD & PLUG BY OWNER
N	1	DISPLAY CASE													
P															
Q	1	TRAY SLIDE													
30															
31	3	ICE CREAM CABINETS (BY OTHERS)							¼			1	120	1	BASES BY K.E.C. CORD & PLUG
32	1	CAN RINSER	¾"	¾"											
33	1	HOT STORAGE CABINET													

DATE	ISSUE OR REVISION	No.

SERVING

CAFETERIA #2

DISHWASHING

COOKER ROOM

STORE ROOM
SHELVING BY G.C.

KITCHEN

RECEIVING

TRASH & CAN WASHING

OFFICE
TELEPHONE

DISHWASHING

CAFETERIA #1

FACULTY DINING ROOM

PLAN
SCALE: ¼"=1'-0"

SECTION V-V
¾"=1'-0"

DISPLAY CASE
PROTECTOR CASE
SILVERWARE
ICE CREAM CABINET
REMOV. ACCESS PANEL
REFRIG. MILK DISPENSER
REMOVABLE SHELVES
FIXED
PLATE SHELF
BOTTOM SHELF
SCREENED OPENING
BASE BY K.E.C.

ELEVATION A-A
½"=1'-0"

SLOPED SHELF
FOUR(4) BINS
SCREENED OPENING
TOE BASE

ELEVATION B-B
½"=1'-0"

SECTION C-C
¾"=1'-0"

SECTION D-D

SECTION THRU ¾"=1'-0" ELEVATIONS
SOILED DISH PASS OPENINGS

SECTION Z-Z
1½"=1'-0"

SECTION THRU SOILED DISH TABLE
SIZE AND SHAPE AS SHOWN ON PLAN

SECTION THRU CLEAN DISH TABLE
SIZE AND SHAPE AS SHOWN ON PLAN
¾"=1'-0"

SECTION THRU PRE RINSE SINK

SECTION THRU SINK
¾"=1'-0"

SECTION X X THRU PRE RINSE SINK
¾"=1'-0"

PART ELEVATION OF SINK AND DRAINBOARD
SIZE AND SHAPE AS SHOWN ON PLAN

SECTION THRU RANGE HOOD
¾"=1'-0"

SECTION Y-Y
HALF SIZE

DETAILS SHELVES OVER
1½"=1'-0"

SECTION THRU DISHWASHER HOOD
¾"=1'-0"

SECTION THRU TABLE AT WALLS

WORK TABLE
¾"=1'-0"

PERSPECTIVE

SECTION

CARVING BOARDS
¾"=1'-0"

PERSPECTIVE OF TOOL DRAWER

GENERAL NOTE
THIS PLAN IS AN INSTRUMENT OF SERVICE PREPARED FOR THE CONVENIENCE OF OTHER CONTRACTORS AND IS AS ACCURATE AS CAN BE OBTAINED AT THIS DATE. WE WILL NOT BE RESPONSIBLE FOR ANY DISCREPANCIES WHICH MAY DEVELOP BETWEEN LOCATIONS OF CONNECTIONS SHOWN AND ACTUAL LOCATIONS OF CONNECTIONS OF FIXTURES FURNISHED. CONNECTIONS SHOWN ARE APPROXIMATE LOCATIONS ONLY. FIXTURES VENDOR MAY REQUIRE DIFFERENT STANDARD ALLOWANCES MUST BE MADE FOR TRAPS, VALVES, STRAINERS OR OTHER CONNECTING DEVICES. CONNECTIONS FOR FIXTURES IN FLOOR OR PARTITIONS OR DROP ANS ARE FOR GUIDANCE ONLY. FOR FLOOR AT REAR OF DRIP PAN AND CONNECTIONS FOR FIXTURES AS REQUIRED. LOCATIONS OR CONDITIONS ON FIXTURES ARE MEASURED FROM FINISHED FLOORS, WALLS OR PARTITIONS. IT IS THE CONSULTANT CONTRACTOR WILL FURNISH DIMENSIONED PLANS.

ROTHMAN & FOERST
FOOD SERVICE CONSULTANTS
LONG ISLAND CITY, N.Y. - PASSAIC, NEW JERSEY
HENRY H. ROTHMAN, F.F.E.S. W. E. FOERST

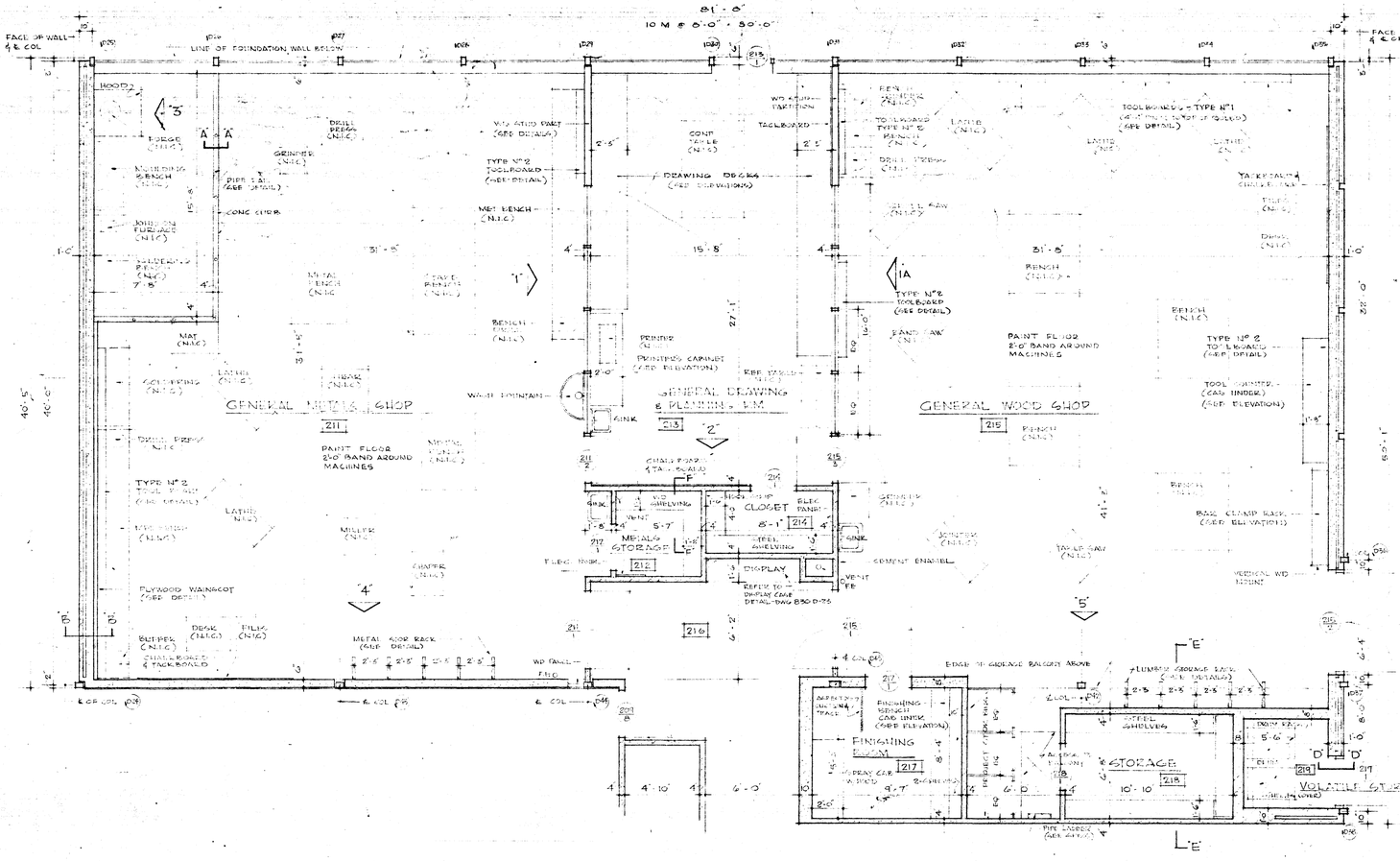
KITCHEN

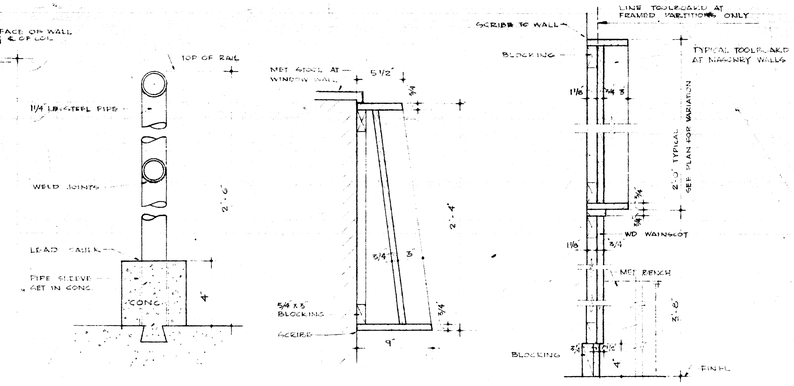
CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

830-25
Date 30APR 57 Scale AS SHOWN

SHERWOOD, MILLS AND SMITH
Architects and Town Planners, Litchfield, Connecticut

BQ #70 & 125 Attachment

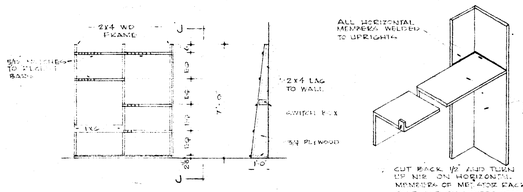




SECTION A-A
SCALE: 1"=1'-0"

SECTION THRU TOOLBOARD TYPE N° 1
SCALE = 1½"=1'-0"

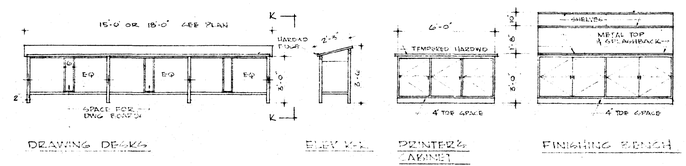
SECTION B-B
TYPE N° 2 TOOLBOARD
(W/O WAINSCOT WHERE NOTED)
SCALE: 1½"=1'-0"



FRONT ELEVATION
BASE CLAMP RACK
SCALE: 1½"=1'-0"

ELEVATION J-J

TYPICAL RACK FRAME DETAIL
SCALE: 3"=1'-0"



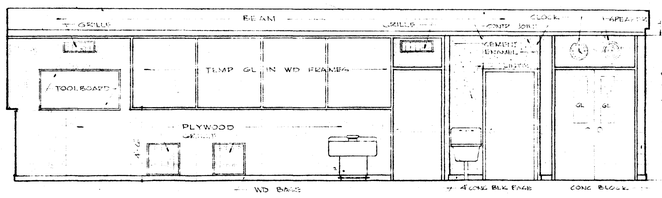
DRAWING DESKS

ELEVATION

PRINTERS CABINET

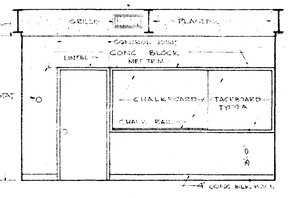
FINISHING BENCH

PLAN & ELEVATIONS
SCALE: 1/4"=1'-0"

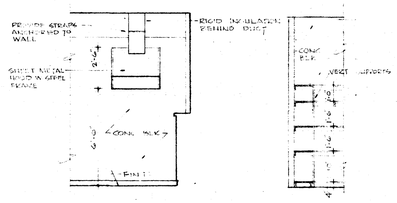


ELEVATION #1

ELEVATION 1A
SIMILAR BUT OPPOSITE HAND

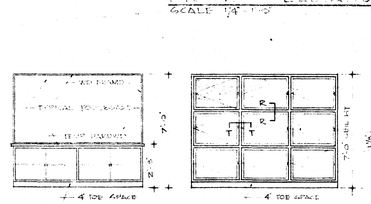


ELEVATION #2



ELEVATION #3
HOOD IN FINISHING RM SIMILAR

SECTION E-E
SCALE: 1/4"=1'-0"

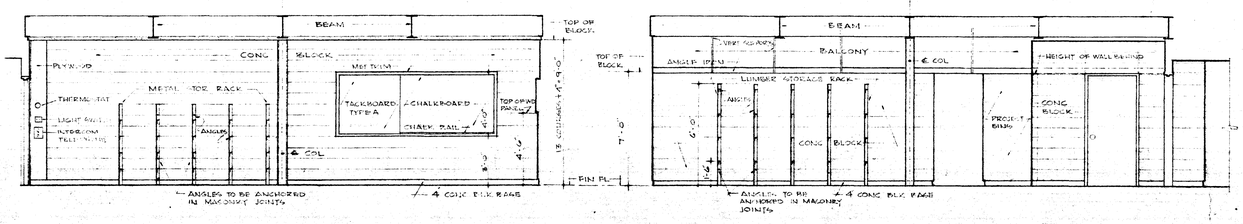


FRONT ELEVATION
TOOL COUNTERS
SCALE: 1/4"=1'-0"

FRONT ELEVATION
PROJECT VISOR RING
SCALE: 1/4"=1'-0"

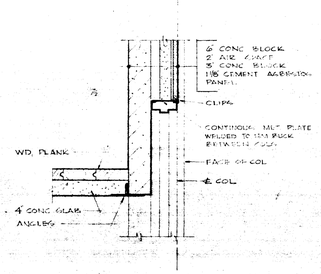
SECTION T-T

SECTION R-R
SCALE: 3"=1'-0"

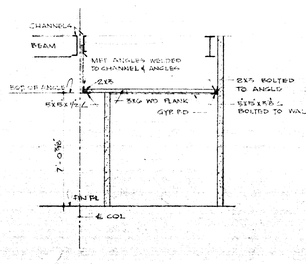


ELEVATION #4

ELEVATION #5



SECTION D-D
SCALE: 3/4"=1'-0"



SECTION E-E
SCALE: 1/4"=1'-0"

DATE	ISSUE OR REVISION	No.

SHOPS

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

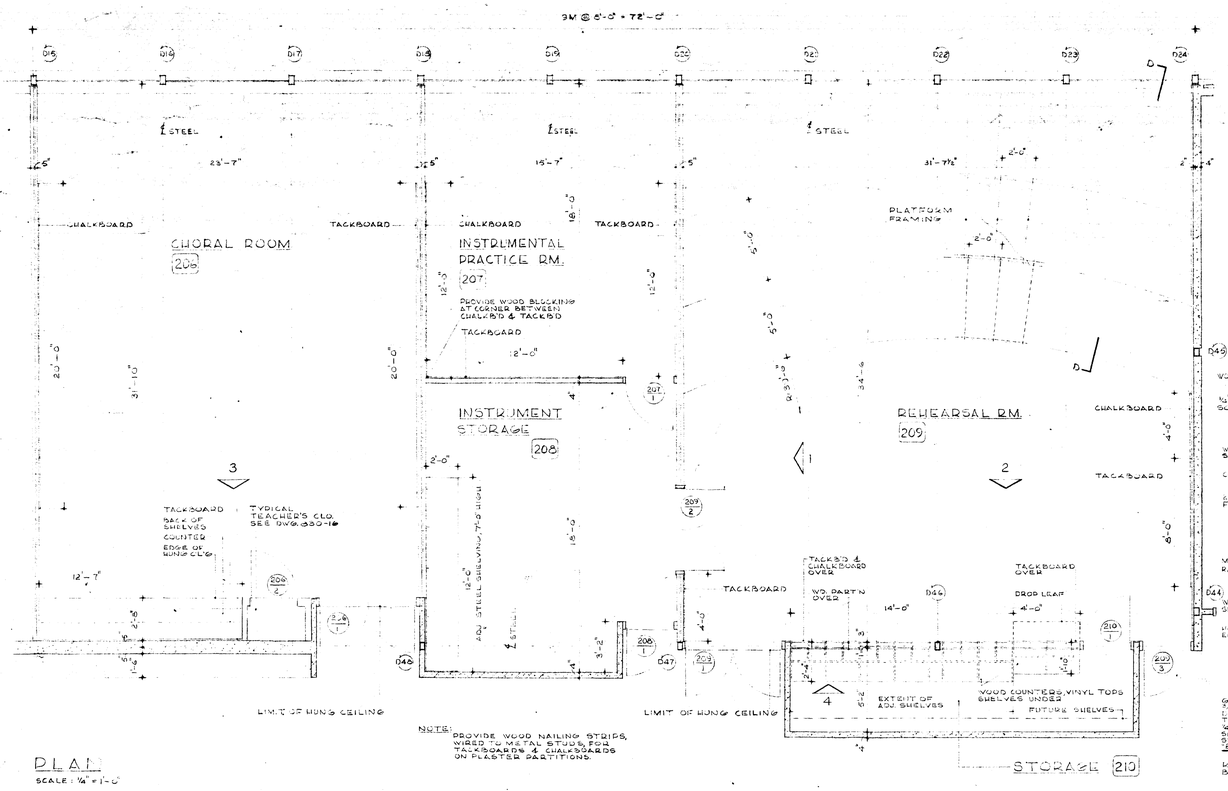
830-26

Date: 30APR 57
Scale: AS SHOWN

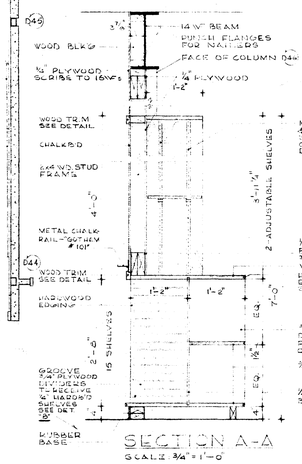
N

SHERWOOD, MILLS AND SMITH
Architects 65 Broad Street, Stamford, Connecticut

BQ #70 & 125 Attachment



PLAN
SCALE: 1/4" = 1'-0"



SECTION A-A
SCALE: 3/4" = 1'-0"

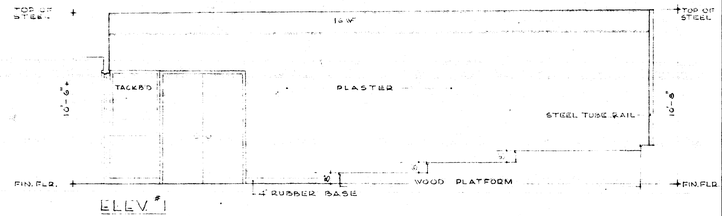
METAL STANDARDS & BRACKETS SURFACE MOUNTED ON INSIDE ¾" PLYWD DIVIDERS, SEE ELEV. #2

¼ PLYWOOD BACK
¾" PLYWOOD, VINYL TOP
HARDWOOD EDGING ON ALL SHELVES

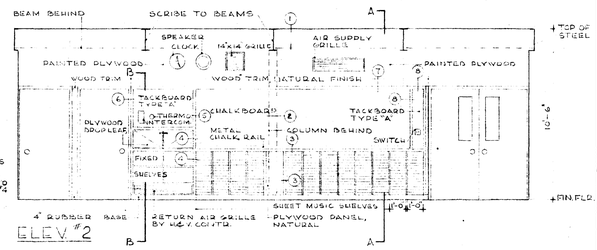
¾" PLYWOOD DIVIDERS SEE PLAN FOR EXTENT OF EACH

¾" PLYWOOD.

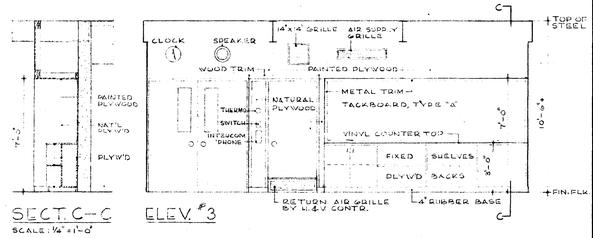
¼ PLYWOOD BACK



ELEV. #1



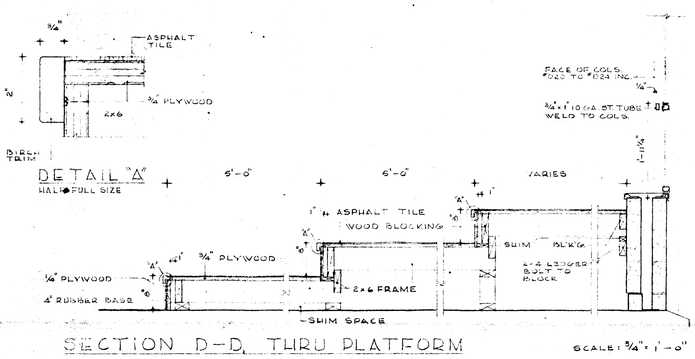
ELEV. #2



SECT. C-C
SCALE: 1/4" = 1'-0"

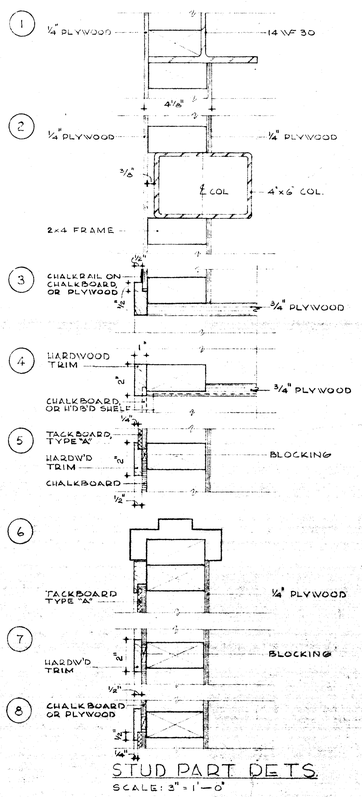
ELEV. #3

NOTE: ELEVS #2 & #3 — HEIGHT ℄ CLOCK & SPEAKERS TO FIN. FLR. = 8'-6"

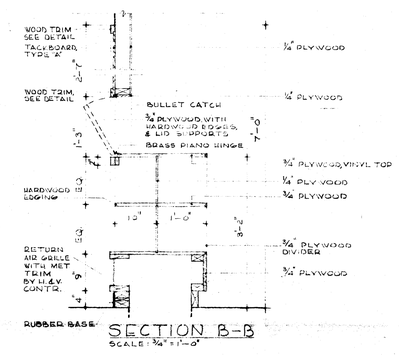


DETAIL "A"
HALF FULL SIZE

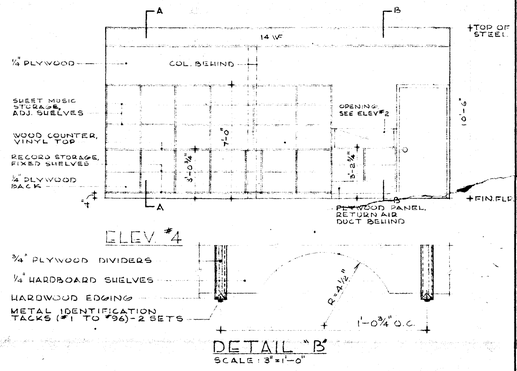
SECTION D-D THRU PLATFORM
SCALE: 3/4" = 1'-0"



STUD PART DETS.
SCALE: 3" = 1'-0"



SECTION B-B
SCALE: 3/4" = 1'-0"



ELEV. #4

DETAIL "B"
SCALE: 3" = 1'-0"

DATE	ISSUE OR REVISION	No

MUSIC ROOMS

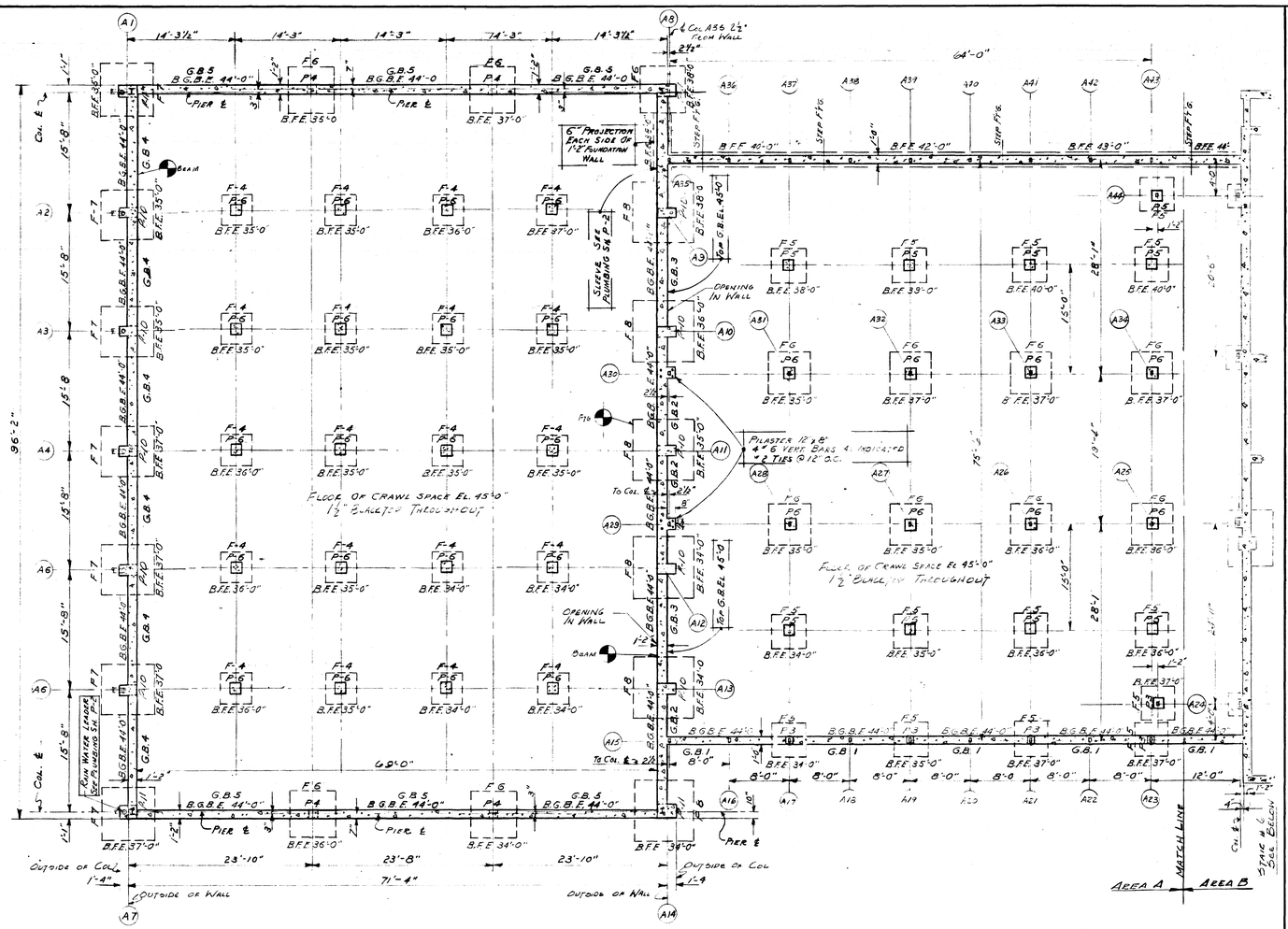
CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

830-27

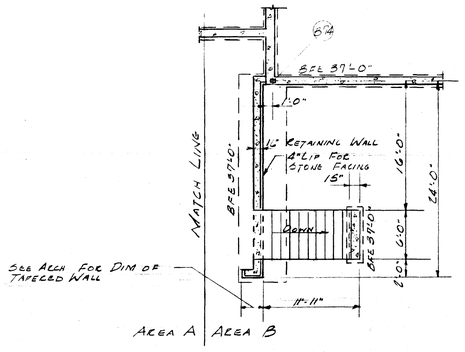
Date: 30 APR 57 | Scale: AS SHOWN

SHERWOOD, MILLS AND SMITH
Architects 65 Broad Street, Stamford, Connecticut

BQ #70 & 125 Attachment

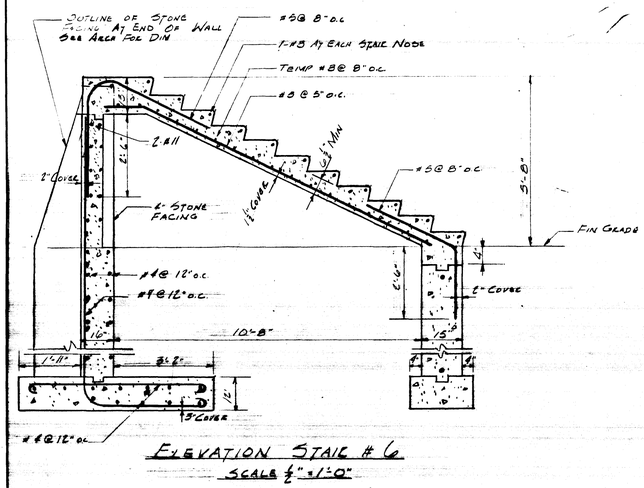


FOUNDATION PLAN

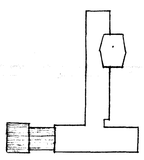


FOUNDATION PLAN
STAIR #6
SCALE 3/8" = 1'-0"

NOTE
SEE STAIR ELEV. THIS SHEET FOR DIMENSIONS & REINFORCEMENT



ELEVATION STAIR #6
SCALE 1/2" = 1'-0"



KEY PLAN

FOUNDATION
AREA A

CENTRAL JUNIOR
HIGH SCHOOL
Greenwich, Connecticut

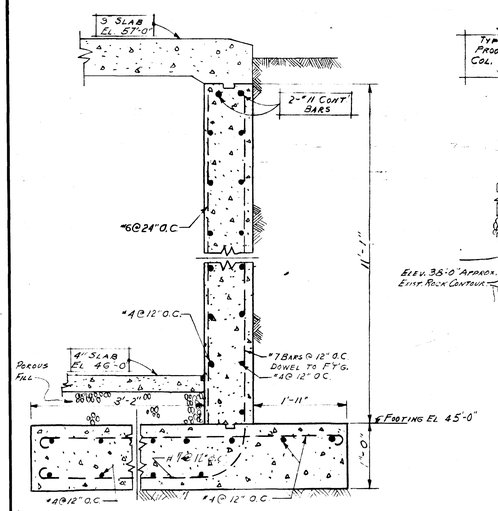
830-51

Date 30 APR 57 | Scale 1/8" = 1'-0"

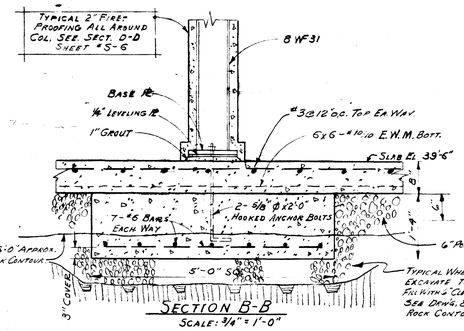
SHERWOOD, MILLS AND SMITH
Architects, 65 Broad Street, Stamford, Conn.

MARCHANT & MINGES
ENGINEERS
WEST HARTFORD, CONN.

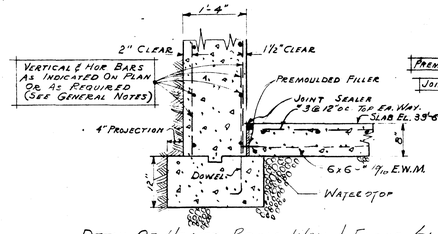
BQ #70 & 125 Attachment



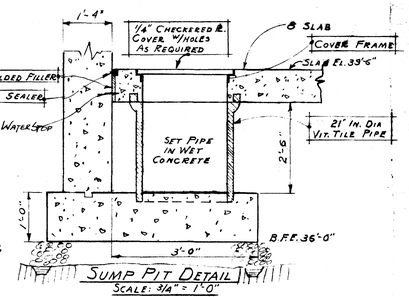
SECTION A-A
SCALE: 3/4" = 1'-0"



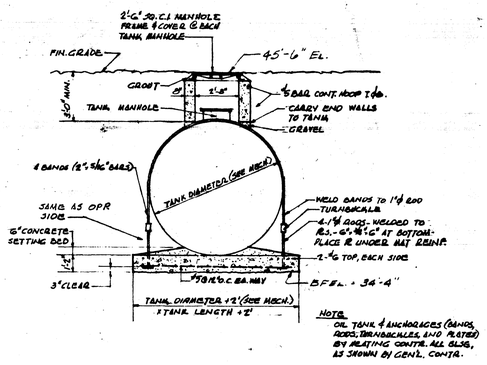
SECTION B-B
SCALE: 3/4" = 1'-0"



DETAIL OF HEATER ROOM WALL & FLOOR SLAB
TYPICAL WATERTIGHT JOINT
SCALE: 3/4" = 1'-0"



SUMP PIT DETAIL
SCALE: 3/4" = 1'-0"



NOTE
OIL TANK & ANCHORAGES (BANDS, RODS, TURNBUCKLES, AND PLATES) BY MARTINO CONSTR. CO. ALL SLABS, AS SHOWN BY GEN'L. CONTR.

OIL TANK FOUNDATION
SCALE 1/4" = 1'-0"

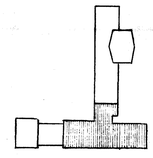
BEAM SCHEDULE

MARK	DEPTH	WIDTH	REINFORCEMENT		DIAGRAM
			MAIN STEEL	TOP STEEL	
B-1	15"	12"	5-#6 BOT.	NONE	
B-2	20"	18"	7-#7 BOT.	NONE	

FOUNDATION PLAN
SCALE: 1/8" = 1'-0"
INDICATES CONCRETE TEST LOCATION



TYPICAL HAUNCHED SLAB AT PIPES
NO SCALE



KEY PLAN

FOUND. & BSMT. FLOOR FRAMING AREA B

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

830-52

Date: 30 APR 57
Scale: AS NOTED

SHERWOOD, MILLS AND SMITH
Architects 65 Broad Street, Stamford, Connecticut

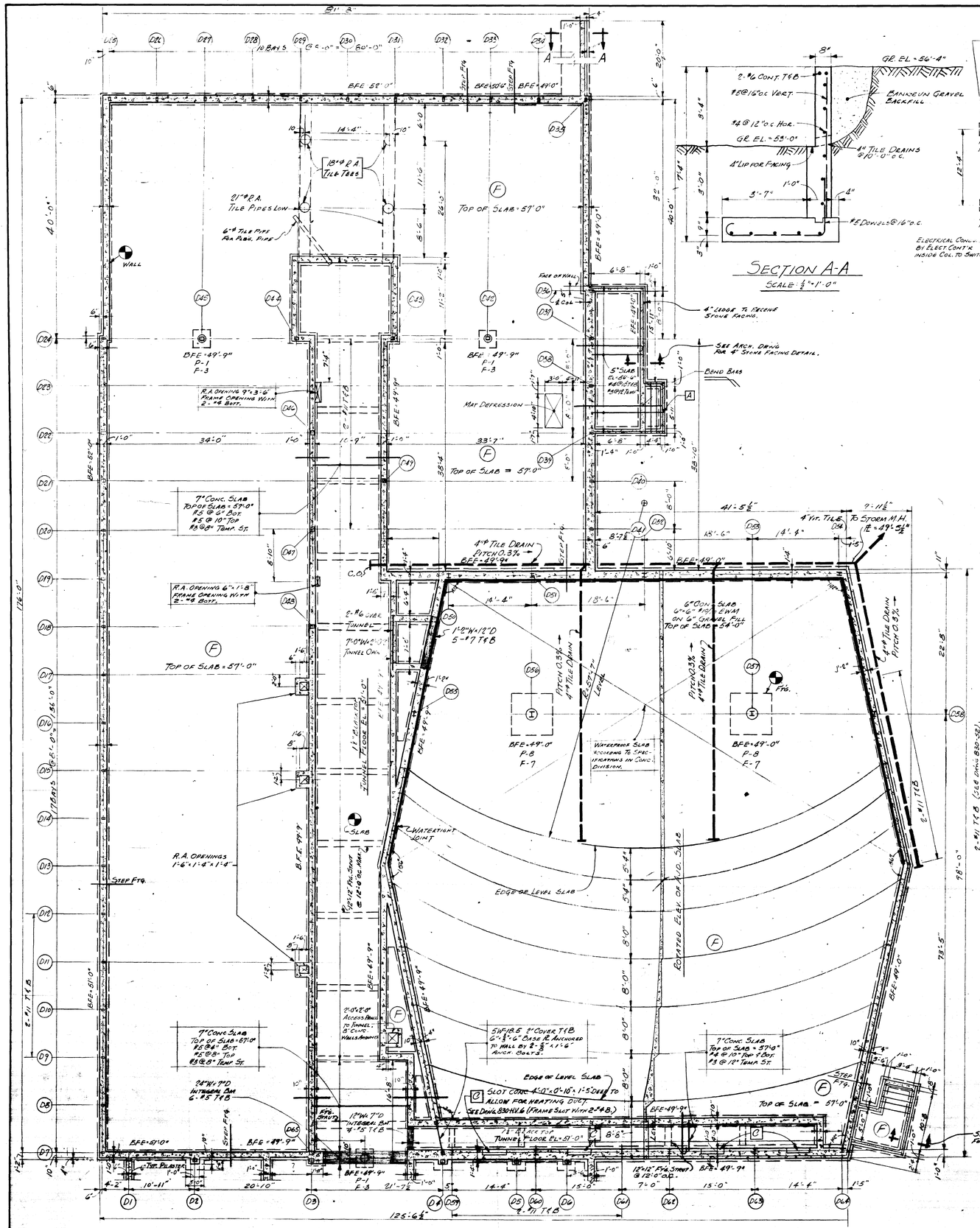
MARCHANT & MINGES
ENGINEERS
WEST HARTFORD, CONN.

STATE OF CONNECTICUT CHARLES S. MINGES NO. 2423 REGISTERED PROFESSIONAL ENGINEER

STATE OF CONNECTICUT CHARLES G. MARCHANT NO. 2385 REGISTERED PROFESSIONAL ENGINEER

80'-0"
32 M @ 8'-0" = 256'-0"
B.F.E. 44'-0"
B.F.E. 42'-0"
B.F.E. 39'-6"
B.F.E. 37'-6"
B.F.E. 36'-0"
B.F.E. 38'-0"
B.F.E. 40'-0"
B.F.E. 33'-0"
B.F.E. 35'-0"
B.F.E. 34'-0"
B.F.E. 39'-0"
B.F.E. 41'-0"
B.F.E. 37'-0"
B.F.E. 36'-6"
B.F.E. 39'-6"
B.F.E. 37'-10"
B.F.E. 37'-5"
B.F.E. 39'-9"
B.F.E. 35'-6"
B.F.E. 38'-6"
B.F.E. 37'-9"
B.F.E. 36'-9"
B.F.E. 38'-9"
B.F.E. 40'-6"
B.F.E. 39'-10"
B.F.E. 38'-10"
B.F.E. 36'-10"
B.F.E. 37'-10"
B.F.E. 39'-3"
B.F.E. 39'-0"
B.F.E. 38'-0"
B.F.E. 36'-0"
B.F.E. 35'-0"
B.F.E. 34'-0"
B.F.E. 33'-0"
B.F.E. 32'-0"
B.F.E. 31'-0"
B.F.E. 30'-0"
B.F.E. 29'-0"
B.F.E. 28'-0"
B.F.E. 27'-0"
B.F.E. 26'-0"
B.F.E. 25'-0"
B.F.E. 24'-0"
B.F.E. 23'-0"
B.F.E. 22'-0"
B.F.E. 21'-0"
B.F.E. 20'-0"
B.F.E. 19'-0"
B.F.E. 18'-0"
B.F.E. 17'-0"
B.F.E. 16'-0"
B.F.E. 15'-0"
B.F.E. 14'-0"
B.F.E. 13'-0"
B.F.E. 12'-0"
B.F.E. 11'-0"
B.F.E. 10'-0"
B.F.E. 9'-0"
B.F.E. 8'-0"
B.F.E. 7'-0"
B.F.E. 6'-0"
B.F.E. 5'-0"
B.F.E. 4'-0"
B.F.E. 3'-0"
B.F.E. 2'-0"
B.F.E. 1'-0"
B.F.E. 0'-0"
B.F.E. -1'-0"
B.F.E. -2'-0"
B.F.E. -3'-0"
B.F.E. -4'-0"
B.F.E. -5'-0"
B.F.E. -6'-0"
B.F.E. -7'-0"
B.F.E. -8'-0"
B.F.E. -9'-0"
B.F.E. -10'-0"
B.F.E. -11'-0"
B.F.E. -12'-0"
B.F.E. -13'-0"
B.F.E. -14'-0"
B.F.E. -15'-0"
B.F.E. -16'-0"
B.F.E. -17'-0"
B.F.E. -18'-0"
B.F.E. -19'-0"
B.F.E. -20'-0"
B.F.E.

BQ #70 & 125 Attachment


10 BAYS @ C. 0"-0" = 60'-0"
BFE 52'-0"
BFE 50'-6"
BFE 49'-0"
TOP OF SLAB = 57'-0"
18"ø R.A. TILE TYES
21"ø R.A. TILE PIPES LOW
6" TILE PIPE FOR REC. PIPE
WALL
BFE 49'-9" P-1 F-3
R.A. OPENING 9"-3"-6" FRAME OPENING WITH 2-¾" BOLTS
7" CONC. SLAB TOP OF SLAB = 57'-0" #5 @ 1' BOT. #5 @ 10" TOP #3 @ 8" TEMP ST.
R.A. OPENING 6"-1'-8" FRAME OPENING WITH 2-¾" BOLTS
4"ø TILE DRAIN PITCH 0.3% BFE 49'-0"
C.O.
8'-0"W. TUNNEL
7'-0"W. TUNNEL OPEN
TUNNEL FLOOR EL. 51'-0"
1'-0"W. x 12"D 5-#7 T&B
BFE 49'-9" P-8 F-7
WATERPROOF SLAB ACCORDING TO SPECIFICATIONS IN CONC. DIVISION
WATERTIGHT JOINT
SLAB
R.A. OPENINGS 1'-6"x1'-4"x1'-4"
EDGE OF LEVEL SLAB
ROTATED ELEV. OF X-O SLAB
2'-0"x2'-0" ACCESS TO TUNNEL & CONC. WALLS ABOVE
7" CONC SLAB TOP OF SLAB = 57'-0" #5 @ 8" BOT. #5 @ 8" TOP #3 @ 8" TEMP ST.
5W 1/8 B 2" COVER T&B 6"-8½"x6" CASE R. ANCHORED TO WALL BY 2-¾"x1'-6" ANCH. BOLTS
SLOT CORE 4'-0"x0'-10"x1'-5" DEEP TO ALLOW FOR HEATING DUCT. SEE DWG. 830-H-16 (FRAME SLOT WITH 2-¾" Ø BOLTS)
28"W. 7"D INTEGRAL BM 6-#5 T&B
12"W. 7"D INTEGRAL BM 4-#5 T&B
12"x12" FYG. STRUT @ 12'-0" OC.
7" CONC SLAB TOP OF SLAB = 57'-0" #5 @ 10" TOP & BOT. #3 @ 10" TEMP ST.
5" SLAB EL. 56'-6" PAINTED FOR TERRAZZO
4" LEDGE TO RECEIVE STONE FACING
SEE ARCH. DRWG. FOR 4" STONE FACING DETAIL.
BEND BARS
MAT DEPRESSION
4" TILE DRAIN @ 10'-0" O.C.
4" TILE DRAINS @ 10'-0" O.C.
4" TILE DRAIN PITCH 0.3%
4" TILE DRAIN PITCH 0.3%
4" TILE DRAIN PITCH 0.3%

BQ #70 & 125 Attachment

GRADE BEAM SCHEDULE

NOTE: RUN TOP STEEL OF GRADE BEAMS CONTINUOUS AND SEE TYPICAL BAR SPLICE DIAGRAMS FOR GRADE BEAMS AT CORNERS AND INTERSECTIONS. SPLICE TOP BARS AT MIDSPAN AND BOTTOM BARS AT SUPPORTS.

MARK	WIDTH	DEPTH	REINFORCEMENT TOP	REINFORCEMENT BOTTOM	#3 STIRRUPS DIAG.	#3 STIRRUPS	REMARKS
GB-1	12"	6'-10"	3-#6	3-#6	*	NONE	#3@18"o.c. HOR. INSIDE & OUTSIDE FACES #4@18"o.c. VERT. INSIDE & OUTSIDE FACES
GB-2	1'-8"	6'-10"	4-#11	4-#11	*	NONE	NONE
GB-3	1'-8"	18"	2-#5 BOTH ENDS	5-#5	O	NONE	NONE
GB-4	1'-8"	6'-10"	3-#6	3-#6	*	NONE	#6@12"o.c. HOR. INSIDE FACE #6@24"o.c. HOR. OUTSIDE FACE #4@12"o.c. VERT. INSIDE & OUTSIDE FACE
GB-5	1'-8"	6'-10"	4-#10	4-#10	*	NONE	#6@8"o.c. HOR. INSIDE FACE #6@12"o.c. HOR. OUTSIDE FACE #4@12"o.c. VERT. INSIDE & OUTSIDE FACE

PIER SCHEDULE

NOTE: WHEN PIERS ARE 2'-0" OR LESS IN HEIGHT, DOWELS MAY BE USED AS VERTICAL STEEL. INCLUDE TIES.

MARK	SIZE	VERT. REINF	HOR TIES	DIAGRAM
P-1	14"ø	4-#6	#2@10"	
P-2	16"ø	4-#7	#2@10"	
P-3	12"□	4-#6	#2@10"	
P-4	14"□	4-#7	#2@10"	
P-5	16"□	4-#8	#3@16"	
P-6	18"□	6-#7	#2 [a@12" b@12" ALT. #3 a@16" b@16" ALT.	
P-7	20"□	6-#8	#3@16"	
P-8	22"ø	4-#10	#3@18"	
P-9	24"□	8-#8	#3 [a@16" b@16" ALT.	
P-10	14"x30"	10-#8	#3 [a@12" b@12" c@12" ALT.	
P-11	20"x30"	10-#8	Do	

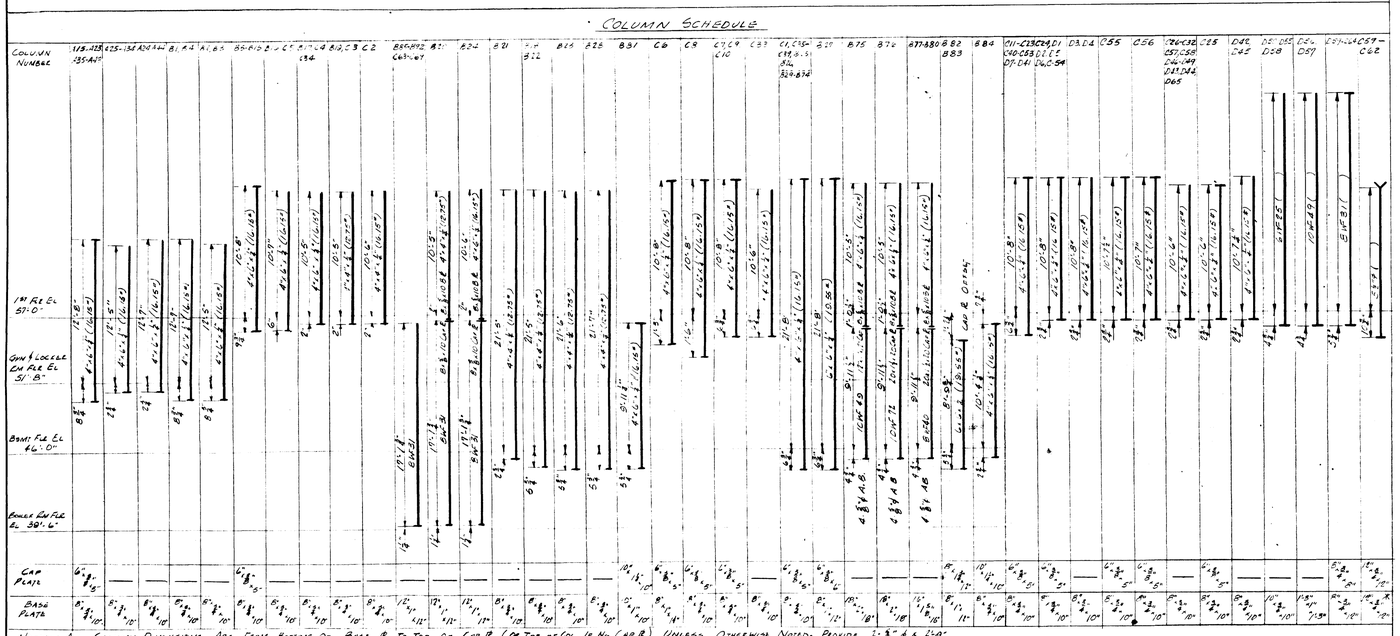
FOOTING SCHEDULE

NOTE: PROVIDE DOWELS SAME NO. AND SIZE AS PIER STEEL. OMIT DOWEL WHERE NO PIER EXISTS.

MARK	SIZE	DEPTH	REINF. EA WAY
F-1	3'-6"□	1'-4"	4-#6
F-2	2'-0"□	1'-0"	NONE
F-3	3'-0"□	1'-4"	4-#6
F-4	4'-0"□	1'-6"	5-#6
F-5	5'-0"□	1'-9"	7-#6
F-6	6'-0"□	1'-5"	10-#6
F-7	7'-0"□	1'-8"	11-#6
F-8	8'-0"□	1'-10"	13-#6

BEND #8 BARS TO ALIGN WITH COL BARS ABOVE. SEE DWG 830-S10

COLUMN SCHEDULE



NOTES: ALL COLUMN DIMENSIONS ARE FROM BOTTOM OF BASE PL TO TOP OF CAP PL (OR TOP OF COL IN NO CAP PL). UNLESS OTHERWISE NOTED, PROVIDE 2-¾" ø x 2'-0" HOOKED ANCHOR BOLTS AT EACH COLUMN BASE.
ALL COLS 8"x6"x⅜", 6"x4"x⅜", OR 5"x3½"x⅜" ARE HOLLOW TUBULAR COLUMNS.
FOR COLUMNS BEARING ON BEAMS USE 4 BOLTS IN BASE PL
SEE SHEET S-7 FOR STEEL & CONC. COL. TYP. A-1, A-2, A-3, A-4, A-5, A-6
* PROVIDE 3" HOLE IN MIDDLE OF BASE PL

STRUCTURAL GENERAL NOTES

GENERAL:

A. SEE ARCHITECTURAL, MECHANICAL AND ELECTRICAL DRAWINGS AND SPECIFICATIONS FOR DIMENSIONS AND DETAILS REQUIRED AS STRUCTURAL WORK. BUT WHICH ARE NOT SHOWN ON STRUCTURAL DRAWINGS.
B. EXCEPTIONS TO ITEMS AS OUTLINED IN THESE NOTES ARE SPECIFICALLY NOTED ON PLANS AND SPECIFICATIONS.

SPECIFICATIONS:

A. SEE SPECIFICATIONS GOVERNING DETAILING, FABRICATION, ERECTION, AND INSTALLATION OF ALL STRUCTURAL STEEL, CONCRETE AND WOOD CONSTRUCTION.

DESIGN:

A. LIVE LOADS
Roof ..... 40 psf
Office ..... 50 "
Classrooms & Toilets ..... 60 "
Cafeteria & Wood Shop ..... 80 "
Corr., Exitways, Stairs, Gym & Projection Rm., Assembly .. 100 "
Book Stacking Area ..... 120 "
Retail Shr Storage, Fanroom ..... 150 "
B. FOUNDATION BEARING
2 TSF = 4 KSF
C. CONCRETE STRENGTH: ALSO, SEE SPECS. CONCRETE QUALITY AND STRENGTH:
4000 P.S.I. [illegible]
[illegible]

BEARING ON MASONRY WALLS:

A. CONCRETE OR STEEL BEAMS AND COLUMNS SHALL BEAR ON SOLID BLOCK 3'-0" IN LENGTH
B. CONCRETE OR STEEL JOISTS SHALL BEAR ON SOLID BLOCK
C. FILLED CONCRETE BLOCK WILL NOT BE ACCEPTABLE FOR BEARING.

CONCRETE:

A. FOOTINGS ARE 12" DEEP WITH 4" PROJECTION.
B. EXTERIOR FOUNDATION FOOTINGS SHALL BE CARRIED A MINIMUM OF 4'-0" BELOW FINAL GRADE AND ALL FOOTINGS A MINIMUM OF 21-0" BELOW PRESENT GRADE, BUT TO SOUND GROUND IN ANY CASE.
C. CONCRETE BEAMS ARE CAST MONOLITHICALLY WITH SLABS AND ARE LISTED IN BEAM SCHEDULE. DEPTHS ARE MEASURED FROM TOP OF SLABS TO BOTTOM OF BEAMS.
D. INSTALL #6 BARS, 2 FOR EACH SIDE, FRAMING AROUND FOUR SIDES OF ALL OPENINGS IN CONCRETE WALLS. BARS SHALL EXTEND 2' BEYOND OPENING.
E. INSTALL #4 TOP BARS @ 10" O.C. EXTENDING INTO SLAB TWO FEET EACH SIDE OF BEAM OR WALL WHERE SOLID SLABS ARE PARALLEL TO BEAM OR WALL. WHERE SLAB OCCURS ON ONE SIDE ONLY, PROVIDE STANDARD HOOK.
F. CONCRETE SLABS AND BEAMS SHALL HAVE 8" MINIMUM BEARING ON MASONRY WALLS.
G. SLABS AND BEAMS BEARING LESS THAN 8" REQUIRE BOTTOM BARS HOOKED AT SUPPORTS.
H. TOPS OF CONCRETE WALLS SUPPORTING SLABS SHALL BE KEYED TO RECEIVE SLABS AND TO INSURE LATERAL SUPPORT TO WALLS. ALL FOOTINGS SHALL BE KEYED TO RECEIVE WALLS.
I. PROVIDE 2 #4 TIE BARS IN TOPS OF ALL CONCRETE BEAMS IN ORDER TO FASTEN STIRRUPS WHEN NO TOP STEEL IS DESIGNATED ON PLANS OR BEYOND WHERE DESIGNATED TOP STEEL MIGHT NORMALLY BE DISCONTINUED.
J. WHERE COLUMNS BEAR ON INTERSECTION OF TWO DISCONTINUOUS WALLS, PROVIDE #4 BARS X 8'-0" LONG 1' 12" O.C. CORNER REINFORCEMENT FOR TOP FIVE FEET OF WALLS, 2" CLEAR FROM OUTSIDE FACE.
K. WHEREVER STEEL BEAMS ARE ENCASED IN CONCRETE, THE MINIMUM COVER SHALL BE 2 INCHES.
L. PLACE ALL BASEMENT FLOOR SLABS PRIOR TO BACKFILLING AGAINST ADJACENT WALLS.
M. REINFORCE ALL FOOTINGS WITH 2 #6 BOTTOM BARS EXCEPT FOR FOOTINGS WHICH SUPPORT FOUNDATION WALLS GREATER THAN 2'-0" IN HEIGHT.
N. ALL EXTERIOR AND INTERIOR CONCRETE WALLS OF ALL THICKNESSES SHALL BE REINFORCED AS FOLLOWS:

HEIGHT OF WALL	FOOTING SUPPORTING WALL	EARTH PRESSURE ON WALL	REINFORCEMENT
0' TO 2'-0"	YES	FULL OR PARTIAL EITHER SIDE	1-#6 TOP
0' TO 2'-0"	NO	FULL OR PARTIAL EITHER SIDE	1-#6 TOP AND BOTTOM
2'-0" TO 8'-0"	YES OR NO	FULL OR PARTIAL EITHER SIDE	1-#6 TOP AND BOTTOM
2'-0" TO 12'-0"	YES OR NO	LESS THAN 4'-0" DIFFERENCE BETWEEN SIDES	1-#6 TOP AND BOTTOM
8'-0" TO 12'-0"	YES OR NO	MORE THAN 4'-0" DIFFERENCE BETWEEN SIDES	#6@18" O.C. VERT #4@12" O.C. HORIZ

O. ALL REINFORCING FOR WALLS AND FOOTINGS SHALL BE CONTINUOUS AND LAPPED 30 DIAMETERS AT ALL SPLICES, CORNERS AND INTERSECTIONS. PROVIDE #6 FOOTING DOWELS FOR ALL VERTICAL BARS IN WALLS.
P. METAL REINFORCEMENT SHALL BE PROTECTED BY THE FOLLOWING THICKNESSES OF CONCRETE:
1. WHERE CONCRETE IS DEPOSITED AGAINST GROUND, 3" INCHES.
2. WHERE CONCRETE IS EXPOSED TO THE WEATHER, OR EXPOSED TO THE GROUND AFTER REMOVAL OF THE FORMS, 2" INCHES EXCEPT THAT SLABS WITH #5 BARS OR SMALLER SHALL HAVE ONLY 1-1/2" CLEAR COVER.
3. IN SLABS INCLUDING CONCRETE ROOF CONSTRUCTION, AND WALLS NOT EXPOSED TO THE GROUND OR WEATHER, 3/4" INCHES.
4. IN BEAMS, GIRDERS, AND COLUMNS NOT EXPOSED TO THE WEATHER OR TO THE GROUND, 1-1/2" INCHES.
5. IN ALL CASES THE THICKNESS OF CONCRETE OVER THE REINFORCEMENT SHALL BE AT LEAST EQUAL TO THE DIAMETER OF THE BARS.

STEEL:

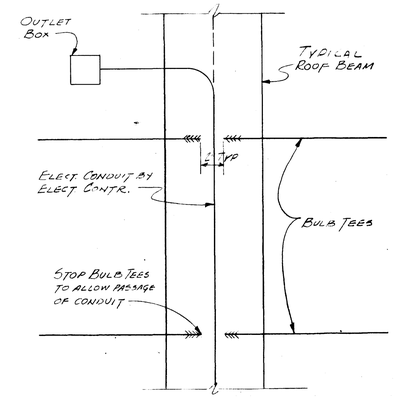
A. FURNISH LOOSE ANGLE LINTELS OVER ALL OPENINGS IN MASONRY WALLS AND PARTITIONS INCLUDING OPENINGS AT DOORS, WINDOWS, RECESSES, DUCTS, VENTS, ETC.
B. PROVIDE ONE ANGLE FOR EACH 4" OF MASONRY THICKNESS AS FOLLOWS:

SPANS	LINTEL
UP TO 4'-6"	L - 3-1/2" X 3-1/2" X 5/16"
4'-6" TO 5'-6"	L - 4" X 3-1/2" X 5/16"
5'-6" TO 6'-6"	L - 5" X 3-1/2" X 5/16"
6'-6" TO 7'-6"	L - 6" X 3-1/2" X 3/8"

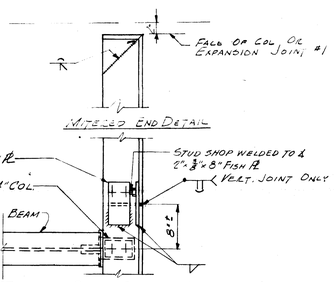
PROVIDE 3" HORIZONTAL LEG ON ANGLES IF REQUIRED AT CERTAIN METAL DOOR BUCKS. WHERE TOTAL THICKNESS OF WALL TO BE SUPPORTED BY LINTEL IS 4" AND ARCHITECTURAL FINISHES REQUIRE EXPOSED MASONRY ON EACH SIDE, LINTEL SHALL BE AN ST3X3.25 WITH 2" OF MASONRY EACH SIDE OF WEB. FURNISH SIMILAR TREATMENT FOR 6" WALLS USING 2 L'S 3-1/2" X 3-1/2" X 5/16" WITH 2" OF MASONRY ON EACH SIDE OF VERTICAL LEGS. ALL STEEL LINTELS SHALL HAVE 8" BEARING ON MASONRY AT EACH END.
C. ALL ROLLED STEEL MEMBERS BEARING ON MASONRY OR CONCRETE WALLS SHALL BE PROVIDED WITH BEARING PLATES AND SHALL BE ANCHORED BY MEANS OF HOOKED ANCHOR BOLTS FOR ALL ROOF ANCHORAGE. WHERE BEAMS FRAME INTO A WALL AND ROOF ANCHORAGE IS NOT NEEDED, GOVERNMENT ANCHORS MAY BE USED. ANCHOR BOLTS SHALL BE ⅝" X 2'-0" (3" HOOK). BEAMS SHALL BE OF SUFFICIENT LENGTH TO BEAR THE FULL WIDTH OF PLATE AT EACH END.
SIZE OF BEARING PLATES FOR BEAMS SHALL BE AS FOLLOWS:

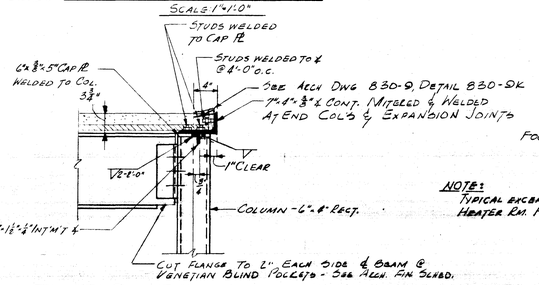
S-SERIES, CHANNELS, TS, AND 4 WF'S	6" X 3/8" X 6"
8 WF	8" X 3/4" X 10"
10 WF, 12 WF	8" X 7/8" X 1'-0"
14 WF, 16 WF, 18 WF	8" X 1" X 1'-2"
21 WF, 24 WF	10" X 1" X 1'-2"

D. PUNCH OR DRILL STEEL FOR ⅞" BOLTS FOR ALL BLOCKING AND ACCESSORIES AS INDICATED ON THE DRAWINGS AND SPECIFICATIONS. SEE ARCHITECTURAL, WHERE NOT SPECIFICALLY INDICATED, STEEL SHALL BE PUNCHED 2'-6" O.C. STAGGERED, FOR BLOCKING.

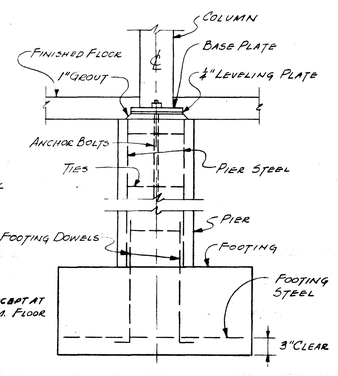


TYPICAL PLAN OF BULB TEE
BREAK FOR PASSAGE OF ELEC. CONDUIT TO OUTLET BOXES IN AREAS OF EXPOSED ROOF CONSTRUCTION
No Scale

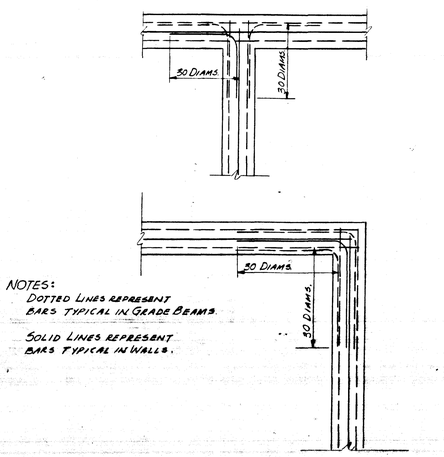




NOTE: TYPICAL EXCEPT AT HEATER RM. FLOOR

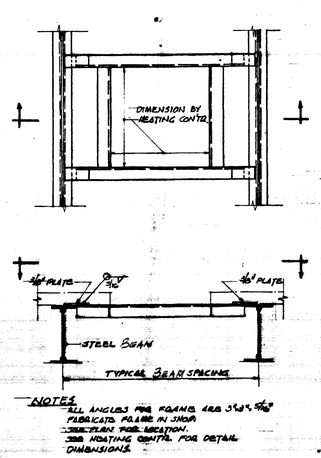


TYPICAL COLUMN BASE, PIER AND FOOTING DETAIL
No Scale
FOR SIZES, SEE KEY NOS. ON PLAN, & SCHEDULE ABOVE



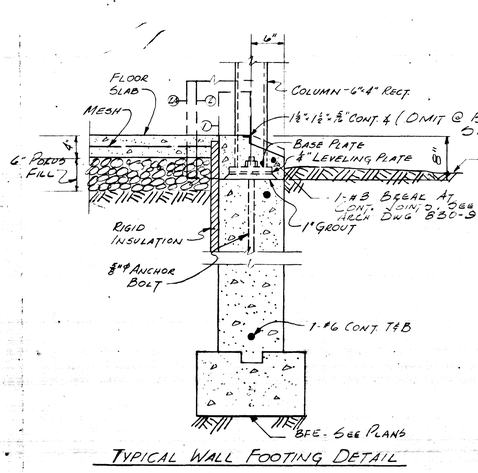
NOTES:
DOTTED LINES REPRESENT BARS TYPICAL IN GRADE BEAMS.
SOLID LINES REPRESENT BARS TYPICAL IN WALLS.

TYPICAL BAR SPLICES AT CORNERS AND INTERSECTIONS OF ALL WALLS AND GRADE BEAMS
No Scale



NOTES:
ALL ANGLES FOR FRAMING ARE 3½"x3½"x5/16" FABRICATED SQUARE IN SHOP.
SEE PLAN FOR LOCATION.
SEE HEATING CONTR. FOR DETAIL DIMENSIONS.

TYPICAL FAN OPENING IN ROOF
SCALE: ½"=1'-0"



TYPICAL WALL FOOTING DETAIL
SCALE: 1"=1'-0"
OTHER CONDITIONS SHOWN DOTTED
① CAFETERIA
② 10" BLOCK SPANDREL
③ 1'-0" BOBBE SPANDREL

STATE OF CONNECTICUT JAMES K. MINGES NO. 2423 REGISTERED PROFESSIONAL ENGINEER

STATE OF CONNECTICUT CHARLES G. MANCHANT NO. 2389 REGISTERED PROFESSIONAL ENGINEER

STRUCTURAL DET'LS. & SCHEDULES

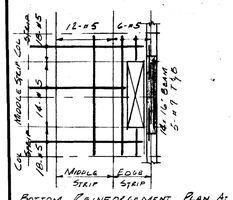
CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

830-S4
Date: 30 APR 57 | Scale: AS SHOWN

SHERWOOD, MILLS AND SMITH
Architects, 65 Broad Street, Stamford, Connecticut

MANCHANT & MINGES
ENGINEERS
WEST HARTFORD, CONN.

BQ #70 & 125 Attachment

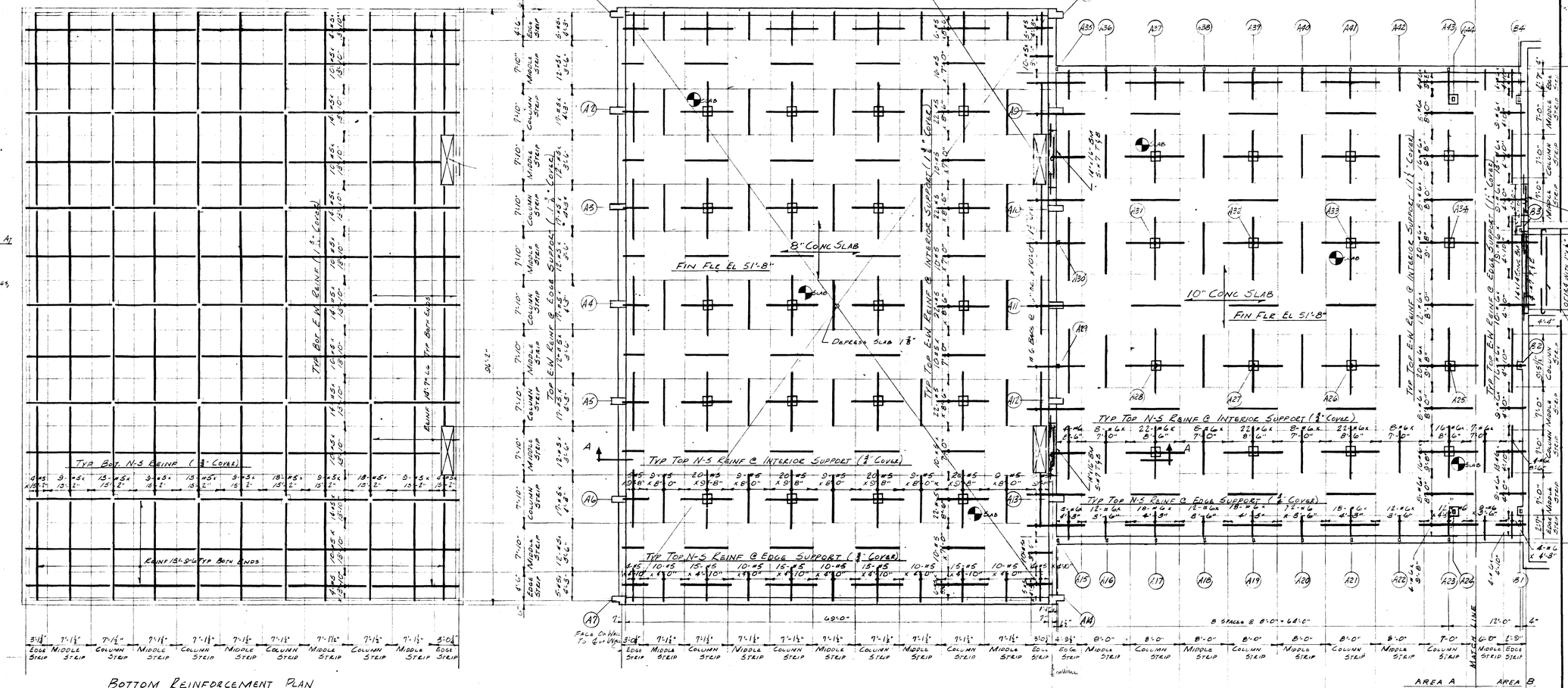


BOTTOM REINFORCEMENT PLAN AT GYM SLAB OPENING

SCALE 3/8" = 1'-0"

NOTES:

TYPICAL TOP STEEL USED AT OPENING, EXCEPT N-S STEEL TO BE 8'-0" LG FOR EDGE STRIP. E-W TOP # 6 BARS TO BE 6'-0" LG & HOOKED AT BEAM.



BOTTOM REINFORCEMENT PLAN

FIRST FLOOR FRAMING PLAN AND TOP REINFORCEMENT PLAN

SCALE 3/8" = 1'-0"

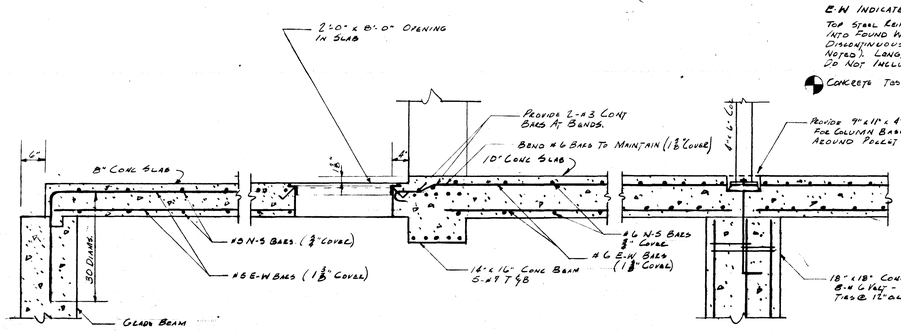
NOTES:

N-S INDICATES NORTH - SOUTH

E-W INDICATES EAST - WEST

TOP STEEL REINF TO BE DOWELED 30 DIAMS INTO FOUND WALL OR GRADE BEAM AT ALL DISCONTINUOUS EDGES (UNLESS OTHERWISE NOTED). LENGTHS OF REINF NOTED ON PLAN DO NOT INCLUDE EDGE DOWEL LENGTH.

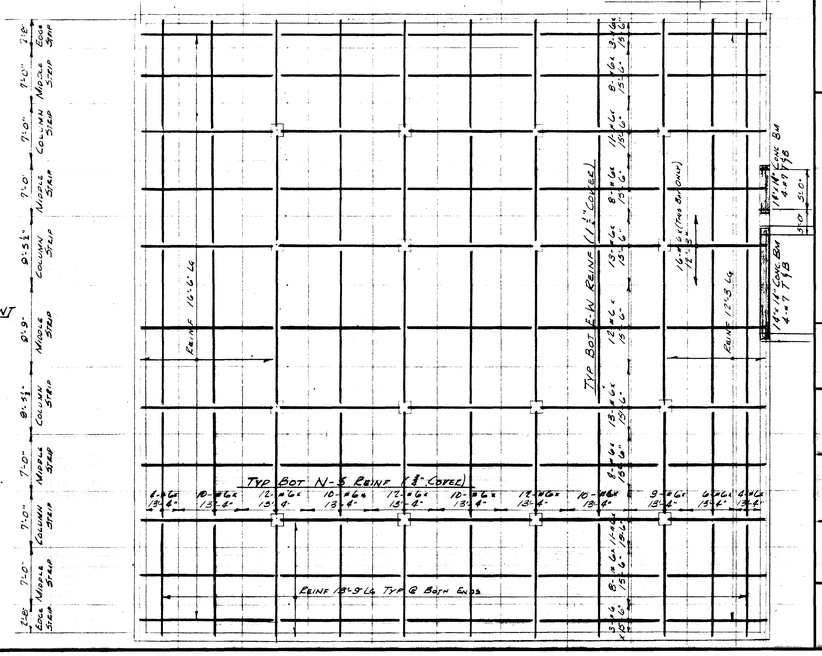
● CONCRETE TEST LOCATIONS



SECTION A-A

SCALE 3/8" = 1'-0"

BOTTOM REINFORCEMENT PLAN



KEY PLAN

I st. FLOOR FR'M'G. AREA A

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

830- S5

Date: 30 APR 57 | Scale: AS SHOWN

SHERWOOD, MILLS AND SMITH
Architects 65 Broad Street, Stamford, Connecticut

MARCHANT & MINGES
ENGINEERS
WEST HARTFORD, CONN.

STATE OF CONNECTICUT JAMES S. MINGES NO. 2423 REGISTERED PROFESSIONAL ENGINEER

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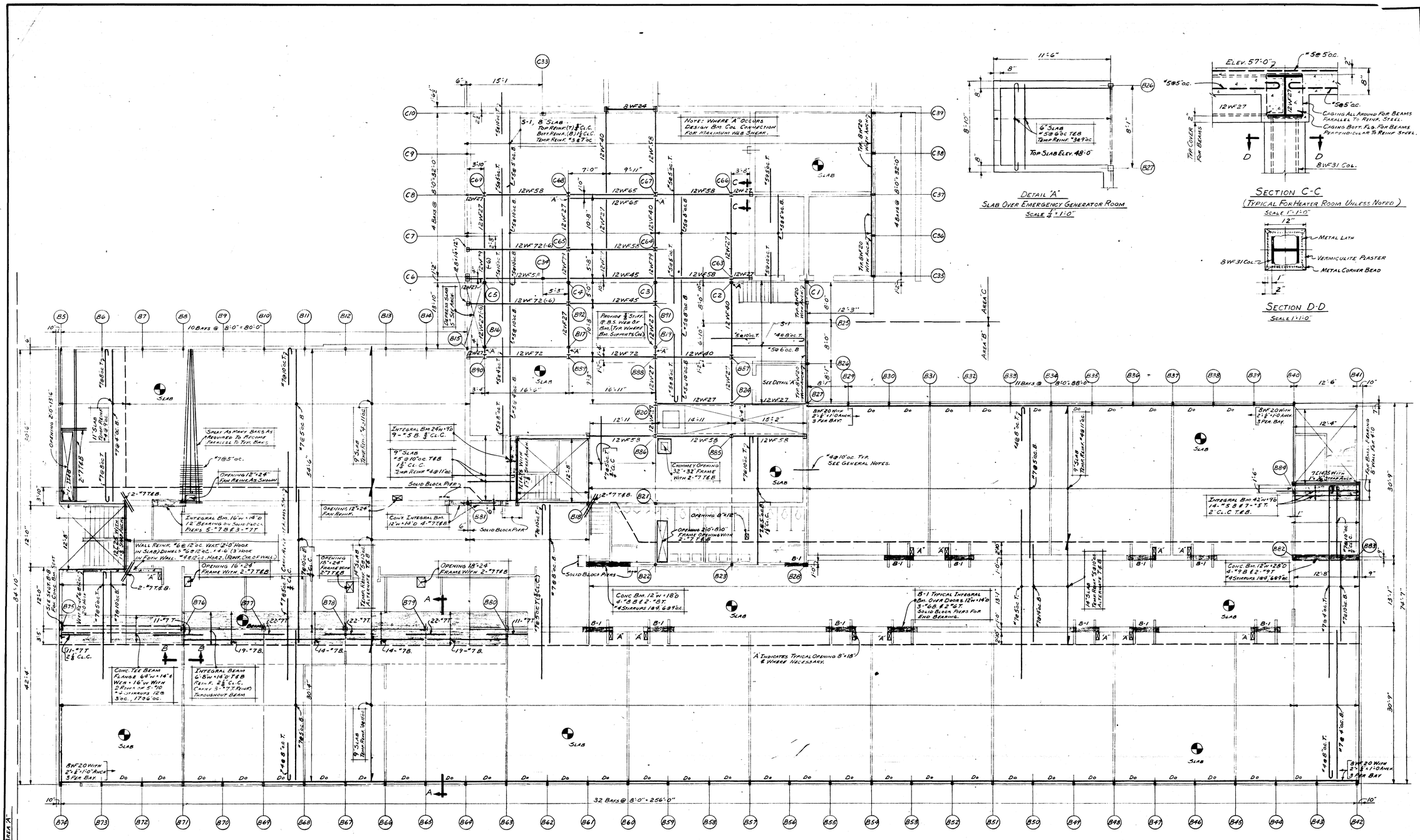
First Floor Framing Plan Unit "B"

Top Slab Elev. 57:0"

Scale 1/8" = 1:0"



Detail "A"

Slab over Emergency Generator Room

Scale 1/4" = 1:0"

Section C-C

(Typical for Heater Room Unless Noted)

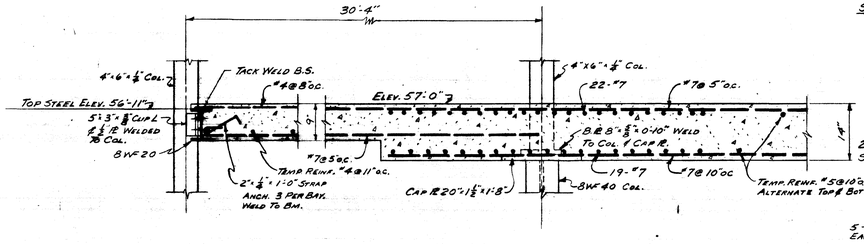
Scale 1"=1'-0"

Section D-D

Scale 1"=1'-0"

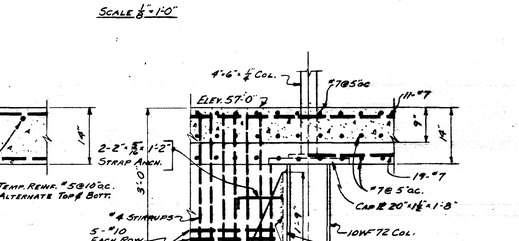
Section A-A

Scale 3/4" = 1:0"



Section B-B

Scale 3/4" = 1:0"



Notes:

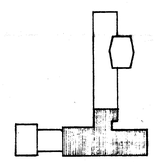
See General Notes for reinforcement not shown on plan.

Top of Conc. Drop Beams same Elev. as Top of Slab.

Top Steel in Heater Room (-2") from Top Slab Elev. 57'-0" unless noted.

Indicates Concrete Test Locations.

KEY PLAN



I st. FLOOR FR'M'G. AREA B

CENTRAL JUNIOR HIGH SCHOOL

Greenwich, Connecticut

830-56

Date 30 APR 57

Scale 1/8 SHOWN

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Architects 65 Broad Street, Stamford, Connecticut

MARCHANT & MINGES ENGINEERS

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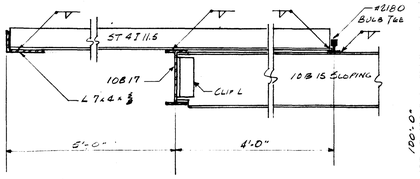
BQ #70 & 125 Attachment

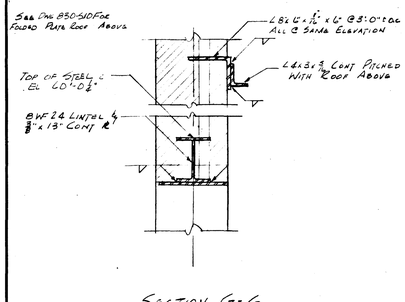
NOTES:

SEE DWG. B30-510 FOR DIMENSIONS & EQUIP FOR CONC. COLUMNS.

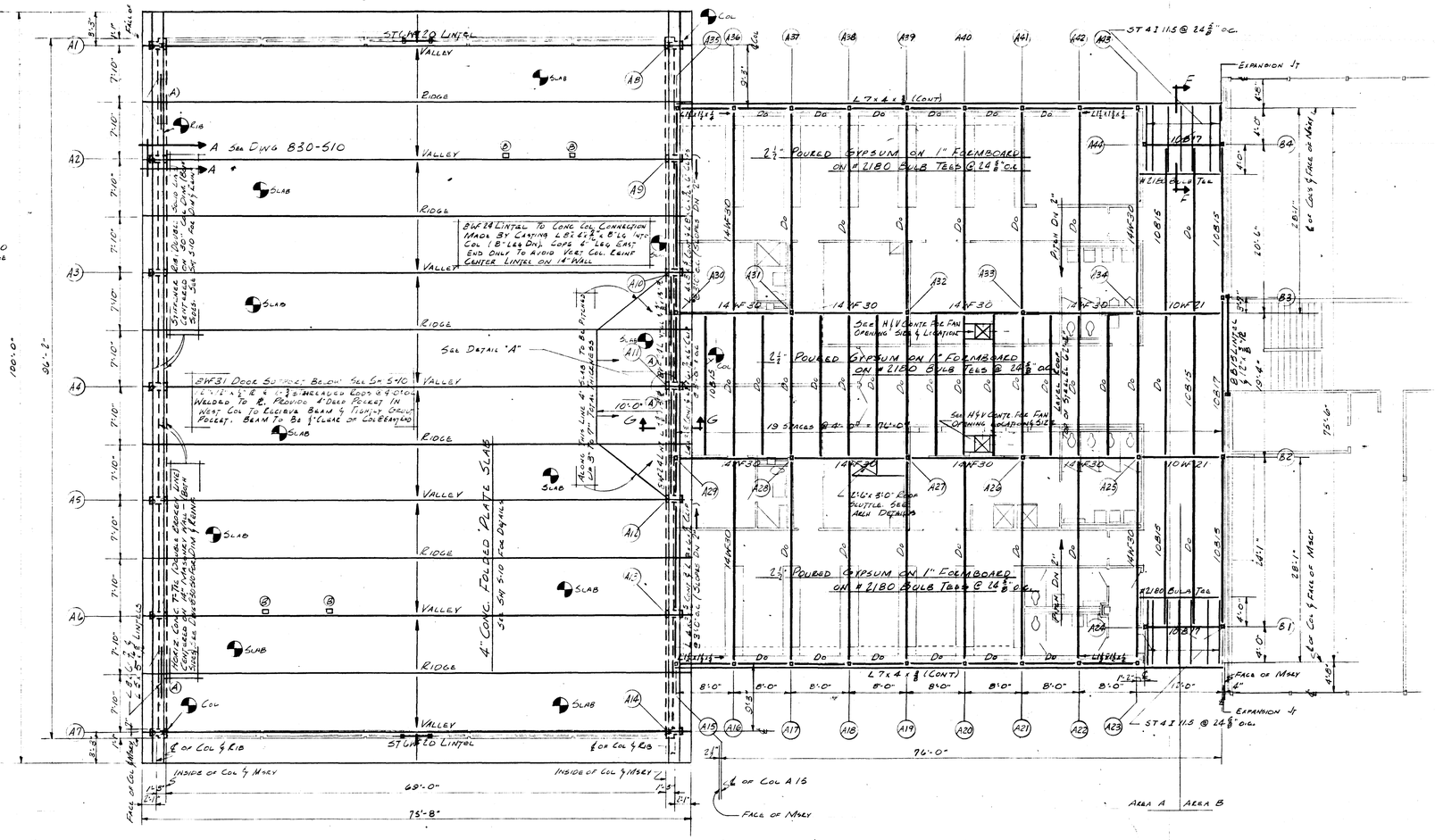
COLUMNS A1, A7, A8, & A14 HAVE INTERIOR STEEL COLUMNS CAST IN CONCRETE SECTION. STEEL COLUMNS CONSIST OF 8WF31 & 6WF15.5 SPLICED AS SHOWN ON DWG. B30-510 PROVIDE 8"x $\frac{3}{8}$"x 8" BASE PL FOR 6WF15.5. USE 2-$\frac{3}{4}$"ø x 1'-9" ANCHOR BOLTS AT EACH COLUMN BASE. BOTTOM BASE PL EL 51'-0"



SECTION F-F
SCALE 1"=1'-0"



SECTION G-G
SCALE 1"=1'-0"



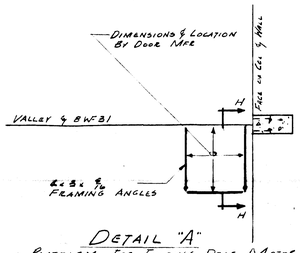
ROOF FRAMING PLAN - UNIT A
SCALE ⅛"=1'-0"

NOTE:

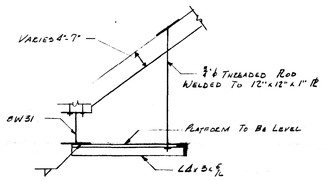
(A) INDICATES LOCATION OF SPECIAL LINTELS (4 PLACES) LINTELS ARE L 8"x 6"x ½" & L 5"x 3½"x ⅜"

(B) INDICATES L 4"x 3½"x ½" PL WITH ¾"ø THREADED STUD SHOT NORMAL INTO 4" CONC PLATE SLAB FOR HANGING ROPE SUPPORT. SEE ARCH FOR LOCATION

CONCRETE TEST LOCATION



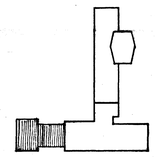
DETAIL "A"
PLATFORM FOR FOLDING DOOR MOTOR
NO SCALE



SECTION H-H
NO SCALE

STATE OF CONNECTICUT JAMES S. MINGES NO. 2423 REGISTERED PROFESSIONAL ENGINEER

STATE OF CONNECTICUT CHARLES G. MARCHANT NO. 2385 REGISTERED PROFESSIONAL ENGINEER



KEY PLAN

ROOF FRAMING AREA A

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

830-57

Date 30 APR 57 | Scale AS SHOWN

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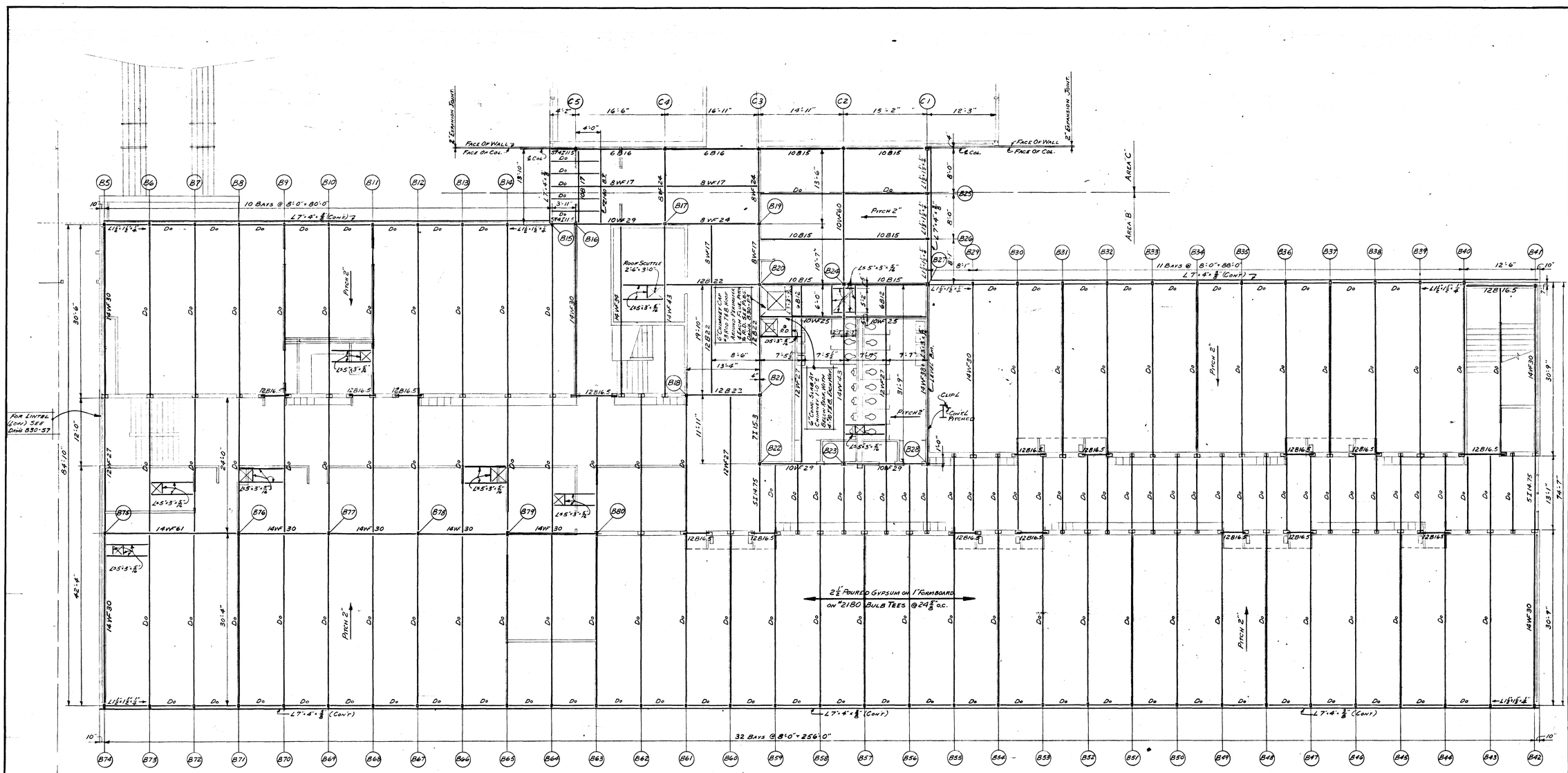
Architects 65 Broad Street, Stamford, Connecticut

MARCHANT & MINGES
ENGINEERS
WEST HARTFORD, CONN.

BQ #70 & 125 Attachment

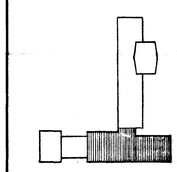


ROOF FRAMING PLAN UNIT "B"

SCALE ⅛" = 1'-0"

GENERAL NOTES:

USE #2140 BULB TEES FOR SPANNING LESS THAN 3 BAYS CONTINUOUS.
ANCHOR MASONRY BEARING BEAMS WITH 1-⅝" x 2'-0" (3" HOOK) BOLTS.
SEE H.&V. CONTR. FOR ALL FAN OPENING DIMENSIONS AND LOCATION.



KEY PLAN

ROOF FRAMING
AREA B

CENTRAL JUNIOR
HIGH SCHOOL
Greenwich, Connecticut

830- S8

Date 30 APR 57 | Scale ⅛" = 1'0"

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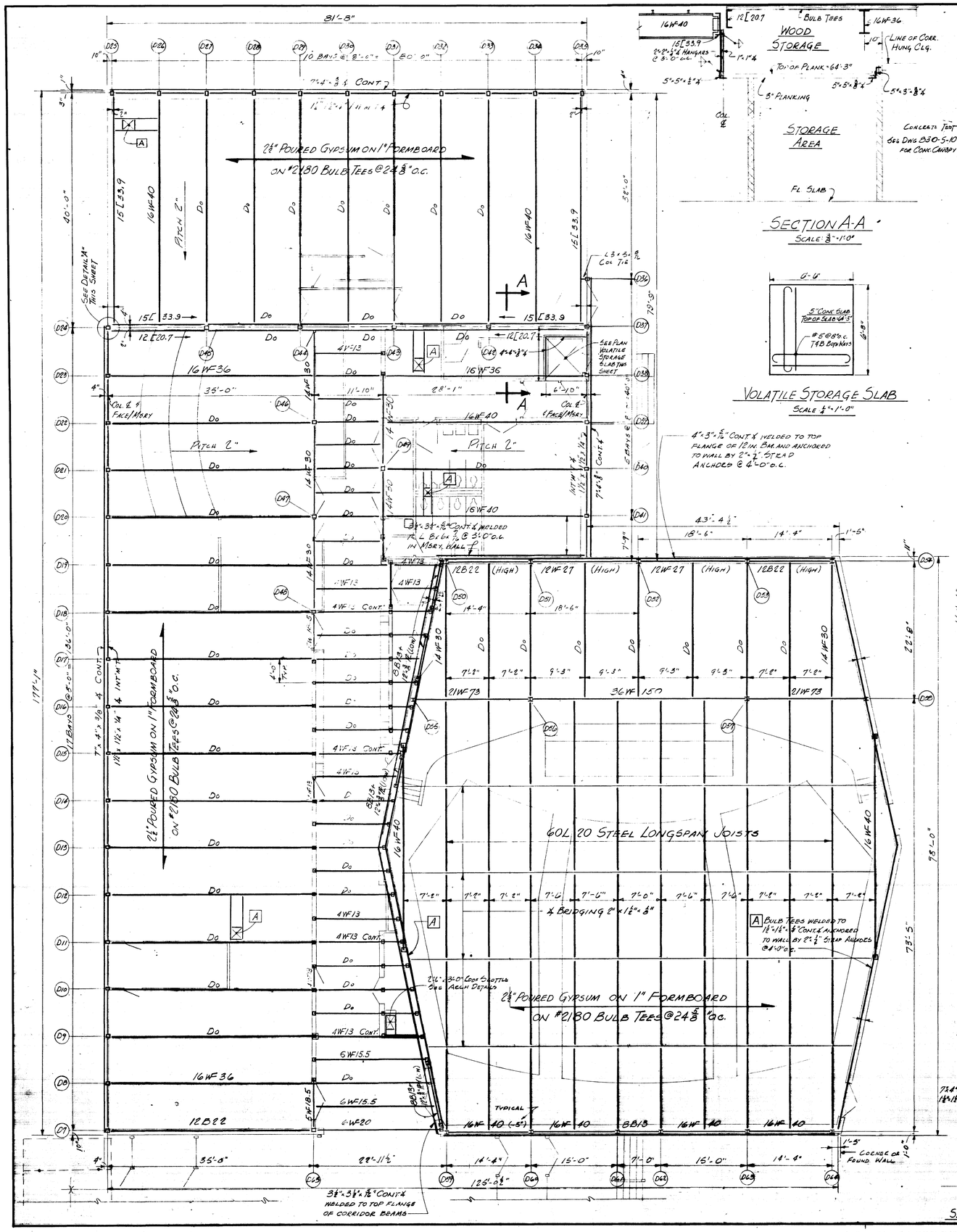
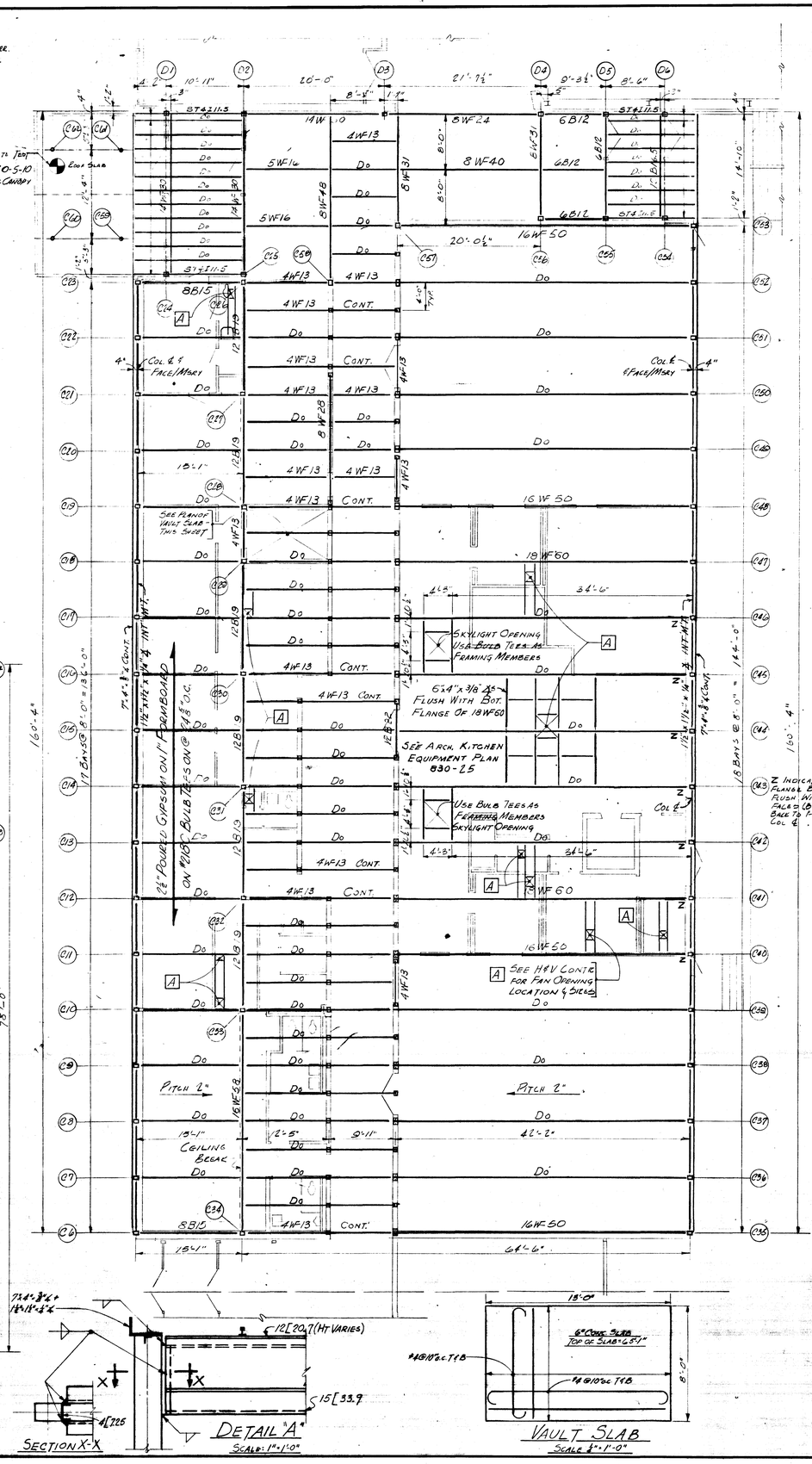
BQ #70 & 125 Attachment





STATE OF CONNECTICUT JAMES S. MINGES NO. 2423 REGISTERED PROFESSIONAL ENGINEER

STATE OF CONNECTICUT CHARLES G. MARCHANT NO. 2385 REGISTERED PROFESSIONAL ENGINEER

KEY PLAN

ROOF FRAMING AREAS C&D

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

830- S9

Date	Scale
30 APR 57	AS SHOWN

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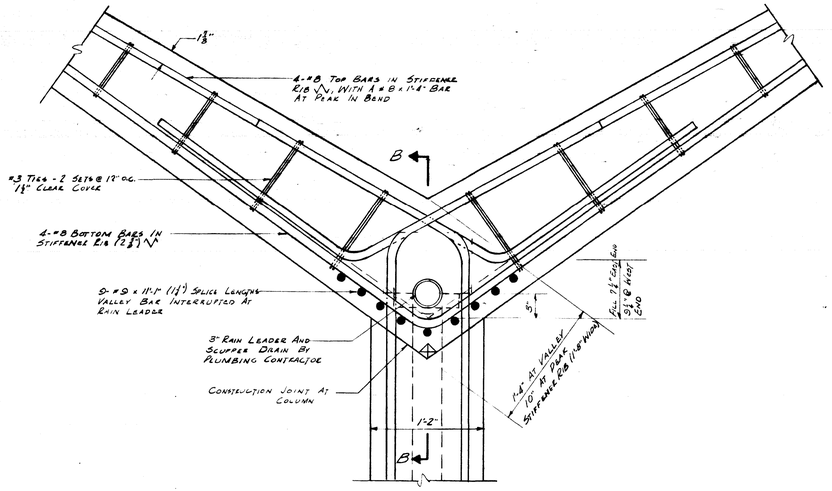
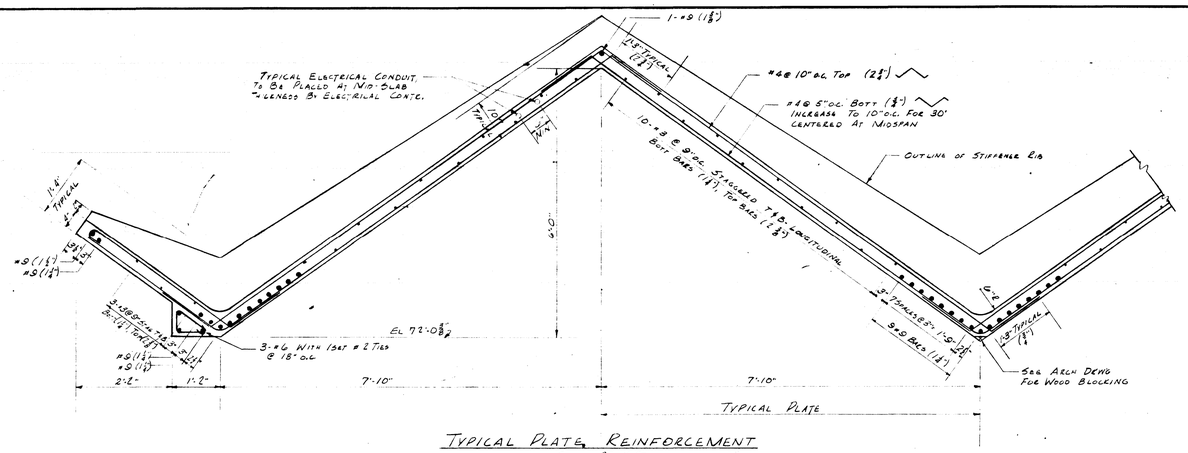
MARCHANT & MINGES ENGINEERS
WEST HARTFORD, CONN.

BQ #70 & 125 Attachment



SECTION A-A
SCALE 1½" = 1'-0"



TYPICAL PLATE REINFORCEMENT
SCALE ¾" = 1'-0"

NOTES:

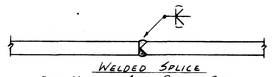
Dimensions In Parenthesis, i.e. (1⅛"), Indicate Support Distance For Bottom Of Bar Above Bottom Of Slab.

Entire Folded Roof Plate Shall Be Placed In Either 2 Or 3 Sections. If 2 Sections Are Prefixed, Locate Construction Joint At Center Valley. If 3 Sections, Locate Construction Joints At Valleys Each Side Of Center.

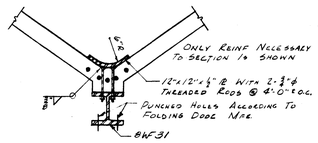
All Forms Must Be Left In Place A Minimum Of 7 Days. Provide 1½" Camber At Midspan. Forms Shall Be Removed In Sections To Insure That Shores In Longitudinal Direction At No Time Exceed 12' O.C., Throughout, For A Duration Not Less Than 28 Days After Final Concrete Placement. Temp Bents Or Longitudinal Shores Shall Compress One At Ridge, One At Midslope, And One At Valley Of Each Plate, Maintaining Proportionate Camber.

Forming, Shoring, And Concrete Sequence Shall Be Subject To Engineer's Approval.

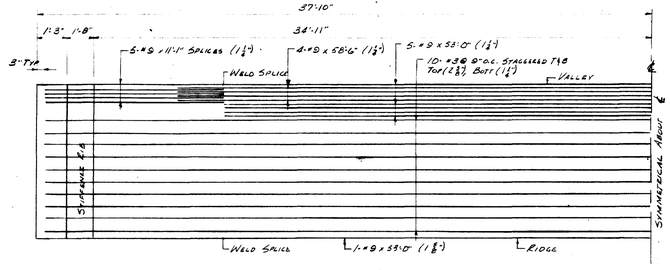
Shores At North And South End Valleys Must Not Be Removed Until Masonry Walls Are Mortared Up Tight.



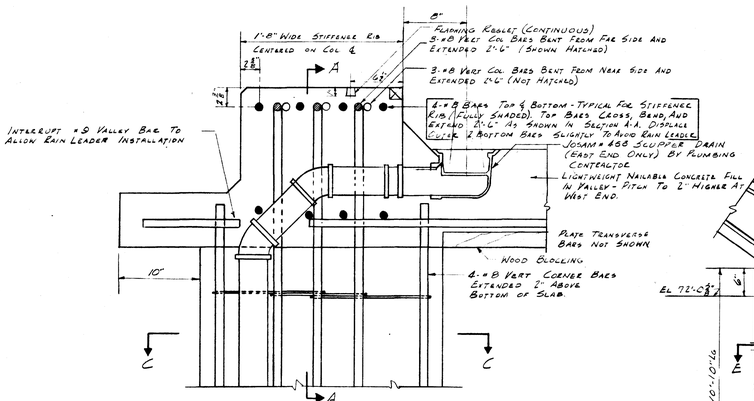
WELDED SPLICE
FOR VALLEY AND RIDGE BARS
NO SCALE



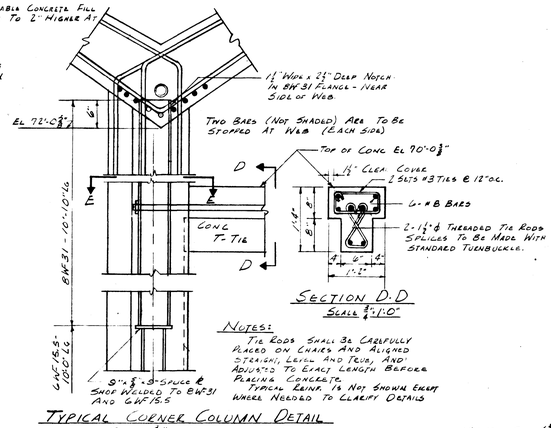
FOLDING DOOR SUPPORT
SCALE ¾" = 1'-0"



PLAN OF LONGITUDINAL STEEL IN PLATE
SCALE ¾" = 1'-0"



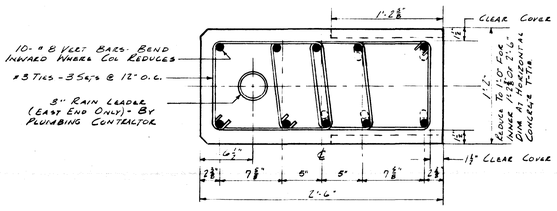
SECTION B-B
SCALE 1½" = 1'-0"



SECTION D-D
SCALE ¾" = 1'-0"

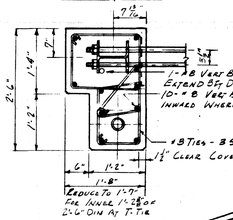
NOTES:

Tie Rods Shall Be Carefully Placed On Chairs And Aligned Straight, Level And True, And Adjusted To Exact Length Before Placing Concrete. Typical Reinf. To Not Shown Except Where Needed To Clarify Details

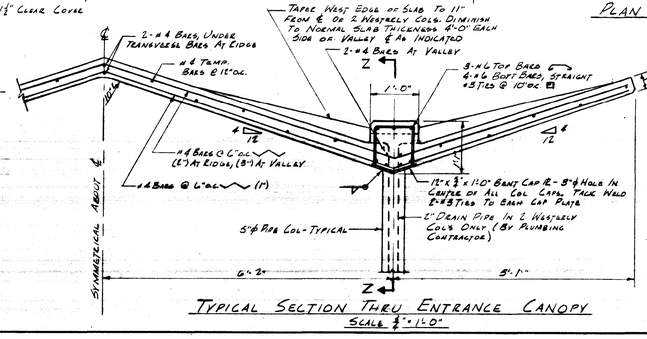


SECTION C-C
SCALE 1½" = 1'-0"

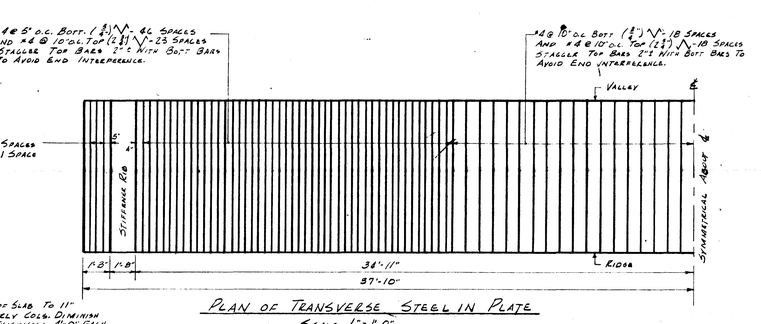
TYPICAL CORNER COLUMN DETAIL
SCALE ¾" = 1'-0"



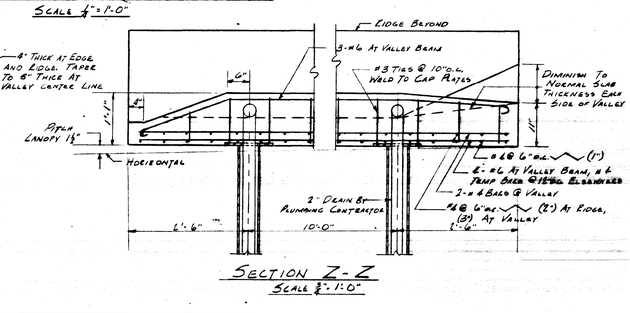
SECTION E-E
SCALE ¾" = 1'-0"



TYPICAL SECTION THRU ENTRANCE CANOPY
SCALE ¾" = 1'-0"



PLAN OF TRANSVERSE STEEL IN PLATE
SCALE ¾" = 1'-0"



SECTION Z-Z
SCALE ¾" = 1'-0"

TYPICAL FOLDED PLATE DETAILS
SCALE AS SHOWN

STATE OF CONNECTICUT JAMES S. MINGES NO. 2423 REGISTERED PROFESSIONAL ENGINEER

STATE OF CONNECTICUT CHARLES G. MARCHANT NO. 2388 REGISTERED PROFESSIONAL ENGINEER

STRUCTURAL DETAILS

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

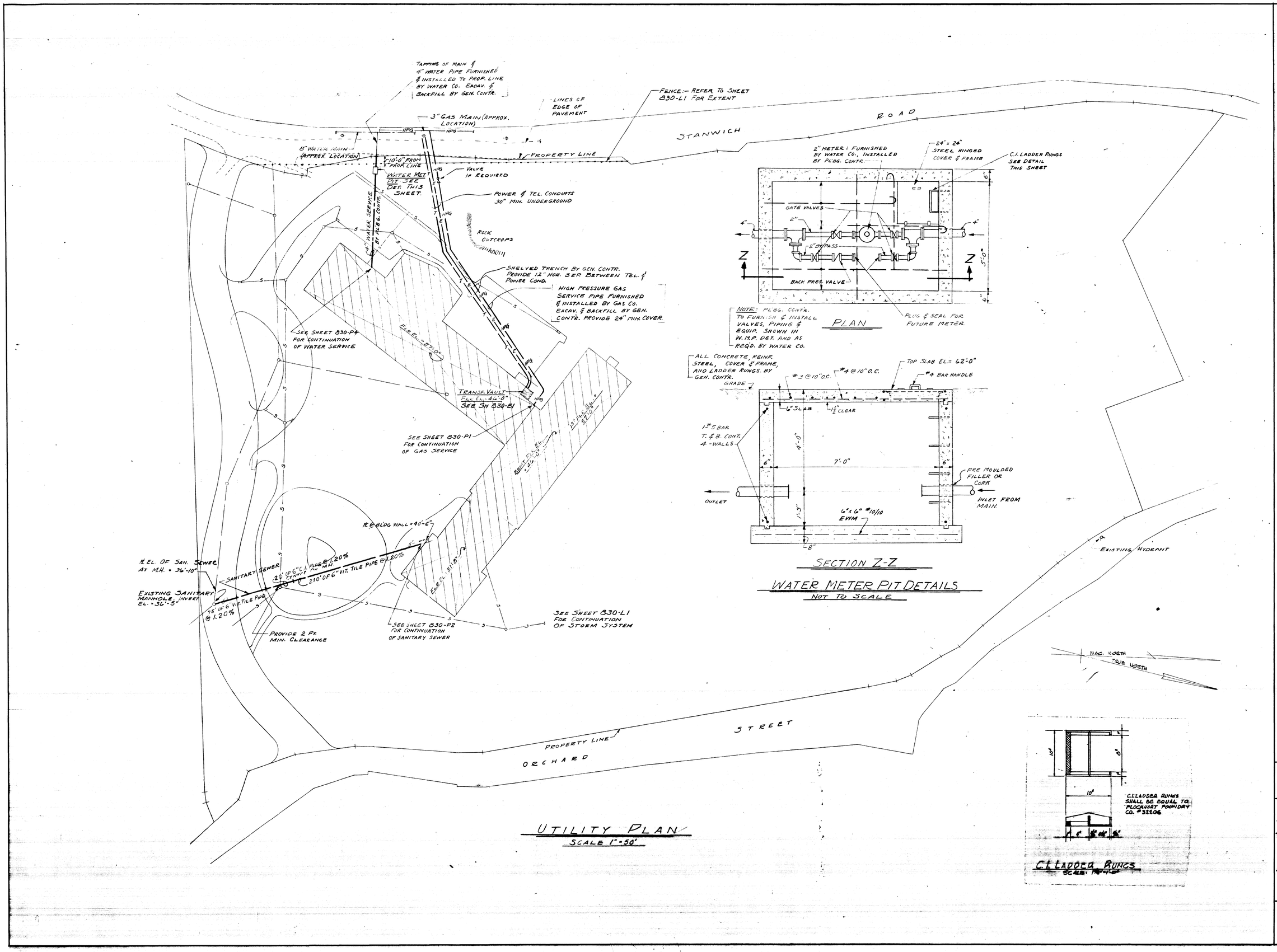
830-510

Date: 30 APR 57 Scale: AS SHOWN

SHERWOOD, MILLS AND SMITH
Architects 65 Broad Street, Stamford, Connecticut.

MARCHANT & MINGES
ENGINEERS
WEST HARTFORD, CONN.

BQ #70 & 125 Attachment



SITE & UTILITY PLAN

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

830-U1

Date 30 APR 57 | Scale AS SHOWN

SHERWOOD, MILLS AND SMITH
Architects 65 Broad Street, Stamford, Connecticut

MARCHANT & MINGES
ENGINEERS
WEST HARTFORD, CONN.

BQ #70 & 125 Attachment

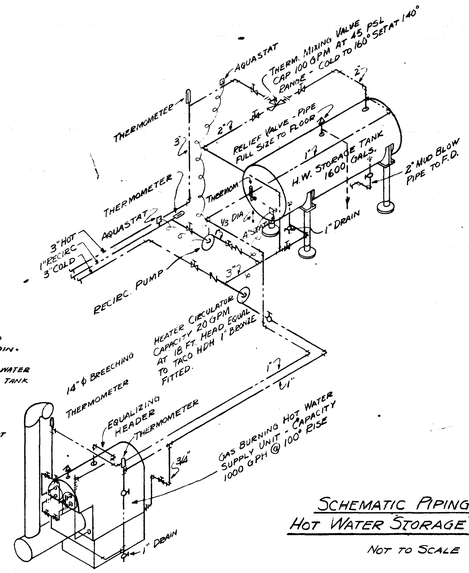
NOTE
RACK PIPING ON EAST WALL AT ENTRANCE TO TUNNEL TO AVOID R.A. DAMPERS. SEE H&V DWGS. FOR SPACE AVAILABLE

NOTE: NO HORIZONTAL PIPING TO BE RUN IN STRUCTURAL BEARING WALLS

6"S BURIED
DROP TO R. ELEV 44'-0"
4"SAN.
2"G, 3/4"R, 2"H, 4"C
3" HOT
1" RECIRC
3" COLD
2" GAS
C.O.
FD-4
HOT WATER STORAGE TANK
FL ELEV 46'-0"
3"C, 2½"H, 3/4"R
3-½"C. STUB OFF FOR CONN. TO HUMIDIFIERS BY H&V CONTR.
3-3/4" GAS STUB OFF FOR CONNECTION BY H&V CONTRACTOR
2" GAS 1"H, 1"C UNDER 72 x 90 DUCT
SWITCH ROOM
TRANSFORMER VAULT
275 GAL. TANK BURIED FOR TRANSF. VAULT DRAIN - SLOPE ANCH. TO P.G.
3" PIPE TO GRADE WITH WATER TIGHT CAP FOR PUMPING TANK
1¼" VENT UP IN WALL ADJACENT TO F.O.V. TERMINATE WITH BRICK VENT
HEATER ROOM
FIN. FL ELEV. 39'-6"
SPACE FOR GAS METER & PRESSURE REDUCING VALVE TO BE FURNISHED & INSTALLED BY GAS CO.
GAS SERVICE TO STREET - SEE DWG. 0-1 FOR CONTINUATION
1¼" GAS - STUB OFF FOR CONNECTION TO EMERGENCY GENERATOR BY ELECTRICAL CONTRACTOR
HOT WATER HEATER
3"C, 2½"H, 3/4"R, 2"GAS
SEE NOTE AT TUNNEL ENTRANCE ABOVE
14" Ø FLUE
3" VENT FOR GAS SERVICE
3" CHIMNEY DRAIN UP TO ROOF
SUBMERSIBLE SUMP PUMP BY PLG. CONTR. IN SUMP PIT BY GEN. CONTR.
STAIR No.1
2½"H, 3"C, 3/4"R, 2"GAS
3"R.L. UP
2"V
4" STACK UP
BOYS' TOILET ROOM
GIRLS' TOILET ROOM
ABOVE CEILING
4" V.T.-F. UP
1"H.C.-2"C TO 2ND FLOOR
CAP TEE FOR FUTURE SAN. R. 43'-0"
FD-4
IN TUNNEL BELOW
2½"C, 1"H, 3/4"R.
2"C, 1"H, 3/4"R.
CORRIDOR No. 2 FIN. FL EL 46'-0" (TUNNEL UNDER FL. EL. 40'-0")
R. 44'-1"
4"R.L.
4"R.L. UP
CAP TEE FOR FUTURE
3¼"C.
3¼" SILLCOCK
1½"C
STAIR #2

1½" A.W., ½"G, ½"C UP
1½" TRAP
½"C & G UP
1½" A.W. UP - 1½" TRAP & 1½" A.W. BELOW FLOOR
STORAGE
2½" A.W. UP
2½"
2½" A.W., ½"C, ½" GAS
C.O.
2½" A.W., 1½"C, ½" GAS
2 "A.W., 3/4"C, 3/4" GAS
4"R.L. UP
2"W UP
2½" A.W., 3/4"C, ½" GAS
2" A.W., 3/4" H&C UP
2½" A.W., 3/4"H, 1"C, ½"G
AT CEILING
R. 42'-5"
IN TUNNEL BELOW
2½"C, 2"H, 3/4"R, 1¼" GAS
CORRIDOR No. 1
FD-4
1"H, ¼"C, 1" GAS
1"H.C.V. GAS
2½"W DN
3" A.W. TO CEILING
1"H&C, 2"H, 1" GAS BEHIND COUNTER
2½"W DN EXPOSED
1½"W DN EXPOSED
TYPE "F" SINK
3"W. DN - 2"V UP
1½" W TO DISHWASHER TRAP & CONN. BY PLBG CONTR.
½" W, ½" H&C UP TO LIBRARY SINK
1"GAS, ½" H&C BEHIND COUNTER
3/4" GAS TO RANGES
½" H&C BEHIND COUNTER
3 TYPE "F" LINKS
½" H&C ABOVE C.O.
3/4" GAS TO RANGES
1½" STANDPIPE WASTE - ½" H&C FOR WASHER TRAP CONNECTIONS BY PLUMBING CONTRACTOR.
1½" A.W. UP & DN
3" A.W. UP & DN
ABOVE C.O.
3/4" C & GAS UP
3" A.W. BURIED

COMMERCIAL
HOMEMAKING No.1
HOME & FAMILY LIVING
HOMEMAKING No. 2
CLASSROOM 16
CLASSROOM 17
CLASSROOM 18
CLASSROOM 19
CLASSROOM 20
CLASSROOM 21
CLASSROOM 22
CLASSROOM 12
CLASSROOM 13
CLASSROOM 14
CLASSROOM 14



SCHEMATIC PIPING DIAGRAM
HOT WATER STORAGE TANK & HEATER
NOT TO SCALE

STATE OF CONNECTICUT JAMES S. MINGES NO. 2423 REGISTERED PROFESSIONAL ENGINEER

STATE OF CONNECTICUT CHARLES G. MARCHANT NO. 2385 REGISTERED PROFESSIONAL ENGINEER

KEY PLAN

BASEMENT PLUMBING AREA B

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

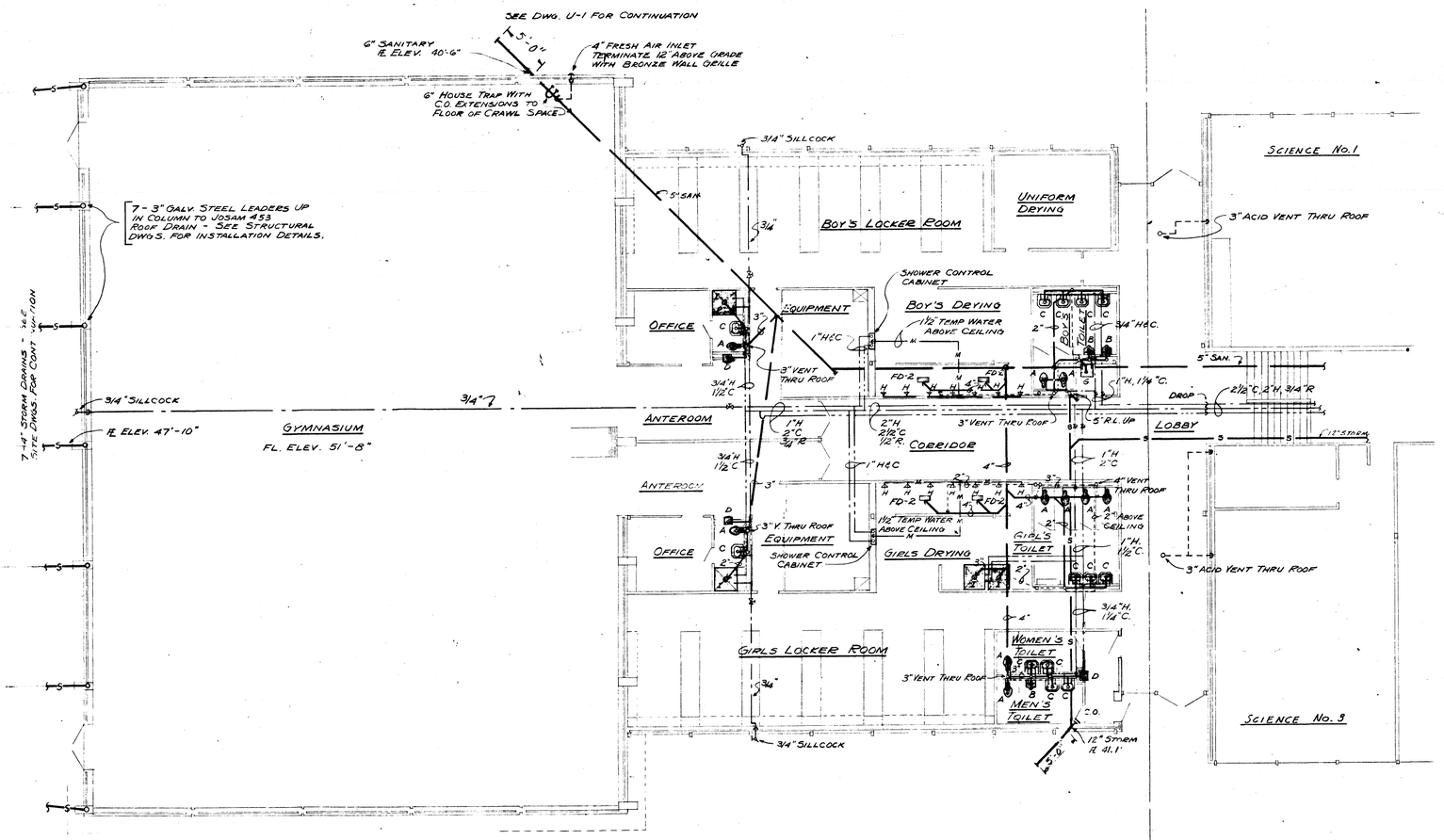
830-P1

Date 30 APR. 57 | Scale 1/8"=1'-0"

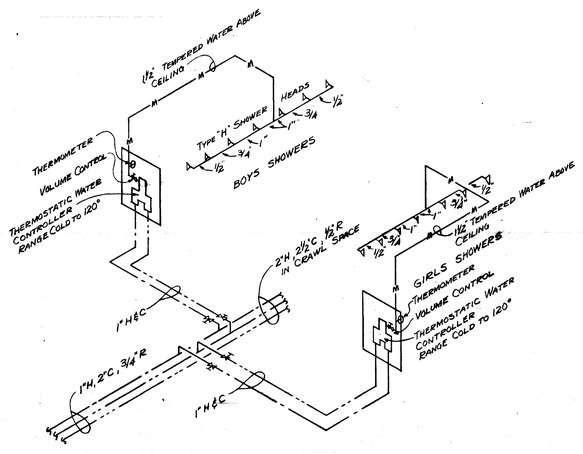
SHERWOOD, MILLS AND SMITH
Architects 65 Broad Street, Stamford, Connecticut

MARCHANT & MINGES
ENGINEERS
WEST HARTFORD, CONN.

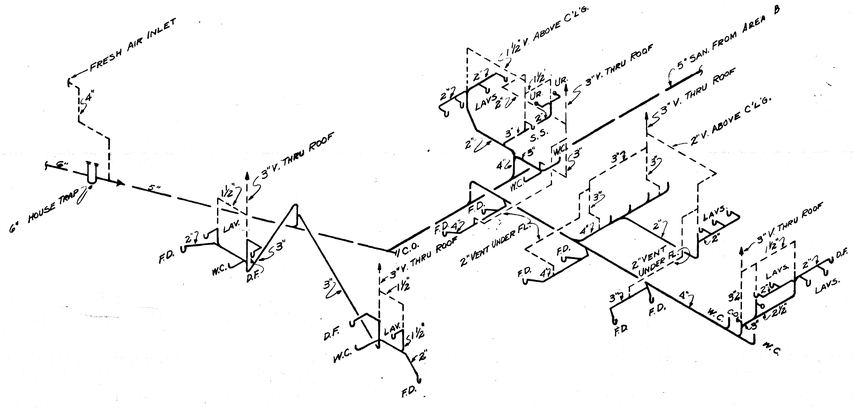
BQ #70 & 125 Attachment



FIRST FLOOR PLAN
SCALE 1/8" = 1'-0"



SCHEMATIC WATER PIPING
BOYS & GIRLS SHOWERS
NOT TO SCALE



SCHEMATIC SOIL, WASTE, & VENT PIPING
LOCKER ROOM AREA
NOT TO SCALE



KEY PLAN

FIRST FLOOR PLUMBING AREA A

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

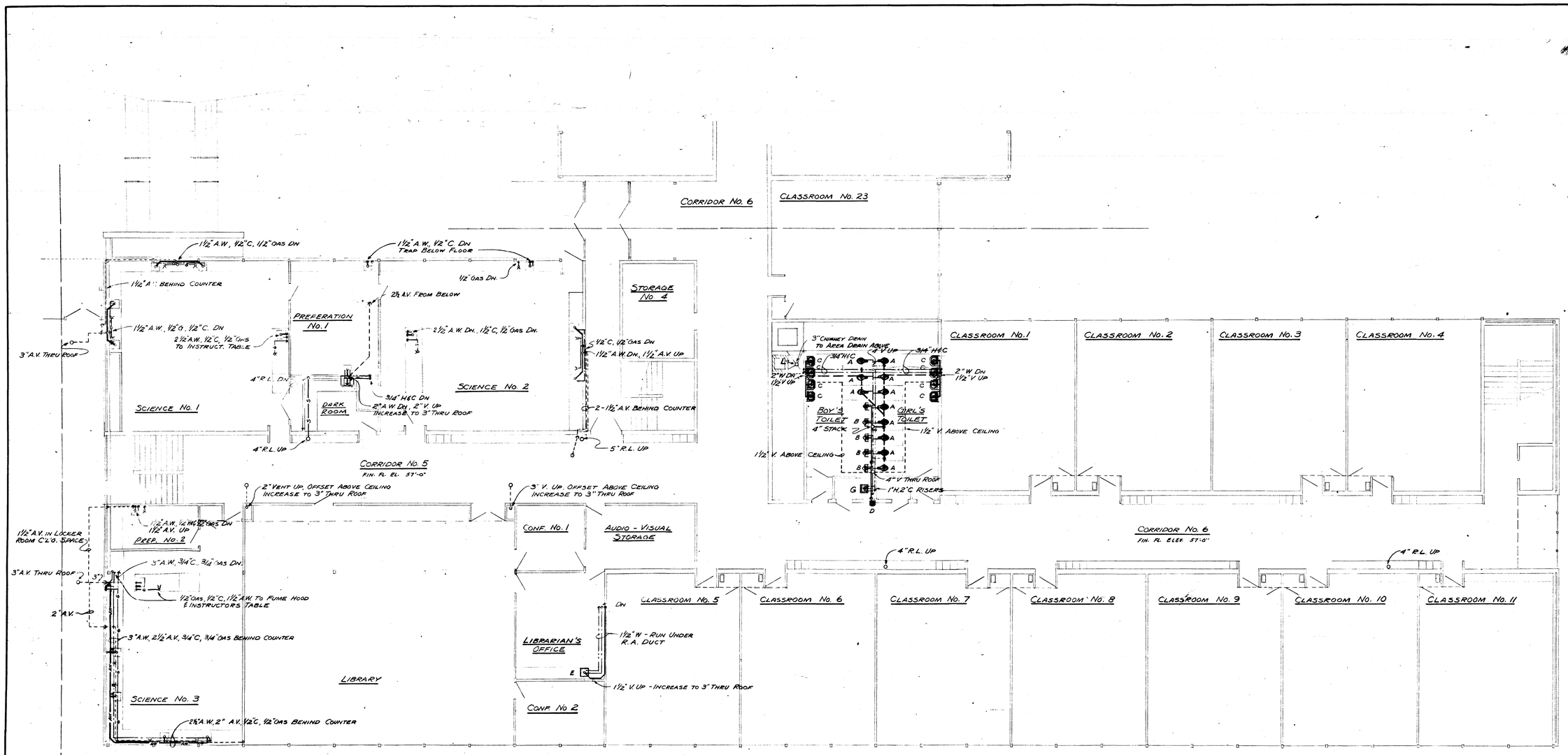
830-P2

Date: 30 APR. 57
Scale: 1/8" = 1'-0"

SHERWOOD, MILLS AND SMITH
Architects 65 Broad Street, Stamford, Connecticut

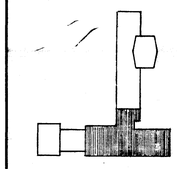
MARCHANT & MINGES
ENGINEERS
WEST HARTFORD, CONN.

BQ #70 & 125 Attachment



NOTE

PLUMBING CONTRACTOR TO FURNISH AND INSTALL TRAPS FOR ALL SINKS AND MAKE FINAL GAS AND WATER CONNECTIONS TO ALL OUTLETS IN SCIENCE ROOMS, PREP ROOMS & DARK ROOM.
TRAPS INSTALLED ON ACID WASTE LINES SHALL BE DURIRON OR EQUAL AND 1½" SIZE UNLESS OTHERWISE NOTED.



KEY PLAN

FIRST FLOOR
PLUMBING
AREA B

CENTRAL JUNIOR
HIGH SCHOOL
Greenwich, Connecticut

830-P3

Date 30 APR. 57 | Scale 1/8" = 1'-0"

SHERWOOD, MILLS AND SMITH
Architects 65 Broad Street, Stamford, Connecticut

MARCHANT & MINGES
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BQ #70 & 125 Attachment

GEN. DRAWING & PLANNING ROOM
GENERAL METALS
GENERAL WOODSHOP
STORAGE
REHEARSAL
BOY'S TOILET
MEN'S TOILET
CUSTODIAN
INSTRUMENTAL
INSTRUMENT STORAGE
STAGE
CHORAL
CRAFTS
WORK & STORAGE
AUDITORIUM
ARTS
LOBBY
PRINCIPAL
WAITING
OFFICE
VAULT
VICE-PRINCIPAL
STORAGE & WORK
GUID. CONF.
GUIDANCE
NURSE
EXAMINATION
TEACHER'S ROOM
CAFETERIA NO. 2
DISH-WASHING
KITCHEN
STORE ROOM
CAFETERIA NO. 1

KEY PLAN

FIRST FLOOR PLUMBING AREAS C&D

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

830- P4
Date 30 APR 57
Scale 1/8"=1'-0"

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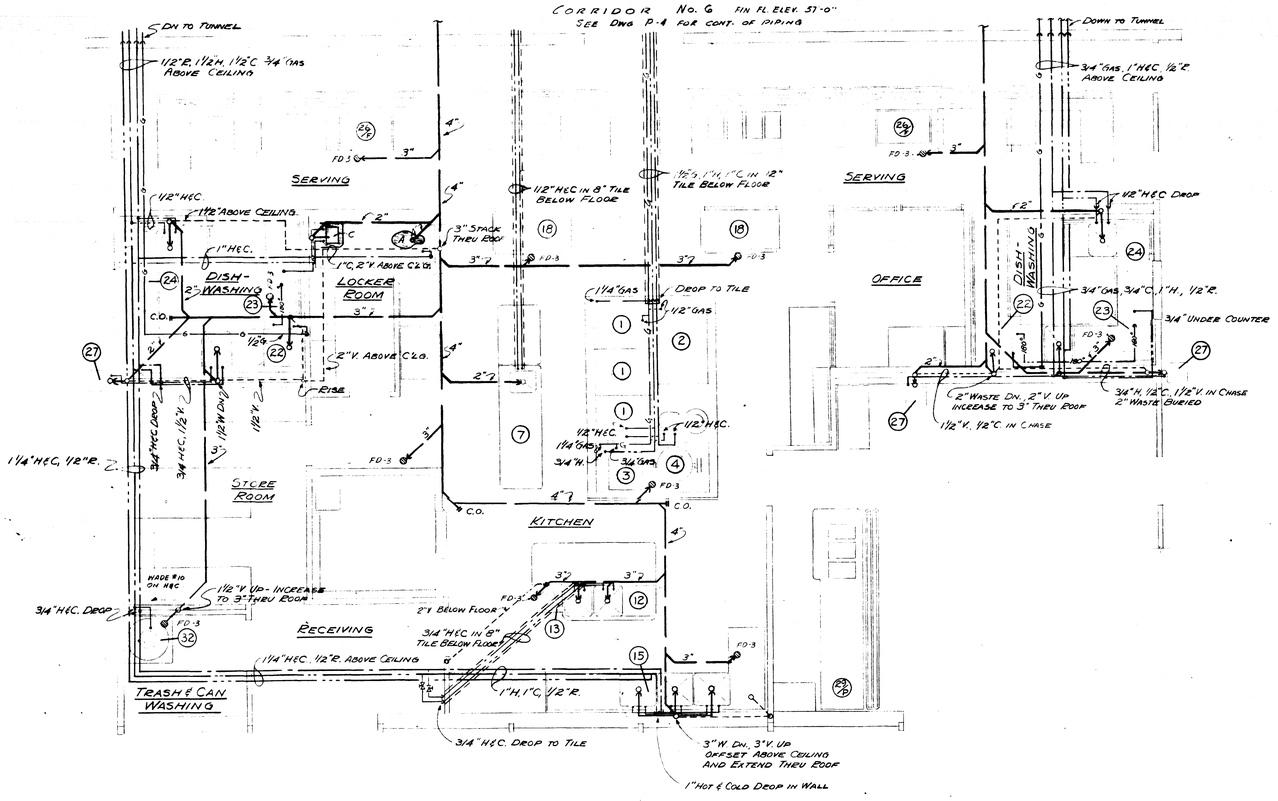
Architects 65 Broad Street, Stamford, Connecticut

MARCHANT & MINGES
ENGINEERS
WEST HARTFORD, CONN.

BQ #70 & 125 Attachment



KITCHEN FLOOR PLAN

SCALE 1/4" = 1'-0"

SCHEDULE OF KITCHEN EQUIPMENT AND CONNECTIONS

ITEM NO.	Q'TY	DESCRIPTION	CONNECTIONS BY PLBG CONT. M	C	W	FW	G	FURNISHED AND INSTALLED BY PLUMBING CONTRACTOR
1	3	RANGES, SHELF AND FAUCET	1/2"	1/2"			1 1/2", 1/2"	STOPS ON SUPPLIES
2	1	OVEN					1/2", 1/2"	
3	1	VEGETABLE STEAMER	3/8"				3/4"	STOPS ON SUPPLIES
4	1	TILTING KETTLE & FAUCET	1/2"	1/2"				STOPS ON SUPPLIES
7	1	COOK'S TABLE & SINK	1/2"	1/2"	1 1/2"			STOPS ON SUPPLIES & 2" TRAP BELOW FLOOR
12	1	VEGETABLE SINKS & DRAINBOARD	1/2", 1/2"	1/2", 1/2"	2", 2"			STOPS ON SUPPLIES & 2" TRAP BELOW FLOOR
13	1	PEELER & TRAP		1/2"			1 1/2"	EXTEND WASTE OUTLET TO F.D.
15	1	POT SINK & DRAINBOARDS	1/2", 1/2", 1/2"	1/2", 1/2", 1/4"	2", 2"			TRAP EACH SINK ABOVE FLOOR
18	2	PASS THRU REFRIGERATORS					1"	EXTEND WASTE OUTLET TO F.D.
22	2	DISHWASHERS	3/4"		2"		1/2"	2" TRAP ON OUTLET, AIR BREAK ON INLET, TO BOOSTER CONNECT
23	2	HOT WATER BOOSTER	3/4"					3/4" 180° HOT TO D. WASHER W/ WADE #5 THERMOM; ECO VALVE PECS.
24	2	DISHTABLES & SINKS	1/2", 1/2"	1/2", 1/2"	2", 1 1/2"			TRAP EACH SINK ABOVE FLOOR; STOPS ON SUPPLIES
24/2	2	REFRIGERATED MILK DISPENSERS					1"	EXTEND WASTE OUTLET TO F.D.
27	3	WATER COOLER'S		3/8"	1/4"			TRAP AND STOPS ON SUPPLY
29/2	1	OVEN SECTION						
32	1	CAN RINSER	3/4"	3/4"				STOPS ON SUPPLIES

PLUMBING FIXTURE SCHEDULE

FIXTURE	SYMBOL	SOIL OR WASTE	VENT	COLD WATER	HOT WATER	MOUNTING HEIGHT	SPECIFICATION
Water Closet	A	4	2	1		Floor	"Santon" #3-300 bowl with #110 FIV "Crown" valve; Olsonite #10 Seat, black with check hinge.
Urinal	B	2	1½	3/4		22"	"Correcto" #7-07 urinal with #186 "Crown" valve.
Lavatory	C	1½	1½	½	½	31"	"Norwich" #1-160V 20"x18"; #8-562 supply and drain fitting, #8-410 1 1/4"x1 1/2" trap; #8-304 3/8" supplies with stops. #8-763 porcelain brackets.
Drinking Fountain	D	1½	1½	½	½	36"	"Coolbrook" #6-570, #6-572 supply fitting; #6-813 waste and 1 1/4" trap with G.P. Wall C.O. No substitutes.
Sink	E	2	1½	½	½	Counter	#5-136 24"x21" acid resisting enamaled C.I. sink; #8-101 A supply fitting, #8-365 open strainer, #8-410 1½" rough brass 'P' trap with C.O.; Judee Frame.
Sediment Trap	F	1½	1½				Josam series "H-20 type H-21½ sediment interceptor with gasketed watertight screwed cover and removable perforated screen. Install on each sink outlet in Arts & Crafts Rms.
Service Sink	G	3	1½	½	½		#7-563 22"x18" acid resisting enamaled C.I. sink; #8-101 rough plated supply fitting with hose end and pail hook, #7-620 trap standard, #8-980 rim guard.
Service Sink	G-1	3	1½	½	½		Same as sink G except without rim guard.
Shower	H					Girls-69" Boys-71"	Speakman #S-2260 shower head with key operated volume control and back inlet.
Shower Cabinet	I	2	1½	½	½		Fiat "Cadet" Model 27 76"x36" galv. steel cabinet with baked enamel fin. Terrazzo receptor with integral drain; Speakman #S-2250 Mixometer shower control with renewable seats #S-2250 Model 3 shower head with ball joint, Bent arm and wall flange, furnish plastic curtain, hooks and soap dish.
Wash Fountain	J	2	1½	1	1	Floor	Bradley type CFA 36" semi-circular, foot operated, precast granito wash fountain
Trap	K	1½	1½				Crane # 8-410 rough brass "P" trap with cleanout. Double sinks to be provided with "LK-5" (Elkay) waste fitting #L350.
Area Drain	L	3					Josam series 110 C.I. area drain with loose set grate
Floor Drain	FD-1	3					Josam series 300 C.I. floor drain with brass strainer. Furnish deep seal 'P' trap
Floor Drain	FD-2	3					Josam series 300-R C.I. floor drain with C.P 17"x5" rectangular strainer. Furnish deep seal 'P' trap
Floor Drain	FD-3	3					Josam series 300-350 C.I. floor drain with non clog C.P. strainer and removable sediment bucket. Furnish deep seal 'P' trap.
Floor Drain	FD-4	3					Josam series 200 C.I. floor drain with integral drum type 'P' trap and polished brass strainer.
Roof Drain							Josam series 410 C.I. roof drain with removable high dome and sediment cup.
Roof Drain		3					Josam series 450 C.I. drain with flashing clamp, removable high dome and C.I. flashing clamp device.
Sillcock					3/4		Josam series Y-210 cast brass non-freeze wall hydrant with loose key.
Gas Valve	Gas V. →						Crane #L-2880 hose end needle valve with renewable seat and plastic index button.
Air Valve	Air V. →						Same as gas, valve, except for use with compressed air and with indentifying index button.

MATERIAL SCHEDULE

	SYSTEM	PIPING	JOINTS	SUPPORTS	TEST	REMARKS
A.	BURIED DRAIN & VENT PIPING EXCEPT WHERE NOTED	SUPER SPUN XHCI PIPE, TARRED - XHCI FITTINGS, TARRED	PACKED OAKUM 1" POURED LEAD SECURELY CAULKED	MASONRY PIERS AT LEAST EVERY 5' ON SOLID EARTH	MAINTAIN 10' HEAD IN PRESENCE OF ENGINEER	3" MIN. DRAINS - 2" MIN. VENTS
B.	ABOVE GROUND DRAIN & VENT PIPING	DO	DO	CLEVIS HANGERS 5' O.C. HORIZ. PIPE CLAMP EVERY OTHER FLOOR	CAP SYSTEM AND FILL TO ROOF IN PRESENCE OF ENGINEER	WHERE ALLOWED BY CODE AND APPROVED BY ENGINEER "C", "D" OR "E" MAY BE USED
C.	ABOVE GROUND DRAINAGE - SEE REMARKS FOR "B"	TYPE L COPPER TUBING. COPPER DRAINAGE FITTINGS	SWEAT JOINTS. 50/50 SOLDER. NON-CORROSIVE FLUX	CLEVIS HANGERS 8' O.C. PIPE CLAMP EVERY OTHER FLOOR	DO	
D.	DO	STD. WGT. GAL. W.I. PIPE, GAL. C.I. DRAINAGE FITTINGS	USE NON HARDENING JOINT CEMENT	DO	DO	NO CLOSE NIPPLES
E.	ABOVE GROUND VENTS - SEE REMARKS FOR "B"	STD. WGT. GAL. STEEL. GAL. MALL. VENT FITTINGS	DO	DO	DO	NO CLOSE NIPPLES
F.	ABOVE GROUND WATER PIPING	TYPE L COPPER TUBING. BRONZE SWEAT FITTINGS	SWEAT JOINTS 95/5 SOLDER. NON-CORROSIVE FLUX	DO	MAINTAIN 150 LBS. PRES. FOR 3 HRS. IN PRESENCE OF ENGINEER	GANG HANGER MAY BE USED WHERE APPROVED BY ENGINEER
G.	BURIED WATER PIPE, 2" AND SMALLER	TYPE K SOFT COPPER WITH FLARED COMPRESS. FITTINGS	JOINTS AS RECOMMENDED BY MANUFACTURER	LAY ON 3" FINE SAND OR GRAVEL	DO	NO JOINTS LESS THAN 60' APART ON CONTINUOUS RUNS
H.	BURIED WATER PIPE, 3" AND LARGER	CLASS C BELL & SPIGOT PIPE & FITTINGS - CEMENT LINED	PACKED WITH JUTE, 2" POURED LEAD SECURELY CAULKED	LAY ON SOLID EARTH OR MASONRY PIERS	DO	LEADITE MAY BE USED WHERE APPROVED. ANCHOR AND STRAP AS REQUIRED BY ENGINEER.
I.	DRAIN PIPE OUTSIDE BUILDING	VIT. CLAY PIPE AND FITTINGS	HOT BITUMINOUS COMPOUND	DO	VISUAL INSPECTION BY ENGINEER	TRANSITE MAY BE USED WHERE ALLOWED BY CODE AND APPROVED AS REQUIRED BY ENGINEER.
J.	ACID WASTE AND VENT PIPING	DURIRON PIPE & FITTINGS	SAME AS "B"	SAME AS "B"	SAME AS "B"	OAKUM TO BE COATED WITH BEES WAX
K.	GAS AND AIR PIPING	STD. WGT. BLK. STEEL PIPE. BLK. MALL. PATTERN FITTINGS	USE NON HARDENING JOINT CEMENT NO WICKING	SAME AS "C"	MAINTAIN 150 LBS. PRES. FOR 2 HRS. IN PRESENCE OF ENGINEER	PIPING TO BE INSTALLED AS APPROVED BY LOCAL UTILITY CO.

WATER SUPPLY SIZING SCHEDULE

FIXTURE	RATING IN UNITS	PIPE SIZE	CAPACITY IN UNITS
WATER CLOSET	6	1/2"	3
URINAL	3	3/4"	5
LAVATORY	1	1"	12
SINK	2	1 1/4"	30
D. FOUNTAIN	1	1 1/2"	30
SHOWER HEAD	3	2"	65
SILLCOCK	3	2 1/2"	112

THE ABOVE SCHEDULE TO BE USED FOR SIZING BRANCH WATER PIPING FOR FIXTURES IN BATTERIES. SEE FIXTURE SCHEDULE FOR INDIVIDUAL SUPPLY SIZES.

GENERAL NOTES

1. ALL LINES OF PIPING SHOWN ARE DIAGRAMMATIC ONLY. EXACT LOCATIONS SHALL BE DETERMINED ON THE JOB AND IN CONJUNCTION WITH THE OTHER TRADES.
2. CONTRACTOR SHALL CHECK ARCHITECTURAL DRAWINGS FOR LOCATIONS OF ALL ROOF LEADERS, FIXTURES AND SPECIAL EQUIPMENT REQUIRING PLUMBING CONNECTIONS. CONTRACTOR SHALL MAKE CONNECTIONS TO ALL SUCH EQUIPMENT.
3. SANITARY LINES SHALL BE LAID OUT TO MAINTAIN A MINIMUM PITCH OF 1/8" PER FT.
4. PROVIDE STOPS ON BOTH HOT AND COLD WATER LINES AT EACH FIXTURE AND OUTLET. PROVIDE GAS SHUTOFF COCK AT EACH GAS OUTLET.
5. RACK ALL PIPING ON TUNNEL WALLS ON PROPER SUPPORTS TO MAINTAIN MAXIMUM PASSAGE.
6. ALL TRAPS INSTALLED UNDER FLOOR SLABS TO BE LOCATED AS CLOSE AS POSSIBLE TO FINISHED FLOOR.
7. ALL PLUMBING SHOWN ON THESE DWGS SHALL CONFORM TO NATIONAL PLUMBING CODE.

PLUMBING SYMBOLS

- SOIL OR WASTE
- SOIL OR WASTE - BURIED
- VENT
- S — S — S — STORM
- S — S — STORM - BURIED
- COLD WATER
- HOT WATER
- H.W. RECIRCULATION
- G — G — G — GAS
- AW — AW — AW — ACID WASTE
- A — A — A — COMPRESSED AIR
- GATE VALVE
- GLOBE VALVE
- CHECK VALVE
- COCK
- TRAP
- CLEANOUT
- UNION
- RELIEF VALVE
- THERMOMETER
- SILLCOCK
- A.V. ACID VENT

STATE OF CONNECTICUT JAMES S. MINGES NO. 2423 REGISTERED PROFESSIONAL ENGINEER

STATE OF CONNECTICUT CHARLES G. MARCHANT NO. 2385 REGISTERED PROFESSIONAL ENGINEER

PLUMBING SCHEDULES
KITCHEN PLAN

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

830-P5

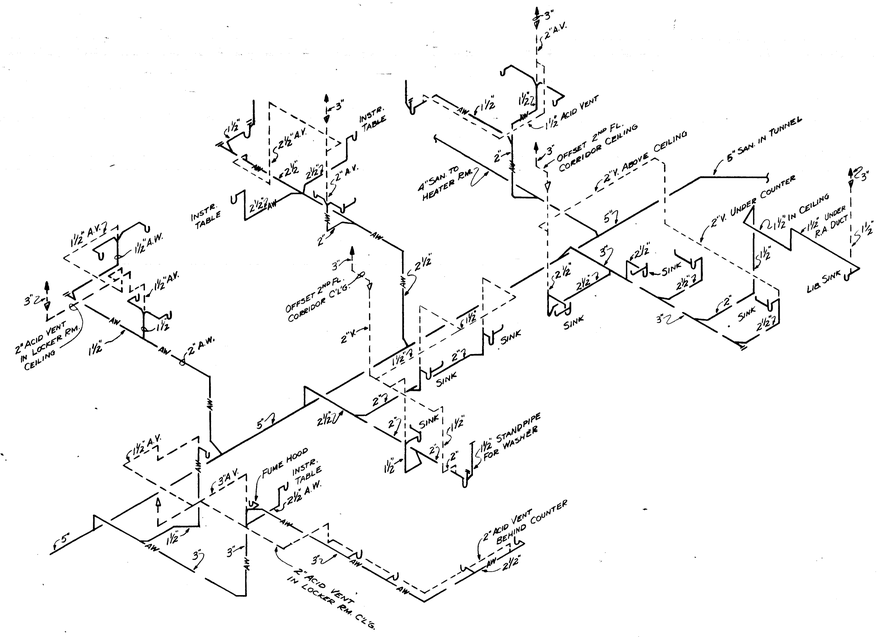
Date: 30 APR 57

Scale: AS NOTED

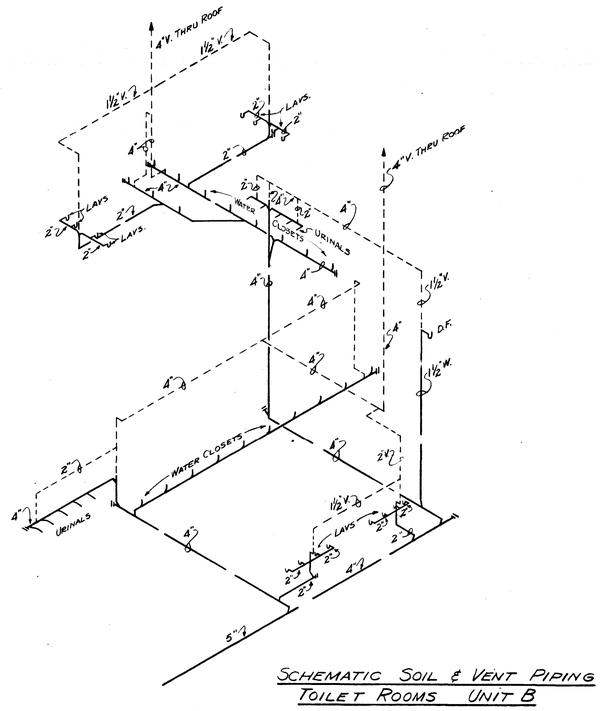
SHERWOOD, MILLS AND SMITH
Architects
45 Broad Street, Stamford, Connecticut

MARCHANT & MINGES
ENGINEERS
WEST HARTFORD, CONN.

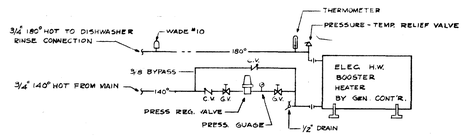
BQ #70 & 125 Attachment



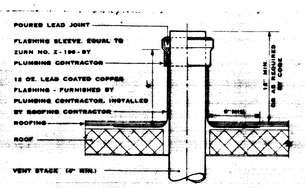
SCHEMATIC SOIL WASTE & VENT PIPING
LABORATORIES UNIT B
NOT TO SCALE



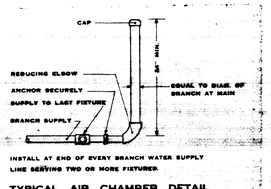
SCHEMATIC SOIL & VENT PIPING
TOILET ROOMS UNIT B
NOT TO SCALE



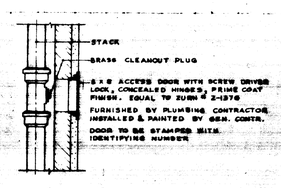
HOT WATER BOOSTER HEATER
SCHEMATIC PIPING DIAGRAM
NOT TO SCALE



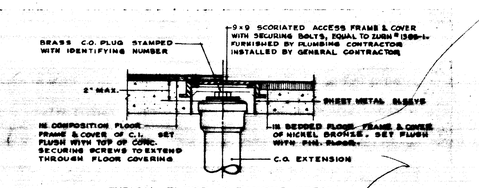
TYPICAL VENT FLASHING DETAIL
NOT TO SCALE



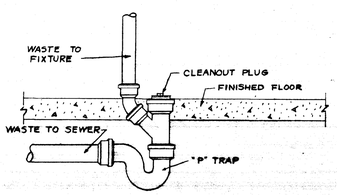
TYPICAL AIR CHAMBER DETAIL
NOT TO SCALE



TYPICAL WALL CLEANOUT DETAIL
NOT TO SCALE



TYPICAL FLOOR CLEANOUT DETAIL
NOT TO SCALE



TYPICAL BURIED TRAP DETAIL
NOT TO SCALE

STATE OF CONNECTICUT
JAMES S. MINGES
NO. 2423
REGISTERED PROFESSIONAL ENGINEER

STATE OF CONNECTICUT
CHARLES G. MARCHANT
NO. 2388
REGISTERED PROFESSIONAL ENGINEER

PLUMBING SCHEMATICS DETAILS

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

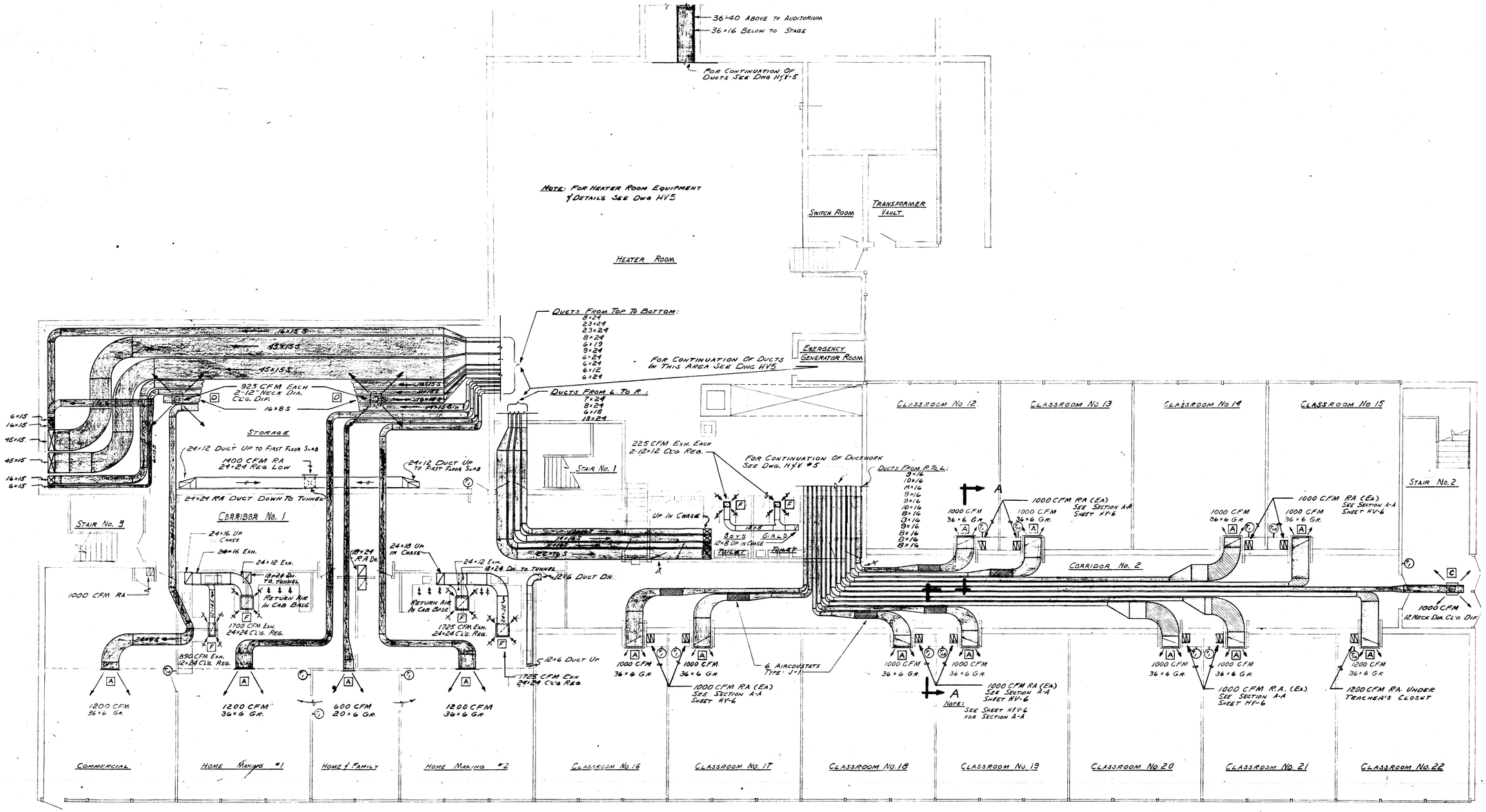
830- P6

Date: 30 APR. 57
Scale: AS NOTED

SHERWOOD, MILLS AND SMITH
Architects 65 Broad Street, Stamford, Connecticut

MARCHANT & MINGES
ENGINEERS
WEST HARTFORD, CONN.

BQ #70 & 125 Attachment



LOWER CLASSROOM WING PLAN AREA "B"

SCALE: 1/8"=1'-0"

STATE OF CONNECTICUT JAMES S. MINGES NO. 2423 REGISTERED PROFESSIONAL ENGINEER

STATE OF CONNECTICUT CHARLES G. MARCHANT NO. 2385 REGISTERED PROFESSIONAL ENGINEER

KEY PLAN

BASEMENT HEATING AND VENTILATING AREA B

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

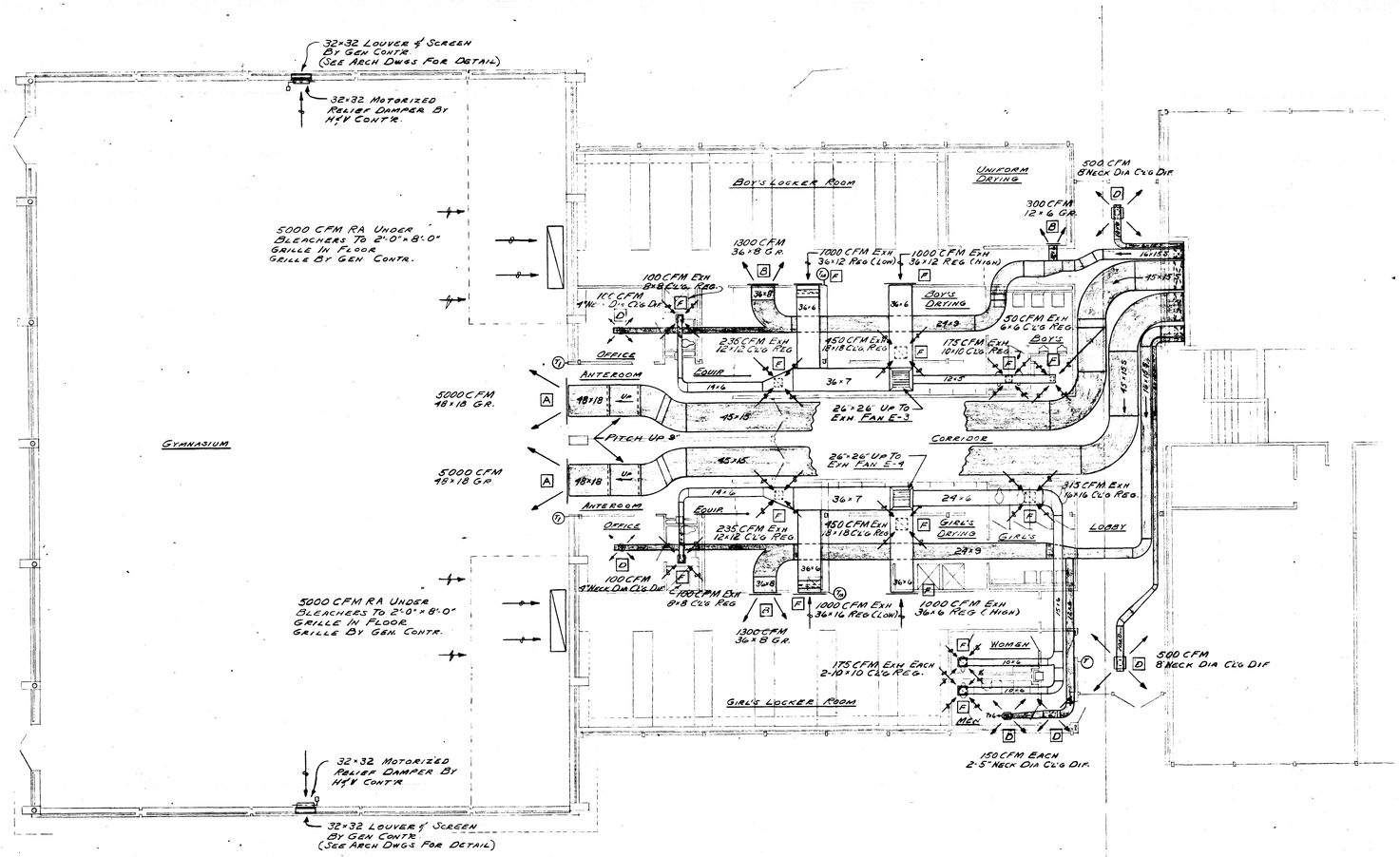
1830 - HV-1

30 APR. 67 1/8"=1'-0"

SHERWOOD, MILLS AND SMITH
Architects 60 Broad Street, Stamford, Connecticut

MARCHANT & MINGES ENGINEERS
WEST HARTFORD, CONN.

BQ #70 & 125 Attachment



GYMNASIUM FLOOR PLAN
SCALE: 1/8"=1'-0"

STATE OF CONNECTICUT JAMES S. MINGES NO. 2423 REGISTERED PROFESSIONAL ENGINEER

STATE OF CONNECTICUT CHARLES G. MARCHANT NO. 2385 REGISTERED PROFESSIONAL ENGINEER

KEY PLAN

1st FLOOR HEATING & VENTILATING AREA A

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

830-HV-2

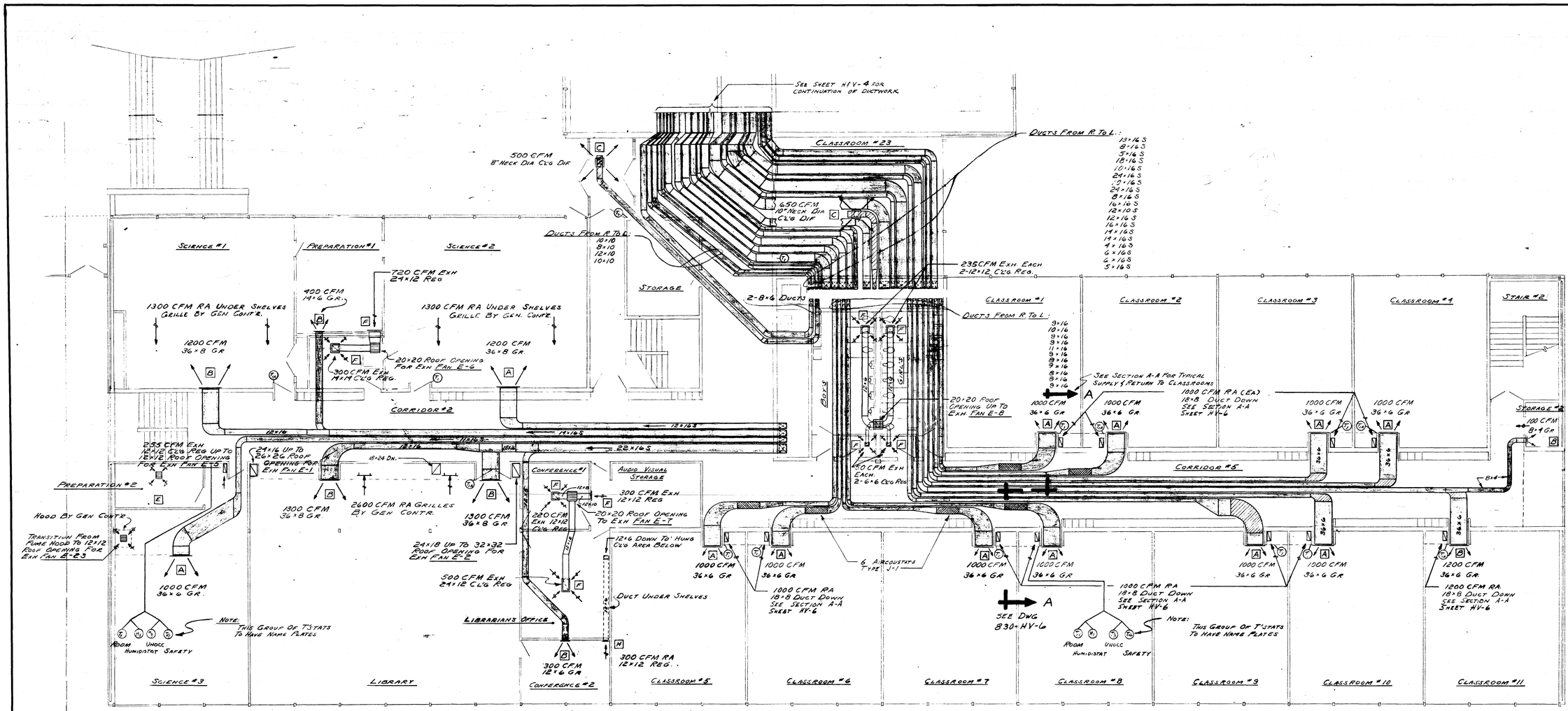
Date 30 APR. 57

Scale 1/8"=1'-0"

SHERWOOD, MILLS AND SMITH
Architects 65 Broad Street, Stamford, Connecticut

MARCHANT & MINGES
ENGINEERS
WEST HARTFORD, CONN.

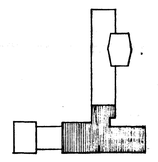
BQ #70 & 125 Attachment



UPPER CLASSROOM WING PLAN
SCALE: 1/8" = 1'-0"

STATE OF CONNECTICUT CHARLES S. MINGES REGISTERED PROFESSIONAL ENGINEER NO. 2423

STATE OF CONNECTICUT CHARLES G. MARCHANT REGISTERED PROFESSIONAL ENGINEER NO. 2385



KEY PLAN

1st. FLOOR HEATING & VENTILATING AREA B

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

830-HV-3

Date: 20 APR. 57

Scale: 1/8" = 1'-0"

SHERWOOD, MILLS AND SMITH
Architects 65 Broad Street, Stamford, Connecticut

MARCHANT & MINGES
ENGINEERS
WEST HARTFORD, CONN.

BQ #70 & 125 Attachment

EXH FAN E-9 TRANSITION DUCT FROM FORGE HOOD UP TO 24"x24" OPNG AT FAN.

2020 CFM EXH.

950 CFM 24×8 GR

950 CFM 24×8 GR

EXPOSED DUCT 3

1050 CFM RA EACH 2-48×12 REGS.

1050 CFM RA EACH 2-48×12 REGS.

METAL SHOP

DRAFTING

WOOD SHOP

600 CFM 20×8 GR

950 CFM 24×8 GR.

950 CFM 24×8 GR.

NOTE: ALL DUCTWORK TO THE RIGHT OF LINE IS UNDER SUPPLY DUCT

DRAFTING

WOOD SHOP

1050 CFM RA EACH 2-12×48 REGS.

FLOOR

21"x18" TEE

21" TILE BY GEN. CONTR.

SECTION C-C
NO SCALE

20×20 UP TO EXH FAN E-10

FINISHING ROOM

STORAGE

VOLATILE STORAGE

50 CFM 8×4 GRILLE

1055 CFM EXH.

PAINT SPRAY HOOD BY GC

250 CFM 7" NECK DIA. C.I.G. DIF.

1400 CFM RA GRILLE IN CAB. BY GEN. CONTR.

1400 CFM 36×8 GR.

REHEARSAL

16×16 UP TO EXH FAN E-11

400 CFM 16×6 GR.

300 CFM EACH 2-14×14 C.I.G. REG.

CUSTODIAN

140 CFM EXH 10×10 C.I.G. REG.

500 CFM 20×6 GR.

20×6 S.

INSTRUMENTAL

INSTRUMENT STOR. ROOM

BLANK PLATE EACH END

3600 CFM CONTINUOUS 4" SECTIONS BASEBOARD SUPPLY GRILLE

CENTERED 18"×3" SLOTS ONE PER SECTION

1050 CFM RA GRILLE IN CAB BY GEN. CONTR.

CHORAL

1050 CFM 20×6 GR.

1400 CFM RA UNDER CLOSET

CRAFTS

NOTE: UNDER STAGE IS RA PLENUM

STAGE

14600 CFM RA

1400 CFM 36×8 GR

TRANSITION DUCT FROM PAINT SPRAY BOOTH TO 12"x12" ROOF OPENING FOR EXH FAN E-22

490 CFM EXH

200 CFM 10×4 GR.

WORK & STORAGE

1400 CFM RA UNDER CLOSET

1200 CFM 36×6 GR.

ARTS

AUDITORIUM

DUCTS FROM R TO L:
8-20S
10-20S
9-20S
18-20S
43-20S
6-20S
10-20S
13-20S
12-20S

3250 CFM EACH 2-48"×20" GRILLES.

3-32×32 MOTORIZED RELIEF DAMPERS. BY H&V CONT'R. CENTERED OVER SUPPLY GRILLES. SEE SECT. 7 ON SH. HV-6

B

SEE DWG. H&V #8 FOR SECTION B-B

12×12 UP TO EXH FAN E-13

255 CFM EXH 10×10 C.I.G. REG.

STORAGE

130 CFM EXH 10×10 C.I.G. REG.

12×12 UP TO EXH FAN E-14

115 CFM EXH 8×8 C.I.G. REG.

NURSE'S OFFICE

550 CFM RA 36×4 REG

12×12 UP TO EXH FAN E-13

115 CFM EXH 8×8 C.I.G. REG

100 CFM EXH 8×8 C.I.G. REG.

160 CFM EXH 10×10 C.I.G. REG.

12×12 UP TO EXH FAN E-24

850 CFM RA UNDER COUNTER

350 CFM EXH 14×14 C.I.G. REG.

TEACHER'S ROOM

140 CFM EXH 10×10 C.I.G. REG

MEN'S TOILET

1000 CFM 12" NECK DIA. C.I.G. DIF.

16×10S

130 CFM EXH 10×10 C.I.G. REG.

12×12 UP TO EXH FAN E-16

250 CFM 12×5 GR.

250 CFM RA 10×4 REG.

OFFICE

650 CFM 24×6 GR.

NOTE: THIS GROUP OF T'STATS TO HAVE JAMB PLATES

HUMIDISTAT UNOCC. SAFETY ROOM

250 CFM 12×5 GR.

VICE PRINCIPAL

125 CFM 8×4 GR.

1275 CFM RA 24×24 REG.

20×4S

125 CFM 8×4 GR.

20×5S

185 CFM 8×4 GR.

NURSE'S OFFICE

300 CFM 14×4 GR.

EXAMINING

250 CFM 12×4 GR.

850 CFM 24×8 GR

TEACHER'S ROOM

MEN'S TOILET

500 CFM 8" NECK DIA C.I.G. DIF.

2200 CFM 48×8 GR

CAFETERIA NO. 2

3200 CFM RA 36×30 REG.

DISHWASHING

12×12 DUCT FROM HOOD TO 16×16 ROOF OPENING FOR EXH FAN E-17

HOOD BY KITCHEN SUPPLIER

790 CFM EXH.

550 CFM 20×6 GR.

20×6 S.

OFFICE

FACULTY DINING ROOM

FOR SECTION C-D SEE H&V DWG #6

HOOD & FILTERS BY KITCHEN SUPPLIER

18 GAUGE STEEL DUCT FROM OPENING IN HOOD TO 38×38 ROOF OPENING FOR EXH FAN E-14

3800 CFM EXH.

700 CFM 10" NECK DIA. C.I.G. DIF.

24×16S

KITCHEN

TOILET

12×12 ROOF OPENING FOR EXH FAN E-15

200 CFM 4" NECK DIA. C.I.G. DIF

130 CFM EXH 12×12 C.I.G. REG.

12×12 DUCT FROM HOOD TO 16×16 ROOF OPENING FOR EXH FAN E-18

100 CFM 12×4 REG

HOOD BY KITCHEN SUPPLIER

COLD STORAGE

130 CFM EXH. 12×12 GR. 4-12×12 ROOF OPENING FOR EXH FAN E-21

790 CFM EXH.

DISHWASHING

CAN WASH

2200 CFM RA 36×30 REG

255 CFM EXH. 14×14 REG TO 12×12 ROOF OPENING FOR EXH FAN E-20

2200 CFM 48×8 GR

CAFETERIA NO 1

5 DUCTS FROM R TO L:
11×20S
7×20S
5×20S
15×20S
8×20S
18×20S
19×20S
19×20S
13×20S
6×20S
10×20S
13×20S
12×20S
12×20S
1×20S
6×20S
6×20S
5×20S
7×20S

MEN'S TOILET

AUDITORIUM WING FLOOR PLAN
SCALE: 1/8"=1'-0"

STATE OF CONNECTICUT CHARLES S. MINGES REGISTERED NO. 2423 PROFESSIONAL ENGINEER

STATE OF CONNECTICUT CHARLES S. MARCHANT REGISTERED NO. 2385 PROFESSIONAL ENG.

KEY PLAN

1st. FLOOR HEATING & VENTILATING-AREAS C & D

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

830 - HV-4

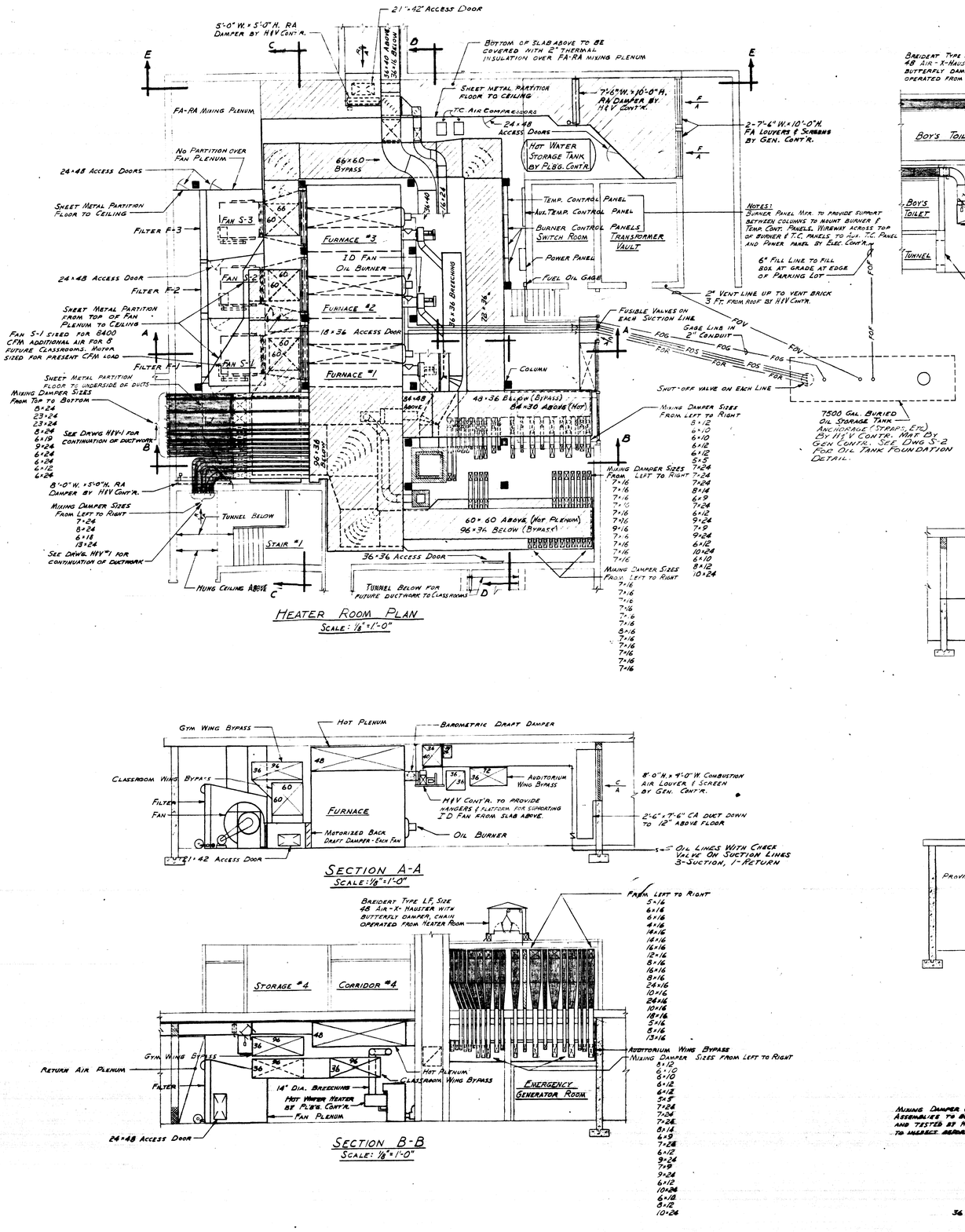
Date 30 APR. '57

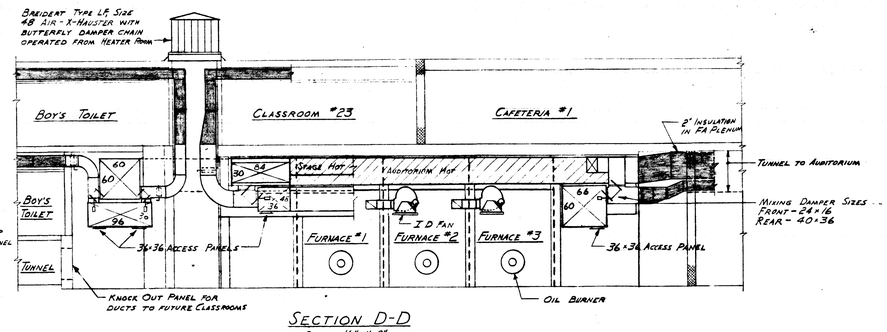
Scale AS NOTED

SHERWOOD, MILLS AND SMITH
Architects 65 Broad Street, Stamford, Connecticut

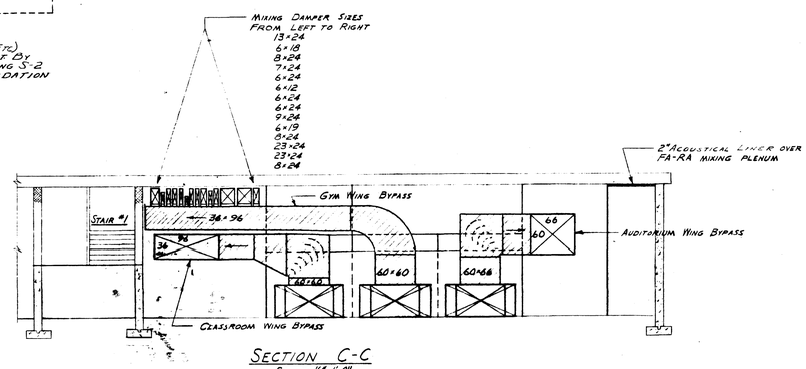
MARCHANT & MINGES
ENGINEERS
WEST HARTFORD, CONN.

BQ #70 & 125 Attachment





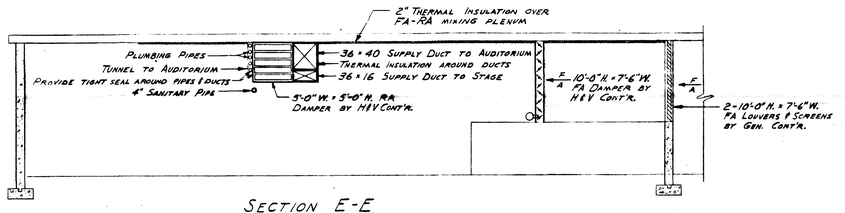
Section D-D
Scale: 1/8" = 1'-0"



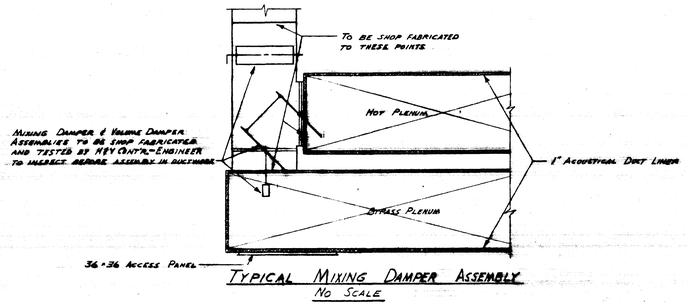
Section C-C
Scale: 1/8" = 1'-0"

Section A-A
Scale: 1/8" = 1'-0"

Section B-B
Scale: 1/8" = 1'-0"



Section E-E
Scale: 1/8" = 1'-0"



Typical Mixing Damper Assembly
No Scale

STATE OF CONNECTICUT JAMES S. MINGES NO. 2423 REGISTERED PROFESSIONAL ENGINEER

STATE OF CONNECTICUT CHARLES G. MARCHANT NO. 2385 REGISTERED PROFESSIONAL ENGINEER

HEATER ROOM PLAN & SECTIONS

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

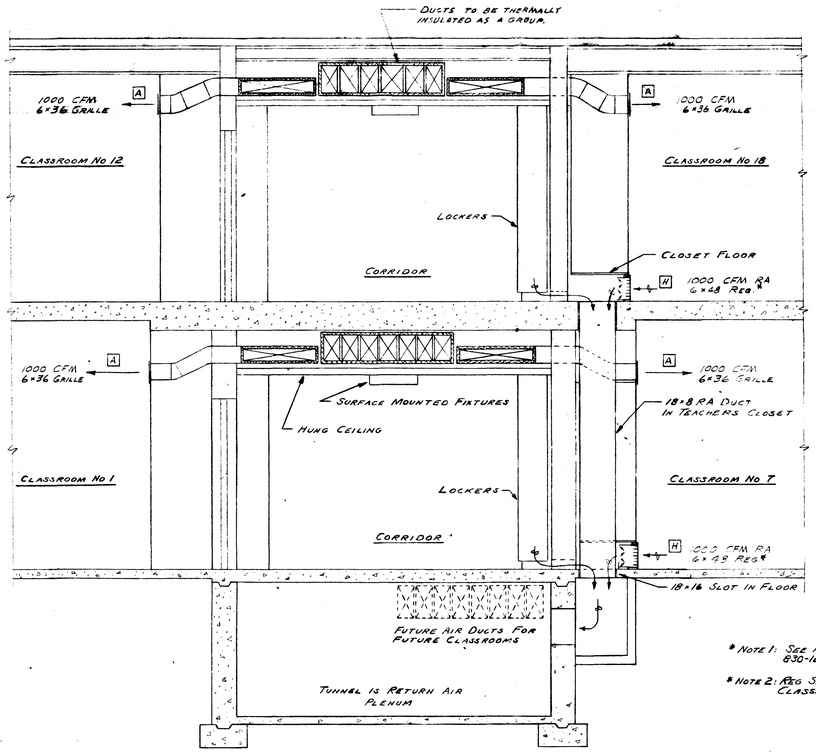
830 - HV-5

Date: 30 APR 57
Scale: As Noted

SHERWOOD, MILLS AND SMITH
Architects 65 Broad Street, Stamford, Connecticut

MARCHANT & MINGES
ENGINEERS
WEST HARTFORD, CONN.

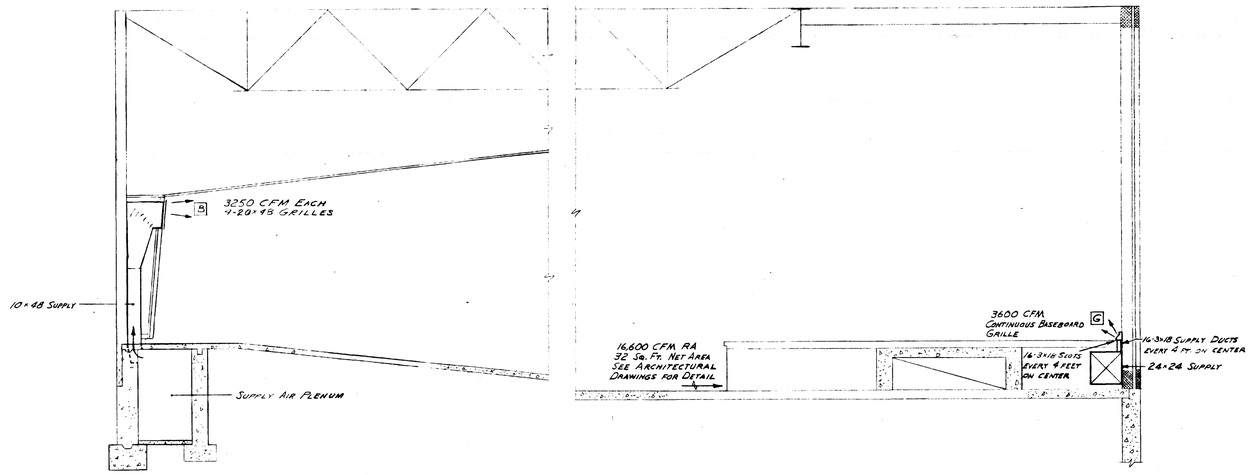
BQ #70 & 125 Attachment



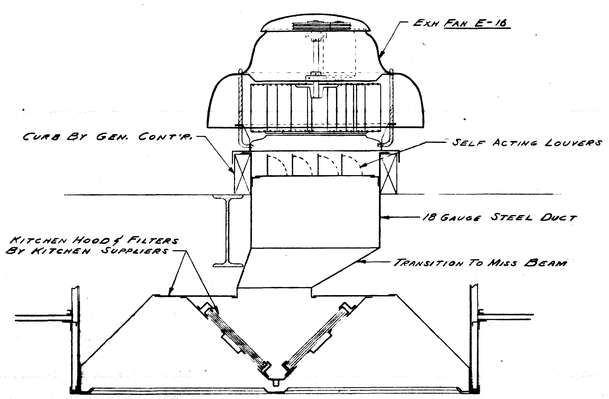
* NOTE 1: SEE ARCHITECTURAL SECTION 830-12-D FOR RA REG DETAIL

* NOTE 2: REG SIZE TO BE 7"×18" IN CLASSROOMS #11 & #22

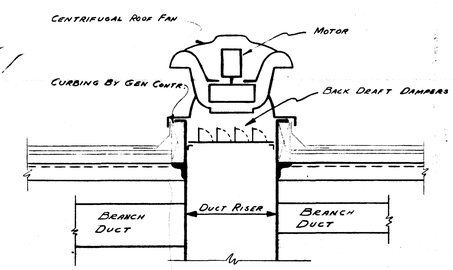
SECTION A-A
TYPICAL CLASSROOM SUPPLY AND RETURN
NO SCALE



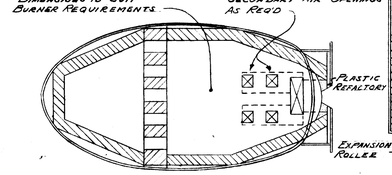
SECTION B-B
SCALE: 1/4"=1'-0"



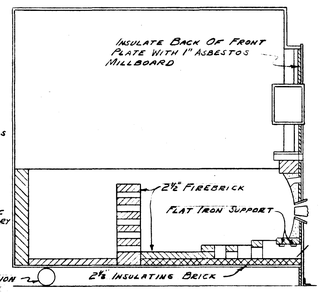
KITCHEN HOOD EXH. FAN DETAIL
SECTION D-D
NO SCALE



TYPICAL ROOF EXHAUST FAN
NO SCALE



PLAN



ELEVATION
COMBUSTION CHAMBER DETAIL
SCALE 1½"=1'-0"

STATE OF CONN. JAMES S. MITCHELL NO. 2423 REGISTERED PROFESSIONAL ENGINEER

STATE OF CONNECTICUT CHARLES G. MARCHANT NO. 2385 REGISTERED PROFESSIONAL ENGINEER

HEATING & VENTILATING
SECTIONS & DETAILS

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

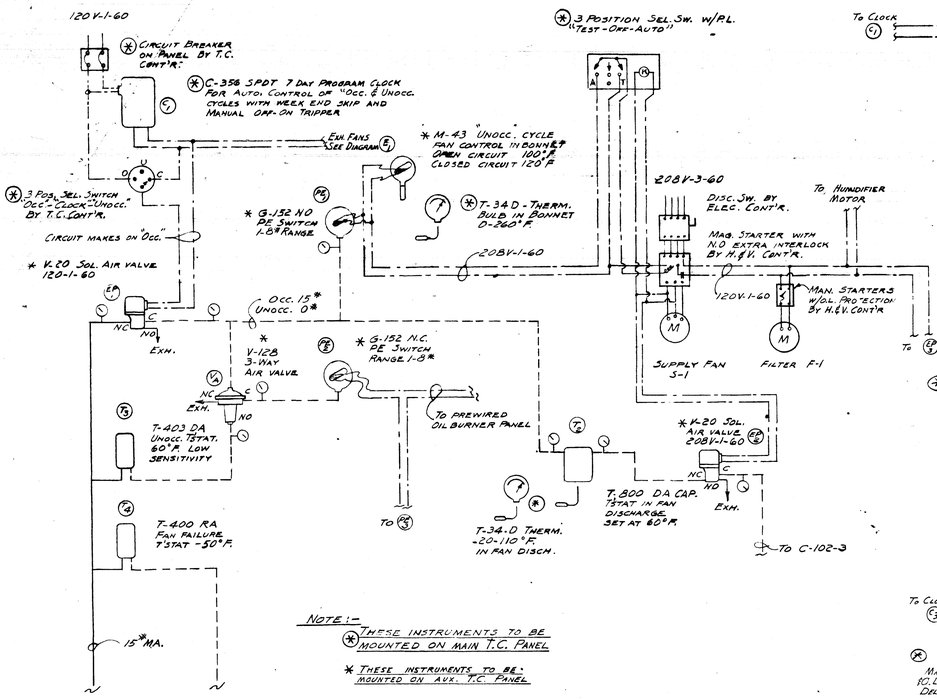
830-HVL

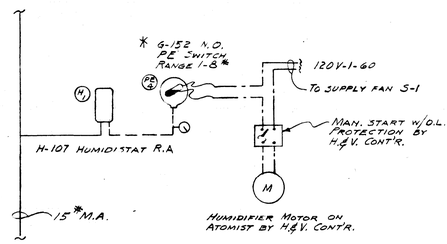
Date: 30 APR. 67 | Scale: AS NOTED

SHERWOOD, MILLS AND SMITH
Architects: 63 Broad Street, Stamford, Connecticut

MARCHANT & MINGES
ENGINEERS
WEST HARTFORD, CONN.

BQ #70 & 125 Attachment





Humidity Control — System I

(Systems 2 & 3 Same)

Grilles & Registers

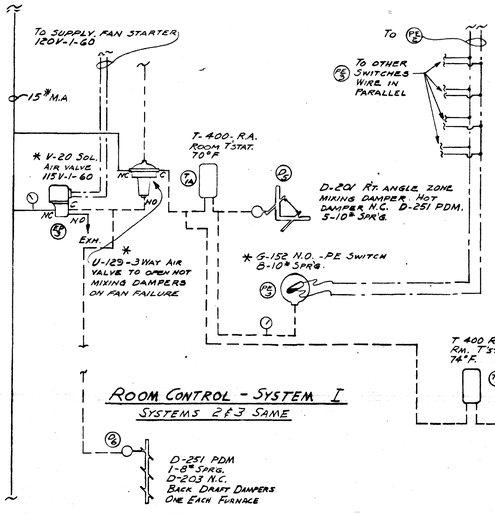
TYPE	DUTY	MFG. & STYLE	FINISH	SPECIAL FEATURES
A	Supply	Tuttle & Bailey #T-64 Grille	Prime	
B	Supply	Tuttle & Bailey #T-647 Grille	Prime	Key operated volume damper
C	Supply	Anemostat Type E-1	Aluminum	Equalizing Deflector
D	Supply	Anemostat Type E-1	Aluminum	Combo Unit Type CU-2
E	Exhaust	Tuttle & Bailey T-70D	Prime	
F	Exhaust	Tuttle & Bailey T-77D	Prime	Key operated volume damper
G	Supply	Standard #B-48 Baseboard Grille	Prime	Dial operated damper
H	RETURN	TUTTLE & BAILEY #T936 W/#T956 FACE	PRIME	KEY OPERATED VOLUME DAMPER

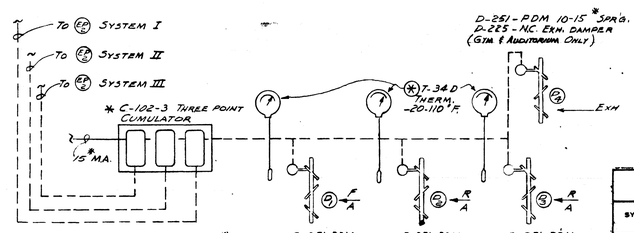
Filter Schedule

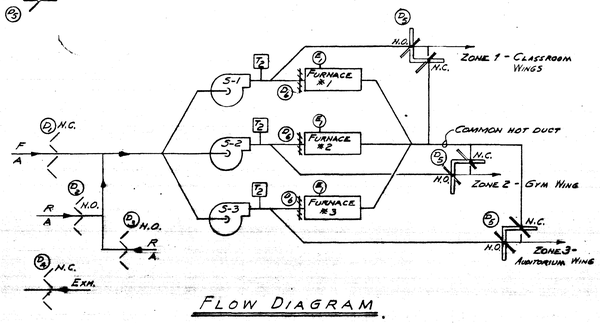
SYSTEM NO.	FILTER NO.	MFG. & STYLE	CFM	FILTER SIZE
1	F-1	American Air Filter Roll-O-Matic #8-100	24,650	10'-0" H. x 8'-0" W
2	F-2	American Air Filter Roll-O-Matic #8-100	27,000	10'-0" H. x 8'-0" W
3	F-3	American Air Ficter Roll-O-Matic #12-100	40,000	10'-0" H. x 12'-0" W

Heating & Ventilating Symbols

FUEL OIL SUCTION — FOS — FOS
FUEL OIL RETURN — FOR — FOR
FUEL OIL TANK VENT — FOV — FOV
FUEL OIL PUMP DISCHARGE — FOD — FOD
FUEL OIL TANK FILL — FOF — FOF
SUPPLY DUCT (NO INSULATION) — S
RETURN DUCT (NO INSULATION) — R
EXHAUST — E
THERMALLY (EXTERNALLY) INSULATED DUCTS
ACCOUSTICALLY (INTERNALLY) INSULATED DUCTS







Fan Schedule

SYSTEM NO.	FAN NO.	SERVICE	LOCATION	CFM	SP	MIN. W.D.	MAX. OV FPM	ARRANGEMENT & DISCHARGE	FAN SIZE & MFG.	RPM	BHP	MOTOR HP SIZE	MOTOR CURRENT	DRIVE TYPE	REMARKS
1	S-1	Supply	Classrooms	24650	1 1/4	44"	1200	Arr. #3 BH Disch.	Trane #44 BIDW	421	6.26	7 1/2	208V-3-60	V-Belt	Fan Sized for additional 8,400 CFM future CR load.
2	S-2	Supply	Gymnasium	27000	1 1/4	40"	1600	Arr. #3 BH Disch.	Trane #40 BIDW	515	7.19	10	208V-3-60	V-Belt	
3	S-3	Supply	Auditorium	40000	1 1/4	49"	1600	Arr. #3 BH Disch.	Trane #49 BIDW	419	10.69	15	208V-3-60	V-Belt	
	E-1	Exhaust	Home Ec. #1	2590	1/8			Roof	Jenn-Air #24 BCR	460		1/4	115V-1-60	V-Belt	Local Sw. & Pl.
	E-2	Exhaust	Home Ec. #2	3450	1/8			Roof	Jenn-Air #27 BCR	430		1/3	115V-1-60	V-Belt	Local Sw. & Pl.
	E-3	Exhaust	Boy's Lockers	3010	1/8			Roof	Jenn-Air #24 BCR	520		1/3	115V-1-60	V-Belt	Local Sw. & Pl. - 2 Speed
	E-4	Exhaust	Girl's Lockers	3450	1/8			Roof	Jenn-Air #27 BCR	430		1/3	115V-1-60	V-Belt	Local Sw. & Pl. - 2 Speed
	E-5	Exhaust	Prep. Rm. #2	255	1/8			Roof	Jenn-Air #70 CR	1550		1/25	115V-1-60	Direct	
	E-6	Exhaust	Dark Rm.	1020	1/8			Roof	Jenn-Air #128 CR	860		1/4	115V-1-60	Direct	
	E-7	Exhaust	Lib. Office	1020	1/8			Roof	Jenn-Air #128 CR	860		1/4	115V-1-60	Direct	
	E-8	Exhaust	Toilets	1020	1/8			Roof	Jenn-Air #128 CR	860		1/4	115V-1-60	Direct	
	E-9	Exhaust	Forge Hood	2020	1/8			Roof	Jenn-Air #24 CW	460		1/4	115V-1-60	V-Belt	Local Sw. & Pl.
	E-10	Exhaust	Paint Spray	1055	1/4			Roof	Jenn-Air #111 CR	1140		1/6	115V-1-60	Direct	Expl. motor-spark resistant fan wheel-Local Sw. & Pl.
	E-11	Exhaust	Toilets	740	1/8			Roof	Jenn-Air #91 CR	1140		1/8	115V-1-60	Direct	
	E-12	Exhaust	Princ. Toilet	130	1/8			Roof	Jenn-Air #71 CR	1550		1/25	115V-1-60	Direct	2 speed Local Sw. & Pl.
	E-13	Exhaust	Storage	255	1/8			Roof	Jenn-Air #70 CR	1550		1/25	115V-1-60	Direct	
	E-14	Exhaust	Nurses Toilet	130	1/8			Roof	Jenn-Air #71 CR	1550		1/25	115V-1-60	Direct	
	E-15	Exhaust	Health	190	1/8			Roof	Jenn-Air #80 CR	1550		1/15	115V-1-60	Direct	
	E-16	Exhaust	Kit. Hood	9800	1/4			Roof	Jenn-Air #36 BCR	500		2	208V-3-60	V-Belt	Local Sw. & Pl.
	E-17	Exhaust	Dishwash #2	740	1/8			Roof	Jenn-Air #91 CR	1140		1/8	115V-1-60	Direct	Local Sw. & Pl.
	E-18	Exhaust	Dishwash #1	740	1/8			Roof	Jenn-Air #91 CR	1140		1/8	115V-1-60	Direct	Local Sw. & Pl.
	E-19	Exhaust	Kit. Toilet	130	1/8			Roof	Jenn-Air #71 CR	1550		1/25	115V-1-60	Direct	
	E-20	Exhaust	Cold Storage	255	1/8			Roof	Jenn-Air #70 CR	1550		1/25	115V-1-60	Direct	
	E-21	Exhaust	Can Wash	130	1/8			Roof	Jenn-Air #71 CR	1550		1/25	115V-1-60	Direct	
	E-22	Exhaust	Grefte Hood	490	1/8			Roof	Jenn-Air #80 CR	1550		1/25	115V-1-60	Direct	Expl. motor spark resistant fan wheel Local Sw. & Pl.
	E-23	Exhaust	Science Rm.	490	1/8			Roof	Jenn-Air #80 CR	1550		1/25	115V-1-60	Direct	Local Sw. & Pl.
	E-24	Exhaust	Teachers Toi.	490	1/8			Roof	Jenn-Air #80 CR	1550		1/25	115V-1-60	Direct	

STATE OF CONNECTICUT CHARLES O. MARCHANT NO. 2423 REGISTERED PROFESSIONAL ENGINEER

STATE OF CONNECTICUT CHARLES O. MARCHANT NO. 2385 REGISTERED PROFESSIONAL ENGINEER

H&V TEMP. CONTROLS DIAGRAMS & SCHEDULES

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

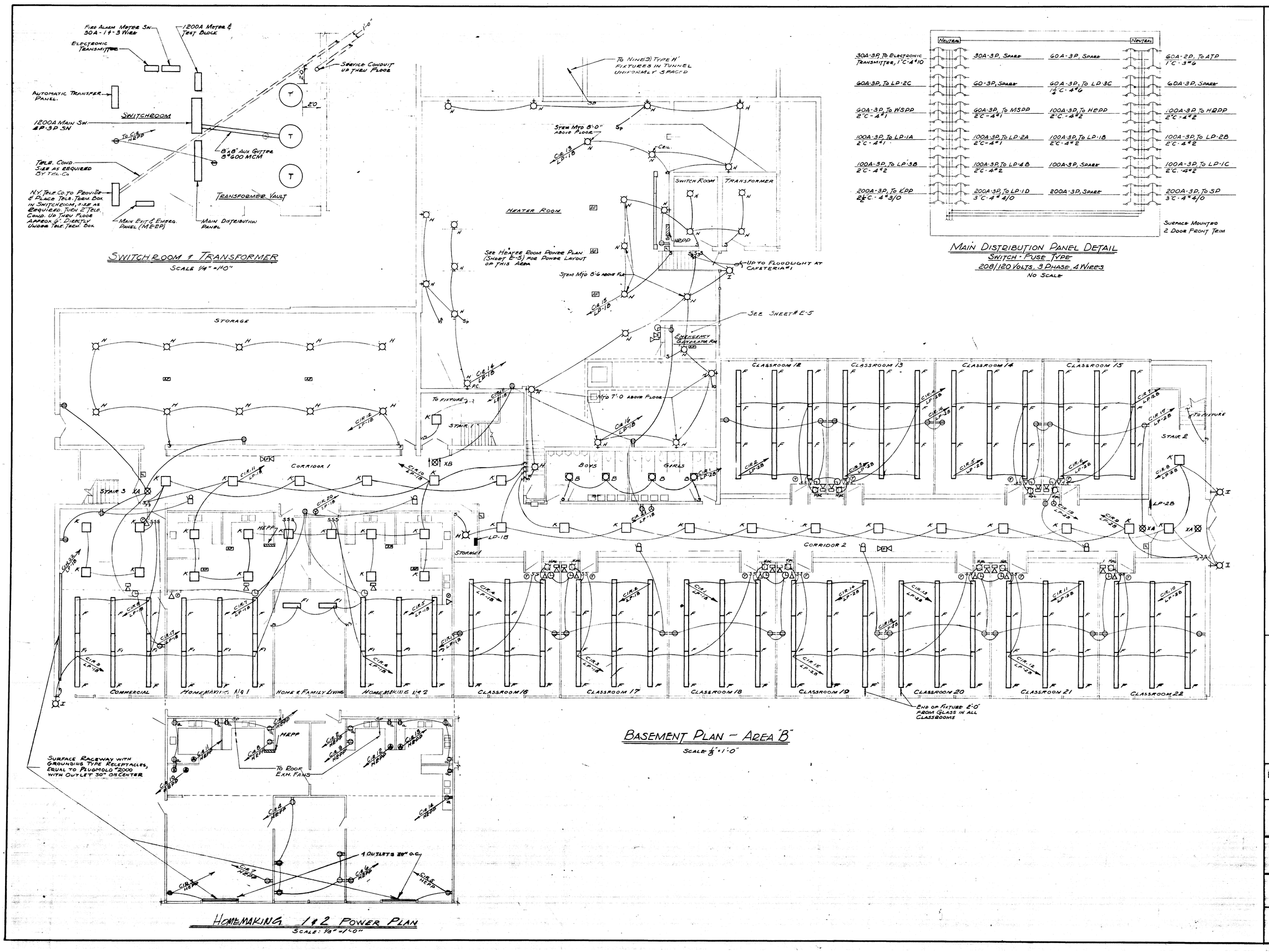
830 - HV-7

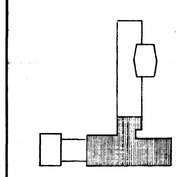
Date 30 APR. 57 | Scale No Scale

SHERWOOD, MILLS AND SMITH
Architects 65 Broad Street, Stamford, Connecticut

MARCHANT & MINGES
ENGINEERS
WEST HARTFORD, CONN.

BQ #70 & 125 Attachment





KEY PLAN

BASEMENT ELECTRICAL AREA B

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

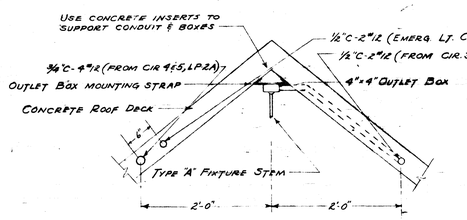
830-E1

Date 30 APR 57 | Scale AS SHOWN

SHERWOOD, MILLS AND SMITH
Architects 65 Broad Street, Stamford, Connecticut

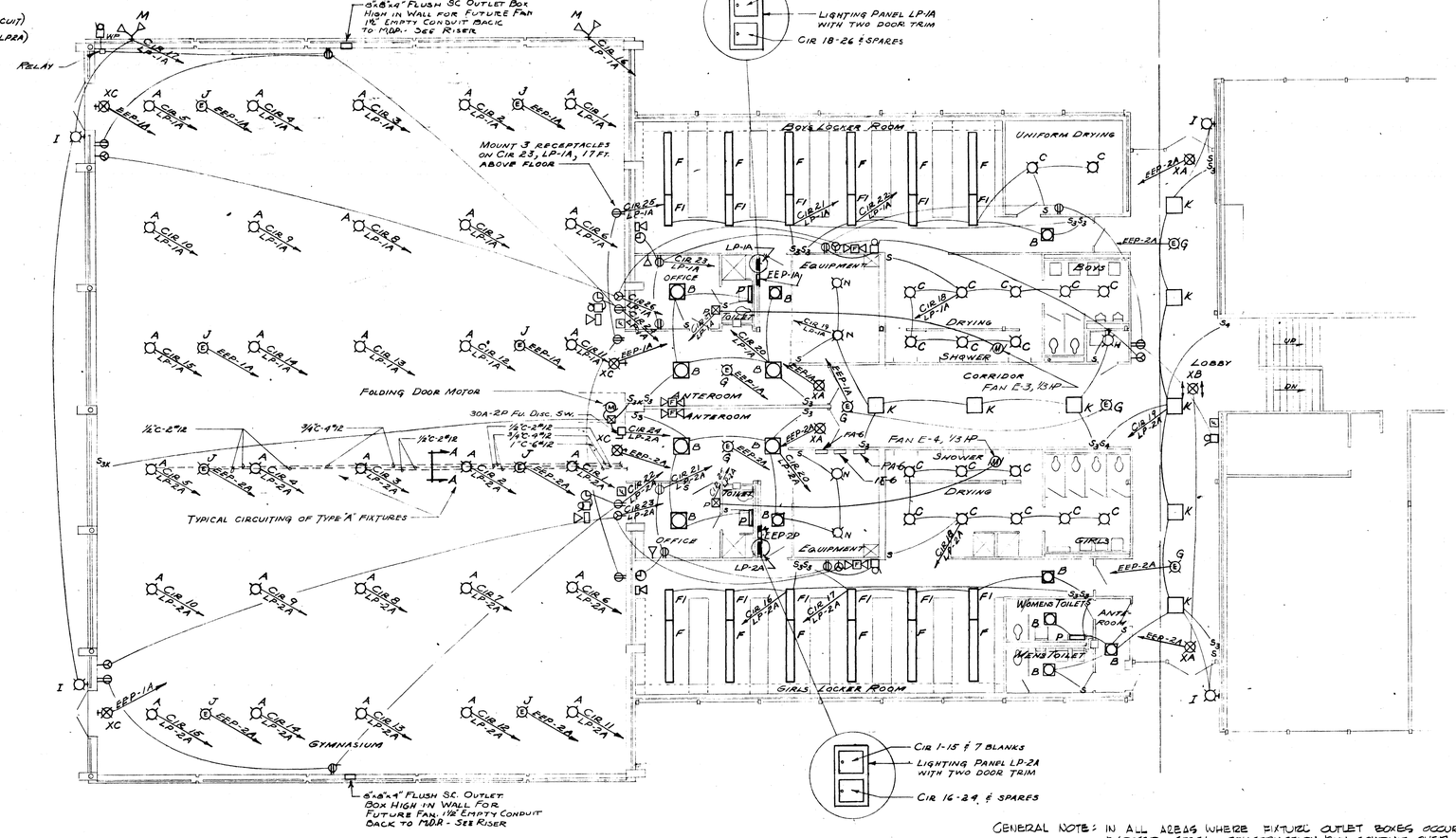
MARCHANT & MINGES
ENGINEERS
WEST HARTFORD, CONN.

BQ #70 & 125 Attachment



ELEVATION A-A

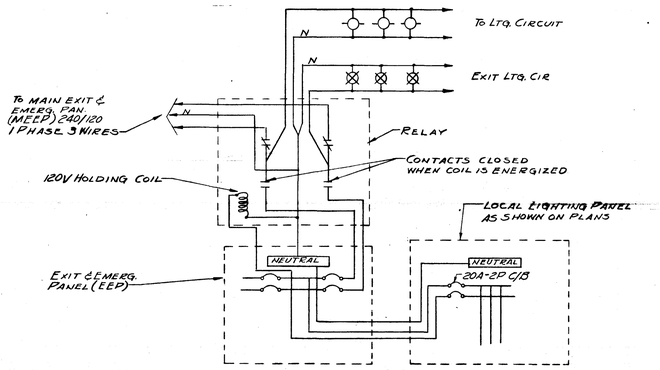
SCALE 1"=1'-0"



FIRST FLOOR PLAN - AREA "A"

SCALE ⅛"=1'-0"

GENERAL NOTES: IN ALL AREAS WHERE FIXTURE OUTLET BOXES OCCUR AT EXPOSED STEEL CONSTRUCTION, RUN CONDUIT OVER BEAMS BETWEEN WELDED BULB TEES. SEE DWG. 830 S4 FOR DETAIL.



TYPICAL CONNECTIONS FOR EXIT & EMERG. LTG.

NO SCALE

SCHEDULE - CLOCK, PROGRAM BELL, RELAY

ROOM OR AREA	CLOCK	BELL	RELAY
AREA "A"			
Gym	2	2	
Gym Outside		1	
Boy's Locker Rm.	1	1	
Girl's Locker Rm.	1	1	
AREA "B"			
Commercial	1		
Home Economics #1	1		
Home Economics #2	1		
Classroom #16	1		
Classroom #17	1		
Classroom #18	1		
Classroom #19	1		
Classroom #20	1		
Classroom #21	1		
Classroom #22	1		
Classroom #12	1		
Classroom #13	1		
Classroom #14	1		
Classroom #15	1		
Corridor		5	
AREA "B" FIRST FLOOR			
Science #3	1		
Library	2		
Classroom 5	1		
Classroom 6	1		
Classroom 7	1		
Classroom 8	1		
Classroom 9	1		
Classroom 10	1		
Classroom 11	1		
Science #1	1		
Science #2	1		
Classroom #23	1		

ROOM OR AREA	CLOCK	BELL	RELAY
AREA "B" FIRST FLOOR CON'T.			
Classroom #1	1		
Classroom #2	1		
Classroom #3	1		
Classroom #4	1		
Corridor #4		2	
Corridor #5		3	
Corridor #6		1	
AREA "C"			
Principal	1		
Gen'l. Off.	Master Clock		
Guidance	1		
Nurse	1		
Teachers' Room	1		
Cafeteria #2	1		
Cafeteria #1	1		
Serving	1		
Corridor #4		2	
Faculty Dining	1		
AREA "D"			
Wood Shop	1	1	
Metal Shop	1	1	
Metal Shop Outside		1	
Rehearsal	1		
Instrumental	1		
Choral	1		
Crafts	1		
Arts	1		
Auditorium	1		
Corridor		2	

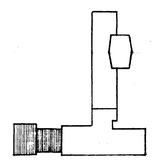
ELECTRICAL SYMBOLS

	CEILING LIGHT OUTLET	F	MANUAL FIRE ALARM STATION
	RECESSED CEILING LIGHT OUTLET	AF	AUTOMATIC FIRE ALARM DETECTOR
	WALL LIGHT OUTLET	FH	FIRE ALARM HORN
	FLOODLIGHT OUTLET	FA	FIRE ALARM JUNCTION BOX
	PILOT LIGHT OUTLET		OUTSIDE TELEPHONE
	EMERGENCY LIGHT OUTLET		LOUD SPEAKER
	EXIT LIGHT OUTLET		INTERCOM. 'PHONE
	FLUORESCENT FIXTURE	PA	P.A. JUNCTION BOX
	DUPLEX CONVENIENCE OUTLET 6" AF TO ℄		CLOCK OUTLET
	OUTLET 2" ABOVE COUNTER TO ℄	M	MOTOR
	SPECIAL OUTLET - SEE PLANS & BELOW	H	HOT WATER HEATER
	OUTLET FURNISHED BY EQUIP. MAN (SCIENCE)	T	TRANSFORMER
	3 WIRE POLARIZED OUTLET		FUSED DISCONNECT SWITCH
WP	WEATHERPROOF OUTLET		CONTROLLER
EP	EXPLOSION-PROOF OUTLET	P	CONTROLLER WITH PILOT LIGHT
	RANGE OUTLET	AQ	AQUASTAT
	FLOOR OUTLET	R	RELAY
M	MICROPHONE OUTLET		PUSH BUTTON
B	SOUND OUTLET	T	THERMOSTAT
V	TELEVISION OUTLET		POWER PANEL
S	SINGLE POLE SWITCH		EXIT & EMERGENCY PANEL
S2	TWO POLE SWITCH		LIGHTING PANEL
S3	THREE WAY SWITCH		DISTRIBUTION PANEL
S4	FOUR WAY SWITCH		BUZZER
SK	KEYED SWITCH	PB	PROGRAM BELL
SKP	KEYED SWITCH WITH PILOT		
SRC	REMOTE CONTROL SWITCH		
SA	SEE KIT POWER PLAN SH. E5		

STATE OF CONNECTICUT JAMES H. MARCHANT No. 1648 REGISTERED PROFESSIONAL ENGINEER

STATE OF CONNECTICUT JAMES S. MINGES NO. 2423 REGISTERED PROFESSIONAL ENGINEER

STATE OF CONNECTICUT CHARLES G. MARCHANT NO. 2385 REGISTERED PROFESSIONAL ENGINEER



KEY PLAN

FIRST FLOOR ELECTRICAL AREA A

CENTRAL JUNIOR HIGH SCHOOL

Greenwich, Connecticut

830-E2

Date 30 APR 57 | Scale AS SHOWN

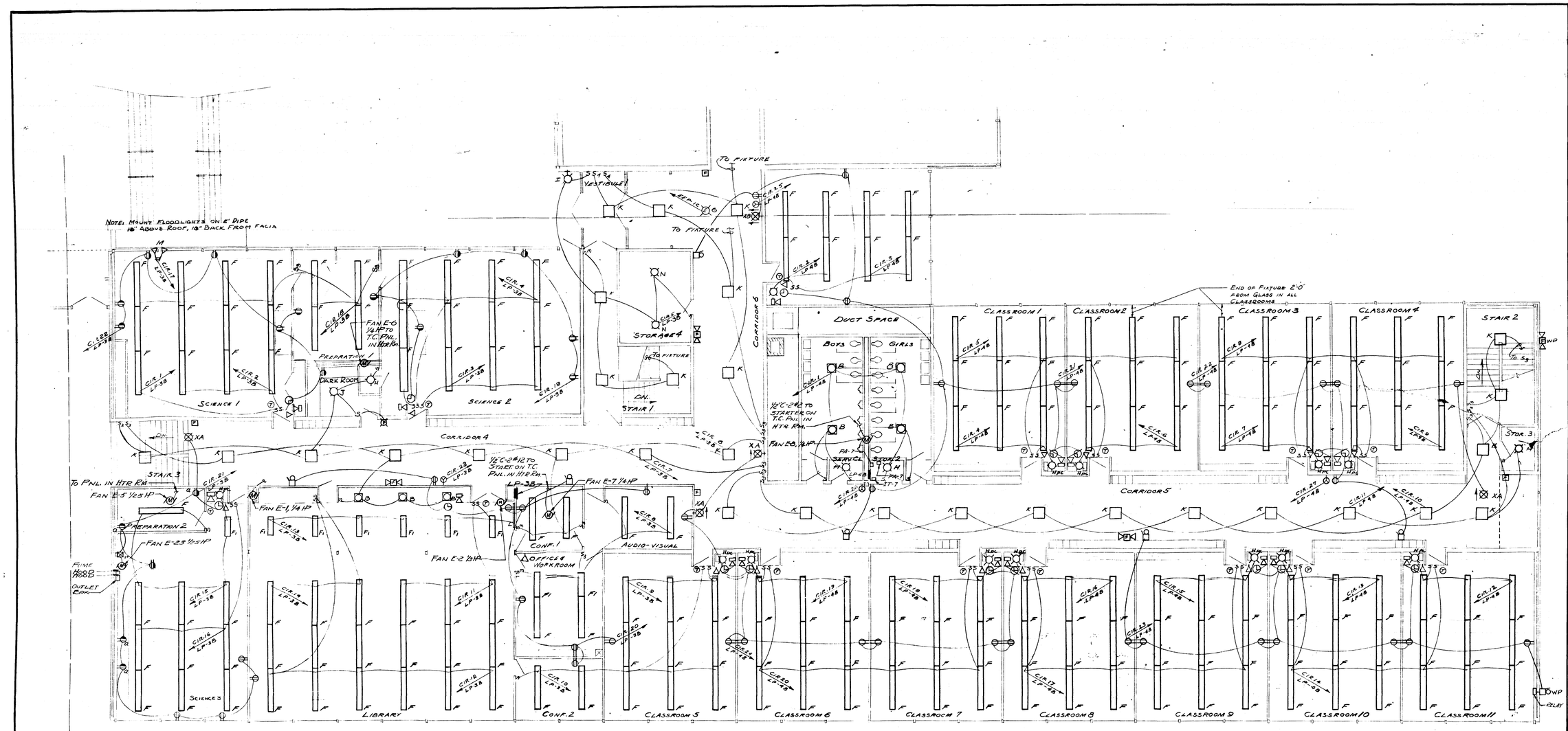
SHERWOOD, MILLS AND SMITH

Architects 65 Broad Street, Stamford, Connecticut

MARCHANT & MINGES ENGINEERS

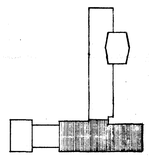
WEST HARTFORD, CONN.

BQ #70 & 125 Attachment



FIRST FLOOR PLAN - AREA "B"

SCALE 1/8" = 1'-0"



KEY PLAN

FIRST FLOOR ELECTRICAL AREA B

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

830-E3

Date 30 APR 57 | Scale 1/8" = 1'-0"

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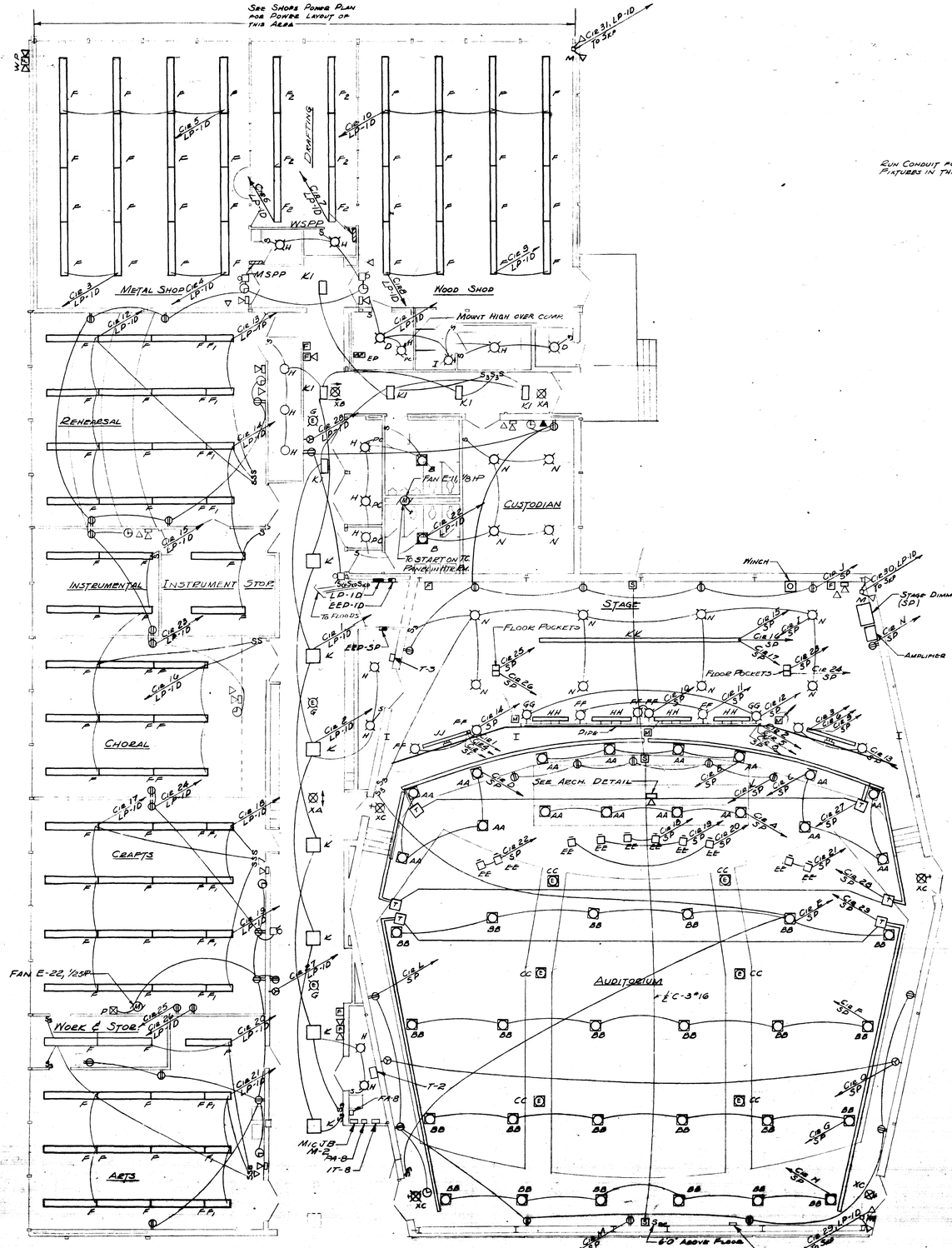
Architects 65 Broad Street, Stamford, Connecticut

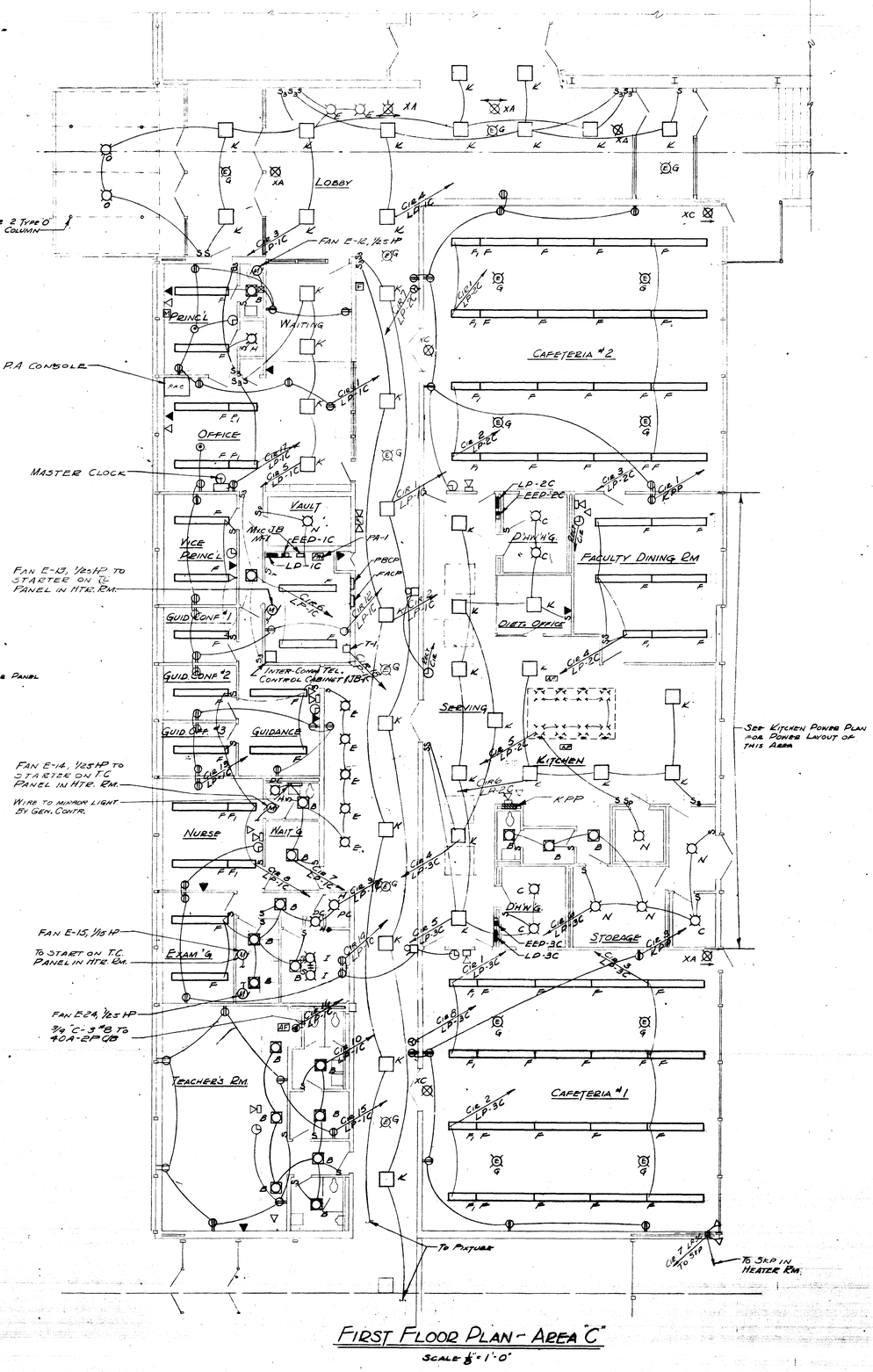
MARCHANT & MINGES
ENGINEERS
WEST HARTFORD, CONN.

BQ #70 & 125 Attachment



FIRST FLOOR PLAN - AREA "D"

SCALE ⅛" = 1'-0"



FIRST FLOOR PLAN - AREA "C"

SCALE ⅛" = 1'-0"

STATE OF CONNECTICUT JOHN N. MACDONALD No. 1648 REGISTERED ARCHITECT

STATE OF CONNECTICUT JAMES S. MINGES NO. 2423 REGISTERED PROFESSIONAL ENGINEER

STATE OF CONNECTICUT CHARLES G. MARCHANT NO. 2385 REGISTERED PROFESSIONAL ENGINEER

KEY PLAN

FIRST FLOOR ELECTRICAL AREAS C & D

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

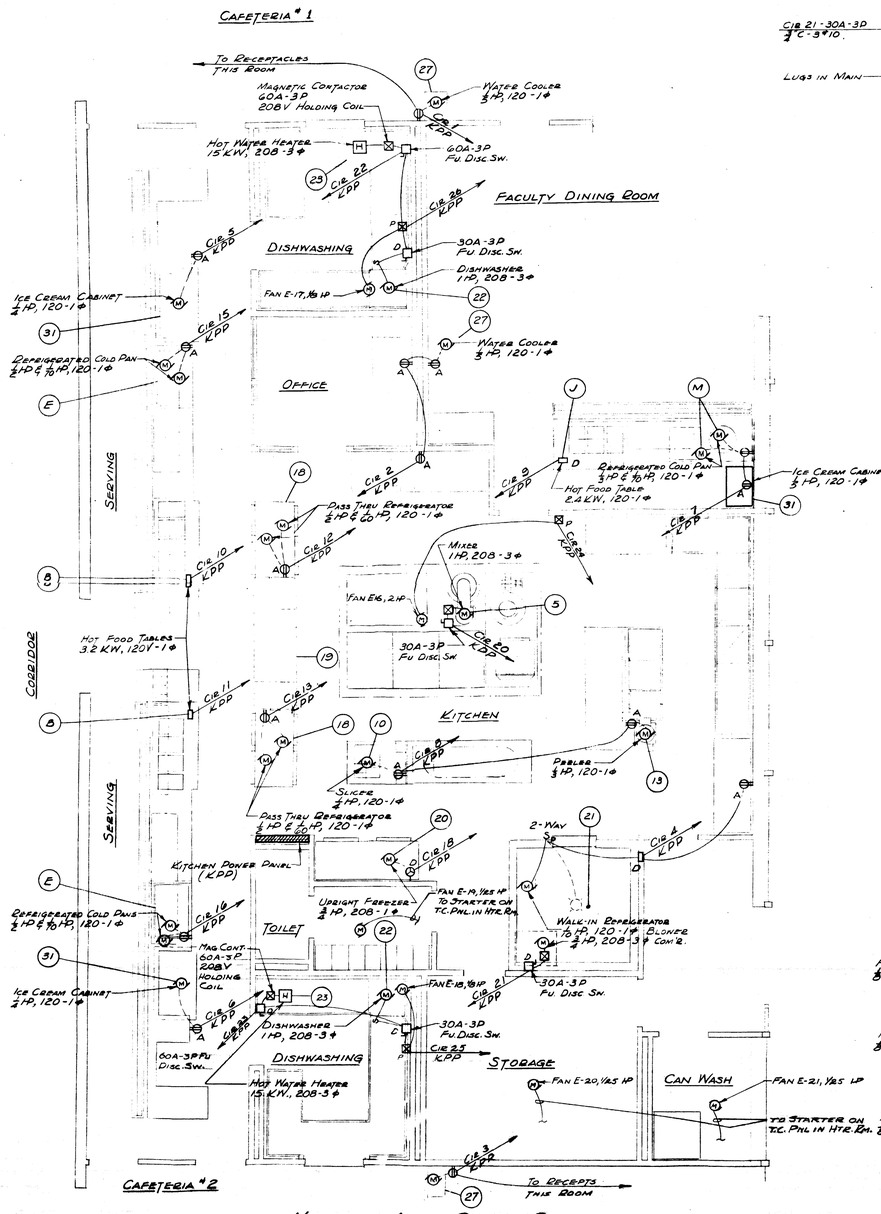
830-E4

Date 30 APR 67 | Scale ⅛" = 1'-0"

SHERWOOD, MILLS AND SMITH
Architects 65 Broad Street, Stamford, Connecticut

MARCHANT & MINGES
ENGINEERS
WEST HARTFORD, CONN.

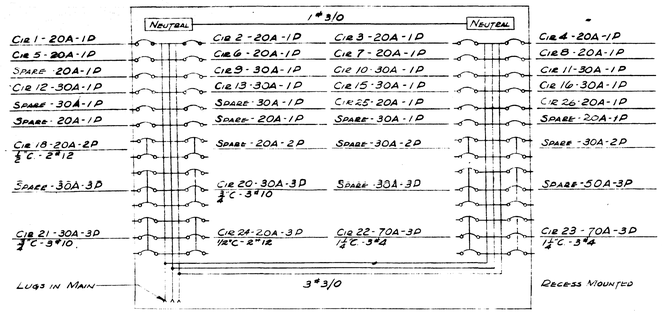
BQ #70 & 125 Attachment



Kitchen Area Power Plan

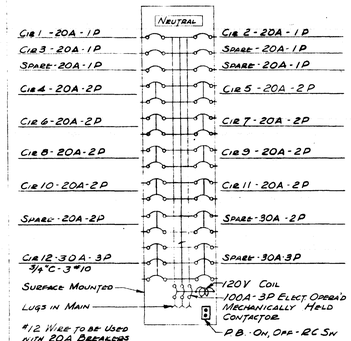
Scale ¼"-1'-0"

Note: Refer to Kitchen Equipment Drwg. (Sheet 330-E5) for Mounting Height of all Receptacles, Junction Boxes, & Disconnect Sws. Item Numbers Refer to Kitchen Equipment Schedule & Detail (Sheet 330-E4) All Symbols with the Letter "A" next to the Symbol, to be Checked on Kitchen Equip. Drwg. for Mounting Height



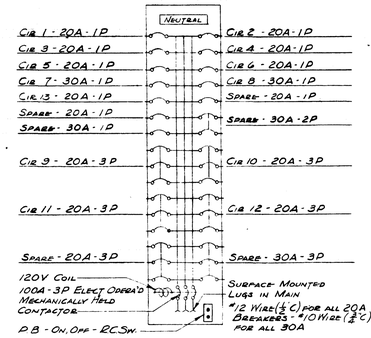
Kitchen Power Panel (KPP)

Circuit Breaker Type
120/208 Volts 3 Phase 4 Wires



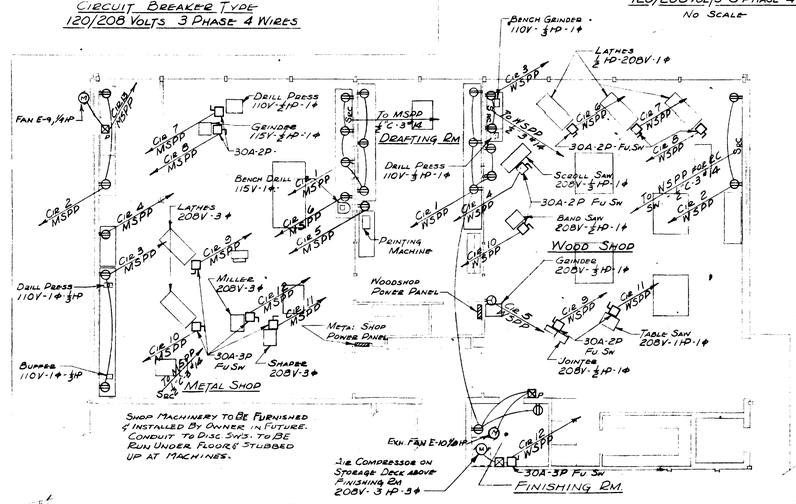
Wood Shop Power Panel

Circuit Breaker Type
120/208 Volts 3 Phase 4 Wires
No Scale



Metal Shop Power Panel

Circuit Breaker Type
120/208 Volts 3 Phase 4 Wires
No Scale



Shop Area Power Plan

Scale ⅛"-1'-0"

Heater Room Power Panel

No Scale

Heater Room Power Panel

Scale ⅛"-1'-0"

ELECTRICAL POWER PLANS & DETAILS

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

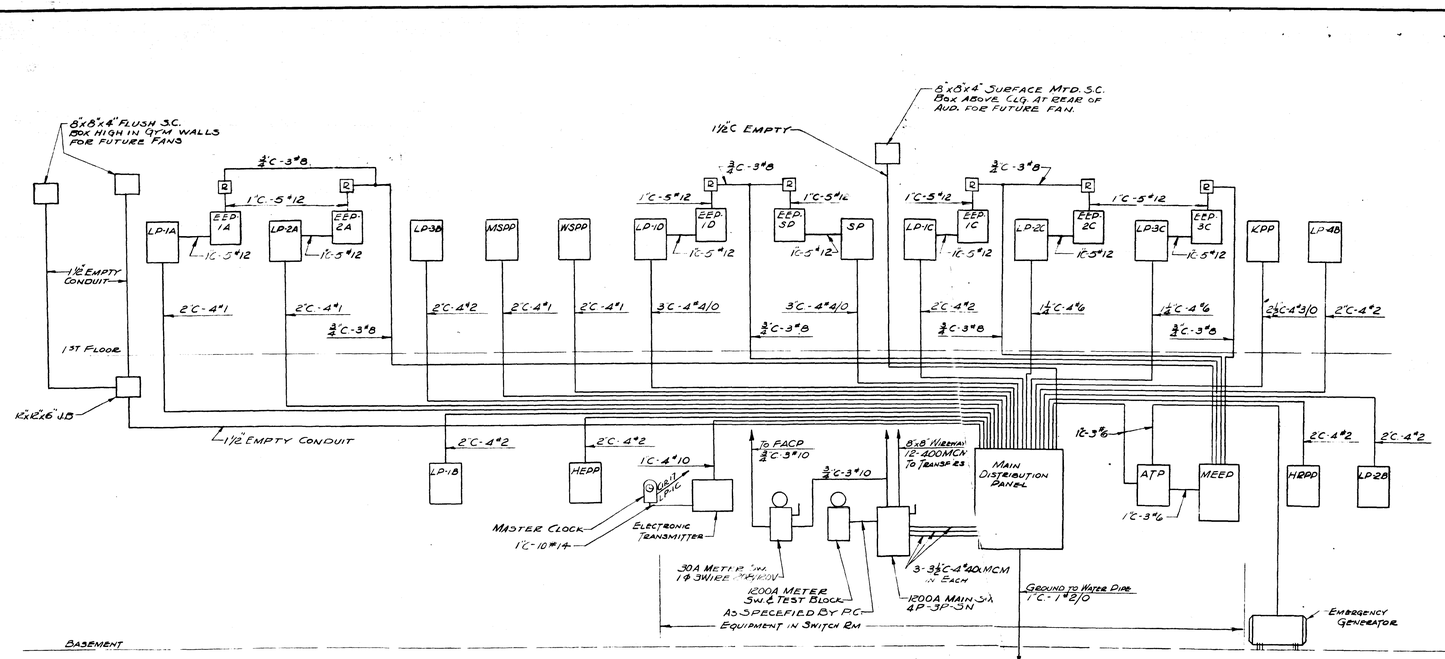
830-E5

Date: 30 APR 57 | Scale: AS SHOWN

SHERWOOD, MILLS AND SMITH
Architects 65 Broad Street, Stamford, Conn.

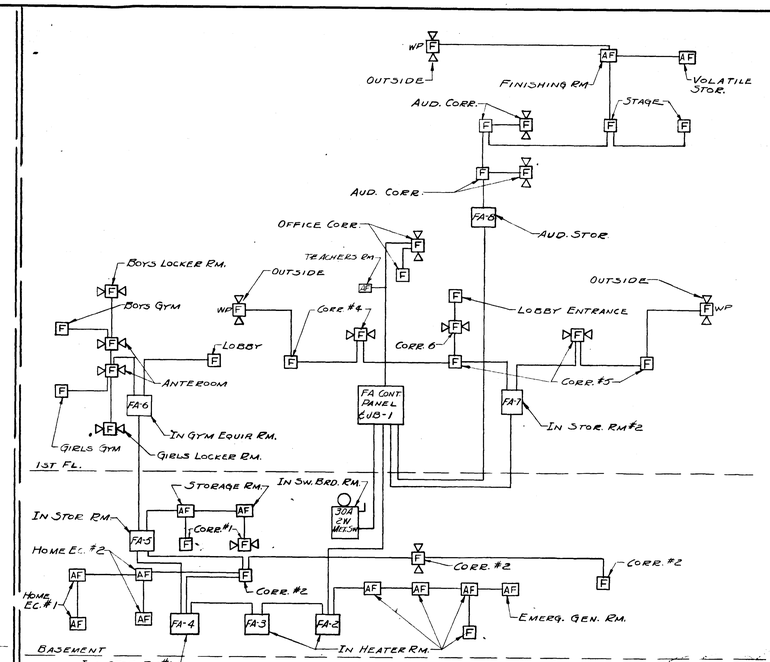
MARCHANT & M... ENGINEERS WEST HARTFORD, CONN.

BQ #70 & 125 Attachment



MAIN LIGHT, POWER, & EMERGENCY SYSTEM RISER DIAGRAM

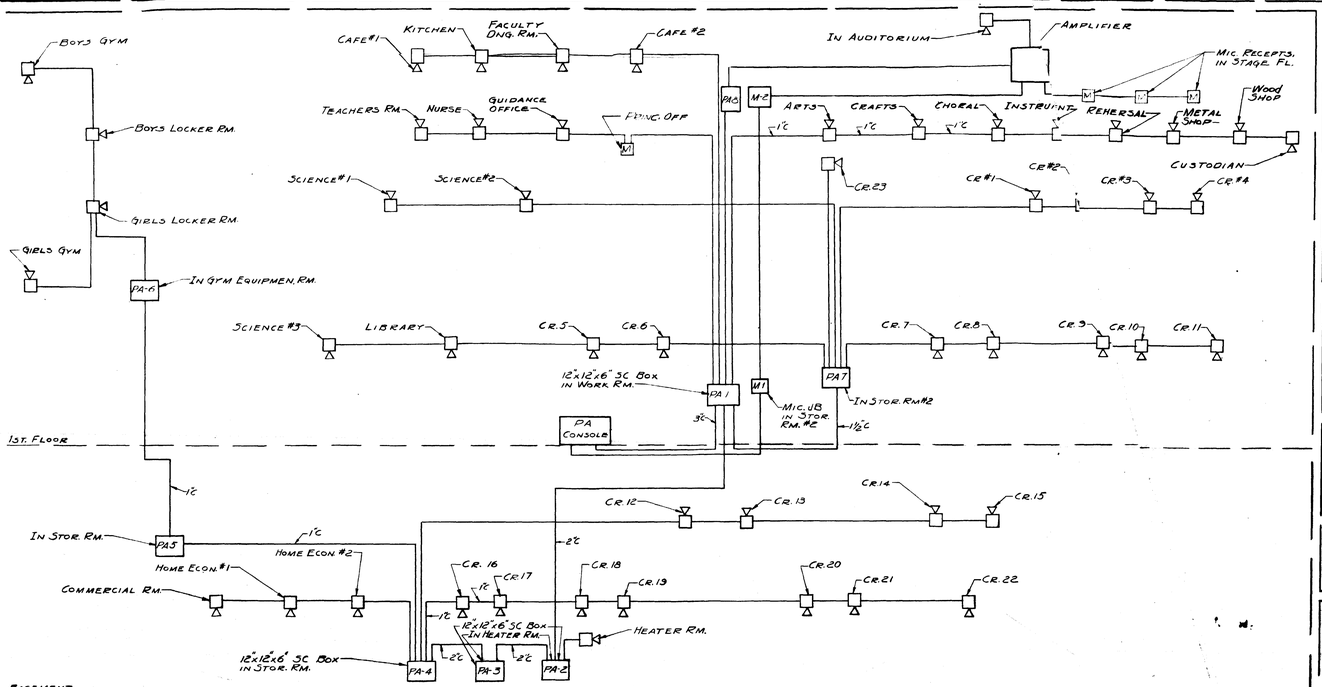
No Scale



NOTE: ALL CONDUITS ¾"

FIRE ALARM RISER DIAGRAM

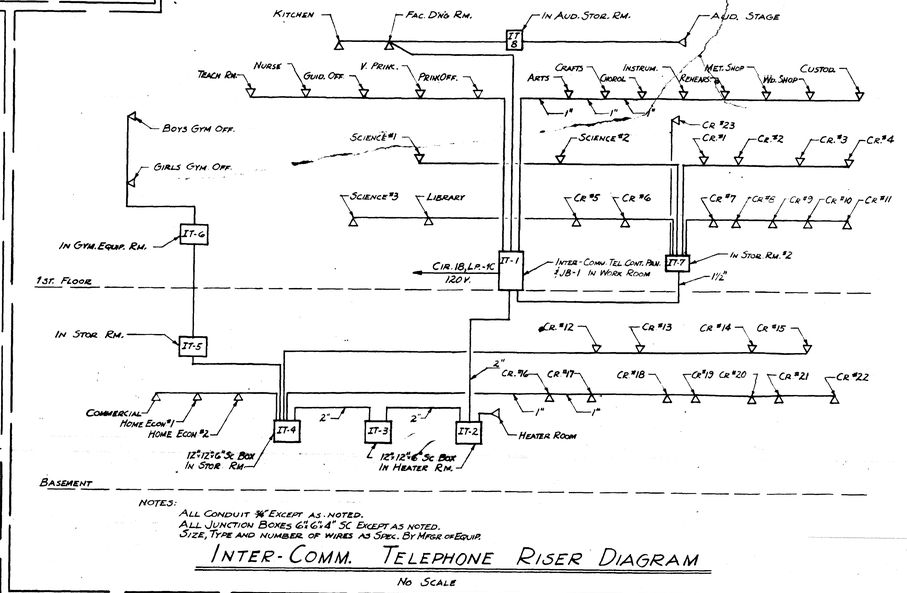
No Scale



NOTE:
ALL CONDUITS ¾" EXCEPT AS NOTED
ALL JUNCTION BOXES 6"x6"x4" SC EXCEPT AS NOTED
SIZES, TYPE AND NUMBER OF CONDUCTORS AS SPECIFIED BY MFGR. OF EQUIP.

PUBLIC ADDRESS AND AUDITORIUM SOUND SYSTEMS RISER DIAGRAM

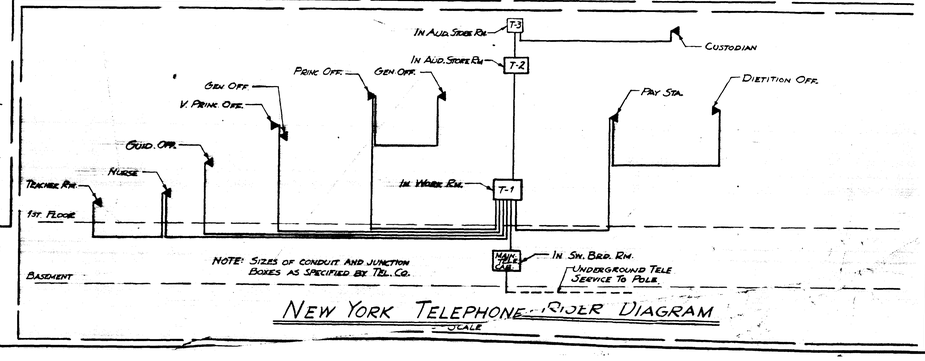
No Scale



NOTES:
ALL CONDUIT ¾" EXCEPT AS NOTED.
ALL JUNCTION BOXES 6"x6"x4" SC EXCEPT AS NOTED.
SIZE, TYPE AND NUMBER OF WIRES AS SPEC. BY MFGR OF EQUIP.

INTER-COMM. TELEPHONE RISER DIAGRAM

No Scale



NOTE: SIZES OF CONDUIT AND JUNCTION BOXES AS SPECIFIED BY TEL. CO.

NEW YORK TELEPHONE RISER DIAGRAM

No Scale

STATE OF CONNECTICUT JOHN W. MINGES REGISTERED PROFESSIONAL ENGINEER No. 1648

STATE OF CONNECTICUT JAMES S. MITCHELL No. 2423 REGISTERED P.E. PROFESSIONAL ENGINEER

STATE OF CONNECTICUT CHARLES G. MARCHANT No. 2385 REGISTERED PROFESSIONAL ENGINEER

ELECTRICAL RISER DIAGRAMS

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

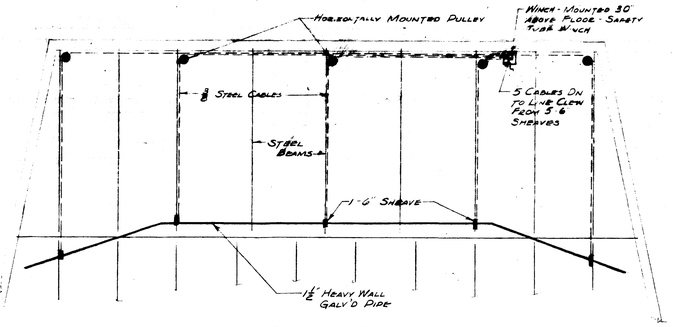
830-E6

Date: 30 APR 57 | Scale: AS SHOWN

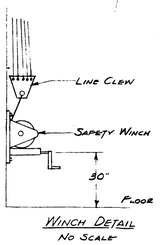
SHERWOOD, MILLS AND SMITH
Architects 65 Broad Street, Stamford, Connecticut

MARCHANT & MINGES
ENGINEERS
WEST HARTFORD, CONN.

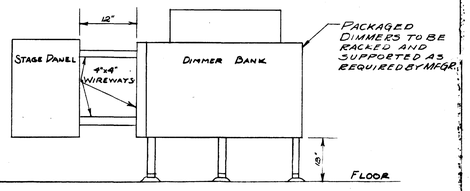
BQ #70 & 125 Attachment



RIGGING PLAN
FOR RAISING & LOWERING OF BORDER LIGHTS
NO SCALE



WINCH DETAIL
NO SCALE

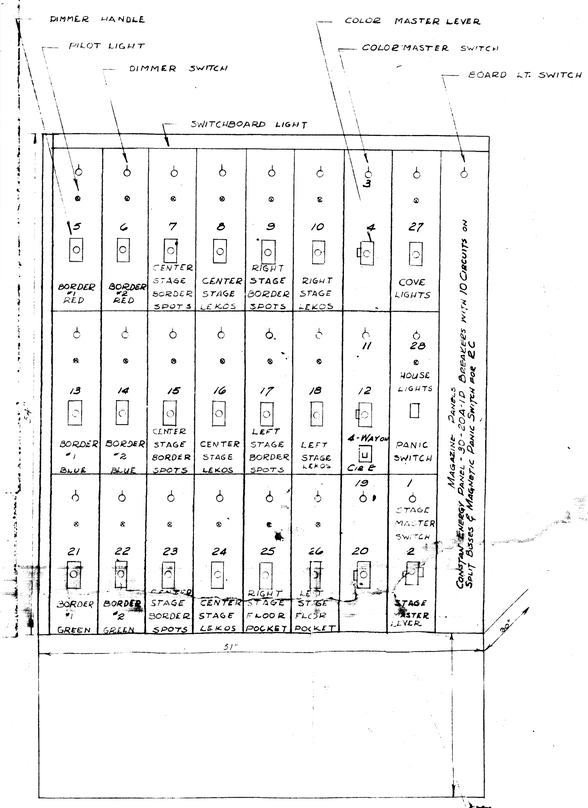


STAGE PANEL (SP) & PACKAGE DIMMER BANK INSTALLATION-ALTERNATE
NO SCALE

LIGHTING FIXTURE SCHEDULE

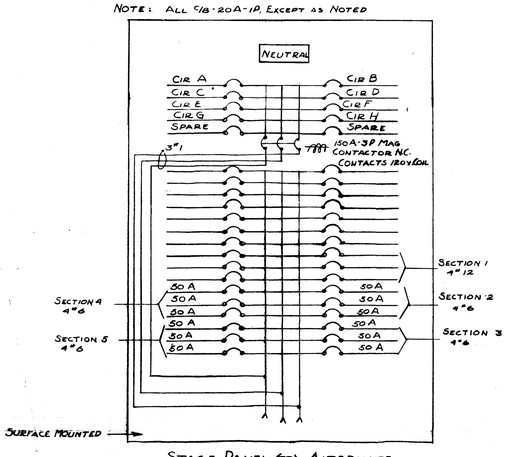
TYPE	MANUFACTURER AND DESCRIPTION	LAMP		MOUNT	REMARKS
A	Holophane #692-AL-HS High Bay unit with #0256 wire guard	I	1-1000W	30"Stem	Swivel on outlet box
B	Litecraft #E312 housing with #E24 opal glass lens and frame	I	1-150W	Ceiling Recess	
C	Perfeclite #1517 vapor proof with aluminum baby and round opal globe	I	2-60W	Ceiling Surface	
D	Russell & Stoll #4510 explosion proof fixture	I	1-150W		
E	Century #942 swivel light with canopy and #948 lauver	I	1-150W R-40FL	Ceiling Surface	
F	Smithcraft #SN2-42Rs "Shearton" with 8 ft. housing with plastic sides and metal louvers. Include necessary stems, clamps & end plates. Use with rapid start lamps	F	4-40W RS	Ceiling	
F_1	Same as "F" except with 4 ft. housing and 2-4ft. lamps	F	2-40W RS	Ceiling	
F_2	Same as "F" except #SN 4-42R Switch 8' housing and 8-4ft. lamps	F	8-40W RS	Ceiling	
G	Miller #MB-150 round aluminum drum with flat glass lens	I	2-15W	Ceiling Surface	Use 2-40W lamps where not on Emerg. System
H	Bryant #5289 porcelain filter with convenience outlet and pull chain	I	1-100W	Ceiling or Wall Surface	
I	Presolite #WB-24 wall bracket with opal glass globe	I	1-100W	Wall Surface	Mount 7'-6" above floor slab
J	Miller #MB-160 satin aluminum tapered drum	I	1-150W R-40FL	Ceiling Surface	
K	Lightolier #13526 "Optiplex" 24" square with plexi-glass diffuser	F	6-20W	Ceiling Surface	
K_1	Same as "K" except #13524, 12"x24"	F	4-2W	do	
L	Progress #1148RS strip with #R-48 adjustable chrome reflector	F	1-40W RS	Under Cabinets	
M	Outside Flod lights - see specifications	I	2-500W	See detail	
N	Miller #PREDD-150 RLM reflector for conduit mounting	I	1-150W	Ceiling Stem	
O	McPhilben #32-88 cast aluminum square, weather-resistant with square opal glass bowl	I	2-100W	Canopy Surface	
XA	Day-Brite #3146 or #3145 single face top or end mounted Exit Lights with solid bottom and metal stencil. Furnish with directional arrows as shown on drawings	I	2-25W	Ceiling or Wall Surface	
XB	Same as "XA" except #3126 or #3125 with double face	I	2-25W	Ceiling or wall Surface	
XC	Same as "XA" except #3106 or #3105 recessed	I	2-25W	Wall Recess	With wire guard in Gym

NOTE:
REFER TO SPECIFICATIONS - DIV. 43 FOR AUDITORIUM & STAGE LIGHTING FIXTURES



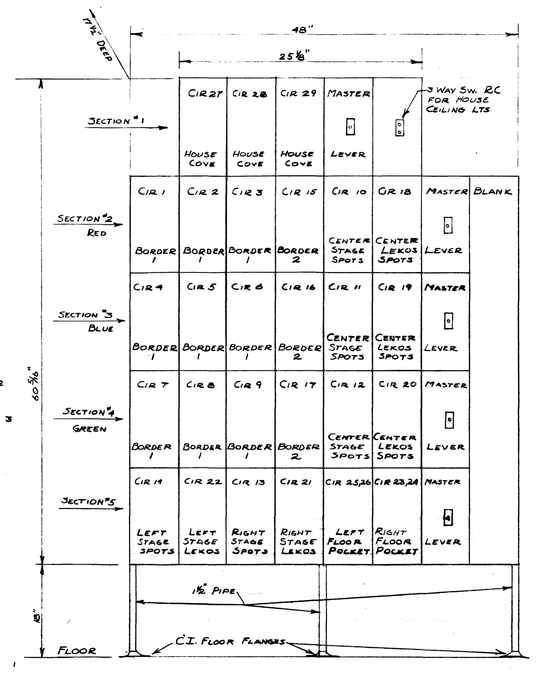
STAGE DIMMER PANEL PLAN
NO SCALE

NOTE: ALL C/B-20A-1P. EXCEPT AS NOTED

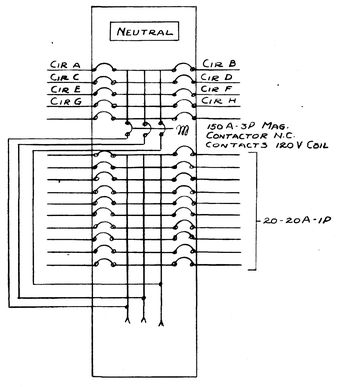


STAGE PANEL (SP) ALTERNATE
CIRCUIT BREAKER TYPE
208-120 VOLTS 3 PHASE 4 WIRE
NO SCALE

ALTERNATE
STAGE PANEL



STAGE DIMMER PANEL SCHEDULE - ALTERNATE
NO SCALE



CONSTANT ENERGY PANEL
BUILT-IN TO MAGAZINE OF DIMMER BOARD
NO SCALE

STAGE DIMMER PANEL SCHEDULE

No	NAME	COLOR	DIMMER WATTS	DIMMER CIR SIZE	No. OF BRANCH CIRCUITS	BRANCH CIRCUIT NUMBERS
1	STAGE MASTER SW					
2	STAGE MASTER LEVER					
3	COLOR MASTER SW	RED				
4	COLOR MASTER LEVER	"				
5	BORDER #1	"	1-6000	50-A	3	1,2,3
6	BORDER #2	"	1-2500	30-A	1	15
7	CENTER STAGE SPOTS	"	1-1000	20-A	1	10
8	CENTER LEKO SPOTS	"	1-2000	20-A	1	18
9	RIGHT STAGE SPOTS	"	1-1000	20-A	1	13
10	RIGHT STAGE LEKOS	"	1-2000	20-A	1	21
11	COLOR MASTER SW	BLUE				
12	COLOR MASTER LEVER	"				
13	BORDER #1	"	1-6000	50-A	3	4,5,6
14	BORDER #2	"	1-2500	30-A	1	16
15	CENTER STAGE SPOTS	"	1-1000	20-A	1	11
16	CENTER LEKO SPOTS	"	1-2000	20-A	1	19
17	LEFT STAGE SPOTS	"	1-1000	20-A	1	14
18	LEFT STAGE LEKOS	"	1-2000	20-A	1	22
19	COLOR MASTER SW	GREEN				
20	COLOR MASTER LEVER	"				
21	BORDER #1	"	1-6000	50-A	3	7,8,9
22	BORDER #2	"	1-2500	30-A	1	17
23	CENTER STAGE SPOTS	"	1-2500	30-A	1	12
24	CENTER STAGE LEKOS	"	1-2000	20-A	1	20
25	RIGHT FLOOR POCKET		1-2000	20-A	2	23,24
26	LEFT FLOOR POCKET		1-2000	20-A	2	25,26
27	HOUSE COVE LIGHTS		1-6000	50A	3	27,28,29
28	HOUSE CEILING LTS.		NONE			A,B,C,D,E,F,G,H

NOTE: CONNECT "LETTERED" CIRCUITS TO CONSTANT ENERGY PANEL. PANIC CONTACTOR 60A-3P-MAGNETIC TYPE, NORMALLY CLOSED CONTACTS (CONNECT TO CIRCUITS "A" TO "H" INCLUSIVE.

STATE OF CONNECTICUT JOHN H. MARCHANT No. 1640 REGISTERED PROFESSIONAL ENGINEER

STATE OF CONNECTICUT JAMES G. MINGES NO. 2423 REGISTERED PROFESSIONAL ENGINEER

STATE OF CONNECTICUT CHARLES G. MARCHANT NO. 2385 REGISTERED PROFESSIONAL ENGINEER

ELECTRICAL DETAILS AND SCHEDULES

CENTRAL JUNIOR HIGH SCHOOL
Greenwich, Connecticut

830-E7

Date 30 APR 57 | Scale NO SCALE

SHERWOOD, MILLS AND SMITH
Architects 65 Broad Street, Stamford, Connecticut

MARCHANT & MINGES
ENGINEERS
WEST HARTFORD, CONN.

BQ #70 & 125 Attachment

CENTRAL MIDDLE SCHOOL

9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

CENTRAL MIDDLE SCHOOL

ESTIMATING

FLETCHER THOMPSON

ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

TWO LAFAYETTE SQUARE / BRIDGEPORT, CT 06604-3944 / 203 366 5441 / FAX 367 9540

BID SET

MARCH 16, 1998

FT PROJECT NO. 50950.06

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ABBREVIATIONS

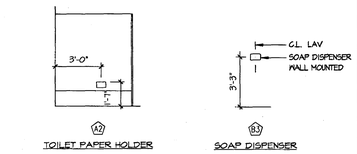
A.DR.	ACCESS DOOR	K.E.C.	KITCHEN EQUIPMENT CONTRACTOR
A.F.F.	ABOVE FINISH FLOOR		
A.F.R.	ABOVE FINISH ROOF	L.P.	LOW POINT
A.P.	ACCESS PANEL	LAB.	LABORATORY
A.S.	ALUMINUM SADDLE	LAD.	LADDER
A.V.	AUDIO VISUAL	LAM.	LAMINATED
AC.	ACOUSTIC, ACOUSTICAL	LAV.	LAVATORY
AC.BD.	ACOUSTICAL BOARD	LDR.	LEADER
AC.T.	ACOUSTICAL TILE	L.F.	LINEAR FEET
ADD.	ADDITIONAL	LKR.	LOCKER
AD.J.	ADJUSTABLE	LOC.	LOCATION
ALT.	ALTERNATE	LT.	LIGHT
ALUM.	ALUMINUM	LTWT.	LIGHTWEIGHT
APPROX.	APPROXIMATE		
ARCH.	ARCHITECTURAL	M.B.	MARKER BOARD
&	AND	M.ER.	MECHANICAL EQUIPMENT ROOM
@	AT	M.O.	MASONRY OPENING
		MACH. RM.	MACHINE ROOM
B	B LABEL DOOR	MAS.	MASONRY
B.M.	BENCH MARK	MAX.	MAXIMUM
B.U.R.	BUILT-UP ROOF	MATL.	MATERIAL
BD.	BOARD	MECH.	MECHANICAL
BIT.	BITUMINOUS	MET.	METAL
BLDG.	BUILDING	MEZZ.	MEZZANINE
BLK.	BLOCK	MFR.	MANUFACTURER
BLKG.	BLOCKING	MIN.	MINIMUM
BM.	BEAM	MISC.	MISCELLANEOUS
BOT.	BOTTOM	MLDG.	MOULDING
BRK.	BRICK	MTD.	MOUNTED
C.	CLEAN, CLOSET	N.	NORTH
C. TO C.	CENTER TO CENTER	N.I.C.	NOT IN CONTRACT
C.B.	CHALK BOARD	N.T.S.	NOT TO SCALE
C.J.	CONTROL JOINT	N.A.	NOT APPLICABLE
C.L. OR ℄	CENTER LINE	NO. OR #	NUMBER
C.M.U.	CONCRETE MASONRY UNIT	NOM.	NOMINAL
CAB.	CABINET		
CEM.	CEMENT	OA.	OVERALL
CHG.	CHANGE	O.D.	OUTSIDE DIAMETER
CLG.	CEILING	OFF.	OFFICE
CLO.	CLOSET	OPNG.	OPENING
CNTR.	COUNTER	OPP.	OPPOSITE
COL.	COLUMN		
CONC.	CONCRETE	P.L.	PROPERTY LINE
CONF.	CONFERENCE	P. LAM.	PLASTIC LAMINATE
CONN.	CONNECTION	PH.	PENTHOUSE
CONST.	CONSTRUCTION	PLAS.	PLASTER
CONT.	CONTINOUS, CONTINUE	PLYWD.	PLYWOOD
CONTR.	CONTRACTOR	PNL.	PANEL
CORR.	CORRIDOR	PREFAB.	PREFABRICATED
CPT.	CARPET	PROP.	PROPERTY
CTR.	CENTER	PRTN.	PARTITION
		PTD.	PAINTED
DEPT.	DEPARTMENT		
DET.	DETAIL	QTR.	QUARTER
DIA.	DIAMETER	QTY.	QUANTITY
DN.	DOWN		
DR.	DOOR	R.	RADIUS
DWG.	DRAWING	R.C.P.	REFLECTED CEILING PLAN
		R.D.	ROOF DRAIN
E.	EAST	R.O.	ROUGH OPENING
EA.	EACH	REC.	RECESS
E.I.F.S.	EXTERIOR INSULATION AND FINISH SYSTEM	REF.	REFRIGERATOR
EL.	ELEVATION	REINF.	REINFORCEMENT
ELEC.	ELECTRIC	RELOC.	RELOCATED
ELEV.	ELEVATOR	REQD.	REQUIRED
ENCL.	ENCLOSURE	RESIL.	RESILIENT
ENT.	ENTRANCE	REV.	REVISION
EQ.	EQUAL	RIS.	RISER
EQUIP.	EQUIPMENT	RM.	ROOM
EXIST.	EXISTING	RUB.	RUBBER
EXP.	EXPANSION		
EXP. JT.	EXPANSION JOINT	S.	SOUTH
EXT.	EXTERIOR	S.S.	STAINLESS STEEL
		S.F.	SQUARE FEET
F.E.	FIRE EXTINGUISHER	SCHED.	SCHEDULED
F.E.C.	FIRE EXTINGUISHER WITH CABINET	SECT.	SECTION
F.H.C.	FIRE HOSE CABINET	SH. MT.	SHEET METAL
F.S.P.	FIRE STANDPIPE	SIM.	SIMILAR
F.D.	FLOOR DRAIN	SK.	SKETCH
FDN.	FOUNDATION	SPEC.	SPECIFICATIONS
FIN.	FINISH, FINISHED	ST.	STREET
FIXT.	FIXTURE	STD.	STANDARD
FL.	FLOOR	STL.	STEEL
FLUOR.	FLUORESCENT	STOR.	STORAGE
FT. OR '	FEET OR FOOT	STRUCT.	STRUCTURAL
FTG.	FOOTING	SUPP.	SUPPORT
FURR.	FURRING	SUSP.	SUSPENDED, SUSPENSION
FUT.	FUTURE		
		T. & G.	TONGUE AND GROOVE
G.C.	GENERAL CONTRACTOR	T.B.	TACK BOARD
GA.	GAGE	T.O.S.	TOP OF STEEL
GALV.	GALVANIZED	T.O.W.	TOP OF WALL
GEN.	GENERAL	TD.	TREAD
G.F.R.G.	GLASS FIBER REINFORCED GYPSUM	TELE. CAB.	TELEPHONE CABINET
G.F.R.G.	GLASS FIBER REINFORCED GYPSUM	TELE.	TELEPHONE
GL.	GLASS, GLAZE	THK.	THICKNESS
GR.	GRADE	THRES.	THRESHOLD
GYP.	GYPSUM	THRU	THROUGH
GYP. BD.	GYPSUM BOARD	TLT.	TOILET ROOM
		TRANS.	TRANSFER
H.C.	HANDICAP, HANDICAPPED	TV.	TELEVISION
H.M.	HOLLOW METAL	TYP.	TYPICAL
H.P.	HIGH POINT		
HDWD.	HARDWOOD	U.N.O.	UNLESS NOTED OTHERWISE
HDWR.	HARDWARE	U.L.	UNDERWRITERS LABORATORY
HGT.	HEIGHT	UR.	URINAL
HORIZ.	HORIZONTAL, HORIZONTALLY	URH.	URINAL HANDICAPPED
H.V.A.C.	HEATING VENTILATING AIR CONDITIONING		
		V.C.T.	VINYL COMPOSITION TILE
I.D.	INSIDE DIAMETER	V.I.F.	VERIFY IN FIELD
I.P.S.	IRON PIPE SIZE	V.W.C.	VINYL WALL COVERING
IN. OR "	INCH OR INCHES	VEST.	VESTIBULE
INCL.	INCLUSIVE, INCLUDE, INCLUDING	VIT.	VITREOUS
INSUL.	INSULATION		
INT.	INTERIOR	W.	WEST
INTER.	INTERMEDIATE	W. GL.	WIRE GLASS
		W.M.	WIRE MESH
JAN.	JANITOR	W/	WITH
JT.	JOINT	W/ANS.	WAINSCOT
		WD.	WOOD

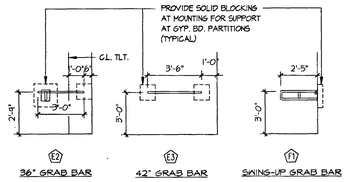
NOTES

1. FOR STRUCTURAL SYMBOLS AND ABBREVIATIONS REFER TO DRAWING S401.
2. FOR MECHANICAL SYMBOLS AND ABBREVIATIONS REFER TO DRAWING M401.
3. FOR FIRE PROTECTION SYMBOLS AND ABBREVIATIONS REFER TO DRAWING FP401.
4. FOR PLUMBING SYMBOLS AND ABBREVIATIONS REFER TO DRAWING P401.
5. FOR ELECTRICAL SYMBOLS AND ABBREVIATIONS REFER TO DRAWING E401.

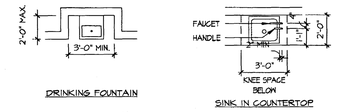
MOUNTING REQUIREMENTS

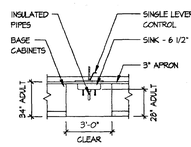
ACCESSORY REQUIREMENTS

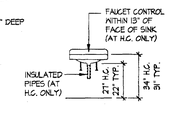


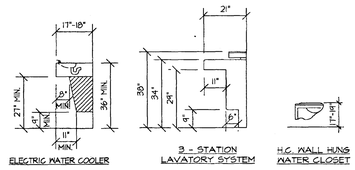


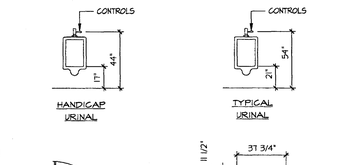
FIXTURE REQUIREMENTS

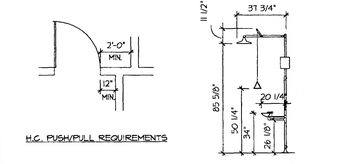






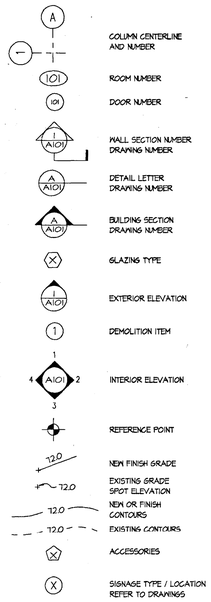




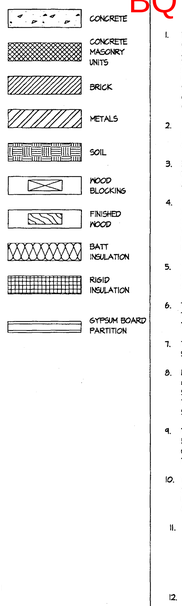


SYMBOLS

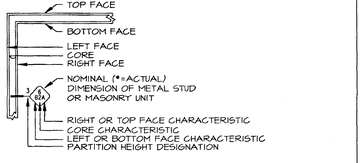
GRAPHIC



MATERIALS



PARTITION TYPE DESCRIPTION



CORE CHARACTERISTICS

1. METAL STUD
2. METAL STUD WITH SOUND ATTENUATION BLANKET
3. 7/8" FURRING
4. METAL Z CHANNEL WITH RIGID INSULATION
5. C-H METAL STUD

FACE CHARACTERISTICS

- NO CHARACTERISTIC
A. SINGLE LAYER- 5/8" GYPSUM BOARD
B. DOUBLE LAYER- 5/8" AND 5/8" GYPSUM BOARD
C. DOUBLE LAYER- 1/2" AND 5/8" GYPSUM BOARD BELOW (ACOUSTIC)
D. DOUBLE LAYER- 3/8" AND 3/8" GYPSUM BOARD (CURVED)
E. DOUBLE LAYER- 5/8" GYPSUM BOARD WITH 3/4" PLYWOOD BELOW
F. ABUSE RESISTANT GYPSUM BOARD
6. MOISTURE RESISTANT GYPSUM BOARD
H. CEMENT BOARD
J. PLASTER AND LATH
K. RESILIENT CHANNELS WITH 5/8" GYPSUM BOARD
L. 1" GYPSUM LINER PANEL
M. EXISTING SURFACE
N. 6" CONCRETE MASONRY UNIT. (SEE NOTE #18)
O. 8" CONCRETE MASONRY UNIT. (SEE NOTE #18)
P. 8" X 8" X 3" SOLID GLASS BLOCK 1 1/2 HR RATED UL DESIGN #R2556.

PARTITION HEIGHT

1. FULL HEIGHT
2. 4" MINIMUM ABOVE FINISHED CEILING
3. UNDERSIDE OF FINISHED CEILING
4. LOW HEIGHT

GYPSUM BOARD PARTITION RATING

1. 1-HR SHAFT-WALL UL DESIGN #468.
2. 1-HR PARTITION UL DESIGN #465.
3. 2-HR PARTITION UL DESIGN #412.
4. 2-HR SHAFT-WALL UL DESIGN #438.

BRICK VENEER W/ SHEATHING METAL STUDS & GYPSUM BOARD

1. 1-HR EXTERIOR WALL CONSTRUCTION UL DESIGN #425. SEE DWG A601 FOR EXTENT.

NOTE:
ADD ADDITIONAL LAYER OF 1/2" RATED GYPSUM BOARD TO SHAFT-WALL WHEN USED HORIZONTALLY TO MEET WARNOCK-HERSEY TESTED AND APPROVED ASSEMBLY # WH-0415-PSH0154-0187.

PARTITION NOTES

1. UNLESS OTHERWISE NOTED ALL MASONRY PARTITIONS SHALL BE FULL HEIGHT UP TO STRUCTURE ABOVE. ALL PENETRATIONS SHALL BE SEALED WITH FIRE-STOPPING MATERIALS. SEE STRUCTURAL DRAWINGS FOR REINFORCING AND BRACING REQUIREMENTS.
2. UNLESS OTHERWISE NOTED ALL GYPSUM BOARD PARTITIONS SHALL BE 3- 5/8" METAL STUDS AT 16" O.C. WITH 1- LAYER 5/8" GYPSUM BOARD ON EACH SIDE. EXTEND FULL HEIGHT UP TO STRUCTURE ABOVE AND SEAL WITH FIRE-STOPPING MATERIAL AT RATED PARTITIONS AND ACOUSTIC SEALANT AT NON-RATED PARTITIONS. PROVIDE SOUND ATTENUATION INSULATION FULL HEIGHT.
3. PROVIDE SOLID BLOCKING AT ALL GYPSUM BOARD PARTITIONS FOR ALL WALL MOUNTED EQUIPMENT INCLUDING THOSE LISTED AS N.I.C.

GENERAL NOTES

BQ #70 & 125 Attachment

1. THE EXISTING CONDITIONS REPRESENTED HEREIN ARE BASED ON THE CONSTRUCTION DRAWINGS PREPARED BY SHERWOOD, MILLS AND SMITH ARCHITECTS DATED 4-30-97, MAITLAND/STRAUSS/BEIRK ARCHITECTS PC DATED 5-4-81 AND SITE SURVEY PREPARED BY CCA DATED 8-27-97. SITE SURVEY IS INCLUDED FOR CONTRACTORS REFERENCE ONLY. FLETCHER THOMPSON CANNOT GAURANTEE THE CORRECTNESS OF THE EXISTING SHOWN AND ASSUMES NO RESPONSIBILITY HEREITOF. INCLUSION OF THESE EXISTING CONDITIONS HEREIN SHALL IN NO WAY ALLEVIATE THE CONTRACTOR OF ITS RESPONSIBILITY TO VISIT THE SITE AND VERIFY ALL EXISTING CONDITIONS.
2. THE CONTRACTOR SHALL VERIFY EXISTING CONDITIONS, DIMENSIONS, FLOOR ELEVATIONS AND MATERIALS IN THE FIELD AND SHALL NOTIFY THE ARCHITECT OF ANY DISCREPANCIES TWO WEEKS PRIOR TO BID OPENING.
3. EACH TRADE CONTRACTOR IS RESPONSIBLE FOR REVIEWING "THE CONSTRUCTION DRAWINGS" IN COORDINATING HIS WORK WITH THE OTHER TRADE CONTRACTORS AS IS INDICATED ON THE DRAWINGS AND SPECIFICATIONS.
4. THE CONTRACTOR SHALL PATCH, REPAIR AND FINISH ALL EXISTING CONSTRUCTION DAMAGED DURING PERFORMANCE OF HIS OR HIS SUB-CONTRACTORS WORK. HE SHALL ALSO PROVIDE ALL OPENINGS IN EXISTING AND NEW CONSTRUCTION REQUIRED BY HIM OR HIS SUB-CONTRACTORS AND SHALL PATCH, REPAIR AND FINISH THE OPENINGS TO MATCH EXISTING OR NEW FINISHES AFTER WORK HAS BEEN COMPLETED.
5. THE CONTRACTOR SHALL SCHEDULE ALL WORK SO AS TO KEEP ALL CORRIDORS, STAIRWAYS AND OTHER EXIT COMPONENTS FREE OF CONSTRUCTION DEBRIS, STAGING, STORED MATERIALS, ETC. DURING NORMAL SCHOOL HOURS.
6. THE CONTRACTOR SHALL COORDINATE ALL WORK IN THE EXISTING BUILDING WITH THE SCHOOL PRINCIPAL AND SHALL PROVIDE A MIN. OF ONE WEEKS NOTICE PRIOR TO PROCEEDING WITH ANY WORK.
7. THE LOCATION OF ALL TRAILERS, STORAGE STRUCTURES AND OTHER TEMPORARY SITE FACILITIES SHALL BE APPROVED BY THE OWNER AND FIRE MARSHAL.
8. WHERE OWNERS FURNITURE IS REQUIRED TO BE MOVED AND/OR STORAGE CLEANED OUT IN ORDER FOR THE CONTRACTOR TO PERFORM HIS WORK, THE CONTRACTOR SHALL COORDINATE THAT PHASE OF WORK WITH THE OWNER A MIN. OF ONE WEEK TO WORK START-UP. ALL OWNERS FURNITURE RELOCATION AND/OR CLEAN-UP SHALL BE PERFORMED BY THE OWNERS WORK FORCE.
9. THE CONTRACTOR SHALL COORDINATE WITH THE OWNER ANY SALVAGE REQUIREMENTS PRIOR TO START-UP OF WORK AND SHALL REMOVE AND TURN OVER TO THE OWNER ANY HARDWARE AND/OR OTHER EQUIPMENT OR MATERIALS THE OWNER WANTS TO RETAIN.
10. THE PLUMBING, HVAC, SPRINKLER AND ELECTRICAL CONTRACTORS SHALL SEAL NEW OPENINGS AROUND PIPE, CONDUITS, DUCTS, ETC. WITH FIRE-STOPPING / SMOKE RESISTANT NON-COMBUSTIBLE MATERIALS AS INDICATED ON CONSTRUCTION DRAWINGS AND IN PROJECT SPECIFICATIONS.
11. ACCESS PANELS WHICH ARE REQUIRED BY THE PLUMBING, HVAC, SPRINKLER OR ELECTRICAL CONTRACTORS WHICH ARE NOT SHOWN ON THE CONSTRUCTION DRAWINGS, BUT ARE REQUIRED FOR ACCESS TO THEIR EQUIPMENT, SHALL BE FURNISHED BY THE RESPECTIVE CONTRACTOR TO THE MASONRY CONTRACTOR FOR INSTALLATION INTO MASONRY WALLS AND TO THE DRYWALL AND CEILING CONTRACTOR FOR INSTALLATION INTO DRYWALL PARTITIONS AND CEILINGS.
12. PROVIDE TRENCHING IN EXISTING BUILDING FOR UNDERFLOOR PIPING AS INDICATED ON PLUMBING, MECHANICAL AND ELECTRICAL DRAWINGS.
13. ALL WOOD BLOCKING USED ON THE INTERIOR SHALL BE FIRE RETARDANT TREATED. ALL EXTERIOR WOOD BLOCKING SHALL BE PRESSURE TREATED.
14. ALL CONCRETE MASONRY UNIT WALLS SHALL EXTEND TO THE UNDERSIDE OF CONSTRUCTION ABOVE AND BE SEALED-OFF BETWEEN THE CONSTRUCTION AND TOP OF WALL W/ A NON-COMBUSTIBLE FIRE-STOPPING MATERIAL. SEE SPECIFICATIONS 07210. SEE STRUCTURAL DRAWINGS FOR TYPICAL BRACING AT TOP OF INTERIOR C.M.U. WALLS.
15. REFER TO STRUCTURAL DRAWINGS FOR REINFORCING AND GROUTING REQUIREMENTS OF ALL CONCRETE MASONRY WALLS.
16. BLOCK FOR USE IN (1) & (2) HR FIRE RATED WALLS AND PARTITIONS SHALL HAVE SUCH EQUIVALENT SOLID THICKNESS THAT WHEN INSTALLED THEY WILL PROVIDE FIRE RESISTANCE RATING CONFORMING TO STATE CODE REQUIREMENTS.

    THE PRODUCER OF CONCRETE MASONRY UNITS FOR FIRE RATED WALLS SHALL FURNISH CERTIFICATION FROM AN INDEPENDENT TESTING LABORATORY CONFIRMING ALL 8" WIDE OR LARGER MASONRY UNITS MEET THE REQUIREMENTS OF UL-618, REFERENCING FULL SCALE FIRE TEST REPORTS (ASTM E-119). ALL 4" AND 6" WIDE UNITS SHALL CONFORM TO NATIONAL BUREAU OF STANDARDS AND NATIONAL COUNCIL FULL SCALE FIRE TESTS.
17. FINISH GROUND FLOOR ELEVATION 44'-1".
    FINISH FIRST FLOOR ELEVATION 55'-1".
18. IN ALL NEW CONSTRUCTION WHERE CEILING PLENUMS ARE INDICATED FOR USE AS UNDUCTED RETURN AIR TRANSFER, ALL MATERIALS PROVIDED WITHIN THESE SPACES SHALL BE NON-COMBUSTIBLE. ALL WIRING SHALL BE IN CONDUIT & ALL CABLING FOR FIRE ALARM, P.A., COMPUTERS, T.V., TELEPHONE SYSTEMS SHALL BE RATED FOR PLENUM INSTALLATION.

    IN ALL EXISTING RENOVATED AREAS WHERE CEILING PLENUMS ARE INDICATED FOR USE AS UNDUCTED RETURN AIR TRANSFER, ALL COMBUSTIBLE MATERIALS SHALL BE REMOVED & REPLACED WITH NON-COMBUSTIBLE MATERIALS. ALL WIRING SHALL BE IN CONDUIT & ALL CABLING FOR FIRE ALARM, P.A., COMPUTERS, T.V. TELEPHONE SYSTEMS SHALL BE RATED FOR PLENUM INSTALLATION.

DRAWING NOTES

- REFER TO STRUCTURAL DRAWINGS AND SPECIFICATIONS FOR REINFORCING, GROUTING AND BRACING REQUIREMENTS AT CONCRETE MASONRY UNIT PARTITIONS.
- REFER TO CODE COMPLIANCE AND LIFE SAFETY DRAWINGS FOR SMOKE AND FIRE RESISTANCE REQUIREMENTS FOR PARTITIONS.
- REFER TO GENERAL INFORMATION DRAWING FOR ABBREVIATIONS, SYMBOLS, GENERAL NOTES, AND ACCESSORY MOUNTING HEIGHTS.

TRADE CONTRACTOR'S NOTE

ALL EQUIPMENT SHOWN ON THESE DRAWINGS AND IN PROJECT SPECIFICATION IS BASED ON SPECIFIED MANUFACTURERS. ANY MODIFICATION AND/OR SUBSTITUTION OF SAID EQUIPMENT IS SUBJECT TO COMPLETE COORDINATION OF ALL CONNECTIONS, SERVICES, OPENING SIZES, AND ANY OTHER CONSTRUCTION RELATED REQUIREMENTS BY THE TRADE CONTRACTOR PROVIDING THE EQUIPMENT.

SCHEDULE OF DRAWINGS

DWG. NO.	TITLE
-	COVER SHEET
G1001	GENERAL INFORMATION
Site	
G001	SITE GRADING UTILITY LANDSCAPE AND SOIL
G002	EROSION CONTROL PLAN
	CONSTRUCTION NOTES & DETAILS
1 OF 1	PROPERTY & TOPOGRAPHIC SURVEY (REFERENCE ONLY)
1 OF 2	PROPOSED BUS LANE IMPROVEMENTS
2 OF 2	NOTES & DETAILS BUS LANE IMPROVEMENTS
Architectural	
A001	GROUND FLOOR PLAN CODE COMPLIANCE & LIFE SAFETY
A002	FIRST FLOOR PLAN CODE COMPLIANCE & LIFE SAFETY
A098	GROUND FLOOR DEMOLITION PLAN
A098.1	FIRST FLOOR DEMOLITION PLAN
A100.1	GROUND FLOOR PLAN PART "A"
A100.2	GROUND FLOOR PLAN PART "B"
A101.1	FIRST FLOOR PLAN PART "A"
A101.2	FIRST FLOOR PLAN PART "B"
A110	ROOF PLAN
A110.1	ROOF DETAILS
A201	EXTERIOR ELEVATIONS AND BUILDING SECTIONS
A301	WALL SECTIONS
A302	WALL SECTIONS
A303	WALL SECTIONS
A401	DOOR SCHEDULE
A410	ROOM FINISH SCHEDULE
A411	INTERIOR SIGNAGE
A501	ENLARGED TOILET PLANS
A502	MISCELLANEOUS DETAILS
A503	MISCELLANEOUS DETAILS
A601	STAIR PLANS SECTIONS & DETAILS
A700.1	GROUND FLOOR REFLECTED CEILING PLAN - PART "A"
A700.2	FIRST FLOOR REFLECTED CEILING PLAN - PART "B"
A701.1	FIRST FLOOR REFLECTED CEILING PLAN - PART "A"
A701.2	FIRST FLOOR REFLECTED CEILING PLAN - PART "B"
A801	INTERIOR ELEVATIONS
A802	INTERIOR ELEVATIONS
A803	INTERIOR ELEVATIONS
A804	INTERIOR ELEVATIONS
A805	INTERIOR ELEVATIONS
A901	CASEWORK DETAILS
Structural	
S100.1	FOUNDATION PLAN - PART "A"
S101.1	FIRST FLOOR FRAMING - PART "A"
S102.1	ROOF FRAMING PLAN - PART "A"
S301	FRAMING SECTIONS AND DETAILS
S302	FRAMING SECTIONS AND DETAILS
S401	GENERAL NOTES AND TYPICAL DETAILS
S402	GENERAL NOTES AND TYPICAL DETAILS

DWG. NO.	TITLE
HVAC	
M098.1	GROUND FLOOR DEMOLITION PLAN - HVAC
M098.2	FIRST FLOOR DEMOLITON PLAN - HVAC
M100.1	GROUND FLOOR PLAN PART "A" - HVAC
M100.2	GROUND FLOOR PLAN PART "B" - HVAC
M101.1	FIRST FLOOR PLAN PART "A" - HVAC
M101.2	FIRST FLOOR PLAN PART "B" - HVAC
M110	ROOF PLAN - HVAC
M201	FLOW DIAGRAMS & DETAILS - HVAC
M301	DETAILS - HVAC
M302	DETAILS - HVAC
M401	SCHEDULES & NOTES - HVAC
PLUMBING/FIRE PROTECTION	
P098	GROUND FLOOR DEMOLITION PLAN - PLUMBING
P098.1	FIRST FLOOR DEMOLITION PLAN - PLUMBING
FPP100.1	GROUND FLOOR PLAN PART "A" - PLUMBING & FIRE PROTECTION
FPP100.2	GROUND FLOOR PLAN PART "B" - PLUMBING & FIRE PROTECTION
FPP101.1	FIRST FLOOR PLAN PART "A" - PLUMBING & FIRE PROTECTION
FPP101.2	FIRST FLOOR PLAN PART "B" - PLUMBING & FIRE PROTECTION
P110	ROOF PLAN - PLUMBING
P201	ENLARGED TOILET ROOM LAYOUT AND RISER DIAGRAMS - PLUMBING
P301	DETAILS - PLUMBING
P302	DETAILS - PLUMBING
P401	LEGEND, NOTES AND SCHEDULES - PLUMBING
Electrical	
E001	SITE ELECTRICAL PLAN AND SITE DETAILS
E100	GROUND FLOOR FIRE ALARM PLAN
E100.1	GROUND FLOOR PART "A" ELECTRICAL PLAN
E100.2	GROUND FLOOR PART "B" ELECTRICAL PLAN
E101	FIRST FLOOR FIRE ALARM PLAN
E101.1	FIRST FLOOR PART "A" ELECTRICAL PLAN
E101.2	FIRST FLOOR PART "B" POWER PLAN
E110	NEW ADDITION ROOF ELECTRICAL PLAN
E301	ELECTRICAL HIRING AND RISER DIAGRAMS AND DETAILS
E302	ELECTRICAL HIRING AND RISER DIAGRAMS AND DETAILS
E401	ELECTRICAL SPECIFICATIONS, SCHEDULES AND NOTES
E100.1	GROUND FLOOR PART "A" LIGHTING PLAN
E100.2	GROUND FLOOR PART "B" LIGHTING PLAN
E101.1	FIRST FLOOR PART "A" LIGHTING PLAN
E101.2	FIRST FLOOR PART "B" LIGHTING PLAN

GENERAL LINTEL NOTES

1. Openings for which no specific lintels or lintel sizes are indicated shall have one angle for each 4" of masonry, or an approved equivalent thereof as follows:

ANGLES SIZE	MAX. M.O.	BEARING EACH END
3 1/2" X 3 1/2" X 5/16"	3'-6"	6"
3 1/2" X 4" X 5/16"	5'-0"	6"
3 1/2" X 5" X 5/16"	6'-0"	8"
3 1/2" X 6" X 5/16"	8'-0"	8"

2. For 6" partitions use wt. 7 x 13 for spans up to 7'-0" with 6" bearing each end.
3. Fill two courses directly under lintel bearing with grout for 16" length x 16" depth.
4. See ARCHITECTURAL & MECHANICAL drawings for size and location of openings.
5. When openings occur in bearing walls or the height of masonry above the lintel is less than the opening width or when a control joint is located directly above or within 16" of the jamb opening and drawings do not otherwise indicate a specific lintel design, consult with the architect to confirm lintel requirements.
6. Within the existing building, new openings in concrete masonry walls where no specific lintels or lintel sizes are indicated shall have the following sizes.

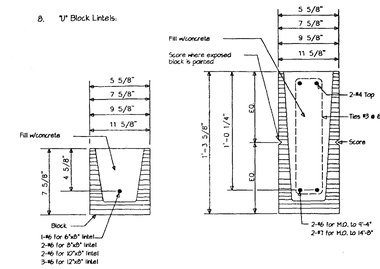
MAX. M.O.	WALL THICKNESS	LINTEL SIZE	BEARING PLATE
6'-0"	8"	(3) 3 1/2"X6"X3/8"(LLV)	7"X8"X1/2"
9'-0"	8"	W8X18 + 5/16" PLATE	7"X8"X1/2"
12'-0"	8"	W8X28 + 5/16" PLATE	7"X8"X1/2"

   Plates indicated in above lintels shall have a width 1" less than the wall thickness.

7. At new shear walls AND NEW exterior wall where no specific lintels or lintel sizes are indicated, provide the following sizes.

MAX. M.O.	WALL THICKNESS	LINTEL SIZE	BEARING PLATE
7'-0"	10" - 14"	W8X13 + 5/16" PLATE	10"X8"X1/2"
12'-0"	10" - 14"	W8X28 + 3/8" PLATE	10"X8"X1/2"

8. "L" Block Lintels.



   6"x8", 8"x8", 10"x8" & 12"x8" lintel for M.O. to 8'-8" 8" bearing (min.) each end See note 3 above

   8"x16", 10"x16" & 12"x16" lintel for M.O. to 14'-8" 12" bearing (min.) each end See note 3 above

9. Lintels over adjacent opening with piers between less than 2'-4" wide shall be continuous over piers. Masonry units of such piers shall be filled with grout for full story height.
10. Connect lintel to structural steel columns when there is less then 16" of masonry between the masonry opening and the outer most face of column.
11. Reference structural drawings for notes and details regarding reinforcing and grouting requirements.
12. For lintels at unit ventilators in building parts "D" and "E", see detail on structural drawings.

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PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE

ARCHITECT/ENGINEER: S.E. McNEECE

DRAWN BY: J.J. DUBATY

FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3904

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO

CENTRAL MIDDLE SCHOOL

9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106BA

DRAWING TITLE

GENERAL INFORMATION

NO	DATE	REVISION	BY

DATE: MARCH 16, 1998

SCALE: N. T. S.

PROJECT NO.: 50950.06

DRAWING NO.: G1001

BQ #70 & 125 Attachment

SYMBOL LEGEND

- PROPERTY LINE
- 50 — EXISTING CONTOUR LINE
- 40 — PROPOSED CONTOUR LINE
- EX. STONE WALL
- EX. TREELINE
- EX. TREE TO BE REMOVED
- EX. CHAINLINK FENCE
- EX. RETAINING WALL
- EX. WIRE FENCE
- EXISTING CATCH BASIN/MANHOLE
- PROPOSED CATCH BASIN/MANHOLE
- PROPOSED YARD DRAIN
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- PROPOSED STORM SEWER
- PROPOSED SANITARY SEWER
- E — E — EXISTING ELECTRICAL LINE
- T — T — EXISTING TELEPHONE LINE
- G — G — EXISTING GAS LINE
- W — W — EXISTING WATER LINE
- GV — EXISTING GAS VALVE
- WV — EXISTING WATER VALVE
- GS — PROPOSED GAS SERVICE
- WS — PROPOSED WATER SERVICE
- FS — PROPOSED FIRE SERVICE
- EX. FIRE HYDRANT
- EX. POLE W/ ANCHOR
- EX. STREET SIGN
- EX. BASKETBALL HOOP

CONSTRUCTION NARRATIVE:

THIS PROJECT IS COMPRISED OF THE CONSTRUCTION OF A NEW BUILDING ADDITION TO ADD 12 NEW CLASSROOMS. 11 NEW PARKING SPACES SHALL BE PROVIDED ON THE SOUTH SIDE OF THE WEST PARKING LOT. BUILDING CONSTRUCTION MACHINES AND EQUIPMENT WILL ACCESS THE SITE THROUGH THE WEST PARKING LOT. A 1:1 ROCK SLOPE WILL BE EXCAVATED ON THE WEST SIDE TO PROVIDE ROOM FOR THE NEW BUILDING AND WALKWAY. CONSTRUCTION MATERIAL WILL BE STORED ADJACENT TO THE NEW BUILDING.

GENERAL CONSTRUCTION NOTES:

1. EXISTING UTILITIES, TOPOGRAPHY AND PROPERTY LINE INFORMATION SHOWN ON THIS PLAN IS TAKEN FROM EXISTING RECORDS AND FIELD SURVEY PERFORMED BY CARROCCIO-COVILL AND ASSOCIATES, LLC. REFER TO "PROPERTY & TOPOGRAPHIC SURVEY CENTRAL MIDDLE SCHOOL", DATED AUGUST 27, 1997 FOR ADDITIONAL INFORMATION.
2. EXISTING SUBSURFACE STRUCTURES AND UTILITIES HAVE BEEN DETERMINED FROM EXISTING RECORDS. THESE RECORDS ARE NOT GUARANTEED TO BE COMPLETE OR ACCURATE. TO AVOID CONFLICT WITH THE PROPOSED WORK AND EXISTING UTILITIES, THE CONTRACTOR SHALL CHECK EXISTING INVERTS AND PERTINENT DATA, EXCAVATE TEST HOLES AND NOTIFY "CALL BEFORE YOU DIG". IF A CONFLICT EXISTS, PROMPTLY NOTIFY THE DESIGN ENGINEER PRIOR TO CONSTRUCTION.
3. ALL SITE CONSTRUCTION SHALL CONFORM TO THE TOWN OF GREENWICH STANDARD SPECIFICATIONS AND THE CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENT CONTROL. IN THE ABSENCE OF TOWN STANDARDS, REFER TO THE STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION FORM 814.
4. ALL STORM SEWER PIPE SHALL BE REINFORCED CONCRETE PIPE (RCP) WITH MORTARED JOINTS. CATCH BASINS AND YARD DRAINS SHALL BE PRECAST CONCRETE WITH 4" SUMPS.
5. WATER SERVICE TO THE PROPOSED BUILDING SHALL BE PROVIDED BY CONNECTICUT AMERICAN WATER COMPANY VIA THE EXISTING WATER SERVICE SERVING THE SCHOOL.
6. SANITARY SEWER, ELECTRIC, TELEPHONE AND OTHER UTILITY SERVICES SHALL BE PROVIDED FROM THE EXISTING SCHOOL BUILDINGS.
7. GENERAL FILL SHALL BE CLEAN, FREE DRAINING AND FREE OF ORGANIC MATERIAL WITH NO STONES LARGER THAN 8 INCHES. APPROVAL OF THE FILL MATERIAL IS REQUIRED BY THE DESIGN ENGINEER.
8. A 4" LAYER OF TOPSOIL SHALL BE SPREAD OVER ALL LAWN, LANDSCAPE AND SLOPE AREAS. FINAL SEEDING OF DISTURBED AREAS SHALL BE COMPLETED AS SOON AS PRACTICABLE AND COVERED WITH HAY TO PREVENT EROSION DURING THE GERMINATION PERIOD.
9. ALL EROSION AND SEDIMENT CONTROL MEASURES WILL BE INSTALLED PRIOR TO CONSTRUCTION WHENEVER POSSIBLE. REFER TO DRAWING C002 FOR ADDITIONAL SOIL & EROSION CONTROL NOTES.
10. REFER TO DRAWING C002 "CONSTRUCTION NOTES AND DETAILS" FOR ADDITIONAL INFORMATION.

STRUCTURE DATA TABLE

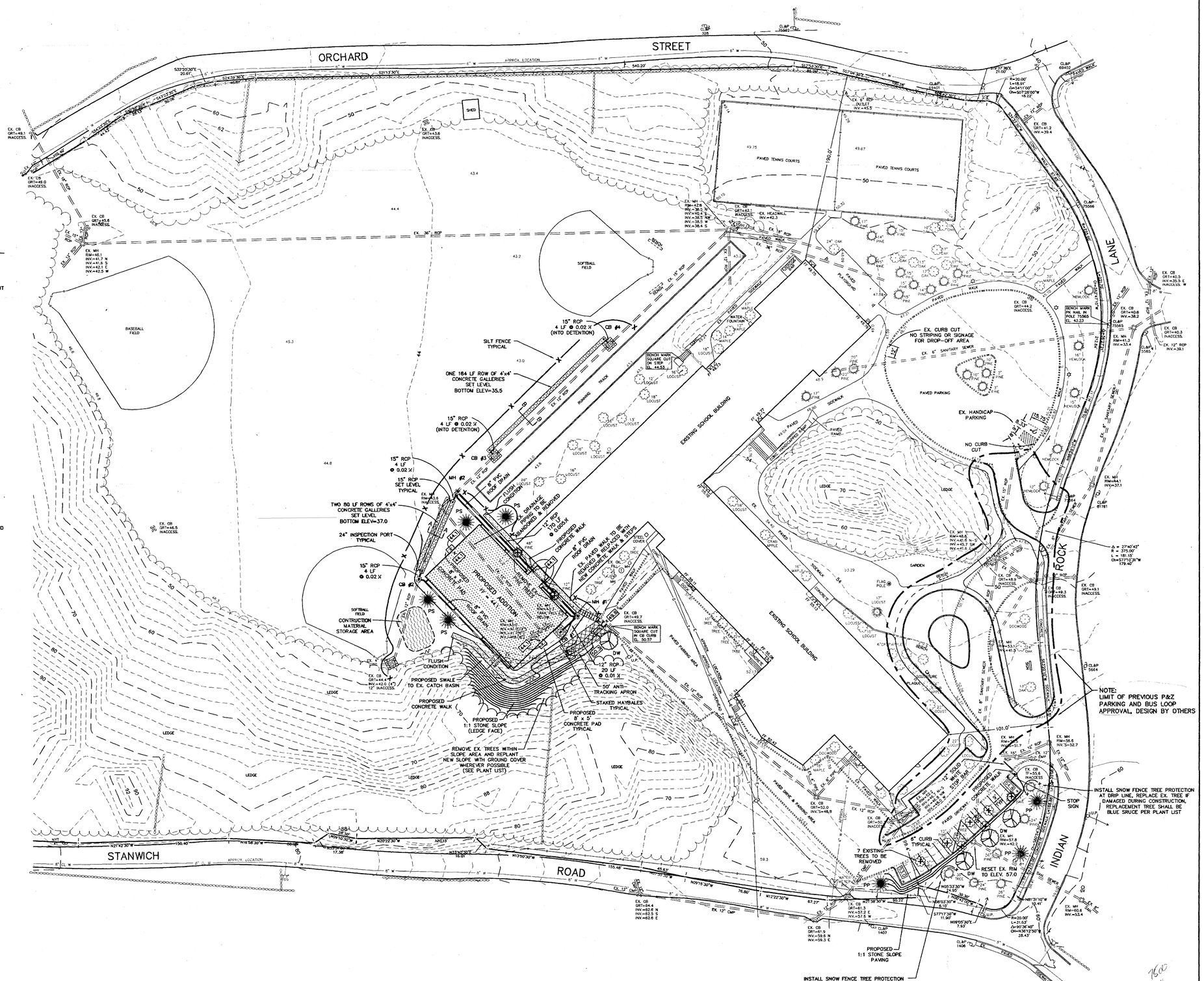
STRUCTURE	GRT/RIM	INV. IN	INV. OUT	TYPE
CB #1	43.5	41.7	41.7	"C-L"
CB #2	43.8	41.0(EX.) 39.6	39.6	"C-L"
CB #3	42.6	41.0(ROOF) 40.4(EX.) 38.2(DET.)	40.3(EX.)	"C-L"(EX.)
CB #4	42.6	39.4(EX.) 38.2(DET.)	39.3(EX.)	"C-L"(EX.)
MH #1	43.9	41.5(CB #1) 41.8(ROOF)	41.5	"STORM"
MH #2	43.1	40.8(ROOF) 40.7(MH #1) 39.4(DET.)	40.6	"STORM"

ZONING DATA TABLE:

LOCATION:		9 INDIAN ROCK LANE
ZONE:		R-12
LOT AREA:		21.72 ACRES (946,123 SQUARE FEET)
BUILDING SQUARE FOOTAGE:	EXISTING:	91,617
	PROPOSED:	19,800
	TOTAL:	111,417
BUILDING FOOTPRINT:	EXISTING:	66,547
	PROPOSED:	9,900
	TOTAL:	76,547
FLOOR AREA RATIO:	ALLOWED:	.35
	EXISTING:	.0968
	PROPOSED:	.1178
SITE COVERAGE:	EXISTING:	128,066(13.53%)
	PROPOSED:	144,184(15.24%)
PARKING SPACES:	EXISTING:	108
	PROPOSED:	121
NUMBER OF FACILTY AND STAFF:	EXISTING:	78
	PROPOSED:	97
NUMBER OF STUDENTS:	EXISTING:	514
	PROPOSED:	692(PEAK @ 2002)
BUILDING HEIGHT:	EXISTING:	21'-8" 27'-0"
	PROPOSED:	24'-4"

PLANT LIST:

QTY.	KEY	BOTANICAL NAME	COMMON NAME	SIZE	ROOT
3	PP	Picea pungeus var. glanca	BLUE SPRUCE	8'-10'	B&B
4	DW	Malus "Donald Wyman"	DONALD WYMAN "CRABAPPLE"	8'-10'	B&B
4	PS	Pinus strobus	WHITE PINE	8'-10'	B&B
25	PT	Parthenoussus tricuspidata	BOSTON IVY	1 GAL.	CONT.



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FLETCHER-THOMPSON, INC.
TWO WORLD TRADE PLAZA
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO

CENTRAL MIDDLE SCHOOL

INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

SITE GRADING, UTILITY, LAND-SCAPE AND SOIL & EROSION CONTROL PLAN

NO	DATE	REVISION	BY
6	4-28-98	REVISED & ISSUED TO P&Z	HWM
5	3-24-98	ISSUED TO D.O.E.	HWM
4	12-31-97	REVISED & ISSUED TO P&Z	HWM
3	11-12-97	ADDED PREV. APPROVED BUS LOOP/PARKING IMP.	HWM
2	10-20-97	ISSUED TO P&Z	HWM
1	9-22-97	ISSUED FOR SCHEMATIC DESIGN	HWM

DATE	9/22/97
SCALE	1"=40'
PROJECT NO.	50950.06
DRAWING NO.	C001

3

7500
3-4th 11-12
$228,800
Final 325,800

BQ #70 & 125 Attachment

SEDIMENT AND EROSION CONTROL NARRATIVE:

THE PURPOSE OF THE SEDIMENT AND EROSION CONTROL PLAN, DETAILS AND NOTES IS TO OUTLINE A PROGRAM THAT MINIMIZES THE SOIL EROSION DURING CONSTRUCTION. THE PRIMARY POLICIES OF THIS PROGRAM ARE:

A) AVOIDANCE & MINIMIZATION BY RETAINING THE NATURAL VEGETATION WHENEVER FEASIBLE AND EXPOSE THE SMALLEST PRACTICAL AREA AT ONE TIME.
B) TRAPPING PARTICLES AT THE SOURCE BY PROMPTLY STABILIZING AND REVEGETATING DISTURBED AREAS.
C) AVOIDING THE CONCENTRATION OF WATER AND RUNOFF.
D) AVOIDING THE CONTAMINATION OF STORM DRAINS.
E) MAINTAINING THE EROSION CONTROLS TO ENSURE THAT THEY ARE FUNCTIONING PROPERLY BY PERFORMING WEEKLY INSPECTIONS AND AFTER STORM EVENTS.
F) DISPOSAL OF COLLECTED SILT AND SEDIMENT LEGALLY AND IN KEEPING WITH THE INTENT OF THIS PLAN.

CONSTRUCTION SEQUENCE:

A. GENERAL
1. PROJECT START: SPRING 1998
PROJECT COMPLETION: FALL 1999
BASED ON RECEIVING TIMELY APPROVALS
2. THE PROPOSED CONSTRUCTION SEQUENCE IS PROVISIONAL.

B. SITE PREPARATION
1. REVIEW THE SEDIMENT AND EROSION CONTROL PLAN WITH THE CONSTRUCTION TEAM, SITE ENGINEER AND INLAND WETLANDS OFFICER.
2. DELINEATE THE LIMITS OF DISTURBANCE AND ESTABLISH THE STAGING AREAS, CONSTRUCTION TRAILER LOCATIONS AND TEMPORARY UTILITIES.
3. INSTALL THE TRACKING PAD FOR THE CONSTRUCTION ACCESS AND INSTALL SILT FENCE ALONG THE LIMITS OF DISTURBANCE AS SHOWN ON THE PLANS.
4. INSTALL ADDITIONAL SOIL AND EROSION CONTROLS AS REQUIRED.
5. FLAG AND/OR FENCE OFF ALL TREES TO BE PROTECTED.
6. CUT TREES TO BE REMOVED AND GRUB AREAS TO BE CLEARED WITHIN THE DEVELOPMENT ENVELOPE AS APPROPRIATE.
7. STRIP TOPSOIL AND STOCKPILE IN DESIGNATED AREAS. SURROUND TOPSOIL WITH SILT FENCE TO CONTAIN SEDIMENTS.

C. GENERAL SITE CONSTRUCTION:
1. PERFORM GENERAL EARTHWORK ACTIVITIES INCLUDING EXCAVATION AND FILLING AS REQUIRED.
2. ABANDON EXISTING UTILITIES AS MAY BE INDICATED ON THE PLANS.
3. ROUGH GRADE AND EXCAVATE THE BUILDING AREA AND PREPARE THE BUILDING SUBGRADE.
4. INSTALL THE STORM SEWER AND ADDITIONAL SEDIMENT AND EROSION CONTROLS ASSOCIATED WITH THE NEW STORM SEWER.
5. EXCAVATE AND ROUGH GRADE THE PROPOSED PARKING AREA. STABILIZE STEEP SLOPES ADJACENT TO THE NEW PARKING.
6. CONSTRUCT THE LANDSCAPE SLOPES AND SEED AND MULCH ALL LANDSCAPE AREAS.
7. STABILIZE DISTURBED AREAS AS SOON AS PRACTICAL.

D. DUST CONTROL:
1. PREVENT BLOWING AND MOVEMENT OF DUST FROM EXPOSED SOIL SURFACES, AND REDUCE THE PRESENCE OF DUST WHICH MAY CAUSE OFF-SITE DAMAGE, BE A HEALTH HAZARD TO HUMANS, WILDLIFE AND PLANTLIFE, OR REDUCE TRAFFIC SAFETY HAZARD.
2. THIS MEASURE IS APPLICABLE TO AREAS SUBJECT TO DUST BLOWING AND SOIL MOVEMENT WHERE ON-SITE AND OFF-SITE DAMAGE IS LIKELY TO OCCUR IF PREVENTIVE MEASURES ARE NOT TAKEN.
3. USE TRAFFIC CONTROL TO RESTRICT TRAFFIC TO PREDETERMINED ROUTES. MAINTAIN AS MUCH NATURAL VEGETATION AS IS PRACTICABLE. USE PHASING OF CONSTRUCTION TO REDUCE THE AREA OF LAND DISTURBED AT ANY ONE TIME. THE USE OF TEMPORARY MULCHING, PERMANENT MULCHING, TEMPORARY VEGETATIVE COVER, OR SODDING WILL REDUCE THE NEED FOR DUST CONTROL. USE MECHANICAL SWEEPERS ON PAVED SURFACES WHERE NECESSARY TO PREVENT DUST BUILD UP. STATIONARY SOURCES OF DUST, I.E., ROCK CRUSHERS SHOULD UTILIZE FINE WATER SPRAYS TO CONTROL DUST.
4. INSTALLATION REQUIREMENTS
A. WATER –
THE EXPOSED SOIL SURFACE SHOULD BE MOISTENED PERIODICALLY WITH ADEQUATE WATER TO CONTROL DUST.
B. STONE –
COVER SURFACES WITH CRUSHED STONE OR COARSE GRAVEL. IN AREAS ADJACENT TO WATERWAYS USE CHEMICALLY STABLE AGGREGATE.
5. WHEN TEMPORARY DUST CONTROL MEASURES ARE USED, REPETITIVE TREATMENT SHALL BE APPLIED AS NEEDED TO ACCOMPLISH CONTROL.

E. GENERAL BUILDING CONSTRUCTION:
1. INSTALL THE BUILDING FOUNDATIONS AND FLOOR SLABS.
2. BACKFILL THE FOUNDATIONS AND CONNECT BUILDING UTILITIES.
3. CONSTRUCT THE BUILDING SUPERSTRUCTURE.
4. FINE GRADE ALL DISTURBED AREAS, STABILIZE AND SEED AS SOON AS PRACTICAL.
5. INSTALL PAVING ON DRIVES AND PARKING AREAS. COMPLETE ALL WALKWAYS AND SITE HARDSCAPE.
6. INSTALL LANDSCAPE PLANTINGS AND SEED.

F. GENERAL CLEAN UP:
1. REMOVE TEMPORARY SEDIMENT AND EROSION CONTROLS.
2. MAINTAIN PERMANENT SEDIMENT AND EROSION CONTROLS.
3. COMPLETE ALL PUNCH LIST ITEMS.

GENERAL SEDIMENT AND EROSION CONTROL NOTES:

1. SEDIMENT AND EROSION CONTROL MEASURES SHALL BE INSTALLED PRIOR TO THE START OF CONSTRUCTION.
2. COORDINATE THE CONSTRUCTION PHASING WITH THE TOWN OF GREENWICH INLAND WETLANDS AGENCY STAFF PRIOR TO BEGINNING WORK IN EACH PHASE.
3. EXISTING TREES TO BE SAVED SHALL BE PROTECTED BY FLAGGING AND/OR SNOW FENCING AT THE DRIP LINE WHICH SHALL BE MAINTAINED DURING CONSTRUCTION.
4. ANTI-TRACKING APRONS SHALL BE INSTALLED AT THE START OF CONSTRUCTION AND MAINTAINED THROUGHOUT CONSTRUCTION. APRONS SHALL CONSIST OF 2"- 4" CRUSHED STONE WITH A MINIMUM THICKNESS OF 4 INCHES. EACH APRON SHALL BE APPROXIMATELY 50 FEET LONG AND EXTEND THE WIDTH OF THE CONSTRUCTION ACCESS. THE LOCATION OF THE TRACKING PADS MAY CHANGE DURING THE VARIOUS PHASES OF CONSTRUCTION.
5. SILT FENCE AND OTHER SEDIMENT CONTROL MEASURES MUST BE INSTALLED IN ACCORDANCE WITH THE DRAWINGS AND SPECIFIC MANUFACTURER'S RECOMMENDATIONS.
6. SILT FENCE SHALL BE MIRAFI ENVIROFENCE OR EQUIVALENT APPROVED BY THE DESIGN ENGINEER. FILTER FABRIC SHALL BE MIRAFI 100X OR EQUIVALENT.
7. ADDITIONAL SEDIMENT AND EROSION CONTROLS MAY BE INSTALLED DURING THE CONSTRUCTION PERIOD IF FOUND NECESSARY BY THE INSPECTING ENGINEER OR ANY GOVERNING AGENCY.
8. AFTER EACH STORM EVENT OR AT LEAST ONCE WEEKLY, ALL SEDIMENT AND EROSION CONTROLS WILL BE INSPECTED. CORRECTIVE MEASURES TO MITIGATE ENVIRONMENTAL CONCERNS WILL BE ORDERED BY THE DESIGN ENGINEER OR GOVERNING AGENCY IF REQUIRED.
9. ALL PERMANENT AND TEMPORARY SEDIMENT CONTROL MEASURES WILL BE MAINTAINED IN EFFECTIVE CONDITION THROUGHOUT THE CONSTRUCTION PERIOD. UPON COMPLETION OF WORK, ALL TEMPORARY SEDIMENT CONTROL DEVICES SHALL BE REMOVED FROM THE SITE AND ANY COLLECTED SEDIMENTS FROM THE DEVICES AND CATCH BASINS SHALL BE DISPOSED OF LEGALLY AND IN KEEPING WITH THE INTENT OF THIS PLAN.
10. DUST CONTROL SHALL BE ACHIEVED WITH WATERING DOWN THE DISTURBED AREAS AS REQUIRED.
11. UPON THE INSTALLATION OF CATCH BASINS, IMMEDIATELY SURROUND THEM WITH HAYBALES AS PER THE DETAIL AND/OR PROVIDE SILT SACKS FOR THE BASIN TOPS.
12. ALL DEWATERING PUMPING MUST HAVE SEDIMENT AND EROSION CONTROL PROVISIONS TO MAINTAIN CLEAR WATER DISCHARGE. IF TRENCH DEWATERING IS REQUIRED, PUMP DISCHARGE SHALL PASS THROUGH A SEDIMENT FILTER TO OBTAIN CLEAR WATER DISCHARGE.
13. LAND DISTURBANCE SHALL BE KEPT TO A MINIMUM. ALL DISTURBED AREAS SHALL BE SEEDED AND MULCHED.
14. EFFECTED PORTIONS OF OFFSITE ROADS MUST BE SWEPT CLEAN WHEN REQUIRED OR AT LEAST ONCE A WEEK DURING CONSTRUCTION.
15. ALL EROSION AND SEDIMENTATION CONTROL MEASURES WILL BE CONSTRUCTED IN ACCORDANCE WITH THE STANDARDS AND SPECIFICATIONS OF THE "CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENT CONTROL," DATED JANUARY 1985.

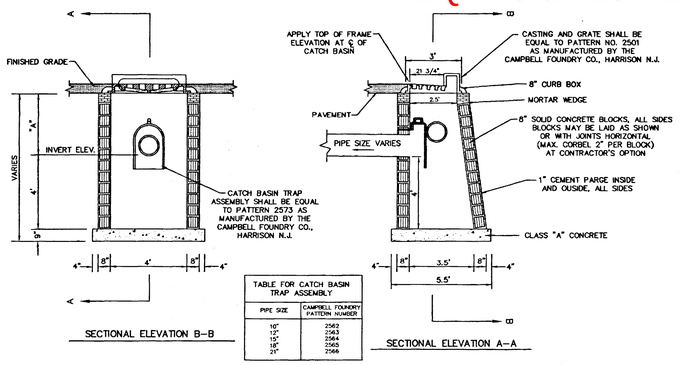
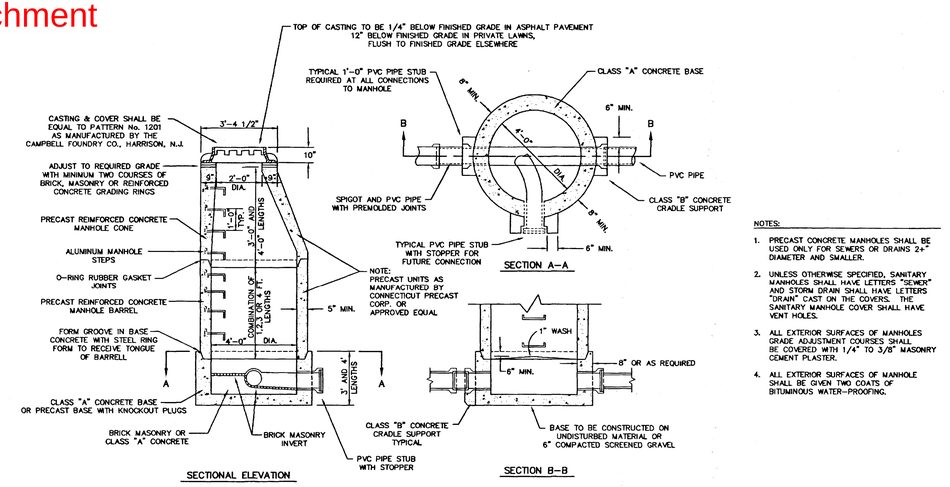


TABLE FOR CATCH BASIN TRAP ASSEMBLY

PIPE SIZE	CAMPBELL FOUNDRY PATTERN NUMBER
10"	2562
12"	2563
15" AND 18"	2564
24"	2565
30"	2566

NOTES:
1. DIMENSION "A" SHALL BE CONSISTENT WITH INVERT ELEVATION SHOWN ON CONTRACT DRAWING. WHEN NO INVERT ELEVATION IS SPECIFIED DIMENSION "A" SHALL BE SUCH AS TO PROVIDE MINIMUM OF 2'-6" COVER OVER PIPE.
2. INCREASE WALL THICKNESS TO 12" FOR THOSE PORTIONS OF WALL AT DEPTHS GREATER THAN 8'. INSIDE DIMENSIONS TO REMAIN THE SAME, FOOTING SIZE TO BE INCREASED 8".

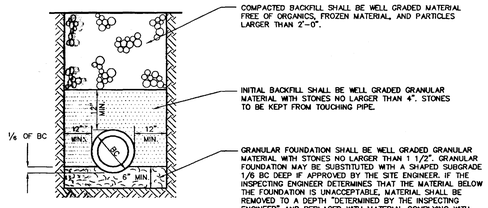
CATCH BASIN TYPE "C-1"
N.T.S.



NOTES:
1. PRECAST CONCRETE MANHOLES SHALL BE USED ONLY FOR SEWERS OR DRAINS 2+" DIAMETER AND SMALLER.
2. UNLESS OTHERWISE SPECIFIED, SANITARY MANHOLES SHALL HAVE LETTERS "SEWER" AND STORM DRAIN SHALL HAVE LETTERS "DRAIN" CAST ON THE COVERS. THE SANITARY MANHOLE COVER SHALL HAVE VENT HOLES.
3. ALL EXTERIOR SURFACES OF MANHOLES GRADE ADJUSTMENT COURSES SHALL BE COVERED WITH 1/4" TO 3/8" MASONRY CEMENT PLASTER.
4. ALL EXTERIOR SURFACES OF MANHOLE SHALL BE GIVEN TWO COATS OF BITUMINOUS WATER-PROOFING.

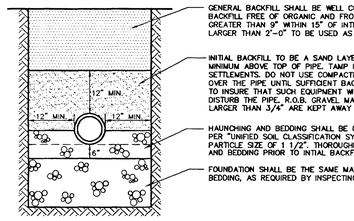
PRECAST CONCRETE MANHOLE TYPE P2
N.T.S.

ALL MATERIAL TO BE COMPACTED TO 95% OF THE MAXIMUM DRY DENSITY AS DETERMINED BY ASTM D1557 EXCEPT "COMPACTED BACKFILL" NOT UNDER PAVEMENT WHICH SHALL BE COMPACTED TO A DENSITY AT LEAST EQUAL TO THAT OF THE ADJACENT UNDISTURBED MATERIAL.

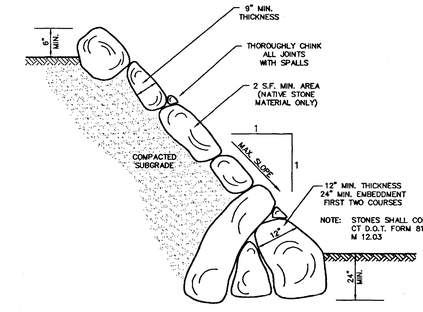


RCP PIPE TRENCH BEDDING DETAIL
N.T.S.

NOTE: GENERAL BACKFILL SHALL BE COMPACTED TO A DENSITY AT LEAST EQUAL TO THAT OF THE ADJACENT UNDISTURBED MATERIAL. ALL OTHER MATERIAL TO BE COMPACTED TO 95% OF THE MAXIMUM DRY DENSITY AS DETERMINED BY ASTM D1577. TAMPING AND COMPACTION TO BE IN ACCORDANCE WITH THE MANUFACTURERS INSTALLATION MANUAL AND ASTM D2821. GENERAL BACKFILL UNDER PAVEMENT TO BE COMPACTED TO 95% DENSITY.



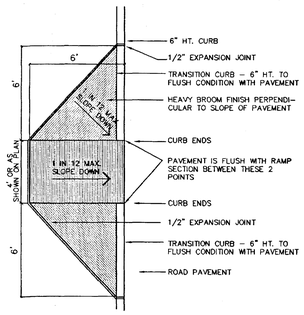
PVC TRENCH BEDDING DETAIL
N.T.S.



NOTE: STONES SHALL CONFORM TO CT D.O.T. FORM 814, SECTION M 12.03

STONE SLOPE PAVING DETAIL
N.T.S.

NOTE: ALL WORK SHALL CONFORM TO CT D.O.T. FORM 814 SECTION 7.05



ACCESSIBLE CURB/RAMP
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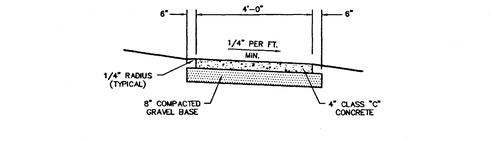
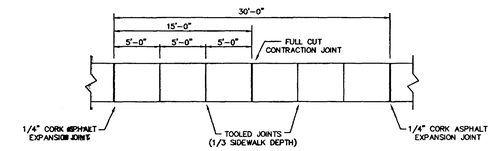
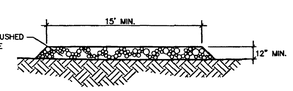




CONCRETE SIDEWALK DETAIL
N.T.S.



TYPICAL ANTI-TRACKING APRON
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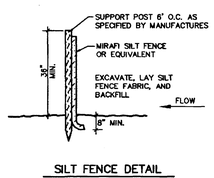

SILT FENCE DETAIL
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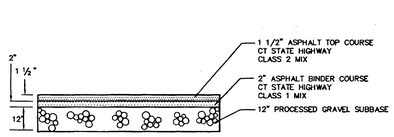

PAVEMENT DETAIL
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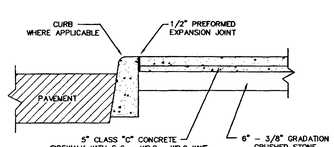

REINFORCED CONCRETE SIDEWALK
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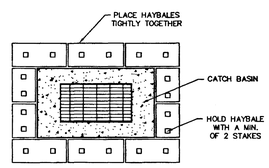

HAYBALE RING DETAIL
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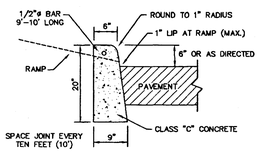

CONCRETE CURB
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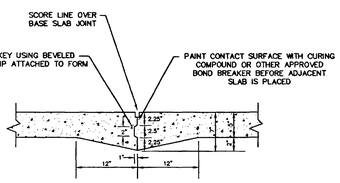

CONTRACTION JOINT DETAIL
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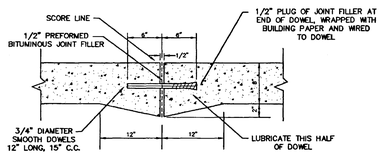

EXPANSION JOINT DETAIL
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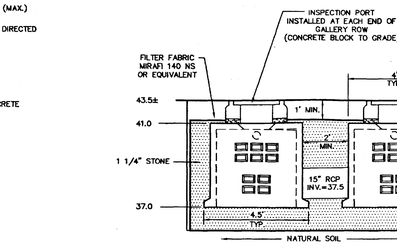

YARD DRAIN DETENTION DETAIL SECTION A-A
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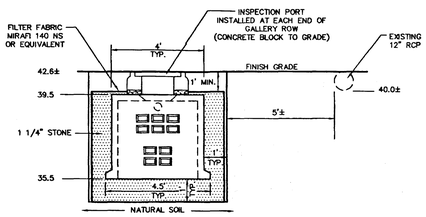

YARD DRAIN DETENTION DETAIL SECTION B-B
N.T.S.

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PROFESSIONAL SEAL

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PROJECT ENGINEER: H. McCHORD
DRAWN BY: D. SULLA

FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN
FLETCHER-THOMPSON, INC.
TWO WORLD TRADE PLAZA
BRIDGEPORT, CT 06604-3944

PROJECT TITLE
ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE
CONSTRUCTION NOTES & DETAILS

NO	DATE	REVISION	BY
4	3-24-98	ISSUED TO D.O.E.	HWM
3	12-31-97	REVISED & ISSUED TO P&Z	HWM
2	10-20-97	ISSUED TO P&Z	HWM
1	9-22-97	ISSUED FOR SCHEMATIC DESIGN	HWM

DATE: 9/22/97
SCALE: AS SHOWN
PROJECT NO.: 50950.06
DRAWING NO.: C002
4

PRINTED BY NATIONAL DIRECT - 518-372-9985 - TEMP484.ILL - 11/19/98 4:02:08 PM

file: 551m2

BQ #70 & 125 Attachment

LEGEND

- PROPERTY LINE
- STONE WALL
- CURBING
- MANHOLE (MH)
- SANITARY SEWER MANHOLE (S)
- DRAINAGE MANHOLE (D)
- CATCH BASIN
- GAS VALVE (GV)
- WATER VALVE (WV)
- FIRE HYDRANT
- UTILITY POLE WITH ANCHOR
- STREET SIGN
- TEST BORING
- RETAINING WALL
- CHAIN LINK FENCE
- WOODEN FENCE
- GAS LINE (G)
- WATER LINE (W)
- ELECTRIC LINE (E)
- TELEPHONE LINE (T)
- TREE LINE
- EXISTING CONTOUR (200)
- EXISTING SPOT ELEVATION (202.77)
- BASKETBALL HOOP

PROPERTY & TOPOGRAPHIC SURVEY
CENTRAL MIDDLE SCHOOL
INDIAN ROCK LANE
GREENWICH, CONNECTICUT

NOTES:
- BOUNDARY DETERMINATION CATEGORY: RESURVEY
- VERTICAL DATUM BASED ON N.G.V.D.
- REFER TO TOWN CLERK MAPS 3472, 5728, 4209, 3708, 4108 AND 3483 ON FILE IN GREENWICH LAND RECORDS.
- REFER TO SITE, UTILITY AND DRAINAGE PLANS FOR CENTRAL JUNIOR HIGH SCHOOL GREENWICH, CONN. PREPARED APRIL 1957 BY SHERWOOD, MILLS AND SMITH ARCHITECTS, STAMFORD, CT.
- OFFSETS ARE TO THE FACE OF THE STRUCTURE.

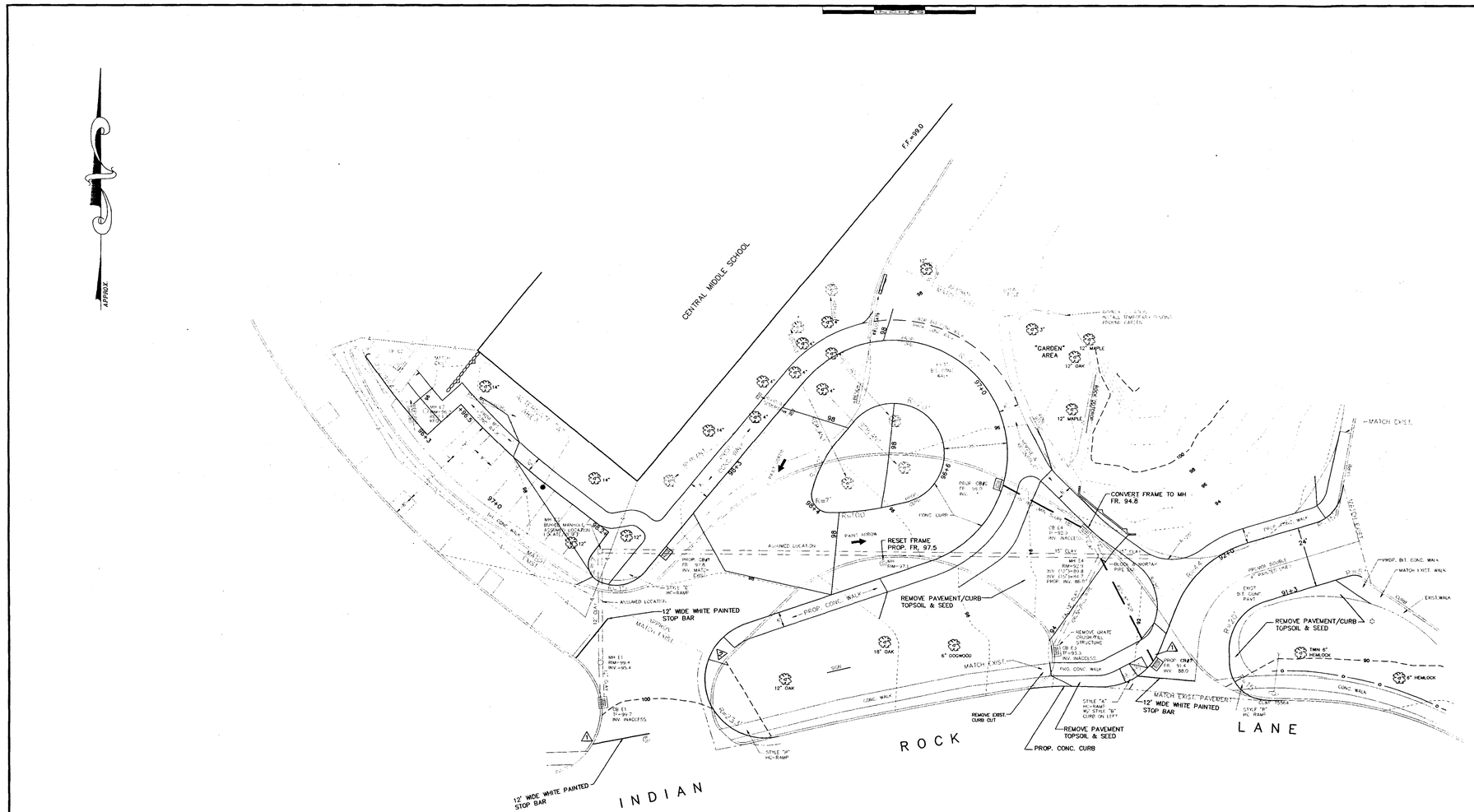
I HEREBY DECLARE THAT TO MY KNOWLEDGE AND BELIEF, THIS MAP IS SUBSTANTIALLY CORRECT AS NOTED HEREON. THIS SURVEY CONFORMS TO THE STANDARDS OF A CLASS A-2 SURVEY AND WAS PREPARED IN ACCORDANCE WITH SECTIONS 20-300b-1 THROUGH 20-300b-20 OF THE REGULATIONS OF CONNECTICUT STATE AGENCIES AND THE MINIMUM STANDARDS FOR SURVEYS AND MAPS IN THE STATE OF CONNECTICUT AS ADOPTED BY THE CONNECTICUT ASSOCIATION OF LAND SURVEYORS, INC. ON SEPTEMBER 26, 1996.

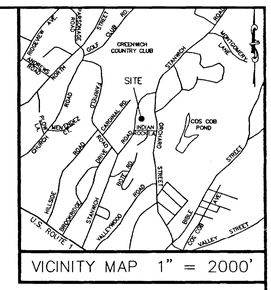
STEPHEN R. LATOUR, R.L.S. CT LIC. #15456
NOT VALID WITHOUT EMBOSSED SEAL

CCA
ENGINEERING-SURVEYING-ENVIRONMENTAL
40 Old New Milford Road, Brookfield, CT 06804, (203) 775-6207
33 Ridge Green Drive, Enfield, CT 06759, (203) 567-3179

By: G.P.O. | Scale: 1" = 40' | Sheet 1 of 1
Date: 8 / 27 / 97 | Project No. 97-199 | Drawing No. 1993

BQ #70 & 125 Attachment





LEGEND

UTILITY POLE W/ANCHOR	
CHAIN FENCE	
STONE WALL	
EXIST. CATCH BASIN	
PROP. CATCH BASIN	
PROP. DRAINAGE	
EXISTING CONTOUR	310
EXISTING SPOT ELEVATION	311.5
PROPOSED CONTOUR	98
PROPOSED SPOT ELEVATION	311+5
ROCK OUTCROP	
MANHOLE	MH
LIGHT POLE	
RETAINING WALL	
"ALTERNATE A" LIMIT	
PROP. TRAFFIC SIGN	

SIGNS

- PROPOSED STANDARD STOP SIGN
- PROPOSED "AUTHORIZED VEHICLES ONLY" SIGN

PROPOSED
BUS LANE IMPROVEMENTS

PREPARED FOR

CENTRAL MIDDLE SCHOOL
GREENWICH , CONNECTICUT

CCA
CARROCCIO-COVILL & ASSOCIATES, INC.
ENGINEERING-SURVEYING-ENVIRONMENTAL
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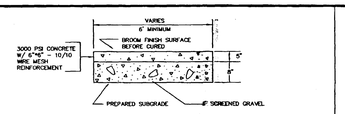
By: R.T.P.	Scale: 1" = 20'	Sheet 1 of 2
Date: 4/18/96	Project No.93-386SP	Drawing No. 1432

NOT VALID WITHOUT

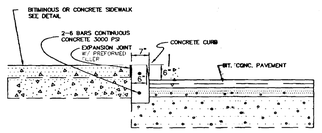
Date	Revisions

ORIGINAL SEAL



SIDEWALK DETAIL
N.T.S.

- PROVIDE EXPANSION JOINT W/ PREFORMED FILLER EVERY 25' MAXIMUM.
- PROVIDE TROWLED JOINTS EVERY 5'.
- ALL CONSTRUCTION JOINTS TO HAVE A KEY CONSTRUCTED.



CONCRETE SIDEWALK, PARKING & DRIVEWAY DETAIL
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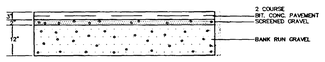
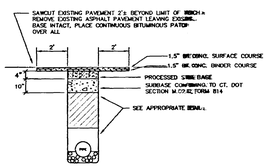
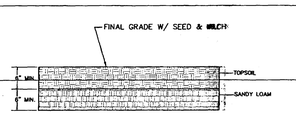


PARKING AND DRIVEWAY DETAIL
N.T.S.

PAVEMENT MATCHING DETAIL
N.T.S.



TYPICAL DETAIL
PAVEMENT PATCHING
N.T.S.



TOPSOIL DETAIL IN PAVEMENT REMOVAL AREAS
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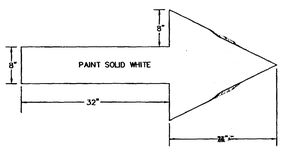
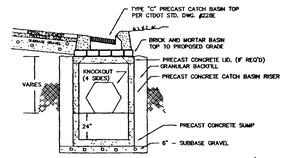
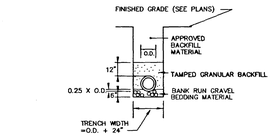


PAVEMENT MARKING DETAIL
N.T.S.



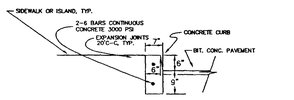
NOTE - 1) ALL PRECAST COMPONENTS TO BE ABLE TO WITHSTAND HS-20 WHEEL LOADING.
- 2) BACKFILL TO BE COMPACTED IN 8" LIFTS AROUND BASIN
- 3) TYPE C-1, OR C-G BASIN TOP MAY SUBSTITUTED ABOVE WHERE CALLED FOR ON THE PLANS.

DETAIL - PRECAST CATCH BASIN
WITH TYPE "C" CATCH BASIN TOP
SCALE 1/4"=1'-0"

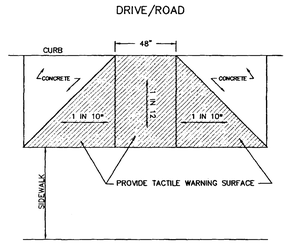


NOTE: 1) - PIPE SECTIONS TO BE JOINED IN ACCORDANCE WITH MANUFACTURERS' RECOMMENDATIONS.
2) - INSTALL ADDITIONAL 6" OF BEDDING MATERIAL FOR TRENCH IN LEDGE.

TYPICAL TRENCH SECTION
NTS

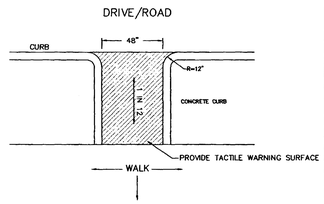


TYPICAL CONCRETE CURB
N.T.S.

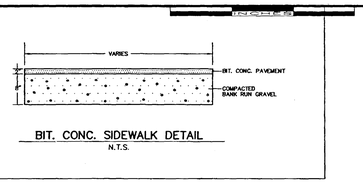


* IF ADJACENT SIDEWALK IS LESS THAN 4' WIDE THIS SLOPE SHALL BE 1IN 12.

CONCRETE HANDICAP RAMP STYLE "A"
N.T.S.



CONCRETE HANDICAP RAMP STYLE "B"
N.T.S.



BIT. CONC. SIDEWALK DETAIL
N.T.S.

NOTES:
- TOPOGRAPHIC AND BOUNDARY SURVEYED BY CCA AND BASED ON AN ASSUMED DATUM
- ALL CURBING TO BE PORTLAND CEMENT CONCRETE.
- PARKING AND DRIVEWAYS TO BE BITUMINOUS CONCRETE.
- CONTRACTOR IS RESPONSIBLE TO CONTACT "CALL BEFORE YOU DIG".
- CONTRACTOR TO CONFIRM LOCATION AND ELEVATION OF EXISTING DRAINAGE INCLUDING DRAINAGE WHOSE INVERTS AND LOCATION WERE INACCESSIBLE OR ASSUMED. ENGINEER TO BE NOTIFIED OF ANY DISCREPANCIES OR NECESSARY REVISIONS.
- ALL WORK TO CONFORM WITH THE REQUIREMENTS OF THE TOWN OF GREENWICH.
- IN ALL AREAS THAT ARE TO BE "MATCHED" INTO EXISTING CONDITIONS THE "MATCHING" TO BE AS SMOOTH A TRANSITION AS POSSIBLE. ALL JOINTS TO BE SEALED.
- MINIMUM DEPTH OF TOPSOIL TO BE 6".
- CONTRACTOR TO PROVIDE SHOP DRAWING FOR RELOCATION OF TREES. TREES SHALL BE STAKED W/ PROTECTION AGAINST CHAFING PROVIDED.
- CONTRACTOR TO PROVIDE AND INSTALL "GEOFOAM" OR EQUIVALENT SEDIMENTATION PROTECTION FOR ALL CATCH BASINS.
- ALL DISTURBED AREAS TO BE TOPSOILED, SEEDED & MULCHED OR LANDSCAPING PLACED AS SOON AS POSSIBLE TO PREVENT EROSION.
- CONTRACTOR TO PROPOSED TYPE OF TEMPORARY FENCING AROUND GARDEN AREA. SUCH FENCING SHALL BE MAINTAINED UNTIL THE END OF CONSTRUCTION. NO DISTURBANCE WITHIN THIS AREA SHALL BE PERMITTED WITHOUT PERMISSION.
- ALL TREES, SHRUBS, ETC TO REMAIN OR BE RELOCATED TO BE PROTECTED WITH FENCING OR BY OTHER APPROVED METHODS.
- CONTRACTOR TO PROVIDE, INSTALL AND MAINTAIN ALL NECESSARY EROSION CONTROLS.
- LAYOUT OF DRIVES, WALKS, ETC. TO BE APPROVED BY OWNER OR OWNER'S REPRESENTIVE.
- OWNER WILL BEING USE THE SITE AND BUILDINGS DURING THE CONSTRUCTION OF THE IMPROVEMENTS. CONTRACTOR TO COORDINATE ACCESS TO BUILDING AND PARKING AREAS.
- "ALTERNATE "A" AREA" REFERS TO AN ALTERNATE CONSTRUCTION OPTION THAT THE OWNER MAY OR MAY NOT CONSTRUCT.

NOTES & DETAILS
BUS LANE IMPROVEMENTS

PREPARED FOR

CENTRAL MIDDLE SCHOOL
GREENWICH , CONNECTICUT

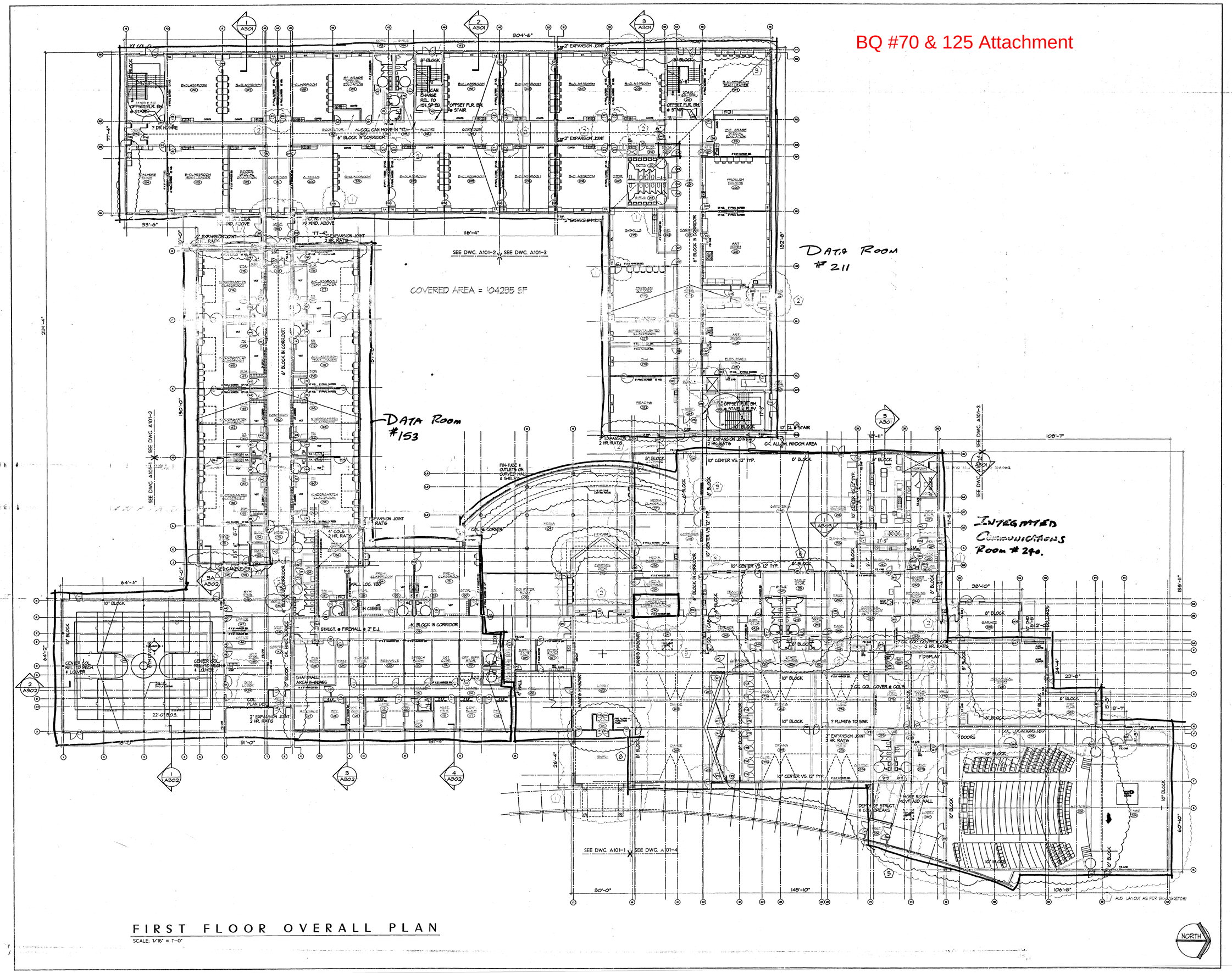
CCA
CARROCCIO-COVILL & ASSOCIATES, INC.
ENGINEERING-SURVEYING-ENVIRONMENTAL
40 Old New Milford Road
Brookfield, CT 06804
(203) 775-6207
33 Village Green Drive
Litchfield, CT 06759
(203) 567-3179

By: R.T.P.	Scale: AS NOTED	Sheet 2 of 2
Date: 4/18/96	Project No.93-386SP	Drawing No. 1432

NOT VALID WITHOUT ORIGINAL SEAL

Date	Revisions

BQ #70 & 125 Attachment



FIRST FLOOR OVERALL PLAN

SCALE: 1/16" = 1'-0"

CONSULTANTS

NOTES:

1. FOR ARCHITECTURAL LEGENDS, ABBREVIATIONS, PARTITION TYPES AND LINTEL SCHEDULE, SEE DRAWINGS G1001 AND G1002.
2. XXXXX
XXXXX

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PROGRESS PRINT
NOT FOR CONSTRUCTION

NO	DATE	REVISIONS	BY
8	1/5/95	PLAN REV'S.	S.E.M.
6	12/27/95	PLAN REV'S.	S.E.M.
5	12/19/95	PLAN REV'S.	S.E.M.
3	12/11/95	PLAN REV'S.	S.E.M.
2	[illegible]	[illegible]	[illegible]
1	[illegible]	[illegible]	S.E.M.

JMO	EF	MT	Acctg
FY	MAY 19 [illegible]		
SS			
Connecticut Office			
FILE			

PROJECT MANAGER: P. MYLER

PROJECT ARCHITECT OR ENGINEER: J. KANCPO

DESIGN ARCHITECT: J. A. SELLS

DRAWN BY: S. E. McNEECE

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ARCHITECTURE / ENGINEERING / INTERIOR DESIGN
FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

NEW WESTOVER ELEMENTARY SCHOOL

STILLWATER ROAD
STAMFORD, CONNECTICUT

REGIONAL MAGNET SCHOOL
STATE PROJECT NO. 135-178

DRAWING TITLE

FIRST FLOOR OVERALL PLAN

0 16' 32' 56'

DATE: MARCH 15, 1995

SCALE: 1/16" = 1'-0"

PROJECT NO.: 48100.06

DRAWING NO.: A101

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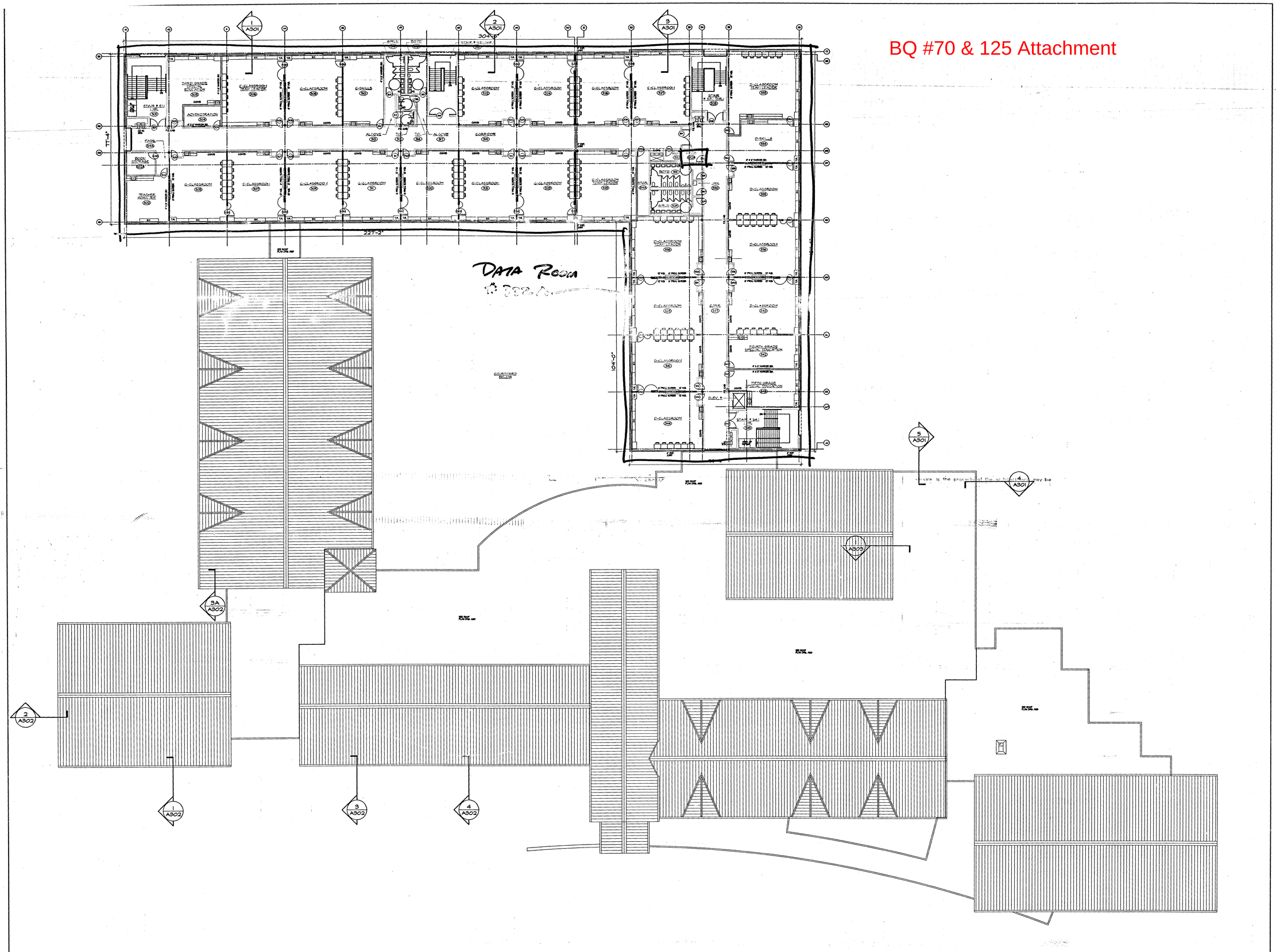
BQ #70 & 125 Attachment



SECOND FLOOR OVERALL PLAN

SCALE: 1/16" = 1'-0"

NORTH

CONSULTANTS

NOTES:

1. FOR ARCHITECTURAL LEGEND, PARTITION TYPES AND SCHEDULE, SEE DRAWINGS G1.0
2. XXXXX
XXXXX

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PROGRESS PRINT
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NO	DATE	REVISION	BY

J. Michael Orifici & Associates — RECEIVED
JMO | EF | NT | Acctg.
FY | MAY 19 1998
SS | Connecticut Office
FILE

PROJECT MANAGER: P. MYLER
PROJECT ARCHITECT OR ENGINEER: J. KANCRO
DESIGN ARCHITECT: J. A. SELLS
DRAWN BY: S. E. McNEECE

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FLETCHER-THOMPSON, INC
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

NEW WESTOVER ELEMENTARY SCHOOL

STILLWATER ROAD
STAMFORD, CONNECTICUT

REGIONAL MAGNET SCHOOL
STATE PROJECT NO. 135-178

DRAWING TITLE

SECOND FLOOR OVERALL PLAN

0 16' 32' 56'

DATE: MARCH 15, 1995

SCALE: 1/16" = 1'-0"

PROJECT NO.: 48100.06

DRAWING NO.: A102

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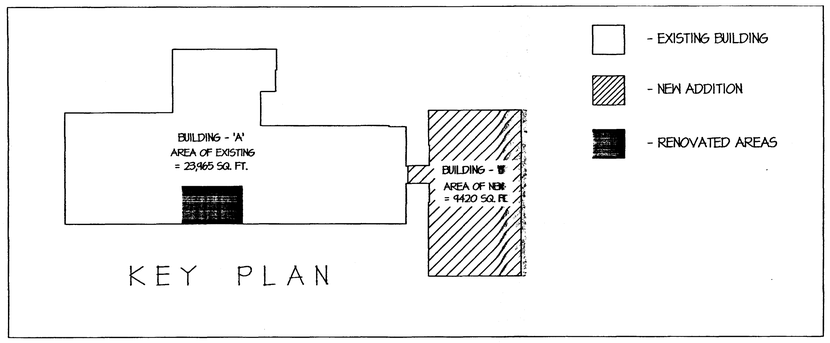


KEY PLAN

BQ #70 & 125 Attachment

EXISTING PASSENGER ELEVATOR INFORMATION

THE GROUND AND FIRST FLOOR OF THE ACADEMIC BUILDING IS ACCESSIBLE BY MEANS OF AN EXISTING PASSENGER ELEVATOR. THE PASSENGER ELEVATOR HAS AUTOMATIC OPERATION, SELF-LEVELING WITHIN 1/2-INCH OF THE FLOOR, DOOR REOPENING DEVICE, INTERIOR CAB SIZE OF 51 INCHES IN DEPTH BY 69 INCHES IN WIDTH AND A LEFT SIDE CAB DOOR WITH A CLEAR OPENING WIDTH OF 36 INCHES. THE CAR CONTROLS ARE LOCATED ON THE FRONT WALL RIGHT OF THE CAB DOOR, 3/4 INCHES IN SIZE WITH RAISED BUTTONS WHICH LIGHT WHEN CALL IS REGISTERED AND EXTINGUISHED WHEN ANSWERED, AND ARE IDENTIFIED WITH RAISED ARABIC CHARACTERS FOR NUMBERS WITH BRAILLE RIGHT OF THE BUTTON. THE VISUAL CAR POSITION INDICATOR IS LOCATED ABOVE THE CAR CONTROL PANEL. THE HALL CALL BUTTON IS KEY AND BUTTON OPERATION (3/4 INCHES IN SIZE WITH RAISED BUTTONS WHICH LIGHT WHEN CALL IS REGISTERED AND EXTINGUISHED WHEN ANSWERED) LOCATED ON THE WALL ADJACENT TO THE ELEVATOR HOISTWAY JAMBS AT 46 INCHES TO CENTERLINE ABOVE THE FLOOR. THE VISUAL SIGNALS ARE LOCATED ON THE WALL ABOVE THE CAB DOOR AND ARE ARROWS WHICH INDICATE THE DIRECTION OF TRAVEL. RAISED 2-INCH HIGH ALPHABET OR ARABIC CHARACTERS AND BRAILLE FLOOR DESIGNATIONS ARE PROVIDED AT 60 INCHES ABOVE THE FLOOR ON ONE SIDE OF THE HOISTWAY JAMB.

SYMBOLS LEGEND

CLASSROOM — ROOM NAME

(XXX) — ROOM NUMBER

154 / 20 = 30 P — ROOM OCCUPANCY LOAD
AREA IN SQUARE FEET
OCCUPANCY LOAD FACTOR

EXIT CAPACITY
36 / 165 — ACTUAL EGRESS OCCUPANCY OF DOOR OR STAIR
MAXIMUM ALLOWABLE EGRESS OCCUPANCY OF DOOR OR STAIR

AREA OF REFUGE
DIRECTIONAL SIGNAGE
WITH BATTERY BACKUP

—15— DIRECTION OF TRAVEL
WITH ACCUMULATED LOAD

—145'— MAXIMUM TRAVEL DISTANCE
FROM FURTHEST POINT

1 (ONE) HOUR FIRE RATED WALL
(TIGHT TO DECK ABOVE WHERE REQUIRED)

2 (TWO) HOUR FIRE RATED WALL
(TIGHT TO DECK ABOVE WHERE REQUIRED)
2 HOUR FIRE WALL WHERE NOTED

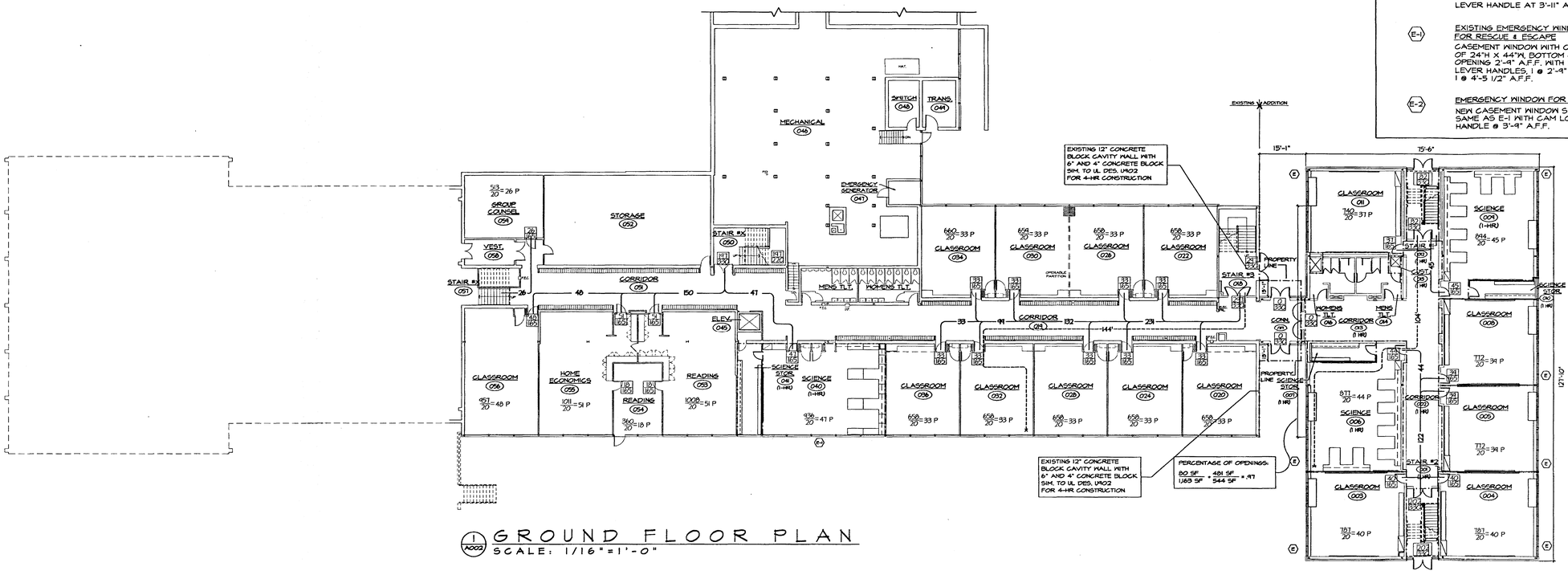
SMOKE BARRIER

PARTITION TO PREVENT THE PASSAGE OF SMOKE
REFER TO SHEET G1001 NOTE #16

(E) EMERGENCY WINDOW FOR RESCUE & ESCAPE
CASEMENT WINDOW WITH CLEAR OPENING OF 24"H X 36"W, BOTTOM OF CLEAR OPENING 2'-11" A.F.F. WITH CAM LOCKING LEVER HANDLE AT 3'-11" A.F.F.

(E-1) EXISTING EMERGENCY WINDOW FOR RESCUE & ESCAPE
CASEMENT WINDOW WITH CLEAR OPENING OF 24"H X 44"W, BOTTOM OF CLEAR OPENING 2'-9" A.F.F. WITH 2-CAM LOCKING LEVER HANDLES, 1 @ 2'-9" A.F.F. AND 1 @ 4'-5 1/2" A.F.F.

(E-2) EMERGENCY WINDOW FOR RESCUE & ESCAPE
NEW CASEMENT WINDOW SIZE AND HEIGHT SAME AS E-1 WITH CAM LOCKING LEVER HANDLE @ 3'-9" A.F.F.



(1/A002) GROUND FLOOR PLAN
SCALE: 1/16" = 1'-0"

CODE INFORMATION

BUILDING "A" - EXISTING

DATE OF ORIGINAL CONSTRUCTION: 1957 - (APPROX.)

1. USE GROUP CLASSIFICATION (302.0 - 313.0)
(Primary) USE GROUP "E" EDUCATIONAL
(Incidental) USE GROUP "A3" ASSEMBLEY
2. CONSTRUCTION TYPE (401.0)
TYPE 2-C UNPROTECTED, NON COMBUSTIBLE
Non Construction — TYPE 2-C UNPROTECTED, NON-COMBUSTIBLE
3. BUILDING HEIGHT (501.0, 503.0)
Existing Height (story/feet) — 2 STORIES / 22'-4"
4. BUILDING AREA (501.0 - 503.0)
Gross Building Area (Per Floor)

	EXISTING
Ground Floor	23,965 SF
First Floor	63,338 SF
Total	87,303 SF

5. EXISTING BUILDING IS NON-CONFORMING

BUILDING "B" - NEW

1. USE GROUP CLASSIFICATION (302.0 - 313.0)
(Primary) USE GROUP "E" EDUCATIONAL
2. CONSTRUCTION TYPE (401.0)
Minimum Type Required: TYPE 2-C UNPROTECTED, NON-COMBUSTIBLE
Actual Type Provided: TYPE 2-C UNPROTECTED, NON-COMBUSTIBLE
3. BUILDING HEIGHT (501.0, 503.0)
Allowable Height (story/feet) — 2 STORIES / 30'-0"
Actual Height (story/feet) — 2 STORIES / 22'-4"
4. BUILDING AREA (501.0 - 503.0)
Ground Floor 9,420 SF
Ground Floor 9,420 SF
Total 18,840 SF

5. AREA TABULATION - BUILDING "B"

Open Space:	75 FT N	112 FT E	128 FT W	75 FT S	
PERIMETER: 406 FT	OPEN PERIMETER:		390 FT (390/406 FT) =		79%
% Perimeter = (Open Perimeter/ Perimeter)					
% Tabular Area Increase 2 x (% Open Perimeter - 25%) =			(2)(79% - 25%) =		106%
% of Allowable Tabular Area (Table 501)					100%
% Reduction for Height (501.4)					-0%
% Increase for Open Perimeter (502.2)					+106%
% Increase for Full Fire Suppression (502.3)					+0%
Total Percentage Factor					=206%
Conversion Factor (% Factor/100)					2.06

A) Adjusted Tabular Area: 4,573 SF
(Actual Floor Area/Conversion Factor)(7,500/1.96)
B) Allowable Building Area per Floor:
(Conversion Factor x Tabular Area)
USE GROUP E-EDUCATIONAL (14,400 X 2.06) 29,664 SF
C) Actual Floor Area: (largest floor) 9,420 SF

6. MIXED-USE / SEPARATED USES (313.0):
NO MIXED USE

7. OCCUPANCY LOAD

DESIGN GROUND FLOOR	284 PERSONS
DESIGN FIRST FLOOR	205 PERSONS
DESIGN TOTAL FOR BUILDING	484 PERSONS

EXIT CAPACITY

GROUND FLOOR	990 PERSONS
FIRST FLOOR	660 PERSONS
TOTAL FOR BUILDING	1,650 PERSONS

NUMBER OF EXITS	# Required	# Provided
GROUND FLOOR:	2	3
FIRST FLOOR:	2	3
TOTAL:	4	6

TRAVEL DISTANCE

Allowable	150 FT
Provided	144 FT (MAX)

8. FIRE RESISTANT RATING OF STRUCTURE ELEMENTS - CONSTRUCTION TYPE 2-C

A) Exterior Walls (Load Bearing)	0 HRS
B) Fire Walls	2 HRS
C) Fire Separations	2 HRS
D) Smoke Barriers	1 HRS
E) Enclosures of Exits	1 HRS
F) Shafts	1 HRS
G) Exit Access Corridors	1 HRS
H) Separations	1 HRS
I) Interior Bearing Walls and Columns	0 HRS
J) Structural Members Supporting Wall	0 HRS
K) Floor Construction including Beams	0 HRS
L) Roof Construction	0 HRS

9. FIRE PROTECTION SYSTEMS
A) Suppression System ____ Full __X__ Limited
If limited, where: NEW JANITORS CLOSETS & STORAGE ROOMS
B) Notification/ Alarms
SPEAKER/STROBE , VOICE EVACUATION
C) Detection
SMOKE AND HEAT

10. MODIFICATIONS
A) Existing/ Approved — __X__ NONE
____ __X__ NONE

11. ACCESSIBLE BUILDING — __X__ Designated ____ Non-designated

12. MINIMUM PLUMBING FIXTURE COUNT (P-1202)

	REQUIRED	PROVIDED
W/C	10	14
LAVS	10	14
URN		
D/F	5	6

13. CODES TO WHICH THIS PROJECT WAS DESIGNED

	DATED
STATE BUILDING CODE W/SUPPLEMENT(S) (BUILDING, MECHANICAL & PLUMBING)	BOCA 1990, 1992(SUPP.), 1994 CT(SUPP.)
(ELECTRIC CODE)	1993, 1994(SUPP.)
STATE FIRE CODE W/SUPPLEMENT(S)	NFPA 101-1991, 1994(SUPP.)
STATE HEALTH CODE	1992
OSHA	TITLE 29/LABOR
SECTION 504	REHABILITATION ACT, 1973

14. THRESHOLD LIMIT BUILDING — ____ YES __X__ NO
If yes, why?

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N

PROFESSIONAL SEAL

PROJECT MANAGER	L.J. FREE
ARCHITECT/ENGINEER	S.E. McNEECE
DRAWN BY	J.C. OTTO

FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN
FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

GROUND FLOOR PLAN CODE COMPLIANCE & LIFE SAFETY

0 8' 16' 32'
SCALE: 1/16" = 1'-0"

NO	DATE	REVISION	BY

DATE: MARCH 16, 1998
SCALE: 1/16" = 1'-0"
PROJECT NO.: 50950.06
DRAWING NO.: A001

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BQ #70 & 125 Attachment

SYMBOLS LEGEND

CLASSROOM — ROOM NAME

(XXX) — ROOM NUMBER

ROOM OCCUPANCY LOAD
- 134 = 38 P — AREA IN SQUARE FEET
- 20 — OCCUPANCY LOAD FACTOR

EXIT CAPACITY
- 38 — ACTUAL EGRESS OCCUPANCY OF DOOR OR STAIR
- 165 — MAXIMUM ALLOWABLE EGRESS OCCUPANCY OF DOOR OR STAIR

AREA OF REFUSE DIRECTIONAL SIGNAGE WITH BATTERY BACKUP

15 — DIRECTION OF TRAVEL WITH ACCUMULATED LOAD

145' — MAXIMUM TRAVEL DISTANCE FROM FURTHEST POINT

1 (ONE) HOUR FIRE RATED WALL (TIGHT TO DECK ABOVE WHERE REQUIRED)

2 (TWO) HOUR FIRE RATED WALL (TIGHT TO DECK ABOVE WHERE REQUIRED) 2 HOUR FIRE WALL WHERE NOTED

SMOKE BARRIER

PARTITION TO PREVENT THE PASSAGE OF SMOKE — REFER TO SHEET G1001 NOTE #16

(E) — EMERGENCY WINDOW FOR RESCUE & ESCAPE: CASEMENT WINDOW WITH CLEAR OPENING OF 24"H X 36"W, BOTTOM OF CLEAR OPENING 2'-11" A.F.F. WITH CAM LOCKING LEVER HANDLE AT 3'-11" A.F.F.

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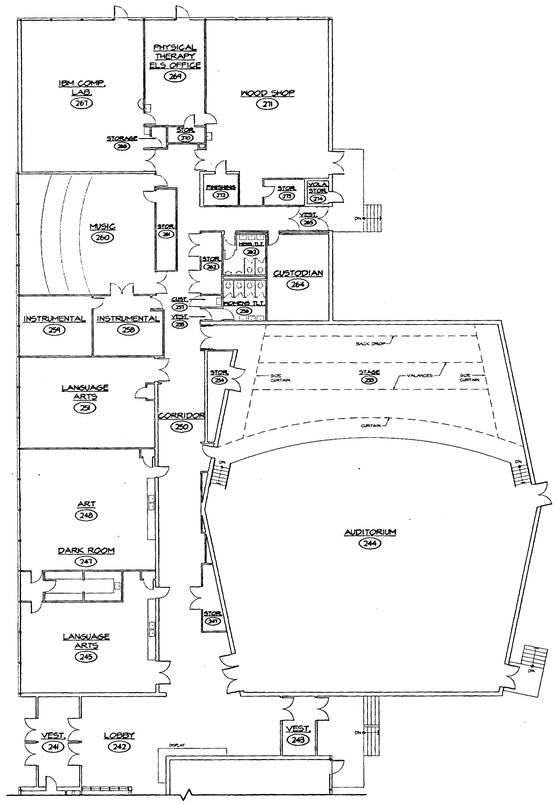

2 A002 FIRST FLOOR PLAN
SCALE: 1/16"=1'-0"

1 A002 FIRST FLOOR PLAN
SCALE: 1/16"=1'-0"

KEY PLAN

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PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE
ARCHITECT/ENGINEER: S.E. McNEECE
DRAWN BY: J.C. OTTO

FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

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CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

FIRST FLOOR PLAN CODE COMPLIANCE & LIFE SAFETY

0 8' 16' 32'
SCALE: 1/16" = 1'-0"

NO	DATE	REVISION	BY

DATE: MARCH 16, 1998
SCALE: 1/16" = 1'-0"
PROJECT NO.: 50950.06
DRAWING NO.: A002

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BQ #70 & 125 Attachment

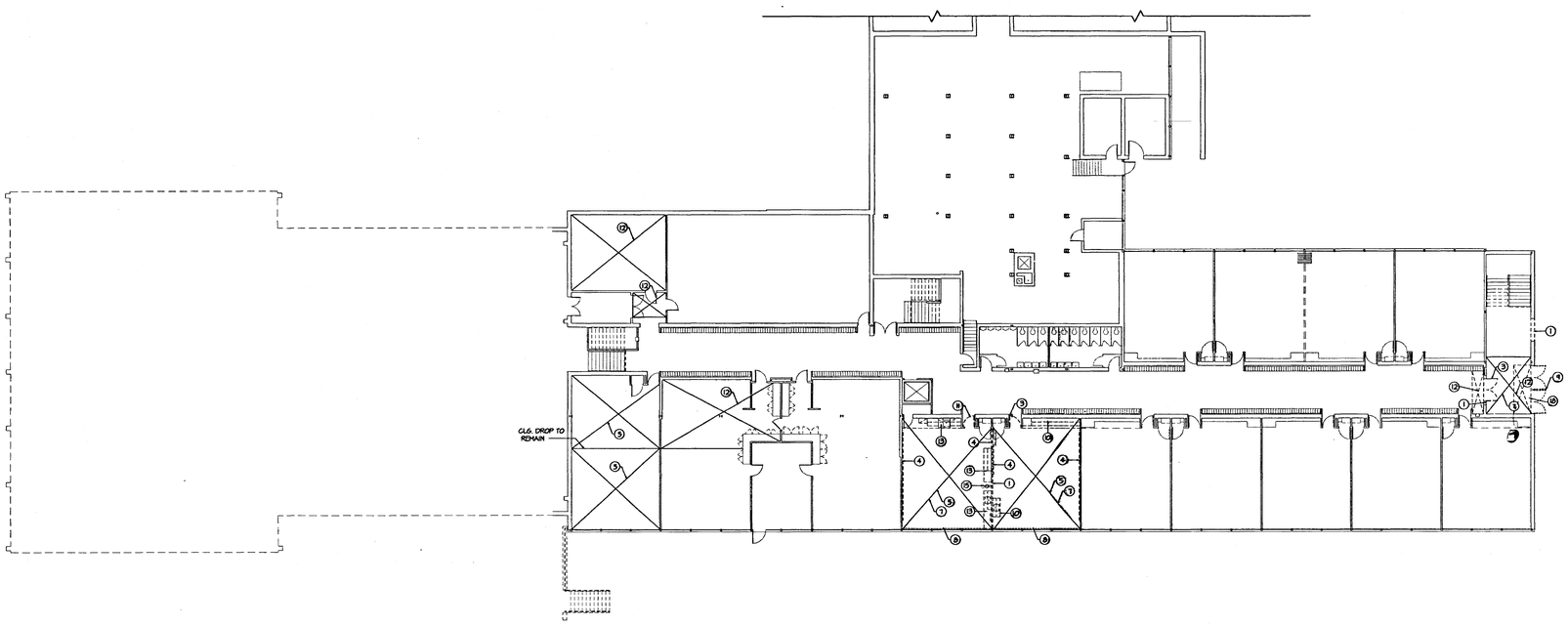
GENERAL DEMOLITION NOTES:

1. THE DEMOLITION NOTES ARE FOR A DESCRIPTIVE GUIDE ONLY. IT IS NOT THE INTENT TO POINT TO EACH AND EVERY ITEM. THE G.C. WILL BE RESPONSIBLE FOR REMOVING ALL QUANTITIES OF EACH ITEM. WHERE NEW WORK IS RUN THROUGH EXISTING AREAS, THE G.C. IS TO DO ALL CUTTING AND PATCHING FOR ALL TRADES OF ALL ADJACENT SURFACES. COORDINATE W/ STRUCTURAL, MECHANICAL AND ELECTRICAL DRAWINGS.
2. COORDINATE DEMOLITION WITH CONSTRUCTION DOCUMENTS. DO NOT OVERDEMOLISH
3. SEE SPECIFICATIONS FOR ADDITIONAL DEMOLITION REQUIREMENTS.
4. SEE MECHANICAL, ELECTRICAL, PLUMBING AND FIRE PROTECTION DRAWINGS FOR ADDITIONAL DEMOLITION REQUIREMENTS PERTAINING TO THEIR TRADES.
5. DASHED LINES INDICATE CONSTRUCTION TO BE DEMOLISHED AND REMOVED.
6. PROVIDE SAW CUTTING AND SLAB REMOVAL FOR NEW BELOW FLOOR SANITARY, STORM, WATER-LINES, AND DRAINS. SEE PLUMBING DRAWINGS FOR EXTENT AND LOCATION.
7. SEE FLOOR PLANS FOR NEW LOCATIONS OF EXISTING EQUIPMENT / SHELVING / FURNITURE NOTED TO BE RELOCATED.
8. VERIFY EXISTING CONSTRUCTION IN THE FIELD.
9. PRIOR TO STARTING DEMOLITION COORDINATE WITH OWNER ANY SALVAGE REQUIREMENTS OF EQUIPMENT, MATERIALS, ETC.
10. IN ALL SPACES WHERE DEMOLITION IS INDICATED REMOVE WINDOW BLINDS AND PROJECTION SCREENS.
11. WHERE ONE WALL IS BEING REMOVED AND AN ADJACENT ONE IS TO REMAIN, THE CONTRACTOR SHALL PATCH THE WALL TO REMAIN TO MATCH EXISTING CONSTRUCTION.
12. SOME DEMOLITION OF MATERIALS INDICATED ON THIS DRAWING MAY BE INCLUDED IN THE HAZARDOUS MATERIALS DEMOLITION SECTION OF THE SPECIFICATIONS. THE CONTRACTOR SHALL COORDINATE THIS WORK PRIOR TO SUBMITTING HIS BID.

DEMOLITION NOTES:

ITEMS TO BE DEMOLISHED AND REMOVED

1. MASONRY WALLS
2. METAL/WOOD STUDS - GYPSUM OR PLASTER PARTITION
3. DOOR, FRAME, GLAZING AND ASSOCIATED HARDWARE
4. BLACKBOARD/ TACKBOARD
5. 1' X 1' CEILING TILE AND ASSOCIATED WOOD FURRING, SUPPORTS / SUSPENSION SYSTEM
6. CARPET, BASE, ADHESIVE, & V.A.T. / ADHESIVE BELOW CARPET
7. VINYL FLOORING, BASE, ADHESIVE
8. WINDOW BLINDS AND HARDWARE
9. EXTERIOR WINDOW AND DOOR SYSTEM
10. WALL HUNG AND/OR FLOOR MOUNTED WOOD CASEWORK
11. DOORS AND HARDWARE (FRAME REMAINS)
12. SUSPENDED ACOUSTIC TILE CEILING SYSTEM
13. SCIENCE ROOM WALL HUNG AND/OR FLOOR MOUNTED CASEWORK INCLUDING MECHANICAL UTILITIES
14. NOT USED
15. EMERGENCY SHOWER/EYE WASH AND ASSOCIATED PIPING
16. FUME HOOD AND ASSOCIATED DUCTWORK
17. DOOR, FRAME, SIDELIGHTS, GLASS AND ASSOCIATED HARDWARE
18. RECESSED MAT AND FRAME



1 / A099 GROUND FLOOR DEMOLITION PLAN

SCALE: 1/16" = 1'-0"

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PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE
ARCHITECT/ENGINEER: S.E. McNEECE
DRAWN BY: J. OTTO

FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

GROUND FLOOR DEMOLITION PLAN

0 8' 16' 32'
SCALE: 1/16" = 1'-0"

NO	DATE	REVISION	BY
1	6/19/98	D.O.E. REVISIONS	J. C.

DATE: **MARCH 16, 1998**
SCALE: **1/16" = 1'-0"**
PROJECT NO.: **50950.06**
DRAWING NO.: **A099**

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BQ #70 & 125 Attachment

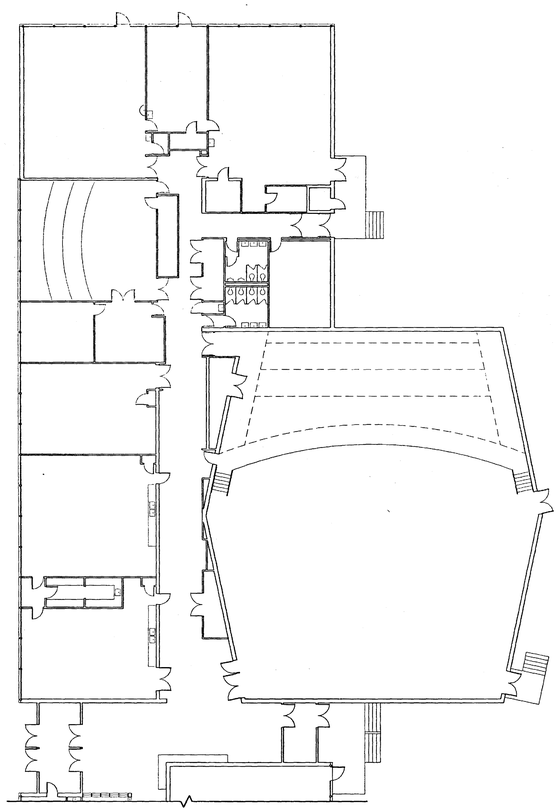
GENERAL DEMOLITION NOTES:

1. THE DEMOLITION NOTES ARE FOR A DESCRIPTIVE GUIDE ONLY. IT IS NOT THE INTENT TO POINT TO EACH AND EVERY ITEM. THE G.C. WILL BE RESPONSIBLE FOR REMOVING ALL QUANTITIES OF EACH ITEM. WHERE NEW WORK IS RUN THROUGH EXISTING AREAS, THE G.C. IS TO DO ALL CUTTING AND PATCHING FOR ALL TRADES OF ALL ADJACENT SURFACES. COORDINATE W/ STRUCTURAL, MECHANICAL AND ELECTRICAL DRAWINGS.
2. COORDINATE DEMOLITION WITH CONSTRUCTION DOCUMENTS. DO NOT OVERDEMOLISH
3. SEE SPECIFICATIONS FOR ADDITIONAL DEMOLITION REQUIREMENTS.
4. SEE MECHANICAL, ELECTRICAL, PLUMBING AND FIRE PROTECTION DRAWINGS FOR ADDITIONAL DEMOLITION REQUIREMENTS PERTAINING TO THEIR TRADES.
5. DASHED LINES INDICATE CONSTRUCTION TO BE DEMOLISHED AND REMOVED.
6. PROVIDE SAW CUTTING AND SLAB REMOVAL FOR NEW BELOW FLOOR SANITARY, STORM, WATER LINES, AND DRAINS. SEE PLUMBING DRAWINGS FOR EXTENT AND LOCATION.
7. SEE FLOOR PLANS FOR NEW LOCATIONS OF EXISTING EQUIPMENT / SHELVING / FURNITURE NOTED TO BE RELOCATED.
8. VERIFY EXISTING CONSTRUCTION IN THE FIELD.
9. PRIOR TO STARTING DEMOLITION COORDINATE WITH OWNER ANY SALVAGE REQUIREMENTS OF EQUIPMENT, MATERIALS, ETC.
10. IN ALL SPACES WHERE DEMOLITION IS INDICATED REMOVE WINDOW BLINDS AND PROJECTION SCREENS.
11. WHERE ONE WALL IS BEING REMOVED AND AN ADJACENT ONE IS TO REMAIN, THE CONTRACTOR SHALL PATCH THE WALL TO REMAIN TO MATCH EXISTING CONSTRUCTION.
12. SOME DEMOLITION OF MATERIALS INDICATED ON THIS DRAWING MAY BE INCLUDED IN THE HAZARDOUS MATERIALS DEMOLITION SECTION OF THE SPECIFICATIONS. THE CONTRACTOR SHALL COORDINATE THIS WORK PRIOR TO SUBMITTING HIS BID.

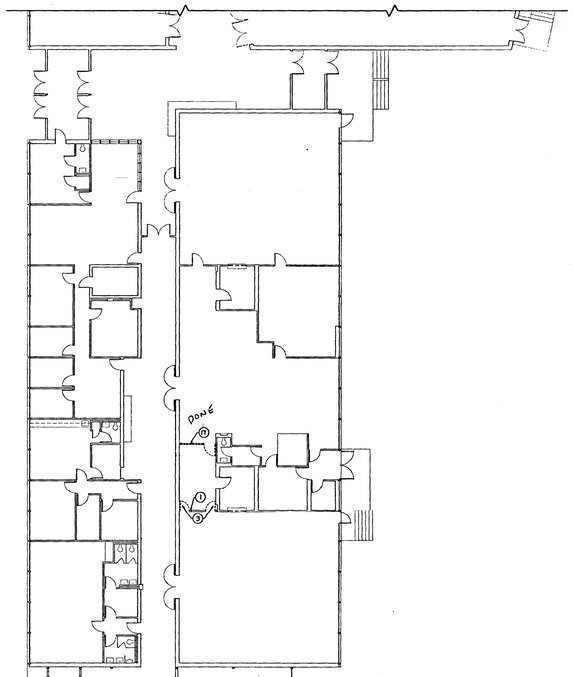
DEMOLITION NOTES:

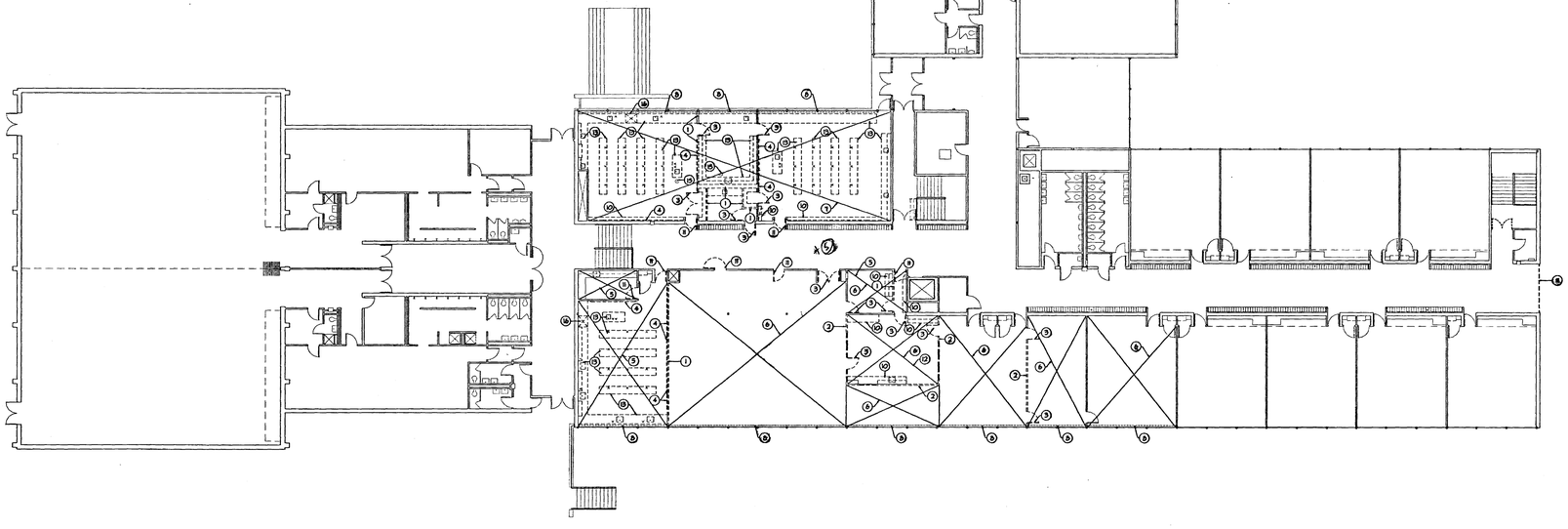
ITEMS TO BE DEMOLISHED AND REMOVED

1. MASONRY WALLS
2. METAL/WOOD STUDS - GYPSUM OR PLASTER PARTITION
3. DOOR, FRAME, GLAZING AND ASSOCIATED HARDWARE
4. BLACKBOARD/ TACKBOARD
5. 1' X 1' CEILING TILE AND ASSOCIATED WOOD FURRING, SUPPORTS / SUSPENSION SYSTEM
6. CARPET, BASE, ADHESIVE, & V.A.T. / ADHESIVE BELOW CARPET
7. VINYL FLOORING, BASE, ADHESIVE
8. WINDOW BLINDS AND HARDWARE
9. EXTERIOR WINDOW AND DOOR SYSTEM
10. WALL HUNG AND/OR FLOOR MOUNTED WOOD CASEWORK
11. DOORS AND HARDWARE (FRAME REMAINS)
12. SUSPENDED ACOUSTIC TILE CEILING SYSTEM
13. SCIENCE ROOM WALL HUNG AND/OR FLOOR MOUNTED CASEWORK INCLUDING MECHANICAL UTILITIES
14. NOT USED
15. EMERGENCY SHOWER/EYE WASH AND ASSOCIATED PIPING
16. FUME HOOD AND ASSOCIATED DUCTWORK
17. DOOR, FRAME, SIDELIGHTS, GLASS AND ASSOCIATED HARDWARE



(2/A099.1) FIRST FLOOR DEMOLITION PLAN
SCALE: 1/16"=1'-0"





(1/A099.1) FIRST FLOOR DEMOLITION PLAN
SCALE: 1/16"=1'-0"

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PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE
ARCHITECT/ENGINEER: S.E. McNEECE
DRAWN BY: J.C. OTTO

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ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

FIRST FLOOR DEMOLITION PLAN

0 8' 16' 32'
SCALE: 1/16" = 1'-0"

NO	DATE	REVISION	BY

DATE: MARCH 16, 1998
SCALE: 1/16" = 1'-0"
PROJECT NO.: 50950.06
DRAWING NO.: A099.1

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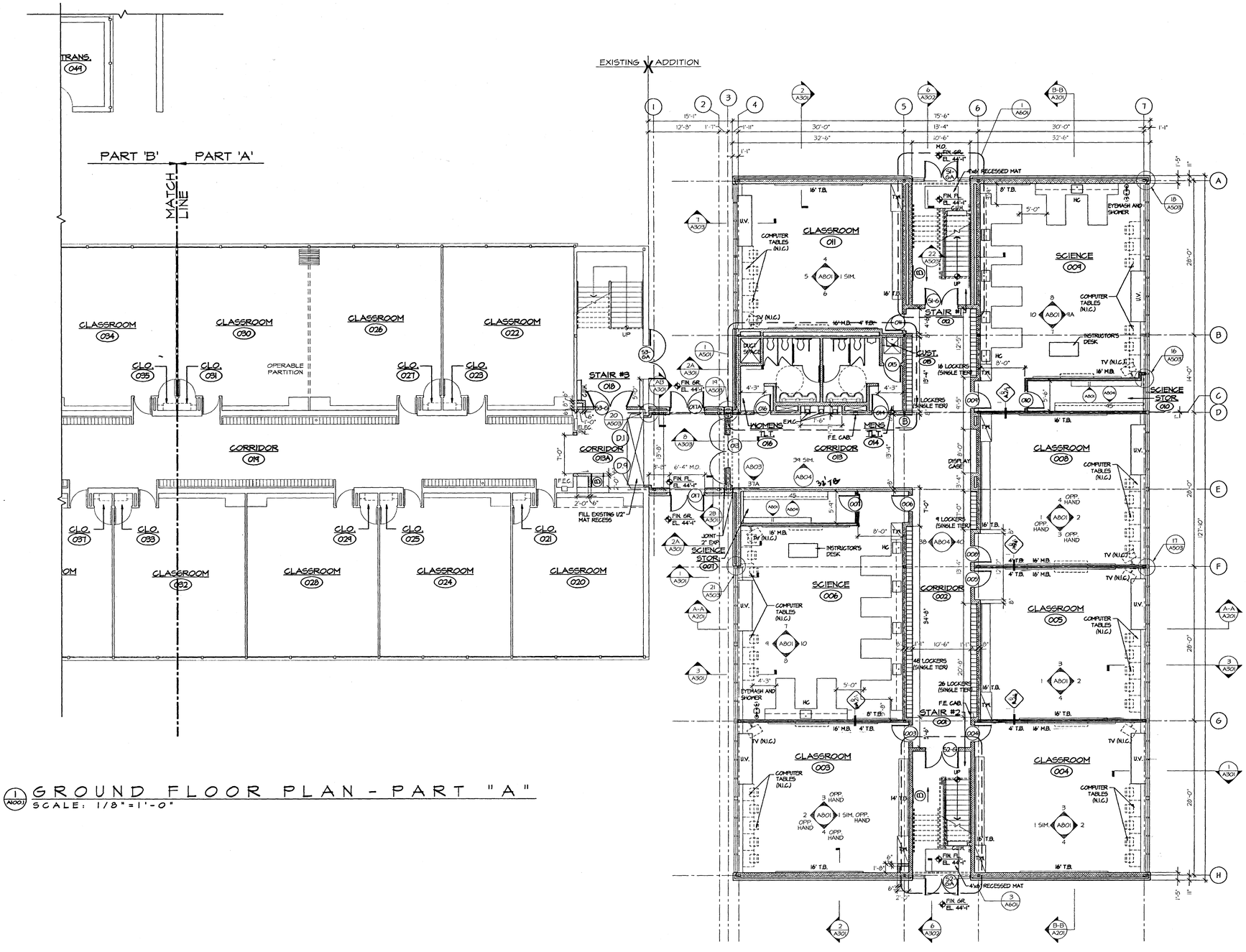
BQ #70 & 125 Attachment



1 A100.1 GROUND FLOOR PLAN - PART "A"
SCALE: 1/8"=1'-0"

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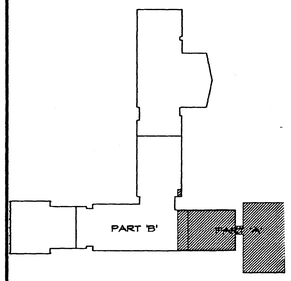

KEY PLAN

N

PROFESSIONAL SEAL

PROJECT MANAGER	L.J. FREE
ARCHITECT/ENGINEER	S.E. McNEECE
DRAWN BY	S. FENNELL

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ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
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PROJECT TITLE

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CENTRAL MIDDLE SCHOOL

9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

GROUND FLOOR PLAN PART "A"

0 4' 8' 16'
SCALE: 1/8" = 1'-0"

NO	DATE	REVISION	BY
1	6/19/98	D.O.E. REVISIONS	J. C.

DATE	MARCH 16, 1998
SCALE	1/8" = 1'-0"
PROJECT NO.	50950.06
DRAWING NO.	A100.1

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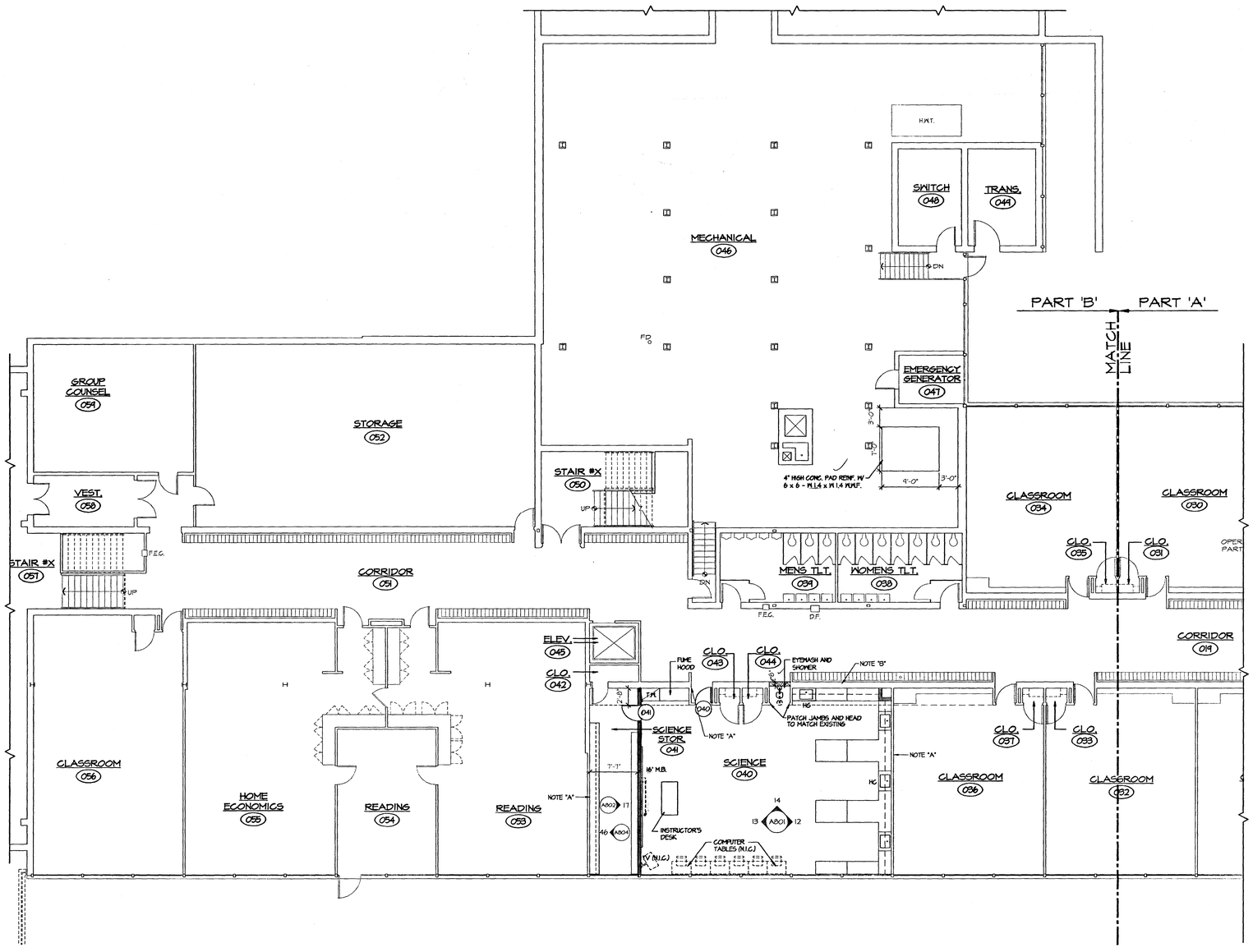
BQ #70 & 125 Attachment



1 A100.2 GROUND FLOOR PLAN - PART "B"
SCALE: 1/8" = 1'-0"

NOTE "A"

EXISTING 4" CONCRETE BLOCK WALL SIM. TO 1-HOUR RATED 4", 3 CORE REGULAR CONCRETE BLOCK PER "FIRE RATINGS FOR MASONRY UNITS", USING EQUIVALENT THICKNESS METHOD CONFORMING TO "BASIC NATIONAL BUILDING CODE (BOCA), BUILDING OFFICIALS CONFERENCE OF AMERICA INC." 1988.

NOTE "B"

EXISTING 10" CONCRETE BLOCK WALL SIM. TO UL DESIGN U906 FOR 2-HR. CONSTRUCTION.

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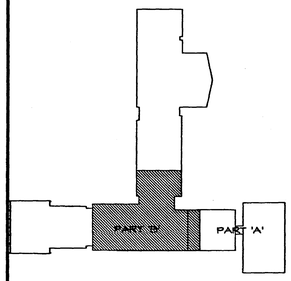

KEY PLAN

N

PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE
ARCHITECT/ENGINEER: S.E. McNEECE
DRAWN BY: S. FENNELL

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BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
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9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

GROUND FLOOR PLAN PART "B"

0 4' 8' 16'
SCALE: 1/8" = 1'-0"

NO	DATE	REVISION	BY
1	6/19/98	D.O.E. REVISIONS	J.C.

DATE: MARCH 16, 1998
SCALE: 1/8" = 1'-0"
PROJECT NO.: 50950.06
DRAWING NO.: A100.2

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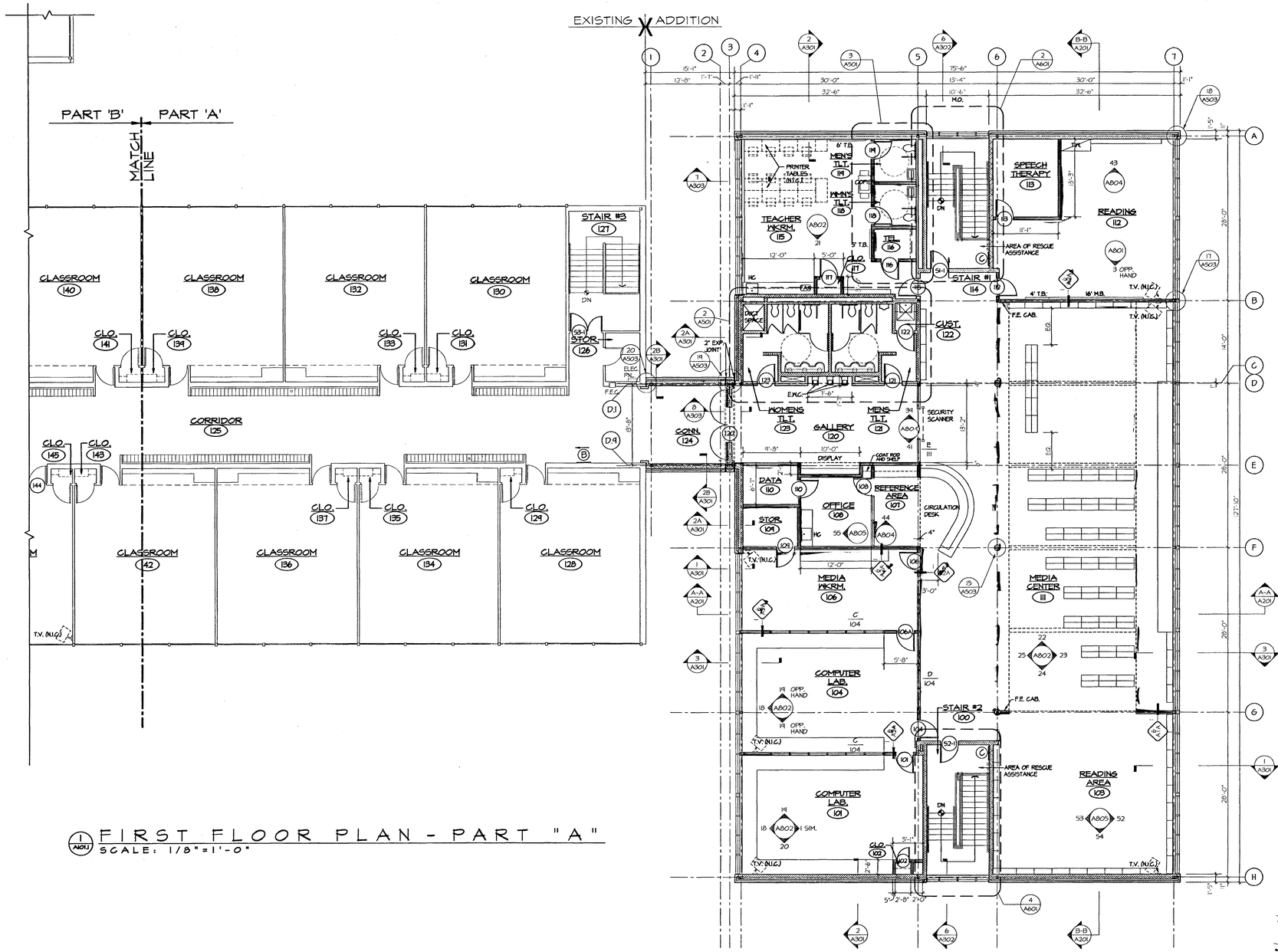
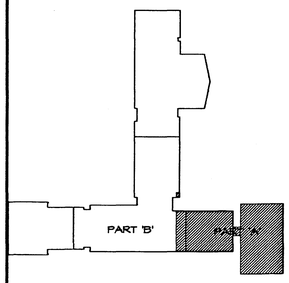
BQ #70 & 125 Attachment



1 A101.1 FIRST FLOOR PLAN - PART "A"
SCALE: 1/8"=1'-0"



KEY PLAN

N

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PROJECT MANAGER: L.J. FREE
ARCHITECT/ENGINEER: S.E. McNEECE
DRAWN BY: S. FENNELL

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ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

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TWO LAFAYETTE SQUARE
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9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

FIRST FLOOR PLAN PART "A"

0 4' 8' 16'
SCALE: 1/8" = 1'-0"

NO	DATE	REVISION	BY
1	6/19/98	D.O.E. REVISIONS	J.C.

DATE: MARCH 16, 1998
SCALE: 1/8" = 1'-0"
PROJECT NO.: 50950.06
DRAWING NO.: A101.1

270
37
6
51 3

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NOTE "A"

EXISTING 4" CONCRETE BLOCK WALL SIM. TO 1-HOUR RATED 4", 3 CORE REGULAR CONCRETE BLOCK PER "FIRE RATINGS FOR MASONRY UNITS" USING EQUIVALENT THICKNESS METHOD CONFORMING TO "BASIC NATIONAL BUILDING CODE (BOCA), BUILDING OFFICIALS CONFERENCE OF AMERICA INC." 1988.

NOTE "B"

EXISTING 10" CONCRETE BLOCK WALL SIM. TO UL DESIGN U906 FOR 2-HR. CONSTRUCTION.

NOTE "C"

EXISTING 6" CONCRETE BLOCK WALL, UL DES. SIM. TO U906 FOR 2-HOUR CONSTRUCTION.

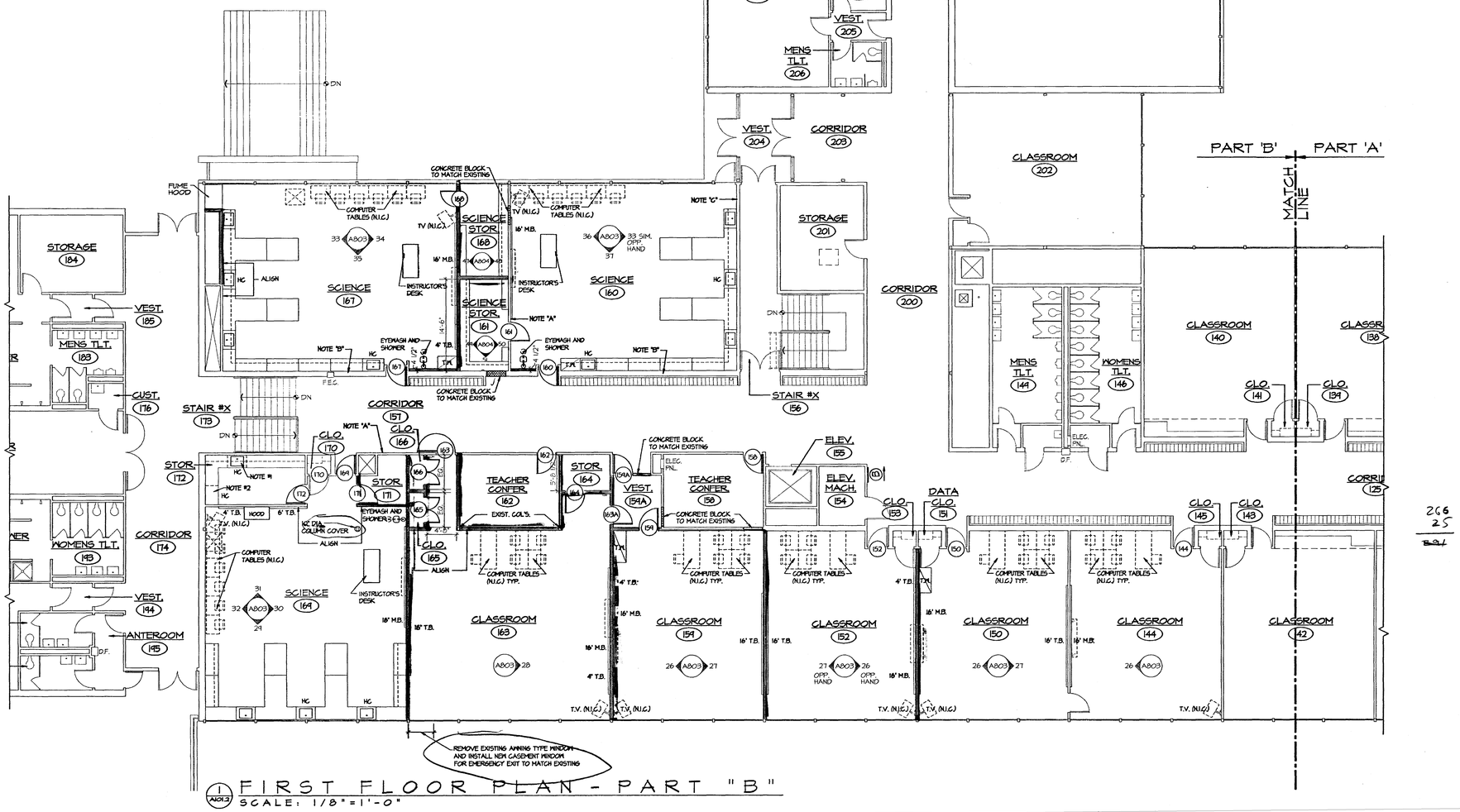
NOTE #1

REMOVE EXISTING SINK AND BASE CABINET. INSTALL NEW SINK AND CONTROLS, SEE PLUMBING DRAWINGS. INSTALL NEW END PANELS AT EXISTING ADJACENT BASE CABINETS. MIN. KNEE SPACE 36" WIDE X 27" HIGH. PATCH WALL, FLOOR AND INSTALL NEW BASE.

NOTE #2

SAME AS NOTE #1, EXCEPT NO SINK REQUIRED.

BQ #70 & 125 Attachment



1 / A101.2 FIRST FLOOR PLAN - PART "B"
SCALE: 1/8" = 1'-0"

266
25
B-21

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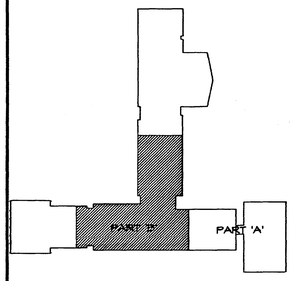

KEY PLAN

N

PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE
ARCHITECT/ENGINEER: S.E. McNEECE
DRAWN BY: S. FENNELL

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TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

FIRST FLOOR PLAN PART "B"

0 4' 8' 16'
SCALE: 1/8" = 1'-0"

NO	DATE	REVISION	BY
1	6/19/98	D.O.E. REVISIONS	J.C.

DATE: MARCH 16, 1998
SCALE: 1/8" = 1'-0"
PROJECT NO.: 50950.06
DRAWING NO.: A101.2

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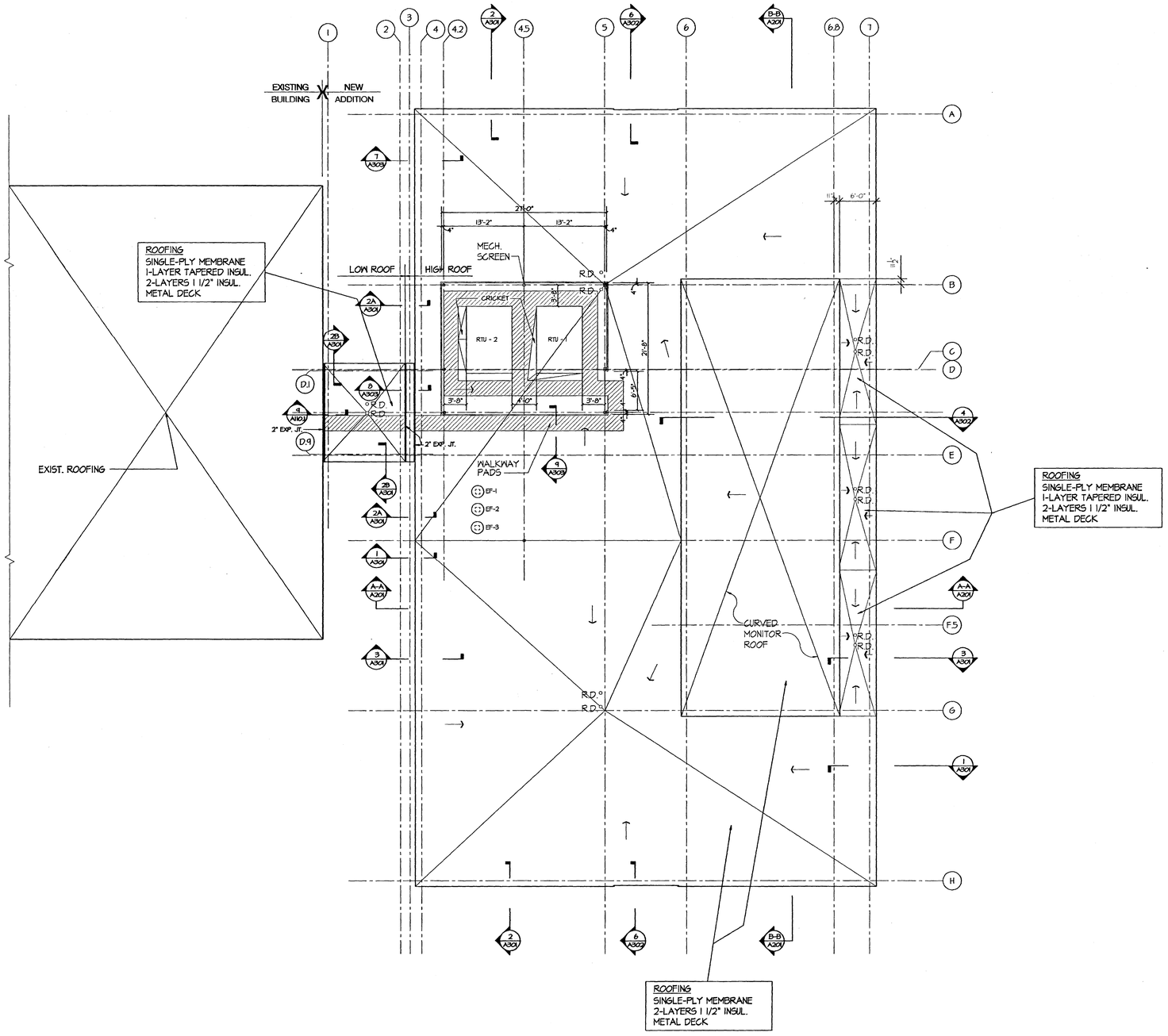
BQ #70 & 125 Attachment



1 A110 ROOF PLAN
SCALE: 1/8"=1'-0"

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PROFESSIONAL SEAL

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DRAWN BY: J.C. OTTO

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9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

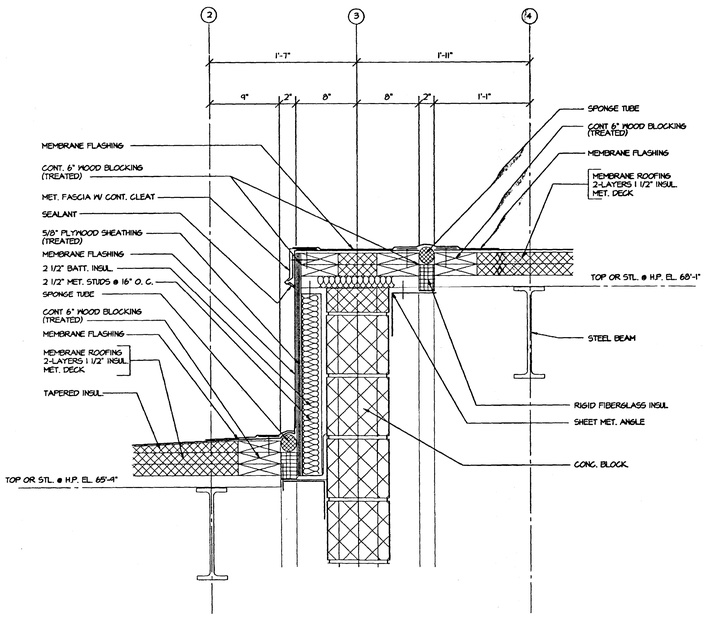
ROOF PLAN

0 4' 8' 16'
SCALE: 1/8" = 1'-0"

NO	DATE	REVISION	BY

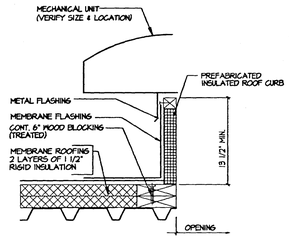
DATE: **MARCH 16, 1998**
SCALE: **1/8" = 1'-0"**
PROJECT NO.: **50950.06**
DRAWING NO.: **A110**

BQ #70 & 125 Attachment

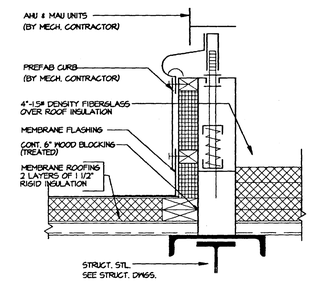


1 A110.1 ROOF EXPANSION JOINT DETAIL
SCALE: 1 1/2" = 1'-0"

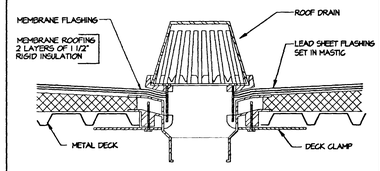
NOTE
PROVIDE NEW FLASHING AT 3 - NEW FUME HOOD EXHAUST FANS IN EXISTING BUILDING. NEW FLASHING SHALL BE COMPATIBLE WITH EXISTING FOAM ROOFING.



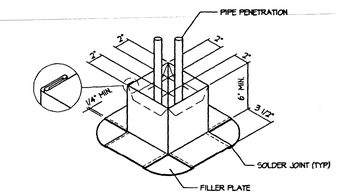
2 A110.1 TYPICAL MECHANICAL CURB DETAIL
SCALE: 1 1/2" = 1'-0"



3 A110.1 MECH. ROOF TOP UNIT CURB DETAIL
SCALE: 1 1/2" = 1'-0"



4 A110.1 TYPICAL ROOF DRAIN DETAILS
SCALE: 1 1/2" = 1'-0"



ISOMETRIC VIEW

5 A110.1 PENETRATION POCKET DETAIL
SCALE: 1 1/2" = 1'-0"

6 A110.1 TYPICAL PENETRATION POCKET DETAIL
SCALE: 1 1/2" = 1'-0"

7 A110.1 TYPICAL PENETRATION POCKET DETAIL
SCALE: 1 1/2" = 1'-0"

8 A110.1 TYPICAL VENT STACK DETAIL
SCALE: 1 1/2" = 1'-0"

9 A110.1 EXPANSION JT. DETAIL
SCALE: 1 1/2" = 1'-0"

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PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE
ARCHITECT/ENGINEER: S.E. McNEECE
DRAWN BY: J. CZUBATYJ

FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

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TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

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9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

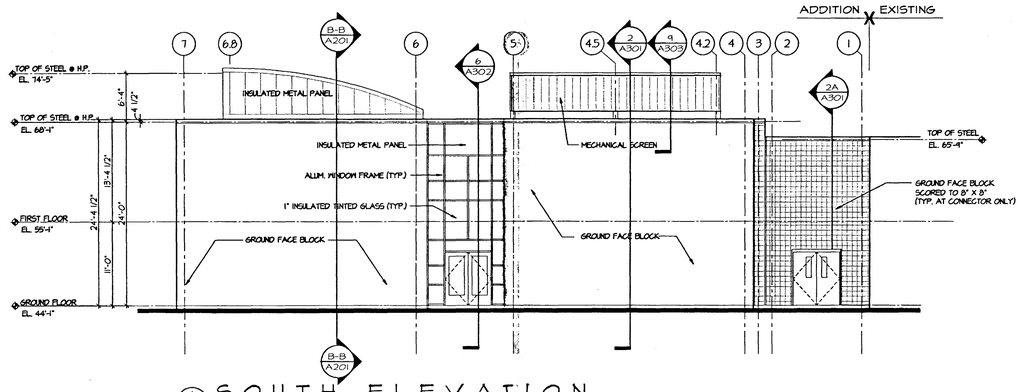
STATE PROJECT NO. 057-106EA

DRAWING TITLE

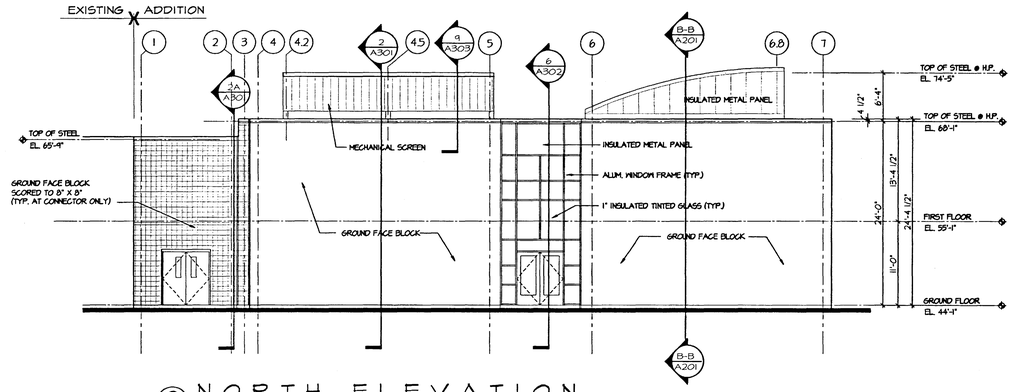
ROOFING DETAILS

NO	DATE	REVISION	BY

DATE: MARCH 16, 1998
SCALE: 1 1/2" = 1'-0"
PROJECT NO.: 50950.06
DRAWING NO.: A110.1

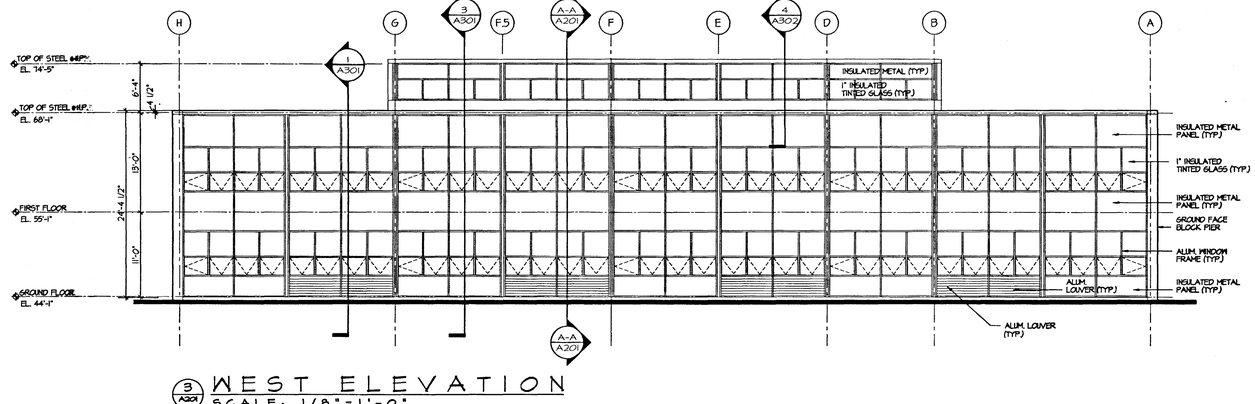


1 A201 SOUTH ELEVATION
SCALE: 1/8"=1'-0"

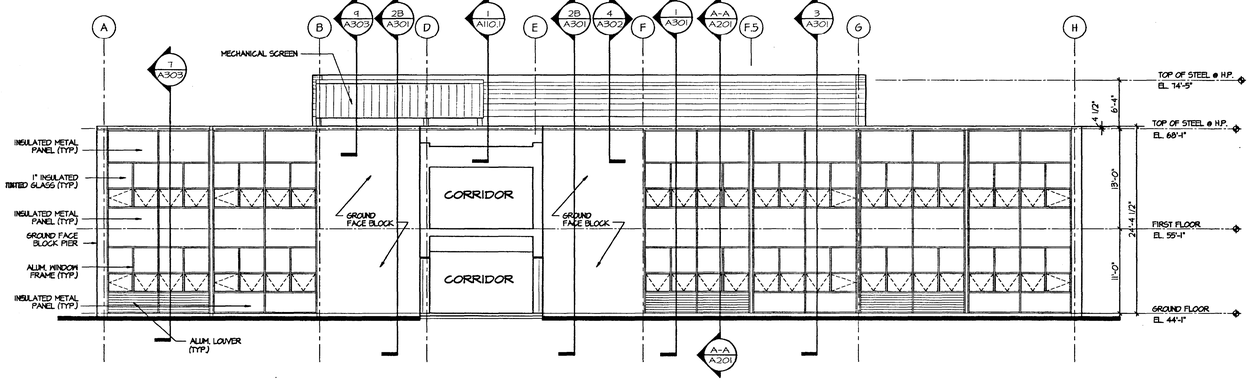


2 A201 NORTH ELEVATION
SCALE: 1/8"=1'-0"

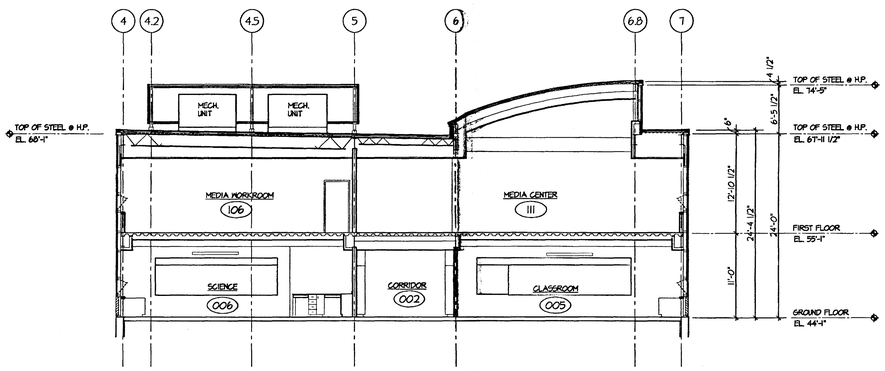
BQ #70 & 125 Attachment



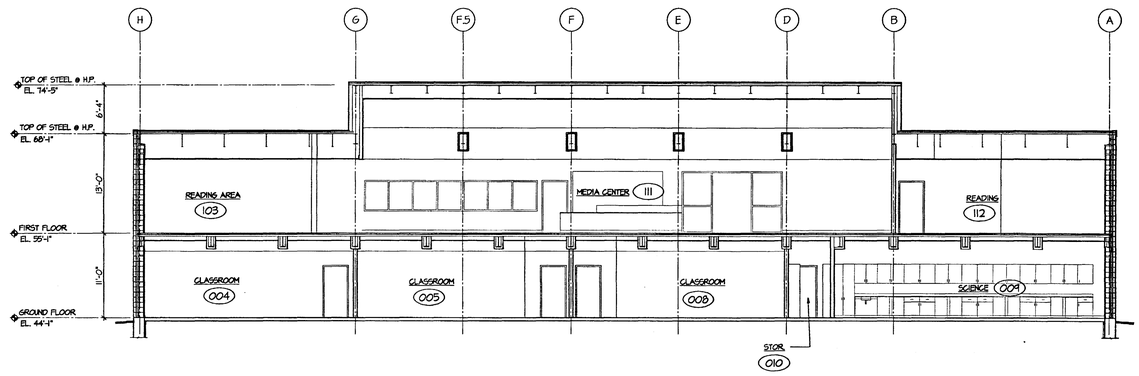
3 A201 WEST ELEVATION
SCALE: 1/8"=1'-0"



4 A201 EAST ELEVATION
SCALE: 1/8"=1'-0"



A-A A201 BUILDING SECTION
SCALE: 1/8"=1'-0"



B-B A201 BUILDING SECTION
SCALE: 1/8"=1'-0"

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PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE
ARCHITECT/ENGINEER: S.E. McNEECE
DRAWN BY: S.E. McNEECE

FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

EXTERIOR ELEVATIONS & BUILDING SECTIONS

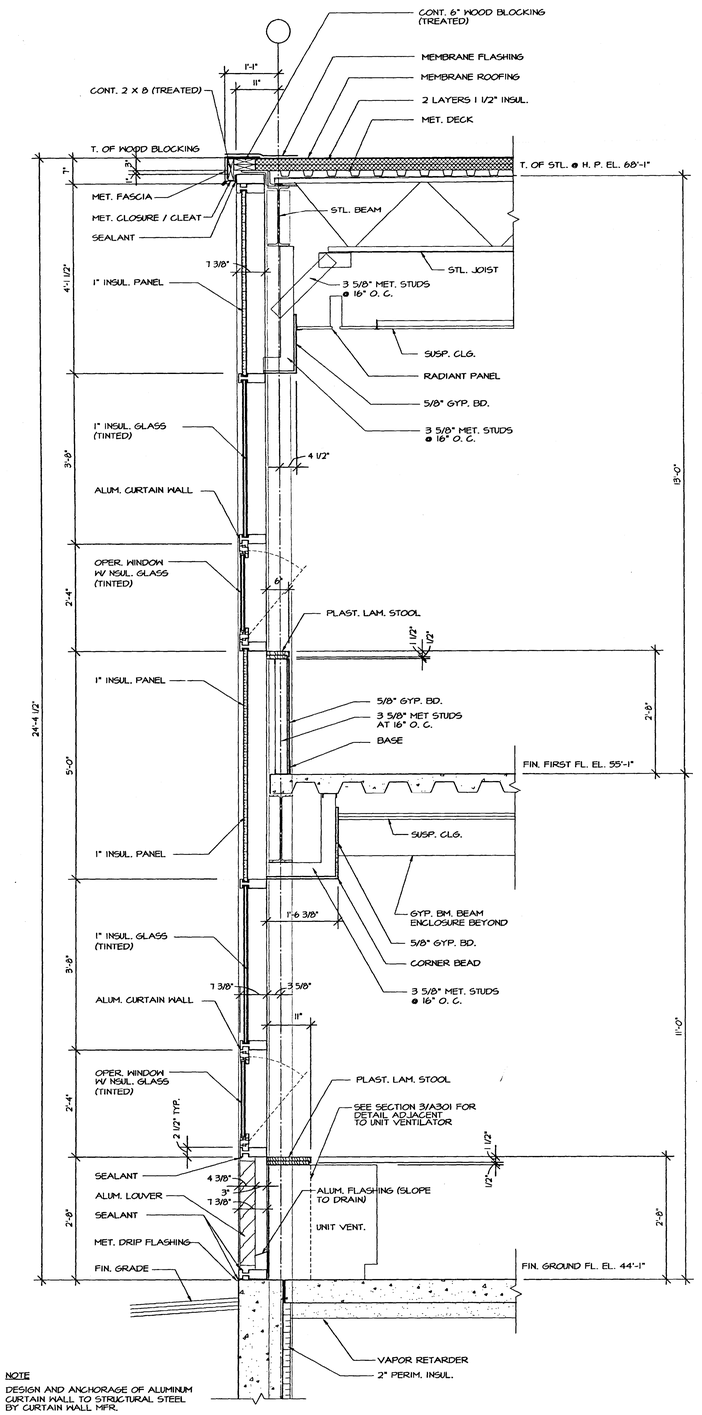
NO	DATE	REVISION	BY

DATE: MARCH 16, 1998
SCALE: 1/8" = 1'-0"
PROJECT NO.: 50950.06
DRAWING NO.: A201

PRINTED BY NATIONAL DIRECT - 618-372-9885 - TLW#918.ILC - 7/15/98 4:02:00 PM

K:\50 projects\50950\dwg\Arch\A201 6-18-98 1:26:33 pm EST

BQ #70 & 125 Attachment

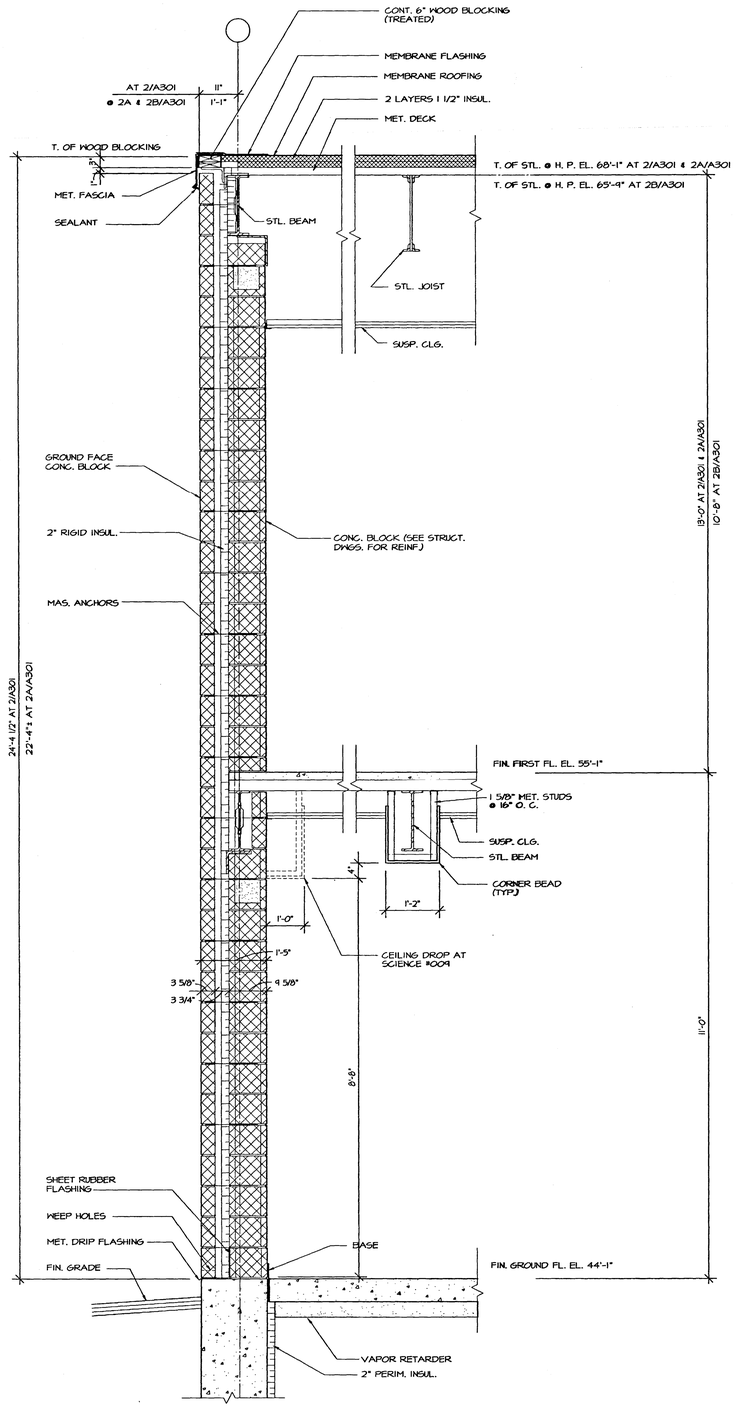


NOTE

DESIGN AND ANCHORAGE OF ALUMINUM CURTAIN WALL TO STRUCTURAL STEEL BY CURTAIN WALL MFR.

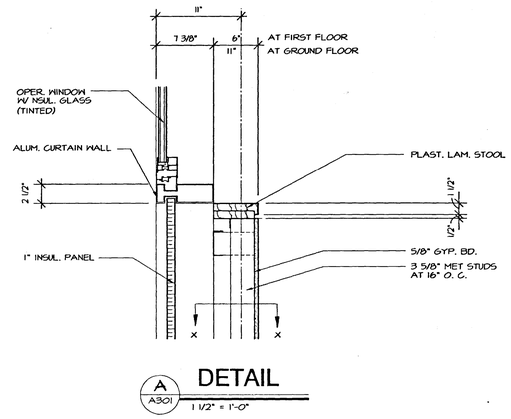
1/A301 SECTION

3/4" = 1'-0"



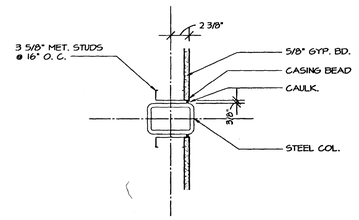
2/A301 & 2A/A301 & 2B/A301 SECTION

3/4" = 1'-0"



A/A301 DETAIL

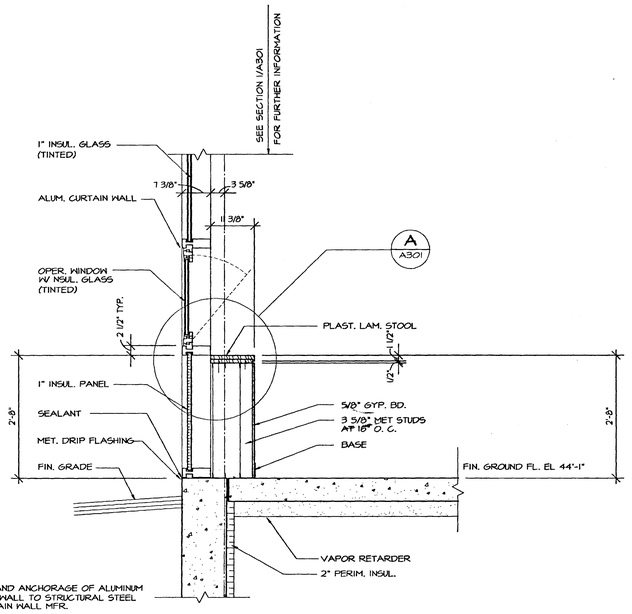
1 1/2" = 1'-0"



SECTION X-X

3" = 1'-0"

(AT FIRST FLOOR)



NOTE

DESIGN AND ANCHORAGE OF ALUMINUM CURTAIN WALL TO STRUCTURAL STEEL BY CURTAIN WALL MFR.

3/A301 SECTION

3/4" = 1'-0"

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PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE

ARCHITECT/ENGINEER: S.E.McNEECE

DRAWN BY: J. CZUBATY

FLETCHER THOMPSON

ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

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TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO

CENTRAL MIDDLE SCHOOL

9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

WALL SECTIONS

NO	DATE	REVISION	BY

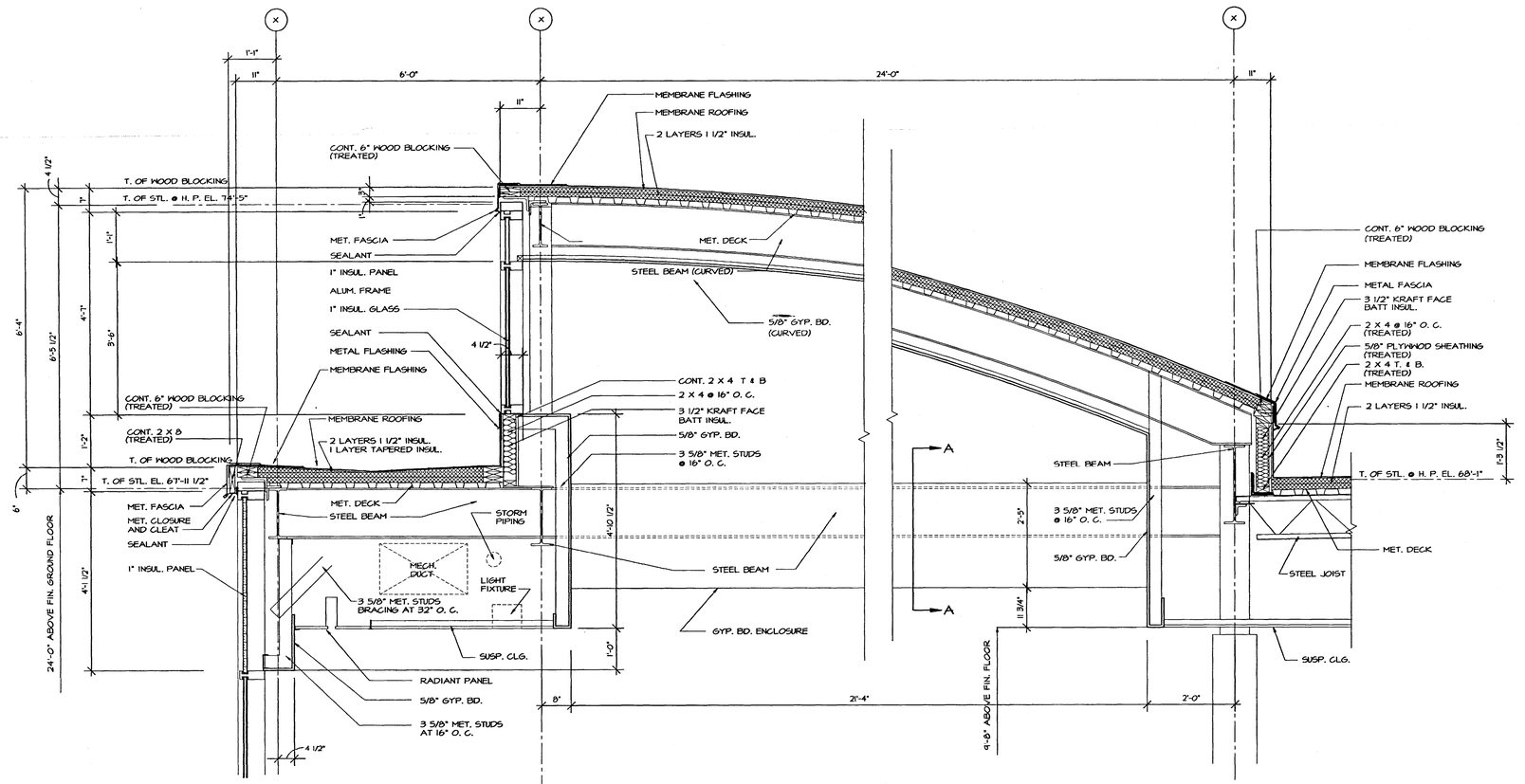
DATE: MARCH 16, 1998

SCALE: AS NOTED

PROJECT NO.: 50950.06

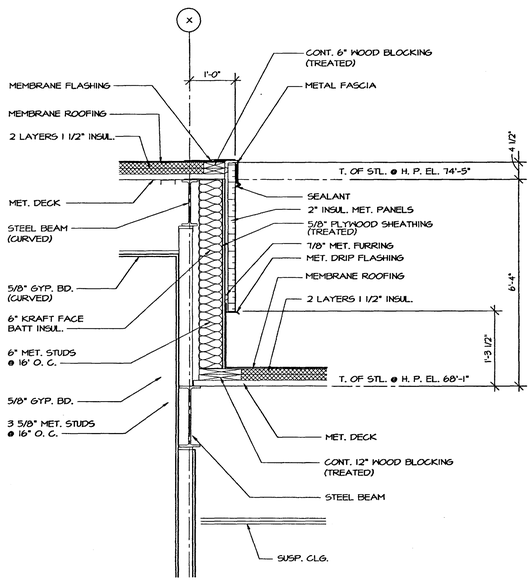
DRAWING NO.: A301

BQ #70 & 125 Attachment



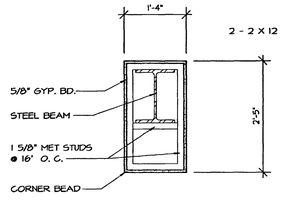
4 / A302 SECTION

3/4" = 1'-0"



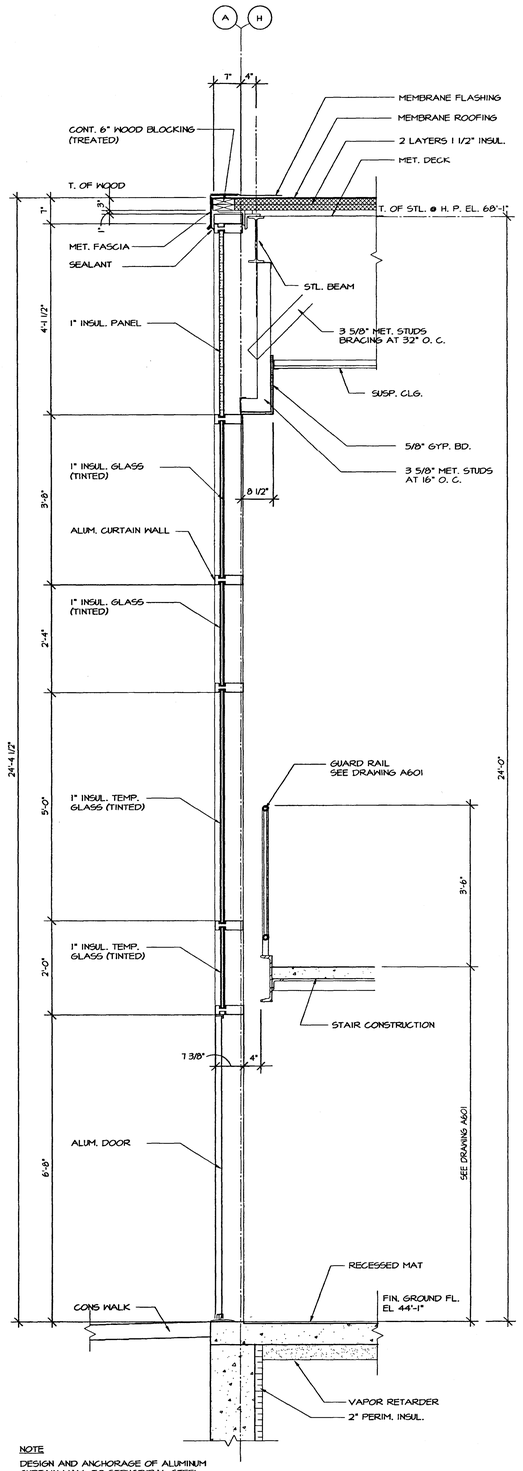
5 / A302 SECTION

3/4" = 1'-0"



SECTION A - A

3/4" = 1'-0"



NOTE

DESIGN AND ANCHORAGE OF ALUMINUM CURTAIN WALL TO STRUCTURAL STEEL BY CURTAIN WALL MFR.

6 / A302 SECTION

3/4" = 1'-0"

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PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE

ARCHITECT/ENGINEER: S.E.McNEECE

DRAWN BY: J. CZUBATYJ

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ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO

CENTRAL MIDDLE SCHOOL

9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

WALL SECTIONS

NO	DATE	REVISION	BY

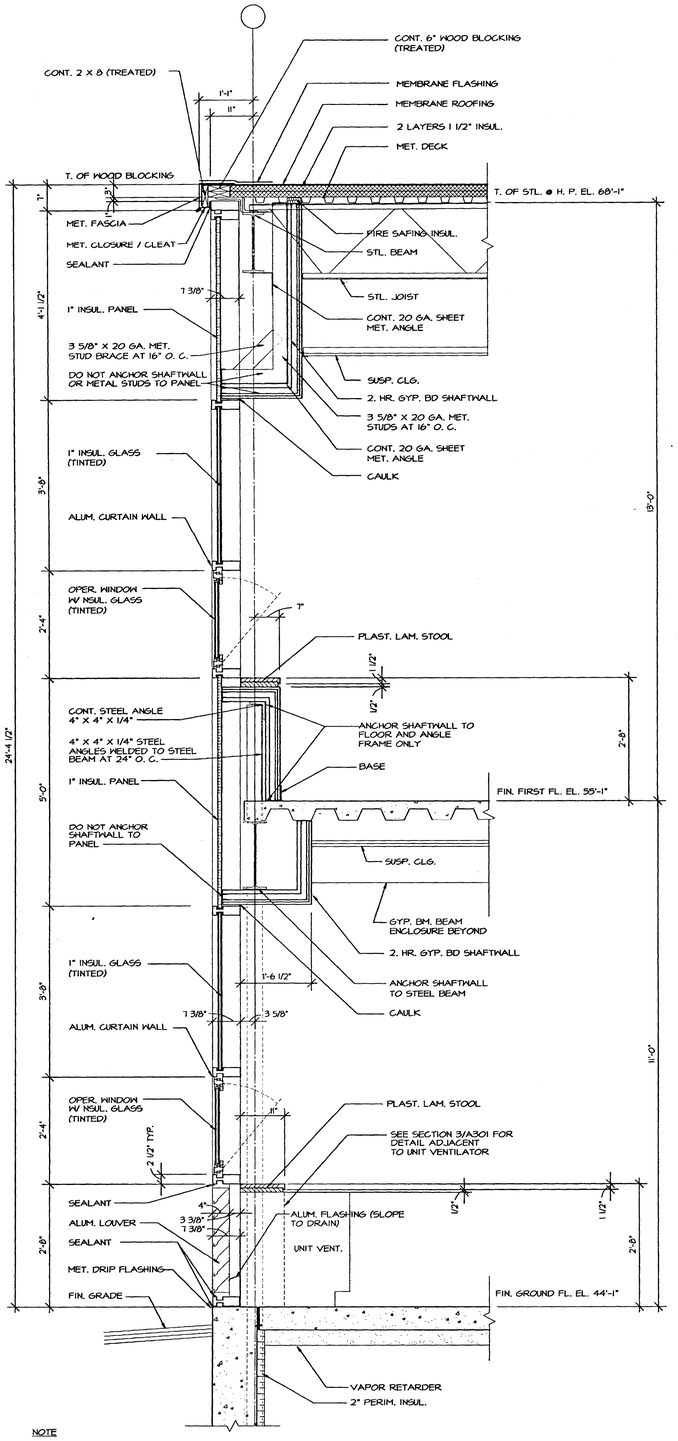
DATE: MARCH 16, 1998

SCALE: 3/4" = 1'-0"

PROJECT NO.: 50950.06

DRAWING NO.: A302

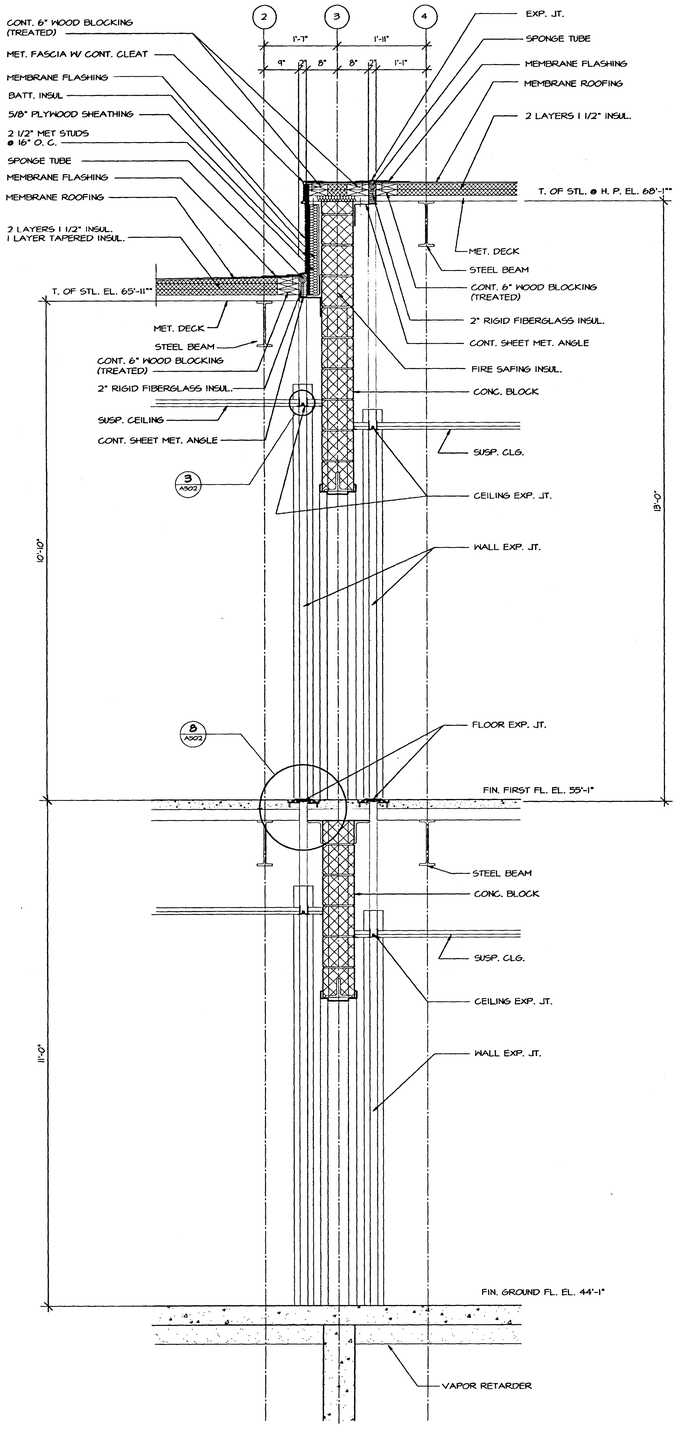
BQ #70 & 125 Attachment



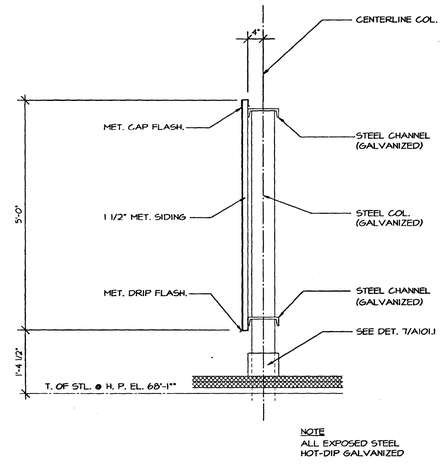
NOTE
DESIGN AND ANCHORAGE OF ALUMINUM CURTAIN WALL TO STRUCTURAL STEEL BY CURTAIN WALL MFR.

7 / A303 SECTION
3/4" = 1'-0"

TYP. AT EXTERIOR WALL
OF CLASSROOM #011
& TEACHERS WORKROOM #115



8 / A303 SECTION
3/4" = 1'-0"
2 - HR. FIRE WALL



NOTE
ALL EXPOSED STEEL
HOT-DIP GALVANIZED

9 / A303 SECTION
3/4" = 1'-0"

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PROFESSIONAL SEAL

PROJECT MANAGER	L.J. FREE
ARCHITECT/ENGINEER	S.E.McNEECE
DRAWN BY	J. CZUBATY

FLETCHER THOMPSON
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FLETCHER-THOMPSON, INC.
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BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

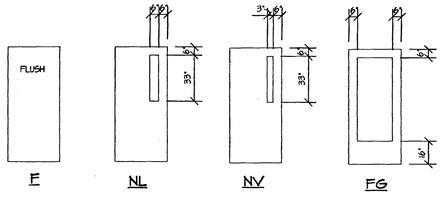
WALL SECTIONS

NO	DATE	REVISION	BY

DATE	MARCH 16, 1998
SCALE	3/4" = 1'-0"
PROJECT NO.	50950.06
DRAWING NO.	A303

DOOR SCHEDULE

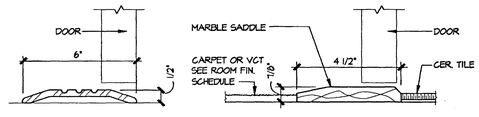
FLOOR DESIGNATION	DRAWING DESIGNATION	DOOR NUMBER	DOOR: DOOR SIZE: DOUBLE LEAF DOOR	4'-0"W X 6'-8"H	3'-0"W X 6'-8"H	14'-0"W X 6'-10"H	3'-0"W X 7'-1 3/4"H	2'-6"W X 6'-8"H	TYPE / MATERIAL: TYPE	MATERIAL	FRAME: DETAIL/SHEET NUMBER: TYPE - SEE FRAME ELEV.	HEAD DETAIL	JAMB DETAIL	SADDLE DETAIL	FIRE RATING: 20 MINUTES	45 MINUTES	60 MINUTES	90 MINUTES	HARDWARE: FIRE CODE: PANIC RELEASE LATCH	LATCHING	AUTOMATIC CLOSER	ELECTRO-MAG. H.O.	DELAYED ACTION CLOSER	PUSH / PULL ADA	PHYSICALLY CHALLENGED: LEVER HANDLES	KICK PLATES	TACTILE WARNING	ACCESSIBLE THRESHOLD	180 DEGREE HINGES	VERTICAL PULL ADA	VT. PULL W/ THUMBLATCH	SIGNAGE TYPE	SIGNAGE MOUNTING HEIGHT: 60" A.F.F.	HARDWARE SET	REMARKS
GROUND FLOOR — PART - 'A'		003		●					NL	WD	A	1	1	-		●			●	●				●							A	Classroom	2	1/4" WIRE GL.
		004		●					NL	WD	A	1	1	-		●			●	●				●							A	Classroom	2	1/4" WIRE GL.
		005		●					NL	WD	A	1	1	-		●			●	●				●							A	Classroom	2	1/4" WIRE GL.
		006		●					NL	WD	A	1	1	-			●		●	●				●							A	Science	2	1/4" WIRE GL.
		007		●					F	WD	A	2	2	-			●		●	●				●		●					A	Storage	2	1/4" WIRE GL. 3/4" UNDERCUT
		008		●					NL	WD	A	1	1	-		●			●	●				●							A	Classroom	2	1/4" WIRE GL.
		009		●					NL	WD	A	1	1	-			●		●	●				●							A	Science	2	1/4" WIRE GL.
		010		●					F	WD	A	1	1	-			●		●	●				●		●					A	Storage	2	3/4" UNDERCUT
		011		●					NL	WD	A	1	1	-		●			●	●				●							A	Classroom	2	1/4" WIRE GL.
		013	●	●					F	WD	A	1	1	-				●	●	●	●			●	●			●			-		4	1/4" WIRE GL.
		014		●					F	WD	A	1	1	C.B						●			●	●		●				A & F	Men's Toilet	5	3/4" UNDERCUT
		015		●					F	WD	A	1	1	-			●		●	●				●	●						A	Custodian Closet	3	3/4" UNDERCUT
		016		●					F	WD	A	1	1	B						●			●	●		●				A & F	Women's Toilet	5	3/4" UNDERCUT
		017	●				●		NL	HM	A	3	4	A					●	●	●			●	●		●				-		6	1/4" TEMP. GL. (TINTED)
		017A	●				●		NL	HM	A	3	4	A					●	●	●			●	●		●				-		6	1/4" TEMP. GL. (TINTED)
		51-6	●	●					NV	WD	A	1	1	-				●	●	●	●			●	●						A	Stair	7	1/4" WIRE GL.
		51-6A	●	●					FG	AL	-	SECT 6/A302	SECT 6/A302	A					●	●	●			●	●		●						14	1" INSUL. TEMP. GL. (TINTED)
		52-6	●	●					NV	WD	A	1	1	-				●	●	●	●			●	●						A	Stair	7	1/4" WIRE GL.
		52-6A	●	●					FG	AL	-	SECT 6/A302	SECT 6/A302	A					●	●	●			●	●		●						14	1" INSUL. TEMP. GL. (TINTED)
		53-6	●	●					NV	WD	A	1	1	-				●	●	●	●			●	●						A	Stair	7	1/4" WIRE GL.
		53-6A	●			●			NV	HM	A	SIM. 3	SIM. 4	A					●	●	●			●	●		●				-		6	1/4" WIRE GL.
		040		●					NL	WD	-	-	-	-				●	●		●			●	●						A	Science	2	1/4" WIRE GL. EXIST. FRAME (VERIFY SIZE IN FIELD)
		041		●					F	WD	A	2	2	-				●	●		●			●		●							2	3/4" UNDERCUT
		101		●					NL	WD	A	2	2	-					●					●							A	Computer Lab	1	1/4" TEMP. GL.
		102				●			F	WD	A	2	2	-					●					●							-		1	
		104		●					NL	WD	A	2	2	-					●					●							A	Computer Lab	1	1/4" TEMP. GL.
		106		●					NL	WD	A	2	2	-					●					●							A	Media Mark Room	1	1/4" TEMP. GL.
		106A		●					NL	WD	A	2	2	-					●					●							A	Media Mark Room	1	1/4" TEMP. GL.
		108		●					F	WD	B	2	2	-					●					●							A	Office	12	
		109		●					F	WD	A	2	2	-		●			●	●				●		●					A	Storage	3	
		110		●					F	WD	A	2	2	-					●					●							A	Data	1	
		112		●					NL	WD	A	2	2	-					●					●							A	Reading	1	1/4" TEMP. GL.
		113		●					F	WD	A	2	2	-					●					●							A	Speech Therapy	1	
		115		●					NL	WD	A	1	1	-					●					●							A	Teacher's Workroom	1	1/4" TEMP. GL.
		116		●					F	WD	A	2	2	-					●					●							A	Telephone	8	
		117		●					F	WD	A	2	2	-					●					●									1	
		118		●					F	WD	A	2	2	B					●					●	●		●				A & F	Women's Toilet	9	3/4" UNDERCUT
		119		●					F	WD	A	2	2	B					●					●	●		●				A & F	Men's Toilet	9	3/4" UNDERCUT
		120	●	●					F	WD	A	1	1	-				●	●	●	●			●	●			●			-		4	1/4" WIRE GL.
		121		●					F	WD	A	1	1	B						●			●	●		●				A & F	Women's Toilet	5	3/4" UNDERCUT
		122		●					F	WD	A	1	1	-		●			●	●				●		●					A	Custodian Closet	3	3/4" UNDERCUT
		123		●					F	WD	A	1	1	B						●			●	●		●				A & F	Men's Toilet	5	3/4" UNDERCUT
		51-1		●					NV	WD	A	1	1	-				●	●	●	●			●	●						A & D	Stair	11	1/4" WIRE GL. - SECURITY ALARM LOCKABLE FROM STAIR SIDE
		52-1		●					NV	WD	A	1	1	-				●	●	●	●			●	●						A & D	Stair	11	1/4" WIRE GL. - SECURITY ALARM LOCKABLE FROM STAIR SIDE
		53-1	●	●		●			NV	WD	-	-	-	-				●	●	●	●			●	●						A	Stair	7	1/4" WIRE GL. EXIST. FRAME (VERIFY SIZE IN FIELD)
		144		○					-	-	-	-	-	-					●					●							A	Classroom 144	13	REMOVE EXIST. LOCKSET
		150		○					-	-	-	-	-	-					●					●							A	Classroom 150	13	REMOVE EXIST. LOCKSET
		152		○					-	-	-	-	-	-					●					●							A	Classroom 152	13	REMOVE EXIST. LOCKSET
		158		●					F	WD	A	1	1	-		●			●	●				●							A	Conference Room	2	
		159		●					NL	WD	A	2	2	-					●					●							A	Classroom	1	1/4" TEMP. GL.
		159A		●					NL	WD	A	1	1	-		●			●	●				●							A	Classroom	2	1/4" WIRE GL.
		160		●					NL	WD	-	-	-	-			●		●	●				●							A	Science	2	1/4" WIRE GL. EXIST. FRAME (VERIFY SIZE IN FIELD)
		161		●					F	WD	A	1	1	-			●		●	●				●		●					A	Storage	2	3/4" UNDERCUT
		162		●					F	WD	-	-	-	-		●			●	●				●							A	Conference Room	2	EXIST. FRAME (VERIFY SIZE IN FIELD)
		163		●					NL	WD	-	-	-	-		●			●	●				●							A	Classroom	2	1/4" WIRE GL. EXIST. FRAME (VERIFY SIZE IN FIELD)
		163A		●					NL	WD	A	2	2	-					●					●							A	Classroom	1	1/4" TEMP. GL.
		164		●					F	WD	A	2	2	-		●			●	●				●		●					A	Storage	2	3/4" UNDERCUT
		165	●	●					F	WD	A	2	2	-					●					●									10	
		166	●	●					F	WD	A	2	2	-					●					●							-		10	
		167		●					NL	WD	-	-	-	-			●		●	●				●							A	Science	2	1/4" WIRE GL. EXIST. FRAME (VERIFY SIZE IN FIELD)
		168		●					F	WD	A	2	2	-		●			●	●				●		●					A	Storage	2	3/4" UNDERCUT
		169		●					NL	WD	-	-	-	-		●			●	●				●							A	Science	2	1/4" WIRE GL. EXIST. FRAME (VERIFY SIZE IN FIELD)
		170		●					NL	WD	-	-	-	-		●			●	●				●							A	Science	2	1/4" WIRE GL. EXIST. FRAME (VERIFY SIZE IN FIELD)
		171		●					F	WD	A	2	2	-					●	●				●	●						A	Storage	2	3/4" UNDERCUT
		172		●					F	WD	-	-	-	-		●			●	●				●	●						A	Storage	2	3/4" UNDERCUT EXIST. FRAME (VERIFY SIZE IN FIELD)
FIRST FLOOR — PART - 'B'		218		●					F	WD	A	1	1	-					●	●				●	●						A	Serving	2	



F NL NV FG

DOOR TYPES

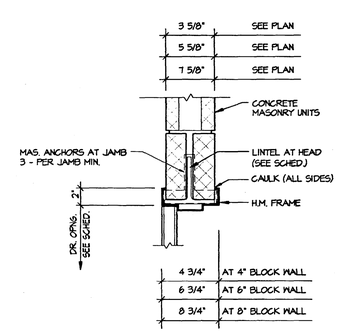
SCALE: 1/4" = 1'-0"



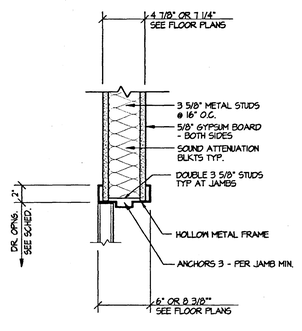
A B

SADDLE TYPES

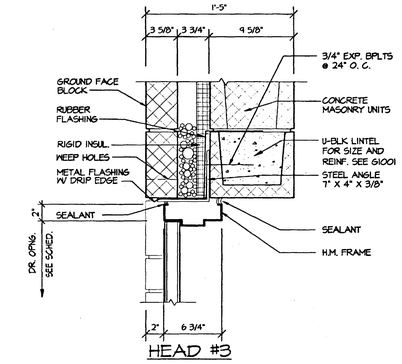
N.T.S.



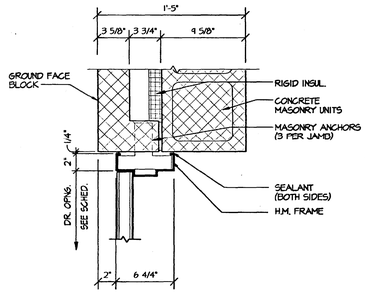
HEAD #1
JAMB #1 SIMILAR



HEAD #2
JAMB #2 SIMILAR



HEAD #3

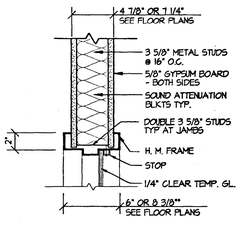


JAMB #4

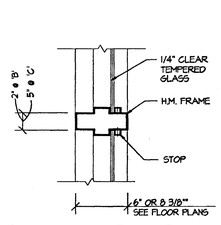
HEAD & JAMB DETAILS

SCALE: 1 1/2" = 1'-0"

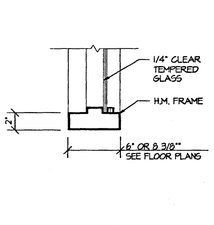
BQ #70 & 125 Attachment



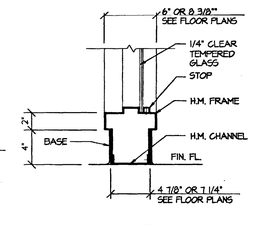
DET. A



DET. B & C



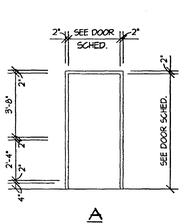
DET. D



DET. E

FRAME DETAILS

SCALE: 1 1/2" = 1'-0"



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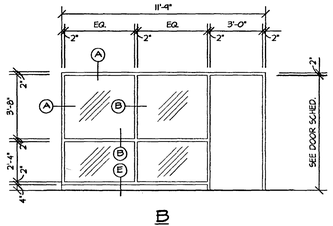

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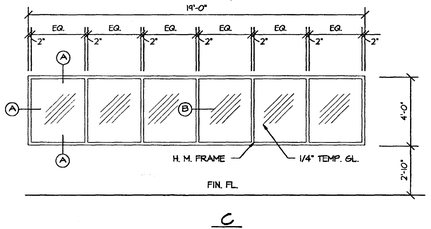

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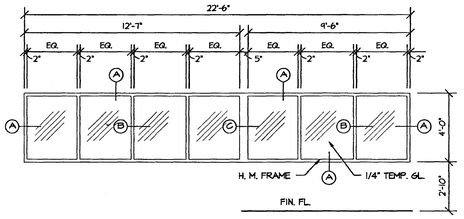
104



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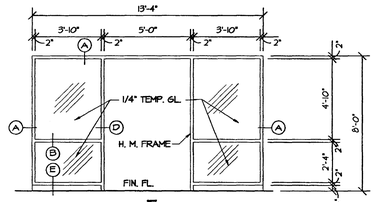

E
111

HOLLOW METAL FRAME ELEVATIONS

SCALE: 1/4" = 1'-0"

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LEGEND

● - NEW WORK 101A - DOOR NUMBER
○ - EXISTING

GENERAL DOOR NOTES

1. ALL DOORS SHALL BE 1 3/4" THICK UNLESS OTHERWISE NOTED
2. ALL RATED DOORS AND DOORS FRONTING CORRIDORS EXCEPT RESTROOM DOORS SHALL HAVE POSITIVE LATCHING LOCKSETS OR LATCHSETS AND CLOSERS.
3. ALL RATED DOORS AND DOORS TO HAZARDOUS AREAS SHALL HAVE POSITIVE LATCHING LOCKSETS OR LATCHSETS AND CLOSERS.
4. ALL DOORS LEADING TO HAZARDOUS SPACES SHALL HAVE TACTILE MARKING.
5. ALL DOORS EXITING 100 OR MORE PERSONS SHALL HAVE PANIC EXIT DEVICES.
6. DOOR HARDWARE ACCESSIBLE TO PERSONS WITH DISABILITIES SHALL BE PROVIDED TO COMPLY WITH UNIFORM FEDERAL ACCESSIBILITY STANDARDS.
7. HAZARDOUS AREAS INCLUDE: CUSTODIAN SPACES, STORAGE ROOMS, MECHANICAL ROOMS, ELECTRICAL ROOMS, DOOR OPERATIONAL HARDWARE TO STUDENT SPACES DOES NOT REQUIRE TACTILE MARKINGS, HOWEVER, SOME STAGE DOORS DO.
8. THE CONTRACTOR SHALL INSURE THAT 1 THROUGH 5 ARE IMPLEMENTED IN NEW BUILDING AREAS.
9. ALL HOLLOW METAL DOORS AND FRAMES SHALL BE PAINTED.
10. ALL EXTERIOR DOORS SHALL HAVE WEATHERSTRIPPING.
11. DOORS 013, 120, 163 SHALL HAVE 180 DEGREE CLOSERS.
12. SEE EXTERIOR ELEVATION DRAWING # A403 FOR GLAZING TY
13. ALL CEILING HIGH ALUM. AND HOLLOW METAL FRAMES WITH NO WALL ABOVE SHALL BE BRACED TO STRUCTURE ABOVE WITH 3 5/8" METAL STUDS AT 16" O.C.

PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE
ARCHITECT/ENGINEER: S.E.McNEECE
DRAWN BY: J. CZUBATY

FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

DOOR SCHEDULE AND DETAILS

NO	DATE	REVISION	BY
1	6/19/98	D. O. E. REVISIONS	J.C.

DATE: MARCH 16, 1998
SCALE: AS NOTED
PROJECT NO.: 50950.06
DRAWING NO.: A401

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BQ #70 & 125 Attachment

ROOM FINISH SCHEDULE

	ROOM NO.	DESIGNATION	FLOOR TYPE	BASE TYPE	WALL TYPE	CEILING TYPE	CEILING HEIGHT	REMARKS
GROUND FLOOR PART 'A'	001	STAIR #2	1, 4 & 5	1	1	-	-	
	002	CORRIDOR	1	1	3	2	8'-0"	
	003	CLASSROOM	2	1	1	1 & 4	10'-0"	
	004	CLASSROOM	2	1	1	1 & 4	10'-0"	
	005	CLASSROOM	2	1	1	1 & 4	10'-0"	
	006	SCIENCE	1	1	1	1 & 4	10'-0"	
	007	SCIENCE STOR.	1	1	1	1	8'-8"	
	008	CLASSROOM	2	1	1	1 & 4	10'-0"	
	009	SCIENCE	1	1	1	1 & 4	10'-0"	
	010	SCIENCE STOR.	1	1	1	1	8'-8"	
	011	CLASSROOM	2	1	1	1 & 4	10'-0"	
	012	STAIR #1	1, 4 & 5	1	1	-	-	
	013	CORRIDOR	1	1	2	2	8'-0"	
	013A	CORRIDOR	1	1	3	2	8'-0"	
	014	MEN'S TOILET	3	2	2 & 3	1	8'-0"	
	015	CUSTODIAN	3	2	2 & 3	1	8'-0"	
	016	WOMEN'S TOILET	3	2	2 & 3	1	8'-0"	
	017	CONN.	1	1	1	2	8'-6"	
	018	STAIR #3	*1	**1	**1	2	-	* PATCH TO MATCH EXIST. ** ON NEW CONSTRUCTION TO MATCH EXIST.
PART 'B'	040	SCIENCE	1	1	1	1	9'-6"	
	041	SCIENCE STORAGE	1	1	1	1	8'-8"	
	051	CORRIDOR	0	0	0	1	7'-10"	
	055	HOME ECON.	0	0	0	5	7'-6"	
	056	CLASSROOM	0	0	0	1	7'-6" / 9'-6"	
	059	GROUP COUNCIL	0	0	0	1	7'-4"	
FIRST FLOOR PART 'A'	100	STAIR #2	1 & 4	1	1	2	9'-8"	
	101	COMPUTER LAB	2	1	1	3	8'-8"	
	102	CLOSET	2	1	1	1	8'-0"	
	103	READING AREA	2	1	1	3	9'-8"	
	104	COMPUTER LAB	2	1	1	3	9'-8"	
	106	MEDIA WORKROOM	2	1	1	1	9'-8"	
	107	REFERENCE AREA	2	1	1	3	8'-0"	
	108	OFFICE	2	1	1	3	8'-0"	
	109	STORAGE	1	1	1	1	8'-0"	
	110	DATA	1	1	1	1	8'-0"	
	111	MEDIA CENTER	2	1	1	3	9'-8"	
	112	READING CLASSROOM	2	1	1	3	9'-8"	
	113	SPEECH THERAPY	2	1	1	1	8'-0"	
	114	STAIR #1	1 & 4	1	1	2	9'-8"	
	115	TEACHERS WORKROOM	1 & 2	1	1	1	9'-8"	
	116	TELEPHONE	2	1	1	1	8'-0"	
	117	CLOSET	2	1	1	1	8'-0"	
	118	WOMEN'S TOILET	3	2	2 & 3	1	8'-0"	
	119	MEN'S TOILET	3	2	2 & 3	1	8'-0"	
	120	GALLERY	2	1	1 & 4	3	8'-0" / 10'-6"	FABRIC WALL COV. ON NORTH WALL
	121	MEN'S TOILET	3	2	2 & 3	1	8'-0"	
	122	CUSTODIAN CLOSET	3	2	2 & 3	1	8'-0"	
	123	WOMEN'S TOILET	3	2	2 & 3	1	8'-0"	
	124	CONN.	1	1	1	2	8'-6"	
PART 'B'	144	CLASSROOM	2	1	1	1 & 4	9'-6"	
	145	CLOSET	2	1	1	1	8'-0"	
	150	CLASSROOM	2	1	1	1 & 4	9'-6"	
	151	DATA CLOSET	2	1	1	1	8'-0"	
	152	CLASSROOM	2	1	1	1 & 4	9'-6"	
	153	CLOSET	2	1	1	1	8'-0"	
	158	TEACHERS CONFERENCE	2	1	1	1	8'-0"	
	159	CLASSROOM	2	1	1	1 & 4	9'-6"	
	159A	VESTIBULE	2	1	1	1	8'-0"	
	160	SCIENCE	1	1	1	1 & 4	9'-6"	
	161	SCIENCE STORAGE	1	1	1	1	8'-8"	
	162	TEACHERS CONFERENCE	2	1	1	1	8'-0"	
	163	CLASSROOM	2	1	1	1 & 4	9'-6"	
	164	STORAGE	1	1	1	1	8'-0"	
	165	CLOSET	2	1	1	1	8'-0"	
	166	CLOSET	2	1	1	1	8'-0"	
	167	SCIENCE	1	1	1	1 & 4	9'-6"	
	168	SCIENCE STORAGE	1	1	1	1	8'-8"	
	169	SCIENCE	1	1	1	1 & 4	9'-6"	
	170	CLOSET	1	1	1	1	8'-0"	
	171	STORAGE	1	1	1	1	8'-8"	
	172	SCIENCE STORAGE	1	1	1	1	8'-8"	
	213	SERVING	0	0	1	4	-	SEE DD CEILING DROP AT SKYLIGHT
	219	OFFICE	1	1	1	1	8'-8"	

ROOM FINISH LEGEND

FLOOR TYPES

0. - EXISTING TO REMAIN
1. - VINYL COMPOSITION TILE
2. - CARPET
3. - CERAMIC TILE
4. - RUBBER NOSING, TREAD, & RISER
5. - RECESSED ENTRANCE MAT

BASE TYPES

0. - EXISTING TO REMAIN
1. - RUBBER
2. - CERAMIC TILE

WALL TYPES

0. - EXISTING TO REMAIN
1. - PAINTED
2. - VITREOUS WALL SURFACING
3. - CERAMIC TILE WAINSCOT 4'-0" HIGH
4. - VINYL WALL COVERING

CEILING TYPES

0. - EXISTING TO REMAIN
1. - 2' X 4' ACOUSTICAL CLG. BD. (TYPE - 1)
2. - 2' X 4' ACOUSTICAL CLG. BD. - (TYPE - 2)
3. - 2' X 4' ACOUSTICAL CLG. BD. (TYPE - 3)
4. - PAINTED GYPSUM BOARD
5. - 2' X 2' ACOUSTICAL CLG. BD. TO MATCH EXIST.

GENERAL NOTES

1. INTERIOR FINISHES IN ALL EXITS SHALL BE CLASS "A".
2. INTERIOR FINISHES AT ALL ACCESS TO EXITS SHALL BE CLASS "A OR CLASS "B".
3. INTERIOR FINISHES AT ALL OTHER SPACES SHALL BE CLASS "A OR CLASS "B".
4. WHERE WALLS, CEILINGS & EXPOSED CONSTRUCTION ARE INDICATED ON ROOM FINISH SCHEDULE TO BE PAINTED, ALL NEW MISCELLANEOUS METAL, INCLUDING STAIR CONSTRUCTION, HANDRAILS, EXPOSED LINTELS, PRIMED FINISH MECH'L EQUIPMENT, EXPOSED PIPING, DUCTWORK, CONDUIT, ETC., SHALL ALSO BE PAINTED.
5. IN SPACES WHERE NO NEW FINISHES ARE INDICATED, FINISH NEW OR PATCHED CONSTRUCTION TO MATCH EXISTING.
6. ALL GYP. BD. CEILING DROPS, BEAM ENCLOSURES, ETC. SHALL BE PAINTED.

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PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE

ARCHITECT/ENGINEER: S.E.McNEECE

DRAWN BY: J. CZUBATY

FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

ROOM FINISH SCHEDULE

NO	DATE	REVISION	BY

DATE: **MARCH 16, 1998**

SCALE: **AS NOTED**

PROJECT NO.: **50950.06**

DRAWING NO.: **A410**

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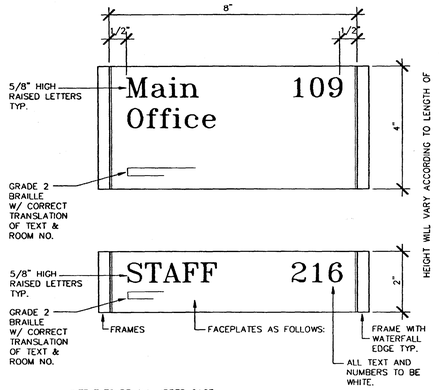
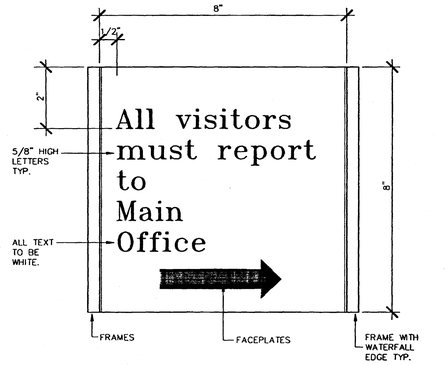


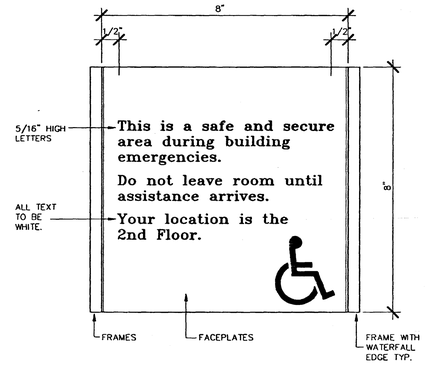
- TEXT TO BE ALL UPPER CASE.
- ROOM NAME TO BE LEFT JUSTIFIED, ROOM NUMBER TO BE RIGHT JUSTIFIED.
- TEXT SHOWN ON THIS SHEET ARE NOT REPRESENTATIVE OF ANY ACTUAL SIGN. REFER TO SCHEDULE FOR MESSAGES.
- COORDINATE WITH OWNER ACTUAL NUMBERS OF ROOMS.

SIGN TYPE A



- TEXT TO BE ALL UPPER AND LOWER CASE AS SHOWN.
- TEXT SHOWN IS REPRESENTATIVE OF ACTUAL SIGN MESSAGE.
- SEE FLOOR PLANS FOR ARROW DIRECTION.

SIGN TYPE B



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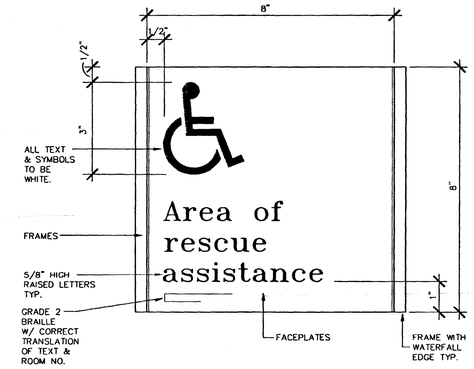
- TEXT SHOWN IS REPRESENTATIVE OF ACTUAL SIGN MESSAGE

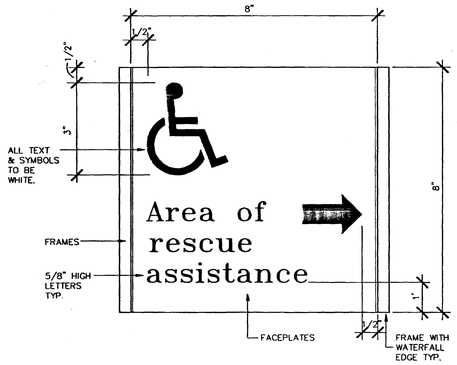
SIGN TYPE C

BQ #70 & 125 Attachment



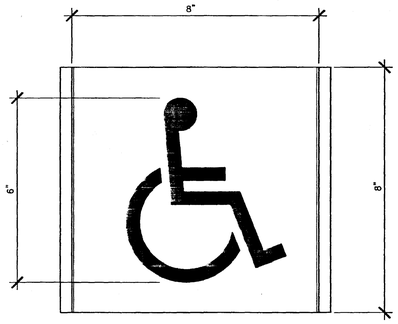
- TEXT TO BE ALL UPPER AND LOWER CASE AS SHOWN.
- TEXT TO BE RIGHT JUSTIFIED.
- TEXT SHOWN IS REPRESENTATIVE OF ACTUAL SIGN MESSAGE.

SIGN TYPE D

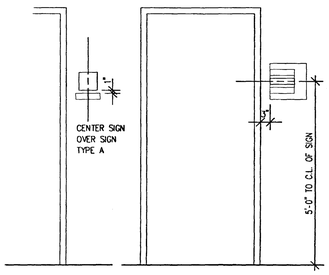


- TEXT TO BE ALL UPPER AND LOWER CASE AS SHOWN.
- TEXT TO BE RIGHT JUSTIFIED.
- SEE FLOOR PLAN FOR ARROW DIRECTION.

SIGN TYPE E



SIGN TYPE F



- SIGNS TO BE INSTALLED ON LATCH SIDE OF DOOR.
- DO NOT INSTALL SIGN ON GLASS.
- WHERE THERE IS NO WALL SPACE TO THE LATCH SIDE OF THE DOOR, SIGNS SHALL BE PLACED ON NEAREST ADJACENT WALL.
- SEE DOOR SCHEDULE A401 FOR LOCATIONS OF SIGN TYPES A, D AND F.
- SEE FLOOR PLANS FOR LOCATIONS OF SIGNAGE NOT LOCATED ON DOOR SCHEDULES
- FRAME AS SELECTED BY ARCHITECT COLOR OF TEXT AS INDICATED. CONTRASTING COLOR FOR FACEPLATE
- FINAL ROOM NUMBERING AND TEXT TO BE VERIFIED BY OWNER.
- SIGNAGE LOCATED ON FLOOR PLANS SHOWN THUS (B)

1/A411 **DOOR INFORMATION**

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PROFESSIONAL SEAL

PROJECT MANAGER	L.J. FREE
ARCHITECT/ENGINEER	S.E. McNEECE
DRAWN BY	J. CZUBATY

FLETCHER THOMPSON
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BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO

CENTRAL MIDDLE SCHOOL

9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

INTERIOR SIGNAGE

NO	DATE	REVISION	BY
1	6/19/98	D. O. E. REVISIONS	J. C.

DATE: MARCH 16, 1998

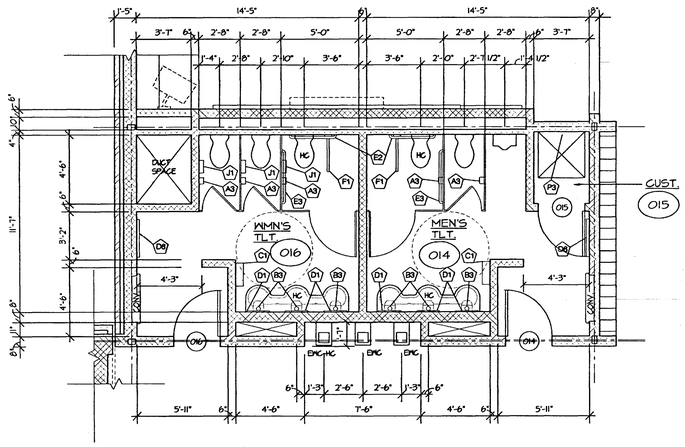
SCALE: N. T. S.

PROJECT NO.: 50950.06

DRAWING NO.: A411

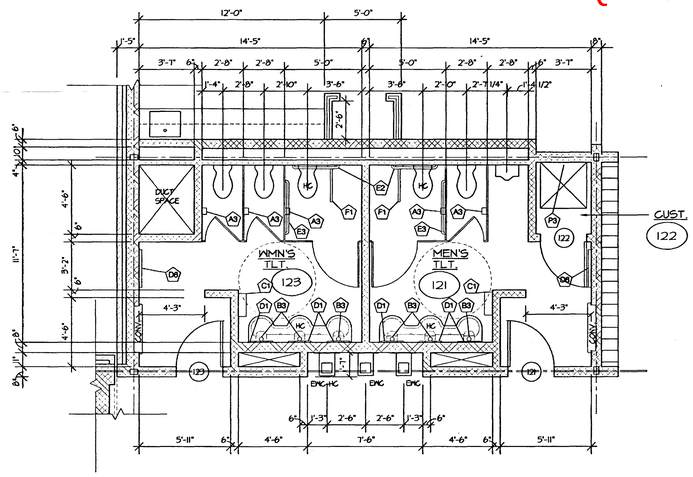
K:\50 projects\50950\dwg\Arch\A411 6-18-98 7:45:22 am EST

BQ #70 & 125 Attachment



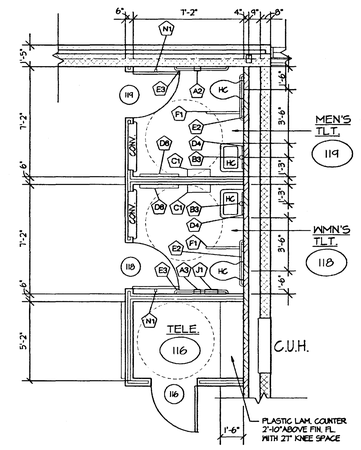
1 A501 PLAN AT TOILET ROOMS #014 & #016

1/4" = 1'-0"



2 A501 PLAN AT TOILET ROOMS #121 & # 123

1/4" = 1'-0"



3 A501 PLAN AT TOILET ROOMS #118 & 119

1/4" = 1'-0"

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TOILET ACCESSORIES LEGEND

- A2 - JUMBO ROLL TOILET PAPER HOLDER
- B3 - SOAP DISPENSER
- C1 - PAPER TOWEL DISPENSER
- D1 - SMALL MIRROR
- D4 - HANDICAP MIRROR
- D8 - FULL HEIGHT MIRROR
- E2 - 36" GRAB BAR
- E3 - 42" GRAB BAR
- F1 - SWING UP GRAB BAR
- J1 - SANITARY NAPKIN DISPOSAL UNIT
- N1 - SINGLE HOOK
- P3 - JANITORIAL MOP RACK

PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE

ARCHITECT/ENGINEER: S.E. McNEECE

DRAWN BY: J.C. OTTO

FLETCHER THOMPSON

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PROJECT TITLE

ADDITIONS AND RENOVATIONS TO

CENTRAL MIDDLE SCHOOL

9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

ENLARGED TOILET PLANS

NO	DATE	REVISION	BY
1	6/19/98	D. O. E. REVISIONS	J.C.

DATE: **MARCH 16, 1998**

SCALE: **1/4" = 1'-0"**

PROJECT NO.: **50950.06**

DRAWING NO.: **A501**

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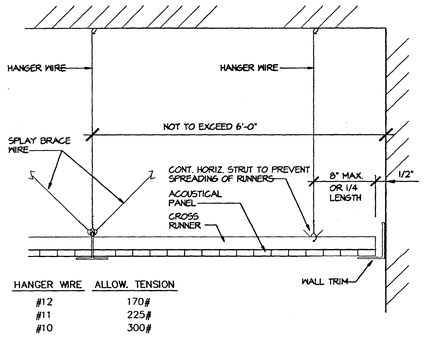
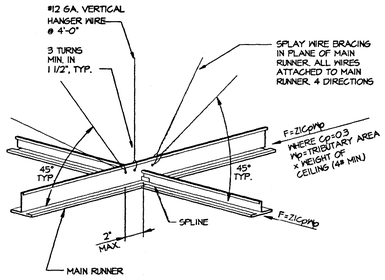
BQ #70 & 125 Attachment



HANGER WIRE	ALLOW. TENSION
#12	170#
#11	225#
#10	300#

1 A502 CEILING BRACING DETAIL
SCALE 1 1/2" = 1'-0"



2 A502 CEILING BRACING DETAIL
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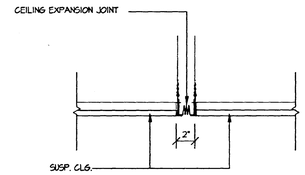
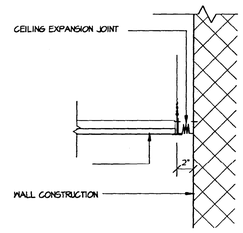


3 A502 CEILING EXP. JT. DETAIL
SCALE 3/4" = 1'-0"



4 A502 CEILING EXP. JT. DETAIL
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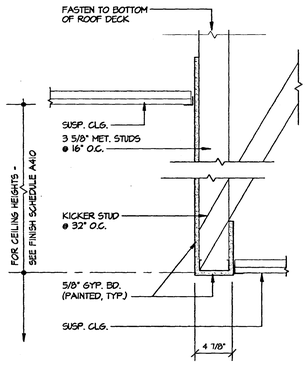

5 A502 CEILING DROP DETAIL
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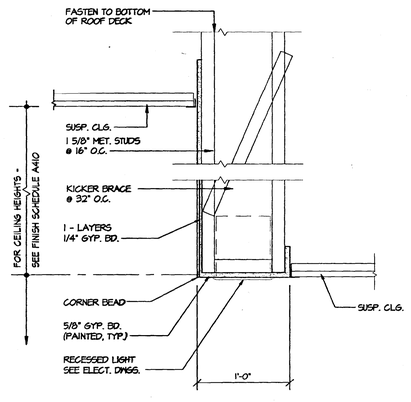
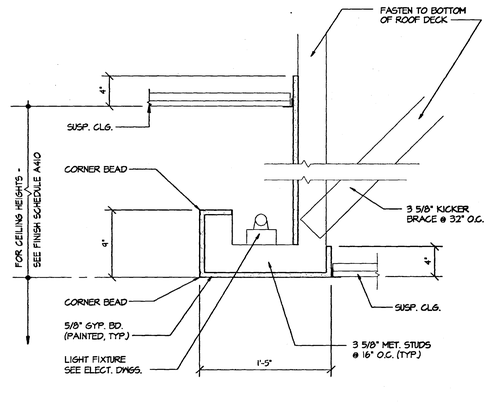
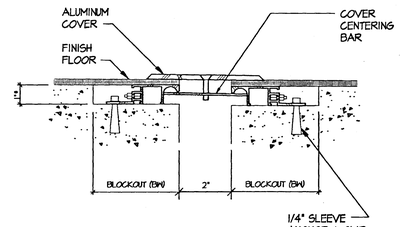


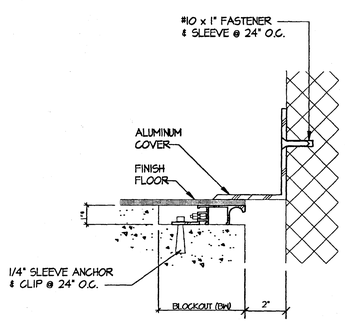
6 A502 CLG. DROP DET. @ MEDIA CENTER CIRCULATION DESK
SCALE 1 1/2" = 1'-0"



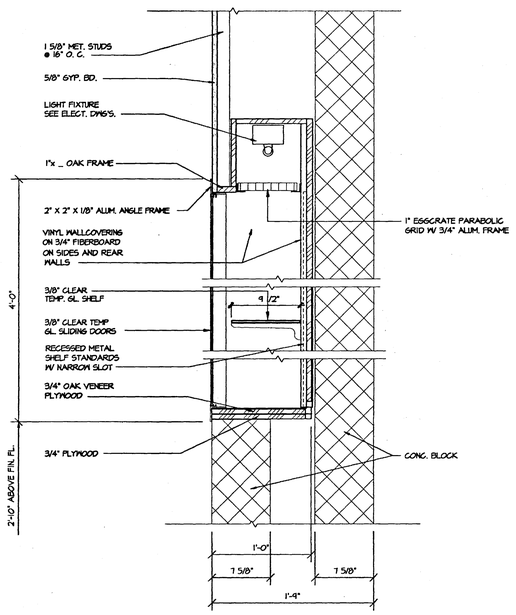
7 A502 CLG. DROP DET. @ GALLERY #120
SCALE 1 1/2" = 1'-0"



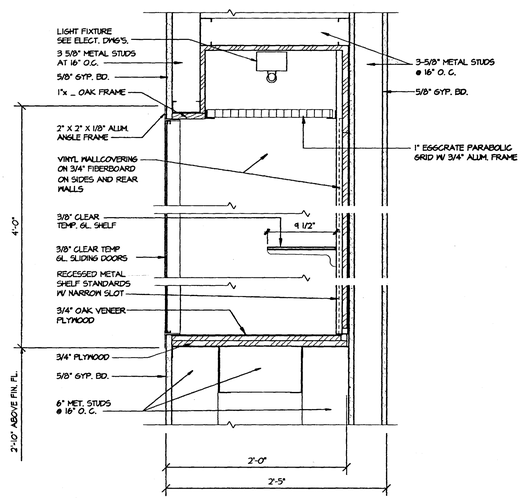
8 A502 SEISMIC FLOOR EXP. JT. DETAIL
SCALE 3"=1'-0"



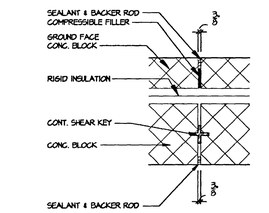
9 A502 SEISMIC FLOOR EXP. JT. AT WALL DETAIL
SCALE 3"=1'-0"



10 A502 DISPLAY CASE DETAIL IN CORRIDOR #002
SCALE 1 1/2" = 1'-0"



11 A502 DISPLAY CASE DETAIL IN GALLERY 120
SCALE 1 1/2" = 1'-0"



12 A502 TYP. CONTROL JOINT DETAIL (CJ)
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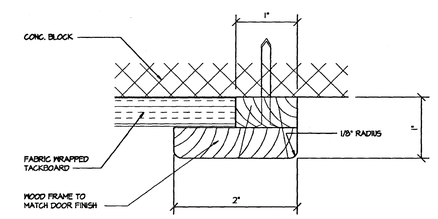

13 A502 TACKBOARD FRAME DETAIL
FULL SIZE

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PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE
ARCHITECT/ENGINEER: S.E. McNEECE
DRAWN BY: J. CZUBATYJ

FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

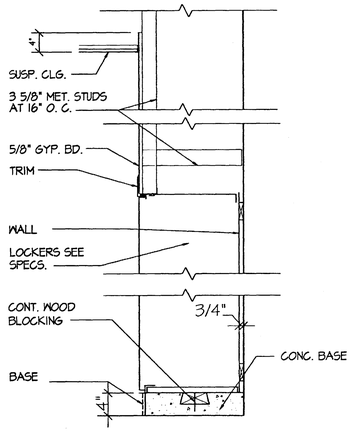
DRAWING TITLE

MISCELANEOUS DETAILS

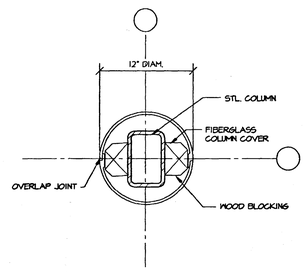
NO	DATE	REVISION	BY

DATE: MARCH 16, 1998
SCALE: AS NOTED
PROJECT NO.: 50950.06
DRAWING NO.: A502

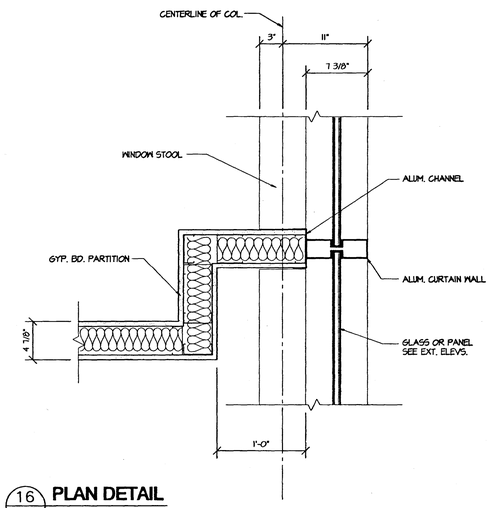
BQ #70 & 125 Attachment



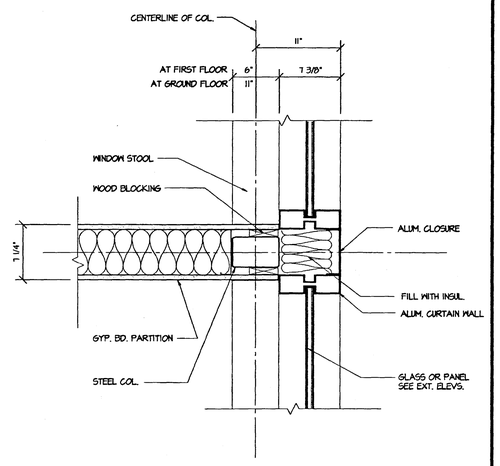
14 A503 **TYP. LOCKER DETAIL**
SCALE 1 1/2" = 1'-0"



15 A503 **FIBERGLASS COLUMN COVER**
SCALE 1 1/2" = 1'-0"



16 A503 **PLAN DETAIL**
SCALE 1 1/2" = 1'-0"



17 A503 **PLAN DETAIL**
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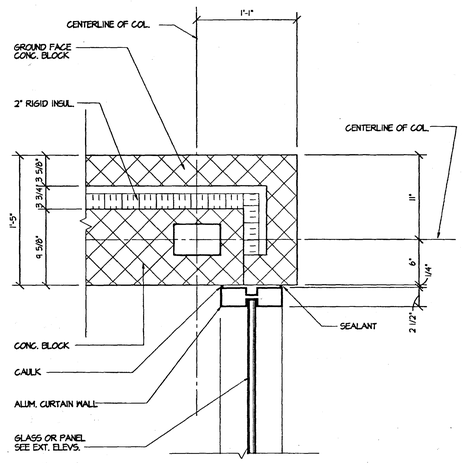

18 A503 **PLAN DETAIL**
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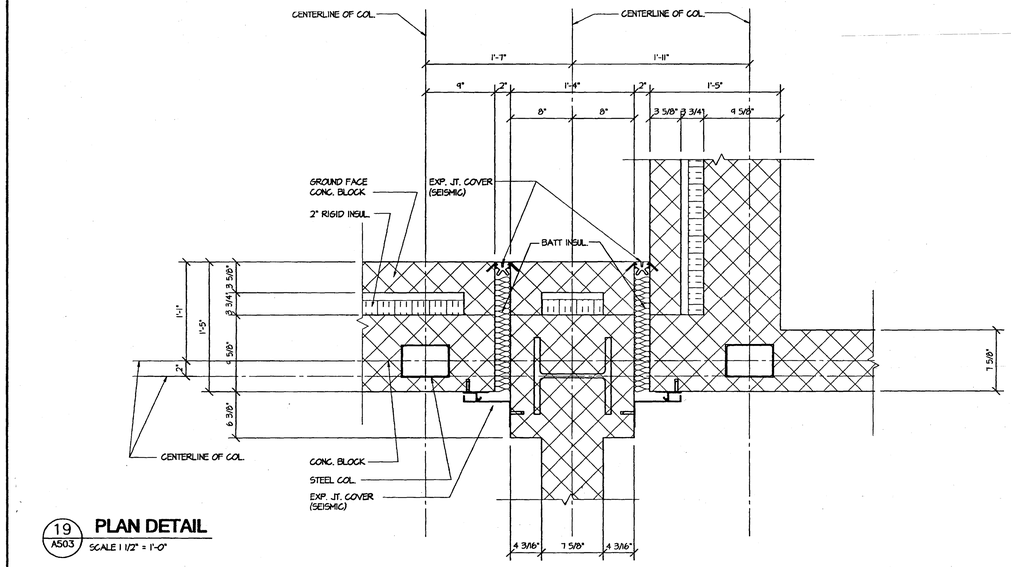
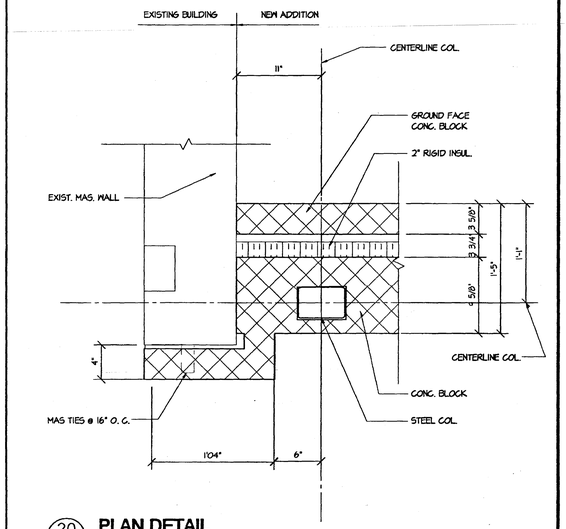


19 A503 **PLAN DETAIL**
SCALE 1 1/2" = 1'-0"



20 A503 **PLAN DETAIL**
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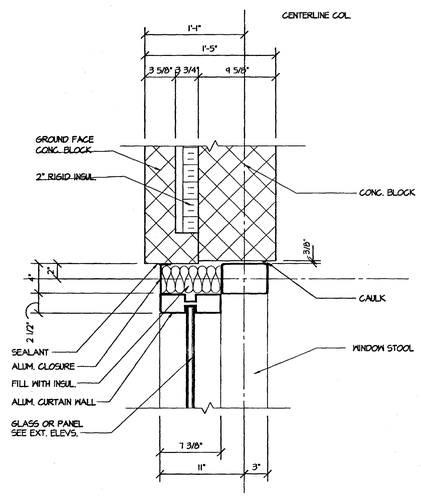

21 A503 **PLAN DETAIL**
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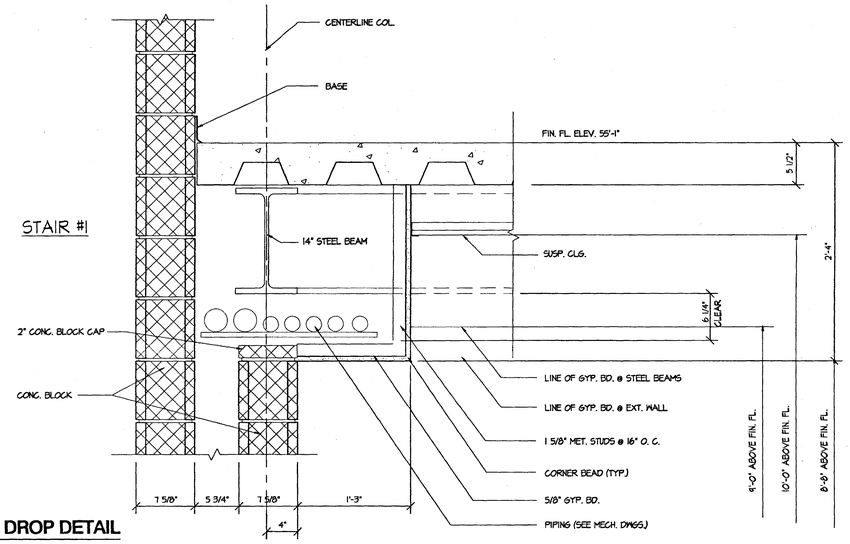
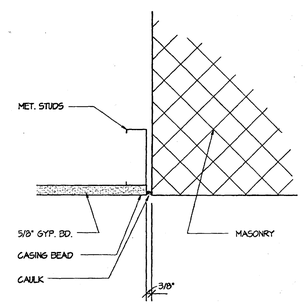


22 A503 **CEILING DROP DETAIL**
SCALE 1 1/2" = 1'-0"



23 A503 **GYP. BD. / MAS. DETAIL**
SCALE 3" = 1'-0"

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PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE
ARCHITECT/ENGINEER: S.E. McNEECE
DRAWN BY: J. CZUBATYJ

FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

MISCELANEOUS DETAILS

NO	DATE	REVISION	BY

DATE: MARCH 16, 1998
SCALE: AS NOTED
PROJECT NO.: 50950.06
DRAWING NO.: **A503**

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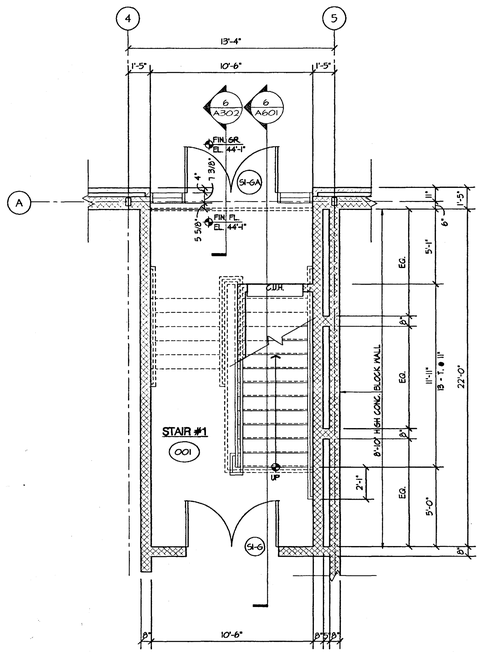
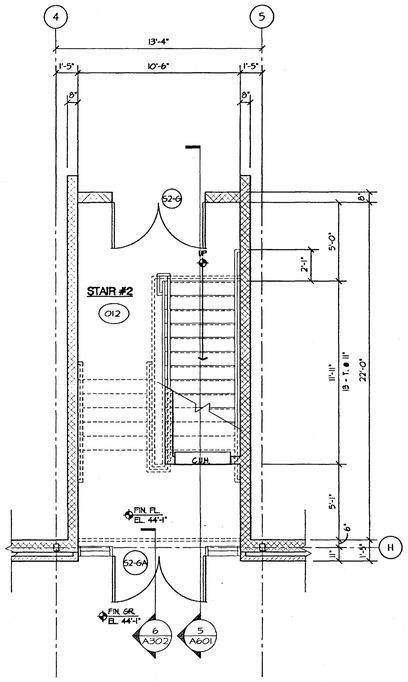
BQ #70 & 125 Attachment



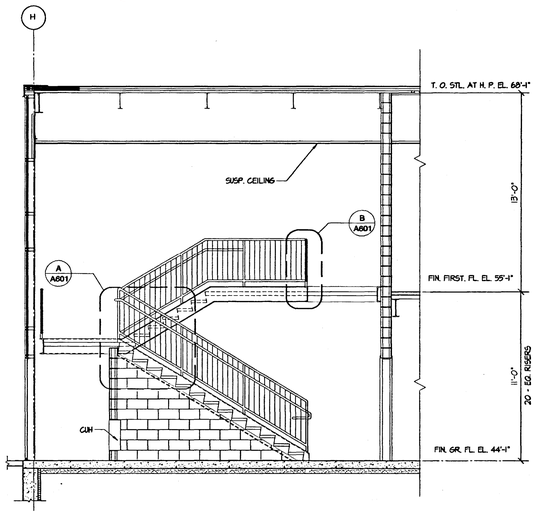
1 A601 STAIR #1 - GROUND FLOOR

1/4" = 1'-0"



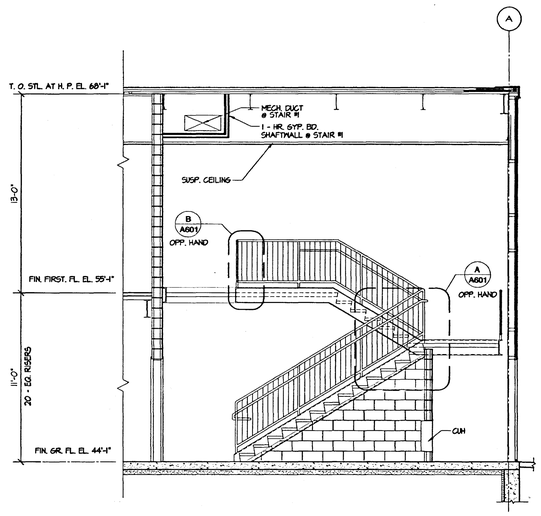
3 A601 STAIR #2 - GROUND FLOOR

1/4" = 1'-0"



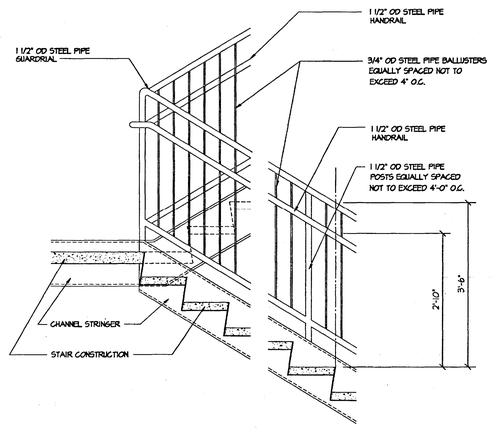
5 A601 SECTION - STAIR #2

1/4" = 1'-0"



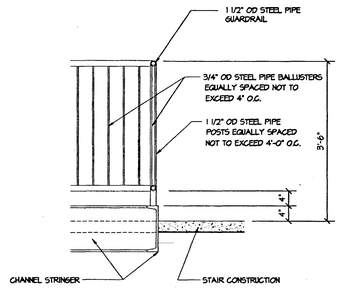
6 A601 SECTION - STAIR #1

1/4" = 1'-0"



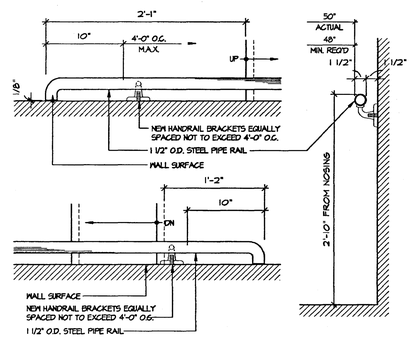
A A601 DETAIL

3/4" = 1'-0"



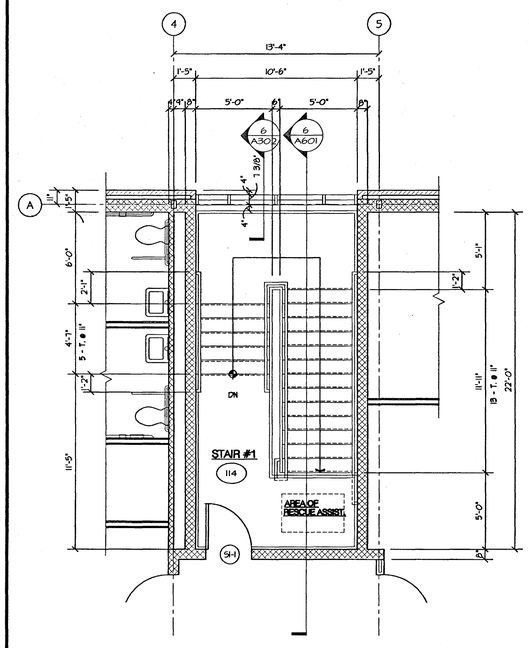
B A601 DETAIL

3/4" = 1'-0"



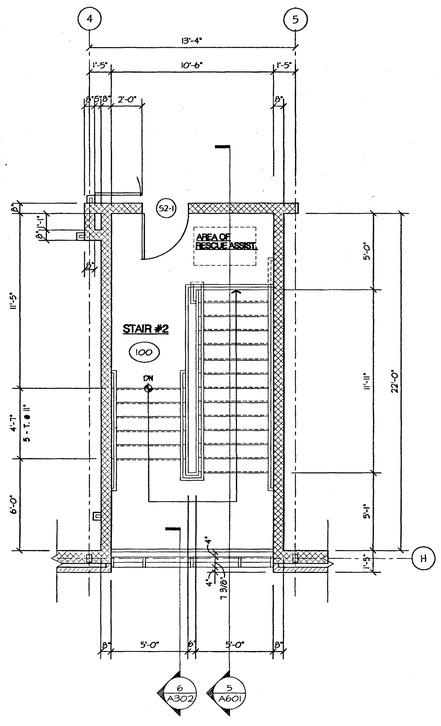
C A601 TYPICAL HANDRAIL DETAIL

1 1/2" = 1'-0"



2 A601 STAIR #1 - FIRST FLOOR

1/4" = 1'-0"



4 A601 STAIR #2 - FIRST FLOOR

1/4" = 1'-0"

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PROFESSIONAL SEAL

PROJECT MANAGER L.J. FREE

ARCHITECT/ENGINEER S.E. McNEECE

DRAWN BY J.C. OTTO

FLETCHER THOMPSON

ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO

CENTRAL MIDDLE SCHOOL

9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106A

DRAWING TITLE

STAIR PLANS, SECTIONS & DETAILS

NO	DATE	REVISION	BY
1	6/19/98	D.O.E. REVISIONS	J.C.

DATE MARCH 16, 1998

SCALE 1/4" = 1'-0"

PROJECT NO. 50950.06

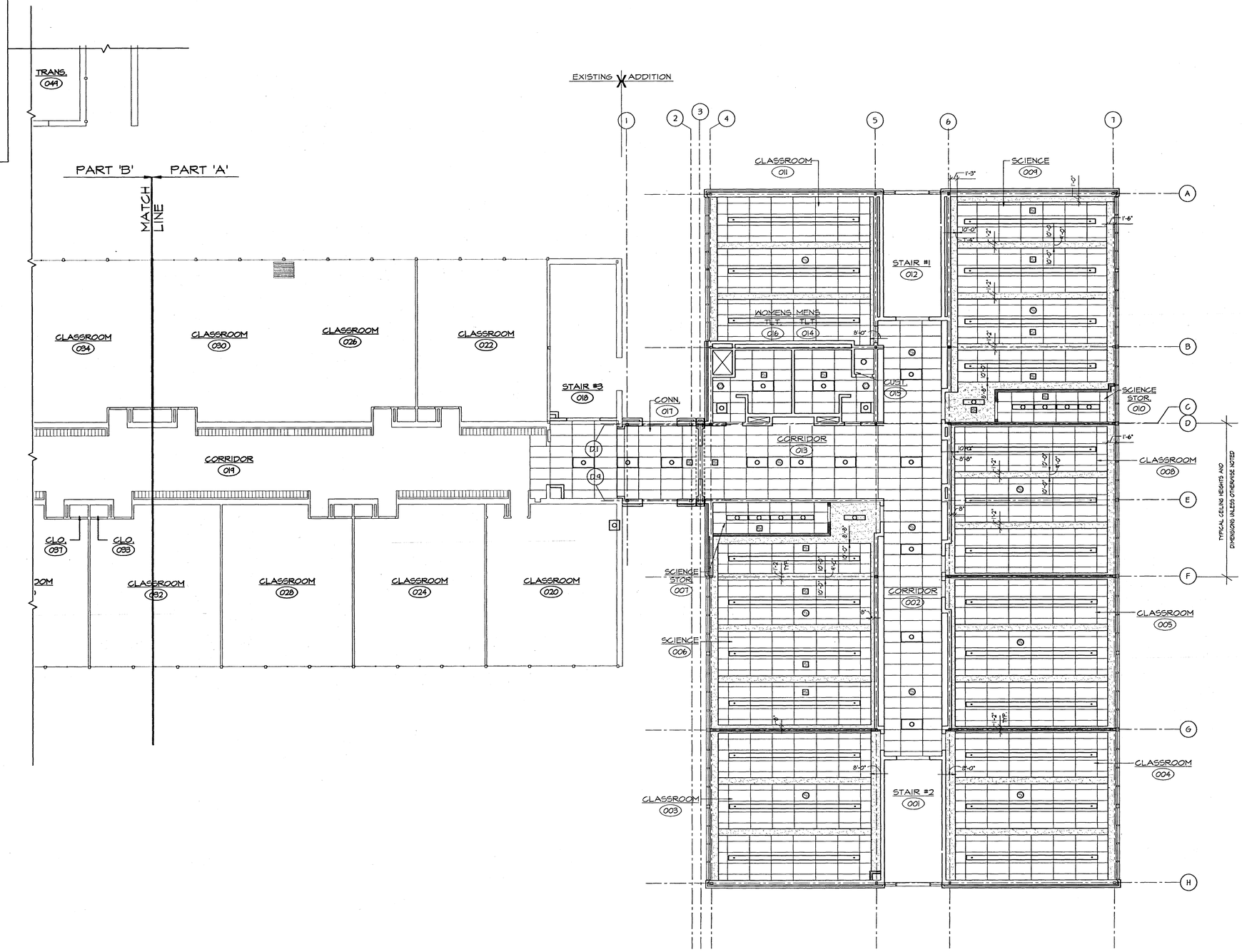
DRAWING NO. A601

K:\50 projects\50950\dwg\Arch\A601 6-19-98 9:44:56 am EST

BQ #70 & 125 Attachment

LEGEND

- LIGHT FIXTURES (SEE ELECTRICAL DWGS)
- DIFFUSERS, REGISTERS, GRILLES (SEE HVAC DWGS)
- SPRINKLER
- EXIT SIGN
- SPEAKER
- SMOKE DETECTOR
- HEAT DETECTOR
- OCCUPANCY SENSOR
- POWER REEL
- E.I.F.S.
- RELOCATED EXIST'G TRACKS
- ACOUSTICAL SUSPENDED CEILING
- GYPSUM BOARD



1 A700.1 GROUND FLOOR PLAN - PART "A"
SCALE: 1/8" = 1'-0"

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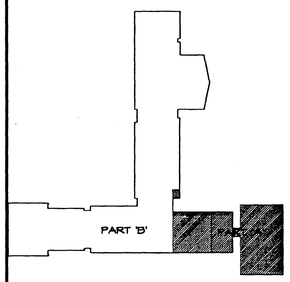


KEY PLAN

N

PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE
ARCHITECT/ENGINEER: S.E. McNEECE
DRAWN BY: J.C. OTTO

FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

GROUND FLOOR REFLECTED CEILING PLAN - PART "A"

0 4' 8' 16'
SCALE: 1/8" = 1'-0"

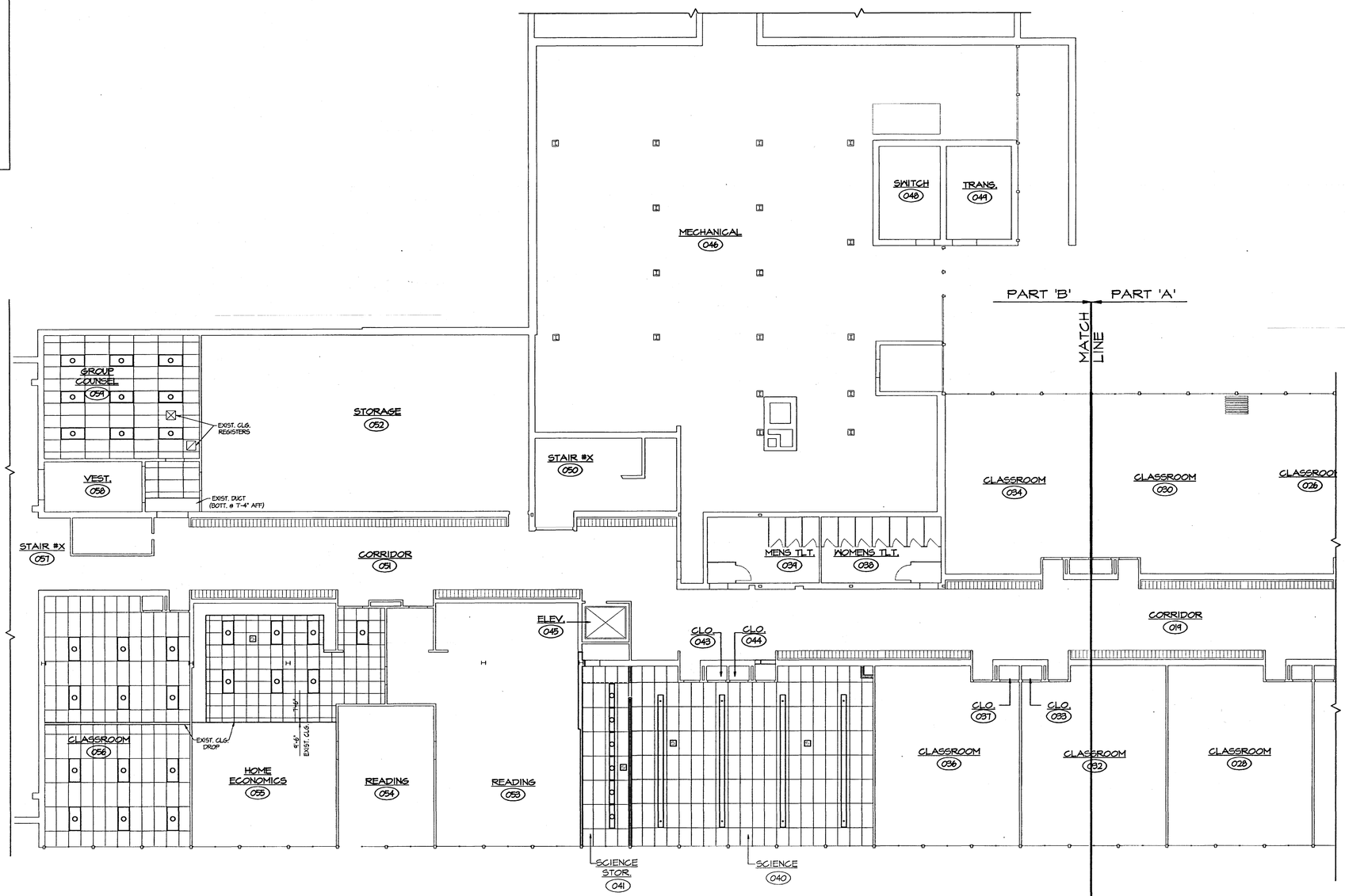
NO	DATE	REVISION	BY

DATE: MARCH 16, 1998
SCALE: 1/8" = 1'-0"
PROJECT NO.: 50950.06
DRAWING NO.: A700.1

BQ #70 & 125 Attachment

LEGEND

- LIGHT FIXTURES (SEE ELECTRICAL DWGS)
- DIFFUSERS, REGISTERS, GRILLES (SEE HVAC DWGS)
- SPRINKLER
- EXIT SIGN
- SPEAKER
- SMOKE DETECTOR
- HEAT DETECTOR
- OCCUPANCY SENSOR
- POWER REEL
- E.I.F.S.
- RELOCATED EXISTG TRACKS
- ACOUSTICAL SUSPENDED CEILING
- GYPSUM BOARD



1 A700.2 GROUND FLOOR PLAN-PART "B"
SCALE: 1/8"=1'-0"

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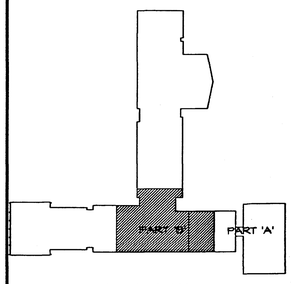

KEY PLAN

N

PROFESSIONAL SEAL

PROJECT MANAGER	L.J. FREE
ARCHITECT/ENGINEER	S.E. McNEECE
DRAWN BY	J.C. OTTO

FLETCHER THOMPSON

ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO

CENTRAL MIDDLE SCHOOL

9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

GROUND FLOOR REFLECTED CEILING PLAN - PART "B"

0 4' 8' 16'
SCALE: 1/8" = 1'-0"

NO	DATE	REVISION	BY

DATE	MARCH 16, 1998
SCALE	1/8" = 1'-0"
PROJECT NO.	50950.06
DRAWING NO.	A700.2

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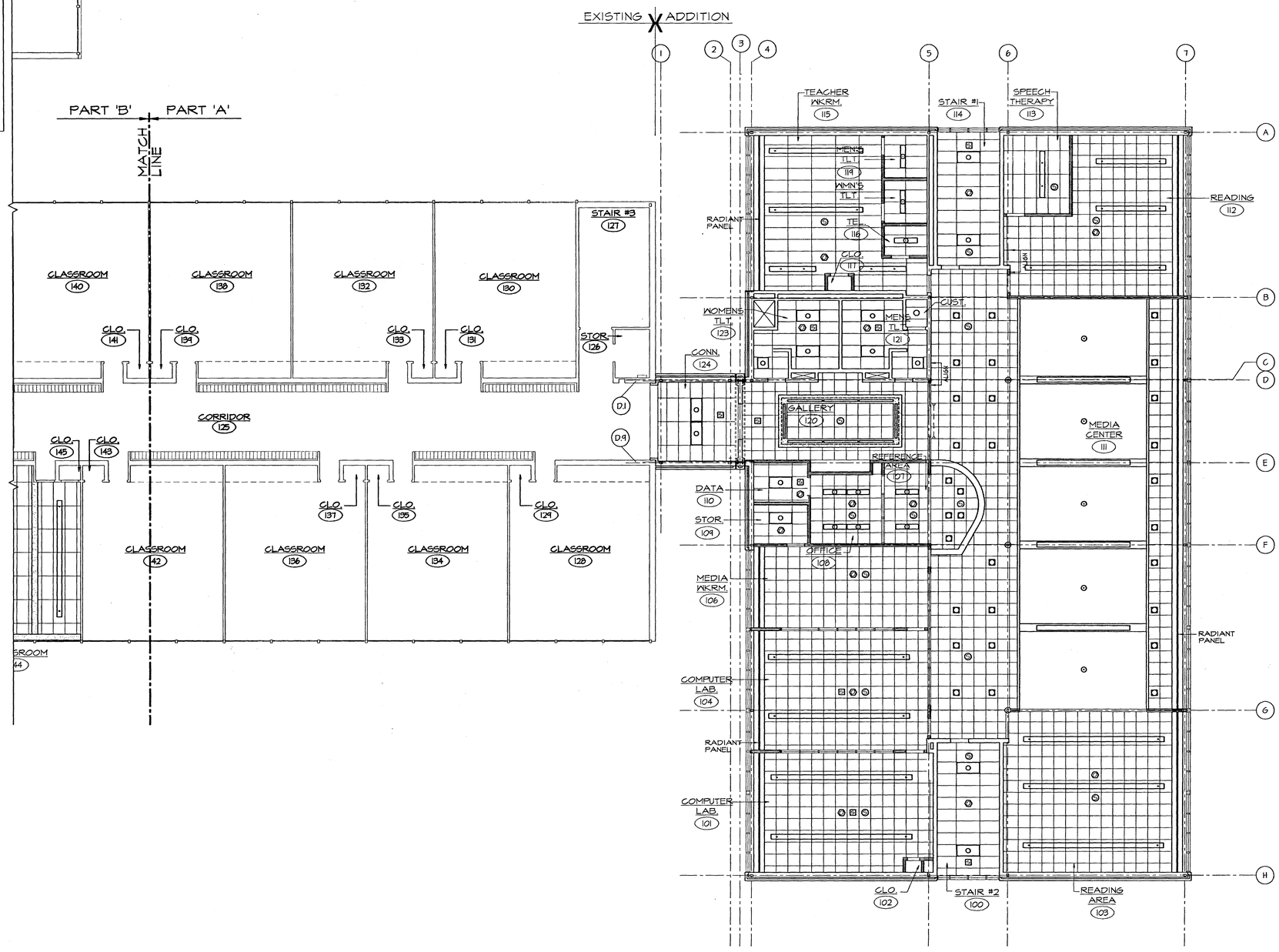
BQ #70 & 125 Attachment

LEGEND

- LIGHT FIXTURES (SEE ELECTRICAL DWGS)
- DIFFUSERS, REGISTERS, GRILLES (SEE HVAC DWGS)
- SPRINKLER
- EXIT SIGN
- SPEAKER
- SMOKE DETECTOR
- HEAT DETECTOR
- OCCUPANCY SENSOR
- POWER REEL
- E.I.F.S.
- RELOCATED EXISTG TRACKS
- ACOUSTICAL SUSPENDED CEILING
- GYPSUM BOARD



1 A701.1 FIRST FLOOR PLAN - PART "A"
SCALE: 1/8" = 1'-0"

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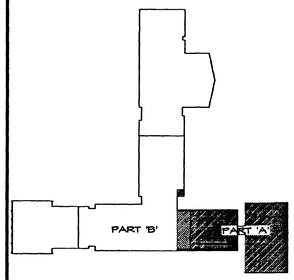


KEY PLAN

N

PROFESSIONAL SEAL

PROJECT MANAGER	L.J. FREE
ARCHITECT/ENGINEER	S.E. McNEECE
DRAWN BY	J.C. OTTO

FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

FIRST FLOOR REFLECTED CEILING PLAN - PART "A"

0 4' 8' 16'
SCALE: 1/8" = 1'-0"

NO	DATE	REVISION	BY

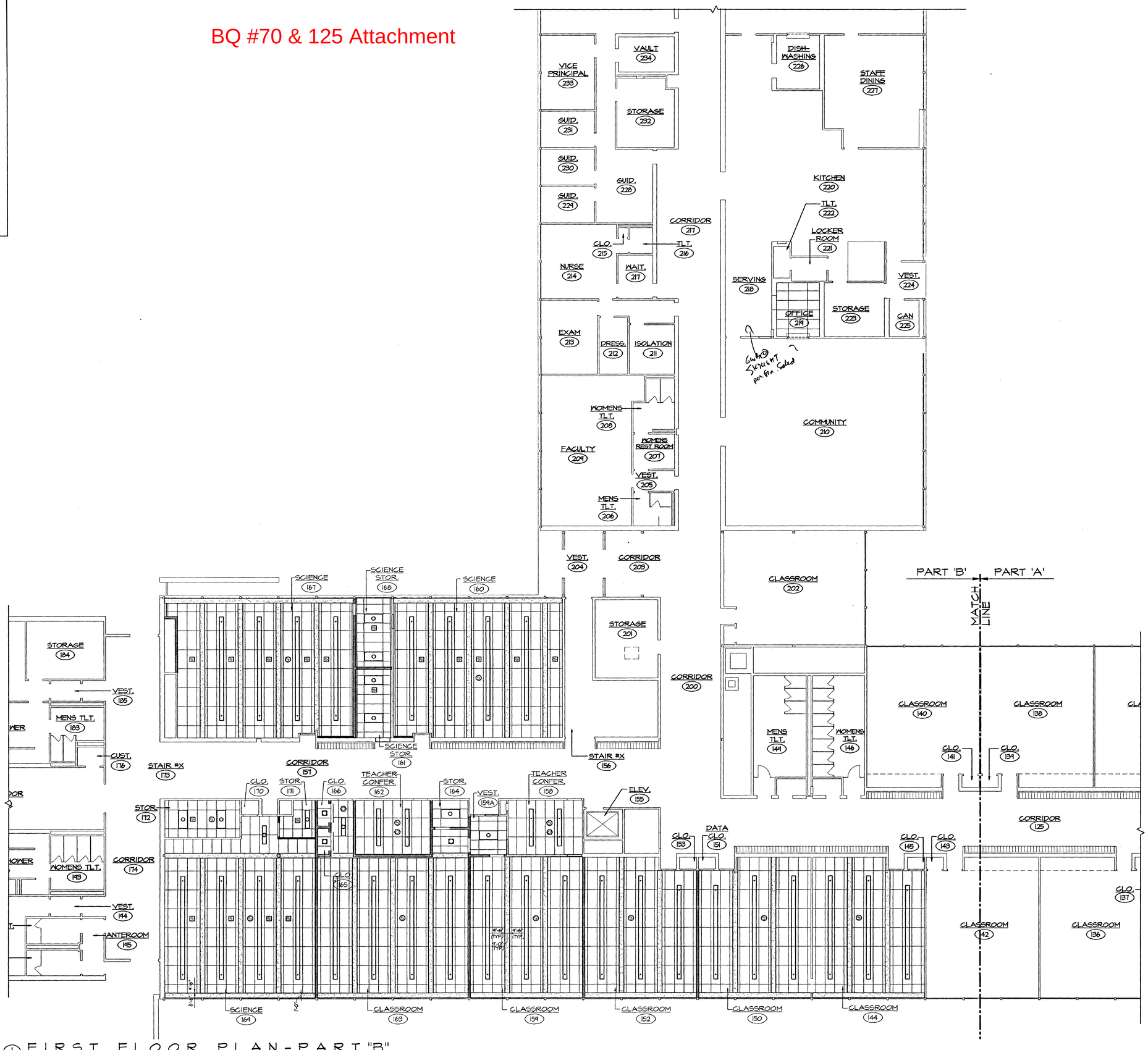
DATE	MARCH 16, 1998
SCALE	1/8" = 1'-0"
PROJECT NO.	50950.06
DRAWING NO.	A701.1

K:\50 projects\50950\dwg\A701.1 6-19-98 10:35:37 am EST

BQ #70 & 125 Attachment

LEGEND

- LIGHT FIXTURES (SEE ELECTRICAL DWGS)
- DIFFUSERS, REGISTERS, GRILLES (SEE HVAC DWGS)
- SPRINKLER
- EXIT SIGN
- SPEAKER
- SMOKE DETECTOR
- HEAT DETECTOR
- OCCUPANCY SENSOR
- POWER REEL
- E.I.F.S.
- RELOCATED EXISTG TRACKS
- ACOUSTICAL SUSPENDED CEILING
- GYPSUM BOARD



1 / A701.2 FIRST FLOOR PLAN - PART "B"
SCALE: 1/8" = 1'-0"

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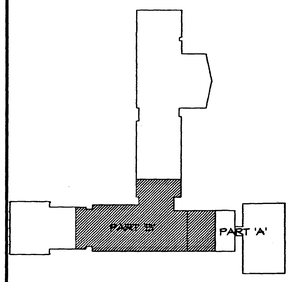


KEY PLAN

N

PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE
ARCHITECT/ENGINEER: S.E. McNEECE
DRAWN BY: J.C. OTTO

FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

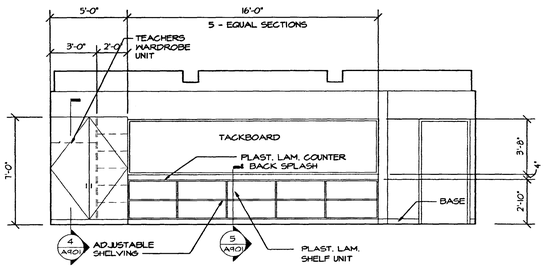
FIRST FLOOR REFLECTED CEILING PLAN - PART "B"

0 4' 8' 16'
SCALE: 1/8" = 1'-0"

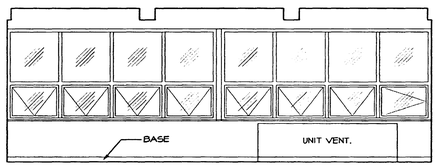
NO	DATE	REVISION	BY

DATE: MARCH 16, 1998
SCALE: 1/8" = 1'-0"
PROJECT NO.: 50950.06
DRAWING NO.: A701.2

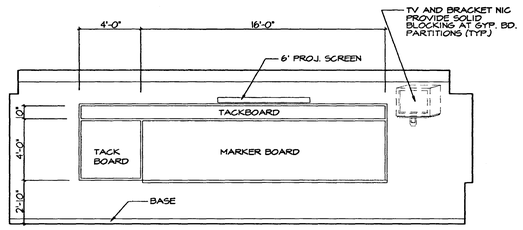
BQ #70 & 125 Attachment



1 A801 CLASSROOM
1/4" = 1'-0"



2 A801 CLASSROOM
1/4" = 1'-0"



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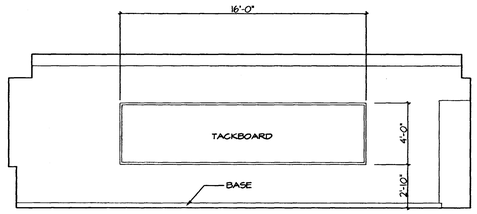
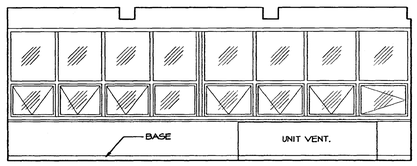
1/4" = 1'-0"



4 A801 CLASSROOM
1/4" = 1'-0"

DRIP PAN



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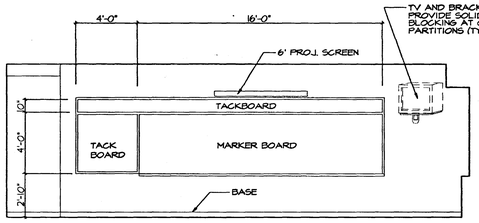

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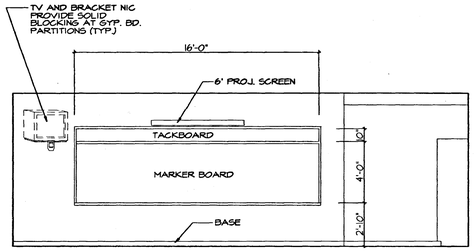
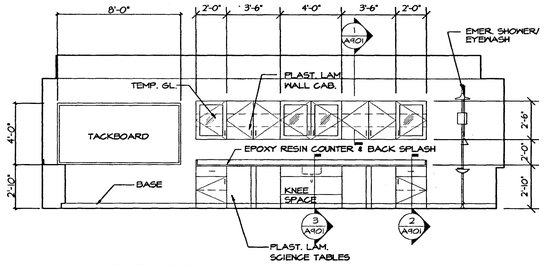
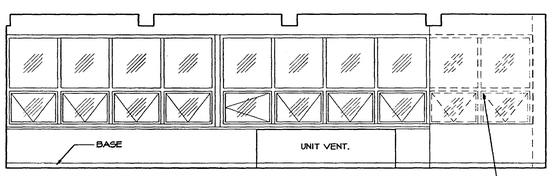
1/4" = 1'-0"



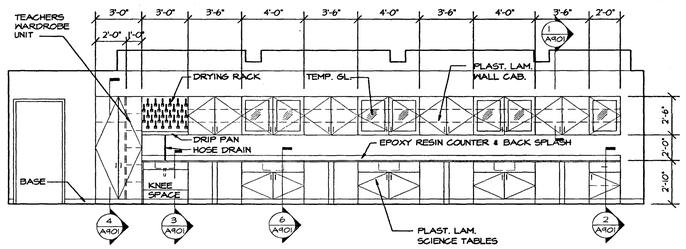
7 A801 SCIENCE
1/4" = 1'-0"



8 A801 SCIENCE
1/4" = 1'-0"



9 A801 & 9A A801 SCIENCE
1/4" = 1'-0"



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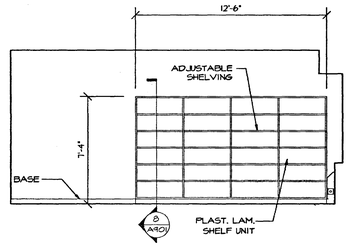
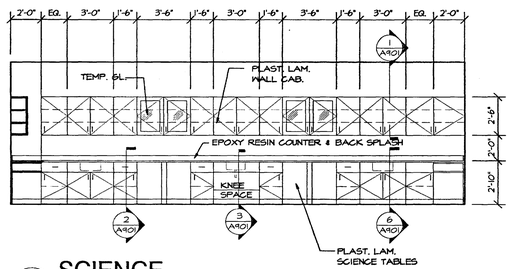
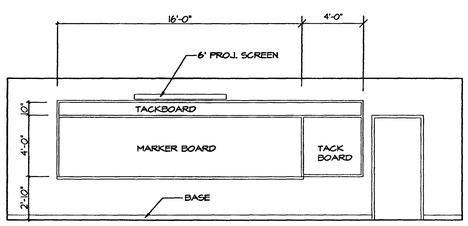


11 A801 SCIENCE STOR.
1/4" = 1'-0"



12 A801 SCIENCE
1/4" = 1'-0"



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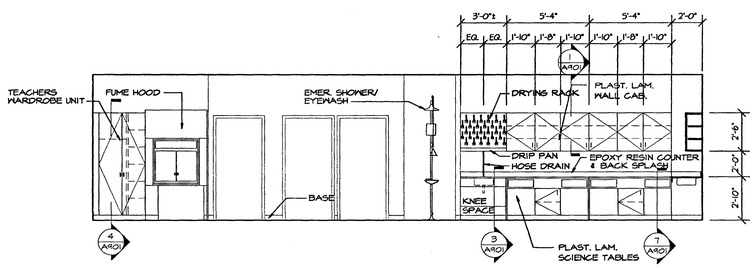
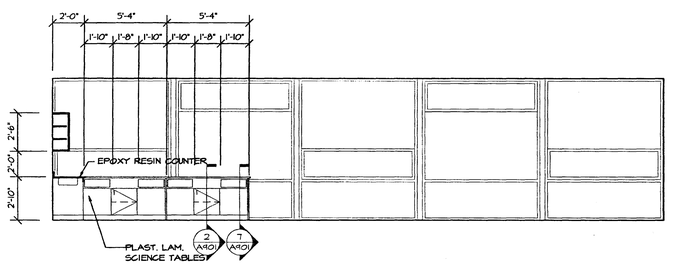


14 A801 SCIENCE
1/4" = 1'-0"



15 A801 SCIENCE
1/4" = 1'-0"

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PROFESSIONAL SEAL

PROJECT MANAGER	L.J. FREE
ARCHITECT/ENGINEER	S.E.McNEECE
DRAWN BY	J. CZUBATYJ

FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

INTERIOR ELEVATIONS

NO	DATE	REVISION	BY
1	6/19/98	D. O. E. REVISIONS	J.C.

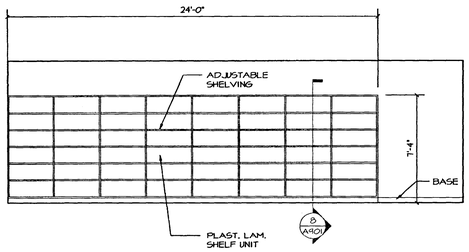
DATE: MARCH 16, 1998

SCALE: 1/4" = 1'-0"

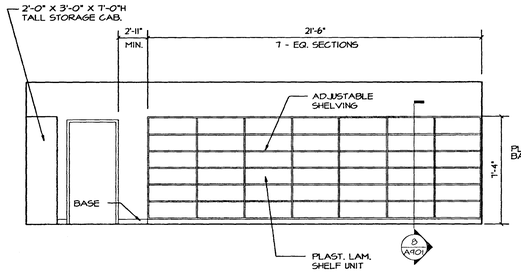
PROJECT NO.: 50950.06

DRAWING NO.: **A801**

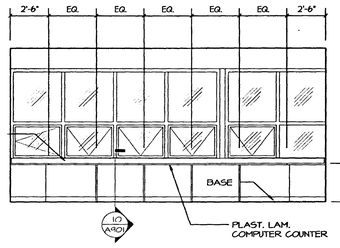
BQ #70 & 125 Attachment



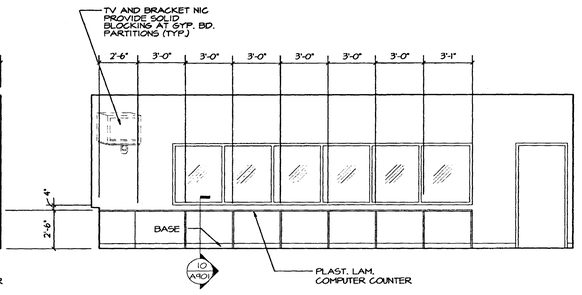
16 A802 STORAGE
1/4" = 1'-0"



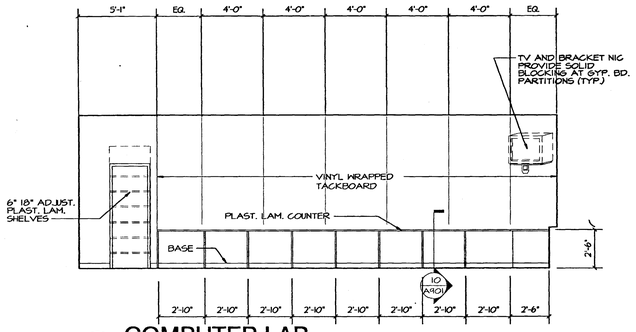
17 A802 STORAGE
1/4" = 1'-0"



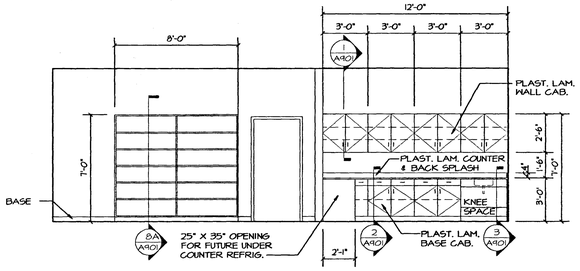
18 A802 COMPUTER LAB
1/4" = 1'-0"



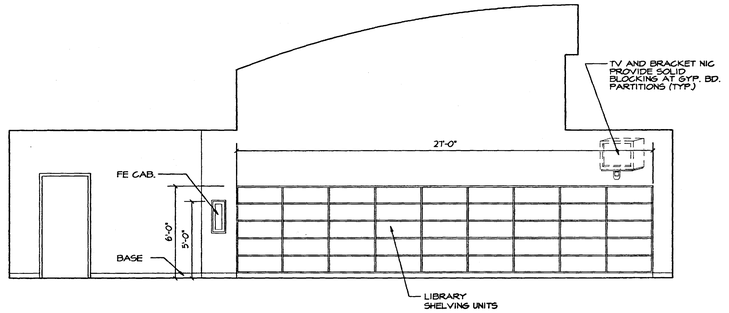
19 A802 COMPUTER LAB
1/4" = 1'-0"



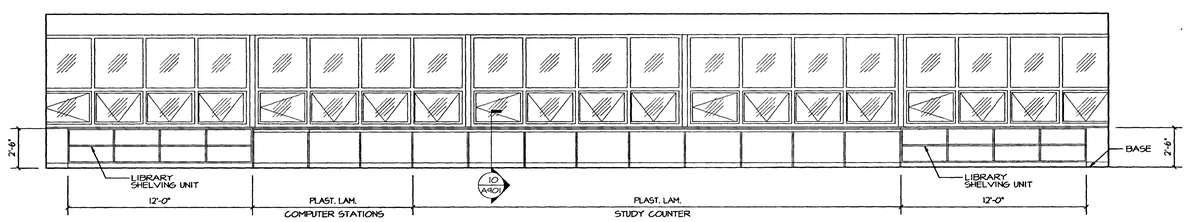
20 A802 COMPUTER LAB
1/4" = 1'-0"



21 A802 TEACHERS WORKROOM
1/4" = 1'-0"



22 A802 MEDIA CENTER
1/4" = 1'-0"



23 A802 MEDIA CENTER
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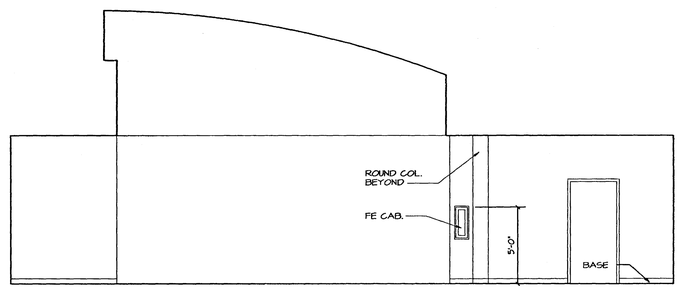
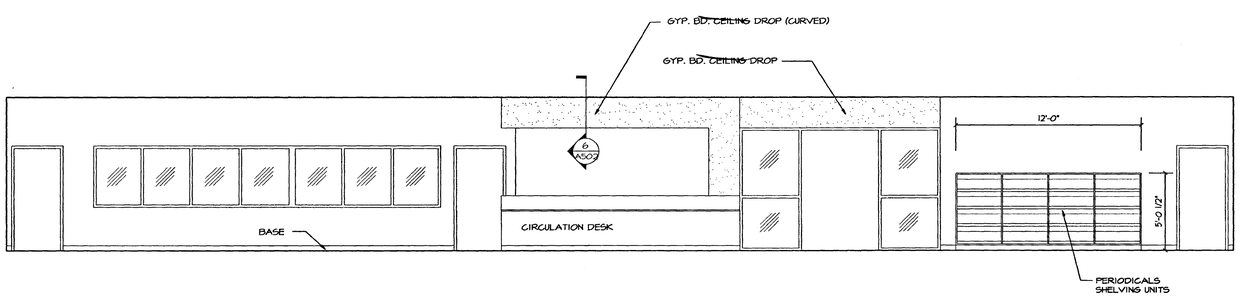


24 A802 MEDIA CENTER
1/4" = 1'-0"



25 A802 MEDIA CENTER
1/4" = 1'-0"

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PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE
ARCHITECT/ENGINEER: S.E.McNEECE
DRAWN BY: J. CZUBATY

FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL
MIDDLE
SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

INTERIOR ELEVATIONS

NO	DATE	REVISION	BY

DATE: **MARCH 16, 1998**
SCALE: **1/4" = 1'-0"**
PROJECT NO.: **50950.06**
DRAWING NO.: **A802**

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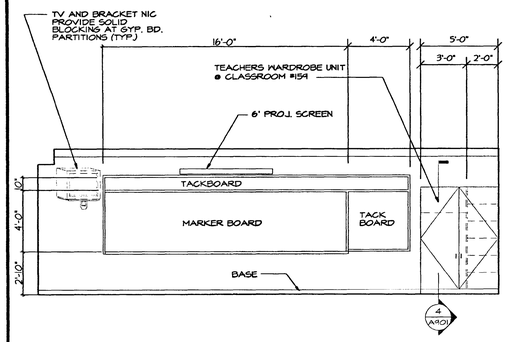
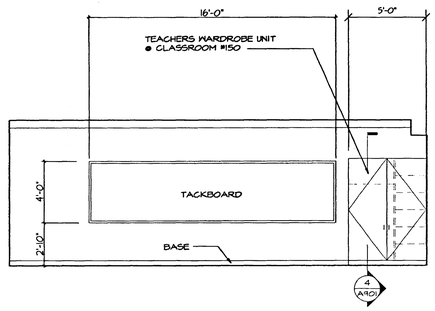
BQ #70 & 125 Attachment



26 A803 CLASSROOM
1/4" = 1'-0"



27 A803 CLASSROOM
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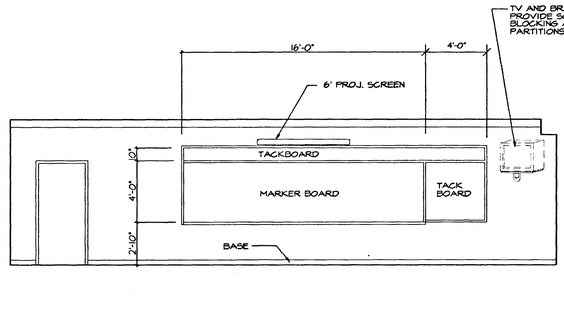

28 A803 CLASSROOM
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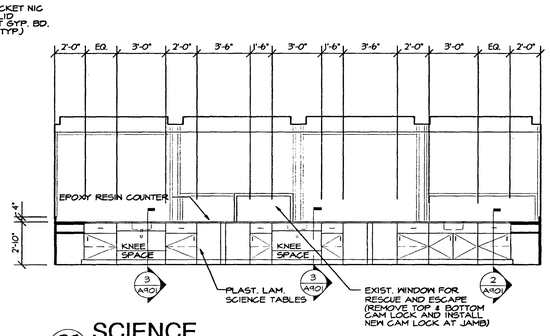
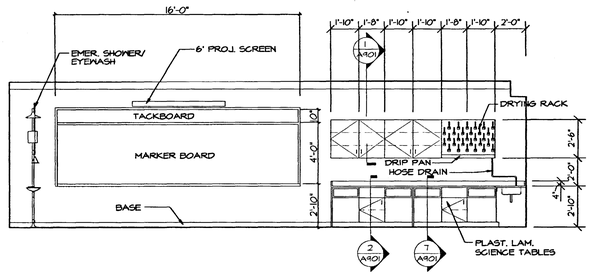
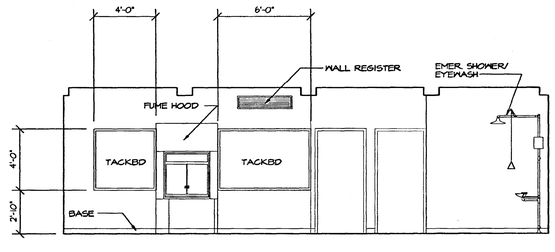


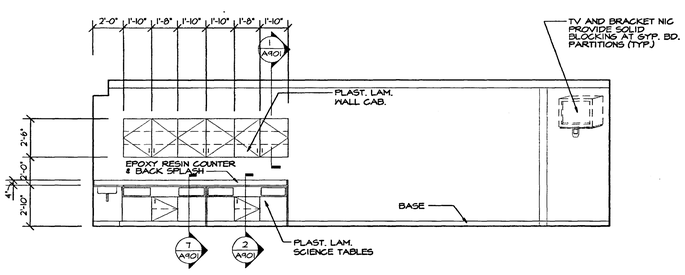
29 A803 SCIENCE
1/4" = 1'-0"



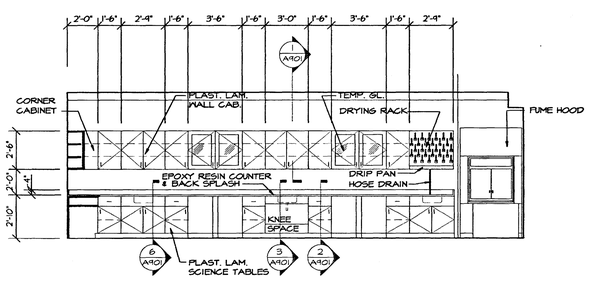
30 A803 SCIENCE
1/4" = 1'-0"



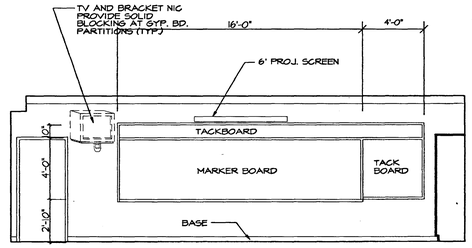
31 A803 SCIENCE
1/4" = 1'-0"



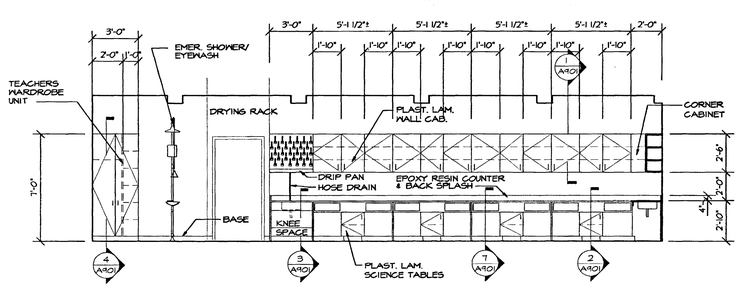
32 A803 SCIENCE
1/4" = 1'-0"



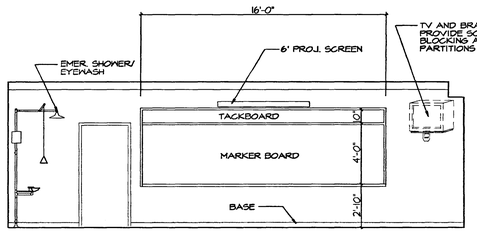
33 A803 SCIENCE
1/4" = 1'-0"



34 A803 SCIENCE
1/4" = 1'-0"



35 A803 SCIENCE
1/4" = 1'-0"



36 A803 SCIENCE
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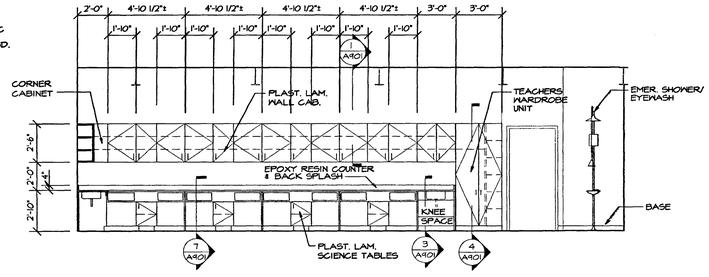
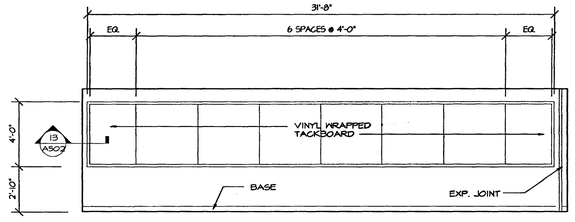


37 A803 SCIENCE
1/4" = 1'-0"



37A A803 CORRIDOR
1/4" = 1'-0"

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PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE
ARCHITECT/ENGINEER: S.E.McNEECE
DRAWN BY: J. CZUBATYJ

FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

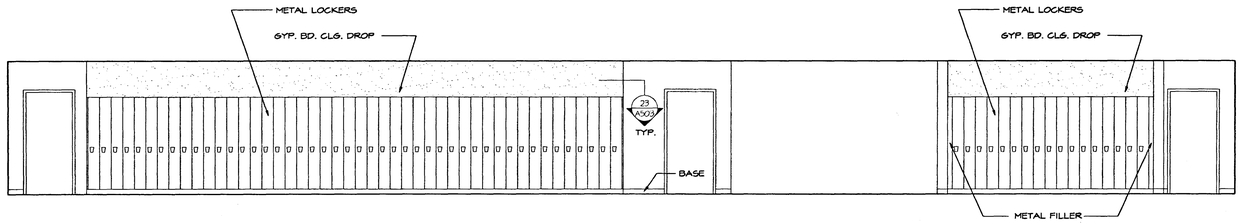
INTERIOR ELEVATIONS

NO	DATE	REVISION	BY

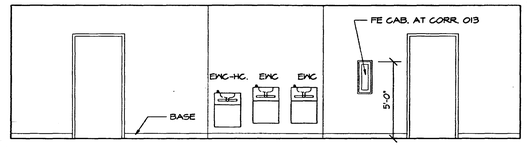
DATE: MARCH 16, 1998
SCALE: 1/4" = 1'-0"
PROJECT NO.: 50950.06
DRAWING NO.: A803

K:\50_projects\50950\dno\Arch\A803 6-18-98 8:00:51 am EST

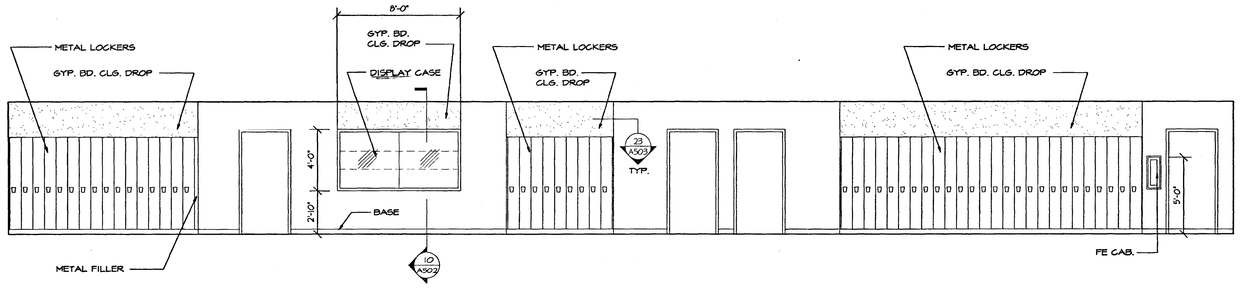
BQ #70 & 125 Attachment



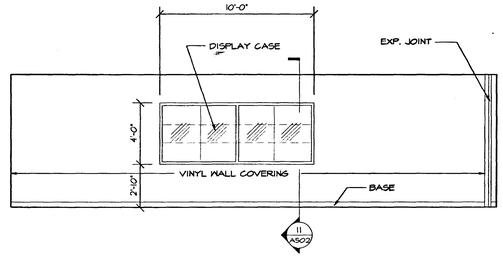
38 A804 CORRIDOR
1/4" = 1'-0"



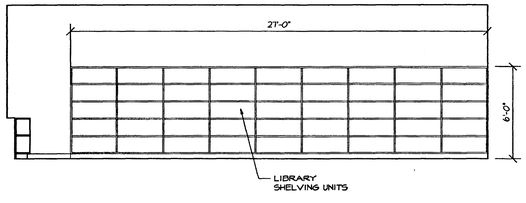
39 A804 CORRIDOR
1/4" = 1'-0"



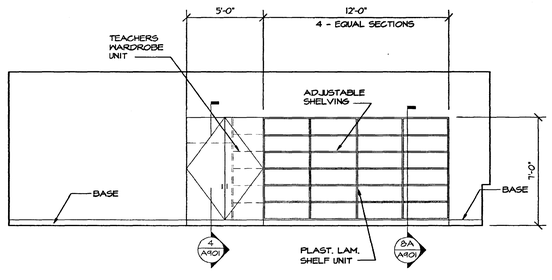
40 A804 CORRIDOR
1/4" = 1'-0"



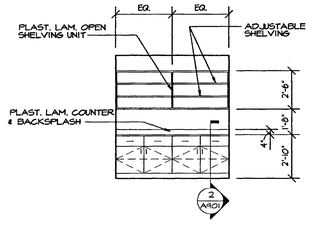
41 A804 GALLERY
1/4" = 1'-0"



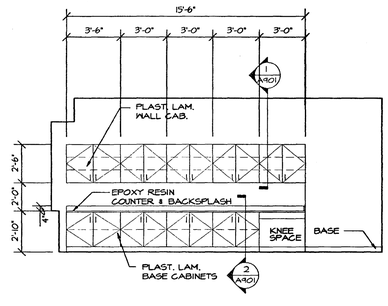
42 A804 READING AREA
1/4" = 1'-0"



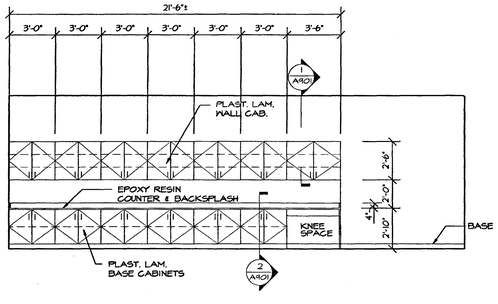
43 A804 READING
1/4" = 1'-0"



44 A804 REFERENCE AREA
1/4" = 1'-0"



45 A804 SCIENCE STOR.
1/4" = 1'-0"



46 A804 SCIENCE STOR.
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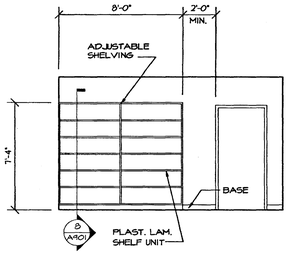

47 A804 SCIENCE STOR.
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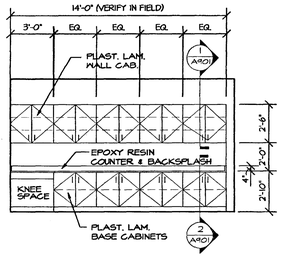
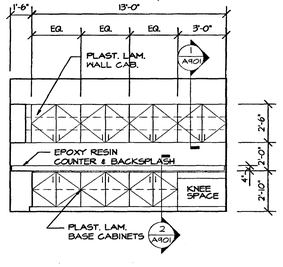


48 A804 SCIENCE STOR.
1/4" = 1'-0"



49 A804 SCIENCE STOR.
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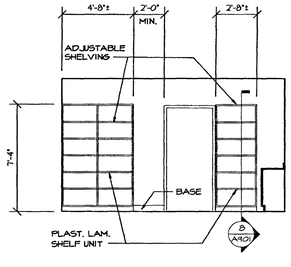

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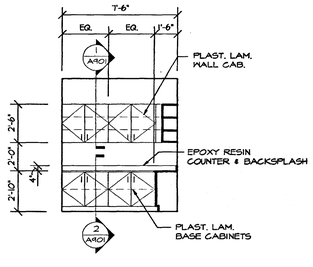
1/4" = 1'-0"



51 A804 SCIENCE STOR.
1/4" = 1'-0"

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PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE
ARCHITECT/ENGINEER: S.E.McNEECE
DRAWN BY: J. CZUBATY

FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL
MIDDLE
SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

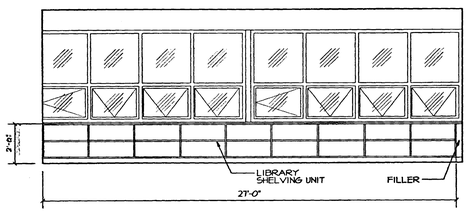
INTERIOR ELEVATIONS

NO	DATE	REVISION	BY
1	6/19/98	D. O. E. REVISIONS	J.C.

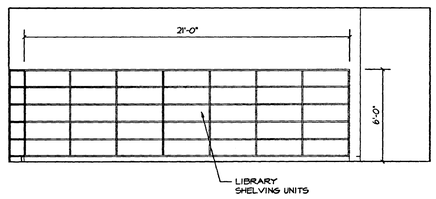
DATE: MARCH 16, 1998
SCALE: 1/4" = 1'-0"
PROJECT NO.: 50950.06
DRAWING NO.: A804

K:\50.projects\50950\dwg\Arch\A804 6-18-98 8:01:58 am EST

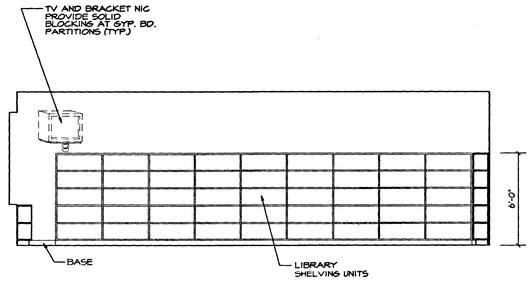
BQ #70 & 125 Attachment



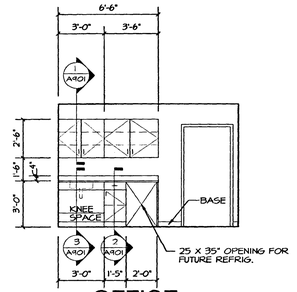
52 A805 READING AREA
1/4" = 1'-0"



53 A805 READING AREA
1/4" = 1'-0"



54 A805 READING AREA
1/4" = 1'-0"



55 A805 OFFICE
1/4" = 1'-0"

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PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE
ARCHITECT/ENGINEER: S.E.McNEECE
DRAWN BY: J. CZUBATY

FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

INTERIOR ELEVATIONS

NO	DATE	REVISION	BY
1	6/19/98	D.O.E. REVISIONS	J.G.

DATE: MARCH 16, 1998
SCALE: 1/4" = 1'-0"
PROJECT NO.: 50950.06
DRAWING NO.: A805

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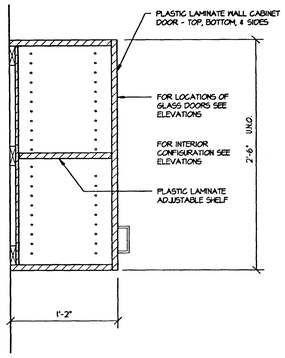
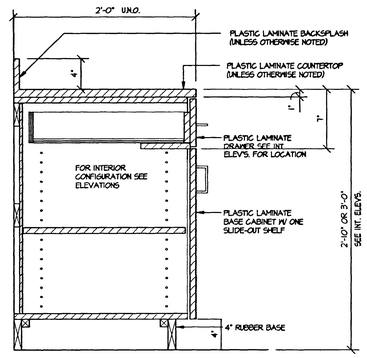
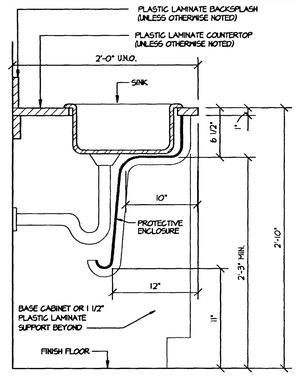


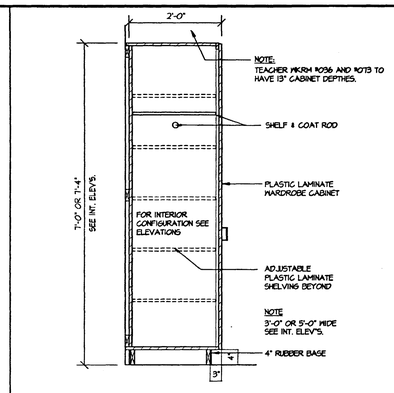
1 A901 WALL CABINET - TYPICAL
SCALE: 1 1/2" = 1'-0"



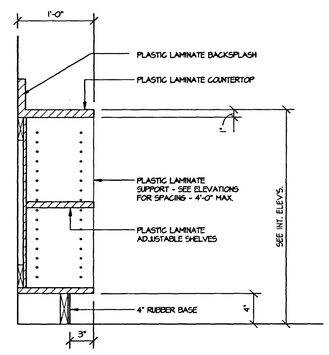
2 A901 BASE CABINET DETAIL
SCALE: 1 1/2" = 1'-0"



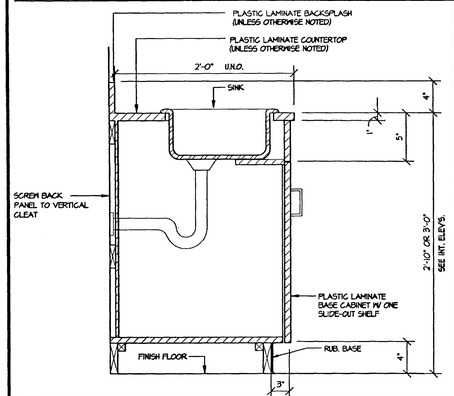
3 A901 HC. SINK COUNTER DETAIL
SCALE: 1 1/2" = 1'-0"



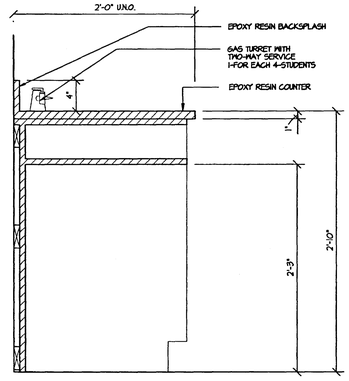
4 A901 CABINET DETAIL - TYPICAL
SCALE: 3/4" = 1'-0"



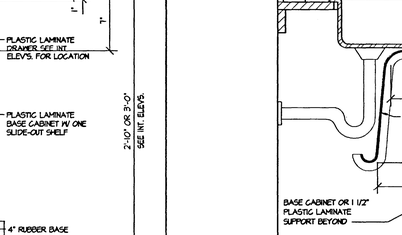
5 A901 OPEN SHELF CABINET DETAIL - TYPICAL
SCALE: 1 1/2" = 1'-0"



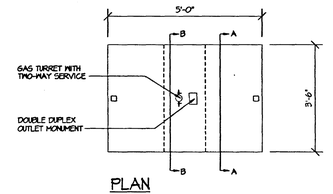
6 A901 HC. SINK COUNTER WITH DOOR DETAIL
SCALE: 1 1/2" = 1'-0"



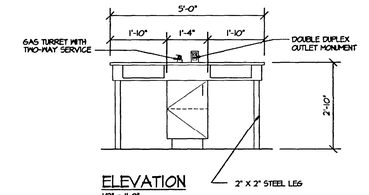
SECTION C-C
1 1/2" = 1'-0"



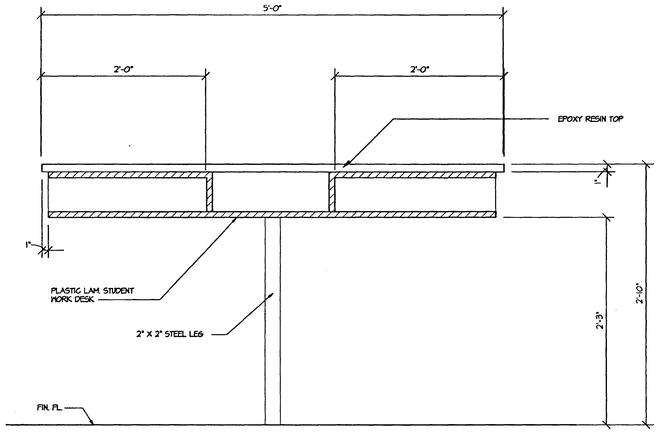
PLAN
1/2" = 1'-0"



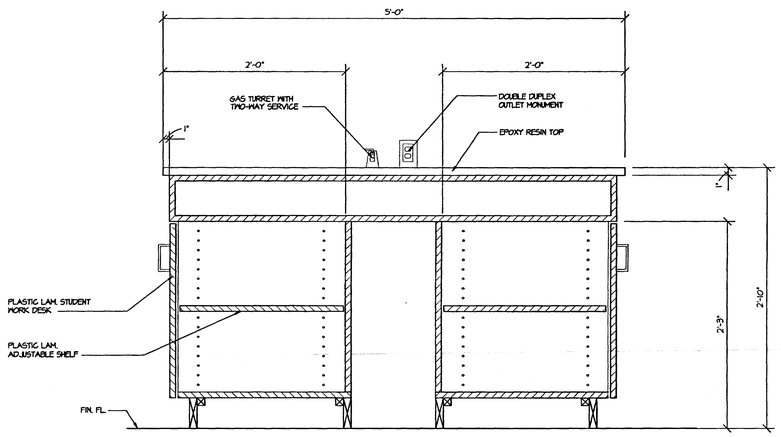
PLAN
1/2" = 1'-0"



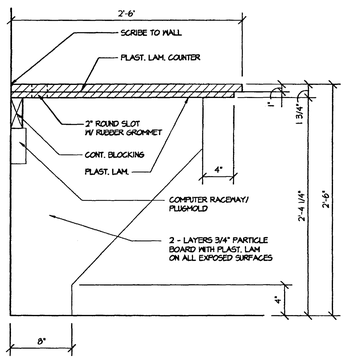
ELEVATION
1/2" = 1'-0"



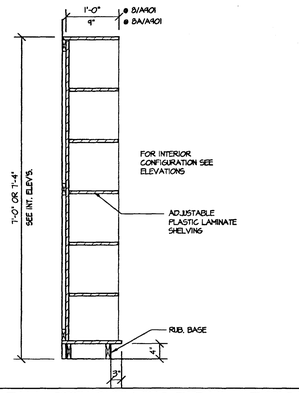
SECTION A-A
1 1/2" = 1'-0"



SECTION B-B
1 1/2" = 1'-0"



10 A901 COMPUTER STATION DETAIL
SCALE: 1 1/2" = 1'-0"



9 A901 & 9A A901 TALL OPEN SHELVING DETAIL - TYPICAL
SCALE: 3/4" = 1'-0"

7 A901 SCIENCE WORK STATION DETAIL
AS NOTED

BQ #70 & 125 Attachment

9 A901 FOUR STUDENT SCIENCE WORK DESK DETAIL
SCALE: 3/4" = 1'-0"

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PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE
ARCHITECT/ENGINEER: S.E. McNEECE
DRAWN BY: J. CZUBATYJ

FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

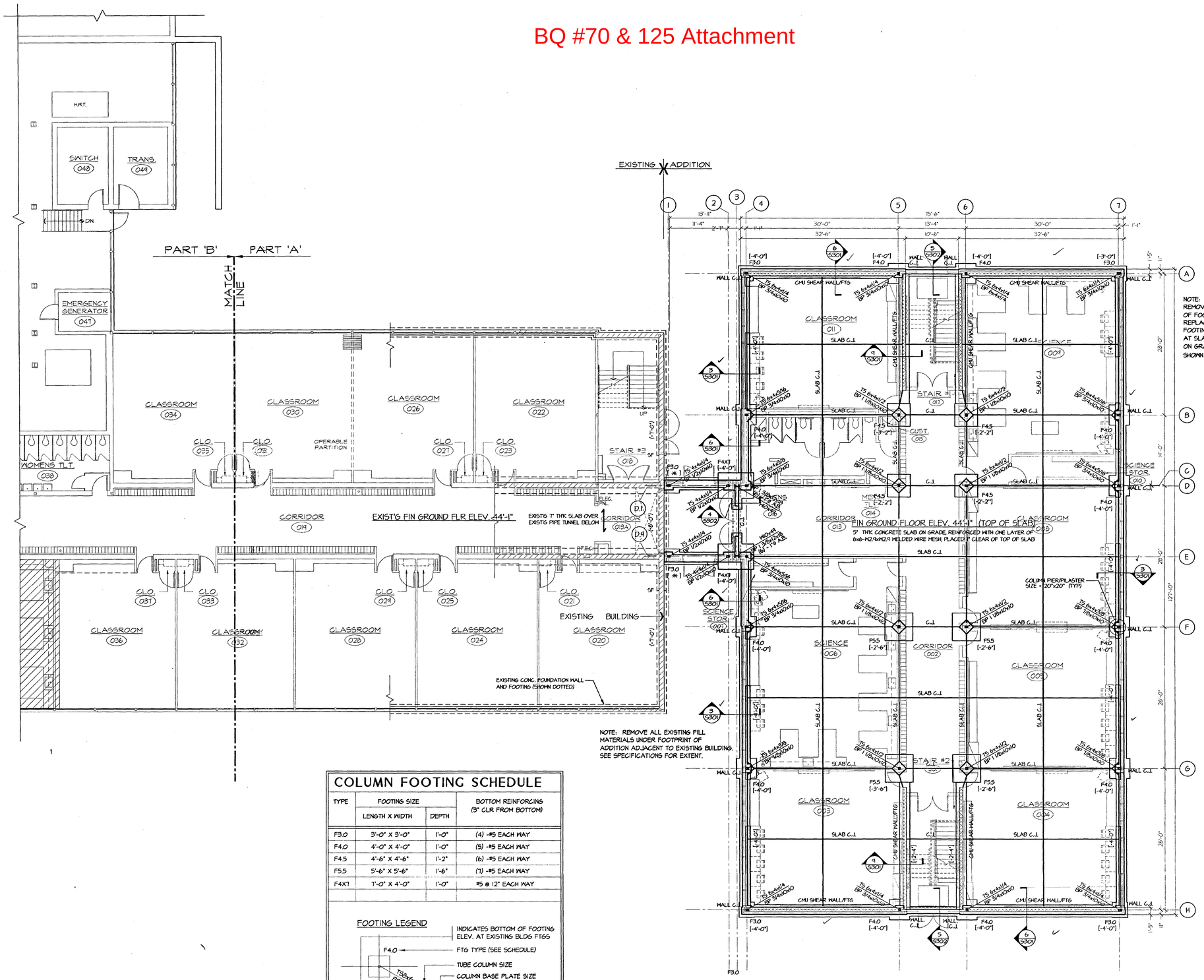
DRAWING TITLE

CASEWORK DETAILS

NO	DATE	REVISION	BY

DATE: MARCH 16, 1998
SCALE: AS NOTED
PROJECT NO.: 50950.06
DRAWING NO.: A901

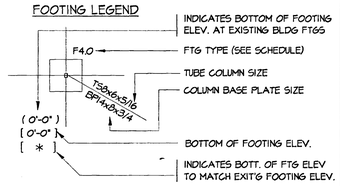
BQ #70 & 125 Attachment



COLUMN FOOTING SCHEDULE

TYPE	FOOTING SIZE		BOTTOM REINFORCING (3" CLR FROM BOTTOM)
	LENGTH X WIDTH	DEPTH	
F3.0	3'-0" X 3'-0"	1'-0"	(4) -#5 EACH WAY
F4.0	4'-0" X 4'-0"	1'-0"	(5) -#5 EACH WAY
F4.5	4'-6" X 4'-6"	1'-2"	(6) -#5 EACH WAY
F5.5	5'-6" X 5'-6"	1'-6"	(7) -#5 EACH WAY
F4X7	7'-0" X 4'-0"	1'-0"	#5 @ 12" EACH WAY

FOOTING LEGEND



FOUNDATION PLAN - PART "A"

1/8" = 1'-0"

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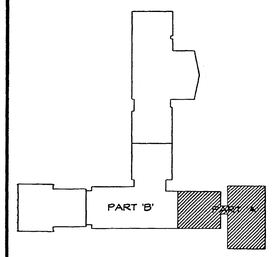

KEY PLAN

FOR DWG. REF.

N

PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE
ARCHITECT/ENGINEER: R. C. BOGGS, P.E.
DRAWN BY: L. CZUBATY

FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
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PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

FOUNDATION PLAN - PART "A"

0 4' 8' 16'
SCALE: 1/8" = 1'-0"

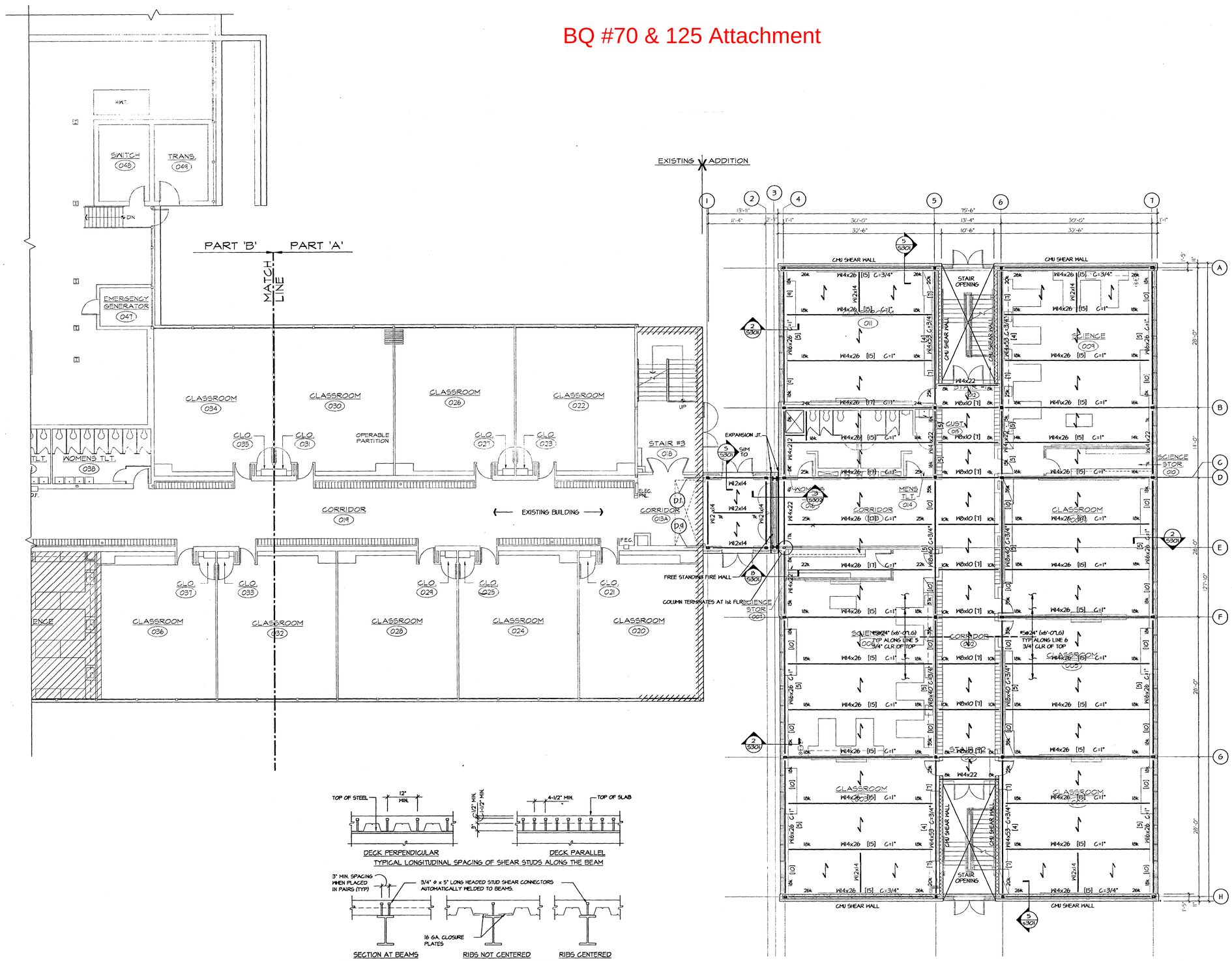
NO	DATE	REVISION	BY

DATE: **MARCH 16, 1998**
SCALE: **1/8" = 1'-0"**
PROJECT NO.: **50950.06**
DRAWING NO.: **S100.1**

K:\50 projects\50950\dwg\Struct\S100-1 7-2-98 9:57:06 am EST

50 projects\50950\dwg\Struct\S100-1 7-2-98 9:57:06 am EST

BQ #70 & 125 Attachment



1. PL x__ [10] : INDICATES QUANTITY OF STUD SHEAR CONNECTORS PER FRAMING MEMBER, AS INDICATED ON FLOOR FRAMING PLAN.
2. WHEN THE QUANTITY OF STUDS EXCEEDS THE QUANTITY OF AVAILABLE DECK RIBS, THEN THE EXCESS QUANTITY OF STUDS SHALL BE PLACED IN PAIRS STARTING AT EACH END OF THE BEAM.
3. IT IS THE INTENT THAT THE STUDS SHALL BE UNIFORMLY SPACED ALONG THE FULL BEAM LENGTH, OR PORTION OF BEAM AS INDICATED ON PLAN, ON THE ℄ OF WEB, UNLESS THE QUANTITY OF STUDS EXCEEDS THE MIN. SPACING, IN WHICH CASE STUDS WILL BE UNIFORMLY SPACED IN PAIRS STARTING AT EA. END.
4. SLAB MESH REINFORCING NOT SHOWN. SEE DATUM NOTES.

COMPOSITE METAL FLOOR DECK / SHEAR STUD PLACEMENT DET.

NOT TO SCALE

FIRST FLOOR FRAMING

1/8" = 1'-0"

FLOOR CONSTRUCTION:
2 1/2" CONCRETE OVER 3" DEEP x 20 GA. GALVANIZED COMPOSITE METAL FLOOR DECK. (5 1/2" TOTAL SLAB THICKNESS), REINFORCED WITH 6x6-W1.4xW1.4 WWF., PLACED 1" CLEAR OF TOP OF SLAB, OVER STEEL BEAM AND COLUMN CONSTRUCTION.

REFERENCE DATUM:
REFERENCE DATUM FOR FIRST FLOOR TOP OF STEEL (UNDERSIDE OF FLOOR DECK) SHALL BE FIN. FIRST FLOOR ELEV 55'-1". TOP OF ALL STEEL FRAMING MEMBERS SHALL BE 5 1/2" BELOW DATUM, UNLESS OTHERWISE NOTED ABOVE (+), OR BELOW (-) THE DATUM.

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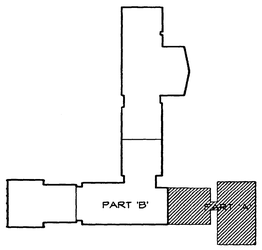

KEY PLAN

FOR DWG. REF. N

PROFESSIONAL SEAL

PROJECT MANAGER	L.J. FREE
ARCHITECT/ENGINEER	R. C. BOGGS, P.E.
DRAWN BY	L. CZUBATYJ

FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO

CENTRAL MIDDLE SCHOOL

9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

FIRST FLOOR FRAMING PLAN PATR - "A"

0 4' 8' 16'
SCALE: 1/8" = 1'-0"

NO	DATE	REVISION	BY

DATE	MARCH 16, 1998
SCALE	1/8" = 1'-0"
PROJECT NO.	50950.06
DRAWING NO.	S101.1

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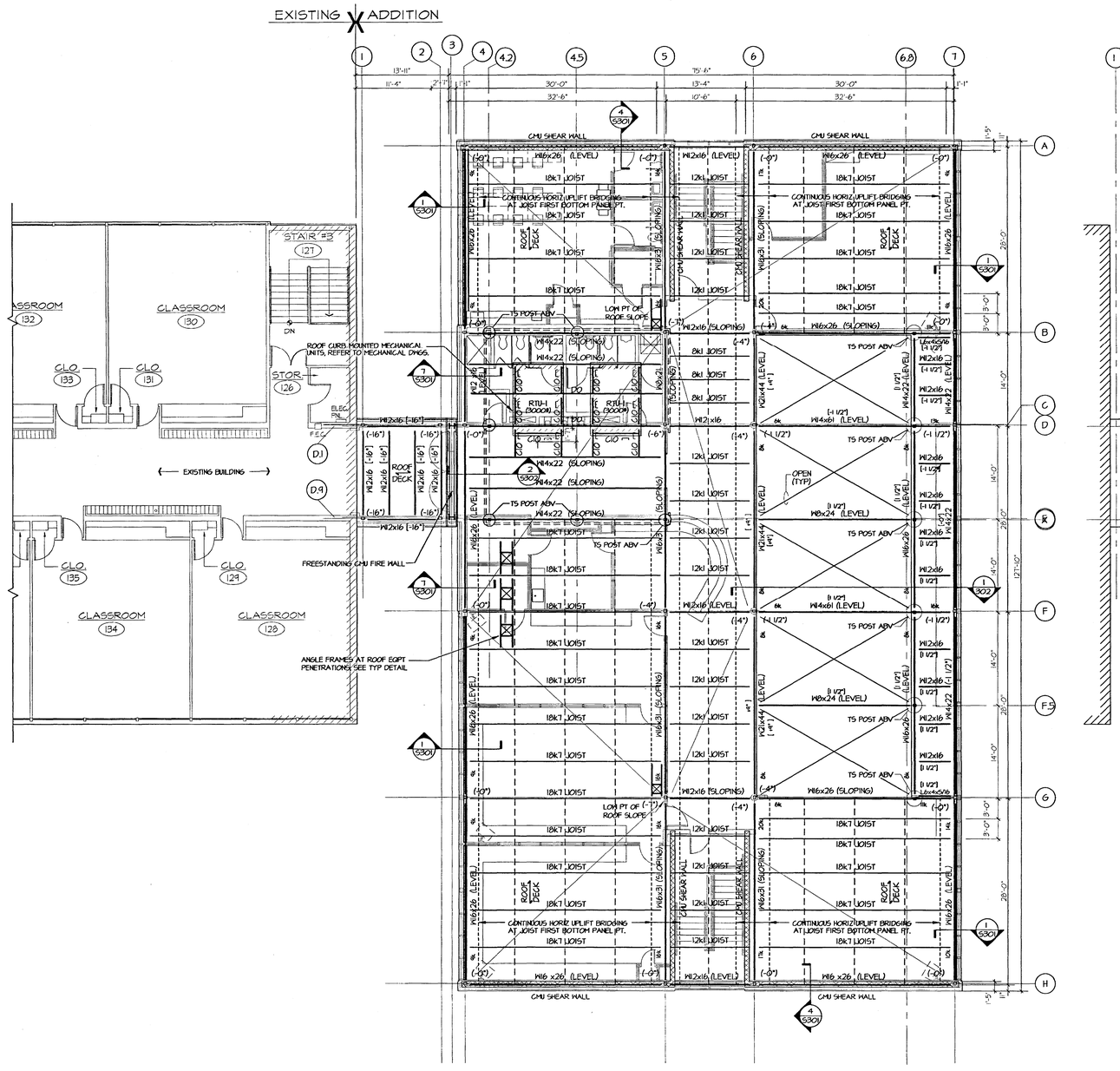
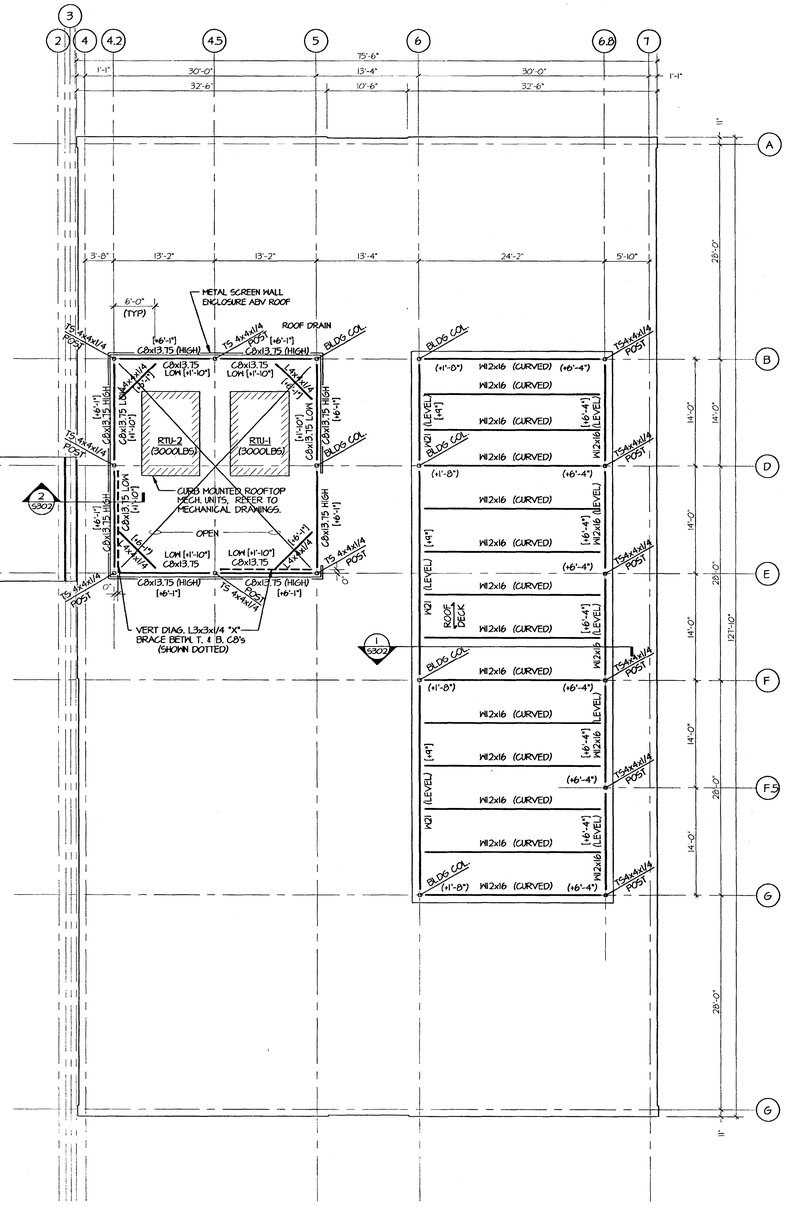
BQ #70 & 125 Attachment





ROOF FRAMING PLAN

1/8" = 1'-0"

ROOF CONSTRUCTION:
1 1/2" DEEP x 20 GA. GALVANIZED WIDE RIB METAL ROOF DECK OVER "K" SERIES OPEN WEB STEEL JOIST, BEAM & COLUMN CONSTRUCTION. ALL ROOF FRAMING MEMBERS SHALL SLOPE FROM HIGH POINT AT PERIMETER OF ROOF TO LOW POINTS AT ROOF DRAIN LOCATIONS.

TOP OF STEEL (DATUM) ELEVATION:
TOP OF STEEL "UNDERSIDE OF ROOF DECK" AT HIGH POINT OF ROOF SLOPE SHALL BE ELEVATION 68'-1" ALONG THE ROOF PERIMETER. ROOF FRAMING SHALL SLOPE TO LOW POINTS AT ROOF DRAINS. FIGURES SHOWN THUS "(-)", AT COLUMNS, REFER TO TOP OF STEEL ELEV. BELOW (-) OR ABOVE (+) THE DATUM ELEVATION.

ROOF FRAMES:
LOCATION, SIZE, AND QUANTITY OF STEEL ANGLE ROOF FRAMES, SHOWN ON FRAMING PLAN, AT ROOF DECK PENETRATIONS, ARE TO BE VERIFIED WITH ARCH'L. AND MECH'L DWGS. REFER TO "TYPICAL ANGLE FRAME" DETAIL ON STRUCTURAL DRAWINGS.

MEDIA CENTER ROOF & EQPT SCREEN FRAMING

1/8" = 1'-0"

MEDIA ROOF CONSTRUCTION:
1 1/2" DEEP x 20 GA. GALVANIZED WIDE RIB METAL ROOF DECK OVER STEEL BEAM, COLUMN, AND STEEL POST FRAMING

TOP OF STEEL ELEVATIONS
REFER TO DATUM ELEVATION NOTE AT ROOF FRAMING PLAN FOR TOP OF STEEL FIGURES "( )".

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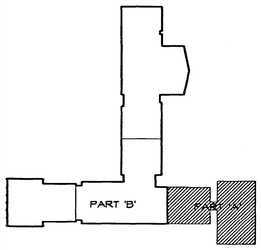

KEY PLAN

FOR DWG. REF.

N

PROFESSIONAL SEAL

PROJECT MANAGER	L.J. FREE
ARCHITECT/ENGINEER	R. C. BOGGS, P.E.
DRAWN BY	L. CZUBATYJ

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BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

ROOF FRAMING PLAN - PART "A"

SCALE: 1/8" = 1'-0"

NO	DATE	REVISION	BY

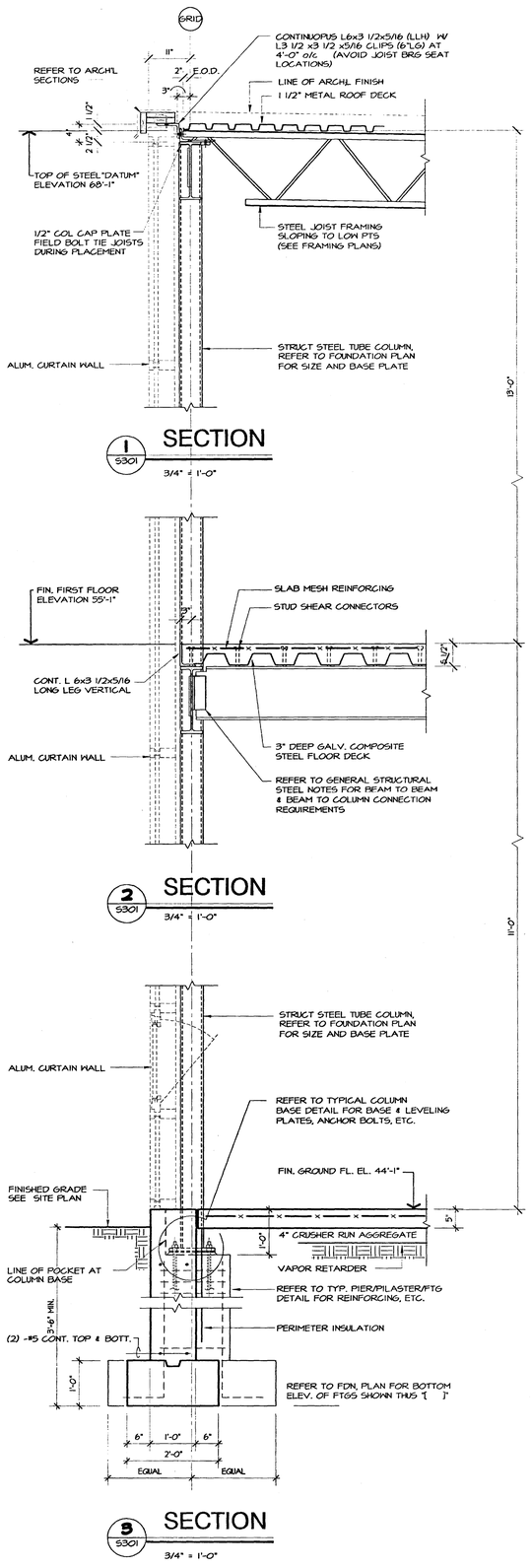
DATE: MARCH 16, 1998

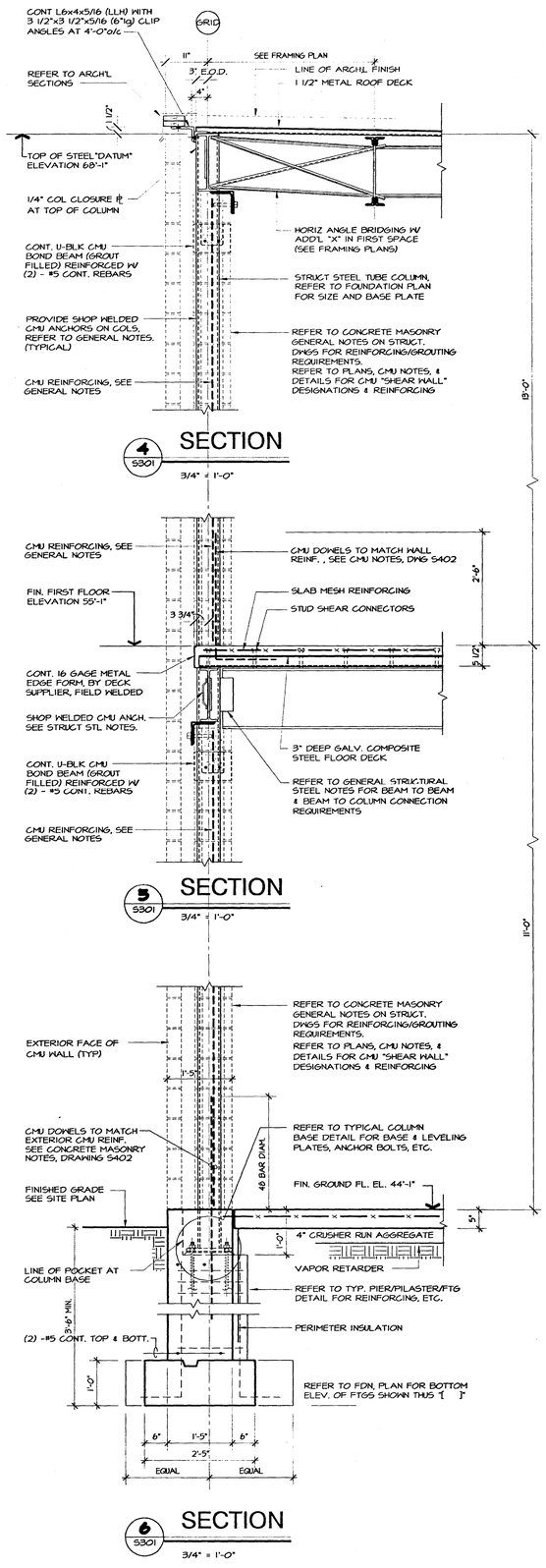
SCALE: 1/8" = 1'-0"

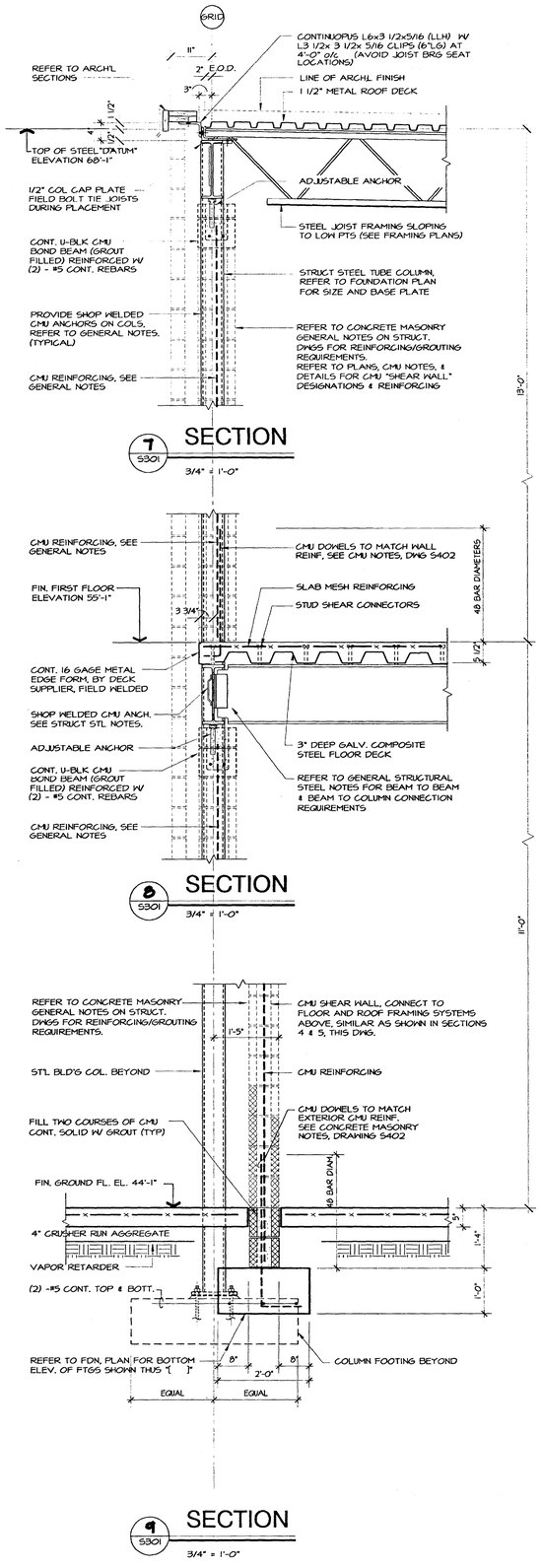
PROJECT NO.: 50950.06

DRAWING NO.: **S102.1**

BQ #70 & 125 Attachment







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PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE

ARCHITECT/ENGINEER: R.C.BOGGS, P.E.

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9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

FRAMING SECTIONS AND DETAILS

NO	DATE	REVISION	BY

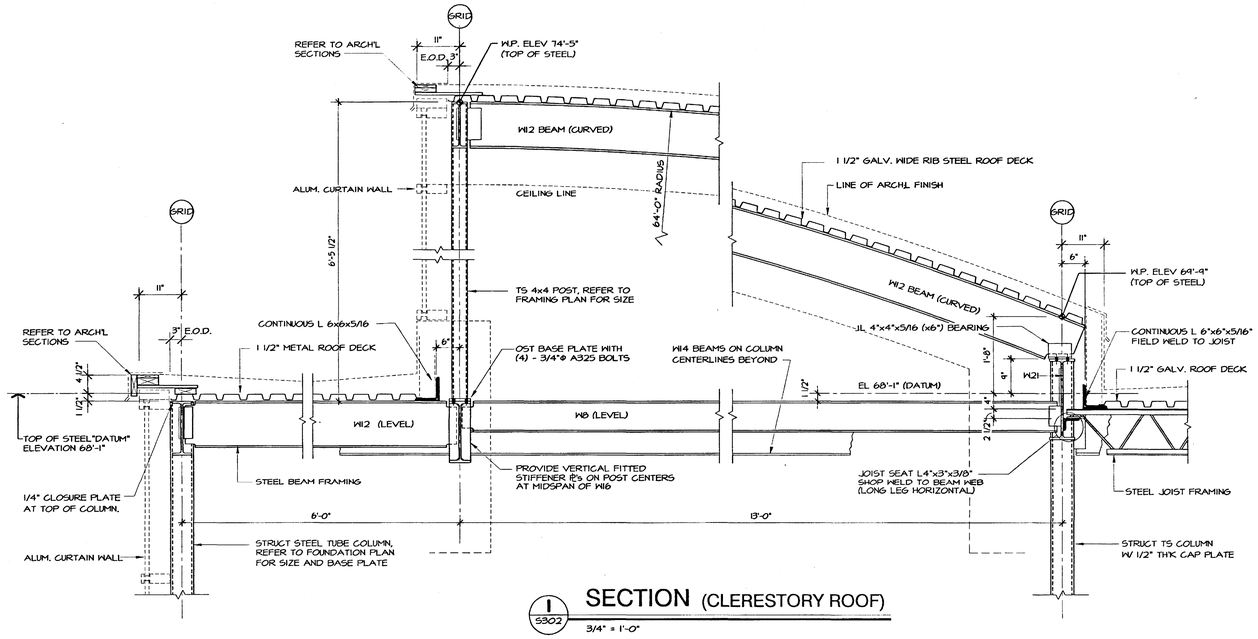
DATE: MARCH 16, 1998

SCALE: 3/4" = 1'-0"

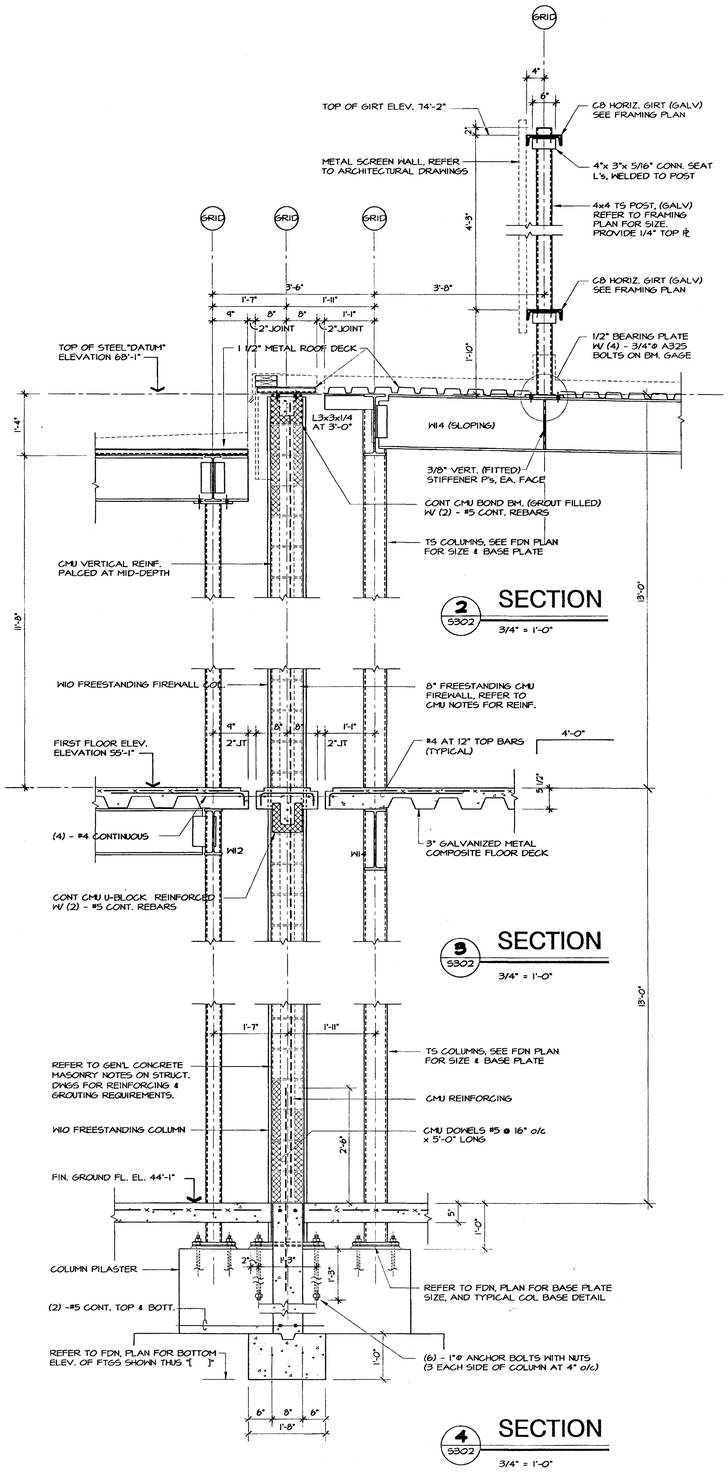
PROJECT NO.: 50950.06

DRAWING NO.: S301

BQ #70 & 125 Attachment

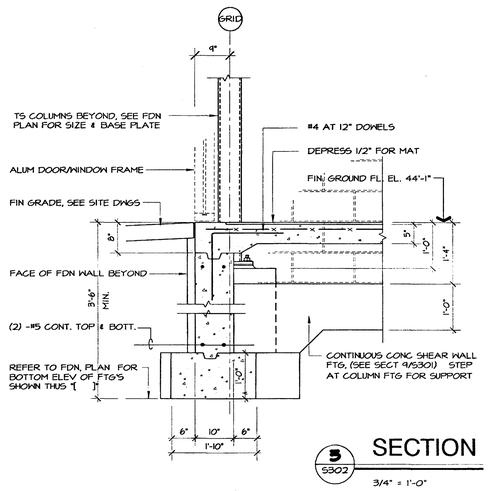


1 / S302 SECTION (CLERESTORY ROOF)
3/4" = 1'-0"



2 / S302 SECTION
3/4" = 1'-0"

3 / S302 SECTION
3/4" = 1'-0"



5 / S302 SECTION
3/4" = 1'-0"

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PROJECT MANAGER: L.J. FREE
ARCHITECT/ENGINEER: R.C. BOGGS, P.E.
DRAWN BY: L. CZUBATYJ

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DRAWING TITLE

FRAMING SECTIONS AND DETAILS

NO	DATE	REVISION	BY

DATE: MARCH 16, 1998
SCALE: 3/4" = 1'-0"
PROJECT NO.: 50950.06
DRAWING NO.: S302

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BQ #70 & 125 Attachment

GENERAL STRUCTURAL NOTES

GENERAL

GOVERNING CODE: 1994 STATE OF CONNECTICUT BASIC BUILDING CODE (BOCA BASIC NATIONAL BUILDING CODE 1990, BOCA ACCUMULATIVE SUPPLEMENT 1992).

DESIGN LOADS:

NEW FLOOR AREAS: CORRIDORS: DEAD LOAD 65 PSF, LIVE LOAD 80 PSF
CLASSROOMS: DEAD LOAD 65 PSF +20 PSF PARTITIONS, LIVE LOAD 40 PSF

ROOF LOAD:

ROOF SNOW LOAD CRITERIA: Pg = 30 PSF, Ce = 0.7 AND I = 1.0, WITH INCREASES FOR SNOW DRIFTING, UNBALANCES AND SLIDING PER SECTION 1111 (1990 BOCA).

MINIMUM ROOF LIVE LOAD = 30 PSF

ROOF DEAD LOAD = 20 PSF

WIND LOAD CRITERIA: SECTION 1112 (1990 BOCA) WITH BASIC WIND SPEED = 80 MPH, BUILDING CATEGORY I, I = 1.03, EXPOSURE CLASSIFICATION "B".

MINIMUM WIND LOAD ON PRIMARY STRUCTURE = 18 PSF

WIND LOADS ON SECONDARY ELEMENTS SHALL CONFORM WITH ASCE 7-88.

TYPICAL WIND LOAD ON EXTERIOR WALLS = 24 PSF
MAXIMUM WIND LOAD AT CORNERS = 29 PSF
NET WIND UPLIFT ON STEEL JOIST ROOFS = 9 PSF

SEISMIC LOAD CRITERIA: AS PER SECTION 1113 (1990 BOCA SUPPLEMENT) WITH Av = .13, Aa = .13, S = 1.0, R = 4.5.

SEISMIC LOAD ON PRIMARY STRUCTURE = 7% OF MASS

ASSUMED BEARING PRESSURE ON UNDISTURBED SOIL: 5000 PSF
ASSUMED BEARING PRESSURE ON COMPACTED FILL: 5000 PSF

1. SHOULD ANY OF THE DETAILED INSTRUCTIONS SHOWN ON THE PLANS CONFLICT WITH THE GENERAL STRUCTURAL NOTES, THE SPECIFICATIONS, OR WITH EACH OTHER, THE STRICTEST PROVISION SHALL GOVERN.
2. THE STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER THE BUILDING IS FULLY COMPLETED. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO DETERMINE ERECTION PROCEDURE AND SEQUENCE AND TO INSURE THE SAFETY OF THE BUILDING AND ITS COMPONENT PARTS DURING ERECTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, SHEETING, TEMPORARY BRACING, GUYS OR TIEDOWNS MIGHT BE NECESSARY. SUCH MATERIAL SHALL REMAIN THE CONTRACTOR'S PROPERTY AFTER COMPLETION OF THE PROJECT.
3. THE STRUCTURE UTILIZES SHEAR WALLS TO PROVIDE LATERAL STABILITY. THEREFORE, TEMPORARY BRACING, GUYS, ETC. MUST BE MAINTAINED UNTIL ALL MASONRY SHEAR WALLS HAVE BEEN ERECTED AND ATTACHED TO STEEL FRAMING.
4. LOADS, OPENINGS AND STRUCTURE IN ANY WAY RELATED TO REQUIREMENTS OF OTHER (NON-STRUCTURAL) DISCIPLINES ARE SHOWN FOR BIDDING PURPOSES ONLY. THE CONTRACTOR SHALL OBTAIN FROM THE HEATING AND VENTILATING, ELECTRICAL, PLUMBING AND OTHER SUBCONTRACTORS THE FINAL APPROVED SIZE AND LOCATION OF ALL OPENINGS AND WORK TO BE PROVIDED FOR THEIR TRADE IN ROOFS, FLOORS AND WALLS, WHETHER SHOWN OR NOT SHOWN ON STRUCTURAL DRAWINGS. CONTRACTOR SHALL BE RESPONSIBLE FOR TRANSMISSION OF REQUIREMENTS, LOCATIONS AND DETAILS TO STRUCTURAL SUBCONTRACTORS. EXCESS COST RELATED TO VARIATION IN MECHANICAL REQUIREMENTS ARE NOT TO BE BORNE BY THE OWNER.
5. MECHANICAL EQUIPMENT WEIGHTS USED IN DESIGN OF SUPPORTING ELEMENTS HAVE BEEN INDICATED ON THE DRAWINGS. CONTRACTOR SHALL NOTIFY THE ARCHITECT PRIOR TO INSTALLATION IF ACTUAL WEIGHT EXCEEDS WEIGHT SHOWN ON DRAWINGS.
6. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO FOLLOW ALL APPLICABLE SAFETY CODES AND REGULATIONS DURING ALL PHASES OF CONSTRUCTION.
7. SHOP DRAWINGS ARE TO BE CHECKED BY THE CONTRACTOR AND SUBCONTRACTOR AND BEAR CHECKER'S INITIALS BEFORE BEING SUBMITTED TO THE ARCHITECT FOR APPROVAL.
8. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES AND EXISTING CONDITIONS BEFORE PROCEEDING WITH ANY WORK.
9. ALL SECTIONS AND DETAILS SHALL BE CONSIDERED TYPICAL AND APPLY FOR THE SAME AND SIMILAR SITUATIONS THROUGHOUT THE BUILDING, UNLESS OTHERWISE SPECIFICALLY NOTED.

FOUNDATIONS

1. BACKFILLING SHALL BE ACCOMPLISHED TO EQUAL HEIGHTS ON BOTH SIDES OF FOUNDATION WALLS TO PREVENT MOVEMENTS DUE TO UNBALANCED EARTH PRESSURE. WHERE EARTH IS ON ONE SIDE ONLY, BACKFILLING AND COMPACTION SHALL NOT START UNTIL FLOOR SLAB OR ADEQUATE BRACING IS PROVIDED FOR WALL SUPPORT (EXCEPT AT RETAINING WALLS).
2. ALL FOOTINGS ARE TO REST ON UNDISTURBED NATURAL SOIL, AS DEFINED IN THE SPECIFICATIONS, OR CONTROLLED COMPACTED FILL, REGARDLESS OF ELEVATIONS SHOWN ON DRAWINGS. FOOTING BOTTOM ELEVATIONS SHALL NOT BE HIGHER THAN INDICATED ON THE FOUNDATION PLAN.
3. ALL SOIL SURROUNDING AND UNDER ALL FOOTINGS SHALL BE PROTECTED FROM FREEZING AND FROST ACTION DURING THE COURSE OF CONSTRUCTION.
4. BOTTOM OF ALL EXTERIOR FOOTINGS SHALL BE AT LEAST 3'-6" BELOW FINISHED GRADE.
5. FOOTING BOTTOMS SHALL STEP WHERE INDICATED AT THE RATE OF 1 UNIT VERTICAL TO 2 UNITS HORIZONTAL WITH A MAXIMUM VERTICAL STEP OF 2'-0".
6. WHERE FOOTINGS ARE IN CLOSE PROXIMITY OF SUBSURFACE PIPING, BOTTOM OF FOOTINGS SHALL BE AT LEAST 6" BELOW INVERT ELEVATION OF PIPING, UNLESS OTHERWISE SHOWN ON DRAWINGS.
7. KEEP FOUNDATION EXCAVATIONS FREE OF WATER AT ALL TIMES.
8. USE LEAN CONCRETE (f'c=1500) OR CONTROLLED COMPACTED FILL FOR OVER-EXCAVATION OF FOOTINGS.
9. PLACEMENT OF ALL COMPACTED FILL MUST BE UNDER SUPERVISION OF AN APPROVED TESTING LABORATORY (SEE SPECIFICATIONS). CONCRETE FOUNDATIONS SHALL NOT BE PLACED UNTIL SUBBASE HAS BEEN CHECKED IN PLACE AND APPROVED BY TESTING LABORATORY.
10. CONTROL JOINT SPACING IN FOUNDATION WALLS SHALL NOT EXCEED 30 FEET. 50% OF HORIZONTAL REINFORCEMENT SHALL EXTEND THROUGH JOINT AND HAVE A CLASS "B" SPLICE (PER ACI 318-89).
11. WHERE REQUIRED, CONSTRUCTION JOINTS SHALL BE KEYED AND OCCUR AT CONTROL JOINT INTERVALS.
12. THE LOCATION AND ELEVATION OF EXISTING FOOTINGS INDICATED ARE BASED ON DRAWINGS BY: MARCHANT & MINGES ENGINEERS, DATED APRIL 30, 1957, WHICH HAVE BEEN PROVIDED TO THE DESIGNERS BY THE OWNER. THIS INFORMATION IS PROVIDED FOR BIDDING PURPOSES ONLY. ACTUAL EXISTING FOUNDATIONS MAY VARY FROM WHAT IS INDICATED, AND MUST BE VERIFIED IN FIELD PRIOR TO PREPARATION OF SHOP DRAWINGS. NOTIFY ARCHITECT IF EXISTING CONDITIONS PRECLUDE USE OF DETAILS AS SHOWN.

SLAB ON GRADE

1. CONTROL JOINTS ARE TO BE CREATED IN SLABS ON GRADE. JOINTS SHALL BE SAW CUT 1/8" WIDE AND TO A DEPTH EQUAL TO 1/4 OF THE SLAB THICKNESS. LOCATE JOINTS 15'-0" ON CENTER (PLUS OR MINUS 5'-0") IN EACH DIRECTION, UNLESS OTHERWISE SHOWN ON DRAWINGS. CONSTRUCTION JOINTS AS REQUIRED SHALL BE KEYED AND LOCATED AT CONTROL JOINT INTERVALS.
2. SEE ARCHITECTURAL DRAWINGS FOR LOCATION AND SIZE OF DEPRESSED AREAS IN CONCRETE SLABS AND FOR CONCRETE PADS. MAINTAIN FULL SLAB THICKNESS IN DEPRESSED AREAS, UNLESS OTHERWISE SHOWN.
3. SEE ARCHITECTURAL DRAWINGS FOR LOCATION OF ALL MASONRY WALLS FOR WHICH NO FOOTING IS SHOWN. SEE DETAILS FOR SLAB REINFORCING REQUIREMENTS AT ALL WALL LOCATIONS.

CONCRETE

MATERIALS:

CONCRETE SHALL DEVELOP STRENGTH IN 28 DAYS AS FOLLOWS:

LOCATION		STRENGTH (PSI)
	FOUNDATIONS	3000
	WALLS	3000
	SLABS ON GRADE	4000
	SLABS ON METAL DECK	4000

1. ALL DETAILING, FABRICATION AND ERECTION OF REINFORCING BARS MUST FOLLOW THE LATEST ACI CODE AND THE LATEST ACI "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES".
2. REINFORCING STEEL SHALL BE 60,000 PSI YIELD.
3. NO TACK WELDING OF REINFORCING WILL BE PERMITTED.
4. UNLESS NOTED OTHERWISE, ALL LAP SPLICES SHALL BE CLASS B, IN ACCORDANCE WITH ACI 318-89.
5. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A-185.
6. WIRE MESH REINFORCEMENT MUST LAP ONE MESH SIZE AT SIDES AND ENDS AND BE WIRED TOGETHER.
7. WELDED WIRE FABRIC SIDE LAPS SHALL BE STAGGERED TO AVOID FOUR MESH THICKNESS AT COINCIDING END LAP AND SIDE LAP LOCATION.
8. NO CALCIUM CHLORIDE OR ADMIXTURES CONTAINING MORE THAN 0.1% CHLORIDE BY WEIGHT OF ADMIXTURE SHALL BE USED IN THE CONCRETE.
9. CONTRACTOR SHALL ANTICIPATE DEFLECTION OF UNCAMBERED STEEL AT SUPPORTED SLABS, AND PROVIDE ADDITIONAL CONCRETE AS REQUIRED.
10. AT INTERSECTIONS OF REINFORCED CONCRETE WALLS, PROVIDE CORNER DOWELS OF SAME SIZE AND AT THE SAME SPACING AS THE SMALLER HORIZONTAL REINFORCING. DOWELS SHALL HAVE A CLASS B LAP WITH HORIZONTAL REINFORCING IN EACH DIRECTION.
11. PROVIDE CORROSION RESISTANT ACCESSORIES IN ALL EXPOSED CONSTRUCTION.
12. ALL KEYS IN CONCRETE WALLS SHALL BE 2 X 4 UNLESS NOTED OTHERWISE.
13. CONCRETE PIERS: PLACE CONCRETE PIERS AND WALLS TO SOLIDLY SET PIER REINFORCING AND SET WALL REINFORCING THROUGH PIER VERTICAL BARS. PROVIDE DOWELS WITH STANDARD HOOK FROM FOOTING AT ALL PIERS. SIZE AND QUANTITY OF DOWELS TO MATCH VERTICAL PIER REINFORCING (CLASS "B" SPLICE).
14. SEE ARCHITECTURAL, MECHANICAL AND EQUIPMENT DRAWINGS FOR CONCRETE PADS, SLEEVES, OPENINGS, RECESSES, AND BUILT-IN WORK IN CONCRETE ELEMENTS.
15. THE CONTRACTOR SHALL FURNISH, LOCATE AND INSTALL ALL ACCESSORIES FOR PROPER ANCHORAGE OF WOOD AND METAL FRAMING, WOOD BLOCKING, BRICK WORK AND MASONRY UNITS. HE SHALL BE SOLELY RESPONSIBLE FOR FURNISHING, LOCATING AND ENSURING PROPER QUANTITY OF ALL FASTENING DEVICES.
16. ALL CONCRETE TO REMAIN EXPOSED TO VIEW SHALL RECEIVE A SMOOTH RUBBED FINISH (SEE SPECIFICATIONS).
17. ALL CONCRETE CORNERS WITH BOTH SIDES EXPOSED TO VIEW SHALL BE SQUARE UNLESS OTHERWISE SHOWN OR NOTED. THE EDGE SHALL BE RUBBED, PRODUCING A SMOOTH, DENSE SURFACE WITHOUT PITS OR IRREGULARITIES.
18. PROVIDE CONTINUOUS VERTICAL DOVETAIL SLOTS AT 16 INCH CENTERS HORIZONTALLY FOR ALL CONCRETE WALLS ABUTTING A MASONRY WALL OR VENEER, UNLESS OTHERWISE NOTED.
19. PROVIDE CLEARANCE FROM EDGE OF REINFORCING TO EDGE OF CONCRETE AS FOLLOWS:

FOOTINGS (AGAINST EARTH)	3"
COLUMNS AND PIERS (VERTICAL REINFORCING)	2"
WALLS, INTERIOR FACE	3/4"
WALLS, EXTERIOR FACE (#5 AND SMALLER)	1 1/2"
SLABS (INTERIOR)	3/4"
SLABS (EXTERIOR)	1 1/2"
SLABS ON GRADE (MAT.)	1/3 X THK. FROM TOP SURFACE

20. PROVIDE THE FOLLOWING AT OPENINGS IN ALL CONCRETE WALLS AND FRAMED SLABS, UNLESS OTHERWISE INDICATED:

1-#5 AT EACH FACE ON EACH SIDE OF OPENING, EXTENDING 2'-0" BEYOND OPENING.
1-#5 X 4'-0" LONG AT EACH FACE DIAGONALLY AT EACH CORNER.

STRUCTURAL STEEL

MATERIALS:

WIDE FLANGE STRUCTURAL STEEL SHAPES	ASTM A 572, GR.50
STEEL PLATES AND ANGLES	ASTM A 36
STRUCTURAL STEEL TUBING	ASTM A500, GRADE B
BOLTS:	ASTM A325
ANCHOR BOLTS	ASTM A307
WELDING ELECTRODE	ASTM E 70

1. DESIGN, FABRICATION, AND ERECTION OF STRUCTURAL STEEL SHALL CONFORM TO CURRENT AMERICAN INSTITUTE OF STEEL CONSTRUCTION SPECIFICATION.
2. WELDING SHALL CONFORM TO THE CODE FOR "ARC AND GAS WELDING IN BUILDING CONSTRUCTION" OF THE AMERICAN WELDING SOCIETY.
3. ALL LOOSE BEAM LINTELS SHALL HAVE 8" MINIMUM BEARING. SEE ARCHITECTURAL JAMB DETAILS FOR LENGTHS.
4. FOR MISCELLANEOUS STEEL SEE ARCHITECTURAL DRAWINGS.
5. ALL WELDING SHALL BE DONE BY A CERTIFIED WELDER IN ACCORDANCE WITH AWS STANDARDS.
6. CONNECTIONS:
   CONNECTIONS SHALL BE DESIGNED BY THE FABRICATOR AND CONSTRUCTED IN ACCORDANCE WITH THE LATEST EDITION OF THE A.I.S.C. MANUAL OF STEEL CONSTRUCTION. CONNECTIONS SHALL BE PROVIDED TO CONFORM TO THE REQUIREMENTS OF TYPE 2 CONSTRUCTION UNLESS OTHERWISE DETAILED.
   CONNECTIONS SHALL BE DESIGNED TO ACCOMMODATE REACTIONS INDICATED ON THE DRAWINGS.
   IF NO REACTION IS INDICATED AT A PARTICULAR BEAM END, DESIGN CONNECTION FOR 6 KIPS.
   MINIMUM CONNECTION ANGLE THICKNESS SHALL BE 5/16".
   IN ADDITION TO PROVIDING ADEQUATE BOLTS TO ACCOMMODATE REACTIONS, THE FOLLOWING MINIMUM NUMBER OF BOLT ROWS SHALL BE USED:

MEMBER DEPTH	MINIMUM BOLT ROWS
12" or Less	2
14" to 18"	3
21" to 24"	4
27" to 30"	5
Over 30"	6

   CONNECTIONS SHALL BE MADE USING 3/4" DIAMETER ASTM A325 BOLTS (SNUG TIGHT OR SLIP CRITICAL) OR WELDS, UNLESS NOTED OTHERWISE. IF TENSION CONTROL BOLTS ARE USED, CONNECTIONS SHALL BE DESIGNED FOR SLIP CRITICAL BOLT ALLOWABLE LOAD VALUES.
   PROVIDE SLOTTED BOLTED CONNECTIONS WHERE SHOWN WITH 13/16" X 1 7/8" SLOTTED HOLES USING ASTM A 325 BOLTS WITH WASHERS. NUTS SHALL BE FASTENED SNUG TIGHT, THEN UNTIGHTENED BY ONE-HALF TURN. PEEN THREADS TO PREVENT FURTHER LOOSENING OF NUT.
   USE LARGER OF 1/4" FILLET WELDS OR MINIMUM SIZE PER AISC REQUIREMENTS WHERE NO WELD SIZE IS SHOWN ON DRAWINGS.
   WELDS IN EXCESS OF 24" IN LENGTH SHALL BE 3" STITCH WELDS AT 12" ON CENTERS, UNLESS SPECIFICALLY SHOWN ON DRAWINGS TO BE CONTINUOUS.
   MOMENT CONNECTIONS SHALL BE DESIGNED TO DEVELOP FULL MOMENT CAPACITY OF THE ELEMENTS CONNECTED, UNLESS SPECIFIC MOMENT IS INDICATED ON THE DRAWINGS.
7. NO WELDING OR FINAL BOLTING SHALL BE DONE UNTIL AS MUCH OF THE STRUCTURE THAT WILL BE STIFFENED THEREBY HAS BEEN PROPERLY ALIGNED.
8. SEQUENCE OF PLACING WELDS SHALL BE SUCH AS TO AVOID DISTORTION OF MEMBERS.
9. SUBSTITUTION OF STRUCTURAL STEEL MEMBERS IS PERMITTED TO FACILITATE DELIVERY AT NO ADDITIONAL COST TO THE OWNER. SUBSTITUTED MEMBERS MUST BE OF THE SAME NOMINAL DEPTH AS THE MEMBER ORIGINALLY INDICATED AND HAVE A WEIGHT GREATER THAN THAT INDICATED. BEAM FLANGES MUST NOT INFRINGE ON ADJACENT ARCHITECTURAL ELEMENTS.

STRUCTURAL STEEL (CONTINUED)

10. ALL STRUCTURAL STEEL BEAMS AND COLUMNS ADJACENT TO MASONRY SHALL HAVE THE FOLLOWING MASONRY ANCHORAGE:
    16 GAGE GALVANIZED CHANNEL SLOTS (DUR-O-WAL INC. D/A 401) WELDED TO COLUMNS AND BEAMS WITH 1/4" GALVANIZED STRAP ANCHORS (DUR-O-WAL INC. D/A 914) SPACED 1'-4" O.C. AT COLUMNS AND 1'-4" AT BEAMS (UNLESS OTHERWISE NOTED). INSTALL PER MANUFACTURER'S SPECIFICATIONS.
11. STEEL MEMBERS SHOWN CONNECTED TO MASONRY WITH EXPANSION ANCHORS SHALL HAVE 3/4" DIAMETER EXPANSION ANCHORS AT 2'-8" ON CENTERS IN VERTICALLY SLOTTED HOLES, UNLESS OTHERWISE INDICATED.
12. PROVIDE 9/16" DIAMETER HOLES FOR WOOD NAILERS AS REQUIRED BY ARCHITECTURAL DRAWINGS.
13. PROVIDE BITUMASTIC PROTECTION COATING FOR ALL STRUCTURAL STEEL BELOW GRADE.
14. EXISTING STEEL SURFACES TO RECEIVE FIELD WELDS SHALL BE THOROUGHLY CLEANED UNTIL FREE FROM PAINT, RUST, GREASE, ETC.

METAL ROOF DECK

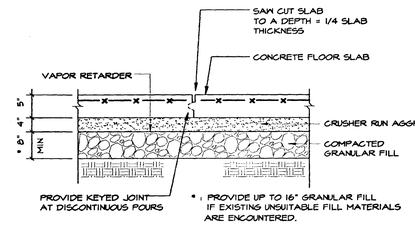
1. MATERIALS:
   TYPICAL METAL DECK SHALL BE 1 1/2" GALVANIZED WIDE RIB TYPE WITH NESTING SIDE SEAMS OF GAGE INDICATED ON THE DRAWINGS.
   DECK SHALL CONFORM TO "BASIC DESIGN SPECIFICATION" AS ADOPTED BY THE STEEL DECK INSTITUTE.
   METAL ROOF DECK SHALL BE FURNISHED IN SHEET LENGTHS SUFFICIENT TO EXTEND OVER FOUR SUPPORTS (3 SPANS) WHEREVER POSSIBLE.
2. ATTACHMENT:
   METAL DECK SHALL BE WELDED TO SUPPORTING STEEL WITH PUDDLE WELDS (5/8" DIAMETER MINIMUM) SPACED NOT MORE THAN 12" ON CENTER.
   WELD METAL ROOF DECK TO STEEL MEMBERS PARALLEL TO SPAN OF DECK USING 5/8" DIAMETER PUDDLE WELDS AT 12" ON CENTER.
   INTERMEDIATE SIDE CONNECTIONS SHALL BE MADE WITH #10 SELF TAPPING SCREWS. THE MAXIMUM SPACING OF SIDE LAP CONNECTIONS SHALL BE 3'-0".

COMPOSITE FLOOR DECK

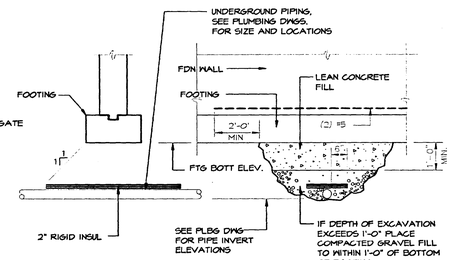
1. MATERIALS:
   METAL FLOOR DECK SHALL BE GALVANIZED AND OF DEPTH AND GAGE INDICATED ON THE DRAWINGS. METAL FLOOR DECK SHALL BE FORMED WITH EMBOSSMENTS TO PROVIDE A MECHANICAL LOCK BETWEEN THE STEEL FLOOR AND CONCRETE SLAB.
   METAL FLOOR DECK SHALL BE FURNISHED IN SHEET LENGTHS SUFFICIENT TO EXTEND OVER 4 SUPPORTS (3 SPANS).
2. ATTACHMENT:
   METAL FLOOR DECK SHALL BE FASTENED TO SUPPORTING STEEL, INCLUDING CAST IN PLACE PERIMETER STEEL ANGLES, WITH ATTACHMENTS EQUIVALENT TO 3/4" DIAMETER PUDDLE WELDS SPACED NOT MORE THAN 12" ON CENTER. ADJACENT DECK UNITS SHALL BE FASTENED TOGETHER AT SIDE LAPS SUCH THAT THE CONNECTION SPACING DOES NOT EXCEED 36" ON CENTER.

STEEL JOISTS

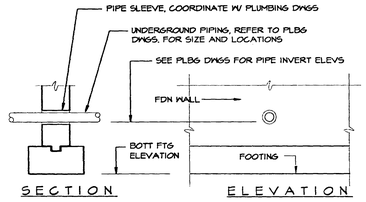
1. STEEL JOISTS SHALL CONFORM TO AND BE ERECTED IN ACCORDANCE WITH THE LATEST SPECIFICATIONS AND CODE OF STANDARD PRACTICE OF THE STEEL JOIST INSTITUTE AND AS SHOWN ON THE DRAWINGS.
2. BRIDGING FOR STEEL JOISTS SHALL BE AS SHOWN AND NOT LESS THAN CALLED FOR BY THE STEEL JOIST INSTITUTE SPECIFICATION AND CODE OF STANDARD PRACTICE.
3. HEADERS AND/OR FASTENERS BETWEEN JOISTS SHALL BE FASTENED TO TOP CHORD AND LOCATED OVER AN UPPER PANEL POINT OF A JOIST, UNLESS OTHERWISE SHOWN.
4. EXTEND ALL JOISTS 1" PAST CENTERLINE OF SUPPORTING MEMBER WHERE POSSIBLE.
5. ADJACENT JOISTS OF THE SAME DEPTH SHALL HAVE WEB MEMBERS IN LINE TO PERMIT PASSAGE OF MECHANICAL DUCTS.
6. ANCHOR ALL STEEL JOIST BRIDGING LINES TO INTERSECTING CONCRETE WALLS, MASONRY WALLS, AND/OR STEEL BEAMS WITH LATERAL ANCHORS UNLESS SHOWN OTHERWISE.
7. JOISTS AND JOIST EXTENDED ENDS, WHETHER CANTILEVERED OR SUPPORTED, SHALL BE DESIGNED TO SUSTAIN UNIFORM LOAD CAPACITY OVER FULL SPAN INDICATED IN THE SJI LOAD TABLES FOR STEEL JOISTS, UNLESS NOTED OTHERWISE ON DRAWINGS WITH "SP" DESIGNATION.
8. JOISTS ON COLUMN LINES SHALL BE ANCHORED BY BOLTING. IF THERE IS NO JOIST ON COLUMN CENTERLINE, THE JOIST NEAREST THE COLUMN CENTERLINE SHALL BE ANCHORED BY BOLTING.
9. WELD ALL JOISTS TO SUPPORTING STEEL WITH 1 1/2" OF 3/16" FILLET WELD EACH SIDE OF BEARING, UNLESS OTHERWISE SHOWN.
10. MAXIMUM LIVE LOAD DEFLECTION SHALL BE 1/360 OF JOIST SPAN, UNLESS OTHERWISE NOTED ON DRAWINGS.
11. WHERE DIAGONAL BRIDGING INTERFERES WITH MECHANICAL INSTALLATIONS, REMOVE CROSS BRIDGING AFTER TOTAL DEAD LOAD IS APPLIED AND REPLACE WITH HORIZONTAL ANGLES 2" X 2" x 3/16" AT TOP AND BOTTOM CHORDS.



TYP. SLAB ON GRADE CONTROL JT. DETAIL
NOT TO SCALE



EARTHWORK DET. AT PIPE TRENCHING BENEATH FTGS.
NOT TO SCALE



FOUNDATION WALL PIPE SLEEVE DETAIL
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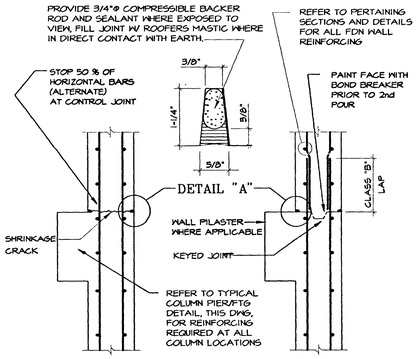

TYPICAL CONCRETE FOUNDATION WALL CONTROL/CONSTRUCTION JOINT DETAIL
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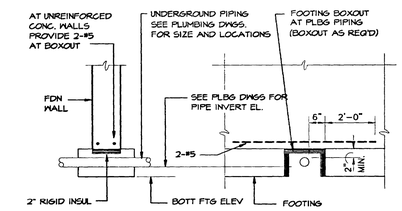
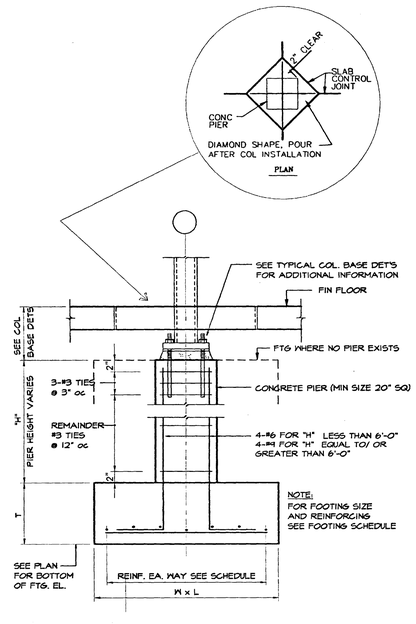


FOUNDATION WALL /FTG PIPE BOXOUT DET.
NOT TO SCALE



TYPICAL COLUMN PIER/PILASTER/FTG DETAIL
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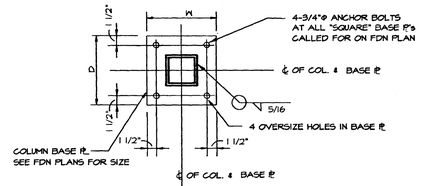
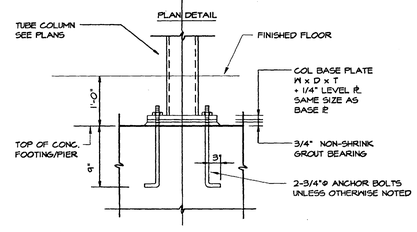
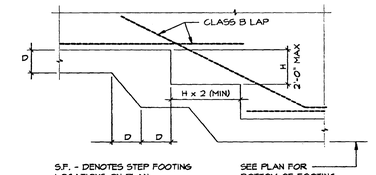




TYPICAL COLUMN BASE DETAIL
NOT TO SCALE



TYPICAL STEPPED FOOTING DETAIL
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PROFESSIONAL SEAL

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ARCHITECTURE / ENGINEERING / INTERIOR DESIGN
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TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT
STATE PROJECT NO. 057-106EA

DRAWING TITLE

GENERAL NOTES AND TYPICAL DETAILS

NO	DATE	REVISION	BY

DATE: MARCH 16, 1998
SCALE: AS NOTED
PROJECT NO.: 50950.06
DRAWING NO.: S401

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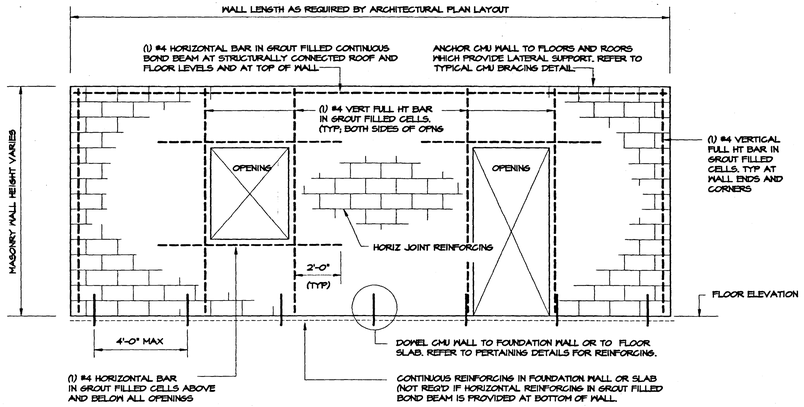
CONCRETE MASONRY NOTES

CONCRETE MASONRY

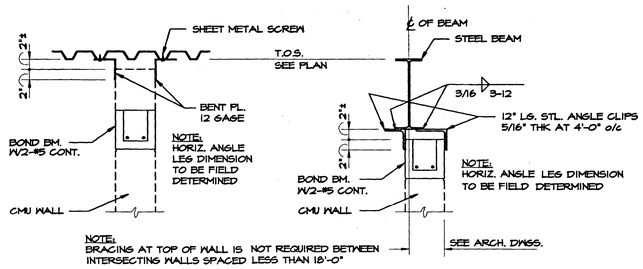
MATERIALS:

HOLLOW LOAD BEARING UNITS: ASTM C 90
MORTAR: (TYPE S) ASTM C 270
GROUT FOR REINFORCED MASONRY: ASTM C 476

1. WALLS INDICATED ON STRUCTURAL DRAWINGS ARE FOR REFERENCE ONLY. SEE ARCHITECTURAL DRAWINGS FOR LOCATION, THICKNESS AND COMPOSITION OF MASONRY WALLS.
2. ALL EXTERIOR MASONRY WALLS SHALL CONTAIN THE FOLLOWING REINFORCING:
   - 1-#6 BAR AT 48" ON CENTER.
   - 1-#6 BAR AT BOTH SIDES OF DOOR AND WINDOW OPENINGS.
   - 1-#4 BAR MINIMUM ABOVE AND BELOW ALL WINDOW OPENINGS AND ABOVE ALL DOOR OPENINGS. PROVIDE ADDITIONAL BARS ABOVE DOORS AND WINDOWS AS REQUIRED IN ACCORDANCE WITH LINTEL SCHEDULE.
   - 1-#4 AT TOP OF ALL WALLS, UNLESS OTHERWISE INDICATED.
   - 2-#6 BAR AT ENDS OF ALL WALLS.
   - STANDARD LADUR TYPE DESIGN DUR-O-WAL HORIZONTAL REINFORCING AT 16" O.C. VERTICAL.
3. INTERIOR SHEAR WALLS, WHERE INDICATED, SHALL CONTAIN THE SAME REINFORCING AS EXTERIOR WALLS.
4. ALL OTHER INTERIOR MASONRY WALLS SHALL CONTAIN THE FOLLOWING MINIMUM REINFORCING:
   - 1-#4 AT ALL SIDES OF DOOR AND WINDOW OPENINGS.
   - 1-#4 AT TOP AND ENDS OF ALL WALLS.
   - STANDARD LADUR TYPE DESIGN DUR-O-WAL HORIZONTAL REINFORCING AT 16" O.C. VERTICAL.
5. ALL VERTICAL REINFORCING SHALL EXTEND FOR THE FULL HEIGHT OF THE MASONRY, AND SHALL PASS INTO OR THROUGH BOND BEAMS.
6. CELLS CONTAINING REINFORCING BARS AND ALL CELLS BELOW GRADE SHALL BE GROUTED SOLID. ALL OTHER CELLS SHALL REMAIN HOLLOW EXCEPT WHERE NOTED.
7. ALL BOLTS OR ANCHORS SHALL BE SOLIDLY EMBEDDED IN MORTAR OR GROUT. IF BOND BEAM IS NOT LOCATED AT BOLT OR ANCHOR ELEVATION, PROVIDE LATH AND FILL CELL LOCALLY TO PROVIDE SUBSTRATE FOR BOLT OR ANCHOR.
8. ALL COLUMNS WITHIN SHEAR WALLS AND EXTERIOR WALLS SHALL BE SOLIDLY EMBEDDED IN GROUT.
9. USE 2 COURSES (16") OF SOLID MASONRY BELOW EACH BEAM OR LINTEL BEARING EXCEPT AS NOTED.
10. PROVIDE CONTINUOUS GROUTED BOND BEAM WHERE MASONRY TIES CONCRETE MASONRY TO STEEL FRAMING.
11. HOLLOW UNITS SHALL BE LAID WITH FULL MORTAR COVERAGE ON HORIZONTAL AND VERTICAL FACE SHELLS, EXCEPT THAT WEBS SHALL ALSO BE BEDDED IN ALL COURSES OF BEARING WALLS, PIERS, COLUMNS AND PILASTERS, AND IN THE STARTING COURSE ON FOOTINGS AND SOLID FOUNDATION WALLS, AND WHERE ADJACENT TO CELLS OR CAVITIES WHICH ARE TO BE REINFORCED AND / OR FILLED WITH GROUT.
12. MORTAR PROTRUSIONS EXTENDING INTO CELLS OR CAVITIES TO BE REINFORCED AND/OR GROUTED SHALL BE REMOVED.
13. ALL MASONRY WALLS SHALL BE BRACED AT THE TOP UNLESS BRACED HORIZONTALLY BY COLUMNS OR INTERSECTING WALLS AT A MAXIMUM SPACING OF 12 FEET.

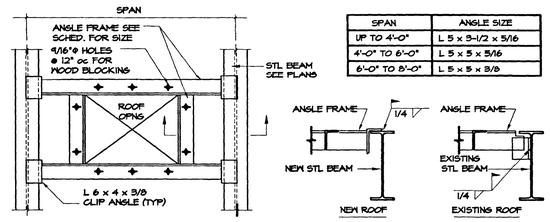


MINIMUM REINFORCING REQUIREMENTS FOR CMU WALLS
NOT TO SCALE



CMU WALL @ UNDERSIDE OF DECK CMU WALL @ STEEL BEAM/JOIST

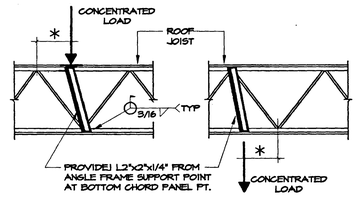
TYP. BRACING AT TOP OF INTERIOR CMU WALLS
NOT TO SCALE



SPAN	ANGLE SIZE
UP TO 4'-0"	L 5 x 3-1/2 x 5/16
4'-0" TO 6'-0"	L 5 x 5 x 5/16
6'-0" TO 8'-0"	L 5 x 5 x 3/8

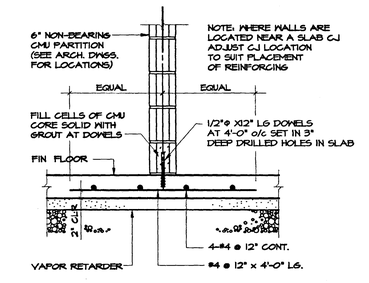
NOTES: 1. SEE ARCH. AND MECH. DWGS. FOR SIZE AND LOCATION OF ALL ROOF PENETRATIONS
2. PROVIDE SUPPORT FRAMES FOR ALL OPNS. 8" OR GREATER IN SIZE. COORDINATE WITH MECH'L AND ARCH'L DWGS FOR SIZE AND LOCATION.
3. AT EXISTING CONCRETE BUILDING, PROVIDE FRAMES BOLTED TO SIDE OF PERIMETER CONCRETE WITH 2 - 3/4"ø EXPANSION ANCHORS AT EACH ANGLE.

TYPICAL FRAME DETAIL AT ROOF DECK PENETRATIONBRATIONS
NOT TO SCALE



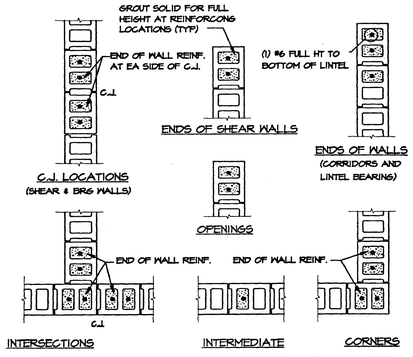
* WHEN CONCENTRATED LOADS OCCUR AT A DISTANCE MORE THAN 4" FROM A PANEL POINT PROVIDE AN ANGLE STRUT FROM POINT OF SUPPORT TO JOIST PANEL POINT.

TYP. JOIST REINFORCING DETAIL
NOT TO SCALE



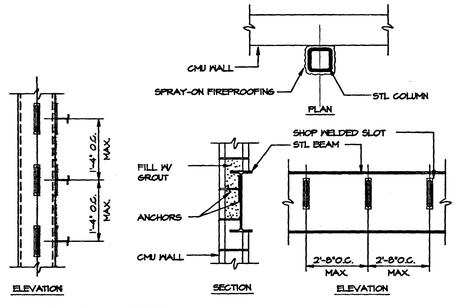
NOTE: PROVIDE SLAB DOWELS BETWEEN CONC FLR SLAB AND CMU WALLS THAT ARE SUPPORTED ON ELEVATED SLABS ALSO.

SLAB ON GRADE REINF. AT CMU PARTITIONS
NOT TO SCALE



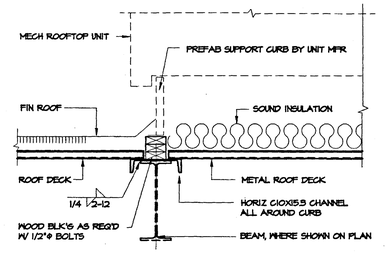
(FOR REINFORCING REQUIREMENTS, REFER TO GENERAL NOTES, THIS DWG.)

TYPICAL CMU REINFORCING PLAN DETAILS
NOT TO SCALE



TS COL ADJACENT TO CMU WALL BEAM ADJACENT TO CMU WALL

TYPICAL MASONTY ANCHORAGE DETAILS
NOT TO SCALE



ROOFTOP MECH. UNIT CURB SUPPORT DETAIL
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PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE
ARCHITECT/ENGINEER: R. C. BOGGS, P.E.
DRAWN BY: L. CZUBATYJ

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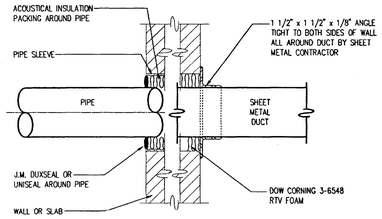
DRAWING TITLE

GENERAL NOTES AND TYPICAL DETAILS

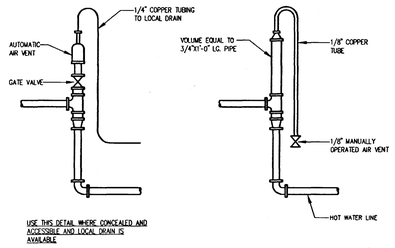
NO	DATE	REVISION	BY

DATE: MARCH 16, 1998
SCALE: AS NOTED
PROJECT NO.: 50950.06
DRAWING NO.: S402

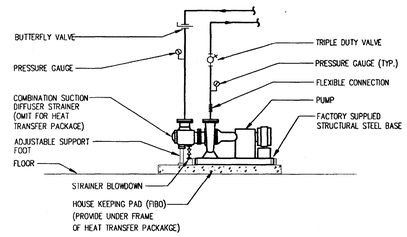
BQ #70 & 125 Attachment



1 DETAIL OF ACOUSTIC CAULKING OF DUCTS AND PIPES PIERCING WALLS, SLABS, SHAFT WALLS, ETC.
NOT TO SCALE



2 TYPICAL VENT AT PIPING DROPS IN DIRECTION OF FLOW
NOT TO SCALE



3 BASE MOUNTED PUMP PIPING DETAIL
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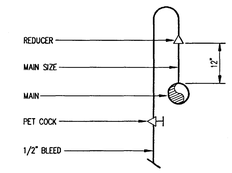

4 MAIN SYSTEM AIR VENT DETAIL
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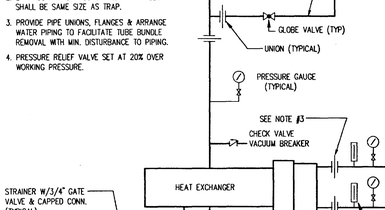

5 FLEXIBLE EXPANSION LOOP DETAIL
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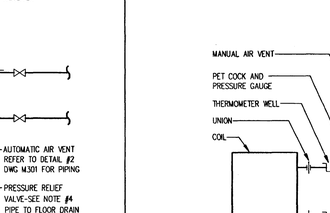

6 CABINET UNIT HEATER HOT WATER PIPING DETAIL
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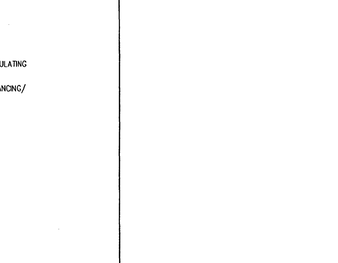
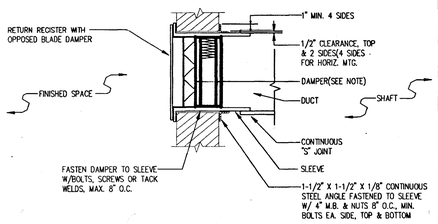


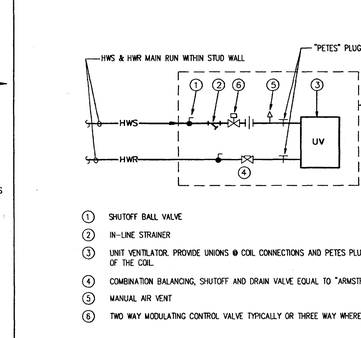
7 DETAIL OF HOT WATER DUCT COIL PIPING
NOT TO SCALE

8 HOT WATER CONVECTOR PIPING DETAIL
NOT TO SCALE



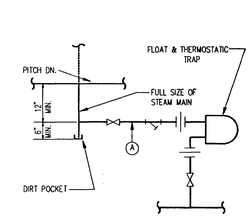
NOTES:
1. DAMPER STYLE & SLEEVE CONFIGURATION IS GOVERNED BY MAINTAINING A MAX. .06 STATIC PRESSURE @ 2500 F.P.M. FACE VELOCITY.
2. DEPTH OF DAMPER TO BE COORDINATED WITH WALL THICKNESS.
3. INSTALLATIONS & MATERIALS PER U.L. 555.

9 VERTICAL FIRE DAMPER
NOT TO SCALE



1. SHUTOFF BALL VALVE
2. IN-LINE STRAINER
3. UNIT VENTILATOR. PROVIDE UNIONS @ COIL CONNECTIONS AND PETES PLUGS ON EACH SIDE OF THE COIL.
4. COMBINATION BALANCING, SHUTOFF AND DRAIN VALVE EQUAL TO "ARMSTRONG" MODEL CV-1
5. MANUAL AIR VENT
6. TWO WAY MODULATING CONTROL VALVE TYPICALLY OR THREE WAY WHERE INDICATED ON PLAN.

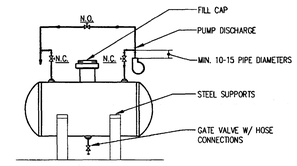
10 UNIT VENTILATOR PIPING DIAGRAM
NOT TO SCALE



MIN. SIZES, TRAP & LINE	
STM. LOAD LBS HR	TRAP SIZE AND LINE SIZE (A)
0-70	3/4"
71-175	1"
176-425	1-1/4"
426-850	1-1/2"
851-1775	2"
1775 & UP	USE MULTIPLE 2" TRAPS

NOTES
1. THE ENTIRE TRAP RIG AS SHOWN HERE IS DENOTED ON PLANS BY THE SYMBOL: T
2. STEAM LOAD FOR ALL TRAPS BASED ON CAPACITY OF EQUIPMENT SERVED. DRIP TRAP MIN. CAPACITY 70 LBS/HR

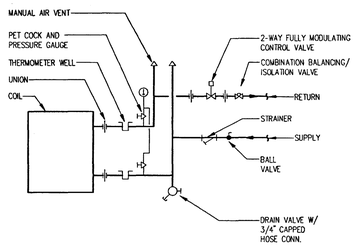
11 STEAM TRAP DETAIL
NOT TO SCALE



12 BYPASS FEEDER SYSTEM DETAIL
NOT TO SCALE

NOTES
1. AUTOMATIC STEAM CONTROL VALVE.
2. BY-PASS PIPING AROUND F & T TRAP LEG SHALL BE SAME SIZE AS TRAP.
3. PROVIDE PIPE UNIONS, FLANGES & ARRANGE WATER PIPING TO FACILITATE TUBE BUNDLE REMOVAL WITH MIN. DISTURBANCE TO PIPING.
4. PRESSURE RELIEF VALVE SET AT 20% OVER WORKING PRESSURE.

13 STEAM TO WATER CONVERTOR PIPING DETAIL
NOT TO SCALE



14 DETAIL OF VAV HOT WATER REHEAT COIL PIPING
NOT TO SCALE

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HVAC PLAN NOTES:

1. REFER TO DRAWING M401 FOR HVAC SCHEDULES.
2. REFER TO DRAWING M201 FOR SYMBOL LIST AND LIST OF ABBREVIATIONS FOR THESE HVAC DRAWINGS.

PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE
ARCHITECT/ENGINEER: J. MACALUSO
DRAWN BY: D. EAR

FLETCHER THOMPSON
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FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

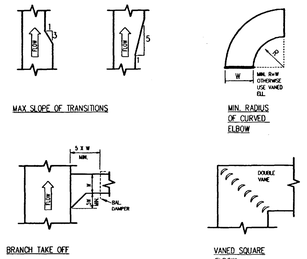
DRAWING TITLE

DETAILS - HVAC

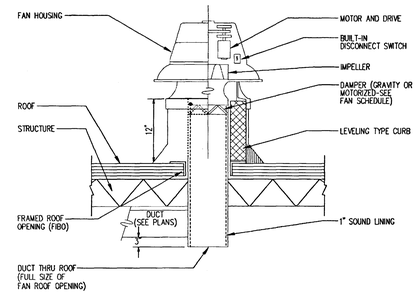
NO	DATE	REVISION	BY

DATE: MARCH 16, 1998
SCALE: AS NOTED
PROJECT NO.: 50950.06
DRAWING NO.: M301

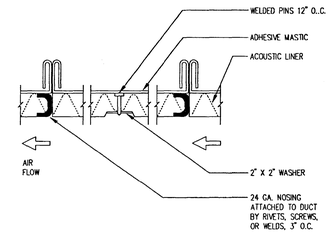
BQ #70 & 125 Attachment



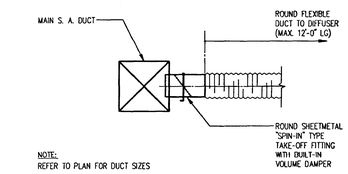
1 DUCT CONSTRUCTION DETAIL
NOT TO SCALE



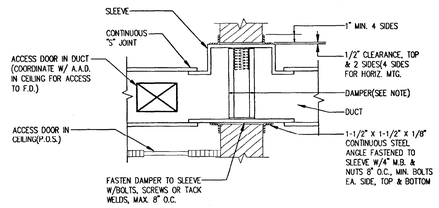
2 ROOF CURB MOUNTED EXHAUST FAN DETAIL
NOT TO SCALE



3 DETAIL OF ACOUSTIC LINING
NOT TO SCALE

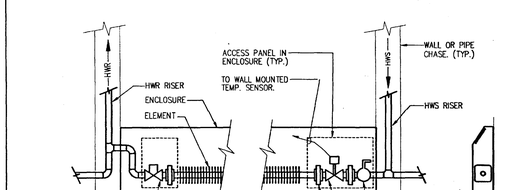


4 FLEXIBLE DUCT TAKE-OFF DETAIL
NOT TO SCALE

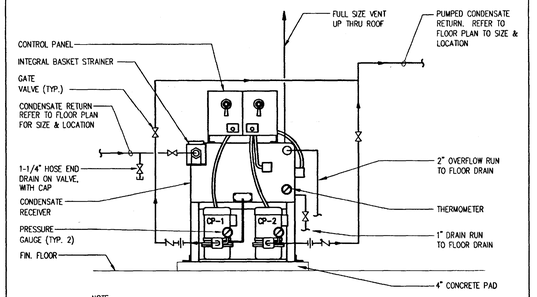


NOTES:
1. DAMPER STYLE & SLEEVE CONFIGURATION IS GOVERNED BY MAINTAINING A MAX. .06 STATIC PRESSURE @ 2500 F.P.M. FACE VELOCITY.
2. DEPTH OF DAMPER TO BE COORDINATED WITH WALL THICKNESS.
3. INSTALLATIONS & MATERIALS PER U.L. 555.

5 VERTICAL FIRE DAMPER DETAIL
NOT TO SCALE

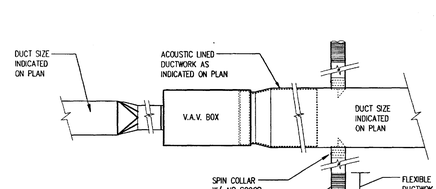


6 TYPICAL RADIATION PIPING DIAGRAM DOWNFEED
NOT TO SCALE

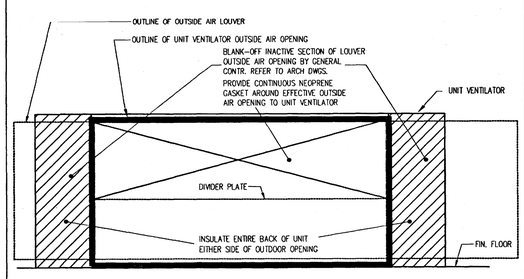


NOTE:
REFER TO THIS SHEET FOR CONDENSATE RECEIVER SPECIFICATION.

7 CONDENSATE TRANSFER PUMP PIPING DETAIL
NOT TO SCALE

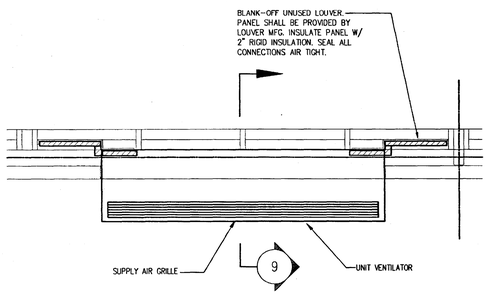


8 TYPICAL V.A.V. BOX DETAIL
NOT TO SCALE



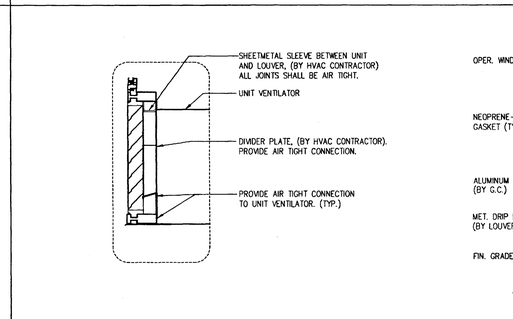
NOTE: REFER TO ARCH DWG. A.301 FOR CROSS SECTION OF UNIT VENTILATORS.

7 DETAIL AT BACK OF UNIT VENTILATOR
NOT TO SCALE



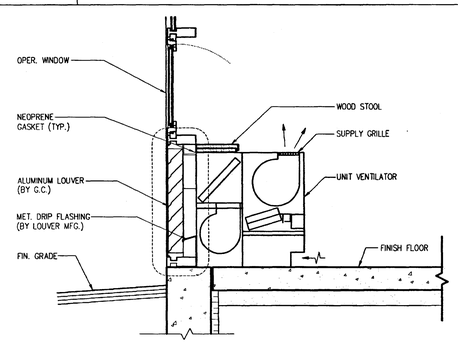
REFER TO DETAIL ON M.301 FOR PIPING ARRANGEMENT

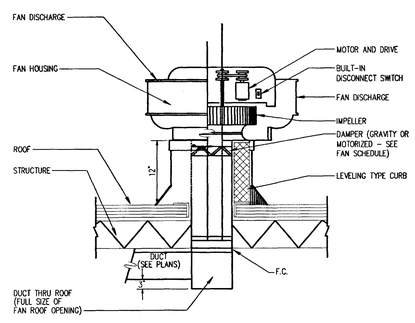
8 UNIT VENTILATOR INSTALLATION DETAIL – PLAN VIEW
NOT TO SCALE



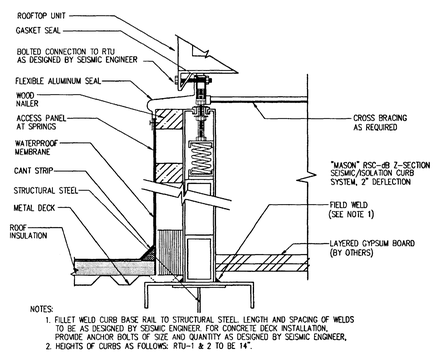
9 UNIT VENTILATOR INSTALLATION DETAIL – SECTION
NOT TO SCALE

15730268



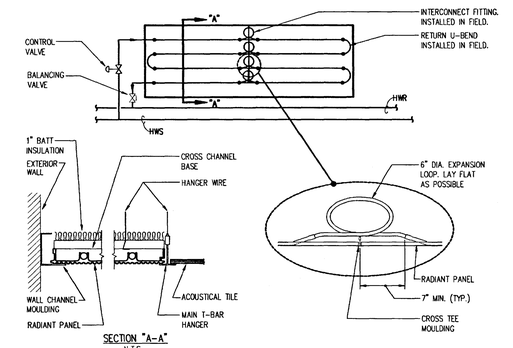


11 ROOF CURB MOUNTED UP-BLAST EXHAUST FAN DETAIL
NOT TO SCALE



NOTES:
1. FILLET WELD CURB BASE RAIL TO STRUCTURAL STEEL. LENGTH AND SPACING OF WELDS TO BE AS DESIGNED BY SEISMIC ENGINEER. FOR CONCRETE DECK INSTALLATION, PROVIDE ANCHOR BOLTS OF SIZE AND QUANTITY AS DESIGNED BY SEISMIC ENGINEER.
2. HEIGHTS OF CURBS AS FOLLOWS: RTU-1 & 2 TO BE 14".

13 ROOFTOP UNIT ISOLATION SEISMIC CURB
NOT TO SCALE



14 RADIANT PANEL DETAIL
NOT TO SCALE

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2. REFER TO DRAWING M201 FOR SYMBOL LIST AND LIST OF ABBREVIATIONS FOR THESE HVAC DRAWINGS.

PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE
ARCHITECT/ENGINEER: J. MACALUSO
DRAWN BY: D. EAR

FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
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PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
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9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

DETAILS - HVAC

NO	DATE	REVISION	BY

DATE: **MARCH 16, 1998**
SCALE: **AS NOTED**
PROJECT NO.: **50950.06**
DRAWING NO.: **M302**

HOT WATER COIL SCHEDULE (BASED ON MCQUAY EQUAL IS TRANE)

SYMBOL	UNIT SERVED	AREA SERVED	CAPACITY TOTAL MBH	AIR DATA CFM	AIR DATA MAX. P. D. IN. W. G.	AIR DATA TEMP. ENT. AIR °F	AIR DATA TEMP. LVG. AIR °F	WATER DATA GPM	WATER DATA MAX. P. D. (FT)	WATER DATA TEMP. ENT. °F	WATER DATA TEMP. LVG. °F	COIL DATA SIZE	COIL DATA ROWS	REMARKS
HC-1	RTU-1	MEDIA CENTER	237.3	7000	.2	48°	80°	16	3'	190	160	60x24	1	①

① PROVIDE COIL W/ DUCTWORK TRANSITION. EACH HEATING COIL WITH 2 WAY MODULATING CONTROL VALVE.
② COIL TYPE TT

HOT WATER CONVECTOR (BASED ON VULCAN, EQUAL ARE TRANE, MODINE OR RITTLING)

SYMBOL	LOCATION	MFR.	MODEL/TYPE	CAPACITY (MBH)	WATER DATA GPM	WATER DATA MAX. P. D. (FT)	WATER DATA TEMP. ENT.	WATER DATA TEMP. LVG.	CABINET DATA LENGTH (IN.)	CABINET DATA HEIGHT (IN.)	CABINET DATA DEPTH (IN.) REC.	CABINET DATA DEPTH (IN.) PROJ.	REMARKS
C-1	LARGE TOILET ROOMS	VULCAN	PW-A	4.0	.5	.5	190	160	36	20	4	2 1/4	①
C-2	TOILET ROOMS	VULCAN	FWC-A	1.9	.5	.5	190	160	28	20	4	1/8	②

① SEMI-RECESSED 4 SIDE OVERLAP ② RECESSED UNIT

PUMP SCHEDULE (BASED ON "BELL & GOSSETT", EQUAL ARE TACO OR WEINMAN)

DESIGNATION	SERVICE	LOCATION	FLOW RATE (GPM)	TOTAL PUMP HEAD (FT. OF WATER)	IMPELLER DIAMETER (INCHES)	MOTOR DATA MIN. MOTOR H.P	MOTOR DATA RPM	MOTOR DATA VOLT/PHASE	MOTOR CONTROLLER TYPE	MOTOR CONTROLLER CONTROL	MOTOR CONTROLLER PILOT DEVICE	MOTOR CONTROLLER MODEL NO.	PUMP TYPE	REMARKS
P-1	HOT WATER	BOILER ROOM	75	40	7"	1 1/2	1750	208/3	MAG	HOA	PE	1 1/2 AB	BASE MOUNTED	① ②
P-2	HOT WATER	BOILER ROOM	75	40	7"	1 1/2	1750	208/3	MAG	HOA	PE	1 1/2 AB	BASE MOUNTED	① ②

① ONE PUMP OPERATING AND ONE PUMP STANDBY
② FACTORY MOUNTED ON HTP2-90 HEAT TRANSFER PACKAGE

STEAM TO WATER HEAT EXCHANGER SCHEDULE (BASED ON B&G)

SYMBOL	LOCATION	AREA SERVED	CAPACITY (MBH)	SHELLSIDE DATA LB/HR	SHELLSIDE DATA PRESS. PSI	TUBESIDE DATA FLUID	TUBESIDE DATA GPM	TUBESIDE DATA TEMP. F° IN	TUBESIDE DATA TEMP. F° OUT	MAX. P. D. (FT.)	NO. PASS.	REMARKS
HX-1	MECHANICAL ROOM	ADDITION	1098	1161	15	WATER	75	160	190	.5	2	①

① FACTORY MOUNTED ON HTP2-90 HEAT TRANSFER PACKAGE.

HOT WATER CABINET UNIT HEATER SCHEDULE (BASED ON VULCAN, EQUAL ARE TRANE, DUNHAM BUSH, MODINE OR NESBITT)

SYMBOL	LOCATION	MAKE	MODEL/ TYPE	CAPACITY (MBH)	WATER DATA GPM	WATER DATA MAX. P. D. (FT)	WATER DATA TEMP. ENT.	WATER DATA TEMP. LVG.	AIR DATA CFM	AIR DATA TEMP. ENT.	AIR DATA TEMP. LVG.	FAN MOTOR DATA HP	FAN MOTOR DATA RPM	FAN MOTOR DATA VOLT	FAN MOTOR DATA PH	CABINET DATA STYLE/ ARR.	CABINET DATA LENGTH (IN.)	CABINET DATA HEIGHT OR WIDTH (IN.)	CABINET DATA DEPTH (IN.) REC.	CABINET DATA DEPTH (IN.) PROJ.	REMARKS
CUH-1	STAIRS	VULCAN	RW1120	15.1	1.0	.06	190	160	230	60	125	1/15	1050	120	1	REC. WALL	35	25	9"	1/2"	①

① PROVIDE WALL MOUNTED TSTAT WITH GUARD AND UNIT MOUNTED SPEED SELECTOR SWITCH

FAN SCHEDULE (BASED ON GREENHECK EQUAL ARE COOK OR PENN)

SYMBOL	LOCATION	AREA SERVED	FAN TYPE	SONES	MODEL	DAMPER TYPE	CFM	S.P. (IN W.G.)	FAN RPM	DRIVE	MOTOR DATA HP	MOTOR DATA VOLT	MOTOR DATA PH	MOTOR CONTROLLER TYPE	MOTOR CONTROLLER CONTROL	MOTOR CONTROLLER PILOT DEVICE	APPROX. WT.(LBS.)	REMARKS
EF-1W	ADDITION ROOF	GROUND FLOOR GENERAL EXHAUST	CRCE	14.7	GB-180	MOTORIZED	3200	1.25	1185	BELT	1 1/2	208	3	MAG	HOA	PE	101	① ③
EF-2W	ADDITION ROOF	ADDITON TOILET EXHAUST	CRCE	9.8	GB-140	MOTORIZED	1350	1.0	1300	BELT	1/2	208	3	MAG	HOA	PE	85	① ③
EF-3W	ADDITION ROOF	SCIENCE STORAGE ROOMS	CRCU	9.3	CUBE-140 HP	MOTORIZED	420	.75	1125	BELT	1/4	120	1	TT	---	--	60	① ③ ④
EF-4E	EXISTING ROOF	SCIENCE STORAGE 172	CRCE	6.8	GB-80	MOTORIZED	400	.5	1290	BELT	1/4	120	1	TT	---	--	30	① ③ ④ ⑤
EF-5E	EXISTING ROOF	SCIENCE STORAGE 161, 168	CRCE	6.8	GB-80	MOTORIZED	400	.5	1290	BELT	1/4	120	1	TT	---	--	30	① ③ ④ ⑤
EF-6E	EXISTING ROOF	FUME HOOD SCIENCE 167	CRCU	9.4	CUBE-100	MOTORIZED	770	1.0	1645	BELT	1/4	120	1	TT	---	--	52	① ② ③ ⑤
EF-7E	EXISTING ROOF	FUME HOOD SCIENCE	CRCU	9.4	CUBE-100	MOTORIZED	770	1.0	1645	BELT	1/4	120	1	TT	---	--	52	① ② ③ ⑤
EF-8E	EXISTING ROOF	FUME HOOD SCIENCE 169	CRCU	9.4	CUBE-100	MOTORIZED	770	1.0	1645	BELT	1/4	120	1	TT	---	--	52	① ② ③ ⑤

① PROVIDE WITH MANUFACTURERS PRE-FAB INSULATED ROOF CURB, 12" (H) AND DISCONNECT SWITCH.
② PUSH BUTTON STATION BY DIVISION 16 AT HOOD
③ INTERLOCK WITH MOTORIZED DAMPER
④ CONSTANT OPERATION
⑤ COORDINATE ROOF FLASHING OF EXISTING ROOF WITH ARCHITECTURAL DRAWINGS.

FAN TYPES:
CRCE = CENTRIFUGAL ROOF CURB MOUNTED EXHAUSTER
PRCS = PROPELLER ROOF CURB MOUNTED SUPPLY FAN
CRCU = CENTRIFUGAL ROOF CURB UPBLAST
CAF = CENTRIFUGAL AIR FOIL
CBI = CENTRIFUGAL, BACKWARD INCLINED
KUB = KITCHEN UPBLAST
IL = IN-LINE CENTRIFUGAL
CFC = CENTRIFUGAL FORWARD CURVED
VA = VANE AXIAL
CE = CEILING MOUNTED EXHAUSTER
TC = TUBULAR CENTRIFUGAL
BMCS = BUILDING MANAGEMENT CONTROL SYSTEMS
US = UTILITY SET

V. A. V. BOX SCHEDULE (BASED ON ENVIRO-TEC. EQUAL IS TRANE, TITUS OR TEMP MASTER)

SYMBOL	UNIT SERVED	AREA SERVED	CFM MAX.	CFM MIN.	P.D. (IN W.G.)	N.C. RADIATED/ DISCHARGE	INLET SIZE ø	CAPACITY TOTAL MBH	WATER DATA GPM	WATER DATA MAX. P.D. FT.	AIR DATA TEMP. ENT.	AIR DATA TEMP. LVG.	COIL DATA MIN. FACE AREA (SF)	COIL DATA ROWS	REMARKS
VAV-1	RTU-2	SPEECH	200	100	.13	20/20	5"	5.2	.5	.2	48	80	.7	1	① ② ③
VAV-2	RTU-2	GALLERY	500	250	.21	20/20	8"	13.0	1	.8	48	80	.8	1	① ② ③
VAV-3	RTU-2	OFFICE	500	250	.21	20/20	8"	13.0	1	.8	48	80	.8	1	① ② ③
VAV-4	RTU-2	MEDIA WKRM	900	450	.27	20/20	10"	23.4	1.5	2.4	48	80	1.2	1	① ② ③
VAV-5	RTU-2	TEACH. WKRM	1,300	650	.31	20/21	12"	33.9	2	4.6	48	80	1.7	1	① ② ③
VAV-6	RTU-2	COMP. LAB. 101	1500	750	.36	20/22	12"	39.1	2.5	.7	48	80	1.7	1	① ② ③
VAV-7	RTU-2	COMP. LAB. 104	1500	750	.36	20/22	12"	39.1	2.5	.7	48	80	1.7	1	① ② ③
VAV-8	RTU-2	READING 112	1500	750	.36	20/22	12"	39.1	2.5	.7	48	80	1.7	1	① ② ③
BPV-1	RTU-2	BYPASS	3325	0	.15	29/32	16"	-	-	-	-	-	-	-	① ④

① CONTROLS BY ETVT SYSTEM. EACH COIL WITH 2 WAY MODULATING CONTROL VALVE.
② COIL CAPACITY BASED ON 190°F EWT 30° DROP, AND 75% AIRFLOW.
③ NC AT 1" INLET STATIC PRESSURE.
④ NC AT 3" INLET STATIC PRESSURE .

DIFFUSER, REGISTER, & GRILLE SCHEDULE (BASED ON TITUS EQUAL ARE TUTTLE & BAILEY OR METALAIRE)

SYMBOL	MODEL	MAX. CFM	INLET SIZE	N.C. @ MAX CFM	BLOW DEG. & FT.	CEILING TYPE	REMARKS
A	TMS	500	10"	25	8'	LAY-IN	② ⑤
B	TMS	300	8"	20	6'	LAY-IN	② ⑤
C	TMS	200	6"	23	5'	LAY-IN	② ⑤
D	MPI-38	235	8"	27	21'	LAY-IN	② ⑦
E	TMSA	620	12"	31	8'	LAY-IN	②
F	272 RS	1300	36x8	26	22.5° 31'	-	① ②
G	272 RS	1000	36x6	25	22.5° 32'	-	① ②
H	272 RS	150	10x6			-	① ②
I	MPI-38	85	6"	25	16'	LAY-IN	⑩
A	350 RL	500	14x8	30	35°	-	① ②
B	350 RL	300	10x10	25	35°	LAY-IN	① ②
C	350 RL	100	6x6	18	35°	LAY-IN	① ②
D	CT 540	1200	24x12	32	0°	-	⑧ ⑨
E	350 ZRL	1300	36x8	24	0°	-	① ②
F	350 ZRL	1000	36x6	23	0°	-	① ②

TG-1 TYPE (DIFFUSER) CFM - SEE DWGS.
TG-1 TYPE (REGISTER/GRILLE) CFM - SEE DWGS.

① PROVIDE ODD for BALANCING
② COLOR SELECTED BY ARCHITECT
③ TYPE 3 ADJUSTMENT
④ SAFETY CHAIN
⑤ 24X24 MODULE SIZE
⑥ 12X12 MODULE SIZE
⑦ INTEGRATED W/RADIANT PANEL
⑧ TYPE 5 FRAME, FLOOR MOUNTED
⑨ TYPE A FASTENING
⑩ 2-3/4" SLOT, 2' LONG INSULATED PLENUM

FIN TUBE RADIATION SCHEDULE (BASED ON VULCAN, EQUAL ARE TRANE, MODINE OR RITTLING)

DESIGNATION	MINIMUM HEATING CAPACITY (BTUH PER UNIT.)	HEATING ELEMENT @ 175° F AVERAGE WATER TEMP. FIN SIZE (INCHES)	FIN MATERIAL	FINS PER FOOT	NUMBER OF ROWS	PIPE SIZE (INCHES)	PIPE MATERIAL	ENCLOSURE DATA STYLE	ENCLOSURE DATA HEIGHT (INCHES)	ENCLOSURE DATA DEPTH (INCHES)	REMARKS
A 00	1106	2 3/4" x 4 1/4"	AL	48	1	3/4"	CU	DS	12	5 5/16"	① ② ③ ④
B 00											

X XX — TYPE OF FINTUBE
X XX — LENGTH OF FINTUBE

① FINTUBE COVERS ARE TO BE WALL TO WALL MINIMUM MOUNTING HEIGHT IS 4" A.F.F. PROVIDE 24" ACCESS SECTION FOR VALVE ACCESS.
② PROVIDE WITH 14 GAUGE COVER.
③ PROVIDE WITH FULL BACK PLATE.
④ .02" FIN THICKNESS

GENERAL NOTES:

1. THE BMCS CONTRACTOR SHALL RUN LOW VOLTAGE WIRING FROM THE FIRE ALARM CONTROL PANEL TO ALL BMCS PANEL. THE FIRE ALARM CONTRACTOR SHALL PROVIDE SPACES AND ZONE DESIGNATIONS FOR THE BMCS CONTRACTOR.
2. THE BMCS CONTRACTOR SHALL RUN 120V CIRCUITS FROM SPARE CIRCUIT BREAKERS IN THE NEAREST ELECTRICAL PANEL TO POWER EACH LOW VOLTAGE TRANSFORMER OR CONTROL PANEL USED FOR CONTROLS.
3. THE BMCS CONTRACTOR SHALL PROVIDE ALL AUTOMATICALLY OPERATED: DAMPERS, SMOKE DAMPERS & VALVES. PROVIDE TRANSFORMERS AND LOW VOLTAGE WIRING.
4. COORDINATE WITH BMCS CONTRACTOR FOR LOCATIONS OF ALL CONTROL ACCESSORIES TO BE INSTALLED IN PIPING AND DUCTWORK. PROVIDE ALL REQUIRED TAPPINGS. CONTROL VALVES, WELLS, FITTINGS & DAMPERS WILL BE FURNISHED BY BMCS CONTRACTOR INSTALLED UNDER THE MECHANICAL CONTRACTOR SCOPE OF WORK.
5. THE CEILING VOID IN THE ADDITION AND THE EXISTING TUNNEL ARE USED AS RETURN AIR PLENUMS. ALL ITEMS INSTALLED IN THESE AREAS MUST BE APPROVED FOR SUCH USE.
7. SEAL PIPE & DUCT PENETRATIONS OF WALLS & FLOORS.
8. MECHANICAL EQUIPMENT OR REGISTERS MOUNTED IN BLOCK WALLS SHALL CONFORM TO BLOCK COURSING. REFER TO ARCHITECTURAL DRAWINGS FOR EXACT LOCATION & MOUNTING HEIGHTS.
9. STARTERS ARE FURNISHED BY THE MECHANICAL CONTRACTOR AND INSTALLED BY THE ELECTRICAL CONTRACTOR.
10. REFER TO MANUFACTURER'S CERTIFIED DRAWINGS FOR EQUIPMENT DIMENSIONS AND MAINTAIN RECOMMENDED CLEARANCES.
11. DRAWINGS AND SKETCHES ARE DIAGRAMMATIC AND INTENDED TO SHOW APPROXIMATE ROUTING OF PIPING AND LOCATION OF EQUIPMENT. IT IS THE MECHANICAL CONTRACTOR'S RESPONSIBILITY TO VERIFY ALL FIELD CONDITIONS AND MAKE PROVISIONS TO PERFORM THE WORK ACCORDINGLY.
12. SEISMIC CERTIFICATION AND ANALYSIS:
SEISMIC RESTRAINT CALCULATIONS MUST BE PROVIDED FOR ALL CONNECTIONS OF EQUIPMENT TO THE STRUCTURE. CALCULATIONS TO SUPPORT SEISMIC RESTRAINT DESIGNS MUST BE STAMPED BY A REGISTERED PROFESSIONAL ENGINEER WITH AT LEAST FIVE YEARS OF SEISMIC DESIGN EXPERIENCE. ANALYSIS MUST INDICATE CALCULATED DEAD LOADS, DERIVED LOADS AND MATERIALS UTILIZED FOR CONNECTIONS TO EQUIPMENT AND STRUCTURE. ANALYSIS MUST DETAIL ANCHORING METHODS, BOLT DIAMETER, EMBEDMENT AND/OR WELD LENGTH. A SEISMIC DESIGN ERRORS AND OMISSIONS INSURANCE CERTIFICATE MUST ACCOMPANY SUBMITTALS.
PROCURE THE SERVICES OF A MANUFACTURER'S SEISMIC REPRESENTATIVE TO REVIEW THE PIPING INSTALLATION, PROVIDE SEISMIC CALCULATIONS AND DIRECT THE CONTRACTOR AS TO LOCATION AND AND TYPE OF SEISMIC SUPPORTS REQUIRED FOR NEW PIPING, DUCTWORK & EQUIPMENT.
13. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATION OF DIFFUSERS & REGISTERS.

CONDENSATE PUMP AND RECEIVER SCHEDULE (DOMESTIC)

DESIGNATION	SERVICE	LOCATION	WATER FLOW RATE (GPM)	PUMP DISCHARGE PRESSURE (PSIG)	MOTOR DATA MOTOR HP	MOTOR DATA RPM	MOTOR DATA VOLTS/PHASE	RECEIVER CAPACITY (GALLONS)	MODEL NO.	OPERATING WEIGHT (LBS)	REMARKS
CP-1	CONDENSATE RETURN	MER	9	15	1/3	3500	120/1	23	23CB9-15		①

① UNIT TO BE COMBINATION CONDENSATE RETURN PUMPING/RECEIVER WITH (2) SETS OF DUPLEX PUMPS. REFER TO SPECIFICATIONS.

RADIANT PANEL SCHEDULE (BASED ON AIRTEX)

DESIGNATION	MINIMUM HEATING CAPACITY (BTUH PER UNIT.)	HEATING ELEMENT @ 175° F AVERAGE WATER TEMP. PANEL WIDTH (INCHES)	PANEL MATERIAL	NUMBER OF TUBES	TUBE I.D. (INCHES)	PIPE MATERIAL	MODEL	REMARKS
AA XX	307	18	AL	4	1/2	CU	HEF 18	① ② ③

XX — TYPE OF PANEL
XX — LENGTH OF PANEL

① RADIANT PANEL SHALL BE WALL TO WALL OR COLUMN TO COLUMN. CUT OUT FOR COLUMN ENCLOSURE
② T-BAR CEILING INSTALLATION
③ FOUR PASS CONFIGURATION

ROOFTOP UNIT SCHEDULE (BASED ON MCQUAY EQUAL ARE TRANE OR AAON)

SYMBOL	AREA SERVED	LOCATION	FILTER (AAF AS STANDARD) MIN. % EFF.	FILTER (AAF AS STANDARD) INITIAL PD IN IN. WTR.	FILTER (AAF AS STANDARD) FINAL PD IN IN. WTR.	FILTER (AAF AS STANDARD) TYPE	REFRIGERATION SYSTEM CAP. NET TOTAL (MBH)	REFRIGERATION SYSTEM CAP. NET SENS. (MBH)	REFRIGERATION EVAPORATOR COIL ENTERING AIR TEMP. T db/T dwb	REFRIGERATION EVAPORATOR COIL LEAVING AIR TEMP. T db/T dwb	NOMINAL CAPACITY (TONS)	SUPPLY FAN CFM	SUPPLY FAN MIN. OSA %	SUPPLY FAN ESP IN. WC	SUPPLY FAN TOTAL S.P.	SUPPLY FAN FAN (RPM)	SUPPLY FAN WHEEL # & DIAM. INCHES	SUPPLY FAN TYPE	SUPPLY FAN MOTOR BHP	SUPPLY FAN MOTOR MIN. HP	SUPPLY FAN MOTOR RPM	SUPPLY FAN MOTOR VOLTS	SUPPLY FAN MOTOR ø	EXHAUST FAN CFM	EXHAUST FAN EXT. S.P. IN. WC.	EXHAUST FAN RPM	EXHAUST FAN # & TYPE	EXHAUST FAN MOTOR BHP	EXHAUST FAN MOTOR MIN. HP	EXHAUST FAN MOTOR RPM	EXHAUST FAN MOTOR VOLTS	EXHAUST FAN MOTOR ø	UNIT ELECTRICAL VOLT/ PH.	UNIT ELECTRICAL MCA (AMPS)	UNIT ELECTRICAL MFS (AMPS)	STAND-ARD AIR EER	UNIT WEIGHT LBS.	MFR	MODEL
RTU-1	MEDIA CENTER	PART A ROOF	30	.12	.5	2" TA	218	159.1	80	67	59.1	57.3	17 1/2	7000	25	2.0	2.7	1085	(2) 15x15	FC	5.45	7.5	1750	208	3	6470	.2	-	(2) PROP	-	1/3	-	208	1	208/3	98	110	11.2	3000	MCQUAY	LCA 210H ① ② ③ ⑤
RTU-2	FIRST FLOOR	PART A ROOF	30	.12	.5	2" TA	218	159.1	80	67	59.1	57.3	17 1/2	7000	25	2.0	2.7	1085	(2) 15x15	FC	5.45	7.5	1750	208	3	6470	.2	-	(2) PROP	-	1/3	-	208	1	208/3	98	110	11.2	3000	MCQUAY	LCA 210H ① ③ ④ ⑤

① FURNISH UNIT WITH LOW LEAK DAMPERS, HIGH EFFICIENCY MOTORS, FULLY MODULATING ECONOMIZER, POWER EXHAUST FAN AND MASON SEISMIC CURB.
② CONSTANT VOLUME UNIT.
③ ALL UNITS SHALL HAVE MULTIPLE COMPRESSORS.
④ VARIABLE VOLUME UNIT
⑤ START/STOP THROUGH PNEUMATIC CONTROL SYSTEM

UNIT VENTILATOR SCHEDULE (BASED ON A.A.F. EQUAL ARE TRANE OR NESBITT)

SYMBOL	AIR DATA AIR FLOW RATE (CFM)	AIR DATA OUTDOOR AIR FLOW RATE (CFM)	HEATING DATA AIR DATA EAT (°F)	HEATING DATA AIR DATA LAT (°F)	HEATING DATA HEATING COIL WATER DATA EWT (°F)	HEATING DATA HEATING COIL WATER DATA LWT (°F)	HEATING DATA HEATING COIL WATER DATA CAPACITY (MBH)	HEATING DATA HEATING COIL WATER DATA WATER FLOW RATE (GPM)	HEATING DATA HEATING COIL WATER DATA P. D. (FT)	HEATING DATA HEATING COIL WATER DATA ROWS	FAN DATA MOTOR DATA H.P.	FAN DATA MOTOR DATA RPM HI SPEED	FAN DATA MOTOR DATA ELECTRICAL VOLT	FAN DATA MOTOR DATA ELECTRICAL ø	GENERAL TOTAL MBH	GENERAL SENSIBLE MBH	GENERAL EER	COOLING DATA CONDENSER COND. FANS AMBIENT TEMP. (°F)	COOLING DATA CONDENSER COND. FANS NUMBER OF FANS	COOLING DATA CONDENSER COND. FANS HORSEPOWER PER FAN	COOLING DATA COMPRESSOR NUMBER OF COMPRESSORS	COOLING DATA COMPRESSOR FLA./EA.	COOLING DATA COMPRESSOR LRA./EA.	COOLING DATA UNIT ELECTRICAL CHARACTERISTICS MCA (AMPS)	COOLING DATA UNIT ELECTRICAL CHARACTERISTICS MFS (AMPS)	COOLING DATA UNIT ELECTRICAL CHARACTERISTICS VOLTAGE /PHASE	CABINET DIMENSIONS LENGTH (IN.)	CABINET DIMENSIONS HEIGHT (IN.)	CABINET DIMENSIONS DEPTH (IN.)	OUTDOOR AIR INLET SIZE (LxH) (INTAKE)	UNIT WEIGHT (LBS)	MFG. MODEL	UNIT CONFIG. H - HORIZONTAL V - VERTICAL	REMARKS
UH-1	1400	450	50	100	190	170	69.5	5	6.6	1	1/4	970	208	1	53.3	34.1	9.1	95	1	3/4	1	8.5	123	30.1	45	208/1	112	30	28	REFER TO ARCH. DRAWINGS	1100	AAF A254	VERTICAL		

NOTES: 12 EACH UNIT VENTILATOR SHALL BE FURNISHED WITH THE FOLLOWING EQUIPMENT:
MICROTECH UNIT MOUNTED CONTROLLER WITH OPEN PROTOCOL ASHRAE II CYCLE CONTROL, WALL MOUNTED SPACE SENSOR WITH ROOM OVERRIDE CONTROL & 2 HR. BY-PASS, 2-WAY MODULATING VALVES OR 3-WAY MODULATING VALVES WERE INDICATED ON DRAWINGS. (SHIPPED LOOSE FOR FIELD INSTALLATION).

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HVAC PLAN NOTES:

1. REFER TO DRAWING M401 FOR HVAC SCHEDULES.
2. REFER TO DRAWING M201 FOR SYMBOL LIST AND LIST OF ABBREVIATIONS FOR THESE HVAC DRAWINGS.

PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE
ARCHITECT/ENGINEER: J.MACALUSO
DRAWN BY: D. EAR

FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN
FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT
STATE PROJECT NO. 057-106EA

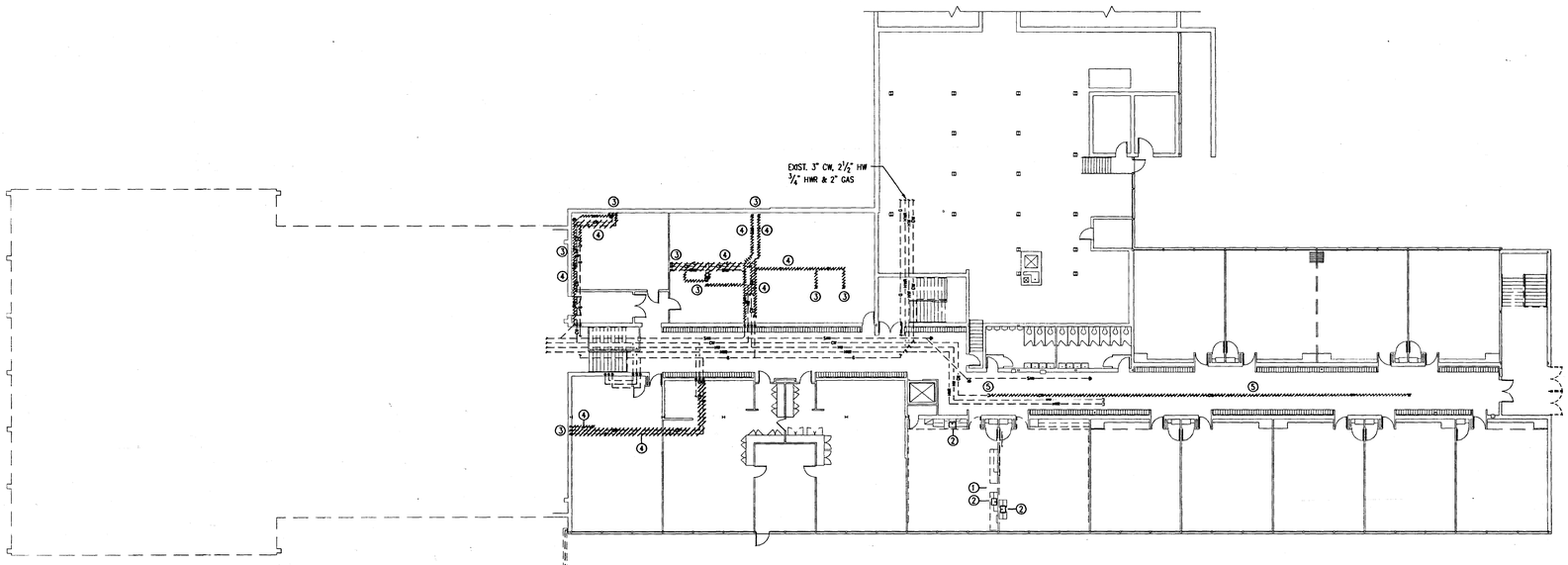
DRAWING TITLE

SCHEDULES & NOTES - HVAC

NO.	DATE	REVISION	BY

DATE: MARCH 16, 1998
SCALE: AS NOTED
PROJECT NO.: 50950.06
DRAWING NO.: M401

BQ #70 & 125 Attachment



PLAN DEMOLITION NOTES

1. REMOVE & DISPOSE OF EMERGENCY EYE WASH.
   - A) REMOVE COLD WATER PIPING FROM WALL AND CEILING BACK TO THE MAIN FEED PIPE AND CAP PIPE.
2. REMOVE & DISPOSE OF COUNTERTOP SINK AND ALL TRIM.
   - A) REMOVE HOT WATER AND COLD WATER PIPING BACK INTO WALL CAVITY AND CAP IN WALL CAVITY.
   - B) REMOVE WASTE PIPING BACK TO SANITARY RISER AND PLUG FITTING IN WALL CAVITY.
3. REMOVE EXISTING PIPING SERVING EXISTING PLUMBING FIXTURES ON FIRST FLOOR. CAP OR PLUG PIPING AT EXISTING MAIN AS REQUIRED.
4. REMOVE EXISTING PIPING BACK TO POINT SHOWN AND PLUG OR CAP.
5. REMOVE EXISTING 1½" CW PIPING BACK TO EXISTING 2½" CW PIPING AND TEMPORARALY CAP.

DEMOLITION GENERAL NOTES:

1. THE DEMOLITION NOTES ARE FOR DESCRIPTIVE GUIDE ONLY. THE CONTRACTOR IS RESPONSIBLE FOR REMOVING ALL QUANTITIES OF EACH ITEM. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING HIS WORK WITH ALL TRADES, MECHANICAL, ELECTRICAL AND PLUMBING. SEE SPECIFICATIONS FOR ADDITIONAL DEMOLITION REQUIREMENTS.
2. DISPOSE OF ALL REMOVED ITEMS OFF SITE OR IN ON SITE DUMPSTER PROVIDED SPECIFICALLY FOR THIS WORK.
3. SEE ARCHITECTURAL DRAWINGS FOR ANY ADDITIONAL DEMOLITION REQUIREMENTS.
4. HAZARDOUS AND/OR ASBESTOS MATERIALS TO BE REMOVED BY OWNER UNDER SEPARATE CONTRACT. BEFORE STARTING ANY WORK UNDER THE CONTRACT, VERIFY WITH THE GENERAL CONTRACTOR AND NOTIFY THE ARCHITECTS IN WRITING, THAT, IN ACCORDANCE WITH THE LATEST REVISION OF THE FEDERAL ASBESTOS NESHAP (NATIONAL EMISSION STANDARD FOR HAZARDOUS AIR POLLUTANTS), THE FOLLOWING ITEMS HAVE BEEN COMPLETED:

   AN EPA APPROVED ASBESTOS SURVEY HAS BEEN MADE OF THE BUILDING WHERE THE WORK WILL BE PERFORMED.
   THE EPA HAS BEEN NOTIFIED THAT DEMOLITION AND/OR RENOVATION WORK WILL OCCUR IN THE BUILDING WHERE THE WORK WILL BE PERFORMED.

5. CROSSHATCHED LINES INDICATE EXISTING PIPING TO BE DEMOLISHED AND REMOVED.
6. SOLID LINES INDICATE EXISTING PIPING TO REMAIN.

GROUND FLOOR DEMOLITION PLAN
SCALE: 1/16"=1'-0"

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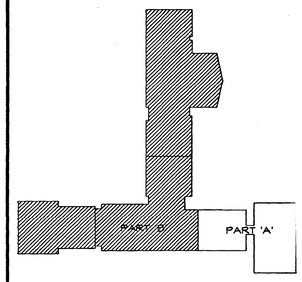

KEY PLAN

N

PROFESSIONAL SEAL

PROJECT MANAGER	L.J. FREE
ARCHITECT/ENGINEER	R.M. DECARLO
DRAWN BY	R.M. DECARLO

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ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

GROUND FLOOR DEMOLITION PLAN - PLUMBING

0 8' 16' 32'
SCALE: 1/16" = 1'-0"

NO	DATE	REVISION	BY

DATE	MARCH 16, 1998
SCALE	1/16" = 1'-0"
PROJECT NO.	50950.06
DRAWING NO.	P099

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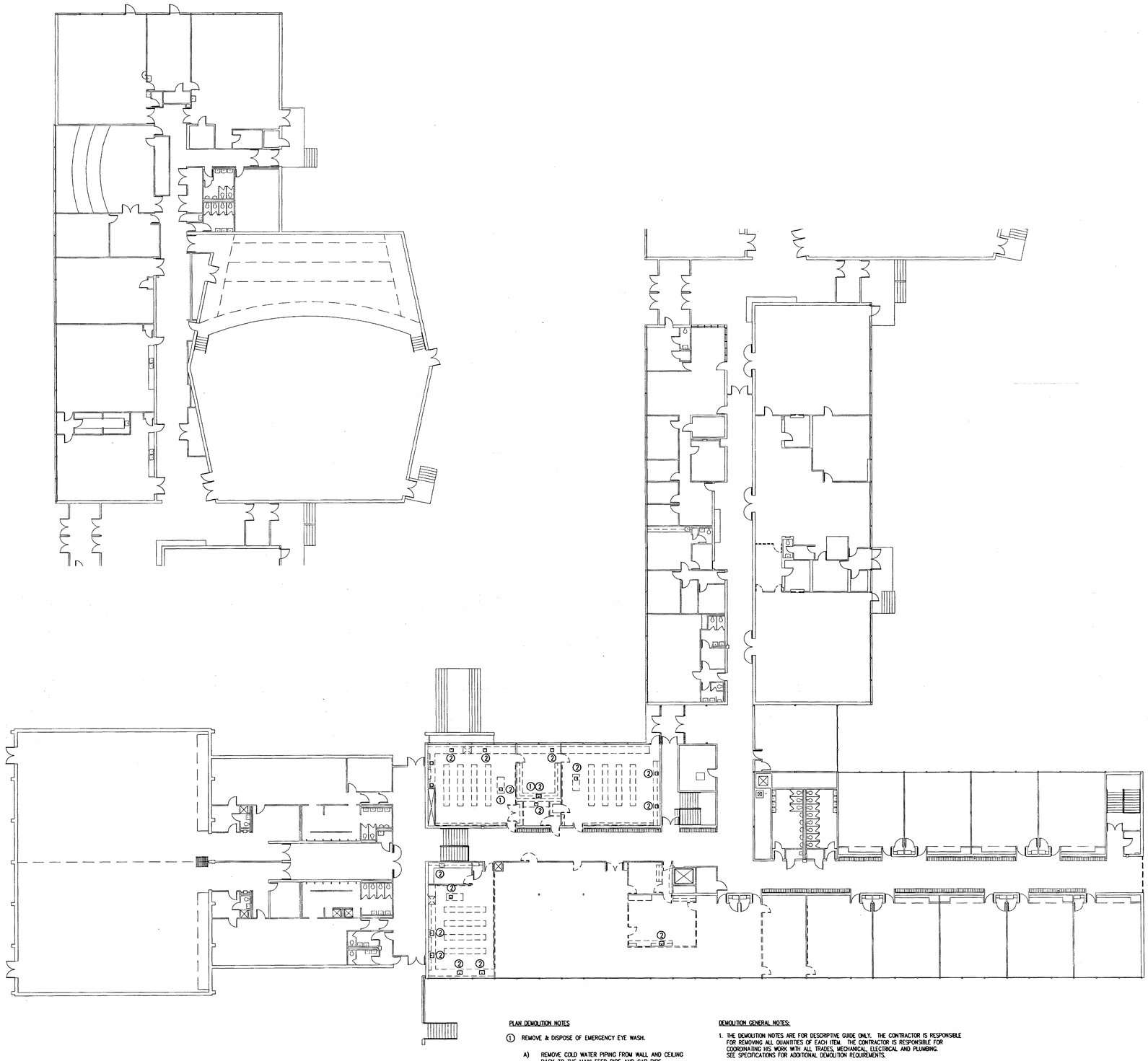
BQ #70 & 125 Attachment



PLAN DEMOLITION NOTES

① REMOVE & DISPOSE OF EMERGENCY EYE WASH.

A) REMOVE COLD WATER PIPING FROM WALL AND CEILING BACK TO THE MAIN FEED PIPE AND CAP PIPE.

② REMOVE & DISPOSE OF COUNTERTOP SINK AND ALL TRIM.

A) REMOVE HOT WATER AND COLD WATER PIPING BACK INTO WALL CAVITY AND CAP IN WALL CAVITY.

B) REMOVE WASTE PIPING BACK TO SANITARY RISER AND PLUG FITTING IN WALL CAVITY.

DEMOLITION GENERAL NOTES:

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2. DISPOSE OF ALL REMOVED ITEMS OFF SITE OR IN ON SITE DUMPSTER PROVIDED SPECIFICALLY FOR THIS WORK.
3. SEE ARCHITECTURAL DRAWINGS FOR ANY ADDITIONAL DEMOLITION REQUIREMENTS.
4. HAZARDOUS AND/OR ASBESTOS MATERIALS TO BE REMOVED BY OWNER UNDER SEPARATE CONTRACT. BEFORE STARTING ANY WORK UNDER THE CONTRACT, VERIFY WITH THE GENERAL CONTRACTOR AND NOTIFY THE ARCHITECTS IN WRITING, THAT, IN ACCORDANCE WITH THE LATEST REVISION OF THE FEDERAL ASBESTOS NESHAP (NATIONAL EMISSION STANDARD FOR HAZARDOUS AIR POLLUTANTS), THE FOLLOWING ITEMS HAVE BEEN COMPLETED:

   AN EPA APPROVED ASBESTOS SURVEY HAS BEEN MADE OF THE BUILDING WHERE THE WORK WILL BE PERFORMED.
   THE EPA HAS BEEN NOTIFIED THAT DEMOLITION AND/OR RENOVATION WORK WILL OCCUR IN THE BUILDING WHERE THE WORK WILL BE PERFORMED.

5. CROSSHATCHED LINES INDICATE EXISTING PIPING TO BE DEMOLISHED AND REMOVED.
6. SOLID LINES INDICATE EXISTING PIPING TO REMAIN.

FIRST FLOOR DEMOLITION PLAN

SCALE: 1/16"=1'-0"

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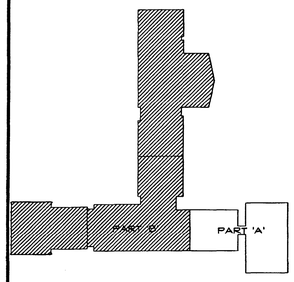

KEY PLAN

N

PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE
ARCHITECT/ENGINEER: R.M. DECARLO
DRAWN BY: R.M. DECARLO

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FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

FIRST FLOOR DEMOLITION PLAN - PLUMBING

0 8' 16' 32'
SCALE: 1/16" = 1'-0"

NO	DATE	REVISION	BY

DATE: MARCH 16, 1998
SCALE: 1/16" = 1'-0"
PROJECT NO.: 50950.06
DRAWING NO.: **P099.1**

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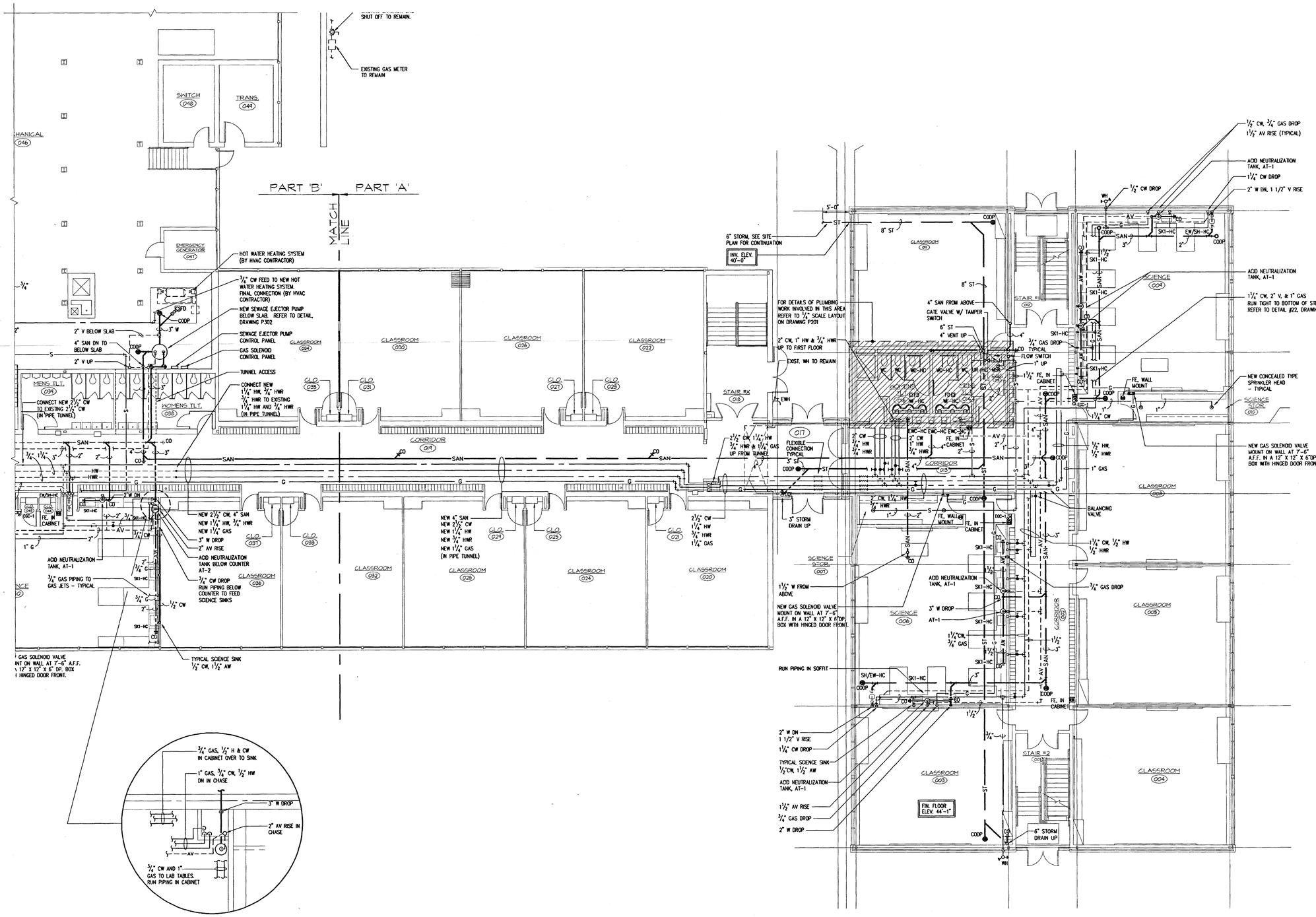
BQ #70 & 125 Attachment



GROUND FLOOR PLAN - PART "A"

SCALE: 1/8"=1'-0"

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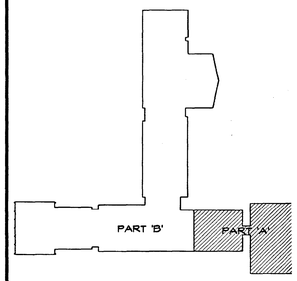

KEY PLAN

N

PLUMBING PLAN NOTES:

1. REFER TO DRAWING P401 FOR PLUMBING NOTES PERTAINING TO THIS AND ALL PLUMBING DRAWINGS.
2. REFER TO DRAWING P401 FOR SYMBOL LIST AND LIST OF ABBREVIATIONS FOR THESE PLUMBING DRAWINGS.
3. REFER TO DRAWING P401 FOR ACCESSIBILITY PLUMBING FIXTURE SCHEDULE FOR THESE PLUMBING DRAWINGS.

PROFESSIONAL SEAL

PROJECT MANAGER	L.J. FREE
ARCHITECT/ENGINEER	R.M. DECARLO
DRAWN BY	R.M. DECARLO

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ARCHITECTURE / ENGINEERING / INTERIOR DESIGN
FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO

CENTRAL MIDDLE SCHOOL

9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

GROUND FLOOR PLAN PART "A" - PLUMBING & FIRE PROTECTION

0 4' 8' 16'
SCALE: 1/8" = 1'-0"

NO	DATE	REVISION	BY

DATE	MARCH 16, 1998
SCALE	1/8" = 1'-0"
PROJECT NO.	50950.06
DRAWING NO.	PFP100.1

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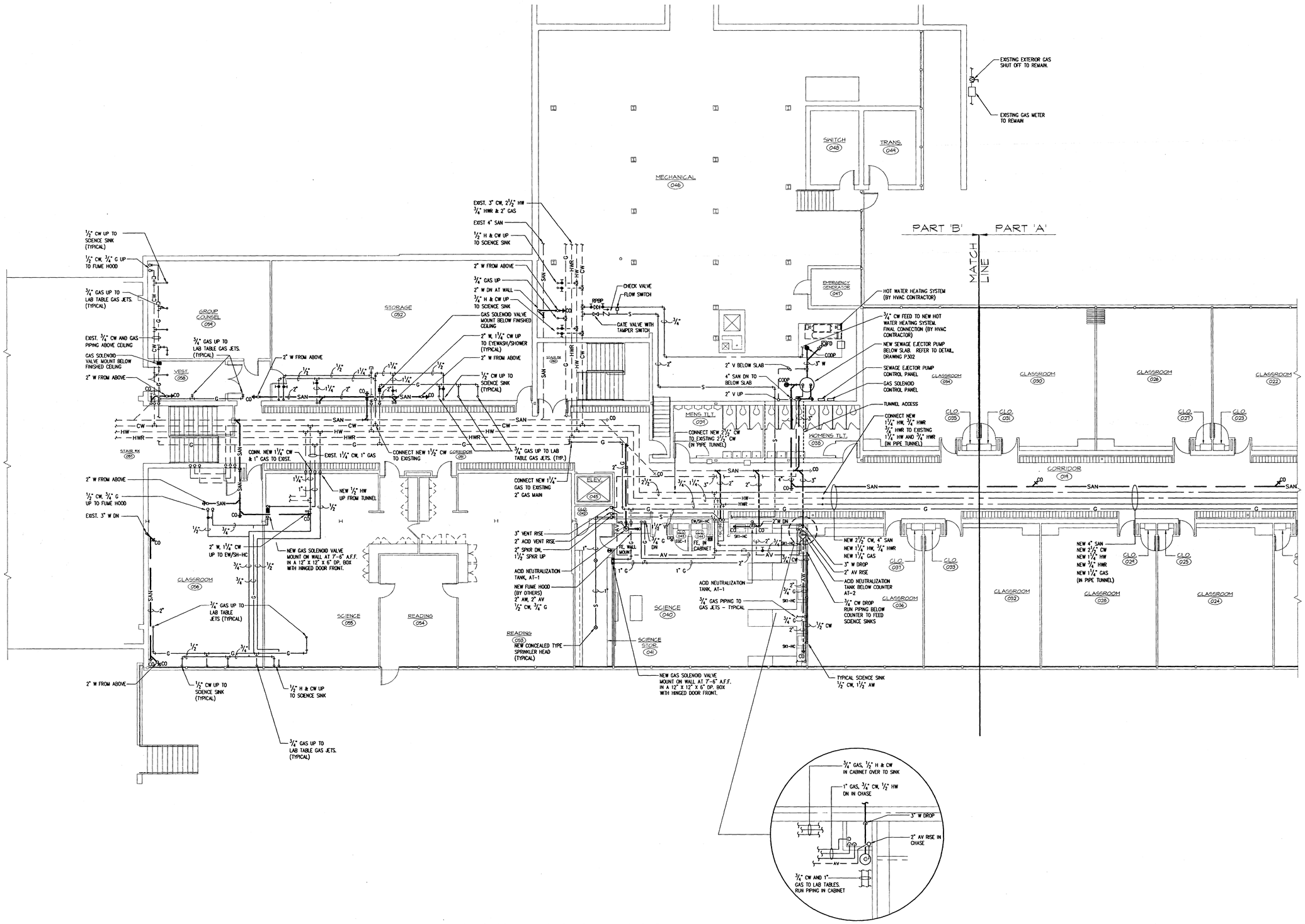
BQ #70 & 125 Attachment



GROUND FLOOR PLAN - PART "B"

SCALE: 1/8" = 1'-0"

K:\50 projects\50950\dwg\Plumb-FP\P100-2 6-29-98 10:30:29 pm EST

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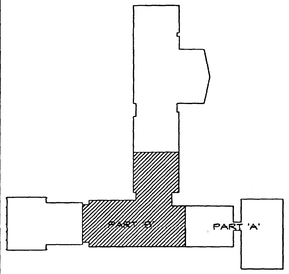


KEY PLAN

N

PLUMBING PLAN NOTES:

1. REFER TO DRAWING P401 FOR PLUMBING NOTES PERTAINING TO THIS AND ALL PLUMBING DRAWINGS.
2. REFER TO DRAWING P401 FOR SYMBOL LIST AND LIST OF ABBREVIATIONS FOR THESE PLUMBING DRAWINGS.
3. REFER TO DRAWING P401 FOR ACCESSIBILITY PLUMBING FIXTURE SCHEDULE FOR THESE PLUMBING DRAWINGS.

PROFESSIONAL SEAL

PROJECT MANAGER	L.J. FREE
ARCHITECT/ENGINEER	R.M. DECARLO
DRAWN BY	R.M. DECARLO

FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

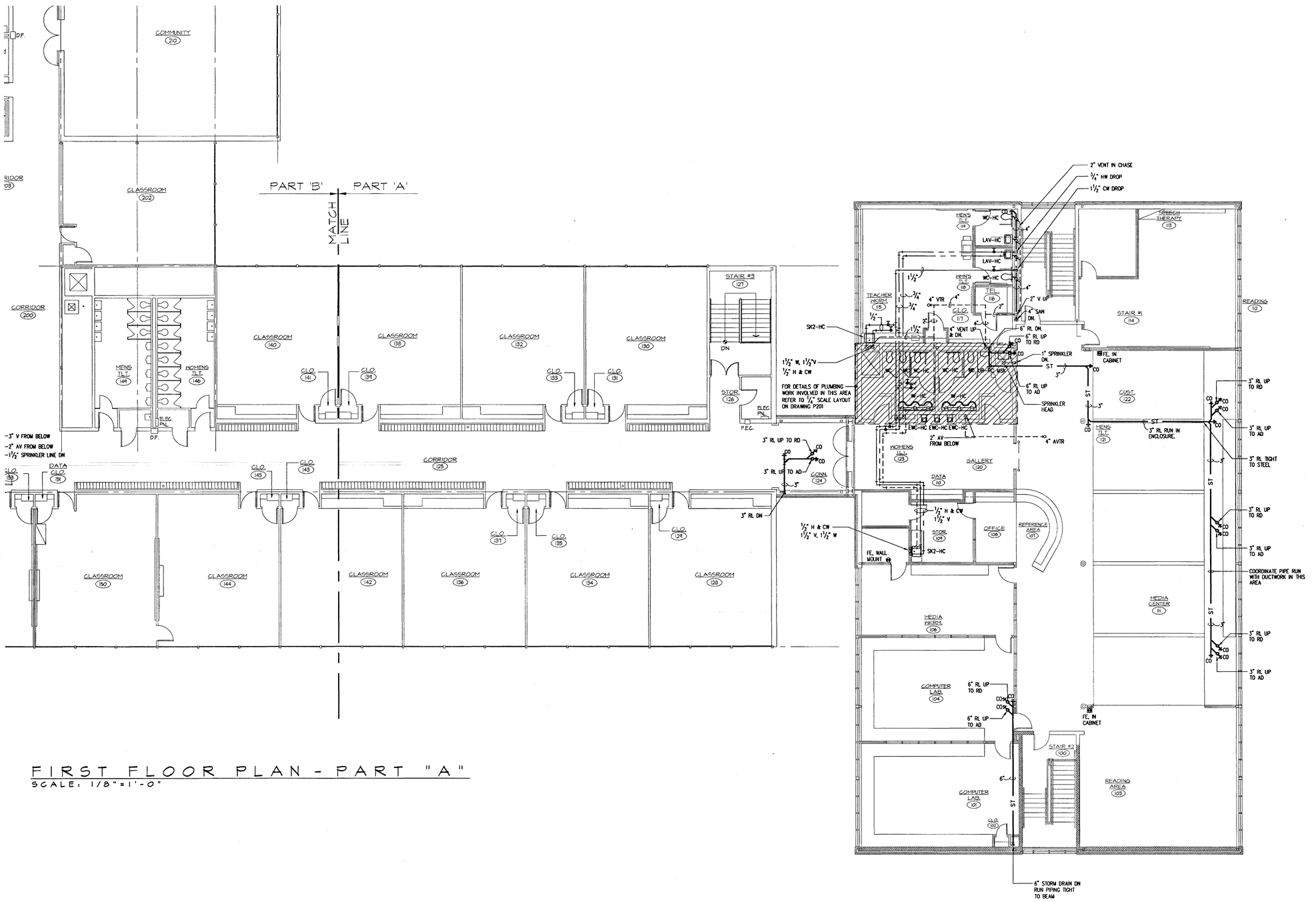
GROUND FLOOR PLAN PART "B" - PLUMBING & FIRE PROTECTION

0 4' 8' 16'
SCALE: 1/8" = 1'-0"

NO	DATE	REVISION	BY

DATE	MARCH 16, 1998
SCALE	1/8" = 1'-0"
PROJECT NO.	50950.06
DRAWING NO.	PFP100.2

BQ #70 & 125 Attachment



FIRST FLOOR PLAN - PART "A"

SCALE: 1/8"=1'-0"

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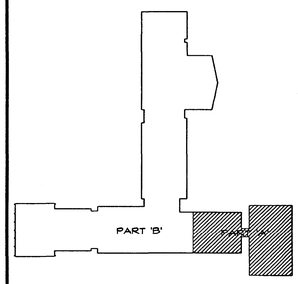

KEY PLAN

N

PLUMBING PLAN NOTES:

1. REFER TO DRAWING P401 FOR PLUMBING NOTES PERTAINING TO THIS AND ALL PLUMBING DRAWINGS.
2. REFER TO DRAWING P401 FOR SYMBOL LIST AND LIST OF ABBREVIATIONS FOR THESE PLUMBING DRAWINGS.
3. REFER TO DRAWING P401 FOR ACCESSIBILITY PLUMBING FIXTURE SCHEDULE FOR THESE PLUMBING DRAWINGS.

PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE

ARCHITECT/ENGINEER: R.M. DECARLO

DRAWN BY: R. M. DECARLO

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ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO

CENTRAL MIDDLE SCHOOL

9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

FIRST FLOOR PLAN PART "A" - PLUMBING & FIRE PROTECTION

0 4' 8' 16'

SCALE: 1/8" = 1'-0"

NO	DATE	REVISION	BY

DATE: MARCH 16, 1998

SCALE: 1/8" = 1'-0"

PROJECT NO.: 50950.06

DRAWING NO.: **PFP101.1**

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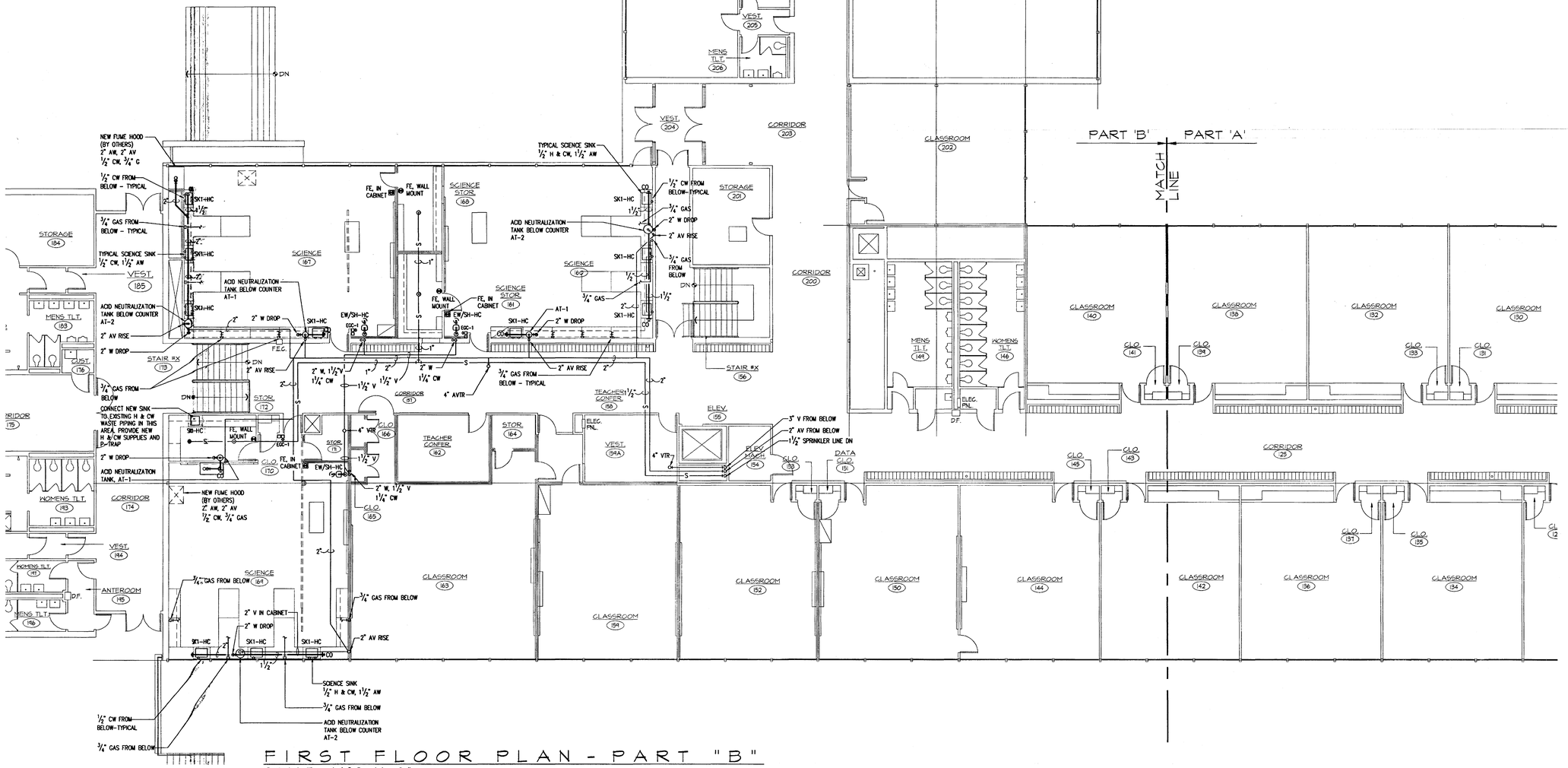
BQ #70 & 125 Attachment



FIRST FLOOR PLAN - PART "B"

SCALE: 1/8" = 1'-0"

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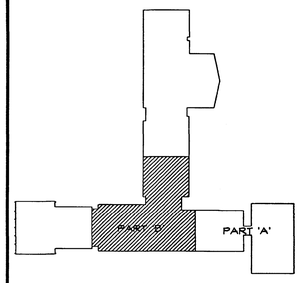

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ARCHITECT/ENGINEER: R.M. DECARLO

DRAWN BY: R. M. DECARLO

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BRIDGEPORT, CT 06604-3944

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ADDITIONS AND RENOVATIONS TO

CENTRAL MIDDLE SCHOOL

9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

FIRST FLOOR PLAN PART "B" - PLUMBING & FIRE PROTECTION

0 4' 8' 16'

SCALE: 1/8" = 1'-0"

NO	DATE	REVISION	BY
1	6/19/98	D.O.E. REVISIONS	N.S.

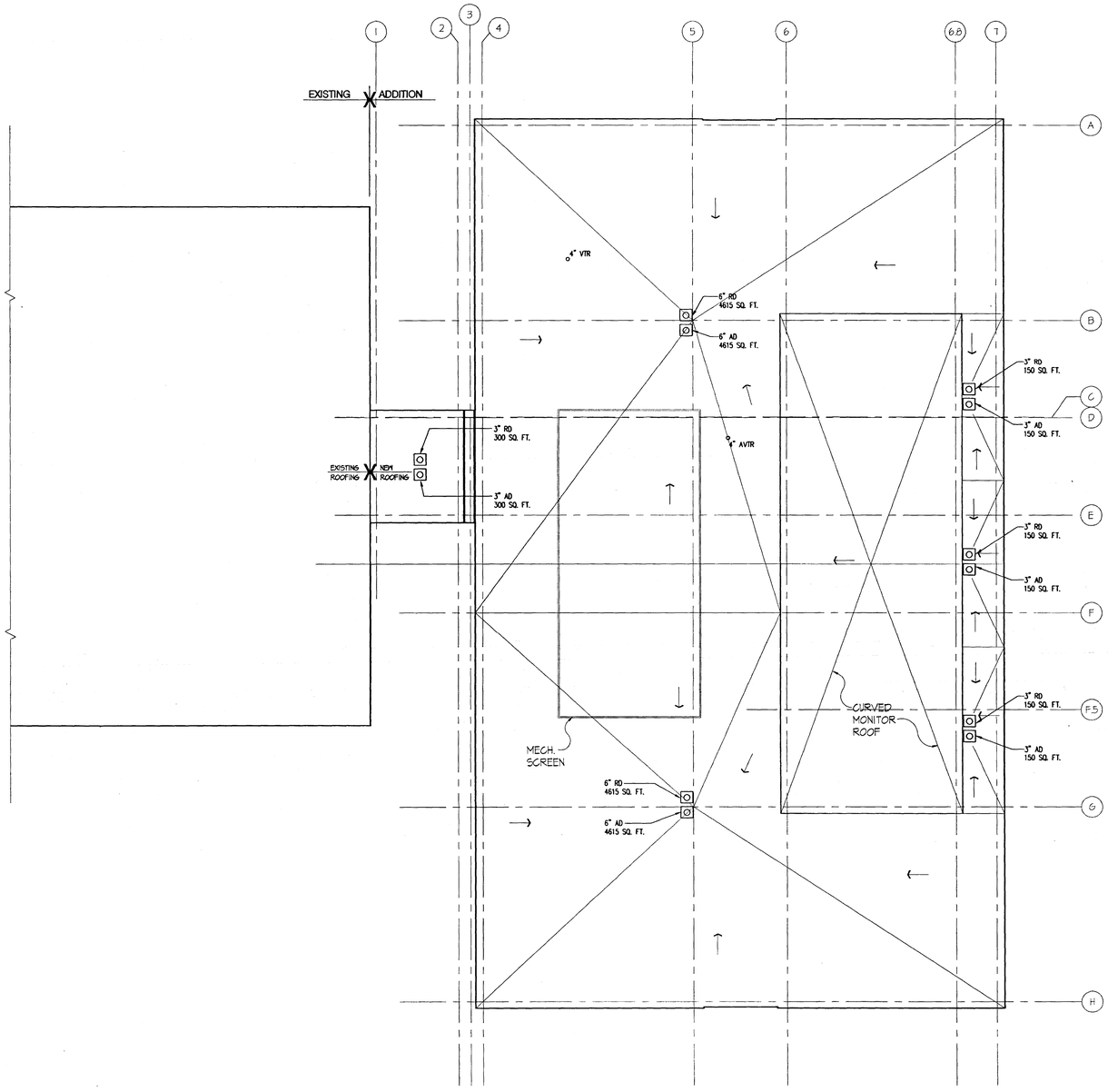
DATE: MARCH 16, 1998

SCALE: 1/8" = 1'-0"

PROJECT NO.: 50950.06

DRAWING NO.: **PFP101.2**

BQ #70 & 125 Attachment



ROOF PLAN
SCALE: 1/8"=1'-0"

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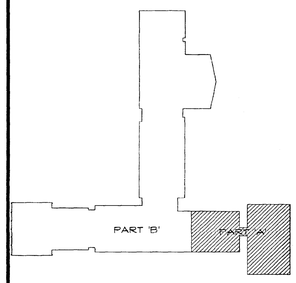

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DRAWN BY: R.M. DECARLO

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PROJECT TITLE

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9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

ROOF PLAN - PLUMBING

0 4' 8' 16'
SCALE: 1/8" = 1'-0"

NO	DATE	REVISION	BY

DATE: **MARCH 16, 1998**
SCALE: **1/8" = 1'-0"**
PROJECT NO.: **50950.06**
DRAWING NO.: **P110**

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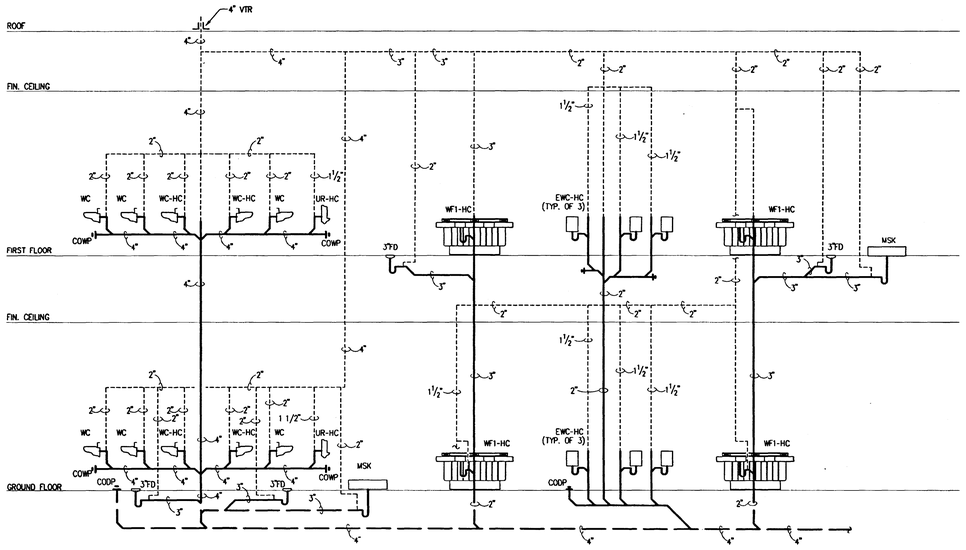
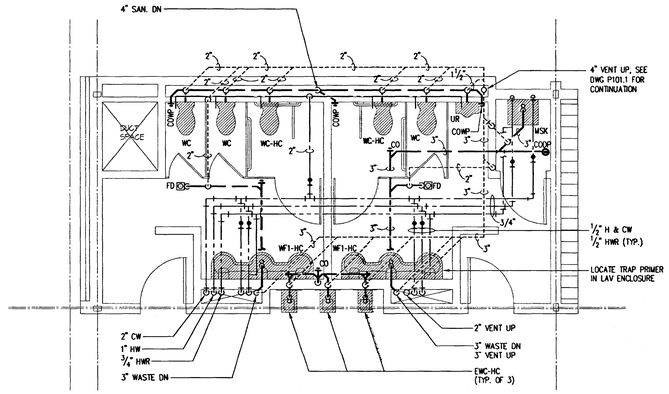
BQ #70 & 125 Attachment



SANITARY RISER DIAGRAM
FIRST FLOOR AND SECOND FLOOR - PART A

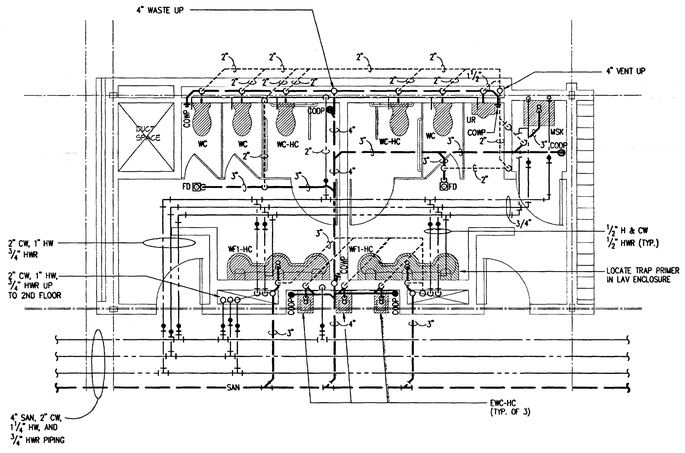
1 / P301 SCALE: NONE



1 / P201 **LARGE SCALE TOILET ROOM PLAN - SECOND FLOOR**
SCALE: 1/4" = 1'-0"

WATER RISER DIAGRAM
FIRST FLOOR AND SECOND FLOOR - PART A

2 / P301 SCALE: NONE



1 / P201 **LARGE SCALE TOILET ROOM PLAN - FIRST FLOOR**
SCALE: 1/4" = 1'-0"

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ARCHITECT/ENGINEER: R.M. DECARLO
DRAWN BY: R.M. DECARLO

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ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

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BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

ENLARGED TOILET ROOM LAYOUT & RISER DIAGRAMS - PLUMBING

NO	DATE	REVISION	BY

DATE: MARCH 16, 1998
SCALE: AS NOTED
PROJECT NO.: 50950.06
DRAWING NO.: P201

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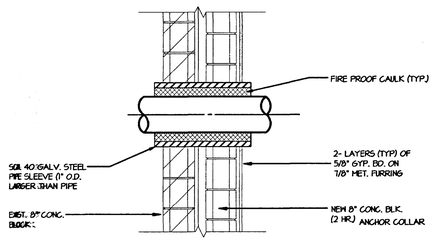
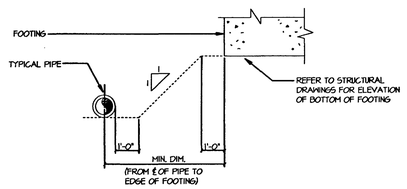
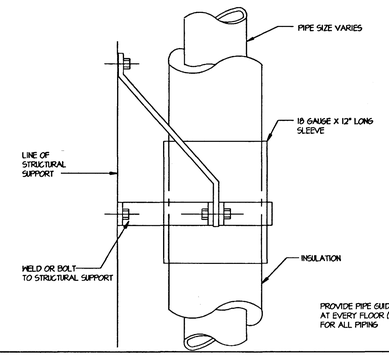


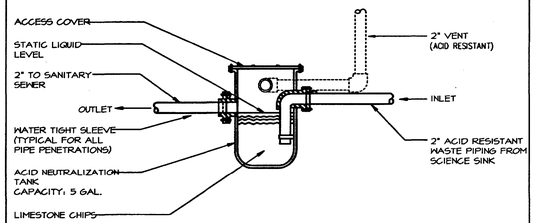
1 DETAIL OF PENETRATION W/ SLEEVE THRU FIRE WALL
NOT TO SCALE



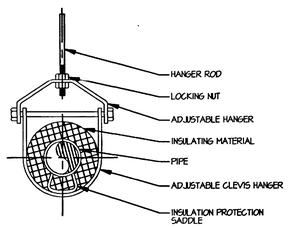
2 DETAIL OF UNDERGROUND PIPING
NOT TO SCALE



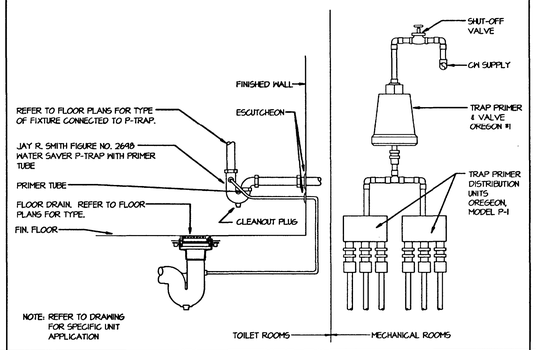
3 DETAIL OF VERTICAL PIPE GUIDE
NOT TO SCALE



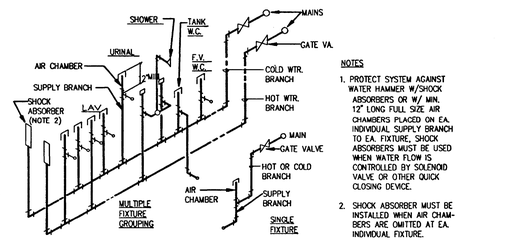
4 DETAIL OF ACID NEUTRALIZATION TANK
NOT TO SCALE



5 CLEVIS HANGAR WITH SADDLE
NOT TO SCALE

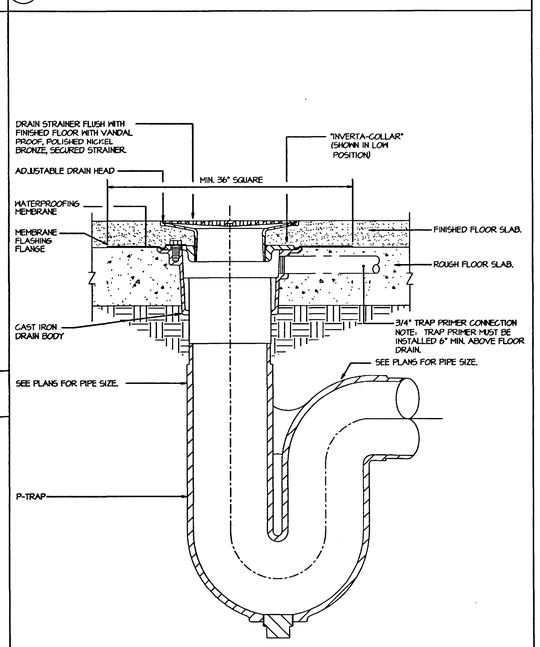


6 TRAP PRIMER DETAIL
NOT TO SCALE

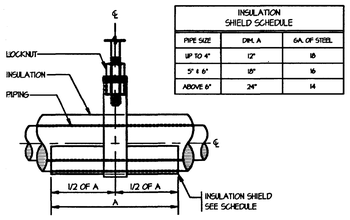


NOTES
1. PROTECT SYSTEM AGAINST WATER HAMMER W/SHOCK ABSORBERS OR W/ MIN. 12" LONG FULL SIZE AIR CHAMBERS PLACED ON E.A. INDIVIDUAL SUPPLY BRANCH TO E.A. FIXTURE, SHOCK ABSORBERS MUST BE USED WHEN WATER FLOW IS CONTROLLED BY SOLENOID VALVE OR OTHER QUICK CLOSING DEVICE.
2. SHOCK ABSORBER MUST BE INSTALLED WHEN AIR CHAMBERS ARE OMITTED AT E.A. INDIVIDUAL FIXTURE.
3. AT SHOCK ABSORBERS, ACCESS PANEL REQUIRED
4. SEE RISER DIAGRAMS AND PLUMBING DRAWINGS FOR ARRANGEMENT OF PIPING AND FIXTURES.

7 DETAIL OF AIR CHAMBER & SHOCK ABSORBER LOCATIONS
NOT TO SCALE

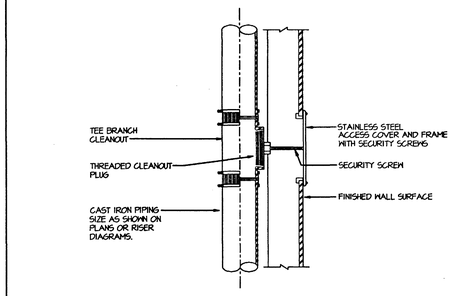


4 DETAIL OF ACID NEUTRALIZATION TANK
NOT TO SCALE

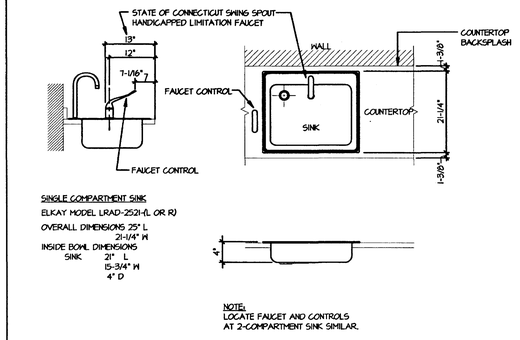


INSULATION SHIELD SCHEDULE		
PIPE SIZE	DIM. A	GA. OF STEEL
1/2" TO 4"	12"	18
5" & 6"	18"	16
ABOVE 6"	24"	14

8 PIPE HANGAR/SHIELD DETAIL
NOT TO SCALE



9 WALL CLEANOUT DETAIL
NOT TO SCALE



SINGLE COMPARTMENT SINK
ELKAY MODEL LRAD-2521-(L OR R)
OVERALL DIMENSIONS 25" L
21-1/4" H
INSIDE BOWL DIMENSIONS
SINK 21" L
15-3/4" H
4" D

NOTE:
LOCATE FAUCET AND CONTROLS AT 2-COMPARTMENT SINK SIMILAR.

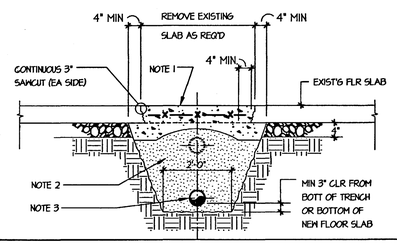
10 DETAIL OF HANDICAPPED ACCESSIBLE SINK & FAUCET LAYOUT
NOT TO SCALE

RPD SIZE	DRAIN SIZE
3/4"	1"
1"	1"
1 1/2"	2"
2"	2"

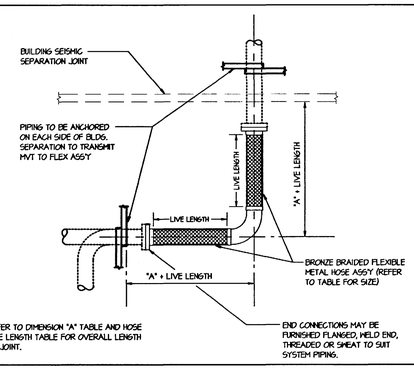
NOTE:
THIS DETAIL IS APPROPRIATE FOR PIPE SIZES 3/4" THRU 2".

11 ADJUSTABLE FLOOR DRAIN DETAIL
NOT TO SCALE

1. REPLACE CONCRETE SLAB WITH 4000 PSI CONCRETE, FINISH NEW SLAB FLUSH WITH EXISTING FLOOR SLAB. REINFORCE W/ 6x6-W2.9xW2.9 WWF.
2. COMPACTED FINE AGGREGATE FILL CONFORMING TO STATE OF CONN. DOT FORM 814 1988, SECTION M.03, ARTICLE M.03.01, PARAGRAPH 2. COMPACT TO 95% MAX DRY DENSITY IN ACCORDANCE WITH ASTM D1557. PLACE BACKFILL IN MAXIMUM 8" DEEP LAYERS.
3. NEW PIPE OR ELECTRICAL CONDUIT. REFER TO PLUMBING AND ELECTRICAL DRAWINGS FOR LOCATION, EXTENT, AND PITCH REQUIREMENTS.



12 DETAIL OF NEW UNDERSLAB PIPING AT EXISTING FLOOR SLAB
NOT TO SCALE



NOTES:
1) REFER TO DIMENSION "A" TABLE AND HOSE LIVE LENGTH TABLE FOR OVERALL LENGTH OF JOINT.

BRONZE BRAIDED METAL HOSE LIVE LENGTH											
HOSE SIZE (ID)											
1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"	5"	6"	8"
13-3/4"	15-1/4"	16"	17-1/2"	18-1/2"	20-3/4"	22-1/4"	24"	26-3/4"	29-1/2"	42-1/2"	48-1/4"

DIMENSION "A" TABLE				
PIPE SIZE	TYPE OF END FITTING			
	THD'D NIPPLE	HELD NIPPLE	COPPER SWEAT	150# FLANGE
1/2"	4"	4-1/4"	2-9/16"	3-1/8"
3/4"	4-3/8"	4-1/8"	3-1/2"	3"
1"	5"	4-3/4"	4-1/16"	3-9/16"
1-1/4"	5-1/8"	5-1/16"	4-3/4"	4-1/16"
1-1/2"	6-1/4"	6"	5-3/8"	5-1/8"
2"	7-1/2"	6-3/4"	6-1/2"	6"
2-1/2"	8-3/4"	7-1/2"	7-3/8"	6-7/8"
3"	9-1/2"	8-1/4"	8-5/16"	7-1/16"
4"	12"	9-3/4"	10-1/2"	9-5/16"
5"	—	12-3/4"	—	11-5/16"
6"	—	14-1/4"	—	13-1/16"
8"	—	17-1/4"	—	16-5/8"

NOTE:
TO DETERMINE APPROXIMATE OVERALL LENGTH (OAL) OF EACH LEG, ADD DIMENSION "A" TO THE LIVE LENGTH.

13 DETAIL OF SEISMIC SEPARATION JOINT PIPING DETAIL
NOT TO SCALE

14 DETAIL OF BACKFLOW PREVENTER (RPBP)
NOT TO SCALE

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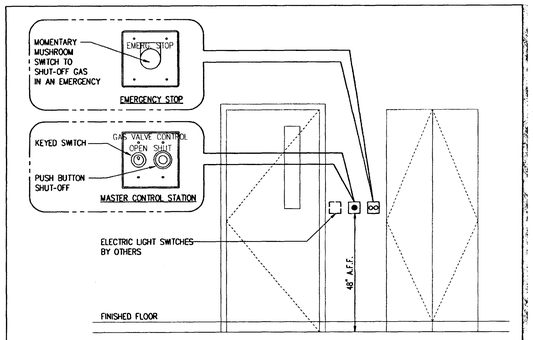
PROJECT TITLE
ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT
STATE PROJECT NO. 057-106EA

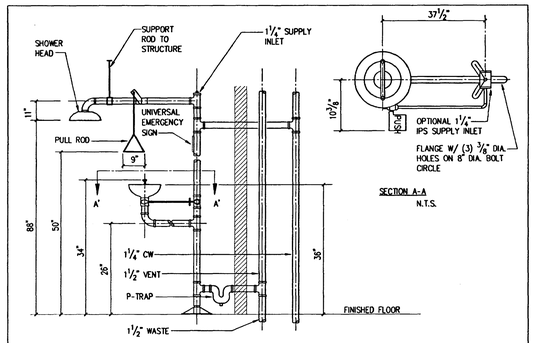
DRAWING TITLE
DETAILS - PLUMBING

NO	DATE	REVISION	BY

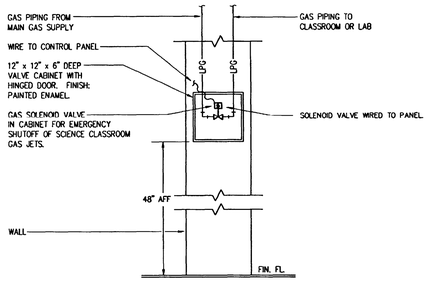
DATE: MARCH 16, 1998
SCALE: NOT TO SCALE
PROJECT NO.: 50950.06
DRAWING NO.: P301



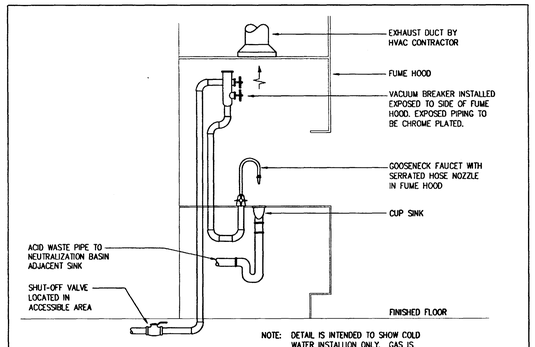
1 DETAIL OF EMERGENCY GAS CONTROL SHUTOFF
SCALE : 1/2" = 1'-0"



2 DETAIL OF EMERGENCY SHOWER/EYE WASH (FREE STANDING)
NOT TO SCALE

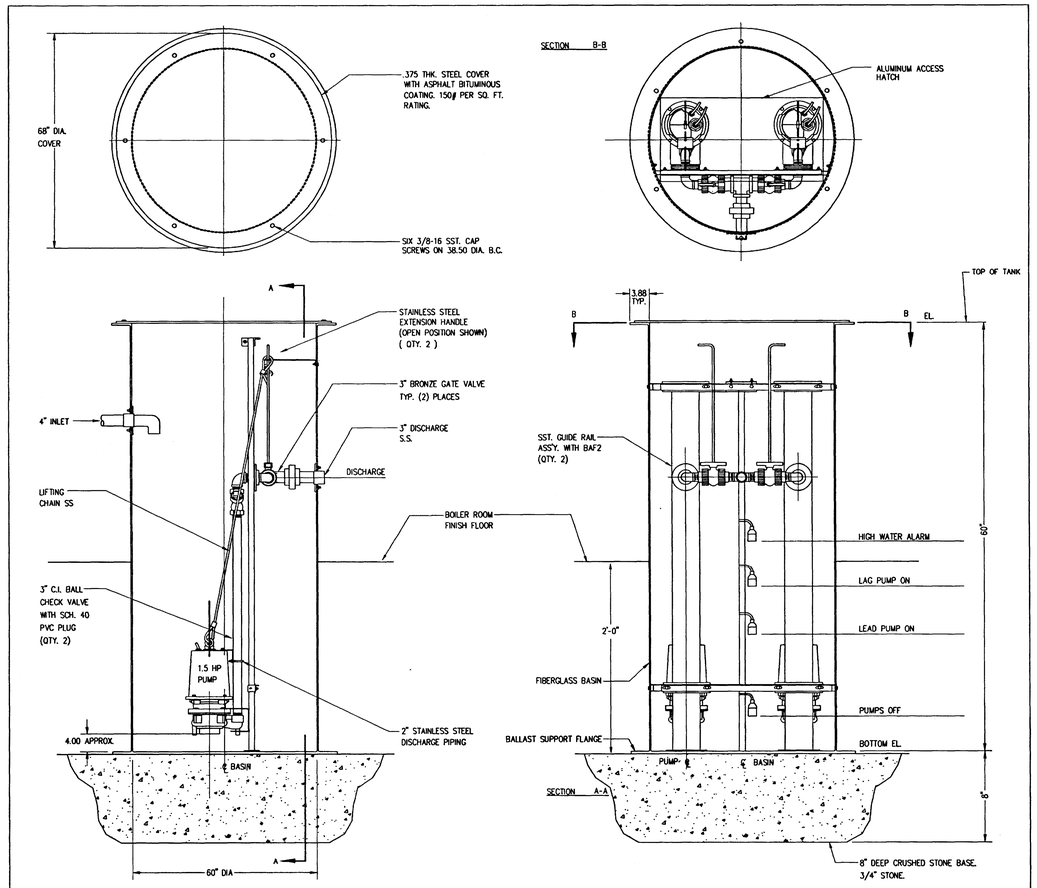


3 DETAIL OF GAS SOLENOID VALVE IN CABINET
NOT TO SCALE



NOTE: DETAIL IS INTENDED TO SHOW COLD WATER INSTALLION ONLY. GAS IS ALSO REQUIRED, REFER TO PLANS.

4 DETAIL OF TYPICAL FUME HOOD
NOT TO SCALE



5 SEWAGE EJECTOR PIPING DETAIL
NOT TO SCALE

BQ #70 & 125 Attachment

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PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE
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FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

DETAILS - PLUMBING

NO	DATE	REVISION	BY

DATE: MARCH 16, 1998
SCALE: NOT TO SCALE
PROJECT NO.: 50950.06
DRAWING NO.: P302

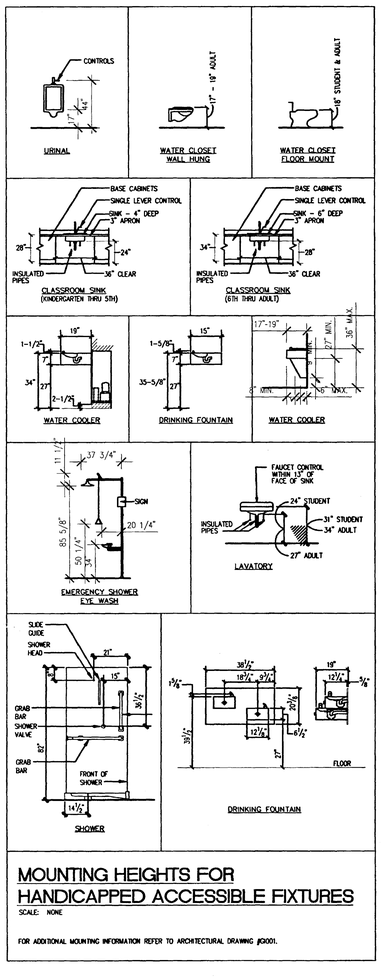
FIXTURE CONNECTION SCHEDULE

SYMBOL	DESCRIPTION	SUPPLY SIZE	TRAP SIZE	MINIMUM BRANCH SIZE				REMARKS
				WASTE	VENT	HOT	COLD	
WC	WATERCLOSET	1"	- -	4"	2"	- -	1"	
WC-HC	WATERCLOSET (HANDICAP ACCESSIBLE)	1"	- -	4"	2"	- -	1"	
UR	URINAL	3/4"	- -	2"	1-1/2"	- -	3/4"	
UR-HC	URINAL (HANDICAPPED ACCESSIBLE)	3/4"	- -	2"	1-1/2"	- -	3/4"	
EWC	ELECTRIC WATER COOLER	3/8"	1-1/2"	1-1/2"	1-1/2"	-	1/2"	
LAV	LAVATORY	3/8"	1-1/2"	1-1/2"	1-1/2"	1/2"	1/2"	
LAV-HC	LAVATORY (HANDICAP ACCESSIBLE)	3/8"	1-1/2"	1-1/2"	1-1/2"	1/2"	1/2"	
SK#	SINK (HANDICAP ACCESSIBLE)	3/8"	1-1/2"	1-1/2"	1-1/2"	1/2"	1/2"	
DF#-HC	DRINKING FOUNTAIN (HANDICAP ACCESSIBLE)	3/8"	1-1/4"	1-1/2"	1-1/2"	- -	1/2"	
MSK	MOP SINK	1/2"	3"	3"	2"	3/4"	3/4"	
SH/EW-HC	SHOWER/EYE WASH (HANDICAP)	1-1/4"	- -	2"	1-1/2"	- -	1-1/4"	

HANDICAPPED ACCESSIBLE PLUMBING FIXTURE SCHEDULE

SYMBOL	DESCRIPTION	MFG.	MODEL	SIZE (OVERALL DIMENSIONS) (L=LENGTH, W=WIDTH, D=DEPTH, H=HIGH)	DESCRIPTION
WC-HC	WATER CLOSET	KOHLER	K-4268	19" HIGH x 14" W x 29 5/8" L	WHITE VITREOUS CHINA, FLOOR SET, ELONGATED, SIPHON JET BOWL. SEE FIXTURE SCHEDULE ABOVE FOR MOUNTING HEIGHTS
UR-HC	URINAL	KOHLER	K-4960-T	28"H x 18"W	SEE MOUNTING HEIGHT DIAGRAM ABOVE
LAV-HC	LAVATORY	KOHLER	K-2032	20"L x 18"W	SEE MOUNTING HEIGHT DIAGRAM ABOVE
SK1-HC	SINK (SCIENCE SINK)	ELKAY	LRAD-3321	33"L x 21 1/2"W x 6 1/2"D	TWO COMPARTMENT, STAINLESS STEEL, 18 GAUGE, TYPE 302, SELF-RIMMING.
SK2-HC	SINK (STUDENT SINK 4") (ADULT SINK 6-1/2")	ELKAY	LRAD-2521	25"L x 21 1/4"W x 4"D	SINGLE COMPARTMENT, STAINLESS STEEL, 18 GAUGE, TYPE 302, SELF-RIMMING.
WF-HC	WASH FOUNTAIN (HANDICAP)	BRADLEY	SS-3	80"L x 21"W x 38"H	3 PERSON, SOLID SURFACE MATERIAL
EWC-HC	ELECTRIC WATER COOLER (HANDICAP)	ELKAY	LISEA-8-C	18-5/16" x 23-1/4" OVERALL	UL LISTED, STAINLESS STEEL BASIN & CABINET, LEAD FREE, SINGLE LEVEL

BQ #70 & 125 Attachment



MOUNTING HEIGHTS FOR HANDICAPPED ACCESSIBLE FIXTURES

SCALE: NONE

FOR ADDITIONAL MOUNTING INFORMATION REFER TO ARCHITECTURAL DRAWING #0001.

PLUMBING GENERAL NOTES

1.) CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO STARTING WORK. REFER PROBLEMATIC CONDITIONS TO ENGINEER.

2.) MAKE SUBMITTALS OF SHOP DRAWINGS AS SPECIFIED.

3.) DRAWINGS ARE DIAGRAMMATIC AND INDICATE GENERAL ARRANGEMENT OF WORK. BASIC DESIGN CONCEPTS INDICATED ARE MINIMAL AND MUST BE FOLLOWED OR BETTERED. DO NOT SCALE DRAWINGS.

4.) WORK IS NOT SHOWN IN FINITE DETAIL BUT IS INTENDED TO INCLUDE ITEMS NECESSARY FOR COMPLETION AND PROPER OPERATION.

5.) PROVIDE REQUIRED SUPPORTS AND HANGERS FOR PIPING, FIXTURES AND EQUIPMENT, SO LOADING WILL NOT EXCEED ALLOWABLE LOADINGS OF STRUCTURE.

6.) ALL EQUIPMENT, FIXTURES, PIPING, ETC., TO BE REMOVED, SHALL NOT BE REMOVED FROM THE PREMISES WITHOUT THE OWNER'S APPROVAL.

7.) ALL PIPING TO BE REMOVED SHALL BE PROPERLY PLUGGED AND CAPPED.

8.) NO DEAD ENDS SHALL BE LEFT ON ANY PIPING UPON COMPLETION OF WORK.

9.) ALL SYSTEMS SHALL BE LEFT IN PERFECT WORKING ORDER UPON COMPLETION OF ALL NEW WORK.

10.) FIXTURES (GENERAL): "FIRST QUALITY", NEW COMPLETE WITH TRIMMINGS AND FITTINGS, INCLUDING FAUCETS, SUPPLIES, STOPS, TRAPS, TAILPIECES, WASTE PLUGS, CASINGS, HANGERS, PLATES, BRACKETS, ANCHORS, SUPPORTS, HARDWARE AND FASTENING DEVICES.

11.) WHERE FIXTURES OR TRIM ARE DAMAGED OR BROKEN DURING THE INSTALLATION, THEY SHALL BE REPLACED WITH NEW FIXTURES.

12.) TRIMMINGS AND FITTINGS: CONSTRUCTED OF FORGED, CAST, ROLLED OR EXTRUDED BRASS OR BRONZE WITH MONEL AND OTHER SUITABLE NON-CORROSIVE PARTS: DESIGNED WITH PARTS SUBJECT TO WEAR OR DETERIORATION EASILY RENEWABLE. NO DIE CASTINGS AND STAMPINGS OTHER THAN BRASS OR STAINLESS STEEL.

13.) EXAMINE ROUGH-IN WORK OF POTABLE WATER AND WASTE PIPING SYSTEMS TO VERIFY ACTUAL LOCATIONS OF PIPING CONNECTIONS PRIOR TO INSTALLING FIXTURES. CORRECT ANY INCORRECT LOCATION OF PIPING, AND OTHER UNSATISFACTORY CONDITIONS FOR INSTALLATION OF PLUMBING FIXTURES.

14.) EXERCISE CARE IN HANDLING OF FIXTURES, TRIM, PIPE, AND FITTINGS. USE TOOLS DESIGNED TO PREVENT DAMAGE TO SURFACE FINISHES.

15.) SET FIXTURES LEVEL AND UNIFORMLY, WITH CONNECTIONS AT RIGHT ANGLES TO WALL AND PROPERLY CENTERED. LAY OUT ROUGHING ACCURATELY AND IN COORDINATION WITH SPACE AND FINISH REQUIREMENTS. IF FIELD CUT-OUTS AND HOLES ARE REQUIRED, USE PROPER CUTTING AND DRILLING TOOLS TO MAINTAIN INTEGRITY OF FINISHED SURFACE. PROVIDE CUT-OUT TEMPLATES FOR COUNTERTOP INSERT ITEMS.

16.) LOCATE WASTE OUTLETS AND WATER SUPPLIES AT CONSTANT HORIZONTAL LEVELS, WITH WASTE OUTLET CENTERED ON FIXTURE DRAIN CONNECTION AND WATER SUPPLIES SPACED EQUALLY RIGHT TO LEFT.

17.) SUPPORT WALL HUNG FIXTURES RIGIDLY FROM BUILDING CONSTRUCTION, NOT FROM PIPING, BY MEANS OF CONCEALED METAL SUPPORTING MEMBERS DESIGNED TO CARRY WEIGHT OF FIXTURE UNDER CONDITIONS OF UNUSUAL LOADING, WITH NO STRESS PLACED ON WASTE CONNECTION OR ANY OTHER PART OF SYSTEM.

18.) SECURE FLOOR MOUNT SUPPORTS TO SLAB. SECURE WALL MOUNT SUPPORTS TO 1/4" THICK METAL BACKUP PLATE SECURED TO WALL CONSTRUCTION. DO NOT USE WIRE, NAILS, OR OTHER MAKESHIFT DEVICES TO SECURE SUPPORTING MEMBERS.

19.) USE VANDALPROOF DEVICES TO SECURE FIXTURES, TRIMMINGS AND FITTINGS TO DETER UNAUTHORIZED REMOVAL. PROVIDE CHROME PLATED BRASS WASHERS AND CAP NUTS FOR EXPOSED BOLT ENDS.

20.) PROVIDE ESCUTCHEONS, THREADED OR HELD IN PLACE WITH THREADED PART OR SET SCREW, ON PIPING AND FIXTURE SUPPORTS PROTRUDING FROM WALL OR FLOOR, AND ON WSBLE CONNECTIONS TO FIXTURES.

21.) MAKE CONNECTION BETWEEN INTEGRAL TRAPPED FIXTURES AND DRAINAGE PIPING GAS AND WATERTIGHT, WITH CLOSET COUPLING OR FLANGE, CLOSET RING GASKET AND NON-CORROSIVE BOLTING MATERIALS.

22.) USE SPACING DEVICES TO SUPPORT AND STABILIZE WATER PIPING.

23.) PAINT NON-CORROSIVE FERROUS METAL SURFACES OF FIXTURES, INCLUDING BRACKETS, HANGERS, AND PLATES WITH PRIME COAT OF PAINT.

24.) UPON COMPLETION OF WORK, REMOVE PROTECTIVE COVERS AND THOROUGHLY CLEAN SURFACES, TRAPS AND STRAINERS. CHECK ALL ITEMS FOR PROPER OPERATION. TIGHTEN PACKINGS AND RETAINING DEVICES.

25.) ADJUST FLUSH VALVES TO PROVIDE MINIMUM FLOW CONSISTENT WITH CLEANING REQUIREMENTS OF FIXTURES. ADJUST SUPPLIES TO PROVIDE ADEQUATE FLOW WITHOUT SPLASHING, AND WITH FLOW RATE OF HOT AND COLD WATER EQUAL IN VELOCITY, EXCEPT AS OTHERWISE REQUIRED.

26.) SECURE AND PAY COSTS OF PERMITS, CERTIFICATES, LICENSES, INSPECTIONS AND APPROVALS.

27.) OBTAIN CERTIFICATE OF APPROVAL FROM RESPONSIBLE BUILDING OFFICIAL.

28.) SUPPLY TWO COPIES OF A WARRANTY COUNTERSIGNED AND GUARANTEED BY CONTRACTOR, STATING THAT IMPERFECT SYSTEM OPERATION AND ALL DEFECTS IN LABOR AND MATERIALS OF PLUMBING WORK WILL BE REPAIRED WITHOUT COST TO OWNER FOR A PERIOD OF ONE YEAR FROM DATE OF SUBSTANTIAL COMPLETION, AND STATING THAT ALL PLUMBING EQUIPMENT HAS BEEN FULLY SERVICED AND LEFT IN PROPER OPERATING CONDITION.

29.) GUARANTEE THAT SERVICING WILL BE PROVIDED WITHOUT COST DURING GUARANTEE PERIOD.

30.) TEST PLUMBING SYSTEMS TO SATISFACTION OF BUILDING OFFICIAL. DO NOT CLOSE IN, CONCEAL, OR COVER UP ANY PLUMBING WORK UNTIL IT HAS BEEN TESTED, INSPECTED AND APPROVED.

31.) FLUSH PIPING, PRIOR TO TESTING, TO REMOVE FOREIGN MATERIALS WHICH MAY HAVE ENTERED DURING COURSE OF INSTALLATION. CLEAN FILTERS AND STRAINERS AFTER FLUSHING.

32.) ALL PIPING PENETRATIONS THRU NEW RATED WALLS SHALL BE SEALED WITH LISTED FIREPROOFING MATERIALS. SEE ARCHITECTURAL PLANS FOR EXACT LOCATIONS.

33.) PLUMBERS WORK SHALL END 5'-0" AWAY FROM EXTERIOR FOUNDATION AND SITE CONTRACTORS WORK SHALL BEGIN AT THAT POINT.

34.) PROVIDE SEISMIC BRACING AND SUPPORTS FOR ALL PIPING AND EQUIPMENT PER BOCA BUILDING CODE. SEE HVAC DRAWINGS FOR DETAILS.

35.) LOCATION OF ALL FULL-OPEN VALVES AND SHUTOFF VALVES SHALL BE INSTALLED PER BOCA PLUMBING CODE SECTION P-1504.1 AND P-1504.2 WHETHER SPECIFICALLY SHOWN ON DRAWINGS OR NOT.

36.) ITEMS NEEDING SAWCUTTING AND PATCHING SHALL BE COORDINATED BETWEEN TRADES. ONLY MAJOR PIECES ARE SHOWN ON DRAWINGS AND DO NOT INDICATE ALL LOCATIONS. PLUMBER SHALL BE RESPONSIBLE FOR CONCEALING ALL NEW WORK, UNLESS NOTED OTHERWISE.

37.) SET AND CONNECT ALL FIXTURES WITH HOT AND COLD WATER, VENT AND DRAINAGE AS REQUIRED AND PROTECT FIXTURES UNTIL FINAL ACCEPTANCE AND TEST.

38.) CLEAN ALL FLUSH VALVES AFTER TWO WEEKS OPERATION.

39.) FIXTURES SHALL BE COMPLETE WITH CHROME PLATING ON EXPOSED IRON OR PIPE, TRAPS, ANCHOR BOLTS, HANGERS, STRAINERS, STOP VALVES AT EVERY FIXTURE AND OTHER INCIDENTAL ITEMS FURNISHED AS STANDARD.

40.) ALL FIXTURES SHALL BE CAULKED TIGHT TO WALLS AND FINISHED SURFACES SO THAT NO VOIDS SHALL REMAIN.

41.) ALL FLOOR DRAINS SHALL RECEIVE WATER FROM TRAP PRIMER VALVES - TYPICAL. SEE DETAIL J ON DRAWING P.501.

42.) ALL PLUMBING FIXTURE'S BACK PLATES AND ESCUTCHEONS RECTANGULAR IN NATURE SHALL BE INSTALLED FLUSH WITH THE WALL SURFACE. THE VERTICAL EDGE SHALL BE INSTALLED IN A VERTICAL POSITION PERPENDICULAR TO A HORIZONTAL PLANE AND THE HORIZONTAL EDGE SHALL BE INSTALLED IN A HORIZONTAL (LEVEL) POSITION.

43.) TRADE CONTRACTOR'S NOTE:
ALL EQUIPMENT SHOWN ON THESE DRAWINGS AND IN PROJECT SPECIFICATION IS BASED ON SPECIFIED MANUFACTURERS. ANY MODIFICATION AND/OR SUBSTITUTION OF SAID EQUIPMENT IS SUBJECT TO COMPLETE COORDINATION OF ALL CONNECTIONS, SERVICES, OPENING SIZES, AND ANY OTHER CONSTRUCTION RELATED REQUIREMENTS BY THE TRADE CONTRACTOR PROVIDING THE EQUIPMENT.

PIPE AND FITTING SCHEDULE

DESCRIPTION	SIZE	TEST P.S.I.	PIPE		FITTING		REMARKS
			TYPE	SCHED.	TYPE	RATING	
WASTE & VENT PIPING (ABOVE GRADE)	UNDER 2"	CODE	S1 GALV.	40	S1 GALV.	40	
WASTE, & VENT PIPING (ABOVE GRADE)	OVER 2"	CODE	C. I.	SV	C. I.	SV	NO-HUB WITH 4 BAND "HUSKEY" OR EQUAL "CLAMP ALL" CLAMPS
WASTE, & VENT PIPING (BELOW GRADE)	ALL	CODE	C. I.	SV	C. I.	SV	HUB AND SPIGOT
STORM DRAIN (ABOVE GRADE)	ALL	CODE	C. I.	SV	C. I.	SV	NO-HUB WITH 4 BAND "HUSKEY" OR EQUAL "CLAMP ALL" CLAMPS
STORM DRAIN (BELOW GRADE)	ALL	CODE	C. I.	SV	C. I.	SV	HUB AND SPIGOT
DOMESTIC COLD WATER	ALL	200	CUL	STD.	CUS	STD.	
DOMESTIC HOT WATER	ALL	200	CUL	STD.	CUS	STD.	
CONDENSATE DRAIN	ALL	200	DWV	STD.	CUS	STD.	COPPER
GAS PIPING (PROPANE)	UP TO 2"	50	S2 BLK	40	M.I.	40	
FUEL OIL PIPING	ALL	200	CUL	STD.	CUS	STD.	

INSULATION SCHEDULE

DESCRIPTION	TYPE	PIPE SIZE	THICKNESS	REMARKS
DOMESTIC COLD WATER	P-10		1"	
DOMESTIC HOT WATER	P-10	3/4"-1"	1"	
		1-1/4"-2"	1"	
		2-1/2"-4"	1-1/2"	
DOMESTIC HOT WATER CIRC	P-10		1"	
STORM HORIZ. RUNS ABOVE GRADE	P-10		1/2"	ALSO INSULATE FIRST TWO (2) FEET OF VERTICAL RISER
ROOF DRAIN BODY	P-45		1"	INCLUDE VERTICAL SECTION UP TO ROOF DRAIN
LAVATORY HANDICAPPED ACCESSIBLE INSULATION FOR UNDER HANDICAPPED LAV.	P-10A		3/16"	INSULATE TRAP, CW & HW PIPING UNDER HANDICAPPED ACCESSIBLE LAVATORY/SINKS
CONDENSATE DRAIN	P-10		1/2"	(INSIDE BUILDING ABOVE CEILING ONLY)

PLUMBING LEGEND

SYMBOL	ABBREVIATION	DESCRIPTION
	S OR W	NEW SOIL OR WASTE ABOVE FLOOR OR GRADE
S	S OR W	NEW SOIL OR WASTE BELOW FLOOR OR GRADE
S	S	EXIST. SANITARY LINE ABOVE FLOOR OR GRADE
S	S	EXIST. SANITARY LINE BELOW FLOOR OR GRADE
ST	ST	NEW STORM DRAIN ABOVE FLOOR OR GRADE
ST	ST	NEW STORM DRAIN BELOW FLOOR OR GRADE
ST	ST	EXIST. STORM DRAIN PIPING
V	V	NEW VENT PIPING
CW	CW	NEW COLD WATER PIPING
HW	HW	NEW HOT WATER PIPING
HWR	HWR	NEW HOT WATER RECIRCULATION PIPING
V	V	EXIST. VENT PIPING
CW	CW	EXIST. COLD WATER PIPING
HW	HW	EXIST. HOT WATER PIPING
HWR	HWR	EXIST. HOT WATER RECIRCULATION PIPING
G	G	NEW GAS SERVICE ABOVE GRADE
G	G	EXIST. GAS SERVICE
	CO/COWP	CLEANOUT/CLEANOUT WALL PLATE
	CODP	CLEANOUT DECKPLATE
		TRAP
	BV	BALL VALVE
	CV	CHECK VALVE
	GV	GATE VALVE
	RPBP	REDUCED PRESS. BACKFLOW PREVENTER
		GAS COCK
	WH	WALL HYDRANT W/ VACUUM BREAKER(NON FREEZE)
		UNION
		CAP
	P.O.C.	POINT OF CONNECTION
	INV. EL.	INVERT ELEVATION
	V.T.R.	VENT THRU ROOF
	EXIST.	EXISTING
	FD	FLOOR DRAIN
	RD	ROOF DRAIN
	L-WC, EWC-HC, WC, WC-HC	EXISTING WATER CLOSET (HANDICAPPED ACCESSIBLE) WATER CLOSET (HANDICAPPED ACCESSIBLE)
	EUR, EUR-HC, UR, UR-HC	EXISTING URINAL (HANDICAPPED ACCESSIBLE) URINAL (HANDICAPPED ACCESSIBLE)
	ELAV, ELAV-HC, LAV, LAV-HC	EXISTING LAVATORY (HANDICAPPED ACCESSIBLE) LAVATORY (HANDICAPPED ACCESSIBLE)
	ESK, SK-#	EXISTING SINK, SINK
	EMSR, MSR	EXISTING MOLDED STONE RECEPTOR MOLDED STONE RECEPTOR
	EDF, DF, DF-HC	EXISTING DRINKING FOUNTAIN (HANDICAPPED ACCESSIBLE) DRINKING FOUNTAIN (HANDICAPPED ACCESSIBLE)
	ESH, SH, SH-HC	EXISTING SHOWER, SHOWER (HANDICAPPED ACCESSIBLE)
	EXEWC, EXEWC-HC EWC, EWC-HC	EXIST. ELECT. WATER COOLER (HANDICAPPED ACCESSIBLE ELECTRIC WATER COOLER (HANDICAPPED ACCESSIBLE)
	ES/EEW	EMERGENCY SHOWER/EMERGENCY EYEWASH
	EWF, WF	EXISTING WASH FOUNTAIN, WASH FOUNTAIN

FIRE PROTECTION LEGEND

SYMBOL	ABBREVIATION	DESCRIPTION
S	SPKR.	SPRINKLER PIPING
		SEMI-RECESSED PENDENT SPRINKLER HEAD
		CONCEALED SPRINKLER HEAD
		UPRIGHT SPRINKLER HEAD
	O S & Y W/ TAMP SW	OUTSIDE SCREW & YOKE VALVE WITH TAMPER SWITCH
	F.E. WITH CAB.	FIRE EXTINGUISHER WITH CAB
	F.E.	FIRE EXTINGUISHER - WALL MOUNT
	F.S.	FLOW SWITCH
	RPBP	REDUCED PRESSURE BACKFLOW PREVENTER
		PIPING DOWN
		PIPING DOWN
		SEISMIC SEPARATION ASSEMBLY

VALVE SCHEDULE

DESCRIPTION	SIZE	TYPE					REMARKS
		GATE	GLOBE	CHECK	BALL	PLUG	
DOMESTIC COLD WATER	TO 3"	GVT	GLVT	CVT	BVB		
DOMESTIC HOT WATER	TO 3"	GVT	GLVT	CVT	BVB		
DOMESTIC COLD WATER	ABV. 3"	GVF		CVF	BVF		
DOMESTIC HOT WATER	ABV. 3"	GVF		CVF	BVF		
BACKFLOW PREVENTER (RPBP)	ALL	GVT					
GAS	ALL	GVF				PVG	

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PLUMBING PLAN NOTES:

1. REFER TO DRAWING P401 FOR PLUMBING NOTES PERTAINING TO THIS AND ALL PLUMBING DRAWINGS.
2. REFER TO DRAWING P401 FOR SYMBOL LIST AND LIST OF ABBREVIATIONS FOR THESE PLUMBING DRAWINGS.
3. REFER TO DRAWING P401 FOR ACCESSIBILITY PLUMBING FIXTURE SCHEDULE FOR THESE PLUMBING DRAWINGS.

PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE
ARCHITECT/ENGINEER: R.M. DECARLO
DRAWN BY: R.M. DECARLO

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FLETCHER-THOMPSON, INC.
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BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO

CENTRAL MIDDLE SCHOOL

9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

LEGEND, NOTES AND SCHEDULES - PLUMBING

NO	DATE	REVISION	BY

DATE: MARCH 16, 1998
SCALE: NOT TO SCALE
PROJECT NO.: 50950.06
DRAWING NO.: P401

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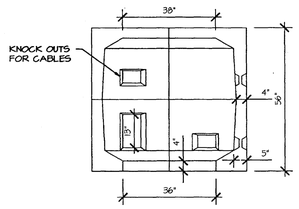
ELECTRICAL NOTE LEGEND:

1. EXISTING UTILITY COMPANY POLE WITH ONE (1) RISER CONDUIT FOR PRIMARY SERVICE AND ONE (1) POLE RISER CONDUIT STUBBED 18" A.F.G..
2. TWO (2) 4" PVC CONDUITS UNDERGROUND, ONE (1) FOR NEW PRIMARY SERVICE CABLE AND ONE (1) SPARE CONDUIT. PROVIDE CONCRETE ENCASEMENT FOR CONDUITS BELOW PARKING AND ROAD-WAYS.
3. NEW ELECTRICAL HAND HOLE, SEE DETAIL.
4. NEW PAD MOUNTED TRANSFORMER AND PAD, SEE DETAIL.
5. SIX SETS OF UNDERGROUND SECONDARY FEEDERS, EACH 4 #500 MCM-THHN - 4" GALVANIZED STEEL CONDUITS TO NEW MAIN SWITCH AND SECONDARY DISTRIBUTION SWITCHBOARD. SEAL AND WATERPROOF CONDUITS AT BOTH THE BUILDING ENTRANCE AND TRANSFORMER LOCATION.
6. UPON COMPLETION OF THE NEW ELECTRICAL SERVICE THE EXISTING TRANSFORMER SHALL BE REMOVED AS WELL AS THE EXISTING PRIMARY CABLES. CAP CONDUIT AT BOTH ENDS AND ABANDON IN PLACE.

ELECTRICAL SITE PLAN
SCALE: 1" = 40'-0"



PLAN VIEW

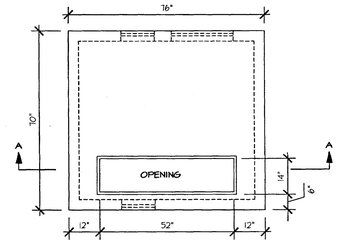


SECTION A-A

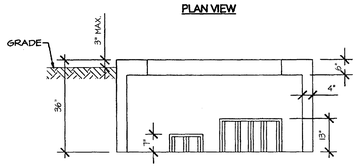
HANDHOLE - HEXAGONAL - PRECAST CONCRETE 60" WIDE X 56" HIGH OUTSIDE (N.U. SPC H-019)

NOT TO SCALE

NOTES:
1. DESIGN LOADING SHALL BE IN ACCORDANCE WITH AASHTO HS20-1983.
2. CONCRETE AND CONCRETE DESIGN SHALL BE IN ACCORDANCE WITH ACI 318-1986.
3. CONCRETE SHALL HAVE A MINIMUM 28 DAY STRENGTH OF 4000 PSI AND A MAXIMUM 28 DAY STRENGTH OF 5000 PSI.
4. FIVE INCH X 12 INCH KNOCKOUTS, (3) IN THE TOP, (3) IN THE BOTTOM AND (1) 12 INCH X 13 INCH KNOCKOUT IN THE BOTTOM SHALL BE CLEAR OF REINFORCEMENT.
5. ¾ INCH - COIL LOOP INSERTS - 6 INCH - (DAYTON B-16) WITH INSERT LOCATOR PLUG (DATTON T-21). TWO EACH IN TOP AND BOTTOM SECTIONS FOR LIFTING WITH SWIVEL PLATE. INSERTS ARE TO BE SECURED IN PLACE WITH REBAR.



PLAN VIEW



SECTION A-A

1. CONCRETE - 4000 P.S.I. 28 DAYS
2. COMPLY WITH PROVISIONS OF NORTHEAST UTILITIES SPECIFICATIONS #SPC P-015 FOR 500-2500 KVA TRANSFORMER PAD.

PRECAST CONCRETE TRANSFORMER PAD 3 PHASE, 500 - 2500 KVA (N.U.)

NOT TO SCALE

PROFESSIONAL SEAL

PROJECT MANAGER	L.J. FREE
ARCHITECT/ENGINEER	W.D. BOLAND
DRAWN BY	F. AGOSTINI

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9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

SITE ELECTRICAL PLAN

0 40' 80' 120'

NO	DATE	REVISION	BY

DATE	MARCH 16, 1998
SCALE	AS NOTED
PROJECT NO.	50950.06
DRAWING NO.	E001

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BQ #70 & 125 Attachment

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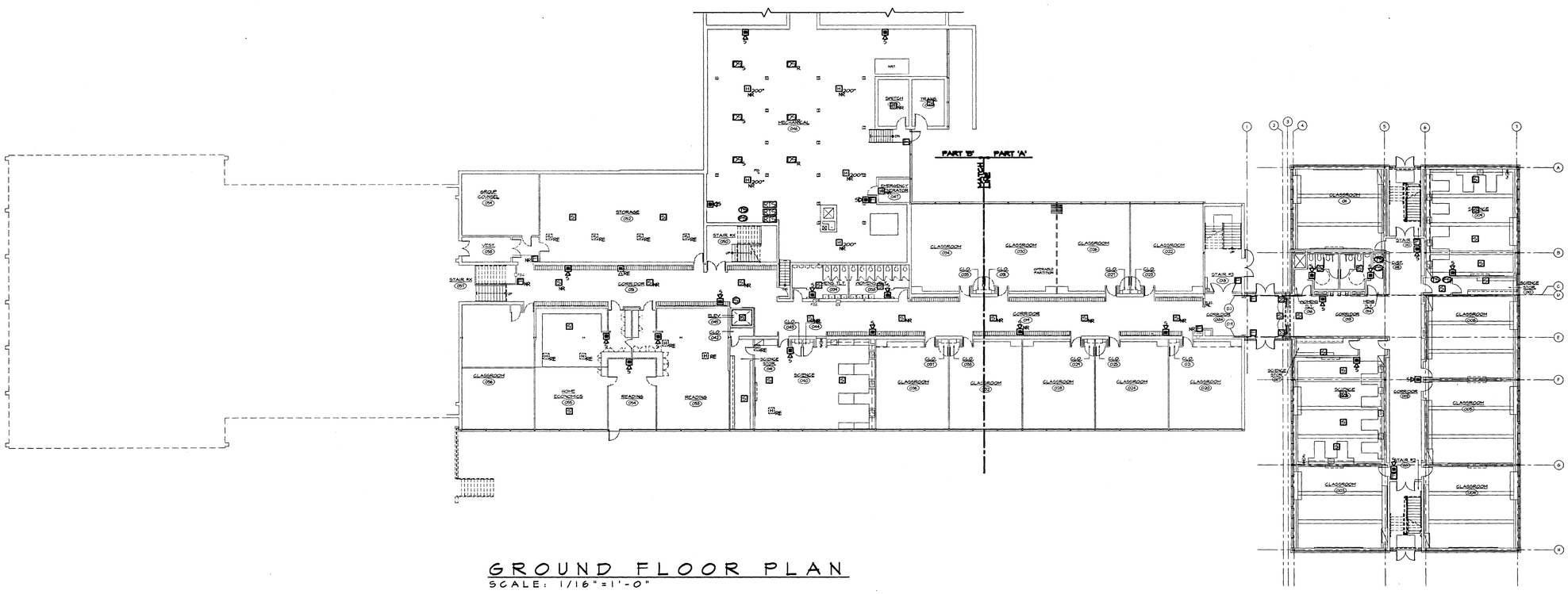
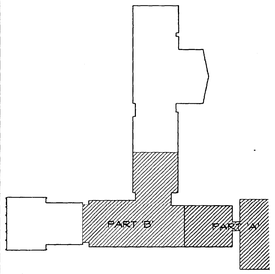


GROUND FLOOR PLAN
SCALE: 1/16"=1'-0"



KEY PLAN

N

PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE
ARCHITECT/ENGINEER: W.D. BOLAND
DRAWN BY: F. AGOSTINI

FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

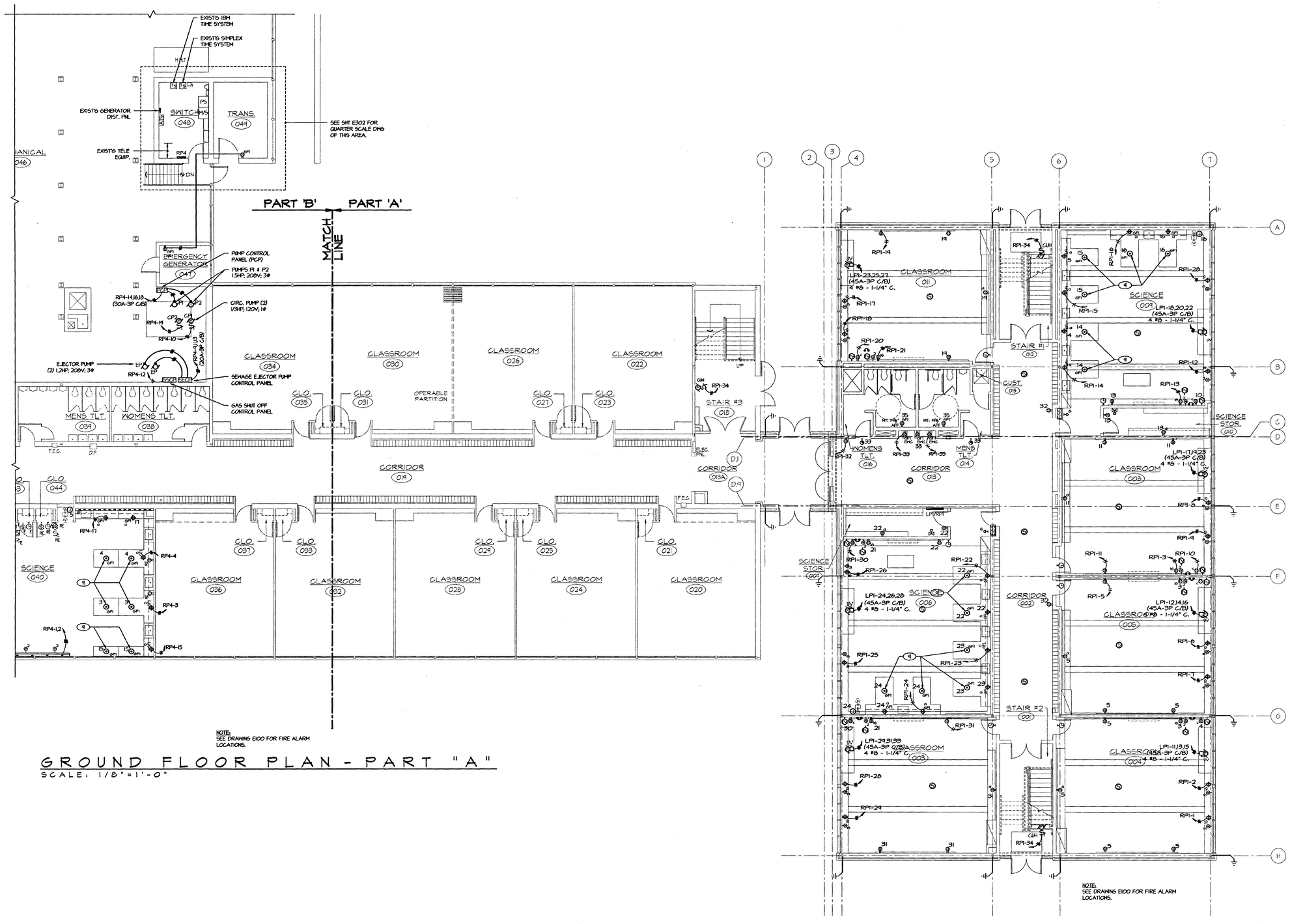
GROUND FLOOR FIRE ALARM PLAN

0 8' 16' 32'
SCALE: 1/16" = 1'-0"

NO	DATE	REVISION	BY
1	6/19/98	D.O.E. REVISIONS	F.A.

DATE: MARCH 16, 1998
SCALE: 1/16" = 1'-0"
PROJECT NO.: 50950.06
DRAWING NO.: E100

BQ #70 & 125 Attachment



GROUND FLOOR PLAN - PART "A"

SCALE: 1/8" = 1'-0"

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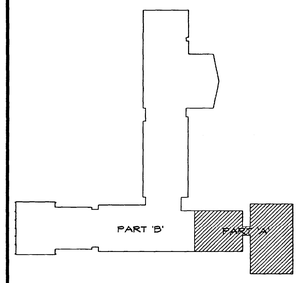

KEY PLAN

N

PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE

ARCHITECT/ENGINEER: W.D. BOLAND

DRAWN BY: F. AGOSTINI

FLETCHER THOMPSON

ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO

CENTRAL MIDDLE SCHOOL

9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

GROUND FLOOR PART "A" ELECTRICAL PLAN

0 4' 8' 16'

SCALE: 1/8" = 1'-0"

NO	DATE	REVISION	BY

DATE: MARCH 16, 1998

SCALE: 1/8" = 1'-0"

PROJECT NO.: 50950.06

DRAWING NO.: **E100.1**

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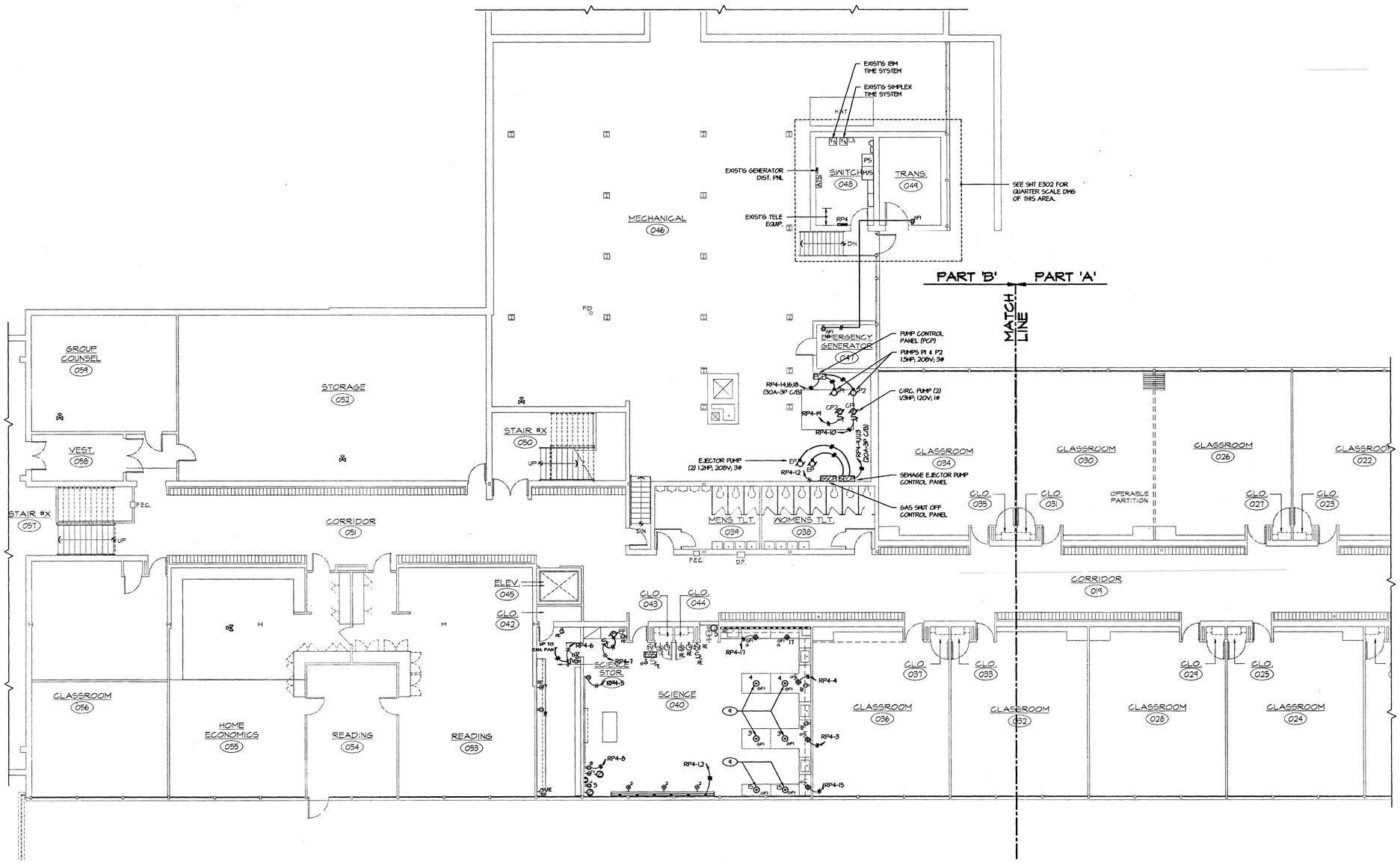
BQ #70 & 125 Attachment



GROUND FLOOR PLAN - PART "B"

SCALE: 1/8" = 1'-0"

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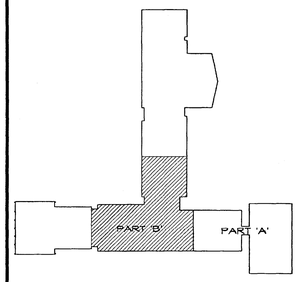


KEY PLAN

N

PROFESSIONAL SEAL

PROJECT MANAGER	L.J. FREE
ARCHITECT/ENGINEER	W.D. BOLAND
DRAWN BY	F. ACOSTINI

FLETCHER THOMPSON

ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO

CENTRAL MIDDLE SCHOOL

9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

GROUND FLOOR PART "B" ELECTRICAL PLAN

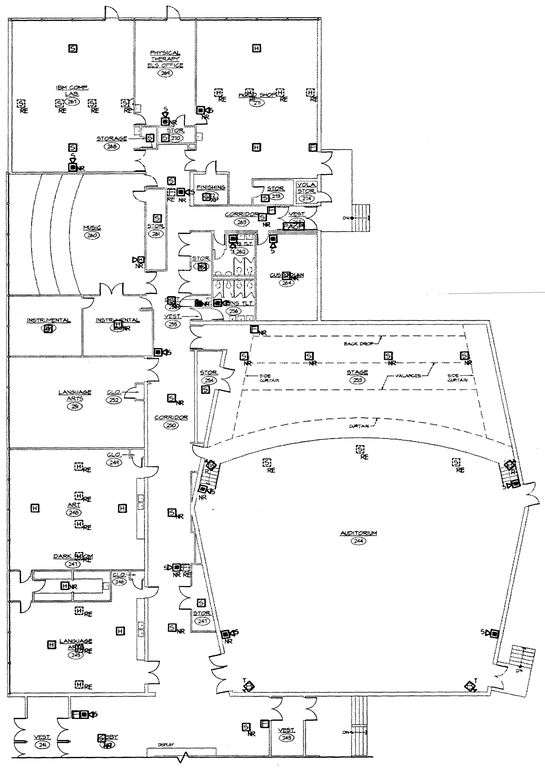
0 4' 8' 16'

SCALE: 1/8" = 1'-0"

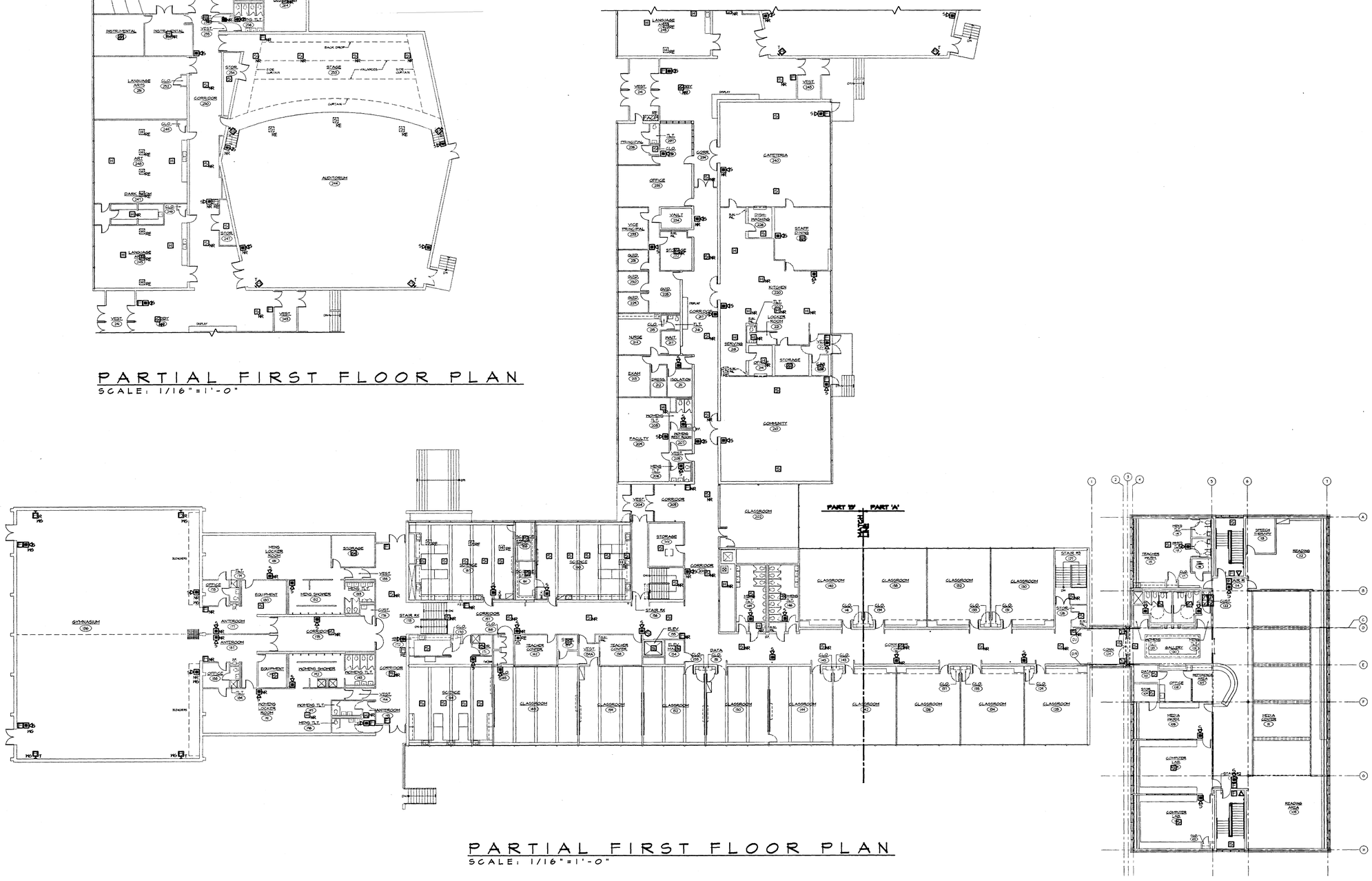
NO	DATE	REVISION	BY

DATE	MARCH 16, 1998
SCALE	1/8" = 1'-0"
PROJECT NO.	50950.06
DRAWING NO.	E100.2

BQ #70 & 125 Attachment



PARTIAL FIRST FLOOR PLAN
SCALE: 1/16"=1'-0"



PARTIAL FIRST FLOOR PLAN
SCALE: 1/16"=1'-0"

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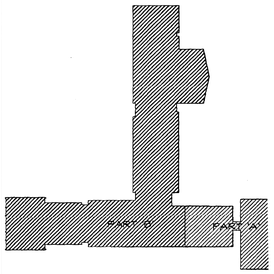

KEY PLAN

N

PROFESSIONAL SEAL

PROJECT MANAGER L.J. FREE
ARCHITECT/ENGINEER W.D. BOLAND
DRAWN BY F. AGOSTINI

FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE
ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE
FIRST FLOOR FIRE ALARM PLAN

0 4' 8' 16'
SCALE: 1/8" = 1'-0"

NO	DATE	REVISION	BY
1	6/19/98	D.O.E. REVISIONS	F.A.

DATE MARCH 16, 1998
SCALE 1/16" = 1'-0"
PROJECT NO. 50950.06
DRAWING NO. **E101**

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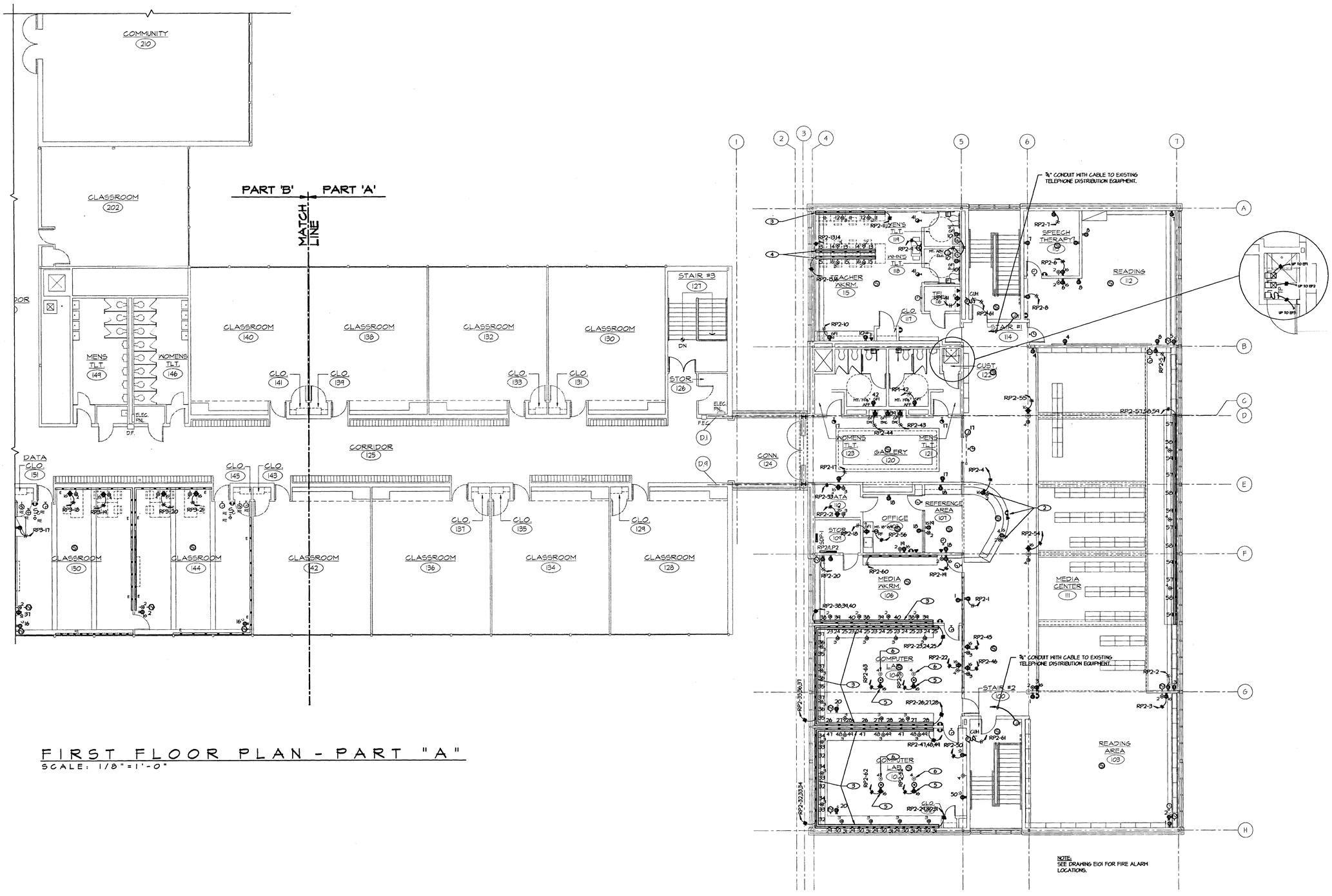
BQ #70 & 125 Attachment



FIRST FLOOR PLAN - PART "A"
SCALE: 1/8"=1'-0"

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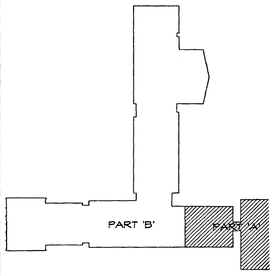

KEY PLAN

N

PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE
ARCHITECT/ENGINEER: W.D. BOLAND
DRAWN BY: F. AGOSTINI

FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

FIRST FLOOR PART "A" ELECTRICAL PLAN

0 4' 8' 16'
SCALE: 1/8" = 1'-0"

NO	DATE	REVISION	BY

DATE: MARCH 16, 1998
SCALE: 1/8" = 1'-0"
PROJECT NO.: 50950.06
DRAWING NO.: **E101.1**

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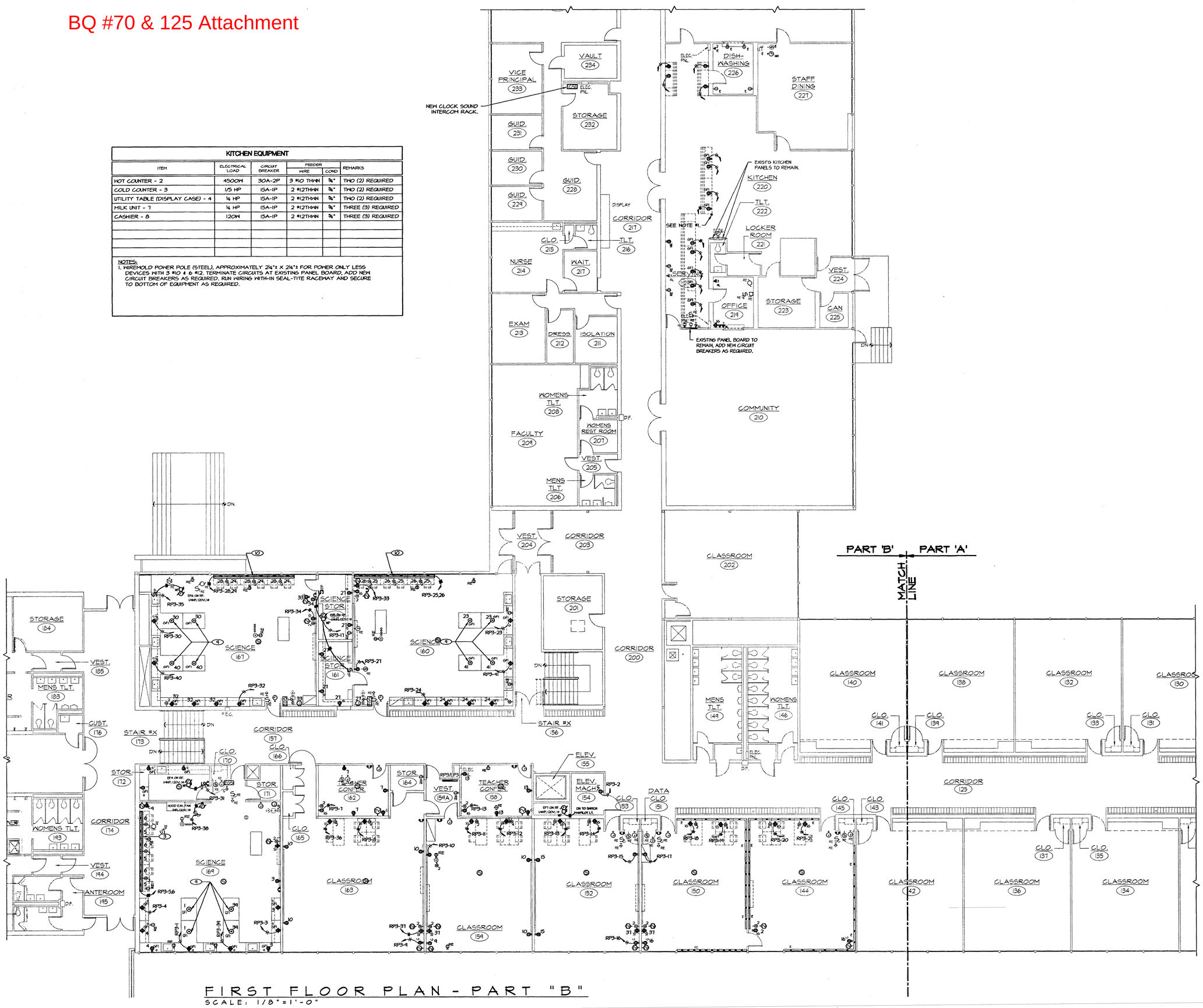
BQ #70 & 125 Attachment

KITCHEN EQUIPMENT

ITEM	ELECTRICAL LOAD	CIRCUIT BREAKER	FEEDER WIRE	FEEDER CONDT	REMARKS
HOT COUNTER - 2	4500W	30A-2P	3 #10 THWN	¾"	TWO (2) REQUIRED
COLD COUNTER - 3	1/5 HP	15A-1P	2 #12THWN	¾"	TWO (2) REQUIRED
UTILITY TABLE (DISPLAY CASE) - 4	¼ HP	15A-1P	2 #12THWN	¾"	TWO (2) REQUIRED
MILK UNIT - 7	¼ HP	15A-1P	2 #12THWN	¾"	THREE (3) REQUIRED
CASHIER - 8	120W	15A-1P	2 #12THWN	¾"	THREE (3) REQUIRED

NOTES:
1. WIREMOLD POWER POLE (STEEL), APPROXIMATELY 2¼"± X 2¼"± FOR POWER ONLY LESS DEVICES WITH 3 #10 & 6 #12. TERMINATE CIRCUITS AT EXISTING PANEL BOARD, ADD NEW CIRCUIT BREAKERS AS REQUIRED. RUN WIRING WITH-IN SEAL-TITE RACEWAY AND SECURE TO BOTTOM OF EQUIPMENT AS REQUIRED.



FIRST FLOOR PLAN - PART "B"
SCALE: 1/8"=1'-0"

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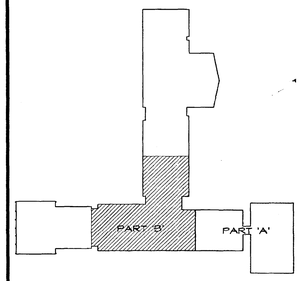


KEY PLAN

N

PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE
ARCHITECT/ENGINEER: W.D. BOLAND
DRAWN BY: F. AGOSTINI

FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

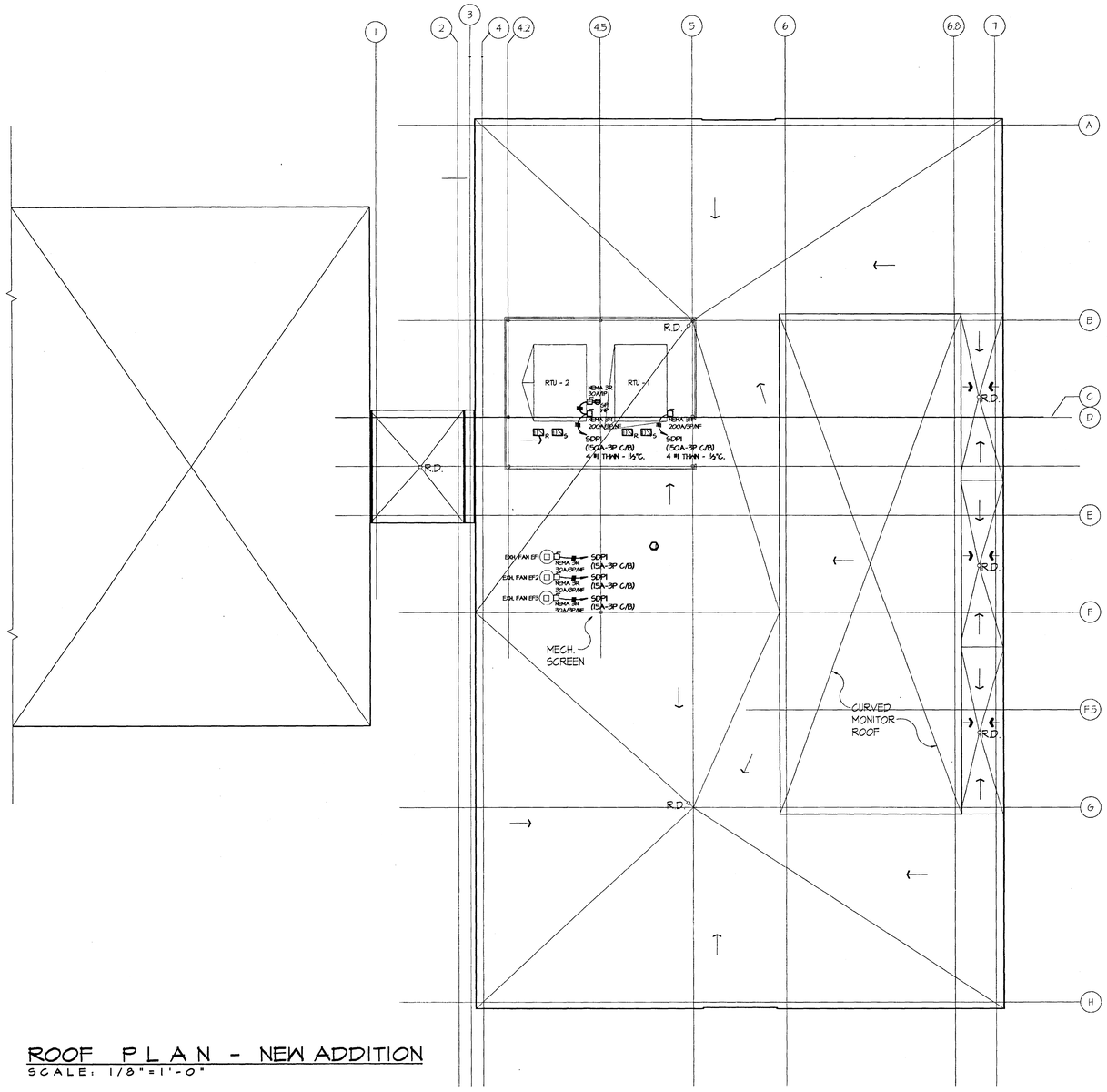
FIRST FLOOR PART "B" ELECTRICAL PLAN

0 4' 8' 16'
SCALE: 1/8" = 1'-0"

NO	DATE	REVISION	BY

DATE: MARCH 16, 1998
SCALE: 1/8" = 1'-0"
PROJECT NO.: 50950.06
DRAWING NO.: E101.2

BQ #70 & 125 Attachment



ROOF PLAN - NEW ADDITION
SCALE: 1/8"=1'-0"

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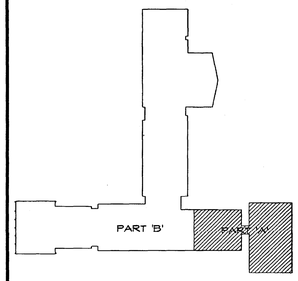

KEY PLAN

N

PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE
ARCHITECT/ENGINEER: W.D. BOLAND
DRAWN BY: F. AGOSTINI

FLETCHER
THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND
RENOVATIONS TO

CENTRAL
MIDDLE
SCHOOL

9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

NEW ADDITION
ROOF
ELECTRICAL
PLAN

0 4' 8' 16'
SCALE: 1/8" = 1'-0"

NO	DATE	REVISION	BY

DATE: **MARCH 16, 1998**
SCALE: **1/8" = 1'-0"**
PROJECT NO.: **50950.06**
DRAWING NO.: **E110**

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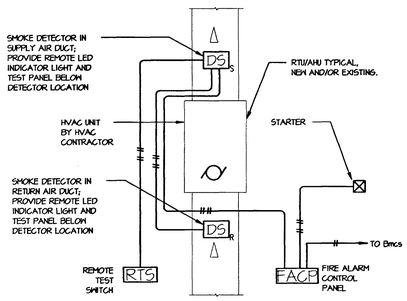
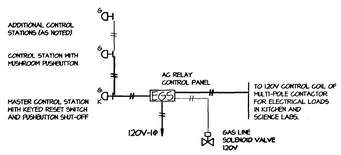
BQ #70 & 125 Attachment



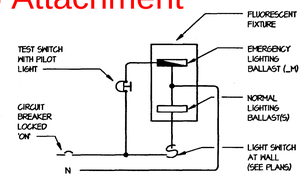
NOTE:
UPON ACTIVATION OF FIRE ALARM SYSTEM RTU SHALL BE SHUT OFF, TYPICALLY, OR AS DIRECTED BY FIRE MARSHAL.

WIRING DIAGRAM: DUCT SMOKE DETECTORS
NOT TO SCALE:



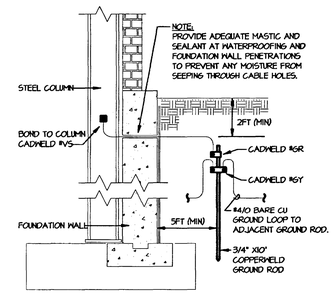
NOTES:
1. ALL PANELS, VALVES, AND CONTROL STATIONS TO BE FURNISHED AND INSTALLED BY PLUMBING CONTRACTOR.
2. ALL CONDUIT AND WIRE TO BE FURNISHED AND INSTALLED BY ELECTRICAL CONTRACTOR; USE #12AWG, 3/4"C MIN.

WIRING DIAGRAM: EMERGENCY GAS SHUT-OFF
SCALE: NONE

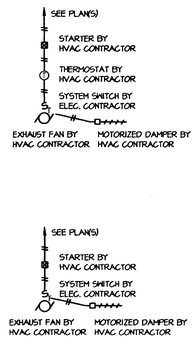


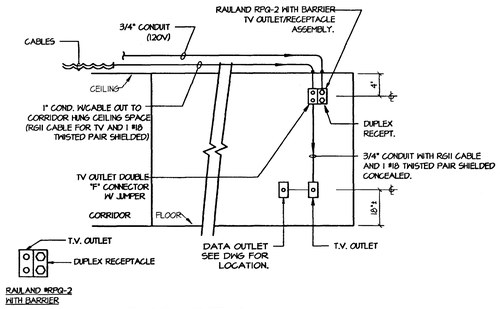
NOTE: EMERGENCY LAMPS SWITCHABLE; ON DURING A POWER FAILURE.

WIRING DIAGRAM: EMERGENCY FLUORESCENT LIGHTING
NOT TO SCALE:



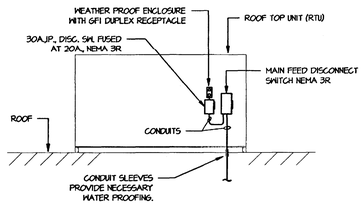
GROUNDING LOOP DETAIL
NOT TO SCALE:



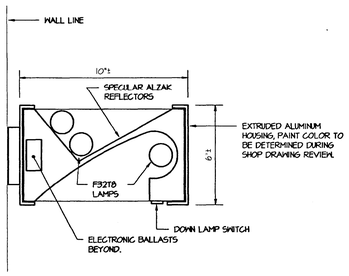


RAULAND #RPG-2 WITH BARRIER

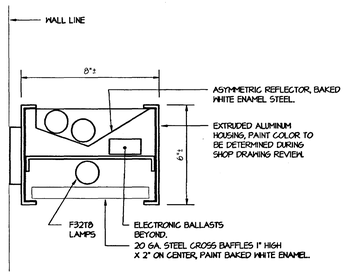
TYPICAL DETAIL: CLASSROOM T.V. WIRING
NOT TO SCALE:



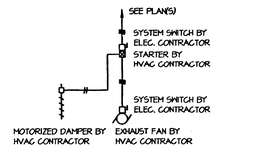
ROOF TOP UNIT DETAIL
NOT TO SCALE:



CROSS SECTION DETAIL: FIXTURE TYPE "K1" SERIES
NOT TO SCALE

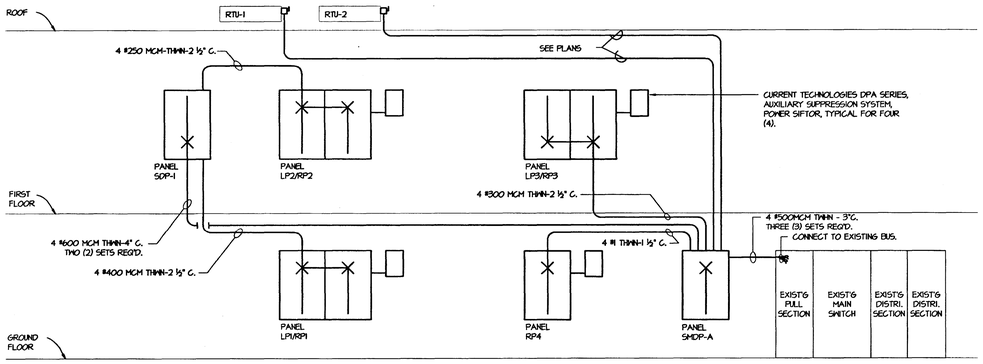


CROSS SECTION DETAIL: FIXTURE TYPE "H1A" SERIES
NOT TO SCALE

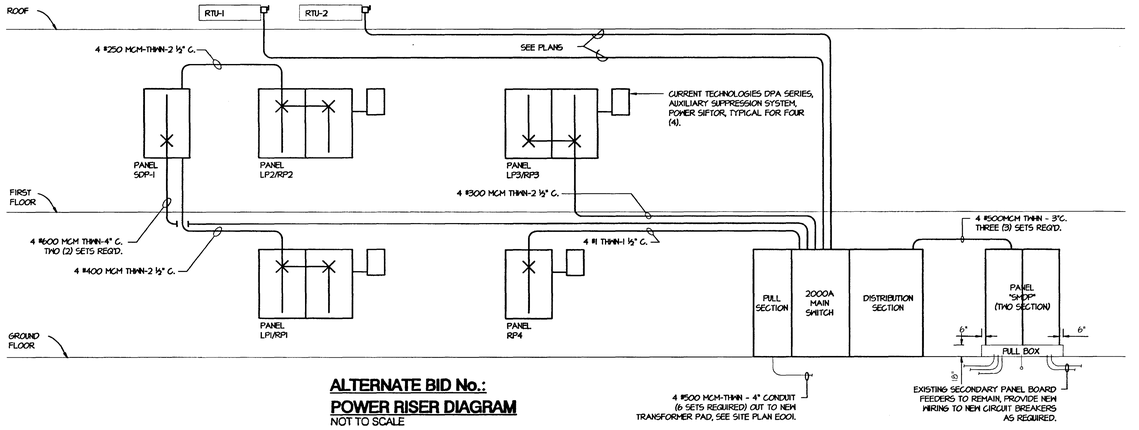


NOTES:
1. ALL EQUIPMENT BY HVAC CONTRACTOR (UON).
2. ALL WIRING BY ELECTRICAL CONTRACTOR.
3. ALL WIRING TO BE #12 (MIN) IN 3/4"C (MIN).
4. REFER TO PLAN(S) FOR LOCATIONS AND QUANTITIES OF EXHAUST FANS AND COMPONENTS.

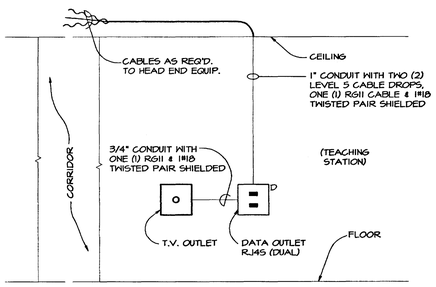
WIRING DIAGRAM: HVAC EXHAUST FANS
NOT TO SCALE:



BASE BID: POWER RISER DIAGRAM
NOT TO SCALE



ALTERNATE BID No.: POWER RISER DIAGRAM
NOT TO SCALE



TYPICAL DETAIL: DATA AND T.V. OUTLET LOCATIONS
NOT TO SCALE

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PROFESSIONAL SEAL

PROJECT MANAGER	L.J. FREE
ARCHITECT/ENGINEER	W.D. BOLAND
DRAWN BY	F. AGOSTINI

FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN
FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

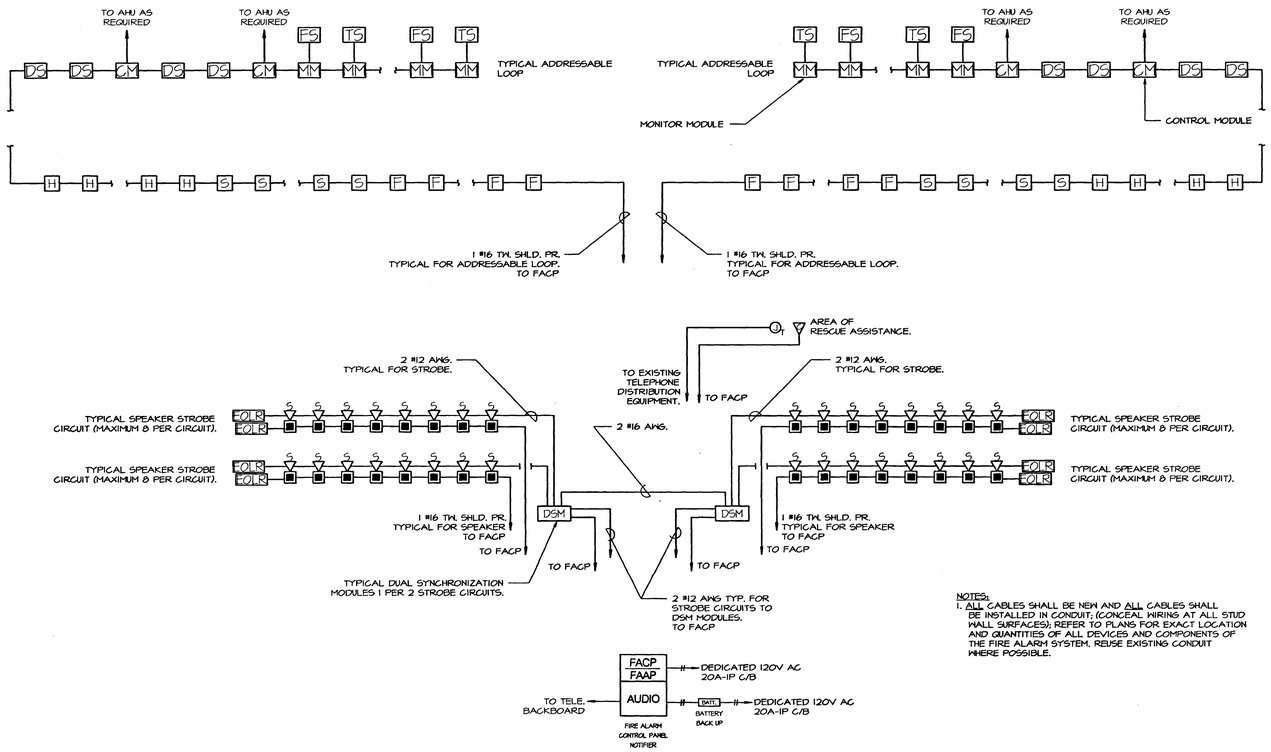
ELECTRICAL WIRING AND RISER DIAGRAMS AND DETAILS

NO	DATE	REVISION	BY

DATE: MARCH 16, 1998
SCALE: AS NOTED
PROJECT NO.: 50950.06
DRAWING NO.: **E301**

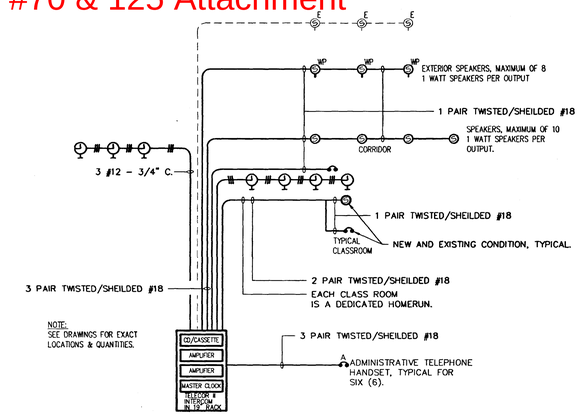
K:\projects\06050\dwg\files\E301 1-13-98 10:13:18 pm EST

BQ #70 & 125 Attachment

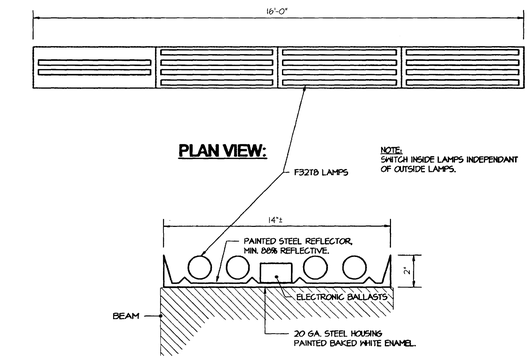


NOTES:
1. ALL CABLES SHALL BE NEW AND ALL CABLES SHALL BE INSTALLED IN CONDUIT; (CONCEAL WIRING AT ALL STUD WALL SURFACES). REFER TO PLANS FOR EXACT LOCATION AND QUANTITIES OF ALL DEVICES AND COMPONENTS OF THE FIRE ALARM SYSTEM. REUSE EXISTING CONDUIT WHERE POSSIBLE.

WIRING DIAGRAM: FIRE ALARM SYSTEM
NOT TO SCALE

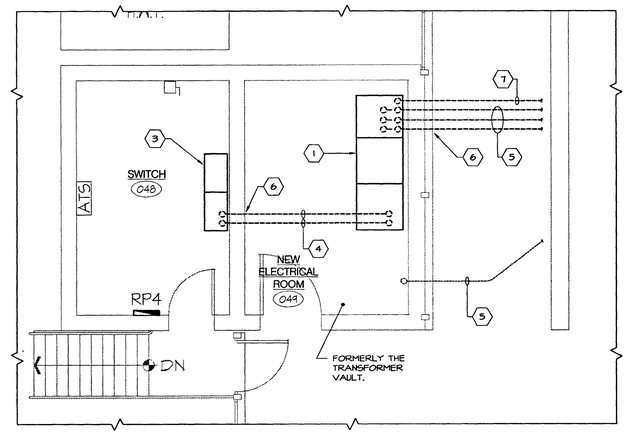


WIRING DIAGRAM: CLOCK-SOUND-INTERCOM
NOT TO SCALE



CROSS SECTION:

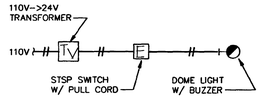
LUMINAIRE DETAIL:
FIXTURE TYPE "H1/H1M" SERIES
NOT TO SCALE



ELECTRICAL ROOM LAYOUT
SCALE: 1/4" = 1'-0"

ELECTRICAL NOTE LEGEND:

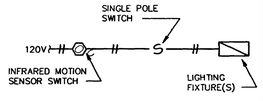
1. NEW 2000A MAIN SWITCH AND SECONDARY DISTRIBUTION SWITCHBOARD (EXACT LOCATION TO BE DETERMINED FROM FINAL SHOP DRAWING DIMENSIONS.)
2. NEW UNDERGROUND SECONDARY FEEDERS, SEE SHEET E001.
3. NEW SUB-DISTRIBUTION PANEL, SEE SHEET E301.
4. NEW SECONDARY FEEDERS, SEE SHEET E301.
5. APPROXIMATE LOCATION OF EXISTING PRIMARY SERVICE, SEE SHEET E001.
6. CUT AND PATCH WALL AND FLOOR SLABS AS REQUIRED.
7. NEW GROUND, CUT TO TRANSFORMER PAD.



ALL CONNECTIONS SHALL BE PER MANUFACTURER'S WIRING DIAGRAM(S).

ENTIRE SYSTEM, EXCLUDING CONDUIT AND WIRE, SHALL BE COMPONENTS OF A SINGLE SYSTEM AS PRODUCED BY ONE MANUFACTURER.

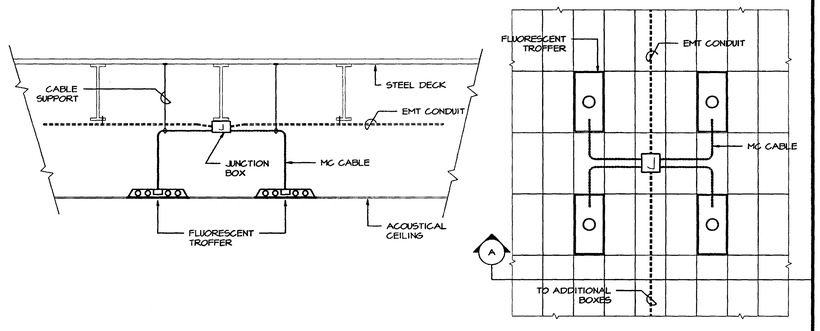
WIRING DIAGRAM: CALL FOR AID SYSTEM
NOT TO SCALE



ALL CONNECTIONS SHALL BE PER MANUFACTURER'S WIRING DIAGRAM(S).

SINGLE POLE SWITCH TO BE AN INTEGRAL COMPONENT OF WALL MOUNTED SENSORS; SWITCH REQUIRED FOR CEILING MOUNTED SENSORS.

WIRING DIAGRAM: OCCUPANCY SENSOR SWITCH
NOT TO SCALE



SECTION A
SCALE: NONE

PLAN VIEW
SCALE: NONE

FLUORESCENT TROFFER WIRING DETAIL AND CONDUIT
SCALE: NONE

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PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE
ARCHITECT/ENGINEER: W.D. BOLAND
DRAWN BY: F. AGOSTINI

FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN
FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

ELECTRICAL WIRING AND RISER DIAGRAMS AND DETAILS

NO	DATE	REVISION	BY

DATE: MARCH 16, 1998
SCALE: AS NOTED
PROJECT NO.: 50950.06
DRAWING NO.: E302

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SCHEDULE OF LUMINAIRES

TYPE VOLTS	MANUFACTURER CATALOG NUMBER	LAMPS SOURCE	DESCRIPTION	REMARKS
A1 120V	Hubbell # RS236MA02-BL Daylite or Williams	(3) 32 W	Fluorescent 2'x4' lay-in Troffer, three (3) lamps (T8), electronic ballast, hinged door frame, acrylic plastic lens panel (.125 thick)	Recessed
A1M 120V	Hubbell # RS236MA02-EM, Daylite or Williams	(3) 32 W	Fluorescent 2'x4' lay-in Troffer, Similar to Type "A1" except center lamp on self-contained emergency ballast.	Recessed
A1A 120V	Hubbell # RA236MA02-A1	(2) 32W	Similar to Type "A1" except 2'x2' housing size and "J" shaped	Recessed
A1AM 120V	Hubbell # RA236MA02-EM	(2) 32W	Similar to Type "A1A" except one (1) lamp on self-contained emergency ballast.	Recessed
A2 120V	Hubbell # RC236MA02-BI	(2) 32W	Fluorescent 1'x4' lay-in Troffer, two (2) lamps (T8), electronic ballast, hinged door frame, acrylic plastic lens panel (.125 thick)	Recessed
A2M 120V	Hubbell # RC236MA02-EM	(2) 32W	Similar to Type "A2" except one (1) lamp on self-contained emergency ballast.	Recessed
B1 120V	Ledalite # 25261025-24-I-12-EO-EM	(12) 32W	Fluorescent luminaire, two (2) lamps with direct/indirect distribution (50% DN/50% UP), twenty four (24'-0") foot, one-piece aluminum extrusion open top and specular parabolic lower down. Air-craft cable suspension, flat canopy. Electronic ballast. Exact housing/canopy color to be determined during shop drawing	Pendant Provide 2' suspension.
B1M 120V	Ledalite # 25261025-24-I-12-EO-EM	(12) 32W	Similar to Type "B1" except one (1) lamp on self-contained emergency ballast.	Pendant
B1A 120V	Ledalite # 25261025-20-I-12-EO	(10) 32W	Similar to Type "B1" except twenty foot (20'-0") long housing.	Pendant
B1B 120V	Ledalite # 25261025-08-I-12-EO	(10) 32W	Similar to Type "B1" except twenty foot (20'-0") long housing.	Pendant
B1C 120V	Ledalite # 25261025-8-I-12-EO	(4) 32W	Fluorescent luminaire, two (2) lamps with direct/indirect distribution, similar to Type "B1" except eight foot (8'-0") long housing.	Pendant
B1CM 120V	Ledalite #	(4) 32W	Fluorescent luminaire, two (2) lamps with direct/indirect distribution, similar to Type "B1C" except one (1) lamp on self-contained emergency ballast.	Pendant
C1 120V	Alkco # SF332	(1) 32W	Under cabinet task light, solid front, flat lens panel, 4'-0" long housing.	Surface
C1A 120V	Alkco # SF325	(1) 25W	Under cabinet task light, similar to Fixture type "C1" except 3'-0" long housing	Surface
D1 120V	Kurt Versen #634EB	(2) 26W	Fluorescent down-light, two (2) lamps, specular clear alzak reflector, electronic ballast.	Recessed
D1M 120V	Kurt Versen # 634EB-EM	(2) 26W	Similar to Type "D1" except one (1) lamp on self-contained emergency ballast.	Recessed
D2 120V	Kurt Versen # PR12-EB	(1) 26W	Fluorescent down-light, one (1) lamp, specular clear alzak reflector.	Recessed
F1 120V	Lite Control # LCA1254618-CMM-TH	(4) 25W	Indirect cove light, two (2) lamp, T8, electronic ballasts 6'-0" Long housing.	Surface
F1M 120V	Lite Control # LCA1254618-CMM-TH Linear Lighting or I.C.E.	(4) 25W	Indirect cove light, two (2) lamp, Similar to Type "F1" except one (1) lamp on self-contained emergency ballast.	Surface
G1 120V	Linear Lighting # 5380P-1-2-18-120-NS-C21-GG-NO-24, Peerless, ICE or PAL	(12) 32W	Indirect fluorescent luminaire, two (2) T8 lamps, electronic ballast. One (1) piece extruded aluminum 24'-0" long housing with perforated upper housing, air-craft cable suspension, flat canopy. Exact color to be determined during shop-drawing review.	Pendant Provide 2' suspension.
G1A 120V	Linear Lighting	(10) 32W	Similar to Type "G1" except 20'-0" long housing.	Pendant
G1B 120V	Linear Lighting	(8) 32W	Similar to Type "G1" except 16'-0" long housing	Pendant
G1C 120V	Linear Lighting	(6) 32W	Similar to Type "G1" except 12'-0" long housing.	Pendant
G1D1 120V	Linear Lighting	(4) 32W	Similar to Type "G1" except 8'-0" long housing.	Pendant
G1DM 120V	Linear Lighting	(4) 32W	Similar to Type "G1" except one (1) lamp on emergency battery ballast, Bodine #150.	Pendant
H1 120V	Day-O-Lite # DLS-10RRA	(14) 32W	Indirect fluorescent luminaire (mounts on top of wood beam) steel housing, 16'-0" long row. See details.	Surface
H1A 120V	Day-O-Lite # MF-DLS-10RRA	(6) 32W UP (4) 32W DN	Direct/Indirect fluorescent luminaire, Asymetric reflector up, two (2) lamp up x one (1) lamp dn w/ cross baffle shielding, 16'-0" lg. Extruded aluminum housing. Exact color to be determined during shop-dwg review.	Wall
H1M 120V	Day-O-Lite # DLS-10RRA-EM	(14) 32W	Similar to Type "H1" except two (2) lamps on emergency ballast battery unit.	Surface
J1 120V	Louis Poulsen #PH6-184 White	(1) 300W	Decorative chandelier, 25.6" dia. X 19.3 over all hgt. graduated reflector shades.	Pendant
K1 120V	Day-O-Lite Linear Lighting or I.C.E.	(12) 32W UP (6) 32W DN	Direct/Indirect fluorescent luminaire, two (2) lamps up w/asymetric reflector and one (1) lamp down. Extruded aluminum housing, 24'-0" long. See details.	Wall
K1A 120V	Day-O-Lite	(8) 32W UP (4) 32W DN	Direct/Indirect fluorescent luminaire, Similar to Type "K1" except 12'-0" long housing.	Wall
L1 120V	Hubbell # NRD-308-4M-PC-EM	(1) 26W	Exterior light fixture, prismatic reflector, 20° F ballast operation, with emergency ballast.	Wall
N1 120V	Day-O-Lite Alan Series Linear Lighting or I.C.E.	(6) 32W	Continuous fluorescent wall washer, extruded aluminum housing, 24'-0" long row, acrylic ribbed lens at bottom and at wall side, electronic ballast. Exact paint color to be determined at the site.	Wall
P1 120V	Prudential # P-101-48-GTE	(1) 32W	Single lamp strip light, 4'-0" long housing w/5/8" eggcrate acrylic plastic cube & mounting grid. See dwg A002.	Surface
QIM 120V	Hubbell #HEM42-MAC	(2) 32W	Prop-around, 4'-0" long fluorescent luminaire, acrylic plastic, two (2) lamp, one (1) lamp on emergency battery ballast, Bodine #350.	Surface Electronic Ballast.
X1 120V	PRESCOLITE #LED-R-1-NB-M,	(1) 1.5W LED	EMERGENCY TYPE EXIT LIGHT, SINGLE FACE EITHER WALL OR CEILING MOUNTED, ALUMINUM HOUSING, WHITE FINISH	SURFACE DUAL LITE OR HIGH-LITES
X2 120V	PRESCOLITE #LED-R-2-NB-M	(2) 1.5W LED	SIMILAR TO TYPE "X1" EXCEPT DOUBLE-FACE.	SURFACE DUAL LITE OR HIGH-LITES
X3 120V	PRESCOLITE #LED-R-1-NB-M,	(1) 1.5W LED	"AREA OF RESCUE ASSISTANCE" SIGN SINGLE FACE COMPLETE WITH NI-CAD BATTERY.	SURFACE DUAL LITE OR HIGH-LITES

NOTES:
1. ALL LAMPS SHALL BE EITHER F25T8/SP35RS OR F32T8/SP35RS.
2. ALL BALLAST SHALL BE ELECTRONIC, MOTOROLA, MAGNATEK OR TRIAD.
3. PROVIDE BODINE #350 EMERGENCY BALLAST IN ALL "AIM" FIXTURES LOCATED IN CORRIDORS AND STAIR WELLS AND BODINE #850 IN REMAINING AREAS.
4. ALL FLUORESCENT FIXTURES SHOWN ALIGNED IN TANDEM TO BE INSTALLED TO APPEAR AS A SINGLE CONTINUOUS LUMINAIRE.
5. ALL INCANDESCENT LAMPS SHALL BE RATED FOR 130 VOLTS.
6. ALL EXIT LIGHTS SHALL BE WALL MOUNTED, U.O.N. OR CEILING MOUNTED AS CLOSE TO WALL AS POSSIBLE.
7. UNLESS OTHERWISE NOTED, ALL LUMINAIRES INDICATED WITH THE LETTER_M PRECEDING THE FIXTURE TYPE, ie. "AIM" SHALL BE USED FOR EMERGENCY LIGHTING. WHERE MULTIPLE LAMPS ARE PRESENT ONLY ONE (1) LAMP SHALL BE USED FOR EMERGENCY.

ALTERNATE BID PANEL: MDP 2000A MAIN SWITCH 120 / 208V 3 PHASE 4 WIRE

CKT	EQUIPMENT	LOAD	FRAME	TRIP	POLE	FEEDER WIRE	FEEDER GOND	NOTES
1	PANEL SMDP	200,000	800A	800A	3	SEE RISER DIAGRAM		
2	PANEL RP4	18,644	225A	100A	3			
3	PANEL SDP-1	154,032	-	600A	3			
4	PANEL LP3/RP3	44,374	225A	225A	3			
5	RTU-1	35,280	225A	150A	3			
6	RTU-2	35,280	225A	150A	3			
7	SPARE		225A	225A	3			
8	SPACE		225A	100A	3			
9	SPACE		225A	100A	3			
10								
11								
12								

NOTES:
1. CONNECT AHEAD OF MAIN.
2. MAIN BREAKER 100,000A I.C., FEEDER BREAKER 65,000A I.C..
3. ALL CABLE SHALL BE THHN.
4. ALL CONDUIT SHALL BE GALVANIZED STEEL IN FLOOR SLAB AND E.M.T. IN OPEN AREAS.

SCHEDULE OF PANEL BOARDS

PANEL DESIGNATION	VOLTAGE	MAINS	BRANCH CIRCUITS FRAME	TRIP	POLE	ACTIVE	SPARE	TOTAL	REMARKS
SDP-1	120/208 3Ø,4W	600A MCB	400A	400A	3	1	-	1	-
			225A	225A	3	1	-	1	-
			100A	100A	3	1	-	1	-
			100A	20A	3	1	2	2	-
			100A	15A	3	2	-	2	-
			100A	20A	1	-	4	4	-
			100A	15A	1	1	-	1	-
LP1/RP1 DBLE SECT. PNL	120/208 3Ø,4W	300A MLO	100A	45A	3	7	-	7	-
			100A	20A	1	44	12	56	-
			100A	15A	1	1	-	1	-
LP2/RP2 DBLE SECT. PNL	120/208 3Ø,4W	300A MLO	100A	20A	1	61	11	72	-
LP3/RP3 DBLE SECT. PNL	120/208 3Ø,4W	225A MLO	100A	15A	1	4	-	4	-
			100A	20A	1	44	8	52	-
RP4	120/208 3Ø,4W	150A MLO	100A	30A	3	1	-	1	-
			100A	20A	3	1	-	1	-
			100A	20A	1	9	5	14	-
			100A	15A	1	4	-	4	-
SMDP ALTERNATE BID	120/208 3Ø,4W	800A MLO	200A	200A	3	2	1	3	-
			100A	100A	3	10	2	12	-
			100A	60A	3	9	-	9	-
			100A	30A	3	1	-	1	-

NOTES:
1. MCB; MAIN CIRCUIT BREAKER, MLO; MAIN LUGS ONLY, MFS; MAIN FUSED SWITCH.
2.
3.

TYPICAL ELECTRICAL PLAN NOTES:

1. WHEREVER POSSIBLE, RE-USE EXISTING BRANCH CIRCUIT(S) FOR NEW EQUIPMENT (U.O.N); EXISTING CIRCUIT(S) THAT ARE ABANDONED SHALL BE CLEARLY IDENTIFIED AT PANELBOARD DIRECTORY AS 'SPARE' AND ALL CONDUCTORS ASSOCIATED WITH SPARE CIRCUIT(S) SHALL BE REMOVED.
2. EXACT LOCATION OF ALL 'EXISTING TO REMAIN' MATERIAL AND ALL 'EXISTING TO BE RELOCATED' MATERIAL SHALL BE ESTABLISHED AND VERIFIED IN FIELD.
3. FOR EXACT LOCATION OF ALL MECHANICAL, PLUMBING, FIRE PROTECTION, AND OWNER FURNISHED EQUIPMENT, REFER TO DRAWINGS OF THOSE TRADES, AND COORDINATE ALL ELECTRICAL WORK WITH THOSE RESPECTIVE CONTRACTORS.
4. ELECTRICAL CONTRACTOR TO PROVIDE ALL NECESSARY NEW CIRCUIT BREAKERS IN EXISTING PANELBOARDS AS REQUIRED BY THESE DRAWINGS.
5. ALL NEW DUPLEX RECEPTACLES SHALL BE TIED TO NEAREST AVAILABLE 20A-1P, 120V BRANCH CIRCUIT (U.O.N); NO CIRCUIT IS TO BE LOADED TO MORE THAN 80% OF BREAKER RATING.
6. ALL NEW OUTLETS SHALL MATCH EXISTING DEVICES (IN THAT SPACE) FOR STYLE, COLOR, AND MOUNTING HEIGHT (U.O.N).
7. ALL ITEMS INDICATED ON ELECTRICAL PLANS SHALL BE NEW, UNLESS OTHERWISE INDICATED AS EXISTING TO REMAIN (E) OR EXISTING TO BE RELOCATED (RL) OR (RR).
8. FOR EXACT LOCATION OF LIGHTING FIXTURES AND ALL OTHER CEILING MOUNTED MATERIAL, REFER TO REFLECTED CEILING PLAN(S).
9. ALL NEW AND RELOCATED LIGHTING FIXTURES SHALL BE TIED TO EXISTING BRANCH CIRCUITS AND CONTROL, UNLESS INDICATED OTHERWISE.
10. IN AREAS WHERE NO ELECTRICAL WORK IS INDICATED, ALL EXISTING LIGHTING, CONTROL, AND BRANCH CIRCUIT(S) AND WIRING DEVICES ARE EXISTING (TO REMAIN).
11. IN AREAS WHERE ONE FIXTURE IS SHOWN TO BE CONTROLLED BY A SWITCH OR SWITCH(ES), ALL OTHER CEILING MOUNTED FIXTURES IN THAT SPACE SHALL BE CONTROLLED BY THE SAME SWITCH(ES).
12. ALL EXISTING, RELOCATED, AND NEW EMERGENCY LIGHTING FIXTURES AND EXIT SIGNS SHALL MONITOR NEAREST LIGHTING BRANCH CIRCUIT AHEAD OF ANY CONTROL DEVICES (U.O.N); FEED FIXTURES FROM SAME BRANCH CIRCUIT.
13. ALL SALVAGEABLE EQUIPMENT, FIXTURES, DEVICES, ETC. NOT BEING REUSED SHALL BE TURNED OVER TO BUILDING OWNER'S REPRESENTATIVE FOR STORAGE AND/OR FOR USE IN NEW WORK.
14. WHERE THE REMOVAL OF ANY DEVICE, FIXTURE, AND/OR EQUIPMENT INTERRUPTS THE CONTINUITY OF AN EXISTING (TO REMAIN) CIRCUIT, PROVIDE ALL CONNECTIONS, CONDUIT, AND CONDUCTORS NECESSARY TO MAINTAIN AND/OR EXTEND EXISTING CIRCUIT CONTINUITY.
15. WHERE BOXES REMAIN AFTER REMOVAL OF FIXTURES AND ELECTRICAL DEVICES FROM EXISTING (TO REMAIN) CONSTRUCTION, PROVIDE BLANK COVER FOR EACH OUTLET BOX.
16. REMOVAL OF ANY ELECTRICAL MATERIAL SHALL INCLUDE THE REMOVAL OF ALL CONTROL (INCLUDING SWITCHES), WIRES, AND CONDUIT (WHERE PRACTICAL) ASSOCIATED WITH SUCH MATERIAL, UNLESS OTHERWISE NOTED.
17. RELOCATION OF ANY ELECTRICAL MATERIAL SHALL INCLUDE THE EXTENSION OF ALL BRANCH CIRCUIT FEEDERS AND ALL CONTROL CIRCUITS TO NEW LOCATION.
18. ALL EXISTING DUPLEX RECEPTACLES LOCATED WITHIN 6'-0" OF ANY WATER SOURCE (SUCH AS SINKS, WATER COOLERS, OR GRADE, ETC.) TO BE REPLACED WITH NEW GFI TYPE DUPLEX RECEPTACLE (WHETHER INDICATED OR NOT).
19. IT IS THE INTENT OF THESE DRAWINGS THAT THE ENTIRE EXISTING FIRE ALARM SYSTEM SHALL BE REMOVED AND REPLACED WITH A NEW COMPLETE SYSTEM; HOWEVER, THIS BUILDING MUST REMAIN PROTECTED AT ALL TIMES.
20. WHERE NEW DEVICES AND/OR EQUIPMENT ARE INDICATED ON EXISTING (TO REMAIN) MASONRY WALLS, USE WIREMOLD SURFACE BOXES AND WIREMOLD SERIES 700 RACEWAY(S); WHERE NEW DEVICES AND/OR EQUIPMENT ARE INDICATED ON EXISTING (TO REMAIN) STUD WALLS (SHEETROCK OR GYPSUM BOARD SURFACES), USE FLUSH BOXES AND CONCEAL ALL RACEWAYS WITHIN WALL CONSTRUCTION.
21. ALL EXISTING TO REMAIN DIRECTIONAL EMERGENCY LIGHTING FIXTURES SHALL BE RE-AIMED TO PROVIDE EMERGENCY ILLUMINATION AT PATH OF EGRESS.

ELECTRICAL NOTE LEGEND:

1. LOCATE SWITCHES HERE FOR CONTROL OF SWITCH CONTROL A THROUGH F WITHIN MEDIA CENTER.
2. LOCATE DEVICES WITHIN CHARGING DESK, EXACT LOCATION TO BE DETERMINED AT THE SITE AND/OR DURING SHOP DRAWING REVIEW.
3. #4000 WIREMOLD RACEWAY COMPLETE WITH CENTER DIVIDER AND CONTINUOUS COVER. PROVIDE HUBBELL #1653625 SINGLE SUPPRESSION TYPE RECEPTACLES LOCATED AS INDICATED. IN ADDITION PROVIDE CATEGORY 5 DATA OUTLETS LOCATED AS INDICATED AND CATEGORY 5 DATA CABLES, TERMINATE DATA CABLES IN DATA ROOM #110. LOCATE RACEWAY BELOW COUNTER, 18" A.F.F..
4. SIMILAR TO NOTE #3, EXCEPT MOUNT WIREMOLD RACEWAY TO FURNITURE, EXACT MOUNTING METHOD TO BE DETERMINED AT THE SITE.
5. FLUSH FLOOR BOX WITH THREE (3) DUPLEX RECEPTACLES, #1653625, SURGE SUPPRESSION TYPE AND BRASS COVER PLATES.
6. FLUSH FLOOR BOX WITH FOUR (4) RJ45, CATEGORY FIVE (5) DATA OUTLETS
7. UNLESS OTHERWISE NOTED, DISCONNECT AND REMOVE ALL EXISTING LIGHTING FIXTURES, RECEPTACLES, FIVE ALARM EQUIPMENT, ETC. AND REPLACE WITH NEW. REUSE EXISTING WIRING WHERE EVER POSSIBLE.
8. TECHNOLOGY NOTES:
   EACH INSTRUCTIONAL AREA SHOULD HAVE A WALL PLATE WITH RF MASTER ANTENNA VIDEO OUTLET, RF OUTLET CONNECTED BY CONDUIT TO THE CLASSROOM COMPUTER AREA BY IN-WALL CONDUIT (WITH AN RF OUTLET ALSO AT THE COMPUTER END TO BE USED WITH A COMPUTER DISPLAY ADAPTER), AND TWO ELECTRICAL OUTLETS MOUNTED AT WHATEVER STANDARD HEIGHT YOU USE FOR WALL MOUNTING (10"). WE REQUIRE A MOUNTED WALL OR CEILING DEVICE THAT WILL HOLD BOTH A 27 PLUS INCH DISPLAY MONITOR AS WELL AS A VCR (THE REASON FOR THE SECOND AC OUTLET).

   TV WALL PLATES: BLONDER TONGUE #V-1GF-FT, OFO TYPE

   FEED COVERS: MULBERRY #84101 IVORY ENAMELED METAL.

   TV CABLE: ALPHA OR EQUIVALENT RG-6 TRIPPLE-SHIELD COAX WITH BRAIDED AND FOIL SHIELD. THIS DIVISION OF AT&T IS KNOWN AS LUCENT

   DATA WALL PLATES: AT&T M28A-246 (8 POSITION), M14A-246 (4 POSITION) OR M12A-246 (2 POSITION). NOTE: 8 POSITION PLATES REQUIRE A 2 GANG BOX. OTHERS ARE SINGLE GANG.

   DATA OUTLETS (JACK ASSEMBLIES): AT&T M100BH-246 (RJ45). NOW MPS 100BH.

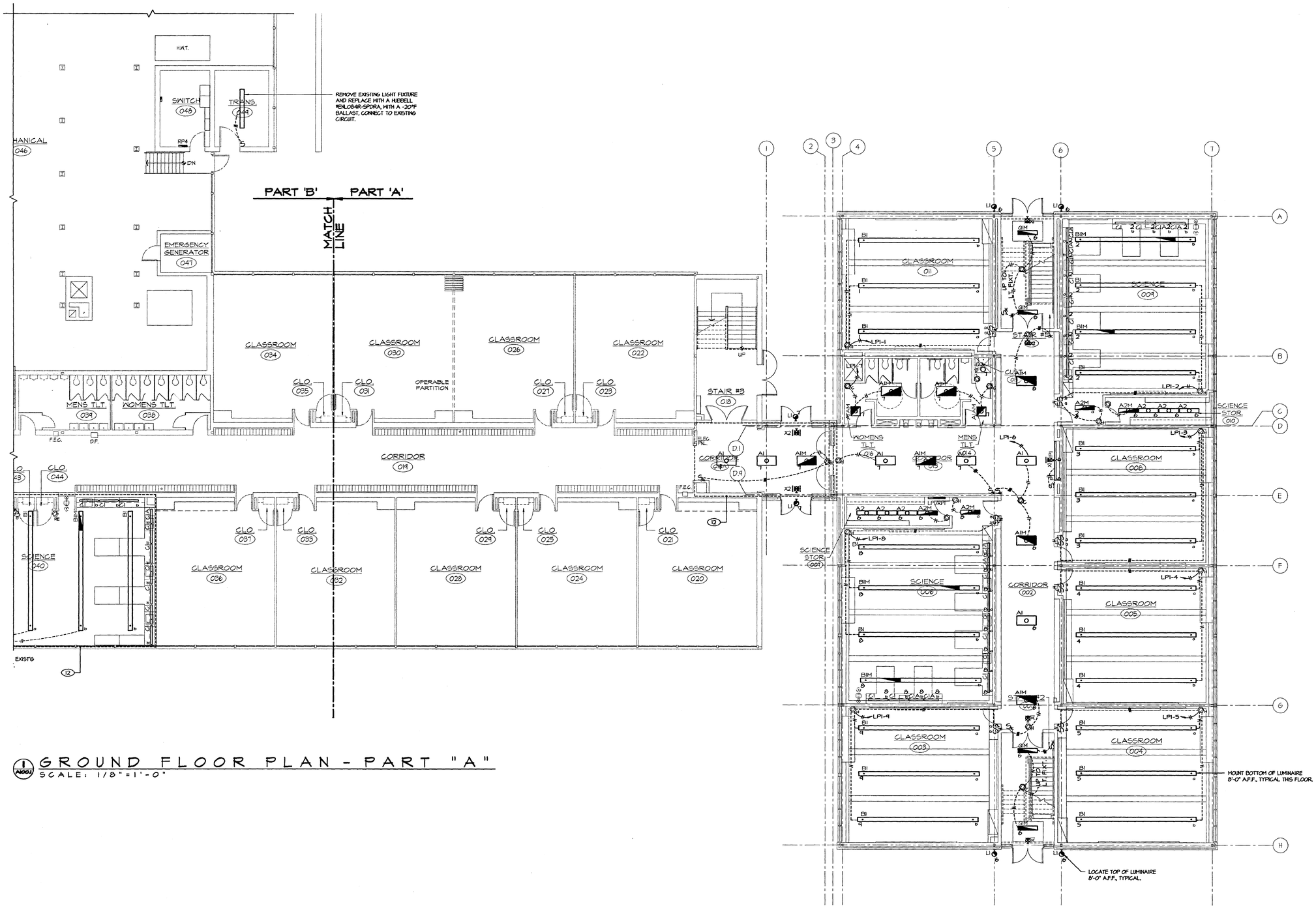
   DATA CABLE: AT&T #1061C, 4 PAIR, LEVEL 5 UTP (UNLESS PLENUM CABLE IS REQUIRED).

   RACK: CHATSWORTH 190H X 380H X 180D, WALL MOUNTED, OPEN FRAME RACK, SWING OUT TYPE FOR REAR ACCESS:
   PATCH PANEL: ATT 110CAT5-48 OR 96
   CONCENTRATOR CHASSIS: ASANTE AH2072
   12 PORT MODULES: ASANTE AH2072-RJ45
   MANAGEMENT MODULE: ASANTE AH2072-NMM
9. PEDESTAL TYPE, DOUBLE DUPLEX, MOUNTED TO TOP OF WORK STATION. WIRING FROM CONDUIT STUB-UP BELOW. EXACT ROUTING TO BE DETERMINED AT THE SITE.
10. DISCONNECT AND REMOVE EXISTING LIGHT FIXTURES AND REPLACE IN ORIGINAL LOCATION TO FACILITATE REMOVAL OF ANY EXISTING CEILING TILES TO ACCOMMODATE NEW HVAC, PLUMBING PIPING. RECONNECT TO EXISTING WIRING.
11. PROVIDE DIMMING BALLASTS FOR EACH TYPE "G1" LIGHT FIXTURE IN COMPUTER LABS, LUTRON ELECTRONIC HI-LUME SERIES WITH NOVA, SLIDE STYLE DIMMER SWITCHES AS REQUIRED.
12. DISCONNECT AND REMOVE EXISTING LIGHT FIXTURES INCLUDING ALL WIRING, etc. AND REPLACE WITH NEW AS INDICATED PROVIDE NEW WIRING, RACEWAYS, SWITCHING AND NEW HOME RUNS AS REQUIRED.

SYMBOL LIST
(STATE OF CONNECTICUT)

○	SURFACE MOUNT LUMINAIRE SUBSCRIPT DENOTES FIXTURE TYPE	⊖	SINGLE RECEPTACLE MOUNT AT 18" AFF (U.O.N)
◘	RECESSED MOUNT DOWNLIGHT LUMINAIRE SUBSCRIPT DENOTES FIXTURE TYPE	⊖	DUPLEX RECEPTACLE MOUNT 18" AFF (U.O.N) c. = MOUNT AT 80" AFF (REFER TO DETAIL)
◥	LUMINAIRE USED FOR EMERGENCY LIGHTING W/ A SELF-CONTAINED, DIODE, EMERGENCY BATTERY BALLAST. SUBSCRIPT DENOTES FIXTURE TYPE	⊖ a / b	a = MOUNT 6" ABOVE COUNTERTOP OR 48" AFF b = MOUNT WITHIN ARCHITECTURAL MILLWORK
⊙	PENDANT SUSPEND LUMINAIRE SUBSCRIPT DENOTES FIXTURE TYPE	⊖	DOUBLE DUPLEX RECEPTACLE MTD 18" AFF (U.O.N)
▭	CEILING MOUNT FLUORESCENT TROFFER SUBSCRIPT DENOTES FIXTURE TYPE	⊖	DUPLEX SAFETY RECEPTACLE MTD 18" AFF (U.O.N)
▭	FLUORESCENT TROFFER (WIRE FOR TWO CIRCUITS) SUBSCRIPT DENOTES FIXTURE TYPE	⊖ AC	DUPLEX RECEPTACLE FOR UNIT AIR CONDITIONER MOUNT AS NOTED ON PLAN
◥ ◔ ◒	LUMINAIRE USED FOR EMERGENCY LIGHTING W/ A SELF-CONTAINED, DIODE, EMERGENCY BATTERY BALLAST. SUBSCRIPT DENOTES FIXTURE TYPE	⊖ CD	SINGLE RECEPTACLE FOR CLOTHES DRYER MOUNT AT 12" AFF (U.O.N)
▭	PENDANT SUSPEND FLUORESCENT LUMINAIRE SUBSCRIPT DENOTES FIXTURE TYPE	⊖ DW	SINGLE RECEPTACLE FOR DISHWASHER MOUNT AT 12" AFF (U.O.N)
○	WALL MOUNT LUMINAIRE SUBSCRIPT DENOTES FIXTURE TYPE	⊖ GFI	GFI TYPE DUPLEX RECEPTACLE FOR ELECTRIC WATER COOLER; MOUNT AT 18" AFF (U.O.N)
▬	WALL MOUNT FLUORESCENT LUMINAIRE SUBSCRIPT DENOTES FIXTURE TYPE	⊖ FZR	SINGLE RECEPTACLE FOR FREEZER MOUNT AT 48" AFF (U.O.N)
▬	LINEAR FLUORESCENT CHANNEL LUMINAIRE SUBSCRIPT DENOTES FIXTURE TYPE	⊖ GFI	GFI TYPE DUPLEX RECEPTACLE MOUNT AT 18" AFF (U.O.N)
A B	TRACK WITH LIGHTING FIXTURES AS INDICATED SUBSCRIPTS DENOTE TRACK AND FIXTURE TYPES	⊖ IG	DUPLEX RECEPTACLE MOUNT AT 18" AFF (U.O.N) WITH INSULATED ISOLATED GROUND CONDUCTOR TO PANEL. SURGE SUPPRESSION OUTLET HUBBELL #5635825
A1 a b	LIGHTING FIXTURE ATTRIBUTES LEGEND a = LIGHTING CONTROL CIRCUIT b = LIGHTING FIXTURE TYPE (SEE SCHEDULE) = POWER BRANCH CIRCUIT	⊖ REF	DUPLEX RECEPTACLE FOR REFRIGERATOR MOUNT AT 48" AFF (U.O.N)
⊠ ⊠	SELF-CONTAINED EMERGENCY EXIT SIGNS WITH DIRECTIONAL ARROWS AS INDICATED	⊖ RF	SINGLE RECEPTACLE FOR REFRIGERATOR/FREEZER MOUNT AT 48" AFF (U.O.N)
◘ ◘	SELF-CONTAINED EMERGENCY LIGHTING UNITS WIRE TO NEAREST LIGHTING BRANCH CIRCUIT	⊖ RNG	SINGLE RECEPTACLE FOR ELECTRIC RANGE MOUNT AT 12" AFF (U.O.N)
◘ ◘	SELF-CONT MASTER/SATELLITE EMERG. LTG UNITS WIRE TO NEAREST LIGHTING BRANCH CIRCUIT	⊖ TC	SINGLE RECEPTACLE FOR TRASH COMPACTOR MOUNT AT 12" AFF (U.O.N)
		⊖ VM	DUPLEX RECEPTACLE FOR VENDING MACHINE MOUNT AT 48" AFF (U.O.N)
S	SINGLE POLE SWITCH MOUNT AT 48" AFF	⊖ WD	GFI DUPLEX RECEPTACLE FOR WASHING MACHINE MOUNT AT 48" AFF (U.O.N)
S_3	THREE-WAY SWITCH MOUNT AT 48" AFF	⊳	SPECIAL PURPOSE OUTLET; CONFIGURATION TO MATCH EQUIPMENT CONNECTION ASSEMBLY
S_4	FOUR-WAY SWITCH MOUNT AT 48" AFF	⊙	FLOOR MOUNTED TOMBSTONE MONUMENT WITH OUTLETS AS INDICATED
S_P	SINGLE POLE SWITCH WITH PILOT LIGHT 48" AFF	⊡	FLUSH MOUNT FLOOR RECEPTACLE PROVIDE FLANGE TO SUIT FLOOR FINISH MATERIAL
S_{3P}	THREE-WAY SWITCH WITH PILOT LIGHT 48" AFF	▭	PUSHBUTTON WITH OUTLETS 18" OC (U.O.N) MOUNT AT 18" AFF (U.O.N)
S_D	SINGLE POLE 1000W DIMMER SWITCH 48" AFF	▭	PUSHBUTTON WITH OUTLETS 36" OC (U.O.N) RACEWAY (FOR DATA) MOUNT AT 18" AFF (U.O.N) WIREMOLD #4000 WITH HUBBELL #5659125 SURGE SUPPRESSION OUTLETS, SEE OTHER NOTES ALSO.
S_{3D}	THREE-WAY 1000W DIMMER SWITCH 48" AFF		
S_{WC}	BOILER EMERGENCY SWITCH MOUNT AT 60" AFF	(J) (H)	JUNCTION BOX (SEE PLAN FOR APPLICATION)
(M)	OCCUPANCY MOTION SENSOR LIGHT SWITCH 48" AFF, U.O.N. (G DENOTES CEILING MOUNT ASSEMBLY) (M DENOTES MOUNT HIGH ON WALL)	(J) (P)	JUNCTION BOX FOR ELECTRONIC PLUMBING FIXTURE COORDINATE MOUNTING WITH PLUMBING DRAWINGS
		(C)	12" SYSTEM CLOCK
S_T	SWITCH W/ THERMAL OVERLOAD PROTECTION 48" AFF	▶	TELEPHONE OUTLET MTD 18" AFF (T-FAX 18" AFF) (T-FAX PHONE 48" AFF) (T-WALL PHONE 48" AFF)
S_K	KEY OPERATED SINGLE POLE SWITCH 48" AFF	▶	COMBINATION DATA/TELEPHONE OUTLET 18" AFF REFER TO DETAIL DIAGRAM
S_{3K}	KEY OPERATED THREE-WAY SWITCH 48" AFF	⊛	FLOOR MOUNTED TELEPHONE/DATA OUTLET
ES	ELECTRIC DOOR STRIKE	(D)	DATA OUTLET MOUNT AT 18" AFF, SEE NOTES BELOW (D) INDICATES QUANTITY OF DATA OUTLETS/CABLES
●	DOOR CONTACT SWITCH	(D)	DATA OUTLET MOUNT AT 18" AFF (D-DUPLEX) REFER TO DETAIL DIAGRAM OR LOCATED WITHIN IN WIREMOLD
▭	VIDEO CAMERA WITH MOUNTING HARDWARE	(T)	TELEVISION SYSTEM OUTLET MOUNT AT 18" AFF SEE DETAIL ON DRAWING E501
VM VM	VIDEO MONITOR; VIDEO RECORDER	(C) (C)	COMBINATION OUTLET FOR COMMUNICATION, COMPUTER, AND CABLE TV MOUNT AT 18" AFF (SEE DETAIL)
▭	CARD READER MOUNT AT 48" AFF		
(M) (M)	CEILING OR WALL MOUNTED MOTION DETECTOR	⌂	MASTER FIRE ALARM PULL BOX 48" AFF
◁	SECURITY SYSTEM INFARED BEAM	▭	MANUAL FIRE ALARM PULL STATION 48" AFF
		◁	FIREFIGHTER'S TELEPHONE JACK MOUNT AT 48" AFF
(S)	CEILING MOUNTED SPEAKER	(F) (S)	FIRE ALARM CEILING OR WALL MOUNT SPEAKER
(S)	WALL OR COLUMN MOUNTED SPEAKER	■◁	FIRE ALARM HORN/LIGHT COMBINATION 80" AFF (U.O.N)
(M)	WALL MOUNTED MICROPHONE OUTLET (18" AFF)	■◁ S	FIRE ALARM SPEAKER/STROBE 80" AFF FOR VOICE EVACUATION SYSTEM
VC	SOUND SYSTEM VOLUME CONTROL MOUNT AT 48" AFF	■◁	FIRE ALARM HORN (ONLY) 80" AFF (U.O.N)
AMP	SOUND SYSTEM AMPLIFIER	■	FIRE ALARM FLASHING LIGHT 80" AFF (U.O.N)
(S) (S)	PA/SOUND SYSTEM/CLOCK IN COMMON ENCLOSURE MOUNT AT 80" AFF	(S)	FIRE ALARM SMOKE DETECTOR
	PA/PAGING SYSTEM HANDSET MOUNT AT 48" AFF	▭	FIRE ALARM HEAT DETECTOR (135° F U.O.N) BOILER ROOM DETECTORS TO BE 200° F
	ADMINISTRATIVE HANDSET	(S)	ELEVATOR RECALL SMOKE DETECTOR
S_C	3 POSITION SELECTOR SWITCH 48" AFF (P-PRIVACY, N-NORMAL, C-CALL-IN)	T/R	INFARED BEAM TYPE SMOKE DETECTOR 12" BPG R-RECEIVER, T-TRANSMITTER
RQ	PROGRAM BELL MOUNT AT 80" AFF	▭	FIRE ALARM MAGNETIC DOOR HOLDER/RELEASE F DENOTES FLOOR MOUNTED ASSEMBLY
⊙	CALL FOR AID BEACON WITH BUZZER 80" AFF	(S) R	DUCT MOUNTED SMOKE DETECTOR R-RETURN S-SUPPLY
▭	CALL FOR AID SWITCH WITH PULL CORD 36" AFF	(S) (S)	SPRINKLER FLOW SWITCH, TAMPER SWITCH
(V) (V) (V)	AUDIO-VISUAL SYSTEM OUTLETS (C-CAMERA) (P-PANEL/SCREEN, V-VIDEO PROJECTOR)	FACP	FIRE COMMAND CENTER WITH FIRE ALARM ANNUNCIATOR PANEL
	DEDICATED HOMERUN TO PANELBOARD (BREAKER CONDUCTORS AS INDICATED OR SCHEDULED	FACP	FIRE ALARM CONTROL PANEL WITH FIREFIGHTERS COMMAND CENTER
	EMERGENCY LIGHTING HOMERUN TO BATTERY VOLTAGE AND CAPACITY TO MATCH BATTERY	VES	FIRE ALARM VOICE EVACUATION PANEL
	#4/0 AWG COPPER GROUND FROM COLUMN STEEL TO 3/4"x10' COPPERWELD GROUND ROD (ALL CADWELD)	◁	AREA OF REFUGE COMMUNICATION PHONE TO FIRE COMMAND CENTER (MOUNT AT 42" AFF)
	PANELBOARD (277/480V, 3PH, 4W)		
T	DRY TYPE TRANSFORMER	⏀	CONNECTION TO MOTORIZED EQUIPMENT
	PANELBOARD (120/208V, 3PH, 4W)	□	UNFUSED SAFETY DISCONNECT SWITCH 60" AFF
HO	EMERGENCY SHUT-OFF SWITCH 42" AFF G-GAS L-ELECTRIC, U-BOTH UTILITIES	F	FUSED SAFETY DISCONNECT SWITCH 60" AFF
M	MULTI-POLE CONTACTOR IN NEMA 1 ENCLOSURE MTD AT 80" AFF (REFER TO WIRING DIAGRAM)	⊠	MOTOR STARTER (FURNISHED WITH EQUIPMENT)
EQCP	EMERGENCY GAS SHUT-OFF CONTROL PANEL	S_F	CONTROL SWITCH FURNISHED WITH FAN 60" AFF
	GAS LINE SHUT-OFF SOLENOID VALVE	T	THERMOSTAT (BY HVAC CONTRACTOR) 60" A

BQ #70 & 125 Attachment



1 A100J GROUND FLOOR PLAN - PART "A"
SCALE: 1/8"=1'-0"

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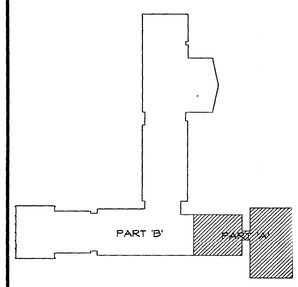

KEY PLAN

N

PROFESSIONAL SEAL

PROJECT MANAGER L.J. FREE
ARCHITECT/ENGINEER W.D. BOLAND
DRAWN BY F. AGOSTINI

FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE
ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE
GROUND FLOOR PART "A" LIGHTING PLAN

0 4' 8' 16'
SCALE: 1/8" = 1'-0"

NO	DATE	REVISION	BY

DATE MARCH 16, 1998
SCALE 1/8" = 1'-0"
PROJECT NO. 50950.06
DRAWING NO. **E700.1**

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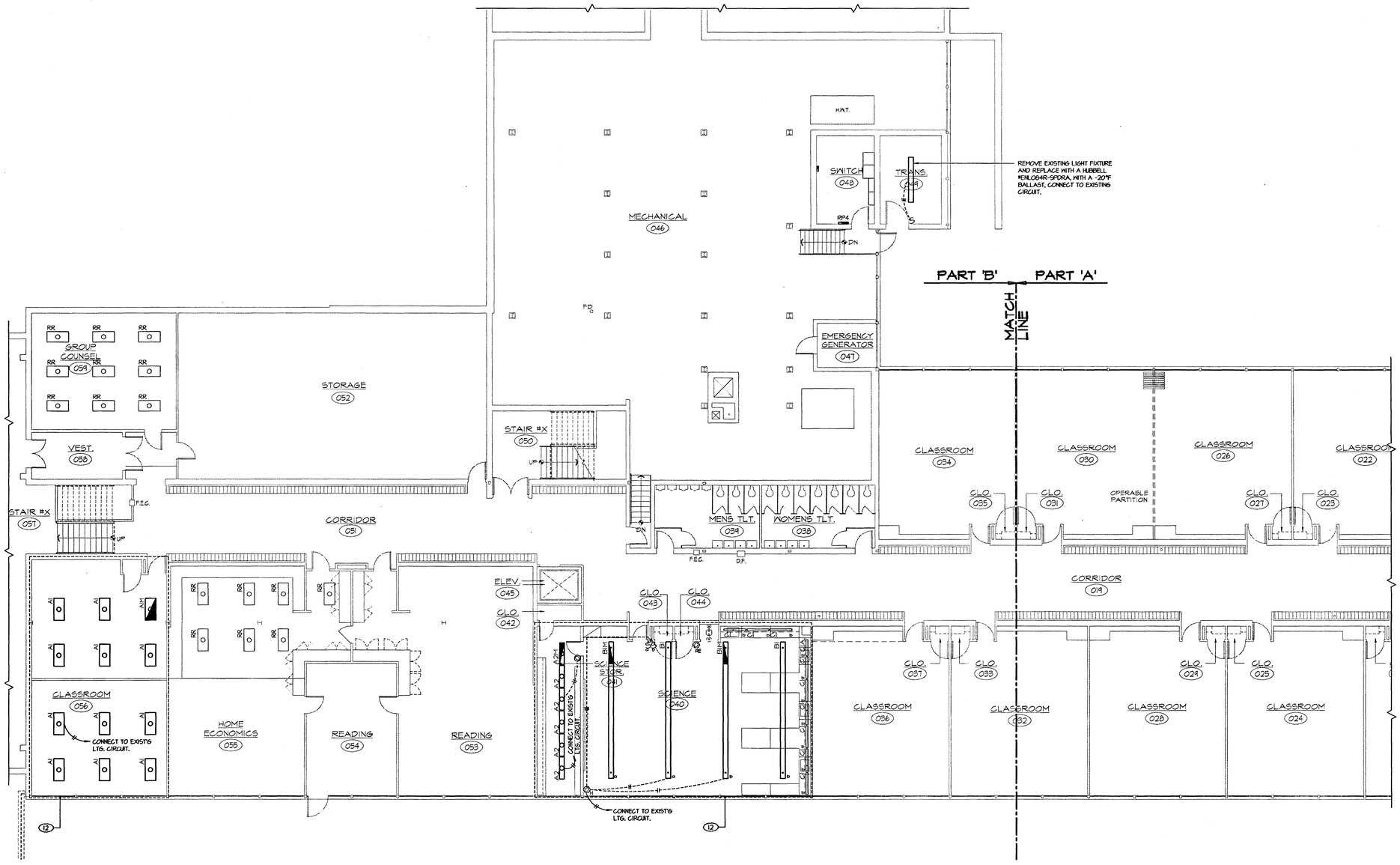
BQ #70 & 125 Attachment



GROUND FLOOR PLAN - PART "B"

A100.3 SCALE: 1/8" = 1'-0"

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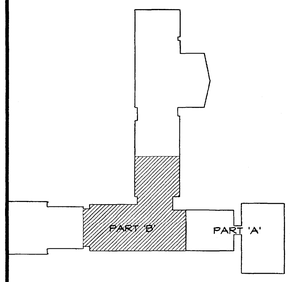


KEY PLAN

N

PROFESSIONAL SEAL

PROJECT MANAGER	L.J. FREE
ARCHITECT/ENGINEER	W.D. BOLAND
DRAWN BY	F. AGOSTINI

FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO

CENTRAL MIDDLE SCHOOL

9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

GROUND FLOOR PART "B" LIGHTING PLAN

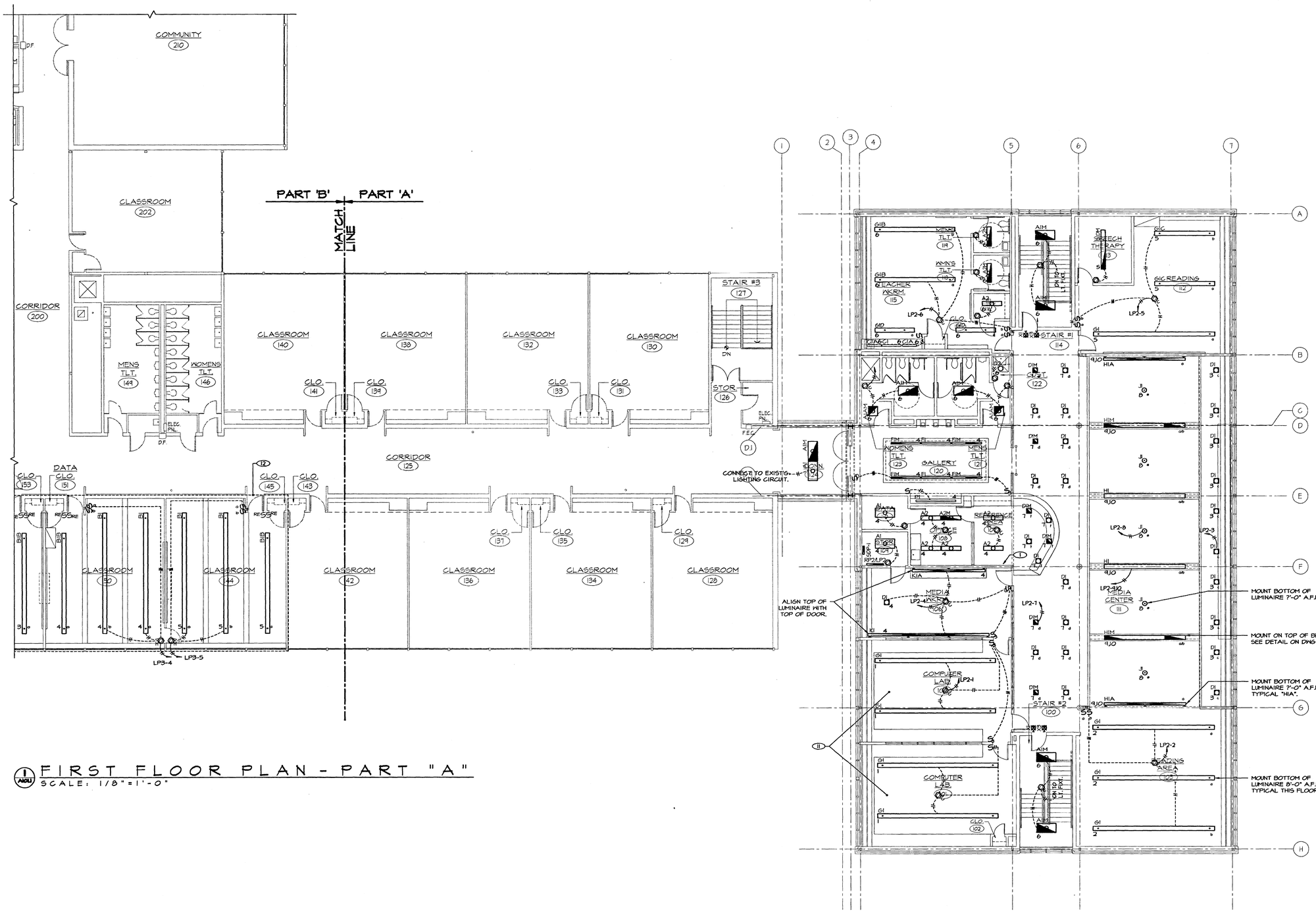
0 4' 8' 16'

SCALE: 1/8" = 1'-0"

NO	DATE	REVISION	BY

DATE	MARCH 16, 1998
SCALE	1/8" = 1'-0"
PROJECT NO.	50950.06
DRAWING NO.	E700.2

BQ #70 & 125 Attachment



1 A601 FIRST FLOOR PLAN - PART "A"

SCALE: 1/8"=1'-0"

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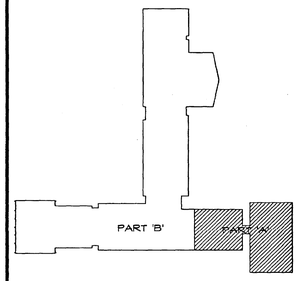

KEY PLAN

N

PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE
ARCHITECT/ENGINEER: W.D. BOLAND
DRAWN BY: F. AGOSTINI

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ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

FIRST FLOOR PART "A" LIGHTING PLAN

0 4' 8' 16'
SCALE: 1/8" = 1'-0"

NO	DATE	REVISION	BY

DATE: **MARCH 16, 1998**
SCALE: **1/8" = 1'-0"**
PROJECT NO.: **50950.06**
DRAWING NO.: **E701.1**

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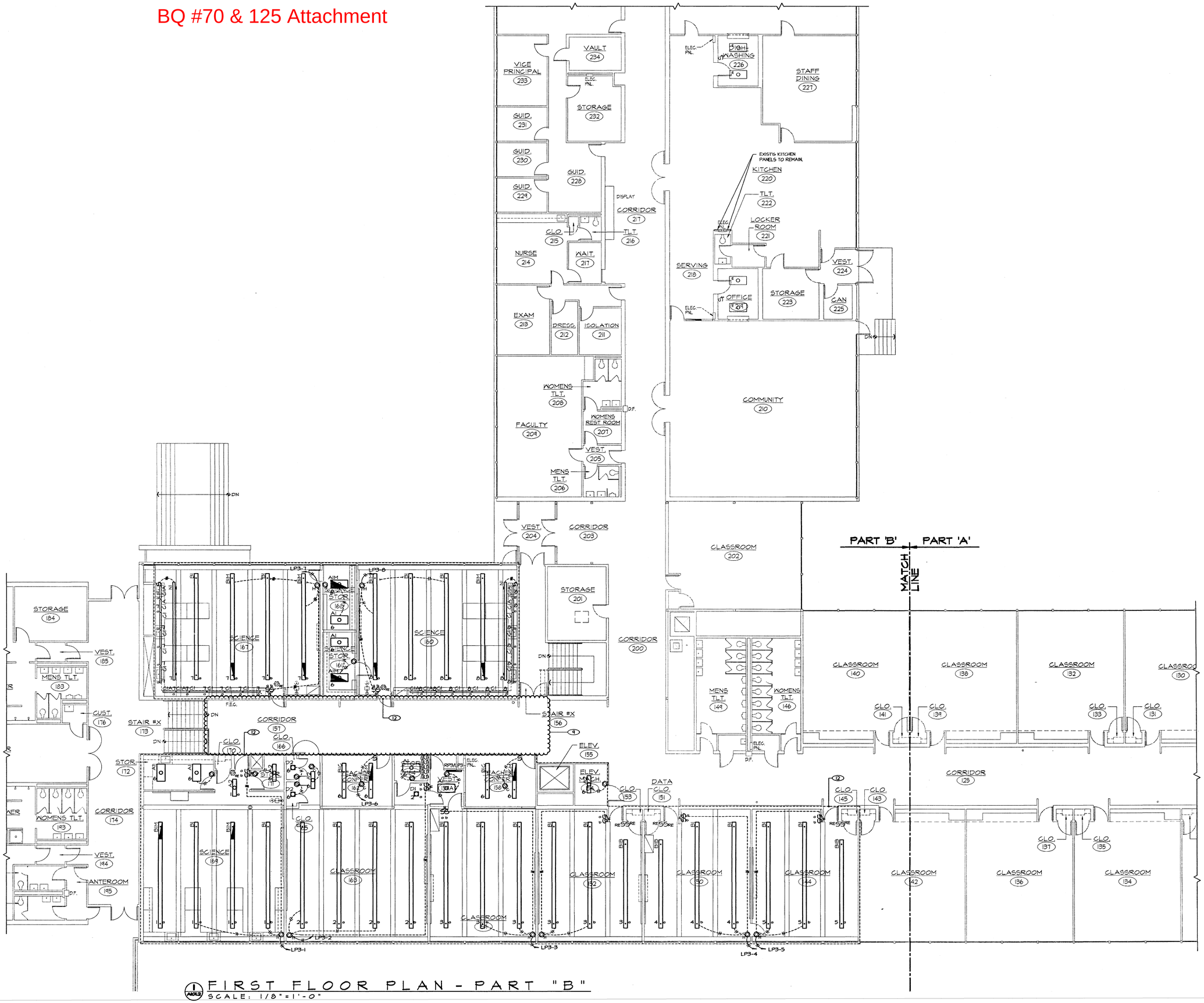
BQ #70 & 125 Attachment



1 A601.2 FIRST FLOOR PLAN - PART "B"
SCALE: 1/8"=1'-0"

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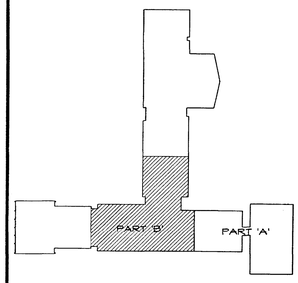

KEY PLAN

N

PROFESSIONAL SEAL

PROJECT MANAGER	L.J. FREE
ARCHITECT/ENGINEER	W.D. BOLAND
DRAWN BY	F. AGOSTINI

FLETCHER THOMPSON
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TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

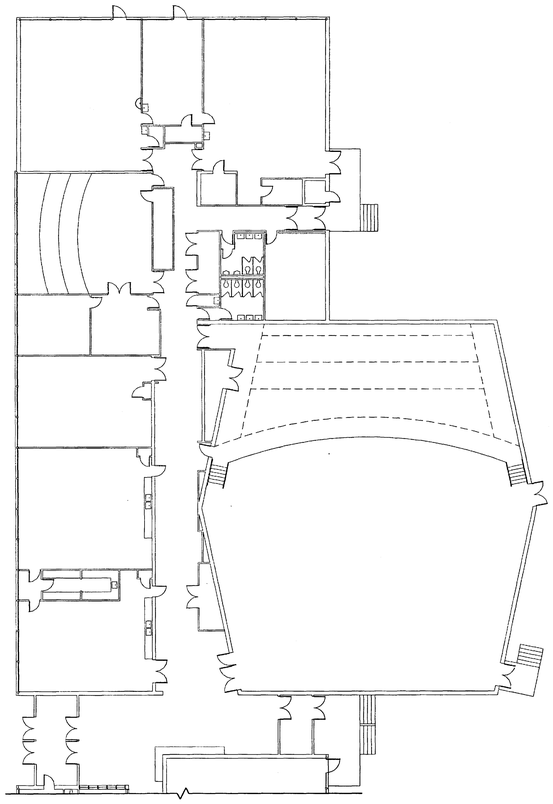
FIRST FLOOR PART "B" LIGHTING PLAN

0 4' 8' 16'
SCALE: 1/8" = 1'-0"

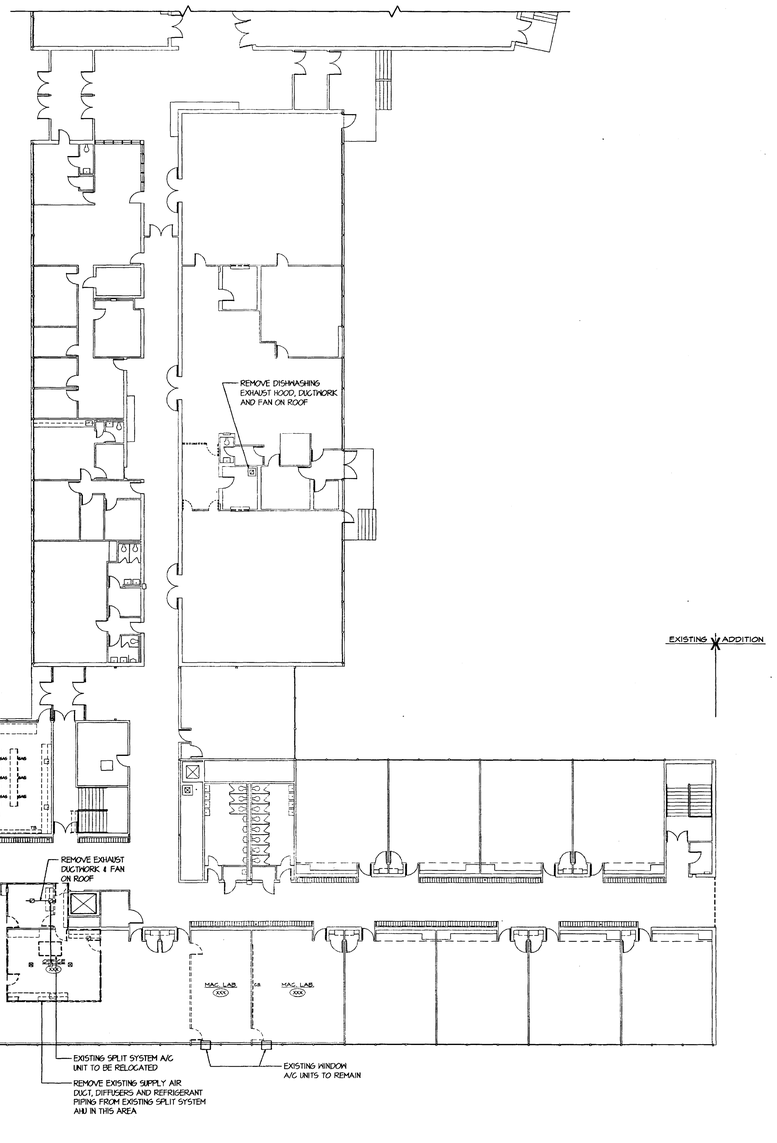
NO	DATE	REVISION	BY

DATE	MARCH 16, 1998
SCALE	1/8" = 1'-0"
PROJECT NO.	50950.06
DRAWING NO.	E701.2

BQ #70 & 125 Attachment



② FIRST FLOOR DEMOLITION PLAN
SCALE: 1/16"=1'-0"



① FIRST FLOOR DEMOLITION PLAN
SCALE: 1/16"=1'-0"

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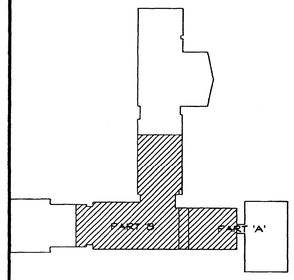
HVAC PLAN NOTES:

1. REFER TO DRAWING M001 FOR HVAC SCHEDULES.
2. REFER TO DRAWING M201 FOR SYMBOL LIST AND LIST OF ABBREVIATIONS FOR THESE HVAC DRAWINGS.



KEY PLAN

N

PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE
ARCHITECT/ENGINEER: J. MACALUSO
DRAWN BY: D. EAR

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ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

FIRST FLOOR DEMOLITION PLAN - HVAC

0 4' 8' 16'
SCALE: 1/8" = 1'-0"

NO	DATE	REVISION	BY

DATE: **MARCH 16, 1998**
SCALE: **1/16" = 1'-0"**
PROJECT NO.: **50950.06**
DRAWING NO.: **M099.1**

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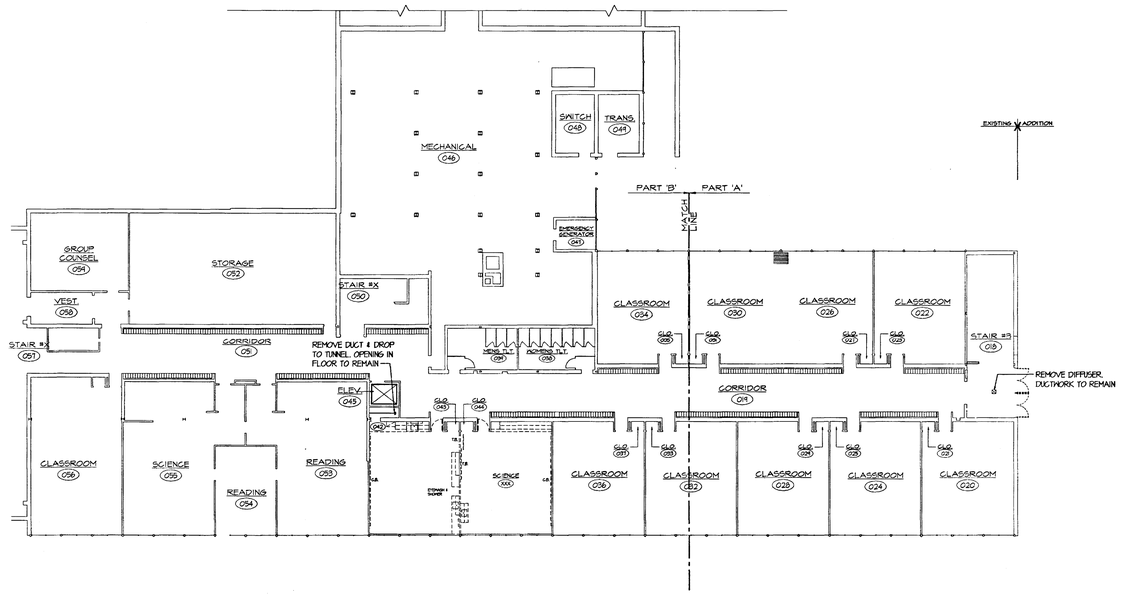
BQ #70 & 125 Attachment



1 A099 GROUND FLOOR DEMOLITION PLAN
SCALE: 1/16"=1'-0"

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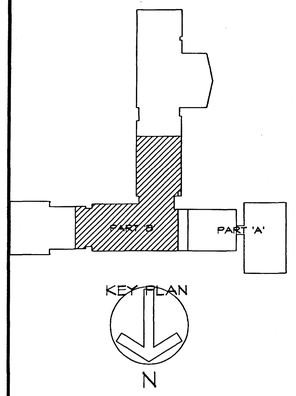
HVAC PLAN NOTES:

1. REFER TO DRAWING M001 FOR HVAC SCHEDULES.
2. REFER TO DRAWING M001 FOR SYMBOL LIST AND LIST OF ABBREVIATIONS FOR THESE HVAC DRAWINGS.



PROFESSIONAL SEAL

PROJECT MANAGER	L.J. FREE
ARCHITECT/ENGINEER	J. MACALUSO
DRAWN BY	D. EAR

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ARCHITECTURE/ENGINEERING/INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO

CENTRAL MIDDLE SCHOOL

9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

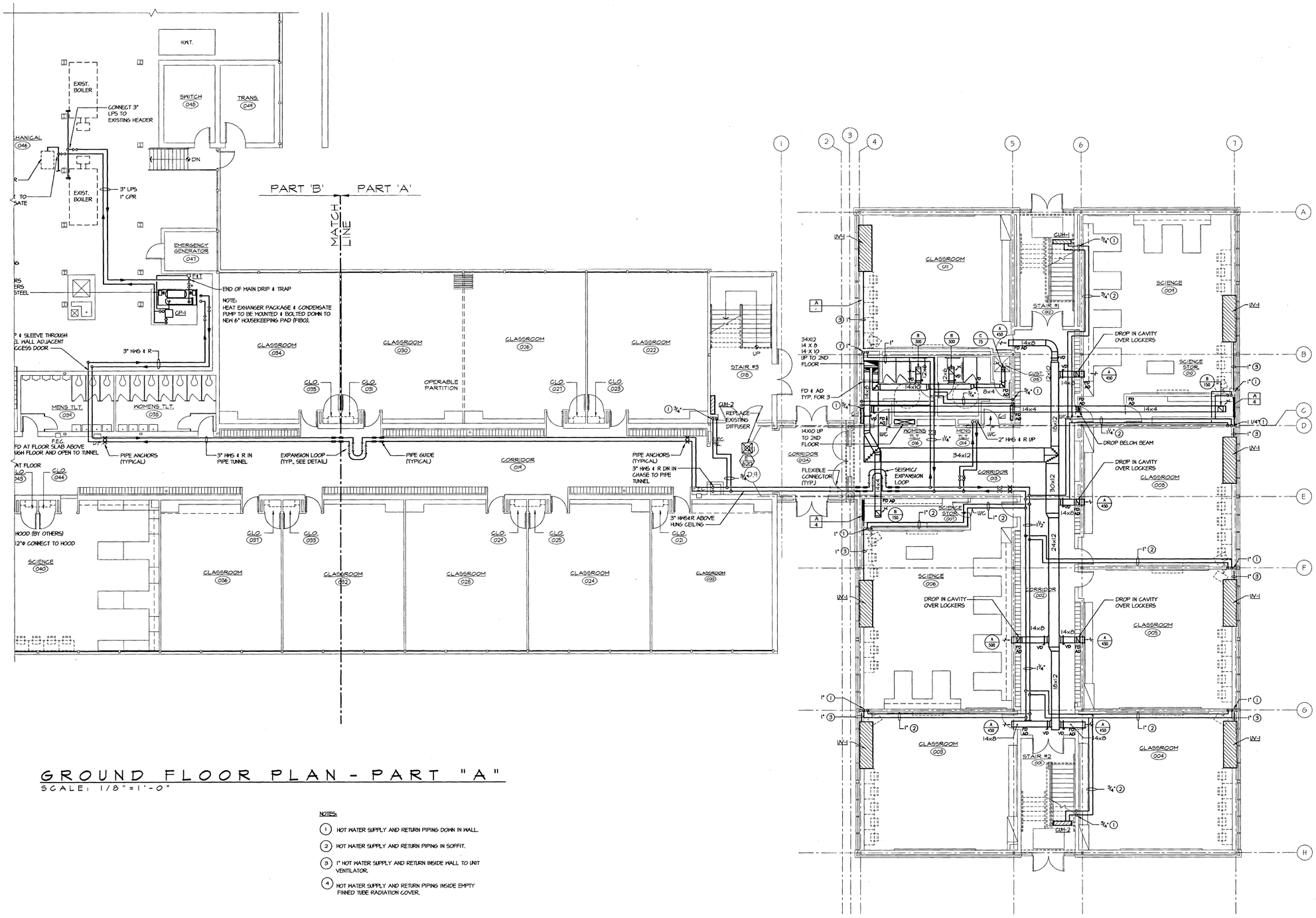
GROUND FLOOR DEMOLITION PLAN - HVAC

0 4' 8' 16'
SCALE: 1/8" = 1'-0"

NO	DATE	REVISION	BY

DATE	MARCH 16, 1998
SCALE	1/16" = 1'-0"
PROJECT NO.	50950.06
DRAWING NO.	M099.2

BQ #70 & 125 Attachment



GROUND FLOOR PLAN - PART "A"

SCALE: 1/8"=1'-0"

NOTES:

1. HOT WATER SUPPLY AND RETURN PIPING DOWN IN WALL.
2. HOT WATER SUPPLY AND RETURN PIPING IN SOFFIT.
3. 1" HOT WATER SUPPLY AND RETURN INSIDE WALL TO UNIT VENTILATOR.
4. HOT WATER SUPPLY AND RETURN PIPING INSIDE EMPTY FINNED TUBE RADIATION COVER.

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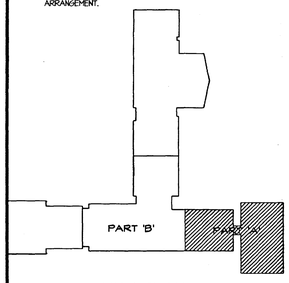
HVAC PLAN NOTES:

1. REFER TO DRAWING M401 FOR HVAC SCHEDULES.
2. REFER TO DRAWING M201 FOR SYMBOLS LIST AND LIST OF ABBREVIATIONS FOR THESE HVAC DRAWINGS.
3. PROVIDE AIR VENTS ON ALL PIPING DROPS, HIGH POINTS OR CHANGES OF ELEVATION. REFER TO DETAIL FOR PIPING ARRANGEMENT.



KEY PLAN

N

PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE

ARCHITECT/ENGINEER: J. MACALUSO

DRAWN BY: D. EAR

FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO

CENTRAL MIDDLE SCHOOL

9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

GROUND FLOOR PLAN PART "A" - HVAC

0 4' 8' 16'

SCALE: 1/8" = 1'-0"

NO	DATE	REVISION	BY

DATE: MARCH 16, 1998

SCALE: 1/8" = 1'-0"

PROJECT NO.: 50950.06

DRAWING NO.: **M100.1**

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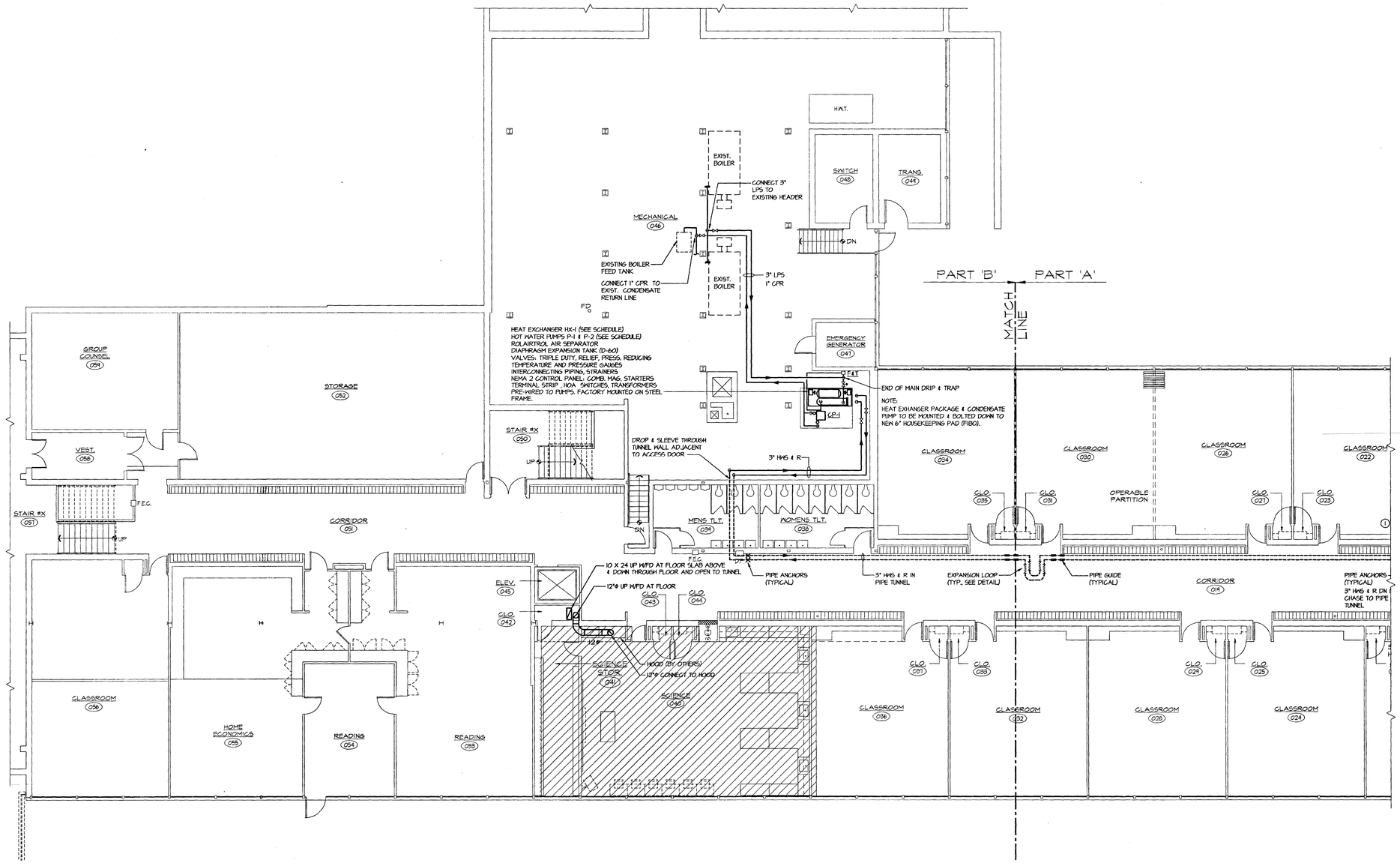
AB

BQ #70 & 125 Attachment



GROUND FLOOR PLAN - PART "B"

SCALE: 1/8" = 1'-0"

NOTES:

1. HOT WATER SUPPLY AND RETURN PIPING DOWN IN CHASE. REFER TO ARCHITECTURAL DRAWING AND COORDINATE WITH ALL TRADES.
2. HOT WATER SUPPLY AND RETURN PIPING IN SOFFIT.
3. 1" HOT WATER SUPPLY AND RETURN ALONG WALL TO UNIT VENTILATOR.
4. 1" HOT WATER SUPPLY AND RETURN UP TO SECOND FLOOR UNIT VENTILATOR.
5. HOT WATER SUPPLY AND RETURN PIPING DOWN IN WALL.
6. HOT WATER SUPPLY AND RETURN PIPING UP FROM FIRST FLOOR.

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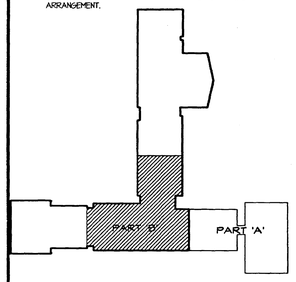
HVAC PLAN NOTES:

1. REFER TO DRAWING M401 FOR HVAC SCHEDULES.
2. REFER TO DRAWING M201 FOR SYMBOLS LIST AND LIST OF ABBREVIATIONS FOR THESE HVAC DRAWINGS.
3. PROVIDE AIR VENTS ON ALL PIPING DROPS, HIGH POINTS OR CHANGES OF ELEVATION. REFER TO DETAIL FOR PIPING ARRANGEMENT.



KEY PLAN

N

PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE

ARCHITECT/ENGINEER: J. MACALUSO

DRAWN BY: D. EAR

FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO

CENTRAL MIDDLE SCHOOL

9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

GROUND FLOOR PLAN PART "B" - HVAC

0 4' 8' 16'

SCALE: 1/8" = 1'-0"

NO	DATE	REVISION	BY

DATE: MARCH 16, 1998

SCALE: 1/8" = 1'-0"

PROJECT NO.: 50950.06

DRAWING NO.: **M100.2**

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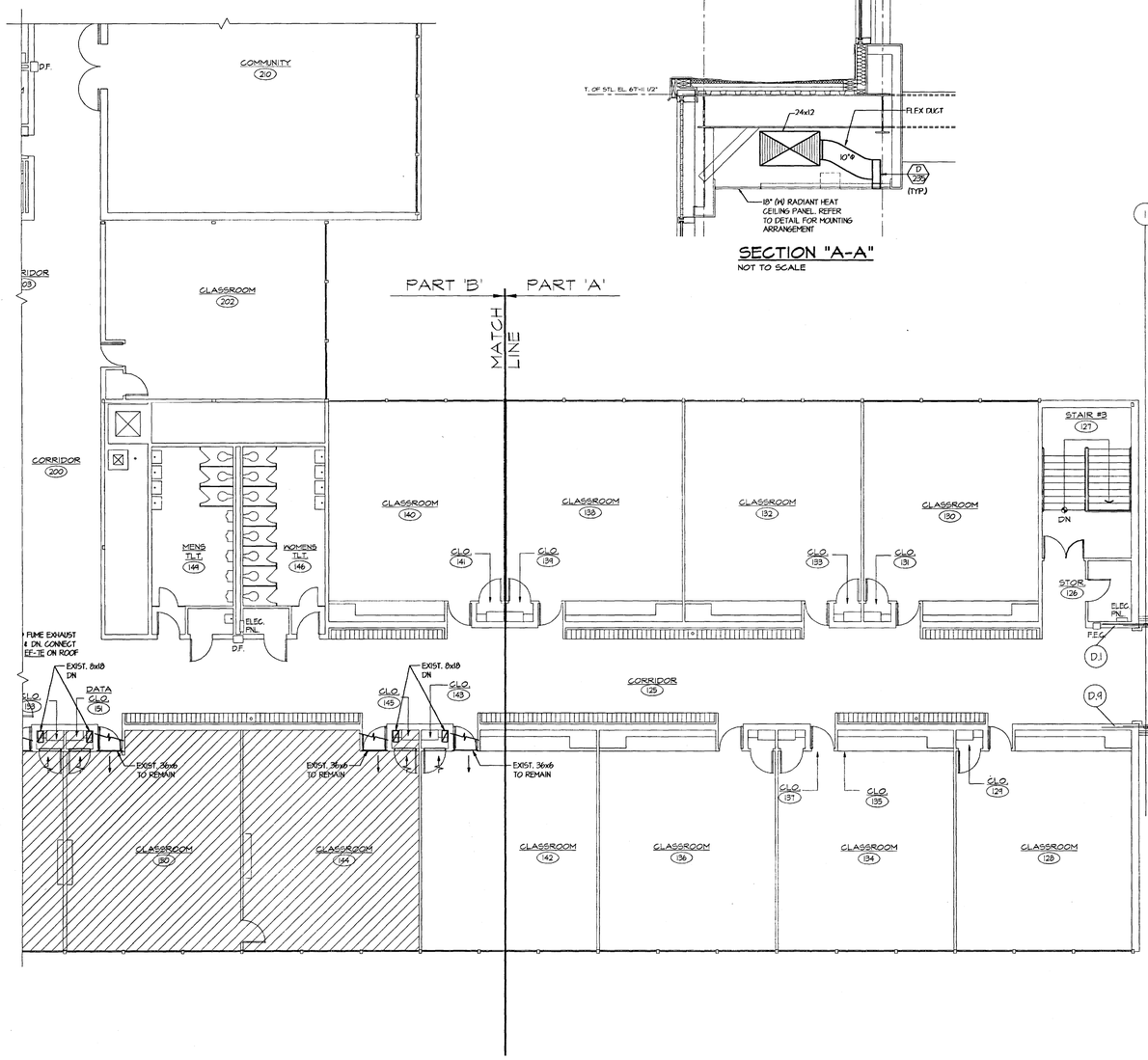
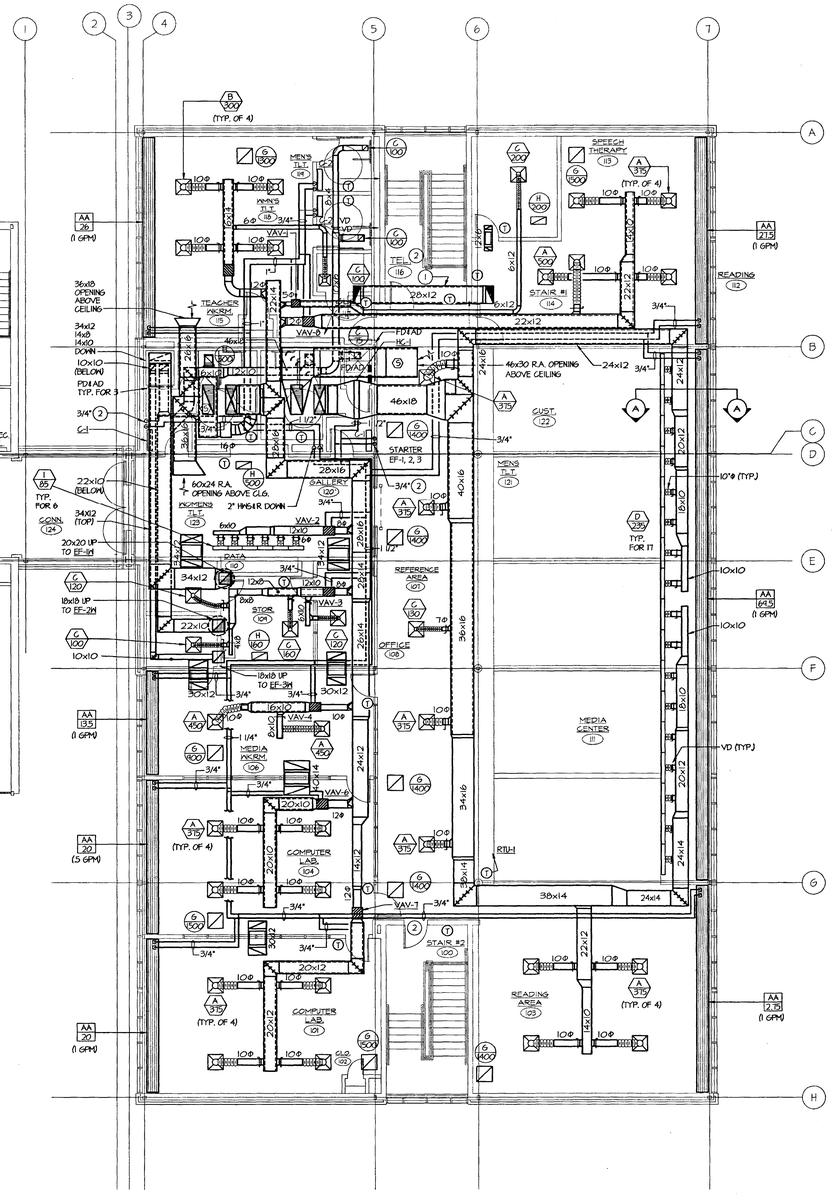
BQ #70 & 125 Attachment



SECTION "A-A"
NOT TO SCALE



GENERAL NOTES:

1. RETURN AIR TRANSFER DUCT LOCATED IN FIRE RATED ENCLOSURE ABOVE STAIR CEILING.
2. HOT WATER SUPPLY & RETURN PIPING DOWN IN WALL.

FIRST FLOOR PLAN - PART "A"

SCALE: 1/8"=1'-0"

HVAC PLAN NOTES:

1. REFER TO DRAWING M401 FOR HVAC SCHEDULES.
2. REFER TO DRAWING M201 FOR SYMBOLS LIST AND LIST OF ABBREVIATIONS FOR THESE HVAC DRAWINGS.
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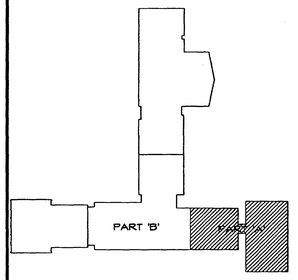

KEY PLAN

N

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PROFESSIONAL SEAL

PROJECT MANAGER	L.J. FREE
ARCHITECT/ENGINEER	J. MACALUSO
DRAWN BY	D. EAR

FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO

CENTRAL MIDDLE SCHOOL

9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

FIRST FLOOR PLAN PART "A" - HVAC

0 4' 8' 16'

SCALE: 1/8" = 1'-0"

NO	DATE	REVISION	BY

DATE	MARCH 16, 1998
SCALE	1/8" = 1'-0"
PROJECT NO.	50950.06
DRAWING NO.	M101.1

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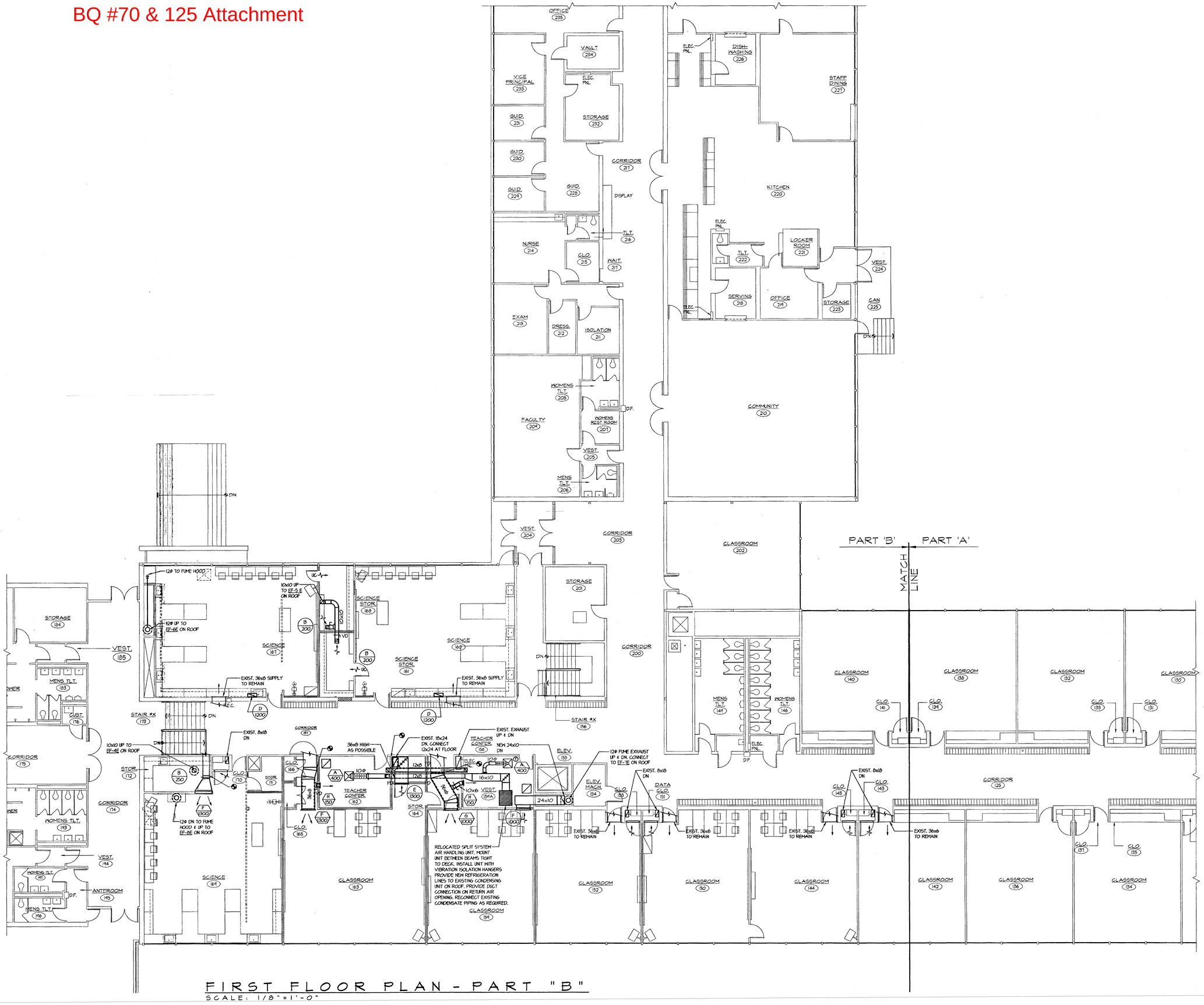
BQ #70 & 125 Attachment



FIRST FLOOR PLAN - PART "B"

SCALE: 1/8"=1'-0"

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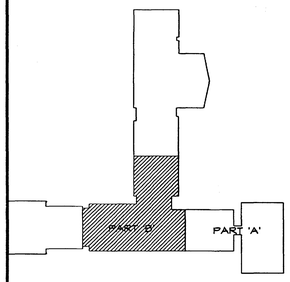
HVAC PLAN NOTES:

1. REFER TO DRAWING M401 FOR HVAC SCHEDULES.
2. REFER TO DRAWING M301 FOR SYMBOLS LIST AND LIST OF ABBREVIATIONS FOR THESE HVAC DRAWINGS.
3. PROVIDE AIR VENTS ON ALL PIPING DROPS, HIGH POINTS OR CHANGES OF ELEVATION. REFER TO DETAIL FOR PIPING ARRANGEMENT.



KEY PLAN

N

PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE
ARCHITECT/ENGINEER: J. MACALUSO
DRAWN BY: D. EAR

FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

FIRST FLOOR PLAN PART "B" - HVAC

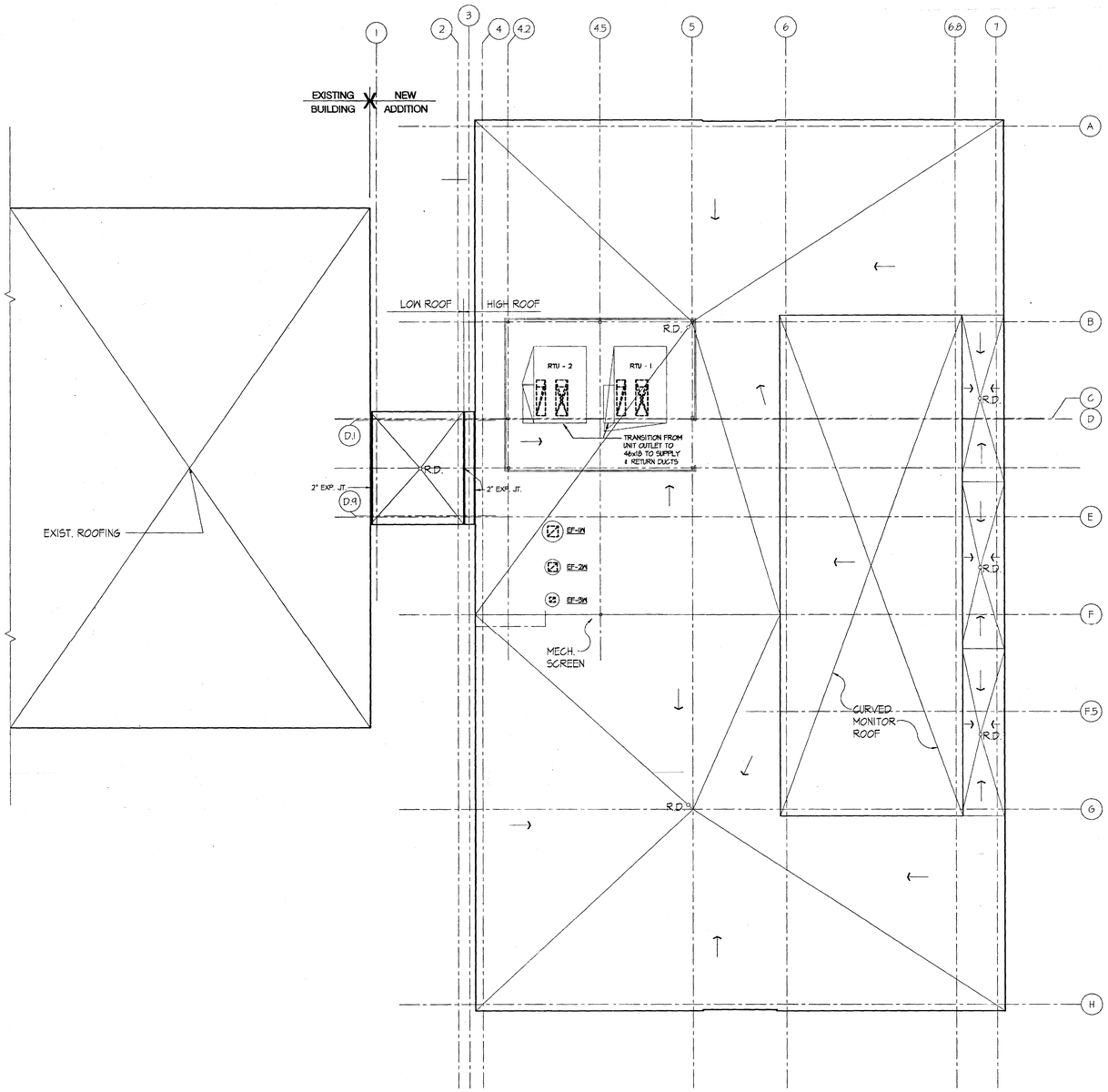
0 4' 8' 16'

SCALE: 1/8" = 1'-0"

NO	DATE	REVISION	BY

DATE: MARCH 16, 1998
SCALE: 1/8" = 1'-0"
PROJECT NO.: 50950.06
DRAWING NO.: M101.2

BQ #70 & 125 Attachment



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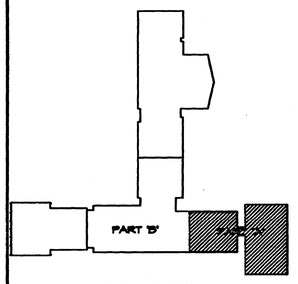

KEY PLAN

N

PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE
ARCHITECT/ENGINEER: J. MACALUSO
DRAWN BY: D. EAR

FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

ROOF PLAN

0 4' 8' 16'
SCALE: 1/8" = 1'-0"

NO	DATE	REVISION	BY

DATE: MARCH 16, 1998
SCALE: 1/8" = 1'-0"
PROJECT NO.: 50950.06
DRAWING NO.: M110

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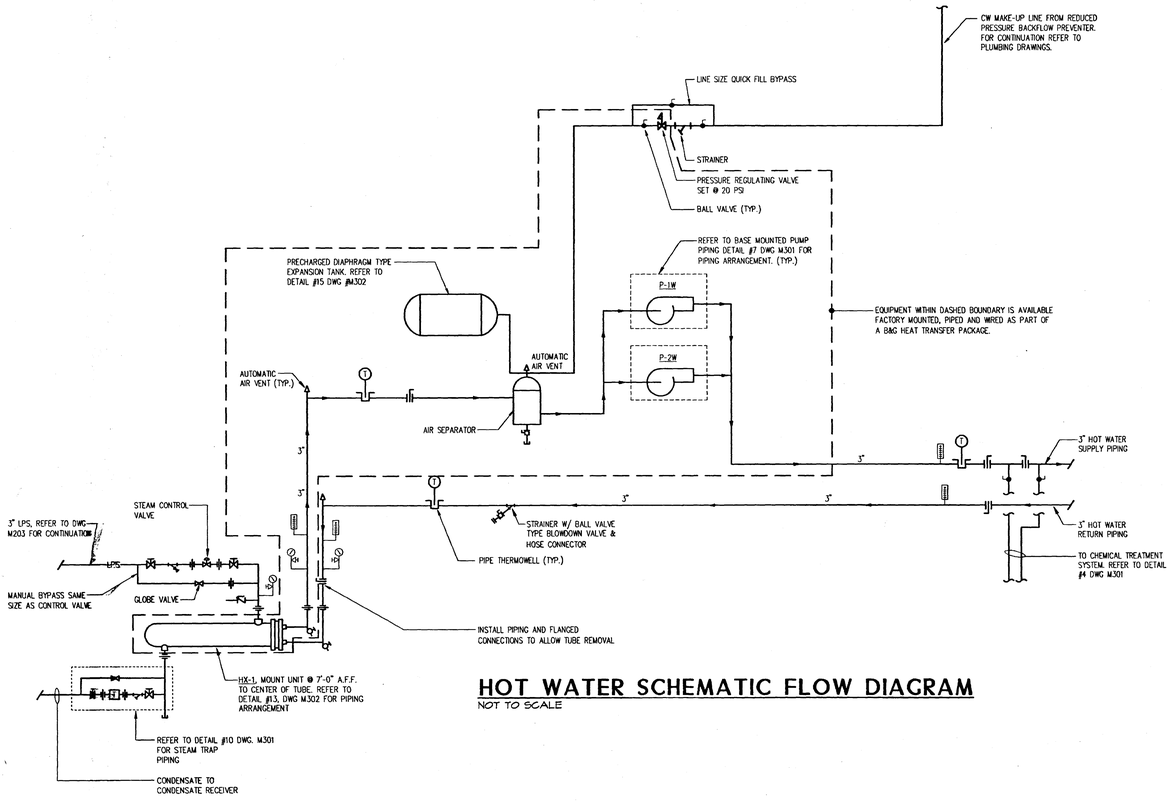
BQ #70 & 125 Attachment



HOT WATER SCHEMATIC FLOW DIAGRAM

NOT TO SCALE

ABBREVIATIONS

(###)	CFM	FA	FACE AREA	NO	NORMALLY OPEN
ABV	ABOVE	FBO	FURNISHED BY OTHERS	NTS	NOT TO SCALE
AC	AIR COMPRESSOR		INSTALLED BY HVAC SUBCONTRACTOR	OA	OUTSIDE AIR
ACU-#	AIR CONDITIONING UNIT	FC	FORWARD CURVE	OAT	OUTDOOR AIR TEMPERATURE
AD	ACCESS DOOR	FCU	FAN COIL UNIT	OAI	OUTDOOR AIR INTAKE
AF	AIRFOIL	FD	FIRE DAMPER WITH ACCESS DOOR	OBD	OPPOSED BLADE DAMPER
AFC	ADJUSTABLE FREQUENCY CONTROLLER	FF	FINAL FILTER	OD	OUTSIDE DIMENSION
AFF	ABOVE FINISHED FLOOR	FIBO	FURNISHED AND INSTALLED BY OTHERS	O.E. T.D.	OPEN END TRANSFER DUCT
AFMS	AIR FLOW MEASURING STATION	FIN FL	FINISH FLOOR	P-#	PUMP
AHU-#	AIR HANDLING UNIT	FL	FLOOR	PB	PUSH BUTTON
AL	ACOUSTIC LINING	FLA	FULL LOAD AMPERES	PBD	PARALLEL BLADE DAMPER
ALD	AUTOMATIC LOUVER DAMPER	FLEX	FLEXIBLE	PD	PRESSURE DROP
APD	AIR PRESSURE DROP	FPF	FINS PER FOOT	PF	PREFILTER
AUTO	AUTOMATIC	FPV	FAN POWERED VAV BOX	PH	PHASE
B-#	BOILER	FT	FEET	PHC	PREHEAT COIL
BC	BACKWARD CURVED	F.T.	FLOAT & THERMOSTATIC TRAP	PPH	POUND PER HOUR
BD	BELT DRIVE	FTR	FIN TUBE RADIATION	PRV	PRESSURE REDUCING VALVE
BMCS	BUILDING MANAGEMENT & CONTROL SYSTEM	FV	FACE VELOCITY	PSI	POUND PER SQUARE INCH
BIT	INVERTED BUCKET TRAP	GC	GENERAL CONTRACTOR	RA	RETURN AIR
BTU	BRITISH THERMAL UNIT	GH	GRAVITY INTAKE HOOD	RAF-#	RETURN AIR FAN
C-#	CHILLER	GPH	GALLONS PER HOUR	RAT	RETURN AIR TEMPERATURE
CAP	CAPACITY	GPM	GALLONS PER MINUTE	REG	REGISTER
CB-#	CONTROL BOX	H/C	HEATING/COOLING	RH	RELATIVE HUMIDITY
CC-#	COOLING COIL	H-#	HUMIDIFIER	RHC	REHEAT COIL
CD	CEILING DIFFUSER	H-O-A	HAND-OFF-AUTOMATIC	RM	ROOM
CFM	CUBIC FEET PER MINUTE	HC-#	HEATING COIL	RPM	REVOLUTIONS PER MINUTE
CG	CEILING GRILLE	hd	FEET OF HEAD	RS	RISE
CLG	CEILING	HP	HORSEPOWER	RTU-#	ROOFTOP AIR CONDITIONING UNIT
CONV-#	HOT WATER CONVECTOR	HTG	HEATING	SA	SUPPLY AIR
CP	CONDENSATE RECEIVER/PUMPING SYSTEM	HTR	HEATER	SAF-#	SUPPLY AIR FAN
CR	CEILING REGISTER	HV-#	HEATING AND VENTILATING UNIT	SAT	SUPPLY AIR TEMPERATURE
CT-#	COOLING TOWER	HVAC	HEATING, VENTILATING & AIR CONDITIONING	SB	SECURITY BARS
CTD	CEILING TRANSFER DUCT			VSC	VERTICAL SPLIT CASE
CUH-#	CABINET UNIT HEATER HOT WATER	HX-#	HEAT EXCHANGER CONVERTOR	HSC	HORIZONTAL SPLIT CASE
CV	CONTROL VALVE	ID	INSIDE DIMENSION	SD	SMOKE DAMPER
CW	COLD WATER	IN	INCHES	SG	SUPPLY GRILLE
D&T	DRIP AND TRAP	IV	INLET GUIDE VANES	SP	STATIC PRESSURE
db	DECIBELS	KW	KILOWATT	SQ FT	SQUARE FOOT (AREA)
DB	DRY BULB	KWH	KILOWATT HOUR	ST	SINGLE POLE SWITCH W/THERMAL OVERLOAD
DD	DIRECT DRIVE	IL	INLINE	SWR	SIDE WALL REGISTER
DDC	DIRECT DIGITAL CONTROL	LAT	LEAVING AIR TEMPERATURE	TSTAT	THERMOSTAT
DIFF	DIFFUSER	LD	LINEAR DIFFUSER	TD	TEMPERATURE DIFFERENCE
DL	DOOR LOUVER	LIN	LINEAR	TEMP	TEMPERATURE
DN	DOWN	LRA	LOCKED ROTOR AMPERES	TG	AIR TRANSFER GRILLE
DP	DEWPOINT TEMPERATURE	LPR	LOW PRESSURE RETURN	TOT	TOTAL
DR	DROP	LPS	LOW PRESSURE SUPPLY	TN-HR	TON HOUR REFRIGERATION
DX	DIRECT EXPANSION	LVG	LEAVING	TRD	TRANSFER DUCT
E-#	EXHAUST FAN	LWT	LEAVING WATER TEMPERATURE	TT	THERMOSTATIC TRAP
EAT	ENTERING AIR TEMPERATURE	MAN	MANUAL	TYP	TYPICAL
EER	ENERGY EFFICIENCY RATIO	MAT	MIXED AIR TEMPERATURE	UC	UNDERCUT DOOR
EG	EXHAUST GRILLE	MAX	MAXIMUM	UH-#	UNIT HEATER HOT WATER
EHC-#	ELECTRIC HEATING COIL	MBH	1000 BTU'S	UV-#	UNIT VENTILATOR
ENT	ENTERING	MCA	MINIMUM CIRCUIT AMPACITY	VAV-#	VARIABLE AIR VOLUME
HEPA	HIGH EFFICIENCY PARTICULATE FILTER	MD	MOTORIZED DAMPER	VD	VOLUME DAMPER
ER	EXHAUST REGISTER	MER	MECHANICAL EQUIPMENT ROOM	VE	VOLUME EXTRACTOR
ES	END SUCTION	MEZZ	MEZZANINE	VI	VIBRATION ISOLATOR
ESP	EXTERNAL STATIC PRESSURE	MFS	MAXIMUM FUSE SIZE	VSF	VARIABLE SPEED FAN SWITCH
ET-#	EXPANSION TANK	MIN	MINIMUM	W/	WITH
EUH-#	ELECTRIC UNIT HEATER	MOT	MOTOR	WB	WET BULB
EWT	ENTERING WATER TEMPERATURE	MUA	MAKE-UP AIR	WFM	WATER FLOW MEASURING STATION
EX	EXISTING	MV	MOTORIZED VALVE	WMS	WIRE MESH SCREEN
EXH	EXHAUST	NC	NORMALLY CLOSED	WPD	WATER PRESSURE DROP
EXT	EXTERNAL	NC	NOISE CRITERIA	WT	WEIGHT (LBS)
F	DEGREES FAHRENHEIT	NFA	NET FREE AREA	ZD	ZONE DAMPER
F&B	FACE & BYPASS DAMPER	NIC	NOT IN THIS CONTRACT		

SYMBOLS

PIPING SYMBOLS

- CHILLED WATER SUPPLY PIPING (CWS)
- CHILLED WATER RETURN PIPING (CWR)
- CONDENSER WATER SUPPLY PIPING (CWS)
- CONDENSER WATER RETURN PIPING (CWR)
- GLYCOL WATER SUPPLY (GWS)
- GLYCOL WATER RETURN (GWR)
- DOMESTIC COLD WATER MAKE-UP (CW)
- HOT WATER (HEATING) SUPPLY PIPING (HWS)
- HOT WATER (HEATING) RETURN PIPING (HWR)
- HIGH PRESSURE STEAM SUPPLY PIPING (HPS)
- HIGH PRESSURE STEAM CONDENSATE RETURN PIPING (HPR)
- LOW PRESSURE STEAM SUPPLY PIPING (LPS)
- LOW PRESSURE STEAM CONDENSATE RETURN PIPING (LPR)
- PUMPED CONDENSATE RETURN PIPING (PC)
- CONDENSATION DRAIN PIPING (D)
- DUAL TEMPERATURE SUPPLY PIPING (DTS)
- DUAL TEMPERATURE RETURN PIPING (DTR)
- DIRECTION OF FLOW IN PIPE
- PITCH PIPE DOWN IN DIRECTION OF ARROW
- PIPE ELBOW UP; DOWN
- PIPE TOP CONNECTION
- PIPE BOTTOM CONNECTION
- PIPE CAPPED
- PIPE UNION
- PIPE ANCHOR
- PIPE GUIDES
- PIPE EXPANSION JOINTS
- FLEXIBLE PIPE CONNECTOR
- PIPE EXPANSION LOOP (LENGTH X WIDTH)
- SEISMIC OR EXPANSION LOOP
- PRESSURE GAUGE WITH PETCOCK
- PIPE REDUCER OR INCREASER
- THERMOMETER WITH THERMO WELL
- PIPE WELL (FOR CONTROLS OR TEST)
- PIPE AIR VENT (M-MANUAL, A-AUTOMATIC)
- PET COCK
- GLOBE VALVE
- GATE VALVE
- BUTTERFLY VALVE
- BALANCING CIRCUIT SETTER TYPE VALVE WITH 100% SHUT OFF
- PLUG VALVE
- BALL VALVE
- DRAIN VALVE W/ HOSE COUPLING W/CAP
- CHECK VALVE
- THREE-WAY MOTORIZED CONTROL VALVE
- TWO-WAY MOTORIZED CONTROL VALVE
- SUMMER/WINTER VALVE
- RELIEF VALVE
- ANGLE RELIEF VALVE
- PRESSURE REDUCING VALVE (PRV)
- RADIATION PIPING CONTROL VALVE
- STRAINER W/ BLOWDOWN BALL VALVE
- STEAM TRAP RIG
- WATER FLOW MEASURING STATION
- O S & Y GATE VALVE

DUCTWORK SYMBOLS

- S.A. OR O.A. DUCT UP; DN
- R.A. OR EXH. DUCT UP; DN
- DOUBLE LINE DUCTWORK W/ INTERNAL ACOUSTICAL INSULATION AND INDICATION OF INSIDE DIMENSION
- SINGLE LINE DUCTWORK W/ INDICATION OF INSIDE DIMENSIONS
- SINGLE LINE DUCTWORK W/ INTERNAL ACOUSTICAL INSULATION AND INDICATION OF INSIDE DIMENSION
- ACCESS DOOR IN DUCT
- ROUND DUCT DIAMETER SIZE
- FLEXIBLE DUCT CONNECTION
- DUCT MOUNTED COIL
- FLEXIBLE ROUND DUCT
- DIRECTION OF AIR FLOW
- FIRE DAMPER
- SMOKE DAMPER
- MANUAL VOLUME DAMPER
- MOTORIZED DAMPER
- ELBOW WITH AIRFOIL TURNING VANES
- TEMPERATURE SENSOR OR THERMOSTAT (G DENOTES WITH GUARD)
- STATIC PRESSURE SENSOR
- SMOKE DETECTOR IN DUCT (FIBO)
- RELATIVE HUMIDITY SENSOR OR HUMIDISTAT
- CEILING DIFFUSER
- CEILING DIFFUSER (3-WAY BLOW)
- CEILING DIFFUSER (2-WAY BLOW)
- CEILING DIFFUSER (1-WAY BLOW)
- WALL GRILLE OR REGISTER AS NOTED
- LINEAR DIFFUSER
- RETURN OR EXHAUST GRILLE
- FIN-TUBE RADIATION W/ COVER
- AIR TERMINAL UNIT
- DOOR UNDERCUTS
- DUCT STATIC PRESSURE CLASSIFICATION
- ADJUSTABLE FREQUENCY CONTROLLER
- VARIABLE SPEED FAN SWITCH
- MOTOR STARTER
- EQUIPMENT DISCONNECT

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HVAC PLAN NOTES:

1. REFER TO DRAWING M401 FOR HVAC SCHEDULES.
2. REFER TO DRAWING M201 FOR SYMBOL LIST AND LIST OF ABBREVIATIONS FOR THESE HVAC DRAWINGS.

PROFESSIONAL SEAL

PROJECT MANAGER: L.J. FREE
ARCHITECT/ENGINEER: J. MACALUSO
DRAWN BY: D. EAR

FLETCHER THOMPSON
ARCHITECTURE / ENGINEERING / INTERIOR DESIGN

FLETCHER-THOMPSON, INC.
TWO LAFAYETTE SQUARE
BRIDGEPORT, CT 06604-3944

PROJECT TITLE

ADDITIONS AND RENOVATIONS TO
CENTRAL MIDDLE SCHOOL
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

STATE PROJECT NO. 057-106EA

DRAWING TITLE

FLOW DIAGRAMS & DETAILS - HVAC

NO	DATE	REVISION	BY

DATE: MARCH 16, 1998
SCALE: AS NOTED
PROJECT NO.: 50950.06
DRAWING NO.: M201

Board of Education of The Town of Greenwich

New Central Middle School Project
State Project No. 057-0114 N
Greenwich, CT

Bid Due Date: **12/20/2024 @ 10 a.m.**

FORM OF PROPOSAL dated 12/02/24

To: **Turner Construction Company**

Name and Address of Bidder: _____

_____

Contact Representative: _____

Telephone: _____

Email Address: _____

We offer to perform per plans, specifications, additional provisions, and addendum as acknowledged below, all the _____ Work for Bid Package #_____for Project Listed Above the lump sum of (inclusive of all applicable State and Local taxes):

Labor:	***$*** _____	***dollars***
Material:	***$*** _____	***dollars***
Tax:	***$*** _____	***dollars***
TOTAL QUOTE:	***$*** _____	***dollars***

Board of Education of The Town of Greenwich

New Central Middle School Project
State Project No. 057-0114 N
Greenwich, CT

Information required to be provided with Bid:

A. Trade Information:

Unburdened Payroll $_____
Total Trade Hours Included _____ hrs

B. Bid Notice Receipt:

The receipt of the following Bid Notices to the Contract Documents is acknowledged:

Received Addendum #1	_____	**dated**	_____
Received Addendum #2	_____	**dated**	_____
Received Addendum #3	_____	**dated**	_____

C. Current Experience Modification Rating (EMR): _____
(Proof required via NCCI form from insurance provider)

2023 Recordable Incident Rate (RIR): _____

2023 Lost Time Incident Rate (LTIR): _____

D. Unit Prices:

The following Unit Prices shall be valid for the life of the project and include all cost for labor, materials, tools, equipment, shipping, handling, storage, hoisting, rigging, distribution, protection of materials, fringe benefits, applicable taxes, overhead, profit, insurance, and all other things necessary for a complete installation on a per unit basis.

MEP Related Unit Prices

A. Provide an additional sprinkler head including arm-over piping with an addition (6) six feet of piping to get back to nearest branch line; Div. 21
Per Sprinkler head installed

$ _____ each

B. Provide an additional duplex receptacle including wiring to nearest normal power panel with sufficient capacity, faceplate, back-box, conduits, bushing, and pull string. Also include cutting and patching of typical interior partition; Div. 26
Per receptacle installed

$ _____ each

Board of Education of The Town of Greenwich

New Central Middle School Project
State Project No. 057-0114 N
Greenwich, CT

C. Provide an additional duplex receptacle including wiring to nearest emergency power panel with sufficient capacity, faceplate, back-box, conduits, bushing, and pull string. Also include cutting and patching of typical interior partition; Div. 26
Per receptacle installed

$ _____ each

D. Provide an additional exit sign including power wiring and conduit system from the nearest emergency electrical power panel. Extension of the nearest exit sign circuit is acceptable if the base bid circuit capacity is sufficient: Div. 26
Per Exit Sign Installed

$ _____ each

E. Provide an additional fire alarm pull station, including wiring to panel. Also include cutting and patching of typical interior partition; Div. 28
Per pull station installed

$ _____ each

F. Provide an additional combination audible/visual fire alarm device, including wiring to panel. Also include cutting and patching of typical interior partition; Div. 28
Per fire alarm device installed

$ _____ each

G. Provide an additional ceiling smoke detector including wiring and conduit system to the nearest node. Also include cutting and patching of typical acoustical ceiling panel; Div. 28
Per smoke detector installed

$ _____ each

H. Provide an additional carbon monoxide detector including wiring and conduit system to the nearest node. Also include cutting and patching of typical acoustical ceiling panel and/or typical interior partition; Div. 28
Per carbon monoxide detector installed

$ _____ each

I. Provide an additional combination audible/visual fire alarm device, including wiring to panel. Also include cutting and patching of typical interior partition; Div. 28
Per fire device installed

$ _____ each

Board of Education of The Town of Greenwich

New Central Middle School Project
State Project No. 057-0114 N
Greenwich, CT

J. Single Data or Voice Outlet; Div 26 & 27

1. Provide an additional back-box, conduits, cable, bushing, and pull string. Include cutting and patching of typical interior partition, to accommodate installation of Single Data Outlet, including terminations, cable mounting devices, labeling, testing, documentation, installation and supervision
2. One (1) Category 6 rated RJ45 jack mounted on a single gang faceplate with one (1) Category 6, plenum rated, unshielded twisted pair cable installed to relevant IDF or MDF patch panel.
   a) Category 6 cable shall terminate onto an available port on the IDF or MDF patch panel.
   b) Cable length: Assume 285 feet.

Per outlet installed

$ _____ each

K. Dual Data Outlet; Div 26 & 27

1. Provide an additional back-box, conduits, cable, bushing, and pull string. Include cutting and patching of typical interior partition, to accommodate installation of Dual Data Outlet, including terminations, cable mounting devices, labeling, testing, documentation, installation and supervision.
2. Two (2) Category 6 rated RJ45 jacks, mounted on a single gang faceplate with one (2) Category 6, plenum rated, unshielded twisted pair cable installed to relevant IDF or MDF patch panel.
   a) Category 6 cable shall terminate onto an available port on the IDF or MDF patch panel.
   b) Cable length to assume 285 feet.

Per outlet installed

$ _____ each

L. Wireless Access Point location; Div 26 & 27

1. Provide pathway, and cable for additional WAP. Include cutting and patching of typical interior partition and/or ceiling tile, to accommodate installation of Wireless Access Point location, including terminations, cable mounting devices, labeling, testing, documentation, installation and supervision.
2. One (1) Category 6 rated RJ45 plug, terminated onto (1) Category 6, plenum rated, unshielded twisted pair cable, with a 20ft. service loop, and installed to relevant IDF or MDF patch panel.
   a) Category 6 cable shall terminate onto an available port on the the IDF or MDF patch panel.
   b) Cable length to assume 285 feet.

Per WAP installed

$ _____ each

Board of Education of The Town of Greenwich

New Central Middle School Project
State Project No. 057-0114 N
Greenwich, CT

E. Alternate Prices:

The following Alternate Prices shall be valid for the life of the project and include all cost for labor, materials, tools, equipment, shipping, handling, storage, hoisting, rigging, distribution, protection of materials, fringe benefits, applicable taxes, overhead, profit, insurance, and all other things necessary for a complete installation.

Turner Alternate #1 Exclude 100% Payment and Performance Bond

Deduct $ _____

Turner Alternate #2 Provide a cost to provide Commercial General Liability Insurance and Worker's Compensation and Employer's Liability Insurance through an insurance carrier of the Subcontractor's choosing in lieu of through the CCIP Program.

ADD $ _____

F. Wage Rates:

The following are hourly wage rates for all tradespeople associated with this Bid Package for performing extra work on a time and material basis. These rates are fully loaded (including benefits, payroll and sales taxes, insurance, 10% overhead and profit, bond costs, small tools, travel, parking, supervision, and any other costs associated with labor, etc.). The wage rates shall be valid for the life of the project. ***NOTE: Further, no mark-up shall be allowed on the premium time portion of the wage rate. This Subcontractor is required to submit labor rate summary sheets, which will fully justify all these labor rates. All rates are subject to a thorough analysis and subject to reduction if deemed inaccurate at the time of Bid.***

Foreman	**Straight Time**	**Time & Half**	**Double Time**
_____	$_____	$_____	$_____
_____	$_____	$_____	$_____
Journeyman	**Straight Time**	**Time & Half**	**Double Time**
_____	$_____	$_____	$_____
_____	$_____	$_____	$_____

Board of Education of The Town of Greenwich

New Central Middle School Project
State Project No. 057-0114 N
Greenwich, CT

G. ADDITIONAL BID REQUIREMENTS:

1 Bidder acknowledges that this proposal is based on reasonable interpretation of the documents / information/ specifications provided. This pricing shall be full compensation to the subcontractor for the complete work of the associated trade required at the Project. This proposal includes any necessary elaboration, missing segments, obvious requirements, etc. that would be necessary for a functioning system at the quality level established by the Contract Documents.

2 Your bid accounts for all information contained in the Contract Documents and Design Drawings, Bid Notifications, Project Memos all other correspondence provided to you as related to your work. If the Contract Documents and/or Contract Drawings and/or Specifications conflict, then the greater quantity shall apply.

3 Your bid shall remain valid for ninety (90) days.

4 Current Financial Statements will be required at time of final scope review for the competitive bidder(s).

5 All bids must be accompanied by the NCCI form from your insurance provider indicating the subcontractor's current EMR (Experience Modification Rating).

6 The bidder acknowledges that if successful (at the time of final scope review), it will sign the Turner Construction Company's Form of Contract **36** with no exceptions.

7 Did you verify and acknowledge all Bid Notifications on the bid form?

8 Your bid is based on TAX EXEMPT STATUS– TAX-EXEMPT ORGANIZATION.

9 Bidder has included acknowledged Non-Collusion Affidavit, Scope of Work Sheet and Insurance worksheets.

1) The following documentation **MUST** be submitted with each bid (2 copies of each) in order per below:
   a) Turner Form of Proposal
   b) Inititaled Scope of work sheet for your assigned Bid Package
   c) Non- Collusion Affidavit
   d) Bid Bond (if applicable)
   e) Turner Prequalification Response Form
   f) Curret DAS certificate (as applicable)
   g) Curret SBE/MBE Certificate (Set-aside Packages Only)
   h) OPM Ethics Form 1 or 6 as applicable

Submitted By: _____

_____ Date: _____
Signature of Authorized Agent for Bidder

_____
(Title)

_____ Date: _____
(Attest)

Turner

Thank you for your interest in Turner Construction Company. In order to develop a more complete knowledge of your Company and better match future Turner opportunities to your Company's capabilities please complete this form and return to with your bid to:

Board of Education of the Town of Greenwich.
290 Greenwich Ave.
Greenwich, CT 06830
Attn: Greenwich Public Schools
GPS Bid #_____

Date of Response: _____

BIDDER QUALIFICATION STATEMENT (QUESTIONNAIRE)
(*)(Based upon Turner format 6//17/24)

Name of Company: _____
Street Address: _____

_____ (city) _____ (state) _____ (zip)

Mailing Address: _____

_____ (city) _____ (state) _____ (zip)

Phone: _____ Fax: _____

Contact : _____ Phone: _____ Cell Phone: _____ E-mail: _____

Contact _____ Phone: _____ Cell Phone: _____ E-mail: _____

Contact _____ Phone: _____ Cell Phone: _____ E-mail: _____

Website: _____

Is your Company:
☐ MBE ☐ WBE ☐ DBE MBE/WBE/DBE Certified by: _____
Please attach copies of all certifications.

Is this address the: ☐ Main Office ☐ Regional Office ☐ Branch Office

Name of Parent Company: _____

Address of Parent Company: _____

Trades
Please fill-in the trade(s) that your Company is interested in bidding

_____
_____
_____
_____
_____

Year Company Started: _____ Type of Company: ☐ Corp. ☐ Partnership ☐ Proprietorship ☐ Sub. S. Corp.

State of Incorporation: _____ Date of Incorporation: _____

SUBCONTRACTOR/VENDOR PREQUALIFICATION QUESTIONNAIRE *(continued)*

Contractor's License Number: _____ State: _____ Expiration: _____ (Attach list if needed)

State Sales Tax Registration Number: _____ (attach list as needed)

State Unemployment Insurance Number: _____ (attach list as needed)

Federal ID Number _____

List the corporate officers, partners, proprietors, members and shareholders of more than 5% of the stock of your Company:

	Name	Year of Birth	Position	Percent Owned
A.				
B.				
C.				
D.				

Under what other names has your Company operated? _____

How many people does your Company presently employ:
Home Office _____ Field Supervisory _____ Tradespeople _____

How many people did your Company employ on average for the last 3 years?
Home Office _____ Field Supervisory _____ Tradespeople _____

Has your Company or any of its principals ever petitioned for bankruptcy, failed in business, defaulted or been terminated on a contract awarded to you? _____ Yes _____ No
If yes, please explain: _____

Have any of the Owners, officers or major stockholders of your Company ever been indicted or convicted of any felony or other criminal conduct? _____ Yes _____ No
If yes, please explain: _____

Has your Company or any Owners, officers or major stockholders ever been suspended, disbarred or otherwise precluded from pursuing public work or ever been found to be non- responsive by a public agency?
_____ Yes _____ No
If yes, please explain: _____

Has your Company ever had a claim made against it for improper, delayed, defective or non-compliant work or failure to meet warranty obligations? _____ Yes _____ No
If yes, please explain: _____

Is your Company or any of its owners, officers or major shareholders currently involved in any arbitration or litigation?
_____ Yes _____ No
If yes, please explain: _____

Does you Company have any outstanding judgements or claims against it? _____ Yes _____ No
If yes, please explain: _____

Has your company or any of its owners, officers or major stock holders been investigated for or charged with alleged labor law violations including alleged violations of the Immigration Control and Reform Act; state or local laws regarding employment of immigrants; prevailing wage laws; wage and hour laws or other federal, state or local labor laws? If yes, please explain. _____

Please list any litigation brought against your Company in the past five (5) years asserting that you failed to make payments to anyone. _____

List the geographical areas in which you work : _____

List Unions which you have agreements with:

Local Number	Union Name	Agreement Expiration

Indicate the size of project you are most competitive in performing (enter 1). Show in preference order (2,3,…) other size projects you are capable of performing:

Under $100,000		$3,000,000 - $6,000,000	
$100,000 - $200,000		$6,000,000 - $9,000,000	
$200,000 - $500,000		$10,000,000 - $15,000,000	
$500,000 - $1,000,000		Over $15,000,000	
$1,000,000 - $3,000,000			

Check all building types on which your Company has worked:

A.	High rise Office Building		F.	Sports/Entertainment	
B.	Mid rise Office Building		G.	Industrial Bldg.	
C.	Hotels/Motels		H.	High Tech/Laboratories	
D.	Hospital		I.	Correctional Facilities	
E.	Residential		J.	Design Build/Design Assist	

List the trades you normally perform with your own forces: _____

What percentage of the Company's work is normally subcontracted? _____ %

What trades do you normally subcontract? _____

What is the largest contract your Company has completed?
Amount: $ _____ Year: _____ Project name and scope: _____

What is the largest dollar volume job you expect to do during this year?
Amount: $ _____ Project name and scope: _____

What is your expected annual volume this year: $ _____ # of Projects _____

SUBCONTRACTOR/VENDOR PREQUALIFICATION QUESTIONNAIRE *(continued)*

What was the average annual volume of work performed over the past 5 years:

Yr./Vol. _____ Yr./Vol. _____ Yr./Vol. _____
Yr./Vol. _____ Yr./Vol. _____

MBE/WBE Participation in work which you subcontract (average participation for last 3 years) MBE ____ % WBE ____ %
Minority/Female workforce participation (average percentage utilization for last 3 years) MIN ____ % FEM ____ %

Attach a list of current major projects giving name of project, address, owner, architect, general contractor, contract amount, scope of work and scheduled completion. (Include contact people and phone numbers)

Attach a list of completed major projects giving name of project, address, owner, architect, general contractor, contract amount and scope of work. (Include contact people and phone numbers)

Provide a copy of your latest audited financial statement. Required if low bidder. (Your finanical statement is strictly for Turner Purchasing Dept. use and will be treated confidentially.

If the provided financial statement is not for the identical Company named above, explain the relationship and financial responsibility of the Company whose financial statement is provided.

_____

_____

Name of your Bank: _____
Address: _____
Phone: _____ Contact Person: _____

Amount of line of credit: $ _____ Amount Available: $ _____ Expiration date: _____

UCC Filing? ____ Yes ____ No ____ How is credit secured: _____

What is Company's Dunn & Bradstreet Number: _____
D&B Rating: _____ Pay Record: _____ Date of Rating: _____
Remarks: _____

_____

Bonding Company:

	Name of Surety	Key Contact Person/Phone
A.	_____	_____

B. Bonding Capacity: Per Job $ _____ Aggregate: $ _____

Date of Last Bond _____ Amount: $
Bond Rate _____ %

C. Please list the persons or entities who provide indemnification to your Surety: _____

_____

SUBCONTRACTOR/VENDOR PREQUALIFICATION QUESTIONNAIRE *(continued)*

List three of your major suppliers:

A. Name: _____
Address: _____ Telephone: _____
Contact: _____
B. Name: _____
Address: _____ Telephone: _____
Contact: _____
C. Name: _____
Address: _____ Telephone: _____
Contact: _____

List three contractors that you do business with:

A. Name: _____
Address: _____ Telephone: _____
Contact: _____
B. Name: _____
Address: _____ Telephone: _____
Contact: _____
C. Name: _____
Address: _____ Telephone: _____
Contact: _____

Trade Association Memberships: _____

List local or national accredited training programs in which you participate (craft or management training): _____

List key office personnel and field supervisors (attach resumes):

	Name Position	Year of Birth	Years Experience	Previous Employer
A.				
B				
C.				
D.				
E.				

List any subsidiaries and affiliates of your Company:

	Company Name	Ownership	Type of Company
A.			
B			
C.			

General Remarks: _____

SUBCONTRACTOR/VENDOR PREQUALIFICATION QUESTIONNAIRE *(continued)*

We have attempted to answer all questions in a full and complete manner to assure that our answers are not in any respect misleading either by expressing ourselves in a misleading or ambiguous manner or omitting information. We recognize that Turner will be relying on the accuracy of the information and our responses in this questionnaire in deciding whether to permit us to bid and in awarding work to our Company.

Dated at _____ this ____ day of _____Two Thousand and _____(___

Name of Company: _____
Completed by: _____ (must be an officer of the Company)
Title: _____

Title:_____

_____ being duly sworn, deposes and says that the information provided herein is true and sufficiently complete so as to not be misleading.

Subscribed and sworn before me this _____ Day of _____ , 2_____

Notary Public: _____
My commission Expires: _____

Exhibit A
SUBCONTRACTOR Pre-Qualification Form
Safety Prequalification Form

1. Please list your Company's Workers' Compensation Interstate/Intrastate Experience Modification Rate for the most recent three years. (Attach a copy of your insurance carrier or state fund (on their letterhead) verifying the EMR data.

   Interstate (Yr./Rate)

   _____/_____ _____/_____ _____/_____

   Intrastate (Yr./Rate/Name state(s) with abbreviations next to modification rate)

_____/_____	_____/_____	_____/_____
_____/_____	_____/_____	_____/_____
_____/_____	_____/_____	_____/_____
_____/_____	_____/_____	_____/_____

   Note: Subcontractor's must have a current EMR less than or equal to 1.0 to qualify for Turner Construction's Bid List. Should your EMR exceed 1.0, the Contractor must demonstrate and document that it has or will initiate programs, policies, and attitudes which will result in a safety conscious performance in order to be included on Turner's Approved Contractor List. In this case it is the sole discretion of Turner to approve or disapprove a SUBCONTRACTOR.

2. Please use the three most recent year's OSHA No. 300/200 Log to fill in the number of cases for each of the following categories: (attach a copy of your last three years of OSHA 300/200 logs.)

Year	_____	_____	_____
No. of fatalities (Column G from 300) or (Columns 1 + 8 from200)	_____	_____	_____
No. of lost & restricted workday cases (Column H + I) or (Columns 2 + 9)	_____	_____	_____
No. of medical treatment cases (Column J) or (Columns 6 + 13)	_____	_____	_____
No. of lost workday cases (Column H) or (Columns 3 + 10)	_____	_____	_____
Employee Hours Worked	_____	_____	_____
OSHA Recordable Incidence Rate	_____	_____	_____
OSHA Lost Workday Incidence Rate	_____	_____	_____

   Note: --Items in parenthesis come from your OSHA 300/200 Log
   --**Recordable Incidence Rate = [G, H, I, & J] or [1,2,6,8,9,13] x 200,000 / Employee Hours Worked**
   --Lost Workday Incidence Rate = [H] or [3 + 10] x 200,000 / Employee Hours Worked
   --Employee Hours Worked = total number of hours worked during the year by all employees

3. How many OSHA violation(s) has your Company received in the last three years?
   (Yr. = # violations)

   _____ = _____ _____ = _____ _____ = _____

   Any willful OSHA violations: _____ Yes _____ No _____
   Please give a brief description of the violation(s); use additional paper if necessary

   _____
   _____
   _____

Safety Prequalification Form (Continued)

Any employee deaths in the past 3 years? ___ Yes ___ No
If yes, please give a brief description of the circumstances: _____

4. Do you have a qualified person responsible for safety within your Company: ___ Yes ___ No
Please describe his/her qualifications: _____

5. Does this person do safety inspections on all of your projects: ___ Yes ___ No Frequency _____

6. Do you have a written Company Safety Policy and Program and will you provide copies if requested: ___ Yes ___ No

7. Does your Company have a substance abuse policy: ___ Yes ___ No
If Yes, please check which are included in the policy:

Pre-hire/Initial Employment _____
Cause _____
Post Accident/Incident _____
Random _____
Periodic _____

8. Do you have a return to work\light duty program? ___ Yes ___ No
If yes, please describe: _____

9. Have you ever implemented 100% fall protection ___ Yes ___ No
If requested can you provide us with a site-specific program addressing the fall hazards in your work? ___ Yes ___ No

10. Do you require documented safety meetings for your employees? Indicate which, and how often.

Field Supervisors: ___ Yes ___ No Frequency _____

New Hires: ___ Yes ___ No Frequency _____

Employees: ___ Yes ___ No Frequency _____

SUBCONTRACTOR/VENDORs: ___ Yes ___ No Frequency _____

11. Does your Company provide safety training for all employees: ___ Yes ___ No
If yes, please list training provided.

(Turner will require that at least one full time on-site person must have completed the 30 hour OSHA training)

12. Do you have home office representatives (not directly involved in the project) who will visit and audit the project for safety:
___ Yes ___ No Frequency _____

Safety Prequalification Form (Continued)

13. Does your Company set annual safety goals? ____ Yes ___ No
If yes, please list training provided.

_____
_____

14. Does your Company have a program recognizing your employees for safety performance excellence? Yes No

15. Does your Company have a disciplinary program in place for safety violations? ___ Yes ___ No
16. Does your Company review the safety management systems of your sub-subcontractors ? ___ Yes ___ No

17. Does your Company conduct accident/incident investigations? ___ Yes ___ No

18. List all supervisory employees who have completed an OSHA 30 Hour Training Program.

Employee Name	OSHA 30 Hour Date of Certification

The undersigned warrants and represents the data provided is accurate in all respects.

Name of Company: _____
Prepared By: _____
Signature: _____
Title: _____
Date _____

Exhibit B
TURNER CONSTRUCTION COMPANY
Subcontractor Prequalification
Insurance Questionnaire

Agent/Broker: _____

Contact: _____

Phone: _____

A. Commercial General Liability

Insurance Carrier:

1. Policy Form Policy Number Policy Period From ____ to ____ Occurrence Based _____ Claims Made _____

2. Any exclusion from Standard CGL Policy? (Y/N) _____

3.

Limits:	Current	Max Obtainable
General Aggregate	$	$
Products-Comp/Op Agg.	$	$
Personal/Adv. Injury	$	$
Each Occurrence	$	$
Fire Damage (any one fire)	$	$
Med. Exp (any one person)	$	$

4. Deductible: $ _____

5. Per Project limits Yes _____ No _____

B. Excess Liability
Insurance Carrier:

1. Policy Form Policy Number Policy Period From ____ To ____ Occurrence Based _____ Claims Made _____

2. Umbrella _____
Or Excess: _____

	Current	Max Obtainable
3. Each Occurrence	$	$
4. Aggregate:	$	$

C. Worker's Compensation and Employer's Liability
Insurance Carrier:

1. Policy Form Policy Number Policy Period From ____ To ____

2. Limits	$
3. E.L. Each Accident	$
4. E.L. Disease-Policy Limit	$
5. E.L. Disease-Each Employee	$

Insurance Questionnaire (Continued)

D. Automobile Liability

Insurance Carrier:

1. Policy Form Policy Number Policy Period From To

		Current	Max Obtainable
2.	Combined Single Limit	$	$
3.	Bodily Injury (per person)	$	$
4.	Bodily Injury (per accident)	$	$
5.	Property Damage	$	$

E. Professional Liability Insurance

Insurance Carrier:

1. Policy Form Policy Number Policy Period From To

2. Office Policy Limit: $ _____ Deductible: $ _____

3. Project Specific Limit available: $ _____ Extended Reporting Period (tail) _____ yrs.
Prior Acts: Yes _____ No _____

F. Submit Rate Pages for Worker's compensation, Commercial General Liability and Umbrella Insurance for current policy year.

Form 110 REV 3/98

MULTIPLE OBLIGEE
BID BOND

Bond #_____

KNOW ALL MEN BY THESE PRESENTS; that.....
(Name of Subcontractor)
.....

a.....corporation with principal offices located at.....

.....
(Address)
as Principal (hereinafter "Principal"), and .....as Surety,
(Name of Surety)
a .....corporation with home offices located at.....

.....
(Address)
(hereinafter "Surety"), are held and firmly bound unto TURNER CONSTRUCTION COMPANY a New York Corporation (hereinafter "Turner") and.....

.....
(Hereinafter collectively referred to as "Obligees") in the sum of .....
.....(Enter dollar amount required or percent of Bid price) for the payment whereof Principal and Surety bind themselves, and their respective heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted to Turner a certain bid, dated . . . .20 . . . . for the performance of . . . . . .
(Description of Work)
. . . . . (hereinafter "Bid").

NOW THEREFORE, THE CONDITION OF THIS OBLIGATION is such that, if Turner shall accept the Bid of Principal and the Principal shall in accordance with such Bid:

1) enter into a contract with Turner,

2) furnish Bonds for the faithful performance of such contract and for the payment of all persons performing labor or furnishing materials in connection therewith; and

3) shall in all other respects perform the agreement created by the acceptance of such Bid;

Then this obligation shall be null and void; otherwise it shall remain in full force and effect.

IN WITNESS WHEREOF, the Principal and Surety have hereunto caused this Bond to be duly

executed and acknowledged as set forth below this .....day of ....., 20....

(Impress Corporate Seal)

.....,Principal
(Name of Subcontractor /Principal)

ATTEST:

By:.....
(Officer)

.....

Title.....

(Impress Corporate Seal)

.....Surety
(Name of Surety)

By:.....
(Attorney-in-Fact)

ATTEST:
.....

NOTE: An original Power of Attorney bearing same date as Bond must be attached.



Project Manual For

Volume 2 of 4

Divisions 01 - 14

TOWN OF GREENWICH
GREENWICH CENTRAL MIDDLE SCHOOL

Phase 2 of 3 – Building Construction, Demolition, and Sitework

9 Indian Rock Lane
Greenwich, Connecticut 06830

SLAM

The S/L/A/M Collaborative

State Project No.: 057-0114 N
Project No.: 22367.00
Issued for: Constr. Docs. – July 8, 2024
Bidding/Permit – Sept. 30, 2024

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PROCUREMENT AND CONTRACTING REQUIREMENTS

DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS

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00 4000 –Turner Construction: Phase 2 of 3 Procurement Manual

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00 0110 - Table of Contents

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- 01 2000A – Supplemental Instructions Form
- 01 2000B – Proposal Request Form
- 01 2000C – Construction Change Directive Form

01 2100 - Allowances

01 2201 – Unit Prices

01 2300 – Alternates

01 2500 - Substitution Procedures
- Attachment – CSI Form 1.5C
- Attachment – CSI Form 13.1A

01 3000 - Administrative Requirements
- Attachment – CADD EFT Form
- Attachment – BIM Access License Agreement

01 3566.42 – Sustainability Compliance Procedures
- CTHPB Working Compliance Checklist w/ LEED cross-reference
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01 6000 - Product Requirements

01 6116 – Volatile Organic Compound (VOC) Content Restrictions

01 7000 - Execution and Closeout Requirements

01 7419 – Construction Waste and Management Disposal
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02 8200 - Selective Hazardous Building Materials Abatement Demolition

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02 8313 – Lead-Based Paint Awareness

02 8416 – Universal Waste Removal and Recycling

02 8432 - PCBs Greater than 50ppm Remediation
.Attachment: Form SCG-3012 PCB Checklist – Central Middle School
.Attachment: Form SCG-9008 PCB I Caulk - Central Middle School

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09 6429 – Wood Strip and Plank Flooring

09 6466 - Wood Athletic Flooring

09 6500 - Resilient Flooring

09 6566 - Resilient Athletic Flooring

09 6700 - Fluid-Applied Flooring

09 6813 - Tile Carpeting

09 7200 – Wall Coverings

09 7800 – Interior Wall Paneling

09 8300 – Acoustic Finishes

09 8416 – Fixed Sound Reflective Panels

09 8430 – Sound-Absorbing Wall and Ceiling Units

09 9123 - Interior Painting

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10 1100 - Visual Display Units

10 1416 – Plaques

10 1419 – Dimensional Letter Signage

10 1423 - Panel Signage

10 1453 – Traffic Signage [Landscape]

10 1453 – Traffic Signage [Civil]

10 1454 – Traffic Signage Removal and Relocation

10 1473 – Painted Signage

10 2113.19 - Plastic Toilet Compartments

10 2123 - Cubicle Curtains and Track

10 2800 - Toilet Accessories

10 4400 - Fire Protection Specialties

10 5113 - Metal Lockers

10 5502 – Mail Sorter

10 7516 – Ground-Set Flagpoles

DIVISION 11 – EQUIPMENT

11 0610 – Stage Rigging and Curtains

11 3013 –Appliances

11 4000 – Foodservice Equipment

11 5400 – Art Education Equipment

11 5410 – Technology Education Equipment

11 6623 – Gymnasium Equipment

11 6643 – Interior Electronic Scoreboard

11 6833 – Athletic Field Equipment

11 7300 – Patient Care Equipment

DIVISION 12 – FURNISHINGS

12 2401 – Window Shades

12 3553.19 – Wood Laboratory Casework

12 3600 – Countertops

12 6100 - Fixed Audience Seating

12 6613 – Telescoping Bleachers

12 9300 – Site Furnishings

DIVISION 13 – SPECIAL CONSTRUCTION [NOT USED]

DIVISION 14 – CONVEYING EQUIPMENT

14 2100 - Electric Traction Elevators

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DIVISION 21 – FIRE SUPPRESSION

21 0400 – General Conditions for Fire Protection Trades

21 0516 - Expansion Fittings and Loops for Fire Suppression Piping

21 0548 - Vibration and Seismic Controls for Fire Suppression Piping and Equipment

21 1313 – Wet Pipe Sprinkler Systems

21 3000 – Fire Pumps

DIVISION 22 – PLUMBING

22 0400 – General Conditions for Plumbing Trades

22 0516 - Expansion Fittings and Loops for Plumbing Piping

22 0517 - Sleeves and Sleeve Seals for Plumbing Piping

22 0519 - Meters and Gauges for Plumbing Piping

22 0523 – General Duty Valves for Plumbing Piping

22 0529 - Hangers and Supports for Plumbing Piping and Equipment

22 0548 - Vibration and Seismic Controls for Plumbing Piping and Equipment

22 0553 - Identification for Plumbing Piping and Equipment

22 0700 – Plumbing Insulation

22 1005 – Plumbing Piping

22 1123 – Fuel Gas Piping

22 1124 – Domestic Water Pumps

22 1500 – General Service Compressed Air Systems

22 3000 – Plumbing Equipment [Water Heaters]

22 4000 - Plumbing Fixtures and Specialties

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23 0400 – General Conditions for Mechanical Trades

23 0516 - Expansion Fittings and Loops for HVAC Piping

23 0517 - Sleeves and Sleeve Seals for HVAC Piping

23 0523 – General Duty Valves for HVAC Piping

23 0529 - Hangers and Supports for HVAC Piping, Ductwork, and Equipment

23 0548 - Vibration and Seismic Controls for HVAC Piping and Equipment

23 0553 - Identification for HVAC Piping and Equipment

23 0593 - Testing, Adjusting, and Balancing for HVAC

23 0700 – HVAC Insulation

23 0900 - Instrumentation and Controls for HVAC

23 0993 - Sequence of Operations

23 2113 – Hydronic Piping

23 2114 – Hydronic Specialties

23 2123 – Hydronic Pumps

23 2500 – HVAC Water Treatment

23 3100 – HVAC Ducts and Casings

23 3300 – Air Duct Accessories

23 3400 – HVAC Fans

23 3600 – Air Terminal Units

23 3700 – Air Outlets and Inlets

23 5100 - Breechings, Chimneys, and Stacks

23 5239 – Fire-Tube Boilers

23 5700 - Heat Exchangers for HVAC

23 6411 – Packaged Water Chillers - Scroll

23 7413 – Modular Central-Station Air-handling Units

23 8126 - Split-System Air-Conditioners

23 8200 - Convection Heating and Cooling Units

DIVISION 25 – INTEGRATED AUTOMATION [NOT USED]

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26 0400 - General Conditions for Electrical Trades

26 0503 - Equipment Wiring Connections

26 0519 - Electrical Power Conductors and Cables

26 0526 - Grounding and Bonding for Electrical Systems

26 0529 - Hangers and Supports for Electrical Systems

26 0533 - Raceway and Boxes for Electrical Systems

26 0534 - Floor Boxes for Electrical Systems

26 0536 - Cable Trays for Electrical Systems

26 0553 - Identification for Electrical Systems

26 0573 – Overcurrent Protective Device Coordination Study

26 0923 - Lighting Control Devices

26 2200 - Low-Voltage Transformers

26 2413 - Switchboards

26 2416 - Panelboards

26 2653 - Electric Vehicle Charging Equipment

26 2716 – Electrical Cabinets and Enclosures

26 2726 - Wiring Devices

26 2813 - Fuses

26 2819 - Enclosed Switches

26 2823 - Enclosed Circuit Breakers

26 2826 - Enclosed Transfer Switches

26 3213 - Engine Generators

26 4113 - Lightning Protection for Structures

26 5100 - Lighting

26 5561 - Theatrical Lighting

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DIVISION 27 – COMMUNICATIONS

27 0536 - Cable Trays for Communication Systems

27 1000 – Structured Cabling

27 4100 – Audio Video Systems

27 5116 – Public Address System

27 5313 – Clock System

27 6010 - Emergency Responder Radio Coverage System

DIVISION 28 -- ELECTRONIC SAFETY AND SECURITY

28 0500 – Security Conductor Cables

28 0528 – Pathways for Security Systems

28 1300 – Access Control System

28 1600 – Intrusion Detection

28 2300 – Video Surveillance System

28 3100 - Fire Detection and Alarm

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31 1000 – Site Clearing

31 1000 – Site Clearing/Selective Clearing and Thinning [Civil]

31 1005 – Athletic Field Site Preparation

31 1006 – Soil Stripping and Stockpiling

31 1200 – Site Utility Preparation

31 2200 - Grading

31 2300 - Excavation, Backfill, Compaction and Dewatering

31 2316.26 – Rock Removal

31 2323 – Borrow Material

31 2333 – Trenching and Backfilling

31 2500 - Soil Erosion and Sediment Controls

31 6616 – Aggregate Piers

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32 0529 – Glacial Boulders for Exterior Improvements

32 1216 – Asphalt Paving

32 1313 – Concrete Paving

32 1373 – Concrete Paving Joint Sealants

32 1400 – Unit Pavers

32 1500 – Aggregate Surfacing

32 1613.23 – Precast Concrete Curb

32 1640 – Granite Curbing

32 1726 – Tactile Warning Surfaces

32 1823.17 – Natural Infield and Warning Track Surfacing

32 3113 – Chain Link Fences and Gates

32 3118 – Metal Fences and Gates

32 3120 – Vehicle Barrier Gates

32 3223 – Segmental Retaining Walls

32 8415 – Sitework Sleeves

32 8423 – Irrigation Systems

32 9113 – Soil Preparation

32 9113.29 – Athletic Field Root Zone

32 9200 – Turf and Grasses

32 9219.22 – Athletic Field Seeding and Sodding

32 9300 - Plants

DIVISION 33 – UTILITIES

33 0513 - Manholes and Catch basins

33 0514 - Breaking into Existing Manholes and Catch Basins

33 1113 – Ductile Iron Pipe and Fittings

33 1300 - Disinfection of Water Distribution Systems

33 1400 - Testing of Water Distribution Systems

33 3113 - Polyvinyl Chloride (PVC) Pipe and Fittings

33 3114 - Testing of Sanitary Sewer and Storm Drainage Systems

33 4100 – Storm Drainage

33 4113 - High Density Polyethylene Pipe and Fittings

33 4114 - Underground Warning Tape

33 4419 - Stormwater Treatment System

DIVISION 34 – TRANSPORTATION

34 0000 – Transportation

34 4114 – Rectangular Rapid Flashing Beacon

34 4115 – LED School Radar Speed Display with Flashing Beacons

34 4117 – Pedestrian Push Button

34 7001 -Traffic Person

34 7002 – Maintenance and Protection of Traffic

DIVISION 40 – PROCESS INTEGRATION [NOT USED]

DIVISION 46 – WATER AND WASTEWATER EQUIPMENT [NOT USED]

END OF SECTION 00 0110

SECTION 01 1000 - SUMMARY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Project information.

B. Contract description.

C. Owner occupancy.

D. Contractor use of site and premises.

E. Work restrictions.

F. Specification sections applicable to all contracts.

G. Specification and drawing conventions.

1.2 PROJECT INFORMATION

A. Project Name: Central Middle School.

B. Owner's Name: Greenwich Public Schools.

C. Architect's Name: The S/L/A/M Collaborative.

D. Contract Documents, dated Juy 8, 2024 were prepared for the Project by The SLAM Collaborative, Somerset Square, 80 Glastonbury Boulevard, Glastonbury, Connecticut 06033-4415.

E. The Project consists of the construction of a two-story 156,000 s.f. secondary school facility and associated site work, including parking, vehicular circulation, and athletic fields.

1.3 CONTRACT DESCRIPTION

A. Contract Type: Multiple prime contracts, each based on a Stipulated Price as described in Document 00 5000 - Contracting Forms and Supplements.

1.4 OWNER OCCUPANCY

A. Owner intends to occupy the Project upon Substantial Completion.

B. Owner may allow others to occupy the Project for installation of materials and equipment during construction. Cooperate with suppliers and installers of such work.

C. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.

D. Schedule the Work to accommodate Owner occupancy.

1.5 CONTRACTOR USE OF SITE AND PREMISES

A. Construction Operations: Limited to areas determined by Construction Manager in consultation with Owner.
   1. Locate and conduct construction activities in ways that will limit disturbance to site.
   2. Repair damage caused by construction operations.
   3. Protect the building and its occupants during the construction period.
   4. Permit Owner occupancy and public use of adjacent areas outside the Project limit lines.

B. Arrange use of site and premises to allow:
   1. Work by Others.

C. Provide access to and from site as required by law and by Owner:
   1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
   2. Do not obstruct roadways, sidewalks, or other public ways without permit.

1.6 WORK RESTRICTIONS

A. Comply with restrictions on construction operations.
   1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.

B. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet of entrances, operable windows, or outdoor-air intakes.

C. Smoking and Controlled Substance Restrictions: Use of tobacco products, alcoholic beverages, and other controlled substances within the existing building is not permitted.

D. Employee Identification: Provide identification tags for Contractor personnel working on project site. Require personnel to use identification tags at all times.

1.7 SPECIFICATION SECTIONS APPLICABLE TO EVERY CONTRACT

A. Unless otherwise noted, provisions of the sections listed below apply to every contract. Specific items of work listed under individual contract descriptions constitute exceptions.

B. Section 01 2000 - Price and Payment Procedures.

C. Section 01 2300 - Alternates.

D. Section 01 2500 - Substitution Procedures.

E. Section 01 3000 - Administrative Requirements.

F. Section 01 3329.04 - Material Content Form

G. Section 01 3566.42 - Sustainability Compliance Procedures - CT-HPBS.

H. Section 01 4000 - Quality Requirements.

I. Section 01 4219 - Reference Standards.

J. Section 01 6000 - Product Requirements.

K. Section 01 7000 - Execution and Closeout Requirements.

L. Section 01 7800 - Closeout Submittals.

1.8 SPECIFICATION AND DRAWING CONVENTIONS

A. Basic Contract definitions are included in the General Conditions of the Contract.

B. Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" means "directed by the Architect," and similar phrases. However, no implied meaning shall be interpreted to extend the Architect's responsibility into the Contractor's area of construction supervision.

C. The term "approved," where used in conjunction with the Architect's action on the Contractor's submittals, applications, and requests, is limited to the duties and responsibilities of the Architect as stated in the General and Supplementary Conditions. Such approval shall not release the Contractor from responsibility to fulfill Contract requirements unless otherwise provided in the Contract Documents.

D. The term "Regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work, whether lawfully imposed by authorities having jurisdiction or not.

E. The term "furnish" is used to mean "supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, and similar operations."

F. The term "install" is used to describe operations at project site including the actual "unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations."

G. The term "provide" means "to furnish and install, complete and ready for intended use."

H. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. The conventions are as follows:
   1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
   2. Text Color: Text used in the Specifications, including units of measure, manufacturer and product names, and other text may appear in multiple colors or underlined as part of a hyperlink; no emphasis is implied by text with these characteristics.
   3. Hypertext: Text used in the Specifications may contain hyperlinks. Hyperlinks may allow for access to linked information that is not included in the Specifications. Unless otherwise noted, linked information is not part of the Contract Documents.
   4. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

I. Installer: The Contractor or an entity engaged by the Contractor, either as an employee, subcontractor, or sub-subcontractor, for performance of a particular construction activity, including installation, erection, application, and similar operations.
   1. Installers are required to be experienced in the work they are engaged to perform.
   2. The term "experienced," when used with the term "Installer" means having successfully completed a minimum of 5 previous projects similar in size and scope to this Project, being familiar with the precautions required, and having complied with requirements of the authorities having jurisdiction.

J. Project Site: Space available to the Contractor for performance of construction activities, either exclusively or in conjunction with others performing other construction activities as part of the Project.
   1. The extent of the Project Site is indicated on the Drawings.

K. Testing Laboratories: A "testing laboratory" is an independent entity engaged to perform specific inspections or tests, either at the Project Site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

L. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One of more of the following are used on Drawings to identify materials and products:
   1. Terminology: Materials and products are identified by the typical generic terms used in the individual specification sections.
   2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 01 1000

SECTION 01 2000 - PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Procedures for preparation and submittal of applications for progress payments.

B. Documentation of changes in Contract Sum and Contract Time.

C. Change procedures.

D. Correlation of Contractor submittals based on changes.

E. Procedures for preparation and submittal of application for payment at substantial completion.

F. Procedures for preparation and submittal of application for final payment.

1.2 RELATED REQUIREMENTS

A. Section 01 7800 - Closeout Submittals: Project record documents.

1.3 SCHEDULE OF VALUES

A. Use Schedule of Values Form: AIA G703, edition stipulated in the Agreement.

B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Architect for approval.

C. Forms filled out by hand will not be accepted.

D. Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement.

E. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification section. Identify site mobilization.

F. Include separately from each line item, a direct proportional amount of Contractor's overhead and profit.

G. Revise schedule to list approved Change Orders, with each Application For Payment.

1.4 APPLICATIONS FOR PROGRESS PAYMENTS

A. Payment Period: Submit at intervals stipulated in the Agreement.

B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.

C. Forms filled out by hand will not be accepted.

D. Execute certification by signature of authorized officer.

E. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.

F. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.

G. Submit one electronic and three hard-copies of each Application for Payment.

H. Stored Materials:Include amounts in Application for Payment applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
   1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment for stored materials.
   2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
   3. Provide summary documentation for stored materials indicating the following:
      a) Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
      b) Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
      c) Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.

I. When Architect requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

1.5 MODIFICATION PROCEDURES

A. For minor changes not involving an adjustment to the Contract Sum or Contract Time, Architect will issue instructions directly to Contractor.

B. For other required changes, Architect will issue a document signed by Owner instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order.
   1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
   2. Promptly execute the change.

C. For changes for which advance pricing is desired, Architect will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit a fixed price quotation within ____ days.

D. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.

E. Substantiation of Costs: Provide full information required for evaluation.
   1. On request, provide the following data:
      a) Quantities of products, labor, and equipment.
      b) Taxes, insurance, and bonds.
      c) Overhead and profit.
      d) Justification for any change in Contract Time.
      e) Credit for deletions from Contract, similarly documented.
   2. Support each claim for additional costs with additional information:
      a) Origin and date of claim.
      b) Dates and times work was performed, and by whom.
      c) Time records and wage rates paid.
      d) Invoices and receipts for products, equipment, and subcontracts, similarly documented.
   3. For Time and Material work, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.

F. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

G. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.

H. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.

I. Promptly enter changes in Project Record Documents.

1.6 APPLICATION FOR PAYMENT AT SUBSTANTIAL COMPLETION

A. Following issuance of the Certificate of Substantial Completion, submit at Application for Payment. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
   1. Administrative actions and submittals that shall precede or coincide with this application include the following:
      a) Occupancy permits.
      b) Warranties and maintenance agreements.
      c) Test/adjust/balance records.
      d) Maintenance instructions.
      e) Changeover information related to Owner's occupancy.
      f) Final cleaning.
      g) Application for reduction of retainage and consent of surety.

1.7 APPLICATION FOR FINAL PAYMENT

A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.

B. Include the following submittals with the Application for Final Payment:
   1. Transmittal of project construction records to the Owner.

2. Insurance certificates for products and completed operations where required.
3. Proof that taxes, fees, and similar obligations were paid.
4. Waivers and releases.

C. Application for Final Payment will not be considered until the following have been accomplished:
1. All closeout procedures specified in Section 01 7000.
2. Completion of items specified for completion after Substantial Completion.
3. Removal to temporary facilities and services.
4. Change of door locks to Owner's access.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 01 2000

FOR REFERENCE: THIS SECTION WAS ISSUED FOR PHASE 1 AND PHASE 2



Supplemental Instructions No. XX

To: |

Date: |

Project No.: |

Project: |

Distribution : |

The Work shall be carried out in accordance with the following supplemental instructions issued in accordance with the Contract Documents without change in Contract Sum or Contract Time. Prior to proceeding in accordance with these instructions, indicate your acceptance of these instructions for minor change to the Work as consistent with the Contract Documents and return a copy to the Architect.

Item:	**Description of Revisions:**
|	|

Issued: |

By: |

Accepted: |

By: |

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Proposal Request No. XX

To: |

Date: |

Project No.: |

Project: |

Distribution : |

Please submit an itemized quotation for changes in the Contract Sum and/or Time incidental to proposed modifications to the Contract Documents described herein.

This is not a Change Order or a directive to proceed with the following work.

Item:	**Description of Revisions:**
|	|

End of Proposal Request

Construction Change Directive No. XX

To:		**Date:**	
		Contract For:	
Project No.:		**Contract Date:**	
Project:			
Distribution:			

You are hereby directed to make the following change(s) in this Contract:

Proposed Adjustments

1. The Proposed basis of adjustment to the Contract Sum or Guaranteed Maximum Price is:
   Lump Sum increase / decrease of $
   Unit Price of $ per
   as provided in Subparagraph 7.3.3 of AIA Document A201, 2017 edition.
   as follows:
2. The Contract Time is proposed to be adjusted / remain unchanged. The proposed adjustment, if any, is an increase / a decrease of days.

When signed by the Owner and Architect and received by the Contractor, the document becomes effective IMMEDIATELY as a Construction Change Directive (CCD), and the Contractor shall proceed with the change described above.

Signature by the Contractor indicates the Contractor's agreement with the proposed adjustments in the Contract Sum and Construction Contract Time set forth in this Change Directive.

Architect	Owner	Contractor
By	By	By
Date	Date	Date

The S/L/A/M Collaborative, Inc.
S/L/A/M Architects, Landscape Architects, & Engineers, P.C.
S/L/A/M Construction Services

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SECTION 01 2100 - ALLOWANCES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Lump Sum Trade allowances.

B. Unit-cost Trade Allowances

C. Quantity Trade Allowances

D. Payment and modification procedures relating to Trade Allowances.

1.2 RELATED REQUIREMENTS

A. Section 01 2000 - Price and Payment Procedures: Additional payment and modification procedures.

1.3 LUMP SUM, UNIT COST AND QUANTITY TRADE ALLOWANCES

A. Trade Allowance shall include cost to Trade Contractor of labor, specific products and materials ordered or directed under allowance and shall include supervision, taxes, freight, and delivery to Project site.
   1) Do not include Trade Contractor's or subcontractor's indirect expense in the Change Order cost.
   2) No change to Trade Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or labor type of the same scope and nature as originally indicated.

B. Refer to Division 0 documents for contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to labor, and materials ordered under trade allowance.

C. Trade Contractor Responsibilities:
   1. Value of Trade Allowance is to be indicated on Schedule of Values with pay application.
   2. Perform work of Allowance as directed by Contractor only.
   3. Provide Time and Material tickets to Superintendent for confirmation of Time and Material utilized.
   4. Submit invoices for actual quantities and materials utilized at the site for each allowance.
   5. Contractor to issue zero cost change order noting value of in contract Trade Allowance to be billed within Trade monthly application against original Schedule of Value.
   6. Prepare Change Order if necessary.

D. Differences in costs will be adjusted by Change Order. Any unused portion of Trade Allowance is to be returned to Owner via deduct change order based upon approved rates.

1.4 ALLOWANCES SCHEDULE

A. Refer to Bid Package Scope of Work for more information regarding Trade Allowances to include.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 01 2100

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SECTION 01 2201 - UNIT PRICES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. List of unit prices, for use in preparing Bids.

B. Measurement and payment criteria applicable to Work performed under a unit price payment method.

C. Defect assessment and non-payment for rejected work.

1.2 RELATED REQUIREMENTS

A. Document 00 4000 - Procurement Manual: Refer to "Invitation to Bid" section for preparation of pricing for Unit Prices.

B. Section 31 6616 - Aggregate Piers: Unit prices and pricing notes for aggregate piers.

1.3 COSTS INCLUDED

A. Unit Prices included on the Bid Form shall include full compensation for all required labor, products, tools, equipment, plant, transportation, services and incidentals; erection, application or installation of an item of the Work; overhead and profit.

1.4 UNIT QUANTITIES SPECIFIED

A. Quantities indicated in the Bid Form are for bidding and contract purposes only. Quantities and measurements of actual Work will determine the payment amount.

1.5 MEASUREMENT OF QUANTITIES

A. Measurement methods delineated in the individual specification sections complement the criteria of this section. In the event of conflict, the requirements of the individual specification section govern.

B. Take all measurements and compute quantities. Measurements and quantities will be verified by Architect.

C. Assist by providing necessary equipment, workers, and survey personnel as required.

D. Measurement by Volume: Measured by cubic dimension using mean length, width and height or thickness.

E. Measurement by Area: Measured by square dimension using mean length and width or radius.

F. Linear Measurement: Measured by linear dimension, at the item centerline or mean chord.

1.6 PAYMENT

A. Payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities of Work that is incorporated in or made necessary by the Work and accepted by the Architect, multiplied by the unit price.

B. Payment will not be made for any of the following:
   1. Products wasted or disposed of in a manner that is not acceptable.
   2. Products determined as unacceptable before or after placement.
   3. Products not completely unloaded from the transporting vehicle.
   4. Products placed beyond the lines and levels of the required Work.
   5. Products remaining on hand after completion of the Work.
   6. Loading, hauling, and disposing of rejected Products.

1.7 DEFECT ASSESSMENT

A. Replace Work, or portions of the Work, not complying with specified requirements.

B. If, in the opinion of Owner, it is not practical to remove and replace the Work, Owner will direct one of the following remedies:
   1. The defective Work may remain, but the unit price will be adjusted to a new unit price at the discretion of Owner.
   2. The defective Work will be partially repaired to the instructions of the Owner, and the unit price will be adjusted to a new unit price at the discretion of Owner.

C. The individual specification sections may modify these options or may identify a specific formula or percentage price reduction.

1.8 SCHEDULE OF UNIT PRICES - DIV. 02 - FOR HAZARDOUS BUILDING MATERIALS

A. Unit Price No. 1: Small Containment Preparation Containment (Less than 160 square\260 linear feet of asbestos containing material). Pricing for containments with larger amounts of materials are to be INCLUDED in the unit prices themselves listed below. There is no separate unit price for containments with larger amounts.
   1. $ _____ per containment

B. Unit Price No. 2: Floor Tile/Flooring Materials and Mastics (Includes all layers of carpeting, adhesives, multiple layers of floor tiles/flooring materials/linoleum/sheet flooring/vinyl stairwell flooring/wood/slate/ceramic/grout/mud bed/terrazzo/concrete/mastics, levelastics, contaminated flooring materials and substrates, etc.) Removal and Disposal as ACM.
   1. $ _____ per square foot

C. Unit Price No. 3: Cove Base and Adhesives (multiple layers) (including contaminated substrates) Removal and Disposal as ACM.
   1. $ _____ per linear foot

D. Unit Price No. 4: Mudded Pipe Fitting Insulation Removal and Disposal as ACM.
   1. $ _____ per fitting/joint

E. Unit Price No. 5: Glove Bag Removal and Disposal as ACM.

1. $ _____ per bag

F. Unit Price No. 6: Pipe and Pipe Fitting Insulation Removal and Disposal as ACM.
   1. $ _____ per linear foot

G. Unit Price No. 7: Pipe/Duct Insulation Buried under Floor Slabs Removal and Disposal as ACM.
   1. $ _____ per linear foot

H. Unit Price No. 8: Duct Insulation/Adhesives/Seam/Flange Sealant (including contaminated substrates) Removal and Disposal as ACM.
   1.

I. Unit Price No. 9: Air Duct Vibration Isolation Cloth Removal and Disposal as ACM.0
   1. $ _____ per cloth

J. Unit Price No. 10: Light Backing Paper Insulation Removal and Disposal as ACM.
   1. $ _____ per light fixture

K. Unit Price No. 11: Sink Undercoating Removal and Disposal as ACM.
   1. $ _____ per sink

L. Unit Price No. 12: Countertop/Millwork/Cabinet/Adhesives/Science Desk Tops Removal and Disposal as ACM.
   1. $ _____ per square foot

M. Unit Price No. 13: Transite Cement Board Removal and Disposal as ACM.
   1. $ _____ per square foot
   2. $ _____ per linear foot (buried transite piping)

N. Unit Price No. 14: Fire Door/Insulation Removal and Disposal as ACM.
   1. $ _____ per door

O. Unit Price No. 15: Wall Adhesives and Contaminated Substrates (mirrors/blackboards/bulletin boards, wood panel walls, etc.) Removal and Disposal as ACM.
   1. $ _____ per square foot

P. Unit Price No. 16: Vermiculite and Associated/Contaminated Wall/Ceiling Materials Removal and Disposal as ACM.
   1. $ _____ per square foot

Q. Unit Price No. 17: Ceramic Wall and Floor Tiles Adhesives, Damp-Proofing, Mud Bed/Grout and Contaminated Substrates Removal and Disposal as ACM.
   1. $ _____ per square foot

R. Unit Price No. 18: Wall/Ceiling Board/Sheetrock/Taping/Joint Compounds (multiple layers) and Removal and Disposal as ACM.
   1. $ _____ per square foot

S. Unit Price No. 19: Wall/Ceiling Plaster (multiple layers) and Supporting Systems and Contaminated Substrates Removal and Disposal as ACM.

1. $ _____ per square foot

T. Unit Price No. 20: Electrical Insulation Removal and Disposal as ACM.
   1. $ _____ per linear foot

U. Unit Price No. 21: Wall, Ceiling Tile and Glue Daubs and Contaminated Substrates Removal and Disposal as ACM.
   1. $ _____ per square foot

V. Unit Price No. 22: Water Fountain/Damp-Proofing Removal and Disposal as ACM.
   1. $ _____ per fountain

W. Unit Price No. 23: Custodial Slop Sink/Damp-Proofing Removal and Disposal as ACM.
   1. $ _____ per slop sink

X. Unit Price No. 24: Freezers/Damp-Proofing/Contaminated Cork/Contaminated Substrates/Other Material Removal and Disposal as ACM.
   1. $ _____ per freezer

Y. Unit Price No. 25: Incinerator/Boiler/Brick/Mortar/Interior and Exterior Insulation/Mastic/Fireproofing Materials/Gaskets/Roping Removal and Disposal as ACM.
   1. $ _____ per boiler/incinerator

Z. Unit Price No. 26: Gymnasium Flooring Materials (All Layers) and Mastics/Damp-proofing (including cleaning concrete substrates) Removal and Disposal as ACM.
   1. $ _____ per square foot

AA. Unit Price No. 27: Caulking, Glazing and Sealant Compounds (includes substrates and contaminated materials) Removal and Disposal as ACM.
   1. $ _____ per linear foot
   2. $ _____ per square foot
   3. $ _____ per window opening (multiple windows/sizes exist in openings)
   4. $ _____ per door opening (multiple doors/sizes exist in openings)

BB. Unit Price No. 28: Caulking, Glazing and Sealant Compounds (includes substrates and contaminated materials) Removal and Disposal as PCB>50 ppm Bulk Product Waste.
   1. $ _____ per linear foot
   2. $ _____ per square foot
   3. $ _____ per window opening (multiple windows/sizes exist in openings)
   4. $ _____ per door opening (multiple doors/sizes exist in openings)

CC. Unit Price No. 29: Caulking, Glazing and Sealant Compounds (includes substrates and contaminated materials) Removal and Disposal as ACM and PCB>50 ppm Bulk Product Waste.
   1. $ _____ per linear foot
   2. $ _____ per square foot
   3. $ _____ per window opening (multiple windows/sizes exist in openings)
   4. $ _____ per door opening (multiple doors/sizes exist in openings)

DD. Unit Price No. 30: Interior/Exterior Wall/Ceiling/Floor/Paint Removal and Disposal as PCB>50 Bulk Product Waste.

1. $ _____ per ton

EE. Unit Price No. 31: Interior/Exterior Wall/Ceiling/Floor/Paint Removal and Disposal as PCB<50 CT DEEP Regulated Waste.
1. $ _____ per ton

FF. Unit Price No. 32: Interior/Exterior Wall/Ceiling/Floor Removal and Disposal as PCB Remediation Waste.
1. $ _____ per ton

GG. Unit Price No. 33: Exterior Asphalt/Concrete Removal and Disposal as PCB Remediation Waste.
1. $ _____ per ton

HH. Unit Price No. 34: Exterior Soil Removal and Disposal as PCB Remediation Waste.
1. $ _____ per ton

II. Unit Price No. 35: Roofing Core/Field Base Material (includes multiple layers and substrates) Removal and Disposal as ACM.
1. $ _____ per square foot

JJ. Unit Price No. 36: Roof Flashing (includes multiple layers and substrates) Removal and Disposal as ACM.
1. $ _____ per square foot

KK. Unit Price No. 37: Damp-proofing/Tars/Mastics – Interior/Exterior Walls/Floors/Ceilings/Slab/Foundation and Associated Substrate/Adjacent Materials (includes multiple layers, contaminated materials and substrates) Removal and Disposal as ACM.
1. $ _____ per square foot
2. $ _____ per ton with substrate

LL. Unit Price No. 38: Off-Site Transportation and Disposal of Natural Soil.
1. $ _____ per ton.
   a) "Natural" Soil: Soils have no detectable concentrations of non-naturally occurring compounds.

MM. Unit Price No. 39: Off-Site Transportation and Disposal of Polluted Soil.
1. $ _____ per ton.
   a) "Polluted" Soils contain concentrations of non-naturally occurring compounds detected above laboratory reporting limits, but below the CTDEEP RSR criteria in accordance with RCSA 22a-133k-1(a)(45). Polluted soils can be reused on-site with the preparation of a Materials Management Plan and approval from the Engineer.

NN. Unit Price No. 40: Off-Site Transportation and Disposal of Contaminated Soil.
1. $ _____ per ton.
   a) "Contaminated Materials" contain concentrations of compounds that exceed CT DEEP RSR criteria in accordance with RCSA 22a-133k. Contaminated materials (concrete, soil, sediment, groundwater or surface water) can NOT be reused on-site and must be disposed of at an off-site disposal facility.

OO. Unit Price No. 41: Off-Site Transportation and Disposal of Hazardous Waste/Soils.

1. $ _____ per ton.
   a) "Hazardous Waste/Soils" Includes all soil/fill material that exceeds regulatory limits for hazardous substances as defined in 40 CFR, Part 261.20 Subpart C – Characteristics of Hazardous Waste. This material CANNNOT be reused on-site and must be disposed of at an off-site approved disposal facility.

PP. Unit Price No. 42: Off-Site Transportation and Disposal of Hazardous Lead-Based Paint Demolition Debris.
1. $ _____ per 40-yard dumpster.
2. $ _____ per 100-yard dumpster.

1.9 SCHEDULE OF UNIT PRICES - DIV. 03-14

A. Structural Steel, more than 30 LBS/LF - New Construction, Div 05.
1. Per ton, $_____, furnished and installed.

B. Structural Steel, less than, or equal to 30 LBS/LF – New Construction; Div 05
1. Per ton, $_____, furnished and installed.

C. Beam Penetrations, field fabricated and installed - each Type; Div 05
1. 6" x 6", $ _____, furnished and installed.
2. 8" x 8", $ _____, furnished and installed.
3. 12" x 12", $ _____, furnished and installed.

D. Epoxy anchor, 0.75 inch by 8 inches, full manufacturer in-place system installation ; Div 05.
1. Each, $_____, furnished and installed.

E. Alternate Flooring Adhesive; Section 09 0561. Square foot $_____.

F. MVE Control System; Section 09 0561. Square foot $ _____.

G. Traffic Signage; Each type with/post/bollard/base in place; Div. 10.
1. Each type $_____.

1.10 SCHEDULE OF UNIT PRICES - DIV. 21-28

A. Provide an additional sprinkler head including arm-over piping with an addition (6) six feet of piping to get back to nearest branch line; Div. 21
1. Per sprinkler head installed $_____.

B. Provide an additional duplex receptacle including wiring to nearest normal power panel with sufficient capacity, faceplate, back-box, conduits, bushing, and pull string. Also include cutting and patching of typical interior partition; Div. 26.
1. Per receptacle installed $_____.

C. Provide an additional duplex receptacle including wiring to nearest emergency power panel with sufficient capacity, faceplate, back-box, conduits, bushing, and pull string. Also include cutting and patching of typical interior partition; Div. 26
1. Per receptacle installed $_____.

D. Provide an additional exit sign including power wiring and conduit system from the nearest emergency electrical power panel. Extension of the nearest exit sign circuit is acceptable if the base bid circuit capacity is sufficient: Div. 26
   1. Per exit sign installed $_____.

E. Provide an additional fire alarm pull station, including wiring to panel. Also include cutting and patching of typical interior partition; Div. 28.
   1. Per pull station installed $_____.

F. Provide an additional combination audible/visual fire alarm device, including wiring to panel. Also include cutting and patching of typical interior partition; Div. 28
   1. Per fire alarm device installed $_____.

G. Provide an additional ceiling smoke detector including wiring and conduit system to the nearest node. Also include cutting and patching of typical acoustical ceiling panel; Div. 28
   1. Per smoke detector installed $_____.

H. Provide an additional carbon monoxide detector including wiring and conduit system to the nearest node. Also include cutting and patching of typical acoustical ceiling panel and/or typical interior partition; Div. 28
   1. Per carbon monoxide detector installed $_____.

I. Provide an additional combination audible/visual fire alarm device, including wiring to panel. Also include cutting and patching of typical interior partition; Div. 28
   1. Per fire alarm device installed $_____.

J. Single Data or Voice Outlet; Div 26 & 27.
   1. Provide an additional back-box, conduits, cable, bushing, and pull string. Include cutting and patching of typical interior partition, to accommodate installation of Single Data Outlet, including terminations, cable mounting devices, labeling, testing, documentation, installation and supervision.
   2. One (1) Category 6 rated RJ45 jack mounted on a single gang faceplate with one (1) Category 6, plenum rated, unshielded twisted pair cable installed to relevant IDF or MDF patch panel.
      a) Category 6 cable shall terminate onto an available port on the IDF or MDF patch panel.
      b) Cable length: Assume 285 feet.
   3. Per outlet installed $_____.

K. Dual Data Outlet; Div 26 & 27
   1. Provide an additional back-box, conduits, cable, bushing, and pull string. Include cutting and patching of typical interior partition, to accommodate installation of Dual Data Outlet, including terminations, cable mounting devices, labeling, testing, documentation, installation and supervision.
   2. Two (2) Category 6 rated RJ45 jacks, mounted on a single gang faceplate with one (2) Category 6, plenum rated, unshielded twisted pair cable installed to relevant IDF or MDF patch panel.
      a) Category 6 cable shall terminate onto an available port on the IDF or MDF patch panel.
      b) Cable length to assume 285 feet.

3. Per outlet installed $_____.

L. Wireless Access Point location; Div 26 & 27
   1. Provide pathway, and cable for additional WAP. Include cutting and patching of typical interior partition and/or ceiling tile, to accommodate installation of Wireless Access Point location, including terminations, cable mounting devices, labeling, testing, documentation, installation and supervision.
   2. One (1) Category 6 rated RJ45 plug, terminated onto (1) Category 6, plenum rated, unshielded twisted pair cable, with a 20ft. service loop, and installed to relevant IDF or MDF patch panel.
      a) Category 6 cable shall terminate onto an available port on the the IDF or MDF patch panel.
      b) Cable length to assume 285 feet.
   3. Per WAP installed $_____.

1.11 SCHEDULE OF UNIT PRICES - DIV. 31-32

A. Preparation of aggregate pier design, one mobilization, one modulus test, pre-auger each aggregate pier location, pre-drill or pre-excavate 50% of pier locations, installation of aggregate pier elements, and demobilization (See Note AG-1 below); Div 31
   1. Lump sum $_____.

B. Pre-drill aggregate pier location using down-hole hammer (See Note AG-2 below); Div 31
   1. Linear foot $_____.

C. Pre-excavate aggregate pier location, remove oversize materials that could obstruct aggregate pier, backfill excavation with excavated soils or imported borrow to satisfaction of aggregate pier designer (See Note AG-2 below); Div 31
   1. Linear foot $_____ .

D. Additional aggregate piers (See Note AG-3 below); Div 31.
   1. Linear foot $_____ .

E. Additional aggregate piers (See Note AG-3 below); Div 31.
   1. Linear foot $_____ .

F. Additional modulus tests; Div 31.
   1. Each $_____.

G. Additional mobilizations/demobilizations; Section 31 6616, page 11, Item 7.
   1. Each $_____.

H. Additional Contractor-provided information: Div 31.
   1. Total number of aggregate piers in base bid design: Quantity _____.
   2. Average installed pier length in base bid design:: Linear Foot _____.
   3. Volume of crushed stone import in base bid design: Cubic Yard _____.

I. NOTES AG-1 to AG-3

1. **AG-1**: Contractor's base bid shall include pre-drill or pre-excavate of 50% of the Contractor's design number of piers and based on the Contractor's average design pier length, in addition to pre-auger. Payment for pre-drill or pre-excavate will be based on actual installed length of pre-drill or pre-excavate in accordance with the unit costs provided under Item 2 and Item 3.
2. **AG-2**: Contractor will only be paid for one of pre-drill or pre-excavate - whichever is the method used to achieve the final installation depth.
3. **AG-3**: Additional aggregate pier unit cost shall only apply to additional piers required to be installed outside the limits of unsuitables shown on the Drawings. Unit cost shall be based on aggregate pier installation with pre-auger. Unit cost for pre-drill/pre-excavate, as applicable, will be paid in addition to aggregate pier with pre-auger unit cost.

J. Bituminous concrete paving regular duty, in place with base, Div 32.
   1. Square Foot $ _____.

K. Bituminous concrete paving heavy duty, in place with base, Div. 32
   1. Square Foot $ _____.

L. Bituminous concrete walk paving, in place with base, Div. 32.
   1. Square Foot $ _____.

M. Pavement Stripping – 4" wide striping, Div. 32.
   1. Linear Foot $ _____.

N. Gravel subbase placed and compacted, Div. 32
   1. Cubic Yard $ _____.

O. Processed aggregate, placed and compacted, Div. 32
   1. Cubic Yard $ _____.

P. Unit masonry pavers, in place with base, Div 32
   1. Square Foot $ _____.

Q. Washed stone aggregate surfacing, in place with geotextile fabric and base, Div. 32
   1. Square Foot $ _____.

R. Natural infield & warning track surfacing, spread and compacted, Div. 32.
   1. Cubic Yard $ _____.

S. Granite Curbing, in place with base, each, Div. 32
   1. Straight Section, Linear Foot $ _____.
   2. Curved Section, Linear Foot $ _____.

T. Chain link fence, each, Div. 32.
   1. 4-foot-tall fence, Linear Foot $ _____.
   2. 4-foot gate, Linear Foot $ _____.
   3. 6-foot-tall fence, Linear Foot $ _____.
   4. 6-foot gate, Linear Foot $ _____.
   5. 8-foot-tall fence, Linear Foot $ _____.
   6. 10-foot-tall fence, Linear Foot $ _____.
   7. 12-foot-tall fence, Linear Foot $ _____.

U. Segmental retaining walls with base, backfill, geotextile fiber and anchoring system, Div. 32.
   1. Face Foot $ _____.

V. Athletic Field Seeding/Sodding, each, Div. 32 .
   1. Seeding, Square Foot $ _____.
   2. Per Alternate 2 - Sodding, Square Foot $ _____.

W. Turf and Grasses, each, Div. 32.
   1. Seeding - Lawn, Square Foot $ _____.
   2. Seeding - Conservation Mix, Square Foot $ _____.

X. Plants, Div. 32.
   1. All planting listed on the plant list (each type), in place, with mulch.
      a) Each $ - Furnish as separate attachment.
   2. Mulch placed and fine raked, Cubic Yard $ _____.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 01 2201

SECTION 01 2300 - ALTERNATES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Description of Alternates.

1.2 ACCEPTANCE OF ALTERNATES

A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in the Owner-Contractor Agreement.

B. Coordinate related work and modify surrounding work to integrate the Work of each Alternate.

1.3 SCHEDULE OF ALTERNATES

A. Alternate No. 01 - Provide sod in lieu of seeding at the Baseball and Rectangular fields:

B. Alternate No. 02 - Provide sod in lieu of seeding at the Softball field:

C. Alternate No. 03 - Courtyards: Provide pavers in lieu of concrete:

D. Alternate No. 04 - Add painted graphics at all gym walls:
   1. Alternate Item: Drawing number A111.4 including elevations 1B, 1D, 1E, 3B.

E. Alternate No. 05 - Add full-height wall tile at sink wall in the following restrooms: 1105, 1104, 2021, 2027, 2055, 2061, 2092 and 2098.
   1. Alternate Item: Refer to Finish Plans and Finish Product List for type of tile.
   2. Alternate Item: Drawing number A131 and Section 09 3000.

F. Alternate No. 06 - Add dimensional letter signage at the following:
   1. Auditorium doors.
   2. Cafeteria.
   3. Art room.
   4. Construction Tech room.
   5. Main reception window.
   6. Gymnasium.
   7. See Drawings for specific dimensional letter signage at each location.
   8. Alternate Item: Section 10 1419.

G. Alternate No. 07 - Provide 250kW natural gas fueled generator in lieu of diesel fueled generator.

H. Alternate No. 08 - Delete lightning protection system:

I. Alternate No. 09 - Provide 80 mil roofing membrane and 30-year warranty in lieu of 60 mil roofing membrane and 20-year warranty:
   1. Alternate Item: Section 07 5423.

J. Alternate No. 10 – The hazardous buildings material contractor shall remove and dispose of PCB greater than 50PPM containing paint/painted materials as PCB bulk product waste
   1. Alternate Item: Section 02 8432

K. Alternate No. 11 - The hazardous buildings material contractor shall remove and dispose of PCB less than 50PPM containing paint/painted materials as PCB CTDEEP regulated waste.
   1. Alternate Item: Section 02 8432.

L. Alternate No. 12 - Aggregate pier ground improvement shall be provided as an alternate to complete removal and replacement of existing fill or buried organic-containing materials from below building structures.
   1. Alternate Item: Section 31 6616.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 01 2300

SECTION 01 2500 - SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Procedural requirements for proposed substitutions.

1.2 RELATED REQUIREMENTS

A. Section 01 2300 - Alternates, for product alternatives affecting this section.

B. Section 01 3000 - Administrative Requirements: Submittal procedures, coordination.

C. Section 01 6000 - Product Requirements: Fundamental product requirements, product options, delivery, storage, and handling.

1.3 DEFINITIONS

A. Substitutions: Changes from Contract Documents requirements proposed by Contractor to materials, products, assemblies, and equipment.
   1. Substitutions for Cause: Proposed due to changed Project circumstances beyond Contractor's control.
      a) Product unavailability.
      b) Regulatory changes.
      c) Warranty terms unavailability.
   2. Substitutions for Convenience: Proposed due to possibility of offering substantial advantage to the Project.

1.4 REFERENCE STANDARDS

A. CSI/CSC Form 1.5C - Substitution Request (During the Bidding/Negotiating Stage); Current Edition.

B. CSI/CSC Form 13.1A - Substitution Request (After the Bidding/Negotiating Phase); Current Edition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

A. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
   2. Agrees to provide the same warranty for the substitution as for the specified product.

3. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
4. Waives claims for additional costs or time extension that may subsequently become apparent.
5. Agrees to reimburse Owner and Architect for review or redesign services associated with re-approval by authorities.

B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.
1. Note explicitly any non-compliant characteristics.

C. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
1. Forms indicated in the Project Manual are adequate for this purpose, and must be used.

D. Limit each request to a single proposed substitution item.
1. Submit an electronic document, combining the request form with supporting data into single document.

3.2 SUBSTITUTION PROCEDURES DURING PROCUREMENT

A. Submittal Time Restrictions:
1. Instructions to Bidders specifies time restrictions and the documents required for submitting substitution requests during the bidding period.

B. Submittal Form (before award of contract):
1. Submit substitution requests by completing CSI/CSC Form 1.5C - Substitution Request. See this form for additional information and instructions. Use only this form; other forms of submission are unacceptable.

3.3 SUBSTITUTION PROCEDURES DURING CONSTRUCTION

A. Submittal Form (after award of contract):
1. Submit substitution requests by completing CSI/CSC Form 13.1A - Substitution Request. See this form for additional information and instructions. Use only this form; other forms of submission are unacceptable.

B. Submit request for Substitution for Cause within 14 days of discovery of need for substitution, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.

C. Submit request for Substitution for Convenience immediately upon discovery of its potential advantage to the project, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.
1. In addition to meeting general documentation requirements, document how the requested substitution benefits the Owner through cost savings, time savings, greater energy conservation, or in other specific ways.
2. Document means of coordinating of substitution item with other portions of the work, including work by affected subcontractors.
3. Bear the costs engendered by proposed substitution of:

a) Owner's compensation to the Architect for any required redesign, time spent processing and evaluating the request.
b) Other construction by Owner.
c) Other unanticipated project considerations.

D. Substitutions will not be considered under one or more of the following circumstances:
1. When they are indicated or implied on shop drawing or product data submittals, without having received prior approval.
2. Without a separate written request.
3. When acceptance will require revisions to Contract Documents.

3.4 RESOLUTION

A. Architect may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.

B. Architect will notify Contractor in writing of decision to accept or reject request.
1. Architect's decision following review of proposed substitution will be noted on the submitted form.

3.5 ACCEPTANCE

A. Accepted substitutions change the work of the Project. They will be documented and incorporated into work of the project by Change Order, Construction Change Directive, Architectural Supplementary Instructions, or similar instruments provided for in the Conditions of the Contract.

3.6 CLOSEOUT ACTIVITIES

A. See Section 01 7800 - Closeout Submittals, for closeout submittals.

B. Include completed Substitution Request Forms as part of the Project record. Include both approved and rejected Requests.

3.7 ATTACHMENTS

A. A facsimile of the Substitution Request Forms (During Bidding and During Construction) required to be used on the Project is included after this section.

END OF SECTION 01 2500

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FOR REFERENCE: THIS SECTION WAS ISSUED FOR PHASE 1 AND PHASE 2

SUBSTITUTION REQUEST
(During the Bidding/Negotiating Phase)

CSI®

PROJECT: _____

SUBSTITUTION REQUEST NUMBER: _____

_____

FROM: _____

TO: _____

DATE: _____

_____

A/E PROJECT NUMBER: _____

RE: _____

CONTRACT FOR: _____

SPECIFICATION TITLE: _____

DESCRIPTION: _____

SECTION: _____ PAGE: _____

ARTICLE/PARAGRAPH: _____

PROPOSED SUBSTITUTION: _____

MANUFACTURER: _____ ADDRESS: _____ PHONE: _____

TRADE NAME: _____ MODEL NO.: _____

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.
Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

SUBMITTED BY: _____

SIGNED BY: _____

FIRM: _____

ADDRESS: _____

TELEPHONE: _____

A/E's REVIEW AND RECOMMENDATION:

☐ Approve Substitution—Make submittals in accordance with Specification Section 01 33 00 Submittal Procedures.

☐ Approve Substitution as noted—Make submittals in accordance with Specification Section 01 33 00 Submittal Procedures.

☐ Reject Substitution—Use specified materials.

☐ Substitution Request received too late—Use specified materials.

SIGNED BY: DATE:

SUPPORTING DATA ATTACHED: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____

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SUBSTITUTION REQUEST
(After the Bidding/Negotiating Phase)

CSI®

PROJECT: _____

SUBSTITUTION REQUEST NUMBER: _____

_____

FROM: _____

TO: _____

DATE: _____

_____

A/E PROJECT NUMBER: _____

RE: _____

CONTRACT FOR: _____

SPECIFICATION TITLE: _____

DESCRIPTION: _____

SECTION: _____ PAGE: _____

ARTICLE/PARAGRAPH: _____

PROPOSED SUBSTITUTION: _____

MANUFACTURER: _____ ADDRESS: _____ PHONE: _____

TRADE NAME: _____ MODEL NO.: _____

INTALLER: _____ ADDRESS: _____ PHONE: _____

HISTORY: ☐ New Product ☐ 1-4 years old ☐ 5-10 years old ☐ More than 10 years old

DIFFERENCES BETWEEN PROPOSED SUBSTITUTION AND SPECIFIED PRODUCT: _____

_____

_____

☐ Point-by-point comparative data attached — REQUIRED BY A/E

REASON FOR NOT PROVIDING SPECIFIED ITEM: _____

_____

SIMILAR INSTALLATION:

PROJECT: _____ ARCHITECT: _____

ADDRESS: _____ OWNER: _____

_____ DATE INSTALLED: _____

PROPOSED SUBSTITUTION AFFECTS OTHER PARTS OF WORK: ☐ No ☐ Yes; explain _____

_____

SAVINGS TO OWNER FOR ACCEPTING SUBSTITUTION:

PROPOSED SUBSTITUTION CHANGES CONTRACT TIME: ☐ No ☐ Yes [Add] [Deduct] _____ days.

SUPPORTING DATA ATTACHED: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____

CONTINUE ON NEXT PAGE

CSI Form 13.1A (April 2022 version)

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SUBSTITUTION REQUEST
(After the Bidding/Negotiating Phase—Continued)

The Undersigned certifies:
- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

SUBMITTED BY: _____

SIGNED BY: _____

FIRM: _____

ADDRESS: _____

TELEPHONE: _____

☐ **Attachments**

A/E's REVIEW AND RECOMMENDATION:

☐ Approve Substitution—Make submittals in accordance with Specification Section 01 33 00 Submittal Procedures.

☐ Approve Substitution as noted—Make submittals in accordance with Specification Section 01 33 00 Submittal Procedures.

☐ Reject Substitution—Use specified materials.

☐ Substitution Request received too late—Use specified materials.

SIGNED BY: **DATE:**

OWNER'S REVIEW AND ACTION:

☐ Substitution approved—Make submittals in accordance with Specification Section 01 33 00 Submittal Procedures. Prepare Change Order

☐ Substitution approved as noted—Make submittals in accordance with Specification Section 01 33 00 Submittal Procedures. Prepare Change Order.

☐ Substitution rejected—Use specified materials.

SIGNED BY: **DATE:**

ADDITIONAL COMMENTS: ☐ **Contractor** ☐ **Subcontractor** ☐ **Supplier** ☐ **Manufacturer** ☐ **A/E**

CSI Form 13.1A (April 2022 version)

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SECTION 01 3000 - ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. General administrative requirements.

B. Electronic document submittal service.

C. Preconstruction meeting.

D. Progress meetings.

E. Construction progress schedule.

F. Coordination drawings.

G. Submittals for review, information, and project closeout.

H. Submittals for design-related professional design services (delegated design).

I. Number of copies of submittals.

J. Requests for Interpretation (RFI) procedures.

K. Submittal procedures.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures - CT-HPBS: Reporting related to sustainability compliance.

B. Section 01 6000 - Product Requirements: General product requirements.

C. Section 01 7000 - Execution and Closeout Requirements: Additional coordination requirements.

D. Section 01 7800 - Closeout Submittals: Project record documents; operation and maintenance data; warranties and bonds.

1.3 GENERAL ADMINISTRATIVE REQUIREMENTS

A. Comply with requirements of Section 01 7000 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.

B. Make the following types of submittals to Architect:
   1. Requests for Interpretation (RFI).
   2. Requests for substitution.
   3. Shop drawings, product data, and samples.
   4. Test and inspection reports.

5. Design data.
6. Manufacturer's instructions and field reports.
7. Applications for payment and change order requests.
8. Progress schedules.
9. Coordination drawings.
10. Correction Punch List and Final Correction Punch List for Substantial Completion.
11. Closeout submittals.

1.4 PROJECT COORDINATOR

A. Project Coordinator: Construction Manager.

B. Cooperate with the Project Coordinator in allocation of mobilization areas of site; for field offices and sheds, for building access, traffic, and parking facilities.

C. During construction, coordinate use of site and facilities through the Project Coordinator.

D. Comply with Project Coordinator's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.

E. Comply with instructions of the Project Coordinator for use of temporary utilities and construction facilities. Responsibility for providing temporary utilities and construction facilities is identified in Section 01 1000 - Summary.

F. Coordinate field engineering and layout work under instructions of the Project Coordinator.

G. Make the following types of submittals to Architect through the Project Coordinator:
1. Requests for Interpretation.
2. Requests for substitution.
3. Shop drawings, product data, and samples.
4. Test and inspection reports.
5. Design data.
6. Manufacturer's instructions and field reports.
7. Applications for payment and change order requests.
8. Coordination drawings.
9. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 ELECTRONIC DOCUMENT SUBMITTAL SERVICE

A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF, MS Word, or MS Excel) format, as appropriate to the document, and transmitted via an Internet-based submittal service that receives, logs and stores documents, provides electronic stamping and signatures, and notifies addressees via email.

1. Besides submittals for review, information, and closeout, this procedure applies to Requests for Interpretation (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Contractor's correction punchlist, and any other document any participant wishes to make part of the project record.
2. Contractor and Architect are required to use this service.
3. It is Contractor's responsibility to submit documents in allowable format.
4. Subcontractors, suppliers, and Architect's consultants will be permitted to use the service at no extra charge.
5. Users of the service need an email address, internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com), unless such software capability is provided by the service provider.
6. Paper document transmittals will not be reviewed; emailed electronic documents will not be reviewed.
7. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.

B. Training: One, one-hour, web-based training session will be arranged for all participants, with representatives of Architect and Contractor participating; further training is the responsibility of the user of the service.

C. Project Closeout: Architect will determine when to terminate the service for the project and is responsible for obtaining archive copies of files for Owner.

3.2 PRECONSTRUCTION MEETING

A. Project Coordinator will schedule a meeting after Notice of Award.

B. Attendance Required:
1. Owner.
2. Architect.
3. Contractor.

C. Agenda:
1. Execution of Owner-Contractor Agreement.
2. Submission of executed bonds and insurance certificates.
3. Distribution of Contract Documents.
4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
5. Submission of initial Submittal schedule.
6. Schedule of meetings during construction.
7. Designation of personnel representing the parties to Contract and Architect.
8. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
9. Construction facilities, controls and construction aids.
10. Temporary utilities.
11. Contractor's quality control/quality assurance program.
12. Scheduling.

13. Requirements for Substantial Completion.
14. Project Closeout procedures and submittals.

D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.3 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the work at maximum bi-monthly intervals.

B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

C. Attendance Required:
1. Contractor.
2. Owner.
3. Architect.
4. Contractor's superintendent.
5. Major subcontractors.

D. Agenda:
1. Review minutes of previous meetings.
2. Review of work progress.
3. Field observations, problems, and decisions.
4. Identification of problems that impede, or will impede, planned progress.
5. Review of submittals schedule and status of submittals.
6. Review of RFIs log and status of responses.
7. Maintenance of progress schedule.
8. Corrective measures to regain projected schedules.
9. Planned progress during succeeding work period.
10. Maintenance of quality and work standards.
11. Effect of proposed changes on progress schedule and coordination.
12. Other business relating to work.

E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.4 CONSTRUCTION PROGRESS SCHEDULE

A. Within 10 days after date of the Agreement, submit preliminary schedule.

B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
1. Include written certification that major contractors have reviewed and accepted proposed schedule.

D. Within 10 days after joint review, submit complete schedule.

E. Submit updated schedule with each Application for Payment.

3.5 COORDINATION DRAWINGS

A. Prepare coordination drawings as required by individual sections and where installation is not completely indicated on shop drawings, where limited space availability requires coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one contractor.
   1. Include project-specific information, shown accurately at a large enough scale to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
      a) Base preparation of coordination drawings on applicable Drawings and include sections, elevations, and details as required to illustrate relationship of various systems and components.
      b) Coordinate the addition of trade-specific information to coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
      c) Include functional and spatial relationships of components of architectural, structural, civil, plumbing, fire-protection, mechanical, fire-alarm, and electrical systems.
      d) Provide space for routine maintenance and for replacement of components during the life of the installation.
      e) Indicate location and size of access doors required for access to concealed damplers, valves, and other controls.
      f) Illustrate required installation sequences.
      g) Indicate dimensions shown on Drawings. Note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Submit alternative sketches to Architect indicating proposed resolution of such conflicts.
      h) Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Organize coordination drawings in the following manner:
   1. Floor Plans and Reflected Ceiling Plans: Indicate architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical work. Show locations of visible ceiling-mounted devices in relation to acoustical ceiling grid system. Provide section drawings to supplement plan drawings as required to adequately represent the Work.
   2. Plenum Space: Indicate subframing for ceiling support, raised access floor, and wall systems, mechanical and electrical equipment, and related Work. Show location of components within plenums to accommodate layout of light fixtures and other components shown on Drawings. Indicate areas of conflict between light fixtures and other components.
   3. Mechanical Rooms: Submit coordination drawings for mechanical rooms, showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
   4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
   5. Slab Edge and Embedded Items: Show slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.

6. Mechanical and Plumbing Work: Indicate the following:
   a) Sizes and elevations of the bottom of ductwork, piping, and conduit runs. Include insulation, bracing, flanges, and support systems.
   b) Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
   c) Fire-rated enclosures around ductwork.
7. Electrical Work: Indicate the following:
   a) Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
   b) Locations of light fixtures, exit lights, emergency battery packs, smoke detectors, and other fire-alarm devices.
   c) Location of panel boards, switchboards, switchgear, transformers, busways, generators, and motor-control centers.
   d) Location of pull boxes and junction boxes, dimensioned from column center lines.
8. Fire-Protection System: Indicate the following:
   a) Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.

C. Review drawings prior to submission to Architect.

D. Architect will review coordination drawings to confirm that, in general, the Work is being coordinated, but not for the details of the coordination, which are the Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will notify Contractor accordingly, who shall make required modifications and resubmit.

E. Prepare coordination drawing electronic files in accordance with Section 01 3000 - Administrative Requirements.

F. Coordination Digital Data Files: Prepare coordination digital data files in accordance with the following requirements:
1. File Preparation Format:
   a) Same digital data software program, version, and operating system as original Drawings.
2. File Submittal Format: Submit or post coordination drawing files using format same as file preparation format.
3. BIM File Incorporation: Develop and incorporate coordination drawing files into BIM setup for the project.
   a) Perform three-dimensional component conflict analysis as part of preparation of coordination drawings. Resolve components conflicts prior to submittal. Indicate where conflict resolution requires modification of design requirements by Architect.
4. Architect will furnish Contractor one set of digital files of Drawings for use in the preparation of coordination digital files.
   a) Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
   b) Digital Data Software Program: Drawings are available in Revit 2023 digital data software program and operating system.
   c) Contractor shall execute a data licensing agreement in the form of Agreement included following this section.

3.6 REQUESTS FOR INTERPRETATION (RFI)

A. Definition: A request seeking one of the following:
   1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.
   2. A resolution to an issue which has arisen due to field conditions and affects design intent.

B. Whenever possible, request clarifications at the next appropriate project progress meeting, with response entered into meeting minutes, rendering unnecessary the issuance of a formal RFI.

C. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of the Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
   1. Prepare a separate RFI for each specific item.
      a) Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
      b) Do not forward requests which solely require internal coordination between subcontractors.
   2. Prepare in a format and with content acceptable to Owner.
   3. Prepare using software provided by the Electronic Document Submittal Service.
   4. Combine RFI and its attachments into a single electronic file. PDF format is preferred.

D. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
   1. Include in each request Contractor's signature attesting to good faith effort to determine from Contract Documents information requiring interpretation.
   2. Unacceptable Uses for RFIs: Do not use RFIs to request the following:
      a) Approval of submittals (use procedures specified elsewhere in this section).
      b) Approval of substitutions (see Section - 01 6000 - Product Requirements)
      c) Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).
      d) Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).
   3. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.
   4. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, the Contract Documents, with no additional input required to clarify the question. They will be returned without a response, with an explanatory notation.

E. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
   1. Official Project name and number, and any additional required identifiers established in Contract Documents.
   2. Owner's, Architect's, and Contractor's names.
   3. Discrete and consecutive RFI number, and descriptive subject/title.

4. Issue date, and requested reply date.
5. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).
6. Annotations: Field dimensions and/or description of conditions which have engendered the request.
7. Contractor's Suggested Resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.

F. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.

G. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.
1. Indicate current status of every RFI. Update log promptly and on a regular basis.
2. Note dates of when each request is made, and when a response is received.
3. Highlight items requiring priority or expedited response.
4. Highlight items for which a timely response has not been received to date.
5. Identify and include improper or frivolous RFIs.

H. Review Time: Architect will respond and return RFIs to Contractor within seven calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.

I. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.
1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.
2. Do not extend applicability of a response to specific item to encompass other similar conditions, unless specifically so noted in the response.
3. Upon receipt of a response, promptly review and distribute it to all affected parties, and update the RFI Log.
4. Notify Architect within seven calendar days if an additional or corrected response is required by submitting an amended version of the original RFI, identified as specified above.

3.7 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:
1. Product data.
2. Shop drawings.
3. Samples for selection.
4. Samples for verification.

B. Submit to Architect for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.

C. Samples will be reviewed for aesthetic, color, or finish selection.

D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 7800 - Closeout Submittals.

3.8 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:
1. Design data.
2. Sustainability design submittals and reports.
3. Certificates.
4. Test reports.
5. Inspection reports.
6. Manufacturer's instructions.
7. Manufacturer's field reports.
8. Other types indicated.

B. Submit for Architect's knowledge as contract administrator or for Owner.

3.9 SUBMITTALS FOR DESIGN-RELATED PROFESSIONAL DESIGN SERVICES (DELEGATED DESIGN)

A. Architect and/or their consultants will review each submittal for general Contract Document conformance; indicate action taken and direction to the Contractor.
1. Architect's "Delegated Design Review Stamp" will be applied to this type of submittal.

B. Delegated Design Review Stamp: Review of calculations and design services provided by the Contractor's Professional Engineer is only for general conformance with the Contract Documents. The Architect and/or Structural Engineer will not review the proposed design and calculations in detail, since the design and calculations for this element are solely the responsibility of the Contractor and the Contractor's Professional Engineer.
1. The Contractor and the Contractor's Professional Engineer shall remain responsible for design and code compliance.
2. Annotations shall not be construed as relieving the Contractor or the Contractor's Professional Engineer from compliance with the project's Contract Documents, including applicable codes, laws and regulations.
3. The Design Review performed by the Architect and/or Structural Engineer shall not be interpreted as an independent confirmation of attached calculations, as this confirmation is the responsibility of the Contractor's Professional Engineer.
4. The Contractor shall confirm and correlate quantities, dimensions, and existing conditions, and shall select fabrication processes and techniques of construction, coordinate their work with that of other trades, and perform their work in a safe and satisfactory manner.
5. PDF Submittals: Architect will indicate, via markup on each submittal, the appropriate action as follows:
6. Submittals by Web-Based Project Software: Architect will indicate, on project software website, the appropriate action, as follows:

3.10 SUBMITTALS FOR PROJECT CLOSEOUT

A. Submit Correction Punch List for Substantial Completion.

B. Submit Final Correction Punch List for Substantial Completion.

C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 01 7800 - Closeout Submittals:
   1. Project record documents.
   2. Operation and maintenance data.
   3. Warranties.
   4. Bonds.
   5. Other types as indicated.

D. Submit for Owner's benefit during and after project completion.

3.11 NUMBER OF COPIES OF SUBMITTALS

A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.

B. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
   1. After review, produce duplicates.
   2. Retained samples will not be returned to Contractor unless specifically so stated.

3.12 SUBMITTAL PROCEDURES

A. General Requirements:
   1. Use a single transmittal for related items.
   2. Submit all product data required for each specification section as one submittal. Piecemeal submittals will not be reviewed.
   3. Identify each item using the specification section number followed by a unique sequential two-digit submittal identifier and single-digit submittal revision number. For example, 04-2100-01-0, where "04-2100" is the specification section number, "01" is the submittal identifier, and "0" is the revision number. The first submittal would use Revision Number "0".
   4. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
   5. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
   6. Deliver each submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties, and is of the benefit to the project.
      a) Upload submittals in electronic form to Electronic Document Submittal Service website.
   7. Schedule submittals to expedite the Project, and coordinate submission of related items.
      a) For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.

b) For sequential reviews involving Architect's consultants, Owner, or another affected party, allow an additional 7 days.
c) Resubmittal Review: Allow 15 days for review of each resubmittal.
d) For sequential reviews involving approval from authorities having jurisdiction (AHJ), in addition to Architect's approval, allow an additional 30 days.
e) No extension of Contract Time will be authorized because of failure to transmit submittals to the Architect sufficiently in advance of the Work to permit processing.

8. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
9. When revised for resubmission, identify all changes made since previous submission.
10. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.
11. Submittals received from sources other than Contractor will be returned without review.
12. Submittals not requested will be recognized, and will be returned "Not Reviewed",

B. Product Data Procedures:
1. Submit only information required by individual specification sections.
2. Collect required information into a single submittal.
3. Do not submit (Material) Safety Data Sheets for materials or products.

C. Shop Drawing Procedures:
1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
2. Do not reproduce Contract Documents to create shop drawings.
3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.

D. Samples Procedures:
1. Transmit related items together as single package.
2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.

3.13 SUBMITTAL REVIEW

A. Submittals for Review: Architect and Construction Manager will review each submittal, and approve, or take other appropriate action.

B. Submittals for Information: Architect will acknowledge receipt and review. See below for actions to be taken.

C. Architect's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.
1. Notations may be made directly on submitted items and/or listed on appended Submittal Review cover sheet.

D. Submittals for Review: PDF Submittals; Architect's and consultants' actions on items submitted for review:
1. Actions taken by indication on PDF submittals have the following meanings:
a) "APPROVED": Final unrestricted release; Work covered by the submittal may proceed provided it complies with the requirements of the Contract Documents. Payment for the Work depends on that compliance.

b) "APPROVED AS CORRECTED": Final-but-restricted-release; Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and it complies with the requirements of the Contract Documents. Payment for the Work depends on that compliance.
c) "APPROVED AS CORRECTED - RESUBMIT FOR RECORD WITH ALL CORRECTIONS INCORPORATED": Final-but-restricted-release; Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and it complies with the requirements of the Contract Documents. Submit corrected copies for distribution to all parties. Payment for the Work depends on that compliance.
d) "NOT APPROVED": Submittal is fundamentally not in compliance. No corrections or notations will be made. Do not proceed with the Work covered by the submittal in any aspect. Do not use or allow others to use these submittals. Discard submittal and prepare a new submittal immediately.
e) "NO ACTION REQUIRED": Submittal either not required for this item or provided for information or record purposes only. Follow Contract requirements in all cases.

E. Submittals for Information: Architect's and consultants' actions on items submitted for information:
1. Items for which no action was taken:
a) "Received" - to notify the Contractor that the submittal has been received for record only.
2. Items for which action was taken:
a) "Reviewed" - no further action is required from Contractor.

F. Submittals for Design-Related Professional Design Services (Delegated Design): PDF Submittals; Architect's and consultants' actions on items submitted for delegated design:
1. Actions taken by indication on PDF Submittals; have the following meanings:
a) "SEE COMMENTS": Final-but-restricted release; Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and complies with the requirements of the Contract Documents. Payment for the Work depends on that compliance.
b) "NO COMMENTS": Final unrestricted release; Work covered by the submittal may proceed provided it complies with the requirements of the Contract Documents. Payment for the Work depends on that compliance.
c) "NO ACTION REQUIRED": Submittal either not required for this item or provided for information or record purposes only. Follow Contract requirements in all cases.
d) "REVISE AND RESUBMIT": Do not proceed with the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity for the product submitted. Revise or prepare a new submittal according to Architect’s notations and corrections.
e) "RESUBMIT FOR RECORD WITH ALL CORRECTIONS INCORPORATED": Final-but-restricted-release; Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and it complies with the requirements of the Contract Documents. Submit corrected copies for distribution to all parties. Payment for the Work depends on that compliance.

END OF SECTION 01 3000

FOR REFERENCE: THIS SECTION WAS ISSUED FOR PHASE 1 AND PHASE 2

Electronic File Transfer Agreement

Dear: {Contractor/Client/Consultant name}:

At your request, The S/L/A/M Collaborative, Inc. ("SLAM") or S/L/A/M Architects, Landscape Architects & Engineers, P.C ("SLAM") will provide electronic files for your convenience and use in the preparation of shop drawings related to *(name of project)*, subject to the following terms and conditions:

We make no representation as to the compatibility of these files with your hardware or your software.

Data contained on these electronic files are part of our instruments of service and shall not be used by you for any purpose other than as a convenience and for no other use other than specifically for the referenced project. Any other use or reuse will be at your sole risk and without liability or legal exposure to us. You agree to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against us, our officers, directors, employees, agents or consultants that may arise out of or in connection with your use of the electronic files.

Furthermore, you shall, to the fullest extent permitted by law, indemnify and hold us harmless against all damages, liabilities or costs, including reasonable attorneys' fees and defense costs, arising out of or resulting from your use of the electronic files.

These electronic files are not Construction Documents. Differences may exist between these electronic files and corresponding hard-copy Construction Documents. We make no representation regarding the accuracy or completeness of the electronic files you receive. In the event a conflict arises between the signed or sealed hard-copy Construction Documents prepared by us and the electronic files, the signed or sealed hard-copy Construction Documents shall govern. You are responsible for determining if any conflict exists. By your use of these electronic files, you are not relieved of your duty to fully comply with the Contract Documents, including, and without limitations, the need to check, confirm and coordinate all dimensions and details, take field measurements, verify field conditions and coordinate your work with that of the contractors and subcontractors for the project.

Because information presented on the electronic files can be modified, unintentionally or otherwise, we reserve the right to remove all indicia of ownership and / or involvement from each electronic display.

UNDER NO CIRCUMSTANCES SHALL DELIVERY OF THE ELECTRONIC FILES FOR USE BY YOU BE DEEMED A SALE BY US, AND WE MAKE NO WARRANTIES, EITHER EXPRESS OR IMPLIED, OF MERCHANTABILITY AND FITNESS FOR ANY PARTICULAR PURPOSE. IN NO EVENT SHALL WE BE LIABLE FOR ANY LOSS OR PROFIT OR ANY CONSEQUENTIAL DAMAGES AS A RESULT OF YOUR USE OR REUSE OF THESE ELECTRONIC FILES.

AGREED TO BY:

_____

{Type Name and Title of Person Signing Agreement}
{Type Company Name of Contractor/Client/Consultant}
{Type Address of Contractor/Client/Consultant}

_____

Date

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FOR REFERENCE: THIS SECTION WAS ISSUED FOR PHASE 1 AND PHASE 2

BIM Access License Agreement

This Agreement is made by and between The S/L/A/M Collaborative, Inc. ("S/L/A/M") and _____ ("Licensee") as of the _____ day of _____ in the year Two Thousand _____, and shall govern the Licensee's use of the Building Information Model prepared by S/L/A/M for the ***Central Middle School*** Project ("Project"), located at ***Greenwich, CT.***
For purposes of this Agreement, the Building Information Model(s) is defined as a database that can be utilized to express a digital representation of the physical and functional characteristics of the Project and is referred to in this Agreement as the "Model(s)," which term may be used herein to describe a Model Element, a single Model or multiple Models used in the aggregate. "Building Information Modeling" means the process and technology used to create the Model.

The S/L/A/M Collaborative, Inc. ("S/L/A/M") hereby provides a non-exclusive license to the Licensee for the duration of the Project for access to the Models for the Licensee's use for construction coordination and modeling of construction related activities for the Project, subject to the following terms and conditions:

S/L/A/M will furnish the Licensee with access to use the following Models for the Project in exchange for the associated license fees identified below:

Fee waived

The Model(s) that are the subject of this Agreement are compatible with BIM file Revit 2014 ***[Enter software version]*** Format, and the Licensee is responsible for obtaining the rights to such hardware and software to assure the compatibility of these Models with its own hardware and software beyond the specified release of the referenced software and hardware specifications.

The Licensee, in its activities of construction coordination and modeling of construction related activities, is permitted to share the Model(s) with trade contractors, subcontractors and vendors (collectively, "Third Parties") with whom the Licensee is in privity of contract for the Project. In such case, the Licensee shall require any and all such Third Parties to comply with the terms of this Agreement without exception, and the Licensee shall indemnify S/L/A/M against any claims, actions or proceedings initiated by any of those Third Parties.

Data contained in the Model(s) is part of S/L/A/M's Instruments of Service and shall not be used by Licensee or anyone else receiving these Model(s) through or from the Licensee for any purpose other than use in construction coordination and modeling of construction related activities specific to and solely for the referenced Project. Any other use or reuse of the Model(s) by the Licensee or by any other party receiving the Model(s) from the Licensee shall be at the Licensee's sole risk and without any liability or legal exposure whatsoever to S/L/A/M. The Licensee shall make no claim and hereby waives, to the fullest extent permitted by law, any claim or cause of action of any nature against S/L/A/M, its officers, directors, employees, agents or consultants that may arise out of or in connection with the use of the Model(s) by the Licensee or by any other party receiving the Model(s) from the Licensee.

Furthermore, the Licensee shall, to the fullest extent permitted by law, indemnify and hold harmless S/L/A/M, and its officers, directors, employees, agents or consultants against and from all damages, liabilities or costs, including reasonable attorneys' fees and defense costs, arising out of or resulting from the use of the Model(s) by the Licensee or by any other party receiving the Model(s) from the Licensee.

The Licensee, by executing this Agreement, hereby acknowledges and agrees that the Model(s) are not Construction Documents, and that differences may exist between the Model(s) and the hard-

copy Construction Documents for the Project. Due to the inherent nature of how the Models are designed and created, often times requiring the use of multiple and different software packages, S/L/A/M makes no representation regarding the accuracy or completeness of the Model(s) that are the subject of this Agreement. In the event of any conflict or inconsistency in the information between the signed or sealed hard-copy Construction Documents and the Model(s,) the signed or sealed hard-copy Construction Documents shall prevail. The Licensee is responsible for determining if any such conflict or inconsistency exists. By its use of the Models, the Licensee and any other of its Third Parties are not relieved of their duty to fully comply with the requirements of the Contract Documents, including, and without limitations, the need to check, confirm and coordinate all dimensions and details, take field measurements, verify field conditions and coordinate the Licensee's or other Third Party's work with that of the other trades, subcontractors, vendors and materialmen, whether or not any such party is in privity of contract with the Licensee or the Owner for the Project.

The Licensee acknowledges and agrees that this Agreement, and the Licensee's use of the Model(s) as set forth herein, do not affect the Licensee's obligations, duties and responsibilities including, but not limited to, construction means, methods, sequence, techniques or coordinating all portions of the Work of construction in accordance with the Contract Documents and any health or safety precautions required by any regulatory agencies.

Because information presented in the Model(s) can be modified, unintentionally or otherwise, S/L/A/M reserves the right, but is not required, to remove all indicia of ownership from the Models.

UNDER NO CIRCUMSTANCES SHALL DELIVERY OF THE MODELS FOR USE BY THE LICENSEE BE DEEMED A SALE BY S/L/A/M, AND S/L/A/M MAKES NO WARRANTIES OR REPRESENTATIONS, EITHER EXPRESS OR IMPLIED, OF MERCHANTABILITY AND FITNESS FOR ANY PARTICULAR PURPOSE. IN NO EVENT SHALL S/L/A/M BE LIABLE FOR ANY LOSS OF PROFIT OR ANY CONSEQUENTIAL DAMAGES AS A RESULT OF THE LICENSEE'S OR ANY THIRD PARTY'S USE OR REUSE OF THE MODEL(S).

Any claim, dispute or other matter in question arising out of or related to this Agreement shall be subject to mediation as a condition precedent to binding arbitration by either party. Mediation and arbitration shall be conducted in accordance with the Construction Industry Mediation and Arbitration Rules of the American Arbitration Association currently in effect, but the parties may agree to the use of an independent mediator and alternate dispute resolution provider. Any mediation or arbitration proceeding arising out of or relating to this Agreement shall held in the greater Hartford region as mutually agreed between the parties.

This Agreement shall be governed by and construed in accordance with the laws of the State of Connecticut.

Both parties to this Agreement acknowledge and agree that this Agreement has been freely entered into, and that, in any dispute over the meaning, interpretation, validity or enforceability of this Agreement or any of its terms or conditions, there shall be no presumption whatsoever against either party by virtue of that party having drafted this Agreement of any portion hereof.

This Agreement may only be modified by a written amendment that is agreed to, and signed by, both parties to this Agreement.

This Agreement is entered into as of the day and year first written above.

The S/L/A/M Collaborative, Inc.

(insert name of Licensee)

_____

(insert name/title)

_____

(insert name/title)

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FOR REFERENCE: THIS SECTION WAS ISSUED FOR PHASE 1 AND PHASE 2

SECTION 01 3566.42 - SUSTAINABILITY COMPLIANCE PROCEDURES - CT HPBS

PART 1 GENERAL

1.1 PROJECT APPROACH

A. This project is required to comply with the State of Connecticut High Performance (Green) Building Standards for State Agency Buildings and School Buildings (abbreviated here to CT-HPBS).

B. This section includes general requirements and procedures for compliance with the CT-HPBS, which are based on certain U.S. Green Building Council (USGBC) LEED prerequisites and credits needed to obtain LEED Silver certification per the USGBC's "LEED 2009 for Schools - New Construction and Major Renovations".
   1. It has been determined that the project shall not be submitted to obtain LEED certification. However, the requirements as specified in this Section and other Sections in Divisions 01 through 33 shall be followed to assure compliance with CT-HPBS.
   2. Other LEED prerequisites and credits needed to obtain LEED certification and /or CT-HPBS compliance are dependent on product selections and may not be specifically identified as LEED requirements. Compliance with requirements needed to obtain LEED prerequisites and credits may be used as one criterion to evaluate substitution requests and comparable product requests.
   3. Additional LEED prerequisites and credits needed to obtain the indicated LEED certification and/or CT-HPBS compliance are dependent on the Architect's design and other aspects of the project that are not part of the work of the Contract.

C. Contractor is not responsible for the application for Sustainability certification, nor for determination of methods of achieving Sustainability credits unless specifically so indicated.

D. Many of the Sustainability credits can be achieved only through intelligent design of the project and are beyond the control of the Contractor. However, certain credits relate to the products and procedures used for construction. Therefore, full cooperation of the Contractor and subcontractors is essential to achieving final certification goal, and they must familiarize themselves with the relevant requirements, and provide the necessary information and instructions to product suppliers and installers.

E. Since Contractor and subcontractors may not be familiar with detailed CT-HPBS sustainability procedures, this section includes a list of other specifications sections that contain related requirements for products and procedures necessary for achievement of targeted Sustainability certification level.
   1. Achievement of many prerequisites and credits is dependent on proper performance by Contractor and subcontractors, using specific required project management and work execution means and methods.
   2. Achievement of other credits involves quantifying percentages of installed products by weight and cost; these require careful recordkeeping and reporting by the Contractor.

F. A copy of the CT HPBS Compliance Checklist is attached at the end of this section, for information only.

1.2 SECTION INCLUDES

A. General requirements and procedures for compliance with State of Connecticut High Performance (Green) Building Standards for State Agency Buildings and School Buildings (abbreviated here to CT HPBS)

1.3 RELATED REQUIREMENTS

A. General and Technical Sections: Sections that include requirements intended to achieve Sustainability Credits include, but are not limited to, the following:
   1. Divisions 01 through 33 Sections for CT HPBS requirements specific to the work of those sections. Those requirements may or may not include reerenes to LEED.

B. DIVISION 01 - GENERAL REQUIREMENTS
   1. Section 01 5719 - Temporary Environmental Controls.
      a) Basic construction procedures.
      b) Contractor's IAQ management plan and construction procedures.
      c) Building flush out is required, but at Contractor's option, may be performed before occupancy or partially after occupancy.
   2. Section 01 6000 - Product Requirements.
      a) Definitions of:
         1) Reused Products.
         2) Recycled Content.
         3) Bio-Based content.
         4) Sustainable forestry certified Wood.
         5) Source Location.
         6) Environmental Product Declarations.
         7) Health Product Declarations.
         8) Cradle-to-Cradle.
         9) GreenScreen Chemical Hazard Analysis.
         10) Manufacturer's Inventory of Product Content.
      b) Regionally-sourced products.
         1) Contractor is not required to provide any particular minimum percentage of regionally-sourced products; however, Contractor is required to collect and submit information necessary to determine whether the material is eligible for application of cost multiplier for products sourced within 100 miles of the project site.
   3. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions: List of indoor-emissions-restricted products and VOC-content-restricted products, requirements, evidence required, and reporting.
   4. Section 01 7000 - Execution and Closeout Requirements.
      a) Dust control and basic surface drainage.
      b) HEPA vacuuming of all carpet and soft surfaces.
   5. Section 01 7419 - Construction Waste Management and Disposal: Requirements for landfill diversion and reporting.
   6. Section 01 7800 - Closeout Submittals: Maintenance and operation manuals for commissioned systems.
   7. Section 01 9113 - General Commissioning Requirements.

C. DIVISION 03 - CONCRETE
   1. Section 03 3000 - Cast-in-Place Concrete: Replacement of Portland cement, to some extent, with recycled content.

D. DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES
   1. Note: Definition of sustainable forestry certified wood is in Section 01 6000.
   2. Section 06 1000 - Rough Carpentry: Requirement to use sustainable forestry certified wood.
   3. Section 06 2000 - Finish Carpentry: Requirement to use sustainable forestry certified wood.
   4. Section 06 4100 - Architectural Wood Casework: Requirement to use sustainable forestry certified wood.
   5. Section 06 4200 - Wood Paneling: Requirement to use sustainable forestry certified wood.

E. DIVISION 07 - THERMAL AND MOISTURE PROTECTION
   1. Section 07 5423 - Thermoplastic Polyolefin (TPO) Roofing.
      a) Unballasted white or light-colored roofing with minimum SRI specified.
   2. Section 07 8400 - Firestopping.
      a) Emissions-compliant firestopping sealants.
   3. Section 07 9200 - Joint Sealants.
      a) Emissions-compliant sealants.

F. DIVISION 08 - OPENINGS
   1. Section 08 1416 - Flush Wood Doors: For sustainable forestry certified wood.
   2. Section 08 4313 - Aluminum-Framed Storefronts: For daylighting and views.
   3. Section 08 4413 - Glazed Aluminum Curtain Walls: For daylighting and views.
   4. Section 08 6300 - Metal-Framed Skylights: For daylighting.
   5. Section 08 8000 - Glazing: For daylighting and views.

G. DIVISION 09 - FINISHES
   1. Section 09 2116 - Gypsum Board Assemblies: Deck-to-deck sealed partitions around rooms where hazardous gases or chemicals are present or used.
   2. Section 09 5100 - Acoustical Ceilings: Low-Emitting Materials.
   3. Section 09 6429 - Wood Strip and Plank Flooring.
      a) Sustainable forestry certified wood.
      b) VOC-restrictions for flooring.
      c) VOC-restrictions for adhesives.
   4. Section 09 6500 - Resilient Flooring: VOC restrictions.
   5. Section 09 6813 - Tile Carpeting: Carpet tile complying with CRI Green Label Plus requirements.
   6. Section 09 9123 - Interior Painting: Emissions-compliant interior opaque paints and coatings.

H. DIVISION 10 - SPECIALTIES

I. DIVISION 31 - EARTHWORK
   1. 31 2500 - Soil Erosion and Sediment Controls.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Conference: Conduct conference at project site. Review CT-HPBS requirements and action plans for compliance with requirements.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for additional submittal procedures requirements.

B. General: Submit sustainable design submittals required by other Sections.

C. Sustainable design submittals are in addition to other submittals.

PART 2 PRODUCTS

2.1 MATERIALS AND PRODUCTS

A. Provide products and procedures necessary to comply with CT-HPBS requirements indicated as Contractor's responsibility. Although other sections may specify some requirements that contribute to these CT-HPBS requirements, Contractor shall provide additional materials and procedures necessary to comply with the requirements indicated.

B. Recycled Content: Building materials shall have recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content for Project constitutes a minimum of 20 percent of cost of materials used for Project.

C. Local Materials: Use a minimum of 20 percent of building materials extracted from or manufactured within a 500-mile radius of the building site.

2.2 LOW-EMITTING MATERIALS

A. The following materials shall be certified for low emissions of volatile organic compounds (VOCs) using specifications or certification programs listed in the Connecticut Building Standard Guidelines Compliance Manual for High Performance Buildings.
   1. 50% of adhesives and sealants used in the interior of the building.
   2. Acoustic ceiling tiles and wall panels.
   3. Interior paints.
   4. Wall coverings.
   5. Carpet systems and associated adhesives.
   6. Composite and solid wood flooring.
   7. Resilient flooring and associated adhesives.

B. Provide material and products certified as low-VOC-emitting by one of the following organizations:
   1. Scientific Certification Systems - Indoor Advantage - Gold.
   2. GREENGUARD Certification Program.
   3. Carpet and Rug Institute's Green Label/Green Label Plus.
   4. Scientific Certification Systems Floorscore (for flooring products)

5. Green Seal-GS-11 (paints and coatings).
6. Green Seal-GS-36 (adhesives and sealants).
7. If any paints, coatings, adhesives, or sealants are not certified through any of the above organizations, the product must meet or exceeed the requirements of the South Coast Air Quality Management Distric (SCAQMD) Rule 1113 - for paints and coatings - or Rule 1168 - for adhesives and sealants. Supporting documentation must be provided to show the products meet those rules.

C. Composite Wood and Agrifiber Products: All composite wood and agrifiber products used within the shell of the building shall meet the California Department of Health Services *Standard Practice for the Testing of Volatile Organic Emssions from Various Sources Using Small Scale Environmental Chambers*, including 2004 Addenda. Downloadable version available at http://www.cal-iaq.org/VOC/.
   1. Alternative Compliance: Composite wood and agrifiber products must be documented not to contain added urea-formaldehyde resins. Adhesives used to fabricate wood and agrifiber assemblies on-site must be free of added urea-formaldehyde resins.
   2. Applicable products include particleboard, medium-density fiberboard (MDF), plywood, wheatboard, strawboard, panel substrates, and door cores.

2.3 ENERGY STAR PRODUCTS

A. Energy consuming products installed in the building shall be ENERGY STAR compliant if the product has an ENERGY STAR specification.

PART 3 EXECUTION

3.1 PROCEDURES

A. General: Conduct project management and construction operations in a manner consistent with, and in support of successful achievement of Owner's targeted compliance level.
   1. Collect and report the quantities, costs, weights, volumes and/or sourcing information for materials and products noted.
      a) Collect information for the volume used for following products:
         1) Interior paints and coatings applied on site.
         2) Interior adhesives and sealants applied on site.
   2. Collect VOC and other emissions information for:
      a) Interior paints and coatings applied on site. Calculated by volume.
      b) Interior adhesives and sealants applied on site (including flooring adhesive). Calculated by volume.
      c) Composite Wood. 100 percent not covered by other product categories.
      d) Furniture (include in calculations if part of scope of work). Calculated by cost.

B. Construction Waste Management and Disposal: Implement approved waste management plan during the entire duration of the Contract.

C. Commissioning Authority Activities: Cooperate with Commissioning Authority to coordinate construction and closeout activities scheduling.

3.2 SMOKING POLICY

A. General: Smoking policy on the project site is implemented for the following reasons:
   1. As a mandatory requirement for CT-HPBS compliance.
   2. Protection and promotion of health of all persons on the project site.

B. Smoking is not permitted anywhere on project site.

3.3 CONSTRUCTION WASTE MANAGEMENT

A. Comply with applicable requirements of Section 01 7419 - Construction Waste Management and Disposal.
   1. Project Sustainability Goal: Recycle or salavage at least 75 percent of non-hazardous construction and demolition debris.

END OF SECTION 01 3566.42

CTHPB Compliance Checklist- Schools- Greenwich Central Middle School - Greenwich, CT

Mandatory Requirements

YES	?	??	NO	Section	Summary Description	LEED
Y				16a-38k-3(a)	Building Commissioning	EAp1/EAc3
Y				16a-38k-3(b)	Integrated Design Process	IDc1
Y				16a-38k-3(c)	Base Energy Performance	EAp2
Y				16a-38k-3(d)	ENERGY STAR Products	IDc1
Y				16a-38k-3(e)	Indoor Air Quality Management Plan	IEQc3.1
Y				16a-38k-3(f)	Water Efficiency	WEp1
Y				16a-38k-3(g)	Recycling of Materials	MRp1
Y				16a-38k-3(h)	Erosion and Sedimentation Control	SSp1
Y				16a-38k-3(i)	No Smoking Policy	IEQp2
Y				16a-38k-3(j)	Integrated Pest Management Plan	IDc1
Y				16a-38k-3(k)	CFC Refrigerant Ban or Phase-out Plan	EAp3
Y				16a-38k-3(l)	Minimum Ventilation	IEQp1
Y				16a-38k-5(a)	Acoustical Standards	IEQp3
Y				16a-38k-5(b)	Properly Locate Outside Air Intakes	IEQp1
Y				16a-38k-5(c)	Electronic Ignition on Natural Gas Equipment	IDc1
Y				16a-38k-5(d)	Use of Low VOC Products	IEQc4
Y				16a-38k-5(e)	Environmental Site Assessment	SSp2
Y				16a-38k-5(f)	HEPA Vacuuming	IDc1

Building Standard Options (A minimum of 28 of the following strategies must be implemented.)

YES	?	??	NO	Section	Summary Description	LEED
7	**4**	**0**	**0**	**ENERGY EFFICIENCY AND RENEWABLE ENERGY (16a-38k-6(a))**		
				At least one measure in subsection (a) must be selected		
1				16a-38k-6(a)(1)	Energy Performance 3.5% Better Than Code	EAc1
1				16a-38k-6(a)(2)	Energy Performance 7% Better Than Code	EAc1
1				16a-38k-6(a)(3)	Energy Performance 10.5% Better Than Code	EAc1
1				16a-38k-6(a)(4)	Energy Performance 14% Better Than Code	EAc1
1				16a-38k-6(a)(5)	Energy Performance 17.5% Better Than Code	EAc1
1				16a-38k-6(a)(6)	Energy Performance 21% Better Than Code	EAc1
	1			16a-38k-6(a)(7)	On-Site Renewable Energy – 3%	EAc2
	1			16a-38k-6(a)(8)	On-Site Renewable Energy – 7%	EAc2
	1			16a-38k-6(a)(9)	On-Site Renewable Energy – 10%	EAc2
	1			16a-38k-6(a)(10)	Purchase Renewable Energy	EAc6
1				16a-38k-6(a)(11)	Energy Measurement and Verification Plan	EAc5
8	**2**	**0**	**3**	**INDOOR ENVIRONMENT (16a-38k-6(b))**		
				At least two measures in subsection (b) must be selected		
1				16a-38k-6(b)(1)	Install Permanent Indoor Air Monitoring Systems	IEQc1
			1	16a-38k-6(b)(2)	Provide Increased Outdoor Ventilation	IEQc2
1				16a-38k-6(b)(3)	Building Flushout	IEQc3.2
1				16a-38k-6(b)(4)	Composite Wood and Agrifiber Products	IEQc4.4
1				16a-38k-6(b)(5)	Individual Lighting Control	IEQc6.1
			1	16a-38k-6(b)(6)	Individual Thermal Comfort Control	IEQc6.2
	1			16a-38k-6(b)(7)	Building Occupant Survey	IEQc7.2
	1			16a-38k-6(b)(8)	Daylight Contribution	IEQc8.1
1				16a-38k-6(b)(9)	Visual Gazing – Views to the Outdoor Environment	IEQc8.2
1				16a-38k-6(b)(10)	Mold Prevention	IEQc10
1				16a-38k-6(b)(11)	Low VOC Furniture	IEQc4.5
1				16a-38k-6(b)(12)	Isolation of Chemical Use Areas	IEQc5
			1	16a-38k-6(b)(13)	Control of Particulates at Pedestrian Entryways	IEQc5

1	**0**	**#REF!**	**0**	**WATER EFFICIENCY (16a-38k-6(c))**		
				At least one measure in subsection (c) must be selected		
1				16a-38k-6(c)(1)	Reduce Total Potable Water Usage by 30%	WEc3
			N/A	16a-38k-6(c)(2)	Reduce Water Consumption for Landscaping 50%	WEc1
		#####		16a-38k-6(c)(3)	Eliminate Potable Water Usage for Landscaping	WEc1
			N/A	16a-38k-6(c)(4)	Reduce Total Potable Water Usage by 50%	WEc2

YES	?	??	NO	Section	Summary Description	LEED
7	**0**	**0**	**6**	**RECYCLING, REUSE AND SUSTAINABILITY (16a-38k-6(d))**		
				At least one measure in subsection (d) must be selected		
			1	16a-38k-6(d)(1)	Maintain 75% of an Existing Building Structure	MRc1.1
			1	16a-38k-6(d)(2)	Maintain 95% of an Existing Building Structure	MRc1.1
			1	16a-38k-6(d)(3)	Re-use Existing Non-Structural Building Elements	MRc1.2
1				16a-38k-6(d)(4)	Recycle or Salvage 50% of Construction and Demolition Debris	MRc2
1				16a-38k-6(d)(5)	Recycle or Salvage 75% of Construction and Demolition Debris	MRc2
			1	16a-38k-6(d)(6)	Use 5% Refurbished, Salvaged, or Reused materials	MRc3
			1	16a-38k-6(d)(7)	Use 10% Refurbished, Salvaged, or Reused materials	MRc3
1				16a-38k-6(d)(8)	Use 10% Recycled Content Materials	MRc4
1				16a-38k-6(d)(9)	Use 20% Recycled Content Materials	MRc4
1				16a-38k-6(d)(10)	Use 10% Local Materials	MRc5
1				16a-38k-6(d)(11)	Use 20% Local Materials	MRc5
			1	16a-38k-6(d)(12)	Use Building Materials Made from Short Harvest Cycle Plants	MRc6
1				16a-38k-6(d)(13)	Use Forest Stewardship Council (FSC) Certified Wood Products	MRc7
9	**3**	**0**	**3**	**SITE SELECTION AND DEVELOPMENT (16a-38k-6(e))**		
				At least two measures in subsection (e) must be selected		
			1	16a-38k-6(e)(1)	Re-develop a Local Site	SSc2
			1	16a-38k-6(e)(2)	Select a Site with Public Transportation Access	SSc4.1
1				16a-38k-6(e)(3)	Encourage Bicycle Transportation	SSc4.2
1				16a-38k-6(e)(4)	Encourage Low-Emission Vehicle Use with Preferred Parking	SSc4.3
	1			16a-38k-6(e)(5)	Encourage Car and Van-pooling	SSc4.4
	1			16a-38k-6(e)(6)	Protect Natural Areas at the Construction Site	SSc5.1
1				16a-38k-6(e)(7)	Maximize Open Space	SSc5.2
	1			16a-38k-6(e)(8)	Implement a Stormwater Management Plan Reducing Run-off by Annual Rainfall 25%	SSc6.1
1				16a-38k-6(e)(9)	Implement a Stormwater Management Plan that Treats 90% of Annual Rainfall	SSc6.2
			1	16a-38k-6(e)(10)	Reduce Heat Island Effect Through Landscaping Strategies	SSc7.1
1				16a-38k-6(e)(11)	Select Roofing Materials to Reduce Heat Island Effect	SSc7.2
1				16a-38k-6(e)(12)	Reduce Outdoor Light Pollution	SSc8
1				16a-38k-6(e)(13)	Orient Building for Daylighting and Energy Performance	EAc1
1				16a-38k-6(e)(14)	No Building in Floodplain and Sustainable Site Development	SSc1
1				16a-38k-6(e)(15)	Site Building away from External Sources of Excessive Noise	N/A
2	**1**	**0**	**0**	**OPERATIONS AND PROCEDURES/ INNOVATION (16a-38k-6(f))**		
				No minimum requirement for measures in subsection (f)		
1				16a-38k-6(f)(1)	Eliminate the use of CFCs, HCFCs and Halons	EAc4
1				16a-38k-6(f)(2)	Building Innovation	IDc1
	1			16a-38k-6(f)(3)	Curriculum on Sustainable Building Features	IDc1
34	**10**	**#REF!**	**12**	Total Building Standard Optional Strategies (27 Needed for Compliance)		

LEED/CTHPBS Submittal Cover Sheet

LEED / CTHPBS - GREEN BUILDING RATING SYSTEM NEW CONSTRUCTION MAJOR RENOVATION

Contractor: _____ Tel. No. _____

Contact: _____ Submittal No.: _____

Product	Vendor or Manufacturer	REQUIRED for CSI Division 02-10,31,32	Recycled Content MRc4/d8		Regional Materials MRc5/d10		Wood Products MRc7/d13					VOC Content (g/l) EQc4/5d	Carpet Systems (CRI ID No.) EQc4/5d		Heat Island Effect (SRI) SSc7.2/e10-111	
		Material COST (excluding Labor & Equipment)	% Post Consumer	% Pre Consumer	Extracted within 500 mile radius of project site (Provide straight line distance)	Manufactured within 500 mile radius of project site (Provide straight line distance)	% New Wood	% FSC Certified wood	FSC Certified (Provide SW-COC #) FSC Certified (Provide SW-COC #)	Invoice provided W/COC	Urea-Formaldehyde Resin Free? (Yes or No)	Low-Emitting Materials For Adhesives, Sealants & Coatings (Provide g/l #)	Does the Carpet Materials meet the Green Label Plus Program?	Does the Carpet Pad Materials meet the Green Label Plus Program?	Hardscape Areas Parking Lots, Roads & Walkways (Provide SRI #)	Roof Materials (Provide SRI #)

CONTRACTOR CERTIFICATION:

I, _____ a duly authorized representative of _____ hereby certify that the material information contained herein is an accurate representation of the material qualifications to be provided by us, as components of the final building construction. Furthermore, I understand that any changes in such qualifications during the purchasing period will require prior written approval from the Construction Manager and Owner.

SIGNATURE OF AUTHORIZED REPRESENTATIVE: _____ DATE: _____

LEED/CTHPBS Submittal Cover Sheet

LEED / CTHPBS - GREEN BUILDING RATING SYSTEM NEW CONSTRUCTION MAJOR RENOVATION

OPTION 1: DEFAULT BUDGET	OR OPTION 2: ACTUAL BUDGET
The Total Materials Budget can be a default value of 45% of the total construction budget [Material Cost + Labor] (CSI Master Spec 2004 Format Divisions 3–10, 31.60 Foundations, 32.10 Paving, 32.30 Site Improvements, and 32.90 Planting, Division 12 Furniture is optional). Mechanical, electrical, plumbing and equipment costs are excluded. **ENTER VALUE BELOW**	The actual material budget [Material Cost Only- No Labor] (CSI Master Spec 2004 Format Divisions 3–10, 31.60 Foundations, 32.10 Paving, 32.30 Site Improvements, and 32.90 Planting, Division 12 Furniture is optional). Mechanical, electrical, plumbing and equipment costs are excluded **(Enter line item budget beginning with row 10)**
0.45	$0.00

Total Materials Budget = $0.00

MATERIALS CALCULATOR & TRACKER

LEED for schools-CTHPBS

Greenwich Central Middle School

BELOW: MATERIAL TRACKING FOR CSI Master Spec 2004 Format Divisions 3-10, 31.60 Foundations, 32.10 Paving, 32.30 Site Improvements, and 32.90 Planting. Division 12 Furniture is optional. Mechanical, electrical, plumbing and equipment costs are excluded

					MATERIALS AND RESOURCES													IEQ - Choose from IEQc4.1-4.6 with a maximum of 4 points						INNOVATION		
CSI #	PRODUCT NAME & DESCRIPTION	MANUFACTURER	NEW WOOD PRODUCT BUDGET	TOTAL COST	MRc3.1-3.2-16a-38k-6(d)(6) Salvaged Material Costs (can use replacement value) ($)	Recycled Content MRc4-116a-38k-6(d)(8) PRE -CONSUMER (%)	Recycled Content MRc4-116a-38k-6(d)(8) PRE -CONSUMER Value ($)	Recycled Content MRc416a-38k-6(d)(8) POST -CONSUMER (%)	Recycled Content MRc416a-38k-6(d)(8) POST -CONSUMER Value ($)	MRc5-16a-38k-6(d)(10) Cost of Materials Manufactured & Extracted Regionally ($)	Manufacturing Location	Distance from Site (Miles)	Extraction Location	Distance from Site (Miles)	MRc6-16a-38k-6(d)(12) Rapidly Renewable Cost ($)	MRc7-16a-38k-6(d)(13) Certified Wood Costs ($)	FSC TRACKING #	IEQc4.1-16a-38k-5(d) Low Emitting Adhesives & Sealants (product is compliant with CA section 01350 or enter VOC conent)	IEQc4.2-16a-38k-5(d) Low Emitting Paints and Coatings (product is compliant with CA section 01350 or enter VOC conent)	IEQc4.3-16a-38k-5(d) Low Emitting Flooring Systems (product is compliant with CA section 01350 or enter product certification type)	IEQc4.4-16a-38k-5(d) Low Emitting Composite Woods and Laminate Adhesives (product is compliant with CA section 01350 or urea-formaldehyde free)	IEQc4.5-16a-38k-6(b)(11) Low Emitting Furniture and Furnishings (Greenguard, EPA ETV, or BIFMA tested)	IEQc4.6-16a-38k-5(d) Low Emitting Ceiling and Wall Systems (product is compliant with CA section 01350)	IDc1.1	IDc1.1	IDc1.1
							$0		$0																

OPTIONAL: DIVISION 12 (Furniture items) may be added but will need to be use consistently across material credits MRc3-7.

CATEGORY	DESCRIPTION	Manufacturer	NEW WOOD PRODUCT BUDGET	TOTAL COST	MRc3.1-3.2-16a-38k-6(d)(6) Salvaged Material Costs (can use replacement value) ($)	Recycled Content MRc4-116a-38k-6(d)(8) PRE -CONSUMER (%)	Recycled Content MRc4-116a-38k-6(d)(8) PRE -CONSUMER Value ($)	Recycled Content MRc416a-38k-6(d)(8) POST -CONSUMER (%)	Recycled Content MRc416a-38k-6(d)(8) POST -CONSUMER Value ($)	MRc5-16a-38k-6(d)(10) Cost of Materials Manufactured & Extracted Regionally ($)	Manufacturing Location	Distance from Site (Miles)	Extraction Location	Distance from Site (Miles)	MRc6-16a-38k-6(d)(12) Rapidly Renewable Cost ($)	MRc7-16a-38k-6(d)(13) Certified Wood Costs ($)	FSC TRACKING #	IEQc4.1-16a-38k-5(d) Low Emitting Adhesives & Sealants (product is compliant with CA section 01350 or enter VOC conent)	IEQc4.2-16a-38k-5(d) Low Emitting Paints and Coatings (product is compliant with CA section 01350 or enter VOC conent)	IEQc4.3-16a-38k-5(d) Low Emitting Flooring Systems (product is compliant with CA section 01350 or enter product certification type)	IEQc4.4-16a-38k-5(d) Low Emitting Composite Woods and Laminate Adhesives (product is compliant with CA section 01350 or urea-formaldehyde free)	IEQc4.5-16a-38k-5(b)(11) Low Emitting Furniture and Furnishings (Greenguard EPA ETV, or BIFMA tested)	IEQc4.6-16a-38k-5(d) Low Emitting Ceiling and Wall Systems (product is compliant with CA section 01350)	IDc1.1	IDc1.1	IDc1.1
							$0		$0																		
							$0		$0																		
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TOTAL MATERIALS BUDGET FOR DIVISION 12 ITEMS			$0	$0	$0		$0		$0	$0					$0	$0											
TOTAL MATERIALS BUDGET>>>			$0	$0	$0		$0		$0	$0					$0	$0											
LEED PERCENTAGES>>>>>>					#DIV/0!		#DIV/0!		#DIV/0!	#DIV/0!					#DIV/0!	#DIV/0!											
						Total Recycled Content			#DIV/0!																		
DESCRIPTION OF THE CALCUATION AND LEED REQUIREMENTS>>>>>>>>					5%(1PT) 10%(2PTS) Of Materials Budget	10%(1PT) 20%(2PTS) Of Materials Budget.				10% (1pt) 20%(1PT) Of Materials Budget	** for salvaged items, you can use the vendor location as the manufacturing location**		** for salvaged items, you can use the place the vendor salvaged an item from as the manufacturing location**		2.5%(1PT) Of Materials Budget .	50%(1PT) Of **ONLY NEW WOOD items.** Salvaged Materials and Recycled Content can not be counted for this credit.										

Product	Sealants		Paints		Carpet	Wood	Information Source
	LEED EQ 4.1 Low-Emitting Materials Adhesives & Sealant- CTHPBS 16a-38k-5(d)	Allowable VOC's	LEED EQ 4.2 Low-Emitting Materials Paints & Coatings- CTHPBS 16a-38k-5(d)	Allowable VOC's	LEED EQ 4.3 Low-Emitting Materials Carpet Systems- CTHPBS 16a-38k-5(d)	LEED EQ 4.4 Low-Emitting Materials Composite Wood & Agrifiber Products- CTHPBS 16a-38k-5(d)	
	(g/l)	(g/l)	(g/l)	(g/l)	CRI ID No.	Binder Type	

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Indoor Air Quality Field Report

Pollutant	Plan	Compliant	Comments
Smoking	Signage posted in building to prohibit any smoking		
Daily Cleanup	All debris removed at the end of each day		
Trash	Use of mobile trash bins in the building		
Electrical Cords	Electrical cords organized and out of walking paths		
Cut Rooms/Areas	Contractors protecting floor or using collection pans to prevent oils from penetrating and staining floors		

Material Storage

Paint and Cleaning Supplies	Material is kept outside or in a contained area vented directly to the outside		
New porous material delivery (i.e. drywall, acoustical tile, carpet, etc	Materials not delivered into the space when VOCs or moisture is present. If moisture is present materials will be blocked off the ground at least 1.5" and covered with a breathable waterproof		
Mechanical Room	No material stored in mechanical rooms		
Other Material Deliveries	All new material delivered into the conditioned space, blocked off the floor, covered to protect from dust, VOCs, and moisture		

Construction Operations

Construction Dust	Walk-off mats provided at all egress points to areas receiving finished flooring		
Construction Dirt	Boot scrape provided at all exterior entrances to building		
Liquid Spills	Spills cleaned up immediately and damaged materials replaced		
Concrete Block Sawing	Water used to cut block		
Drywall Cutting	Rotocut saws used with vacuum attachments or dust producing area is isolated & workers using PPE		
Drywall Sanding	Vacuum sanders used and workers using PPE		
Wood Saws	Work performed outside or vacuum attachments used		
Drilling	Vacuum attachments used or wetting and PPE when necessary		
Gas Powered Equipment	No gas or other fume producing equipment used in the building after enclosure, unless it can be vented directly		

Emissions Control	No idling policy indoors or outside. Prevent exhaust fumes from idling vehicles, equipment, or fossil fueled tools from entering the building		

Construction Byproducts

Drywall Dust	All workers in exposed areas wearing masks. Unprotected workers protected via dust partitioning or scheduled to work different hours		
Construction Dust	Work area swept daily with environmentally friendly sweeping		
Soldering & Welding	Area vented directly to the outside or smoke eaters used, and PPE provided to workers		
Isolating Areas	Contamination of other spaces prevented, whether they are finished or not. Seal doorways, windows, or tent off area as needed using temporary barriers, such as plastic separations		
Depressurized Areas	Allow differential between construction areas and clean areas. Exhaust to the outdoors using 100% outdoor air, if		

HVAC Installation and Operation

All Delivered Ductwork	All ductwork and associated elbows and fittings delivered to the jobsite sealed		
Insulated Ductwork	If delivered into open building, cap all ductwork and waterproof seals. During installation waterproof joints and capping at the end of each workday.		
During Ductwork Installation	All ductwork and HVAC equipment openings covered at the end of the day		
During HVAC Operation	Temporary filtration media with a MERV of at least 8 installed at all intake openings		
Immediately Before Occupancy	All HVAC equipment filters replaced with new		

Description of photos from the site here

Description of photos from the site here

Description of photos from the site here

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SECTION 01 3573 - DELEGATED DESIGN PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Summary of Delegated Design portion of Work.

B. Permitting for Delegated Design portion of Work.

C. Delegated Design submittals.

D. Coordinate and assume full responsibility for design, engineering, submittals, fabrication, transportation, and installation of this work.

1.2 RELATED REQUIREMENTS

A. Section 01 3000 - Administrative Requirements: Submittal procedures, project meetings, progress schedules and documentation, reports, coordination.

B. Section 01 4000 - Quality Requirements: Procedures for testing, inspection, mock-ups, reports, certificates; use of reference standards.

C. Section 01 4533 - Code-Required Special Inspections and Procedures.

D. Section 01 6000 - Product Requirements: Fundamental product requirements, substitutions and product options, delivery, storage, and handling.

E. Section 01 7000 - Execution and Closeout Requirements: Examination, preparation, and general installation procedures; preinstallation meetings; cutting and patching; cleaning and protection; starting of systems; demonstration and instruction; closeout procedures except payment procedures; requirements for alterations work.

F. Section 01 7800 - Closeout Submittals: Project record documents, operation and maintenance (O&M) data, warranties and bonds.

1.3 DEFINITIONS

A. Delegated Design: Professional design service or certification specifically required of the Contractor in the specifications.

B. AHJ: Authorities Having Jurisdiction, defined in AIA Document A201.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual specification sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.

C. Preliminary Design: Submit drawings and product data that describe Contractor's design prior to performing engineering calculations and final drawings.
   1. Architect will evaluate proposed design and comment on conformance with intent of Contract Documents.
   2. Preliminary review is for aesthetic and general function concerns and will not constitute approval of engineering.
   3. Purpose of this submittal is to avoid engineering and detailing an unacceptable proposal.

D. Final Design: Submit drawings, product data and engineering calculations that describe Contractor's final design.

E. Permit Review: Submit Delegated Design documents to AHJ for review and approval as a Deferred Submittal. Architect will deliver submittal to the AHJ and be the main point of contact with the AHJ.
   1. Review by Architect or Architect's consultant prior to submittal to the AHJ is required. Allow adequate time for Architect's review as described in Section 01 3000 - Administrative Requirements.
   2. Make corrections noted by Architect.
   3. Obtain permits prior to executing work component.
   4. Comply with AHJ requirements.
   5. Execute corrections to Delegated Design work required by AHJ at no cost to Owner and prior to Substantial Completion.
      a) Notify Architect of changes required by AHJ as soon as they are known.
   6. Include design criteria, design assumptions, structural calculations, fabrication, and construction details, required clearances, and interface requirements.
      a) Delegated Design drawings are in addition to shop drawings.
   7. Affix Design Professional's State License seal on submittals.

F. Engineer's qualifications.

G. Product Data, Shop Drawings and Samples: Comply with requirements in Section 01 3000 - Administrative Requirements for each product of Delegated Design portion of work. Product submittals are in addition to submittals for permit and design data.

H. Erection Drawings: Indicate Connections of steel assemblies.

I. Designer's Qualification Statement.

J. Manufacturer's Qualification Statement.

K. Installer's Qualification Statement.

L. Maintenance Contracts.

1.5 QUALITY ASSURANCE

A. Engineer Qualifications: Perform design under direct supervision of a Professional Engineer experienced in providing engineering services of the find indicated and licensed in the State in which the Project is located.

B. Design requirements specific to Delegated Design portions of the Work are indicated on Drawings and in sections that specify the component.

C. Pre-Submittal Meeting: Contractor shall meet with Architect, consultant, and Delegated Designer to discuss requirements of work-portion, submittals, scheduling, and sequencing prior to start of Delegated Design.

1.6 DELEGATED DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
   1. If criteria indicated are insufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated Design Services Certification: In addition to shop drawings, product data, and other required submittals, submit digitally signed PDF file and three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
   1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

C. Schedule design process and submittals required for Delegated Design portions to fit within construction schedule.

D. Allow adequate time for AHJ review. Contact AHJ for time estimate and coordination of schedule.

E. Architect's approval of final design is required prior to submittal to the AHJ. Allow time specified in Section 01 3000 - Administrative Requirements for Architect's review prior to submittal to the AHJ.

F. Provide complete, operational systems that perform their intended use.

G. Engineer Delegated Design portions of the Work for gravity, lateral, and seismic loads.
   1. Load criteria is indicated on the Drawings and in the specific product sections.
   2. Indicate reactions to structure.

H. Execute the design intent as indicated on the Drawings and in the specific product sections.

I. Obtain permits and inspections and pay fees required by the AHJ.

J. The Owner will not pay for progress delays, additional Work, additional products, restocking, or re-working required by Contractor's failure to coordinate Delegated Design work with other project work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 SCHEDULE OF DELEGATED DESIGN SPECIFICATION SECTIONS

A. Section 04 2000 - Unit Masonry: Engineered design of anchors for wide wall cavities.

B. Section 05 1200 - Structural Steel Framing: Structural steel connections designed by steel fabricator.

C. Section 05 2100 - Steel Joist Framing.

D. Section 05 4000 - Cold-Formed Metal Framing: Exterior wall stud design and cantilevered partial wall support systems.

E. Section 05 5000 - Metal Fabrications.

F. Section 05 5100 - Metal Stairs.

G. Section 05 7000 - Decorative Metal Railings.

H. Section 05 7100 - Monumental Stairs.

I. Section 07 4213.23 - Metal Composite Material Wall Panels: Cladding support system.

J. Section 07 4646 - Fiber Cement Wall Panels: Cladding support system.

K. Section 08 4413 - Aluminum Storefronts.

L. Section 08 4413 - Glazed Aluminum Curtain Walls.

M. Section 08 6300 - Metal-Framed Skylights.

N. Section 08 9200 - Louvered Equipment Enclosures.

O. Section 10 7516 - Ground Set Flagpoles.

P. Section 11 6833 - Athletic Field Equipment.

Q. Section 12 6613 - Telescoping Bleachers; Certification of design by professional engineer.

R. Section 12 9300 - Site Furnishings.

S. Fire Protection Sections 21 0400, 21 0516, 21 0548, 21 1313, and 21 3000.

T. Section 22 0548 - Vibration and Seismic Controls for Plumbing Piping and Equipment.

U. Section 23 0529 - Hangers and Supports for HVAC Piping, Ductwork, and Equipment.

V. Section 23 0548 - Vibration and Seismic Controls for HVAC Piping and Equipment.

W. Section 23 0573 - Overcurrent Protection Device Coordination Study

X. Section 26 4113 - Lightning Protection for Structures.

Y. Section 27 4100 - Speaker and Electric Rigging.

Z. Section 28 5319 - Distributed Antenna System.

AA. Section 32 3118 - Metal Fences and Gates.

BB. Secton 32 3223 - Segmental Retaining Walls.

CC. Section 32 8423 - Irrigation Systems.

END OF SECTION 01 3573

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SECTION 01 4000 - QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Submittals.

B. Quality assurance.

C. Testing and inspection agencies and services.

D. Contractor's construction-related professional design services.

E. Contractor's design-related professional design services.

F. Control of installation.

G. Mock-ups.

H. Tolerances.

I. Manufacturers' field services.

J. Defect Assessment.

1.2 RELATED REQUIREMENTS

A. Section 01 3000 - Administrative Requirements: Submittal procedures.

B. Section 01 4219 - Reference Standards.

C. Section 01 6000 - Product Requirements: Requirements for material and product quality.

1.3 REFERENCE STANDARDS

A. IAS AC89 - Accreditation Criteria for Testing Laboratories; 2018.

1.4 DEFINITIONS

A. Contractor's Professional Design Services: Design of some aspect or portion of the project by party other than the design professional of record. Provide these services as part of the Contract for Construction.
   1. Design Services Types Required:
      a) Construction-Related: Services Contractor needs to provide in order to carry out the Contractor’s sole responsibilities for construction means, methods, techniques, sequences, and procedures.
      b) Design-Related: Design services explicitly required to be performed by another design professional due to highly-technical and/or specialized nature of a portion of the project. Services primarily involve engineering analysis, calculations, and design, and are not intended to alter the aesthetic aspects of the design.

B. Design Data: Design-related, signed and sealed drawings, calculations, specifications, certifications, shop drawings and other submittals provided by Contractor, and prepared directly by, or under direct supervision of, appropriately licensed design professional.

1.5 CONTRACTOR'S CONSTRUCTION-RELATED PROFESSIONAL DESIGN SERVICES

A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.

B. Provide such engineering design services as may be necessary to plan and safely conduct certain construction operations, pertaining to, but not limited to the following:
1. Temporary sheeting, shoring, or supports.
2. Temporary scaffolding.
3. Temporary bracing.
4. Temporary foundation underpinning.
5. Temporary stairs or steps required for construction access only.
6. Temporary hoist(s) and rigging.
7. Investigation of soil conditions to support construction equipment.

1.6 CONTRACTOR'S DESIGN-RELATED PROFESSIONAL DESIGN SERVICES

A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.

B. Base design on performance and/or design criteria indicated in individual specification sections.
1. Submit a Request for Interpretation to Architect if the criteria indicated are not sufficient to perform required design services.

C. Scope of Contractor's Professional Design Services: Provide for the following items of work:
1. Refer to Section 01 3573 - Delegated Design Procedures for schedule of applicable specification sections.

1.7 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Designer's Qualification Statement: Submit for Architect's knowledge as contract administrator, or for Owner's information.
1. Include information for each individual professional responsible for producing, or supervising production of, design-related professional services provided by Contractor.
a) Full name.
b) Professional licensure information.
c) Statement addressing extent and depth of experience specifically relevant to design of items assigned to Contractor.

C. Design Data: Submit for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.
1. Include calculations that have been used to demonstrate compliance to performance and regulatory criteria provided, and to determine design solutions.

2. Include required product data and shop drawings.
3. Include a statement or certification attesting that design data complies with criteria indicated, such as building codes, loads, functional, and similar engineering requirements.
4. Include signature and seal of design professional responsible for allocated design services on calculations and drawings.

D. Test Reports: After each test/inspection, promptly submit two copies of report to Architect and to Contractor.
1. Include:
   a) Date issued.
   b) Project title and number.
   c) Name of inspector.
   d) Date and time of sampling or inspection.
   e) Identification of product and specifications section.
   f) Location in the Project.
   g) Type of test/inspection.
   h) Date of test/inspection.
   i) Results of test/inspection.
   j) Compliance with Contract Documents.
   k) When requested by Architect, provide interpretation of results.
2. Test report submittals are for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.

E. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect, in quantities specified for Product Data.
1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
2. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.

F. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

G. Manufacturer's Field Reports: Submit reports for Architect's benefit as contract administrator or for Owner.
1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.

H. Erection Drawings: Submit drawings for Architect's benefit as contract administrator or for Owner.
1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.

1.8 QUALITY ASSURANCE

A. Testing Agency Qualifications:

1. Prior to start of work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
3. Qualification Statement: Provide documentation showing testing laboratory is accredited under IAS AC89.

B. Designer Qualifications: Where professional engineering design services and design data submittals are specifically required of Contractor by Contract Documents, provide services of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

1.9 TESTING AND INSPECTION AGENCIES AND SERVICES

A. Owner will employ and pay for services of an independent testing agency to perform specified testing.

B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.

D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.2 MOCK-UPS

A. Before installing portions of the Work where mock-ups are required, construct mock-ups in location and size indicated for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work. The purpose of mock-up is to demonstrate the proposed range of aesthetic effects and workmanship.

B. Accepted mock-ups establish the standard of quality the Architect will use to judge the Work.

C. Integrated Exterior Mock-ups: Construct integrated exterior mock-up as indicated on drawings. Coordinate installation of exterior envelope materials and products as required in individual Specification Sections. Provide adequate supporting structure for mock-up materials as necessary.

D. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.

E. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.

F. Architect will use accepted mock-ups as a comparison standard for the remaining Work.

G. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear area when directed to do so by Architect.

3.3 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

3.4 TESTING AND INSPECTION

A. Testing Agency Duties:
   1. Test samples of mixes submitted by Contractor.
   2. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
   3. Perform specified sampling and testing of products in accordance with specified standards.
   4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
   5. Promptly notify Architect and Contractor of observed irregularities or non-compliance of Work or products.
   6. Perform additional tests and inspections required by Architect.
   7. Submit reports of all tests/inspections specified.

B. Limits on Testing/Inspection Agency Authority:
   1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
   2. Agency may not approve or accept any portion of the Work.
   3. Agency may not assume any duties of Contractor.
   4. Agency has no authority to stop the Work.

C. Contractor Responsibilities:
   1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
   2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
   3. Provide incidental labor and facilities:
      a) To provide access to Work to be tested/inspected.
      b) To obtain and handle samples at the site or at source of Products to be tested/inspected.
      c) To facilitate tests/inspections.
      d) To provide storage and curing of test samples.
   4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
   5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
   6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

D. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect.

E. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

3.5 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment as applicable, and to initiate instructions when necessary.

B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.6 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not complying with specified requirements.

B. If, in the opinion of Construction Manager, it is not practical to remove and replace the work, Construction Manager will direct an appropriate remedy or adjust payment.

END OF SECTION 01 4000

FOR REFERENCE: THIS SECTION WAS ISSUED FOR PHASE 1 AND PHASE 2

SECTION 01 4219 - REFERENCE STANDARDS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Requirements relating to referenced standards.

B. Reference standards full title and edition date.

1.2 QUALITY ASSURANCE

A. For products or workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Comply with the reference standard of date of issue specified in this section, except where a specific date is established by applicable code.

C. Should specified reference standards conflict with Contract Documents, request clarification from the Architect before proceeding.

D. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of the Architect shall be altered by Contract Documents by mention or inference otherwise in any reference document.

PART 2 CONSTRUCTION INDUSTRY ORGANIZATION DOCUMENTS

2.1 AA -- ALUMINUM ASSOCIATION, INC.

A. AA DAF-45 - Designation System for Aluminum Finishes; 2003 (Reaffirmed 2009).

B. AA SAAA-46 - Standards for Anodized Architectural Aluminum; 1978.

C. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017a.

2.2 AI -- THE ASPHALT INSTITUTE

2.3 AIA -- THE AMERICAN INSTITUTE OF ARCHITECTS

A. AIA A232 - General Conditions of the Contract for Construction, Construction Manager as Adviser Edition; 2009.

B. AIA A533 - Guide for Supplementary Condition, Construction Manager as Advisor Edition; 2009.

C. AIA A701 - Instructions to Bidders; 2018.

D. AIA G612 - Owner's Instructions to the Architect; 2017.

E. AIA G701 - Change Order; 2017.

F. AIA G702CMa - Application and Certificate for Payment, Construction Manager-Adviser Edition; 1992.

G. AIA G704CMa - Certificate of Substantial Completion, Construction Manager-Adviser Edition; 1992.

H. AIA G709 - Proposal Request; 2018.

I. AIA G710 - Architect's Supplemental Instructions; 2017.

J. AIA G714 - Construction Change Directive; 2017.

K. AIA G716 - Request for Information; 2004.

2.4 AISC -- AMERICAN INSTITUTE OF STEEL CONSTRUCTION, INC.

A. AISC 201 - AISC Certification Program for Structural Steel Fabricators, Standard for Steel Building Structures; 2006.

B. AISC 207 - Certification Standard for Steel Fabrication and Erection, and Manufacturing of Metal Components; 2016.

C. AISC 325 - Steel Construction Manual; 2017.

2.5 ANSI -- AMERICAN NATIONAL STANDARDS INSTITUTE

A. ANSI/FM 4474 - American National Standard for Evaluating the Simulated Wind Uplift Resistance of Roof Assemblies Using Static Positive and/or Negative Differential Pressures; 2004 (R2010).

2.6 ASCE -- AMERICAN SOCIETY OF CIVIL ENGINEERS

A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.

2.7 ASHRAE -- AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS, INC.

A. ASHRAE (FUND)-2017 - ASHRAE Handbook - Fundamentals; 2017.

B. ASHRAE (HVACA) - ASHRAE Handbook - HVAC Applications; Most Recent Edition Cited by Referring Code or Reference Standard.

C. ASHRAE (REFR) - ASHRAE Handbook - Refrigeration; Most Recent Edition Cited by Referring Code or Reference Standard.

D. ASHRAE (HVACS) - ASHRAE Handbook - HVAC Systems and Equipment; Most Recent Edition Cited by Referring Code or Reference Standard.

E. ASHRAE Std 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size; 2017 (Amended (2020).

F. ASHRAE Std 55 - Thermal Environmental Conditions for Human Occupancy; 2020.

G. ASHRAE Std 62.1 - Ventilation for Acceptable Indoor Air Quality; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. ASHRAE Std 62.1-2019 - Ventilation for Acceptable Indoor Air Quality; 2019, with Errata and Amendments (2021).

I. ASHRAE Std 68 - Laboratory Method of Testing to Determine the Sound Power in a Duct; 1997.

J. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Inlets; 2006 (Reaffirmed 2011).

K. ASHRAE Std 84 - Method of Testing Air to Air Heat/Energy Exchangers; 2020.

L. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

M. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems; 2008 (Reaffirmed 2017).

N. ASHRAE Std 126 - Method of Testing HVAC Air Ducts; 2016.

O. ASHRAE Std 129 - Measuring Air-Change Effectiveness.; 1997 (Reaffirmed 2002).

P. ASHRAE Std 130 - Methods of Testing Air Terminal Units; 2016.

Q. ASHRAE Std 135 - A Data Communication Protocol for Building Automation and Control Networks; 2020.

R. ASHRAE Std 140 - Method of Test for Evaluating Building Performance Simulation Software; 2020, with Addenda (2023).

S. ASHRAE Std 180 - Standard Practice for Inspection and Maintenance of Commercial-Building HVAC Systems; 2018.

T. ASHRAE Std 189.1 - Standard for the Design of High-Performance Green Buildings; 2017.

U. ASHRAE Std 202 - Commissioning Process for Buildings and Systems; 2018.

2.8 ASTM A SERIES -- ASTM INTERNATIONAL

A. ASTM A6/A6M - Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling; 2019.

B. ASTM A29/A29M - Standard Specification for General Requirements for Steel Bars, Carbon and Alloy, Hot-Wrought; 2020.

C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

D. ASTM A48/A48M - Standard Specification for Gray Iron Castings; 2003 (Reapproved 2016).

E. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.

F. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings; 2020.

G. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished; 2018.

H. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

I. ASTM A148/A148M - Standard Specification for Steel Castings, High Strength, for Structural Purposes; 2020, with Editorial Revision.

J. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

K. ASTM A645/A645M - Standard Specification for Pressure Vessel Plates, 5% and 5-1/2% Nickel Alloy Steels, Specially Heat Treated; 2010 (Reapproved 2016).

L. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

M. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2023, with Editorial Revision.

2.9 ASTM B SERIES -- ASTM INTERNATIONAL

A. ASTM B75/B75M - Standard Specification for Seamless Copper Tube; 2020.

B. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2020.

C. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2020.

D. ASTM B302 - Standard Specification for Threadless Copper Pipe, Standard Sizes; 2017.

E. ASTM B306 - Standard Specification for Copper Drainage Tube (DWV); 2020.

2.10 ASTM C SERIES -- ASTM INTERNATIONAL

A. ASTM C273/C273M - Standard Test Method for Shear Properties of Sandwich Core Materials; 2020.

B. ASTM C478 - Standard Specification for Circular Precast Reinforced Concrete Manhole Sections; 2019.

C. ASTM C478M - Standard Specification for Circular Precast Reinforced Concrete Manhole Sections (Metric); 2019.

D. ASTM C923M - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals (Metric); 2018.

E. ASTM C1262 - Standard Test Method for Evaluating the Freeze-Thaw Durability of Manufactured Concrete Masonry Units and Related Concrete Units; 2010.

2.11 ASTM D SERIES -- ASTM INTERNATIONAL

A. ASTM D779 - Standard Test Method for Determining the Water Vapor Resistance of Sheet Materials in Contact with Liquid Water by the Dry Indicator Method; 2016.

B. ASTM D785 - Standard Test Method for Rockwell Hardness of Plastics and Electrical Insulating Materials; 2008 (Reapproved 2015).

C. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials; 2017.

D. ASTM D1079 - Standard Terminology Relating to Roofing and Waterproofing; 2020.

E. ASTM D2310 - Standard Classification for Machine-Made "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe; 2006 (Reapproved 2012).

F. ASTM D4397 - Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications; 2016.

G. ASTM D6878/D6878M - Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing; 2019.

H. ASTM D8257/D8257M - Standard Specification for Mechanically Attached Polymeric Roof Underlayment Used in Steep Slope Roofing; 2020.

2.12 ASTM E SERIES -- ASTM INTERNATIONAL

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

B. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings; 2020a.

C. ASTM E985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings; 2000 (Reapproved 2006).

D. ASTM E1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces; 2011 (Reapproved 2019).

2.13 ASTM F SERIES -- ASTM INTERNATIONAL

2.14 AWS – AMERICAN WELDING SOCIETY

A. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021.

B. AWS B5.1 - Specification for the Qualification of Welding Inspectors; 2013, with Amendment (2014).

C. AWS D9.1/D9.1M - Sheet Metal Welding Code; 2018.

2.15 BHMA -- BUILDERS HARDWARE MANUFACTURERS ASSOCIATION

A. BHMA (CPD) - Certified Products Directory; Current Edition.

B. BHMA A156.9 - American National Standard for Cabinet Hardware; 2015.

2.16 CRRC -- COOL ROOF RATING COUNCIL

A. CRRC-1 - Standard; Cool Roofs Rating Council; 2017.

2.17 CSI/CSC – CONSTRUCTION SPECIFICATIONS INSTITUTE/CONSTRUCTION SPECIFICATIONS CANADA

A. CSI/CSC Form 13.1A - Substitution Request (After the Bidding/Negotiating Phase); Current Edition.

2.18 FM -- FACTORY MUTUAL GLOBAL

A. FM (AG) - FM Approval Guide; Current Edition.

B. FM 4470 - Approval Standard for Single-Ply, Polymer-Modified Bitumen Sheet, Built-Up Roof (BUR) and Liquid Applied Roof Assemblies for use in Class 1 and Noncombustible Roof Deck Construction; 2016.

2.19 ICC -- INTERNATIONAL CODE COUNCIL, INC.

A. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

B. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

C. ICC (IECC) - International Energy Conservation Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. ICC (IFC) - International Fire Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. ICC (IFGC) - International Fuel Gas Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

F. ICC (IMC) - International Mechanical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. ICC (IPC) - International Plumbing Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

2.20 NEMA -- NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION

A. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2018.

B. NEMA 260 - Safety Labels for Padmounted Switchgear and Transformers Sited in Public Areas; 1996 (Reaffirmed 2004).

C. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts; 2016.

D. NEMA PB 1 - Panelboards; 2011.

E. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less; 2013.

2.21 NFPA -- NATIONAL FIRE PROTECTION ASSOCIATION

A. NFPA 1 - Fire Code; 2018.

B. NFPA 13 - Standard for the Installation of Sprinkler Systems; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

C. NFPA 30 - Flammable and Combustible Liquids Code; 2018.

D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

2.22 NRCA -- NATIONAL ROOFING CONTRACTORS ASSOCIATION

A. NRCA (RM) - The NRCA Roofing Manual; 2019.

B. NRCA (WM) - The NRCA Waterproofing Manual; 2005.

2.23 NWFA -- NATIONAL WOOD FLOORING ASSOCIATION

2.24 TCNA -- TILE COUNCIL OF NORTH AMERICA, INC.

2.25 TPI -- TURFGRASS PRODUCERS INTERNATIONAL

2.26 UL -- UNDERWRITERS LABORATORIES INC.

A. UL (DIR) - Online Certifications Directory; Current Edition.

B. UL (FPED) - Fire Protection Equipment Directory; current edition.

C. UL (FPSD) - Fire Protection Systems Directory; current edition.

D. UL (FRD) - Fire Resistance Directory; Current Edition.

E. UL (HCVCE) - Heating, Cooling, Ventilating and Cooking Equipment Directory; current edition.

F. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.

G. UL 5 - Surface Metal Raceways and Fittings; Current Edition, Including All Revisions.

H. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.

I. UL 6A - Electrical Rigid Metal Conduit-Aluminum, Red Brass, and Stainless Steel; Current Edition, Including All Revisions.

J. UL 580 - Standard for Tests for Uplift Resistance of Roof Assemblies; Current Edition, Including All Revisions.

K. UL 790 - Standard for Standard Test Methods for Fire Tests of Roof Coverings; Current Edition, Including All Revisions.

L. UL 1053 - Ground-Fault Sensing and Relaying Equipment; Current Edition, Including All Revisions.

M. UL 1897 - Uplift Tests for Roof-Covering Systems; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

PART 3 UNITED STATES GOVERNMENT AND RELATED AGENCIES DOCUMENTS

3.1 CFR -- CODE OF FEDERAL REGULATIONS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.

3.2 FS -- FEDERAL SPECIFICATIONS AND STANDARDS (GENERAL SERVICES ADMINISTRATION)

3.3 MDOT -- MISSISSIPPI DEPARTMENT OF TRANSPORTATION SPECIFICATIONS AND STANDARDS

A. MDOT - Standard Specifications for Construction; 2015.

END OF SECTION 01 4219

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FOR REFERENCE: THIS SECTION WAS ISSUED FOR PHASE 1 AND PHASE 2

SECTION 01 4339 - MOCKUPS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Mockups.

1.2 RELATED REQUIREMENTS

A. Section 01 3000 - Administrative Requirements: Submittal procedures, project meetings, progress schedules and documentation, reports, coordination.

B. Section 01 4000 - Quality Requirements: Procedures for testing, inspection, reports, certificates; use of reference standards.

C. Section 01 6000 - Product Requirements: Fundamental product requirements, substitutions and product options, delivery, storage, and handling.

D. Sections with materials and products to be furnished and installed as components of an integrated exterior mockup include, but are not limited to, the following:
1. Section 04 2000 - Unit Masonry.
2. Section 04 7323 – Manufactured Building Stone Masonry
3. Section 05 5400 – Cold-Formed Metal Framing.
4. Section 05 5000 - Metal Fabrications.
5. Section 06 1000 - Rough Carpentry
6. Section 07 2100 - Thermal Insulation.
7. Section 07 2726 – Fluid-Applied Membrane Air Barriers.
8. Section 07 4213.23 – Metal Composite Material Wall Panels.
9. Section 07 4646 - Fiber-Cement Wall Panels.
10. Section 07 6200 - Sheet Metal Flashing and Trim.
11. Section 08 4313 - Aluminum-Framed Storefronts.
12. Section 08 4413 - Glazed Aluminum Curtain Walls.
13. Section 08 8000 – Glazing.
14. Section 08 9200 – Louvered Equipment Enclosure.

1.3 DEFINITIONS

A. Mockups (General): Full-size physical assemblies that are constructed on-site. Mockups are not samples.

B. Integrated Exterior Mockups: Mockups of the exterior envelope erected separately from the building but on project site, consisting of mulitple products, assemblies, and subassemblies.
1. A standalone, integrated exterior envelope mockup is included in this project. Refer to Drawing A315 for mockup design and assemblies

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: For integrated exterior mockups.
   1. Include plans, sections, and elevations, indicating materials and size of mockup construction.
   2. Indicate manufacturer and model number of individual components.
   3. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.5 QUALITY ASSURANCE

A. Pre-Construction Conference: Prior to construction of the mockups, schedule a conference at the job site for the purpose of reviewing the requirements and intent of mockups.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 MOCKUPS

A. Before installing portions of the Work where mockups are required, construct mockups in location and size indicated for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work. The purpose of mockups is to verify selections made under sample submittals, to demonstrate the proposed range of aesthetic effects and workmanship, and where indicated, qualities of materials and execution.
   1. Mockups will be used to make final material selection, to review coordination, testing, or operation, to show interface between dissimilar materials, evaluate installation techniques, demonstrate compliance with specified installation tolerances, and evaluate compatibility of selected components.
   2. Completed mockups will serve as a mutual understanding of the workmanship and methods to be used on actual installation.

B. See Section 01 4000 - Quality Requirements for additional requirements.

C. Notify Architect fifteen (15) working days in advance of dates and times when mockups will be constructed and available for review.

D. Provide supervisory personnel who will oversee mockup construction. Provide workers that will be employed during the construction at Project.

E. Perform tests under provisions identified in this section and identified in the respective product specification sections.

F. Assemble and erect mockups complete with specified attachment and anchorage devices, flashings, seals, and finishes.

G. Obtain Architect's approval of mockups before ordering materials and starting work, fabrication, or construction.
   1. Architect will issue written comments within seven (7) working days of initial review and each subsequent follow up review of each mockup.

2. Make corrections as necessary until Architect's approval is issued.

H. Accepted mockups establish the standard of quality the Architect will use to judge the Work.

I. Where mockup has been accepted by Architect and is specified in product specification sections to be removed, protect mockup throughout construction, remove mockup and clear area when directed to do so by Architect.

J. Where possible salvage and recycle the demolished mockup materials.

K. Integrated Exterior Mockups: Construct integrated exterior mockup in accordance with approved shop drawings. Coordinate installation of exterior envelope materials and products for which mockups are required in individual specification sections. Provide adequate supporting structure for mockup materials as necessary. Comply with requirements in this article.
   1. Provide the following integrated exterior mockup:
      a) Exterior wall assembly systems and finishes, including all transitions and interfaces between different materials and walls to openings/curtain wall and storefronts. Construct as a single comprehensive mockup.
         1) Refer to Drawing A315 for configuration and components of the mockup.

3.2 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Coordination of Other Tests and Inspections: Owner will employ independent testing agency to test and/or inspect integrated building mock-up; provide access as required to accommodate timely performance.

END OF SECTION 01 4339

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SECTION 01 4533 - CODE-REQUIRED SPECIAL INSPECTIONS AND PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Code-required special inspections.

B. Testing services incidental to special inspections.

C. Submittals.

D. Manufacturers' field services.

E. Fabricators' field services.

1.2 RELATED REQUIREMENTS

A. Section 01 3000 - Administrative Requirements: Submittal procedures.

B. Section 01 4219 - Reference Standards.

C. Section 01 6000 - Product Requirements: Requirements for material and product quality.

1.3 ABBREVIATIONS AND ACRONYMS

A. AHJ: Authority having jurisdiction.

B. IAS: International Accreditation Service, Inc.

C. NIST: National Institute of Standards and Technology.

1.4 DEFINITIONS

A. Code or Building Code: ICC (IBC), International Building Code, Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements and specifically, Chapter 17 - Special Inspections and Tests.

B. Authority Having Jurisdiction (AHJ): Agency or individual officially empowered to enforce the building, fire and life safety code requirements of the permitting jurisdiction in which the Project is located.

C. Special Inspection:
   1. Special inspections are inspections and testing of materials, installation, fabrication, erection or placement of components and connections mandated by the AHJ that also require special expertise to ensure compliance with the approved Contract Documents and the referenced standards.
   2. Special inspections are separate from and independent of tests and inspections conducted by Owner or Contractor for the purposes of quality assurance and contract administration.

1.5 REFERENCE STANDARDS

A. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2021.

B. IAS AC89 - Accreditation Criteria for Testing Laboratories; 2018.

C. IAS AC291 - Accreditation Criteria for Special Inspection Agencies; 2017.

D. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.6 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Special Inspection Agency Qualifications: Prior to the start of work, the Special Inspection Agency is required to:
   1. Submit agency name, address, and telephone number, names of full time registered Engineer and responsible officer.
   2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
   3. Submit certification that Special Inspection Agency is acceptable to AHJ.
   4. Submit documentation that Special Inspection Agency is accredited by IAS according to IAS AC291.

C. Testing Agency Qualifications: Prior to the start of work, the Testing Agency is required to:
   1. Submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
   2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
   3. Submit certification that Testing Agency is acceptable to AHJ.
   4. Submit documentation that Testing Agency is accredited by IAS according to IAS AC89.

D. Special Inspection Reports: After each special inspection, Special Inspector is required to promptly submit at least two copies of report; one to Architect and one to the AHJ.
   1. Include:
      a) Date issued.
      b) Project title and number.
      c) Name of Special Inspector.
      d) Date and time of special inspection.
      e) Identification of product and specifications section.
      f) Location in the Project.
      g) Type of special inspection.
      h) Date of special inspection.
      i) Results of special inspection.
      j) Compliance with Contract Documents.

E. Test Reports: After each test or inspection, promptly submit at least two copies of report; one to Architect and one to AHJ.
   1. Include:
      a) Date issued.
      b) Project title and number.
      c) Name of inspector.
      d) Date and time of sampling or inspection.
      e) Identification of product and specifications section.
      f) Location in the Project.
      g) Type of test or inspection.
      h) Date of test or inspection.
      i) Results of test or inspection.
      j) Compliance with Contract Documents.

F. Certificates: When specified in individual special inspection requirements, Special Inspector shall submit certification by the manufacturer, fabricator, and installation subcontractor to Architect and AHJ, in quantities specified for Product Data.
   1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

1.7 SPECIAL INSPECTION AGENCY

A. Owner will employ services of a Special Inspection Agency to perform inspections and associated testing and sampling in accordance with ASTM E329 and required by the building code.

B. Employment of agency in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.

1.8 TESTING AND INSPECTION AGENCIES

A. Owner may employ services of an independent testing agency to perform additional testing and sampling associated with special inspections but not required by the building code.

B. Employment of agency in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.

1.9 QUALITY ASSURANCE

A. Special Inspection Agency Qualifications:
   1. Independent firm specializing in performing testing and inspections of the type specified in this section.
   2. Accredited by IAS according to IAS AC291.

B. Testing Agency Qualifications:
   1. Independent firm specializing in performing testing and inspections of the type specified in this section.
   2. Accredited by IAS according to IAS AC89.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 SCHEDULE OF SPECIAL INSPECTIONS, GENERAL

A. Frequency of Special Inspections: Special Inspections are indicated as continuous or periodic.
   1. Continuous Special Inspection: Special Inspection Agency is required to be present in the area where the work is being performed and observe the work at all times the work is in progress.
   2. Periodic Special Inspection: Special Inspection Agency is required to be present in the area where work is being performed and observe the work part-time or intermittently and at the completion of the work.

3.2 TESTING AGENCY DUTIES AND RESPONSIBILITIES

A. Testing Agency Duties:
   1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
   2. Perform specified sampling and testing of products in accordance with specified standards.
   3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
   4. Promptly notify Architect and Contractor of observed irregularities or non-compliance of work or products.
   5. Perform additional tests and inspections required by Architect.
   6. Submit reports of all tests or inspections specified.

B. Limits on Testing or Inspection Agency Authority:
   1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
   2. Agency may not approve or accept any portion of the work.
   3. Agency may not assume any duties of Contractor.
   4. Agency has no authority to stop the work.

C. On instructions by Architect, perform re-testing required because of non-compliance with specified requirements, using the same agency.

D. Contractor will pay for re-testing required because of non-compliance with specified requirements.

3.3 CONTRACTOR DUTIES AND RESPONSIBILITIES

A. Contractor Responsibilities, General:
   1. Deliver to agency at designated location, adequate samples of materials for special inspections that require material verification.
   2. Cooperate with agency and laboratory personnel; provide access to approved documents at project site, to the work, to manufacturers' facilities, and to fabricators' facilities.
   3. Provide incidental labor and facilities:
      a) To provide access to work to be tested or inspected.

b) To obtain and handle samples at the site or at source of Products to be tested or inspected.
c) To facilitate tests or inspections.
d) To provide storage and curing of test samples.

4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing or inspection services.
5. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

B. Contractor Responsibilities, Seismic Force-Resisting System, Designated Seismic System, and Seismic Force-Resisting Component: Submit written statement of responsibility for each item listed in the Statement of Special Inspections to AHJ and Owner prior to starting work. Statement of responsibility shall acknowledge awareness of special construction requirements and other requirements listed.

C. Contractor Responsibilities, Wind Force-Resisting System and Wind Force-Resisting Component: Submit written statement of responsibility for each item listed in the Statement of Special Inspections to AHJ and Owner prior to starting work. Statement of responsibility shall acknowledge awareness of special construction requirements and other requirements listed.

3.4 MANUFACTURERS' AND FABRICATORS' FIELD SERVICES

A. When specified in individual specification sections, require material suppliers, assembly fabricators, or product manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, to test, adjust, and balance equipment as applicable, and to initiate instructions when necessary.

B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

END OF SECTION 01 4533

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SECTION 01 5000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Temporary utilities.

B. Temporary telecommunications services.

C. Temporary sanitary facilities.

D. Temporary Controls: Barriers, enclosures, and fencing.

E. Security requirements.

F. Vehicular access and parking.

G. Waste removal facilities and services.

H. Project identification sign.

I. Field offices.

1.2 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

B. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).

1.3 TEMPORARY UTILITIES

A. Owner will provide the following:
   1. Electrical power and metering, consisting of connection to existing facilities.
   2. Water supply, consisting of connection to existing facilities.

1.4 TELECOMMUNICATIONS SERVICES

A. Provide, maintain, and pay for telecommunications services to field office at time of project mobilization.

B. Telecommunications services shall include:
   1. Windows-based personal computer dedicated to project telecommunications, with necessary software and laser printer.
   2. Internet Connections: Minimum of one; Cable modem or faster.
   3. Project web site.

1.5 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.

B. Maintain daily in clean and sanitary condition.

1.6 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.

C. Provide protection for plants designated to remain. Replace damaged plants.

D. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.7 FENCING

A. Construction: Contractor's option.

B. Provide 6 foot high fence around construction site; equip with vehicular and pedestrian gates with locks.

1.8 SECURITY

A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

1.9 VEHICULAR ACCESS AND PARKING

A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.

B. Coordinate access and haul routes with governing authorities and Owner.

C. Provide and maintain access to fire hydrants, free of obstructions.

D. Provide means of removing mud from vehicle wheels before entering streets.

E. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.

1.10 WASTE REMOVAL

A. See Section 01 7419 - Construction Waste Management and Disposal, for additional requirements.

B. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.

C. Provide containers with lids. Remove trash from site periodically.

D. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.11 PROJECT IDENTIFICATION

A. Provide project identification sign of design and construction required by the CT Department of Administrative Service and as indicated in the Project Sign Form SCG-3021 attached to this section.

B. Erect on site at location indicated.

C. No other signs are allowed without Owner permission except those required by law.

1.12 FIELD OFFICES

A. Office: Weathertight, with lighting, electrical outlets, heating, cooling equipment, and equipped with sturdy furniture, drawing rack, and drawing display table.

B. Provide space for Project meetings, with table and chairs to accommodate 6 persons.

C. Locate offices a minimum distance of 30 feet from existing and new structures.

1.13 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.

B. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.

C. Clean and repair damage caused by installation or use of temporary work.

D. Restore new permanent facilities used during construction to specified condition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 01 5000

DEPARTMENT OF ADMINISTRATIVE SERVICES (DAS)
Office of School Construction Grants & Review (OSCG&R)
Project Sign
FORM SCG-3021

8’-0”

4’ - 0”



NAME OF THE PROJECT

Town Seal

State Project Number 000-0000 XYZ

Constructed in Partnership

STATE OF CONNECTICUT
NED LAMONT, GOVERNOR

Department of Administrative Services
Michelle H. Gilman, Commissioner

and the
Name of Town/City
Name and Title of Chief Elected Official

Architect | Project Manager | Construction Manager

SIGN PANEL: ¾” MDO-EXT-APA PLYWOOD SUPPORTED WITH (2) 4X4 TREATED WOOD COLUMNS AND SECURED 4’ INTO GRADE. TOP OF SIGN AT 8’-0” ABOVE GRADE.
COLORS: ALL LETTERS AND SYMBOLS ARE TO BE ROYAL BLUE. THE BACKGROUND WILL BE WHITE ENAMEL. BACK OF PLYWOOD AND SUPPORT STRUCTURE SHALL BE PAINTED MATTE BLACK.
TYPEFACE: HELVETICA MEDIUM
LOCATION: SIGN MUST BE LOCATED TO BE CLEARLY VISIBLE TO THE PUBLIC.
TIMING: INSTALL AT THE START OF CONSTRUCTION AND REMOVE AT CONSTRUCTION COMPLETION.

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SECTION 01 5639 - TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Division 00 Bidding and Contracting Requirements, and other Division 01 General Requirements Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes general protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.

B. Related Requirements:

1. Division 01 Section "Temporary Facilities and Controls" for temporary site fencing.

2. Division 01 Section(s) “Construction Waste Management Disposal” and “Sustainability Compliance Procedures” for sustainability requirements.

3. Division 31 Section "Site Clearing" for removing existing trees and shrubs.

1.3 DEFINITIONS

A. Caliper: Diameter of a trunk measured by a diameter tape or the average of the smallest and largest diameters of multi-trunk trees at 6 inches (150 mm) above the ground for trees up to, and including, 4-inch (100-mm) size; and 12 inches (300 mm) above the ground for trees larger than 4-inch (100-mm) size.

B. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, and indicated on Drawings.

C. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by a circle concentric with each tree with a radius 1.5 times the diameter of the drip line unless otherwise indicated.

D. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. CTHPB Documentation Submittals: Comply with Section 01 3566.42 – Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

C. Samples for Verification: For each type of the following:

   1. Organic Mulch: 1-quart (1-L) volume of organic mulch; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch.
   2. Protection-Zone Fencing: Assembled Samples of manufacturer's standard size made from full-size components.

D. Tree Pruning Schedule: Written schedule detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction. Schedule to be provided to Landscape Architect and Town of Greenwich Tree Warden.

   1. Species and size of tree.
   2. Location on site plan. Include unique identifier for each.
   3. Reason for pruning.
   4. Description of pruning to be performed.
   5. Description of maintenance following pruning.

E. Qualification Data: For qualified arborist and tree service firm.

F. Certification: From arborist, certifying that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.

G. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.

H. Existing Conditions: Documentation of existing trees and plantings indicated to remain, which establishes preconstruction conditions that might be misconstrued as damage caused by construction activities.

   1. Use sufficiently detailed photographs or videotape.
   2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

1.5 QUALITY ASSURANCE

A. Arborist Qualifications: Licensed arborist in jurisdiction where Project is located. Arborist to work in conjunction with Town of Greenwich arborist per Tree Warden.

B. Tree Service Firm Qualifications: An experienced tree service firm that has successfully completed temporary tree and plant protection work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of the Work.

C. Quality-Control Program: Prepare a written program to systematically demonstrate the ability of personnel to properly follow procedures and handle materials and equipment during the Work without damaging trees and plantings. Include dimensioned diagrams for placement of protection zone fencing and signage, the arborist's and tree-service firm's responsibilities, instructions given to workers on the use and care of protection zones, and enforcement of requirements for protection zones

D. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to temporary tree and plant protection including, but not limited to, the following:

a. Construction schedule. Verify availability of materials, personnel, and equipment needed to make progress and avoid delays.
b. Enforcing requirements for protection zones.
c. Arborist's responsibilities.
d. Field quality control.

1.6 PROJECT CONDITIONS

A. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

B. Do not direct vehicle or equipment exhaust toward protection zones.

C. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

1.7 SPECIAL CONDITIONS

A. Protection and repair of impacts to above ground portions of street trees:
1. Prior to beginning any construction activities, a qualified arborist or tree service should remove all trees designated for removal. Where appropriate, the arborist or tree service should prune tree branches to a height of 14 feet over streets and 7-8 feel over sidewalks

to reduce the possibility of breaking or damaging limbs with equipment during construction.

2. During construction, extreme care should be exercised to avoid equipment damage to the tree trunks and lower branches. Damaged or broken branches and tree trunk injuries should be reported to the Owner's Representative and be professionally treated as soon as possible

B. Root Zone Protection

1. Before beginning any construction activities, trees to be retained shall be protected with fencing. The purpose of the fencing is to prevent root damage due to soil compaction. Soil compaction can be caused by heavy equipment, truck traffic, and stockpiling fill or other construction materials on the root system of a tree. As much of the tree's root zone as possible should be fenced off. The minimum area to be fenced off would be that area within the dripline of the tree; otherwise known as the Critical Root Zone. The fencing should be highly visible, of sturdy construction, and at least four feet high. Fences may be snow fence, chain link, synthetic fabric, or plastic fence.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Topsoil: Stockpiled topsoil from location shown on Drawings and conforming to Division 32 Section "Soil Preparation".

B. Organic Mulch: Free from deleterious materials and suitable as a top dressing for trees and shrubs, consisting of one of the following:

1. Type: Wood and bark chips.
2. Size Range: 3 inches (76 mm) maximum, 1/2 inch (13 mm) minimum.
3. Color: Natural.

C. Protection-Zone Fencing: Fencing fixed in position and meeting the following requirements. Previously used materials may be used when approved by Architect.

1. Plastic Protection-Zone Fencing: Plastic construction fencing constructed of high-density extruded and stretched polyethylene fabric with 2-inch (50-mm) maximum opening in pattern and weighing a minimum of 0.4 lb/ft. (0.6 kg/m); remaining flexible from minus 60 to plus 200 deg F (minus 16 to plus 93 deg C); inert to most chemicals and acids; minimum tensile yield strength of 2000 psi (13.8 MPa) and ultimate tensile strength of 2680 psi (18.5 MPa); secured with plastic bands or galvanized-steel or stainless-steel wire ties; and supported by tubular or T-shape galvanized-steel posts spaced not more than 8 feet (2.4 m) apart.

a. Height: 4 feet (1.2 m).
b. Color: High-visibility orange, nonfading.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion- and sedimentation-control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

B. For the record, prepare written report, endorsed by arborist, listing conditions detrimental to tree and plant protection.

3.2 PREPARATION

A. Locate and clearly identify trees, shrubs, and other vegetation to remain. Flag each tree trunk at 54 inches (1372 mm) above the ground.

B. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.

C. Tree-Protection Zones: Mulch areas inside tree-protection zones and other areas indicated.

1. Apply 4-inch (100-mm) average thickness of organic mulch. Do not place mulch within 6 inches (150 mm) of tree trunks.

3.3 TREE- AND PLANT-PROTECTION ZONES

A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones before materials or equipment are brought on the site and construction operations begin in a manner that will prevent people from easily entering protected area. Construct fencing so as not to obstruct safe passage or visibility at vehicle intersections where fencing is located adjacent to pedestrian walkways or in close proximity to street intersections, drives, or other vehicular circulation.

1. Posts: Set or drive posts into ground one-third the total height of the fence without concrete footings. Where a post is located on existing paving or concrete to remain, provide appropriate means of post support acceptable to Architect.

B. Maintain protection zones free of weeds and trash.

C. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Design/Builder.

D. Maintain protection-zone fencing in good condition as acceptable to Architect and remove when construction operations are complete and equipment has been removed from the site.

1. Do not remove protection-zone fencing, even temporarily, to allow deliveries or equipment access through the protection zone.
2. Temporary access is permitted subject to preapproval in writing by arborist if a root buffer effective against soil compaction is constructed as directed by arborist. Maintain root buffer so long as access is permitted.

3.4 EXCAVATION

A. General: Excavate at edge of protection zones and for trenches indicated within protection zones according to requirements in Division 31 Section "Excavation Backfill Compaction and Dewatering".

B. Trenching near Trees: Where utility trenches are required within protection zones, hand excavate under or around tree roots or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning.

C. Cut roots approximately 3 inches (75 mm) back from new construction and as required for root pruning.

D. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

3.5 ROOT PRUNING

A. Prune roots that are affected by temporary and permanent construction. Prune roots as follows:

1. Cut roots manually by digging a trench and cutting exposed roots with sharp pruning instruments; do not break, tear, chop, or slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.
2. Cut Ends: Do not paint cut root ends.
3. Temporarily support and protect roots from damage until they are permanently covered with soil.
4. Cover exposed roots with burlap and water regularly.
5. Backfill as soon as possible according to requirements in Division 31 Section "Earthwork".

B. Root Pruning at Edge of Protection Zone: Prune roots 12 inches (300 mm) outside of the protection zone, by cleanly cutting all roots to the depth of the required excavation.

C. Root Pruning within Protection Zone: Clear and excavate by hand to the depth of the required excavation to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.

3.6 CROWN PRUNING

A. Prune branches that are affected by temporary and permanent construction. Prune branches as follows:

1. Prune trees to remain to compensate for root loss caused by damaging or cutting root system. Provide subsequent maintenance during Contract period as recommended by arborist.
2. Pruning Standards: Prune trees according to ANSI A300 (Part 1) and the following:

    a. Type of Pruning: Cleaning and Raising.
    b. Specialty Pruning: Restoration Vista Utility.

3. Cut branches with sharp pruning instruments; do not break or chop.
4. Do not apply pruning paint to wounds.

B. Chip removed branches and spread over areas identified by Architect.

3.7 REGRADING

A. Lowering Grade outside Protection Zone: Where new finish grade is indicated below existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

B. Lowering Grade within Protection Zone: Where new finish grade is indicated below existing grade around trees and where lowering of grade is unavoidable, slope grade away from trees as recommended by arborist unless otherwise indicated. Minimize area and depth of grade lowering operations to the greatest extent possible.

1. Root Pruning: Prune tree roots exposed by lowering the grade. Do not cut main lateral roots or taproots; cut only smaller roots. Cut roots as required for root pruning.

C. Raising Grade outside of Protection Zone: Where new finish grade is indicated above existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

D. Minor Fill within Protection Zone: Where existing grade is 2 inches (50 mm) or less below elevation of finish grade and where raising of grade is unavoidable, fill with topsoil. Place topsoil in a single uncompacted layer and hand grade to required finish elevations. Minimize area and depth of grade raising operations to the greatest extent possible.

3.8 FIELD QUALITY CONTROL

A. Inspections: Engage a qualified arborist to direct plant-protection measures in the vicinity of trees, shrubs, and other vegetation indicated to remain and to prepare inspection reports.

3.9 REPAIR AND REPLACEMENT

A. General: Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Landscape Architect.

1. Submit details of proposed root cutting and tree and shrub repairs.
2. Have arborist perform the root cutting, branch pruning, and damage repair of trees and shrubs.
3. Treat damaged trunks, limbs, and roots according to arborist's written instructions.
4. Perform repairs within 24 hours.
5. Replace vegetation that cannot be repaired and restored to full-growth status, as determined by Architect and Arborist.

B. Trees: Remove and replace trees indicated to remain that are more than 25 percent dead or in an unhealthy condition before the end of the corrections period or are damaged during construction operations that Architect determines are incapable of restoring to normal growth pattern.

1. Provide one new tree(s) of 6-inch (150-mm) caliper size for each tree being replaced that measures more than 6 inches (150 mm) in caliper size.

    a. Species: Species selected by Landscape Architect.

2. Plant and maintain new trees as specified in Division 32 Section "Plants".

C. Soil Aeration: Where directed by Landscape Architect, aerate surface soil compacted during construction. Aerate 10 feet (3 m) beyond drip line and no closer than 36 inches (900 mm) to tree trunk. Drill 2-inch- (50-mm-) diameter holes a minimum of 12 inches (300 mm) deep at 24 inches (600 mm) o.c. Backfill holes with an equal mix of augered soil and sand.

3.10 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove excess excavated material, displaced trees, trash and debris, and legally dispose of them off Owner's property.

END OF SECTION 31 1010

SECTION 01 5719 - TEMPORARY ENVIRONMENTAL CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Construction procedures to promote adequate indoor air quality after construction.

B. Building flush-out after construction and before occupancy.

C. Testing indoor air quality after completion of construction.

1.2 PROJECT GOALS

A. Dust and Airborne Particulates: Prevent deposition of dust and other particulates in HVAC ducts and equipment.
   1. Cleaning of ductwork is not contemplated under this Contract.
   2. Contractor shall bear the cost of cleaning required due to failure to protect ducts and equipment from construction dust.

B. Airborne Contaminants: Procedures and products have been specified to minimize indoor air pollutants.
   1. Furnish products meeting the specifications.
   2. Avoid construction practices that could result in contamination of installed products leading to indoor air pollution.

1.3 REFERENCE STANDARDS

A. ASTM D5197 - Standard Test Method for Determination of Formaldehyde and Other Carbonyl Compounds in Air (Active Sampler Methodology); 2016.

B. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions From Indoor Sources Using Environmental Chambers; 2017, v1.2.

C. EPA 600/4-90/010 - Compendium of Methods for the Determination of Air Pollutants in Indoor Air; 1990.

D. EPA 625/R-96/010b - Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air; 1999.

E. SMACNA (OCC) - IAQ Guidelines for Occupied Buildings Under Construction; 2007.

1.4 DEFINITIONS

A. Adsorptive Materials: Gypsum board, acoustical ceiling tile and panels, carpet and carpet tile, fabrics, fibrous insulation, and other similar products.

B. Contaminants: Gases, vapors, regulated pollutants, airborne mold and mildew, and the like, as specified.

C. Particulates: Dust, dirt, and other airborne solid matter.

D. Wet Work: Concrete, plaster, coatings, and other products that emit water vapor or volatile organic compounds during installation, drying, or curing.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Sustainability Documentation: Submit documentation required in this section.

C. Indoor Air Quality Management Plan: Describe, in detail, measures to be taken to promote adequate indoor air quality upon completion; use SMACNA (OCC) as a guide.
1. Submit not less than 60 days before enclosure of building.
2. Identify potential sources of odor and dust.
3. Identify construction activities likely to produce odor or dust.
4. Identify areas of project potentially affected, especially occupied areas.
5. Evaluate potential problems by severity and describe methods of control.
6. Describe construction ventilation to be provided, including type and duration of ventilation, use of permanent HVAC systems, types of filters and schedule for replacement of filters.
7. Describe cleaning and dust control procedures.

D. Interior Finishes Installation Schedule: Identify each interior finish that either generates odors, moisture, or vapors or is susceptible to adsorption of odors and vapors, and indicate air handling zone, sequence of application, and curing times.

E. Duct and Terminal Unit Inspection Report.

F. Air Contaminant Test Plan: Identify:
1. Testing agency qualifications.
2. Locations and scheduling of air sampling.
3. Test procedures, in detail.
4. Test instruments and apparatus.
5. Sampling methods.

G. Air Contaminant Test Reports: Show:
1. Location where each sample was taken, and time.
2. Test values for each air sample; average the values of each set of 3.
3. HVAC operating conditions.
4. Certification of test equipment calibration.
5. Other conditions or discrepancies that might have influenced results.

PART 3 EXECUTION

2.1 CONSTRUCTION PROCEDURES

A. Prevent the absorption of moisture and humidity by adsorptive materials by:

1. Sequencing the delivery of such materials so that they are not present in the building until wet work is completed and dry.
2. Delivery and storage of such materials in fully sealed moisture-impermeable packaging.
3. Provide sufficient ventilation for drying within reasonable time frame.

B. Begin construction ventilation when building is substantially enclosed.

C. Do not store construction materials or waste in mechanical or electrical rooms.

D. Prior to use of return air ductwork without intake filters clean up and remove dust and debris generated by construction activities.
1. Inspect duct intakes, return air grilles, and terminal units for dust.
2. Clean plenum spaces, including top sides of lay-in ceilings, outsides of ducts, tops of pipes and conduit.
3. Clean tops of doors and frames.
4. Clean mechanical and electrical rooms, including tops of pipes, ducts, and conduit, equipment, and supports.
5. Clean return plenums of air handling units.
6. Remove intake filters last, after cleaning is complete.

E. Do not perform dusty or dirty work after starting use of return air ducts without intake filters.

F. Use other relevant recommendations of SMACNA (OCC) for avoiding unnecessary contamination due to construction procedures.

2.2 BUILDING FLUSH-OUT

A. Contractor's Option: Either full continuous flush-out OR satisfactory air contaminant testing is required, not both.

B. Perform building flush-out before occupancy.

C. Do not start flush-out until:
1. All construction is complete.
2. HVAC systems have been tested, adjusted, and balanced for proper operation.
3. Inspection of inside of return air ducts and terminal units confirms that cleaning is not necessary.
4. New HVAC filtration media have been installed.

D. Building Flush-Out: Operate all ventilation systems at normal flow rates with 100 percent outside air until a total air volume of 14,000 cubic feet per square foot of floor area has been supplied.
1. Obtain Owner's concurrence that construction is complete enough before beginning flush-out.
2. Maintain interior temperature of at least 60 degrees F and interior relative humidity no higher than 60 percent.
3. If additional construction involving materials that produce particulates or any of the specified contaminants is conducted during flush-out, start flush-out over.
4. If interior spaces must be occupied prior to completion of the flush-out, supply a minimum of 25 percent of the total air volume prior to occupancy, and:
   a) Begin ventilation at least three hours prior to daily occupancy.

b) Continue ventilation during all occupied periods.
c) Provide minimum outside air volume of 0.30 cfm per square foot or design minimum outside air rate, whichever is greater.

E. Install new HVAC filtration media after completion of flush-out and before occupancy or further testing.

2.3 AIR CONTAMINANT TESTING

A. Contractor's Option: Either full continuous flush-out, or satisfactory air contaminant testing is required, not both.

B. Perform air contaminant testing before occupancy.

C. Do not start air contaminant testing until:
1. All construction is complete, including interior finishes.
2. HVAC systems have been tested, adjusted, and balanced for proper operation.
3. New HVAC filtration media have been installed.

D. Indoor Air Samples: Collect from spaces representative of occupied areas:
1. Collect samples while operable windows and exterior doors are closed, HVAC system is running normally as if occupied, with design minimum outdoor air, but with the building unoccupied.
2. Collect samples from spaces in each contiguous floor area in each air handler zone, but not less than one sample per 25,000 square feet; take samples from areas having the least ventilation and those having the greatest presumed source strength.
3. Collect samples from height from 36 inches to 72 inches above floor.
4. Collect samples from same locations on 3 consecutive days during normal business hours; average the results of each set of 3 samples.
5. Exception: Areas with normal very high outside air ventilation rates, such as laboratories, do not need to be tested.
6. When retesting the same building areas, take samples from at least the same locations as in first test.

E. Outdoor Air Samples: Collect samples at outside air intake of each air handler at the same time as indoor samples are taken.

F. Analyze air samples and submit report.

G. Volatile Organic Compounds Limits:
1. Formaldehyde: Not more than 27 parts per billion.
2. Total Volatile Organic Compounds (TVOCs): Not more than 500 micrograms per cubic meter.
3. Chemicals Listed in CAL (CDPH SM) Table 4-1, other than Formaldehyde: Not more than allowable concentrations listed in Table 4-1.

H. Air Contaminant Concentration Test Methods:
1. Formaldehyde: ASTM D5197, EPA 625/R-96/010b Method TO-11A, or EPA 600/4-90/010 Method IP-6A.
2. Particulates: EPA 600/4-90/010 Method IP-10.

3. Total Volatile Organic Compounds (TVOC): EPA 625/R-96/010b Method TO-1, TO-15, or TO-17; or EPA 600/4-90/010 Method IP-1.
4. Chemicals Listed in CAL (CDPH SM) Table 4-1, except Formaldehyde: ASTM D5197, or EPA 625/R-96/010b Method TO-1, TO-15, or TO-17.
5. Carbon Monoxide: EPA 600/4-90/010 Method IP-3, plus measure outdoor air; measure in ppm; report both indoor and outdoor measurements.

END OF SECTION 01 5719

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SECTION 01 6000 - PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. General product requirements.

B. Sustainable design-related product requirements.

C. Re-use of existing products.

D. Transportation, handling, storage and protection.

E. Product option requirements.

F. Substitution limitations.

G. Procedures for Owner-supplied products.

H. Maintenance materials, including extra materials, spare parts, tools, and software.

1.2 RELATED REQUIREMENTS

A. Section 01 2500 - Substitution Procedures: Substitutions made during procurement and/or construction phases.

B. Section 01 3566.42 - Sustainability Compliance Procedures - CT HPBS: Requirements for sustainability compliance procedures.

C. Section 01 4000 - Quality Requirements: Product quality monitoring.

D. Section 01 7419 - Construction Waste Management and Disposal: Waste disposal requirements potentially affecting product selection, packaging and substitutions.

1.3 REFERENCE STANDARDS

A. 16 CFR 260.13 - Guides for the Use of Environmental Marketing Claims; Federal Trade Commission; Recycled Content; Current Edition.

B. ASTM D6866 - Standard Test Methods for Determining the Biobased Content of Solid, Liquid, and Gaseous Samples Using Radiocarbon Analysis; 2021.

C. C2C (DIR) - C2C Certified Products Registry; Cradle to Cradle Products Innovation Institute; Current Edition.

D. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions From Indoor Sources Using Environmental Chambers; 2017, v1.2.

E. EN 15804 - Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products; 2014.

F. GreenScreen (LIST) - GreenScreen for Safer Chemicals List Translator; Clean Production Action; Current Edition.

G. GreenScreen (METH) - GreenScreen for Safer Chemicals Method v1.2; Clean Production Action; Current Edition.

H. ISO 14025 - Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures; 2006.

I. ISO 14040 - Environmental management - Life cycle assessment - Principles and framework; 2006 (Amended 2020).

J. ISO 14044 - Environmental management - Life cycle assessment - Requirements and guidelines; 2006 (Amended 2020).

K. ISO 21930 - Sustainability in buildings and civil engineering works -- Core rules for environmental product declarations of construction products and services; 2017.

1.4 SUBMITTALS

A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
   1. Submit within 15 days after date of Agreement.
   2. For products specified only by reference standards, list applicable reference standards.

B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

C. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

D. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
   1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

E. Sustainable Design Submittals: Items necessary to document use of sustainable construction materials, products, and practices.
   1. See Section 01 3566.42 for Contractor's procedures necessary for achievement of targeted CT-HPBS sustainability compliance level.

1.5 QUALITY ASSURANCE

A. Bio-Based Content: Of vegetable or animal origin, not including products made by killing the animal.
   1. Determine percentage of bio-based content in accordance with ASTM D6866.
   2. Bio-based content must be sourced from a Sustainable Agriculture Network certified farm.

B. CAL (CDPH SM) v1.1: California Department of Public Health (CDPH) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, v. 1.1–2010, for the emissions testing and requirements of products and materials.

C. Chain-of-Custody (COC): A procedure that tracks a product from the point of harvest or extraction to its end use, including successive stages of processing, transformation, manufacturing, and distribution.

D. Chain-of-Custody Certificates: Certificates signed by manufacturers and fabricators certifying that wood used to make products was obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001.

E. Composite Wood and Agrifiber: Products made of wood particles and/or plant material pressed and bonded with adhesive or resin such as particleboard, medium density fiberboard (MDF), plywood, wheatboard, strawboard, panel substrates, and door cores.

F. Cradle-to-Cradle Certified: End use product certified Cradle-to-Cradle v2 Basic or Cradle-to-Cradle v3 Bronze, minimum, as evidenced by C2C (DIR).

G. Environmental Product Declaration (EPD): Publicly available, critically reviewed life cycle analysis having at least a cradle-to-gate scope.
   1. Good: Product-specific; compliant with ISO 14044.
   2. Better: Industry-wide, generic; compliant with ISO 21930, or with ISO 14044, ISO 14040, ISO 14025, and EN 15804; Type III third-party certification with external verification, in which the manufacturer is recognized as the program operator.
   3. Best: Commercial-product-specific; compliant with ISO 21930, or with ISO 14044, ISO 14040, ISO 14025, and EN 15804; Type III third-party certification with external verification, in which the manufacturer is recognized as the program operator.
   4. Where demonstration of impact reduction below industry average is required, submit both industry-wide and commercial-product-specific declarations; or submit at least 5 declarations for products of the same type by other manufacturers in the same industry.

H. GreenScreen Chemical Hazard Analysis: Ingredients of 100 parts-per-million or greater evaluated using GreenScreen (METH).
   1. Good: GreenScreen (LIST) evaluation to identify Benchmark 1 hazards; a Health Product Declaration includes this information.
   2. Better: GreenScreen Full Assessment.
   3. Best: GreenScreen Full Assessment by GreenScreen Licensed Profiler.
   4. Acceptable Evidence: GreenScreen report.

I. Health Product Declarations (HPD): Complete, published declaration with full disclosure of known hazards, prepared using one of the HPDC (HPD-OLT) online tools.

J. Manufacturer's Inventory of Product Content: Publicly available inventory of every ingredient identified by name and Chemical Abstract Service Registration Number (CAS RN).
   1. For ingredients considered a trade secret or intellectual property, the name and CAS RN may be omitted, provided the ingredient's role, amount, and GreenScreen Benchmark are given.

K. Recycled Content: Determine percentage of post-consumer and pre-consumer (post-industrial) content separately, using the guidelines contained in 16 CFR 260.13.
   1. Previously used, reused, refurbished, and salvaged products are not considered recycled.
   2. Wood fabricated from timber abandoned in transit to original mill is considered reused, not recycled.
   3. Determine percentage of recycled content of any item by dividing the weight of recycled content in the item by the total weight of materials in the item.
   4. Determine value of recycled content of each item separately, by multiplying the content percentage by the value of the item.
   5. Acceptable Evidence:
      a) For percentage of recycled content, information from manufacturer.
      b) For cost, Contractor's cost data.

L. Regional Materials: Materials that are extracted, harvested, recovered, and manufactured within a radius of 500 miles from the Project site.

M. Reused Products: Materials and equipment previously used in this or other construction, salvaged and refurbished as specified.
   1. Wood fabricated from timber abandoned in transit after harvesting is considered reused, not recycled.
   2. Acceptable Evidence: Information about the origin or source, from Contractor or supplier.

N. Source Location: Location of harvest, extraction, recovery, or manufacture; where information about source location is required to be submitted, give the postal address:
   1. In every case, indicate the location of final assembly.
   2. For harvested products, indicate location of harvest.
   3. For extracted (i.e. mined) products, indicate location of extraction.
   4. For recovered products, indicate location of recovery.
   5. For products involving multiple manufacturing steps, provide a description of the process at each step, with location.
   6. Acceptable Evidence:
      a) Manufacturer's certification.
      b) Life cycle analysis (LCA) performed by third-party.

O. Sustainably Harvested Wood: Solid wood, wood chips, and wood fiber certified or labeled by an organization accredited by one of the following:
   1. The Forest Stewardship Council, The Principles for Natural Forest Management; for Canada visit http://www.fsccanada.org, for the USA visit http://www.fscus.org.
   2. Acceptable Evidence: Copies of invoices bearing the certifying organization's certification numbers.

PART 2 PRODUCTS

2.1 EXISTING PRODUCTS

A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by Contract Documents.

B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.

C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.

2.2 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by Contract Documents.

B. See Section 01 4000 - Quality Requirements, for additional source quality control requirements.

C. Use of products having any of the following characteristics is not permitted:
1. Made using or containing CFC's or HCFC's.
2. Made of wood from newly cut old growth timber.
3. Containing lead, cadmium, or asbestos.

D. Where other criteria are met, Contractor shall give preference to products that:
1. If used on interior, have lower emissions, as defined in Section 01 6116.
2. If wet-applied, have lower VOC content, as defined in Section 01 6116.
3. Are extracted, harvested, and/or manufactured closer to the location of the project.
4. Result in less construction waste. See Section 01 7419
5. Are made of recycled materials.
6. If made of wood, are made of sustainably harvested wood, wood chips, or wood fiber.

2.3 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.4 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.

B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.1 SUBSTITUTION LIMITATIONS

A. See Section 01 2500 - Substitution Procedures.

3.2 OWNER-SUPPLIED PRODUCTS

A. Owner's Responsibilities:
   1. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Contractor.
   2. Arrange and pay for product delivery to site.
   3. On delivery, inspect products jointly with Contractor.
   4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
   5. Arrange for manufacturers' warranties, inspections, and service.

B. Contractor's Responsibilities:
   1. Review Owner reviewed shop drawings, product data, and samples.
   2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
   3. Handle, store, install and finish products.
   4. Repair or replace items damaged after receipt.

3.3 TRANSPORTATION AND HANDLING

A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.

B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.

C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

D. Transport and handle products in accordance with manufacturer's instructions.

E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.

H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.4 STORAGE AND PROTECTION

A. Provide protection of stored materials and products against theft, casualty, or deterioration.

B. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 01 7419.

C. Store and protect products in accordance with manufacturers' instructions.

D. Store with seals and labels intact and legible.

E. Arrange storage of materials and products to allow for visual inspection for the purpose of determination of quantities, amounts, and unit counts.

F. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.

G. For exterior storage of fabricated products, place on sloped supports above ground.

H. Provide off-site storage and protection when site does not permit on-site storage or protection.

I. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.

J. Comply with manufacturer's warranty conditions, if any.

K. Do not store products directly on the ground.

L. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

M. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

N. Prevent contact with material that may cause corrosion, discoloration, or staining.

O. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

P. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION 01 6000

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FOR REFERENCE: THIS SECTION WAS ISSUED FOR PHASE 1 AND PHASE 2

SECTION 01 6116 - VOLATILE ORGANIC COMPOUND (VOC) CONTENT RESTRICTIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Requirements for Indoor-Emissions-Restricted products.

B. Requirements for VOC-Content-Restricted products.

1.2 RELATED REQUIREMENTS

A. Section 01 3000 - Administrative Requirements: Submittal procedures.

B. Section 01 3566.42 - Sustainability Compliance Procedures

C. Section 01 4000 - Quality Requirements: Procedures for testing and certifications.

1.3 DEFINITIONS

A. Indoor-Emissions-Restricted Products: All products in the following product categories, whether specified or not:
   1. Interior paints and coatings applied on site.
   2. Interior adhesives and sealants applied on site, including flooring adhesives.
      a) See Section 01 3566.42 for specific extent.
   3. Flooring types indicated in Section 01 3566.42.
   4. Products making up wall and ceiling assemblies.

B. VOC-Content-Restricted Products: All products in the following product categories, whether specified or not:
   1. Interior paints and coatings applied on site.
   2. Interior adhesives and sealants applied on site, including flooring adhesives.

C. Interior of Building: Anywhere inside the exterior weather barrier.

D. Adhesives: All gunnable, trowelable, liquid-applied, and aerosol adhesives, whether specified or not; including flooring adhesives, resilient base adhesives, and pipe jointing adhesives.

E. Sealants: All gunnable, trowelable, and liquid-applied joint sealants and sealant primers, whether specified or not; including firestopping sealants and duct joint sealers.

F. Inherently Non-Emitting Materials: Products composed wholly of minerals or metals, unless they include organic-based surface coatings, binders, or sealants; and specifically the following:
   1. Concrete.
   2. Clay brick.
   3. Metals that are plated, anodized, or powder-coated.
   4. Glass.
   5. Ceramics.
   6. Solid wood flooring that is unfinished and untreated.

1.4 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.

B. ASTM D3960 - Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings; 2005 (Reapproved 2018).

C. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions From Indoor Sources Using Environmental Chambers; 2017, v1.2.

D. CARB (SCM) - Suggested Control Measure for Architectural Coatings; California Air Resources Board; 2007.

E. CHPS (HPPD) - High Performance Products Database; Current Edition at www.chps.net/.

F. CRI (GLP) - Green Label Plus Testing Program - Certified Products; Current Edition.

G. SCAQMD 1113 - Architectural Coatings; 1977 (Amended 2016).

H. SCAQMD 1168 - Adhesive and Sealant Applications; 1989 (Amended 2017).

I. SCS (CPD) - SCS Certified Products; Current Edition.

J. UL (GGG) - GREENGUARD Gold Certified Products; Current Edition.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: For each VOC-restricted product used in the project, submit evidence of compliance.

1.6 QUALITY ASSURANCE

A. Indoor Emissions Standard and Test Method: CAL (CDPH SM), using Standard Private Office exposure scenario and the allowable concentrations specified in the method, and range of total VOC's after 14 days.
   1. Wet-Applied Products: State amount applied in mass per surface area.
   2. Paints and Coatings: Test tinted products, not just tinting bases.
   3. Evidence of Compliance: Acceptable types of evidence are the following;
      a) Current UL (GGG) certification.
      b) Current SCS (CPD) Floorscore certification.
      c) Current SCS (CPD) Indoor Advantage Gold certification.
      d) Current listing in CHPS (HPPD) as a low-emitting product.
      e) Current CRI (GLP) certification.
      f) Test report showing compliance and stating exposure scenario used.
   4. Product data submittal showing VOC content is NOT acceptable evidence.
   5. Manufacturer's certification without test report by independent agency is NOT acceptable evidence.

B. VOC Content Test Method: 40 CFR 59, Subpart D (EPA Method 24), or ASTM D3960, unless otherwise indicated.
   1. Evidence of Compliance: Acceptable types of evidence are:
      a) Report of laboratory testing performed in accordance with requirements.

C. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

PART 2 PRODUCTS

2.1 MATERIALS

A. All Products: Comply with the most stringent of federal, State, and local requirements, or these specifications.

B. Indoor-Emissions-Restricted Products: Comply with Indoor Emissions Standard and Test Method, except for:
   1. Inherently Non-Emitting Materials.

C. VOC-Content-Restricted Products: VOC content not greater than required by the following:
   1. Adhesives, Including Flooring Adhesives: SCAQMD 1168 Rule.
   2. Joint Sealants: SCAQMD 1168 Rule.
   3. Paints and Coatings: Each color; most stringent of the following:
      a) 40 CFR 59, Subpart D.
      b) SCAQMD 1113 Rule.
      c) CARB (SCM).

PART 3 EXECUTION

3.1 FIELD QUALITY CONTROL

A. Owner reserves the right to reject non-compliant products, whether installed or not, and require their removal and replacement with compliant products at no extra cost to Owner.

B. Additional costs to restore indoor air quality due to installation of non-compliant products will be borne by Contractor.

END OF SECTION 01 6116

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SECTION 01 7000 - EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Pre-installation meetings.

C. Surveying for laying out the work.

D. Cleaning and protection.

E. Starting of systems and equipment.

F. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

G. General requirements for maintenance service.

1.2 RELATED REQUIREMENTS

A. Section 01 1000 - Summary: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.

B. Section 01 3566.42 - Sustainability Compliance Procedures.

C. Section 01 4000 - Quality Requirements: Testing and inspection procedures.

D. Section 01 7419 - Construction Waste Management and Disposal: Additional procedures for trash/waste removal, recycling, salvage, and reuse.

E. Section 01 7800 - Closeout Submittals: Project record documents, operation and maintenance data, warranties, and bonds.

F. Section 01 9113 - General Commissioning Requirements: Contractor's responsibilities in regard to commissioning.

1.3 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Survey Work: Submit name, address, and telephone number of Surveyor before starting survey work.
   1. On request, submit documentation verifying accuracy of survey work.
   2. Submit a copy of site drawing signed by the Land Surveyor, that the elevations and locations of the work are in compliance with Contract Documents.
   3. Submit surveys and survey logs for the project record.

1.4 QUALIFICATIONS

A. For surveying work, employ a land surveyor registered in the State in which the Project is located and acceptable to Architect. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities,

B. For field engineering, employ a professional engineer of the discipline required for specific service on Project, licensed in the State in which the Project is located. Employ only individual(s) trained and experienced in establishing and maintaining horizontal and vertical control points necessary for laying out construction work on project of similar size, scope and/or complexity.

C. For design of temporary shoring and bracing, employ a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

1.5 PROJECT CONDITIONS

A. Use of explosives is not permitted.

B. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

C. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

D. Perform dewatering activities, as required, for the duration of the project.

E. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

F. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.

G. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
   1. Minimize amount of bare soil exposed at one time.
   2. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
   3. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
   4. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

H. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.

I. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.

J. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.

K. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.6 COORDINATION

A. See Section 01 1000 for occupancy-related requirements.

B. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

C. Notify affected utility companies and comply with their requirements.

D. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

E. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

F. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

G. Coordinate completion and clean-up of work of separate sections.

H. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

PART 2 PRODUCTS [NOT USED]

PART 3 EXECUTION

3.1 EXAMINATION

A. The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
   1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, gas service piping, and water-service piping; underground electrical services; and other utilities.

2. Furnish location data for work related to project that must be performed by public utilities serving project site.

B. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

C. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

D. Examine and verify specific conditions described in individual specification sections.

E. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

F. Verify that utility services are available, of the correct characteristics, and in the correct locations.

3.2 PREPARATION

A. Verify space requirements and dimensions of items shown diagrammatically on Drawings.

B. Clean substrate surfaces prior to applying next material or substance.

C. Seal cracks or openings of substrate prior to applying next material or substance.

D. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.3 PRE-INSTALLATION MEETINGS

A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.

B. Require attendance of parties directly affecting, or affected by, work of the specific section.

C. Notify Architect four days in advance of meeting date.

D. Prepare agenda and preside at meeting:
1. Review conditions of examination, preparation and installation procedures.
2. Review coordination with related work.

E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

F. Layout Meeting:
1. Prior to establishing layout of new perimeter and structural column grid(s), review building location requirements. Review benchmark, control point, and layout and dimension requirements. Inform Architect and Construction Manager of scheduled meeting. Require representatives of each entity directly concerned with Project layout to attend.

3.4 LAYING OUT THE WORK

A. Verify locations of survey control points prior to starting work.

B. Promptly notify Architect of any discrepancies discovered.

C. Contractor shall locate and protect survey control and reference points.

D. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

E. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

F. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.

G. Utilize recognized engineering survey practices.

H. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
   1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
   2. Grid or axis for structures.
   3. Building foundation, column locations, ground floor elevations.
   4. Controlling lines and levels required for mechanical and electrical trades.

I. Periodically verify layouts by same means.

J. Maintain a complete and accurate log of control and survey work as it progresses.

3.5 GENERAL INSTALLATION REQUIREMENTS

A. In addition to compliance with regulatory requirements, conduct construction operations in compliance with NFPA 241, including applicable recommendations in Appendix A.

B. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

C. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

D. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

E. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.

F. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.

G. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces, unless otherwise indicated on Drawings.

H. Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions with manufacturer.
   1. Where mounting heights are not indicated, mount components at heights directed by Architect.
   2. Allow for building movement, including thermal expansion and contraction.
   3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installation. Deliver these items to project site in time for installation.

I. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

J. Make neat transitions between different surfaces, maintaining texture and appearance.

K. Maintain conditions required for product performance until Substantial Completion.

L. Repair or remove and replace damaged, defective, or nonconforming Work.

3.6 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and HEPA vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.7 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

F. Protect work from spilled liquids. If work is exposed to spilled liquids, immediately remove protective coverings, dry out work, and replace protective coverings.

G. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

H. Prohibit traffic from landscaped areas.

I. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.8 SYSTEM STARTUP

A. Coordinate with requirements of Section 01 9113 - General Commissioning Requirements.

B. Coordinate schedule for start-up of various equipment and systems.

C. Notify Architect and Owner seven days prior to start-up of each item.

D. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.

E. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

F. Verify that wiring and support components for equipment are complete and tested.

G. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.

H. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

I. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.9 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.10 FINAL CLEANING

A. Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
   1. Vacuum all carpeted and soft surfaces with a high-efficiency particulate arrestor (HEPA) vacuum clean in accordance with the Connecticut High Performance Building Standards mandatory requirements.

C. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

D. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

E. Clean filters of operating equipment.

F. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.11 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.

B. Accompany Project Coordinator on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.

C. Notify Architect when work is considered ready for Architect's Substantial Completion inspection.

D. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Substantial Completion inspection.

E. Owner will occupy all of the building as specified in Section 01 1000.

F. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.

G. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.

H. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.

I. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

3.12 MAINTENANCE

A. Provide service and maintenance of components indicated in specification sections.

B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.

C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.

E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

END OF SECTION 01 7000

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FOR REFERENCE: THIS SECTION WAS ISSUED FOR PHASE 1 AND PHASE 2

SECTION 01 7419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.1 WASTE MANAGEMENT REQUIREMENTS

A. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.

B. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.

C. Contractor Reporting Responsibilities: Submit periodic Waste Disposal Reports; report landfill disposal, incineration, recycling, salvage, and reuse regardless of to whom the cost or savings accrues; use the same units of measure on required reports.

D. Develop and follow a Waste Management Plan designed to implement these requirements.

E. The following sources may be useful in developing the Waste Management Plan:

F. Methods of trash/waste disposal that are not acceptable are:
   1. Burning on the project site.
   2. Burying on the project site.
   3. Dumping or burying on other property, public or private.
   4. Other illegal dumping or burying.

G. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.2 RELATED REQUIREMENTS

A. Section 01 3000 - Administrative Requirements: Additional requirements for project meetings, reports, submittal procedures, and project documentation.

B. Section 01 3566.42 - Sustainability Compliance Procedures - CT HPBS: Procedures for sustainable design documentation.

C. Section 01 5000 - Temporary Facilities and Controls: Additional requirements related to trash/waste collection and removal facilities and services.

D. Section 01 6000 - Product Requirements: Waste prevention requirements related to delivery, storage, and handling.

E. Section 01 7000 - Execution and Closeout Requirements: Trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

1.3 DEFINITIONS

A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.

B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.

C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.

D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.

E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.

F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.

G. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.

H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

I. Return: To give back reusable items or unused products to vendors for credit.

J. Reuse: To reuse a construction waste material in some manner on the project site.

K. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.

L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.

M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.

N. Toxic: Poisonous to humans either immediately or after a long period of exposure.

O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.

P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Sustainable Design Submittals: Submit Waste Management Plan and Waste Disposal Reports in accordance with procedures specified in Section 01 3566.42 - Sustainability Compliance Procedures - CT HPBS.

C. Waste Management Plan: Include the following information:
   1. Analysis of the trash and waste projected to be generated during the entire project construction cycle, including types and quantities.
   2. Landfill Options: The name, address, and telephone number of the landfill(s) where trash/waste will be disposed of, the applicable landfill tipping fee(s), and the projected cost of disposing of all project trash/waste in the landfill(s).
   3. Landfill Alternatives: List all waste materials that will be diverted from landfills by reuse, salvage, or recycling.
   4. Meetings: Describe regular meetings to be held to address waste prevention, reduction, recycling, salvage, reuse, and disposal.
   5. Materials Handling Procedures: Describe the means by which materials to be diverted from landfills will be protected from contamination and prepared for acceptance by designated facilities; include separation procedures for recyclables, storage, and packaging.
   6. Transportation: Identify the destination and means of transportation of materials to be recycled; i.e. whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler.

D. Waste Disposal Reports: Submit at specified intervals, with details of quantities of trash and waste, means of disposal or reuse, and costs; show both totals to date and since last report.
   1. Submit updated Report with each Application for Progress Payment; failure to submit Report will delay payment.
   2. Submit Report on a form acceptable to Owner.
   3. Landfill Disposal: Include the following information:
      a) Identification of material.
      b) Amount, in tons or cubic yards, of trash/waste material from the project disposed of in landfills.
      c) State the identity of landfills, total amount of tipping fees paid to landfill, and total disposal cost.
      d) Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
   4. Incinerator Disposal: Include the following information:
      a) Identification of material.
      b) Amount, in tons or cubic yards, of trash/waste material from the project delivered to incinerators.
      c) State the identity of incinerators, total amount of fees paid to incinerator, and total disposal cost.
      d) Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
   5. Recycled and Salvaged Materials: Include the following information for each:
      a) Identification of material, including those retrieved by installer for use on other projects.
      b) Amount, in tons or cubic yards, date removed from the project site, and receiving party.
      c) Transportation cost, amount paid or received for the material, and the net total cost or savings of salvage or recycling each material.
      d) Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.

e) Certification by receiving party that materials will not be disposed of in landfills or by incineration.

6. Material Reused on Project: Include the following information for each:
   a) Identification of material and how it was used in the project.
   b) Amount, in tons or cubic yards.
   c) Include weight tickets as evidence of quantity.
7. Other Disposal Methods: Include information similar to that described above, as appropriate to disposal method.

PART 3 EXECUTION

2.1 WASTE MANAGEMENT PROCEDURES

A. See Section 01 3000 for additional requirements for project meetings, reports, submittal procedures, and project documentation.

B. See Section 01 5000 for additional requirements related to trash/waste collection and removal facilities and services.

C. See Section 01 6000 for waste prevention requirements related to delivery, storage, and handling.

D. See Section 01 7000 for trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

2.2 WASTE MANAGEMENT PLAN IMPLEMENTATION

A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.

B. Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, Owner, and Architect.

C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.

D. Meetings: Discuss trash/waste management goals and issues at project meetings.
   1. Prebid meeting.
   2. Preconstruction meeting.
   3. Regular job-site meetings.

E. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
   1. Provide containers as required.
   2. Provide adequate space for pick-up and delivery and convenience to subcontractors.
   3. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.

F. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.

G. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.

H. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.

I. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

END OF SECTION 01 7419

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Construction Waste Management Form

Date	Ticket No.	Recycled Y or N	Name of Hauler	QTY	Type of Material	Container Size (yds)	Total Container Weight (Tons)	Masonry (Tons)	Wood (Tons)	Sheet Rock	Metal (Tons)	Paper	Old Cardboard	Aluminum	Concrete	Glass	Plastic	Tons Recycled	Tons Non-Recycled

SECTION 01 7800 - CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Project record documents.

B. Operation and maintenance data.

C. Warranties and bonds.

1.2 RELATED REQUIREMENTS

A. Section 01 3000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

B. Section 01 7000 - Execution and Closeout Requirements: Contract closeout procedures.

C. Section 01 9113 - General Commissioning Requirements: Verification and compilation of data into operation and maintenance manuals.

D. Individual Product Sections: Specific requirements for operation and maintenance data.

E. Individual Product Sections: Warranties required for specific products or Work.

1.3 SUBMITTALS

A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.

B. Electronic Manual Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

C. Operation and Maintenance Data:
1. Submit electronic copy of preliminary draft or proposed formats and outlines of contents before start of Work. Architect will review draft and return one copy with comments.
2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
3. Submit electronic copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of document set as required prior to final submission.
4. Submit electronic set of revised final documents in final form within 10 days after final inspection.

D. Warranties and Bonds:
1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.

3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 PROJECT RECORD DOCUMENTS

A. Maintain one set on site of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other modifications to the Contract.
   5. Reviewed shop drawings, product data, and samples.
   6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Do not use project record documents for construction purposes.

F. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
   1. Manufacturer's name and product model and number.
   2. Product substitutions or alternates utilized.
   3. Changes made by Addenda and modifications.

G. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
   1. Measured depths of foundations in relation to finish first floor datum.
   2. Revisions to routing of piping and conduits.
   3. Revisions to electrical circuitry.
   4. Actual equipment locations.
   5. Duct size and routing.
   6. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   7. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
   8. Field changes to dimension and detail.
   9. Details not on original Contract drawings.
   10. Field records for variable and concealed conditions.
   11. Information on the Work that is shown only schematically.
   12. Changes made by Change Order or Construction Change Directive.

13. Changes made following Architect's written orders.

H. Miscellaneous Record Documents: Assemble miscellaneous record documents required by other specification sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind and file miscellaneous record documents and identify each, ready for continued use and reference.
   1. Include miscellaneous record documents directory organized by specification section number and title, electronically linked to each item of miscellaneous record documents.

3.2 OPERATION AND MAINTENANCE DATA

A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.3 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

A. For Each Product, Applied Material, and Finish:
   1. Product data, with catalog number, size, composition, and color and texture designations.
   2. Include lists of materials and local sources of materials and related services for repairs.

B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

C. Moisture protection and weather-exposed products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.

D. Additional information as specified in individual product specification sections.

E. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

3.4 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

A. For Each Item of Equipment and Each System:
   1. Description of unit or system, and component parts.
   2. Identify function, normal operating characteristics, and limiting conditions.
   3. Include performance curves, with engineering data and tests.
   4. Complete nomenclature and model number of replaceable parts.

B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

C. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

D. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

E. Provide servicing and lubrication schedule, and list of lubricants required.

F. Include manufacturer's printed operation and maintenance instructions.

G. Include sequence of operation by controls manufacturer.

H. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

I. Provide control diagrams by controls manufacturer as installed.

J. Provide Contractor's coordination drawings, with color coded piping diagrams as installed.

K. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

L. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

M. Include test and balancing reports.

N. Additional Requirements: As specified in individual product specification sections.

3.5 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

A. Electronic Manuals: Assemble manuals in the form of a multiple file composite electronic PDF file for each manual type required.
   1. Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
   2. Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a easily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

B. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.

C. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.

D. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.

E. Arrangement of Contents: Organize each volume in parts as follows:
   1. Project Directory.
   2. Table of Contents, of all volumes, and of this volume.
   3. Operation and Maintenance Data: Arranged by system, then by product category.
      a) Source data.
      b) Product data, shop drawings, and other submittals.
      c) Operation and maintenance data.
      d) Field quality control data.
      e) Photocopies of warranties and bonds.
   4. Design Data: To allow for addition of design data furnished by Architect or others, provide a tab titled "Design Data".

3.6 WARRANTIES AND BONDS

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.

E. List circumstances and conditions that would affect validity of warranties or bonds. Include procedures to follow and required notifications for warranty claims.

F. Electronic Manual: Assemble manual in the form of a multiple file composite electronic PDF file for each manual required.
   1. Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
   2. Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a easily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

G. Cover: Identify each manual with printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.

H. Table of Contents: Use the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.

I. Separate each warranty or bond with sheet keyed to the Table of Contents listing. Provide full information, using separate as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

END OF SECTION 01 7800

FOR REFERENCE: THIS SECTION WAS ISSUED FOR PHASE 1 AND PHASE 2

SECTION 01 7900 - DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.1 SUMMARY

A. Demonstration of products and systems to be commissioned and where indicated in specific specification sections.

B. Training of Owner personnel in operation and maintenance is required for:
1. HVAC systems and equipment.
2. Electrical systems and equipment.
3. Conveying systems.
4. Items specified in individual product Sections.

C. Training of Owner personnel in care, cleaning, maintenance, and repair is required for:
1. Roofing, waterproofing, and other weather-exposed or moisture protection products.
2. Finishes, including flooring, wall finishes, ceiling finishes.
3. Fixtures and fittings.
4. Items specified in individual product Sections.

1.2 RELATED REQUIREMENTS

A. Section 01 7800 - Closeout Submittals: Operation and maintenance manuals.

B. Section 01 9113 - General Commissioning Requirements: Additional requirements applicable to demonstration and training.

C. Other Specification Sections: Additional requirements for demonstration and training.

1.3 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures; except:
1. Make all submittals specified in this section, and elsewhere where indicated for commissioning purposes, directly to the Commissioning Authority.
2. Submit one copy to the Commissioning Authority, not to be returned.
3. Make commissioning submittals on time schedule specified by Commissioning Authority.
4. Submittals indicated as "Draft" are intended for the use of the Commissioning Authority in preparation of overall Training Plan; submit in editable electronic format, Microsoft Word 2003 preferred.

B. Draft Training Plans: Owner will designate personnel to be trained; tailor training to needs and skill-level of attendees.
1. Submit to Commissioning Authority for review and inclusion in overall training plan.
2. Submit not less than four weeks prior to start of training.
3. Revise and resubmit until acceptable.
4. Provide an overall schedule showing all training sessions.
5. Include at least the following for each training session:
a) Identification, date, time, and duration.
b) Description of products and/or systems to be covered.

c) Name of firm and person conducting training; include qualifications.
d) Intended audience, such as job description.
e) Objectives of training and suggested methods of ensuring adequate training.
f) Methods to be used, such as classroom lecture, live demonstrations, hands-on, etc.
g) Media to be used, such a slides, hand-outs, etc.
h) Training equipment required, such as projector, projection screen, etc., to be provided by Contractor.

C. Training Manuals: Provide training manual for each attendee; allow for minimum of two attendees per training session.
1. Include applicable portion of O&M manuals.
2. Include copies of all hand-outs, slides, overheads, video presentations, etc., that are not included in O&M manuals.
3. Provide one extra copy of each training manual to be included with operation and maintenance data.

D. Video Recordings: Submit digital video recording of each demonstration and training session for Owner's subsequent use.
1. Format: DVD Disc.
2. Label each disc and container with session identification and date.

1.4 QUALITY ASSURANCE

A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.
1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.
2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

1.5 COORDINATION

A. Coordinate instruction schedule with Owner. Adjust schedule as required to minimize disruption to Owner's operations and and to ensure availability of Owner's personnel.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 DEMONSTRATION - GENERAL

A. Demonstrations conducted during system start-up do not qualify as demonstrations for the purposes of this section, unless approved in advance by Owner.

B. Demonstrations conducted during Functional Testing need not be repeated unless Owner personnel training is specified.

C. Demonstration may be combined with Owner personnel training if applicable.

D. Operating Equipment and Systems: Demonstrate operation in all modes, including start-up, shut-down, seasonal changeover, emergency conditions, and troubleshooting, and maintenance procedures, including scheduled and preventive maintenance.
   1. Perform demonstrations not less than two weeks prior to Substantial Completion.
   2. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

E. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.
   1. Perform demonstrations not less than two weeks prior to Substantial Completion.

3.2 TRAINING - GENERAL

A. Commissioning Authority will prepare the Training Plan based on draft plans submitted.

B. Conduct training on-site unless otherwise indicated.

C. Owner will provide classroom and seating at no cost to Contractor.

D. Do not start training until Functional Testing is complete, unless otherwise specified or approved by the Commissioning Authority.

E. Provide training in minimum two hour segments.

F. The Commissioning Authority is responsible for determining that the training was satisfactorily completed and will provide approval forms.

G. Training schedule will be subject to availability of Owner's personnel to be trained; re-schedule training sessions as required by Owner; once schedule has been approved by Owner failure to conduct sessions according to schedule will be cause for Owner to charge Contractor for personnel "show-up" time.

H. Review of Facility Policy on Operation and Maintenance Data: During training discuss:
   1. The location of the O&M manuals and procedures for use and preservation; backup copies.
   2. Typical contents and organization of all manuals, including explanatory information, system narratives, and product specific information.
   3. Typical uses of the O&M manuals.

I. Product- and System-Specific Training:
   1. Review the applicable O&M manuals.
   2. For systems, provide an overview of system operation, design parameters and constraints, and operational strategies.
   3. Review instructions for proper operation in all modes, including start-up, shut-down, seasonal changeover and emergency procedures, and for maintenance, including preventative maintenance.
   4. Provide hands-on training on all operational modes possible and preventive maintenance.
   5. Emphasize safe and proper operating requirements; discuss relevant health and safety issues and emergency procedures.
   6. Discuss common troubleshooting problems and solutions.

7. Discuss any peculiarities of equipment installation or operation.
8. Discuss warranties and guarantees, including procedures necessary to avoid voiding coverage.
9. Review recommended tools and spare parts inventory suggestions of manufacturers.
10. Review spare parts and tools required to be furnished by Contractor.
11. Review spare parts suppliers and sources and procurement procedures.

J. Be prepared to answer questions raised by training attendees; if unable to answer during training session, provide written response within three days.

3.3 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

B. Digital Video Recordings: Provide high-resolution, digital video in MPEG format, produced by a digital camera with minimum sensor resolution of 12 megapixels and capable of recording in full HD mode with vibration reduction technology.

END OF SECTION 01 7900

FOR REFERENCE: THIS SECTION WAS ISSUED FOR PHASE 1 AND PHASE 2

SECTION 019113 - GENERAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Commissioning is a quality-oriented process for achieving, verifying, and documenting that the performance of facilities, systems, and assemblies meet defined objectives and criteria. The Commissioning process begins at project inception (during the pre-design phase) and continues through the life of the facility. The commissioning process includes specific tasks to be conducted during each phase in order to verify that design, construction, and training meet the Owner's Project Requirements.

B. The Goals of the Commissioning Process are to:

1. Verify that applicable equipment and systems are installed according to the contract documents, manufacturer's recommendations, and industry accepted minimum standards, and that they receive adequate operational checkout by installing contractors.
2. Verify and document proper performance of equipment and systems.
3. Verify that O&M documentation has been provided to the client.
4. Verify that the owner's operating personnel are adequately trained.

C. The commissioning process does not take away from or reduce the responsibility of the system designers or installing contractors to provide a finished and fully functioning product.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions, Division 1, and other trade specific specification sections shall apply to this section.

B. Owner's Project Requirements and Basis of Design documents are included by reference for information only.

C. ASHRAE Guideline 0-2005, The Commissioning Process

1.3 SUMMARY

A. This section includes general requirements that apply to the implementation of the commissioning process without regard to specific systems, assemblies, and components.

B. Related sections include the following:

1. Section 013300 Submittal Procedures
2. Section 017823 Operation and Maintenance Data
3. Section 017900 Demonstration and Training
4. Division 21 Fire Suppression

5. Division 22 Plumbing
6. Division 23 Heating Ventilating and Air Conditioning (Mechanical)
7. Division 25 Integrated Automation
8. Division 26 Electrical
9. Division 27 Communications
10. Division 28 Electronic Safety and Security

1.4 DEFINITIONS

A. Acceptance - A formal action, taken by a person with appropriate provider (which may or may not be contractually defined) to declare that some aspect of the project meets defined requirements, thus permitting subsequent activities to proceed.

B. Approval - Acceptance that a piece of equipment or system has been properly installed and is functioning in the tested modes according to the contract documents.

C. Basis of Design - A document that records the concepts, calculations, decisions, and product selections used to meet the Owner's Project Requirements and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.

D. Checklists, Construction Checklists, Installation Checklists, or Pre-Functional Checklists - Checklists that are developed by the CxA and completed by the Construction Team during all phases of the construction process to verify that materials, equipment, assemblies, and systems are installed in accordance with the Contract Documents.

E. Commissioning Authority or Agent (CxA) - The entity identified by the owner who leads, plans, schedules, and coordinates the commissioning team to implement the commissioning process.

F. Commissioning Plan (CxP) - A document developed by the CxA that outlines the organization, schedule, roles and responsibilities, and documentation requirements of the Commissioning Process. The CxP is initially developed in the design phase.

G. Commissioning Process - A quality-focused process for enhancing the delivery of a project. The process focuses upon verifying and documenting that the facility and all of its systems and assemblies are planned, designed, installed, tested, operated, and maintained to meet the Owner's Project Requirements.

H. Commissioning Team - The individuals who through coordinated actions are responsible for implementing the commissioning process.

I. Data logging -The monitoring and recording of flows, currents, status, pressures, etc., of equipment using stand-alone data recorders separate from the control system or the trending capabilities of control systems.

J. Deferred Performance Tests (DPTs) - Performance tests that are performed, at the discretion of the CxA, after substantial completion, due to partial occupancy, equipment, seasonal requirements, design, or other site conditions that disallow the test from being performed.

K. Deficiency, Non-Compliance, Non-Conformance - A condition in the installation or function of a component, piece of equipment, or system that is not in compliance with the contract documents.

L. Factory Testing - Testing of equipment on-site or at the factory, by factory personnel, with or without an owner's representative present.

M. Issues Log - A formal and ongoing record of problems or concerns – and their resolution – that have been raised by members of the commissioning team during the course of the commissioning process.

N. Owner's Project Requirements - A written document that details the functional requirements of a project and the expectations of how it will be used and operated. These include project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information. This is also referred to as the Project Intent or Design Intent.

O. Pre-Functional Testing – testing performed by the contractors to verify complete system operation and system readiness.

P. Quality Based Sampling - A process for evaluating a sub-set (sample) of the total population. The sample is based upon a known or estimated probability distribution of expected values; an assumed statistical distribution based upon data from a similar product, assembly, or system; or a random sampling that has scientific statistical basis.

Q. Seasonal Performance Tests - Performance tests that are deferred until the system(s) will experience conditions closer to their design conditions based on weather conditions.

R. Startup - The initial starting or activating of dynamic equipment, including completing construction checklists.

S. Systems Manual - A system-focused composite document that includes the operation manual, maintenance manual, and additional information of use to the owner during the occupancy and operations phase.

T. Functional Performance Test (FPT) - A protocol written by the CxA that defines methods, personnel, and expectations for tests conducted on components, equipment, assemblies, systems, and interfaces among systems. Performance testing includes the dynamic functions and operations of equipment and systems using manual or monitoring methods under various levels of operation. Systems are tested under various modes, such as during low cooling loads, high loads, component failures, unoccupied, varying outside air temperatures, fire alarm, power failure, etc. The systems are run through all the control system's sequences of operation and components are verified to respond as the sequences state.

U. Training Plan or Instruction Program - A written document that details the expectations, schedule, and deliverables related to the training of project operating and maintenance personnel, users, and occupants.

V. Verification - The process by which specific documents, components, equipment, assemblies, systems, and interfaces among systems are confirmed to comply with the criteria

described in the Owner's Project Requirements.

W. Trending – The monitoring, by a building management system or other electronic data gathering equipment, and analyzing of the data gathered over a period of time.

1.5 COORDINATION

A. Coordination of the Cx process is the responsibility of all Cx Team members.

B. The CxA coordinates the commissioning activities through the construction manager or general contractor. All members shall work together to fulfill their contracted responsibilities and meet the objectives of the contract documents.

C. The CxA, through the Owner or CM, will provide sufficient notice to the contractor for scheduling commissioning activities with respect to the Owner's participation. The CM will integrate all commissioning activities into the overall project schedule. All parties will address scheduling problems and make necessary notifications in a timely manner in order to expedite the commissioning process.

1.6 REMOBILIZATION AND RETESTING FEES

A. In general, CxA testing will include one test of each system or equipment. The cost of any additional testing will be submitted to the Owner for review and direction. Following Owner review, the cost for additional testing to verify that performance is in accordance with the design intent may be deducted from the Contractor's final payment by the Owner.

B. In the event that a CxA site visit is scheduled in advance with the Contractor and testing is unable to be performed through no fault of the Owner and the CxA is not notified within 48 hours, the cost of the travel and time will be deducted from the contractor's final payment by the Owner.

1.7 COMMISSIONING PLAN

A. Commissioning during construction begins with an initial commissioning meeting conducted by the CxA where the commissioning process is reviewed with the project commissioning team members. This meeting shall be scheduled by the CM. Generally, the initial Cx Meeting will be scheduled within 60 days of the award of contracts related to commissioned systems and equipment.

B. Additional meetings will be required throughout construction, scheduled by the CxA, through the owner or CM, with necessary parties attending to plan, scope, coordinate, schedule future activities, and resolve problems. In general these meetings will be monthly with the frequency increasing towards substantial completion to accommodate start-ups, balancing, scheduling testing, and training.

C. The CxA reviews submittals for commissioned equipment and systems parallel with the Design Team for compliance with the OPR.

D. The construction checklists, developed by the CxA, are to be completed by the contractor (or its subcontractors), before and during the startup process and verified by the CxA.

E. The CxA may witness selected assembly mock-ups, equipment, and system start-ups.

F. The CxA develops equipment and system functional performance test (FPT) procedures. The FPT's are executed by the contractor and witnessed and documented by the CxA.

G. The CxA reviews the O&M documentation for completeness.

H. The CxA reviews the training plan provided by the contractor.

I. Deferred performance testing will be conducted as required.

1.8 COMMISSIONING TEAM

A. Members appointed by Contractor(s): Individuals, each having authority to act on behalf of the entity he or she represents, explicitly organized to implement the commissioning process through coordinated actions. The commissioning team shall consist of, but not be limited to, representatives of each contractor, including project superintendent and subcontractors, installers, suppliers, and specialists deemed appropriate by the CxA.

B. Members appointed by Owner:

1. CxA - An entity identified by the owner who leads, plans, schedules, and coordinates the commissioning team to implement the commissioning process. Owner will engage the CxA under a separate contract.
2. Representatives of the facility Users and Operation and Maintenance personnel.
3. Architect and engineering design professionals.

1.9 RESPONSIBILITIES

Understanding and defining the roles of each participant are vital to the success of the Commissioning Process. This provides an outline of the responsibilities of each participant in the Commissioning Process. These responsibilities are typically formalized in the contracts between the Owner and the various parties and this section is not intended to supersede or negate any contracted relationships.

A. Owner (or Designated Representative)

1. Include the design professionals' Commissioning related responsibilities and scope of work in the design request for proposal and contract.
2. Oversee the development of the Owner's Project Requirements and approve any changes.
3. Designate a representative, ideally from the building's operations and maintenance team, to participate in the Commissioning Process including:

a. Design Phase coordination meetings
b. Construction Phase coordination meetings

c. Informal owner-training as equipment is installed and started
d. Maintenance orientation and inspections
e. System testing and verification meetings
f. Functional procedure review meetings before testing of systems
g. Training sessions
h. Verification demonstrations
i. Systems and assemblies tests
j. Final review at acceptance meeting

4. Review and approve any changes made to the Owner's Project Requirements.
5. Review, comment on, and accept the Commissioning Authority's progress and final reports.

B. Commissioning Authority (CxA)

C. The Commissioning Authority is responsible to verify that the Owner's Project Requirements for the project are satisfactorily achieved. The CxA leads, plans, schedules, and coordinates the commissioning team to implement the commissioning process. Specific tasks performed by the CxA include:

Design Phase

1. Develop and update the design phase commissioning plan.
2. Perform focused review of the design, drawings and specifications at various stages of development as required.
3. Review documents and responses from A/E to ensure that all previous comments have been addressed by the appropriate party.
4. Develop full commissioning specifications for all commissioned equipment. The specifications will be consistent in content, rigor and format to the referenced standards.

a. A detailed description of the responsibilities of all parties.
b. Details of the commissioning process.
c. Reporting and documentation requirements, including formats; alerts to coordination issues, deficiency resolution; construction checklist and start up requirement.
d. The functional testing processes.
e. Specific functional test requirements, including testing conditions and acceptance criteria for each piece of equipment being commissioned.
f. Review the Owner's Project Requirements and Basis of Design.
g. Develop a Design Phase Commissioning Plan.

Bid Phase

1. Answer commissioning related questions throughout the bid process.

Construction Phase

1. Perform the tasks and functions to be incorporated in the specifications ascribed to the CxA.
2. Coordinate and direct the commissioning activities in a logical, sequential and efficient manner using consistent protocols and forms, centralized documentation, clear and regular communications and consultations with all necessary parties.
3. Coordinate the commissioning work, with the Construction Manager, Contractor, Architect and Owner's representatives to ensure that commissioning activities are being scheduled into the master schedule.
4. Plan and conduct commissioning meetings and distribute minutes.
5. Coordinate control integration meetings where the owner, design team, mechanical engineers, building management system programmer, equipment factory representative and CxA discuss integration requirements between equipment, systems and disciplines to ensure the equipment and systems operate to meet the design intent.
6. Request and review information required to perform commissioning tasks, including O&M materials, contractor start-up and checkout procedures.
7. Review coordination drawings to ensure that trades are making a reasonable effort to coordinate work. Coordinate submittal review with the architect so that the CxA/A/E comments are combined into one review submitted to the contractor.
8. Write and distribute construction checklists for commissioned equipment.
9. Perform site visits to observe component and system installations. Attend selected planning and job-site meetings to obtain information on construction progress. Review construction meeting minutes for revisions/substitutions relating to the commissioning process. Assist in resolving any discrepancies.
10. Provide construction checklists for equipment/systems within the scope of work to the contractors.
11. Document construction checklist completion by reviewing completed checklists and by site observation.
12. Verify air and water systems balancing by reviewing completed TAB report.
13. With assistance and review from the installing contractor, CxA will write functional performance test procedures for equipment and systems.
14. Analyze functional performance trend logs and monitoring data to verify performance.
15. Coordinate, witness and document manual functional performance tests performed by installing contractors.
16. Maintain a master issues log and report all issues as they occur directly to the Owner's representative and the architect.
17. Verify the training of the Owner's operating personnel.
18. Review the preparation of the O&M manuals for commissioned equipment. Coordinate submittal review with the architect so that the CxA/A/E comments are combined into one review submitted to the contractor.
19. Compile a final commissioning Report, which shall include:

    a. An executive summary that includes a summary of findings and system descriptions.
    b. All outstanding non-compliance items shall be specifically listed. Each non-compliance issue shall be referenced to the specific functional test, inspection, trend log, etc. where the deficiency is documented.

c. Also included in the Commissioning Record shall be the issues log, commissioning plan, progress reports, submittal and O&M manual reviews, training record, construction checklists, start-up reports, and functional tests.

20. Comply with the requirements of any applicable green-building rating systems (i.e. LEED, High Performance Buildings, Green Guide for Healthcare, etc.).

Warranty Period

1. Coordinate and supervise required opposite season or deferred testing as needed.
2. Return to the site approximately10 months into the warranty period and review with facility staff the current building operation and the condition of outstanding issues related to the original and seasonal commissioning. Also interview facility staff and identify problems or concerns they have with operating the building as originally intended.
3. Identify areas that may come under warranty or under the original construction contract. The CxA is not responsible for verifying that the deficiencies have been corrected.

D. Design Team

The primary role of the Design Team is to translate the Owner's Project Requirements into a complete design. Relative to commissioning, the design team's responsibilities vary depending on the specific project and contract, but may include:

1. Participate in the development and documentation of the initial Owner's Project Requirements.
2. Document revisions to the Owner's Project Requirements as approved by the Owner.
3. Document the Basis of Design.
4. Integrate the Commissioning Process requirements provided by CxA in the Contract Documents.
5. Respond to Commissioning Team design review comments.
6. Adequately detail the Operations and Maintenance of the systems and assemblies in Contract Documents.
7. Review and incorporate the CxA's comments from submittal reviews.
8. Participate in the initial Operation and Maintenance personnel training sessions. Include a presentation of the project's Basis of Design and descriptions of the associated systems.
9. Review functional test procedures.
10. Review the CxA's reports and logs and comment as appropriate.
11. Review and comment on the final Cx Report.

E. Construction Manager

The Construction Manager provides management, technical, and administrative expertise during the Construction phase to ensure the building Owner's goals relating to schedule and quality are met. The Construction Manager's responsibilities related to the Commissioning Process typically include:

1. Include any costs for Commissioning Process activities in the contract price.
2. Include Commissioning Process requirements and activities in all contractors' contracts.
3. Include Cx-related milestones in the construction schedule.
4. Ensure necessary accessibility to all equipment to allow for proper operation and maintenance of the building.
5. Provide individuals with the required background and authority to implement the Commissioning Process activities as outlined in the Contract Documents.
6. Issue a statement at the end of the project certifying that all work has been completed in accordance with the Contract Documents and the facility is operational.
7. Respond to Commissioning Process reports and correct deficiencies identified during installation verification or functional testing.
8. Review and comment on the final Cx Report.

F. Contractors

Many different contractors will be involved in the Commissioning Process. The various contractors may include the building contractors (general, mechanical and electrical), the

testing, adjusting, and balancing contractor, the building automation system contractor and others as required by the contract documents. As a member of the Commissioning Team, the responsibilities of the various building contractors include:

1. Include any costs for Commissioning Process activities in the contract price.
2. Include Commissioning Process requirements and activities in all subcontracts or equipment purchases.
3. Ensure the cooperation and participation of all subcontractors and manufacturers of equipment or systems to be commissioned.
4. Attend Commissioning Team meetings.
5. Include Cx-related milestones in the construction schedule.
6. Implement the training program as described in the Contract Documents. Coordinate related activities with the CxA.
7. Provide submittals to the Owner, Design Team, and CxA as detailed in the Contract Documents.
8. Respond to and resolve issues identified in the Cx Issues Log.
9. Notify the CxA when systems and assemblies are ready for installation verification and testing. For repetitive assemblies, notify the CxA upon the completion of the prototype for a First Piece or Mock-Up review.
10. Complete system and equipment checklists developed by the CxA. Complete the Checklists as the work is completed. Provide completed copies to the CxA at regular intervals for verification.
11. Complete Pre-Functional test procedures. Functional testing will not take place until all Pre-Functional Tests have been fully executed.
12. Functional testing. Once pre-functional tests are complete, functional test verification will be scheduled and demonstrated in the presence of the CxA.
13. Maintain the Project Record Documents in accordance with the requirements of the Contract Documents.

G. Manufacturers

The suppliers of major equipment are required to support the Commissioning Team in the following manner:

1. Provide all information required for the proper Start-up and Operation and Maintenance of the system or assembly in the initial submittal, as detailed in the Contract Documents.
2. Provide the requirements to maintain the warranty in the initial submittal, as detailed in the Contract Documents.
3. Coordinate and provide results of all factory tests required in the Contract Documents.
4. Participate in the training process as detailed in the Contract Documents.
5. Demonstrate operation and performance of equipment and assemblies as detailed in the Contract Documents.

H. Operations and Maintenance Staff

The Operations and Maintenance staff will participate in the Commissioning Process in the following areas:

1. Define Operations and Maintenance related requirements of the building.
2. Participate in design review for O&M impacts.
3. Review maintenance manual, record drawing and documentation requirements developed by the Design Team.
4. Define training program requirements.
5. Participate/witness functional performance testing.
6. Attend contractor and vendor training sessions.

1.10 EQUIPMENT/SYSTEMS TO BE COMMISSIONED

A. The following equipment/systems will be commissioned in this project:

HVAC/Mechanical:
Air Handling Units
Humidifiers
Fans
Demand Control Ventilators
Variable Air Volume Terminal Units
Lab Terminal Units
Chiller
Cooling Tower
Boiler
Pumps
Heat Exchangers
Pressure Reducing Valves
Energy Recover Ventilators
Refrigeration Systems
Ductless Split Air Conditioning Systems
Unit Heaters & Cabinet Unit Heaters
Building Management System

Electrical:
Emergency Generator
Automatic Transfer Switch
Lighting & Daylighting Controls
Renewable Energy Systems
Switchgear
Main Switchboards
Uninterrupted Power Supply
Telecommunications System
Security System

Fire Protection:
Fire Alarm System
Fire Suppression

Plumbing:
Domestic Hot Water System

Piping
Sanitary Waste Piping
Storm Drainage
Plumbing Fixtures

Envelope:
Roof
Walls
Windows
Doors

PART 2 - **PRODUCTS**

2.1 TEST EQUIPMENT

A. All standard testing equipment required to perform startup and initial checkout and required performance testing shall be provided by the contractor for the equipment being tested. This includes, but is not limited to, two-way radios, meters, and data recorders. Data recorders may be provided by the CxA at the option of the CxA.

B. Special equipment, tools, and instruments required for testing equipment according to these contract documents shall be included in the contractor's base bid price and shall be turned over to the owner at Project close-out.

C. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance within the tolerances specified in the specifications. If not otherwise noted, the following minimum requirements apply: Temperature sensors and digital thermometers shall have a certified calibration to NIST traceable standards within the past year to an accuracy of 0.5 degree F and a resolution of + or - 0.1 degree F. Pressure sensors shall have an accuracy of + or - 2.0% of the value range being measured (not full range of meter) and have been calibrated within the last year. All equipment shall be calibrated according to the manufacturer's recommended intervals and when dropped or damaged. Calibration tags shall be affixed or certificates readily available.

PART 3 - **EXECUTION**

3.1 OVERVIEW

Through the Construction Phase of the project, it is the responsibility of the CxA to coordinate and direct the Commissioning Process activities in a logical, sequential, and efficient manner using protocols and forms, centralized documentation, clear and regular communications and consultations with all necessary parties.

3.2 CONDUCT PRE-CONSTRUCTION MEETING

The Pre-Construction Meeting is an opportunity for the CxA to meet with the Construction Team and discuss the general Commissioning Process. It is the ideal time to identify Commissioning Team members, discuss the integration of the Commissioning Process Schedule with the

Construction Schedule, review the submittal review requirements, review the inspection and testing process, and develop the formal lines of communication between all parties.

3.3 CONDUCT REGULAR COMMISSIONING MEETINGS

Once the Commissioning Team (Cx Team) has been formed, regular Commissioning Meetings are held. These meetings vary in frequency based upon the activity level at the time, but will generally be held monthly and will be coordinated to coincide with Construction Meeting days for convenience. At the Commissioning Meetings, past Commissioning Process activities are reviewed, future Commissioning Process activities are planned and coordinated, Commissioning documentation is requested and exchanged, and the Commissioning Schedule is updated and integrated into the Construction Schedule. The CxA will request all documentation necessary to develop the installation checklists, requirements for equipment start-ups, pre-functional and functional performance tests at these meetings and review the draft versions of these documents with the contractors that are responsible for implementing them. The CxA leads these meetings, records the minutes, and distributes the minutes with action items to all Cx Team members.

3.4 CONTRACTOR SUBMITTAL REVIEW

The CxA will review the Contractor submittals coincident with the Design Team and provide comments to the Design Team for inclusion with their review so a single set of review comments can be provided to the Contractors. The reviewed submittals will include commissioned equipment and coordination drawings that include commissioned equipment and systems, control drawings and sequences, and interfaces and interlocks between systems. In addition, the CxA will periodically review the final Design Team comments to ensure a quality review process.

The review will focus on operations, maintenance, and commissioning related issues with the goal of ensuring the submitted equipment complies with the Owner's Project Requirements. The CxA review will NOT include a detailed review of system capacities, sizes, and other technical data that are the responsibility of the Engineer of Record. CxA submittal reviews will frequently request additional information from the Contractors, including specific operations and maintenance data, performance curves, and targeted coordination drawings for areas of concern.

3.5 MAINTAIN ISSUES LOGS

Throughout the Construction Process, the CxA will maintain a Commissioning Issues Log. This log will document all Construction Phase issues that identifies the following fields.

A. The responsible party, either Construction Team member, Design Team member, or Owner

B. The exact location of the issue (floor and room)

C. The applicable system component, i.e. lighting, ductwork, pump, etc.

D. The project impact

E. Priority

F. A reference to the Contract Documents (if applicable)

G. A detailed description of the issue

H. A status, i.e. complete, incomplete, accepted, unverifiable

The issues log will be available online and reviewed at each Commissioning Meeting and each issue will be tracked by the CxA.

3.6 CONSTRUCTION CHECKLISTS

The Contractors will be responsible for completing documentation related to the installation, start-up, and testing of all commissioned equipment and systems.

The CxA will develop the installation checklists and will be available online to the Construction Team. The Construction Team will be responsible for completing the installation checklists for 100% of the commissioned systems and equipment. The checklists will include best practices related to the specific equipment or system, highlights of required installation details from the drawings and specifications, and equipment manufacturer, model number, serial number, and capacity verification information.

These checklists will be reviewed at every commissioning meeting with the expectation that checklists will be completed as the work progresses.

The CxA will use sampling strategies to field verify the proper completion of the checklists with sampling rates determined based upon the success of the verification process, the quantity of each type of equipment, and the relative importance of the equipment's operation related to the overall building operation.

The Functional Testing of the equipment and systems will not be scheduled until all relevant Installation Checklists are submitted to the Commissioning Agent.

3.7 PRE-FUNCTIONAL CHECKLISTS

In order to verify that the systems and equipment are ready for final Functional Testing witnessed by the CxA, the Contractor will perform Pre-Functional Testing independent of the CxA. Pre-Functional Testing shall consist of performing the complete Functional Testing (described below) with tests provided by the CxA. Through this process, the Contractor will validate the test procedure and provide a marked-up version of the test complete with results. Once a completed test is provided indicating successful operation of the system, the CxA will schedule the Functional Testing as described below.

3.8 SITE OBSERVATIONS

Periodically throughout the Construction process, the CxA will perform site visits to observe component and systems installations. These visits will be planned to coincide with selected planning and job-site meetings, installation milestones, component and assembly mock-ups, and equipment and system start-ups. A field report will be provided at the conclusion of each visit documenting the tasks accomplished during the visit.

3.9 FUNCTIONAL TESTING

The performance of the testing of all commissioned equipment and systems is the responsibility of the Contractors. The CxA will develop the functional performance tests with the assistance of the installing contractors, and upon the successful completion of Pre-Functional Testing as described above, will coordinate the testing process, and witness the tests that are performed by the Contractors. The CxA will coordinate the retesting of equipment to verify satisfactory performance is achieved.

The functional performance testing will include operating the systems and components through each of the written sequences of operation, other significant modes and miscellaneous alarms, power failure, and security alarm when impacted by and interlocked with commissioned equipment. Sensors and actuators shall be calibrated during construction check listing by the installing contractors and spot checked by the CxA during functional testing. Tests on HVAC equipment shall be done, if possible, in their proper operating season (cooling in summer, heating in winter). Any equipment that operates in both seasons, such as the heat pumps, should ideally be tested in both seasons. However, if this is not possible, some manipulation of setpoints and control points will be done to simulate the necessary conditions. Functional testing will be done using conventional manual methods and control system trend logs as required to provide a high level of confidence in proper system function, as deemed appropriate by the CxA and the Owner. A report will be provided that includes all of the issues identified during the testing process.

As a component of the test procedures, the CxA will identify specific system trends to be set up and then analyze the trend and monitoring data as a method of verifying performance.

3.10 TRAINING AND O&M REVIEW

Planning for the training of the Owner's operations and maintenance staff begins in the design phase with the development of training requirements.

The Owner's operations and maintenance staff will commence training sessions during the construction phase through a combination of formal and informal training activities. Although the informal training sessions, such a project walkthroughs or submittal reviews, will take place throughout the construction process, the formal training program should not be initiated until the successful completion of functional testing to ensure that the operations and maintenance personnel receive accurate training and are able to witness the systems operating properly during the training.

The CxA will verify the Contractor-provided training of the Owner's operating personnel. The training agendas, attendance logs, and materials will be reviewed by the CxA and any additional or supplemental training required for the Owner's operating personnel to properly and efficiently operate the building will be highlighted to the Owner by the CxA.

The CxA may attend select training sessions to participate, document, monitor, and provide quality control. If required, the sessions may be video recorded by the Contractors or Owner without CxA involvement or coordination of the recording.

The CxA will review the commissioned systems and equipment sections of the Operations and Maintenance (O&M) manuals prepared by the Contractors. Comments will be provided to the Design Team to allow one submittal review to be sent to the Contractor. The Contractor is to have the O&M manuals ready and available for use in the training process.

PART 4 - **OCCUPANCY AND OPERATIONS PHASE**

4.1 FINAL COMMISSIONING PROCESS REPORT

At the completion of the Commissioning Process, the CxA will provide a final report based on the framework of the Commissioning Plan. An Executive Summary will be included that provides a summary of the participants and their roles, a brief building description, an overview of the commissioning and testing scope, and a general description of testing and verification methods.

The final report will specifically identify all outstanding non-compliance issues, recommendations for improvement to equipment or operations, future actions required, and recommended changes to the Commissioning Process. In addition, the Report shall include a final issues log with all issues identified through the Commissioning Process, progress and field reports, submittal and O&M manual reviews, training record, test schedules, construction checklists, start-up reports, functional tests, and trend log analysis.

4.2 SEASONAL TESTING

Any equipment or system that cannot be adequately tested at the time of the initial testing due to seasonal operating issues will be retested in their primary operating season. Whenever possible, systems will be tested under load to verify system capacity and function.

4.3 WARRANTY REVIEW

The CxA will return to the site approximately10 months into the 12 month warranty period and review with facility staff the current building operation and condition of outstanding issues related to the original and seasonal commissioning. Any issues that may come under warranty or under the original construction contract will be identified. The CxA is not responsible for correcting or tracking deficiencies identified during the warranty review.

4.4 HIGH PERFORMANCE BUILDING RATING SYSTEMS (IF APPLICABLE)

In addition to the reports described above, all paperwork required to satisfy the High Performance Building Commissioning Requirements and/or of LEED EA Prerequisite 1, Fundamental Building Systems Commissioning and EA Credit 3, Enhanced Commissioning will be provided. This includes submittal paperwork and any work required for audits of these points.

END OF SECTION

Greenwich Public Schools
Central Middle School

Design Phase Commissioning Plan
March 2024

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Commissioning Plan Overview

1 COMMISSIONING PLAN OVERVIEW

1.1 General

The Commissioning Plan is a tool developed by the CxA to clearly define the processes and procedures required for a successful commissioning process. It is continually updated throughout the project and becomes the basis of the final commissioning report when complete.

1.2 Abbreviations and Definitions

The following are common abbreviations used in this document.

A/E	Architecture and Engineering Design Team	FPT	Functional Performance Test
CxA	Commissioning Authority	GC	General Contractor
CC	Controls Contractor	MC	Mechanical Contractor
CM	Construction Manager	PC	Plumbing Contractor
Cx	Commissioning	PM	Project Manager
Cx Plan	Commissioning Plan Document	Subs	Subcontractors to the CM
EC	Electrical Contractor	TAB	Test, Adjust, and Balance Contractor
FIF	Field Inspection Form	CIL	Commissioning Issues Log
OPR	Owner's Project Requirements	BOD	Basis of Design
ATC	Automatic Temperature Controls Contractor		

2 COMMISSIONING PROCESS DESCRIPTION

Commissioning is a systematic process designed to ensure that the building and its systems function properly to meet the Owner's requirements. This is typically achieved by applying quality control principles to all aspects of the project, from pre-design through the first year of occupancy and includes design reviews, inspections, equipment and systems testing, and training. The commissioning process is defined by several different organizations, the generally accepted best practice is ASHRAE Guideline 0-2005, *The Commissioning Process*. This guideline, available at www.ashrae.org, provides the foundation for building commissioning by defining the general process to be followed for the commissioning of all building systems.

The primary objectives of this Commissioning Process are:

1. Confirm and document that this facility fulfills the functional and performance requirements of the Owner, occupants, and operators.
2. Document the Owner's criteria for system function, performance, and maintainability; verify and document compliance with these criteria throughout design construction, start-up and the initial period of operation.
3. Ensure that complete operation and maintenance (O&M) manuals, as well as training on system operation, are provided to the building operators to allow the building to operate as intended.
4. Develop and coordinate the execution of a testing plan which will include observing and documenting performance of all commissioned systems to ensure they are functioning in accordance with the Owner's objectives and the contract documents.

3 BUILDING DESCRIPTION

Project Name	Central Middle School
Project Address	9 Indian Rock Ln, Greenwich, CT 06830
Building Type	Public School Grades 6, 7 & 8
Project Square Footage	~124,000 GSF
Owner	Town of Greenwich, CT

4 CONSTRUCTION PHASE

4.1 Overview

Through the Construction Phase of the project, it is the responsibility of the CxA to coordinate and direct the Commissioning Process activities in a logical, sequential, and efficient manner using protocols and forms, centralized documentation, clear and regular communications and consultations with all necessary parties.

4.3 Conduct Commissioning Meetings

Once the Commissioning Team (Cx Team) has been formed, Commissioning Meetings will be held as required. These meetings vary in frequency based upon the activity level at the time, but generally are coordinated to coincide with Construction Meeting days for convenience. At the Commissioning Meetings, past Commissioning Process activities are reviewed, future Commissioning Process activities are planned and coordinated, Commissioning documentation is requested and exchanged, and the Commissioning Schedule is updated and integrated into the Construction Schedule. The CxA will request all documentation necessary to develop the installation checklists, contractor start-up checklists, and the functional performance tests at these meetings and review the draft versions of these documents with the contractors that are responsible for implementing them. The CxA leads these meetings, records the minutes, and distributes the minutes with action items to all Cx Team members.

The CxA reserves the right to modify the schedule periodically as needed to accommodate the commissioning activities and the construction schedule.

4.4 Contractor Submittal Review

The CxA will review the Contractor submittals coincident with the Design Team and provide comments to the Design Team for inclusion with their review so a single set of review comments can be provided to the Contractors. The reviewed submittals will include commissioned equipment identified in Appendix A and coordination drawings that include commissioned equipment and systems, control drawings and sequences, and interfaces and interlocks between systems. In addition, the CxA will periodically review the final Design Team comments to ensure a quality review process.

The review will focus on operations, maintenance, and commissioning related issues with the goal of ensuring the submitted equipment complies with the Owner's Project Requirements. The CxA review will NOT include a detailed review of system capacities, sizes, and other technical data that are the responsibility of the Engineer of Record. CxA submittal reviews will frequently request additional information from the Contractors, including specific operations and maintenance data, performance curves, and targeted coordination drawings for areas of concern.

4.5 Maintain Issues Logs

Throughout the Construction Process, the CxA will maintain an on-line Commissioning Issues Log. Members of the Cx team will be assigned a username and password to access the on-line system. As issues are identified, the responsible party will be able to log into the system and update the project team on the status and/or resolution of their incomplete issues. Once an item has been identified by the team member as complete, it will change to a pending status to alert the CxA that an item is ready for field verification. Each issue will be tracked by the CxA.

This log will document all Construction Phase issues through a sortable database that identifies the following fields.

1. The responsible party, either Construction Team member, Design Team member, or Owner
2. The exact location of the issue (floor and room)

3. The applicable system component, i.e. lighting, a specific piece of equipment, or a system
4. A detailed description of the issue
5. A status, i.e. complete, incomplete, accepted, unverifiable

The issues log will be continually updated and also reviewed at each Commissioning Meeting.

4.6 Installation Checklists

The Contractors will be responsible for completing documentation related to the installation, start-up, and testing of all commissioned equipment and systems. This documentation will be available online.

The CxA will develop the installation checklists and provide them to the Construction Team. The Construction Team will be responsible for completing the installation checklists for 100% of the commissioned systems and equipment. The checklists will include best practices related to the specific equipment or system, highlights of required installation details from the drawings and specifications, and equipment manufacturer, model number, serial number, and capacity verification information.

These checklists will be reviewed at every commissioning meeting with the expectation that checklists will be completed as the work progresses.

The CxA will use sampling strategies to field verify the proper completion of the checklists with sampling rates determined based upon the success of the verification process, the quantity of each type of equipment, and the relative importance of the equipment's operation related to the overall building operation.

The Functional Testing of the equipment and systems will not be scheduled until all relevant Installation/Prefunctional Checklists are submitted to the Commissioning Agent.

4.7 Prefunctional Checklists and Tests

The Contractors will be responsible for completing documentation related to the installation, start-up, and testing of all commissioned equipment and systems.

The Functional Testing of the equipment and systems will not be scheduled until all relevant Prefunctional Tests are submitted to the Commissioning Agent.

4.8 Site Observations

During the Construction process, the CxA will perform site visits to observe component and systems installations. These visits will be strategically planned to coincide with selected planning and job-site meetings, installation milestones, component and assembly mock-ups, and equipment and system start-ups. The CxA will use these site visits to verify the proper completion of installation and start-up checklists through sampling, witness selected HVAC pipe and duct testing if required, review air and water systems balancing, and generally track the progress of the construction. A field report will be provided at the conclusion of each visit documenting the tasks accomplished during the visit.

4.9 Testing

The performance of all of the building's systems and equipment and the completion of the testing of the commissioned equipment and systems are the responsibility of the Contractors. The CxA will develop the functional performance tests with the assistance of the installing contractors, coordinate the testing process, and witness the tests that are performed by the Contractors. In addition, the CxA will document selected tests of commissioned equipment overseen by regulatory authorities if required. The CxA will coordinate one day of retesting of equipment until satisfactory performance is achieved. However, witnessing of follow up testing will be at the expense of the Contractor. Added expenses, including time, travel, and incidentals for retesting

of failed system tests, or for tests that cannot be performed due to contractors' lack of preparedness, attendance, or system completeness, will be charged to the Contractors through the Owner.

Prior to the CxA witnessing functional testing for any commissioned systems, the Contractor will perform and complete internal functional testing with the CxA-provided functional tests. A Statement of Readiness must be provided before scheduling the verification of the functional testing by the CxA. While the Statement of Readiness will vary for each system, at a minimum, the following documentation must be provided: Installation Checklists, Prefunctional Checklists, equipment start-up reports, approved air and water balancing reports, and completed Functional Tests. All controls, graphics, safeties, and alarms must be fully operational.

Functional performance testing will include operating the systems and components through each of the written sequences of operation, other significant modes and miscellaneous alarms, power failure, and security alarm when impacted by and interlocked with commissioned equipment. Sensors and actuators shall be calibrated during construction check listing by the installing contractors and spot checked by the CxA during functional testing. Tests on HVAC equipment shall be done, if possible, in their proper operating season (cooling in summer, heating in winter). Any equipment that operates in both seasons, such as the heat pumps, should ideally be tested in both seasons. However, if this is not possible, some manipulation of setpoints and control points will be done to simulate the necessary conditions. Functional testing will be done using conventional manual methods, control system trend logs, and stand-alone data loggers as required to provide a high level of confidence in proper system function, as deemed appropriate by the CxA and the Owner.

As a component of the test procedures, the CxA will identify specific system trends to be set up and then analyze the trend and monitoring data as a method of verifying performance.

Systems that fail a functional performance test will not be retested under the base commissioning contract, but rather this will be addressed as added scope. However, if an isolated portion of a sequence fails, this portion will be retested with a maximum for all failures combined of one day of retesting.

4.10 Training and O&M Review

Planning for the training of the Owner's operations and maintenance staff begins in the design phase with the development of a training matrix. The matrix, indicates the breadth and depth of training desired by the Owner. The information from this matrix is incorporated into the Construction Documents by the Design Team to ensure that the appropriate level of training is procured and provided.

The Owner's operations and maintenance staff will commence training sessions during the construction phase through a combination of formal and informal training activities. Although the informal training sessions, such as project walkthroughs or submittal reviews, will take place throughout the construction process, the formal training program should not be initiated until the successful completion of functional testing to ensure that the operations and maintenance personnel receive accurate training and are able to witness the systems operating properly during the training.

The CxA will oversee and verify the Contractor-provided training of the Owner's operating personnel. The training agendas, attendance logs, and materials will be documented by the CxA and any additional or supplemental training required for the Owner's operating personnel to properly and efficiently operate the building will be highlighted to the Owner by the CxA.

The CxA will verify operating personnel training. The sessions will be video recorded (if required) by the Contractors or Owner without CxA involvement or coordination of the recording.

The CxA will review and verify the commissioned systems and equipment sections of the Operations and Maintenance (O&M) manuals prepared by the Contractors. Comments will be provided to the Design Team to allow one submittal review to be sent to the Contractor. The Contractor is to have the O&M manuals ready and available for use in the training process.

5 OCCUPANCY AND OPERATIONS PHASE

5.1 Final Commissioning Process Report

At the completion of the Commissioning Process, the CxA will provide a final report based on the framework of this Commissioning Plan. An Executive Summary will be included that provides a summary of the participants and their roles, a brief building description, an overview of the commissioning and testing scope, and a general description of testing and verification methods. Included with the summary will be a matrix that provides the disposition of the CxA regarding the adequacy of the commissioned equipment and system in the following five areas: equipment meeting the equipment specifications, equipment installation, functional performance and efficiency, equipment documentation, and operator training.

The final report will specifically identify all outstanding non-compliance issues, recommendations for improvement to equipment or operations, future actions required, and recommended changes to the Commissioning Process. In addition, the Report shall include a final issues log with all issues identified through the Commissioning Process, field reports, submittal and O&M manual reviews, training record, construction checklists, and functional tests.

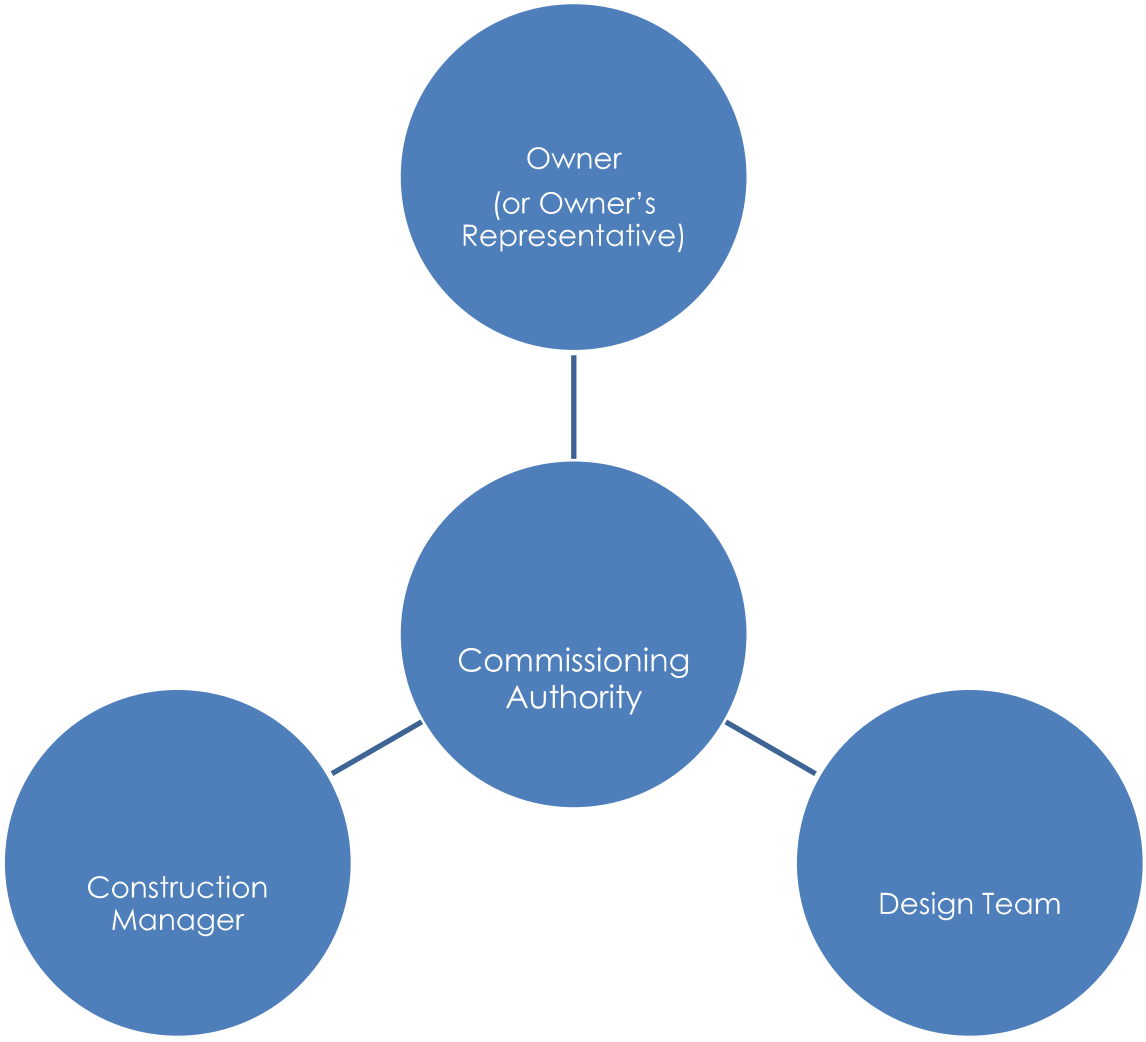
5.2 Seasonal Testing

Any equipment or system that cannot be adequately tested at the time of the initial testing due to seasonal operating issues will be retested in its primary operating season. Whenever possible, systems will be tested under load to verify system capacity and function.

5.3 Warranty Review

The CxA will schedule a warranty review site visit approximately 10 months into the 12 month warranty period and review with facility staff the current building operation and condition of outstanding issues related to the original and seasonal commissioning. Any issues that may come under warranty or under the original construction contract will be identified and the CxA will assist the facility staff in requests for services to remedy outstanding problems. The CxA is not responsible for correcting deficiencies.

6 COMMUNICATIONS STRUCTURE



In general, the CxA communicates directly with the Construction Manager for issues related to construction deficiencies and scheduling of Cx activities and the Design Team for issues related to design. The Owner, or Owner's representative, is kept informed and consulted for decisions as necessary on all Cx issues and activities. In addition, the CxA has informal conversations with subcontractors in the field to discuss construction issues and related Cx activities. The CxA does not, under any circumstances, provide direction to subcontractors other than through the Construction Manager.

7 ROLES AND RESPONSIBILITIES

Understanding and defining the roles of each participant is vital to the success of the Commissioning Process. This section provides an outline of the responsibilities of each participant in the Commissioning Process. These responsibilities are typically formalized in the contracts between the Owner and the various parties and this section is not intended to supersede or negate any contracted relationships.

7.1 Owner (or Designated Representative)

- Include the design professionals' Commissioning related responsibilities and scope of work in the design request for proposal and contract.
- Oversee the development of the Owner's Project Requirements and approve any changes.
- Designate a representative, ideally from the building's operations and maintenance team, to participate in the Commissioning Process including
    - Design Phase coordination meetings
    - Construction Phase coordination meetings
    - Informal owner-training as equipment is installed and started
    - Maintenance orientation and inspections
    - System testing and verification meetings
    - Functional procedure review meetings before testing of systems
    - Training sessions
    - Verification demonstrations
    - Systems and assemblies tests
    - Final review at acceptance meeting
- Review and approve any changes made to the Owner's Project Requirements
- Review and approve the Construction Documents
- Review, comment on, and accept the Commissioning Authority's progress and final reports

7.2 Commissioning Authority

The Commissioning Authority is responsible to verify that the Owner's Project Requirements for the project are satisfactorily achieved. The CxA is comprised of building commissioning experts who maintain a broad understanding of all aspects of building construction, maintenance, and operations. Specific tasks performed by the CxA include:

Construction Phase

1. Perform the tasks and functions to be incorporated in the specifications ascribed to the CxA.
2. Coordinate and direct the commissioning activities in a logical, sequential and efficient manner using consistent protocols and forms, centralized documentation, clear and regular communications and consultations with all necessary parties. Frequently updated timelines and schedules and technical expertise.
3. Coordinate the commissioning work with the contractor, architect and Owner's representatives to ensure that commissioning activities are being scheduled into the master schedule.
4. Revise the construction phase commissioning plan developed during the design phase as required to include refined scope and schedule.
5. Plan and conduct commissioning meetings and distribute minutes.
6. Request and review information required to perform commissioning tasks, including O&M materials, contractor start-up and checkout procedures. Before start-up, gather and review current control sequence and interlocks. Work with the architect so that the CxA/A/E comments are combined into one review submitted to the contractor.

7. Review coordination drawings to ensure that trades are making a reasonable effort to coordinate work. Coordinate submittal review with the architect so that the CxA/A/E comments are combined into one review submitted to the contractor.
8. Write and distribute construction checklists for commissioned systems and equipment.
9. Perform site visits to observe component and system installations. Attend selected planning and job-site meetings to obtain information on construction progress. Review construction meeting minutes for revisions/substitutions relating to the commissioning process. Assist in resolving any discrepancies.
10. Provide construction checklists for equipment/systems within the scope of work to the contractors.
11. Document construction checklist completion by reviewing completed checklists and by site observation.
12. Document system start-up by reviewing start-up reports and by select site observations.
13. Verify air and water systems balancing which may include spot testing, by reviewing completed reports, and by select site observation. Coordinate submittal review with the architect so that the CxA/A/E comments are combined into one review submitted to the contractor.
14. With assistance and review from the installing contractor, CxA will write functional performance test procedures for equipment and systems. This will include manual functional testing, energy management control system trending and may include stand-alone data-logging monitoring.
15. Analyze functional performance trend logs and monitoring data to verify performance.
16. Coordinate, witness and document manual functional performance tests performed by installing contractors.
17. Tests on respective HVAC equipment shall be executed, if possible, during both the heating and cooling seasons. However, some overwriting of control values to simulate conditions shall be allowed. Functional testing shall be done using conventional manual methods, control system trend logs, and read-outs or stand-alone data loggers, to provide a high level of confidence in proper system function, as deemed appropriate by the CxA and the Owner.
18. Prepare test plans for, assist with execution of, and document tests of commissioned equipment requiring oversight by regulatory authorities and ensure that such tests meet the testing rigor desired by the Owner.
19. Maintain a master issues log. Report all issues as they occur directly to the Owner's representative and the architect. Provide directly to the Owner's representative and the architect written progress reports and test results with recommended actions.
20. Oversee and verify the training plans to be implemented by the contractors for training of the Owner's operating personnel.
21. Compile a Commissioning Record.
22. Comply with the requirements of any applicable green-building rating systems (i.e. LEED, High Performance Buildings, Green Guide for Healthcare, etc.).

Warranty Period

1. Coordinate and supervise required opposite season or deferred testing and deficiency corrections.
2. Schedule a remote meeting approximately 10 months warranty period and review with facility staff the current building operation and the condition of outstanding issues related to the original and seasonal commissioning. Also interview facility staff and identify problems or concerns they have with operating the building as originally intended. Make suggestions for improvements and for recording these changes in the O&M manuals.
3. Identify areas that may come under warranty or under the original construction contract. Assist facility staff in requesting service to remedy outstanding problems. The CxA is not responsible for correcting deficiencies.

7.3 Construction Manager

The Construction Manager provides management, technical, and administrative expertise during the Construction phase to ensure the building Owner's goals relating to schedule and quality are met. The Construction Manager's responsibilities related to the Commissioning Process typically include:

- Include any costs for Commissioning Process activities in the contract price.
- Coordinate and include all Cx-related milestones into the overall construction schedule.
- Include Commissioning Process requirements and activities in all contractors' contracts.
- Ensure that sub or trade contractors execute their commissioning responsibilities according to the project specifications and Cx Plan.
- Ensure necessary accessibility to all equipment to allow for proper operation and maintenance of the building.
- Provide individuals with the required background and authority to implement the Commissioning Process activities as outlined in the Contract Documents.
- Issue a statement at the end of the project certifying that all work has been completed in accordance with the Contract Documents and the facility is operational.
- Respond to Commissioning Process reports and correct deficiencies identified during installation verification or functional testing.
- Review and comment on the final Cx Report.

7.4 Contractors

Many different contractors are involved in the Commissioning Process. The various contractors may include the building contractors (general, mechanical, plumbing, and electrical), the testing, adjusting, and balancing contractor, the building automation system (ATC) contractor and others as required by the contract documents. As a member of the Commissioning Team, the responsibilities of the various building contractors include:

- Include any costs for Commissioning Process activities in the contract price.
- Include Commissioning Process requirements and activities in all subcontracts or equipment purchases.
- Ensure the cooperation and participation of all subcontractors and manufacturers of equipment or systems to be commissioned.
- Attend Commissioning Team meetings.
- Include Cx-related milestones in the construction schedule.
- Implement the training program as described in the Contract Documents. Coordinate related activities with the CxA.
- Provide submittals to the Owner, Design Team, and CxA as detailed in the Contract Documents.

- Complete the Construction Checklists as the work is completed. Provide completed copies to the CxA at regular intervals for verification.
- Complete Pre-functional tests for all systems and equipment.
- Notify the CxA when systems and assemblies are ready for installation verification and testing. For repetitive assemblies, notify the CxA upon the completion of the prototype for a First Piece or Mock-Up review.
- Demonstrate the performance of assemblies and operate systems as required to fulfill the requirements of the Functional Test Procedures detailed in the Commissioning Plan and the Contract Documents.
- Maintain the Project Record Documents in accordance with the requirements of the Contract Documents.

7.5 **Manufacturers**

The suppliers of major equipment are required to support the Commissioning Team in the following manner:

- Provide all information required for the proper Start-up and Operation and Maintenance of the system or assembly in the initial submittal, as detailed in the Contract Documents.
- Provide the requirements to maintain the warranty in the initial submittal, as detailed in the Contract Documents.
- Coordinate and provide results of all factory tests required in the Contract Documents.
- Participate in the training process as detailed in the Contract Documents.
- Demonstrate the performance of assemblies and operate systems as required to fulfill the requirements of the Functional Test Procedures detailed in the Commissioning Plan and the Contract Documents.
- Confirm all packaged controls are functioning as designed and that interlocks and communications to the Building Management System are fully functional.

7.6 **Operations and Maintenance Staff**

The Operations and Maintenance staff will participate in the Commissioning Process in the following areas:

- Define Operations and Maintenance related requirements of the building.
- Participate in design review for O&M impacts.
- Review maintenance manual, record drawings and documentation requirements developed by the Design Team.
- Define training program requirements.
- Participate in/witness functional performance testing.
- Attend contractor and vendor training sessions.

APPENDIX A Commissioned Systems

Commissioned Systems

System or Equipment	Submittal Review	Installation Checklist	Functional Test
HVAC/Mechanical			
Air Handling Units	x	x	x
Humidifiers	x	x	x
Fans	x	x	x
Demand Control Ventilators	x	x	x
Variable Air Volume Terminal Units	x	x	x
Lab Terminal Units	x	x	x
Chiller	x	x	x
Cooling Tower	x	x	x
Boiler	x	x	x
Pumps	x	x	x
Heat Exchangers	x	x	x
Pressure Reducing Valves		x	x
Energy Recover Ventilators	x	x	x
Refrigeration Systems	x	x	x
Ductless Split Air Conditioning Systems	x	x	x
Unit Heaters & Cabinet Unit Heaters	x	x	x
Building Management System	x		x
Electrical			
Emergency Generator		x	x
Automatic Transfer Switch			x
Lighting & Daylighting Controls	x	x	x
Renewable Energy Systems	x	x	x
Switchgear		x	x
Main Switchboards		x	x
Uninterrupted Power Supply		x	x
Telecommunications System			x
Security System			x
Fire Protection			
Fire Alarm System			x
Fire Suppression			x
Plumbing			
Domestic Hot Water System	x	x	x
Piping		x	
Sanitary Waste Piping		x	
Storm Drainage		x	
Plumbing Fixtures		x	x
Envelope			
Roof		x	x
Walls		x	x
Windows	x	x	x
Doors	x	x	x

Note 1: Testing will be done by witnessing with approving authority and/or reviewing approving authority's report.

APPENDIX B Commissioning Milestone Schedule

Commissioning Milestone Schedule

The following Commissioning Process activities and milestones are to be integrated into the overall project schedules maintained either by the Design Team or the Construction Manager, depending on the phase of the project.

Milestone	Date	Status
Design Phase		
Design Review	FEB 2024	Underway
Develop Cx Plan	MAR 2024	Closed
Submittal Review	OCT 2024	Open
Construction Phase		
Develop construction checklists	JAN 2025	Open
Begin site visits to observe component and system installations	JUN 2025	Open
Review Controls submittal	JUL 2025	Open
Develop functional performance test procedures	AUG 2025	Open
Update Construction Phase Cx Plan	AUG 2025	Open
System fill and flush	MAR 2026	Open
DDC programming	MAR 2026	Open
Major Equipment Factory Startup	APR 2026	Open
Testing and balancing tasks	APR 2026	Open
Contractor performs preliminary Functional Tests	MAY 2026	Open
Contractors provide Statement of Readiness	MAY 2026	Open
CxA witnesses and documents Functional Tests	JUN 2026	Open
Operation and Maintenance Manual review	JUL 2026	Open
Training: Colliers & Daiken on site	JUL 2026	Open
Final Commissioning Process Report	AUG 2026	Open
Warranty Period		
Deferred seasonal testing	NOV 2026	Open
Near End of Warranty Review (One remote Meeting)	MAR 2027	Open

APPENDIX C Submittal Review Forms

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Submittal Review Forms will be added in the Construction Phase Cx Plan

APPENDIX D Installation Checklists

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Installation Checklists will be added in the Construction Phase Cx Plan

APPENDIX E Functional Performance Tests

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Functional Performance Tests will be added in the Construction Phase Cx Plan

APPENDIX F Sample Training Plan (may be used by contractors)

Project Name

Project Training Plan – General Scope and Responsible Parties

Equipment/System	Spec Section	Total Hours (if spec'd)	Scope Code[1]	Trainee Type[2] (list no. of each)	Primary Responsible Contractor	Trainers' Company	Agenda Rec'd?	Planned Training Date(s)

[1]General Scope Codes: (Refer to the Training Agendas for the specific equipment for additional details.)

A Provide an overview of the purpose and operation of this equipment, including required interactions of trainees with the equipment.

B At an intermediate level, provide technical information regarding the purpose, operation and maintenance of this equipment, expecting that serious malfunctions will be addressed by factory representatives.

C At a very technical level, provide information regarding the purpose, operation, troubleshooting and maintenance of this equipment, expecting that almost all operation, service and repair will be provided by the trainees.

[2]Trainee Types:

FM = Facility Manager
FE = Facility Engineer
FT = Facility Technician/Maintenance
PM = Project Manager
U = Users/Occupants
O = Other

Owner Approval:

_____ _____

Owner Date

Commissioning Agent Approval:

_____ _____

Commissioning Agent Date

Project Name

Training and Orientation Agenda

Date:_____ Spec Section:_____

Equipment/System_____

Section 1. Audience and General Scope (Owner fills out this section and transmit entire form to responsible contractors.)

Intended Audience Type: ____Facility Manager ____Facility Engineer

____Facility Technician ____Project Manager ____User/Occupant

____Other_____

General objectives and scope of training: (check all that apply)

_____ A. Provide an overview of the purpose and operation of this equipment, including required interactions of trainees with the equipment.

_____ B. Provide technical information regarding the purpose, operation and maintenance of this equipment at an intermediate level, expecting that serious malfunctions will be addressed by factory representatives.

_____ C. Provide technical information regarding the purpose, operation, troubleshooting and maintenance of this equipment at a very detailed level, expecting that almost all operation, service and repair will be provided by the trainees.

Section 2. Instructors (General contractor fills in Company. Trainer fills out the balance, prior to training.)

ID	Trainer	Company	Position/Qualifications
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

Section 3. Agenda (The responsible contractors have their trainers fill out this section and submit to Owner and Commissioning Authority for review and approval prior to conducting training.)

Location: site _____ Date_____

classroom (location)_____Date_____

Subjects covered, specific to equipment:	Duration (min)	Instructor (ID)	Completed (√)

Total duration of training (hours) ---------► _____

Training methods that will be included (clarify as needed): (Trainer checks all that apply)

___use of the Operation and Maintenance Manuals, illustrating where the verbal training information is found in writing

___each attendee will be provided: 1) the control drawing schematic and sequence of operations;
2) a copy of this agenda

___discussion/lecture at site_____

___site demonstration of equipment operation_____

___written handouts_____

___manufacturer training manuals_____

___classroom lecture _____

___classroom hands-on equipment_____

___video presentation_____

___question and answer period_____

Section 4. Approvals and Use: (Once the Agenda has been filled out by the Trainer, the Owner and Commissioning Authority review, edit, sign, and return to the Contractor who provides to the Trainer for use during the training. Copies of Agenda shall be provided to the Trainees.)

This plan has been approved by the following individuals, subject to the additions and clarifications noted in the left columns marked “add.” (This is not an approval of training completion.)

_____ _____

Owner’s Representative Date

_____ _____

Commissioning Agent Date

Project Name

Training and Orientation Record

Equipment/System_____

	Trainee Signature and Position	Trainer Signature and Company	CxA Initials
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Final Approval of Training Completion According to the Contract Documents:

_____ _____

Owner's Representative Date

_____ _____

Commissioning Authority Date

SECTION 023000 - SUBSURFACE INVESTIGATIONS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Pipe and utility subsurface investigations, test pits, which are required in order to properly locate, plan for and/or connect to the various existing pipelines.

B. Related Sections

1. Section 312300 - Excavation, Backfill, Compaction and Dewatering

2. Appendix F - Report entitled "Greenwich Central Middle School Construction-Vibration and Controls During Construction" by Gap Mountain Consulting Engineers, PLLC dated November 1, 2024. The Construction-Vibration and Controls report is provided to outline the requirements for monitoring and protection the existing school building from structural damage while it is occupied.

1.2 REFERENCES

A. 29 CFR Part 1926 Subpart P - OSHA Excavation Regulations 1926.560 through 1926.562 including Appendices A through F.

1.3 PIPELINE AND UTILITY INVESTIGATIONS

A. The Drawings show available data relative to existing underground pipe and utilities.

B. During the course of the Work, excavate to locate various existing pipelines and utilities, where they are involved in the Work.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 TEST PITS

A. Excavate test pits as indicated, or as requested by the Owner. Expose the top of the pipeline, and adjacent utilities, at each test pit location.

B. Perform test pits in accordance with the requirements of Section 31 2333, Trenching and Backfilling. Excavate the bottom 2 feet of the test pit by hand. Excavate to top of pipeline by hand. Test pits shall be braced, sheeted, and dewatered or as otherwise required for safe excavation and examination of the structure or utility to be exposed.

C. Measure the depth to the top of the pipeline, as well as to adjacent utilities, from the ground surface, at each test pit location. Record location, depth and size of pipelines and utilities uncovered during the test pits.

D. Prior to test pitting operations, delineate the general scope of the excavation or boring on the paved surface of the ground using white paint, or stakes or other suitable white markings on non-paved surfaces and coordinate with the appropriate agencies in accordance state regulations. Pre-marking will not be acceptable if such marks can interfere with traffic or pedestrian control or are misleading to the general public. Pre-marking will not be required of any continuous excavation that is over 500 feet in length

E. Excavate test pits of an appropriate size with equipment suitable for the location and character of the pit to be excavated.

F. All subsurface investigations shall be conducted in accordance 29 CFR Part 1926 Subpart P - OSHA Excavation Regulations 1926.650 through 1926.652 including Appendices A through F.

G. After examination by the Engineer, backfill and compact the test pits in accordance with Section 312300.

H. Repair paved surfaces in accordance with Landscape Architect Specification.

I. Repair lawn areas or grass surfaces in accordance with Landscape Architect Specification

END OF SECTION 023000

SECTION 02 4100 - DEMOLITION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Building demolition excluding removal of hazardous materials and toxic substances.

B. Abandonment and removal of existing utilities and utility structures.

1.2 RELATED REQUIREMENTS

A. Section 01 1000 - Summary: Limitations on Contractor's use of site and premises.

B. Section 01 1000 - Summary: Description of items to be salvaged or removed for re-use by Contractor.

C. Section 01 3566.42 - Sustainability Compliance Procedures.

D. Section 01 5000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.

E. Section 015639 - Temporary Tree and Plant Protection: Pruning of existing trees to remain.

F. Section 01 6000 - Product Requirements: Handling and storage of items removed for salvage and relocation.

G. Section 01 7000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.

H. Section 01 7419 - Construction Waste Management and Disposal: Limitations on disposal of removed materials; requirements for recycling.

1.3 DEFINITIONS

A. Demolition: Dismantle, raze, destroy or wreck any building or structure or any part thereof.

B. Remove: Detach or dismantle items from existing construction and dispose of them off site, unless items are indicated to be salvaged or reinstalled.

C. Remove and Salvage: Detach or dismantle items from existing construction in a manner to prevent damage. Clean, package, label and deliver salvaged items to Owner in ready-for-reuse condition.

D. Remove and Reinstall: Detach or dismantle items from existing construction in a manner to prevent damage. Clean and prepare for reuse and reinstall where indicated.

E. Existing to Remain: Designation for existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Site Plan: Indicate:
   1. Vegetation to be protected.
   2. Areas for temporary construction and field offices.

C. Demolition Plan: Submit demolition plan as required by OSHA and local AHJs.
   1. Indicate extent of demolition, removal sequencing, bracing and shoring, and location and construction of barricades and fences.
   2. Demolition firm qualifications.

D. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Reports for Credit d5: Waste Disposal Reports tracking recycling and /or salvage of demolition debris, in accordance with Section 01 7419.

E. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

1.5 QUALITY ASSURANCE

A. Demolition Firm Qualifications: Company specializing in the type of work required.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 DEMOLITION

A. Remove the entire building existing on the project site.

B. Remove all paving and curbs within site boundaries.

C. Remove other items indicated, for salvage, relocation, and recycling.

D. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as required so that required rough grade elevations do not subside within one year after completion.

3.2 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with requirements in Section 01 7000.

B. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
   1. Obtain required permits.

2. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
3. Provide, erect, and maintain temporary barriers and security devices.
4. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
5. Do not close or obstruct roadways or sidewalks without permits from authority having jurisdiction.
6. Conduct operations to minimize obstruction of public and private entrances and exits. Do not obstruct required exits at any time. Protect persons using entrances and exits from removal operations.
7. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon, or limit access to their property.

C. Do not begin removal until receipt of notification to proceed from Owner.

D. Do not begin removal until built elements to be salvaged or relocated have been removed.

E. Do not begin removal until vegetation to be relocated has been removed and vegetation to remain has been protected from damage.

F. Protect existing structures and other elements to remain in place and not removed.
1. Provide bracing and shoring.
2. Prevent movement or settlement of adjacent structures.
3. Stop work immediately if adjacent structures appear to be in danger.

G. Minimize production of dust due to demolition operations. Do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

H. Hazardous Materials:
1. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCBs, and mercury.

I. Perform demolition in a manner that maximizes salvage and recycling of materials.
1. Comply with requirements of Section 01 7419 - Construction Waste Management and Disposal.
2. Dismantle existing construction and separate materials.
3. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

3.3 EXISTING UTILITIES

A. Coordinate work with utility companies. Notify utilities before starting work, comply with their requirements, and obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.

E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.

F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.

G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

H. Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone. Identify and mark, in same manner as other utilities to remain, utilities to be reconnected.

3.4 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site.

B. Remove materials not to be reused on site; comply with requirements of Section 01 7419 - Waste Management.

C. Leave site in clean condition, ready for subsequent work.

D. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION 02 4100

SECTION 024113 - SITE UTILITY ABANDONMENT

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including general and supplementary conditions and other Division 1 Specifications apply to this section.

1.2 SUMMARY

A. This section specifies the work to be performed by Contractor for abandonment of utilities at the Project Site. This Section includes:

1. Removal and abandonment of pipe, manholes, catch basins, conduit, duct bank, hand holes, wiring and pole bases, fixtures, poles.

2. Abandonment of above- and below-grade utilities and related facilities including but not necessarily limited to electric, tel-data, catv, conduits, utility structures, sewerage, grease traps, drainage, gas, and water, fire protection on, or serving the Project Area as shown on the Drawings or indicated herein.

B. Contractor shall coordinate work between all Subcontractors, sections, and trades required for the proper completion of the work.

C. Contractor is responsible for the health and safety of all Subcontractor workers during progress of the work.

D. Site utility removals and abandonments shall conform with the respective utility company standards to the extent required by the respective utility company.

E. All sanitary sewer abandonments shall conform with the Town of Greenwich Sewer Division requirements and the contractor shall obtain all required permits and approvals from the Town of Greenwich Sewer Division prior to any demolition, removal, or abandonment operations.

F. All water service abandonments and removals shall conform with the requirements of the Aquarion Water Company.

G. All electric and gas service abandonments and removals shall conform with Eversource Electric and Eversource Gas requirements.

H. All tel-data, cable tv, communications service abandonments and removals shall conform with Frontier Communications, Comcast and any other affected respective communications company affected by the demolition operations.

I. The contractor shall contact all affected utility companies to coordinate the timing and exact abandonments and demolition requirements prior to any demolition operations.

J. Related Sections

1. Appendix F - Report entitled "Greenwich Central Middle School Construction-Vibration and Controls During Construction" by Gap Mountain Consulting Engineers, PLLC dated November 1, 2024. The Construction-Vibration and Controls report is provided to outline the requirements for monitoring and protection the existing school building from structural damage while it is occupied.

1.3 SUBMITTALS

A. Abandonment procedures required by the owner of each utility prior to performing the work of utility termination/cutting/capping/plugging.

B. Material specifications and shop drawings for all materials and equipment furnished under this section, prior to performing the work of utility abandonment.

C. As-built drawings showing locations of all terminated/cut/capped/plugged utilities and service disconnections at or before project close-out.

PART 2 PRODUCTS

2.1 MATERIALS

A. Comply with the material specifications required by the owner of each utility. Where such material specifications may conflict with this Specification, utility owner's requirements shall prevail.

B. Borrow Material: Conform to applicable Specifications.

C. Portland Cement: ASTM C 150, Type II.

D. Mortar Aggregate: ASTM C 144, standard masonry type, clean, dry, free of deleterious materials.

E. Concrete: Design of mix in accordance with ASTM C-94, ASTM C-150, Type II Portland Cement, washed and graded sand, and aggregate with maximum size of 1-inch; or pre-packaged concrete mix with maximum aggregate size of 1-inch, ASTM C 387. Minimum 28-day compressive strength of 4000 psi.

F. Masonry Mix: Washed and graded mason sand, lime, and Portland Cement, ASTM C 270; or pre-packaged, dry, sand/lime/cement mortar mixture, ASTM C 387. Minimum 28-day compressive strength of 1200 psi.

G. Water: Potable, free of deleterious materials.

H. Solid Concrete Masonry Unit: ASTM C55, sized per pipe diameter to minimize requirements for cutting.

I. Controlled Low Strength Material (CLSM) is a self-consolidating, rigid setting material to be used in backfills, fills, structural fills and elsewhere as indicated on the plans, or as directed by the Engineer. The flow and set time characteristics of CLSM shall be designed to meet the specific job conditions. All CLSM material covered by this specification shall be designed to be hand excavatable at any time after placement. It shall be composed of a mixture of portland cement, aggregate, and water with the option of using fly ash, slag cement, air-entraining agents, and other approved admixtures.

1. Materials: All materials utilized in the CLSM mix design shall be in accordance with the applicable requirements of Article M.03.01

2. Composition: The composition of the CLSM shall be in accordance with the requirements set forth in Article M.03.01-General Composition of Concrete Mixes, as well as the applicable sections of ACI 229R.

3. The Contractor shall submit each proposed mix design, with all supporting data, to the Engineer for review and approval at least two weeks prior to its use. The setting time of CLSM materials shall be designed so as to achieve the strength necessary to comply with the time constraints called for under the Maintenance and Protection of Traffic requirements of the project specifications. The use of chloride accelerators is not permitted. The minimum compressive strength of the CLSM material shall be 30 pounds per square inch (psi) and the maximum compressive strength of the CLSM shall be 150 pounds per square inch (psi) when tested in accordance with ASTM D4832 after 56 days. The CLSM mix design shall utilize a nominal maximum size of No. 8 aggregate as specified in M.01.01.CLSM mixes shall have a minimum of 20% entrained air when tested in accordance with AASHTO T152.

PART 3 EXECUTION

3.1 GENERAL

A. Notify Call Before You Dig (CBYD) 72 hours prior to any excavation operation and obtain CBYD tracking number.

B. Notify utility owners in reasonable advance of the work and request the utility owner to stake out on the ground surface the underground facilities and structures. Notify the Engineer in writing of any refusal or failure to stake out such underground utilities after reasonable notice.

C. Contractor is solely responsible for providing coordination and obtaining permits with owners of the various utilities serving, or present at, the Project Site as required to complete termination and demolition work. Coordinate as required for termination of service, temporary termination of service, relocation of facilities, abandonment of facilities, demolition of facilities, cutting, capping, and bracing. Comply at all times with the procedures for terminations of utility services as required by the owner of each utility serving, or present at, the Project Site.

D. When utilities are encountered that are not indicated on the drawings, notify Engineer before proceeding with work in such area.

3.2 UTILITY TERMINATION

A. Terminate utilities serving the Project Site as indicated on the Drawings. Terminate, cut, cap, or plug utilities in accordance with each utility owner's requirements, including, but not necessarily limited to, scheduling of inspections by utility company personnel, permits, licenses, approvals, insurance, or bonds.

3.3 DEMOLITION

A. Do not demolish any utility until termination has been verified.

B. Remove and dispose of all overhead and underground utilities and related systems and appurtenances on the Project Site, including but not necessarily limited to water, electric, sanitary sewer, storm sewer, miscellaneous drainage, heating and cooling facilities, communications, exterior lighting supplies; utility poles, light standards, utility foundations, supports and ancillary equipment; hydrants and other similar supply facilities, valves and meters; site drainage and catch basins and related structures; sanitary sewerage piping, manholes, pumps, and related facilities; and other miscellaneous plumbing, piping and conveyances if called out on the plans.

3.4 BACKFILL

A. Replace soil material excavated for utility removal, termination, or abandonment in accordance with applicable Specifications.

1. Backfilling to grade is required with satisfactory soils.

2. Import satisfactory soils if none are available on site.

B. Provide OSHA-compliant barriers or smooth edges of all excavations to produce a stable slope, with smooth grade transitions and no vertical cuts from top of slope to lower limits of the excavation in compliance with the requirements of OSHA. Maximum slope into any excavated area under ideal soil conditions shall be 1 to 1 ½, vertical: horizontal.

3.5 PROTECTION

A. Subcontractor shall take measures to protect from damage those utilities, or portions thereof, which are designated to remain. Provide protection as required such as marking, blocking, bracing, stabilizing, supporting, and retaining.

B. Utilities to remain damaged by Subcontractor shall be repaired/replaced to the satisfaction of the utility owner at Contractor's expense.

3.6 DOCUMENTATION

A. Contractor shall provide as-built documentation for each utility termination, including location, depth, and method and material of construction for termination. Such as-built documentation shall be on the appropriate site plans.

B. Contractor shall physically mark the location of each subsurface utility termination with a surveyor's stake, with such stake identifying the utility type and depth below grade. Where the use of stakes at a utility termination location may be inappropriate, Subcontractor shall provide staking at an adjacent location(s) and include appropriate offset dimensions or other suitable demarcation.

END OF SECTION

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SECTION 02 8200 – SELECTIVE HAZARDOUS BUILDING MATERIALS ABATEMENT DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

A. Provide selective demolition to remove existing carpeting/multiple layers of flooring/wood/concrete and demolish multiple layers of ceilings/walls/floors /doors/windows/lighting/millwork/shelving/countertops/slop sinks/water fountains/science countertops/radiators/ventilators/piping/sinks/test tube racks/etc./elevators/shafts/lifts /showers/ceramic tiles/gymnasium flooring/ /door and window systems/lockers/concrete/ incinerators/chases/mechanical systems/wall paneling/equipment/boilers/tanks/piping/ ductwork/freezers/roofing/siding/masonry/stone/brick/ foundations/wall and ceiling systems/ raised flooring/wall materials (bulletin/chalk/white/etc. boards, mirrors), non-moveable objects, etc. as necessary to access all asbestos/PCB/other hazardous containing materials as specified herein, and as required for complete and proper abatement.

B. The hazardous building materials contractor (contractor) will be responsible for performing additional selective interior demolition throughout the original 1957 building (including tunnels, crawl spaces, basement areas and ductwork) and the 2000 addition which are scheduled for demolition. Contractor shall open walls and ceilings to check for hidden piping (as required for entire building) as well as demolishing millwork, cabinetry, sheetrock walls, all non-moveable objects, black/white/green/bulletin boards, flooring under top layer(s) of flooring, walls, chases etc. to located potential asbestos containing flooring materials and other suspect asbestos containing materials that may be hidden, buried, inaccessible. Contractor shall demolish concrete floors throughout to access buried piping that cannot be accessed from the tunnels/crawl spaces.

C. The contractor(s) will be responsible for hiring an engineer and other appropriate personnel to ensure that all required selective demolition and demolition activities are safe to perform for all personnel on site. The contractor(s) will be financially responsible for any damage that may occur to the site, on-site personnel, fines, penalties, etc. They will also be responsible for paying/reimbursing all legal fees/costs for all parties involved with the project should selective demolition or demolition activities cause injury or death to any persons on site.

D. Please note there are several layers of flooring, ceilings, walls, chases, non-moveable objects, roofing, etc. requiring demolition to access all asbestos/PCB containing or assumed materials, some of which are contaminated with asbestos and require removal and disposal as such.

E. Required permits shall be obtained by the Contractor at no additional cost to the Owner.

F. Notes: Contractor is responsible for removing all asbestos/PCB containing materials (behind walls, ceilings, windows, chases, doors, windows, concrete, non-moveable objects, etc.) in demolition areas as noted by the architect's specifications and drawings.

G. The contractor will be required to remove carpeting and other flooring, wood floors, multiple layers of wall and ceiling structures/systems, raised flooring, multiple layers of mixed flooring, non-moveable objects to gain access to the asbestos flooring and/or mastic and carpet adhesives in all areas. There may be more than one layer of flooring in some locations. All layers of floor tile, leveling materials, mastic, concrete, wood, thinset, sheet flooring, carpet adhesives, etc. are included in the base work, no extra change will be accepted. Demolition or moving typical non-movable objects by the abatement contractor is required to gain access to all flooring materials to be removed. SD sheets for chemicals to be used during the project must be submitted to the owners' representative prior to site delivery.

H. The contractor will be required to remove roofing, window and door systems, mechanical systems, wall, ceiling and floor applications/masonry and foundations and floor slabs to access all asbestos/PCB containing materials for abatement/remediation and packaging for recycling/removal/abatement and disposal.

I. Related Sections:
1. Section 02 8213 – Asbestos Abatement
2. Section 02 8313 – Lead-Based Paint Awareness
3. Section 02 8416 – Universal Waste Removal and Recycling
4. Section 02 8432 – PCBs Greater than 50 PPM Remediation
5. HBM – 01, 02 & 03 – Hazardous Building Materials Abatement Drawings

1.2 PROJECT CONDITIONS

A . Occupancy:
1. Areas of the buildings in which demolition will occur will be unoccupied during work.

B. Existing Conditions:
1. After the project is begun, the Contractor is responsible for the condition of the structures to be selectively demolished.
2. Unforeseen Conditions: Should unforeseen conditions be encountered that affect design or function of project, investigate and fully submit an accurate, detailed, written report to the office of the Consultant. While awaiting a response, reschedule operations if necessary to avoid delay of overall project.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and sealed.

B. Insofar as is practicable, arrange operations to reveal unknown or concealed conditions for examination and verification before removal or demolition.

C. Verify actual conditions to determine, in advance, whether removal or demolition of any element will result in structural deficiency, overloading, failure, or unplanned collapse.
   1. Demolish and remove connections to all electrical gas, and plumbing fixtures required to remove asbestos containing materials.

3.2 PREPARATION

A. Traffic: Do not obstruct walks or public ways without the written permission of governing authorities and of the Owner. Where routes are permitted to be closed, provide alternate routes if required.

B. Protection:
   1. Provide for the protection of persons passing around or through the area of demolition.
   2. Perform demolition so as to prevent damage to adjacent improvements and facilities to remain.
   3. Protect walls, floors, and other new or existing work from damage during demolition operations.

C. Damages: Without cost to the Owner and without delay, repair any damage caused to facilities to remain.

3.3 POLLUTION CONTROLS

A. Control as much as practicable the spread of dust and dirt.

B. Observe environmental regulations.

C. Do not allow water usage resulting in freezing or flooding.

D. Do not allow adjacent improvements to remain to become soiled by demolition operations.

3.4 DEMOLITION - GENERAL

A. Remove: Items indicated to be removed shall be removed by the Contractor.

B. Existing to Remain: Construction or items indicated to remain shall be protected against damage during demolition operations. Where practical, and with the Owner's permission, the Contractor may elect to remove items to a suitable storage location during demolition and then properly clean and reinstall the items.

C. Perform work in a systematic manner.

D. Demolish and remove existing construction only to the extent required, as indicated in the Contract Documents.

E. Perform selective demolition using methods that are least likely to damage work to remain and which will provide proper surfaces for patching.

F. Remove debris daily.

G. Use any methods permitted by governing regulations and the requirements of the Contract Documents.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

A. Promptly dispose of materials resulting from demolition operations. Non-contaminated material (materials not containing residue asbestos, lead, PCB or other hazardous, regulated or special waste) may be disposed of as construction waste. Do not allow materials to accumulate on site.

B. All rubbish and waste material from the Work shall be neatly stacked or kept in suitable containers and removed from the premises daily. The premises shall be kept clean and in an orderly condition at all times to the satisfaction of the Owner and the Consultant.

C. Transport materials resulting from demolition operations and legally dispose of off-site.

D. Off-site disposal location shall not be within one-half mile of any portion of the project site or within sight of the project site.

E. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.

3.6 CLEANING

A. Throughout the construction period, the Contractor shall maintain the building and site free of rubbish, debris, surplus materials, and other items not required for the Work.

B. Remove such material from the site daily to prevent accumulations.

C. Remove all construction debris from work areas, and remove all hazardous waste and asbestos waste as required by the most current federal, state, and local regulations and the requirements of the specifications.

END OF SECTION 02 8200

SECTION 02 8213 – ASBESTOS ABATEMENT

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General Supplementary Conditions and Division 1 Specifications Sections, apply to this Section.

B. Sections containing requirements related to this Section include, but are not limited to:
   1. Section 02 8200 – Selective Hazardous Building Materials Abatement Demolition
   2. Section 02 8313 – Lead-Based Paint Awareness
   3. Section 02 8416 – Universal Waste Removal and Recycling
   4. Section 02 8432 – PCBs Greater than 50 PPM Remediation
   5. HBM – 01, 02 & 03 – Hazardous Building Materials Abatement Drawings

1.2 CONSULTANT

A. The Owner shall retain Langan for the purposes of project management and monitoring during Asbestos Abatement. The Consultant will represent the Owner in all phases of the abatement project at the discretion of the Owner. The Asbestos Abatement Contractor will regard the Consultant's direction as authoritative and binding as provided herein, in matters particularly but not limited to approval of work areas, review of monitoring results, completion of the various segments of work, final completion of the abatement, submission of data, and daily field punch list items. The State of Connecticut licensed Asbestos Consultant — Project Designer is Matthew Myers (license no. 000058).

1.3 USE OF THE CONTRACT DOCUMENTS

A. It shall be incumbent upon the Contractor to visit the Site and determine what exists, its condition, and what will be required to accomplish the Work intended by the Contract Documents. No increase in the Contract Sum will be permitted as a result of the Contractor's failure to visit the Site and understand the existing conditions.

B. All work shall comply with the Contract Documents and with applicable Codes, laws, regulations, and ordinances wherever applicable. The most stringent of all the foregoing shall govern.

C. It is not intended that the Specifications show every detail of the Work, but the Contractor shall be required to furnish within the Contract Sum all material and labor necessary for the completion of the Work in accordance with the intent of the Specifications.

D. In case of ambiguity among the Contract documents, the more stringent requirement as determined by the Consultant shall prevail.

E. The Work of this Contract includes making modifications as necessary, subject to approval by Owner in consultation with the Consultant, to correct any conflicts.

F. All items, not specifically mentioned in the Specifications but implied by trade practices to complete the work, shall be included.

G. This specification and drawings cover the proper and legal removal and disposal of all asbestos-containing materials (ACM) and asbestos contaminated waste from the Central Middle School project site located in Greenwich, Connecticut. The abatement activities shall comply with all aspects of the contract documents and Federal, State and local requirements.

H. Whenever there is a conflict or overlap within these specifications and between applicable codes and regulations, the most stringent provision specified shall apply.

1.4 EXAMINATION OF THE SITE

A. It is understood that the Contractor has examined the Site and made his own estimates of the facilities and difficulties attending the execution of the Work, and has based his price thereon.

B. Except for unforeseeable concealed conditions as determined by the Consultant, the Contractor shall make no claim for additional cost due to the existing conditions at the Site.

1.5 CONTRACTOR QUALIFICATIONS

A. All bidders shall submit a record of prior experience in asbestos abatement projects, listing no less than three (3) completed jobs in the past year, with all projects of similar size and scope. The Contractor shall list the experience and training of the project foremen and all on-site personnel. The information that should be included is as follows:
   1. Project Name and Address
   2. Owner's Name and Address
   3. Architect/Consultant
   4. Contract Amount
   5. Date of Completion
   6. Extras and Changes

B. The Contractor selected must appear on the approved list of Asbestos Abatement contractors on file at the State of Connecticut Department of Public Health (CT DPH) and hold a valid license for asbestos abatement within the State of Connecticut.

C. Submit a written statement regarding whether the Contractor has ever been found out-of-compliance with federal or state asbestos and/or lead regulations pertaining to worker protection, removal, transport, or disposal.

D. The Contractor shall be responsible for obtaining all necessary or required permits from the Federal, State and local agencies having jurisdiction over this asbestos abatement project. Failure on behalf of the Contractor to obtain these permits shall not result in any extension for the timely results of completion of the work set forth in the Contract. The Contractor shall be responsible

and shall be required to pay any administrative penalties imposed on the owner for actions taken or lack thereof by the Contractor.

E. Work includes any and all selective demolition and protective measures required to access and remove ACM and maintain a safe working environment.

F. Upon completion of asbestos removal, the contractor shall provide completed, signed and notarized statements indicating that all asbestos-containing materials identified in the scope of work and project description (Section 1.08 and 1.09) were properly removed and disposed of in accordance with applicable Federal, State, and local regulations.

G. All contractors submitting a bid for this work shall visit the work site, attend a pre-bid meeting and walk-through, to be scheduled by the Owner, and be familiar with the work in its entirety. The contractors pre-meeting attendance and bid submission affirms his/her acceptance of the work, site, and building conditions as is.

H. The contractor shall be responsible for paying the utility bills for the use of power and water (unless owner agrees to supply at no cost to contractor). However, if any such temporary facilities cannot be provided, it shall be the contractor's responsibility to provide all temporary connections and hook-ups as well as obtaining permits and paying all fees for making such services available for his work as is necessary. If necessary, the Contractor shall provide temporary services as specified herein, and as required or as necessary to carry out the work. This may include such items as portable generators, water tank trucks, pumps and necessary accessories or the means and equipment and services necessary to temporarily connect to and maintain such services from adjacent utility systems. The use of portable generators will require 24 hour a day, 7 day a week continuous operation if negative air machines in containments are powered by them. This continuous operation must remain in place from the time the pre-abatement visual is completed up until clearance re-occupancy sampling results have passed. The contractor will pay the owner a $2,500 penalty should the power found to not be running the negative air machines in active abatement containments. This penalty will apply daily and the contractor is also responsible for paying all CT DPH fines that may be imposed on the contractor and owner. The contractor shall also comply with any local permits that may be required as well as local noise ordinances.

I. All Contractor personnel involved with asbestos removal work must be thoroughly familiar with the standard operating procedures of the Contractor for removal work as well as all applicable Federal and State regulations governing asbestos removal work.

J. The Supervisor and Asbestos Abatement workers shall be accredited in accordance with EPA regulation 40 CFR Part 763, subpart E, Appendix C; and CT DPH regulations as outlined in Section 19a-332a-1 through 19a-332a-16 (Standards for Asbestos Abatement), and Section 20-440-1 through 20-440-9 (Licensure and Training Requirements for Persons Engaged in Asbestos Abatement and Consulting Services).

K. The Contractor shall be aware of all conditions of the Project and is responsible for verifying quantities and locations of all Work to be performed. Failure to do so shall not relieve the Contractor of its obligation to furnish all labor and materials necessary to perform the work. Any

discrepancies noted shall be brought to the attention of the Owner and Engineer prior to bidding the project. No claims for extras shall be made during construction/abatement/demolition.

L. Work includes necessary selective demolition and protective measures required to access and remove ACM and maintain a safe working environment. Asbestos containing materials that would be impacted by selective demolition of wall, ceiling and floor cavities shall be performed within negative pressure enclosure.

M. It is the sole responsibility of the Contractor to determine what, if any patents are applicable to the Project. The Contractor will pay all royalties and/or license fees, and will defend all suits or claims for infringement of any patent rights and save the Owner, Architect, Asbestos Safety Control Monitor, Design Sub-Consultant, and Construction Manager harmless from loss, including attorney's fees, on account thereof.

N. The Contractor shall coordinate with the Consultant and maintain the project schedule.

O. The abatement contractor shall hold and document daily pre-abatement safety tool box meeting to review safe work practices and emergency communication program for the project. The abatement contractor's supervisor and the consultant's project monitor must also ensure that proper fire extinguishing equipment is present. The supervisor shall be knowledgeable in use of fire extinguishing equipment, and emergency exit plans.

1.6 TESTING LABORATORY SERVICES

A. The Contractor shall submit to the Consultant the name; address and qualifications of proposed laboratories intended to be utilized for sample analysis as required by this section and the laboratories must be approved by CT DPH.

1.7 ADDITIONAL GENERAL REQUIREMENTS

A. The Asbestos Abatement Contractor shall employ a competent Asbestos Abatement Supervisor with at least three (3) years' experience on projects of similar scope and magnitude who shall be responsible for all work involving asbestos abatement as described in the specifications and defined in applicable regulations, and have full time daily supervision of the same. The Supervisor shall be the competent person as defined by OSHA regulations.

B. The Contractor shall allow the work of this contract to be inspected if required by local, state, federal, and any other authorities having jurisdiction over such work. The Contractor shall immediately notify the Owner and Consultant and shall maintain written evidence of such inspection for review by the Owner and Consultant.

C. The Contractor shall incur the cost of all fines resulting from regulatory non-compliance as issued by federal, state, and local agencies. The Contractor shall incur the cost of all work requirements mandated by federal, state, and local agencies as a result of regulatory non-compliance or negligence.

D. The Contractor shall immediately notify the Owner and Consultant of the delivery of all permits, licenses, certificates of inspection, of approval, or occupancy, etc., and any other such instruments required under codes by authorities having jurisdiction, regardless of who issued, and shall cause them to be displayed to the Owner and Consultant for verification and recording.

1.8 SCOPE OF WORK

A. This specification and drawings HBM-01, 02 & 03 cover the proper and legal removal and disposal of all asbestos-containing materials (ACM) and asbestos contaminated waste from the Central Middle School project site located in Greenwich, Connecticut. The abatement activities shall comply with all aspects of the contract documents and Federal, State and local requirements. There is interior and exterior, friable and non-friable asbestos containing materials (thermal system insulation and miscellaneous materials) identified on the site. Building materials assumed to contain greater than 50 ppm PCBs are located throughout the original 1957 building (see PCB specifications). XRF screening found that some ceramic, metal, and wood components have lead-based paint or lead. All materials should be considered to contain some amounts of lead. Universal wastes are located throughout the building.

1.9 PROJECT DESCRIPTION

A. Central Middle School was constructed in 1957 with an addition in 2000. The school has two stories with approximately 112,000 square feet of gross area. Interior areas consist of classrooms, offices, auditorium, gymnasium, media center, kitchen, cafeterias, toilet rooms, storage rooms, boiler/mechanical rooms, and tunnel/crawlspace/mechanical duct areas.

B. The base bid work includes the removal and disposal of all asbestos containing materials as identified herein, and on the architect's drawings by workers meeting requirements of OSHA 1926.1101 for Class 1 and 2 work. The base bid work will include the cost for removal and disposal of asbestos-containing flooring materials, pipe and pipe fitting insulation, sink undercoating, ceramic floor and cove base materials, wood wall panel adhesive, chalkboard/ bulletin board and other wall glue daubs/adhesives, several types of interior and exterior caulking/glazing/sealant compounds, and roof penetration flashing. Many building materials are assumed to contain PCBs > 50 ppm and will be removed and disposed of as mixed asbestos/PCB waste (see PCB specification). Alternate pricing is requested for painted building materials for possible PCB disposal. Work includes filing and permitting all necessary applications, notifications, requirements and fees; insurance; necessary design services; providing skilled, licensed and certified labor; materials; and equipment necessary for proper preparation, handling, removal and legal disposal of all asbestos-containing materials and asbestos contaminated waste from the subject building in accordance with all requirements of applicable federal, state and local regulations, these specifications and the contract drawings. The following materials and amounts are included in the base bid work.

Base Bid – Original 1957 Building

Material	Location	Estimated Quantity of ACM
Pipe and/or Pipe Fitting, Pipe Hanger and Roof Drain Insulation – Thermal System Insulation	Kitchen/Kitchen Office/Kitchen Storage Room Areas, Large Custodial Storage Room (Adjacent 101), Throughout Building in Inaccessible Locations (Chases, Behind Ceilings, Walls, Under Stage, Auditorium Cat Walk, etc.), and Limited Areas of Tunnel/Crawl/Mechanical Duct Spaces (Some Going into Stone/Concrete Walls)	ALL – Estimate 1,000 Linear Feet (Includes removing contaminated fiberglass) Negotiated Unit Pricing will be used to add or deduct to the estimated asbestos quantity if the amount removed is different by less/more than 20%
Black and Pink Sink Undercoating – Miscellaneous Materials	Classrooms 206, 207 and 218	ALL - 5 Sinks (Double Sinks)
Ceramic Floor and Cove Base Mud Bed and Adhesive/Backing – Miscellaneous Materials (Adjacent Materials/Substrates are Contaminated)	Nurse's Office Toilet Room, Main Office Conference Room Toilet Room and Boys Locker Room Toilet and Shower Areas	ALL - 1,800 Square Feet
Wood Wall Panel Adhesive (Black) – Miscellaneous Material (Adjacent Materials/Substrates are Contaminated)	Main Office and Conference Room	ALL - 660 Square Feet

Material	Location	Estimated Quantity of ACM
9”x9”/Lower Layer Floor Tiles – Miscellaneous Materials (Adjacent Materials/Substrates are Contaminated) Some of the black flooring mastic throughout the building was found to contain less than one percent asbestos by TEM analysis. Contractor(s) must comply with OSHA regulations and some landfills may not accept this waste as clean construction debris. Contractor(s) are responsible for proper disposal and no change orders will be accepted for proper disposal and no change orders will be accepted if concrete flooring with black mastic cannot be used as fill for the site.	Classrooms 206, 106 and 101, Classroom 203 Closet, Cafeteria, Staff Cafeteria, Corridor Along Classrooms 201 - 207, Elevator Mechanical Room, Small Closets in Main Office Conference Room and Classrooms 105-107, 112, 113, 205-207 and 217-225 (May Exist Throughout Building Underneath Gypsum Walls, Millwork, Fixed/Non-Moveable Objects, Inaccessible Areas)	ALL - 7,000 Square Feet Negotiated Unit Pricing will be used to add or deduct to the estimated asbestos quantity if the amount removed is different by less/more than 20%
Bulletin Board, “Chalk” Board and Other Wall Adhesives/Glue Daubs – Miscellaneous Materials (Adjacent Materials/Substrates are Contaminated – Multiple Layers of Boards/Materials Also)	Throughout Building	ALL - Estimate 9,500 Square Feet Negotiated Unit Pricing will be used to add or deduct to the estimated asbestos quantity if the amount removed is different by less/more than 20%

Material	Location	Estimated Quantity of ACM
Ceiling/Deck Caulking Compound – Miscellaneous Material (Located at Ceilings/Deck Panels and Metal Beams/Columns) (Adjacent Materials/Substrates are Contaminated) (Assumed PCB Bulk Product Waste > 50 ppm also)	Throughout Second Floor	ALL – Throughout All Areas of Second Floor Negotiated Unit Pricing will be used to add, if additional asbestos-containing caulking compounds are found on the First Floor during selective demolition and require abatement
Interior Window Glazing Compounds – Miscellaneous Materials (Adjacent Materials/Substrates are Contaminated) (Assumed PCB Bulk Product Waste > 50 ppm also)	Main Office Wall, Classrooms 201/201A and Gymnasium Offices	ALL - L Shaped Window Wall (Main Office). Classrooms 201/201A and Gymnasium Offices
Interior Wall/Wall and Wall/Column Caulking Compounds – Miscellaneous Materials (Multiple Layers/Types of Materials and Adjacent Materials/Substrates are Contaminated) (Assumed PCB Bulk Product Waste > 50 ppm also)	Classrooms 201, 201 Spray Booth, 201A, 202 - 207, Throughout Main Office Areas, Teachers Break/Faculty Room and Nurse Areas, Throughout Building Corridors and Stairwells, Throughout Gymnasium Areas, Corridor Custodial Closets and Throughout Building (Several are Grout/Mortar Only)	ALL

Material	Location	Estimated Quantity of ACM
Interior/Exterior Door/Window/Door Window/Wall/Column Caulking and Glazing Compounds – Miscellaneous Materials (Multiple Layers/Types of Materials and Adjacent Materials/Substrates are Contaminated) (Assumed PCB Bulk Product Waste > 50 ppm also)	Entry/Exit Areas to Building Adjacent Custodial Office, Main Office, Cafeteria, Room 208 and Gymnasium	ALL - Ten Openings (Multiple Sizes and Multiple Door/Window Walls)
Interior/Exterior Vent Caulking Compounds – Miscellaneous Material (Multiple Layers/Types of Materials and Adjacent Materials/Substrates are Contaminated) (Assumed PCB Bulk Product Waste > 50 ppm also)	Throughout Building Perimeter Walls	ALL - Eight Vent Openings
Interior/Exterior Door/Window/Wall/Column Caulking and Glazing Compounds – Miscellaneous Materials (Multiple Layers/Types of Materials and Adjacent Materials/Substrates are Contaminated) (Assumed PCB Bulk Product Waste > 50 ppm also)	Throughout Building Perimeter Walls	ALL - 17 Door/Window Openings (Multiple Sizes)

Material	Location	Estimated Quantity of ACM
Interior/Exterior Window/Wall/Column/Window Walls/Door Caulking and Glazing Compounds – Miscellaneous Materials (Multiple Layers/Types of Materials and Adjacent Materials/Substrates are Contaminated) (Assumed PCB Bulk Product Waste > 50 ppm also)	Throughout Building Perimeter Walls/Window Walls	ALL (Multiple Sizes)
Exterior Wall/Wall Expansion and Column Caulking Compounds – Miscellaneous Materials (Multiple Layers/Types of Materials and Adjacent Materials/Substrates are Contaminated) (Some Materials at Gymnasium and Auditorium are Assumed Behind Building Where They Abut Lower Elevations and Behind Roof Flashing Trim Throughout) (Assumed PCB Bulk Product Waste > 50 ppm also)	Throughout Exterior	ALL
Roofing Penetration Flashing Materials (Tar on Wood – Bottom Layer) – Miscellaneous Material (Adjacent Materials/Substrates are Contaminated)	Throughout Building Exterior	ALL

PLEASE SEE PCB REMEDIATION SPECIFICATIONS FOR POSSIBLE ADD ALTERNATE WORK.

C. Abatement and Remediation in all areas will start with removing materials at the ceiling/roof deck level and end with the materials at the flooring level. The hazardous building materials contractor will coordinate and perform enough selective demolition/demolition to access all materials to be removed/abated/remediated. The hazardous building materials contractor will be responsible for performing additional selective interior demolition throughout the original 1957 original building and the 2000 addition which are scheduled for demolition. Contractor shall open walls and ceilings to check for hidden piping (as required for entire building in areas of work) as well as demolishing millwork, cabinetry, all non-moveable objects, bulletin/chalk/white/etc. boards, mirrors, flooring, walls, chases etc. to located potential asbestos containing flooring materials and other suspect asbestos containing materials that may be hidden, buried, inaccessible. **Assume the abatement work will include full containments throughout the entire interior of the 1957 original building.** Exterior abatement/remediation will be either removed in containment (interior) or the abatement/remediation contractor will install polyethylene sheeting on the interior of the building and remove materials from the exterior. All ground surfaces must also be protected with plywood and two layers 10-mil reinforced polyethylene sheeting. This ground protection must extend at least 20 feet away from the building foundation (or farther - enough to prevent building materials from touching unprotected ground and floor surfaces). The contractor will pay for all contamination/remediation/ abatement of interior and exterior surfaces, including ground surfaces if Langan deems they have contaminated these surfaces. The contractor will supply lifts, scaffolding, staging, etc. to Langan in areas of remediation/abatement until all visual inspections and sampling has passed. The contractor will supply labor to assist in PCB verification sampling (including cleaning/re-cleaning) throughout as well as removing and disposing of all waste created by PCB verification sampling (if sampling is required). The contractor will provide temporary shoring in areas that require it.

D. Additional materials as discovered outside of those listed will be covered by unit prices if all is not listed as the quantity. Quantities are estimates only and should be verified by the Contractor. Safety data sheets for chemicals to be used during the project must be submitted to the Owner's Representative prior to site delivery.

E. The contractor is responsible for providing temporary water, power, and heat as needed at the site. Temporary lighting/Blast Trac machines/Negative air units within the work areas must be connected to Ground Fault Circuit Interrupter (GFCI) Power Panels installed by a State of Connecticut licensed electrician and located outside of the work areas. The contractor shall be responsible for paying for the use of power and water unless the owner agrees to supply free of charge. It shall also be the contractor's responsibility to provide all fixed and temporary connections and hook-ups as well as obtaining permits and paying all fees for making such services available for his work as is necessary. The Contractor shall provide services as specified herein, and as required or as necessary to carry out the work. This will include such items as temporary hard line installation, portable generators for short term work, water tank trucks, pumps and necessary accessories or the means and equipment and services necessary to temporarily connect to and maintain such services from adjacent utility systems. The contractor is responsible for contacting all utility services and getting power connections from the electrical lines located on or adjacent to the properties. All power and water must be supplied 24 hours a

day throughout the abatement project. CT DPH will be notified immediately if active containments do not have sufficient negative pressure throughout the abatement process until acceptable reoccupancy air results are received. The use of portable generators will require 24 hours a day, 7 day a week continuous operation if negative air machines in containments are powered by them. This continuous operation must remain in place from the time the pre-abatement visual is completed up until clearance re-occupancy sampling results have passed. The contractor will pay the owner a $2,500 penalty should the power found to not be running the negative air machines in active abatement containments. This penalty will apply daily and the contractor is also responsible for paying all CT DPH fines that may be imposed on the contractor and owner.

F. The general/abatement contractors shall only use heavy equipment operators that have proper asbestos and/or HAZWOPER training when disturbing/removing/moving and packing asbestos, lead and PCB containing materials. Acceptable training for asbestos can be 32 or 40 hour asbestos worker/supervisor with annual refresher training. 40 hour HAZWOPER training and annual refresher training is required for operators handling lead and/or PCB containing/contaminated materials. All operators must also have current medicals, fit test data and wear respirators during work.

G. The remediation/asbestos abatement contractor, their subcontractors, waste transporters and/or landfill(s) do not have permission to take/analyze building materials for PCB content/ concentrations without written permission from the building owner prior to such sampling. Should the contractor or other parties listed above take/analyze PCB samples without the owner's permission and PCB's are found to be >1 ppm, the hazardous materials/remediation contractor will be responsible for **all costs** associated with the abatement/remediation/replacement of all the interior/exterior building materials and adjacent surfaces, including soil/asphalt/concrete/etc. as well as all costs associated with project delays, attorney fees for all parties affected and all costs resulting from CT DEEP/EPA requirements that may occur as a result.

H. The remediation/asbestos abatement contractor, their subcontractors, waste transporters must submit landfill information to Langan and the owner prior to the shipment of any waste. The contractor(s)/hauler(s) cannot ship waste until Langan and the owner have approved the landfill the contractor/hauler is/are proposing to ship the waste to. PCB TCLP sampling of the waste may be required by the landfills permits and this testing must be performed by the contractor (if testing is approved by Langan and the owner), with Langan present during sampling, and the results made available to Langan and the owner prior to waste shipment. If Langan is not present during the sampling, Langan may perform additional PCB TCLP sampling to confirm the contractor's results and these results will supersede the contractors sample results.

I. The contractor(s) will be responsible for hiring an engineer and other appropriate personnel to ensure that all required selective demolition and demolition activities are safe to perform for all personnel on site. The contractor(s) will be financially responsible for any damage that may occur to the site, on-site personnel, fines, penalties, etc. They will also be responsible for paying/reimbursing all legal fees/costs for all parties involved with the project should selective demolition or demolition activities cause injury or death to any persons on site.

J. The Owner shall retain a Consultant for the purposes of project management and monitoring during asbestos abatement. The Consultant will represent the Owner in all phases of the abatement project at the discretion of the Owner. The asbestos abatement contractor will regard the consultant's direction as authoritative and binding as provided herein, in matters particularly but not limited to approval of work areas, review of monitoring results, completion of the various segments of work, final completion of the abatement, submission of data, and daily field punch list items. The State of Connecticut licensed Asbestos Consultant — Project Designer is Matthew Myers (license no. 000058).

1.10 DEFINITIONS

A. The following definitions relative to asbestos abatement apply:
1. Abatement - Procedures to control fiber release from asbestos-containing materials; includes removal, encapsulation, and enclosure.
2. Air Monitoring - The process of measuring the fiber concentration of an area or of a person.
3. Amended Water - Water to which a surfactant has been added.
4. Asbestos - The name given to a number of naturally occurring fibrous silicates. This includes the serpentine forms and the amphiboles and includes chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite, or any of these forms, which have been chemically altered.
5. Asbestos Felt - a product made by saturating felted asbestos with asphalt or other suitable bindery, such as a synthetic elastomer.
6. Asbestos Fibers - Those particles with a length greater than five (5) microns and a length to diameter ratio of 3:1 or greater.
7. Asbestos Work Area - a regulated area as defined by OSHA 29 CFR 1926.1101 where asbestos abatement operations are performed which is isolated by physical barriers to prevent the spread of asbestos dust, fibers, or debris. The regulated area shall comply with requirements of regulated area for demarcation, access, respirators, prohibited activities, competent persons and exposure assessments and monitoring.
8. Asphalt Shingles, Composition Shingles or Strip Slates: (Pitched Roof Shingle) - a roofing material manufactured by saturating a dry felt with asphalt then coating the saturated felt with a harder asphalt mixed with a fine mineral, glass fiber, asbestos or organic stabilizer. All or part of the weather side may be covered with mineral granules, or with powdered talc or mica.
9. Base Flashing (roof) - the flashing provided by upturned edges of a water tight membrane on a roof. May contain metal and associated waterproofing material or combination of roofing felts and waterproofing at the joint between a roofing surface and a vertical surface such as a wall or parapet. Also base flashing may be present at perimeter of completely flat roof.
10. Built-Up Roofing (Composition Roofing, Felt and Gravel Roofing, Gravel Roofing) - a continuous roof covering made up of laminations or plies of saturated or coated roofing felts, alternated with layers of asphalt or coal-tar pitch and surfaced with gravel, paint or finish coat.
11. Caulking - resilient mastic compound often having a silicone bituminous or rubber base; used to seal cracks, fill joints, and prevent leakage. Typical applications: around windows, and doors. Caulking is at joints between two dissimilar materials. (i.e. masonry to wood, masonry to steel)

12. Clean Room - An uncontaminated area or room, which is a part of the worker decontamination enclosure with provisions for storage of workers' street clothes and protective equipment.
13. Clearance Sampling - Final air sampling performed aggressively after the completion of the abatement project in a regulated area.
    Air samples collected by the air sampling professional having a fiber concentration of less than 0.01 fibers/cc of air in each of five (5) samples collected inside the containment will denote acceptable clearance sampling by Phase Contrast Microscopy.
    or
    Five air samples collected inside the containment by the air sampling professional having an average asbestos concentration of less than 70 structures per square millimeter of air will denote acceptable clearance sampling for Transmission Electron Microscopy.
14. Competent Person - As defined by 29 CFR 1926.1101, a representative of the Abatement Contractor who is capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure. Who has authority to take prompt corrective measures to eliminate such hazards during asbestos removal. Competent person shall be properly trained in accordance with EPA's Model Accreditation Plan.
15. Curtained Doorway - A device to allow ingress and egress from one area to another while permitting minimal air movement between the areas. Two curtained doorways spaced a minimum of six feet apart can form an airlock.
16. Damp Proofing - application of a water impervious material to surface such as wall to prevent penetration of moisture, typically at foundation or below grade surface.
17. Decontamination Enclosure System - A series of connected areas, with curtained doorways between any two adjacent areas, for the decontamination of workers and equipment. A decontamination enclosure system always contains at least one airlock and is adjacent and connected to the regulated area, where possible.
18. Encapsulant - A liquid material which can be applied to asbestos-containing materials which controls the possible release of asbestos fibers from the materials either by creating a membrane over the surface (bridging encapsulant) or penetrating the material and binding its components together (penetrating encapsulant).
19. Equipment Room - Any contaminated area or a room that is part of the worker decontamination enclosure with provisions for storage of contaminated clothing and equipment.
20. Fixed Object - Unit of equipment or furniture in the work areas that cannot be removed from the work area.
21. Friable Asbestos Materials - Any material that contains more than 1% asbestos by weight, that can be crumbled, pulverized or reduced to powder by hand pressure.
22. Glazing Compound - any compound used to hold window glass in place, also referred to as putty, or glazier's putty, is not field applied, usually installed during manufacture of windows.
23. HEPA Filter - High Efficiency Particulate Air (HEPA) filter in compliance with ANSI Z9.2-1979.
24. HEPA Vacuum Equipment - Vacuum equipment equipped with a HEPA filter system for filtering the effluent air from the unit.
25. Movable Object - Unit of equipment of furniture in the work area that can be removed from the work area.

26. Negative Air Pressure Equipment - A portable local exhaust system equipped with HEPA filtration used to create negative pressure in a regulated area (negative with respect to adjacent unregulated areas) and capable of maintaining a constant, low velocity air flow into regulated areas from adjacent unregulated areas.
27. NESHAPS - National Emissions Standard for Hazardous Air Pollutants regulations enforced by the EPA.
28. Permissible Exposure Level (PEL) - The maximum airborne concentration of asbestos fibers to which an employee is allowed to be exposed. The new level established by OSHA 29 CFR 1926.1101 is 0.1 fibers per cubic centimeter of air as an eight (8) hour time weighted average and 1.0 fibers /cc averaged over a sampling period of 30 minutes as an Excursion Limit. The Contractor is responsible for maintaining work areas in a manner that this standard is not exceeded.
29. Project Monitor - A professional capable of conducting air monitoring and analysis of schemes. This individual should be an industrial hygienist, an environmental scientist, or an engineer with experience in asbestos air monitoring and worker protection equipment and procedures. This individual should have demonstrated proficiency in conducting air sample collection in accordance with 29 CFR 1910.1001 and 29 CFR 1926.1101.
30. Regulated Area - An area established by the employer to demarcate where Class I, II, and III asbestos work is conducted and any adjoining area where debris and waste from such asbestos work accumulate, and a work area within which airborne concentrations of asbestos exceed or there is a reasonable possibility that they may exceed the PEL.
31. Shower Room - A room between the clean room and the equipment room in the work decontamination enclosure with hot and cold running water and suitably arranged for employee showering during decontamination. The shower room is located in an airlock between the contaminated area and the clean area.
32. Waterproofing - material, usually a membrane or applied compound (tar/mastic), used to make a surface impervious to water, includes concealed conditions (applications around doors, windows, and in wall cavities). Sometimes combined with felts.

1.11 SUBMITTALS

A. Pre-Work Submittals: Within 7 days prior to the pre-construction conference, the Contractor shall submit 3 copies of the documents listed below to the Owner and Engineer for review:
   1. Valid Contractor's Asbestos Removal license issued by the Connecticut Department of Public Health (CT DPH).
   2. Certificate of insurance covering work of this Contract.
   3. Name, experience of supervisors, and copies of valid Asbestos Supervisor permits issued by the CT DPH.
   4. Citations/Violations/Legal Proceedings: Submit a statement describing:
      a. Any citations, violations, criminal charges, or legal proceedings undertaken or issued within the past two years by any law enforcement, regulatory agency, or consultant concerning performance on previous abatement contracts. Briefly describe the circumstances citing the Project and involved persons and agencies as well as the outcome of any actions.
      b. Any litigation or arbitration proceedings arising out of performance on past Projects.
   5. Work Schedule:

a. Show the complete sequence of abatement activities and the sequencing of work within each building section.
b. Show the dates for the beginning and completion of each major element of work including substantial completion dates for each work area, building, or phase.
c. Show projected percentage of completion for each item, as of the first day of each month.
d. Show final inspection dates.

6. Project Notifications: As required by Federal, State, and local regulatory agencies together with proof of transmittal (i.e. certified mail return receipt). The contractor shall notify the Connecticut Department of Public Health and US EPA Region 1 at least ten (10) days prior to the start of asbestos abatement, as required by the Regulations of Connecticut State Agencies, Section 19a-332a-3 and EPA.
7. Abatement Work Plan: The Contractor shall design, prepare and submit to the Authority for review and approval, a detailed asbestos removal plan for the project in accordance with the applicable regulations and these specifications. The plan shall, at minimum, show limits of containment and work areas, methods of removal, location of decontamination units, number and location of negative air units, waste routes, waste storage location, entrance and exits, emergency exits, and any necessary details. Work shall not commence until the Authority has reviewed, commented and approved the contractor's asbestos removal plan. Provide plans which clearly indicate the following:
    a. All Work Areas/containment numbered sequentially.
    b. Locations and types of all decontamination enclosures.
    c. Entrances and exits to the Work Areas/containment.
    d. Type of abatement activity/technique for each Work Area/containment.
    e. Number and location of negative air units and exhaust. Also provide calculations for determining number of negative air pressure units.
    f. Proposed location and construction of storage facilities and field office.
    g. Location of water and electrical connections to building services.
    h. Waste transport routes through the building to the waste storage container.
8. Contingency plan.
9. Name, location, and applicable licenses for primary and secondary landfill for disposal of asbestos-containing material and asbestos contaminated waste.
10. Summary of proposed materials, and equipment to be used.
11. Certification that vacuums, temporary ventilation equipment, and other equipment to be used meet the ANSI 29.2-79 requirement for airborne fiber filtration.
12. If rental equipment is to be used in work area or to transport asbestos contaminated waste, provide notice to rental agency stating intended use of equipment, with copy to the Authority.
13. Summary of the Contractor's workforce by disciplines. Include a notarized statement signed by the Contractor documenting that all proposed workers, by name, have received all required medical examinations and have been properly trained and certified in asbestos removal work, respirator use, to appropriate EPA and OSHA standards for asbestos removal. Include on statement Contractor's compliance with OSHA medical surveillance requirements.
14. The Contractor shall submit his/her Health and Safety Plan and Standard Operating Procedures for this project for use in complying with the requirements of these

Specifications and applicable regulations. The Plan shall include, but shall not be limited to: distribution and use of amended water, the sequencing of asbestos work, detailed schedules and dates, shift times, and work activities during that shift, the interface of other trades involved in the performance of work, methods to be used to assure the safety of building occupants and visitors to the Site, security of the work areas, and a detailed description of the methods to be employed to control airborne fiber concentrations.

15. Written description of emergency procedures to be followed in case of injury or fire. This section must also include evacuation procedures, sources of medical assistance and procedures for access by medical personnel.
16. Level of respiratory protection intended for each operation for the project.

B. Project Closeout Submittals: Submit the following to Owner and Consultant at the close out of the Project (no later than 15 days subsequent to site demobilization):
   1. Originals of all waste disposal manifests, seals, and disposal logs.
   2. OSHA compliance air monitoring records conducted during the work.
   3. Daily progress log.
      a. A list of all workers used in the performance of the Project, including name, social security number, and CT DPH certification number.
      b. For each worker used in the performance of the project, submit required employee statements including Medical Examination Statement, Worker's Acknowledgment Statement, Respirator Fit Test, and Employee Training Statement.
      c. Certification for the laboratory that analyzed the OSHA personnel air samples.
      d. A notarized “Release of Liens” in a form acceptable to the owner. Such notarized release of liens shall certify that all sub-contractors, labor suppliers, etc. have been paid their pro rate share of all payments to date for the project, that the contractor has no basis for further claims, and will not make further claims for payment in any account after the first payment is made to him.

1.12 MEDICAL REQUIREMENTS

A. Prior to potential exposure to airborne asbestos fibers, provide workers with a comprehensive medical examination as required by 29 CFR 1910.1001, and 29 CFR 1926.1101.
   1. This examination is not required if adequate records show the employee has been examined as required by 29 CFR 1910.1001, and 29 CFR 1926.1101 within the past year.
   2. The same medical examination shall be given on an annual basis to employees engaged in an occupation involving asbestos fibers and within thirty (30) calendar days before or after the termination of employment in such occupations.

B. As required by 29 CFR 1910.1001, and 29 CFR 1926.1101 maintain complete and accurate records of employees' medical examinations for a period of thirty (30) years after termination of employment and make records of the required medical examinations available for inspection and copying to: The Assistant Secretary of Labor for Occupational Safety and Health, the Director of the National Institute for Occupational Safety and Health (NIOSH), authorized representatives of either of them, and an employee’s physician upon the request of the employee or former employee.

C. The Contractor shall furnish the Owner evidence of its firm's medical surveillance program required under 29 CFR 1910.1001, and 29 CFR 1926.1101.

1.13 REGULATIONS AND STANDARDS

Regulatory compliance includes but is not necessarily limited to applicable requirements set forth by:

A. Federal Regulations:
1. 29 CFR 1910 and 1926 – Construction and General Industry Standards
2. 29 CFR 1910.1001, "Asbestos" (OSHA)
3. 29 CFR 1910.1200, "Hazard Communication" (OSHA)
4. 29 CFR 1910.134, "Respiratory Protection" (OSHA)
5. 29 CFR 1910.145, "Specification for Accident Prevention Signs and Tags" (OSHA)
6. 29 CFR 1910.146, “Permit Required Confined Spaces” (OSHA)
7. 29 CFR 1926, "Construction Industry" (OSHA)
8. 29 CFR 1926.1101, "Asbestos, Tremolite, Anthophyllite, and Actinolite" (OSHA)
9. 29 CFR 1926.500 "Guardrails, Handrails and Covers" (OSHA)
10. 40 CFR 61, Subpart A, "General Provisions" (EPA)
11. 40 CFR 61, Subpart M, "National Emission Standards for Hazardous Air Pollutants (NESHAP)" (EPA)
12. 40 CFR 763 Subpart E, “Asbestos in Schools Regulations” (EPA)
13. 49 CFR 171-172, Transportation Standards (DOT)

B. Connecticut Regulations:
State requirements which govern asbestos abatement work and hauling and disposal of asbestos waste materials include but are not necessarily limited to the following:
1. Connecticut Department of Energy and Environmental Protection (Solid Waste Management Regulations).
2. Connecticut Department of Public Health (CT DPH) regulations outlined in Section 19a-332a-1 through 19a-332a-16 “Standards for Asbestos Abatement”
3. CT DPH regulations outlined in Section 20-440-1 through 20-440-9 “Licensure and Training Requirements for Persons Engaged in Asbestos Abatement and Consulting Services”
4. Connecticut Department of Labor (CT DOL)
5. Connecticut Department of Transportation (CT DOT)

C. Local Regulations:
Local agencies which may govern or have certain requirements regarding asbestos abatement work or hauling and disposal of asbestos waste materials include but are not necessarily limited to the following:
1. Building Department
2. Health Department
3. Fire Department

D. Standards and Guidance Documents:
   1. American National Standard Institute (ANSI) Z88.2-80, Practices for Respiratory Protection
   2. ANSI Z9.2-79, Fundamentals Governing the Design and Operation of Local Exhaust Systems
   3. EPA 560/585-024, Guidance for Controlling Asbestos Containing Materials in Buildings (Purple Book)
   4. EPA 530-SW-85-007, Asbestos Waste Management Guidance

1.14 EXEMPTIONS

A. Any deviations from these specifications require the written approval and authorization from the Owner and Consultant.

B. Any modifications from the standard work practices identified in the CT DPH Standards for Asbestos Abatement, Sections 19a-332a-1 to 19a-332a-16 must be requested in writing, and approved in writing from the CT DPH.

1.15 FINAL AIR CLEARANCE

A. Following the completion of the encapsulation phase of the work, the Consultant shall collect final air clearance samples inside the work area per AHERA regulation 40 CFR Part 763 and in compliance with CT DPH regulations. The Owner of the facility shall be responsible for payment of the sampling and analysis of the initial final air clearance samples only. The contractor shall be responsible for payment of all costs associated with the collection and analysis of additional final air clearance samples if the first set of samples fail to satisfy the clearance criteria.

1.16 NOTIFICATIONS, POSTINGS, SUBMITTALS, AND PERMITS

A. The contractor shall make the following notifications, and provide the submittals to the following agencies prior to the commencement of removal work. This notification is required ten (10) calendar days prior to the start of the abatement project:
   1. U.S. EPA, Region 1
      5 Post Office Square, Suite 100 (OES05-4)
      Boston, MA 02109-3912
   2. Connecticut Department of Public Health
      410 Capital Avenue MS #12 AIR
      P.O. Box 340308
      Hartford, CT 06134

B. The minimum information included in the notification to these agencies includes:
   1. Name and address of building Owner/Operator
   2. Building location
   3. Building size, age, and use
   4. Amount of friable asbestos
   5. Work schedule, including proposed start and completion date

6. Asbestos removal procedures to be used
7. Name and location of disposal site for generated asbestos waste, residue, and debris
8. If landfill opens in Connecticut to accept ACM waste, Consultant will notify CT DEEP prior to utilizing said landfill.

1.17 WORK SITE SAFETY PLAN

A. The contractor shall establish a set of emergency procedures and shall post them in a conspicuous place at the work site. The safety plan should include provisions for the following:
   1. Evacuation of injured workers.
   2. Emergency and fire exit routes from all work areas.
   3. Emergency first aid treatment
   4. Local telephone numbers for emergency services including ambulance, fire, and police.
   5. A method to notify occupants of the building in the event of a fire or other emergency requiring evacuation of the building.

B. The contractor is responsible for training all workers in these procedures.

1.18 INDEPENDENT AIR SAMPLING AND ASBESTOS ABATEMENT MONITORING

A. This section describes independent air sampling work being performed on behalf of the Owner. This work is not in the Contract Sum. This section describes air monitoring carried out by the Owner's Consultant to verify that the building beyond the work area and the outside environment remains uncontaminated. (Personal air monitoring required by OSHA is work to be performed by the Contractor and is within the Contract Sum.)

B. The purpose of the Owner's Consultant's air monitoring is to detect faults in the work are isolation such as:
   1. Contamination of the building outside of the work area by airborne asbestos fibers.
   2. Failure of filtration or rupture in the differential pressure system.
   3. Contamination of air outside the building envelope by airborne asbestos fibers.

   Should any of the above occur the Contractor shall immediately cease asbestos abatement activities until the fault is corrected. Do not recommence work until authorized by the Owner's Consultant.

C. The Owner's Consultant will monitor airborne fiber counts in the Work Area. The purpose of this air monitoring will be to detect airborne asbestos concentrations, which may challenge the ability of the Work Area isolation procedures to protect the balance of the building or outside of the building from contamination by airborne fibers.

D. To determine if the elevated airborne fiber counts encountered during abatement operations have been reduced to an acceptable level, the Consultant will sample and analyze air in accordance with clearance air sampling requirements.

E. The Owner's Consultant will perform on-site monitoring throughout the course of the project, as follows:
   1. All work procedures shall be continuously monitored by the Consultant to assure that areas outside the designated work locations in the buildings will not be contaminated.
   2. Prior to work on any given day, the Contractor's designated "competent person" shall discuss the day's work schedule with the Consultant to evaluate job tasks with respect to safety procedures and requirements specified to prevent contamination of the building or the employees. This includes a visual survey of the work area and the decontamination of the building or the employees. This includes a visual survey of the work area and the decontamination enclosure systems.

1.19 CONTRACTOR'S AIR SAMPLING RESPONSIBILITY

A. The contractor shall independently retain a CT licensed asbestos project monitor to monitor airborne asbestos concentrations in the workers' breathing zone and to establish conditions and work procedures for maintaining compliance with OSHA Regulations 29 CFR 1910.1001 and 1926.1101.

B. The Contractor's project monitor shall document all air sampling results and provide a report to the Consultant within 24 hours after sample collection.

C. All air sampling shall be conducted in accordance with methods described in OSHA Standards 29 CFR 1910.1001 and 1926.1101 and the OSHA Respiratory Protection Standard 29 CFR 1910.134.

D. A minimum of 20% of all workers in each working category (i.e., gross removal, final clearance, etc.) must be monitored each day of asbestos removal activities.

E. Phase Contrast Microscopy may be used to analyze personal air samples. The Contractor shall arrange and pay for all costs of the testing. Laboratories used shall be currently enrolled in the American Industrial Hygiene Association Proficiency Analytical Testing Program or an equivalent recognized program and approved by CT DPH.

1.20 PROPER WORKER PROTECTION

A. This section describes the equipment and procedures required for protecting workers against asbestos contamination and other workplace hazards except for respiratory protection.

B. All workers are to be accredited as abatement workers as required by the AHERA regulation 40 CFR 763 Appendix C to Subpart E, February 3, 1994.

C. The contractor is required to be certified and accredited as required by the State of Connecticut Department of Public Health Services.

D. In accordance with 29 CFR 1926 and 20-440-7 RCSA, all workers shall receive a training course covering the dangers inherent in handling asbestos, the dangers of breathing asbestos dust, proper work procedures, and proper worker protective measures. This course must include but is not limited to the following:
   1. Methods of recognizing asbestos
   2. Health effects associated with asbestos
   3. Relationship between smoking and asbestos in producing lung cancer
   4. Nature of operations that could result in exposure to asbestos
   5. Importance of and instruction in the use of necessary protective controls, practices and procedures to minimize exposure including:
      a. Engineering controls
      b. Work Practices
      c. Respirators
      d. Housekeeping procedures
      e. Hygiene facilities
      f. Protective clothing
      g. Decontamination procedures
      h. Emergency procedures
   6. Waste disposal procedures
   7. Purpose, proper use, fitting, instructions, and limitations of respirators as required by 29 CFR 1910.134
   8. Appropriate work practices for the work
   9. Requirements of medical surveillance program
   10. Review of 29 CFR 1926
   11. Pressure Differential Systems
   12. Work practices including hands on or on-job training
   13. Personal Decontamination procedures
   14. Air monitoring, personal and area

E. The Contractor shall provide medical examinations for all workers who may encounter an airborne fiber level of 0.1 f/cc or greater for an 8-hour Time Weighted Average and/or enter regulated areas. In the absence of specific airborne fiber data provide medical examinations for all workers who will enter the Work Area for any reason. Examination shall, at a minimum, meet OSHA requirements as set forth in 29 CFR 1926 In addition, provide an evaluation of the individual's ability to work in environments capable of producing heat stress in the worker.

F. Submit the following to the consultant for review. The contractor shall not start work until these submittals are returned with consultant action stamp indicating that they are approved.
   1. Submit copies of certificates from an EPA-approved AHERA abatement workers course for each worker as evidence that each asbestos abatement worker is accredited as required by the AHERA Regulation 40 CFR 763 Appendix C to Subpart E, February 3, 1994.
   2. Submit evidence that the contractor is certified to perform asbestos abatement work by the State of Connecticut Department of Public Health services.
   3. Submit documents verifying that each worker has had a medical examination within the last 12 months as part of compliance with OSHA medical surveillance requirements. Submit, at a minimum, for each worker the following:

a. Name and Social Security Number
b. Physicians Written Opinion from examining physician including at a minimum the following:

4. Whether worker has any detected medical conditions that would place the worker at an increased risk of material health impairment from exposure to asbestos.
5. Any recommended limitations on the worker or on the use of personal protective equipment such as respirators.
6. Statement that the worker has been informed by the physician of the results of the medical examination and of any medical conditions that may result from asbestos exposure.
7. Copy of information that was provided to physician in compliance with 29 CFR 1926
8. Statement that worker is able to wear and use the type of respiratory protection proposed for the project, and is able to work safely in an environment capable of producing heat stress in the worker.
9. Submit copies of certificates for the site supervisor and the workers issued by CT DPH.

G. Submit certification signed by an officer of the abatement-contracting firm and notarized that exposure measurements, medical surveillance, and worker training records are being kept in conformance with 29 CFR 1926.

H. The Contractor shall maintain control of and be responsible for access to all work areas to ensure the following requirements:
1. Non-essential personnel are prohibited from entering the area.
2. All authorized personnel entering the work area shall read the "Worker Protection Procedures" which are posted at the entry points to the enclosure system, and shall be equipped with properly fitted respirators and protective clothing.
3. All personnel who are exiting from the decontamination enclosure system shall be properly decontaminated.
4. Asbestos waste that is taken out of the work area must be properly bagged and labeled in accordance with these specifications. The surface of the bags shall be decontaminated. Asbestos leaving the enclosure system must be immediately transported off-site or immediately placed in locked, posted temporary storage on-site, and removed within 24 hours of the project conclusion.
5. Any material, equipment, or supplies that are brought out of the decontamination enclosure system shall be cleaned and decontaminated by wet cleaning and/or HEPA vacuuming of all surfaces.

1.21 ALTERNATE WORK PRACTICES

A. The contractor and/or consultant may obtain services of a CT DPH certified asbestos project designer and submit application for variances to the CT DPH, as applicable for any alterations, modifications or non-conforming methods intended of asbestos removal. Methods requiring variances include but are not necessarily limited to glove-bagging, use of tent procedures, remote decons, etc. The alternative procedures shall be submitted in writing and hand delivered or post marked at least ten (10) days before the project start date. CT DPH may approve an alternative procedure for an asbestos abatement project with certain conditions that would provide equivalent or a greater measure of asbestos emission control than the conventional work practices. The alternate work practice request form shall be signed and sealed by a Licensed Designer. Any fees associated with the application shall be paid by the Contractor. All alternative work practices must be approved and accepted by Langan's project designer regardless if they have been approved by CT DPH. The abatement contractor will be required to propose a credit to the building owner/client/consultant that must be reviewed and accepted prior to AWP submission to CT DPH.

1.22 POST-PROJECT CLOSEOUT

A. The contractor shall provide all required documentation as required by this specification once his/her work is complete, final clearances passed and asbestos waste disposed of. This should include but not be limited to: bound copy of the daily log containing log of daily work activities, all supervisor and worker certificates of training and Connecticut licenses, certificates of insurance, daily sign in sheets, containment entry/exit logs, copy of recording manometer charts, waste shipment records, personal air monitoring laboratory reports and chain-of-custody documentation, and project completion certificate. Final payment shall not be made to the contractor until all required documentation is submitted and verified.

PART 2 PRODUCTS

2.1 MATERIALS

A. Deliver all materials in the original packages, containers, or bundles bearing the name of the manufacturer and the brand name and product technical description.

B. Damaged or deteriorating materials shall not be used and shall be removed from the premises. Material that becomes contaminated with asbestos shall be decontaminated or disposed of as asbestos waste.

C. Polyethylene sheet in a roll size to minimize the frequency of joints shall be delivered to the job site with factory label indicating 4 or 6 mil.

D. Polyethylene disposable bags shall be six (6) mil with pertinent pre-printed label. Tie wraps for bags shall be plastic, five (5) inches long (minimum), pointed and looped to secure filled plastic bags.

E. Tape or adhesive spray will be capable of sealing joints in adjacent polyethylene sheets and for attachment of polyethylene sheet to finished or unfinished surfaces of dissimilar materials and capable of adhering under both dry and wet conditions, including use of amended water.

F. Surfactant (wetting agent), shall consist of fifty (50) percent polyoxyethylene ether and fifty (50) percent polyoxyethylene ester, or equivalent, and shall be mixed with water to provide a concentration of one (1) ounce surfactant to five (5) gallons of water or as directed by manufacturer.

G. Removal encapsulant shall be non-flammable factory prepared penetrating chemical encapsulant found acceptable to Consultant. Usage shall be in accordance with manufacturer's printed technical data.

H. The contractor shall have available spray equipment capable of mixing wetting agent with water and capable of generating sufficient pressure and volume and having sufficient hose length to reach all areas with asbestos.

I. Impermeable containers are to be used to received and retain any asbestos-containing or contaminated materials until disposal at an acceptable disposal site. The containers shall be labeled in accordance with OSHA Standard 29 CFR 1926.1101. Containers must be both air and watertight.

J. Labels and signs, as required by OSHA Standard 29 CFR 1926.1101, will be used.

K. Encapsulant shall be bridging or penetrating type which has been found acceptable to the consultant. Usage shall be in accordance with manufacturer's printed technical data.

L. HEPA filtered local exhaust ventilation shall be utilized during the installation of enclosures and supports where asbestos-containing materials may be disturbed.

2.2 TOOLS AND EQUIPMENT

A. The contractor shall provide all tools and equipment necessary for asbestos removal, encapsulation and enclosure.

B. The contractor's air monitoring professional shall have air-monitoring equipment of type and quantity to monitor operations and conduct personnel exposure surveillance per OSHA requirements.

C. The contractor shall have available sufficient inventory or dated purchase orders for materials necessary for the job including protective clothing, respirators, filter cartridges, polyethylene sheeting of proper size and thickness, tape and air filters.

D. The contractor shall provide (as needed) temporary electrical power panels, electrical power cables, and electrical power sources (such as generators). Any electrical connection work affecting the building electrical power system shall be performed by a State of Connecticut licensed electrician and the contractor shall obtain all necessary local permits.

E. The contractor shall have available shower stalls and plumbing to support same to include sufficient hose length and drain system or an acceptable alternate.

F. Exhaust air filtration system units shall contain HEPA filter(s) capable of sufficient air exhaust to create negative pressure of -0.02 inches of water within enclosure with respect to outside area. Equipment shall be checked for proper operation by smoke tubes or differential pressure gauge before the start of each shift and at least twice during the shift. Adequate exhaust air shall be provided for a minimum of four (4) air changes per hour within the enclosure. No air movement system or air filtering equipment shall discharge unfiltered air outside.

G. Vacuum units, of suitable size and capacities for the project, shall have HEPA filter(s) capable of trapping and retaining at least 99.97 percent of all monodispersed particles of 0.3 micrometers in diameter or larger.

H. The contractor will have reserve units so that systems will operate continuously.

2.3 RESPIRATORY PROTECTION

A. Select respirators from those approved by the Mine Safety and Health Administration (MSHA), and the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services.

B. Respirators shall be individually fit-tested to personnel under the direction of an Industrial Hygienist on a yearly basis. Fit-tested respirators shall be permanently marked to identify the individual fitted, and use shall be limited to that individual. Fit-test records shall be maintained on-site for each employee.

C. Where fiber levels permit, and in compliance with regulatory requirements, Powered Air Purifying Respirators (PAPR) are the minimum allowable respiratory protection permitted to be utilized during gross removal operations. The Contractor shall use supplied air respirator for confined space requirements. PAPR's are the minimal respiratory protection required for all thermal system insulation and surfacing asbestos abatement.

D. No respirators shall be issued to personnel without such personnel participating in a respirator training program.

E. High Efficiency Particulate Air (HEPA) respirator filters shall be approved by NIOSH and shall conform to the OSHA requirements in 29 CFR 1910.134 and 29 CFR 1926.1101.

F. A storage area for respirators shall be provided by the contractor in the clean room side of the personnel decontamination enclosure where they will be kept in a clean environment.

G. The contractor shall provide and make available a sufficient quantity of respirator filters so that filter changes can be made as necessary during the work day. Filters will be removed and discarded during the decontamination process. Filters cannot be reused. Filters must be changed if breathing becomes difficult.

H. Filters used with negative pressure air purifying respirators shall not be used any longer than one eight (8) hour work day.

I. Any authorized visitor, worker, or supervisor found in the work area not wearing the required respiratory protection shall be removed from the project site and not be permitted to return.

J. The contractor shall have at least two (2) Powered Air Purifying Respirators stored on-site designated for authorized visitors use. Appropriate respirator filters for authorized visitors shall be made available by the contractor.

K. Establish a respirator program as required by ANSI Z88.2 and 29 CFR 1910.134, and 29 CFR 1926.1101. Provide respirator training and fit-testing.

2.4 PROTECTIVE CLOTHING

A. Provide personnel utilized during the Project with disposable protective whole body clothing, head coverings, gloves and foot coverings. Provide disposable plastic or rubber gloves to protect hands. Cloth gloves may also be worn. Make sleeves secure at the wrists and make foot coverings secure at the ankles by the use of tape, or provide disposable coverings with elastic wrists or tops.

B. Provide sufficient quantities of protective clothing to assure a minimum of four (4) complete disposable outfits per day for each individual performing abatement Work.

C. Eye protection and hard hats shall be provided and made available for all personnel entering any work area.

D. Authorized visitors shall be provided with suitable protective clothing, headgear, eye protection, and footwear whenever they enter the work area.

PART 3 EXECUTION

3.1 PRE-ABATEMENT MEETING

A. At least one week prior to the start of work a Pre-Construction Meeting will be scheduled and must be attended by the contractor and any sub-contractors. The assigned contractor site supervisor is also required to attend this meeting.

B. The contractor shall present a detailed project schedule and project submittals at the Pre-Construction Meeting. Variations, amendments, and corrections to the presented schedule will be discussed, and the Owner and consultant will inform the contractor of any scheduling adjustments for this project.

C. Following the Pre-Construction Meeting, the contractor shall submit a revised schedule (if needed) no later than one week after the meeting.

3.2 WORK AREA PREPARATION

A. Where necessary, shut down electrical power, including receptacles and light fixtures. Under no circumstances during the decontamination procedures will lighting fixtures be permitted to be operating when the spraying of amended water may contact the fixture. Provide GFCI devices, temporary power, and temporary lighting installed in compliance with the applicable electrical codes. All installations are to be made by a State of Connecticut licensed electrician.

B. Shut down and/or isolate heating, cooling, and ventilation air systems or zones to prevent contamination and fiber dispersal to other areas of the structure. During the work, vents within the work area shall be "criticalled" with duct tape and polyethylene sheeting.

C. The contractor shall be responsible for removing furniture from the work areas. The contractor shall pre-clean moveable objects within the proposed work areas using HEPA vacuum equipment and/or wet cleaning methods as appropriate and remove such objects from work areas to a temporary location. For example, cabinets to gain access to floor tile and associated mastic.

D. Seal off all openings, including, but not limited to, windows, corridors, doorways, skylights, ducts, grills, diffusers, and any other penetration of the work areas, with polyethylene sheeting a minimum of six (6) mils thick, sealed with duct tape. This includes doorways and corridors that will not be used for passage during work areas and occupied areas.

E. Pre-clean fixed objects within the work areas, using HEPA vacuum equipment and/or wet cleaning methods as appropriate, and enclose with a minimum six (6) mil plastic sheeting sealed with duct tape.

F. Clean the proposed work areas using HEPA vacuum equipment or wet cleaning methods as appropriate. Do not use methods that raise dust, such as dry sweeping or vacuuming with equipment not equipped with HEPA filters.

G. After HEPA vacuum cleaning, cover fixed walls with two (2) layers of four (4) mil polyethylene sheeting to the floor level. Where fixed walls are not used, two layers of six (6) mil polyethylene sheeting will be applied to a rigid framework of wood, metal, or PVC. Where floor tile/mastic is not being abated, cover the floor with two (2) layers of six-mil polyethylene sheeting. All overlaps shall be sealed with tape or spray adhesive.

H. Maintain emergency and fire exits from the work areas, or establish alternate exits satisfactory to fire officials.

I. Clean and remove ceiling mounted objects, such as lights and other items not sealed off, which interfere with asbestos abatement. Use hand-held amended water spraying or HEPA vacuuming equipment during fixture removal to reduce settled fiber dispersal.

J. Create pressure differential between work areas and uncontaminated areas by the use of acceptable negative air pressure equipment sufficient to provide four (4) air changes per hour and create negative pressure of -0.02 inches of water within enclosure with respect to outside area as measured on a water gauge.

3.3 DECONTAMINATION SYSTEM

A. The following requirements shall be followed for the worker decontamination unit:
   1. At all asbestos abatement projects, work areas shall be equipped with decontamination facilities consisting of: a clean room, a shower room, and an equipment room attached to each containment.
   2. The decontamination enclosure system chambers shall be constructed to meet the criteria of the Specification. The decontamination enclosure shall be installed watertight to prevent water leaks. The interior shall be lined with two layers of 6-mil fire-retardant plastic sheeting, with a minimum overlap of 16 inches at seams and sealed (airtight) by tape and adhesive. The interior floor shall be sheathed with (2) layers of reinforced fire retardant plastic sheeting with a minimum overlap on the wall of sixteen (16) inches. The contractor shall ensure compliance with local building codes and other regulations governing temporary structures.
   3. Curtained Doorways: Three overlapping sheets of 6-mil polyethylene shall be placed over a framed doorway and secured along the top of the doorway. Secure the vertical edge of the outer sheets along one vertical side of the doorway and the vertical edge of the center sheet along the opposite vertical side of the doorway. The sheets shall be weighted so that they close quickly after being released.
   4. Air Locks: Air locks shall consist of two curtained doorways placed a minimum of three feet apart.
      a. Clean Room: In this room, persons remove and leave all street clothes and put on clean disposable coveralls. Approved respiratory protection equipment is stored in this area. The floor of the clean room must be kept dry at all times. At the end of each shift, the room must be cleaned using wet rags. Also, a lockable door may be installed. No asbestos-containing materials are allowed in this room. The clean room shall be equipped with suitable hooks, lockers, shelves, etc. for workers to store personal articles and clothing. THIS IS NOT A CONTAMINATED AREA.
      b. Shower Room: Provide a completely watertight operational shower to be used by cleanly dressed workers heading for the Work area from the clean room or for showering workers headed out of the Work Area after dressing in the Equipment Room. Shower must be constructed so that water leakage is minimized. The shower shall have one shower per six full shift abatement people, calculated on the basis of the largest shift. Any leaking water must be cleaned immediately. Showers must be equipped with hot and cold running water, soap and sufficient disposable towels for the number of workers at the job site. Arrange water shut off and drain pump operation controls, so that a single individual can shower without assistance from either inside or outside the work area. THIS IS A CONTAMINATED AREA.

         Pump wastewater into a polyethylene lined 55-gallon drum located in the work area to be added to the asbestos waste. If the water is allowed by the work treatment workers to be pumped into a drain, provide 20 micron and 5 micron waste water filters in line

to drain. Change filters at a minimum of once a day. Locate filters inside the shower unit, so that the shower pan catches the water lost during filter change.

c. Equipment Room: Work equipment, footwear, and all other contaminated work clothing are to be left here upon exiting work area. A walk-off pan filled with water shall be located in the work area just outside the equipment room for workers to clean foot coverings while exiting the work area. This is a change and transit area for workers. Provide a drop cloth layer of sheet plastic on the floor of the Equipment Room for every shift change. Roll drop cloth layer in upon itself at the end of each shift and dispose of as contaminated waste. THIS IS A CONTAMINATED AREA.

Each room shall be separated from the other and from the work area by airlocks such as will prevent the free passage of air or asbestos fibers and shall be accessible through doorways protected with three (3) overlapping 6 mil polyethylene sheets which shall be weighed, so as to fall into place when people pass through the area. The shower room shall be contiguous to the clean room and equipment room. All personnel entering or leaving the work area shall pass through the shower room. The number of showers provided shall satisfy the requirements of OSHA 29 CFR 1910.141. Hot and cold water shall be supplied to the showers. The equipment room (dirty room) shall be situated between the shower room and the work area and separated from both by means of suitable barriers or overlapping flaps such as will prevent the free passage of air or asbestos fibers.

Decontamination chamber doors shall be of sufficient height and width to enable replacement of equipment, which may fall, and to safely stretcher or carry an injured worker from the site without destruction of the chamber or unnecessary risk to the integrity of the work area. Such doors must be at least four (4) feet wide, and the distance between sets of doors must be at least four (4) feet.

5. No person or equipment shall leave the asbestos abatement project work area unless first decontaminated by showering, wet washing or HEPA vacuuming to remove all asbestos debris. No asbestos contaminated materials or persons shall enter the clean room.
6. Where feasible, decontamination systems shall abut the work area. In situations where it is not possible, due to unusual conditions, to establish decontamination systems contiguous to the work area, personnel shall be directed to remove visible asbestos debris from their persons by HEPA-filtered vacuuming prior to donning clean disposable coveralls while still in the work area, and proceeding directly to a remote decontamination system to shower and change clothes to follow work area exit procedures.
7. In specific situations where the asbestos contractor determines that it is not feasible to establish a contiguous decontamination system at a work site, the asbestos contractor shall utilize a remote decontamination system if approved by Langan. Such systems must be operated in conformance with 29 CFR 1926.1101, Appendix F.

B. Remote Decontamination Facility:

For exterior work on the roof, glove bag or tent procedures, when full containment enclosure is not feasible, the Contractor shall provide remote personnel decontamination enclosure system if approved by the Consultant - Langan.

C. Occupied areas and/or building space not within the work areas shall be separated from asbestos abatement work areas by means of airtight barriers.

D. Construct the decontamination system with wood or metal framing, 3/8" sheathing and cover both sides with a double layer of six (6) mil polyethylene sheeting, spray glued or taped at the joints. Caulk joints watertight at floor, walls, and ceiling.

E. The contractor and the consultant shall visually inspect barrier several times daily to assure effective seal and the contractor shall repair defects immediately

F. Waste/Equipment Decontamination Enclosure System:
This system is located adjacent to the work area. The equipment decontamination enclosure system, consisting of two totally enclosed spaces, shall be constructed as follows:

1. Equipment Washroom: An equipment washroom shall have two air locks: one adjacent to the work area and one common air lock which separate it from the holding area. The washroom shall have facilities for washing material containers and equipment. Gross removal of dust and debris from contaminated material containers and equipment shall be accomplished in the work area, prior to moving to the washroom.
2. Holding Area: A holding area shall share a common air lock with the equipment washroom and shall have a curtained doorway to outside areas. A hinged, lockable door shall be placed at the holding area entrance to prevent unauthorized access into the work area.
3. Remote Decontamination Facility: For exterior work on the roof, glove bag or tent procedures, when full containment enclosure is not required, the contractor shall provide remote Waste/Equipment decontamination enclosure system as specified.

3.4 ABATEMENT REMOVAL PROCEDURES

A. Regulatory compliance will include, but is not necessarily limited to, applicable requirements set forth by the Federal Environmental Protection Agency (EPA), Connecticut Departments of Public Health (CT DPH), Connecticut Department of Environmental Protection, and Local Health and Building Departments.

B. The following procedures shall be followed while performing the abatement activities:

1. No asbestos abatement work, including preparation, shall be performed or continued without having proper notification and a certified supervisor at the work area. The contractor shall have a designated "competent person" on the job at all times to ensure establishment of a proper enclosure system and proper work practices throughout the project.
2. Abatement work will not commence until authorized by the consultant.

3. Provide and display danger signs at every entrance to the work areas in clearly visible locations indicating that asbestos removal work is being conducted and unauthorized and not protected persons should not enter.
   Signs must use the following legend:
   DANGER
   ASBESTOS
   MAY CAUSE CANCER
   CAUSES DAMAGE TO LUNGS
   AUTHORIZED PERSONNEL ONLY
   WEAR RESPIRATORY PROTECTION AND
   PROTECTIVE CLOTHING IN THIS AREA

   Signs shall be posted which meet the specifications set forth in 29 CFR 1926.1101 at all approaches to the work area. Signs shall be posted a sufficient distance from the work area to permit a person to read the sign and take precautionary measures to avoid exposure to asbestos.
4. The worker decontamination enclosure system shall be installed or constructed prior to plasticizing the work area or before disturbing ACM. The waste decontamination enclosure system shall be installed or constructed prior to commencement of gross removal work.
5. All asbestos handlers shall wear disposable suits, including gloves, hood and footwear, and appropriate respiratory equipment, after removing street clothes in the clean room.
6. Abatement of asbestos-containing materials shall be done by wet methods only.
7. ACM shall be sprayed with amended water in sufficient frequency and quantity for enhanced penetration. Sufficient time shall be allowed for penetration to occur prior to removal action or other disturbance-taking place. Dry removal of asbestos materials is prohibited.
8. In order to maintain indoor asbestos concentrations to the minimum, the wet asbestos must be removed in manageable sections. Material drop shall not exceed eight (8) feet. For heights up to 15 feet, provide inclined chutes or scaffolding to intercept drop.
9. Remove asbestos containing materials as appropriate by standard methods. Fill disposal containers as removal proceeds; seal filled containers and clean containers before removal to equipment decontamination system. Wet clean each container thoroughly, double bag and apply caution label. Ensure that workers do not exit the work area thorough the equipment decontamination enclosure.
10. After completion of stripping work, all surfaces from which asbestos has been removed shall be wet brushed, using a nylon brush, wet wiped, and sponged or cleaned by an equivalent method to remove all visible material (wire brushes are not permitted). During this work, the surfaces being cleaned shall be kept wet.
11. Remove and containerize all visible accumulations of asbestos-containing and/or asbestos-contaminated debris. During cleanup, utilize brooms, rubber dustpan, and rubber squeegees to minimize damage to floor covering.
12. Retrieve all free water in contaminated areas and place in plastic lined leak-tight drums.
13. Sealed disposal containers, and all equipment used in the work area, shall be included in the cleanup and shall be removed from work areas via the equipment decontamination enclosure at an appropriate time in the cleaning sequence. All asbestos waste in 6-mil

polyethylene disposal bags shall be double bagged in the equipment decontamination enclosure before removal from the Site.

14. At any time during asbestos removal, should the consultant suspect contamination of areas outside the work area(s), he shall cause all abatement work to stop until the contractor takes steps to decontaminate these areas and eliminate the causes of such contamination. Unprotected individuals shall be prohibited from entering suspected contaminated areas until air sampling and visual inspections certify decontamination.
15. After completion of the initial final cleaning procedure including removal of the inner layers of polyethylene sheeting, but prior to encapsulation, a pre-sealant inspection shall be conducted by the consultant. The pre-sealant inspection shall verify that ACM and residual dust has been removed from the work area.
16. After the work area has been inspected by the Engineer and rendered free of visible debris, a thin coat of a pigmented (non-transparent) encapsulating agent shall be applied to all surfaces in the work area from which ACM was removed, to lockdown nonvisible fibers.
17. Removal of asbestos containing materials shall be done under negative pressure containment. All OSHA Class I, Class III, and interior Class II asbestos abatement projects shall employ HEPA negative air pressure equipment ventilation. The negative air pressure equipment shall operate continuously, twenty-four (24) hours a day, from startup of negative air pressure equipment, through the cleanup operations. A negative air pressure, relative to areas outside of the enclosure, shall be maintained at all times in the regulated abatement work area during the asbestos abatement project to ensure that contaminated air in the regulated abatement work area does not escape back to an uncontaminated area. A manometer shall be used to document the pressure differential for all OSHA Class I Large and Small size asbestos project regulated abatement work areas. A minimum of -0.02 column inches of water pressure differential, relative to pressure outside the regulated abatement work area, shall be maintained within the regulated abatement work area, as evidenced by manometric measurements.

3.5 CONSULTANT

A. The Owner has retained Langan Engineering (Langan) as the Hazardous Materials Consultant for the purpose of project design, construction administration, and project monitoring during Asbestos Abatement. Mr. Matthew Myers (License #000058) of Langan is the DPH-approved Asbestos Project Designer for this project. The Consultant will represent the Owner in all tasks of the abatement project at the discretion of the Owner. The Asbestos Abatement Contractor will regard the Consultant's direction as authoritative and binding as provided herein, in matters particularly but not limited to approval of work areas, review of monitoring results, completion of the various segments of work, final completion of the abatement, submission of data, and daily field punch list items.

3.6 CONSULTANT'S RESPONSIBILITIES

A. Air sampling shall be conducted by the consultant to ascertain the integrity of controls that protect the building from asbestos contamination. Independently, the contractor shall monitor air quality

within the work area to ascertain the protection of employees and to comply with OSHA regulations.

B. The consultant's CT DPH licensed asbestos project monitor shall collect and analyze air samples during two time periods:
   1. Abatement Period: If required, the consultant's project monitor shall collect samples on a daily basis during the work period. A sufficient number of area samples shall be taken outside of the work area, at the exhaust of the negative pressure system, and outside of the building to judge the degree of cleanliness or contamination of the building during removal. Additional samples may be taken inside the work area and decontamination enclosure system, at the discretion of the project monitor.
   2. Post-Abatement Period: The consultant's project monitor shall conduct air sampling following the final cleanup phase of the project, once the "no visible residue" criterion, as established by the project monitor, has been met. Five (5) samples shall be collected inside the work area utilizing aggressive methods to comply with the State of Connecticut Department of Public Health Standards for Asbestos Abatement, sections 19a-332a-12. Analysis of the samples to determine airborne concentrations of asbestos shall be conducted by Transmission Electron Microscopy (TEM) method with an average limit of 70.0 structures per square millimeter of filter surface or by Phase Contrast Microscopy (PCM) with a limit of 0.010 fibers per cubic centimeters of air in accordance with the above Connecticut regulation sections.

C. The consultant's project monitor shall provide continual evaluation of the air quality of the building during removal, using his/her best professional judgment in respect to the State of Connecticut Department of Public Health guideline of 0.010 fibers/cc and the background air quality established during the pre-abatement period.

D. If the project monitor determines that the building air quality has become contaminated from the project, he/she shall immediately inform the contractor to cease all removal operations and implement a work stoppage clean up procedure. The contractor shall conduct a thorough cleanup of the areas of the building designated by the consultant. No further removal work can take place until the project monitor has assessed that the building air has been decontaminated.

E. Pre-abatement and abatement air samples shall be collected as required to obtain a volume of 1,200 liters. Samples shall be analyzed by Phase Contrast Microscopy (PCM) methodology using the NIOSH 7400 protocol.

3.7 CONSULTANT'S INSPECTION RESPONSIBILITIES

A. The consultant shall conduct inspection throughout the progress of the abatement project. Inspections shall be conducted in order to document the progress of the abatement work as well as the procedures and practices employed by the abatement contractor.

B. The consultant shall perform the following inspections during the course of abatement activities:
   1. Pre-commencement Inspection: Pre-commencement inspections shall be performed at the time requested by the abatement contractor. The consultant shall be informed 12 hours prior

to the time the inspection is needed. If, during the course of the pre-commencement inspection, deficiencies are found, the contractor shall perform the necessary adjustments in order to obtain compliance.

2. Work Area Inspections: Work area inspections shall be conducted on a daily basis at the discretion of the consultant. During the course of the work inspections, the consultant shall observe the contractor's removal procedures, verify barrier integrity, monitor negative air filtration devices, assess project progress, and inform the abatement contractor of specific remedial activities if deficiencies are noted.
3. Pre-encapsulation/Final Visual Inspection: The consultant, upon the request of the abatement Contractor, shall conduct a pre-sealant inspection. The consultant shall be informed 24 hours prior the time that the inspection is needed. The pre-encapsulation inspection shall be conducted after completion of the all cleaning procedures, but prior to encapsulation. The pre-encapsulation inspection shall verify that all ACM and residual debris have been removed from the work area. If, during the course of the pre-encapsulation inspection, the consultant identifies residual dust or debris, the contractor shall comply with the request of the consultant in order to render the area "dust free."

3.8 CLEARANCE AIR TESTING

A. After the visual inspection is completed and all surfaces in the abatement area have dried, final air clearance sampling shall be performed by the consultant. Aggressive air monitoring will be used. Selection of location and samples shall be the responsibility of the consultant. Air monitoring volumes shall be sufficient to provide a detection limit of 0.010 f/cc using NIOSH-approved method for PCM analysis. For air clearance by Transmission Electron Microscopy, air-monitoring volumes shall be sufficient to provide a detection limit of 0.005 f/cc using the AHERA Level II Yamate Method.

B. Areas which do not comply with the Standard for Cleaning for Initial Clearance shall continue to be cleaned by and at the contractor's expense until the specified Standard of Cleaning is achieved as evidenced by results of air testing as previously specified.

3.9 ASBESTOS WASTE DISPOSAL

A. The contractor shall package, label, and remove all asbestos waste from the work area in accordance with Connecticut DEEP and DPH regulations, all other applicable regulations, and as specified below. Packaging shall be accomplished in a manner that minimizes waste volume, but insures waste containers shall not tear or break. All waste shall be transported in leak tight containers.

B. Asbestos wastes may include building materials, insulation, disposable clothing and protective equipment, plastic sheeting and tape, exhaust systems or vacuum filters, contractor equipment, or other materials designated by state or local authorities which have been potentially contaminated with asbestos and have not been fully cleaned.

C. Waste Labeling
1. Warning labels, having waterproof print and permanent adhesive in compliance with OSHA, EPA, CT DEEP/DOT and CT DPH requirements, shall be affixed to or printed on

the sides of all waste bags or transfer containers. Warning labels shall be conspicuous and legible, and contain the following words:

DANGER
CONTAINS ASBESTOS FIBERS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
DO NOT BREATHE DUST
AVOID CREATING DUST

2. In compliance with NESHAP, 40 CFR, Part 61.150, all waste containers or bags shall be labeled with the following generator information:
   a. Name of waste generator
   b. Location of where waste was generated

D. Wetting of Waste: A fine water spray shall be used to keep the top layers of waste in containers thoroughly wet at all times. When a waste bag is full, air within the bags shall be evacuated with a HEPA equipped vacuum and be securely sealed with tape or other secure fastener.

E. Use and Decontamination of Fiber Drums: The Contractor's use and decontamination of fiber drums shall be in accordance with CT DPH, EPA and DOT requirements. The drums shall be lined with a minimum of two layers of 6-mil asbestos waste bags. The waste will be appropriately labeled and sealed. The drums shall be sealed with an airtight lid and shall be decontaminated and/or additionally bagged if the drums are filled inside the containment and visible debris/contamination is observed on the exterior of the drums. All waste shall be labeled as previously described. The drums and waste will be re-containerized should their integrity be compromised and/or liquid is visibly passing through or staining the container.

F. Waste Container Storage: The container used for the storage of bagged contaminated waste shall be an enclosed dumpster. The dumpster shall have a solid metal roof and a solid metal door with padlock. At a minimum, line the cargo area with two layers of a 6-mil polyethylene sheeting to prevent contamination from damaged or leaking containers. Floor sheeting shall be installed first and shall extend up the sidewalls 24 inches minimum. Wall sheeting shall be overlapped and taped securely into place. No un-bagged contaminated waste or non-asbestos waste shall be stored in these dumpsters. Ensure that bags placed in dumpsters are undamaged. Warning signs shall be posted on the dumpster in accordance with Sections 29 CFR 1926.1101 of the OSHA regulations.

G. Waste Removal Scheduling: All waste containers shall be decontaminated and removed from the Site before final cleanup is started and isolation barriers are taken down.

H. Waste Transportation and Disposal
   1. It is the responsibility of the contractor to determine and insure that the contractor and his/her subcontractor are complying with: 1) current waste handling regulations; and 2) the current regulations for transporting and disposing waste at the ultimate disposal landfill. The contractor must comply fully with these regulations, and with all U.S. Department of Transportation, State, local, and EPA requirements.

2. The contractor's waste hauler and disposal contractor shall maintain a valid hazardous waste transporter's permit and identification number; and obtain complete, and fully comply with any other local hazardous waste manifesting requirements.
3. Exercise care before and during transport to ensure that no unauthorized persons have access to the containerized ACW.
4. Do not transport ACW on open trucks. Treat and dispose of drums that have been contaminated as asbestos-containing waste.
5. A copy of ACW manifest forms shall be sent to the Owner after each disposal is completed and all required data and signatures have been inserted.

END OF SECTION 02 8213

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Local Educational Agency Town of Greenwich	State Project No. 057-0114 N	Phase 2 of 3
School Central Middle School	Architect The S/L/A/M Collaborative	Date 07/08/2024

DAS - OFFICE OF SCHOOL CONSTRUCTION GRANTS & REVIEW (OSCG&R) PLAN REVIEW CHECKLIST

ASBESTOS / HAZARDOUS MATERIALS ABATEMENT PHASE OR PROJECT

FORM SCG-3011

- Do not use Not Applicable (N/A). Use "None", "NPS" (Not in Project Scope), or explain condition.
- Submit completed **Pre-Bid Conformance Review (PCR) Checklist** with this completed form.
- Status column (by SCG staff): ✓ Accepted ○ Open Item

Asbestos Designer – Matthew Myers Specification Section – 02 8213 – Asbestos Abatement Hazardous Building Materials Drawings – HBM-01, 02 & 03			Status
	Document	Notes	
01.	Abatement plan preparer identified and certified by Department of Public Health (DPH)	1.2 – Page 1	
02.	Abatement plan coordinator identified and certified by DPH	Supervisor – 1.7 – Page 4, Designer & Monitor – 3.5 – Page 33, Town – Daniel Watson	
03.	Type(s) and amount(s) of asbestos containing material (ACM) / hazardous materials (Haz-Mat) to be abated	Drawings HBM-01, 02 & 03 Spec 1.8 and 1.9 – Pages 5-10	
04.	Notification of demolition and renovation to DPH	1.11 (6) – Page 16, 1.16 – Page 19	
05.	Proper worker protection (OSHA requirement)	1.12 – Pages 17 and 18, 1.20 – Page 21 - 23	
06.	Licensed air sampling professional employed by LEA	1.18 – Pages 20 and 21, 3.5 and 3.6 – Pages 33 and 34	
07.	Pre-abatement meeting	3.1 – Page 27	
08.	All ACM / hazmat locations identified	Drawings HBM-01, 02 & 03 Spec 1.8 and 1.9 – Pages 5-10	
09.	Employees' decontamination system	3.3 Pages 29-31	
10.	Waste disposal system (ACM / Haz-Mat removal from contaminated area)	3.9 – Pages 35 - 37, 3.3F – Page 31	
11.	Negative air pressure system	3.2J – Page 29	
12.	Proper worksite preparation	3.2 – Pages 28 and 29	
13.	Re-occupancy clearance standards	1.15 – Page 19, 3.8 – Page 35	
14.	Replacement materials specified	Architect's Package / Specs	
15.	DPH-approved project designer	1.2 – Page 1	
16.	Mini-containment -"Alternative Work Practice" approved by DPH	None Approved	

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SECTION 02 8313 – LEAD-BASED PAINT AWARENESS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

B. Refer to all drawings and/or other Sections of these specifications to determine the type and extent of work therein affecting the work of this Section, whether or not such work is specifically mentioned herein.

C. Sections containing requirements related to this Section include, but are not limited to:
1. Section 02 8200 – Selective Hazardous Building Materials Abatement Demolition
2. Section 02 8213 – Asbestos Abatement
3. Section 02 8416 – Universal Waste Removal and Recycling
4. Section 02 8432 – PCBs Greater than 50 PPM Remediation
5. HBM – 01, 02 & 03 – Hazardous Building Materials Abatement Drawings

1.2 SUMMARY OF WORK

A. Work of this Section includes, requirements for worker protection and waste disposal related to the demolition work involving components and surfaces containing lead at the Central Middle School Site. XRF screening found that some painted ceramic, metal and wood components/ materials have lead-based paint, lead as defined by the CT DPH or lead content. All materials should be considered to contain some amounts of lead per OSHA.

B. The procedures referenced herein shall be utilized during required demolition work specified elsewhere in the Architect's Specification that might impact lead.

C. The demolition may result in dust and debris exposing workers to levels of lead above the OSHA Action Level. Worker protection, training, and engineering controls referenced herein shall be strictly adhered to, until completion of exposure assessment with results indicating exposures below the "Action Level". This section does not involve lead abatement by CT DPH regulation, but identified worker protection requirements for trades involved in the demolition and disposal procedures if lead is involved in the waste stream.

1.3 DEFINITIONS

A. The following definitions relative to lead paint as used in this Section are offered:
1. Action Level (AL): The allowable employee exposure, without regard to use of respiratory protection, to an airborne concentration of lead over an eight (8) hour time weighted average (TWA), as defined by OSHA. The current action level is thirty micrograms per cubic meter of air (30 $\mu g/m^3$).

2. Area Monitoring: The sampling of lead concentrations, which is representative of the airborne lead concentrations that may reach the breathing zone of personnel potentially exposed to lead.
3. Biological Monitoring: The analysis of a person's blood and/or urine, to determine the level of lead concentration in the body.
4. Change Room: An area provided with separate facilities for clean protective work clothing and equipment and for street clothes, which prevents cross-contamination.
5. Competent Person: A person employed by the Contractor who is capable of identifying existing and predictable lead hazards in the surroundings or working conditions, and who has authorization to take prompt corrective measures to eliminate them as defined by OSHA.
6. Exposure Assessment: An assessment conducted by an employer to determine if any employee may be exposed to lead at or above the action level.
7. "High Efficiency Particulate Air" (HEPA): A type of filtering system capable of filtering out particles of 0.3 microns diameter from a body of air at 99.97% efficiency or greater.
8. Lead: Refers to metallic lead, inorganic lead compounds and organic lead soaps. Excluded from this definition are other organic lead compounds.
9. Lead Work Area: An area enclosed in a manner to prevent the spread of lead dust, paint chips, or debris resulting from lead-containing paint disturbance.
10. Lead Paint: Refers to paints, glazes and other surface coverings containing a toxic level of lead.
11. Permissible Exposure Limit (PEL): The maximum allowable limit of exposure to an airborne concentration of lead over an eight (8) hour time weighted average (TWA), as defined by OSHA. The current PEL is fifty micrograms per cubic meter of air (50 $\mu g/m^3$). Extended workdays lower the PEL by the formula: PEL equals 400 divided by the number of hours of work.
12. Personal Monitoring: Sampling of lead concentrations within the breathing zone of an employee to determine the 8-hour time weighted average concentration in accordance with 29 CFR 1926.62 and 29 CFR 1910.1025. Samples shall be representative of the employee's work tasks. Breathing zone shall be considered an area within a sphere with a radius of 18 inches and centered at the nose or mouth of an employee.
13. Resource Conservation Recovery Act (RCRA): RCRA establishes regulatory levels of hazardous chemicals. There are eight (8) heavy metals of concern for disposal: arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver. Six (6) of the metals are typically found in paints, excluding selenium and silver.
14. Toxic Level Of Lead: A level of lead, when present in dried paint or plaster, contains more than 0.50% lead by dry weight as measured by atomic absorption spectrophotometry (AAS) or 1.0 mg/cm^2 as measured by on-site testing utilizing an x-ray fluorescence analyzer. (Term is specific to State of CT regulations and HUD guidelines only)
15. Toxicity Characteristic Leachate Procedure (TCLP): The U.S. Environmental Protection Agency (US EPA) required sample preparation and analysis for determining the hazard characteristics of a waste material.

1.4 REGULATIONS AND STANDARDS

A. The following regulations, standards, and ordinances of federal, state, and local agencies are applicable and made a part of this specification by reference:
   1. American National Standards Institute (ANSI) ANSI 288.2 - 1980 Respiratory Protection
   2. Code of Federal Regulation (CFR)
      a. 29 CFR 1910.134 - Respiratory Protection

b. 29 CFR 1910.1025 - Lead
c. 29 CFR 1926.62 - Lead in Construction Interim Final Rule
d. 29 CFR 1910.1200 - Hazard Communication
e. 29 CFR 1926.59 - Hazard Communication in Construction
f. 29 CFR 1926.55 - Gases, Vapors, Fumes, Dusts, and Mists
g. 29 CFR 1926.57 - Ventilation
h. 40 CFR 260 - Hazardous Waste Management Systems: General

3. 40 CFR 261 - Identification and Listing of Hazardous Waste
4. 40 CFR 262 - Generators of Hazardous Waste
5. 40 CFR 263 - Transporters of Hazardous Waste
6 40 CFR 264 - Owner and Operators of Hazardous Waste Treatment, Storage, and
7. Disposal Facilities
   a. 40 CFR 265 - Interim Statutes for Owner and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
   b. 40 CFR 268 - Lead Disposal Restrictions
   c. 40 CFR 172 - Hazardous Materials Tables and Communication Regulations
   d. 40 CFR 178 - Shipping Container Specifications
   e. 40 CFR 270 and 124 - Hazardous Waste Permits
8. Underwriters Laboratories, Inc. (UL) UL586 - 1990 High Efficiency Particulate Air Filter Units

1.5 QUALITY ASSURANCE

A. Hazard Communication Program
The Contractor shall establish and implement a Hazard Communication Program as required by 29 CFR 1926.59.

B. Compliance Plan (Site Specific)
The contractor shall establish a written compliance plan, which is specific to the project site, to include the following:
1. A description of work activity involving lead including equipment used, material included, controls in place, crew size, employee job responsibilities, operating procedures, and maintenance practices.
2. Methods of engineering controls to be used to control lead exposure.
3. The proposed technology the Contractor will implement in meeting the PEL.
4. Air monitoring data documenting the source of lead emissions.
5. A detailed schedule for implementing the program, including documentation of appropriate supply of equipment, etc.
6. Proposed work practice which establishes proper protective work clothing, housekeeping methods, hygiene facilities, and practices.
7. Worker rotation schedule, if proposed, to reduce TWA.
8 A description of methods for informing workers of potential lead exposure.

C. Hazardous Waste Management
The Contractor shall establish a Hazardous Waste Management Plan, which shall comply with applicable regulations and address the following:
1. Identification of hazardous wastes
2. Estimated quantity of waste to be disposed of

3. Names and qualifications of each sub-contractor that will be transporting, storing, treating, and disposing of wastes
4. Disposal facility location and 24 hour point of contact
5. Establish EPA state hazardous waste and identification numbers if applicable
6. Names and qualifications (experience and training) of personnel who will be working on-site with hazardous wastes
7. List of waste handling equipment to be used in performing the work to include cleaning, volume reduction, if applicable, and transport equipment
8. Qualifications of laboratory to be utilized for TCLP sampling and analysis
9. Spill prevention, containment, and cleanup contingency measures
10. Work plan and schedule for waste containment, removal, treatment, and disposal

D. Medical Examinations
1. Before exposure to lead contaminated dust, provide workers with a comprehensive medical examination as required by 29 CFR 1910.1025 and 29 CFR 1926.62.
2. The examination shall not be required if adequate records show that employees have been examined as required by 29 CFR 1926.62 within the last year.
3. Medical examination shall include, at a minimum, approval to wear respiratory protection and biological monitoring.

E. Training
1. The Contractor shall ensure that workers are trained to perform lead paint disturbing activities and disposal operations prior to the start of work in accordance with 29 CFR 1926.62.

F. Respiratory Protection Program
1. The Contractor shall furnish each employee required to wear a negative pressure respirator with a respirator fit test at the time of initial fitting and at least once every six (6) months thereafter as required by 29 CFR 1926.62.
2. The Contractor shall establish a Respiratory Protection Program in accordance with ANSI Z88.2, 29 CFR 1910.134, and 29 CFR 1926.62.

1.6 SUBMITTALS

A. The Contractor shall submit to the Owner the following submittals prior to start of work:
1. Copies of medical records for each employee to be used on the project, including results of biological monitoring and a notarized statement by the examining physician that such an examination took place.
2. Copies of workers' training certificates.
3. Submit record of successful respirator fit testing performed by a qualified individual within the previous six (6) months, for each employee to be used on this project with the employee's name and social security number with each record.
4. The name and address of Contractor's blood lead testing lab, OSHA-CDC listing, and Certification in the State of Connecticut.
5. The name and address of Contractor's personal air monitoring and waste disposal lead testing laboratory/ies.
6. Name, address, and ID number of the hazardous waste hauler, waste transfer route, and proposed disposal site.

B. The Contractor shall submit to the Owner the following submittals during the job:
   1. Results from personal air samples.
   2. Medicals, certificates, and fit test 24 hours in advance of any new employee starting on the project.

C. The Contractor shall submit to the Owner the following submittals upon completion of the work:
   1. Copies of manifests and receipts acknowledging disposal of all hazardous waste material from the project showing delivery date, quantity, and appropriate signature of landfill's authorized representative.

1.7 PERSONAL PROTECTION

A. Exposure Assessment
   1. The Contractor shall determine if any worker will be exposed to lead at or above the action level.
   2. The exposure assessment shall identify the level of exposure a worker would be subjected to without respiratory protection.
   3. The exposure assessment shall be achieved by obtaining personal monitoring samples representative of a full shift at least (8-hour TWA).
   4. During the period of the exposure assessment, the Contractor shall institute the following procedures for protection of workers.
      a. Protective clothing shall be utilized
      b. Respiratory protection
      c. Change areas shall be provided
      d. Hand washing facilities and shower
      e. Biological monitoring
      f. Training of workers

B. Respiratory Protection
   1. The Contractor shall furnish appropriate respirators approved by NIOSH/MSHA for use in atmospheres containing lead dust.
   2. Respirators shall comply with the requirements of 29 CFR 1926.62.
   3. Workers shall be instructed in all aspects of respiratory protection.
   4. The Contractor shall have an adequate supply of HEPA filter elements and spare parts on site for all types of respirators in use.
   5. The following minimum respirator protection for use during paint removal or demolition of components and surfaces with lead paint shall be the 1/2 mask air purifying respirator with high efficiency filters for exposures (not in excess of 500 ug/m^3 or 10 x PEL).

C. Protective Clothing
   1. Personal protective clothing shall be provided for all workers, supervisors, and authorized visitors entering the work area.
   2. Each worker shall be provided with a minimum of two (2) complete disposable coverall suits.
   3. Removal workers shall not be limited to two (2) suits, and the Contractor shall supply additional suits as necessary.
   4. Under no circumstances shall anyone entering the abatement area be allowed to re-use a contaminated disposable suit.

5. Disposable suits, such as TYVEK suits, and other personal protective equipment (PPE) shall be donned prior to entering the lead control area. A change room shall be provided for workers to put on suits and other personal protective equipment with separate areas to store their street clothes.
6. Eye protection for personnel engaged in lead operations shall be furnished when the use of a full-face respirator is not required.
7. Goggles with side shields shall be worn when working with power tools or a material that may splash or fragment, or if protective eye wear is specified on the Safety Data Sheet (SDS) for a particular product to be used on the project.

1.8 PERSONAL MONITORING

A. General: The Contractor is required to perform the personal air sampling activities during lead paint disturbing work. The results of such sampling shall be posted, provided to individual workers and submitted to the Owner as described herein.

B. Sampling: Samples shall be taken for the duration of the work shift or for eight hours, whichever is less. Personal samples need not be taken every day after the first day if working conditions remain unchanged, but must be taken every time there is a change in removal operations, either in terms of the location or the type of work. Sampling will be used to determine eight-hour Time-weighted averages (TWA). The Contractor is responsible for personal sampling as outlined in OSHA Standard 29 CFR 1926.62 and 29 CFR 1910.1025.

C. Sampling Results: Air sampling results shall be reported to individual workers in written form no more than forty-eight (48) hours after the completion of a sampling cycle. The reporting document shall list each sample's result, sampling time and date, personnel monitored and their social security numbers, flow rate, sample duration, sample yield, cassette size, and analysts' name and company, and shall include an interpretation of the results. Air sample analysis results will be reported in micrograms/cubic meter ($\mu g/m^3$).

D. Testing Laboratory: The Contractor's testing lab shall be participating in AIHA's Environmental Lead Laboratory Accreditation Program (ELLAP). The Contractor shall submit to the Consultant for review and acceptance, the name and address of the laboratory, certification(s) of AIHA participation, a listing of relevant experience in air_lead analysis, and presentation of a documented Quality Assurance and Quality Control Program.

PART 2 PRODUCTS

2.1 GENERAL

A. Any substitution in materials, equipment, or methods to those specified shall be approved by the Owner prior to use. Any requests for substitution shall be provided in writing to the Owner. The request shall clearly state the rationale for the substitution.

B. Submit to the Owner product data of all materials and equipment and samples of all materials to be considered as an alternate.

C. Product data shall consist of manufacturer; catalog sheets, brochures, diagrams, schedules, performance charts, illustrations, safety data sheets (SDS), and other standard descriptive data.

Submittal data shall be clearly marked to identify pertinent materials, products or equipment and show performance characteristics and capacities.

D. Samples shall be of sufficient size and quantity to clearly illustrate the functional characteristics of the product or material with integrally related parts and attachment devices.

2.2 MATERIALS AND PRODUCTS

A. Deliver all materials in the original packages, containers, or bundles bearing the name of the manufacturer and the brand name and product technical description.

B. Damaged or deteriorating materials shall not be used and shall be removed from the premises.

C. The Contractor shall have available sufficient inventory or dated purchase orders for materials necessary for the job including protective clothing, respirators, filter cartridges, polyethylene sheeting of proper size and thickness, tape, and air filters.

D. Materials:
1. Polyethylene sheet in a roll size to minimize the frequency of joints shall be delivered to job site with factory label indicating 6 mil.
2. Polyethylene disposable bags shall be six (6) mil. Tie wraps for bags shall be plastic, five (5) inches long (minimum), pointed and looped to secure filled plastic bags.
3. Tape or adhesive spray will be capable of sealing joints in adjacent polyethylene sheets and for attachment of polyethylene sheet to finished or unfinished surfaces of dissimilar materials and capable of adhering under both dry and wet conditions, including use of amended water.
4. Impermeable containers are to be used to receive and retain any lead containing or contaminated materials until disposal at an acceptable disposal site. (The containers shall be labeled in accordance with EPA and DOT standards.)
5. HEPA filtered exhaust systems shall be used during powered dust generating abatement operations. The use of powered equipment without HEPA exhausts is prohibited.

2.3 TOOLS AND EQUIPMENT

A. Provide suitable tools for all lead disturbing operations.

B. The Contractor shall have available power cables or sources such as generators (where required).

C. Vacuum units, of suitable size and capacities for the project, shall have HEPA filter(s) capable of trapping and retaining 99.97% of all mono-dispersed particles of 0.3 micrometers in diameter.

PART 3 EXECUTION

3.1 WORKER PROTECTION/TRAINING

A. The Contractor shall provide appropriate training, respiratory and other personal protection, and biological monitoring for each worker and ensure proper usage during potential lead exposure and the initial exposure assessment.

B. Workers who will perform procedures must have completed one of the following training courses:
   1. EPA Lead Abatement Supervisor (40 hours)
   2. EPA Lead Abatement Worker (32 hours)
   3. HUD/EPA course "Work Smart, Work Wet, and Work Clean to Work Lead Safe" (8 hours)
   4. HUD/NARI course "The Remodeler's and Renovator's Lead Based Paint Training Program" (8 hours).
   5. HUD "Lead Safe Work Practices" (8 hours)

3.2 CONTRACTOR'S RESPONSIBILITIES

A. The Contractor is responsible for establishing and maintaining controls referenced herein to prevent dispersal of lead contamination from the lead work area.

B. The Contractor is also responsible for conducting work with applicable federal, state, and local regulations as referenced herein.

3.3 WORKER HYGIENE PRACTICES (REQUIRED DURING INITIAL EXPOSURE ASSESSMENT AND IF RESULTS OF AIR SAMPLING ARE ABOVE OSHA ACTION LEVEL)

A. Work Area Entry: Workers shall don personal protective equipment prior to entering work area, including respiratory protection, disposable coveralls, gloves, headgear, and footwear.

B. Work Area Departure: While leaving respirators on, workers shall remove all gross contamination, debris, and dust from disposable coveralls and proceed to change room and remove coveralls and footwear and place in hazardous waste disposal container.

C. Hand washing Facilities: All workers must wash their hands and faces upon leaving the work area.

D. Equipment: All equipment used by workers inside the work area shall be wet wiped or bagged for later decontamination before removal from the work area.

E. Prohibited Activities: Under no circumstances shall workers eat, drink, smoke, chew gum, or tobacco, or remove their respirators in the work area.

F. Shock Hazards: The Contractor is responsible for using safe procedures to avoid electrical hazards. All temporary electrical wiring will be protected by ground fault circuit interrupters (GFI).

3.4 LEAD WORK AREA (REQUIRED DURING INITIAL EXPOSURE ASSESSMENT AND IF RESULTS OF AIR SAMPLING ARE ABOVE OSHA ACTION LEVEL)

A. The Contractor shall place warning signs at all entrances and exits from the work area. Signage shall be a minimum of 20" x 14" and shall state the following:

DANGER
LEAD WORK AREA
MAY DAMAGE FERTILITY OR THE UNBORN CHILD

CAUSES DAMAGE TO THE CENTRAL NERVOUS SYSTEM
DO NOT EAT, DRINK OR SMOKE IN THIS AREA

B. The Contractor shall designate a change room as specified in this Section. The change room shall consist of two (2) layers of sheeting on the floor surface adjacent to the lead work area. The change room shall have separate storage facilities for street clothes to avoid cross contamination.

C. The Contractor shall provide potable water for hand and face washing and provide a portable shower unit.

D. The Contractor shall place six-mil polyethylene drop cloths on floor/ ground surfaces prior to beginning removal work to facilitate clean-up.

3.5 WORK AREA CLEAN UP

A. The Contractor shall remove all loose chips and debris from floor surfaces and place in hazardous waste disposal bags.

B. The Contractor shall HEPA vacuum adjacent surfaces to remove dust and debris.

C. Polyethylene drop cloths shall be properly disposed of.

3.6 WASTE DISPOSAL

A. The Contractor's contractual liability shall be the proper disposal of all non-hazardous and hazardous wastes generated at the site in accordance with all applicable federal, state, and local regulations as referenced herein. Metal lead based paint components may be segregated for recycling at an approved facility. Lead TCLP sampling will be performed by the owner's representative Langan. The contractor will be responsible for all costs associated with lead/hazardous waste disposal should they, their haulers and/or the landfill of their choosing take samples and declare the waste as regulated hazardous waste.

END OF SECTION 02 8313

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SECTION 02 8416 – UNIVERSAL WASTE REMOVAL AND RECYCLING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. General Provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

B. Refer to all drawings and/or other Sections of these specifications to determine the type and extent of work therein affecting the work of this Section, whether or not such work is specifically mentioned herein.

C. Sections containing requirements related to this Section include, but are not limited to:
1. Section 02 8200 – Selective Hazardous Building Materials Abatement Demolition
2. Section 02 8213 – Asbestos Abatement
3. Section 02 8313 – Lead-Based Paint Awareness
4. Section 02 8432 – PCBs Greater than 50 PPM Remediation
5. HBM – 01, 02 & 03 – Hazardous Building Materials Abatement Drawings

1.2 SUMMARY OF WORK

A. Work of this Section includes, but is not necessarily limited to, all which is necessary for complete removal and recycling/disposal of all PCB-containing ballasts, newer ballasts, mercury containing devices, electronics, alarms, emergency lighting, signage, paints, chemicals/ contaminated piping/waste traps, batteries, window air conditioning units, CFC's, boiler and HVAC controls, other hazardous materials, wastes and special wastes that exist in the interior/exterior of the building structure(s) that might be impacted by proposed demolition of the original building and building addition. The hazardous materials contractor will supply the packaging materials and pay for the proper disposal of these materials. The hazardous materials contractor will provide the labor to put the materials into the proper packaging for disposal.
1. All work including the removal, characterization (any testing that may be required by disposal facility) and disposal of hazardous materials and chemicals.
2. Removal, characterization (any testing that may be required by disposal facility) and disposal of fluorescent light ballasts and capacitors throughout all site structures.
3. Removal, characterization (any testing that may be required by disposal facility) and disposal of all containers, drums and unknown materials as well as fire extinguishers.
4. Removal, characterization (any testing that may be required by disposal facility) and disposal of contained gear oils, hydraulic oils and refrigeration liquids, etc. from various pieces of equipment.
5. Removal, characterization (any testing that may be required by disposal facility) and recycling/disposal of batteries, electronic devices, lighting signage, etc.
6. Removal, characterization (any testing that may be required by disposal facility) and recycling/disposal of science equipment, contaminated piping, chemicals, waste traps, etc.
7. File all necessary notices, obtain all permits and licenses, and pay all governmental taxes, fees, and other costs in connection with the work. Obtain all necessary approvals of all governmental departments having jurisdiction.

8. Comply with Health and Safety Plans.

B. The Contractor, under this Section, shall provide all materials, labor, equipment and appliances as necessary to properly remove and recycle/dispose of materials.

1.3 DESCRIPTION OF WORK

A. This specification covers the proper and legal removal and disposal of all Hazardous/Universal Waste from the Central Middle School Site located in Greenwich, Connecticut. The removal and disposal activities shall comply with all aspects of the contract documents and federal, state and local requirements.

B. Universal Wastes shall include, but not be limited to, fluorescent bulbs, light fixture ballasts containing polychlorinated bi-phenyls (PCBs) or DEHP, mercury lamps, mercury containing devices, thermostats and switches, batteries, fire extinguishers, Halon fire suppression systems, alarms, emergency lighting, paint, chemicals, window air conditioning units, CFC's, boiler and HVAC controls, science equipment/chemicals/contaminated piping/waste traps, refrigerants, electronic devices (computers, monitors and signage), and other compressed gases, mechanical fluids, oils, and lubricants. Whenever there is a conflict or overlap within these specifications and between applicable codes and regulations, the most stringent provision specified shall apply.

C. Central Middle School was constructed in 1957 with an addition in 2000. The school has two stories with basement mechanical areas and tunnels and crawl spaces with approximately 112,000 square feet of gross area. Interior areas consist of classrooms, offices, auditorium, gymnasium, media center, kitchen, cafeterias, toilet rooms, storage rooms, boiler/mechanical rooms, and tunnel/crawlspace/mechanical duct areas.

D. The proposed redevelopment consists of demolition of the original building and addition.

E. The Contractor shall independently identify and quantify all Universal Waste Items.

1.4 SUBMITTALS

A. Before Start of Work: Submit the following to the Owner's Representative for review. Do not start work until these submittals are returned with Owner's Representative's approval.
   1. Copy of State or local license for hazardous waste hauler;
   2. Certification of at least one on-site supervisor which has satisfactorily completed the OSHA 40 Hour Health and Safety Course for Handling Hazardous Materials;
   3. Certificates of workers which have successfully completed at least the OSHA 40-Hour Health and Safety Course for Hazardous Materials;
   4. Certificates of workers which have successfully completed the required employee training for universal/hazardous waste or appropriate type of training to the type of wastes being managed;
   5. Name and address of the universal waste handler and/or a destination facility where the waste materials is to be treated, deposited or recycled in accordance with all regulatory requirements (include contact person and telephone numbers), if the universal waste meets the definition of hazardous waste, the name and address of the hazardous waste treatment, storage and disposal (TSD) facility;

6. Work Plan: Provide a detailed written work plan that describes the procedures for the removal,
   a. Proposed level of worker training for each type of regulated and/or hazardous material to be removed.
   b. Names and applicable licenses of key personnel.
   c. Proof of appropriate training for workers.
   d. Proof of a current medical surveillance program for all personnel.
   e. Safety Data Sheets (SDS) for any chemicals to be used on the project. All products to be used on this project must have SDS approved by the Owner's Environmental Consultant.
   f. Proposed detailed work schedule.
7. Following final removal, and disposal or destruction, provide Owner with waste transport and disposal documents (e.g., manifests), as well as certificates of destruction and recycling as appropriate.

1.5 CODES AND REGULATIONS

A. Regulatory compliance includes but is not necessarily limited to applicable requirements set forth by :
   1. Federal Regulations:
      a. 29 CFR 1910, "Occupational Safety and Health Standards"(General Industry Standards)
      b. 29 CFR 1910.134 "Respiratory Protection"
      c. 29 CFR 1910.1200 "Hazard Communication"
      d. 29 CFR 1926, "Safety and Health Regulations for Construction" (Construction Industry Standards)
      e. 40 CFR 50, "National Primary and Secondary Ambient Air Quality Standards"
      f. 40 CFR 60, "Standards of Performance for New Stationary Sources," Appendix B, "Test Methods"
      g. 40 CFR 117, "Determination of Reportable Quantities for Hazardous Substances"
      h. 40 CFR 122, "USEPA Administered Permit Program: The National Pollutant Discharge Elimination System"
      i. 40 CFR 172, "Hazardous Waste Transportation"
      j. 40 CFR 261, "Identification and Listing of Hazardous Waste"
      k. 40 CFR 262, "Standards Applicable to Generators of Hazardous Waste"
      l. 40 CFR 263, "Standards Applicable to Transporters of Hazardous Waste"
      m. 40 CFR 268, "Land Disposal Restrictions"
      n. 40 CFR 273, "Universal Waste Rule"
      o. 40 CFR 300, "National Oil and Hazardous Substances Pollution Contingency Plan"
      p. 40 CFR 302, "Designation, Reportable Quantities, and Notification"
      q. 40 CFR 112 (oil pollution prevention)
      r. 40 CFR 279 (used oil)
      s. 40 CFR 273 (Universal Wastes)
      t. 40 CFR 761 (PCBs)
   2. Toxic Substances Control Act (TSCA), US-EPA
   3. Resource Conservation and Recovery Act (RCRA)
      a. Comprehensive Environmental Response, Compensation & Liability Act (CERCLA) (Superfund Law)

4. Connecticut Regulations:
   State requirements which govern universal waste removal and disposal include but are not necessarily limited to the following:

   a. Connecticut Department of Energy and Environmental Protection (CT DEEP) (Hazardous and Universal Waste Management Regulations); Section 22a-454, 456 Waste Facility and Section 22a-449(c)-113 of the Regulations of Connecticut State Agencies (RCSA), respectively.
   b. Connecticut DEEP; 310 CMR 40 Connecticut Contingency Plan, 310 CMR 30 Hazardous Waste Regulations, 310 CMR 1-7 Clean Water Act, 310 CMR 16, 19 Solid Waste Regulations, 314 CMR 1-8 Clean Air Act
   c. Local Town, City or County Bylaws, rules and regulations.

B. Under TSCA, items that contain more than 500 parts per million (PPM) of PCBs are classified as PCB material, items that contain between 50 ppm and 500 ppm of PCB are classified as PCB-contaminated and items that contain less than 50 ppm of PCBs are classified as non-PCB items.

Under the Small Capacitor Exemption, TSCA has allowed the disposal of non-leaking, intact "small capacitors", defined as containing less than three pounds of PCB dielectric fluid, in a municipal solid waste landfill. Light ballasts containing a small PCB capacitor are covered under this category. The intent of the "small capacitor" disposal rule is for "random disposal" in a landfill by "householders and other infrequent disposers". When commercial and industrial entities dispose of large quantities of small PCB capacitors, the EPA strongly encourages voluntary collection and disposal of PCB capacitors in chemical waste landfills or high-temperature incinerators.

C. Under the "Superfund" laws, PCBs are specifically listed as a hazardous substance. The "release" of more than one pound of PCBs into the environment triggers a "Superfund" notification and cleanup requirement.

Since twenty-five ballasts collectively contain approximately one pound of PCBs, the disposal of twenty five or more PCB-containing ballast in a landfill would trigger a "Superfund" action.

D. The State of Connecticut General Hazardous Waste Statue 22A 454, 456 requires that PCB ballast must be incinerated or sent to a chemical waste landfill. The statue defines PCB waste, including PCB ballast, as Connecticut Regulated Wastes.

E. Other Regulations: The other relevant regulations affecting disposal of PCBs include the following:
   1. Department of Transportation (DOT) regulations – DOT regulation HM-181 regulates transportation of hazardous materials, including PCBs.
   2. Occupational Safety and Health Administration (OSHA) – OSHA regulates worker's safety and exposure to a variety of chemicals including PCB's.
   3. Resource Conservation and Recovery Act (RCRA) – RCRA regulates wastes, which fail Toxic Characteristic Leachate Procedure (TCLP) and which contain more than 50 ppm of PCBs.

PART 2 PRODUCTS

2.1 GENERAL

A. 35 or 55-gallon metal, fiber drums or containers with lids that can be secured and sealed, DOT approved.

B. Appropriate waste labels identifying contents as regulated and hazardous wastes as defined by 49 CFR 172.

C. Fluorescent Lamp Disposal (Crusher) units, such as DexTrite Fluorescent® Lamp Disposal equipment, or equivalent. Such equipment must be capable of capturing fugitive mercury vapors during the bulb crushing process, as well as the fractured and broken waste products.

D. HEPA and charcoal filter equipped mercury capture vacuum.

E. Cardboard boxes and sleeves for packaging lamps that will be removed from the site intact or unbroken.

F. Recovery tanks to temporarily hold compressed gasses.

G. Health & Safety equipment complying with health and safety plan.

PART 3 EXECUTION

3.1 GENERAL

A. Procedures and methods contained herein are to provide guidance to protect from the contamination of the environment, and exposure to workers, while handling hazardous waste and regulated waste-streams for disposal/recycling/destruction.

B. Owner to Stop Work: The Owner's representative and the Owner's Environmental Consultant shall have the authority to stop the work at any time that conditions are not within Specification and/or applicable regulations. The stoppage of work shall continue until conditions have been corrected to the satisfaction of the Owner's representative or Owner's Environmental Consultant. Standby time to resolve the problems shall be at the Contractor's expense.

C. Personal Protective Equipment:
   1. Personal protective equipment shall consist of (at a minimum) safety goggles or other protective eye-ware, work shoes with non-slip soles (e.g., neoprene), chemical resistant gloves that cover the hand and an apron that covers the front of the worker's body from shoulder to toes (e.g., neoprene or nitrile gloves).
   2. Personal protective equipment contaminated by handling operations should be disposed of as contaminated waste.
   3. Hammering or sudden impact methods for removing ballast's from the light fixture shall not be employed, as such methods may cause leakage in an otherwise non-leaking ballast.
   4. Throwing and tossing of ballast's into disposal drums shall not be conducted, as such activities may cause leakage in an otherwise non-leaking ballast.

D. Work Procedures
   1. Contractor shall obtain a hazardous waste generator number from Region I, US EPA for the Owner.
   2. During the light fixture removal stage during demolition, the following procedures (or equivalent alternate but protective measures) shall be followed:
      a. Carefully remove fixtures, and stack them in a designated portion of the work area.
      b. Designate an area where the fixtures can be disassembled, and components removed and segregated (e.g., lamps, ballasts). The area should be remote from other demolition activities, and have adequate ventilation and lighting.
      c. The work area for fixture disassembly shall (at a minimum) have the floor lined with one layer of 6-mil fire-retardant polyethylene plastic to control accidental spills or breakage. The work area should have a table or other solid work platform to facilitate disassembly of the fixtures, and the protective plastic sheeting should cover the work table area and waste drums/lamp crushing/lamp repackaging equipment.
      d. Carefully remove lamps from fixtures, and either crush them or repackage them for disposal.
      e. In the event a lamp breaks, utilize the mercury capture vacuum to remove all debris generated.
   3. Carefully remove ballasts, and segregate for disposal in the following manner:
      a. Ballasts labeled as "No-PCBs" shall NOT be segregated and shall be treated as PCB waste as potting material may contain PCBs and DEHP. Handle and dispose of in the same manner as ballasts containing PCBs and/or DEHP.
      b. Non-leaking ballasts shall be segregated and drummed for disposal as hazardous wastes. These ballasts may be destroyed by high temperature incineration, or land filled at a properly permitted facility.
      c. Leaking ballasts shall be segregated and drummed. Punctures or damage to these ballasts exposes an oily or tar-like substance. These ballasts, and all materials it contacts, MUST be incinerated under TSCA; they cannot be landfilled.

E. Miscellaneous Stored Materials In Containers
   1. Miscellaneous materials may include antifreeze, cleaning solutions, paints, and other miscellaneous materials.
   2. During removing/recycling of materials enclosed in their original container, the Contractor shall package, and label (lab packed) by waste classification in accordance with appropriate RCRA and Connecticut Department of Transportation (ConnDOT). In turn these containers shall be transported, under proper manifesting procedures, to a recycling facility. The facility shall forward a certificate of recycling or disposal to the Contractor, who shall submit this information to the Owner.

F. Universal Waste
   1. Universal waste includes, but is not limited to, fluorescent bulbs, light fixture ballasts containing polychlorinated bi-phenyls (PCBs) or DEHP, mercury lamps and switches, batteries, fire extinguishers, Halon fire suppression systems, paint, refrigerants, electronic devices (computers and monitors), and other compressed gases, mechanical fluids, oils, and lubricants, as defined in 40 CFR 273 and Section 22a-449(c)-113 of the Regulations of Connecticut State Agencies (RCSA). Follow procedures for handling, storage, labeling, shipping, recording keeping and other procedures as required in 40 CFR 273 and Section 22a-449(c)-113.

G. Regulated Waste
   1. Non-thermostat mercury switches: Handle and dispose of in accordance with State regulation and applicable Federal regulations.
   2. Used oil: Handle and dispose of in accordance with State regulations.
   3. Refrigerants: Prior to disposal of refrigerant containing equipment, verify that refrigerant has been removed per the requirements of 40 CFR Part 82 (Protection of Stratospheric Ozone).
   4. Diesel fuel: If possible, use on site to run equipment. Dispose of or recycle any remaining fuel as per applicable regulations.
   5. Fire extinguishers: Contact manufacturer for recycling or donate to local fire department.
   6. Halon Fire Suppression System: For recovery and management of Halon, utilize a technician EPA certified in appropriate level for the system. Technician is to use an EPA-certified reclaimer for disposal.

H. Transportation
   1. Transport waste materials using properly permitted vehicles operated by drivers with Commercial Drivers Licenses (CDLs) and Hazardous Materials endorsements. Coordinate transportation routes with Connecticut Department of Transportation (ConnDOT). Provide Owner with copies of transporter certifications and EPA ID number a minimum of seven (7) days prior to first use. Chain of custody records shall be maintained which include the date of pickup, number of drums, name of transporter and destination.

I. Waste Disposal Documentation
   1. Waste shipment records and manifests for all materials transported from the site as required by regulations and disposal facility are to be provided to the Owner every five (5) business days. Incorporate this information into the close out package to be provided to the Owner. Within thirty (30) days of generation, Contractor shall provide waste manifests/shipment records and Certificates of Recycling and Disposal (CRD) to Owner.
   2. Certificates of Discontinuance for all equipment and fixtures.

J. Disposal Facilities
   1. Contractor shall use only disposal facilities which have been pre-approved by the Owner and its insurers and with valid regulatory permits for type of waste being handled. Provide Owner with copies of disposal facility regulatory permits and EPA identification number a minimum of seven (7) days prior to shipping to that facility. Provide disposal facility required documentation including additional waste sampling.

END OF SECTION 02 8416

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SECTION 028432 – PCBS GREATER THAN 50 PPM REMEDIATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General Supplementary Conditions apply to this Section.

B. Sections containing requirements related to this Section include, but are not limited to:
   1. Section 02 8200 – Selective Hazardous Building Materials Abatement Demolition
   2. Section 02 8213 – Asbestos Abatement
   3. Section 02 8313 – Lead-Based Paint Awareness
   4. Section 02 8416 – Universal Waste Removal and Recycling
   5. HBM – 01, 02 & 03 – Hazardous Building Materials Abatement Drawings

1.2 CONSULTANT

A. Langan CT, Inc. (Langan) has been retained as the Consultant for the purposes of construction administration and project monitoring during PCB Remediation. The Consultant will represent the Owner in all phases of the remediation project at the discretion of the Owner. The PCB Remediation Contractor shall regard the Consultant's direction as authoritative and binding as provided herein, in matters particularly but not limited to approval of work areas, review of monitoring results, completion of the various segments of work, final completion of the remediation, submission of data, and daily field punch list items.

1.3 USE OF THE CONTRACT DOCUMENTS

A. It shall be incumbent upon the PCB Remediation Contractor to visit the Site and determine what exists, its condition, and what will be required to accomplish the Work intended by the Contract Documents. No increase in the Contract Sum will be permitted as a result of the PCB Remediation Contractor's failure to visit the Site and understand the existing conditions.

B. All work shall comply with applicable Codes, laws, regulations, and ordinances wherever applicable. The most stringent of all the foregoing shall govern.

C. It is not intended that the Specifications show every detail of the Work, but the PCB Remediation Contractor shall be required to furnish within the Contract Sum all material and labor necessary for the completion of the Work in accordance with the intent of the Specifications.

D. In case of ambiguity among the Contract Documents, the more stringent requirement as determined by the Consultant shall prevail.

E. The Work of this Contract includes making modifications as necessary, subject to approval by Owner in consultation with the Consultant, to correct any conflicts.

F. All items, not specifically mentioned in the Specifications but implied by trade practices to complete the work, shall be included.

1.4 EXAMINATION OF THE SITE

A. It is understood that the PCB Remediation Contractor has examined the Site and made his/her own estimates of the facilities and difficulties attending the execution of the Work, and has based his price thereon.

B. Except for unforeseeable concealed conditions as determined by the Consultant, the PCB Remediation Contractor shall make no claim for additional cost due to the existing conditions at the Site.

1.5 CONTRACTOR QUALIFICATIONS

A. All bidders shall submit a record of prior experience in PCB remediation projects, specifically including removal of PCB-containing materials listing no less than three (3) completed jobs in the past year, with all projects being of similar size and scope. The PCB Remediation Contractor shall list the experience and training of the project foremen and all on-site personnel. The information that should be included is as follows:
   1. Project Name and Address
   2. Owner's Name and Address
   3. Architect/Consultant
   4. Contract Amount
   5. Date of Completion
   6. Extras and Changes

B. Submit a written statement regarding whether the PCB Remediation Contractor has ever been found out-of-compliance with federal or state regulations pertaining to worker protection, removal, transport, or disposal.

1.6 TESTING LABORATORY SERVICES

A. The PCB Remediation Contractor shall submit to the Consultant the name; address and qualifications of proposed laboratories intended to be utilized for sample analysis as required by this section.

1.7 GENERAL REQUIREMENTS

A. The PCB Remediation Contractor shall furnish all labor, materials, facilities, equipment, installation services, employee training, notifications, permits, licenses, certifications, agreements and incidentals necessary to perform the specified work. Work shall be performed in accordance with the contract documents, the latest regulations from the Occupational Safety and Health Administration (OSHA), the United States Environmental Protection Agency (US EPA), Connecticut Department of Energy and Environmental Protection (CT DEEP) and all other applicable federal, state and local agencies. Whenever the requirements of the above references conflict or overlap, the more stringent provision shall apply.

B. All project personnel engaged in the work covered under this section shall be trained in accordance with OSHA Regulations 29 CFR 1910.1000 and 29 CFR 1910.1200. It should also be noted that work associated with PCB removal may also involve exposure to PCBs during demolition and removal activities specified herein and the PCB Remediation Contractor shall perform required exposure assessment for PCBs.

C. The PCB Remediation Contractor shall provide a Project Health and Safety Officer having a minimum of eight (8) hours of supervisor training in hazardous waste site operations in accordance with the requirements of 29 CFR 1910.1200. The supervisor must be on site at all times during remediation work. This supervisor and other contractor representatives must attend a pre-remediation meeting to be scheduled by the building owner/owners representative.

D. This section specifies the procedures for removal of the 1957 original building existing materials assumed to contain polychlorinated biphenyls (PCB), equal to or greater than (>)50 parts per million (ppm) bulk product waste (caulking/glazing/sealant compounds also contain asbestos), in the form of:

Base Bid – 1957 Original Building

- Ceiling/Deck Caulking Compound and Contaminated Substrates (Located at Ceilings/Deck Panels and Metal Beams/Columns) – ALL – Throughout All Areas of Second Floor (asbestos-containing also);

- Interior Window Glazing Compounds and Contaminated Substrates - ALL - Main Office L Shaped Window Wall, Classrooms 201/201A and Gymnasium Offices (asbestos-containing also);

- Interior Wall/Wall and Wall/Column Caulking Compounds and Contaminated Substrates – ALL - Classrooms 201, 201 Spray Booth, 201A, 202-207, Throughout Main Office Areas, Teachers Break/Faculty Room and Nurse Areas, Throughout Building Corridors and Stairwells, Throughout Gymnasium Areas, Corridor Custodial Closets and Throughout Building (asbestos-containing also);

- Interior/Exterior Door Window Glazing Compounds and Contaminated Substrates – ALL - Throughout Building;

- Interior/Exterior Door/Window/Door Window/Wall/Column Caulking and Glazing Compounds and Contaminated Substrates – ALL – Ten Openings (Multiple Sizes and Multiple Door/Window Walls) - Entry/Exit Areas to Building Adjacent Custodial Office, Main Office, Cafeteria, Room 208 and Gymnasium (Multiple Sizes and Multiple Door/Window Walls) (asbestos-containing also);

- Interior/Exterior Vent Caulking Compounds and Contaminated Substrates – ALL – Eight Openings – Throughout Building Perimeter Walls (asbestos-containing also);

- Interior/Exterior Door/Window/Wall/Column Caulking and Glazing Compounds and Contaminated Substrates – ALL – 17 Door/Window Openings (Multiple Sizes) - Throughout Building Perimeter Walls (asbestos-containing also);

- Interior/Exterior Window/Wall/Column/Window Walls/Door Caulking and Glazing Compounds and Contaminated Substrates – ALL (Multiple Sizes) – Throughout Building Perimeter Walls/Window Walls (asbestos-containing also); and

- Exterior Wall/Wall Expansion and Column Caulking Compounds and Contaminated Substrates – ALL - Throughout Exterior (asbestos-containing also).

Add Alternates – 1957 Original Building

Add Alternate HBM #10 – Disposal of Painted Concrete, Concrete Block, Brick, Glazed Block, Other Materials, Ceilings, Walls and Floors, Other Painted Materials – Throughout – as > 50 ppm PCB Bulk Product Waste.

Add Alternate HBM #11 – Disposal of Painted Concrete, Concrete Block, Brick, Glazed Block, Other Materials, Ceilings, Walls and Floors, Other Painted Materials – Throughout – as < 50 ppm PCB CTDEEP Regulated Waste.

The materials throughout the building are assumed PCB Bulk Product Waste (EPA Bulk Product Waste Reinterpretation dated October 24, 2012). Remediated surfaces may have to pass EPA post remediation verification sampling and areas that fail will require additional remediation at no additional cost to the owner, until verification sampling passes and/or visual inspection deems all the materials have been removed (contractor owns additional remediation for verification sampling failures up to 20% however if the contractor is deemed by Langan to have contaminated the wall surfaces, all additional remediation is to be performed by the contractor at no additional cost to the owner). Abatement and Remediation in all areas will start with removing materials at the ceiling level and end with the materials at the flooring level. The contractor shall assume they will be setting up full containments throughout all areas of the original school. The contractor will coordinate and perform enough selective demolition/demolition to access all materials to be removed/abated/remediated. Exterior abatement/remediation will be either removed in containment (interior) or the abatement/remediation contractor will install polyethylene sheeting on the interior of the building and remove materials from the exterior. All ground surfaces must also be protected with plywood and two layers 10-mil reinforced polyethylene sheeting. This ground protection must extend at least 20 feet away from the building foundation (or farther - enough to prevent building materials from touching unprotected ground and floor surfaces). The contractor will pay for all contamination/remediation/ abatement of interior and exterior surfaces, including ground surfaces if Langan deems they have contaminated these surfaces.

The contractor must dispose of Remediation Waste (segregated adjacent materials, materials that fail verification sampling, sandblasted paint/debris and waste from remediation - suits, polyethylene sheeting, towels/rags, respirator cartridges, etc.) in addition to the Bulk Product Waste.

E. Disturbance or removal of polychlorinated biphenyls (PCB) containing materials may cause a health hazard to workers and building occupants. The PCB Remediation Contractor shall disclose to all of his workers, supervisory personnel, subcontractors and consultants who will be at job site of the seriousness of the hazard and of proper work procedures which must be followed.

F. Where in the performance of the work, workers, supervisory personnel, subcontractors, or consultants may encounter, disturb or otherwise function in the immediate vicinity of polychlorinated biphenyls (PCB) containing materials, appropriate, continuous measures as necessary to protect all workers from the hazard of exposure shall be taken. Such measures shall include the procedures and methods described herein, regulations of the OSHA, US EPA, and local requirements as applicable.

G. The PCB Remediation Contractor shall employ a Competent Person (Supervisor) with at least three (3) years' experience on projects of similar scope and magnitude who shall be responsible for all work involving PCB remediation as described in the specifications and defined in applicable regulations, and have full time daily supervision of the same. The Supervisor shall be the Competent Person as defined by OSHA regulations and have experience in the proper removal and disposal of PCB-Containing Materials.

H. The PCB Remediation Contractor shall allow the work of this contract to be inspected, if required, by local, state, federal, and any other authorities having jurisdiction over such work. The PCB Remediation Contractor shall immediately notify the Owner and Consultant and shall maintain written evidence of such inspection for review by the Owner and Consultant.

I. The PCB Remediation Contractor shall incur the cost of all fines resulting from regulatory non-compliance as issued by federal, state, and local agencies. The PCB Remediation Contractor shall incur the cost of all work requirements mandated by federal, state, and local agencies as a result of regulatory non-compliance or negligence. The PCB Remediation Contractor shall incur all costs associated with contaminating the school property and adjacent properties, including but not limited to all possible litigation costs of the owners, consultants and other involved parties.

J. The PCB Remediation Contractor shall immediately notify the Owner and Consultant of the delivery of all permits, licenses, certificates of inspection, of approval, or occupancy, etc., and any other such instruments required under codes by authorities having jurisdiction, regardless of who issued, and shall cause them to be displayed to the Owner and Consultant for verification and recording.

K. The PCB Remediation Contractor shall provide enough labor to guarantee completion of the work within the time frame given and within the normal operating hours of the buildings.

L. The remediation/asbestos abatement contractor, their subcontractors, waste transporters and/or landfill(s) do not have permission to take/analyze building materials for PCB content/ concentrations without written permission from the building owner prior to such sampling. Should the contractor or other parties listed above take/analyze PCB samples without the owner's permission and PCB's are found to be >1 ppm, the hazardous materials/remediation contractor will be responsible for all costs associated with the abatement/ remediation/replacement of all the interior/exterior building materials and adjacent surfaces, including soil/asphalt/concrete/etc. as

well as all costs associated with project delays, attorney fees for all parties affected and all costs resulting from CT DEEP/EPA requirements that may occur as a result.

1.8 SCOPE OF WORK

A. This specification covers the proper and legal removal and disposal of removal of the existing materials within the original building assumed to contain polychlorinated biphenyls (PCB), equal to or greater than (>)50 parts per million (ppm) throughout the Central Middle School Site located in Greenwich, Connecticut. The remediation activities shall comply with all aspects of the contract documents and federal, state and local requirements.

B. Whenever there is a conflict or overlap within these specifications and between applicable codes and regulations, the most stringent provision specified shall apply.

C. The General Contractor or Remediation Subcontractor shall be aware of all conditions of the Project and is responsible for verifying quantities and locations of all Work to be performed. Failure to do so shall not relieve the General Contractor or Remediation Subcontractor of its obligation to furnish all labor and materials necessary to perform the Work.

D. Work outlined in this Section includes all work necessary for the complete removal and disposal of all PCB-Containing Materials impacted by the proposed work associated with the demolition project for the Central Middle School Site located in Greenwich, Connecticut.

E. Note the work in this section is subject to TSCA regulation 40 CFR 761 and Connecticut General Statutes in accordance with CT DEEP requirements for materials containing >50/1 ppm (PCB-Containing Materials). The Owner or the Owner's Authorized Representative is responsible for notifying the CT DEEP.

F. The quantities, if given below, are provided to establish the order of magnitude of the remediation project. Actual quantities may vary. The PCB Remediation Contractor is responsible for verification of all quantities scheduled for removal. This verification shall include an on-site walk-through inspection of the building. The materials/quantities listed are estimates and no extra will be accepted. All of the listed materials are included in the base bid work (no extra cost accepted) until <1 ppm PCB is obtained by verification sampling and/or visual inspection deems all the materials have been removed (contractor owns additional remediation for verification sampling failures up to 20% however if the contractor is deemed by Langan to have contaminated the wall surfaces, all additional remediation is to be performed by the contractor at no additional cost to the owner). Location, materials, and estimated quantities included in the base bid are noted below:

G. The remediation/asbestos abatement contractor, their subcontractors, waste transporters must submit landfill information to Langan and the owner prior to the shipment of any waste. The contractor(s)/hauler(s) cannot ship waste until Langan and the owner have approved the landfill the contractor/hauler is/are proposing to ship the waste to. PCB TCLP sampling of the waste may be required by the landfills permits and this testing must be performed by the contractor (if testing is approved by Langan and the owner), with Langan present during sampling, and the results made available to Langan and the owner prior to waste shipment. If Langan is not present during

the sampling, Langan may perform additional PCB TCLP sampling to confirm the contractor's results and these results will supersede the contractors sample results.

H. The scope of work is summarized as the following:

1. PCB Summary

The following materials are assumed to contain PCBs above the EPA threshold of >50 ppm source material bulk product waste (caulking/glazing/sealant compounds also contain asbestos):

Base Bid – 1957 Original Building

- Ceiling/Deck Caulking Compound and Contaminated Substrates (Located at Ceilings/Deck Panels and Metal Beams/Columns) – ALL – Throughout All Areas of Second Floor (asbestos-containing also);

- Interior Window Glazing Compounds and Contaminated Substrates - ALL - Main Office L Shaped Window Wall, Classrooms 201/201A and Gymnasium Offices (asbestos-containing also);

- Interior Wall/Wall and Wall/Column Caulking Compounds and Contaminated Substrates – ALL - Classrooms 201, 201 Spray Booth, 201A, 202-207, Throughout Main Office Areas, Teachers Break/Faculty Room and Nurse Areas, Throughout Building Corridors and Stairwells, Throughout Gymnasium Areas, Corridor Custodial Closets and Throughout Building (asbestos-containing also);

- Interior/Exterior Door Window Glazing Compounds and Contaminated Substrates – ALL - Throughout Building;

- Interior/Exterior Door/Window/Door Window/Wall/Column Caulking and Glazing Compounds and Contaminated Substrates – ALL – Ten Openings (Multiple Sizes and Multiple Door/Window Walls) - Entry/Exit Areas to Building Adjacent Custodial Office, Main Office, Cafeteria, Room 208 and Gymnasium (Multiple Sizes and Multiple Door/Window Walls) (asbestos-containing also);

- Interior/Exterior Vent Caulking Compounds and Contaminated Substrates – ALL – Eight Openings – Throughout Building Perimeter Walls (asbestos-containing also);

- Interior/Exterior Door/Window/Wall/Column Caulking and Glazing Compounds and Contaminated Substrates – ALL – 17 Door/Window Openings (Multiple Sizes) - Throughout Building Perimeter Walls (asbestos-containing also);

- Interior/Exterior Window/Wall/Column/Window Walls/Door Caulking and Glazing Compounds and Contaminated Substrates – ALL (Multiple Sizes) – Throughout Building Perimeter Walls/Window Walls (asbestos-containing also); and

- Exterior Wall/Wall Expansion and Column Caulking Compounds and Contaminated Substrates – ALL - Throughout Exterior (asbestos-containing also).

Add Alternates – 1957 Original Building

Add Alternate HBM #10 – Disposal of Painted Concrete, Concrete Block, Brick, Glazed Block, Other Materials, Ceilings, Walls and Floors, Other Painted Materials – Throughout – as > 50 ppm PCB Bulk Product Waste.

Add Alternate HBM #11 – Disposal of Painted Concrete, Concrete Block, Brick, Glazed Block, Other Materials, Ceilings, Walls and Floors, Other Painted Materials – Throughout – as < 50 ppm PCB CTDEEP Regulated Waste.

I. Project Scope Locations and Work Statement: The remediation site is located at 9 Indian Rock Lane, Greenwich, Connecticut. The proposed removal and disposal activities to be performed by PCB Remediation Contractor shall include the following:
   1. Site preparation and controls to facilitate remediation of PCBs. Containment procedures referenced for the remediation zone must be utilized for PCB Bulk Product Waste removal.
   2. Health and Safety in accordance with Occupation Safety and Health Administration (OSHA) requirements.
   3. Remove and dispose of entire/all materials assumed to contain PCBs > 50 ppm listed above throughout the original building. All exterior protection shall include the use of water impervious membrane covering which shall be secured to the ground surface. Edges shall be raised to prevent water run-off used for dust control during cutting and demolition of structures. Plywood will be installed on all exterior ground surfaces first. The exterior membrane shall be covered with a minimum of 2 layers of 10-mil reinforced polyethylene sheeting securely fastened to foundation. This ground protection must extend at least 20 feet away from the building foundation.
   4. Cleaning of each work area following complete removal of PCB containing materials to ensure adherence for post cleaning verification levels and/or visual inspection.
   5. Recordkeeping and distribution as required in accordance with 40 CFR part 761.125 (c)(5).

J. Abatement and Remediation in all areas will start with removing materials at the ceiling level and end with the materials at the flooring level. The contractor shall assume they will be setting up full containments throughout all areas of the original school. The contractor will coordinate and perform enough selective demolition/demolition to access all materials to be removed/abated/remediated. Exterior abatement/remediation will be either removed in containment (interior) or the abatement/remediation contractor will install polyethylene sheeting on the interior of the building and remove materials from the exterior. All ground surfaces must also be protected with plywood and two layers 10-mil reinforced polyethylene sheeting. This ground protection must extend at least 20 feet away from the building foundation (far enough to prevent building materials from touching unprotected ground and floor surfaces). The contractor will pay for all contamination/remediation/ abatement of interior and exterior surfaces, including ground surfaces if Langan deems they have contaminated these surfaces. The contractor will supply lifts, scaffolding, staging, etc. to Langan in areas of remediation/abatement until all PCB verification sampling has passed. The contractor will supply labor to assist in PCB verification sampling (including cleaning/re-cleaning) throughout as well as removing and disposing of all

waste created by PCB verification sampling. The contractor will provide temporary shoring in areas that require it. Roofing abatement must occur prior to performing demolition activities.

K. Additional materials as discovered outside of those listed will be covered by unit prices if all is not listed as the quantity. Quantities are estimates only and should be verified by the Contractor. Safety data sheets for chemicals to be used during the project must be submitted to the Owner's Representative prior to site delivery. The contractor is responsible for providing temporary water, power, and heat as needed at the site. Temporary lighting/Blast Trac machines/Negative air units within the work areas must be connected to Ground Fault Circuit Interrupter (GFCI) Power Panels installed by a State of Connecticut licensed electrician and located outside of the work areas. The contractor shall be responsible for paying for the use of power and water unless the owner agrees to supply free of charge. It shall also be the contractor's responsibility to provide all fixed and temporary connections and hook-ups as well as obtaining permits and paying all fees for making such services available for his work as is necessary. The Contractor shall provide services as specified herein, and as required or as necessary to carry out the work. This will include such items as temporary hard line installation, portable generators for short term work, water tank trucks, pumps and necessary accessories or the means and equipment and services necessary to temporarily connect to and maintain such services from adjacent utility systems. The contractor is responsible for contacting all utility services and getting power connections from the electrical lines located on or adjacent to the properties. All power and water must be supplied 24 hours a day throughout the abatement project. CT DPH will be notified immediately if active containments do not have sufficient negative pressure throughout the abatement process until acceptable reoccupancy air results are received. The use of portable generators will require 24 hour a day, 7 day a week continuous operation if negative air machines in containments are powered by them. This continuous operation must remain in place from the time the pre-abatement visual is completed up until clearance re-occupancy sampling results have passed. The contractor will pay the owner a $2,500 penalty should the power found to not be running the negative air machines in active abatement containments. This penalty will apply daily and the contractor is also responsible for paying all CT DPH fines that may be imposed on the contractor and owner.

L. The contractor(s) will be responsible for hiring an engineer and other appropriate personnel to ensure that all required selective demolition and demolition activities are safe to perform for all personnel on site. The contractor(s) will be financially responsible for any damage that may occur to the site, on-site personnel, fines, penalties, etc. They will also be responsible for paying/reimbursing all legal fees/costs for all parties involved with the project should selective demolition or demolition activities cause injury or death to any persons on site.

M. The general/remediation contractors shall only use heavy equipment operators that have proper asbestos and/or HAZWOPER training when disturbing/removing/moving and packing asbestos, lead and PCB containing materials. Acceptable training for asbestos can be 32/40 hour asbestos worker/supervisor training with annual refresher training. 40 hour HAZWOPER training and annual refresher training is required for operators handling lead and/or PCB containing/contaminated materials. All operators must also have current medicals, fit test data and wear respirators during work. Respirator usage can be suspended if personal air sampling shows appropriate air concentrations complying with OSHA.

N. The General Contractor, or Remediation Subcontractor, is responsible for conducting all work involving the removal, management, storage, and disposal of PCB waste materials in accordance with this specification, with all referenced documents included as part of this specification, with the standards and guidance documents listed below, and with all Federal, state and local regulations. The General Contractor or Remediation Subcontractor shall provide all labor, materials, and equipment necessary to complete the work of this Section.

1.9 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only. Where a conflict or overlap among regulations and/or these specifications exist, the most stringent requirements shall apply.
   1. American National Standards Institute (ANSI)
      a. ANSI.Z89.1 Personnel Protective Equipment - Protective Headwear for Industrial Worker's Requirements (Latest Revision)
      b. ANSI.Z87
   2. Code of Federal Regulations (CFR)
      a. 29 CFR Subpart D- Walking, Working Surfaces
      b. 29 CFR 1910.120 - Hazardous Waste Operations and Emergency Response (HAZWOPER).
      c. 29 CFR 1910.134 - Respiratory Protection Standard
      d. 29 CFR 1910.146 - Permit-Required Confined Spaces
      e. 29 CFR 1910.1000 — Air Contaminants (Table Z-1)
      f. 29 CFR 1910.1200 - Hazard Communication
      g. 29 CFR 1926.20 - General Health and Safety Provisions
      h. 29 CFR 1926.57 – Ventilation
      i. 29 CFR 1926.59 - Hazard Communication Program
      j. 29 CFR 1926.62 - Lead Exposure in Construction
      k. 29 CFR 1926.95 - Criteria for Personal Protective Equipment
      l. 29 CFR 1926, Subpart H - Materials Handling, Storage, Use and Disposal
      m. 29 CFR 1926, Subpart L - Scaffolding
      n. 29 CFR 1926, Subpart M -Fall Protection
      o. 29 CFR 1926, Subpart X – Ladders
      p. 29 CFR 1926, Subpart Z - Toxic and Hazardous Substances
      q. 40 CFR 50.6 - National Primary and Secondary Ambient Air Quality Standards for Particulate Matter
      r. 40 CFR 260 - Hazardous Waste Management System: General
      s. 40 CFR 261 - Identification and Listing of Hazardous Waste
      t. 40 CFR 262 - Standards Applicable to Generators of Hazardous Waste
      u. 40 CFR 263 - Standards Applicable to Transporters of Hazardous Waste
      v. 40 CFR 264 - Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
      w. 40 CFR 265 - Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
      x. 40 CFR 268 - Land Disposal Restrictions
      y. 40 CFR 700 - Toxic Substances Control Act (TSCA)

z. 40 CFR 761- PCBs Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
aa. 49 CFR 105 - Hazardous Materials Program Definitions and General Procedures
bb. 49 CFR 171 - General Information, Regulations and Definitions
cc. 49 CFR 172 - Hazardous Material Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
dd. 49 CFR 173 - Shippers-General Requirements for Shipments and Packaging
ee. 49 CFR 177 - Carriage by Public Highway
ff. 49 CFR 176 - Specifications for Packaging

3. National Institute for Occupational Safety and Health (NIOSH)
   a. Publication Number 87-106 Respiratory Decision Logic
   b. NIOSH /OSHA Booklet 3142 Lead in Construction
   c. Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (NIOSH Publication 85-115)
4. U.S. Environmental Protection Agency (US EPA), Toxic Substances Control Act (TSCA)
   a. Polychlorinated Biphenyl (PCB) Site Revitalization Guidance Under the Toxic Substances Control Act
   b. 40 CFR Part 761.50 - Applicability (b) (1-8)
   c. 40 CFR Part 761.61 - PCB Remediation Waste
   d. 40 CFR Part 761.62 - PCB Bulk Product Waste
   e. 40 CFR Part 761.79 – Decontamination
5. Center for Disease Control (CDC): Air Pollution and Respiratory Health.

1.10 DEFINITIONS

A. The following definitions as used within this technical specification as well as references to specific sections of the Code of Federal Regulation section 40 CRF Part 761 are provided. Definitions are extracted in part from 40 CFR Part 761.3, for full definitions refer to the specified section of regulations.
   1. CERCLA means the Comprehensive Environmental Response, Compensation, and Liability Act (42 U.S.C. 9601-9657).
   2. Chemical waste landfill means a landfill at which protection against risk of injury to health or the environment from migration of PCBs to land, water, or the atmosphere is provided from PCBs and PCB Items deposited therein by locating, engineering, and operating the landfill as specified in §761.75.
   3. Cleanup Site means the areal extent of contamination and all suitable areas in very close proximity to the contamination necessary for implementation of a cleanup of PCB remediation waste, regardless of whether the site was intended for management of waste.
   4. Containment means the enclosure within the building which establishes a contaminated area and surrounds the location where PCB and/or other toxic or hazardous substance removal is taking place and establishes a Control Work Area.
   5. Designated Facility means the off-site disposer or commercial storer of PCB waste designated on the manifest as the facility that will receive a manifested shipment of PCB waste.
   6. Disposal means intentionally or accidentally to discard, throw away, or otherwise complete or terminate the useful life of PCBs and PCB Items. Disposal includes spills, leaks, and

other uncontrolled discharges of PCBs as well as actions related to containing, transporting, destroying, degrading, decontaminating, or confining PCBs and PCB Items.

7. DOT means the United States Department of Transportation.
8. EPA identification number means the 12-digit number assigned to a facility by EPA upon notification of PCB waste activity under §761.205.
9. Excluded PCB products means PCB materials which appear at concentrations less than 50 ppm as defined in 40 CFR §761.3.
10. Fixed Object means mechanical equipment, electrical equipment, fire detection systems, alarms, and all other fixed equipment, fixtures or other items which cannot be removed from the work area.
11. Generator of PCB waste means any person whose act or process produces PCBs that are regulated for disposal under subpart D of 40 CFR Part 761, or whose act first causes PCBs or PCB Items to become subject to the disposal requirements of subpart D, or who has physical control over the PCBs when a decision is made that the use of the PCBs has been terminated and therefore is subject to the disposal requirements of subpart D. Unless another provision of 40 CFR Part 761 specifically requires a site-specific meaning, "generator of PCB waste" includes all of the sites of PCB waste generation owned or operated by the person who generates PCB waste.
12. HEPA means High Efficiency Particulate Air filtration efficiency of 99.97 percent down to 0.3 microns. Filtration provided on specialized vacuums and air filtration devices to trap particles.
13. High occupancy area means any area where PCB remediation waste has been disposed of on-site and where occupancy for any individual not wearing dermal and respiratory protection for a calendar year is: 840 hours or more (an average of 16.8 hours or more per week) for non-porous surfaces and 335 hours or more (an average of 6.7 hours or more per week) for bulk PCB remediation waste. Examples could include a residence, school, day care center, sleeping quarters, a single or multiple occupancy 40 hours per week work station, a school class room, a cafeteria in an industrial facility, a control room, and a work station at an assembly line.
14. Incinerator means an engineered device using controlled flame combustion to thermally degrade PCBs and PCB Items. Examples of devices used for incineration include rotary kilns, liquid injection incinerators, cement kilns, and high temperature boilers.
15. Laboratory means a facility that analyzes samples for PCBs and is unaffiliated with any entity whose activities involve PCBs.
16. Liquid PCBs means a homogenous flowable material containing PCBs and no more than 0.5 percent by weight non-dissolved material.
17. Low occupancy area means any area where PCB remediation waste has been disposed of on-site and where occupancy for any individual not wearing dermal and respiratory protection for a calendar year is: less than 840 hours (an average of 16.8 hours per week) for non-porous surfaces and less than 335 hours (an average of 6.7 hours per week) for bulk PCB remediation waste. Examples could include an electrical substation or a location in an industrial facility where a worker spends small amounts of time per week (such as an unoccupied area outside a building, an electrical equipment vault, or in the non-office space in a warehouse where occupancy is transitory).
18. Manifest means the shipping document EPA form 8700-22 and any continuation sheet attached to EPA form 8700-22, originated and signed by the generator of PCB waste in accordance with the instructions included with the form and subpart K of this part.

19. Mark means the descriptive name, instructions, cautions, or other information applied to PCBs and PCB Items, or other objects subject to these regulations.
20. Marked means the marking of PCB Items and PCB storage areas and transport vehicles by means of applying a legible mark by painting, fixation of an adhesive label, or by any other method that meets the requirements of these regulations.
21. Municipal solid wastes means garbage, refuse, sludges, wastes, and other discarded materials resulting from residential and non-industrial operations and activities, such as household activities, office functions, and commercial housekeeping wastes.
22. Non-liquid PCBs means materials containing PCBs that by visual inspection do not flow at room temperature (25°C or 77°F) or from which no liquid passes when a 100 g or 100 ml representative sample is placed in a mesh number 60 ±5 percent paint filter and allowed to drain at room temperature for 5 minutes.
23. Non-porous surface means a smooth, unpainted solid surface that limits penetration of liquid containing PCBs beyond the immediate surface. Examples are: smooth un-corroded metal; natural gas pipe with a thin porous coating originally applied to inhibit corrosion; smooth glass; smooth glazed ceramics; impermeable polished building stone such as marble or granite; and high density plastics, such as polycarbonates and melamines, that do not absorb organic solvents.
24. On site means within the boundaries of a contiguous property unit.
25. PCB and PCBs means any chemical substance that is limited to the biphenyl molecule that has been chlorinated to varying degrees or any combination of substances which contains such substance. Refer to §761.1(b) for applicable concentrations of PCBs. PCB and PCBs as contained in PCB items are defined in §761.3. For any purposes under this part, inadvertently generated non-Aroclor PCBs are defined as the total PCBs calculated following division of the quantity of mono-chlorinated biphenyls by 50 and di-chlorinated biphenyls by 5.
26. PCB Article means any manufactured article, other than a PCB Container, that contains PCBs and whose surface(s) has been in direct contact with PCBs. "PCB Article" includes capacitors, transformers, electric motors, pumps, pipes and any other manufactured item (1) which is formed to a specific shape or design during manufacture, (2) which has end use function(s) dependent in whole or in part upon its shape or design during end use, and (3) which has either no change of chemical composition during its end use or only those changes of composition which have no commercial purpose separate from that of the PCB Article.
27. PCB Article Container means any package, can, bottle, bag, barrel, drum, tank, or other device used to contain PCB Articles or PCB Equipment, and whose surface(s) has not been in direct contact with PCBs.
28. PCB Bulk Product Waste means waste derived from manufactured products containing PCBs in a non-liquid state, at any concentration where the concentration at the time of designation for disposal is >50 ppm PCBs. PCB bulk product waste does not include PCBs or PCB Items regulated for disposal under §761.60(a) through (c), §761.61, §761.63, or §761.64. PCB bulk product waste is further defined in 40 CFR §761.3. Note in accordance with October 2012 re-interpretation from the U.S. Environmental Protection Agency (EPA), adjacent porous materials in contact with PCB Bulk Products shall be considered PCB Bulk Product Material for disposal purposes.
29. PCB Capacitor means any capacitor that contains >500 ppm PCB. Concentration assumptions applicable to capacitors appear under §761.2.

30. PCB Container means any package, can, bottle, bag, barrel, drum, tank, or other device that contains PCBs or PCB Articles and whose surface(s) has been in direct contact with PCBs.
31. PCB-Contaminated means a non-liquid material containing PCBs at concentrations >50 ppm but < 500 ppm; a liquid material containing PCBs at concentrations >50 ppm but < 500 ppm or where insufficient liquid material is available for analysis, a non-porous surface having a surface concentration >10 pg/100 cm2 but < 100 pg/100 cm2 , measured by a standard wipe test as defined in §761.123.
32. PCB Equipment means any manufactured item, other than a PCB Container or a PCB Article Container, which contains a PCB Article or other PCB Equipment, and includes microwave ovens, electronic equipment, and fluorescent light ballasts and fixtures.
33. PCB Item means any PCB Article, PCB Article Container, PCB Container, PCB Equipment, or anything that deliberately or unintentionally contains or has as a part of it any PCB or PCBs.
34. PCB Remediation Waste means waste containing PCBs as a result of a spill, release, or other unauthorized disposal, at the following concentrations: Materials disposed of prior to April 18, 1978, that are currently at concentrations >50 ppm PCBs, regardless of the concentration of the original spill; materials which are currently at any volume or concentration where the original source was >500 ppm PCBs beginning on April 18, 1978, or >50 ppm PCBs beginning on July 2, 1979; and materials which are currently at any concentration if the PCBs are spilled or released from a source not authorized for use under this part. PCB remediation waste means soil, rags, and other debris generated as a result of any PCB spill cleanup, as further defined in 40 CFR §761.3.
35. PCB waste(s) means those PCBs and PCB Items that are subject to the disposal requirements of subpart D in 40 CFR Part 761.
36. Porous surface means any surface that allows PCBs to penetrate or pass into itself including, but not limited to, paint or coating on metal; corroded metal; fibrous glass or glass wool; unglazed ceramics; ceramics with a porous glaze; porous building stone such as sandstone, travertine, limestone, or coral rock; low-density plastics such as Styrofoam and low-density polyethylene; coated (varnished or painted) or uncoated wood; concrete or cement; plaster; plasterboard; wallboard; rubber; fiberboard; chipboard; asphalt; or tar paper. For purposes of cleaning and disposing of PCB remediation waste, porous surfaces have different requirements than nonporous surfaces.
37. RCRA means the Resource Conservation and Recovery Act (40 U.S.C. 6901 et seq.).
38. Standard wipe sample means a sample collected for chemical extraction and analysis using the standard wipe test as defined in §761.123. Except as designated elsewhere in part 761, the minimum surface area to be sampled shall be 100 cm2.
39. Storage for disposal means temporary storage of PCBs that have been designated for disposal.
40. SW-846 means the document having the title "SW-846, Test Methods for Evaluating Solid Waste,"
41. Totally enclosed manner means any manner that will ensure no exposure of human beings or the environment to any concentration of PCBs.
42. Transfer facility means any transportation-related facility including loading docks, parking areas, and other similar areas where shipments of PCB waste are held during the normal course of transportation. Transport vehicles are not transfer facilities under this definition, unless they are used for the storage of PCB waste, rather than for actual transport activities. Storage areas for PCB waste at transfer facilities are subject to the storage facility standards

of §761.65, but such storage areas are exempt from the approval requirements of §761.65(d) and the recordkeeping requirements of §761.180, unless the same PCB waste is stored there for a period of more than 10 consecutive days between destinations.

43. Transporter of PCB waste means, for the purposes of subpart K of 40 CFR Part 761, any person engaged in the transportation of regulated PCB waste by air, rail, highway, or water for purposes other than consolidation by a generator.
44. Transport vehicle means a motor vehicle or rail car used for the transportation of cargo by any mode. Each cargo-carrying body (e.g., trailer, railroad freight car) is a separate transport vehicle.
45. TSCA means the Toxic Substances Control Act (15 U.S.C. 2601 et seq.).

1.11 SUBMITTALS

A. A pre-remediation meeting shall occur with the PCB Remediation Contractor, Owner or the Owner's Authorized Representative, and environmental consultant two weeks prior to commencement of work. The following documents shall be submitted immediately upon project award to the Owner prior to commencement of PCB Removal work:

1. Site Specific Health and Safety Plan (HASP): The PCB Remediation Contractor shall prepare a site specific HASP plan for protection of workers and control of the work site in accordance with OSHA regulatory requirements. The HASP shall govern all work conducted at the site during the remediation of PCB materials and related debris; waste handling, sampling, waste management; and waste transportation. At a minimum, the HASP shall address the requirements set forth in 29 CFR 1910.120, as further outlined below:
    a. Health and Safety Organization
    b. Site Description and Hazard Assessment
    c. Training
    d. Medical Surveillance
    e. Work Areas
    f. Personal Protective Equipment
    g. Personal Hygiene and Decontamination
    h. Standard Operating Procedures and Engineering Controls
2. Emergency Equipment and First Aid Provisions
    a. Equipment Decontamination
    b. Air Monitoring
3. Telephone List
    a. Emergency Response and Evacuation Procedures and Routes
    b. Site Control
    c. Permit-Required Confined Space Procedures
    d. Spill prevention and Containment Plan
    e. Heat and Cold Stress
    f. Record Keeping
    g. Community Protection Plan
4. Training Documentation: Documentation of OSHA 40-Hour HAZWOPER Training for all employees and subcontractors to be used for the remediation work, and 8-Hour HAZWOPER Supervisor Training for the designated on-site Health and Safety Officer for the remediation work.

5. PCB and or other Toxic or Hazardous Substances Disposal Plan: A written plan that details the PCB Remediation Contractor's plan for transportation and disposal of PCB-containing or other Toxic or Hazardous Substance wastes generated during the project. The Disposal Plan shall identify:
   a. Waste packaging, labeling, placarding and manifesting procedures.
   b. The name, address and 24-hour contact number for the proposed treatment or disposal facility or facilities to which waste generated during the project will be transported.
   c. The name, address, contact person(s) and state-specific permit numbers for proposed waste transporters, and EPA identification number for firms that will transport waste.
   d. The license plate numbers of vehicles to be used in transporting of the waste from the site to the disposal facility.
   e. The route(s) by which the waste will be transported to the designated disposal facility, and states or territories through which the waste will pass.
   f. disposal facility, and states or territories through which the waste will pass.
6. Safely Data Sheets: Safety Data Sheets (OSHA Form 174 or equivalent) and manufacturer's information shall be provided for all chemicals and materials to be used during the project including but not limited to specialty cleaners and chemical stripping products.

B. The following documents shall be submitted to the Owner within fifteen (15) work days following removal of waste from the site:
   1. Waste Profile Sheets
   2. Pre-Disposal Analysis Test Results (If required by disposal facility)
   3. Manifests signed by the disposal facility
   4. Tipping Receipts provided by the disposal facility
   5. Certification of Final Treatment/Disposal signed by the responsible disposal facility official.

C. PCB Work Closeout Submittals:
   1. Disposal Site Receipts: Copy of waste shipment record and disposal site receipt showing the PCB-containing or other Toxic or Hazardous Substances materials have been properly disposed.

D. Product Data: Catalog sheets, specifications, and application instructions for any removal products, if used.

1.12 REGULATIONS AND STANDARDS

A. The PCB Remediation Contractor shall be solely responsible for conducting this project and supervising all work in a manner that will be in conformance with all federal, state, and local regulations and guidelines pertaining to PCB Containing Material removal. Specifically, The PCB Remediation Contractor shall comply with the requirements of the following as applicable to the work to be performed:
   1. Toxic Substance Control Act (TSCA) (40 CFR Part 761).
   2. Comprehensive Environmental Response, Compensation, and Liability Act (Superfund Law).
   3. Department of Transportation (DOT) regulations - DOT regulation HM-181 regulates transportation of hazardous materials, including PCBs.

4. Occupational Safety and Health Administration (OSHA) - OSHA regulates workers' safety and exposure to a variety of chemicals including PCBs.
5. Connecticut Basic Building Code (BOCA) (including Connecticut Supplements);
6. Life Safety Code (NFPA); and
7. Local health and safety codes, ordinances or regulations pertaining to hazardous materials remediation and all national codes and standards including ASTM, ANSI, and Underwriter's Laboratories.

1.13 FINAL VISUAL CLEARANCE

A. Following the completion of the work, the Consultant shall perform a final visual inspection of the work area per guidelines EPA and State of Connecticut CT DEEP regulations and to assess that the above-indicated PCB-containing materials were removed.

1.14 POSTING AND RECORD MAINTENANCE REQUIREMENTS

A. The following items shall be conspicuously displayed proximate but outside of remediation work areas.
   1. Exit Routes -Emergency exit procedures and routes
   2. Emergency Phone Numbers - A list indicating the telephone numbers and locations of the local hospital(s); the local emergency squad; the local fire department; the local police department; the Poison Control Center; Chemical Emergency Advise (CHEMTREC); the local Department of Health's local office; the PCB Remediation Contractor (on-site and after hours numbers); and the environmental consultant (on-site and after hours numbers).
   3. Warning Signs - Warning signs shall be in English and the language of any workers onsite who do not speak English, and be of sufficient size to be clearly legible and display the following or similar language in accordance with 29 CFR 1910.1200:

      WARNING
      HAZARDOUS WASTE WORK AREA
      PCBs-POISON
      NO SMOKING, EATING OR DRINKING
      AUTHORIZED PERSONNEL ONLY
      PROTECTIVE CLOTHING IS REQUIRED IN THIS AREA

      In addition, all entrances to work areas shall be posted with a PCB M_L marker.

B. The PCB Remediation Contractor shall maintain the following items on-site and available for review by all employees and authorized visitors:
   1. PCB Remediation Contractor's Project Specific Health and Safety Plan
   2. Certificates of Training for all employees and the project Supervisor
   3. Codes, Standards and Publications
   4. Safety Data Sheets (SDS) for all chemicals used during the project.
   5. Copies of the PCB Remediation Contractor's written hazard communication, respiratory protection, and confined space entry programs.

C. Fees, Permits and Licenses. The PCB Remediation Contractor shall pay all licensing fees, royalties, and other costs necessary for the use of any copyrighted or patented product, design, invention, or processing in the performance of the work specified in this Section.
   1. The PCB Remediation Contractor shall be solely responsible for costs, damages, or losses resulting from any infringement of these patent rights or copyrights. The PCB Remediation Contractor shall hold the Owner and the Owner's Authorized Representative harmless from any costs, damages, and losses resulting from any infringement of these patent rights or copyrights.
   2. The PCB Remediation Contractor shall be responsible for securing all necessary permits for work under this Section, including hauling, removal, and disposal, fire, and materials usage, or any other permits required to perform the specified work.

1.15 QUALITY ASSURANCE

A. The PCB Remediation Contractor shall provide and assure that the quality of work practices and procedures to be utilized are consistent with the above listed agencies and regulations. PCB Remediation Contractor shall utilize the latest edition, including all addenda, revisions and supplements for all regulatory agencies codes, etc.

B. Worker's Qualifications: The persons performing PCB remediation and their supervisors shall be personally experienced in PCB remediation work and shall have been regularly employed by a company performing PCB remediation for a minimum of 3 years.

C. Pre-Work Conference: Before the Work of this Section is scheduled to commence, a conference will be held by the Owner at the Site for the purpose of reviewing the Contract Documents, discussing requirements for the Work, and reviewing the Work procedures.
   1. The conference shall be attended by the PCB Remediation Contractor, and the Owner's Authorized Representative employed by the Owner. This pre-remediation meeting may consist of multiple meetings.

1.16 MINIMUM REQUIREMENTS FOR WORKER HEALTH AND SAFETY

A. The PCB Remediation Contractor is responsible and liable for the health and safety of all onsite personnel and the offsite community affected by the project. All onsite workers or other persons entering the remediation work areas, decontamination areas or waste handling and staging areas shall be knowledgeable of and comply with the requirements of the site specific Health and Safety Plan at all times. The PCB Remediation Contractor's HASP shall comply with all applicable federal, state, and local regulations protecting human health and the environment from the hazards posed by the work to be performed under this project.

B. Consistent disregard for the provisions of the HASP shall be deemed as sufficient cause for immediate stoppage of work and termination of the Contract or any Sub Contracts without compromise or prejudice to the rights of the Owner or the Owner's Authorized Representative.

C. Any discrepancies between the PCB Remediation Contractor's HASP and these specifications or federal and state regulations shall be resolved in favor of the more stringent requirements that

provide the highest degree of protection to the project personnel and the surrounding community and environment

D. In addition to exposure concerns relating to the presence of PCBs, other health and safety considerations will apply to the work. The PCB Remediation Contractor shall be responsible for recognizing such hazards and shall be responsible for the health and safety of PCB Remediation Contractor employees at all times. It is the PCB Remediation Contractor's responsibility to comply with all applicable health and safety regulations.

E. The HASP shall be reviewed by all persons prior to entry into the remediation, decontamination, or waste staging areas, whether a representative of the PCB Remediation Contractor, owner, architect/engineer, environmental consultant, subcontractor(s), waste transporter or federal, state or local regulatory agency. Such review shall be acknowledged and documented by the PCB Remediation Contractor's Health and Safety Officer by obtaining the name, signature and affiliation of all persons reviewing the HASP.

F. The HASP shall be maintained so as to be readily accessible and reviewable by all site personnel throughout the duration of the remediation project and until all waste materials are removed from the site and disposed of at the appropriate disposal facility.

G. The PCB Remediation Contractor's on-site Health and Safety Officer shall be responsible for ensuring that project personnel and site visitors are informed of and comply with the provisions of the HASP at all times during the project.

1.17 WORK AREAS AND ZONES

A. The PCB Remediation Contractor shall lay-out and clearly identify work areas in the field. Access by equipment, site personnel, and the public to the work areas shall be limited as follows:
   1. Remediation Zone: The Remediation Zone(s) shall consist of all interior and exterior areas where removal of PCBs and other Toxic or Hazardous Substances and waste handling and staging activities are on-going and the immediately surrounding locale or other areas where contamination could occur. The Remediation Zone for purposes of interior and exterior removal of PCB materials or other Toxic or Hazardous Substances for disposal shall be performed within a containment to isolate work areas from non-work areas. The containment shall be visibly delineated with appropriate warning signs at all approaches to Remediation (including a PCB ML marker), and be restricted from access by all persons except those directly necessary for the completion of the respective remediation tasks. The Remediation Zone shall be located and delineated as necessary to limit access to the remediation area and to minimize risk of exposure to site workers and the general public. Access shall be controlled at the periphery of the Remediation Zone to regulate the flow of personnel and equipment into and out of the zone and to help verify that proper procedures for entering and exiting are followed. All persons within the Remediation Zone shall wear the appropriate level of protection established in the HASP.
   2. Decontamination Zone: The Decontamination Zone is the transition zone between the remediation area and the clean support zone of the project site, and is intended to reduce the potential for contaminants from being dispersed from the Remediation Zone to clean areas of the site. The Decontamination Zone shall consist of a buffer area surrounding the

Remediation Zone through which the transfer of equipment, materials, personnel and containerized waste products will occur and in which decontamination of equipment, personnel, and clothing will occur. The Decontamination Zones shall be constructed as a three chamber decontamination unit for workers and a two chamber equipment room for waste load out as detailed in Section 3.4. All emergency response and first aid equipment shall be readily maintained in this Zone. All protective equipment and clothing shall be removed or decontaminated in the Decontamination Zone prior to exiting to the Support Zone.

3. Support Zone: The Support Zone will consist of the area outside the Decontamination Zone and the remainder of the project site. Administrative and other support functions and any activities that by nature need not be conducted in the Remediation or Decontamination Zone related to the project shall occur in the Support Zone, Access to the Remediation and Decontamination Zones shall be controlled by the Health and Safety Officer and limited to those persons necessary to complete the remediation work and which have reviewed and signed the HASP.
4. The remediation contractor is responsible for supplying the direct-reading particulate meter, performing testing and documenting the daily readings. The consultant may choose to perform independent sampling as well.

1.18 PERSONNEL PROTECTIVE EQUIPMENT

A. The PCB Remediation Contractor shall be responsible to determine and provide the appropriate level of personal protective equipment in accordance with applicable regulations and standards necessary to protect the PCB Remediation Contractor's employees from all hazards present.

B. The PCB Remediation Contractor shall provide all employees with the appropriate safety equipment and protective clothing to ensure an appropriate level of protection for each task, taking into consideration the chemical, physical, ergonomic and biological hazards posed by the site and work activities.

C. The PCB Remediation Contractor shall establish in the HASP criteria for the selection and use of personal protective equipment (PPE).

D. The PPE to be utilized for the project shall be selected based upon the potential hazards associated with the project site and the work to be performed. Appropriate protective clothing shall be worn at all times within the Remediation Zone.

E. The PCB Remediation Contractor shall provide the appropriate level of respiratory protection to all field personnel engaged in activities where respiratory hazards exist or there is a potential for such hazard to exit.

F. The PCB Remediation Contractor shall provide, as necessary, protective coveralls, disposable gloves and other protective clothing for all personnel that will be actively involved in remediation activities or waste handling activities or otherwise present in the Remediation Zones. Coveralls shall be of Tyvek or equivalent material. Should the potential for exposure to liquids exist, splash

resistant disposable suits shall be provided and utilized.

G. Protective coveralls, and other protective clothing shall be donned and removed within the Decontamination Zone and shall be disposed of at the end of each day. Ripped coveralls shall be immediately replaced after appropriate decontamination has been completed to the satisfaction of the Health and Safety Officer. Protective clothing shall not be worn outside of the Decontamination Zone.

H. Hard Hats, protective eyewear, rubber boots and or other non-skid footwear shall be provided by the PCB Remediation Contractor as required for workers and authorized visitors.

I. All contaminated protective clothing, respirator cartridges and disposable protective items shall be placed into proper containers to be provided by the PCB Remediation Contractor for transport and proper disposal in accordance with 40 CFR 262.

1.19 EMERGENCY EQUIPMENT AND FIRST AID REQUIREMENTS

A. The PCB Remediation Contractor shall provide and maintain at the site, at a minimum, the following Emergency and First Aid Equipment:
   1. Fire Extinguishers: A minimum one (1) fire extinguisher shall be supplied and maintained at the site by the PCB Remediation Contractor throughout the duration of the project. Each extinguisher shall be a minimum of a 20 pound Class ABC dry fire extinguisher with Underwriters Laboratory approval per 29 CFR 1910.157.
   2. First Aid Kit: A minimum of one (1) first aid kit meeting the requirements of 29 CFR 1910,151 shall be supplied and maintained at the site by the PCB Remediation Contractor throughout the duration of the project.
   3. Communications: Telephone communications (either cellular or land line) shall be provided by the PCB Remediation Contractor for use by site personnel at all times during the project.

B. The Health and Safely Officer shall be notified immediately in the event of personal injury, potential exposure to contaminants, or other emergency. The Health and Safety Officer shall then immediately notify the Owner's Authorized Representative.

1.20 STANDARD SAFETY AND HEALTH PROCEDURES AND ENGINEERING CONTROLS

A. The following provisions shall be employed to promote overall safety, personnel hygiene and personnel decontamination:
   1. Each PCB Remediation Contractor or Subcontractor shall ensure that all safety equipment and protective clothing to be utilized by its personnel is maintained in a clean and readily accessible manner at the site.
   2. All prescription eyeglasses in use on this project shall be safety glasses conforming to ANSI Standard Z87.1. No contact lenses shall be allowed on the site.
   3. Prior to exiting the delineated Decontamination Zone(s), all personnel shall remove protective clothing, and place disposable items in appropriate disposal containers to be dedicated to that purpose. Following removal of PPE, personnel shall thoroughly wash and rinse their face, hands, arms and other exposed areas with soap and tap water wash and

subsequent tap water rinse. A fresh supply of tap water shall be provided at the site on each work day by the PCB Remediation Contractor for this purpose.

4. All PPE used on site shall be decontaminated or disposed of at the end of each work day. Discarded PPE shall be placed in sealed DOT approved 55-gallon barrels for off-site disposal.
5. Respirators, if necessary due to an upgrade to Level C PPE, shall be dedicated to each employee, and not interchanged between workers without cleaning and sanitizing.
6. Eating, drinking, chewing gum or tobacco, smoking, and any other practice that increases the likelihood of hand to mouth contact shall be prohibited within the delineated remediation and decontamination work zones. Prior to performing these activities, each employee shall thoroughly cleanse their face, hands, arms and other exposed areas.
7. All personnel shall thoroughly cleanse their face hands, arms and other exposed areas prior to using toilet facilities.
8. No alcohol, tobacco, illicit drugs or firearms will be allowed on the site at any time.
9. Contact with potentially contaminated surfaces should be avoided, if possible. Field personnel should minimize walking through standing water/puddles, mud or other wet or discolored surfaces; kneeling on ground; and placing equipment, materials or food on ground or other potentially contaminated surface.
10. The use of the "Buddy System" shall be employed at all times while conducting work at the site. Each employee shall frequently monitor other workers for signs of heat stress or chemical exposure or fatigue: periodically examine others PPE for signs of wear or damage; routinely communicate with others; and notify the Health and Safety Officer in the case of an emergency.

B. Workers must wear protective suits, protective gloves, eye protection and a minimum of half-face respirator with HEPA filter cartridge for all projects. Respiratory protection shall be in accordance with OSHA regulation 1910.134 and ANSI Z88.2.

C. Workers must be trained as per OSHA and US EPA requirements, have medical clearance and must have recently received pulmonary function test (PFT) and respirator fit tested by a trained professional.
   1. A personal air sampling program shall be in place as required by OSHA.
   2. The use of respirators must also follow a complete respiratory protection program as specified by OSHA.

1.21 INDEPENDENT INSPECTION AND MONITORING

A. This section describes independent visual inspection and monitoring work being performed on behalf of the Owner. This work is not in the Contract Sum. This section describes monitoring carried out by the Owner's Consultant (Langan) to verify that the building beyond the work area and the outside environment remains uncontaminated.

B. The purpose of the Owner's Consultant's monitoring is to detect faults in the work area isolation such as:
   1. Contamination of the building outside of the work area by PCB dust.
   2. Failure of filtration or rupture in the differential pressure system as applicable.
   3. Contamination of the outside of the containment.

C. Should any of the above occur, the PCB Remediation Contractor shall immediately cease removal activities until the fault is corrected. Do not recommence work until authorized by the Owner's Consultant.

D. The Owner's Consultant may monitor the Work Area. The purpose of this monitoring will be to detect dust outside containment, which may challenge the ability of the Work Area isolation procedures to protect the balance of the building or outside of the building from contamination.

E. The Owner's Consultant will perform on-site monitoring throughout the course of the project, as follows:
   1. All work procedures shall be continuously monitored by the Consultant to assure that areas outside the designated work locations in the buildings will not be contaminated.
   2. Prior to work on any given day, The PCB Remediation Contractor's designated "competent person" shall discuss the day's work schedule with the Consultant to evaluate job tasks with respect to safety procedures and requirements specified to prevent contamination of the building or the employees. This includes a visual survey of the work area and the decontamination of the building or the employees.

PART 2 PRODUCTS

2.1 REMEDIATION PRODUCTS

A. Deliver all materials in the original packages, containers, or bundles bearing the name of the manufacturer and the brand name and product technical description.

B. Damaged or deteriorating materials shall not be used and shall be removed from the premises. Material that becomes contaminated with PCBs shall be decontaminated or disposed of as PCB waste.

C. Polyethylene sheet in a roll size to minimize the frequency of joints shall be delivered to the job site with factory label indicating:
   1. Type: Minimum 6 mil., opaque, fire retardant polyethylene sheets.
   2. Floor/Ground Protective Layer: Minimum of multiple layers of 10 mil., reinforced polyethylene sheets (minimum of 20 feet out/away from building footprint).

D. Respirators:
   1. Type: Approved by the Mine Safety and Health Administration (MSHA), Department of Labor, or the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services.

E. Polyethylene disposable bags shall be six (6) mil with pertinent pre-printed label. Tie wraps for bags shall be plastic, five (5) inches long (minimum), pointed and looped to secure filled plastic bags.

F. Tape or adhesive spray will be capable of sealing joints in adjacent polyethylene sheets and for attachment of polyethylene sheet to finished or unfinished surfaces of dissimilar materials and capable of adhering under both dry and wet conditions, including use of amended water.

G. Cleaning Products: Contractor shall at their discretion utilize specialty cleaning products such as Capsur, TechXtract or other cleaners for use in decontaminating porous and nonporous surfaces to remain. All such products shall be utilized in accordance with manufacturer's specifications as intended. PCB Remediation Contractor shall ensure appropriate use and disposal associated with use in accordance with the SDS sheets for each product utilized. It shall be incumbent upon the PCB Remediation Contractor to determine the need for use of specialty products to meet required cleaning verification levels established herein and in accordance with the SIP or Performance Based Plan.

H. The PCB Remediation Contractor shall have available spray equipment capable of mixing wetting agent with water and capable of generating sufficient pressure and volume and having sufficient hose length to reach all areas with PCBs.

I. HEPA filtered local exhaust ventilation shall be utilized during the installation of enclosures and supports where PCB-containing materials may be disturbed.

2.2 TOOLS AND EQUIPMENT

A. The PCB Remediation Contractor shall provide a sufficient supply of disposable mops, rags, and sponges for work area cleaning and decontamination shall be available.

B. The PCB Remediation Contractor shall provide a sufficient supply of scaffolding, ladders, lifts, and hand tools (e.g., scrapers, wire cutters, brushes, utility knives, wire saws, etc.) shall be provided as needed.

C. The PCB Remediation Contractor shall provide all tools and equipment necessary for PCB removal.

D. The PCB Remediation Contractor's air monitoring professional shall have air-monitoring equipment of type and quantity to monitor operations and conduct personnel exposure surveillance per OSHA requirements.

E. The Remediation Contractor is responsible for supplying direct-reading particulate meters, performing testing and documenting the daily readings for exterior, and if requested, interior areas. The consultant may choose to perform independent sampling as well.

F. The PCB Remediation Contractor shall have available sufficient inventory or dated purchase orders for materials necessary for the job including protective clothing, respirators, filter cartridges, polyethylene sheeting of proper size and thickness, tape and air filters.

G. The PCB Remediation Contractor shall provide (as needed) temporary electrical power panels, electrical power cables, and electrical power sources (such as generators). Any electrical

connection work affecting the building electrical power system shall be performed by a State of Connecticut licensed electrician.

H. The PCB Remediation Contractor shall have available shower stalls and plumbing to support same to include sufficient hose length and drain system or an acceptable alternate.

I. Exhaust air filtration system units shall contain HEPA filter(s) capable of sufficient air exhaust to create negative pressure of -0.02 inches of water within enclosure with respect to outside area. Equipment shall be checked for proper operation by smoke tubes or differential pressure gauge before the start of each shift and at least twice during the shift. Adequate exhaust air shall be provided for a minimum of four (4) air changes per hour within the enclosure. No air movement system or air filtering equipment shall discharge unfiltered air outside.

J. Vacuum units, of suitable size and capacities for the project, shall have HEPA filter(s) capable of trapping and retaining at least 99.97 percent of all mono-dispersed particles of 0.3 micrometers in diameter or larger.

2.3 PERSONNEL PROTECTION

A. Safety equipment (e.g., hard hats meeting the requirements of ANSI Standard 289.11981, eye protection meeting the requirements of ANSI Standard Z87.1-1979, safety shoes meeting the requirements of ANSI Standard Z41.1-1967, disposable PVC gloves or other work gloves), shall be provided to all workers and authorized visitors.

B. Non-skid footwear shall be provided to all remediation workers. Disposable clothing shall be adequately sealed to the footwear to prevent body contamination.

PART 3 EXECUTION

3.1 WORK AREA PROTECTION — REMEDIATION ZONE GENERAL

A. Protection of Existing Construction: Perform PCB Bulk Product Waste and PCB Remediation Waste removal work without damage or contamination of adjacent areas, asphalt and/or concrete paving, soils, and existing construction.

B. Prior to commencement of PCB remediation activities at each work area, a containment system shall be constructed by the PCB Remediation Contractor to capture and contain all materials removed during the remediation. Containment procedures referenced for the remediation zone must be utilized for PCB Bulk Product Waste removal.

C. During all remediation activities, PCB Remediation Contractor shall maintain control of all entrances and exits to the work areas to ensure only authorized personnel enter the work areas and are afforded proper personal protective equipment and as required respiratory protection. All approaches to work areas shall be demarcated with appropriately worded warning signs.

D. Work zones shall be established in accordance with this section to include remediation zone, decontamination zone, and support zone.

E. Negative pressure containments shall be constructed consisting of two layers of 6-mil polyethylene sheeting on wall surfaces and two layers of 10-mil polyethylene sheeting on floor surfaces if required.

3.2 WORK AREA PROTECTION — REMEDIATION ZONE FOR PCB BULK PRODUCT

A. Ground protection to prevent debris from escaping the remediation zone and to protect areas outside of remediation zone from PCB contamination shall be utilized. Protection shall include the use of water impervious membrane covering which shall be secured to the ground surface. Edges shall be raised to prevent water run-off used for dust control during cutting and demolition of structures. The membrane shall be covered with plywood and multiple layers of 10-mil reinforced polyethylene sheeting securely fastened to foundation (extending a minimum of 20 feet away from the building foundation). All interior removal will occur with full containments – negative pressure enclosures including hard solid barriers (wood or similar material), 6 and 10-mil fire retardant polyethylene sheeting on the interior/exterior to maintain containment integrity and abutting decontamination units.

B. Isolation barriers shall be installed on the interior of the building to isolate the building exterior where work shall be performed. Protection shall be affixed to the inside finish surfaces to isolate window. One layer of 6-mil polyethylene sheeting shall create the exterior critical barrier between the Remediation Zone and Interior of the Building.

C. All other openings to the building interior such as ducts, grilles, etc. shall be securely sealed with a single layer of 6-mil polyethylene sheeting from the building exterior.

D. Ground protection and isolation barriers shall remain in place throughout work to collect dust and debris resulting from PCB Bulk Product Waste removal.

E. All debris and dust generated during operations shall be HEPA vacuumed continuously throughout the work shift and at the end of a work shift to avoid accumulation. Any tears or rips that occur in protections shall be repaired or removed and replaced with new protections.

F. All surfaces adjacent to materials removed shall be properly decontaminated upon completing the removal of PCB Bulk Product Waste.

G. Warning Signage: Post warning signs in accordance with 29 CFR 1910.1200 at all approaches to the work area. Signs shall be conspicuously posted to permit a person to read signs and take precautionary measures to avoid exposure to PCBs or other Toxic or Hazardous Substances. These signs should include the PCB ML markers at each entrance to the work area.

H. Waste Containers for PCB Bulk Product Waste: Appropriate PCB waste containers shall be placed adjacent to remediation zones. Containers shall be lined covered and secured. The PCB waste containers shall be properly marked as described in 40 CFR part §761.40. Marking shall

include a PCB ML marker formatted in accordance with 40 CFR part §761.45.

3.3 DECONTAMINATION ZONE

A. The PCB Remediation Contractor shall establish contiguous to the work area, a decontamination enclosure consisting of equipment room, shower room, and clean room in series. The only access between contaminated and uncontaminated areas shall be through this decontamination enclosure. The PCB Remediation Contractor shall ensure that employees enter and exit the Remediation Zone through the decontamination area.

B. Access between rooms in the decontamination system shall be through double flap curtain opening airlocks. The clean room, shower and equipment room within the decontamination enclosure, shall be completely sealed ensuring that the sole source of airflow through this area originates from uncontaminated areas outside the work area.

C. Construct the decontamination systems with wood or metal framing, 3/8" sheathing and cover both sides with a double layer of six (6) mil polyethylene sheeting, spray glued or taped at the joints. Caulk joints watertight at floor, walls, and ceiling.

D. The PCB Remediation Contractor shall visually inspect interior and exterior critical barriers that separate the Remediation Zone and the Interior of the Building, respectively, several times daily to assure effective seal and the PCB Remediation Contractor shall repair defects immediately.

E. Equipment room. The equipment room shall be supplied with impermeable, labeled bags and containers for the containment and disposal of contaminated protective equipment.

F. Shower area. Shower facilities shall be provided which comply with 29 CFR 1910.141(d)(3). The showers shall be adjacent both to the equipment room and the clean room.

G. Clean change room. The clean room shall be equipped with a locker or appropriate storage container for each worker's use. Following showering, each worker must then change into street clothing in clean change areas.

H. Decontamination area entry procedures. The PCB Remediation Contractor shall ensure that all workers follow proper decontamination procedures for entry into a Regulated Work area including but not limited to the following:
   1. Enter the decontamination area through the clean room;
   2. Remove and deposit street clothing within a locker provided for their use;
   3. Put on protective clothing and respiratory protection before leaving the clean room.
   4. Before entering the Remediation Zone, the PCB Remediation Contractor shall ensure that workers pass through the equipment room.

I. Decontamination area exit procedures. The PCB Remediation Contractor shall ensure that all workers follow proper decontamination procedures for exit from a Regulated Work area including but not limited to the following:
   1. Before leaving the regulated area, workers shall remove all gross contamination and debris from their protective clothing.

2. Workers shall remove their protective clothing in the equipment room and deposit the clothing in labeled impermeable bags or containers.
3. Workers shall not remove their respirators in the equipment room.
4. Workers shall shower prior to entering the clean room.
5. After showering, workers shall enter the clean room before changing into street clothes.

J. Equipment Room for Waste Removal: The PCB Remediation Contractor shall establish a two chamber equipment room or area that is adjacent to the Remediation Zone for the decontamination of waste containers and equipment as noted above.
1. The area must be of sufficient size as to accommodate cleaning of equipment and removing waste without spreading contamination beyond the area (as determined by visible accumulations).
2. All equipment and surfaces of containers filled with PCB waste must be cleaned prior to removing them from the equipment room or area.

3.4 PCB BULK PRODUCT MATERIAL REMOVAL

A. PCB Bulk Product Waste Materials – Interior and exterior materials listed in 1.08 Scope of Work per the EPA PCB Bulk Waste Reinterpretation Memorandum dated October 24, 2012. The PCB Bulk Product Waste will also include asbestos containing materials (see asbestos specifications).

B. Materials shall be removed in a manner which does not breakdown the materials into fine dust or powder to the extent feasible. Equipment and tools to be utilized shall include hand tools and mechanical equipment such as demolition hammers to remove materials from adjacent substrates. Mechanical removal equipment shall as appropriate be fitted with dust collection systems.

C. Any dry or brittle sealant/caulking/glazing materials shall be removed with additional engineering controls such as use of a HEPA vacuum to remove accumulated dust or debris during removal.

D. Sequence of removal shall follow the following general requirements:
1. Site preparation and controls shall be completed. Work shall not proceed until authorized by owner's representative.
2. The materials listed in 1.08 shall be removed in their entirety for disposal as PCB Bulk Product Waste. The removal of the systems shall be performed so that the sealant/caulking/glazing compounds and other source/adjacent materials are not disturbed.
3. The adjacent surfaces shall be cleaned of all residue using EPA recommended methods.

E. Waste shall be immediately containerized in temporary 6-mil polyethylene disposal bags for disposal. These containers shall be sealed in remediation zone when full during collection and then placed in disposal containers/storage trailers. The containers shall not be emptied into other containers to avoid dispersal of dust or fugitive emissions.

F. The use of minimal quantities of water to moisten the generated dust prior to collection shall be utilized. Under no circumstances shall the PCB waste show evidence of free liquid water, pooling or ponding within the waste stream. Any liquid used to wet the dust and debris to control fugitive

emissions shall be properly containerized and decontaminated in accordance with 40 CFR Part §761.79 (b)(1) or disposed of in accordance with40 CFR Part §761.60 (a).

G. PCB Bulk Product Waste shall be stored for disposal in accordance with 40 CFR Part §761.65 and marked in accordance with 40 CFR Part §761.40 and §761.45.

H. All waste containers shall be appropriately labeled in accordance with 40 CFR Part §761.40 and §761.45. Labeling shall include the PCB ML marker.

3.5 PCB REMEDIATION WASTE — IF VERFIFICATON SAMPLING FINDS >1 PPM PCB

A. All adjacent components (if failing verification sampling – if required) shall be removed, in containments and transported off-site for disposal as PCB Remediation Waste. This includes adjacent building materials/asphalt/soil failing verification sampling (if contractor contaminates these surfaces/materials) and will be performed at no extra cost to the owner. The contractor owns additional remediation for verification sampling failures up to 20% however if the contractor is deemed by Langan to have contaminated the wall surfaces, all additional remediation is to be performed by the contractor at no additional cost to the owner.

B. All PCB Remediation Waste shall be stored for disposal in accordance with 40 CFR Part §761.65.

C. All waste containers shall be appropriately labeled in accordance with 40 CFR Part §761.40 and §761.45. Marking shall include the PCB M_L marker.

D. Soil excavations will be backfilled with certified clean soil meeting the CT DEEP Remediation Standards Regulations (RSRs) for the Residential Direct Exposure Criteria (RDEC) and Groundwater Classification A (GB) Pollutant Mobility Criteria (PMC). Asphalt excavations shall be replaced in kind. Additionally brushes removed during soil excavation shall be replaced in kind.
   1. Scope for soil sample collection:
      a. Owner's Representative will review the characterization data of soil being brought on-site
      b. Collect one composite soil sample (made up of three sample locations) for every 500 cubic yards (CY) of material planned to be brought to the site for use as clean fill.
   2. Laboratory analysis of soil characterization shall include the following:
      a. Volatile Organic Compounds (VOCs by method 8260)
      b. Polynuclear Aromatic Hydrocarbons (PAHs by method 8270)
      c. Extractable Total Petroleum Hydrocarbons (ETPH)
      d. Polychlorinated Biphenyls (PCBs by method 8082)
      e. Pesticides and Herbicides (by method 8081)
      f. RSR metals (Mass and SPLP)

3.6 CLEANING AND DECONTAMINATION

A. The PCB Remediation Contractor shall be responsible for complete cleaning and decontamination of the Remediation Zone upon completion of work. The Remediation Zone will be required to meet proposed Verification Sampling limits prior to containment tear down.

B. The PCB Remediation Contractor shall utilize HEPA vacuum and wet cleaning products to remove all visible dust and debris from all surfaces within the work area. If specialty products are utilized the PCB Remediation Contractor shall utilize in accordance with manufacturer's specifications including any additional safety and disposal requirements for such use.

C. Cleaning of containment barriers shall be performed prior to removal leaving critical barriers at openings, decontamination units and negative air filtration devices in place until results of post verification sampling indicate acceptable limits. Cleaning shall be performed from ceiling to floors.

D. Any liquid used to wet the dust and debris to control fugitive emissions shall be collected and decontaminated in accordance with 40 CFR Part §761.79 (b)(1) or disposed of in accordance with §761.60 (a).

E. All rags and other cleaning materials used to clean shall also be properly disposed as PCB Remediation Waste. All PCB Remediation Waste shall be stored for disposal in accordance with 40 CFR Part §761.65. All waste containers shall be appropriately marked in accordance with 40 CFR Part §761.40 and §761.45.

F. Equipment to be utilized in connection with the removal of PCB Bulk Product Waste and PCB Remediation Waste including waste collection or that will or may come in direct contact with the site contaminants shall be decontaminated prior to leaving the site to prevent migration of the contaminated residues from the project site. Decontamination shall be in accordance with 40 CFR Part §761.79 and Subpart S procedures.

G. All non-disposable equipment and tools employed in the course of the project will be decontaminated at the conclusion of each work day through the following sequence:

Initial tap water rinse, to remove gross contaminants

1. Tap water and hexane or equivalent wash
2. Tap water rinse
3. Second tap water and hexane or equivalent wash
4. Second tap water rinse

H. The wash water and decontamination liquids shall be captured and containerized in DOT approved 55-gallon barrels for off-site disposal.

3.7 CONSULTANTS INSPECTION RESPONSIBILITIES

A. The Owner shall retain an industrial hygiene firm (Owner's Authorized Representative) to perform periodic inspections and sampling during the work. Site visits shall be scheduled based on the progress of the work and at critical time periods.

B. Consultant shall conduct inspections throughout the progress of the removal project. Inspections shall be conducted in order to document the progress of the removal work as well as the procedures and practices employed by the PCB Remediation Contractor.

C. The Consultant shall perform the following inspections during the course of remediation activities:
   1. Pre-commencement Inspection. Pre-commencement inspections shall be performed at the time requested by the remediation Contractor. The Consultant shall be informed 12 hours prior to the time the inspection is needed. If, during the course of the pre-commencement inspection, deficiencies are found, the PCB Remediation Contractor shall perform the necessary adjustments in order to obtain compliance.
   2. Work Area Inspections. Work area inspections shall be conducted on a daily basis at the discretion of the Consultant. During the course of the work inspections, the Consultant shall observe the PCB Remediation Contractor's removal procedures, verify barrier integrity, assess project progress, and inform the remediation Contractor of specific remedial activities if deficiencies are noted.

D. The Owner's Authorized Representative may perform real time monitoring for dust particulate using Dust Trak or equivalent monitoring devices for total dust. Sampling may be performed prior to remediation for background comparison to during remediation sampling. In addition, air sampling outside of the Remediation Zone, may be performed periodically during active removal activities at the Owner's Authorized Representative's discretion for laboratory confirmation. **The remediation contractor is responsible for supplying the direct-reading particulate meters (minimum of 2), performing testing and documenting the daily readings. The consultant may choose to perform independent sampling as well.**

E. It should be noted that if the results of air samples exceed established action levels or ambient background conditions for real time monitoring whichever is less the PCB Remediation Contractor will be required to implement work stoppage to determine causes of exceeding results and as necessary utilize additional containment measures or engineering controls. Any resulting decontamination of areas beyond the Remediation Zone shall be responsibility of the PCB Remediation Contractor.

F. The Owner's Authorized Representative shall perform post removal and decontamination visual clearance inspection as necessary to determine complete removal of PCB's. Verification sampling may be performed on adjacent building materials.

G. Once verification sampling and/or visual inspection has documented the Remediation Zone meets required criteria, the PCB Remediation Contractor shall be permitted to remove decontamination unit, critical barriers, etc. These areas shall be subjected to a visual inspection to ensure no visible dust is present.

3.8 MARKING OF WASTE CONTAINERS

A. All waste containers must be marked with the name of the waste contained; the date in which the first material was placed in the vessel; and the last date at which addition of waste occurred. All waste containers must be marked with a PCB M_L marker.

B. All waste containers containing PCB Bulk Product Waste, Bulk PCB Remediation Waste and PCB contaminated debris, containment system components, used personnel protective equipment, personal and equipment wash water and decontamination fluids, or other wastes generated during the remediation work shall be labeled as follows:

DOT Class 9 UN3432 (solid)
Or UN2315 (liquid) PCB Waste
RQ
Waste for Disposal
Federal law prohibits improper disposal.
If found, contact the nearest police or public safety authority or the U.S. Environmental Protection Agency.
Generator's Information: NOa-g
Manifest Tracking No.:
Accumulation Start Date:
EPA ID No.:
EPA Waste No.:
Total Weight:
Container No.:
HANDLE WITH CARE!

In addition, these containers must be marked with a PCB M_L marker.

C. Such marking must be durable, in English and printed on or affixed to the surface of the package or on a label, tag or sign; displayed on a background of sharply contrasting color; un-obscured by labels or attachments and located away from any other marking (such as advertising) that could substantially reduce its effectiveness.

3.9 ON-SITE WASTE MANAGEMENT AND DISPOSAL OF SOLID HAZARDOUS WASTES

A. All solid waste material, containment system components, used personnel protective equipment, and other solid wastes generated during the work, shall be placed directly in appropriate waste receptacles immediately upon removal from its in-situ position. Suitable waste receptacles may consist of roll-off containers or DOT-approved 55-gallon barrels.

B. The PCB Remediation Contractor shall be responsible for all packaging, labeling, transport, disposal and record-keeping associated with PCB or PCB contaminated waste in accordance with all federal, state and local regulations.

C. The PCB Remediation Contractor shall ensure that the person transporting the waste holds a valid permit issued in accordance with appropriate federal, state, and local regulations.

D. The PCB Remediation Contractor shall provide to the transporter at the time of transfer appropriate shipping records or uniform waste manifests as required by the federal, state and local regulations with a copy to the Owner and Owner's Authorized Representative.

E. PCB Remediation Contractor shall maintain proper follow up procedures to assure that waste materials have been received by the designated waste site in a timely manner and in accordance with all federal, state and local regulations.

F. The PCB Remediation Contractor shall assure that disposal of polychlorinated biphenyls (PCB) containing waste material is at a facility approved to accept such waste and shall provide a tracking/manifest form signed by the landfill's authorized representative.

G. If roll-off containers are to be utilized for containerization of the remediation wastes the following shall apply:
   1. All roll-off containers or other similar vessels utilized shall be watertight and lined with 6-mil polyethylene sheeting or equivalent impermeable lining, and equipped with a secured and impermeable cover.
   2. The impermeable cover shall remain securely in place at all times when material is not being actively placed in the vessels. The PCB Remediation Contractor shall be responsible for ensuring that the cover remains securely intact until the container is removed from the site.

H. If 55-Gallon barrels are to be utilized for waste containerization, the barrels shall consists of suitable DOT-approved 55-gallon barrels that are watertight and free of corrosion, perforations, punctures, or other damage. All barrels shall be securely covered and sealed at the conclusion of each work day.

I. The waste containers shall remain staged at the site with a secure impermeable cover in place until the materials are transported from the site to be delivered to the designated disposal facility.

J. A waste roll-off and barrel staging area shall be designated prior to initiation of the remediation work, and approved by the Owner's Authorized Representative. If this area is located outside of the building, the area (or areas) shall be surrounded by a chain-link fence with a minimum height of six feet. The fence shall be labeled with a PCB ML marker.

K. Properly containerized waste must be transported by a licensed hauler and shipped as PCB Bulk Product Waste for disposal at a permitted waste facility in accordance with 761.62.

L. PCB Remediation Waste must be transported by a licensed hauler and shipped as PCB Remediation Waste for disposal in accordance with 40 CFR 761.61(b) to a EPA TSCA permitted hazardous waste landfill (EQ's Wayne Disposal Landfill in Belleville, Michigan, CWM Model City Disposal Landfill in Youngstown, NY or equivalent); and dispose of non-liquid PCB remediation waste in a high temperature incinerator approved under 761.70, alternate disposal method approved under 761.60(e), and/or a chemical waste landfill approved under 40 CFR 761.75 which is an EPA, TSCA approved facility for PCB Remediation Waste. Provide required copies of the uniform waste manifests for hazardous wastes to the Owner, waste generation State and waste destination State as required.

M. Bulk Product Waste will be transported under manifest for off-site disposal to a hazardous waste landfill (EQ's Wayne Disposal Landfill in Belleville, Michigan or equivalent); and/or other appropriate waste will be transported under manifest for off-site disposal at a non-hazardous waste landfill permitted to accept such materials (Waste Management's Turnkey Landfill in Rochester, New Hampshire, Minerva, Ohio or GROWS Landfill in Morrisville, Pennsylvania or equivalent).

N. Provide required copies of the uniform waste manifests for hazardous wastes to the Owner, waste generation State and waste destination State as required.

O. Any PCB Liquid Water Waste shall be properly containerized and decontaminated in accordance with 40 CFR Part §761.79 (b)(1) or disposed of in accordance with 40 CFR Part §761.60 (a).

P. Any chemicals, solvents or other products used during decontamination shall be properly containerized as PCB Liquid Waste. Waste must be properly decontaminated or disposed in accordance with 40 CFR Part §761.60 (a) or 40 CFR Part §761.79 (g). PCB Liquid Waste shall be transported by a licensed hauler and shipped for treatment or disposal. Provide required copies of the uniform waste manifests for hazardous wastes to the Owner, waste generation State and waste destination State as required.

Q. All contaminated waste shall be carefully loaded on trucks or other appropriate vehicles for transport. Before and during transport, care shall be exercised to insure that no unauthorized persons have access to the material.

R. Transporters of the waste are prohibited from "back hauling" any freight after the disposition of the Owner's waste stream until decontamination of the vehicle and/or trailer is assured.

END OF SECTION 02 8432

Local Education Agency Town of Greenwich	State Project No. 057-0114 N	Phase 2 of 3
School Central Middle School	Architect S/L/A/M Collaborative	Date 07/08/2024

DAS - OFFICE OF SCHOOL CONSTRUCTION GRANTS & REVIEW (OSCG&R) PLAN REVIEW CHECKLIST

STAND-ALONE

POLYCHLORINATED BIPHENYLS (PCB'S) ABATEMENT AND MANAGEMENT PLAN

FORM SCG-3012

- Do not use Not Applicable (N/A). Use "None", "NPS" (Not in Project Scope), or explain condition.
- Submit completed **Pre-Bid Conformance Review (PCR) Checklist** with this completed form.
- Status column (by SCG staff): ✓ Accepted ○ Open Item

PCB Remediation Designer: Langan CT – Matthew Myers Specification Section – 02 8432 – PCBs Greater Than 50 PPM Remediation Hazardous Building Materials Drawings – HBM-01, 02 & 03				Status
		Drawings	Specifications	
01.	Type(s) and amount(s) of PCB's to be abated per Drawings / Specifications	HBM-01, 02 & 03	1.8 Pages 6-8	
02.	If a **Self-Implementing Plan** (SIP) is being prepared, notification of PCB work/SIP to USEPA (>50 ppm PCB- containing materials)	None	None	
03.	If <50 ppm PCB-containing materials, notification of PCB remediation work to DEEP	None	None	
04.	Proper worker protection (OSHA req.)	See Specifications	1.7 B and C – Page 3, 1.16 – Pages 18 and 19	
05.	Pre-abatement meeting	See Specifications	1.7 C – Page 3	
06.	All PCB locations identified	HBM-01, 02 & 03	1.7 and 1.8 Pages 2 - 10	
07.	Employees' decontamination system	See Specifications	3.3 Pages 27 and 28	
08.	Remediation methods	See Specifications	3.4 and 3.5 – Pages 28 and 29	
09.	Decontamination and cleaning procedures for PCB work areas	See Specifications	3.3 and 3.6 – Pages 27 and 28, and 30	
10.	Waste disposal system (PCB removal from contaminated area)	See Specifications	3.3 and 3.4 – Pages 27 - 29	
11.	Proper worksite preparation	See Specifications	3.1 and 3.2 – Pages 25 and 26	
12.	Verification testing (performance based or SIP) and re-occupancy clearance standards	See Specifications	If needed – 1.8 F – Page 6, 3.5 – Page 29	
13.	Replacement materials specified	None	None	
14.	If a SIP were prepared and submitted to EPA, include copy of EPA approval and any conditions	None	None	

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Insert Greenwich Letterhead

Date: July 8, 2024

Director
Department of Administrative Services
Office of School Construction Grants and Review
450 Columbus Blvd., Suite 1503
Hartford, Connecticut 06103

PCB Caulk Letter
FORM SCG-9008

Subject: PCB in Caulk Products: specific to this Project Phase submission to the OSCG&R

Facility Name: Central Middle School

State Project No.: 057-0114 N

Phase: *2 of 3*

I/We, the undersigned, certify that I/We have read the Division of Construction Services (DCS) PCBs in Caulk Policy (Form 1170). I/We further understand that:

- According to EPA, caulk products containing PCBs at concentrations greater than or equal to 50 parts per million (ppm) are not authorized for use and must be removed and properly disposed of as PCB Bulk Product Waste as defined in 40 CFR 761.3.

- If PCBs are detected in caulk products at concentrations between 1 ppm and 50 ppm and the caulk products meet the definition of a PCB Excluded Product as defined in 40 CFR 761.3, then the Connecticut Department of Energy and Environmental Protection (CT DEEP) recommends that the caulk products be removed.

- Adjacent porous building materials (e.g., concrete, brick, CMU, wood, etc.) that were coated with ≥ 50 ppm PCB-containing caulk may contain PCBs. According to the EPA, if PCBs are present in these materials as a result of the subject caulk and at concentrations greater than or equal to 1 ppm, then EPA considers the materials as PCB Bulk Product Waste per the EPA October 24, 2012 PCB Bulk Product Reinterpretation decision, provided it is removed at the same time as the caulk. In addition, soils beneath ≥ 50 ppm PCB-containing caulk may contain PCBs.

Based on the latest project plans, the following information is provided to the OSCG&R (*check the box, or boxes, adjacent to the applicable statement[s]*):

1. The project ☒ **WILL** ☐ **WILL NOT** disturb existing caulk products as part of the project

2. The original building ☒ **WAS** ☐ **WAS NOT** constructed/renovated/repaired between 1950 and 1979

3. This building has had one or more extensions which has modified the original building footprint. The portion of the building specific to the Project Phase submission noted above ☐ **WAS** ☒ **WAS NOT** constructed/renovated/repaired between 1950 and 1979

4. ☒ The District has decided **NOT TO TEST** caulk products for PCBs

5. ☐ The District has decided **TO TEST** caulk products for PCBs

6. The District **HAS TESTED** caulk products for PCBs and the test results indicate the following:

   a. ☐ PCBs concentrations are **LESS** than 1 ppm

   b. ☐ PCBs concentrations are **BETWEEN** 1 ppm and 50 ppm

   c. ☐ PCBs concentrations are **GREATER** than or **EQUAL** to 50 ppm

For caulk products containing PCB, the District will address the material in the following manner:

7. ☐ The District has developed a PCB Abatement and Management Plan and will be utilizing the "Performance Based" option for material with PCB test results greater than 50 ppm.

8. ☐ The District has developed a PCB Abatement and Management Plan and will be utilizing the "Self-Implementing Plan (SIP)" option for material with PCB test results greater than 50 ppm and has received EPA approval of the SIP (attach a copy of the approval).

9. ☐ The District has developed a PCB Abatement and Management Plan and has submitted a copy to the CT DEEP PCB Unit for material with PCB test results between 1 ppm and 50 ppm (attach a copy of such notice to the CT DEEP).

10. ☒ Other: The sealant compounds throughout the original 1957 building are presumed to contain PCBs > 50 ppm and will be removed and properly disposed of accordingly. A specification section has been created for PCBs assumed > 50 ppm.

If a PCB Abatement and Management Plan has been prepared, attach **FORM SCG-3012** PCB Plan Checklist.

Authorized OSCG&R Grant Applicant/District:

_____ _____

(Signature) (Title)

_____

(Print Name)

Environmental Consultant or Project Architect (as appropriate):

Langan CT

_____ _____

(Signature) (Firm)

Matthew Myers

_____

(Print Name)

Senior Project Manager

_____

(Print Title)

Cc: Superintendent of Schools/District
School Principal
OSCG&R Plan Reviewer (450 Columbus Blvd., Suite 1503, Hartford CT 06103)

SECTION 03 0516 - UNDER-SLAB VAPOR RETARDER

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Sheet vapor retarder, seam tape, mastic, pipe boots, detail strip for installation under concrete slabs on grade.

1.2 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Preparation of subgrade, granular fill, placement of concrete.

1.3 REFERENCE STANDARDS

A. ASTM D1709 - Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method; 2016.

B. ASTM D882 - Standard Test Method for Tensile Properties of Thin Plastic Sheeting; 2018.

C. ASTM E154/E154M - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover; 2008a (Reapproved 2019).

D. ASTM E1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; 2018a.

E. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2017 (Reapproved 2023).

F. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2023.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit manufacturers' data on manufactured products.

C. Samples: Submit samples of underslab vapor barrier to be used.
   1. 4 inch-by-4-inch (minimum) square of vapor retarder sheet.
   2. 12-inch (300 mm) long piece of seam tape.

D. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent construction.

E. Field quality-control reports. Reports shall be submitted to Architect.

PART 2 PRODUCTS

2.1 MATERIALS

A. Underslab Vapor Retarder:
   1. Water Vapor Permeance: Not more than 0.010 perms, maximum.
   2. Thickness: 15 mils.
   3. Puncture Resistance: 2200 grams minimum; ASTM D1709.
   4. Tensile Strength: 57 lbf/in. minimum when tested in accordance with ASTM E154/E154M or ASTM D882.
   5. Material: Manufactured using prime virgin (non-recycled) polyolefin resin and constructed in a multi-layer plastic extrusion process.
   6. Basis of Design:
      a) Stego Industries LLC; Stego Wrap Vapor Barrier (15-mil): www.stegoindustries.com.
      b) Perminator 15 mil by W.R. Meadows, Inc tel (847) 214-2100; (800) 342-5976, www.wrmeadows.com
      c) Viper Vaporcheck II 15 Mil manufactured by Insulation Solutions Inc., tel. (866) 698-6562, www.viper2.com

B. Accessory Products: Vapor barrier manufacturer's recommended tape, adhesive, mastic, pipe boots, etc., for sealing seams and penetrations in vapor barrier.
   1. Seam Tape:
      a) Water Vapor Transmission Rate: 0.3 perms maximum, ASTM E96/E96M.
      b) Roll Width: 4” minimum
      c) Subject to requirements, available products include:
         1) Stego Tape manufactured by Stego Industries, LLC, tel. (877) 464-7834, www.stegoindustries.com
         2) Viper Double Bond Tape manufactured by Insulation Solutions Inc., tel. (866) 698-6562, www.viper2.com
         3) Perminator Tape by W.R. Medows, Inc tel (847) 214-2100; (800) 342-5976, www.wrmeadows.com
   2. Vapor Proofing Mastic:
      a) Water Vapor Transmission Rate: 0.3 perms maximum, ASTM E96/E96M.
      b) Subject to requirements, available products include:
         1) Stego Mastic manufactured by Stego Industries, LLC, tel. (877) 464-7834, www.stegoindustries.com
         2) Vapercheck Mastic manufactured by Insulation Solutions Inc., tel. (866) 698-6562, www.viper2.com
         3) Pointing Mastic or MEL-ROL® LM by W.R. Medows, Inc tel (847) 214-2100; (800) 342-5976, www.wrmeadows.com
   3. Pipe Boots:
      a) Pre-fabricated or construct pipe boots from vapor retarder material, pressure sensitive tape and/or mastic per manufacturer’s instructions.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surface over which vapor barrier is to be installed is complete and ready before proceeding with installation of vapor barrier.

B. Ensure that subsoil is approved by Architect or Geotechnical firm.

3.2 INSTALLATION

A. Install vapor barrier in accordance with manufacturer's instructions and ASTM E1643. Where inconsistencies occur between this practice and the manufacturer's instructions, conform to the manufacturer's instructions. Unroll vapor retarder with the longest dimension parallel with the direction of the pour.

B. Install vapor barrier under interior slabs on grade; lap sheet over footings and seal to foundation walls.

C. Lap joints minimum 6 inches and seal with approved seam tape.

D. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions.

E. No penetration of vapor barrier is allowed except for reinforcing steel and permanent utilities that have been sealed with seam tape and/or mastic in accordance with manufacturer's instructions.

F. Repair damaged vapor retarder before covering with other materials by cutting patches of vapor retarder, overlapping damaged area 6 inches, and taping all four sides with tape.

3.3 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.

B. Inspect and repair sheet vapor retarder in accordance with ASTM E1643, items below and manufacturer's written instructions prior to placement of the slab.
   1. Inspect and mark all areas of damage and insufficient installation of the vapor retarder sufficiently in advance of concrete placement such that deficiencies may be corrected before concrete is placed.
   2. Repair vapor retarder damaged during placement of reinforcing or concrete with vapor barrier material or as instructed by manufacturer.
   3. Lap beyond damaged areas a minimum of 6 in. (50 mm) and seal as prescribed for sheet joints.
   4. Avoid the use of non-permanent stakes driven through vapor retarder.
   5. If non-permanent stakes are driven through vapor retarder, repair as recommended by vapor retarder manufacturer.
   6. Seal permanent penetrations as recommended by vapor retarder manufacturer.

C. Review of representative portions of the vapor barrier membrane installation (digitally or in-person, when possible) prior to concrete placement to help ensure compliance with governing installation standard, ASTM E1643, and Contract Documents.

D. Provide letter from manufacturer to document installation review (in the manner described above) and consistent with governing installation standard, ASTM E1643.

3.4 PROTECTION

A. Take precaution to protect installed Vapor Retarder. Replace or repair any areas where Vapor Retarder has been punctured, regardless of the size of the puncture.

B. Avoid driving stakes through Vapor Retarder. Where this cannot be avoided, each individual penetration must be sealed.

END OF SECTION 03 0516

SECTION 03 1000 - CONCRETE FORMING AND ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Formwork for cast-in-place concrete, with shoring, bracing and anchorage.

B. Form accessories.

C. Form stripping.

1.2 RELATED REQUIREMENTS

A. Section 03 2000 - Concrete Reinforcing.

B. Section 05 1200 - Structural Steel Framing: Placement of embedded steel anchors and plates in cast-in-place concrete.

1.3 REFERENCE STANDARDS

A. ACI CODE-318 - Building Code Requirements for Structural Concrete and Commentary; 2019 (Reapproved 2022).

B. ACI PRC-347 - Guide to Formwork for Concrete; 2014 (Reapproved 2021).

C. ACI SPEC-117 - Specification for Tolerances for Concrete Construction and Materials; 2010 (Reapproved 2015).

D. ACI SPEC-301 - Specifications for Concrete Construction; 2020.

E. ASME A17.1 - Safety Code for Elevators and Escalators Includes Requirements for Elevators, Escalators, Dumbwaiters, Moving Walks, Material Lifts, and Dumbwaiters with Automatic Transfer Devices; 2022.

F. COE CRD-C 513 - Handbook for Concrete and Cement Corps of Engineers Specifications for Rubber Waterstops; 1974.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Reproduction of any portion of the structural contract drawings for resubmittal as shop drawings is prohibited. Shop drawings produced in such a manner will be rejected and returned.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect plastic foam products from damage and exposure to sunlight.

B. Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 PRODUCTS

2.1 FORMWORK - GENERAL

A. Provide concrete forms, accessories, shoring, and bracing as required to accomplish cast-in-place concrete work.

B. Design and construct concrete that complies with design with respect to shape, lines, and dimensions.

C. Comply with applicable state and local codes with respect to design, fabrication, erection, and removal of formwork.

D. Comply with relevant portions of ACI CODE-318, ACI PRC-347, and ACI SPEC-301.

2.2 WOOD FORM MATERIALS

A. Form Materials: At the discretion of the Contractor.

2.3 FORMWORK ACCESSORIES

A. Form Ties: Snap-off type, galvanized metal, fixed length, cone type, with waterproofing washer, 1 inch back break dimension, free of defects that could leave holes larger than 1 inch in concrete surface.

B. Form Release Agent: Capable of releasing forms from hardened concrete without staining or discoloring concrete or forming bugholes and other surface defects, compatible with concrete and form materials, and not requiring removal for satisfactory bonding of coatings to be applied.
   1. Do not use materials containing diesel oil or petroleum-based compounds.

C. Dowel Sleeves: Plastic sleeve and nailable plastic base for smooth, round, steel load-transfer dowels.

D. Plate Dowel System: Steel plate dowel and plastic dowel sleeve; with integral fasteners for attachment to formwork.

E. Filler Strips for Chamfered Corners: Wood strip type; 3/4" by 3/4" inch size; maximum possible lengths.

F. Embedded Anchor Shapes, Plates, Angles and Bars: As specified in Section 05 1200.

G. Reinforcing bar and mesh supports: Supports to hold rebar or wire mesh in place to allow the correct depth and placement, prior to the rebar or wire mesh being encased in concrete.
   1. Metal supports:
      a) Slab bolster with continuous bottom plate or continuous bottom rails.
   2. Precast/concrete blocks:

a)

2.4 WATERSTOPS

A. Flexible Rubber Waterstops: U.S. Army COE CRD-C 513, for embedding in concrete to prevent passage of fluids through joints, with factory fabricated corners, intersections, and directional changes.
   1. Profile: Ribbed with center bulb

B. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch (19 by 25 mm). Apply adhesive primer to the joint surface (especially vertical joints) before applying waterstop as recommended by Manufacturer.
   1. Manufacturers:
      a) Cetco; Waterstop-RX: www.cetco.com
      b) Sika; Swellstop: www.usa.sika.com/
      c) Henry; HYDRO-FLEX® WATERSTOP: www.henry.com/
      d) GCP Applied Technologies; ADCOR 500S Waterstop: www.gcpat.com

PART 3 EXECUTION

3.1 EARTH FORMS

A. Earth forms are not permitted.

3.2 ERECTION - FORMWORK

A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI SPEC-301.

B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.

C. Align joints and make watertight. Keep form joints to a minimum.

D. Coordinate this section with other sections of work that require attachment of components to formwork.

E. If formwork is placed after reinforcement, resulting in insufficient concrete cover over reinforcement, request instructions from Architect before proceeding.

3.3 APPLICATION - FORM RELEASE AGENT

A. Apply form release agent on formwork in accordance with manufacturer's recommendations.

3.4 INSERTS, EMBEDDED PARTS, AND OPENINGS

A. Locate and set in place items that will be cast directly into concrete.

B. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other work.

C. Chamfer where shown on drawings, exterior corners, top of foundation walls, housekeeping pads, and edges of permanently exposed concrete.

D. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.

E. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.5 WATERSTOPS

A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm.
   1. Install in longest lengths practicable.
   2. Locate waterstops in center of joint unless otherwise indicated on Drawings.
   3. Allow clearance between waterstop and reinforcing steel of not less than 2 times the largest concrete aggregate size specified in 03 3000 - Cast-in-Place Concrete.
   4. Secure waterstops in correct position at 12 inches on center.
   5. Clean waterstops immediately prior to placement of concrete.
   6. Support and protect exposed waterstops during progress of the Work.

B. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated on Drawings, according to manufacturer's written instructions, by adhesive bonding, mechanically fastening, and firmly pressing into place.
   1. Install in longest lengths practicable.
   2. Locate waterstops in center of joint unless otherwise indicated on Drawings.
   3. Protect exposed waterstops during progress of the Work.

3.6 FORM CLEANING

A. Clean forms as erection proceeds, to remove foreign matter within forms.

B. Clean formed cavities of debris prior to placing concrete.
   1. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
   2. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.7 FORMWORK TOLERANCES

A. Construct formwork to maintain tolerances required by ACI SPEC-117, unless otherwise indicated.

B. Construct and align formwork for elevator hoistway in accordance with ASME A17.1.

3.8 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.

B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and to verify that supports, fastenings, wedges, ties, and items are secure.

3.9 FORM REMOVAL

A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.

B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.

C. Store removed forms to prevent damage to form materials or to fresh concrete. Discard damaged forms.

END OF SECTION 03 1000

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SECTION 03 2000 - CONCRETE REINFORCING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Reinforcing steel for cast-in-place concrete.

B. Supports and accessories for steel reinforcement.

C. Welded-wire reinforcement.

1.2 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete.

1.3 REFERENCE STANDARDS

A. ACI MNL-66 - ACI Detailing Manual; 2020.

B. ACI SPEC-301 - Specifications for Concrete Construction; 2020.

C. ACI 117 - Specification for Tolerances for Concrete Construction and Materials; 2010 (Reapproved 2015).

D. ACI 302.1R - Guide to Concrete Floor and Slab Construction; 2015.

E. ACI 315R - Guide to Presenting Reinforcing Steel Design Details; 2018.

F. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2022.

G. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2022.

H. CRSI (DA4) - Manual of Standard Practice; 2023.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Comply with requirements of ACI MNL-66 Include bar schedules, shapes of bent bars, spacing of bars, and location of splices.

C. Shop Drawings: Placing drawings that detail fabrication, bending, and placement, prepared according to ACI 315R. Include wall elevations, material, grade, bar schedules, stirrup spacing, bent bar diagrams, splices and laps, mechanical connections, tie spacing, hoop spacing, arrangement, and supports of concrete reinforcement. Include special reinforcement required for openings through concrete structures.

D. Reproduction of any portion of the structural contract drawings for resubmittal as shop drawings is prohibited. Shop drawings produced in such a manner will be rejected and returned.

E. Resubmitted drawings shall have all revisions clouded or clearly identified on the drawings.

F. CTHPB Documentation Submittals: Comply with Division 01 Section "Sustainable Design Requirements" and provide the following in addition to other action submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Certificates for Credit d10: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

G. Manufacturer's Certificate: Certify that reinforcing steel and accessories supplied for this project meet or exceed specified requirements.

H. Field quality-control and special inspection reports.

I. Minutes of preinstallation conference.

1.5 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI SPEC-301.
   1. Maintain one copy of each document on project site.

B. Preinstallation Conference: Conduct conference at Project site to comply with requirements in 01 3000 - Administrative Requirements.
   1. Review the following:
      a) Special inspection and testing and inspecting agency procedures for field quality control.
      b) Construction, contraction and isolation joints.
      c) Steel-reinforcement installation.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage and to avoid damaging coatings on steel reinforcement.

PART 2 PRODUCTS

2.1 REINFORCEMENT

A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
   1. Deformed billet-steel bars.
   2. Unfinished.

B. Steel Welded Wire Reinforcement (WWR): Plain type; ASTM A1064/A1064M.
   1. Form: Flat Sheets.
   2. WWR Style: As indicated on drawings.

C. Reinforcement Accessories:
   1. Tie Wire: Annealed, minimum 16 gauge, 0.0508 inch.
   2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
      a) Manufacture bar supports from steel wire, plastic, or precast concrete in accordance with CRSI's "Manual of Standard Practice," of greater compressive strength than concrete.
   3. Provide plastic coated steel components for placement within 1-1/2 inches of weathering surfaces.
   4. Joint Dowel Bars: ASTM A615/A615M, Grade 60 (Grade 420), plain-steel bars, cut true to length with ends square and free of burrs.

2.2 FABRICATION

A. Fabricate concrete reinforcing in accordance with CRSI (DA4) - Manual of Standard Practice.

B. Welding of reinforcement is not permitted.

C. Locate reinforcing splices not indicated on drawings at point of minimum stress.

PART 3 EXECUTION

3.1 PREPARATION

A. Protection of In-Place Conditions:
   1. Do not cut or puncture vapor retarder.
   2. Repair damage and reseal vapor retarder before placing concrete.

3.2 PLACEMENT

A. Place, support and secure reinforcement against displacement. Do not deviate from required position.

B. Installation tolerances: Comply with ACI 117.

C. Do not displace or damage vapor retarder.

D. Accommodate placement of formed openings.

E. Comply with applicable code for concrete cover over reinforcement.

F. Bond and ground all reinforcement to requirements of Section 26 0526.

G. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

H. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

I. Lap splices as indicated on Drawings.
   1. Bars indicated to be continuous, and all vertical bars shall be lapped per "Reinforcing Splice Length Schedule.
   2. Stagger splices in accordance with ACI 318.
   3. Mechanical Splice Couplers: Install in accordance with manufacturer's instructions.

J. Install welded-wire reinforcement in longest practicable lengths.
   1. Support welded-wire reinforcement in accordance with CRSI "Manual of Standard Practice."
      a) For reinforcement less than W4.0 or D4.0, continuous support spacing shall not exceed 24 inches.
   2. Support: Provide support adequate to maintain WWR 1 1/2 inches from the surface of the slab on grade. Supports should be close enough that the welded wire reinforcement cannot be forced out of location by construction foot traffic.
   3. Welded wire reinforcement should not be placed on the ground and pulled up after placement of the concrete, nor should the mats be walked in after placing the concrete per ACI 302.1R .
   4. Lap edges and ends of adjoining sheets at least one wire spacing plus 2 inches (50 mm) for plain wire and 8 inches (200 mm) for deformed wire.
   5. Offset laps of adjoining sheet widths to prevent continuous laps in either direction.
   6. Lace overlaps with wire.

3.3 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the inspections indicated in the Statement of Special Inspections.

END OF SECTION 03 2000

SECTION 03 3000 - CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Joint devices associated with concrete work.

B. Miscellaneous concrete elements, including equipment pads and steel pan stairs.

C. Concrete curing.

1.2 RELATED REQUIREMENTS

A. Section 03 1000 - Concrete Forming and Accessories: Forms and accessories for formwork.

B. Section 03 2000 - Concrete Reinforcing.

C. Section 03 6213 - Non-Metallic Non-Shrink Grouting: For grout beneath base and bearing plates.

D. Section 03 0516 - Under-Slab Vapor Retarder: For vapor barrier placed directly under slabs on grade.

E. Section 07 9200 - Joint Sealants: Products and installation for sealants for saw cut joints and isolation joints in slabs.

1.3 REFERENCE STANDARDS

A. ACI 211.2 - Standard Practice for Selecting Proportions for Structural Lightweight Concrete; 1998 (Reapproved 2004).

B. ACI CODE-318 - Building Code Requirements for Structural Concrete and Commentary; 2019 (Reapproved 2022).

C. ACI PRC-211.1 - Selecting Proportions for Normal-Density and High Density-Concrete - Guide; 2022.

D. ACI 228.1R - In-Place Methods to Estimate Concrete Strength; 2003.

E. ACI 305.1 - Specification for Hot Weather Concreting; 2014.

F. ACI 306.1 - Standard Specification for Cold Weather Concreting; 1990 (Reapproved 2002).

G. ACI PRC-302.1 - Guide to Concrete Floor and Slab Construction; 2015.

H. ACI PRC-304 - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000 (Reapproved 2009).

I. ACI PRC-305 - Guide to Hot Weather Concreting; 2020.

J. ACI PRC-306 - Guide to Cold Weather Concreting; 2016.

K. ACI PRC-308 - Guide to External Curing of Concrete; 2016.

L. ACI SPEC-301 - Specifications for Concrete Construction; 2020.

M. ASTM C1064/C1064M - Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete; 2017.

N. ASTM C138/C138M - Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete; 2023.

O. ASTM C231/C231M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method; 2017.

P. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field; 2024.

Q. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2023.

R. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2023.

S. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.

T. ASTM C567/C567M - Standard Test Method for Determining Density of Structural Lightweight Concrete; 2014.

U. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2023.

V. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2024.

W. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2020.

X. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete; 2020.

Y. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2023.

Z. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a (Reapproved 2016).

AA. ASTM C330/C330M - Standard Specification for Lightweight Aggregates for Structural Concrete; 2023.

BB. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2019, with Editorial Revision (2022).

CC. ASTM C595/C595M - Standard Specification for Blended Hydraulic Cements; 2020.

DD. ASTM C597 - Standard Test Method for Pulse Velocity Through Concrete; 2016.

EE. ASTM C618 - Standard Specification for Coal Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2023, with Editorial Revision.

FF. ASTM C803/C803M - Standard Test Method for Penetration Resistance of Hardened Concrete; 2018.

GG. ASTM C805/C805M - Standard Test Method for Rebound Number of Hardened Concrete; 2018.

HH. ASTM C881/C881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete; 2020a.

II. ASTM C900 - Standard Test Method for Pullout Strength of Hardened Concrete; 2019.

JJ. ASTM C1059/C1059M - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete; 2021.

KK. ASTM C1116/C1116M - Standard Specification for Fiber-Reinforced Concrete; 2023.

LL. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete; 2022.

MM. ASTM C1866/C1866M - Standard Specification for Ground-Glass Pozzolan for Use in Concrete; 2020.

NN. ASTM C989/C989M - Standard Specification for Slag Cement for Use in Concrete and Mortars; 2024.

OO. ASTM D8139 - Standard Specification for Semi-Rigid, Closed-Cell Polypropylene Foam, Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction; 2023.

PP. ASTM D6817/D6817M - Standard Specification for Rigid Cellular Polystyrene Geofoam; 2017.

QQ. ASTM E1155 - Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers; 2020.

RR. ASTM E1155M - Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers (Metric); 2014.

SS. EN 15804 - Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products; 2014.

TT. ISO 14025 - Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures; 2006.

UU. ISO 14040 - Environmental management - Life cycle assessment - Principles and framework; 2006 (Amended 2020).

VV. ISO 14044 - Environmental management - Life cycle assessment - Requirements and guidelines; 2006 (Amended 2020).

WW. ISO 21930 - Sustainability in buildings and civil engineering works -- Core rules for environmental product declarations of construction products and services; 2017.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Shop Drawings:
   1. Construction/Control Joint Layout Plan: Indicate proposed construction/control joints required to construct the structure.
      a) Layout of construction/control joints is subject to approval of the Architect.
      b) For slab on grade construction/control joint layout, include size and shape of boxouts for column/pier conditions.

C. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.

D. Mix Design: Submit proposed concrete mix design.
   1. Indicate proposed mix design complies with requirements of ACI SPEC-301, Section 4 - Concrete Mixtures.
   2. Indicate proposed mix design complies with requirements of ACI CODE-318, Chapter 5 - Concrete Quality, Mixing and Placing.
   3. Indicate proposed mix design complies with fiber reinforcing manufacturer's written recommendations.
   4. For structural lightweight concrete, submit test results and correlation between equilibrium density and the fresh bulk density of concrete for review. The fresh bulk density shall be used as the basis for acceptance during construction.
   5. Design Mixtures: For each concrete mixture, include the following: mixture identification, minimum 28-day compressive strength, durability exposure class, maximum w/cm, calculated equilibrium unit weight for lightweight concrete, slump limit, air content, nominal maximum aggregate size, fiber reinforcement dosage, intended placement method, indicate amounts of mixing water to be withheld for later addition at Project site if any, and submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

E. Test Reports: Submit report for each test or series of tests specified.

F. Field quality-control and special inspection reports.

G. Cold and hot weather concreting procedures.
   1. Contractor shall indicate how they intend to implement cold and hot weather concreting, as indicated in "PLACING CONCRETE" section below, including materials used and specific examples for this Project.

H. Sustainable Design Submittal: If any fly ash, ground granulated blast furnace slag, silica fume, rice hull ash, or other waste material is used in mix designs to replace Portland cement, submit the total volume of concrete cast in place, mix design(s) used showing the quantity of portland cement replaced, reports showing successful cylinder testing, and temperature on day of pour if cold weather mix is used.

I. CTHPB Documentation Submittals: Comply with Division 01 Section "Sustainable Design Requirements" and provide the following in addition to other action submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Certificates for Credit d10: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

J. Environmental Product Declaration (EPD): Submit in accordance with the following.
   1. Publicly available, critically reviewed life cycle analysis having at least a cradle-to-gate scope conforming to one of the below criteria.
      a) Good: Product-specific; compliant with ISO 14044.
      b) Better: Industry-wide, generic; compliant with ISO 21930, or with ISO 14044, ISO 14040, ISO 14025, and EN 15804; Type III third-party certification with external verification, in which the manufacturer is recognized as the program operator.
      c) Best: Commercial-product-specific; compliant with ISO 21930, or with ISO 14044, ISO 14040, ISO 14025, and EN 15804; Type III third-party certification with external verification, in which the manufacturer is recognized as the program operator.
      d) Where demonstration of impact reduction below industry average is required, submit both industry-wide and commercial-product-specific declarations; or submit at least 5 declarations for products of the same type by other manufacturers in the same industry.
   2. Submit EPD for 90% by volume for all concrete mixes used in the project.
   3. For products delivered in multiple shipments to the jobsite, an EPD must be provided for each separate shipment from a different point of production, or from a a different supplier.
   4. Impact Categories:
      a) Global Warming Potential (GWP): All GWP information submitted shall be in the form of $kgCO_2eq/kg$.

K. Bill of Materials: Material supplier(s) shall provide a report, when the material sources are known, and at the completion of the primary structural frame, summarizing all concrete quantities and the location where each material was obtained. Each unique mix design used on the project shall be itemized.
   1. In addition to the requirements above, report the following in cubic yards for concrete and itemize as required for each unique mix design:
      a) Total Concrete Volume

L. Minutes of preinstallation conference.

1.5 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI SPEC-301 and ACI CODE-318.
   1. Maintain one copy of each document on site.

B. Follow recommendations of ACI PRC-305 when concreting during hot weather.

C. Follow recommendations of ACI PRC-306 when concreting during cold weather.

D. For slabs required to include moisture vapor reducing admixture (MVRA), do not proceed with placement unless manufacturer's representative is present for every day of placement.

E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in 01 3000 - Administrative Requirements.
   1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
      a) Contractor's superintendent.
      b) Independent testing agency responsible for concrete design mixtures.
      c) Ready-mix concrete manufacturer.
      d) Concrete subcontractor.
      e) Special Inspector.
      f) Architect
      g) Structural Engineer of Record
   2. Review the following:
      a) Special inspection and testing and inspecting agency procedures for field quality control.
      b) Construction, control and isolation joints, joint-filler strips and keyway forming.
      c) Semirigid joint fillers.
      d) Vapor-retarder installation and inspection.
      e) Anchor rod and anchorage device installation tolerances.
      f) Cold and hot weather concreting procedures.
      g) Concrete finishes and finishing. Mockups if required.
      h) Curing procedures.
      i) Methods for achieving specified floor and slab flatness and levelness.
      j) Floor and slab flatness and levelness measurements.
      k) Concrete repair procedures.
      l) Concrete protection.
      m) Initial curing and field curing of field test cylinders (ASTM C31/C31M.)
      n) Protection of field cured field test cylinders.
      o) Determine point at which samples are taken.
      p) Distribution list for Test Reports.

F. Installer Qualifications: A qualified installer who employs Project personnel qualified as an ACI-certified Flatwork Technician and Finisher and a supervisor who is a certified ACI Flatwork Concrete Finisher/Technician or an ACI Concrete Flatwork Technician .
   1. Post-Installed Concrete Anchors Installers: ACI-certified Adhesive Anchor Installer.

G. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.
   1. Manufacturer certified in accordance with NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

PART 2 PRODUCTS

2.1 FORMWORK

A. Comply with requirements of Section 03 1000.

2.2 REINFORCEMENT MATERIALS

A. Comply with requirements of Section 03 2000.

2.3 CONCRETE MATERIALS

A. Cement: ASTM C150/C150M, Type I/II Portland type or ASTM C595/C595M, Portland-limestone cement (PLC) Type IL.
   1. Acquire cement for entire project from same source.

B. Fine and Coarse Aggregates: ASTM C 33. Class 3S coarse aggregate or better, graded.
   1. Acquire aggregates for entire project from same source.

C. Lightweight Aggregate: ASTM C330/C330M.

D. Fly Ash: ASTM C618, Class C or F. LOI shall not exceed 3%, specific gravity shall not be less than 2.2.

E. Ground Granulated Blast-Furnace Slag: ASTM C989/C989M, Grade 120.

F. Ground Glass Pozzolan: ASTM C1866/C1866M.

G. Water and Water Used to Make Ice: ASTM C94/C94M , potable or complying with ASTM C1602/C1602M, including all limits listed in Table 2 and the requirements of paragraph 5.4.

H. Structural Fiber Reinforcement: ASTM C1116/C1116M.
   1. Fiber Length: 2.0 inch , nominal.
   2. Products:
      a) Euclid Chemical Company; TUF-STRAND SF: www.euclidchemical.com/#sle.
      b) Fibermesh; Fibermesh 650: www.fibermesh.com/#sle.
      c) GCP Applied Technologies; STRUX 90/40: www.gcpat.com/#sle.
      d) GCP Applied Technologies; STRUX BT50: www.gcpat.com/#sle.
      e) ABC Polymer Industries, LLC; FiberForce 650TM; www.abcpolymerindustries.com

2.4 ADMIXTURES

A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

B. Air Entrainment Admixture: ASTM C260/C260M.

C. High Range Water Reducing and Retarding Admixture: ASTM C494/C494M Type G.

D. High Range Water Reducing Admixture: ASTM C494/C494M Type F.

E. Water Reducing and Accelerating Admixture: ASTM C494/C494M Type E.

F. Water Reducing and Retarding Admixture: ASTM C494/C494M Type D.

G. Accelerating Admixture: ASTM C494/C494M Type C.

H. Retarding Admixture: ASTM C494/C494M Type B.

I. Water Reducing Admixture: ASTM C494/C494M Type A.

2.5 ACCESSORY MATERIALS

A. Underslab Vapor Retarder: Comply with requirements of Section 03 0516 - Under-Slab Vapor Retarder.

B. Non-Shrink Cementitious Grout: Comply with requirements of Section 03 6213 - Non-Metallic Non-Shrink Grouting

C. Structural Grade Rigid Filler Material: Complies with ASTM C578 or ASTM D6817/D6817M.
   1. Expanded Polystyrene (EPS)
   2. Type and Compressive Resistance: Type XIV, 40 psi (276 kPa) compressive resistance at 10% strain, minimum.
   3. Type and Thermal Resistance, R-value: Type XIV, 4.2 (0.74), minimum, per 1 inch thickness at 75 degrees F mean temperature, when tested in accordance with ASTM C518 .
   4. Board Size: 48 inch by 96 inch.
   5. Board Thickness: As Indicated on Drawings.
   6. Board Edges: Square, at long edges.
   7. Recycled Content: Minimum 20%, certified by independent third party such as Scientific Certification Systems.
   8. Manufacturers:
      a) DiversiFoam Products; RayLite® EPS Insulation, Type XIV: www.diversifoam.com
      b) Atlas Molded Products; ThermalStar Insulation Board 40 or Atlas Geofoam 39 www.atlasmoldedproducts.com.
      c) Insulfoam, a Carlisle Company; InsulFoam XIV 40psi: www.Insulfoam.com
      d) ISOLOFOAM Group; ISOLOFOAM XHD 400/600: www.isolofoam.com
      e) Plymouth Foam Incorporated; Durafill 39: www.goplymouthfoam.com
      f) ____.
      g) Substitutions: See Section 01 6000 - Product Requirements.

2.6 BONDING AND JOINTING PRODUCTS

A. Latex Bonding Agent: Non-redispersable acrylic latex, complying with ASTM C1059/C1059M, Type II. For use in non-structural applications i.e. bonding new concrete to old concrete per typical detail "Typical Wall Joints".

B. Epoxy Bonding System:
   1. Complying with ASTM C881/C881M and of Type required for specific application. For use in structural bearing applications.

C. Slab Isolation Joint Filler: 1/2-inch thick, height equal to slab thickness, with removable top section forming 1/2-inch deep sealant pocket after removal.
   1. Material: ASTM D8139, semi-rigid, closed-cell polypropylene foam.
   2. Products:
      a) Nomaco, Inc; Fastflex Slab Isolation Joint Filler with Tear-Off Strip: www.nomaco.com/#sle.
      b) W. R. Meadows, Inc; Deck-O-Foam Joint Filler with pre-scored top strip: www.wrmeadows.com/#sle.
      c) Right / Pointe, LLC; Flex Foam Expansion Joint
      d) Substitutions: See Section 01 6000 - Product Requirements.

D. Slab Construction Joint Devices: Combination keyed joint form and screed, galvanized steel, with rectangular or round knockout holes for conduit or rebar to pass through joint form at 6 inches on center; ribbed steel stakes for setting.

2.7 CURING MATERIALS

A. Moisture-Retaining Sheet: ASTM C171.
   1. White-burlap-polyethylene sheet, weighing not less than 3.8 ounces per square yard.
      a) 10 oz. burlap laminated onto 5 mil white coated polyethylene

B. Water and Water Used to Make Ice: Potable, not detrimental to concrete.

2.8 CONCRETE MIX DESIGN

A. Proportioning Normal Weight Concrete: Comply with ACI PRC-211.1 recommendations.
   1. Replace as much Portland cement as possible with fly ash, ground granulated blast furnace slag, silica fume, or rice hull ash as is consistent with ACI recommendations.

B. Proportioning Structural Lightweight Concrete: Comply with ACI 211.2 recommendations.
   1. Replace as much Portland cement as possible with fly ash, ground granulated blast furnace slag, silica fume, or rice hull ash as is consistent with ACI recommendations.

C. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI SPEC-301.
   1. For trial mixtures method, employ independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.

D. Admixtures: Add acceptable admixtures as recommended in ACI PRC-211.1 and at rates recommended or required by manufacturer.

E. Fiber Reinforcement: Add to mix at rate of 3.0 pounds per cubic yard minimum, or as recommended by manufacturer for specific project conditions.

F. Normal Weight Concrete: Footings and Foundation Walls
   1. Exposure Category: Freezing and Thawing (F)
   2. Exposure Class: ACI 318 F1
   3. Compressive Strength, when tested in accordance with ASTM C39/C39M at 56 days: 4,000 pounds per square inch.
   4. Supplementary Cementitious Materials (SCMs): Mix design must meet a minimum of one of the criteria below.
      a) Fly Ash or Ground Glass Pozzolan Content: Between 15 and 25 percent of cementitious materials by weight.
      b) Ground Granulated Blast-Furnace Slag: Between 30 and 50 percent.
      c) Combined Fly Ash or Ground Glass Pozzolan and Ground Granulated Blast-Furnace Slag: Between 30 and 50 percent by mass, with fly ash or pozzolan not exceeding 25 percent.
   5. Total Air Content: 6 percent plus or minus 1.5 percent at point of placement, determined in accordance with ASTM C173/C173M.
   6. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

G. Normal Weight Concrete: Exterior Building Slabs on Grade
   1. Exposure Category: Freezing and Thawing (F)
   2. Exposure Class: ACI 318 F3
   3. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 4,500 pounds per square inch.
   4. Supplementary Cementitious Materials (SCMs): Mix design must meet a minimum of one of the criteria below.
      a) Fly Ash or Ground Glass Pozzolan Content: Between 10 and 15 percent of cementitious materials by weight.
      b) Ground Granulated Blast-Furnace Slag: Between 10 and 15 percent.
      c) Combined Fly Ash or Ground Glass Pozzolan and Ground Granulated Blast-Furnace Slag: Between 10 and 15 percent by mass, with fly ash or pozzolan not exceeding 15 percent.
   5. Total Air Content: 6 percent plus or minus 1.5 percent at point of placement, determined in accordance with ASTM C173/C173M.
   6. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

H. Normal Weight Concrete: Interior Slabs on Grade and Haunched Slabs
   1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 4,000 pounds per square inch.
   2. Supplementary Cementitious Materials (SCMs): Mix design must meet a minimum of one of the criteria below.
      a) Fly Ash or Ground Glass Pozzolan Content: Between 10 and 15 percent of cementitious materials by weight.
      b) Ground Granulated Blast-Furnace Slag: Between 10 and 15 percent.

c) Combined Fly Ash or Ground Glass Pozzolan and Ground Granulated Blast-Furnace Slag: Between 10 and 15 percent by mass, with fly ash or pozzolan not exceeding 15 percent.

3. Total Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.
4. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

I. Structural Lightweight Concrete: Suspended Slabs and Housekeeping Pads
1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 4,000 pounds per square inch.
2. Supplementary Cementitious Materials (SCMs): Mix design must meet a minimum of one of the criteria below.
a) Fly Ash or Ground Glass Pozzolan Content: Between 10 and 15 percent of cementitious materials by weight.
b) Ground Granulated Blast-Furnace Slag: Between 10 and 15 percent.
c) Combined Fly Ash or Ground Glass Pozzolan and Ground Granulated Blast-Furnace Slag: Between 10 and 15 percent by mass, with fly ash or pozzolan not exceeding 15 percent.
3. Total Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.
4. Maximum dry unit weight: 115 pounds per cubic foot plus or minus 3 lb/cu. ft. (48.1 kg/cu. m). The calculated value per ASTM C567/C567M shall be included in the submittal.
5. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

J. Steel Pan Stairs: Provide 3000 psi normal weight concrete fill with 3/8” maximum aggregate reinforced with WWR 6 x 6-W1.4 x W1.4 for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel-finish concrete surfaces.

2.9 MIXING

A. Transit Mixers: Comply with ASTM C94/C94M.
1. Furnish batch ticket information.
2. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above **90 deg F reduce mixing and delivery time to 60 minutes.**

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section.

B. Before placing concrete, verify that installation of concrete forms, accessories, and reinforcement, and embedded items is complete and that required inspections have been performed.

C. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas and that required inspections are completed.

D. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning and applying bonding agent in according to bonding agent manufacturer's instructions.
   1. Use epoxy bonding system for bonding to damp surfaces, for structural load-bearing applications, and where curing under humid conditions is required.
   2. Use latex bonding agent only for non-load-bearing applications.

3.3 PLACING CONCRETE

A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.
   1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
   2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.

B. Place concrete in accordance with ACI PRC-304.

C. Place concrete for floor slabs in accordance with ACI PRC-302.1.

D. Cold-Weather Placement: Comply with ACI 301 and ACI 306.1 and as follows.
   1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
   2. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
   3. Do not use frozen materials or materials containing ice or snow.
   4. Do not place concrete in contact with surfaces less than 35 deg F (1.7 deg C), other than reinforcing steel.
   5. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
   6. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

E. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1 (ACI 305.1M), and as follows:
   1. Maintain concrete temperature at time of discharge to not exceed 95 deg F (35 deg C).
   2. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor’s option.
   3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.
   4. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
   5. An alternate concrete mix design may be submitted for approval using a retarding admixture.

F. Notify Architect not less than 24 hours prior to commencement of placement operations.

G. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

H. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.

I. Place concrete continuously without construction (cold) joints wherever possible; where construction joints are necessary, before next placement prepare joint surface by removing laitance and exposing the sand and sound surface mortar, by sandblasting or high-pressure water jetting.

J. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301.
   1. Do not use vibrators to transport concrete inside forms.
   2. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer.
   3. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
   4. At each insertion, limit duration of vibration to time necessary to consolidate concrete, and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

K. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
   1. If permitted, the contractor is required to clearly note on the delivery ticket the quantity of water withheld at the batching plant that can be added on site.
   2. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

L. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

3.4 SLAB JOINTING

A. Locate joints as indicated on drawings.

B. Anchor joint fillers and devices to prevent movement during concrete placement.

C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant specified in 07 9200 - Joint Sealants, total height equal to thickness of slab, set flush with top of slab.

D. Saw Cut Contraction Joints: Saw cut joints before concrete begins to cool, within 4 to 12 hours after placing when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks; use 1/8 inch thick shatterproof abrasive or diamond-rimmed blade and cut at least 1 inch deep but not less than one quarter (1/4) the depth of the slab.
   1. For slabs on grade where fiber reinforcment is used in lieu of WWR, saw cut shall be at least one third (1/3) the depth of the slab.

E. Construction Joints: Where not otherwise indicated, use metal combination screed and key form, with removable top section for joint sealant.

F. Construction Joints in Slabs on Steel Deck: Where not otherwise indicated,

1. Joints parallel to girder shall be located minimum 5'-0" off girder centerline.
2. Joints parallel to infill beams shall be located half way between adjacent beam.
3. Submit layout plan for A/E approval.

3.5 FLOOR FLATNESS AND LEVELNESS TOLERANCES

A. Minimum F(F) Floor Flatness and F(L) Floor Levelness Values:
   1. Exposed to View and Foot Traffic: F(F) of 20; F(L) of 15, on-grade only.
   2. Under Thick-Bed Tile: F(F) of 20; F(L) of 15, on-grade only.
   3. Under Carpeting: F(F) of 25; F(L) of 20, on-grade only.
   4. Under Thin Resilient Flooring and Thinset Tile: F(F) of 35; F(L) of 25, on-grade only.

B. Maintain F(F) numbers only for elevated slabs on steel deck for areas listed above.

C. Measure F(F) Floor Flatness and F(L) Floor Levelness in accordance with ASTM E1155 (ASTM E1155M), within 48 hours after slab installation; report both composite overall values and local values for each measured section.

D. Correct the slab surface if composite overall value is less than specified and if local value is less than two-thirds of specified value or less than F(F) 13/F(L) 10.

E. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

3.6 CONCRETE FINISHING

A. Repair surface defects, including tie holes, immediately after removing formwork.

B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.

C. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch or more in height. Provide finish as follows:
   1. Smooth Rubbed Finish: Wet concrete and rub with carborundum brick or other abrasive, not more than 24 hours after form removal.

D. Concrete Slabs: Finish to requirements of ACI PRC-302.1 and as follows:
   1. Surfaces to Receive Thin Floor Coverings: "Steel trowel" as described in ACI 302.1R; thin floor coverings include Resilient Flooring, Resilient Athletic Flooring, Tile Carpeting, Tiling, and Fluid-Applied Flooring.
   2. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.
      a) Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
   3. Other Surfaces to Be Left Exposed: Trowel as described in ACI PRC-302.1, minimizing burnish marks and other appearance defects.

3.7 CURING AND PROTECTION

A. Comply with requirements of ACI PRC-308. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Wet coverings should be laid over the concrete as soon as finishing operations are complete and surface marring can be avoided. Exposed concrete edges should be carefully covered. The coverings should be kept wet so that a film of moisture remains continuously in contact with the concrete throughout the curing period.

C. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
   1. Curing Period: Not less than seven days.

D. Formed Surfaces: Cure by moist curing with forms in place for full curing period.

E. Surfaces Not in Contact with Forms:
   1. Slabs and Floors To Receive Adhesive-Applied Flooring: Curing compounds and other surface coatings are usually considered unacceptable by flooring and adhesive manufacturers. If such materials must be used, either obtain the approval of the flooring and adhesive manufacturers prior to use or remove the surface coating after curing to flooring manufacturer's satisfaction.
   2. Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist.
      a) Saturated Burlap: Saturate burlap-polyethylene and place burlap-side down over floor slab areas, lapping ends and sides; maintain in place.

3.8 TOLERANCES

A. Conform to ACI 117.

3.9 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.

B. Special Inspections: Owner will engage a qualified special inspector to perform the inspections indicated in the Statement of Special Inspections.

C. Provide free access to concrete operations at project site and cooperate with appointed firm.

D. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.

E. Tests of concrete and concrete materials may be performed at any time to ensure compliance with specified requirements.

F. All field quality control tests shall be performed at point of concrete placement.

G. Compressive Strength Tests: ASTM C39/C39M, for each test, mold and cure three concrete test cylinders. Obtain test samples for every 50 cubic yards or less of each class of concrete placed but not less than one per day. Test cylinders at 28 days except for foundation and footing mixes shall be tested at 56 days.

H. In the event that a compressive strength test of standard cured cylinders is more than 500 psi (3.5 MPa) below the design f'c, cores shall be drilled to verify the in-place strength. Three cores are required for each strength test failing to meet the specified criteria per ACI 214.4R.

I. Take three additional test cylinders during cold weather concreting, cured on job site under same conditions as concrete it represents. Test cylinders at 28 days except for foundation and footing mixes shall be tested at 56 days.

J. During cold weather concreting, a number of techniques are available for estimating the in-place strength of concrete per ACI 228.1R. When these have been correlated to standard-cured cylinders, they can be used to determine the concrete strength. Tests are performed using simple handheld equipment. Use one of the following to estimate concrete strength.
   1. Pullout strength testing (ASTM C900) requires placing bolts in the concrete before casting. Individual bolts are then pulled out of the structure.
   2. Penetration resistance (ASTM C803/C803M) is a technique that involves placing pins in the concrete using a powder-actuated tool.
   3. Pulse velocity measurements (ASTM C597) determines the propagation velocity of a pulse of vibrational energy through a concrete member.
   4. Rebound hammer measurements (ASTM C805/C805M) are also used to estimate concrete strength.

K. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.

L. Air Content: Perform one test for each set of test cylinders taken, following procedures of ASTM C231/C231M, pressure method, for normal-weight concrete; ASTM C173/C173M, volumetric method, for structural lightweight concrete.

M. Concrete Temperature: ASTM C1064/C1064M; one test hourly when air temperature is 40 degrees F and below or 80 degrees F and above, and one test for each set of test cylinders taken.

N. Fresh Bulk Unit Weight: ASTM C138/C138M; For normal weight and structural lightweight concrete, perform one test for each set of test cylinders taken, but not less than one test for each day's pour of each concrete mixture.

O. Equilibrium Unit Weight: ASTM C567/C567M; For structural lightweight concrete, perform one test for each set of test cylinders taken, but not less than one test for each day's pour of each concrete mixture.

3.10 DEFECTIVE CONCRETE

A. Test Results: The testing agency shall report test results in writing to Architect and Contractor within 24 hours of test.

B. Defective Concrete: Concrete not complying with required lines, details, dimensions, tolerances or specified requirements.

C. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.

D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.

E. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
   1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete.
      a) Limit cut depth to 3/4 inch.
      b) Make edges of cuts perpendicular to concrete surface.
      c) Clean, dampen with water, and brush-coat holes and voids with bonding agent.
      d) Fill and compact with patching mortar before bonding agent has dried.
      e) Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
   2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement, so that, when dry, patching mortar matches surrounding color.
      a) Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.
      b) Compact mortar in place and strike off slightly higher than surrounding surface.
   3. Repair defects on concealed formed surfaces that will affect concrete's durability and structural performance as determined by Architect.

3.11 PROTECTION

A. Do not permit traffic over unprotected concrete floor surface until fully cured.

END OF SECTION 03 3000

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SECTION 03 3250 - CONCRETE POST-INSTALLED ANCHORS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Post installed anchors for concrete.

B. Post installed anchors for masonry.

1.2 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete.

B. Section 04 2000 - Unit Masonry.

C. Section 04 2900 - Engineered Unit Masonry.

D. Section 05 1200 - Structural Steel Framing.

1.3 REFERENCE STANDARDS

A. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

C. ASTM A193/A193M - Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications

D. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength

E. ASTM A36/A36M - Standard Specification for Carbon Structural Steel

F. ASTM A510/A510M - Standard Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel, and Alloy Steel

G. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts

H. ASTM A563M - Standard Specification for Carbon and Alloy Steel Nuts (Metric)

I. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

J. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel

K. ASTM C42/C42M - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete

L. ASTM C642 - Standard Test Method for Density, Absorption, and Voids in Hardened Concrete

M. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units

N. ASTM E1512 - Standard Test Methods for Testing Bond Performance of Bonded Anchors

O. ASTM E488/E488M - Standard Test Methods for Strength of Anchors in Concrete Elements

P. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions

Q. ASTM F436/F436M - Standard Specification for Hardened Steel Washers Inch and Metric Dimensions

R. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs

S. ASTM F594 - Standard Specification for Stainless Steel Nuts

T. ASTM F844 - Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use

U. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements

V. ICC-ES AC58 - Acceptance Criteria for Adhesive Anchors in Masonry Elements

W. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Concrete or Masonry Elements

X. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements

Y. ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements

1.4 SUBMITTALS

A. General: Submit in accordance with Conditions of the Contract and Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product specifications with recommended design values and physical characteristics for adhesive and mechanical anchors.

C. Quality Assurance Submittals:
   1. Test Reports: Certified test reports (ICC-ES Evaluation Report) showing compliance with ICC-ES AC193 , ICC-ES AC308 , ICC-ES AC01 or ICC-ES AC58.

D. Manufacturer’s installation instructions.

E. Installer Qualifications & Procedures: Submit installer qualifications. Submit a letter of procedure stating method of drilling, the product proposed for use, the complete installation procedure, manufacturer training date, and a list of the personnel to be trained on anchor installation.

F. Substitutions: Contractor shall submit for Structural Engineer's review calculations prepared and sealed by Contractors Professional Engineer indicating substituted product is capable of resisting loads indicated on Construction Documents. Substituted anchors shall be submitted with ICC-ES Evaluation Report indicating anchor conforms with ICC-ES AC308, ICC-ES AC193, ICC-ES AC01 or ICC-ES AC58 . Engineer shall be registered to practice in the State of the State in which the Project is located.

1.5 QUALITY ASSURANCE

A. Installer Qualifications:
   1. Drilled-in anchors shall be installed by a contractor with at least five years of experience performing similar installations. Contractor to be a certified installer of chemical anchors. Certification is achieved by completing the "basic anchor installation training program" prepared by manufacturer. Please call your local Hilti representative to schedule this no-charge service [800.879.8000].

B. Installer Training: Conduct a thorough training with the manufacturer or the manufacturer's representative for the contractor on the project. Training to consist of a review of the complete installation process for drilled-in anchors, to include but not limited to:
   1. Hole drilling procedure.
   2. Hole preparation & cleaning technique using the 2 x 2 x 2 method with compressed air or utilizing a hand-pump if compressed air is not available. 2 x 2 x 2 is equivalent to two passes with compressed air (min 90 psi @ 3.5 CFM), two passes with a manufacturer approved wire brush (correct diameter and length), and a final two passes with compressed air. If compressed air is not available, then the hand-pump requires 4 to 6 pumps or passes. Only two pumps with the hand-pump will not be sufficient for removing the dust and debris from the bore hole.
   3. Hole preparation and cleaning technique using Hilti Safe Set automatic hole cleaning with Hilti TE-CD or TE-YD hollow drill bits used in conjunction with a Hilti vacuum with a minimum value for the maximum volumetric flow rate of 129 cfm.
   4. Adhesive injection techniques and dispenser training/maintenance. Determining when to use the piston plug and extension hoses and when not too. Deep embedment's versus standard and shallow embedment's plus dispenser training. Deep embedment is considered to be greater than 10". Piston plug should be used in all overhead applications.
   5. Rebar dowel preparation and installation.
   6. Proof loading/torquing.

C. Certifications: Unless otherwise authorized by the Engineer, anchors shall have the following certification:
   1. ICC-ESR Evaluation Service Report indicating conformance with current applicable ICC-ES acceptance criteria's ICC-ES AC308 or ICC-ES AC193 reports for building code compliance. Acceptance Criteria.
   2. ACI 355.2 Evaluation Report

1.6 DELIVERY, STORAGE AND HANDLING

A. General: Deliver, store, and handle anchors in accordance with manufacturer's recommendations.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Fasteners and Anchors:
   1. Structural Bolts and Nuts: Carbon steel, ASTM A307, Grade A and galvanized in compliance with ASTM A153/A153M Class C.
   2. High-Strength Structural Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, with matching compatible ASTM A563 or ASTM A563M nuts and ASTM F436/F436M washers.
   3. Carbon Steel Threaded Rod: ASTM A36/A36M; or ASTM A193/A193M Grade B7 or ISO 898 Class 5.8.
   4. Wedge Anchors: ASTM A510/A510M; or ASTM A108.
   5. Stainless Steel Bolts, Hex Cap Screws, and Studs: ASTM F593.
   6. Stainless Steel Nuts: ASTM F594.
   7. Zinc Plating: ASTM B633.
   8. Hot-Dip Galvanizing: ASTM A153/A153M.
   9. Metric Anchor Bolts, Screws, and Studs: ISO 898 Part 1.
   10. Metric Anchor Nuts: EN 24033.
   11. Metric Anchor Stainless Steel Bolts, Screws, and Studs: ISO 3506 Part 1.
   12. Metric Anchor Stainless Steel Nuts: ISO 3506 Part 2.
   13. Reinforcing Dowels: ASTM A615/A615M

2.2 POST INSTALLED ANCHORS

A. Screw Anchors: Screw type. Pre-drilling of the hole requires a standard ANSI drill bit with the same diameter as the anchor and installing the anchor will be done with an impact wrench. Provide anchors with a diameter and anchor length marking on the head. Type and size as indicated on Drawings.
   1. Interior Use: Unless otherwise indicated on the Drawings, provide carbon steel anchors with zinc plating equivalent to DIN EN ISO 4042 (8mm min.).
   2. Where anchor manufacturer is not indicated, subject to compliance with requirements and acceptance by the Engineer, provide the following:
      a) Hilti Kwik-HUS EZ, ICC-ESR 3027 for concrete, ICC-ESR 3056 for masonry.
      b) Hilti Kwik-HUS EZ-I, ICC-ESR 3027.
      c) Hilti Kwik-HUS EZ-P, ICC-ESR 3027 for concrete, ICC-ESR 3056 for masonry.

B. Wedge Anchors: Wedge type, torque-controlled, with impact section to prevent thread damage and wedge dimples to prevent spinning during installation, complete with required nuts and washers. Provide anchors with length identification markings conforming to ICC-ES AC193 or ICC-ES AC01. Type and size as indicated on Drawings.
   1. Interior Use: Unless otherwise indicated on the Drawings, provide carbon steel anchors manufactured from materials conforming to ASTM A510/A510M or ASTM A108 with zinc plating in accordance with ASTM B633, Type III Fe/Zn 5 (SC1). Anchors in contact with preservative-treated and fire retardant treated wood shall be zinc coated or stainless steel.

2. Exterior Use: As indicated on the Drawings, provide stainless steel anchors. Stainless steel anchors shall be AISI Type 304 and Type 316 stainless steel provided with stainless steel nuts and washers of matching alloy group and minimum proof stress equal to or greater than the specified minimum full-size tensile strength of the externally threaded fastener. Stainless steel nuts shall conform to ASTM F594 unless otherwise specified. Avoid installing stainless steel anchors in contact with galvanically dissimilar metals.
3. Acceptable base material: Normal weight concrete, light weight concrete, normal weight concrete on metal deck, light weight concrete on metal deck and grouted masonry units.
4. Base material compressive strength:
   a) Fastening into concrete: Between 2500 psi and 8500 psi
   b) Fastening into concrete over metal deck: Minimum of 3000 psi
   c) Fastening into grouted masonry units: CMU's must be fully grouted and compressive strength of masonry f'm at 28 days must be a minimum of 1500 psi. CMU must conform to ASTM C90 and minimum nominal dimensions of 8 inches wide by 8 inches high by 16 inches long.
5. Where anchor manufacturer is not indicated, subject to compliance with requirements and acceptance by the Engineer, provide the following:
   a) Hilti Kwik Bolt 3 [KB3], ICC-ESR 2302 for uncracked concrete, ICC-ESR 1385 for masonry.
   b) Hilti Kwik Bolt-TZ [KB-TZ], ICC-ESR 1917 for cracked concrete, ICC-ESR 3785 for masonry.

C. Heavy Duty Metric Sleeve Anchors: Torque-controlled, exhibiting follow-up expansion under load, with provision for rotation prevention during installation. Type and size as indicated on Drawings.
1. Interior Use: Unless otherwise indicated on the Drawings, provide carbon steel anchors manufactured from materials conforming to ISO 898 Part 1, with zinc plating equivalent to ASTM B633, Type III Fe/Zn 5 (5 mm min.). Anchors in contact with preservative-treated and fire retardant treated wood shall be zinc coated or stainless steel.
2. Exterior Use: As indicated on the Drawings, provide stainless steel anchors. Stainless steel anchors shall be manufactured from materials conforming to ISO 3506 Part 1 and having corrosion resistance equivalent to AISI Type 304 and Type 316 stainless steel. Stainless steel anchors shall be provided with stainless steel nuts and washers of matching alloy group and minimum proof stress equal to or greater than the specified minimum full-size tensile strength of the externally threaded fastener. All nuts shall conform to ISO 3506 Part 2 unless otherwise specified. Avoid installing stainless steel anchors in contact with galvanically dissimilar metals.
3. Acceptable base material: Normal weight concrete and light weight concrete.
4. Base material compressive strength: Between 2500 psi and 8500 psi
5. Where anchor manufacturer is not indicated, subject to compliance with requirements and acceptance by the Engineer, provide the following:
   a) Hilti HSL-3, HSL-3-G, or HSL-3-B, ICC-ESR-1545 (carbon steel).

D. Heavy Duty Metric Undercut Anchors: Bearing-type. Installed anchor shall have a minimum tension bearing area in the concrete, measured as the horizontal projection of the bearing surface, not less than two times the net tensile area of the anchor bolt. The installed anchor shall exhibit a form fit between the bearing elements and the undercut in the concrete. Type and size as indicated on Drawings.

1. Interior Use: Unless otherwise indicated on the Drawings, provide carbon steel anchors manufactured from materials conforming to ISO 898 Part 1, with zinc plating equivalent to ASTM B633, Type III Fe/Zn 5 (5mm min.). Anchors in contact with preservative-treated and fire retardant treated wood shall be zinc coated or stainless steel.
2. Exterior Use: As indicated on the Drawings, provide sherardized or stainless steel anchors. Sherardized anchors shall be manufactured from materials conforming to ISO 898 Part 1 and having corrosion resistance equivalent to ASTM A153/A153M with sherardized dry diffusion zinc coating (50 mm min.). Stainless steel anchors shall be manufactured from materials conforming to ISO 3506 Part 1 and having corrosion resistance equivalent to AISI Type 304 and Type 316 stainless steel. Stainless steel anchors shall be provided with stainless steel nuts and washers of matching alloy group and minimum proof stress equal to or greater than the specified minimum full-size tensile strength of the externally threaded fastener. All nuts shall conform to ISO 3506 Part 2 unless otherwise specified. Avoid installing stainless steel anchors in contact with galvanically dissimilar metals.
3. Acceptable base material: Normal weight concrete and light weight concrete.
4. Base material compressive strength: Between 2500 psi and 8500 psi
5. Where anchor manufacturer is not indicated, subject to compliance with requirements and acceptance by the Engineer, provide the following:
   a) Hilti HDA, ICC-ESR-1546.

E. Cartridge Injection Adhesive Anchors: Threaded steel rod, inserts or reinforcing dowels, complete with nuts, washers, polymer [epoxy] or hybrid mortar adhesive injection system, and manufacturer's installation instructions. Type and size as indicated on Drawings.
   1. Interior Use: Unless otherwise indicated on the Drawings, provide carbon steel rods conforming to ASTM A36/A36M, ISO 898 Class 5.8 HAS-E rod, or ASTM A193/A193M Type B7 with zinc plating in accordance with ASTM B633, Type III Fe/Zn 5 (SC1). Anchors in contact with preservative-treated and fire retardant treated wood shall be zinc coated or stainless steel.
   2. Exterior Use: As indicated on the Drawings, provide stainless steel anchors. Stainless steel anchors shall be AISI Type 304 and Type 316 stainless steel provided with stainless steel nuts and washers of matching alloy group and minimum proof stress equal to or greater than the specified minimum full-size tensile strength of the externally threaded fastener. All nuts shall conform to ASTM F594 unless otherwise specified. Avoid installing stainless steel anchors in contact with galvanically dissimilar metals.
   3. Reinforcing dowels shall be ASTM A615/A615M Grade 60.
   4. Acceptable base material: Normal weight concrete grouted masonry units.
   5. Base material compressive strength:
      a) Fastening into concrete: Between 2500 psi and 8500 psi
      b) Fastening into concrete over metal deck: Minimum of 3000 psi
      c) Fastening into grouted masonry units: CMU must be fully grouted and compressive strength of masonry f'm at 28 days must be a minimum of 1500 psi. CMU must conform to ASTM C90 and minimum nominal dimensions of 8 inches wide by 8 inches high by 16 inches long.
   6. Where anchor manufacturer is not indicated, subject to compliance with requirements and acceptance by the Architect, provide the following:
      a) Hilti HAS threaded rods with HIT-HY 200 Safe Set System using Hilti Hollow Drill Bit and VC 20/40 vacuum System for anchor and rebar anchorage to concrete, ICC ESR-3187.
      b) Hilti HIT-Z anchor rods with HIT-HY 200 Safe Set System for anchorage to concrete, ICC ESR-3187.

c) Hilti HAS threaded rods with HIT-RE 500 V3 Safe Set System using Hilti Hollow Drill Bit and VC 20/40 vacuum System for anchor and rebar anchorage to concrete, ICC ESR-3814.
d) Hilti HAS-E, HAS-B7 threaded rods with Hilti HIT-HY 70 Adhesive Anchor System for anchorage to fully grouted masonry units, ICC-ESR 2682; AC58

PART 3 - EXECUTION

3.1 INSTALLATION

A. Post Installed Anchors:
1. Drill holes with rotary impact hammer drills using carbide-tipped bits. Drill bits shall be of diameters as specified by the anchor manufacturer. Unless otherwise shown on the Drawings, all holes shall be drilled perpendicular to the concrete surface. Edge distance, spacing and required embedment depth of holes should be in conformance with the Construction Documents.
   a) Cored Holes: Where anchors are permitted to be installed in cored holes, use core bits with matched tolerances as specified by the manufacturer. Properly clean cored hole per manufacturer's instructions.
   b) Embedded Items: Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Exercise care in coring or drilling to avoid damaging existing reinforcing or embedded items. Notify the Engineer if reinforcing steel or other embedded items are encountered during drilling. Take precautions as necessary to avoid damaging prestressing tendons, electrical and telecommunications conduit, and gas lines.
   c) Base Material Compressive Strength: Unless otherwise specified, do not drill holes in concrete or masonry until it has achieved full design strength. If compressive strength is unknown, contractor shall take concrete core complying with ASTM C42/C42M and perform compressive strength test complying with ASTM C39/C39M to determine strength.
   d) Acceptable Base Material: If concrete density is unknown, contractor shall take concrete core complying with ASTM C42/C42M to determine concrete weight in conformance with ASTM C642 (normal or lightweight) and to determine if base material is suitable for post installed anchor.
2. Perform anchor installation in accordance with manufacturer instructions. Contractor shall contact manufacturer for proper overhead application installation procedure.
3. Wedge Anchors and Heavy-Duty Sleeve Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in part to be fastened. Set anchors to manufacturer's recommended torque, using a torque wrench. Following attainment of 10% of the specified torque, 100% of the specified torque shall be reached within 7 or fewer complete turns of the nut. If the specified torque is not achieved within the required number of turns, the anchor shall be removed and replaced unless otherwise directed by the Engineer.
4. Undercut Anchors:

5. Cartridge Injection Adhesive Anchors: Clean all holes per manufacturer instructions to remove loose material and drilling dust prior to installation of adhesive. Holes may be dry, damp or wet. Inject adhesive into holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive Follow manufacturer recommendations to ensure proper mixing of adhesive components. Sufficient adhesive shall be injected in the hole to ensure that the annular gap is filled to the surface [use of piston plug to achieve these results]. Remove excess adhesive from the surface. Shim anchors with suitable device to center the anchor in the hole. Do not disturb or load anchors before manufacturer specified cure time has elapsed.
6. Observe manufacturer recommendations with respect to installation temperatures for cartridge injection adhesive anchors.

3.2 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a special inspector and qualified testing agency to provide continuous inspection during installation. Special inspector and qualified testing agency inspector shall be a certified installer of chemical anchors. Certification is achieved by completing the "basic anchor installation training program" prepared by manufacturer. Please call your local Hilti representative to schedule this no-charge service [800.879.8000].
Inspecting agency to provide field reports which document the following information:
   1. Anchor location and description, including adhesive product name, anchor type, nominal anchor diameter, and anchor length.
   2. Verify hole dimensions, hole cleaning procedures, drill bit, drilling procedures and anchor tightening torque are in compliance with the manufacturer's installation instructions.
   3. Verification of anchor spacing, edge distances, concrete base material thickness and anchor embedment depth are in conformance with Construction Documents and manufacturer's recommendations.

3.3 POST INSTALLED ANCHOR LOAD TESTING

A. Anchors which the structural engineer requires load testing or any anchor that the special inspector or inspecting agency is concerned with the anchor installation or was damaged after installation may require load testing. Load testing is to be performed by a qualified testing agency or the manufacturer and results of test shall be provided in a report to the Structural Engineer of Record. Structural Engineer of Record shall provide the desired load for the test.

B. Anchor tension test procedure is listed below and is derived from ASTM E488/E488M and ASTM E1512 . If Structural Engineer of Record requires a shear load test, agency performing test shall provide testing procedure to engineer for their review prior to performing test.
   1. Locate area in base material where test fasteners will not interfere with permanent connections unless noted otherwise.
   2. Using a rotary hammer drill, drill bore holes with matched tolerance drill bits to specified hole diameters and embedment depths.
   3. Bore hole preparation: Mechanical fasteners: use compressed air or Hilti hand pump. (wire brushing is not needed with mechanical or undercut fasteners).
   4. Bore hole preparation: Chemical anchors: wire brushing and blowing out the hole is required. With two repetitions, first wire brush and then use compressed air.
   5. The bore hole cleaning procedure is the 2x2x2 method. This consists of two passes with compressed air (4+ with hand pump), 2 passes with same size wire brush, and a final two passes (4+ with hand pump) to fully prepare the bore hole for injection.

6. For mechanical anchors, hammer in mechanical fastener until embedment depth is reached, then torque fastener to specified value.
7. For chemical anchors, discard the first two trigger pulls at minimum but not less than required by manufacturer of the adhesive, then start injecting into the bottom of the hole, moving outward, filling up approximately 1/2 to 2/3 full. If piston plugs are used to inject, then the bore hole is only filled half way. Insert threaded rod or rebar with a turning motion, (approximately 1 turn during insertion). Wipe away any excess chemical anchor and let sit until full cure time has been reached.
8. After post installed anchor is set, connect a coupler to test fastener, screw on pull rod to other end of coupler (recommended larger pull rod than test rod), set reaction frame or back to back angles on blocking over pull rod (this constitutes as a Unconfined test; of which this means we are testing bond, concrete and steel), set hollow core ram (i.e. load cell) through pull rod and rest on frame or angles, and then put a nut and washer on the top side of the pull rod to complete the connection.
9. Reaction frame shall span over the test fastener allowing visual inspection of test fastener. Reaction frame should ideally span around fastener equal to embedment depth of test fastener in all directions.
10. Pre-load system to approximately 5% of published failure load and let sit for 1 minute. Then apply incremental increases, i.e. approximately 10%, until desired load is reached. This is done slowly and evenly; the hand pump hand creates the tension force, again, continue this until failure is observed or a desired load is reached.
11. Hold test load for 60 a minumum of seconds.
12. Record load PSI gauge. Convert psi to pounds by multiplying by square inches of hollow-core ram.

3.4 REPAIR OF DEFECTIVE WORK

A. Remove and replace misplaced or malfunctioning anchors. Fill empty anchor holes and patch failed anchor locations with high-strength non-shrink, nonmetallic grout. Anchors that fail to meet proof load or installation torque requirements shall be regarded as malfunctioning.

END OF SECTION 03 3250

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SECTION 03 3511 - CONCRETE FLOOR FINISHES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Clear coatings.

B. Color coatings.

1.2 RELATED REQUIREMENTS

A. Section 01 3329.04 – Material Content Form.

B. Section 01 3566.42 - Sustainability Compliance Procedures

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with concrete floor placement and concrete floor curing.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's published data on each finishing product, including information on compatibility of different products and limitations.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Maintenance Data: Provide data on maintenance and renewal of applied finishes.

E. Warranty Documentation: Manufacturer warranty; ensure that forms have been completed in Owner's name and registered with manufacturer.

F. Specimen Warranty: Manufacturer warranty.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's sealed packaging, including application instructions.

1.6 FIELD CONDITIONS

A. Maintain light level equivalent to a minimum 200 W light source at 8 feet above the floor surface over each 20 foot square area of floor being finished.

B. Maintain ambient temperature of 50 degrees F minimum, or as required by the coating manufacturer's written installation instructions.

1.7 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Correct defective work within a one-year period commencing on the Date of Substantial Completion.

PART 2 PRODUCTS

2.1 CONCRETE FLOOR FINISH APPLICATIONS

A. Color Coatings:
   1. Use at following locations: Floors with finish designations SC2, SC3 .

B. Clear Coating:
   1. Use at following locations: Floors with designation SC1.

2.2 COATINGS

A. High Gloss Clear Coating: Transparent, nonyellowing, acrylic polymer-based coating.
   1. Composition: Solvent-based.

B. Low Gloss Clear Coating **SC1**: Transparent, nonyellowing, acrylic polymer-based coating.
   1. Composition: Water-based.
      a) VOC Content: 100 g/L maximum.
      b) Number of Coats: Two.
      c) Application Temperature Range: 40 - 100 degrees F.
      d) Products:
         1) Basis-of-Design: **Prosoco**; **Consolideck PolishGuard**.
         2) _____.

C. Color Coating **SC2**, **SC3**: Pigmented coating recommended by manufacturer for finishing concrete floors and slabs.
   1. Gloss: Satin.
   2. VOC Content: Less than 50 g/L.
   3. Adhesion: 550 psi, per ASTM D541.
   4. Abrasion Resistance: 150 mg loss, per ASTM D4060 (CS17 wheel, 100 cycles, 1 kg load).
   5. Impact Resistance, per ADTM D2794:
      a) Direct: 100 in. lb.
      b) Indirect: 80 in. lb.
   6. Color(s): As indicated on the Finish Product List on the drawings.

7. Type: High solids epoxy; two-component.
   a) Products:
      1) Basis-of-Design: **Sherwin-Williams**; **Armorseal 8100**.
      2) Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that floor surfaces are acceptable to receive the work of this section.

B. Verify that flaws in concrete have been patched and joints filled with methods and materials suitable for further finishes.

3.2 PREPARATION

A. Follow manufacturer's written instructions for substrate preparation and environmental limitations.

3.3 GENERAL

A. Apply materials in accordance with manufacturer's instructions.

3.4 COATING APPLICATION

A. Verify that surface is free of previous coatings, sealers, curing compounds, water repellents, laitance, efflorescence, fats, oils, grease, wax, soluble salts, residues from cleaning agents, and other impediments to adhesion.

B. Verify that water vapor emission from concrete and relative humidity in concrete are within limits established by coating manufacturer.

C. Protect adjacent non-coated areas from drips, overflow, and overspray; immediately remove excess material.

D. Apply coatings in accordance with manufacturer's instructions, matching approved mock-ups for color, special effects, sealing and workmanship.

END OF SECTION 03 3511

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SECTION 03 6213 - NON-METALLIC NON-SHRINK GROUTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

A. This Section specifies high-precision, fluid, non-shrink, grouting material formulated to be used for applications requiring high strength such as column base plates, beam bearing plates, and leveling plates.

1.3 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: For general foundation specifications and concrete for housekeeping pads.

B. Section 05 1200 - Structural Steel Framing

1.4 REFERENCE STANDARDS

A. AASHTO M 182 - Standard Specification for Burlap Cloth Made from Jute or Kenaf and Cotton Mats; 2005.

B. ACI 301 - Specifications for Concrete Construction; 2020.

C. ACI 305R - Guide to Hot Weather Concreting; 2020.

D. ACI 306R - Guide to Cold Weather Concreting; 2016.

E. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2020.

F. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2019.

G. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2023.

H. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2024.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: For each type of product indicated below.
   1. Non-Metallic, Non-shrink, Natural Aggregate Grout
   2. Curing Compound

C. Design Mixtures: For each grout mixture: Include the following information:
   1. Proposed consistency (Stiff, Plastic, Flowable, or Fluid)
   2. Amount of water to be added to manufacturer's pre-packaged material.
   3. Additional aggregate (required when manufacturer requires additional aggregate to be added to prepackaged material to extend grout heights, etc.).

1.6 QUALITY ASSURANCE

A. Source Limitations:
   1. Obtain all base and bearing plate grout from the same manufacturer.
   2. Obtain aggregate from one source

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver Materials to project in Manufacturer's original, unopened packaging, with labels clearly identifying product name, Manufacturer, and expiration date.

B. Store materials to permit easy access for inspection and identification.

C. Store grout in a cool, dry place, out of the sun.

PART 2 - PRODUCTS

2.1 FORMWORK

A. Furnish formwork and formwork accessories according to ACI 301.

2.2 GROUT MATERIALS

A. Non-Metallic, Non-shrink, Natural Aggregate Grout: Use one of the following:
   1. Five Star Fluid Grout 100, manufactured by Five Star Products, Inc. - www.fivestarproducts.com
   2. Masterflow 928, manufactured by BASF Construction Chemicals, LLC - Building Systems - www.master-builders-solutions.basf.us
   3. Crystex, manufactured by L&M Construction Chemicals, Inc. - www.lmcc.com
   4. 1107 Advantage Grout, manufactured by Dayton Superior - www.daytonsuperior.com
   5. Rapid Set/CTS Construction Grout, manufactured by CTS Cement Manufacturing Corp. - www.ctscement.com
   6. NS Grout, manufactured by Euclid Chemical - www.euclidchemical.com

B. Normal-Weight Aggregate: ASTM C33/C33M, graded, 3/8-inch nominal maximum aggregate size.

C. Water: ASTM C94/C94M; potable.

2.3 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.

B. Water: Potable.

C. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 1, Class B.

2.4 GROUT MIXTURES

A. Comply with manufacturer's written instructions for grout mixtures.

B. Prepare grout mixes as follows:
   1. Minimum Compressive Strength: 8000 psi at 28 days.
   2. Minimum Working Time: 20 minutes
   3. Consistency: As required for workability and to meet compressive strength requirements.

PART 3 - EXECUTION

3.1 FORMWORK

A. Comply with grout manufacturer's recommendations for form construction. Construct forms to be liquid tight.

3.2 PREPARATION

A. Mechanically remove all unsound concrete to the limits indicated on the drawings. Remove cement paste and laitance to expose sound aggregate.

B. Thoroughly clean the roughened surface of dirt, loose chips, and dust.

C. Clean rust from base plates and other metal surfaces to be grouted to obtain satisfactory adhesion. Remove loose rust and scale by grinding or sanding.

D. Maintain substrate in a saturated condition for 24 hours prior to grouting. Surface should be saturated, surface dry (SSD) at time of grout installation.

3.3 MIXING

A. Comply with grout manufacturer's recommendations for mixing procedures.

B. When using less than a full bag of grout, always mix the bag first so that a representative sample is obtained.

C. Adjust water temperature to keep mixed grout temperature in the range of 45°F (7°C) and 90°F (32°C) minimum/maximum.
   1. Use cold or iced water to extend working time in hot weather or in large placements.
   2. Use warm water in cold conditions to achieve minimum as mixed temperatures.

3.4 HOT AND COLD WEATHER GROUTING

A. Cold Weather Grouting: Follow ACI 306R - Guide to Cold Weather Concreting recommendations. Heat water, precondition (warm) the grout, heat the substrate and protect from freezing until sufficient compressive strength is reached to protect the grout from freeze-thaw damage

B. Hot Weather Grouting: Follow ACI 305R - Guide to Hot Weather Concreting recommendations. Use cold water, precondition (cool) the grout by removing shrink wrap & keeping out of the sun, cool the substrate

3.5 INSTALLATION

A. The use of a head box is recommended on larger applications

B. Bevel the edge of the grout at a 45° angle from the underside of base plates.

C. Place grout mixture into prepared areas from one side to the other, rapidly and continuously, to reduce air entrapment. Avoid placing grout from opposite sides.

D. Ensure that foundation and baseplate are within maximum/minimum placement temperatures. Shade foundation from summer sunlight under hot conditions. Warm foundation when foundation temperature is below 45°F (7°C).

E. Cut back or form exposed shoulders when grout reaches initial set.

3.6 CURING

A. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

B. Wet cure exposed shoulders for 24 hours followed by two coats of curing compound.
   1. Wet Curing: Keep surfaces continuously moist for not less than 24 hours with the following materials:
      a) Water.
      b) Absorptive cover, water saturated and kept continuously wet.
   2. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

C. Protect freshly placed grout from excessive cold or hot temperatures. Comply with applicable provisions of ACI 306R for cold-weather protection and with ACI 305R for hot-weather protection during curing.

3.7 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to observe installation, sample materials, perform tests, and submit test reports during grout placement according to requirements specified in this Article.

B. Tests: Fabricate and test non-shrink grout specimens in accordance with the following:
   1. ASTM C1107/C1107M Article 12.1 Consistency:
   2. ASTM C1107/C1107M Article 12.5 Compressive Strength:
      a) Test three cubes for compressive strength at each age - 1, 3, 7, and 28 days.
   3. Testing Frequency: At least one composite sample shall be obtained for each day's pour of each grout mix.
      a) Obtain additional samples as necessary if any property of one particular batch is noticeably different from others.

C. Reports: Report test results in accordance with ASTM C1107/C1107M Article 13 with the following exceptions:
   1. Articles 13.1.7, 13.1.8, and 13.1.9 - Height change need not be reported
   2. Articles 13.1.11 - Yield need not be reported

3.8 REPAIRS

A. Remove and replace grout that does not comply with requirements in this Section.

END OF SECTION 03 6213

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SECTION 04 2000 - UNIT MASONRY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Concrete masonry units.

B. Sound-absorbing concrete masonry units.

C. Mortar and Grout.

D. Reinforcement and anchorage.

E. Flashings.

F. Accessories.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures

B. Section 03 2000 - Concrete Reinforcing: Reinforcing steel for grouted masonry.

C. Section 05 5000 - Metal Fabrications: Loose steel lintels and Fabricated steel items.

D. Section 07 2100 - Thermal Insulation: Insulation for cavity spaces.

E. Section 07 6200 - Sheet Metal Flashing and Trim: Through-wall masonry flashings.

F. Section 07 8400 - Firestopping: Firestopping at penetrations of fire-rated masonry and at top of fire-rated walls.

G. Section 07 9200 - Joint Sealants: Sealing control and expansion joints.

1.3 REFERENCE STANDARDS

A. ACI 315R - Guide to Presenting Reinforcing Steel Design Details; 2018.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

C. ASTM A580/A580M - Standard Specification for Stainless Steel Wire; 2018.

D. ASTM A951/A951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement; 2016, with Editorial Revision (2018).

E. ASTM C114 - Standard Test Methods for Chemical Analysis of Hydraulic Cement; 2015.

F. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; Current Edition.

G. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2023.

H. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2023.

I. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units; 2017.

J. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2018.

K. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.

L. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2018.

M. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019.

N. ASTM C476 - Standard Specification for Grout for Masonry; 2023.

O. ASTM C1072 - Standard Test Methods for Measurement of Masonry Flexural Bond Strength; 2019.

P. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms; 2018.

Q. ASTM C1714/C1714M - Standard Specification for Preblended Dry Mortar Mix for Unit Masonry; 2016.

R. ASTM E514/E514M - Standard Test Method for Water Penetration and Leakage Through Masonry; 2014a.

S. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing; 2017.

T. BIA Technical Notes No. 13 - Ceramic Glazed Brick Exterior Walls; 2017.

U. BIA Technical Notes No. 28B - Brick Veneer/Steel Stud Walls; 2005.

V. BIA Technical Notes No. 46 - Maintenance of Brick Masonry; 2017.

W. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2016.

X. UL (FRD) - Fire Resistance Directory; Current Edition.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting at least one week before starting work of this section; require attendance by all relevant installers.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and masonry accessories.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Shop Drawings: Submit for the following:
   1. Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315R. Show elevations of reinforced walls.

E. Samples: Submit four samples of decorative block units to illustrate color, texture, and extremes of color range.

F. Delegated Design Submittals: For anchorage for wide wall cavities, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

G. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

H. Manufacturer's Certificate: Certify that water repellent admixture manufacturer has certified masonry unit manufacturer as an approved user of water repellent admixture in the manufacture of concrete block.

I. Cold-Weather and Hot-Weather Procedures: Submit detailed description of methods, materials, and equipment to be used to comply with requirements.

1.6 QUALITY ASSURANCE

A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.

B. Fire Rated Assemblies: Conform to applicable code for indicated requirements for fire rated masonry construction.

C. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section with minimum five years of documented experience.

D. Installer Qualifications: Company specializing in performing work of the type specified and with at least five years of documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

1.8 FIELD CONDITIONS

A. Cold-Weather Requirements: Comply with cold-weather construction requirements contained in TMS 402/602.

B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 402/602.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from a single source from a single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from a single manufacturer for each cementitious component and from a single source or producer for each aggregate.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 4000, to design anchorage for wide wall cavities.
   1. Wide wall cavities are defined as those cavities where the nominal width of the wall cavity is greater than 4-1/2 inches.

2.3 CONCRETE MASONRY UNITS

A. Concrete Masonry Units (CMU): Comply with referenced standards and as follows:
   1. Size: Standard units with nominal face dimensions of 16 by 8 inches and nominal depths as indicated on drawings for specific locations.
   2. Special Shapes: Provide nonstandard blocks configured for corners.
      a) Provide bullnose units for outside corners, for all CMU at the building interior.
   3. Load-Bearing Units: ASTM C90, lightweight.
      a) Hollow block.
      b) Minimum Compressive Strength: As indicated on the drawings.
      c) Exposed Faces: Manufacturer's standard color and texture.
   4. Non-Loadbearing Units for Exterior Back-Up and Interior Partitions: ASTM C129.
      a) Hollow block, unless otherwise indicated on the drawings.
      b) Lightweight.
      c) Minimum Net Area Compressive Strength:3,000 psi
      d) Exposed Faces: Manufacturer's standard color and texture.
   5. Sound-Absorbing Units: ASTM C90 hollow block; with specially molded faces and apertures to provide sound absorption into the masonry unit cavity and allow placement of vertical reinforcement.
      a) Lightweight.
      b) Minimum Net Area Compressive Strength: 2000 psi.
      c) Acoustical Fillers: Noise attenuating, noncombustible fibrous filler.

d) Grout Shields: Manufacturer's standard.
e) Sound Absorption: ASTM ASTM C423.
1) 12 inch Units: NRC .74 minimum.
f) Basis-of Design Product: Sound Seal; **SOUNDBLOX Acoustical Concrete Masonry Units, Type RSC/RF4.**

6. Units with Integral Water Repellent: Concrete block units as specified in this section with polymeric liquid admixture added to concrete masonry units at the time of manufacture.
a) Performance of Units with Integral Water Repellent:
1) Water Permeance: When tested per ASTM E514/E514M and for a minimum of 72 hours.
(a) No water visible on back of wall above flashing at the end of 24 hours.
(b) No flow of water from flashing equal to or greater than 0.032 gallons per hour at the end of 24 hours.
(c) No more than 25 percent of wall area above flashing visibly damp at end of test.
2) Flexural Bond Strength: ASTM C1072; minimum 10 percent increase.
3) Compressive Strength: ASTM C1314; maximum 5 percent decrease.
b) Use only in combination with mortar that also has integral water repellent admixture.
c) Use water repellent admixtures for masonry units and mortar by a single manufacturer.

2.4 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C150/C150M, Type I; color as required to produce approved color sample.
1. Alkali content shall not be more than 0.1 percent when tested according to ASTM C114.

B. Hydrated Lime: ASTM C207, Type S.

C. Mortar Aggregate: ASTM C144.

D. Grout Aggregate: ASTM C404.

E. Pigments for Colored Mortar: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C979/C979M.
1. Color(s): As selected by Architect from manufacturer's full range.

F. Water: Clean and potable.

G. Packaged Dry Material for Mortar for Unit Masonry: Premixed Portland cement, hydrated lime, and sand; complying with ASTM C1714/C1714M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
1. Application: Interior unit masonry partitions.
a) Type: Type N.
b) Color: Standard gray.
2. Application: Exterior back-up walls.
a) Type: Type S.
b) Color: Standard gray.
3. Application: Elevator shaft.
a) Type: Type S.

b) Color: Standard gray.

H. Packaged Dry Material for Grout for Masonry: Premixed cementitious materials and dried aggregates; capable of producing grout of the specified strength in accordance with ASTM C476 with the addition of water only.
1. Type: Fine.

2.5 REINFORCEMENT AND ANCHORAGE

A. Manufacturers:
1. Basis-of-Design: Hohmann & Barnard, Inc: www.h-b.com/sle.

B. Reinforcing Steel: Type specified in Section 03 2000; size as indicated on drawings; uncoated finish.

C. Anchorage for Wide Wall Cavities: Provide engineered masonry anchors where wall cavity exceeds 4-1/2 inches in depth (inclusive of cavity insulation thickness).

D. Single Wythe Joint Reinforcement: ASTM A951/A951M.
1. Type: Ladder.
2. Material: stainless steel complying with ASTM A580/A580M Type 304.
3. Size: 0.1875 inch side rods with 0.1483 inch cross rods; width as required to provide not less than 5/8 inch of mortar coverage on each exposure.

E. Adjustable Anchor System for Random Ashlar (Rubble Stone): ASTM A951/A951M. Anchors that permit differential movement between masonry veneer and structural backup.
1. Clip-style sytem with wire ties, vertical J-hooks, and backplates.
2. Material: stainless steel complying with ASTM A580/A580M Type 304.
3. Wire Tie: TYpe 304 stainless steel, 3/16 inch diameter.
4. J-Hooks: Type 304 stainless steel.
5. Backplate: 12 gauge, type 304 stainless steel, custom depth to accommodate insulation depth(s) indicated on drawings.
6. Basis-of-Design Product: Hohmann & Barnard; **Tie-HVR-195B Anchor System**.

F. Partition Top Anchors: Formed sheet metal, 4 inch wide by 8 inch long with 2 inch long legs, 12 gauge thick with two anchor holes.

G. Reinforcement for Stack Bond Masonry: Provide W1.7 horizontal reinforcing wire in every other course for 8 inch wide masonry, unless otherwise required by TMS 402/602.

H. Metal-to-Metal Fasteners: Self-drilling, self-tapping screws; corrosion resistant finish or hot dip galvanized to ASTM A153/A153M.

2.6 FLASHINGS

A. Metal Flashing Materials: Stainless Steel, as specified in Section 07 6200.

B. Factory-Fabricated Flashing Corners and End Dams: Stainless steel.

C. Flashing Sealant/Adhesives: Silicone, polyurethane, or silyl-terminated polyether/polyurethane or other type required or recommended by flashing manufacturer; type capable of adhering to type of flashing used.
   1. Manufacturers, Synthetic Rubber Products:
      a) Tremco Commercial Sealants & Waterproofing; Butyl Sealant: www.tremcosealants.com.
      b) Pecora Corporation; BC-158 One-Part Butyl Rubber Sealant: www.pecora.com.
      c) Substitutions: See Section 01 6000 - Product Requirements.

D. Termination Bars: Stainless steel; compatible with membrane and adhesives.

E. Drip Edge: Stainless steel; angled drip with hemmed edge; compatible with membrane and adhesives.

F. Water Cut-off Mastic: One-component, self-wetting butyl based mastic.

2.7 ACCESSORIES

A. Preformed Control Joints: Neoprene material. Provide with corner and tee accessories, fused joints.

B. Joint Filler: Closed cell neoprene; compressible up to 50 percent to joint width; self expanding; in maximum lengths available.
   1. Manufacturers:
      a) Hohmann & Barnard, Inc; NS - Closed Cell Neoprene Sponge: www.h-b.com/#sle.
      b) W.R. Meadows; X-Foam.
   2. Color: Black.
   3. Thicknesses as required for joints indicated on drawings.

C. Cavity Mortar Control: Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.
   1. Full-Height Airspace Maintenance and Drainage Material: Mesh panels fitted between masonry ties.
      a) Drainage Material Thickness: 1/2 inch.
      b) Manufacturers:
         1) Basis-of-Design: **CavClear, a Division of Archovations Inc; CavClear Masonry Mat:** www.cavclear.com/#sle.
         2) Acceptable Alternate Products: Subjet to compliance with the requirements.
            (a) Advanced Building Products, Inc; Mortairvent-CW: www.advancedbuildingproducts.com/#sle.
         3) Substitutions: See Section 01 6000 - Product Requirements.

D. Weeps:
   1. Type: Molded PVC grilles, insect resistant.
   2. Manufacturers:
      a) Blok-Lok Limited: www.blok-lok.com.
      b) Hohmann & Barnard, Inc; _____: www.h-b.com/#sle.
      c) WIRE-BOND; _____: www.wirebond.com/#sle.

E. Cavity Vents:
   1. Type: Molded PVC grilles, insect resistant.
   2. Manufacturers:
      a) Blok-Lok Limited: www.blok-lok.com.
      b) Hohmann & Barnard, Inc: www.h-b.com/sle.
      c) WIRE-BOND: www.wirebond.com.

F. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

2.8 MORTAR AND GROUT MIXING

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
   1. Do not use calcium chloride in mortar or grout.

B. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification.
   1. Masonry below grade and in contact with earth: Type M.
   2. Exterior, loadbearing masonry: Type S.
   3. Exterior, non-loadbearing masonry: Type S.
   4. Interior, loadbearing masonry: Type N.
   5. Interior, non-loadbearing masonry: Type N.

C. Colored Mortar: Proportion selected pigments and other ingredients to match Architect's sample, without exceeding manufacturer's recommended pigment-to-cement ratio.

D. Grout: ASTM C476; consistency required to fill completely volumes indicated for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches.
   1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 402/602TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive masonry.

B. Verify that related items provided under other sections are properly sized and located.

C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.2 PREPARATION

A. Direct and coordinate placement of metal anchors supplied for installation under other sections.

B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.3 COLD AND HOT WEATHER REQUIREMENTS

A. Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

3.4 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Concrete Masonry Units:
   1. Bond: Running.
   2. Coursing: One unit and one mortar joint to equal 8 inches.
   3. Mortar Joints: Concave.

D. Acoustical Concrete Masonry Units:
   1. Bond: Stacked, with open ends of acoustical cavity facing downward.
   2. Orientation of Slotted Units: Slotted face to face area where sound absorption and diffusion is desired.

3.5 PLACING AND BONDING

A. Lay hollow masonry units with face shell bedding on head and bed joints.

B. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.

C. Remove excess mortar and mortar smears as work progresses.

D. Interlock intersections and external corners, except for units laid in stack bond.

E. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

F. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

G. Cut mortar joints flush where wall tile is scheduled or resilient base is scheduled.

H. Isolate masonry partitions from vertical structural framing members with a control joint.

I. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

3.6 WEEPS/CAVITY VENTS

A. Install weeps in veneer and cavity walls at 24 inches on center horizontally on top of through-wall flashing above shelf angles and lintels and at bottom of walls.

B. Install cavity vents in veneer and cavity walls at 32 inches on center horizontally below shelf angles and lintels and near top of walls.

3.7 CAVITY MORTAR CONTROL

A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.

3.8 REINFORCEMENT AND ANCHORAGE - GENERAL, SINGLE WYTHE MASONRY, AND CAVITY WALL MASONRY

A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches on center.

B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.

C. Place continuous joint reinforcement in first and second joint below top of walls.

D. Embed longitudinal wires of joint reinforcement in mortar joint with at least 5/8 inch mortar cover on each side.

E. Lap joint reinforcement ends minimum 6 inches.

F. Reinforce stack bonded unit joint corners and intersections with strap anchors 16 inches on center.

G. Embed ties and anchors in mortar joint and extend into masonry unit a minimum of 1-1/2 inches with at least 5/8 inch mortar cover to the outside face of the anchor.

3.9 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER

A. Masonry Back-Up: Embed anchors to bond veneer at maximum 16 inches on center vertically and 36 inches on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches on center.

B. Stud Back-Up: Secure veneer anchors to stud framed back-up and embed into masonry veneer at maximum 16 inches on center vertically and 24 inches on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches on center.

3.10 REINFORCEMENT AND ANCHORAGES - MULTIPLE WYTHE UNIT MASONRY

A. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.

3.11 MASONRY FLASHINGS

A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
   1. Remove or cover protrusions or sharp edges that could puncture flashings.
   2. Seal lapped ends and penetrations of flashing before covering with mortar.

B. Terminate flashing up 8 inches minimum on vertical surface of backing:

C. Install flashing in accordance with manufacturer's instructions and BIA Technical Notes No. 7.

D. Extend metal flashings through exterior face of masonry and terminate in a flat drip with hemmed edge. Install joint sealer below drip edge to prevent moisture migration under flashing.

E. Lap end joints of flashings at least 6 inches, minimum, and seal watertight with flashing sealant/adhesive.

3.12 LINTELS

A. Install loose steel lintels over openings.

B. Maintain minimum ____ inch bearing on each side of opening.

3.13 GROUTED COMPONENTS

A. Lap splices minimum 24 bar diameters.

B. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.

C. Place and consolidate grout fill without displacing reinforcing.

D. At bearing locations, fill masonry cores with grout for a minimum 12 inches either side of opening.

3.14 CONTROL AND EXPANSION JOINTS

A. Do not continue horizontal joint reinforcement through control or expansion joints.

B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.

C. Size control joints as indicated on drawings; if not indicated, 3/4 inch wide and deep.

3.15 BUILT-IN WORK

A. As work progresses, install built-in metal door frames and glazed frames and other items to be built into the work and furnished under other sections.

B. Install built-in items plumb, level, and true to line.

C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.
   1. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.

D. Do not build into masonry construction organic materials that are subject to deterioration.

3.16 TOLERANCES

A. Maximum Variation from Alignment of Columns: 1/4 inch.

B. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.

C. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.

D. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.

E. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.

F. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.

G. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

3.17 CUTTING AND FITTING

A. Cut and fit for chases, pipes, conduit, and sleeves. Coordinate with other sections of work to provide correct size, shape, and location.

B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.18 FIELD QUALITY CONTROL

A. Inspections: Perform special inspections according to Level B in TMS 402/602.

B. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.

3.19 CLEANING

A. Remove excess mortar and mortar droppings.

B. Replace defective mortar. Match adjacent work.

C. Clean soiled surfaces with cleaning solution.

D. Use non-metallic tools in cleaning operations.

3.20 PROTECTION

A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION 04 2000

SECTION 04 4313 - STONE MASONRY VENEER

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Dolomitic limestone masonry units.

1.2 RELATED REQUIREMENTS

A. Section 04 2000 - Unit Masonry: Joint reinforcement, Ties, Anchors, and Through-wall flashing.

1.3 REFERENCE STANDARDS

A. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019.

B. ASTM C568/C568M - Standard Specification for Limestone Dimension Stone; 2015.

C. ASTM C1515 - Standard Guide for Cleaning of Exterior Dimension Stone, Vertical And Horizontal Surfaces, New or Existing; 2020.

D. ASTM C1714/C1714M - Standard Specification for Preblended Dry Mortar Mix for Unit Masonry; 2016.

E. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2016.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on stone units, mortar, and reinforcement.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Samples: Submit two stone samples illustrating color range, texture, and markings.

E. Samples: Submit mortar color samples.

F. Installer's Qualification Statement.

1.5 QUALITY ASSURANCE

A. Stone Fabricator Qualifications: Company specializing in fabricating cut stone with minimum ten years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type required by this section, with minimum seven (7) years of experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver masonry units in protective film. Prevent damage to units.

B. Protect stone from discoloration during storage on site.

C. Place polyethylene or other plastic film between wood and other finished surfaces of masonry units when stored for extended periods of time.

D. Cover stored masonry units with protective enclosure if exposed to weather.

E. Do not use salt or calcium-chloride to remove ice from masonry surfaces.

1.7 FIELD CONDITIONS

A. Cold Weather Requirements: Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers of dolomitic limestone having product considered acceptable for use:
   1. Basis of Design: **Arriscraft International**; **Adair Limestone Marble**.
   2. Substitutions: See Section 01 6000 - Product Requirements.

2.2 MATERIALS

A. Dolomitic Limestone: complying with ASTM C568/C568M Classification III - High Density; special shapes as indicated; having the following typical average properties when tested to the identified standard:
   1. Compressive Strength: 22,900 psi, to ASTM C170.
   2. Absorption: 0.75 percent, to ASTM C97.
   3. Density: 167 lbs/ft^3, to ASTM C97.
   4. Modulus of Rupture: 2,250 psi, to ASTM C99.
   5. Flexural Strength: 1,600 psi to ASTM C880.
   6. Abrasion Resistance: 18.0 to ASTM C241.

2.3 FABRICATED UNITS

A. Limestone Masonry Units: Dolomitic limestone masonry units, special; shapes as indicated; as described below:
   1. Bed Thickness: 3-5/8" thick.
   2. Unit Length: 15-5/8" long, unless otherwise indicated on drawings.
   3. Unit Height: 7-5/8" high.
   4. Finish Texture: As selected by Architect from limestone masonry fabricator's full range of finishes.
   5. Color and Pattern: As selected by Architect from limestone masonry fabricator's full range of colors and patterns.
   6. Backs: Sawn.

2.4 MORTAR MIXES

A. Packaged Dry Material for Mortar for Unit Masonry: Premixed Portland cement, hydrated lime, and sand; complying with ASTM C1714/C1714M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
   1. Type: Type S.
   2. Color: Mineral pigments added as required to produce approved color sample.

2.5 ACCESSORIES - ANCHORED VENEER

A. Mortar: 1:1:6 Portland cement-hydrated lime-sand mix, as specified in Section 04 2000.

B. Grout: maximum 6,500 psi at 28 days, as specified in Section 04 2000.

C. Horizontal Joint Reinforcement: See Section 04 2000.

D. Wall Ties and Anchorages: as specified in Section 04 2000.

E. Joint Sealants and Backer Rods: non-staining type, as specified in Section 07 9200.

F. Flashings: See Section 04 2000.

G. Weep/Cavity Vents: See Section 04 2000..

H. Cleaning Solution: Type that will not harm stone, joint materials, or adjacent surfaces.

2.6 FABRICATION TOLERANCES

A. Fabricate dolomitic limestone masonry units to the following tolerances:
   1. Unit Length: plus or minus 1/8 inch.
   2. Unit Height: plus or minus 1/8 inch.
   3. Deviation From Square: plus or minus 1/8 inch, with measurement taken using the longest edge as the base.
   4. Bed Depth: plus or minus 1/8 inch.
   5. Custom Unit Dimensions: plus or minus 1/8 inch.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that support work and site conditions are ready to receive work of this section.

B. Inspect materials for fit and finish prior to installation. Do not set unacceptable units.

C. Verify that items built-in under other sections are properly located and sized.

D. Beginning of installation means acceptance of existing conditions.

3.2 COURSING

A. Place masonry to lines and levels indicated.

B. Maintain masonry courses to uniform width. Make vertical and horizontal joints equal and of uniform thickness.

C. Lay limestone masonry units in running bond.

D. Course one limestone masonry unit and one mortar joint to equal 8 inches.

E. Tool joints when thumbprint hard, to a concave finish.

3.3 PLACING AND BONDING

A. Lay masonry in full bed of mortar, properly jointed with other work. Buttering corners of joints, and deep or excessive furrowing of mortar joints are not permitted.

B. Fully bond intersections, and external corners.

C. Do not adjust masonry units after laying. Where resetting of masonry is required, remove, clean units and reset in new mortar.

D. Where applicable, install wall ties and anchorages as specified in Section 04 2000.

E. Where applicable, install flashings, vents, and masonry accessories as specified in Section 04 2000.

3.4 TOLERANCES

A. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.

B. Maximum Variation from Plane of Wall: 1/4 inch in 10 feet and 1/2 inch in 20 feet or more.

C. Maximum Variation of Joint Thickness: 1/8 inch in 3 feet.

3.5 ADJUSTING AND CLEANING

A. Remove excess mortar as work progresses, and upon completion of work.

B. Replace defective mortar. Match adjacent work.

C. Repair chips with patch kits furnished by manufacturer.

D. Clean soiled surfaces with cleaning solution.

E. Clean exterior stone per ASTM C1515.

F. Use non-metallic tools in cleaning operations.

3.6 PROTECTION

A. During temporary storage on site, at the end of working day, and during rainy weather, cover stone work exposed to weather with non-staining waterproof coverings, securely anchored.

B. Protect units from damage resulting from subsequent construction operations.

C. B. Use protection materials and methods which will not stain or damage units.

D. C. Remove protection materials upon Substantial Completion, or when risk of damage is no longer present.

END OF SECTION 04 4313

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SECTION 04 7323 - MANUFACTURED BUILDING STONE MASONRY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Manufactured stone masonry.
   1. Calcium silicate building stone units.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 04 2000 - Unit Masonry: Through-wall masonry flashings, masonry anchors and other masonry accessories.

1.3 REFERENCE STANDARDS

A. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2016.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data for manufactured building stone units.
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Color charts.
   4. Installation methods.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Shop Drawings: Submit detail drawings depicting proper installation and flashing techniques. Coordinate locations with those found on drawings.

E. Verification Samples: Submit two sample boards of manufactured building stone units to illustrate color, texture, and extremes of color range. Minimum size 24 inches by 12 inches.

F. Manufacturer's Certificate: Certify that manufactured building stone units meet or exceed specified requirements.

G. Test Reports: Test results prepared by an independent testing agency, indicating tested material characteristics as part of a source quality control program, current within the past five (5) years.

H. Installer's Qualification Statement.

I. Specimen Warranty.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum ten years of documented experience.

B. Installer Qualifications: Company specializing in performing work of type specified, with at least five years of documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Prevent mechanical damage and contamination by other materials.

C. Store units in a manner designed to prevent damage and staining of units.
   1. Stack units on timbers or platforms at least 3 inches above grade.
   2. Place polyethylene or other plastic film between wood and other finished surfaces of units when stored for extended periods of time.

D. Protect products from precipitation combined with freezing temperatures. Do not install products with visible frozen moisture.

E. Do not use salt or calcium-chloride to remove ice from masonry surfaces.

1.8 FIELD CONDITIONS

A. Cold and Hot Weather Requirements: Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

1.9 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Correct defective work within a one year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer:

1. Basis of Design: **Arriscraft; Citadel Building Stone**: www.arriscraft.com.
2. Substitutions: See Section 01 6000 - Product Requirements.
   a) For any product not identified as "Basis of Design", submit information as specified for substitutions.

2.2 MANUFACTURED BUILDING STONE MASONRY MATERIALS

A. Calcium Silicate Building Stone Units: to ASTM C73, Grade SW; solid units that have been pressure formed and autoclaved; special shapes as indicated; four-size configuration as follows:
   1. Modular Sizes:
      a) CIT23: 2-3/8" high, 3-5/8" bed, various lengths up to 23-5/8".
      b) CIT36: 3-13/16" high, 3-5/8" bed, various lengths up to 23-5/8".
      c) CIT52: 5-1/4" high, 3-1/2" bed, various lengths up to 23-5/8".
      d) CIT81: 8-1/8" high, 3-1/2" bed, various lengths up to 23-5/8".
   2. Texture: Tumbled finish on exposed faces and ends.
   3. Color: "**French Country**" as manufactured by Arriscraft for Citadel Building Stone.

B. Mortar: 1:1:6 Portland cement-hydrated lime-sand mix, as specified in Section 04 2000.

C. Grout: maximum 6,500 psi at 28 days, as specified in Section 04 2000.

D. Wall Ties and Anchorages: as specified in Section 04 2000.

E. Joint Sealants and Backer Rods: non-staining type, as specified in Section 07 92 00.

F. Flashing, Vents, and Masonry Accessories: as specified in Section 04 2000.

2.3 FABRICATION TOLERANCE

A. Fabricate calcium silicate building stone units to a pressed tolerance of plus or minus 1/8 inch.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify site conditions are ready to receive work.

B. Inspect materials for fit and finish prior to installation. Do not set unacceptable units.

C. Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

A. Cutting Masonry Units:
   1. Cut masonry units to length with a masonry splitter.
   2. Dress split end to match face when exposed in wall.

B. Wetting Masonry Units:
   1. Where the ambient air temperature exceeds 100°F or exceeds 90°F with a wind velocity greater than 8 mph, pre-wet building stone units.

2. Lay wetted units when surface dry.

3.3 INSTALLATION

A. Place masonry to lines and levels indicated.

B. Maintain masonry courses to uniform width. Make vertical and horizontal joints equal and of uniform thickness.

C. Lay building stone units in random bond pattern, to the following percentage ratio, described from smallest to largest sized units: 20:20:40:20.
   1. Lay masonry in full bed of mortar, properly jointed with other work. Buttering corners of joints, [and] deep or excessive furrowing of mortar joints [and] [__] are not permitted.
   2. Fully bond intersections, and external corners.
   3. Do not adjust masonry units after laying. Where resetting of masonry is required, remove, clean units and reset in new mortar.

D. Construct movement joints as indicated on drawings.

E. Maintain mortar joint thickness of 1/2 inch.

F. Tool mortar joints by compacting the surface when thumbprint hard, to a concave finish.

3.4 CUTTING AND FITTING

A. Cut and fit for wall-penetrating pipes and conduit. Coordinate with other sections of work to provide correct size, shape, and location.

3.5 FIELD QUALITY CONTROL

A. Architect's Inspection: Architect, together with Owner's representative, will inspect installed masonry and reject masonry that is chipped, cracked, or blemished (streaked, stained or otherwise damaged), as described below.
   1. Masonry will be inspected to be free of cracks or other blemishes on the finished face or front edges of the masonry units exceeding 3/8 inch or that can be seen from a distance of 20 feet.
   2. Units shall exhibit a texture approximately equal to the approved sample when viewed under diffused daylight illumination at a 20 foot distance.
   3. Minor chipping resulting from shipment and delivery shall not be grounds for rejection. Minor chips shall not be obvious under diffused daylight illumination from a 20 foot distance.
   4. Efflorescence will not be cause for rejection

3.6 CLEANING

A. Remove excess mortar and mortar smears as work progresses.

B. Replace defective mortar. Match adjacent work.

3.7 PROTECTION

A. Protect units from damage resulting from subsequent construction operations.

B. Use protection materials and methods which will not stain or damage units.

C. Remove protection materials at Date of Substantial Completion, or when risk of damage is no longer present.

END OF SECTION 04 7323

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SECTION 05 0805 - FACTORY-APPLIED COATINGS FOR METAL

GENERAL

1.1 SECTION INCLUDES

A. General requirements for hot-dip galvanizing steel fabrications.

B. Requirements for preparing hot-dip galvanized surfaces for painting.

C. Hot-dip galvanizing and factory-applied prime-coat for the following metal fabrications including, but not limited to the items below. All items noted below are to receive a field-applied topcoating.
   1. Loose steel lintels.
   2. Steel framing for rooftop equipment screen.

D. Hot-dip galvanizing, factory-applied prime coat, factory-applied high performance color topcoat, and factory-applied clearcoat:
   1. Exposed steel columns at Main Entrance (no applied fireproofing required).
      a) Framing connection components, including but not limited to: bolts, angles, and washers, for these exposed steel columns.

1.2 RELATED SECTIONS

A. Section 05 1200 - Structural Steel: Design and surface preparation of structural steel indicated to receive hot-dip galvanizing and factory-applied primer coating

B. Section 05 500 - Metal fabrications: Non-structural metal fabrications indicated to receive hot-dip galvanizing and factory-applied primer coating.

C. Section 09 9113 - Exterior Painting: Field-applied topcoats.

1.3 NE-CHPS GENERAL REQUIREMENTS

A. The work of this section is required to comply with general requirements and procedures for compliance with certain prerequisites and credits needed for the Project to obtain CHPS Verified certification based on Northeast Collaborative for High Performance Schools Criteria Version 4.0 (NE-CHPS) as as outlined in Section 01 8113.63 - Sustainable Design Requirements.
   1. The Construction Manager is required to coordinate with the work of other sections and to comply with all NE-CHPS requirements in accordance with the Contract Documents such that the work carried out by this section does not compromise the achievement of any other NE-CHPS prerequisites and credits applicable to the entire project.

B. Related Sections for Sustainable Design Requirements:
   1. Section 01 3000 - Administrative Requirements: General submittal requirements, including NE-CHPS submittals.
   2. Section 01 7419 - Construction Waste Management and Disposal: Waste management, recycling and disposal requirements.

3. Section 01 8113.63 -Sustainable Design Requirements - NE-CHPS: General procedures for compliance with NE-CHPS requirements and credits; credit checklist.

1.4 REFERENCE STANDARDS

A. ASTM A 123 - Standard Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.

B. ASTM A 143 - Safeguarding Against Embrittlement.

C. ASTM A 153 - Standard Specification for Zinc (Hot Dip Galvanizing) on Iron and Steel Hardware.

D. ASTM A 384 - Safeguarding Against Warpage.

E. ASTM A 385 - Providing High Quality Zinc Coatings.

F. ASTM A 780 - Repair of Hot Dip Galvanizing.
1. Refer to Section 01 8113.13 “Sustainable Design Requirements - LEED for New Construction” for LEED requirements affecting work in this section.

G. ASTM D6386 - Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting.

1.5 SUBMITTALS

A. Product Data:
1. Galvanizer’s product literature for coatings specified in this Section indicating type of product and performance requirements.
2. Galvanizer's coatings data sheets for coatings specified in this Section including physical performance data.
3. Product data for shop-applied primer, for coordination with field-applied top coat.

B. Verification Samples: Submit five (5) 3-inch by 6-inch samples of factory-applied coating and colors proposed for use for approval prior to coating applications.
1. Verification samples shall be prepared on substrate of actual material to receive specified factory-applied coating systems. Fabricator shall furnish galvanizer with samples of actual materials (substrates). Galvanizer shall hot-dip and finish sample in selected color.
2. Architect will approve sample for surface color and gloss prior to full fabrication and production

C. Manufacturer's Certification: Coating applicator's notarized Certificate of Compliance that hot dip galvanized coating meets or exceeds the requirements of ASTM A123/A123M, ASTM A153/153M, or A767, as applicable.

D. Certificate of Compliance for Shop Drawing Review by Galvanizer: Submit galvanizer’s certificate that shop drawings for metal fabrications to receive metal coatings have been reviewed; and fabrications are acceptable to the galvanizer for proper application of galvanizing and factory-applied metal coatings. Drawings shall be stamped by the galvanizer to indicate approval of the design for galvanizing.

E. Certificate of Compliance for Items Coated by Galvanizer: Submit notarized Certificate of Compliance with application for payment for galvanizing, signed by galvanizer, indicating compliance with requirements of specifications. Include scope of services provided, and quantity and itemized description of items processed.
   1. Include galvanizer's certification that shop-applied primer is completely compatible with field-applied topcoats specified in Division 09 Section "Exterior Painting."

F. Paint Applicator shall provide a certificate of compliance that all coatings have been performed in accordance with SSPC QP3/AISC 420 - Qualification of Paint Shops, standards and procedures.

1.6 QUALITY ASSURANCE

A. Galvanizer Qualifications: Engage the services of a galvanizer who has demonstrated a minimum of five (5) years experience in the successful performance of the processes outlined in this specification.

B. Coating Applicator: Company specializing in coating hot-dip galvanized steel after fabrication and in following the procedures in the Quality Assurance Manual of the American Galvanizers Association and ASTM D6386.

C. Pre-installation Conference: Before starting factory-applied metal coating process, conduct conference at Project site. Comply with requirements for pre-installation conferences in Section 01 3000 - Administrative Requirements. Review methods and procedures related to factory-applied metal coatings for exterior metal fabrications indicated including, but not limited to, the following:
   1. Project schedule.
   2. Scope of services.
   3. Coordination between fabricator and galvanizer.
   4. Finish of metal surfaces.
   5. Application of coatings,
   6. Submittals and approvals process and schedule.

D. Coordination Between Fabricator and Galvanizer: Prior to fabrication, fabricator shall submit approved shop drawings to the galvanizer for all fabrications. Galvanizer shall review fabricator's shop drawings for suitability of materials for galvanizing and coatings and coordinate any required modifications to fabrications which shall be completed by the fabricator.

E. Steel Materials: For steel to be hot dip-galvanized, provide steel chemically suitable for metal coatings complying with the following requirements: Carbon below 0.25 percent, silicon below 0.04 percent, phosphorous below 0.05 percent, and manganese below 1.3 percent. Notify galvanizer if steel does not comply with these requirements to determine suitability for processing.
   1. Assemblies: Where size of assembly is too large for galvanizing kettle, galvanize components prior to fabrication and assemble after galvanizing.

1.7 WARRANTY

A. Warranty: Provide galvanizer's standard warranty that materials will be free from 10 percent or more visible rust for 20 years.

PART 2 - PRODUCTS

2.1 STEEL MATERIALS FOR GALVANIZING

A. Material for galvanizing to be geometrically suitable for galvanizing as described in ASTM A384 and A385. Steel materials suitable for galvanizing include structural shapes, pipe, sheet, fabrications, and assemblies

B. Material to be chemically suitable for galvanizing.

2.2 HOT-DIP GALVANIZING REQUIREMENTS

A. Hot-dip galvanizing practices shall be in accordance with the applicable portions of ASTM A123/A123M or A153/A153M.

B. Galvanizing Post-Treatments: For galvanized steel items to receive paint coating, water quenching or chromate conversion coating shall be avoided by the galvanizer as these processes interfere with paint adhesion and surface preparation.

C. Galvanizing finish shall be in accordance with ASTM A123 Section 6.2. After galvanizing, the presence of roughness, small dross inclusions, and zinc runs which negatively affect adhesion of the paint/powder coating shall be smoothed.
   1. Responsibility for surface smoothing after galvanizing shall be the responsibility of the galvanizer, performed prior to sending steel items to the liquid coating applicator. Scope includes items noted above and the following:
      a) Grinding off all zinc drips and runs.
      b) Grinding off excess zinc at welds.
      c) Visual criterion for smoothing: Not visible at a distance of 6 feet.
   2. Refer to Article 3.2 below for standards for surface preparation of galvanized steel to receive paint coatings.
   3. Surface smoothing, cleaning, and other required processing of galvanized steel to receive painting shall be in accordance with ASTM D6386 as noted in Part 3.

2.3 FACTORY-APPLIED PRIMER OVER HOT-DIP GALVANIZING

A. Provide factory-applied polyamide epoxy primer, 2.0 mils dry film thickness minimum, and as follows:
   1. Thickness: Minimum 2 mils dry film thickness (DFT).
   2. Performance Criteria: Coating shall meet or exceed the following performance criteria:
      a) Adhesion: 5000 psi when tested in accordance with ASTM D 4541.
      b) Corrosion Weathering: ASTM D 5894.
      c) Direct Impact Resistance: 140 in. lbs. when tested in accordance with ASTM D 2794.
      d) Dry Heat Resistance: 200 degrees F minimum.
      e) Wet Heat Resistance: 150 degrees F minimum.

f) Pencil Hardness: Tested in accordance with ASTM D 3363.
g) Moisture Condensation Resistance: Coating shall pass with no cracking or delamination when tested in accordance with ASTM D 4585, 100 degrees F., 1250 hours.

3. Color: Gray.

2.4 FACTORY-APPLIED TOP COAT OVER HOT-DIP GALVANIZING AND PRIMER

A. Provide factory-applied high-performance urethane color coating over primed galvanized steel as previously referenced, and as follows:
   1. Apply coating in a controlled environment meeting applicable environmental regulations.

B. Color: As selected by Architect from top coat manufacturer's standard range.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION FOR GALVANIZING

A. Pre-clean steel work in accordance with accepted methods to produce an acceptable surface for quality hot-dip galvanizing.

3.2 SHOP REPAIR OF STEEL SURFACES AFTER GALVANZING

A. Grind and smooth zinc drips, runs, and areas of roughness that can impair adhesion of primer, powder, and / or paint coatings. Refer to Paragraph 2-C for full requirements.
   1. Applications:
      a) Steel indicated to be shop- or factory-primed and field-painted.
      b) Steel indicated to be shop- or factory-painted or shop- or factory-coated.
      c) Steel indicated as AESS.

3.3 REPAIR OF DAMAGED GALVANIZING

A. The maximum area to be repaired is defined in accordance with ASTM A123/A123M Section 6.2.

B. Repair areas damaged by welding, flame cutting or during handling, transport or erection, by one of the approved methods in accordance with ASTM A780/A780M. Minimum thickness requirements for the repair are those described in ASTM A123/A123M Section 6.2 current edition.

C. Zinc rich paint used for repair of hot-dip galvanized coatings shall be compatible with the paint system specified and applied in accordance with the manufacturer’s instructions.

D. Zinc rich paint used for repair of hot-dip galvanized coatings shall be top coated within the recommended overcoat time windows according to the manufacturers directions.

3.4 PREPARATION OF GALVANIZED STEEL FOR PRIMING/PAINTING

A. Comply with ASTM D6386 procedures for cleaning and surface preparation of galvanized steel for painting, as required for the applicable category:

1. Newly galvanized steel:
   a) Nominally, steel that has been galvanized within the past 48 hours prior to paint application. See 2-b below.
   b) Steel that has not received any surface treatment after galvanizing, such as water quenching or chromate conversion.
   c) Steel with no visible signs of zinc oxide or zinc hydroxide.
2. Partially weathered galvanized steel:
   a) Steel that has been galvanizd more than 48 hours and less than 1 year prior to paint application.
   b) Exposure of newly galvanized to humidity or moisture may reduce the 48-hour time period that galvanized steel remains free of zinc compounds that impact surface adhesion of coatings. It is coating applicator's responsibility to determine appropriate preparation in accordance with ASTM D6386.
3. Paint Shop Notification: Galvanizer to advise party responsible for painting galvanized items as to how the items were processed and which surface treatment(s), if any, were used.

3.5 APPLICATION OF GALVANIZING AND METAL COATINGS

A. Galvanize materials in accordance with referenced standards and this specification.
   1. Galvanizing shall provide an acceptable substrate for applied coatings.

B. Apply primer over hot-dip galvanizing in accordance with specified requirements and recommendations of galvanizer.

C. The primer and topcoat materials shall be certified VOC compliant, <2.9 lbs/gal., and conform to the following:
   1. Primer: High-solid polyamide epoxy applied to a DFT of 3 mils minimum.
   2. Topcoat: : Color pigmented, two-component high build aliphatic polyurethane applied to a DFT of 3 mils (0.08 mm) minimum.

3.6 INSTALLATION

A. Installation: Comply with fabricator’s, galvanizer’s, and coating applicator's requirements for installation of materials and fabrications, including use of nylon slings or padded cables for handling factory-primed or factory-finished materials.

B. Touch-Up and Repair: For damaged and field-welded metal coated surfaces, clean welds, bolted connections and abraded areas.
   1. On galvanized surfaces, apply organic zinc repair paint complying with requirements of ASTM A 780, modified to 95 percent zinc in dry film.
      a) Thickness of applied galvanizing repair paint shall be not less than coating thickness required by ASTM A 123 or A 153 as applicable.
      b) Touch-up of galvanized surfaces with silver paint, brite paint, or aluminum paints is not acceptable.
   2. On factory-primed surfaces, field-touch-up shall be performed in accordance with factory-applied metal coating manufacturer’s requirements and in the presence of a technical representative of the factory-applied metal coating manufacturer. If non-factory technicians are used for field touch-up, no warranties shall exist. Provide touch-up such that repair is not visible from a distance of 6 feet.

3. Provide touch up repair kit and touchup instructions with each order for each type of factory-applied finish coating.

END OF SECTION 05 0805 05 0805

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SECTION 05 1200 - STRUCTURAL STEEL FRAMING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Structural steel framing members.

1.2 RELATED REQUIREMENTS

A. Section 03 6213 - Non-Metallic Non-Shrink Grouting: For grout beneath base and bearing plates.

B. Section 05 2100 - Steel Joist Framing.

C. Section 05 3100 - Steel Decking: Support framing for small openings in deck.

D. Section 07 8100 - Applied Fire Protection: Fireproof protection to framing and metal deck systems.

1.3 REFERENCE STANDARDS

A. AISC (MAN) - Steel Construction Manual; 2023.

B. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges; 2010.

C. AISC 360 - Specification for Structural Steel Buildings; 2022.

D. AISC S303 - Code of Standard Practice for Steel Buildings and Bridges; 2016.

E. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

F. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings; 2020.

G. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.

H. ASTM D638 - Standard Test Method for Tensile Properties of Plastics; 2022.

I. ASTM D695 - Standard Test Method for Compressive Properties of Rigid Plastics; 2023.

J. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2019, with Editorial Revision (2023).

K. ASTM D1187/D1187M - Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal; 1997 (Reapproved 2018).

L. ASTM D638 - Standard Test Method for Tensile Properties of Plastics; 2022.

M. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials; 2017.

N. ASTM D695 - Standard Test Method for Compressive Properties of Rigid Plastics; 2023.

O. ASTM D2863 - Standard Test Method for Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics (Oxygen Index); 2023.

P. ASTM D696 - Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30°C and 30°C with a Vitreous Silica Dilatometer; 2016.

Q. ASTM D732 - Standard Test Method for Shear Strength of Plastics by Punch Tool; 2017.

R. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2020.

S. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2023).

T. EN 15804 - Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products; 2014.

U. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel AC172; 2019.

V. ISO 14025 - Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures; 2006.

W. ISO 14040 - Environmental management - Life cycle assessment - Principles and framework; 2006 (Amended 2020).

X. ISO 14044 - Environmental management - Life cycle assessment - Requirements and guidelines; 2006 (Amended 2020).

Y. ISO 21930 - Sustainability in buildings and civil engineering works -- Core rules for environmental product declarations of construction products and services; 2017.

Z. RCSC (HSBOLT) - Specification for Structural Joints Using High-Strength Bolts; Research Council on Structural Connections; 2020.

AA. SSPC-SP 3 - Power Tool Cleaning; 2018.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Meeting: Meet at project site prior to beginning of installation to review requirements. Require attendance by representatives of the following:
   1. Contractor's superintendent.
   2. Independent testing agency.
   3. Structural steel erector.
   4. Steel subcontractor
   5. Special Inspector.
   6. Structural Engineer of Record.
   7. Other entities affected by the work of this section.

B. Review special inspection and testing and inspecting agency procedures for field quality control, temporary bracing of structure, shop drawing submittals, AESS requirements.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings:
1. Indicate profiles, sizes, spacing, locations of structural members, openings, attachments, and fasteners.
2. Connections not detailed.
3. Indicate cambers and loads.
4. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.
5. Grid locations of the individual pieces shall be provided on the detail drawings.
6. Resubmitted drawings shall have all revisions clouded or clearly identified on the drawings.
7. Reproduction of any portion of the structural contract drawings for resubmittal as shop drawings is prohibited. Shop drawings produced in such a manner will be rejected and returned. See AISC 303 Section 4.3 for additional information.

C. Steel Connection Calculations:
1. Fabricator's responsibilities include using a qualified registered professional engineer licensed in the State in which the Project is located to prepare structural analysis data for structural steel connections.
2. Submit shop standards for typical steel framing connections. Shop standards shall be signed and sealed by the registered professional engineer responsible for their preparation. Shop drawings will not be reviewed until applicable shop standards have been submitted and approved.
3. Submit calculations for bracing connections, splices, connections not covered by shop standards, and other connections as indicated in the Contract Documents. Calculations shall be signed and sealed by the registered professional engineer responsible for their preparation. Shop drawings will not be reviewed until applicable calculations have been submitted and approved.

D. Connection design Engineer shall review fabricators shop drawings for implementation of their connection design and provide letter stating such per AISC 303 Section 3.1.2 Option (3).

E. The connections shall be designed by a licensed professional engineer working for the fabricator.

F. CTHPB Documentation Submittals: Comply with Division 01 Section “Sustainable Design Requirements” and provide the following in addition to other action submittals:
1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
2. Product Certificates for Credit d10: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

G. Environmental Product Declaration (EPD): Submit in accordance with following.
   1. Publicly available, critically reviewed life cycle analysis having at least a cradle-to-gate scope conforming to one of the below criteria.
      a) Good: Product-specific; compliant with ISO 14044.
      b) Better: Industry-wide, generic; compliant with ISO 21930, or with ISO 14044, ISO 14040, ISO 14025, and EN 15804; Type III third-party certification with external verification, in which the manufacturer is recognized as the program operator.
      c) Best: Commercial-product-specific; compliant with ISO 21930, or with ISO 14044, ISO 14040, ISO 14025, and EN 15804; Type III third-party certification with external verification, in which the manufacturer is recognized as the program operator.
      d) Where demonstration of impact reduction below industry average is required, submit both industry-wide and commercial-product-specific declarations; or submit at least 5 declarations for products of the same type by other manufacturers in the same industry.
   2. For products delivered in multiple shipments to the jobsite, an EPD must be provided for each separate shipment from a different point of production, or from a a different supplier.
   3. Submit an EPD for each structural steel type specified in the Steel section of the structural general notes.

H. Bill of Materials: Material supplier(s) shall provide a report, at the completion of the primary structural frame, summarizing all structural steel quantities and the location where each material was obtained. Each unique ASTM material grade used on the project to be itemized.
   1. In addition to the requirements above, report the following in pounds and itemize as required for each unique steel product:
      a) Total Structural Steel Weight

I. Manufacturer's Mill Certificate: Certify that products meet or exceed specified requirements.

J. Field quality-control and special inspection reports.

K. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172 or that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant.

L. Delegated-Design Submittal: For structural-steel connections indicated to comply with design loads, include analysis data signed and sealed by the qualified professional engineer responsible for their preparation licensed in the State in which the Project is located.

1.6 QUALITY ASSURANCE

A. Fabricate structural steel members in accordance with AISC (MAN) "Steel Construction Manual."

B. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and no more than 12 months before start of scheduled welding work.

C. Fabricator Qualifications: A qualified steel fabricator that is accredited by the International Accreditation Service (IAS) Fabricator Inspection Program for Structural Steel in accordance with IAS AC172 or that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant.

D. Erector: Company specializing in performing the work of this section with minimum 10 years of documented experience.

PART 2 PRODUCTS

2.1 MATERIALS

A. As indicated on drawings.

B. Non-Shrink Cementitious Grout: Comply with requirements of Section 03 6213 - Non-Metallic Non-Shrink Grouting

C. Structural Thermal Break/Insulation Material:
1. Fiberglass-Reinforced Laminate Composite: Basis of design: Fabreeka-TIM® , as manufactured by Fabreeka International, Inc.
2. Include thermal break washers and bushings made from Fabreeka® material. **Steel fabricator note:** When bushings are used, the holes for standard bolt diameters have to be increased to account for these.
3. Material shall maintain structural integrity of connections. Refer to Structural Drawings for specific Load requirements.
4. Ultimate Material Properties:
   a) Tensile Strength: ASTM D638; 11,000 psi (75.8 MPa).
   b) Flexural Strength: ASTM D790; 25,000 psi (172.4 MPa).
   c) Compressive Strength: ASTM D695; 38,900 psi (268.2 MPa).
   d) Compressive Modulus: ASTM D695
      1) 1/2" (12.7mm) thick: 291,194 psi (2,007.7 MPa)
      2) 1" (25.4mm) thick: 519,531 psi (3,582.0 MPa)
   e) Shear Strength: ASTM D732; 15,000 psi (103.4 MPa)
   f) Thickness: 1" (25.4mm) or as indicated.
   g) Oxygen Index: ASTM D2863; 21.8%.
   h) Coefficient of Thermal Expansion: ASTM D696; 2.2.
   i) Thermal Conductivity: ASTM C177; 1.8 BTU/Hr/ft2/in/°F (0.259 W/m*°K).
   j) Density: 107.83 lb/ft3 (1727Kg/M3).

D. Bituminous Paint: Cold-applied water-based emulsion; asphalt with mineral colloid or chemical emulsifying agent; with or without fiber reinforcement; asbestos-free; suitable for application on vertical and horizontal surfaces.
1. Composition - ASTM D1187/D1187M, Type I.
2. VOC Content: Not more than permitted by local, State, and federal regulations.
3. Applied Thickness: 1/16 inch, minimum, wet film.
4. Products:
   a) W. R. Meadows, Inc; Sealmastic Emulsion: www.wrmeadows.com/#sel.
   b) KARNAC; 220 Fibered Emulsion (Brush or Spray):www.karnakcorp.com.
   c) BASF Corporation; MasterSeal ® 610, 614, 615: www.basf.com
   d) Uniflex®; Non-Fibered Asphalt Emulsion Dampproofing 40-324: www.uniflexroof.com
   e) Henry® Company; Non-Fibered Asphalt Emulsion Dampproofing 788: www.henry.com

5. Substitutions: See Section 01 6000 - Product Requirements.

E. Expanded Metal: Standard, Carbon Steel, Cold Rolled, 1/2" No. 20 Standard
   1. For use in radon pits.
   2. Products:
      a) McNICHOLS® EXPANDED METAL; www.mcnichols.com
      b) Direct Metals; www.directmetals.com
      c) MarCo Specialty Steel; www.marcospecialtysteel.com
      d) P+R Metals; www.prmetals.com
      e) Russell Metals; www.russelmetals.com
   3. Substitutions: See Section 01 6000 - Product Requirements.

F. Shop and Touch-Up Primer: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.

G. Touch-Up Primer for Galvanized Surfaces: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.

H. Reinforced Thermoset Resin Structural Thermal Break Pads: High-strength structural framing accessory boards with the following characteristics.
   1. Structural Performance: Provide pads capable of withstanding or transferring structural loads.
      a) Load Types: Shear, moment, and wind loads.
   2. Pad Design: Allow for fabrication and construction tolerances, accommodating live load deflection, shrinkage, and creep of the building structure and other building movements; maintain structural steel deflections as required by applicable codes.
   3. Board Size: 48 by 96 inches.
   4. Pad Thickness: As indicated on drawings.
   5. Apparent Thermal Conductivity: K-value of 1.05 Btu-in/h sq ft degrees F when tested in accordance with ASTM C518.
   6. Compressive Strength: 40,000 psi, minimum, when tested in accordance with ASTM D638.
   7. Compressive Modulus: 673,400 psi, minimum, when tested in accordance with ASTM D695.
   8. Accessories: Manufacturer's standard bushings and washers, minimum 1/4 inch thick, designed to provide thermal break between structural steel washer/bolt and internal element.
   9. Manufacturers:
      a) Armatherm; FRR Structural Thermal Break Material: www.armatherm.com/#sle.

2.2 FABRICATION

A. Shop fabricate to greatest extent possible.

B. Space shear stud connectors as indicated on drawings.

C. Fabricate connections for bolt, nut, and washer connectors.

2.3 FINISH

A. Prepare structural component surfaces in accordance with SSPC-SP 3.

B. Shop prime structural steel members. Do not prime surfaces that will be sprayed fire-resistive material (SFRM), field welded, in contact with concrete, high strength bolted, slip-critical connections, or galvanized.

C. Structural steel members to receive intumescent mastic fire-resistive coatings shall be shop primed with a special compatible primer. See Section 07 8100 - Applied Fire Protection for these requirements.

D. Galvanize structural steel members to comply with ASTM A123/A123M. Provide minimum 1.7 oz/sq ft galvanized coating.
   1. Fill vent and drain holes that will be exposed in the finished Work, unless they will function as weep holes, with tapered plugs.
   2. Provide tapered plugs with diameter at mid-point same as drilled hole in steel member. Install and hammer to a tight fit. File excess flush and touch-up if necessary.
      a) Tapered plugs shall be zinc or aluminum to match hole size.
   3. Galvanize lintels attached to structural-steel frame and located in exterior walls and other items indicated on the Drawings.

E. Refer to Architectural drawings for steel finishes plan.

2.4 SOURCE QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the inspections indicated in the Statement of Special Inspections.

B. Testing Agency: Engage a qualified testing agency to perform tests and inspections

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that conditions are appropriate for erection of structural steel and that the work may properly proceed.

3.2 ERECTION

A. Erect structural steel in compliance with AISC 303.

B. Allow for erection loads and provide sufficient temporary bracing to maintain structure in safe condition, plumb, and in true alignment until completion of erection and installation of permanent bracing.

C. Field weld components and shear studs indicated on shop drawings.

D. Use carbon steel bolts only for temporary bracing during construction, unless otherwise specifically permitted on drawings. Install high-strength bolts in accordance with RCSC (HSBOLT) "Specification for Structural Joints Using High-Strength Bolts".

E. Do not field cut or alter structural members without approval of Architect. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.

F. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.

3.3 TOLERANCES

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 360 Specification for Structural Steel Buildings and AISC S303 Code of Standard Practice for Steel Buildings and Bridges.

3.4 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.

B. Special Inspections: Owner will engage a qualified special inspector to perform the inspections indicated in the Statement of Special Inspections.

3.5 REPAIRS AND PROTECTION

A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A780/A780M and manufacturer's written instructions.

END OF SECTION 05 1200

SECTION 05 2100 - STEEL JOIST FRAMING

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

A. Section 05 1200 - Structural Steel Framing: Superstructure framing.

B. Section 05 3100 - Steel Decking: Support framing for openings less than 12 inches in decking.

1.2 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

B. ASTM A563/A563M - Standard Specification for Carbon and Alloy Steel Nuts (Inch and Metric); 2021a.

C. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings; 2020.

D. ASTM F436/F436M - Standard Specification for Hardened Steel Washers Inch and Metric Dimensions; 2019.

E. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2023.

F. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2023).

G. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel AC172; 2019.

H. SJI 100 - Standard Specifications for K-Series, LH-Series, and DLH-Series Open Web Steel Joists, and for Joist Girders; 2020.

I. SJI Technical Digest No. 9 - Handling and Erection of Steel Joists and Joist Girders; 2008.

J. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 2004.

K. SSPC-SP 2 - Hand Tool Cleaning; 2018.

1.3 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Comprehensive engineering analysis of special joists signed and sealed by the qualified professional engineer responsible for its preparation.

C. Shop Drawings: Indicate standard designations, joist coding, configurations, sizes, spacings, cambers, locations of joists, joist leg extensions, bridging, connections, and attachments.

D. Reproduction of any portion of the structural contract drawings for resubmittal as shop drawings is prohibited. Shop drawings produced in such a manner will be rejected and returned.

E. CTHPB Documentation Submittals: Comply with Division 01 Section "Sustainable Design Requirements" and provide the following in addition to other action submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Certificates for Credit d10: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

F. Manufacturer's Qualification Statement.

G. Fabricator's Qualification Statement.

1.4 QUALITY ASSURANCE

A. Design connections not detailed on drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.

B. Perform Work, including that for headers and other supplementary framing, in accordance with SJI 100 Standard Specifications Load Tables and SJI Technical Digest No. 9.

C. Manufacturer Qualifications: A manufacturer certified by SJI to manufacture joists complying with applicable standard specifications and load tables in SJI's "Specifications"
   1. Manufacturer's responsibilities include providing professional engineering services for designing special joists to comply with performance requirements.

D. Fabricator Qualifications: A qualified steel joist fabricator who is a member of the Steel Joist Institute and has completed the Institute's examination of complete engineering design details and calculations of joists, bridging and accessories for which standards have been adopted.

E. Welding Qualifications: Qualify field-welding procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Transport, handle, store, and protect products to SJI requirements.

B. Protect joists from corrosion, deformation, and other damage during delivery, storage, and handling.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Steel Joists:
   1. Canam Group Inc: www.canam-steeljoists.ws
   2. Nucor-Vulcraft Group: www.vulcraft.com/#sle.
   3. New Millennium Building Systems, LLC: www.newmill.com

2.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide special joists and connections capable of withstanding design loads indicated including any hanging equipment or roof equipment supported by the joist not indicated. Coordinate exact location and magnitude of loads with the equipment supplier.
   1. Use ASD; data are given at service-load level.
   2. Design special joists to withstand design loads with live-load deflections no greater than the following:
      a) Roof Joists: Vertical deflection of 1/360 of the span.

2.3 MATERIALS

A. Open Web Joists: SJI 100 Type LH Joists:
   1. Provide bottom chord extensions as indicated.
   2. Minimum End Bearing on Steel Supports: Comply with referenced SJI standards.
   3. Minimum End Bearing on Masonry or Concrete Supports: Comply with referenced SJI standards.
   4. Finish: Shop primed.
   5. End Arrangement: Underslung.
   6. Top-Chord Arrangement: Pitched 1/4 inch per 12 inches (1:48), two ways.
   7. Camber joists according to SJI's "Specifications."

B. High-Strength Structural Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, with matching compatible ASTM A563/A563M nuts and ASTM F436/F436M washers.

C. Bridging: Comply with referenced SJI standards.
   1. Furnish additional erection bridging if required for stability.

D. Furnish miscellaneous accessories including splice plates and bolts required by joist manufacturer to complete joist assembly.

E. Structural Steel For Supplementary Framing and Joist Leg Extensions: ASTM A36/A36M.

F. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

G. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

2.4 FABRICATION

A. Coordinate web configuation with mechanical duct runs.

2.5 FINISH

A. Shop prime joists as specified.
   1. Do not prime surfaces that will be fireproofed, field welded, or in contact with concrete.

B. Prepare surfaces to be finished in accordance with SSPC-SP 2.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions prior to beginning work.

B. Coordinate layout of hanging equipment that imparts non-uniform loads to the joist top or bottom chords. These loads shall be included in the design of the joist.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ERECTION

A. Erect joists with correct bearing on supports.

B. Allow for erection loads. Provide sufficient temporary bracing to maintain framing safe, plumb, and in true alignment.

C. Coordinate the placement of anchors for securing loose bearing members furnished as part of the work of this section.

D. After joist alignment and installation of framing, bolt joist seats to steel bearing surfaces.

E. Position and bolt joist chord extensions and wall attachments as detailed.

F. Install supplementary framing for floor and roof openings greater than 12 inches.

G. Do not permit erection of decking until joists are braced, bridged, and secured or until completion of erection and installation of permanent bridging and bracing.

H. Do not field cut or alter structural members without approval of joist manufacturer.

3.3 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's written instructions, and requirements in this Section.

3.4 FIELD QUALITY CONTROL

A. Engage an independent testing agency to perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.

B. Visually inspect field welds according to AWS D1.1/D1.1M.

C. Visually inspect bolted connections.

D. Prepare test and inspection reports.

3.5 REPAIRS AND PROTECTION

A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.

END OF SECTION 05 2100

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SECTION 05 3100 - STEEL DECKING

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

1.2 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

B. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished; 2018.

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

D. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings; 2020.

E. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2023).

F. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel; 2018, with Errata (2022).

G. ICC-ES AC43 - Acceptance Criteria for Steel Deck Roof and Floor Systems; 2022.

H. ICC-ES AC70 - Acceptance Criteria for Power-Actuated Fasteners Driven into Concrete, Steel and Masonry Elements; 2019, with Editorial Revision (2021).

I. SDI (DM) - Publication No.30, Design Manual for Composite Decks, Form Decks, and Roof Decks; 2007.

J. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 2004.

1.3 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittals procedures.

B. Shop Drawings: Indicate deck plan, support locations, projections, openings, reinforcement, pertinent details, and accessories.

C. Reproduction of any portion of the structural contract drawings for resubmittal as shop drawings is prohibited. Shop drawings produced in such a manner will be rejected and returned.

D. CTHPB Documentation Submittals: Comply with Division 01 Section “Sustainable Design Requirements” and provide the following in addition to other action submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

2. Product Certificates for Credit d10: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

E. Certificates: Certify that products furnished meet or exceed specified requirements.

F. Powder Actuated Fasteners: For PAF submittals, for fastening metal deck to either structural steel or bar joist, the individual(s) performing the installation shall have submitted for record and approval a package, from the manufacturer of the PAF system, pertinent information such as: a summary table of the correct fastener, pattern, span, deck gauge & type, side-lap fastener and pattern, and shear capacity for the specific zone of work, fastener technical data (pullover & pullout allowable loads), fastening comparison tables for allowable tension and shear values of PAF/puddle welds/screws, proper roof and composite diaphragm shear tables for the given job design application showing the PLF at the correct span and with the correct number of side-lap stitch fasteners (from steel Deck Institute Diaphragm Design Manual), tool descriptions for the tools to be used, and details of each application.

G. Submit manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

A. PAF: Use of powder actuated tools shall only be by a qualified operator, trained and licensed by the tool manufacturer in accordance with the manufacturers and OSHA requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Cut plastic wrap to encourage ventilation.

B. Separate sheets and store deck on dry wood sleepers; slope for positive drainage.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Steel Deck:
1. Canam Steel Corporation: www.canam-steeljoists.ws.
2. Cordeck, Inc: www.cordeck.com.
3. Nucor-Vulcraft Group: www.vulcraft.com.
4. ASC Profiles, Inc.: www.ascprofiles.com
5. Roof Deck, Inc.: roofdeckinc.com
6. New Millennium Building Systems, LLC: www.newmill.com
7. Epic Metals Corporation: www.epicmetals.com

2.2 STEEL DECK

A. Acoustical Cellular Roof Deck: Non-composite type, steel sheet with plain vertical flute faces with a perforated liner panel attached to the bottom flutes with 1/8 inch diameter holes staggered 3/8 inch on center:

1. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS) Grade 33/230, with G90/Z275 galvanized coating.
2. Span Design: Triple.
3. Minimum Base Metal Thickness: As indicated on drawings.
4. Nominal Height: As indicated on drawings.
5. Profile: Fluted; As indicated on drawings.
6. Side Joints: Lapped, mechanically fastened.

B. Roof Deck: Non-composite type, fluted steel sheet:
1. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS) Grade 33/230, with G90/Z275 galvanized coating.
2. Span Design: Triple.
3. Minimum Base Metal Thickness: As indicated on drawings.
4. Nominal Height: As indicated on dawings.
5. Profile: Fluted; As indicated on drawings.
6. Side Joints: Lapped, mechanically fastened.

C. Composite Floor Deck: Fluted steel sheet embossed to interlock with concrete:
1. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS) Grade 33/230, with G60/Z180 galvanized coating.
2. Span Design: Triple.
3. Minimum Base Metal Thickness: As indicated on drawings.
4. Nominal Height: As indicated on drawings.
5. Profile: Fluted; As indicated on drawings.
6. Side Joints: Lapped, mechanically fastened.
7. Extended Female Leg Option: Fabricate panels with an extended female leg at interlocking seams that allows for sidelap screws to be installed vertically.

D. Metal Form Deck: Corrugated sheet steel, with provision for ventilation of concrete:
1. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS) Grade 33/230, with G90/Z275 galvanized coating.
2. Minimum Base Metal Thickness: As indicated on drawings.
3. Nominal Height: As indicated on drawings.
4. Side Joints: Lapped, mechanically fastened.

2.3 ACCESSORY MATERIALS

A. Bearing Plates and Angles: ASTM A36/A36M steel, galvanized per ASTM A123/A123M.

B. Stud Shear Connectors: Made from ASTM A108 Grade 1015 bars.

C. Welding Materials: AWS D1.1/D1.1M.

D. Fasteners: Galvanized hardened steel, self tapping.

E. Powder Actuated Mechanical Fasteners: Steel; with knurled shank and forged ballistic point. Comply with applicable requirements of ICC-ES AC70.
1. Design Requirements: Provide number and type of fasteners that comply with the applicable requirements of SDI (DM) design method for roof deck and floor deck applications and ICC-ES AC43.

2. Equivalent values in schedule on drawing.
3. Products:
   a) Basis-of-Design Product: Hilti: www.hilti.com
   b) Simpson Strong-Tie: www.strongtie.com.
   c) DEWALT Fasteners: www.anchors.dewalt.com
   d) Ramset: www.ramset.com
   e) Substitutions: See Section 01 6000 - Product Requirements.

F. Mechanical Fasteners: Steel; hex washer head, self-drilling, self-tapping.
   1. Design Requirements for Sidelap Connections: Provide number and type of fasteners that comply with the applicable requirements of SDI (DM) design method for roof deck and floor deck applications and ICC-ES AC43.

G. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

H. Touch-Up Primer for Galvanized Surfaces: ASTM A 780/A 780M, complying with VOC limitations of authorities having jurisdiction.

I. Flute Closures: Closed cell foam rubber, 1 inch thick; profiled to fit tight to the deck.

J. Acoustical Insulation: Glass fiber type, minimum 1.1 lb/cu ft density; profiled to suit deck.

K. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of same material and finish as deck, and of thickness and profile recommended by SDI Floor Deck Design Manual Latest Edition for overhang and slab depth.

L. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.

2.4 FABRICATED DECK ACCESSORIES

A. Sheet Metal Deck Accessories: Metal closure strips, wet concrete stops, cover plates, finish strips, and reinforcing channels same gage as deck; of profile and size as indicated; finished same as deck.

B. Roof Sump Pans: Formed sheet steel, 14 gauge, 0.0747 inch minimum thickness, flat bottom, sloped sides, recessed 1-1/2 inches below roof deck surface, bearing flange 3 inches wide, sealed watertight.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions prior to beginning work.

B. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Erect metal deck in accordance with SDI Design Manual and manufacturer's instructions. Align and level.

B. On concrete and masonry surfaces provide minimum 4 inch bearing.

C. On steel supports provide minimum 1-1/2 inch bearing.

D. Install temporary shoring before placing deck panels if required to meet deflection limitations.

E. Locate deck bundles to prevent overloading of supporting members.

F. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

G. The steel roof deck has been designed for uniformly distributed loads and must not be used as the equivalent of point loads or linear loads. Concentrated loads applied to steel roof deck shall not be permitted unless authorized in writing by the structural engineer.

H. Suspended ceilings, excluding acoustical ceiling tile (ACT) or single-layer gypsum wall board (GWB) types, light fixtures, ducts or other utilities shall not be supported from steel roof deck. Install carrying channels or supplemental supports that connect to main structural framing members.

I. The steel deck has not been designed or analyzed for their ability to support the load/weight of scaffolding, stored materials, etc. during construction. All contractors and/or sub-contractors shall hire their own independent engineer, licensed in the jurisdiction of this project, to determine the adequacy of the steel deck to support these loads/weight.

J. Fasten deck as indicated on drawings.

K. Fasten roof deck panels to steel supporting members with low velocity powder actuated fasteners. Installation of fasteners shall be in accordance with design requirements of SDI and installed by an operator licensed by the manufacturer which Hilti provides.
   1. For bar joist base material thicknesses between 3/16” to 3/8” use the Hilti X-EDN19 fastener. For base material thicknesses between 1/8” to 1/4” use the Hilti X-EDNK22 fastener. Mechanically fasten using Hilti DX 460 (hand-held) or DX 860 HSN (stand-up) tools.
   2. For heavy bar joists or beams with base materials thicknesses of Tf >= 1/4” use the Hilti X-ENP19 fastener. Mechanically fasten using Hilti DX76 (hand-held) or DX860 ENP (stand-up) tools.

L. Fasten floor deck panels to steel supporting members with low velocity powder actuated fasteners. Installation of fasteners shall be in accordance with design requirements of SDI or ICC and installed by an operator licensed by the manufacturer which Hilti provides.
   1. Mechanically fasten using Hilti DX76 (hand-held), DX860 ENP (stand-up). For heavy bar-joist or beam base material thicknesses greater than or equal to ¼” use the Hilti X-ENP19 fastener.

M. At mechanically fastened male/female side laps fasten at 18 inches on center maximum.

N. Drive mechanical sidelap connectors completely through adjacent lapped sheets; positively engage adjacent sheets with minimum three-thread penetration.

O. Weld deck in accordance with AWS D1.3/D1.3M.

P. At floor edges, install concrete stops upturned to top surface of slab, to contain wet concrete. Provide stops of sufficient strength to remain stationary without distortion.

Q. At openings between deck and walls, columns, and openings, provide sheet steel closures and angle flashings to close openings.

R. Close openings above walls and partitions perpendicular to deck flutes with single row of foam cell closures.

S. Position roof drain pans with flange bearing on top surface of deck. Fusion weld at each deck flute.

T. Weld stud shear connectors through steel deck to structural members below.

U. Immediately after welding deck and other metal components in position, coat welds, burned areas, and damaged surface coating, with touch-up primer.

V. When installation of deck is complete and prior to placing concrete, all deck shall be cleaned of all debris.

3.3 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.

B. Special Inspections: Owner will engage a qualified special inspector to perform the inspections indicated in the Statement of Special Inspections.

C. Comply with quality assurance inspection requirements of SDI (QA/QC), "Standard for Quality Control and Quality Assurance for the Installation of Steel Deck", as modified by Table C1 contained in the Commentary to that Standard and the Statement of Special Inspections.

D. Welds: Verify compliance with AWS D1.3/D1.3M; continuous.

E. PAF: The manufacturer of the powder actuated system (tools and fasteners) shall be involved in the inspection and quality control process. This will require site visits for training and during installation to assist in the proper installation. Proper installation is determined by pin-head standoff.

F. Remove and replace work that does not comply with specified requirements.

G. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.4 REPAIRS AND PROTECTION

A. Prepare and repair damaged galvanized coatings on both surfaces of roof deck with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.

B. Touchup Painting: Wire brushing, cleaning, and repair painting of rust spots, welds, and abraded areas on both deck surfaces are included in Section 09 9113 - Exterior Painting and Section 09 9123 - Interior Painting.

END OF SECTION 05 3100

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SECTION 05 4000 - COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Formed steel stud exterior wall framing.

B. Cold-formed framing accessories.

C. Exterior wall sheathing.

D. Water-resistive barrier over sheathing.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 06 1000 - Rough Carpentry: Wall sheathing.

C. Section 07 9200 - Joint Sealants.

D. Section 09 2116 - Gypsum Board Assemblies: Gypsum-based sheathing.

1.3 DEFINITIONS

A. General: See AISI S240 for definitions of terms used in this section.

B. Connection: A combination of structural elements and joints used to transmit forces between two or more members.

C. Connector: A device used to transmit forces between cold-formed steel structural members or between a cold-formed steel structural member and another structural element.

1.4 REFERENCE STANDARDS

A. AISI S100 - North American Specification for the Design of Cold-Formed Steel Structural Members; 2016, with Supplement (2020).

B. AISI S240 - North American Standard for Cold-Formed Steel Structural Framing; 2015, with Errata (2020).

C. AISI S200-12 - North American Standard for Cold-Formed Steel Framing – General Provisions, 2012 Edition; 2012.

D. AISI S211-07 - North American Standard for Cold-Formed Steel Framing - Wall Stud Design, 2007 Edition (Reaffirmed 2012); 2012.

E. AISI S212-07 - AISI North American Standard For Cold-Formed Steel Framing - Header Design, 2007 Edition (Reaffirmed 2012); 2012.

F. AISI S213-07 w/ S1-09 - North American Standard for Cold-Formed Steel Framing – Lateral Design, 2007 Edition With Supplement 1 (Reaffirmed 2012); 2012.

G. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.

H. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.

I. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings; 2020.

J. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members; 2015.

K. ASTM C1513 - Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections; 2013.

L. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories; 2020.

M. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021.

N. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2021.

O. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel; 2018, with Errata (2022).

P. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

Q. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 2004.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Meeting: Conduct meeting attended by Owner, Architect, manufacturer's technical representative, and other trade contractors at project site prior to beginning of installation to review requirements.
   1. Convene one week before starting work of this section.

B. Coordinate with work of other sections that is to be installed in or adjacent to metal framing systems, including but not limited to structural anchors, cladding anchors, utilities, insulation, and firestopping.

C. Coordinate cold-formed metal wall and soffit framing with masonry veneer, EIFS system, metal wall tile system, phenolic wall panel system, composite soffit panel system, and terra cotta clay tile cladding system, as specified in Divisions 04 and 07 sections.

1.6 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on standard framing members; describe materials and finish, product criteria, limitations.

C. Product Data: Provide manufacturer's data on factory-made framing connectors, showing compliance with requirements.

D. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

E. Delegated Design Submittal: For cold-formed metal framing, including cantilevered partial wall support system(s) for low wall partitions.

F. Shop Drawings: Indicate component details, framed openings, bearing, anchorage, loading, welds, and type and location of fasteners, and accessories or items required of related work.
   1. Indicate stud and ceiling joist layout.
   2. Indicate cantilevered partial wall support system layouts.
   3. Describe method for securing studs to tracks and for bolted framing connections.

G. Steel Framing Industry Association (SFIA) Certification:
   1. Submittals that do not bear the Contractor's Professional Structural Engineer's seal and signature will be returned, without review.

H. Designer's Qualification Statement.

I. Manufacturer's Qualification statement.

J. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before the start of scheduled welding work.

1.7 QUALITY ASSURANCE

A. See Section 01 4000 - Quality Requirements for additional requirements.

B. Professional Structural Engineer Qualifications: A professional engineer who is legally qualified to practice in Connecticut and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of cold-formed metal framing that are similar to those indicated for this project in material, design, and extent.

C. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, and with minimum ten years of documented experience.

D. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and AWS D1.3/D1.3M and dated no more than 12 months before start of scheduled welding work.

E. Installer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience.

F. Welding Qualifications: Qualify procedures and personnel according to the following:
   1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
   2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

G. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Structural Framing:
   1. ClarkDietrich Building Systems; : www.clarkdietrich.com.
   2. The Steel Network, Inc; : www.SteelNetwork.com.
   3. Substitutions: See Section 01 6000 - Product Requirements.

B. Basis-of-Design Framing Connectors and Accessories: The design of connector devices is based on products manufactured by The Steel Network, Inc. Subject to compliance with requirements, provide either the named products or comparable products by one of the following, as approved by the Architect.
   1. Same manufacturer as metal framing.

2.2 PERFORMANCE REQUIREMENTS

A. Comply with requirements for Contractor's design-related professional design services indicated in Section 01 4000 - Quality Requirements.

B. Design Requirements: Design cold-formed framing systems, components, framing accessories, and connectors to withstand specified design loads in compliance with ICC (IBC), ASCE 7, AISI S100, and AISI S240.

C. Regulatory Requirements: Comply with applicable building code criteria for loads, including seismic loads.
   1. Cold-Formed Steel Framing Standards: Unless more stringent requirements are indicated, framing shall comply with AISI S100-12, AISI S200-12, and the following:

a) Wall Studs: AISI S211-07.
b) Headers: AISI S212-07.
c) Lateral Design: AISI S213-07 w/ S1-09.

2. Design Loads: As indicated on the drawings.
   a) Wind Loads: Calculate wind loads in accordance with ASCE 7.
      1) Design Criteria: As indicated on Structural Drawing S001.
   b) Seismic Loads: Calculate seismic loads in accordance with ASCE 7.
      1) Design Criteria: As indicated on Structural Drawing S001.
3. Live load deflection meeting the following, unless otherwise indicated:
   a) Floors: Maximum vertical deflection under live load of 1/480 of span.
   b) Roofs: Maximum vertical deflection under live load of 1/360 of span.
4. Exterior Walls and Parapets: Maximum horizontal deflection under wind load 1/600 of span, unless otherwise indicated.
5. Exterior Soffit Framing: Vertical deflection of 1/240 of the span under total load, and 1/360 of the span under the live load, unless otherwise indicated.
6. Design non-axial loadbearing framing to accommodate not less than 3/4 in vertical deflection.
7. Able to tolerate movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.
8. Able to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

2.3 MATERIALS

A. Steel Sheet: ASTM A1003/A1003M, subject to the ductility limitations indicated in AISI S240.

2.4 STRUCTURAL FRAMING COMPONENTS

A. Wall Studs and Track Sections: AISI S240; c-shaped studs and u-shaped track sections in stud-matching nominal width and compatible height.
   1. Structural Grade: As required to meet design criteria.
   2. Corrosion Protection Coating Designation: CP 90 CP 90 in accordance with AISI S240.

B. Non-Load Bearing Wall and Parapet Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths as indicated on the Drawings, punched, with stiffened flanges, and as follows:
   1. Minimum Uncoated-Steel Thickness: As required to comply with structural performance requirements, but not less than thickness indicated.
      a) Exterior Applications: 0.0538 inch.
      b) Interior Applications Using Abuse-Resistant/Impact Resistant Gypsum Board: 0.0312 inch.
   2. Flange Width: 2 inches minimum.
   3. Punched openings shall not be located within 12 inches from the ends of in-place wall framing.
   4. Galvanized in accordance with ASTM A653/A653M, and coating indicated.
      a) Coating for Exterior Framing: G90/Z275.
      b) Coating for Interior Framing: G60/Z180.
   5. Grade: As required by structural performance.

C. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flange, and as follows:
   1. Minimum Uncoated-Steel Thickness: As required to comply with structural performance requirements, but not less than thickness of steel studs.
   2. Flange Width: As required to comply with structural performance requirements, but not less than 1-1/4 inches.

D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal and lateral loads, and as follows:
   1. Minimum Uncoated-Steel Thickness: As required to comply with structural performance requirements, but not less than 0.0538 inch.
   2. Flange Width: A minimum of 3 inches, and as required to comply with structural performance requirements, and to accommodate upward and downward deflection of 3/4 inch.

E. Exterior Soffit Framing: Manufacturer's standard C-shaped steel studs, of web depths as indicated on Drawings, unpunched, with stiffened flanges; U-shaped steel track, in matching nominal width, unpunched, with unstiffened flanges, and as follows:
   1. Minimum Uncoated-Steel Thickness: As required to comply with structural performance requirements, but not less than 0.0538 inch.
   2. Stud Flange Width: 2 inches minimum.
   3. Track Flange Width: As required to comply with structural performance requirements, but not less than 1-1/4 inches.

F. Accessory Items: Manufacturer's standard cold-formed plates, angles,

2.5 LATERAL FORCE-RESISTING SYSTEMS

A. Steel Sheet: ASTM A1003/A1003M, subject to the ductility limitations indicated in AISI S240.
   1. Structural Grade: As required to meet design criteria.
   2. Corrosion Protection Coating Designation: CP 90 in accordance with AISI S240.

B. Cantilevered Partial Wall Support System (Low Wall Partitions): Manufacturer's standard partial height wall support system capable of supporting out-of-plane loading in cantilevered partial wall systems that are unsupported at the top track. The out-of-plane loads shall be transferred to the floor system through a 1/2-inch thick plate nested in the flanges of the framing member with two 3/8-inch diameter fasteners.
   1. Products:
      a) Clark Dietrich; **Pony Wall**.
         1) Provide **Pony Wall Heavy** and / or **Pony Wall Lite** as required to comply with the structural design criteria for each condition indicated on drawings.
      b) The Steel Network; **Midwall**.

2.6 MISCELLANEOUS CONNECTIONS

A. Self-Drilling, Self-Tapping Screws, Bolts, Nuts and Washers: Hot dip galvanized per ASTM A153/A153M to match coating level of framing member.

B. Mechanical Fasteners: Self-drilling, self-tapping screws, bolts, nuts and washers per ASTM C1513 corrosion-resistant-coated.
   1. Head Type: Low-profile head beneath sheathing and gypsum board, manufacturer's standard elsewhere.

C. Anchorage Devices: Powder actuated.

2.7 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from ASTM A1003/A1003M, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation used for framing members.

B. Framing accessories are subject to the delegated design requirements.

C. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
   1. CFMF Plates for Parapet Support: Formed sheet steel, thickness determined for conditions encountered; finish to match framing components.
   2. Bracing, Furring, Bridging: Formed sheet steel, thickness determined for conditions encountered; finish to match framing components.
   3. Plates, Gussets, Clips: Formed Sheet Steel, thickness determined for conditions encountered; finish to match framing components.
   4. Stud kickers.
   5. Angles.
   6. Backer plates.

2.8 MISCELLANEOUS MATERIALS

A. Galvanizing Repair: Touch up bare steel with zinc-rich paint in compliance with ASTM A780/A780M.

B. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

C. Touch-Up Primer for Galvanized Surfaces: ASTM A780/A780M, complying with VOC limitations of authorities having jurisdiction.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

B. Verify field measurements and adjust installation as required.

3.2 PREPARATION

A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
   1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

B. Before sprayed fire-resistive materials are applied, attach continuous angles, clips, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.

C. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that are required to obtain fire-resistive rating indicated. Protect remaining fire-resistive materials from damage.

3.3 INSTALLATION - GENERAL

A. Install structural members and connections in compliance with ASTM C1007 and approved shop drawings.

3.4 INSTALLATION OF STUDS

A. Install wall studs plumb and level.

B. Construct corners using minimum of three studs. Install double studs at wall openings, door and window jambs.

C. Provide deflection allowance in stud track, directly below horizontal building framing at non-loadbearing framing.

3.5 INSTALLATION OF EXTERIOR SOFFIT FRAMING

A. Install perimeter track sized to match stud framing. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated on approved shop drawings.

3.6 TOLERANCES

A. Stud Spacing: 1/8 inch from the designated spacing, provided that the cumulative error does not exceed the requirements of the finishing materials in accordance with ASTM C1007.

END OF SECTION 05 4000

SECTION 05 5000 - METAL FABRICATIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Miscellaneous framing and supports.
   1. General: Provide miscellaneous steel framing and equipment support framing not specified in other Sections as needed to complete the work. Applications include but are not limited to:
      a) Secondary support framing for basketball backstop assemblies.
      b) Support of equipment, ducts, piping, and other items indicated to be suspended from the floor/roof deck above.
         1) Slotted channel framing.
      c) Above ceiling support of cubicle curtain track.
      d) Miscellaneous steel trim.
      e) Elevator machine beams, hoist beam, and /or divider beams.
      f) Supports for overhead doors and grilles.
      g) Tube reinforcement for low partitions.
      h) Miscellaneous steel angles, plates, and channels.
      i) Tower stanchion for automatic door operator activation device.

B. Metal ladders and ships ladders

C. Products furnished, but not installed, under this section include the following:
   1. Loose steel lintels.
   2. Shelf (relieving) angles.
   3. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge type inserts indicated to be cast into concrete or built into unit masonry.

1.2 RELATED REQUIREMENTS

A. Section 01 3573 - Delegated Design Procedures.

B. Section 01 3566.42 - Sustainability Compliance Procedures.

C. Section 01 7419 – Construction Waste Management and Disposal.

1.3 REFERENCE STANDARDS

A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2014 (2015 Errata).

B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

C. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.

D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

E. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2018.

F. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.

G. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2021.

H. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

I. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2023.

J. ASTM B210/B210M - Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes; 2019a.

K. ASTM B211/B211M - Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire; 2019.

L. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

M. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2023.

N. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2023).

O. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 2004.

P. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic); 2019.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data:
   1. Slotted channel framing.
   2. Manufactured metal ladders and ships ladders.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Shop Drawings: Show fabrication and installation details. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable. Provide shop drawings for the following:
   1. Miscellaneous framing and supports for applications where framing and supports are not specified in other sections. These may include, but are not limited to:
      a) Secondary support framing for gymnasium equipment (basketball backstop assemblies and gymnasium divider).
      b) Above-ceiling support of cubicle ceiling track.
      c) Supports for overhead coiling doors and grilles.
   2. Elevator machine beams, hoist beams, and/or divider beams.
   3. Metal ladders.
   4. Shelf angles.
   5. Miscellaneous steel trim including steel angle bases and edging.
   6. Loose steel lintels.
   7. Design data: Submit drawings and supporting calculations, signed and sealed by a qualified professional structural engineer.

E. Designer's Qualification Statement.

1.5 QUALITY ASSURANCE

A. Design ladders, backstop and equipment supports, and elevator beams under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance of Aluminum Ladders: Ladders, including landings, are to withstand the effects of loads and stresses within limits and under conditions specified in ANSI/ASC A14.3.

2.2 MATERIALS - STEEL

A. Steel Sections: ASTM A36/A36M.

B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.

C. Plates: ASTM A283/A283M.

D. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.

E. Slotted Channel Framing: ASTM A653/A653M, Grade 33.

F. Slotted Channel Fittings: ASTM A1011/A1011M.

G. Bolts, Nuts, and Washers: ASTM A307, Grade A, plain.

H. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, plain.

I. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

J. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

K. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.3 MATERIALS - ALUMINUM

A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.

B. Sheet Aluminum: ASTM B209 (ASTM B209M), 5052 alloy, H32 or H22 temper.ladder

C. Aluminum-Alloy Drawn Seamless Tubes: ASTM B210/B210M, 6063 alloy, T6 temper.

D. Aluminum-Alloy Bars: ASTM B211/B211M, 6061 alloy, T6 temper.

E. Bolts, Nuts, and Washers: Stainless steel.

2.4 FABRICATION

A. Fit and shop assemble items in largest practical sections, for delivery to site.

B. Fabricate items with joints tightly fitted and secured.

C. Continuously seal joined members by intermittent welds and plastic filler.

D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

F. Furnish components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.5 FABRICATED ITEMS

A. Shelf Angles, Channels, and Plates Not Attached to Structural Framing.

B. Lintels: As detailed.

C. Elevator Hoistway Divider Beams: Beam sections; prime paint finish.

D. Slotted Channel Framing: Fabricate channels and fittings from structural steel complying with the referenced standards; hot-dipped galvanized per ASTM A1 Grade G65. finish.

2.6 METAL LADDERS

A. General:
   1. Comply with ANSI A14.3, except for elevator pit ladders.
   2. For elevator pit ladders, comply with ASME A17.1/CSA B44.

B. Elevator pit ladder.

C. Ships Ladders: Provide metal ships' ladders where indicated. Fabricate of open-type construction with channel or plate stringers and pipe and tube railings unless otherwise indicated. Provide brackets and fittings for installation.

2.7 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

2.8 LOOSE STEEL LINTELS

A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.
   1. Shop-galvanize and shop-prime loose steel lintels located in exterior walls.

2.9 FINISHES - STEEL

A. Prime paint steel items.
   1. Exceptions: Galvanize items to be embedded in concrete and items to be embedded in masonry.

B. Prime Painting: One coat.

C. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

2.10 FINISHES - ALUMINUM

A. As-Fabricated Finish: AA-M12.

B. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.

2.11 FABRICATION TOLERANCES

A. Squareness: 1/8 inch maximum difference in diagonal measurements.

B. Maximum Offset Between Faces: 1/16 inch.

C. Maximum Misalignment of Adjacent Members: 1/16 inch.

D. Maximum Bow: 1/8 inch in 48 inches.

E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.2 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

3.3 INSTALLATION

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

C. Install items plumb and level, accurately fitted, free from distortion or defects.

D. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

E. Field weld components as indicated on drawings.

F. Perform field welding in accordance with AWS D1.1/D1.1M.

G. Obtain approval prior to site cutting or making adjustments not scheduled.

H. After erection, prime welds, abrasions, and surfaces not shop primed , except surfaces to be in contact with concrete.

I. Metal Framing and Supports: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
   1. Anchor supports for operable partitions, overhead doors, and overhead grilles securely to, and rigidly brace from, building structure.

3.4 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION 05 5000

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SECTION 05 5100 - METAL STAIRS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Stairs with concrete treads.

B. Structural steel stair framing and supports.

C. Handrails and guards.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 03 3000 - Cast-in-Place Concrete: Concrete fill in stair pans; mesh reinforcement for landings.

C. Section 05 5213 - Pipe and Tube Railings: Metal handrails and balusters other than specified in this section.

D. Section 09 9123 - Interior Painting: Paint finish.

1.3 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.

C. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2023.

D. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2021.

E. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2023, with Editorial Revision.

F. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2023.

G. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2023.

H. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2020.

I. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021.

J. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2023).

K. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 2004.

L. SSPC-SP 2 - Hand Tool Cleaning; 2018.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide Submit manufacturer's product data, including description of materials, components, finishes, fabrication details, anchors, and accessories.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.
   1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
   2. Include the design engineer's seal and signature on each sheet of shop drawings.

E. Design Data, Seismic Performance: Submit documentation that stairs meet performance requirements specified.

F. Delegated Design Submittal: For stairs, railings, and guards, indicate compliance with performance requirements and design criteria, including analysis data signed and sealed by the qualified Professional Structural Engineer responsible for their preparation.

G. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.

H. Designer's Qualification Statement.

1.5 QUALITY ASSURANCE

A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located, or personnel under direct supervision of such an engineer.

B. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and dated no more than 12 months before start of scheduled welding work.

C. Fabricator Qualifications:
   1. A company specializing in manufacturing products specified in this section, with not less than ten years of documented experience.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 4000, to design stairs, railings and guards, including attachment to building construction.

2.2 METAL STAIRS - GENERAL

A. Metal Stairs: Provide stairs of the design specified, complete with landing platforms, vertical and horizontal supports, railings, and guards, fabricated accurately for anchorage to each other and to building structure.
   1. Regulatory Requirements: Provide stairs and railings complying with the most stringent requirements of local, state, and federal regulations; where requirements of Contract Documents exceed those of regulations, comply with Contract Documents.
   2. Handrails: Comply with applicable accessibility requirements of ADA Standards.
   3. Structural Design: Provide complete stair and railing assemblies complying with the applicable local code.
      a) Stair Capacity: Uniform live load of 100 lb/sq ft and a concentrated load of 300 lb with deflection of stringer and landing framing not to exceed 1/360 of span or 1/4-inch, whichever is less. Total load deflection of treads and landings shall not exceed 1/360 or 1/720 for brittle material.
      b) Stair Framing: Capable of withstanding stresses resulting from railing and guard loads in addition to loads specified above.
   4. Dimensions: As indicated on drawings.
   5. Shop assemble components; disassemble into largest practical sections suitable for transport and access to site.
   6. No sharp or rough areas on exposed travel surfaces and surfaces accessible to touch.
   7. Separate dissimilar metals using paint or permanent tape.

B. Structural Performance of Railings and Guards: Railings and guards, including attachment to building construction, shall be designed to withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
   1. Handrails and Top Rails of Guards:
      a) Uniform load of 50 lbf/ft. applied in any direction.
      b) Concentrated load of 200 lbf applied in any direction.
      c) Uniform and concentrated loads need not be assumed to act concurrently.
   2. Infill of Guards:
      a) Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.
      b) Infill load and other loads need not be assumed to act concurrently.

C. Metal Jointing and Finish Quality Levels:

1. Architectural: All joints as inconspicuous as possible, whether welded or mechanical.
   a) Welded Joints: Continuously welded and ground smooth and flush.
   b) Mechanical Joints: Butted tight, flush, and hairline; concealed fastenings only.
   c) Exposed Edges and Corners: Eased to small uniform radius.
   d) Metal Surfaces to be Painted: Sanded or ground smooth, suitable for highest quality gloss finish.

D. Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.

E. Anchors and Related Components: Same material and finish as item to be anchored, except where specifically indicated otherwise; provide all anchors and fasteners required.

2.3 METAL STAIRS WITH CONCRETE TREADS

A. Jointing and Finish Quality Level: Architectural, as defined above.

B. Risers: Closed.

C. Treads: Metal pan with field-installed concrete fill.
   1. Concrete Depth: 1-1/2 inches, minimum.
   2. Tread Pan Material: Steel sheet.
   3. Tread Pan Thickness: As required by design; 14 gage, 0.075 inch minimum.
   4. Pan Anchorage to Stringers: Continuously welded, from top or bottom.
   5. Concrete Reinforcement: None.
   6. Concrete Finish: Refer to Drawing A910 - Finish Product Schedule - for stair tread and riser finish(es).

D. Risers: Same material and thickness as tread pans.
   1. Nosing Depth: Not more than 1-1/2 inch overhang.
   2. Nosing Return: Flush with top of concrete fill, not more than 1/2 inch wide.

E. Stringers: As indicated on the drawings.
   1. Stringer Depth: As indicated on drawings.
   2. End Closure: Sheet steel of same thickness as risers welded across ends.

F. Landings: Same construction as treads, supported and reinforced as required to achieve design load capacity.

G. Railings: Steel pipe railings.

H. Finish: Shop- or factory-prime painted.

I. Under Side of Stair: Exposed to view, to be finished same as specified for other exposed to view surfaces.

2.4 HANDRAILS AND GUARDS

A. Wall-Mounted Rails: Round pipe or tube rails unless otherwise indicated.
   1. Actual Outside Diameter: 1-1/4 inch, minimum, to 2 inches, maximum.
   2. Refer to drawings for specific railing details.

3. Handrail Brackets:
   a) Basis of Design: **Wagner Companies**; **Wall Mount Handrail Bracket RB14130**.
   b) Substitutions: See Section 01 6000 - Product Requirements.

B. Guards:
1. Top Rails: Round pipe or tube rails unless otherwise indicated.
   a) Outside Diameter: 1-1/4 inch, minimum, to 1-1/2 inches, maximum.
2. Infill at Picket Railings: Vertical pickets.
   a) Horizontal Spacing: Maximum 4 inches on center.
   b) Material: Solid steel bar.
   c) Shape: As indicated on the drawings.
   d) Size: As indicated on the drawings.
   e) Top Mounting: Welded to underside of top rail.
   f) Bottom Mounting: As indicated on drawings.
3. Infill at Pipe Railings: Pipe or tube rails sloped parallel to stair.
   a) Outside Diameter: 1 inch.
   b) Material: Steel pipe or tube, round.
   c) Vertical Spacing: Maximum 4 inches on center.
   d) Jointing: Welded and ground smooth and flush.
4. Infill at Mesh Railings: Woven wire mesh panels.
   a) Material and Finish: Same as stair.
   b) Wire Size: _____ inch.
   c) Wire Spacing: _____ inch.
   d) Mounting: Mesh welded to steel bar frame, frame welded to posts.
5. End and Intermediate Posts: Same material and size as top rails.
   a) Horizontal Spacing: As indicated on drawings.
   b) Mounting: Welded to top surface of stringer.

2.5 MATERIALS

A. Steel Sections: ASTM A36/A36M.

B. Steel Tubing: ASTM A500/A500M or ASTM A501/A501M structural tubing, round and shapes as indicated.

C. Pipe: ASTM A53/A53M Grade B Schedule 40, black finish.

D. Ungalvanized Steel Sheet: Hot- or cold-rolled, except use cold-rolled where finished work will be exposed to view.
1. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Designation CS (commercial steel).
2. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Designation CS (commercial steel).

E. Concrete Fill: See Section 03 3000.

2.6 ACCESSORIES

A. Steel Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, plain.

B. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

C. Shop and Touch-Up Primer: SSPC-Paint 15, and comply with VOC limitations of authorities having jurisdiction.

2.7 SHOP FINISHING

A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

B. Do not prime surfaces in direct contact with concrete or where field welding is required.

C. Prime Painting: Use specified shop- and touch-up primer.
1. Preparation of Steel: In accordance with SSPC-SP 2 Hand Tool Cleaning.
2. Number of Coats: One.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.2 PREPARATION

A. When field welding is required, clean and strip primed steel items to bare metal.

3.3 INSTALLATION

A. Install components plumb and level, accurately fitted, free from distortion or defects.

B. Install metal stairs and railings in accordance with approved shop drawings.

C. Provide anchors, plates, angles, hangers, and struts required for connecting stairs to structure.

D. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

E. Provide welded field joints where specifically indicated on drawings. Perform field welding in accordance with AWS D1.1/D1.1M.

Other field joints may be either welded or bolted provided the result complies with the limitations specified for jointing quality levels.

F. Obtain approval prior to site cutting or creating adjustments not scheduled.

G. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

3.4 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

END OF SECTION 05 5100

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SECTION 05 7000 - DECORATIVE METAL RAILINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Steel railing and guardrail assembly for monumental (open) stairs, with stainless steel handrails.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 01 7419 - Construction Waste Management and Disposal: Additional requirements for cleaning.

C. Section 05 5000 - Metal Fabrications: Supports.

D. Section 05 7100 - Monumental Metal Stairs.

E. Section 09 9123 - Interior Painting: Field-applied finish.

1.3 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

C. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.

D. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.

E. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2021.

F. ASTM A554 - Standard Specification for Welded Stainless Steel Mechanical Tubing; 2016.

G. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.

H. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2023, with Editorial Revision.

I. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2023.

J. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings; 2013, with Editorial Revision.

K. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2023.

L. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021.

M. AWS C3.4M/C3.4 - Specification for Torch Brazing; 2016.

N. AWS C3.5M/C3.5 - Specification for Induction Brazing; 2016 (Amended 2017).

O. AWS C3.9M/C3.9 - Specification for Resistance Brazing; 2009.

P. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2023).

Q. AWS D1.6/D1.6M - Structural Welding Code - Stainless Steel; 2017.

R. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 2004.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Meeting: Schedule and conduct a preinstallation meeting one week before starting work of this section. Attendees shall include, but not be limited to:
   1. Contractor.
   2. Manufacturer's representative.
   3. Architect.
   4. Owner's representative.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Submit manufacturer's product data, including description of materials, components, finishes, fabrication details, glass, anchors, and accessories.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Shop Drawings: Indicate railing system elevations and sections, details of profile, dimensions, sizes, connection attachments, anchorage, size and type of fasteners, and accessories. Indicate anchor and joint locations, brazed connections, transitions, and terminations.
   1. Include the design engineer's stamp or seal on each sheet of shop drawings.

E. Delegated Design Submittal: For stairs, indicate compliance with performance requirements and design criteria, including analysis data signed and sealed by the qualified Professional Structural Engineer responsible for their preparation.

F. Test Reports: Submit test reports from an independent testing agency showing compliance with specified design and performance requirements.

G. Installer's qualification statement.

H. Welders' qualification statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.

1.6 QUALITY ASSURANCE

A. Structural Design Qualifications: Professional Structural Engineer experienced in design of this work and licensed in the State in which the project is located, or personnel under direct supervision of such an engineer.

B. Installer Qualifications: Company specializing in installing decorative stairs and railing systems and acceptable to stair fabricator.

C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with not less than five years of documented experience.

D. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and AWS D1.6/D1.6M no more than 12 months before start of scheduled welding work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in factory-provided protective coverings and packaging.

B. Protect materials against damage during transit, delivery, storage, and installation at site.

C. Inspect materials upon delivery for damage. Repair damage to be indistinguishable from undamaged areas; if damage cannot be repaired to be indistinguishable from undamaged parts and finishes, replace damaged items.

D. Prior to installation, store materials and components under cover in a dry location.

1.8 FIELD CONDITIONS

A. Do not install railings until project is enclosed and ambient temperature of space is minimum 65 degrees F and maximum 95 degrees F.

B. Maintain ambient temperature of space at minimum 65 degrees F and maximum 95 degrees F for 24 hours before, during, and after railing installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

2.2 RAILING SYSTEMS

A. Railing Systems - General: Factory- or shop-fabricated in design indicated, to suit specific project conditions, and for proper connection to building structure, and in largest practical sizes for delivery to site.
   1. Performance Requirements: Design and fabricate railings and anchorages to resist the following loads without failure, damage, or permanent set; loads do not need to be applied simultaneously.
      a) Lateral Force: 75 lb minimum, at any point, when tested in accordance with ASTM E935.
      b) Distributed Load: 50 lb/ft minimum, applied in any direction at the top of the handrail, when tested in accordance with ASTM E935.
      c) Concentrated Loads on Intermediate Rails: 50 psf, minimum.
      d) Concentrated Load: 200 lbs minimum, applied in any direction at any point along the handrail system, when tested in accordance with ASTM E935.
      e) Handrails: Comply with applicable accessibility requirements of ADA Standards.
   2. Assembly: Join lengths, seal open ends, and conceal exposed mounting bolts and nuts using slip-on non-weld mechanical fittings, flanges, escutcheons, and wall brackets.
   3. Joints: Tightly fitted and secured, machined smooth with hairline seams.
   4. Field Connections: Provide sleeves to accommodate site assembly and installation.
   5. Welded and Brazed Joints: Make visible joints butt tight, flush, and hairline; use methods that avoid discoloration and damage of finish; grind smooth, polish, and restore to required finish.
      a) Ease exposed edges to a small uniform radius.
      b) Welded Joints:
         1) Carbon Steel: Perform welding in accordance with AWS D1.1/D1.1M.
         2) Stainless Steel: Perform welding in accordance with AWS D1.6/D1.6M.
      c) Brass/Bronze Brazed Joints:
         1) Perform torch brazing in accordance with AWS C3.4M/C3.4.
         2) Perform induction brazing in accordance with AWS C3.5M/C 3.5.
         3) Perform resistance brazing in accordance with AWS C3.9M/C3.9.

B. Metal Railing: Engineered, post-supported railing system with metal infill.
   1. Configuration: Guardrail with separate handrail. Unless otherwise indicated on drawings, provide the following components:
   2. Top Rail: 1-1/2 inch diameter pipe or tube.
      a) Provide steel channel at bottom of top rail as indicated on drawings, to receive pickets.
   3. Grip Rail: Round, stainless steel, 1-1/4 inch diameter nominal (1.66 inch O.D. actual).
   4. Wall Mounted Components: Components necessary to support railing with 1-1/2 inch clearance from wall, and as follows:

5. Handrail Brackets: Steel rod brackets as indicated on drawings.
6. Fasteners: Concealed.
7. Infill at Picket Railings: Vertical pickets.
   a) Horizontal Spacing: Maximum 4 inches on center.
   b) Material: Solid steel bar.
   c) Shape: Round.
   d) Size: 3/4 inch square.
   e) Top Mounting: Mechanically attached by internal fittings.
   f) Bottom Mounting: Welded to side of stringer as indicated on drawings.
8. End and Intermediate Posts: As shown on drawings.
   a) Horizontal Spacing: As indicated on drawings.
   b) Mounting: Welded.

2.3 MATERIALS

A. Steel Components:
   1. Sections, Shapes, Plate and Bar: ASTM A36/A36M.
   2. Tubing: ASTM A501/A501M structural tubing, round and shapes as indicated.
   3. Pipe: ASTM A53/A53M Grade B Schedule 40, black finish.
   4. Ungalvanized Steel Sheet: Hot- or cold-rolled, except use cold-rolled where finished work will be exposed to view.
      a) Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Designation CS (commercial steel).
      b) Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Designation CS (commercial steel).
   5. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, plain.
   6. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

B. Stainless Steel Components:
   1. ASTM A666, Type 304.
   2. Stainless Steel Tubing: ASTM A554, Type 304, 16 gauge, 0.0625 inch minimum metal thickness, 1-1/2 inch diameter.
   3. Stainless Steel Finish: No. 4 Bright Polished finish.

2.4 ACCESSORIES

A. Welding Fittings: Factory- or shop-welded from matching pipe or tube; joints and seams ground smooth.

B. Anchors and Fasteners: Provide anchors and other materials as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.
   1. For anchorage to concrete, provide inserts to be cast into concrete for bolt anchors.
   2. For anchorage to masonry, provide brackets to be embedded in masonry for bolt anchors.
   3. For anchorage to stud walls, provide backing plates for bolt anchors.
   4. Exposed Fasteners: No exposed bolts or screws.

C. Carbon Steel Bolts and Nuts: ASTM A307.

D. Finish Touch-Up Materials: As recommended by manufacturer for field application.

E. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that substrate and site conditions are acceptable and ready to receive work.

B. Verify field dimensions of locations and areas to receive work.

C. Notify Architect immediately of conditions that would prevent satisfactory installation.

D. Do not proceed with work until detrimental conditions have been corrected.

E. Furnish components to be installed in other work to installer of that other work, including but not limited to blocking, sleeves, inserts, anchor bolts, embedded plates, and supports for attachment of anchors.

3.2 PREPARATION

A. Review installation drawings before beginning installation. Coordinate diagrams, templates, instructions, and directions for installation of anchorages and fasteners.

B. Clean surfaces to receive units. Remove materials and substances detrimental to the installation.

3.3 INSTALLATION

A. Comply with approved shop drawings and written instructions.

B. Install components plumb and level, accurately fitted, free from distortion or defects, and with tight joints, except where necessary for expansion.

C. Anchor securely to structure.

D. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

E. Isolate dissimilar materials with bituminous coating, bushings, grommets, or washers to prevent electrolytic corrosion.

3.4 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per floor level, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

3.5 CLEANING

A. Remove protective film from exposed metal surfaces.

B. Metal: Clean exposed metal finishes with potable water and mild detergent, in accordance with manufacturer recommendations; do not use abrasive materials or chemicals, detergents, or other substances that may damage the material or finish.

C. See Section 01 7419 - Construction Waste Management and Disposal for additional requirements.

3.6 PROTECTION

A. Protect installed components and finishes from damage after installation.

B. Repair damage to exposed finishes to be indistinguishable from undamaged areas.
   1. If damage to finishes and components cannot be repaired to be indistinguishable from undamaged finishes and components, replace damaged items.

END OF SECTION 05 7000

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SECTION 05 7100 - MONUMENTAL METAL STAIRS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Decorative monumental metal stairs - Stairs 3 and 4.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 01 7419 – Construction Waste Management and Disposal.

C. Section 05 7000 - Decorative Metal Railings: Railing and guardrail assemblies.

D. Section 09 3000 - Tiling: Porcelain tile treads and landings.

1.3 REFERENCE STANDARDS

A. AISC 201 - AISC Certification Program for Structural Steel Fabricators, Standard for Steel Building Structures; 2006.

B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

D. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes; 2023.

E. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.

F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

G. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.

H. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2023.

I. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2020.

J. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021.

K. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2023).

L. AWS D1.6/D1.6M - Structural Welding Code - Stainless Steel; 2017.

M. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel AC172; 2019.

N. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 2004.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate the installation of railings and guards with work specified in this section.

B. Preinstallation Meeting: Schedule and conduct a preinstallation meeting one week before starting work of this section. Attendees shall include, but not be limited to:
   1. Contractor.
   2. Manufacturer's representative.
   3. Architect.
   4. Owner's representative.
   5. Other subcontractors of adjacent work.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit manufacturer's product data, including description of materials, components, finishes, fabrication details, anchors, and accessories.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Shop Drawings: Indicate stair plans, elevations, and sections, details of profiles, dimensions, sizes, connection attachments, anchorage, size and type of fasteners, and accessories. Indicate anchor and joint locations, brazed connections, transitions, and terminations.
   1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
   2. Include the design engineer's seal and signature on each sheet of shop drawings.

E. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.

F. Designer's Qualification Statement.

G. Fabricator's Qualification Statement: Provide either of the following.
   1. Provide documentation showing steel fabricator is certified under AISC 201.

2. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

1.6 QUALITY ASSURANCE

A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located or personnel under direct supervision of such an engineer.

B. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and AWS D1.6/D1.6M no more than 12 months before start of scheduled welding work.

C. Fabricator Qualifications: Either of the following.
1. Certified by the American Institute for Steel Construction (AISC) under AISC 201.
2. Accredited by the International Accreditation Service (IAS) Fabricator Inspection Program for Structural Steel in accordance with IAS AC172.

D. Installer Qualifications: Installation by fabricator.

E. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with not less than five years of documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in factory-provided protective coverings and packaging.

B. Protect materials against damage during transit, delivery, storage, and installation at site.

C. Inspect materials for damage upon delivery. Replace damaged materials that cannot be repaired to be indistinguishable from undamaged parts and finishes.

D. Prior to installation, store materials and components under cover in a dry location.

1.8 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Warranty: Installer's standard one year warranty against defects in installation commencing on Date of Substantial Completion.

PART 2 PRODUCTS

2.1 MONUMENTAL METAL STAIRS

A. Monumental Metal Stairs: Provide stairs of the design specified, complete with landing platforms, vertical and horizontal supports, railings and guards, fabricated for anchorage to each other and to building structure.
1. Regulatory Requirements: Comply with the most stringent requirements of local, state, and federal regulations; where requirements of Contract Documents exceed those of regulations, comply with Contract Documents.

2. Structural Design: Comply with the following:
   a) Stair Capacity:
      1) Live Load: Uniform live load of 100 lb/sq ft and a maximum concentrated load of 300 lb.
      2) Dead Load: Weight of stair, associated railing system, concrete fill, cladding and other finishes.
      3) Deflection Limits: Deflection of stringer or landing framing not to exceed 1/360 of span.
      4) Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
      5) In addition to the gravity loads indicated above, the stair framing system shall be evaluated for vibration serviceability due to human activity, walking and running excitations, rhythmic excitation from jumping.
         (a) Refer to AISC Design Guide Number 11, Vibrations of Steel-Framed Structural Systems Due to Human Activity (2016) - Chapter 2.3 "Walking and Running Excitations – Monumental Stairs".
3. Configuration and Dimensions: As indicated on drawings.

B. Metal Jointing and Finish Quality Levels: Architectural, as defined below.
   1. Architectural: Inconspicuous joints, whether welded or mechanical.
      a) Welded Joints: Continuously welded and ground smooth and flush.
      b) Mechanical Joints: Butted tight, flush, and hairline; concealed fastenings only.
      c) Exposed Edges and Corners: Eased to small uniform radius.
      d) Metal Surfaces to be Painted: Sanded or ground smooth, suitable for highest quality gloss finish.

C. Provide required fasteners and anchors:
   1. Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.
   2. Anchors and Related Components: Same material and finish as item to be anchored, except where specifically indicated otherwise.

2.2 COMPONENTS

A. Treads: Porcelain tile on steel plate subtreads.
   1. Steel Plate Subtread Thickness: 1/4 inch, minimum.
   2. Tread Thickness: 1-1/2 inches.
   3. Porcelain Tile Treads: See Section 09 3000.
   4. Nosing: As indicated ont he "Finish Product List" on the drawings.
   5. Anchorage to Stringers: Welded or bolted to carrier angles welded or bolted to stringers.

B. Risers: Woven wire mesh.
   1. Riser/Nosing Profile: Sloped wire mesh riser with stainless steel U-channel at top and bottom, as indicated on drawings.
   2. Wire Mesh: Stainless steel wire, Type 304, woven into a rectangular mesh.
      a) Basis of Design: **McNichols**; **Chateau 3110 Designer Mesh**.
      b) Openness: 67% open area.

C. Stringers: Steel channels.
   1. Stringer Depth: As indicated on drawings.

D. Landings: Same construction as treads, supported and reinforced as required to achieve design load capacity.

E. Finish: Shop- or factory-prime painted.

F. Under Side of Stair: Exposed to view, to be finished same as specified for other exposed to view surfaces.

2.3 MATERIALS

A. Steel Components:
   1. Sections, Shapes, Plate and Bar: ASTM A36/A36M.
   2. Ungalvanized Steel Sheet: Hot- or cold-rolled, except use cold-rolled where finished work will be exposed to view.
   3. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS) Grade 33/230 with G40/Z120 coating.

B. Stainless Steel Components:
   1. ASTM A666, Type 304.
   2. Stainless Steel Bars, Shapes and Moldings: ASTM A276/A276M, Type 304.
   3. Stainless Steel Finish: No.4 Bright Polished finish.

2.4 ACCESSORIES

A. Anchors and Fasteners: Provide anchors and other materials as required to attach to structure, made of same materials as stair components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.
   1. For anchorage to concrete, provide inserts to be cast into concrete for bolt anchors.
   2. For anchorage to masonry, provide brackets to be embedded in masonry for bolt anchors.
   3. For anchorage to stud walls, provide backing plates for bolt anchors.
   4. Exposed Fasteners: No exposed bolts or screws.

B. Steel Bolts, Nuts, and Washers: ASTM A307, Grade A, plain.

C. Steel Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, and galvanized to ASTM A153/A153M where connecting galvanized components.

D. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

E. Bituminous Coating: Cold-applied asphalt mastic, noncorrosive compound free of asbestos, sulfur, and other deleterious impurities; 0.015 inch dry film thickness per coat.

F. Sealant: Silicone; clear.

G. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that substrate and site conditions are acceptable and ready to receive work.

B. Verify field dimensions of locations and areas to receive work.

C. Notify Architect immediately of conditions that would prevent satisfactory installation.

D. Do not proceed with work until detrimental conditions have been corrected.

E. Furnish components to be installed in other work to installer of that other work, including but not limited to blocking, sleeves, inserts, anchor bolts, embedded plates, and supports for attachment of anchors.

3.2 PREPARATION

A. Review installation drawings before beginning installation. Coordinate diagrams, templates, instructions, and directions for installation of anchorages and fasteners.

B. Clean surfaces to receive units. Remove materials and substances detrimental to the installation.

3.3 INSTALLATION

A. Comply with approved shop drawings and written instructions.

B. Install components plumb and level, accurately fitted, free from distortion or defects, and with tight joints, except where necessary for expansion.

C. Anchor securely to structure.

D. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

E. Weld connections that cannot be shop welded due to size limitations.
   1. Match shop welding and bolting.
   2. Clean welds, bolted connections, and abraded areas.
   3. Touch up shop primer and factory-applied finishes.

F. Isolate dissimilar materials with bituminous coating, bushings, grommets, or washers to prevent electrolytic corrosion.

3.4 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per floor level, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

3.5 CLEANING

A. Remove protective film from exposed metal surfaces.

B. Metal: Clean exposed metal finishes with potable water and mild detergent, in accordance with manufacturer recommendations; do not use abrasive materials or chemicals, detergents, or other substances that may damage the material or finish.

C. See Section 01 7419 - Construction Waste Management and Disposal, for additional requirements.

3.6 PROTECTION

A. Protect installed components and finishes from damage after installation.

B. Repair damage to exposed finishes to be indistinguishable from undamaged areas.
   1. If damage to finishes and components cannot be repaired to be indistinguishable from undamaged finishes and components, replace damaged items.

END OF SECTION 05 7100

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SECTION 06 1000 - ROUGH CARPENTRY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Nonstructural dimension lumber for miscellaneous uses.

B. Plywood panels for miscellaneous uses.

C. Sheathing.

D. Subflooring.

E. High density fiberboard for stage flooring.

F. Preservative treated wood materials.

G. Fire retardant treated wood materials.

H. Concealed wood blocking, nailers, and supports.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

1.3 REFERENCE STANDARDS

A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

B. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2017.

C. ASTM D2898 - Standard Practice for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing; 2010 (Reapproved 2017).

D. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2021.

E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

F. AWPA U1 - Use Category System: User Specification for Treated Wood; 2023.

G. NELMA (SGR) - Standard Grading Rules for Northeastern Lumber; 2021.

H. PS 1 - Structural Plywood; 2023.

I. PS 20 - American Softwood Lumber Standard; 2021.

J. SPIB (GR) - Standard Grading Rules; 2021.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide technical data on wood preservative materials and fire retardant treatments.

C. Product Data: Provide product data for high density fiberboard.

D. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Laboratory Test Reports for Credit b4: For composite wood products, documentation indicating that product comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
   2. Certificates for Credit d13: Chain-of-custody certificates indicating that products specified to be made from certified wood comply with forest certification requirements. Include documentation that manufacturer is certified for chain of custody by an FSC-accredited certification body. Inlcude statement indicating cost for each certified wood product.

E. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.
   1. High Density Fiberboard: Submit manufacturer's certificate that products meet or exceed specified requirements, in lieu of grade stamping.

1.5 DELIVERY, STORAGE, AND HANDLING

A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, and installation.

1.6 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Correct defective work within a one-year period commencing on Date of Substantial Completion.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
   1. If no species is specified, provide species graded by the agency specified; if no grading agency is specified, provide lumber graded by grading agency meeting the specified requirements.

2. Grading Agency: Grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee at www.alsc.org, and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

B. Provide sustainably harvested wood; see Section 01 6000 - Product Requirements for requirements.

2.2 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

A. Grading Agency: Northeastern Lumber Manufacturers Association; NELMA (SGR).

B. Grading Agency: Southern Pine Inspection Bureau, Inc; SPIB (GR).

C. Sizes: Nominal sizes as indicated on drawings, S4S.

D. Moisture Content: S-dry or MC19.

E. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
1. Lumber: S4S, No. 2 or Standard Grade.
2. Boards: Standard or No. 3.

2.3 EXPOSED BOARDS

A. High Density Fiberboard **WF2**: Tempered, engineered composite wood board, consisting of wood fibers and resin heated and highly compressed to form a hard, dense board.
1. Refer to Finish Product List on the Drawings for Basis-of-Design product.
2. Density: 50 - 65 lbs/cu. ft.
3. Thickness: As indicated on the Finish Product List on the drawings.
4. Exposed and Back Surface: Smooth, paintable.
a) Paint all sides and edges.

B. Moisture Content: Kiln-dry (15 percent maximum).

C. Surfacing: S2S.

D. Species: Manufacturer's standard.

E. Grade: No. 2, 2 Common, or Construction.

2.4 CONSTRUCTION PANELS

A. Subfloor/Underlayment Combination: PS 1 or PS 2 type, rated Single Floor.
1. Panel Type: Plywood.
2. Bond Classification: Exposure 1.
3. Span Rating: 48.
4. Performance Category: 1-1/8 PERF CAT.
5. Edges: Tongue and groove.

B. Exterior Wall Sheathing: Glass mat faced gypsum, ASTM C1177/C1177M, 5/8 inch Type X fire resistant.

1. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly.
2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
3. Edges: Square.
4. Products:
   a) CertainTeed Corporation; GlasRoc Brand: www.certainteed.com/#sle.
   b) Georgia-Pacific Gypsum; DensGlass Sheathing: www.gpgypsum.com/#sle.
   c) USG Corporation; Securock Brand Glass-Mat Sheathing Regular 5/8 in. (15.9 mm): www.usg.com/#sle.

C. Exterior Parapet Sheathing, For use at parapet framing and any other location where roofing membrane will be adhered over sheathing: Glass mat faced gypsum, ASTM C1177/C1177M, 5/8 inch Type X fire resistant.
1. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
2. Edges: Square.
3. Manufacturers:
   a) Georgia-Pacific Gypsum; DensDeck Prime Roof Board: www.gpgypsum.com/#sle.
   b) National Gypsum; DEXcell Glass Mat Roof Board.
   c) US Gypsum; Securock Gypsum Fiber Roof Board.
   d) Substitutions: See Section 01 6000 - Product Requirements.

D. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, or medium density fiberboard; 3/4 inch thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

E. Other Applications:
1. Plywood Concealed From View But Located Within Exterior Enclosure: PS 1, C-C Plugged or better, Exterior grade.
2. Plywood Exposed to View But Not Exposed to Weather: PS 1, A-D, or better.
3. Other Locations: PS 1, C-D Plugged or better.

2.5 ACCESSORIES

A. Fasteners and Anchors:
1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
2. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.
3. Anchors: Toggle bolt type for anchorage to hollow masonry.

B. Air Barrier: See Section 07 2670.

2.6 FACTORY WOOD TREATMENT

A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.

2. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.

B. Fire Retardant Treatment:
   1. Exterior Type: AWPA U1, Category UCFB, Commodity Specification H, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes both before and after accelerated weathering test performed in accordance with ASTM D2898.
      a) Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
      b) Do not use treated wood in direct contact with the ground.
   2. Interior Type A: AWPA U1, Use Category UCFA, Commodity Specification H, low temperature (low hygroscopic) type, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.
      a) Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
      b) Treat rough carpentry items as indicated .
      c) Do not use treated wood in applications exposed to weather or where the wood may become wet.

C. Preservative Treatment:
   1. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
      a) Kiln dry lumber after treatment to maximum moisture content of 19 percent.
      b) Treat lumber exposed to weather.
      c) Treat lumber in contact with roofing, flashing, or waterproofing.
      d) Treat lumber in contact with masonry or concrete.
      e) Treat lumber less than 18 inches above grade.
      f) Treat lumber in other locations as indicated.
   2. Preservative Pressure Treatment of Plywood Above Grade: AWPA U1, Use Category UC2 and UC3B, Commodity Specification F using waterborne preservative.
      a) Kiln dry plywood after treatment to maximum moisture content of 19 percent.
      b) Treat plywood in contact with roofing, flashing, or waterproofing.
      c) Treat plywood in contact with masonry or concrete.
      d) Treat plywood less than 18 inches above grade.
      e) Treat plywood in other locations as indicated.
   3. Preservative Pressure Treatment of Lumber in Contact with Soil: AWPA U1, Use Category UC4A, Commodity Specification A using waterborne preservative.
      a) Preservative for Field Application to Cut Surfaces: As recommended by manufacturer of factory treatment chemicals for brush-application in the field.

PART 3 EXECUTION

3.1 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.2 BLOCKING, NAILERS, AND SUPPORTS

A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

B. Provide the following specific nonstructural framing and blocking:
1. Cabinets and shelf supports.
2. Wall brackets.
3. Handrails.
4. Grab bars.
5. Towel and bath accessories.
6. Wall-mounted door stops.
7. Visual display units.
8. Wall paneling and trim.
9. Joints of rigid wall coverings that occur between studs.

3.3 INSTALLATION OF CONSTRUCTION PANELS

A. Subflooring: Glue and nail to framing; staples are not permitted.

B. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws, or staples.

C. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches on center on all edges and into studs in field of board.
1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
3. Install adjacent boards without gaps.

3.4 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements for additional requirements.

3.5 CLEANING

A. Waste Disposal: See Section 01 7419 - Construction Waste Management and Disposal.
   1. Comply with applicable regulations.
   2. Do not burn scrap on project site.
   3. Do not burn scraps that have been pressure treated.
   4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or "waste-to-energy" facilities.

B. Do not leave wood, shavings, sawdust, etc. on the ground or buried in fill.

C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION 06 1000

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SECTION 06 2000 - FINISH CARPENTRY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Finish carpentry items.
   1. Wood wall base.
   2. Miscellaneous edge trim.
   3. Wood display rail.

B. High density fiberboard for Stage flooring.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 06 1000 - Rough Carpentry: Support framing, grounds, and concealed blocking.

1.3 REFERENCE STANDARDS

A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014, with Errata (2018).

B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.1; 2017, with Errata (2019).

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data:
   1. Provide data on fire retardant treatment materials and application instructions.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit b4: For composite wood products, documentation indicating that product contains no urea formaldehyde.
   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
   3. Certificates for Credit d13: Chain-of-custody certificates indicating that products specified to be made from certified wood comply with forest certification requirements. Include documentation that manufacturer is certified for chain of custody by an FSC-accredited certification body. Inlcude statement indicating cost for each certified wood product.

D. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
   1. Scale of Drawings: 1-1/2 inch to 1 foot, minimum.

2. Provide information as required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).

E. Samples: Submit two samples of finish plywood, minimum 4 x 4 inch in size illustrating wood grain and specified finish.

F. Samples: Submit two samples of high density fiberboard, 4 x 4 inch in size illustrating specified finish.

G. Samples: Submit two samples of wood trim 3 inch long.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
   1. Single Source Responsibility: Provide and install this work from single fabricator.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver factory-fabricated units to project site in original packages, containers or bundles bearing brand name and identification.

B. Store finish carpentry items under cover, elevated above grade, and in a dry, well-ventilated area not exposed to heat or sunlight.

C. Protect from moisture damage.

D. Handle materials and products to prevent damage to edges, ends, or surfaces.

PART 2 PRODUCTS

2.1 FINISH CARPENTRY ITEMS

A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.

B. Surface Burning Characteristics: Provide materials having fire and smoke properties as required by applicable code.

C. Interior Woodwork Items:
   1. Base **WB1**: White maple, prepare for stained finish.
   2. Miscellaneous Solid Wood Trim, designated **WD1**: White maple, prepare for stained finish.
   3. Display Rail: White birch, soft maple, or poplar; prepare for paint finish.
   4. Solid Wood Trim, Painted: MDF, White birch, soft maple, or poplar; prepare for paint finish.

2.2 SUSTAINABILITY CHARACTERISTICS

A. Provide sustainably harvested wood, certified or labeled; see Section 01 6000.

B. Provide composite wood products complying with composite wood indoor emission requirements in Section 01 3566.42.

2.3 LUMBER MATERIALS

A. Hardwood Lumber: White maple species, plain sawn, maximum moisture content of 6 percent ; with vertical grain , of quality suitable for transparent finish.

2.4 SHEET MATERIALS

2.5 FABRICATION

A. Shop assemble work for delivery to site, permitting passage through building openings.

B. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

END OF SECTION 06 2000

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SECTION 06 4100 - ARCHITECTURAL WOOD CASEWORK

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Specially fabricated cabinet units.
   1. Base and upper cabinets.
   2. Art cabinets.

B. Floating shelves.

C. Built-in display cases.

D. Built-in benches.

E. Custom slat wall assembly.

F. Hardware.

G. Glass display door hardware.

H. Upholstery for casework.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 06 1000 - Rough Carpentry: Support framing, grounds, and concealed blocking.

C. Section 08 8000 - Glazing: Glass for casework.

D. Section 12 3553.19 - Wood Laboratory Casework.

E. Section 12 3600 - Countertops.

1.3 REFERENCE STANDARDS

A. ANSI A208.2 - American National Standard for Medium Density Fiberboard for Interior Use; 2016.

B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014, with Errata (2018).

C. BHMA A156.9 - American National Standard for Cabinet Hardware; 2015.

D. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; 2016.

E. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting not less than one week before starting work of this section; require attendance by all affected installers.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data for hardware accessories.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit 5d: For adhesives, documentation including printed statement of VOC content.
   2. Product Data for Credit b4: For composite wood products, documentation indicating that product contains no urea formaldehyde.
   3. Laboratory Test Reports for Credit b4: For composite wood products, documentation indicating that product comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
   4. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
   5. Certificates for Credit d13: Chain-of-custody certificates indicating that products specified to be made from certified wood comply with forest certification requirements. Include documentation that manufacturer is certified for chain of custody by an FSC-accredited certification body. Inlcude statement indicating cost for each certified wood product.

D. Shop Drawings: Provide plans, elevations, sections, and details. Indicate materials, component profiles, fastening methods, jointing details, and accessories.
   1. Scale of Drawings: 1-1/2 inch to 1 foot, minimum.

E. Samples: Submit actual sample items of proposed pulls, demonstrating hardware design, quality, and finish.

F. Verification Samples: Submit actual samples of each specified plastic laminate color and texture.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
   1. Company with at least one project in the past 5 years with value of woodwork within 20 percent of cost of woodwork for this Project.
   2. Single Source Responsibility: Provide and install this work from single fabricator.

B. Quality Certification:

1. Provide labels or certificates indicating that the installed work complies with AWI/AWMAC/WI (AWS) requirements for grade or grades specified.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect units from moisture damage.

1.8 FIELD CONDITIONS

A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

PART 2 PRODUCTS

2.1 CABINETS

A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS), unless noted otherwise.
   1. Premium Grade: Reception desks.

B. Plastic Laminate Faced Cabinets: Custom grade.

C. Cabinets:
   1. Finish - Exposed Exterior Surfaces: Decorative laminate.
   2. Finish - Exposed Interior Surfaces: Decorative laminate.
   3. Finish - Semi-Exposed Surfaces: Decorative laminate
   4. Finish - Concealed Surfaces: Manufacturer's option.
   5. Door and Drawer Front Edge Profiles: Square edge with thick applied band.
   6. Casework Construction Type: Type A - Frameless.
   7. Interface Style for Cabinet and Door: Style 1 - Overlay; reveal overlay.
   8. Adjustable Shelf Loading: 40 psf.
      a) Deflection: L/144.
   9. Cabinet Style: Flush overlay.
   10. Cabinet Doors and Drawer Fronts: Flush style.
   11. Drawer Side Construction: Multiple-dovetailed.
   12. Drawer Construction Technique: Dovetail joints.

2.2 FLOATING SHELVES

A. Shelf Material: 3/4-inch plastic-laminate clad MDF with valance as indicated on drawings and PVC edge banding.

2.3 WOOD-BASED COMPONENTS

A. Wood fabricated from old growth timber is not permitted.

B. Provide sustainably harvested wood, certified or labeled; see Section 01 3566.42.

2.4 PANEL CORE MATERIALS

A. Medium Density Fiberboard (MDF): Composite panel composed of cellulosic fibers, additives, and bonding system; cured under heat and pressure; comply with ANSI A208.2.
   1. Grade: 115; moisture resistance: MR10.

2.5 HARDWOOD PLYWOOD PANELS

A. Hardwood Plywood: Plywood manufactured for nonstructural decorative applications; consisting of faces and backs applied to a variety of core types; comply with HPVA HP-1.
   1. Woodwork Quality Standard: Panels complying with specified woodwork quality standard.
   2. Veneer Face: See Casework Finish Type **WD1** on the "Finish Product List" on the drawings.
   3. Face: Maple; plain-sliced; grade AA.
      a) Finish: Stained, with transparent topcoat.
   4. Core, Medium Density Fiberboard: Comply with ANSI A208.2.
      a) Grade: 115; moisture resistance: MR10.
      b) Construction and Thickness: 3 plies, 1/2 inch unless otherwise indicated on drawings.
   5. Provide solid hardwood trim to match veneer at all wood-veneered shelf edges.

2.6 LAMINATE MATERIALS

A. Basis of Design Manufacturers: As indicated for each Casework Finish Type "**PL**" on the "Finish Product List" on the drawings.
   1. Formica Corporation: www.formica.com/#sle.
   2. Wilsonart LLC: www.wilsonart.com/#sle.
   3. Other Acceptable Manufacturers:
      a) Formica: www.formica.com.
      b) Nevamar: www.panolam/nevamar.com.
      c) Pionite: www.panolam/pionite.com
   4. Substitutions: See Section 01 6000 - Product Requirements.

B. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications.

C. Provide specific types as indicated.
   1. Horizontal Surfaces: HGS, 0.048 inch nominal thickness, refer to Finish Product List on the drawings for specific products, textures, and colors.
   2. Vertical Surfaces: VGS, 0.028 inch nominal thickness, refer to Finish Product List on the drawings for specific products, textures, and colors.
   3. Laminate Backer: BKL, 0.020 inch nominal thickness, undecorated; for application to concealed backside of panels faced with high pressure decorative laminate.

2.7 COUNTERTOPS

A. Countertops: See Section 12 3600.

2.8 ACCESSORIES

A. Adhesive: Type recommended by fabricator to suit application.

B. Plastic Edge Banding: Extruded PVC, flat shaped; smooth finish; self locking serrated tongue; of width to match component thickness.
   1. Color: As selected by Architect from manufacturer's standard range.
   2. Use at all exposed plywood edges, where plastic laminate is the finish material.
   3. Use at all exposed shelf edges, where plastic laminate is the finish material.

C. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel or chrome-plated finish in exposed locations.

D. Grommets: Standard plastic, painted metal, or rubber grommets for cut-outs, in color to match adjacent surface.

2.9 HARDWARE

A. Cabinet Hardware: Comply with BHMA A156.9 for hardware types and grades indicated below:
   1. Hardware Types: As indicated on drawings.
   2. Product Grade: Grade 2.

B. Metal Z-Shaped Wall Cabinet Support Clips: Paired, cleated, structural anchorage components applied to back of cabinets and walls for wall cabinet mounting.

C. Adjustable Shelf Supports: Standard side-mounted system using recessed metal shelf standards or multiple holes for pin supports and coordinated shelf rests, polished chrome finish, for nominal 1 inch spacing adjustments.
   1. Materials: Formed steel shapes.
   2. Finish: As selected by Architect from manufacturer's standard finishes.
   3. Manufacturers:
      a) Hafele.
      b) Hardware Resources.
      c) Knape & Vog
      d) Sugatsune.

D. Adjustable Shelf Supports - Floating Shelves: Heavy-duty back-mounted system using surface mounted metal shelf standards and coordinated cantilevered shelf brackets, satin chrome finish, for nominal 1 inch spacing adjustments.
   1. Materials: Formed steel shapes.
   2. Support Length: Manufacturer's standard length, to support shelf depth indicated on drawings.
   3. Finish: As selected by Architect from manufacturer's standard finishes.
   4. Products:
      a) Hafele; 186 and 187 Series Backets, KV, with 86 and 187 Standards.
      b) Hardware Resources; Extra Heavy Duty Bracket with TRK07 Standards,
      c) Knape & Vogt; Series 187.
      d) Substitutions: See Section 01 6000 - Product Requirements.

E. Countertop Support Brackets: Fixed, L-shaped, face-of-stud mounting.
   1. Materials: Steel; T-shape cross-section.
      a) Finish: Manufacturer's standard, factory-applied, powder coat.
      b) Color: As selected by Architect from manufacturers standard colors.
      c) Height: 18 inches.
      d) Support Length: As required to support counter depth indicated on drawings.
      e) Width: 2 inches.
   2. Products:
      a) Basis of Design: Rakks/Rangine Corporation; EH Series Brackets: www.rakks.com/#sle.
      b) Substitutions: See Section 01 6000 - Product Requirements.

F. Countertop Brackets: Fixed, concealed vertical leg, side-of-stud mounting.

G. Drawer and Door Pulls: "U" shaped wire pull, steel with chrome finish, 4 inch centers.

H. Cabinet Catches and Latches:

I. Drawer Slides:
   1. Type: Full extension.
   2. Static Load Capacity: Commercial grade.
   3. Mounting: Bottom mounted.

J. Soft-Close, Door and Drawer Adjustable Dampers: Concealed, frame-mounted, screw-adjustable damper; steel with satin finish.
   1. Manufacturers:
      a) Grass America Inc: www.grassusa.com/#sle.
      b) Titus Cabinet Hardware: www.titusplus.com/us/en/#sle.

K. Hinges: European style concealed self-closing type, steel with nickel-plated finish.

L. Slat Wall Hardware:
   1. Slat Wall Insert: Extruded aluminum insert design to receive various hanger accessories.
      a) Basis of Design: **Eagle Aluminum**; **Aluminum Slatwall Insert,** Legacy Part No. E-182.
      b) Nominal Overall Dimension: 1-1/8 inches wide by 19/32 inches deep.
      c) Length: As indicated on drawings.
      d) Finish: Black powder coat.
   2. Slat Wall Shelf Bracket: Extruded aluminum bracket for mounting shelves to slat wall.
      a) Basis of Design: **Hangman Products**; **Slatwall 3/4" Shelf Bracket, 6882-96B.**
      b) Shelf Thickness Supported: 3/4 inches.
      c) Finish: Black powder coat.

M. Closet Pole / Coat Rod: Round metal tube with wall brackets, removable.
   1. Outside Diameter: 1-1/4 inch nominal.
   2. Lengths: As indicated on drawings.
   3. Finish: Brushed nickel.

2.10 DISPLAY CASE COMPONENTS

A. Display Door Hardware: Extruded aluminum top channel and bottom tracks with rollers intended to be installed with glass panels to serve as sliding display cabinet doors. Provide a metal ratchet type lock to secure the glass panel doors.
   1. Basis-of-Design Products:
      a) Tracks: C.R. Laurence Co.; **CRL Double Roller Track System**.
         1) Top channel and bottom track.
      b) Lock: C.R. Laurence Co.; **CRL Chrome "Tamper Proof" Sliding Glass Door Lock with Standard Ratchet Bar**.
      c) Finger Pull: C.R. Laurence Co.; **CRL Anachrome Showcase Threaded Finger Pull**.

B. Glazed Sliding Doors:
   1. 1/4 inch clear tempered glass with threaded finger pulls.
      a) Exposed edges to be flat-polished, if applicable.
   2. Door track: See above.
   3. Lock: See above.

C. Glass Shelves:
   1. 1/4 inch clear tempered glass with flat-polished edges.
   2. Shelf Depth: As indicated on drawings.
   3. Shelves per Unit: As indicated on drawings.

2.11 UPHOLSTERY FOR CASEWORK

A. General:
   1. Unless otherwise indicated, casework supplier shall provide and install all materials and accessories for upholstery for built-in casework specified in this section and indicated on the drawings.
   2. Upholstery and upholstery materials shall meet requirements of applicable State codes and Federal regulations.

B. Materials
   1. Fabrics, Finish Type **UPH1, UPH2**: See Finish Product List on A900 series drawings for specific fabric product(s) and location(s).
   2. All upholstery fabrics shall be treated with an approved stain and soil resistant finish. Such treatment shall be in accordance with applicable code restrictions and in accordance with manufacturer's recommendations.
   3. Upholstery shall comply with CAL TB 117-2013 for flammability.

2.12 FABRICATION

A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.

B. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.

C. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.

D. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.
   1. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.

E. Mechanically fasten back splash to countertops as recommended by laminate manufacturer at 16 inches on center.

F. Provide cutouts for plumbing fixtures. Verify locations of cutouts from on-site dimensions. Prime paint cut edges.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify adequacy of backing and support framing.

B. Verify location and sizes of utility rough-in associated with work of this section.

3.2 INSTALLATION

A. Install work in accordance with AWI/AWMAC/WI (AWS) requirements for grade indicated.

B. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.

C. Use concealed joint fasteners to align and secure adjoining cabinet units.

D. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.

E. Secure cabinets to floor using appropriate angles and anchorages.

3.3 ADJUSTING

A. Adjust installed work.

B. Adjust moving or operating parts to function smoothly and correctly.

3.4 CLEANING

A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

END OF SECTION 06 4100

SECTION 06 4200 - WOOD PANELING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Custom wood veneer paneling.

B. Shop finishing.

C. Installation accessories.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

1.3 REFERENCE STANDARDS

A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014, with Errata (2018).

B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.1; 2017, with Errata (2019).

C. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; 2016.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on fire-retardant treatment materials and application instructions.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit b4: For composite wood products, documentation indicating that product contains no urea formaldehyde.
   2. Laboratory Test Reports for Credit b4: For composite wood products, documentation indicating that product comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
   3. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   4. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

5. Certificates for Credit d13: Chain-of-custody certificates indicating that products specified to be made from certified wood comply with forest certification requirements. Include documentation that manufacturer is certified for chain of custody by an FSC-accredited certification body. Inlcude statement indicating cost for each certified wood product.

D. Shop Drawings: Provide elevations, sections, and details. Indicate materials, component profiles, fastening methods, jointing details, and accessories.
   1. Scale of Drawings: 1-1/2 inch to 1 foot, minimum.
   2. Provide plan of panel number sequencing.

E. Samples: Submit two samples of finished panels, 6 x 6 inch in size, illustrating wood grain and specified finish.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect work from moisture damage.

B. Do not deliver wood materials to project site until building is fully enclosed and interior temperature and humidity are in accordance with recommendations of AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).

1.6 FIELD CONDITIONS

A. Environmental Limitations: Do not install wood wall panels until spaces are enclosed and weatherproof, wet-work in spaces is completed and dry, work above ceilings is complete, and ambient temperature and humidity conditions are being maintained at the levels indicated for Project when occupied for its intended use.

1.7 WARRANTY

A. Warranty: Provide a one-year warranty for materials and workmanship.

B. Installer's Warranty: Provide a one-year warranty for installation, from Date of Substantial Completion.

PART 2 PRODUCTS

2.1 REGULATORY REQUIREMENTS

A. Comply with applicable codes for fire-retardant requirements.

2.2 WOOD WALL PANEL SYSTEM

A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless otherwise indicated.

B. Flat Paneling **WWP1**:
   1. Species: As indicated on the "Finish Product List" on the drawings.
   2. Cut: As indicated on the "Finish Product List" on the drawings.
   3. Panels: Veneer of full width and balanced sequence matched.
      a) Panels More Than One Leaf High: Architectural end matching.

4. Visible Edges and Reveals: Filled and painted.
5. Outside Corners: Mitered and splined, unless otherwise indicated on drawings.

2.3 MATERIALS

A. Provide sustainably harvested wood, certified or labeled as specified in Section 01 3566.42.

B. Hardwood Plywood: HPVA HP-1 Grade A; veneer core, type of glue recommended for application; of grain quality suitable for transparent finish.

C. Wood Veneer Panels: Select AA grade quality wood veneer laminated to wood fiber substrate and coated with furniture grade catalyzed finish as protective topcoat.

2.4 INSTALLATION MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln-dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls.

2.5 FABRICATION

A. Shop prepare and identify panels for grain matching during site erection.

B. Prepare panels for delivery to site, permitting passage through building openings.

C. Finish exposed edges of panels as specified by grade requirements.

D. When necessary to cut and fit on site, provide materials with ample allowance for cutting and scribing.

E. Shop cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

2.6 SHOP FINISHING

A. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing paneling, as applicable to each unit of work.
   1. Backpriming: Apply two coats of sealer or primer, compatible with finish coats, to concealed surfaces of paneling.

B. Sand work smooth and set exposed nails and screws.

C. Apply wood filler in exposed nail and screw indentations.

D. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:

1. Transparent:
   a) System - 11, Polyurethane, Catalyzed.
   b) Stain: As selected by Architect.
   c) Sheen: Satin.

E. Wood Sealer: Factory-applied, water-based polymer, water-repellent sealer that reacts chemically with untreated, natural wood surfaces.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated on shop drawings.

B. Verify adequacy of backing and support framing.

C. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.2 PREPARATION

A. Before installation, condition paneling to humidity conditions in installation areas.

B. Before installing paneling, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.3 INSTALLATION

A. Install wood wall panels in accordance with manufacturer's written instructions and approved shop drawings.

B. Install work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.

C. Do not begin installation until wood materials have been fully acclimated to interior conditions.

D. Anchor paneling to supporting substrate with concealed panel-hanger clips, splined connection strips, or blind nailing.

E. Set and secure materials and components in place, plumb and level, using concealed fasteners wherever possible.

F. Where necessary to cut and fit on site, scribe work abutting other components. Do not use additional overlay trim to conceal gaps.

G. Avoid contamination of the panel faces with adhesives, solvents, or cleaners during installation.

H. Touch up damaged finish to match original, using materials provided by fabricator; replace components that cannot be refinished like new.

3.4 CLEANING

A. Clean exposed wood surfaces in compliance with manufacturer's instructions for cleaning and touchup of minor finish damage. Remove and replace wood wall components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

3.5 TOLERANCES

A. Maximum Variation from True Position: 1/16 inch.

B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

END OF SECTION 06 4200

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SECTION 06 6116 - SOLID SURFACING FABRICATIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Solid surfacing fabrications including the following:
   1. Windowsills.
   2. Cane detection at stairs.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures - CT HPBS: General LEED requirements.

B. Section 01 7419 - Construction Waste Management and Disposal: Waste management and disposal requirements.

C. Section 07 9200 - Joint Sealants: Elastomeric joint sealants.

D. Section 12 3600 - Countertops: Solid surface material and epoxy for countertops.

1.3 DEFINITIONS

A. Solid Surface: Non-porous, homogeneous material maintaining the same composition throughout the part with a composition of acrylic polymer, aluminum trihydrate filler and pigment.

1.4 REFERENCE STANDARDS

A. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

B. ASTM D638 - Standard Test Method for Tensile Properties of Plastics; 2014.

C. ASTM D785 - Standard Test Method for Rockwell Hardness of Plastics and Electrical Insulating Materials; 2008 (Reapproved 2015).

D. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials; 2017.

E. ASTM E228 - Standard Test Method for Linear Thermal Expansion of Solid Materials With a Push-Rod Dilatometer; 2017.

F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2019b.

G. ASTM G155 - Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Nonmetallic Materials; 2013.

H. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.

I. ASTM G22 - Standard Practice for Determining Resistance of Plastics to Bacteria; 1976(96).

J. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

K. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

L. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; 2006.

M. UL 2824 - GREENGUARD Certification Program Method for Measuring Microbial Resistance From Various Sources Using Static Environmental Chambers; Current Edition, Including All Revisions.

N. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meetings: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.
   1. Review Contract Documents for Work included in this section and determine complete understanding of requirements and responsibilities relative to work included, storage and handling of materials, materials to be used, installation of materials, sequence and quality control, project staffing, restrictions on areas of work and other matters affecting construction, to permit compliance with intent of work of this section.

1.6 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Indicate product description including solid surface sills illustrating full range of standard colors, fabrication information and compliance with specified performance requirements. Include resistance to list of chemicals.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Shop Drawings: Indicate plans, sections, dimensions, component sizes, edge details, thermosetting requirements, fabrication details, attachment provisions, sizes of furring, blocking, including concealed blocking and coordination requirements with adjacent work. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, waste receptacles and other items installed in solid surface.

E. Samples: Submit two samples, minimum 6 by 6 inch in size. Cut sample and seam together for representation of inconspicuous seam. Indicate full range of color and pattern variation. Approved samples will be retained as standards for work.

F. Operational and Maintenance Data:
   1. Submit manufacturer's care and maintenance data, including repair and cleaning instructions. Include in project closeout documents.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least five years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience and approved by manufacturer.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Acceptance Requirements: Deliver no components to project site until areas are ready for installation.

B. Storage and Handling Requirements:
   1. Store components indoors prior to installation.
   2. Handle materials to prevent damage to finished surfaces.

1.9 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Manufacturer Warranty: Provide manufacturer’s standard warranty for material only for period of 10 years against defects and/or deficiencies in accordance with General Conditions of the Contract. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of Architect and at no expense to Owner.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers/Products:
   1. Refer to the Finish Product List on the drawings for basis-of-design manufacturers, products, colors, and textures.

2.2 MATERIALS

A. Performance/Design Criteria:
   1. Fire Performance : Class A, per ASTM E84. Smoke Developed < 25; Flame Spread <25.
   2. Property Requirement (min or max) Test Procedure
   3. Solid Surface Based Products:

a) Tensile Strength 6000 psi min ASTM D638
b) Tensile Modulus 1.5 x 10-6 psi min ASTM D638
c) Tensile Elongation 0.4% min. ASTM D638
d) Flexural Strength 10000 psi min ASTM D790
e) Flexural Modulus 1.2 x 106 psi min ASTM D790
f) Hardness >85-Rockwell "M" scale min. ASTM D785
g) Thermal Expansion 2.2 x 10-5 in./in./°F ASTM E228
h) Fungi and Bacteria Does not support microbial growth ASTM G21 & ASTM G22
i) Microbial Resistance Highly resistant to mold growth UL 2824
j) Ball Impact No fracture - 1/2 lb. Ball: NEMA LD 3, Method 3.8
6 mm slab - 36" drop 12 mm slab - 144" drop
k) Weatherability ^E*94<5 in 1,000 hrs. ASTM G155
l) Flammability ASTM E84, NFPA 255 & UL 723
1) All Colors
2) 6 mm 12 mm
m) Flame Spread <25 <25
n) Smoke Developed <25 <25
o) Class A A (NFPA 101)

B. Solid Surface Material **SOSF4**: Non-porous, homogeneous material maintaining the same composition throughout the part with a composition of acrylic polymer, aluminum trihydrate filler and pigment; not coated, laminated or of composite construction; meeting following criteria:

C. Flammability: Class 1 and A when tested to UL 723.

D. Adhesive for Bonding to Other Products: One component silicone complying with ASTM C920.

E. Joint Adhesive: Two-part reactive non-sagging seam adhesive for use with solid surfacing materials; comply with ASTM D790; color-coordinated with solid surfacing materials; DuPont Corian Joint Adhesive.

F. Sealant: A standard mildew-resistant, FDA/UL and NSF 51 compliant in Food Zone area, recognized silicone color matched sealant or clear silicone sealants.

2.3 COMPONENTS

A. Windowsills: 1/2 inch thick solid surfacing material, adhesively joined with inconspicuous seams and edge details as indicated on Drawings. Color selected by Architect from manufacturer’s full color range.

2.4 FABRICATION

A. Fabricate components in shop to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and solid polymer manufacturer requirements. Form joints between components using manufacturer’s standard joint adhesive without conspicuous joints. Provide factory cutouts for plumbing fittings and bath accessories as indicated on Drawings.

B. Where indicated, thermoform corners and edges or other objects to shapes and sizes indicated on Drawings, prior to seaming and joining. Cut components larger than finished dimensions and sand edges to remove nicks and scratches. Heat entire component uniformly prior to forming.

C. Ensure no blistering, whitening and cracking of components during forming.

D. Fabricate joints between components using manufacturer's standard joint adhesive. Ensure joints are inconspicuous in appearance and without voids. Attach 2 inches wide reinforcing strip of solid polymer material under each joint. Reinforcing strip of solid polymer material is not required when using manufacturer's recommended joint adhesive.

E. Rout and finish component edges to a smooth, uniform finish. Rout cutouts, then sand edges smooth. Repair or reject defective or inaccurate work.

F. Finish: Ensure surfaces have uniform finish:
   1. Matte, with a 60-degree gloss rating of 5 - 20.
   2. Semi-gloss, with a 60° gloss rating of 25 - 50.

G. Fabrication Tolerances:
   1. Variation in Component Size: +/-1/8 inch.
   2. Location of Openings: +/-1/8 inch from indicated location.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Examine substrates and conditions, with fabricator present for compliance with requirements for installation tolerances and other conditions affecting performance of work. Proceed with installation only after unsatisfactory conditions have been corrected.
   1. Verify actual site dimensions and location of adjacent materials prior to commencing work.
   2. Examine cabinets upon which counter tops are to be installed. Verify cabinets are level to within 1/8 inch in 10' - 0".
   3. Notify Architect in writing of any conditions which would be detrimental to installation.

B. Commencement of work implies acceptance of previously completed work.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Provide anchoring devices for installation and embedding.

D. Provide templates and rough-in measurements.

3.3 INSTALLATION

A. Install components plumb, level, rigid, scribed to adjacent finishes in accordance with approved shop drawings and product installation details.

B. Fabricate field joints using manufacturer's recommended adhesive, with joints being inconspicuous in finished work. Exposed joints/seams are not permitted. Keep components and hands clean when making joints. Reinforce field joints as specified herein. Cut and finish component edges with clean, sharp returns.

C. Rout radii and contours to template. Anchor securely to base component or other supports. Align adjacent components and form seams to comply with manufacturer’s written recommendations using adhesive in color to match work. Carefully dress joints smooth, remove surface scratches and clean entire surface.

D. Seal between wall and components with joint sealant as specified herein and in Section 07 9200, as applicable.

E. Keep components and hands clean during installation. Remove adhesives, sealants and other stains. Ensure components are clean on date of Substantial Completion of the Work.

3.4 TOLERANCES

A. Maximum Variation From True Dimension: 1/8 inch.

B. Maximum Offset From True Position: 1/8 inch.

3.5 REPAIR

A. Repair minor imperfections and cracked seams and replace areas of severely damaged surfaces in accordance with manufacturer’s technical bulletins.

3.6 FIELD QUALITY CONTROL

A. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Architect at no cost to Owner.

3.7 CLEANING

A. Remove excess adhesive and sealant from visible surfaces.

B. Clean and polish surfaces in accordance with manufacturer’s care and maintenance instructions.

3.8 PROTECTION

A. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

B. Protect surfaces from damage until date of Substantial Completion of the Work.

END OF SECTION 06 6116

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SECTION 06 8316 - FIBERGLASS REINFORCED PANELING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fiberglass reinforced plastic panels.

B. Trim.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

1.3 REFERENCE STANDARDS

A. 9 CFR 416.2 - Regulatory Requirements Under the Federal Meat Inspection Act and the Poultry Products Inspection Act, Part 416-Sanitation; current edition.

B. ASTM D256 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics; 2010 (Reapproved 2018).

C. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2021.

D. ASTM D5319 - Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels; 2017.

E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

F. FM 4880 - Approval Standard for Class 1 Fire Rating of Building Panels or Interior Finish Materials; 2015.

G. ISO 846 - Plastics - Evaluation of the action of microorganisms; 2019.

H. ISO 2812-1 - Paints and varnishes -- Determination of resistance to liquids -- Part 1: Immersion in liquids other than water; 2017.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit 5d: For adhesives and sealants, documentation including printed statement of VOC content.

2. Laboratory Test Reports for Credit 5d: For adhesives and sealants, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
3. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
4. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Samples: Submit two samples 6_by_6 inch in size illustrating material and surface design of panels.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Section 01 6000 - Product Requirements, for additional provisions.
2. Extra Panels: Quantity equal to 1 percent of total installed.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store panels flat, indoors, on a clean, dry surface. Remove packaging and allow panels to acclimate to room temperature for 48 hours prior to installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Fiberglass Reinforced Plastic Panels:
1. Basis-of-Design: Marlite, Inc: www.marlite.com/#sle.
2. Other Acceptable Manufactuers:
a) Crane Composites, Inc: www.cranecomposites.com/#sle.

2.2 PANEL SYSTEMS

A. Wall Panels **FRP1, FRP2**:
1. Panel Size: 4 by 8 feet.
2. Panel Thickness: 0.10 inch.
3. Surface Design: Smooth.
4. Color: As selected by Architect. Refer to Finish Product List on the drawings.
5. Attachment Method: Adhesive only, sealant joints, no trim.

2.3 MATERIALS

A. Panels: Fiberglass reinforced plastic (FRP), complying with ASTM D5319.
1. Surface Burning Characteristics: Maximum flame spread index of 25 and smoke developed index of 450; when system tested in accordance with ASTM E84.
2. Class 1 fire rated when tested in accordance with FM 4880.
3. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.

4. Impact Strength: Greater than 6 ft lb force per inch, when tested in accordance with ASTM D256.
5. Sanitation and Cleanability: Comply with 9 CFR 416.2.
6. Chemical Cleanability: Excellent chemical resistance to common cleaners and detergents when tested in accordance with ISO 2812-1.
7. Biological Resistance: Rating of 0, when tested in accordance with ISO 846.

B. Trim: Vinyl; color coordinating with panel.

C. Adhesive: Type recommended by panel manufacturer.

D. Sealant: Type recommended by panel manufacturer; white.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions and substrate flatness before starting work.

B. Verify that substrate conditions are ready to receive the work of this section.

3.2 INSTALLATION - WALLS

A. Install panels in accordance with manufacturer's instructions.

B. Cut and drill panels with carbide tipped saw blades, drill bits, or snips.

C. Pre-drill fastener holes in panels, 1/8 inch greater in diameter than fastener, spaced as indicated by panel manufacturer.

D. Apply adhesive to the back side of the panel using trowel as recommended by adhesive manufacturer.

E. Apply panels to wall with seams plumb and pattern aligned with adjoining panels.

F. Install panels with manufacturer's recommended gap for panel field and corner joints.

G. Place trim on panel before fastening edges, as required.

H. Fill channels in trim with sealant before attaching to panel.

I. Install trim with adhesive and screws or nails, as required.

J. Seal gaps at floor, ceiling, and between panels with applicable sealant to prevent moisture intrusion.

K. Remove excess sealant after paneling is installed and prior to curing.

END OF SECTION 06 8316

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SECTION 07 1400 - FLUID-APPLIED WATERPROOFING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Modified-polymer elastomeric waterproofing.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 03 3000 - Cast-in-Place Concrete: Concrete substrate.

C. Section 07 2100 - Thermal Insulation: Insulation used for protective cover.

1.3 REFERENCE STANDARDS

A. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension; 2016.

B. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2023.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data for each product specified and/or each components of the system, including membrane, surface conditioner, flexible flashings, joint cover sheet, and joint and crack sealants.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Shop Drawings: Indicate special joint or termination conditions and conditions of interface with other materials.

E. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention, and acceptable installation temperatures.

F. Manufacturer's qualification statement.

G. Installer's qualification statement.

H. Warranty Documentation:
   1. Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
   2. Submit installer's documentation that installation complies with warranty conditions for the field-applied waterproofing.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than ten years documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least five years of documented experience.

1.6 FIELD CONDITIONS

A. Perform work only when existing and forecasted weather conditions are within the limits established by the manufacturer of the materials and products used.

B. Proceed with installation only when substrate construction and preparation work is complete and in condition to receive membrane waterproofing.

1.7 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Installer Warranty: Provide 5-year warranty for waterproofing failing to resist penetration of water commencing on Date of Substantial Completion. Complete forms in Owner's name and register with installer.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Modified-Polymer Elastomeric Waterproofing:
   1. Basis-of-Design:. GCP Applied Technologies; **PROCOR Below-Grade**.
   2. Provide the basis of design product, or a comparable product by one of the following, subject to compliance with reqirements:
      a) Carlisle Coatings & Waterproofing, Inc.
      b) Henry Company.
      c) W.R. Meadows.
   3. Substitutions: See Section 01 6000 - Product Requirements.

2.2 FLUID-APPLIED WATERPROOFING APPLICATIONS

A. Modified-Polymer Elastomeric Waterproofing:
   1. Location: Foundation walls, where indicated on drawings.

a) Includes elevator pit waterproofing, all walls.
2. Cover with protection board and drainage panel.

2.3 FLUID-APPLIED WATERPROOFING MATERIALS

A. Polymer-Modified Elastomeric Waterproofing: Two-component, 100% solids, cold-fluid-applied waterproofing membrane, ASTM C386.
1. Cured Thickness: 60 mil, 0.060 inch, minimum.
2. Volatile Organc Compound (VOC) Content: Less than 75 g/L.
3. Water Vapor Permeance: 0.08 perms, maximum, measured in accordance with ASTM E96/E96M.
4. Ultimate Elongation: 450 percent, minimum, measured in accordance with ASTM D412.
5. Peel Adhesion to Concrete: 5 lbs/inch nominal, per ASTM D903.

2.4 ACCESSORIES

A. Surface Conditioner: Compatible with membrane compound; as recommended by membrane manufacturer.

B. Sealant for Joints and Cracks in Substrate: Type compatible with waterproofing material and as recommended by waterproofing manufacturer.

C. Fluid-Applied Detailing Membrane: Type compatible with waterproofing material and as recommended by waterproofing manufacturer. Applications include flashing around penentrations and curbs, sealing waterproofing material terminations, and reinforcing inside corners.

D. Protection Board: Provide type capable of preventing damage to waterproofing due to backfilling and construction traffic.

E. Drainage Panel: Drainage layer with geotextile filter fabric on earth side.
1. Composition: Dimpled polyethylene, polypropylene, or polystyrene core; polypropylene or polyester filter fabric.
2. Thickness: As indicated on drawings.

F. Tape: Type compatible with waterproofing material and as recommended by waterproofing manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine existing conditions before starting work, with installer present. The installer shall examine conditions of substrates and other conditions under which this work is to be performed and notify the contractor, in writing, of circumstances detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected.

B. Verify substrate surfaces are free of frozen matter, dampness, loose particles, cracks, pits, projections, penetrations, or foreign matter detrimental to adhesion or application of waterproofing system.

C. Verify that substrate surfaces are smooth, free of honeycomb or pitting, and not detrimental to full contact bond of waterproofing materials.

D. Verify that items penetrating surfaces to receive waterproofing are securely installed.

E. Where existing conditions are responsibility of another installer, notify Architect of unsatisfactory conditions.

F. Do not proceed with this work until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protect adjacent surfaces from damage not designated to receive waterproofing.

B. Clean and prepare surfaces to receive waterproofing in accordance with manufacturer's instructions; vacuum substrate clean.

C. Do not apply waterproofing to surfaces unacceptable to waterproofing manufacturer.

D. Fill non-moving joints and cracks with a filler compatible with waterproofing materials.

E. Seal moving cracks with sealant and non-rigid filler, using procedures recommended by sealant and waterproofing manufacturers.

F. Treat tie-holes and cracked, pitted, honeycombed or heavily bugholed surfaces as recommended by the waterproofin manufacturer.

G. Grind irregular construction joints to suitable flush surface.

H. Prepare building expansion joints at locations as indicated on drawings.

I. Install cant strips at inside corners.

3.3 INSTALLATION

A. Install waterproofing system, including all accessories and substate treatments, in accordance with manufacturer's written instructions , and approved shop drawings.

B. Apply primer or surface conditioner, where required or recommended by manufacturer, at a rate recommended by manufacturer, and protect conditioner from rain or frost until dry.

C. Seal membrane and flashings to adjoining surfaces.

3.4 INSTALLATION - DRAINAGE PANEL AND PROTECTION BOARD

A. General: Apply protection board and related materials in accordance with manufacturer’s recommendations and approved shop drawings.

B. Place drainage panel directly against membrane, butt joints, place to encourage drainage downward, and scribe and cut boards around projections, penetrations, and interruptions.

C. Place protection board directly against drainage panel; butt joints, and scribe and cut boards around projections, penetrations, and interruptions.

3.5 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements for additional requirements.

B. Owner will provide testing services, and Contractor to provide temporary construction and materials for testing.

C. Provide daily on-site attendance of waterproofing manufacturer's representative during installation of this work.

3.6 PROTECTION

A. Do not permit traffic over unprotected or uncovered membrane.

END OF SECTION 07 1400

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SECTION 07 2100 - THERMAL INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Board insulation at cavity wall construction, perimeter foundation wall, underside of floor slabs, and exterior wall behind rainscreen cladding.

B. Batt insulation in exterior wall construction (firesafing).

1.2 RELATED REQUIREMENTS

A. Section 01 3329.04 – Material Content Form

B. Section 01 3566.42 - Sustainability Compliance Procedures.

C. Section 01 7419 – Construction Waste Management and Disposal

D. Section 07 2119 - Foamed-in-Place Insulation: Spray-applied insulation materials.

E. Section 07 5423 - Thermoplastic-Polyolefin (TPO) Roofing: Insulation specified as part of roofing construction.

1.3 DEFINITIONS

A. Mineral Fiber Material Composition: Insulation referred to as mineral fiber block, board, and blanket insulation is composed of fibers from mineral based substances such as rock, slag, or glass and processed from the molten state into fibrous form.
   1. Based on type of insulation substance, the material will be referred to as a mineral fiber when having a rock or slag base, and glass fiber with a glass or silica sand base, also considered a mineral.
   2. Insulation blankets are flexible units consisting of felted, bonded, or unbonded fibers formed into rolls or flat cut pieces referred to as batts; rolls are simply longer versions of batts.
   3. For additional information about mineral fiber and the various classification types, refer to the following reference standards; ASTM C553, ASTM C612, ASTM C665, and ASTM C726.

1.4 REFERENCE STANDARDS

A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.

B. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013 (Reapproved 2019).

C. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2023.

D. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014 (Reapproved 2019).

E. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2017.

F. ASTM C726 - Standard Specification for Mineral Wool Roof Insulation Board; 2017.

G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

H. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components; 2023.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Shop Drawings: Submit drawings that indicate location of joint or termination detail conditions.

E. ABAA Field Quality Control Submittals: Submit third-party reports of testing and inspection required by ABAA QAP.

F. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

G. ABAA Manufacturer Qualification: Submit documentation of current evaluation of proposed manufacturer and materials.

H. ABAA Installer Qualification: Submit documentation of current contractor accreditation and current installer certification. Keep copies of contractor accreditation and installer certification on site during and after installation. Present on-site documentation upon request.

1.6 QUALITY ASSURANCE

A. Air Barrier Association of America (ABAA) Quality Assurance Program (QAP); www.airbarrier.org/#sle:
   1. Installer Qualification: Use accredited contractor, certified installers, evaluated materials, and third-party field quality control audit.
   2. Manufacturer Qualification: Use evaluated materials from a single manufacturer regularly engaged in air barrier material manufacture. Use secondary materials approved in writing by primary material manufacturer.

1.7 FIELD CONDITIONS

A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.1 APPLICATIONS

A. Insulation Under Concrete Slabs: Extruded polystyrene (XPS) board.

B. Insulation at Perimeter of Foundation: Extruded polystyrene (XPS) board.

C. Insulation Inside Masonry Cavity Walls: Extruded polystyrene (XPS) board.

D. Insulation for Rainscreen Assemblies, Continuous: Mineral fiber board.

E. Insulation at Slab Edges: Mineral fiber batt (blanket) insulation.

2.2 FOAM BOARD INSULATION MATERIALS

A. Extruded Polystyrene (XPS) Board Insulation: Complies with ASTM C578.
   1. Application: Foundation walls.
   2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
   3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
   4. Complies with fire resistance requirements indicated on drawings as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.
   5. Type and Compressive Resistance: Type IV, 25 psi, minimum. ASTM C578
   6. Water Absorption: 0.3 percent by volume maximum, ASTM C272.
   7. Drainage Capacity: At 500 psf, gals/min/ft: 12.0, ASTM D4716.
   8. Thermal Resistance, R-value: 10.6 per 2.25 inch thickness at 75 degrees F mean temperature.
   9. Basis of Design Product:
      a) Basis-of-Design: Owens Corning; **FOAMULAR NGX Insul-Drain**.
      b) Substitutions: See Section 01 6000 - Product Requirements.

B. \Extruded Polystyrene (XPS) Board Insulation: Complies with ASTM C578 with either natural skin or cut cell surfaces.
   1. Application: Under slab.

2. Type and Compressive Resistance: Type VI, 40 psi (276 kPa), minimum.
3. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
4. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
5. Type and Thermal Resistance, R-value: Type VI, 5.0 (0.88) per 1 inch thickness at 75 degrees F mean temperature.
6. Complies with fire resistance requirements indicated on drawings as part of an approved exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.
    a) Product must be approved for use in Type I construction in accordance with Connecticut State Building Code (IBC) Section 2603.5 and comply with the acceptance criteria of NFPA 285
7. Type and Water Absorption: Type VI, 0.3 percent by volume, maximum, by total immersion.
8. Products:
    a) Basis-of-Design: Owens Corning; **FOAMULAR NGX 400**.
    b) Substitutions: See Section 01 6000 - Product Requirements.

C. Extruded Polystyrene (XPS) Board Insulation: Complies with ASTM C578 with either natural skin or cut cell surfaces.
1. Application: Masonry veneer cavity walls.
2. Type and Compressive Resistance: Type IV, 25 psi (173 kPa), minimum.
3. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
4. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
5. Type and Thermal Resistance, R-value: Type IV, 5.0 (0.88) per 1 inch thickness at 75 degrees F mean temperature.
6. Complies with fire resistance requirements indicated on drawings as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.
    a) Product must be approved for use in Type I construction in accordance with Connecticut State Building Code (IBC) Section 2603.5 and comply with the acceptance criteria of NFPA 285
7. Type and Water Absorption: Type IV, 0.3 percent by volume, maximum, by total immersion.
8. Products:
    a) Basis-of-Design: Owens Corning Corporation**; FOAMULAR NGX CW25**: www.ocbuildingspec.com/#sle.
    b) Alternate Acceptable Product:
        1) Kingspan Insulation LLC; GreenGuard GG25-LG XPS Type IV: www.kingspan.com/#sle.
        2) DuPont de Nemours, Inc; Low-GWP Styrofoam Brand XPS Insulation: building.dupont.com/#sle.
    c) Substitutions: See Section 01 6000 - Product Requirements.

2.3 MINERAL FIBER BOARD INSULATION MATERIALS

A. Mineral Fiberboard Insulation: Rigid or semi-rigid mineral fiber, ASTM C612 or ASTM C553; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E84.
1. Application: Exterior wall assemblies as indicated on drawings. See A500 - Typical Exterior Assemblies.
2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
3. Board Size: 16 by 48 inches.

4. Thermal Resistance: R-value of 4.2 degrees F hr sq ft/Btu per inch at 75 degrees F, minimum, when tested according to ASTM C518.
5. Maximum Density: 8.0 pounds per cubic foot, nominal.
6. Products:
   a) Basis-of-Design: Thermafiber, Inc; RainBarrier Dark: www.thermafiber.com/#sle.
   b) Other Acceptable Products: Subject to compliance with requiremetns.
      1) ROCKWOOL (ROXUL, Inc); CAVITYROCK / CAVITYROCK BLACK: www.rockwool.com/#sle.
   c) Substitutions: See Section 01 6000 - Product Requirements.

B. Mineral Fiberboard Insulation (Perimeter Fire Containment): Semi-rigid mineral fiber, ASTM C612, Type III; faced on one side with foil-scrim vapor retarder, formaldehyde free. Flame spread index of 25 when tested in accordance with ASTM E84.
1. Application: Aluminum curtain wall spandrel.
2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
3. Board Thickness: Provide board thicknesses indicated on the drawings.
4. Thermal Resistance: R-value of 4.0 - 4.3 degrees F hr sq ft/Btu per inch at 75 degrees F, minimum, when tested according to ASTM C518.
5. Water Vapor Permeance: 27 perms minimum, per ASTM E96.
6. Water Vapor Sorption: < 1% by weight, tested in accordance with ASTM C1104.
7. Density: 8.0 pounds per cubic foot, nominal.
8. Basis-of-Design Product:
   a) Owens Corning; **Thermafiber Firespan 90**.
   b) Substitutions: See Section 01 6000 - Product Requirements.
9. Perimeter Fire Containment System: Provide where indicated for gaps between the perimeter edge of fire-resistance-rated floor assemblies and non-fire-resistance rated exterior curtain walls.
   a) Refer to Section 07 8400 - Firestopping for additional requirements.

2.4 MINERAL FIBER BLANKET INSULATION MATERIALS

A. Mineral Fiber Batt Insulation: Flexible or semi-rigid preformed batt or blanket, complying with ASTM C665; friction fit; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E84.
1. Application: Firesafing at slab edges.
2. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
3. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.
4. Products:
   a) Basis-of-Design: Thermafiber, Inc**; Thermafiber Safing:** www.thermafiber.com/#sle.
   b) Substitutions: See Section 01 6000 - Product Requirements.

2.5 ACCESSORIES

A. Tape: Reinforced polyethylene film with acrylic pressure sensitive adhesive.
1. Application: Sealing of interior circular penetrations, such as pipes or cables.
2. Width: As required for application.

B. Self-Adhered Transition Flashing: Multipurpose, self-adhered flashing with modified butyl adhesive, polyester fiber top sheet, and polypropylene interlayer.

1. Application: Primerless adhesion for use as through-wall flashings and wall transitions to roof and below-grade systems.
2. Thickness: 45 mil, 0.045 inch, nominal.
3. Size: 6 inches wide, in rolls 75 feet long.

C. Flashing Tape: Special polyolefin film with high performance adhesive.
1. Application: Interior window and door sill flashing tape.
2. Width: As required for application.

D. Tape joints of rigid insulation in accordance with roofing and insulation manufacturers' instructions.

E. Liquid Flashing: Single-component, nonsag flashing and weather barrier sealant.
1. Products:

F. Accessories for Dark Insulation:
1. Black Facing: Additional black facing material, matching mineral wool facing, for treating exposed edges and joints.
2. Black Coating: Black coating, matching mineral wood facing, rolled or painted onto exposed edges of a/nd or joints in insulation with dark facing. Use product recommended by insulation manufacturer.

G. Rigid Insulation Pronged Attachment Washers: Solid plastic cap washer attached to wall ties for attachment of rigid insulation and to help seal against air and moisture penetration through weather barrier assembly.
1. Basis-of-Design Product: Owens-Corning; **Thermafiber RainBarrier Clip**.
a) Basis-of-Design: Thermafiber; **RainBarrier Clip**.

H. Support for Cladding and Continuous Insulation: See respective cladding section.

I. Black Facing Material: As recommended by insulation manufacturer for concealing exposed edges and joints in dark-faced mineral eiberboard insulation

J. Nails: Steel wire; galvanized; type and size to suit application.

K. Adhesive: Type recommended by insulation manufacturer for application.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.

B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.2 BOARD INSTALLATION AT FOUNDATION PERIMETER

A. Install boards horizontally on foundation perimeter.

B. Extend boards over expansion joints, unbonded to foundation on one side of joint.

C. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.3 BOARD INSTALLATION AT EXTERIOR WALLS

A. Install boards horizontally on walls.

B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.4 BOARD INSTALLATION AT CAVITY WALLS

A. Install boards to fit snugly between wall ties.

B. Install boards horizontally on walls.

C. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.5 BOARD INSTALLATION UNDER CONCRETE SLABS

A. Place insulation under slabs on grade after base for slab has been compacted.

B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

C. Prevent insulation from being displaced or damaged while placing vapor retarder and placing slab.

3.6 BATT INSTALLATION

A. Install insulation and vapor retarder in accordance with manufacturer's instructions.

B. Install in exterior wall and roof spaces without gaps or voids. Do not compress insulation.

C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

3.7 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements for additional requirements.

B. Coordination of Air Barrier Association of America (ABAA) Tests and Inspections:
   1. Provide testing and inspection required by ABAA Quality Assurance Program (QAP).
   2. Notify ABAA in writing of schedule for air barrier work, and allow adequate time for testing and inspection.
   3. Cooperate with ABAA testing agency.
   4. Allow access to air barrier work areas and staging.
   5. Do not cover air barrier work until tested, inspected, and accepted.

3.8 PROTECTION

A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION 07 2100

SECTION 07 2119 - FOAMED-IN-PLACE INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Foamed-in-place insulation.
   1. In masonry cavity walls.
   2. In exterior framed walls.
   3. At junctions of dissimilar wall and roof materials.
   4. ~~At steel roof deck to fill in deck flutes.~~

B. Foamed-in-place insulating sealant.
   1. In exterior wall crevices.
   2. For filling perimeter window and door shim spaces and crevices in exterior wall and roof.

C. Protective intumescent coating.

D. Preformed closure plugs for metal deck.

1.2 RELATED REQUIREMENTS

A. Section 01 3329.04 – Material Content Form

B. Section 01 3566.42 - Sustainability Compliance Procedures

C. Section 01 7419 – Construction Waste Management and Disposal

1.3 REFERENCE STANDARDS

A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.

B. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics; 2019.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

D. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2023.

E. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials; 2021a.

F. FM 4880 - Approval Standard for Class 1 Fire Rating of Building Panels or Interior Finish Materials; 2015.

G. NFPA 275 - Standard Method of Fire Tests for the Evaluation of Thermal Barriers; 2022.

H. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components; 2023.

I. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth; 2019.

J. UL 1040 - Standard for Safety Fire Test of Insulated Wall Construction; Current Edition, Including All Revisions.

K. UL 1715 - Standard for Safety Fire Test of Interior Finish Material; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week prior to commencing work of this section.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide product description, insulation properties, overcoat properties, and preparation requirements.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Certificates: Certify that products of this section meet or exceed specified requirements.

E. Manufacturer's Installation Instructions: Indicate special procedures, and perimeter conditions requiring special attention.

F. Manufacturer Qualification: Submit documentation of current evaluation of proposed manufacturer and materials.

G. Installer Qualification: Submit documentation of current contractor accreditation and current installer certification. Keep copies of all contractor accreditation and installer certification on site during and after installation. Present on-site documentation upon request.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with not less than seven years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified, with minimum five years of documented experience, and approved by manufacturer.

1.7 FIELD CONDITIONS

A. Do not apply foam when temperature is below that specified by the manufacturer for ambient air and substrate.

B. Do not apply foam when temperature is within 5 degrees F of dew point.

PART 2 PRODUCTS

2.1 MATERIALS

A. Foamed-In-Place Insulation: Low-density, flexible, open cell, water vapor permeable polyurethane foam; foamed on-site, using blowing agent of water or non-ozone-depleting gas.
   1. Regulatory Requirements: Comply with applicable code for flame and smoke, concealment, and fire protection requirements.
      a) Fire Protection: Provide 15-minute thermal barrier of 1/2 inch gypsum board or equivalent material complying with NFPA 275 test method, or foamed-in-place insulation either exposed or with covering that complies with FM 4880, NFPA 286, UL 1040, or UL 1715.
   2. Thermal Resistance: R-value of 3.0, minimum, per 1 inch thickness at 75 degrees F mean temperature when tested in accordance with ASTM C518.
   3. Air Permeance: 0.04 cfm per square foot, maximum, when tested at intended thickness in accordance with ASTM E2178 at 1.57 psf.
   4. Surface Burning Characteristics: Flame spread/smoke developed index of 25/450, maximum, when tested in accordance with ASTM E84.
   5. Products:
      a) BASF Corporation; ENERTITE Max: www.spf.basf.com/#sle.
      b) Carlisle Spray Foam Insulation; SealTite PRO High Yield: www.carlislesfi.com/#sle.
      c) Huntsman Building Solutions; Classic Ultra: www.huntsmanbuildingsolutions.com/#sle.
      d) Huntsman Building Solutions;[Icynene Ultra 50]: www.huntsmanbuildingsolutions.com/#sle.
      e) Johns Manville; JM ocSPF Open Cell Spray Polyurethane Foam: www.jm.com/#sle.
   6. Substitutions: See Section 01 6000 - Product Requirements.

B. ~~Foamed-In-Place Insulation: Medium-density, rigid or semi-rigid, closed cell polyurethane foam; foamed on-site, using blowing agent of water or EPA-approved zero-ozone-depleting, low-global warming potential (GWP<1) hydrofluoroolefin (HFO) gas. Use of hydrofluorocarbon (HFC) blowing agents is prohibited.~~

1. ~~Application(s):~~
   a) ~~At steel roof deck to fill in deck flutes. See drawings for specific locations.~~
2. ~~Regulatory Requirements: Comply with applicable code for flame and smoke, concealment, and fire protection requirements.~~
   a) ~~Fire Protection: Provide 15-minute thermal barrier of 1/2 inch gypsum board or equivalent material complying with NFPA 275 test method, or foamed-in-place insulation either exposed or with covering that complies with FM 4880, NFPA 286, UL 1040, or UL 1715.~~
3. ~~Thermal Resistance: R-value of 6.9, minimum, per 1 inch thickness at 75 degrees F mean temperature when tested in accordance with ASTM C518.~~
4. ~~Water Vapor Permeance: Vapor retarder; 1.1 perms, maximum, when tested at intended thickness in accordance with ASTM E96/E96M, desiccant method.~~
5. ~~Water Absorption: Less than 2 percent by volume, maximum, when tested in accordance with ASTM D2842.~~
6. ~~Air Permeance: 0.04 cfm per square foot, maximum, when tested at intended thickness in accordance with ASTM E2178 at 1.57 psf.~~
7. ~~Closed Cell Content: At least 90 percent.~~
8. ~~Surface Burning Characteristics: Flame spread/smoke developed index of 25/450, maximum, when tested in accordance with ASTM E84.~~
9. ~~Products:~~
   a) ~~BASF Corporation; Walltite Plus: www.spf.basf.com/#sle.~~
   b) ~~Carlisle Spray Foam Insulation; SealTite PRO HFO: www.carlislesfi.com/#sle.~~
   c) ~~Henry Company; Permax 2.0 HFO: www.henry.com/#sle.~~
   d) ~~Huntsman Building Solutions; Icynene ProSeal HFO: www.huntsmanbuildingsolutions.com/#sle.~~
   e) ~~Johns Manville; JM Corbond IV Closed Cell Spray Polyurethane Foam: www.jm.com/#sle.~~
10. ~~Substitutions: See Section 01 6000 - Product Requirements.~~

C. Foamed-in-Place Insulating Sealant: ASTM C 1620. Low pressure, one-component, insulating polyurethane foam intended for use in filling gaps and voids in wall assemblies, including at door and window frames.Packaged in self-contained pressurized containers, gun grade, containing no urea formaldehyde.
   1. Performance Requirements: Tested in accordance with AAMA 812.
      a) Pressure Build: Tested in accordance with AAMA 812.
      b) Flame Spread Index: 25 or less, tested per ASTM E 84.
      c) Smoke Developed Index: 100 or less, tested per ASTM E 84.
      d) Air Infiltration: Less than 0.025 cfm/sf @ 1.57 psf when tested in accordance with ASTM E283.
      e) Water Infiltration: No leakage after 15 min. exposure (@ 2.9 psf). ASTM E 331.
      f) Non-ozone depleting.
   2. Manufacturers/Products:
      a) Everkem; **Thermal Seal All-in-One Fireblock + Window & Door Insulating Foam Sealant**.
      b) Hilti; **CF 812 WD Low Pressure Door and Window Foam**.
      c) Owens Corning; **Insulating Foam Sealant.**

2.2 ACCESSORIES

A. Primer: As required by insulation manufacturer.

B. Protective Coating: Intumescent coating of type recommended by insulation manufacturer and as required to comply with applicable codes. Capable of acting as an ignition barrier.
1. Coating Type: Single component, water-based.
2. Protected Insulation Type: Spray polyurethane foam (SPF).
3. Application: Apply using brush, roller, or airless sprayer.
4. Surface Burning Characteristics: Flame spread/smoke developed index of 25/450, maximum, when tested in accordance with ASTM E84.
5. Exterior Wall System: Comply with NFPA 285.
6. Color: White.
7. Products:
   a) International Fireproof Technology Inc; DC315 Intumescent Coating: www.painttoprotect.com/#sle.
   b) No-Burn, Inc; Plus ThB Intumescent Coating: www.noburn.com/#sle.
   c) TPR Corporation; Fireshell IB4 Ignition Barrier Coating.

C. Metal Lath: Expanded galvanized metal lath fabricated from material of weight and configuration required to anchor insulation. Include clips and other anchorage devices required to attach lath to substrates and to receive foamed-in-place insulation material.

D. Preformed Closure Plugs for Metal Deck: Formed ~~foam~~ plugs or plug strips for filling in flutes of metal deck.
1. Applications: As indicated on drawings for each type.
2. Mineral Wool Deck Plugs:
   a) Basis of Design Product: Hilti; Firestop Top Track Seal CFS-TT MD P Series Flute Plug: www.hilti.com.
      1) Select product sizes to fit specific deck size(s).
3. Rubber Deck Plugs: Formed foam or foam rubber individual plugs. Manufacturers of individual deck plugs include:
   a) A.C.T. Metal Deck Supply; Rubber Plugs: www.metaldecksupply.com.
   b) Carrington Specialty Products: www.carringtonbp.com.
   c) Cordeck Building Supply: www.cordeck.com.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify work within construction spaces or crevices is complete before insulation application.

B. Verify that surfaces are clean, dry, and free of matter that may inhibit insulation adhesion.

3.2 PREPARATION

A. Mask and protect adjacent surfaces from over spray or dusting.

B. Apply primer in accordance with manufacturer's instructions.

C. Install metal lath to anchor insulation as needed. Use standoff clips where lath fastens to structural steel.

3.3 APPLICATION

A. Apply each type of foamed-in-place insulation in accordance with manufacturer's written instructions.

B. Apply insulation by spray method, to a uniform monolithic density without voids.

C. Apply in multiple passes to not exceed maximum thicknesses recommended by manufacturer. Do not spray into rising foam.

D. Apply protective coating monolithically, without voids, to fully cover foam insulation, to achieve fire rating required.
   1. Do not cover insulation prior to any required spray foam insulation inspections.

E. Patch damaged areas.

F. Where applied to voids and gaps assure space for expansion to avoid pressure on adjacent materials that may bind operable parts.

G. Trim excess away for applied trim or remove as required for continuous sealant bead.

3.4 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements for additional requirements.

B. Field inspections and tests will be performed by an independent testing agency.

C. Inspection will include verification of insulation and protective coating thickness and density.

3.5 PROTECTION

A. Do not permit subsequent construction work to disturb applied insulation.

END OF SECTION 07 2119

SECTION 07 2163 - FLUID-APPLIED INSULATIVE COATING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Spray-applied insulative coating system (a/k/a "thermal coating") for stuctural steel, including primer, insulative coating and topcoat.
   1. Refer to GC series "Fireproofing and Steel Treatment" drawings for specific locations and extent of coverage.
   2. All spray-applied insulative coating is to be shop-applied.

1.2 RELATED REQUIREMENTS

A. Section 05 1200 - Structural Steel Framing.

B. Section 05 5000 - Metal Fabrications.

C. Section 09 9600 - High-Performance Coatings.

1.3 REFERENCE STANDARDS

A. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus; 2019.

B. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2019, with Editorial Revision (2023).

C. ASTM C272/C272M - Standard Test Method for Water Absorption of Core Materials for Sandwich Constructions; 2018.

D. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.

E. ASTM D870 - Standard Practice for Testing Water Resistance of Coatings Using Water Immersion; 2015 (2020).

F. ASTM D4060 - Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser; 2019.

G. ASTM D4585/D4585M - Standard Practice for Testing Water Resistance of Coatings Using Controlled Condensation.; 2013.

H. ASTM D5894 - Standard Practice for Cyclic Salt Fog/UV Exposure of Painted Metal, (Alternating Exposures in a Fog/Dry Cabinet and a UV/Condensation Cabinet).; 2016.

I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

J. SSPC-SP 6 - Commercial Blast Cleaning; 2007.

1.4 SYSTEM DESCRIPTION

A. The liquid applied thermal break acrylic material shall be applied at the required thickness specified by the manufacturer in order to mitigate thermal bridging. In no case shall the K-value of the liquid applied thermal break be more than 0.040 W/mK.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Submit product data including manufacturer's technical data indicating product performance characteristics, performance and limitation criteria.

C. Shop Drawings: Show layout of steel framing showing locations to receive insulative coating.
   1. Include sequencing of insulative coating installation with respect to construction that will subsequently conceal it.

D. Manufacturer’s Instructions: Submit manufacturer written installation instructions.

E. Applicator Qualifications: Submit applicators current certification as a manufacturer trained applicator.

1.6 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing product in this section with a minimum of 2 years documented experience in manufacturing insulative technology.

B. Applicator: Company specializing in applying the work of this section with documented experience and trained by the manufacturer.

C. Fluid-Applied Thermal Break Acrylic system shall be the complete system from a sole source consisting of primer, acrylic thermal break material and topcoat.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and label

B. Storage: Materials shall be stored in strict accordance with manufacturers documented instructions.

C. Documentation: All batch numbers, product identification and quantities shall be recorded on appropriate QC documents. A copy of the transport documents and manufacturer's conformance certificate shall be attached to the material delivery on site.

1.8 FIELD CONDITIONS

A. Project Environmental Requirements: Substrate and air temperature shall be in accordance with the manufacturers’ requirements.
   1. Protect work area from windblown dust and rain. Protect adjacent areas from over spray of material.

2. Provide ventilation in areas to receive work of this section during application and minimum 24 hours after application.

B. Temperature and Humidity Requirements: Maintain air temperature and relative humidity in areas where products will be applied for a time period before during and after application as recommended by manufacturer.
   1. Do not apply Fluid Applied Acrylic Thermal Break when temperature of substrate and/or surrounding ambient air temperature is below 45 degrees F. Temporary protection and heat shall be maintained at this minimum temperature for 24 hours before, during and 24 hours after material application.
   2. Steel substrate temperature shall be a minimum of 5 degrees F above the dew point of the surrounding air for a period of 24 hours prior, during the application of the material and 24 hour cure period.
   3. If necessary for job schedule, provide enclosures and heat to maintain proper temperatures and humidity levels in the application areas.
   4. The relative humidity of the application area shall not exceed a maximum of 85 percent 24 hours prior, during and 24 hours after the application of the material. The relative humidity shall not exceed 75 percent throughout the application and curing of the decorative top coat finish.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Tnemec Company, Inc; **Aerolon Series 971 Insulative Coating System**: www.tnemec.com.

B. Substitutions: Section 01 6000 - Product Requirements.

2.2 FLUID-APPLIED INSULATIVE COATING, GENERAL

A. Materials Compatibility:
   1. Provide shop and field primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
   2. Provide products of same manufacturer for each coat in a coating system.

B. Material Thickness: Provide the insulative coating thickness indicated, exclusive of primer or topcoat, for the typical conditions noted below:
   1. Standard "W" Shapes (Beams and Columns): 60 mils dry film thickness (DFT), 18" sphere.
   2. Tubes and Pipes: 120 mils dry film thickness (DFT), 18 " sphere.

C. Installation:
   1. Apply insulative coating at maximum 60 mils per wet film thickness (50 mils DFT) per lift. Apply additional coatings until specified thickness is achieved.
   2. Apply primer and coating at the specified thickness to all exposed sides of each steel member indicated to receive the insulative coating system.
   3. Shop application of primer and insulative coating is recommended where steel will subsequently be hidden by the normal sequence of construction.

2.3 FLUID-APPLIED INSULATIVE COATING SYSTEM

A. Fluid-Applied Insulative Coating System: Provide coating system that meets the following minimum performance criteria, unless more stringent criteria are specified:
   1. Surface Burning Characteristics: Flame spread/Smoke developed index of Class A, when tested in accordance with ASTM E84.
   2. Thermal Conductivity: 0.0356 W/m-^{O}K (0.2468 BTU-in/ft^2-hr-^{O}F), R value at one inch equals 4.1, when tested in accordance with ASTM C518 at 77 degrees F.
   3. Accelerated Aging: 5000 hrs prohesion when tested in accordance with ASTM D5894.
   4. Corrosion Resistance: 5000 hrs salt spray when tested in accordance with ASTM B117.
   5. Water Resistance: 18 months of continuous tap water immersion when tested in accordance with ASTM D870.
   6. Water Resistance With Controlled Condensation: No effect after 2000 hrs of controlled condensation when tested in accordance with ASTM D4585/D4585M.
   7. Water Resistance With Immersion: No effect after 2000 hrs at 140 degrees F when tested in accordance with ASTM D870 Method B.
   8. Abrasion Resistance: No more than 50.2 mg loss after 1000 cycles when tested in accordance with ASTM D4060 on the Taber Abraser CS-17 wheel with a 1000g load.
   9. Water Absorption: Less than 1 percent weight gain after 24-hour cure when tested in accordance with ASTM C272/C272M.

B. Primer: Refer to the Fluid-Applied Insulative Coating Schedule in Part 3.

C. Acrylic Insulative Coating: **Tnemec Series 971 Aerolon Acrylic**; fluid-applied, thermal insulating coating containing aerogel particles.
   1. VOC Content: 1.9 grams/liter.
   2. Solids by Volume: 76 percent.
   3. Color: 1278 Insulation Yellow.
   4. Finish: Matte.
   5. Requirements:
      a) Abrasion Resistance: No more than 50.2 mg loss after 1000 cycles when tested in accordance with ASTM D4060.
      b) Cyclic Salt Fog/UV Exposure: No blistering, cracking, rusting or delamination of film after 5000 hours when tested in accordance with ASTM D5894.
      c) Humidity Resistance: No blistering, cracking, rusting, or delamination after 2000 hours when tested in accordance with ASTM D4585/D4585M.
      d) Immersion: No blistering, cracking, rusting, or delamination after six months continuous tap water immersion when tested in accordance with ASTM D870.
      e) Surface Burning Characteristics: Class A when tested in accordance with ASTM E84.
      f) Thermal Conductivity: No greater than 0.0356 W/m-°K or 0.2468 BTU-in/ft2-hr-°F when tested in accordance with ASTM C518.
         1) NORSOK M-501 ISO 20340: Passed 25 cycles.

2.4 ACCESSORIES

A. Thermally Insulative Tape: **Tnemec Aerolon Tape Series 945**; self-adhesive tape containing a blend of insulative particles for low thermal conductivity.
   1. Requirements:

a) Thermal Conductivity: 0.0497 W/m-°K or 0.3446 BTU-in/ft^2-hr-°F (R-value at one inch equal to 2.9) when tested in accordance with ASTM C177 at 79 degrees F.
b) Thickness: 1.5 mm (+/- 0.25 mm).

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Surfaces to receive the fluid-applied insulative coating system shall follow the manufacturer's printed instructions and be clean, dry and free of oil, grease, loose mill scale, dirt, dust or other foreign substances which would impair bond of the material to the substrate.

C. Other corrections of the surfaces to receive the fluid applied insulative coating material shall be the responsibility of the Contractor, at no additional cost to the Owner.

D. Application of the primer, insulative coating material, and topcoat shall not commence until the contractor, applicator and inspector have examined the surfaces to receive the primer and determined the surfaces are acceptable to receive the primer and coating. Commencement of application means acceptance of substrate.

E. Verify that substrate and workspace temperature and humidity conditions are in accordance with manufacturers recommendations.

3.2 SURFACE PREPARATION

A. Prepare surfaces in accordance with manufacturer's instructions.

B. Weld spatter and defects shall be ground smooth prior to commencement of primer and fluid applied thermal break material.

C. Primer shall not be applied to prepared substrate until the area has been adequately vented to remove all airborne dust. Prior to the application of any coating material, the blast products, dust and debris shall be removed by vacuuming.

D. Steel Substrates: Remove rust and loose mill scale.
1. Fabrication defects:
   a) Correct steel and fabrication defects revealed by surface preparation.
   b) Remove weld spatter and slag.
   c) Round sharp edges and corners of welds to a smooth contour.
   d) Smooth weld undercuts and recesses.
   e) Grind down porous welds to pinhole-free metal.
   f) Remove weld flux from surface.
2. Ensure surfaces are dry.
3. Remove visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter in accordance with SSPC-SP 6, unless otherwise specified.

E. Abrasive Blast-Cleaned Surfaces: Coat abrasive blast-cleaned surfaces with primer before visible rust forms on surface. Do not leave blast-cleaned surfaces uncoated for more than 8 hours.

3.3 SHOP COATING APPLICATION

A. Apply coatings in accordance with manufacturer's instructions.
   1. Mix and thin coatings, including multi-component materials, in accordance with manufacturer's instructions.
   2. Keep containers closed when not in use to avoid contamination.
   3. Do not use mixed coatings beyond pot life limits.
   4. Use application equipment, tools, pressure settings, and techniques in accordance with manufacturer's instructions.

B. Uniformly apply coatings at spreading rate required to achieve specified dry film thickness (DFT).

C. Apply coatings to be free of film characteristics or defects that would adversely affect performance or appearance of coating systems.

D. Apply primer at thickness recommended by manufacturer.

E. Apply thermal insulative coating as specified in the Fluid-Applied Insulative Coating Schedule.

F. Apply topcoat at thickness recommended by the manufacturer.

G. Final dry film thickness (DFT) shall be measured with a dry film thickness gauge.

3.4 FIELD REPAIR

A. Damaged Coatings: All patching and repair to material, due to damage by other trades, shall be performed under this section and paid for by the trade responsible for the damage. Patching shall be performed by applicators certified by the manufacturer and applied in accordance with the manufacturer application instructions.

B. Coating Defects: Repair in accordance with manufacturer's instructions coatings that exhibit film characteristics or defects that would adversely affect performance or appearance of coating systems.

3.5 FIELD QUALITY CONTROL

A. The Owner will engage an independent testing laboratory inspect and verify the application of material in accordance with the provisions of the Tnemec Company.
   1. Material inspection and testing shall be performed 24 hours after completion of final application coat.
   2. The results of the above tests shall be made available to all parties at the completion of each pre-designated area and approval.
   3. In-place material not in compliance with the specified thickness requirements shall be corrected prior to final acceptance.

B. The dry film thickness (DFT) of the applied material shall be measured with a non-destructive coating thickness gage after material has completely cured. All measurements shall be documented in writing and furnished to the Owner.

C. Manufacturer's Technical Services: Coordinate with coating manufacturer's technical service department or independent sales representative for current technical data and instructions.

3.6 CLEANING AND PROTECTION

A. Remove overspray materials from surfaces not required to be thermally protected.

B. Protect surfaces of coating systems from damage during transportatino to site and construction.

C. Touch-up, or repair damaged products before Substantial Completion.

3.7 ONE-YEAR INSPECTION

A. Owner will set date for one-year inspection of coating systems.

B. Inspection shall be attended by Owner, Contractor, Architect, and manufacturer's representative.

C. Repair deficiencies in coating systems as determined by Architect in accordance with manufacturer’s instructions.

3.8 FLUID-APPLIED INSULATIVE COATING SCHEDULE

A. Steel Members Penetrating Exterior Building Envelope/Inside Face of Metal Framing/Concrete Slab Edges/Aluminum Window Frames, Condensation Control: Basis of Design Systems.
   1. Fluid-Applied Thermal Break System, Water-Based (for Galvanized Steel):
      a) Surface Preparation: SSPC-16, unless otherwise recommended by coating manufacturer.
      b) Prime Coat (Shop): Tnemec; **Series 1224 Epoxoline WB**, DFT of 4.0 to 10.0 mils (100 to 250 microns) per coat.
      c) Intermediate Coat (Shop or Field) – Two Coats: **Tnemec**: **Series 971 Aerolon Acrylic**, DFT of 40.0 to 50.0 mils (1000 to 1250 microns) per coat. Total thickness of Series 971: 80 to 100 mils (2000 to 2500 microns).
      d) Finish Coat: **Tnemec**; **Series 1028 Enduratone**, DFT of 2.0 to 3.0 mils (50 to 75 microns) per coat.
   2. Fluid-Applied Thermal Break System, Mio-Zinc MCU Primer (Ungalvanized Steel):
      a) Surface Preparation: SSPC-SP 6, unless otherwise recommended by coating manufacturer.
      b) Prime Coat (Shop): **Tnemec**; **Series 394-0250 PerimePrime**, DFT of 2.5 to 3.5 mils (65 to 90 microns) per coat.
      c) Intermediate Coat (Shop or Field) – Two Coats: **Tnemec**; **Series 971 Aerolon Acrylic**, DFT of 40.0 to 50.0 mils (1000 to 1250 microns) per coat. Total thickness of Series 971: 80 to 100 mils (2000 to 2500 microns).

d) Finish Coat: **Tnemec**; **Series 1028 Enduratone**, DFT of 2.0 to 3.0 mils (50 to 75 microns) per coat.

END OF SECTION 07 2163

SECTION 07 2410 - DIRECT-APPLIED EXTERIOR FINISH SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Direct-Applied Exterior Finish System (DEFS): Finish coating applied to cement-based sheathing fastened over metal stud framing infilled with insulation.
   1. Soffits.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 01 7419 – Construction Waste Management and Disposal.

C. Section 06 1000 - Rough Carpentry: Exterior sheathing.

1.3 REFERENCE STANDARDS

A. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus; 2019.

B. ASTM C1325 - Standard Specification for Fiber-Mat Reinforced Cementitious Backer Units; 2019.

C. ASTM C1397 - Standard Practice for Application of Class PB Exterior Insulation and Finish Systems (EIFS) and EIFS with Drainage; 2013 (Reapproved 2019).

D. ASTM D968 - Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive; 2017.

E. ASTM D2247 - Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity; 2015.

F. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2021.

G. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2023).

H. ASTM E2273 - Standard Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish Systems (EIFS) Clad Wall Assemblies; 2018.

I. ASTM G153 - Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials; 2013.

J. ASTM G155 - Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Nonmetallic Materials; 2013.

K. ICC-ES AC219 - Acceptance Criteria for Exterior Insulation and Finish Systems; 2009, with Editorial Revision (2014).

L. ICC-ES AC235 - Acceptance Criteria for EIFS Clad Drainage Wall Assemblies; 2009, with Editorial Revision (2012).

M. NFPA 259 - Standard Test Method for Potential Heat of Building Materials; 2018.

N. NFPA 268 - Standard Test Method for Determining Ignitibility of Exterior Wall Assemblies Using a Radiant Heat Energy Source; 2017.

O. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components; 2023.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on system materials, product characteristics, performance criteria, and system limitations.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Shop Drawings: Indicate soffit joint patterns, joint details, and molding profiles.

E. Verification Samples: Submit actual samples of selected coating on specified substrate, minimum 12 inches square, illustrating project colors and textures.

F. Manufacturer's Installation Instructions: Indicate preparation required, installation techniques, and jointing requirements.

G. Installer's qualification statement.

1.5 QUALITY ASSURANCE

A. Maintain copy of specified installation standard and manufacturer's installation instructions at project site during installation.

B. Installer Qualifications: Company specializing in the type of work specified and with at least three years of documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 7419 - Construction Waste Management and Disposal for packaging waste requirements.

B. Delivery: Deliver materials to project site in manufacturer's original, unopened containers with labels intact. Inspect materials and notify manufacturer of any discrepancies.

C. Storage: Store materials as directed by manufacturer's written instructions.
   1. Protect adhesives and finish materials from freezing, temperatures below 40 degrees F and temperatures in excess of 90 degrees F.
   2. Protect insulation materials from exposure to sunlight.

1.7 FIELD CONDITIONS

A. Do not prepare materials or apply DEFS under conditions other than those described in the manufacturer's written instructions.

B. Do not prepare materials or apply DEFS during inclement weather unless areas of installation are protected. Protect installed DEFS areas from inclement weather until dry.

C. Do not install coatings or sealants when ambient temperature is below 40 degrees F.

D. Do not leave installed insulation board exposed to sunlight for extended periods of time.

1.8 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Provide manufacturer's standard material warranty, covering a period of not less than 5 years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design:
   1. **Sto Corp**; **StoQuik Finish System**: www.stocorp.com/#sle.

B. Other Acceptable Direct-Applied Exterior Finish Systems Manufacturers:
   1. Dryvit Systems, Inc; Dryvit Cement Board MD Finish System: www.dryvit.com/#sle.
   2. Omega Products; AkroGold DEF System: www.omega-products.com.
   3. Parex USA, Inc; WaterMaster NuTech: www.parex.com/#sle.
   4. Substitutions: See Section 01 6000 - Product Requirements.

2.2 DIRECT-APPLIED EXTERIOR FINISH SYSTEM

A. Direct-Applied Exterior Fiinish System **DFS1**: Reinforced finish coating on cement board soffit panels mechanically fastened to framing.

B. Fire Characteristics:
   1. Flammability: Pass, when tested in accordance with NFPA 285.
   2. Ignitibility: No sustained flaming when tested in accordance with NFPA 268.

3. Fire Resistance: Complies with fire resistance requirements indicated on the drawings as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.
4. Potential Heat of Foam Plastic Insulation Tested Independently of Assembly: No portion of the assembly having potential heat that exceeds that of the insulation sample tested for flammability (above), when tested in accordance with NFPA 259 with results expressed in Btu per square foot.

C. Water Penetration Resistance: No water penetration beyond the plane of the base coat/insulation board interface after 15 minutes, when tested in accordance with ASTM E331 at 6.24 psf differential pressure with tracer dye in the water spray; include in tested sample at least two vertical joints and one horizontal joint of same type to be used in construction; disassemble sample if necessary to determine extent of water penetration.

D. Drainage Efficiency: Average minimum efficiency of 90 percent, when tested in accordance with ASTM E2273 for 75 minutes.

E. Salt Spray Resistance: No cracking, checking, crazing, erosion, blistering, peeling, delamination, or corrosion of finish coating after 300 hours exposure in accordance with ASTM B117, using at least three samples matching intended assembly, at least 4 by 6 inches in size.

F. Freeze-Thaw Resistance: No cracking, checking, crazing, erosion, blistering, peeling, delamination, or corrosion of finish coating when viewed under 5x magnification after 10 cycles, when tested in accordance with ICC-ES AC219 or ICC-ES AC235.

G. Weathering Resistance: No cracking, checking, crazing, erosion, blistering, peeling, delamination, or corrosion of finish coating when viewed under 5x magnification after 2000 hours of accelerated weathering conducted in accordance with ASTM G153 Cycle 1 or ASTM G155 Cycles 1, 5, or 9.

H. Water Degradation Resistance: No cracking, checking, crazing, erosion, blistering, peeling, delamination, or corrosion of finish coating after 14 days exposure, when tested in accordance with ASTM D2247.

I. Mold Resistance: No growth supported on finish coating during 60 day exposure period, when tested in accordance with ASTM D3273.

J. Abrasion Resistance Of Finish: No cracking, checking or loss of film integrity when tested in accordance with ASTM D968 with 113.5 gallons of sand.

2.3 MATERIALS

A. Finish Coating Top Coat: Water-based, air curing, acrylic or polymer-based finish with integral color and texture.
1. Texture: Sto Corp; Specialty Finish Stolit Milano; www.stocorp.com/#sle.
2. Color: As selected by Architect from manufacturer's custom range.

B. Base Coat: Acrylic- or polymer-modified, fiber reinforced Portland cement coating, Class PM.
1. Portland Cement: ASTM C150/C150M, Type I or II.
2. Base Coat Thickness: 1/4 inch, minimum.
3. Products:

a) Basis-of-Design: **Sto Corp**.; **Sto BTS Plus.**
b) Substitutions: See Section 01 6000 - Product Requirements.

C. Reinforcing Mesh: Balanced, open weave glass fiber fabric, treated for compatibility and improved bond with coating, weight, strength, and number of layers as required to meet required system impact rating.
1. Basis-of-Design: **Sto Corp**.: **Sto Mesh**.
2. Impact Resistance: Standard.

D. Primer: Acrylic-based sanded primer for use with textured finishes.
1. Basis-of-Design: **Sto Corp**; **StoPrime Sand**.

E. Cementitious Substrate Boards: Type A exterior units, fiber-mat reinforced; ASTM C1325.
1. Thickness: 5/8 inch, unless otherwise indicated on the drawings.
2. Size: 48 by 96 inches.
3. Products:
a) James Hardie; HardieBacker Cement Board.
b) National Gypsum Company; PermaBase Cement Board: https://nationalgypsum.com.
c) USG Corporation; Durock Brand Cement Board: www.usg.com.

2.4 ACCESSORIES

A. Sealant Materials: Compatible with DEFS materials and as recommended by DEFS manufacturer.

B. Water: Clean and potable.

C. Portland Cement: Type I, ASTM C150.

D. Exterior Soffit Vents: One piece, perforated, rigid solid vinyl, with edge suitable for direct application to cement board and manufactured especially for soffit application. Provide continuous vent as indicated on drawings.
1. Reveal Width: 3 inches.
2. Depth: 5/8 inch minimum.
3. Color: White.
4. Basis of Design: **ClarkDietrich**; **Architectural Vented "F" Channel Reveal - SurfaceMount, Model AFDCV58-300SE.**

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that cecment board substrate is sound and free of oil, dirt, other surface contaminants, efflorescence, loose materials, or protrusions that could interfere with DEFS installation and is of a type and construction that is acceptable to DEFS manufacturer. Do not begin work until substrate and adjacent materials are complete and thoroughly dry.

B. Verify that substrate surface is flat, with no deviation greater than 1/4 in when tested with a 10 ft straightedge.

3.2 PREPARATION

A. Prepare and mix DEFS materials in accordance with DEFS manufacturer's written instructions.

3.3 INSTALLATION - GENERAL

A. Install in accordance with DEFS manufacturer's instructions and ASTM C1397.
   1. Where different requirements appear in either document, comply with the most stringent.
   2. Neither of these documents supercedes provisions of Contract Documents that defines contractual relationships between parties or scope of this work.

3.4 INSTALLATION - DEFS

A. Install DEFS materials in accordance with manufacturer's written instructions and approved shop drawings.

B. Install corrosion proof termination accessories with perforated flanges for keying of the base coat at junctures with penetrations such as soffit vents, electrical fixtures, and with abutting walls and columns.

C. Base Coat: Apply in thickness as necessary to fully embed reinforcing mesh, wrinkle free, including back-wrap at terminations of DEFS. Install reinforcing fabric as recommended by DEFS manufacturer.

D. Apply primer to substrate as recommended by DEFS manufacturer for project conditions.

E. Apply finish coat after base and primers coats have dried not less than 24 hours, unless otherwise recommneded by DEFS manufacturer, and finish to a uniform texture and color.

F. Finish Coat Thickness: As recommended by manufacturer.

G. Seal control and expansion joints within the field of exterior finish and insulation system, using procedures recommended by sealant and finish system manufacturers.

3.5 PROTECTION

A. Protect installed materials from dust, dirt, precipitation, freezing, and / or continuou high humidity until they are fully dry.

B. Protect installed materials from water infiltration into or behind them.

C. Protect completed work from damage and soiling by subsequent work.

END OF SECTION 07 2410

SECTION 07 2726 - FLUID-APPLIED MEMBRANE AIR BARRIERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Vapor-permeable, fluid-applied air barriers.

B. Vapor-retarding (vapor impermeable), fluid-applied air barriers.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 01 4000 - Quality Requirements: Procedures for testing, inspection, mockups, reports, certificates; use of reference standards.

C. Section 01 6000 - Product Requirements: Fundamental product requirements, substitutions and product options, delivery, storage, and handling.

D. Section 07 9200 - Joint Sealants: Joint-sealant materials and installation.

1.3 DEFINITIONS

A. Air-Barrier Material: A primary element that provides a continuous barrier to the movement of air.

B. Air-Barrier Accessory: A transitional component of the air barrier that provides continuity.

C. Air-Barrier Assembly: The collection of air-barrier materials and accessories applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.4 REFERENCE STANDARDS

A. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2020a.

B. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.

C. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension; 2016.

D. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating; 2005 (Reapproved 2017).

E. ASTM D4541 - Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers; 2017.

F. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials; 2021a.

G. ASTM E2357 - Standard Test Method for Determining Air Leakage Rate of Air Barrier Assemblies; 2023a.

H. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

I. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2023.

J. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components; 2023.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Conduct a preinstallation meeting at project site one week prior to the start of the work of this section; require attendance by all affected installers.
   1. Review air-barrier requirements and installation, special details, mockups, air-leakage and bond testing, air-barrier protection, and work scheduling that covers air barriers.
   2. Include installers of other construction connecting to air-barrier, such as roofing, waterproofing, masonry, joint sealants, windows, and door frames.
   3. Review air-barrier requirements including surface preparation, substrate condition and pretreatment, minimum substrate curing period, forecasted weather conditions, special details and sheet flashings, mockups, installation procedures, sequence of installation, air-leakage and bond testing, inspecting procedures, and protection and repairs.

1.6 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide for each type of product.
   1. Include manufacturer's written instructions for evaluating, preparing, and treating each substrate; technical data; dry film thickness; and tested physical and performance properties of products.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit 5d: For air-barrier products, documentation including printed statement of VOC content.
   2. Laboratory Test Reports for Credit 5d: For air-barriers, documentation indicating that products comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

D. Shop Drawings: Submit for air-barrier assemblies.
   1. Show locations and extent of air-barrier materials, accessories, and assemblies specific to project conditions.
   2. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
   3. Include details of interfaces with curtain walls, storefronts, doors, windows, louvers, and other materials that form part of the air-barrier.

4. Include details specific to this project; generic details are not permitted.

E. Qualification Data: Provide for installer. Include list of ABAA-certified installers and supervisors employed by installer, who work on project.

F. Product Certificates: From air-barrier manufacturer, certifying compatibility of air barriers and accessory materials with project materials that connect to or that come in contact with the barrier.

G. Product Test Reports: For each air-barrier assembly indicating and interpreting test results of air and vapor barrier system performed by a qualified testing agency.
1. Submit test results for air permeance in accordance with ASTM E2178.
2. Submit test results for air leakage volume testing in accordance with ASTM E2357.

H. Field quality-control reports.

I. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

J. Specimen Warranty: Submit copy of special air and vapor barrier system manufacturer's warranty stating obligations, remedies, limitations, and exclusions before starting air and vapor barrier system installation.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least 10 years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least five years of documented experience and approved by manufacturer.
1. Installer shall have successfully completed at least three projects of similar scope and complexity to this project within the past five years.
2. Installer must show evidence of adequate equipment and trained field personnel to successfully complete the project.

C. Material Compatibility: Air and vapor barrier system primary materials including fluid-applied membrane, flashing primer, and transition membranes shall be compatible with adjacent materials and sourced from one manufacturer regularly engaged in the production of air and vapor barrier materials.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver liquid materials to project site in original containers with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, shelf life, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by air barrier system manufacturer. Do not double stack pallets of materials.

C. Remove and replace liquid materials that cannot be applied within their stated shelf life.

D. Protect stored materials from direct sunlight, extreme heat, and freezing.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended in writing by air-barrier manufacturer, but at not less than 40 degrees F. Do not apply air barrier system when relative humidity exceeds 85 percent, or when temperatures are less than 5 degrees F above dew point.
   1. Do not apply air barrier system to a damp or wet substrate or during snow, rain, fog, or mist.
   2. Protect substrates from environmental conditions that affect air-barrier performance.

1.10 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Special Manufacturer's Warranty: Written warranty, signed by air barrier system manufacturer agreeing to repair or replace air barrier system that does not comply with requirements or that does not remain watertight within specified warranty period.
   1. Warranty does not include failure of air barrier system due to failure of substrate prepared and treated according to requirements or formation of new joints and cracks in substrate that exceed 1/16 inch in width.
   2. Warranty Period: Correct defective Work within a two year period after Date of Substantial Completion.
   3. Warranty Period for Material Only:five years from Date of Substantial Completion.

C. Installer Warranty: Written warranty, signed by installer, agreeing to repair or replace materials installed according to manufacturer's written recommendations, that fails in performance, materials, or workmanship within specified warranty period.
   1. Warranty Period: Two years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MATERIALS

A. Source Limitations: Obtain primary air-barrier materials and accessories from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Air-Barrier Performance: Air-barrier assembly and seals with adjacent construction shall be capable of performing as a continuous air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, tie-ins to installed waterproofing, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

B. Air-Barrier Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft., when tested according to ASTM E2357.

C. UV Resistance: Air-barrier can be exposed to sunlight for 30 days in accordance with manufacturer's written instructions.

D. Fire Performance Characteristics: Provide air-barrier meeting the following fire-test characteristics:
   1. Surface Burning Characteristics: ASTM E84.
      a) Flame Spread Index: 25 or less.
      b) Smoke Developed Index: 450 or less.

E. Vapor-permeable membrane air barrier shall be chemically and adhesively compatible with substrate and adjacent materials and been tested in an assembly with the insulation in accordance with NFPA 285.

F. Low Temperature Installation: Provide products suitable for low temperature installation as required by construction schedule. Apply air barrier system within the range of ambient and substrate temperatures recommended by air barrier manufacturer, but a not less than 25 degrees F.

2.3 HIGH-BUILD AIR BARRIERS, VAPOR PERMEABLE

A. High-Build, Vapor-Permeable Air Barrier Synthetic Polymer Type: Elastomeric membrane with an installed dry film thickness, according to manufacturer's written instructions, of 35 mils or thicker over smooth, void-free substrates..
   1. Basis-of-Design Product: Subject to compliance with requirements, provide **Air-Bloc 33MR** manufactured by **Henry Company:** www.henry.com, or one of the following:
      a) Carlisle Coatings & Waterproofing; Barritech VP: www.carlisleccw.com,
      b) Tremco; ExoAir 220: www.tremcosealants.com.
      c) Substitutions: See Section 01 6000 - Product Requirements.

B. Physical and Performance Properties:
   1. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference; ASTM E2178.
   2. Vapor Permeance: Nominal 11; ASTM E96/E96M, Method B,
   3. Adhesion to Substrate: Minimum 16 lbf/sq. in. when tested according to ASTM D4541.
   4. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
   5. UV Resistance: Can be exposed to sunlight for 30 days in accordance with manufacturer's written instructions.

2.4 HIGH-BUILD VAPOR-RETARDING AIR BARRIERS

A. High-Build, Vapor-Retarding (Vapor Impermeable) Air Barrier Synthetic Polymer Type: Synthetic polymer membrane with an installed dry film thickness, according to manufacturer's written instructions, of 35 mils or thicker over smooth, void-free substrates.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide **Air-Bloc 16MR** manufactured by **Henry Company** or one of the following:
      a) Henry Company; Air-Bloc 16MR: www.henry.com.

b) GCP Applied Technologies; Perm-A-Barrier NPL 10: www.gcpat.com.
c) Substitutions: See Section 01 6000 - Product Requirements.

B. Physical and Performance Properties:
1. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. (0.02 L/s x sq. m of surface area at 75-Pa) pressure difference; ASTM E2178.
2. Vapor Permeance: Maximum 0.1 perm (5.8 ng/Pa x s x sq. m); ASTM E96/E96M, Procedure A, Desiccant Method.
3. Ultimate Elongation: Minimum 500 percent; ASTM D412, Die C.
4. Adhesion to Substrate: Minimum 16 lbf/sq. in. (110 kPa) when tested according to ASTM D4541.
5. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
6. UV Resistance: Can be exposed to sunlight for 90 days according to manufacturer's written instructions.

2.5 ACCESSORY MATERIALS

A. Provide primers, transition strips, termination strips, joint reinforcing fabric and strips, joint sealants, counterflashing strips, flashing sheets and metal termination bars, termination mastic, substrate patching materials, adhesives, tapes, foam sealants, lap sealants, and other accessory materials that are recommended in writing by air-barrier manufacturer to produce a complete air-barrier assembly and that are compatible with primary air-barrier material and adjacent construction to which they may seal.

B. Primer: Liquid waterborne primer recommended for substrate by air barrier material manufacturer.

C. Stainless Steel Sheet: ASTM A240/A240M, Type 304, 0.0187 inch thick, and Series 300 stainless steel fasteners.

D. Preformed Silicone Extrusion: Manufacturer's standard system consisting of cured low-modulus silicone extrusion, sized to fit opening widths, with a single-component, neutral-curing, Class 100/50 (low-modulus) silicone sealant for bonding extrusions to substrates.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Verify that substrates, areas, and conditions comply with requirements and other conditions affecting performance of the Work.
1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
2. Verify that substrates have cured and aged for minimum time recommended in writing by air-barrier manufacturer.
3. Verify that substrates are visibly dry and free of moisture. Test concrete and masonry substrates for capillary moisture by plastic sheet method in accordance with ASTM D4263.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

A. Clean, prepare, treat, fill, and seal substrate and joints and cracks in substrate according to manufacturer's written instructions and details. Provide clean, dust-free, and dry substrate for air-barrier application.

B. Mask off adjoining surfaces not covered by air-barrier to prevent spillage and overspray affecting other construction.

C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching material.

E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.

F. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.

G. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

H. Bridge isolation joints and expansion joints and discontinuous wall-to-wall, deck-to-wall, and deck-to-deck joints with air-barrier accessory material that accommodates joint movement according to manufacturer's written instructions and details.

3.3 SUBSTRATE JOINT TREATMENT

A. Masonry: Prepare, treat, rout, and fill joints and cracks in substrate in accordance with ASTM C1193 and air-barrier manufacturer's written instructions. Remove dust and dirt from joints and cracks in compliance with ASTM D4258 befoere coating substrate surfaces.
   1. Prime substrate and apply a single thickness of preparation coat strip extending a minimum of 3 inches along each side of joints and cracks. Apply a double thickness of air-barrier membrane and embed a joint reinforcing strip in preparation coat.

B. Gypsum Sheathing: Apply first layer of fluid air-barrier material at joints. Tape joints with joint reinforcing strip after first layer is dry. Apply a second layer of fluid air-barrier material over joint reinforcing strip.
   1. Fill joints greater than 1/4 inch in accordance with ASTM C1193 and air-barrier manufacturer's written instructions.

3.4 ACCESSORIES INSTALLATION

A. Install accessory materials in accordance with air-barrier manufacturer's written instructions and details to form a seal with adjacent construction and ensure continuity of air and water barrier.
   1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.

2. Install transition strip on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over each substrate.
3. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
4. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.

B. Connect and seal exterior wall air-barrier material continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.

C. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.

D. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

E. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply transition strip so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain 3 inches of full contact over firm bearing to perimeter frames, with not less than 1 inch of full contact.
1. Transition Strip: Roll firmly to enhance adhesion.

F. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air-barrier material with foam sealant.

G. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.

H. Seal top of through-wall flashings to air barrier with an additional 6-inch wide, transition strip.

I. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.

J. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches beyond repaired areas in strip direction.

3.5 PRIMARY AIR-BARRIER MATERIAL INSTALLATION

A. Apply air-barrier material to form a seal with strips and transition strips and to achieve a continuous air barrier according to air-barrier manufacturer's written instructions and details. Apply air-barrier material within manufacturer's recommended application temperature ranges.
1. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
2. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.

3. Where multiple prime coats are needed to achieve required bond, allow adequate drying time between coats.

B. High-Build Air Barriers: Apply continuous unbroken air-barrier material to substrates according to the following thickness. Apply air-barrier material in full contact around protrusions such as masonry ties.
   1. Vapor-Retarding, High-Build Air Barrier: Total dry film thickness [as recommended in writing by manufacturer to comply with performance requirements, but not less than 35 mils, applied in one coat.
   2. Vapor-Permeable, High-Build Air Barrier: Total dry film thickness as recommended in writing by manufacturer to comply with performance requirements, but not less than 35 mils (0.9 mm), applied in one coat.

C. Do not cover air barrier until it has been tested and inspected by testing agency.

D. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.6 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

C. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements. Inspections may include the following:
   1. Verify that continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
   2. Verify air-barrier dry film thickness.
   3. Verify that continuous structural support of air-barrier system has been provided.
   4. Verify that masonry and concrete surfaces are smooth, clean, and free of cavities, protrusions, and mortar droppings.
   5. Verify that site conditions for application temperature and dryness of substrates have been maintained.
   6. Verify that maximum exposure time of materials to UV deterioration has not been exceeded.
   7. Verify that surface have been primed, if applicable.
   8. Verify that laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
   9. Verify that termination mastic has been applied on cut edges.
   10. Verify that strips and transition strips have been firmly adhered to substrate.
   11. Verify that compatible materials have been used.
   12. Verify that transitions at changes in direction and structural support at gaps have been provided.
   13. Verify that connections between assemblies (air-barrier and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
   14. Verify that all penetrations have been sealed.

D. Tests: As determined by testing agency from among the following tests:

1. Air-Leakage-Location Testing: Air-barrier assemblies will be tested for evidence of air leakage in accordance with ASTM E1186, chamber pressurization or depressurization with smoke tracers.
2. Air-Leakage-Volume Testing: Air-barrier assemblies will be tested for air-leakage rate in accordance with ASTM E783.
3. Adhesion Testing: Air-barrier assemblies will be tested for required adhesion to substrate according to ASTM D4541 for each 600 sq. ft. of installed air barrier or part thereof.
4. Air barriers will be considered defective if they do not pass tests and inspections.
   a) Apply additional air-barrier material, according to manufacturer's written instructions, where inspection results indicate insufficient thickness.
   b) Remove and replace deficient air-barrier components for retesting as specified above.
5. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.
6. Prepare test and inspection reports.

3.7 CLEANING

A. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

B. Remove masking materials upon completion of installation.

3.8 PROTECTION

A. Protect installed air-barrier system from damage during application and remainder of construction period, in accordance with manufacturer's written instructions.
   1. Protect air barrier from exposure to UV light and harmful weather exposure as recommended in writing by manufacturer. If exposed to these conditions for longer than recommended, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed materials according to air-barrier manufacturer's written instructions.
   2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.

END OF SECTION 07 2726

SECTION 07 4213.23 - METAL COMPOSITE MATERIAL WALL PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Exterior cladding panels consisting of formed metal composite material (MCM) sheet, secondary supports, and anchors to structure, attached to solid backup. Provide all accessories required for a complete installation.

B. Matching flashing and trim.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 01 7419 – Construction Waste Management and Disposal

C. Section 07 2726 - Fluid-Applied Membrane Air Barriers: Air and water barrier behind wall panel system.

D. Section 07 6200 - Sheet Metal Flashing and Trim: Metal flashing components integrated with this wall system.

E. Section 07 9200 - Joint Sealants: Sealing joints between siding and adjacent construction and fixtures.

1.3 REFERENCE STANDARDS

A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017a.

B. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

E. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

F. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes; 2023.

G. ASTM A480/A480M - Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip; 2020a.

H. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

I. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.

J. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2010 (Reapproved 2015).

K. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.

L. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

M. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.

N. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

O. ASTM D1781 - Standard Test Method for Climbing Drum Peel for Adhesives; 1998 (Reapproved 2012).

P. ASTM D1929 - Standard Test Method for Determining Ignition Temperature of Plastics; 2020.

Q. ASTM D4145 - Standard Test Method for Coating Flexibility of Prepainted Sheet; 2010 (Reapproved 2018).

R. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

S. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.

T. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014 (Reapproved 2021).

U. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2023).

V. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components; 2023.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Meeting: Convene one week before starting work of this section to verify project requirements, coordinate with installers of other work, establish condition and completeness of building substrate, and review manufacturers' installation instructions and warranty requirements.

1. Require attendance by the installer and relevant sub-contractors.
2. Include MCM sheet manufacturer's representative and wall system manufacturer's representative to review storage and handling procedures.
3. Review in detail truck transportation, parking, vertical transportation, schedule, personnel, installation of adjacent materials and substrate.
4. Review procedures for protection of work and other construction.
5. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
6. Review methods and procedures related to metal panel installation, including manufacturer's written instructions.
7. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
8. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that affect metal panels.
9. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
10. Review temporary protection requirements for metal panel assembly during and after installation.
11. Review of procedures for repair of metal panels damaged after installation.
12. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data - MCM Sheets: Manufacturer's data sheets on each product to be used, including thickness, physical characteristics, and finish, and:
   1. Finish manufacturer's data sheet showing physical and performance characteristics.
   2. Storage and handling requirements and recommendations.
   3. Fabrication instructions and recommendations.
   4. Specimen warranty for finish, as specified herein.

C. Product Data - Wall System: Manufacturer's data sheets on each product to be used, including:
   1. Physical characteristics of components shown on shop drawings.
   2. Storage and handling requirements and recommendations.
   3. Installation instructions and recommendations.
   4. Specimen warranty for wall system, as specified herein.

D. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Data for Credit d10: For products an materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

E. Shop Drawings: Show layout and elevations, dimensions and thickness of panels, connections, details and location of joints, sealants and gaskets, method of anchorage, support clips, number of anchors, supports, reinforcement, trim, flashings, and accessories.
   1. Indicate panel numbering system.
   2. Differentiate between shop and field fabrication.
   3. Indicate substrates and adjacent work with which the wall system must be coordinated.
   4. Include large-scale details of anchorages and connecting elements.
   5. Include large-scale details or schematic, exploded or isometric diagrams to fully explain flashing at a scale of not less than 1-1/2 inches per 12 inches.
   6. Include design engineer's stamp or seal on shop drawings for attachments and anchors.

F. Verification Samples: For each finish product specified, submit at least three samples, minimum size 12 inch square, and representing actual product in color and texture.

G. Delegated Design Submittal: For metal wall panel asembly indicated to comply with performance requirements and design criteria, submit structural calculations signed and sealed by the qualified professional structural engineer responsible for their preparation.

H. Coordination Drawings: Exterior elevations drawn to scale and coordinating penetrations and wall-mounted items. Show the following:
   1. Wall panels and attachments.
   2. Wall-mounted items including doors, windows, louvers, and lighting fixtures.
   3. Penetrations of wall by pipes and utilities.

I. Test Report: Submit report of full-size mock-up tests for air infiltration, water penetration, and wind performance.

J. Test Report: Submit test report verifying compliance with NFPA 285 for previously-tested exterior wall assembly.

K. Manufacturer's Field Reports: Provide within 48 hours of field review. State what was observed and what changes, if any, were requested or required.

L. Designer's qualification statement.

M. Manufacturer's qualification statement.

N. Installer's qualification statement.

O. Testing agency's qualification statement.

P. Maintenance Data: Care of finishes and warranty requirements.

Q. Executed Warranty: Submit warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.6 QUALITY ASSURANCE

A. Field Measurements: Verify actual dimensions by field measurement before fabrication; show recorded measurements on shop drawings.

B. Design Engineer's Qualifications: Design structural supports and anchorages under direct supervision of a Structural Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

C. Manufacturer Qualifications: Company specializing in manufacturing wall panel systems specified in this section.
   1. With not less than seven years of documented experience.
   2. Approved by MCM sheet manufacturer.

D. Installer Qualifications: Company specializing in performing work of type specified in this section.
   1. With minimum five years of documented experience.
   2. Approved by wall panel system manufacturer.

E. Testing Agency Qualifications: Independent agency experienced in testing assemblies of the type required for this project and having the necessary facilities for full-size mock-up testing of the type specified.

1.7 MOCK-UPS

A. See Section 01 4000 - Quality Requirements for additional requirements.

B. Provide a mock-up for evaluation of fabrication workmanship.

C. Locate where directed.

D. Provide specified finish on panels.

E. Mock-up may remain as part of work.

1.8 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 7419 - Construction Waste Management and Disposal for packaging waste requirements.

B. Deliver products in manufacturer's original, unopened, undamaged containers with identification labels intact.
   1. Protect finishes by applying heavy-duty removable plastic film during production.
   2. Package for protection against transportation damage.
   3. Provide markings to identify components consistently with drawings.
   4. Exercise care in unloading, storing, and installing panels to prevent bending, warping, twisting, and surface damage.

C. Store products protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
   1. Store in well-ventilated space out of direct sunlight.
   2. Protect from moisture and condensation with tarpaulins or other suitable weathertight covering installed to provide ventilation.
   3. Store at a slope to ensure positive drainage of accumulated water.
   4. Do not store in enclosed space where ambient temperature can exceed 120 degrees F.

5. Avoid contact with other materials that might cause staining, denting, or other surface damage.

1.9 FIELD CONDITIONS

A. Do not install panels when air temperature or relative humidity are outside manufacturer's limits.

1.10 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Correct defective work within a one-year period after Date of Substantial Completion.

C. Finish Warranty: Provide 20-year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking. Complete forms in Owner's name and register with warrantor.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Metal Composite Material (MCM) Sheet Manufacturers:
1. Basis of Design: **3A Composites USA; ALUCOBOND PLUS:** www.alucobondusa.com/#sle.
2. ALPOLIC Materials; ALPOLIC/fr (Fire Retardant core): www.alpolic-americas.com/#sle.
3. Arconic Architectural Products LLC; Reynobond FR - RB160FR.
4. Fairview Architectural LLC; VitraBond (Fire Rated): www.fairview-na.com/#sle.
5. Substitutions: See Section 01 6000 - Product Requirements.

B. Wall Panel System Manufacturers:
1. Alucoil North America LLC: www.evopanels.com/#sle.
2. East Coast Metal Systems, Inc: www.ecmsinc.net/#sle.
3. Fairview Architectural LLC: www.fairview-na.com/#sle.
4. Kanalco Ltd: www.kanalco.com/#sle.
5. Petersen Aluminum Corporation: www.pac-clad.com/#sle.
6. Substitutions: See Section 01 6000 - Product Requirements.

2.2 WALL PANEL SYSTEM

A. Wall Panel System: Metal panels, fasteners, and anchors designed to be supported by framing or other substrate provided by others; provide installed panel system capable of maintaining specified performance without defects, damage, or failure.
1. Provide structural design by or under direct supervision of a Structural Engineer licensed in the State in which the Project is located.
2. Provide panel jointing and weatherseal using reveal joints and gaskets but no sealant.
3. Anchor panels to supporting framing without exposed fasteners.

B. Performance Requirements:

1. Thermal Movement: Provide for free and noiseless vertical and horizontal thermal movement due to expansion and contraction under material temperature range of minus 20 degrees F to 180 degrees F without buckling, opening of joints, undue stress on fasteners, or other detrimental effects; allow for ambient temperature at time of fabrication, assembly, and erection procedures.
2. Wind Performance: Provide system tested in accordance with ASTM E330/E330M without permanent deformation or failures of structural members under the following conditions:
   a) Design Wind Pressure: As indicated on the Structural drawings.
   b) Wind Load: panels shall be designed to withstand the design loads indicated, but not less than 20 psf and 30 psf on parapet and corner panels.
3. Maximum deflection of perimeter framing member of L/175 normal to plane of the wall; maximum deflection of individual panels of L/60.
4. Maximum anchor deflection in any direction of 1/16 inch at connection points of framing members to anchors.
5. Seismic Loads: Provde metal wall panel assemblies capable of withstanding the effects of earthquake motions calculatd according to the Connecticut State Building Code, as determined by the fabricator's design engineer.
6. Air Leakage: 0.06 cfm/sq ft maximum leakage when tested at 1.57 psf pressure difference in accordance with ASTM E283/E283M.
7. Water Penetration: No water penetration under static pressure when tested in accordance with ASTM E331 at a differential of 10 percent of inward acting design load, 6.27 psf minimum, after 15 minutes.
   a) Water penetration is defined as the appearance of uncontrolled water on the interior face of the wall.
   b) Design to drain leakage and condensation to the exterior face of the wall.
8. Fire Performance: Pass, using test method complying with NFPA 285.
9. Building Envelope Performance: Comply with ASHRAE Std 90.1 I-P when tested as part of building envelope assembly.

2.3 PANELS

A. General: Provide factory-formed and -assembled metal-faced wall panels fabricated from metal composite material and formed into profile for installation method indicated. Include attachment system components and accessories required for complete weathertight system and installation.

B. Panels: 2 inch deep pans formed of metal composite material sheet by routing back edges of sheet, removing corners, and folding edges.
   1. Reinforce corners with riveted aluminum angles.
   2. Provide concealed attachment to supporting structure by adhering attachment members to back of panel; attachment members may also function as stiffeners.
   3. Maintain maximum panel bow of 0.8 percent of panel dimension in width and length; provide stiffeners of sufficient size and strength to maintain panel flatness without showing local stresses or read-through on panel face.
   4. Reinforce panels over 48 inches long with metal angle braces 24 inches on center in short direction.
   5. Secure members to back face of panels using structural silicone sealant approved by MCM sheet manufacturer.

6. Metallic Finished Panels: Maintain consistent grain of MCM sheet; specifically, do not rotate sheet purely to avoid waste.
7. Fabricate panels under controlled shop conditions.
8. Where final dimensions cannot be established by field measurement before commencement of manufacturing, make allowance for field adjustments without requiring field fabrication of panels.
9. Fabricate as indicated on drawings and as recommended by MCM sheet manufacturer.
   a) Make panel lines, breaks, curves, and angles sharp and true.
   b) Keep plane surfaces free from warp or buckle.
   c) Keep panel surfaces free of scratches or marks caused during fabrication.
10. Provide joint details providing a watertight and structurally sound wall panel system that allows no uncontrolled water penetration on inside face of panel system.
11. For "dry" jointing, secure extrusions to returned pan edges with stainless steel rivets; provide means of concealed drainage with baffles and weeps for water that might accumulate in members of system.

C. Attachment Assembly: Manufacturer's standard rainscreen system.
   1. System utilizes an extruded horizontal and vertical extrusion system. Reveal joint is open dry joint in accordance with rainscreen principles.

D. Attachment System Components: Formed from extruded aluminum.
   1. Include manufacturer's standard perimeter extrusions with silicone sealant, panel stiffeners, panel clips. and anchor channels.

2.4 MATERIALS

A. Metal Composite Material (MCM) Sheet: Two sheets of aluminum sandwiching a core of extruded thermoplastic material; no foamed insulation material content.
   1. Overall Sheet Thickness: 4mm / 0.157 inch, minimum.
   2. Face Sheet Thickness: 0.019 inch, minimum.
   3. Core: FR, fire retardant.
   4. Alloy: Manufacturer's standard, selected for best appearance and finish durability.
   5. Bond and Peel Strength: No adhesive failure of the bond between the core and the skin nor cohesive failure of the core itself below 22.4 inch-pound/inch with no degradation in bond performance, when tested in accordance with ASTM D1781, simulating resistance to panel delamination, after 8 hours of submersion in boiling water and after 21 days of immersion in water at 70 degrees F.
   6. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
   7. Flammability: Self-ignition temperature of 650 degrees F or greater when tested in accordance with ASTM D1929.

B. Metal Framing Members: Include sub-girts, zee-clips, base and sill angles and channels, hat-shaped and rigid channels, and furring channels required for complete installation.
   1. Provide material strength, dimensions, configuration as required to meet applied loads, structural design criteria indicated o Structural drawings, and in compliance with applicable building code.
   2. Sheet Steel Components: ASTM A653/A653M galvanized to G90/Z275 or zinc-iron alloy-coated to A60/ZF180; or ASTM A792/A792M aluminum-zinc coated to AZ60/AZM180.

3. Stainless Steel Sheet Components: ASTM A480/A480M.
4. Aluminum Components: ASTM B209/B209M; or ASTM B221 (ASTM B221M).

2.5 FINISHES

A. Factory Finish: Three coat fluoropolymer resin coating, approved by coating manufacturer for length of warranty specified for project, and applied by coil manufacturing facility that specializes in coil applied finishes.
   1. Coating Flexibility: Pass ASTM D4145 minimum 1T Bend at time of manufacturing.
   2. Long-Term Performance: Not less than that specified under WARRANTY in PART 1.

B. Fluoropolymer Coil Coating System: Polyvinylidene fluoride (PVDF) multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent PVDF resin, with at least 80 percent of coil coated metal surfaces having minimum total dry film thickness (DFT) of 0.9 mil, 0.0009 inch.
   1. Color: Custom, match Architect's sample.

C. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

D. Appearance of Finished Work:Variations in the appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved samples. Noticeable variations in the same piece are not acceptable. Variations in the appearance of other components are acceptable if they are within the range of the approved samples and are assembled or installed to minimize contrast.

2.6 ACCESSORIES

A. Flashing: Sheet aluminum; 0.032 inch thick, minimum; finish system and color to match MCM sheet; see Section 07 6200 for additional requirements.
   1. Provide flashing and trim as required to sal against weather and provide a finished appearance. Locations include, but are not limited to: bases, drips, sills, corners, jambs, endwalls, framed openings, soffits, and fillers.

B. Support for Cladding and Continuous Insulation: Thermal clip and rail.
   1. Thermally-broken clips / brackets that provide attachment support for girts, angles, channels, and other cladding support framing. Contractor's option to provide either of the following types:
      a) Thermal Clips: Pultruded fiberglass resin allowing field adjustment and alignment of rails.
      b) Thermal Clips: Extruded aluminum, with thermal spacer at base and slot at top to allow field adjustment and alignment of rails.
         1) Thermal Spacer: Prefastened flame retardant polypropylene copolymer isolator at base of brackets. 3/8 inch nominal thickness.
      c) Range of Height Adjustment: As indicated on drawings.
   2. Extruded vertical and horizontal aluminum rails (girts and subgirts) as indicated on the drawings. Dimensions and thickness(es) as determined by engineering requirements.
   3. Fasteners: Provide support system and cladding attachment fasteners as recommended by system manufacturer in accordance with requirements and as required by the structural design for the wall assembly.

C. Anchors, Clips, and Accessories: Use one of the following:
   1. Stainless steel complying with ASTM A276/A276M, ASTM A480/A480M, or ASTM A666.
   2. Steel complying with ASTM A36/A36M and hot-dip zinc coating to ASTM A153/A153M.
   3. Steel complying with ASTM A36/A36M and hot-dip galvanized to ASTM A123/A123M, with Coating Thickness Grade of 100.

D. Fasteners:
   1. Screws: Self-drilling or self-tapping Type 410 stainless steel or zinc-alloy steel hex washer head, with EPDM or PVC washer under heads of fasteners bearing on weather side of metal wall panels.
   2. Bolts: Stainless steel.
   3. Fasteners for Flashing and Trim: Blind fasteners of high-strength stainless steel.

E. Bituminous Coating: Cold-applied asphalt mastic, noncorrosive compound free of asbestos, sulfur, and other deleterious impurities; 15-mil dry film thickness per coat.

F. Joint Sealer: Provide color to match wall panels silicone sealant of type approved by MCM sheet manufacturer, and in compliance with ASTM C920.

G. Provide panel system manufacturer's and installer's standard corrosion resistant accessories, including fasteners, clips, anchorage devices, and attachments.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine dimensions, tolerances, and interfaces with other work.
   1. Verify that weather barrier system is properly installed

B. Provide tests on full-size mock-ups, performed specifically for this project, unless otherwise indicated.

C. Examine substrate on-site to determine that conditions are acceptable for product installation in accordance with manufacturer's written instructions.
   1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by panel manufacturer.
   2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by panel manufacturer.
   3. Verify that air barrier has been installed over sheathing or backing substrate to prevent air infiltration and water penetration.

D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

E. Notify Architect in writing of conditions detrimental to proper and timely completion of work, and do not proceed with erection until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protect adjacent work areas and finish surfaces from damage during installation.

3.3 INSTALLATION

A. Do not install products that are defective, including warped, bowed, dented, and broken members, and members with damaged finishes.

B. Comply with instructions and recommendations of MCM sheet manufacturer and wall system manufacturer, as well as with approved shop drawings.

C. Install wall system securely allowing for necessary thermal and structural movement; comply with wall system manufacturer's instructions for installation of concealed fasteners.

D. Fasteners: Use stainless steel fasteners for all surfaces.

E. Do not handle or tool products during erection in manner that damages finish, decreases strength, or results in visual imperfection or failure in performance. Return component parts that require alteration to shop for refabrication, if possible, or for replacement with new parts.

F. Do not form panels in field unless required by wall system manufacturer and approved by the Architect; comply with MCM sheet manufacturer's instructions and recommendations for field forming.

G. Separate dissimilar metals; use gasket fasteners, isolation shims, or isolation tape where needed to eliminate possibility of electrolytic action between metals.

H. Install flashings as indicated on shop drawings. At flashing butt joints, provide a lap strap under flashing and seal lapped surfaces with a full bed of non-hardening sealant.

I. Install square, plumb, straight, and true, accurately fitted, with tight joints and intersections maintaining the following installation tolerances:
   1. Variation From Plane or Location: 1/2 inch in 30 feet of length and up to 3/4 inch in 300 feet, maximum.
   2. Deviation of Vertical Member From True Line: 0.1 inch in 25 feet run, maximum.
   3. Deviation of Horizontal Member From True Line: 0.1 inch in 25 feet run, maximum.
   4. Offset From True Alignment Between Two Adjacent Members Abutting End To End, In Line: 0.03 inch, maximum.

J. Replace damaged products.

3.4 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements for additional requirements.

B. Wall System Manufacturer's Field Services: Provide field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with instructions.
   1. Site Visits: Schedule two site visits during execution of installation.

C. Water Spray Test: After installation is 35% complete, test area of assembly as directed by Construction Manager for water penetration per AAMA 501.2.

D. Metal composite panels will be considered defective if they do not pass testing and inspections.

3.5 CLEANING

A. See Section 01 7000 - Execution and Closeout Requirements for additional requirements.

B. Ensure weep holes and drainage channels are unobstructed and free of dirt and sealants.

C. Remove protective film after installation of joint sealers, after cleaning of adjacent materials, and immediately prior to completion of work.

D. Remove temporary coverings and protection of adjacent work areas.

E. Clean installed products in accordance with manufacturer's instructions.

F. Replace panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

3.6 PROTECTION

A. Protect installed panel system from damage until Date of Substantial Completion.

END OF SECTION 07 4213.23

SECTION 07 4646 - FIBER-CEMENT WALL PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fiber-cement siding installed in a rainscreen wall assembly.

B. Cladding support system.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 01 7419 – Construction Waste Management and Disposal

C. Section 05 4000 - Cold-Formed Metal Framing: Cladding substrate.

D. Section 05 4000 - Cold-Formed Metal Framing: Water-resistive barrier under siding.

E. Section 06 1000 - Rough Carpentry: Exterior wall sheathing.

1.3 REFERENCE STANDARDS

A. ASTM C1186 - Standard Specification for Flat Fiber Cement Sheets; 2008 (Reapproved 2016).

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Submit manufacturer's data sheets on each product to be used, including:
   1. Manufacturer's requirements for related materials to be installed by others.
   2. Preparation instructions and recommendations.
   3. Storage and handling requirements and recommendations.
   4. Installation methods, including nail patterns.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Shop Drawings: Provide key plans, elevations, sections, and details. Indicate dimensions, layout, joints, construction details, support clips, interface with adjacent construction, and methods of anchorage.

E. Delegated Design Documents: Submit for information, signed and sealed documents by structural engineer of record responsible for comprehensive design package of cladding support system, including wall fasteners and anchors. Submit structural design, rail spacing, and calculations sufficient to comply with structural design criteria of this section.

F. Manufacturer's qualification statement.

G. Installer's qualification statement.

H. Warranty: Submit copy of manufacturer's warranty, made out in Owner's name, showing that it has been registered with manufacturer.

1.5 QUALITY ASSURANCE

A. Designer Qualifications: Qualified professional structural engineer experienced in design of cladding support systems, associated wall fasteners and anchors, and licensed in the State in which the Project is located.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than seven years of documented experience.

C. Installer Qualifications: Company specializing in performing work of type specified in this section with not less than five years of experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 7419 - Construction Waste Management and Disposal for packaging waste requirements.

B. Deliver and store materials in manufacturer's unopened packaging, with labels intact, until ready for installation.

C. Store materials under dry and waterproof cover, well ventilated, and elevated above grade on a flat surface.

D. Protect materials from harmful environmental elements, construction dust, and other potentially detrimental conditions.

1.7 FIELD CONDITIONS

A. Do not install panels when air temperature or relative humidity are outside manufacturer's limits.

1.8 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Correction Period: Correct defective work within 1-year period commencing on Date of Substantial Completion.

C. Manufacturer Warranty: Provide manufacturer 15-year warranty against manufactured defects in the panels and panel finish.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide composite panel systems capable of withstanding the effects of the following loads, based on testing in accordance with ASTM E330/E330M:
   1. Design Loads: In accordance with the structural design criteria indicated on Drawing S000.
   2. Deflection Limits: For wind loads, panel deflection no greater than L/120 of the span.

B. Thermal Expansion: Maximum 0.00000318 deg F to minus 1 when tested in accordance with ASTM E228.

C. Air Leakage: 1.53 cfm/sq. ft. or less in accordance with AAMA5094.

D. Physical Performance: Provide composite panel system in accordance with ASTM C1186.
   1. Wet Flexural Strength: Result: 1418 psi , Lower Limit: 1015 psi .
   2. Water Tightness: No water droplets observed on any specimen.
   3. Freeze-Thaw: No damage or defects observed.
   4. Warm Water: No evidence of cracking, delamination, swelling, or other defects observed.
   5. Heat-Rain: No crazing, cracking, or other deleterious effects, or surface or joint changes observed in any specimen.

E. Fire Propagation Characteristics: Fiber cement panel wall assembly passes NFPA 285.

2.2 FIBER-CEMENT PANELS

A. Wall Panels: Vertically oriented panels made of cement and cellulose fiber formed under high pressure with integral surface texture, complying with ASTM C1186, Type A, Grade II; with machined edges, for nail attachment.
   1. Texture: Simulated cedar grain.
   2. Length (Height): 120 inches, nominal, unless otherwise indicated on drawings.
   3. Width: 18 inches, nominal, unless otherwise indicated on drawings.
   4. Thickness: 5/8 inch, nominal.
   5. Finish: Factory applied stain.
   6. Products:
      a) Basis-of-Design: **Nichiha USA, Inc; Architectural Wall Panels - Vintagewood:** www.nichiha.com/#sle.
         1) Color #1: "Cedar".
         2) Color #2: "Bark".
      b) Other Accceptable Products:
         1) KMEW USA Inc; Ceraclad: www.ceraclad.com.
      c) Substitutions: See Section 01 6000 - Product Requirements.

2.3 CLADDING SUPPORT SYSTEM

A. Cladding Support System: Non-continuous, stainless steel rainscreen cladding attachment system, installed in conjunction with exterior insulation and thermally isolated from building substrate. Noncombustible in accordance with NFPA 285.
   1. Basis-of-Design: **ECO Cladding**; **Sigma Vci Stainless Steel Rain Screen Attachment System**.
      a) For attaching vertical panels with concealed fasteners.
   2. Provide all cladding support system components from a single source. Scope includes full engineering design of cladding attachment to building back-up walls.
      a) Bracket and rail components (stainless steel).
      b) Brackets shall be self-shimming for out-of-plumb comditions.
      c) Fasteners (Type 304 stainless steel).
   3. Substitutions: See Section 01 6000 - Product Requirements.

2.4 ACCESSORIES

A. Metal Trim: Extruded aluminum alloy 6063-T5 temper.
   1. Finish: Powder coating.
      a) Colors: To match siding color, unless otherwise indicated on drawings.
         1) Trim to match either Color #1 or Color #2, whichever is in direct contact with trim.
   2. Metal Trim, Multi-Purpose: Preformed panel trim and flashing pieces.
      a) Dimensions, Profile, Type, and Layout: As indicated on drawings.

B. Fasteners: Galvanized or corrosion resistant; length as required to penetrate, 1-1/4 inches, minimum.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrate, with installer present, for compliance with requirements for installation tolerances, composite panel supports, and other conditions affecting performance of the work. Clean and repair as required to eliminate conditions that would be detrimental to proper installation.
   1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by composite panel manufacturer.
   2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by composite panel manufacturer.

B. Verify that air-vapor barrier has been installed over substrate completely and correctly.

C. Examine roughing-in for components and assemblies penetrating composite panels to verify actual locations of penetrations relative to seam locations of composite panels before installation.

D. Do not begin until unacceptable conditions have been corrected.

E. If substrate preparation is responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 INSTALLATION

A. Install cladding support system in accordance with manufacturer's instructions and approved shop drawings

B. Install exterior insulation to fit between wall brackets as specified by Section 07 2100.

C. Install fiber cement panels in accordance with manufacturer's instructions and recommendations, and approved shop drawings.
   1. Read warranty and comply with terms necessary to maintain warranty coverage.
   2. Use trim details as indicated on drawings.
   3. Touch up field cut edges before installing.
   4. Pre-drill nail holes if necessary to prevent breakage.

D. Attachment Assembly, General: Install attachment assembly required to support composite wall panels and to provide a complete weathertight wall system, including subgirts, perimeter extrusions, tracks, drainage channels, panel clips, and anchor channels.
   1. Include attachment to supports, panel-to-panel joinery, panel-to-dissimilar-material joinery, and panel-system joint seals.

E. Joints in Vertical Siding: Install Z-flashing in horizontal joints between successive courses of vertical siding.

F. Do not install siding less than 6 inches from ground surface, or closer than 1 inch to roofs, patios, porches, and other surfaces where water may collect.

G. After installation, seal joints except lap joints of lap siding; seal around penetrations, and paint exposed cut edges.

H. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

3.3 ERECTION TOLERANCES

A. Site Verifications of Conditions:
   1. Verify that conditions of substrate previously installed under other Sections are acceptable for composite system installation. Provide documentation indicating detrimental conditions to composite system performance.
   2. Once conditions are verified, composite system installation tolerances are as follows:
      a) Shim and align composite wall panel units within installed tolerance of 1/4 inch in 20 ft. (non-accumulative, on level, plumb, and location lines as indicated, and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Water-Spray Test: After installation is 35% complete, test area of assembly directed by Architect or Construction Manager for water penetration in accordance with AAMA 501.2.

C. Composite wall panels will be considered defective if they do not pass test and inspections.

D. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.

E. Prepare test and inspection reports.

3.5 CLEANING

A. See Section 01 7000 - Execution and Closeout Requirements for additional requirements.

B. Clean faced panels in accordance with manufacturer’s maintenance instructions, using cleaning materials and methods acceptable to manufacturer.

3.6 PROTECTION

A. Protect installed products until Date of Substantial Completion.

B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION 07 4646

SECTION 07 5423 - THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Thermoplastic polyolefin (TPO) induction welded roofing system.

B. Insulation, flat and tapered.

C. Vapor retarder.

D. Cover board.

E. Flashings.

F. Roofing walkway pads.

1.2 RELATED REQUIREMENTS

A. Section 01 2300 - Alternates.

B. Section 01 3566.42 - Sustainability Compliance Procedures.

C. Section 01 7419 – Construction Waste Management and Disposal

D. Section 06 1000 - Rough Carpentry: Wood nailers, curbs, blocking, and wood cant strips.

E. Section 07 7100 - Roof Specialties: Manufactured roof edge fascia, copings, and scuppers.

F. Section 07 7200 - Roof Accessories: Roof hatches and vents.

G. Section 08 6300- Metal-Framed Skylights.

1.3 DEFINITIONS

A. Roofing Terminology: Definitions in ASTM D1079 and glossary in NRCA (RM) apply to work of this section.

1.4 REFERENCE STANDARDS

A. ANSI/FM 4474 - American National Standard for Evaluating the Simulated Wind Uplift Resistance of Roof Assemblies Using Static Positive and/or Negative Differential Pressures; 2004 (R2010).

B. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2023a.

C. ASTM D1079 - Standard Terminology Relating to Roofing and Waterproofing; 2020.

D. ASTM D4397 - Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications; 2016.

E. ASTM D6878/D6878M - Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing; 2019.

F. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings; 2020a.

G. ASTM E1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces; 2011 (Reapproved 2019).

H. FM (AG) - FM Approval Guide; Current Edition.

I. FM 4470 - Approval Standard for Single-Ply, Polymer-Modified Bitumen Sheet, Built-Up Roof (BUR) and Liquid Applied Roof Assemblies for use in Class 1 and Noncombustible Roof Deck Construction; 2016.

J. NRCA (RM) - The NRCA Roofing Manual; 2019.

K. NRCA (WM) - The NRCA Waterproofing Manual; 2005.

L. UL 1897 - Uplift Tests for Roof-Covering Systems; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

M. UL 580 - Standard for Tests for Uplift Resistance of Roof Assemblies; Current Edition, Including All Revisions.

N. UL 790 - Standard for Standard Test Methods for Fire Tests of Roof Coverings; Current Edition, Including All Revisions.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Preliminary Roofing Conference: Before starting roof deck construction, conduct conference at project site.

B. Preinstallation Meeting: Convene at project site one week before starting work of this section.
   1. Review preparation and installation procedures and coordinating and scheduling required with related work.

1.6 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data indicating membrane materials, flashing materials, insulation, vapor retarder, surfacing, and fasteners. Include copy of FM Approvals' RoofNav listing.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit 5d: For adhesives and sealants used within the weatherproofing system, documentation including printed statement of VOC content.

2. Product Data for Credit e11: For roof materials, indicating that roof materials comply with Solar Reflectance Index requirement.
3. Product Data for Credit d8: For insulation, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
4. Product Data for Credit d10: For insulations, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Shop Drawings: Submit drawings that indicate joint or termination detail conditions, conditions of interface with other materials, and paver layout. Include roof plans, sections, and details.

E. Samples of Walkway Pads or Rolls: Submit two samples 12 by 12 inches in size.

F. Wind Uplift Resistance: Submit documentation indicating compliance with wind uplift performance requirements.

G. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

H. Performance Requirement Certificate: Certify that roofing system complies with specified performance requirements.

I. Manufacturer's Installation Instructions: Indicate membrane seaming precautions and perimeter conditions requiring special attention.

J. Manufacturer's Field Reports: Indicate procedures followed, ambient temperatures, humidity, wind velocity during application, and supplementary instructions given.

K. Installer's Qualification Statement.

L. Specimen Warranty: For approval.

M. Warranty Documentation:
1. Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
2. Submit installer's certification that installation complies with warranty conditions for waterproof membrane.

N. Inspection Report: Copy of roofing system manufacturer's inspection report of completed roofing installation.

O. Maintenance Data: For roofing system to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum 10 years of documented experience and is UL listed for roofing system identical to that used for this project.

B. Installer Qualifications: Company specializing in performing the work of this section with at least five years of documented experience and approved by manufacturer.

C. Source Limitations: Obtain components for roofing system, including roof insulation and fasteners, from same manufacturer as membrane roofing or approved by membrane roofing manufacturer.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in manufacturer's original containers, dry, undamaged, with seals and labels intact. Label containers with manufacturer's name, product brand name and type, date of manufacture, and approval or listing agency markings.

B. Store products in weather protected environment, clear of ground and moisture.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location.

D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.9 FIELD CONDITIONS

A. Do not apply roofing membrane during unsuitable weather.

B. Do not apply roofing membrane when ambient temperature is below 40 degrees F. Confirm hot weather storage and installation requirements with roofing membrane manufacturer.

C. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.

D. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

1.10 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. System Warranty: Provide manufacturer's system warranty agreeing to repair or replace roofing that leaks or is damaged due to wind or other natural causes.
   1. Warranty includes roof membrane, base flashings, roof insulation, and other components of roofing system; this is all inclusive of the entire roofing system and its components.
   2. Base Bid Warranty Term: 20 years.
   3. **Alternate #09** Warranty Term: 25-30 years.
   4. For repair and replacement include costs of both the materials listed in item 1 above and all related labor required to complete the work, through the entire system covered in the project's warranty.

C. Project Warranty: Provide roofing installer's warranty, signed by installer, covering work of this section, including all components of roofing system such as roof membrane, base flashing, roof insulation, and walkway products (edge-to-edge coverage).
   1. Warranty Term: Two years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Thermoplastic Polyolefin (TPO) Membrane Roofing Materials:
   1. Basis-of-Design: Carlisle SynTec Systems; Sure-Weld TPO: www.carlisle-syntec.com/#sle.

B. Other Acceptable Manufacturers/Products: Subject to compliance with requirements:
   1. Elevate; UltraPly TPO Membrane: www.holcimelevate.com/#sle.
   2. GAF; EverGuard TPO 60 mil: www.gaf.com/#sle.
   3. Johns Manville; JM TPO - 60 Mil: www.jm.com/#sle.
   4. Tremco; TremPly Max TPO: www.tremcoroofing.com.
   5. Substitutions: See Section 01 6000 - Product Requirements.

2.2 PERFORMANCE REQUIREMENTS

A. General: Installed roofing system and flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roof system and flashings shall remain watertight.

B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roof membrane manufacturer based on testing and field experience.

C. Wind Uplift Resistance: Design roofing system to resist the following wind uplift pressures when tested according to ANSI/FM 4474, UL 580, or UL 1897:
   1. Structural design criteria indicated on Drawing S001.

D. Solar Reflectance Index (SRI): Minimum of 78 based on three-year aged value.
   1. Calculate SRI in accordance with ASTM E1980.
   2. Field applied coating may not be used to achieve specified SRI.

E. Exterior Fire-Test Exposure: ASTM E108 or UL 790, Class A; for application and roof slopes indicate; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

F. Physical Properties:
   1. Breaking Strength: Minimum 250 lbf, tested in accordance with ASTM D751 (grab).
   2. Elongation Break of Reinforcement: Minimum 15% , tested in accordance with ASTM D751 (grab).
   3. Tearing Strength: Minimum 55 lbf , tested in accordance with ASTM D751. proc. B.
   4. Water Vapor Permeance: Maximum 0.10 perms, tested in accordance with ASTM E96, procedure B.
   5. Puncture Resistance: Minimum 300 lbf, tested in accordance with FTM 101C, method 2031.

2.3 ROOFING

A. Thermoplastic Polyolefin (TPO) Roofing: One ply membrane, heat induction welded, over insulation.

B. Acceptable Insulation Types - Constant Thickness Application:
   1. Minimum 2 layers of polyisocyanurate board.

C. Acceptable Insulation Types - Tapered Application:
   1. Tapered polyisocyanurate board.

2.4 MEMBRANE ROOFING AND ASSOCIATED MATERIALS

A. Membrane Roofing Materials:
   1. TPO: Thermoplastic polyolefin (TPO) conforming to ASTM D6878/D6878M, fabric-backed sheet containing reinforcing fabrics or scrims.
      a) Thickness: 60 mil, 0.060 inch, minimum.
      b) **Alternate No. 09**: 80 mil, 0.080 inch.
   2. Sheet Width: Factory fabricated into largest sheets possible.
   3. Color: White or tan, as required to comply with Credit e11.

B. Seaming Materials: As recommended by membrane manufacturer.

C. Membrane Fasteners: As recommended and approved by membrane manufacturer, complying with corrosion-resistance provisions of FM 4470, designed for fastening roofing components to substrate.

D. Vapor Retarder: Polyethylene film; ASTM D4397, 6 mils thick, minimum, with maximum permeance rating of 0.13 perm.
   1. Loose-laid, with joints and penetrations taped and sealed.

E. Flexible Flashing Material: Same material as membrane; same color as roofing membrane.

F. Metal Termination Bars: Manufacturer's standard, predrilled stainless steel bars, approximately 1 by 1/8 inch thick; with anchors.

2.5 COVER BOARDS

A. Cover Boards: Faced, and with high compressive strength polyisocyanurate (ISO) insulation complying with ASTM C1289, and the following characteristics:
   1. Classifications: Type II, Class 4 - Faced with coated or uncoated glass fiber mat facers on both major surfaces of the core foam.
   2. Grade and Compressive Strength: Grade 1, 80 psi (Grade 1, 551 kPa).
   3. Board Size: 48 by 96 inch.
   4. Board Thickness: 1/2 inch.
   5. Insulation Thermal Resistance: R-value: 2.4 (0.42), nominal.
   6. Products: By same manufacturer as roofing membrane.
      a) **Alternate #09**: Provide Carlisle SynTec Systems; SecurShield HD.

2.6 INSULATION

A. General: Preformed roof insulation boards manufactured or approved by TPO roof membrane manufacturer.

B. Polyisocyanurate (ISO) Board Insulation: Rigid cellular foam, complying with ASTM C1289.
   1. Classifications:
      a) Type IV: Faced with cellulosic fiber insulating board on one major surface of core foam and glass fiber reinforced cellulosic felt or uncoated or coated polymer-bonded glass fiber mat facer on other major surface of core foam.
         1) Compressive Strength: 16 psi, minimum.
         2) Thermal Resistance, R-value: At 1-1/2 inch thick; 6.9 at 75 degrees F.
   2. Board Size: 48 by 48 inch.
   3. Board Thickness: 1.5 inch.
   4. Tapered Board: Slope as indicated; minimum thickness 1/2 inch; fabricate of fewest layers possible.
   5. Board Edges: Square.
   6. Products:
      a) Basis of Design: **Carlisle Syntec Systems**; **SecurShield Polyiso Insulation**.
      b) GAF; EnergyGuard Polyiso Insulation: www.gaf.com/#sle.
      c) Holcim Elevate; ISOGARD GL: www.holcimelevate.com.
      d) Johns Manville; ENRGY 3: www.jm.com.
      e) Substitutions: See Section 01 6000 - Product Requirements.

2.7 ACCESSORIES

A. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

B. Roofing Expansion Joint Support: Manufacturer's standard extruded EPDM profile for transition between roof and wall, compatible with roofing membrane.

C. Insulation Fasteners: Appropriate for purpose intended and approved for the induction welding system.
   1. Length as required for thickness of insulation material and penetration of deck substrate, with metal washers.

D. Membrane Adhesive: As recommended by membrane manufacturer, water based.

E. Sealants: As recommended by membrane manufacturer.

F. Walkway Pads: Suitable for maintenance traffic, contrasting color or otherwise visually distinctive from roof membrane.
   1. Composition: Roofing membrane manufacturer's standard.
   2. Size: Manufacturer's standard size(s).
   3. Surface Color: As selected by Architect from roof membrane manufacturer's standard colors.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surfaces and site conditions are ready to receive work.

B. Verify deck is supported and secure.

C. Verify deck is clean and smooth, flat, free of depressions, waves, or projections, properly sloped and suitable for installation of roof system.

D. Verify deck surfaces are dry and free of snow or ice.

E. Verify that roof openings, curbs, and penetrations through roof are solidly set, roof-drain bodies are securely clamped in place, and cant strips are in place.

F. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.

G. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION - GENERAL

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing system installation according to roofing system manufacturer's written instructions. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

3.3 INSTALLATION - GENERAL

A. Perform work in accordance with manufacturer's instructions, NRCA (RM), and NRCA (WM) applicable requirements, and approved shop drawings.

B. **Alternate #09**: Install roofing system with all components, including fastener patterns and methods, required by manufacturer to achieve the specified warranty term.

C. Do not apply roofing membrane during unsuitable weather.

D. Do not apply roofing membrane when ambient temperature is outside the temperature range recommended by manufacturer.

E. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.

F. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

G. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at end of workday or when rain is forecast. Remove and discard temporary seals before beginning Work on adjoining roofing.

H. Coordinate this work with installation of associated counterflashings installed by other sections as the work of this section proceeds.

3.4 INSULATION - UNDER MEMBRANE

A. Coordinate installation of roofing system components so insulation is not exposed to precipitation or left exposed at end of workday.

B. Comply with roofing system and roof insulation manufacturer's written instructions for installing roof insulation.

C. Attachment of Insulation: Mechanically fasten insulation to deck in accordance with roofing manufacturer's instructions for the induction welding attachment method.

D. Lay subsequent layers of insulation with joints staggered minimum 6 inch from joints of preceding layer.

E. Place tapered insulation to the required slope pattern in accordance with manufacturer's instructions.

F. Lay boards with edges in moderate contact without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.

G. Do not apply more insulation than can be covered with membrane in same day.

H. Cover Boards: Mechanically fasten cover boards in accordance with roofing manufacturer's instructions and FM (AG) Factory Mutual requirements.

I. Install slip sheet over cover boards and beneath roof membrane.

3.5 MEMBRANE APPLICATION

A. Roll out membrane, free from wrinkles or tears. Place sheet into place without stretching.

B. Shingle joints on sloped substrate in direction of drainage.

C. Induction Welding/Fastening System Application:
   1. Follow manufacturer's written instructions and best practices for performing induction weld fastening.
   2. Follow roof fastening pattern supplied by roof membrane manufacturer for the specific project conditions.
   3. A minimum of 1-1/2 inches is required over metal deck for proper tool operation.
   4. Eliminate all debris from the roof membrane surface prior to welding.

D. Overlap edges and ends and seal seams by contact adhesive, minimum 3 inches. Seal permanently waterproof. Apply uniform bead of sealant to joint edge.

E. Secure the membrane at the perimeter of each roof level, expansion joint, curb, interior wall, at any angle change exceeding 2 inches in one horizontal foot, and at all other penetrations in accordance with roofing membrane manufacurer's written instructions and details.

F. At intersections with vertical surfaces:
   1. Extend membrane over cant strips and up a minimum of 4 inches onto vertical surfaces.
   2. Fully adhere flexible flashing over membrane and up to nailing strips.

G. At roof fascias and copings, extend membrane under fascias and copings and to the outside face of the wall.

H. Around roof penetrations, seal flanges and flashings with flexible flashing.

I. Coordinate installation of roof drains and sumps and related flashings.

3.6 PAVERS AND ACCESSORIES INSTALLATION

A. Flexible Walkway Installation: Install walkways at the following locations.
   1. Perimeter of each rooftop unit.
   2. Between each rooftop unit location, creating a continuous path connecting rooftop unit locations.
   3. Between each roof hatch and each rooftop unit location or path connecting rooftop unit locations.
   4. Top and bottom of each roof access ladder.
   5. Between each roof access ladder and each rooftop unit location or path connecting rooftop unit locations.
   6. Locations indicated on drawings.
   7. As required by roof membrane manufacturer's warranty requirements.

3.7 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field quality control and inspection.

B. Require site attendance of roofing material manufacturer daily during installation of the Work.

C. Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion, in presence of Architect, and to prepare inspection report.

D. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.

3.8 CLEANING

A. See Section 01 7419 - Construction Waste Management and Disposal, for additional requirements.

B. Remove bituminous markings from finished surfaces.

C. In areas where finished surfaces are soiled by work of this section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.

D. Repair or replace defaced or damaged finishes caused by work of this section.

3.9 PROTECTION

A. Protect installed roofing and flashings from construction operations.

B. Where traffic must continue over finished roof membrane, protect surfaces using durable materials.

END OF SECTION 07 5423

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SECTION 07 6200 - SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fabricated sheet metal items, including flashings, counterflashings, and masonry through-wall flashing.

B. Sealants for joints within sheet metal fabrications.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 01 7419 – Construction Waste Management and Disposal

C. Section 06 1000 - Rough Carpentry: Wood nailers for sheet metal work and Field fabricated roof curbs.

D. Section 07 7100 - Roof Specialties: Manufactured metal roof specialties, including roof edge fascia, gutters, and downspouts.

1.3 REFERENCE STANDARDS

A. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017a.

B. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2020a.

C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.

D. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.

E. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

F. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2018).

G. NRCA (RM) - The NRCA Roofing Manual; 2019.

H. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

C. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

D. Samples: Submit two samples, 4 by 4 inches in size, illustrating metal finish color.

1.6 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA (ASMM) requirements, except as otherwise indicated.

B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with minimum five years of documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 7419 - Construction Waste Management and Disposal for packaging waste requirements.

B. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

C. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies, including cleats, anchors, and fasteners, shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA (RM) and SMACNA (ASMM) requirements for dimensions and profiles shown unless more stringent requirements are indicated.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

2.2 SHEET MATERIALS

A. Pre-Finished Aluminum: ASTM B209/B209M, 3005 alloy, H12 or H14 temper; 18 gauge, 0.040 inch thick; plain finish shop pre-coated with silicone modified polyester coating.
   1. Application: Gutters and downspouts.
   2. Fluoropolymer Coating: High performance organic powder coating, AAMA 2604; multiple coat, thermally cured fluoropolymer finish system.
   3. Color: To match approved sample.

B. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304 alloy, dead soft temper, 26 gage, 0.019 inch thick; smooth flat surface, cold-rolled No. 2D - Dull finish.
   1. Application: Through-wall flashing, overflow scuppers, roof counterflashing,

2.3 FABRICATION

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.

B. Form pieces in longest possible lengths.

C. Hem exposed edges on underside 1/2 inch; miter and seam corners.

D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.

E. Fabricate corners from one piece with minimum 18-inch long legs; seam for rigidity, seal with sealant.

F. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.

2.4 ACCESSORIES

A. Fasteners: Stainless steel, with soft neoprene washers.

B. Primer Type: Zinc chromate.

C. Concealed Sealants: Non-curing butyl sealant.

D. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.

E. Asphalt Roof Cement: ASTM D4586/D4586M, Type I, asbestos-free.

F. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.

B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.2 PREPARATION

A. Install starter and edge strips, and cleats before starting installation.

B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil, 0.015 inch.

3.3 INSTALLATION

A. Comply with drawing details and approved shop drawings.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer's written installation instructions.

C. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..

D. Apply plastic cement compound between metal flashings and felt flashings.

E. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.

F. Seal metal joints watertight.

G. Slope gutters 1/4 inch per 10 feet, minimum.

3.4 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements for field inspection requirements.

B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

END OF SECTION 07 6200

SECTION 07 7100 - ROOF SPECIALTIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Manufactured roof specialties, including gutters, downspouts, collector heads, copings, fascias, and overflow scuppers.

B. Roof expansion joint covers.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 01 7419 – Construction Waste Management and Disposal

C. Section 07 7200 - Roof Accessories: Manufactured roof hatches.

1.3 REFERENCE STANDARDS

A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017a.

B. ANSI/SPRI/FM 4435/ES-1 - Test Standard for Edge Systems Used with Low Slope Roofing Systems; 2017.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on shape of components, materials and finishes, anchor types and locations.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Shop Drawings: Indicate configuration and dimension of components, adjacent construction, required clearances and tolerances, and other affected work.

E. Samples: Submit two samples, 6 by 6 inches, illustrating finish and color, for each color specified.

F. Samples: Submit two appropriately sized samples of coping and roof edge fascia.

G. Manufacturer's Installation Instructions: Indicate special procedures, fasteners, supporting members, and perimeter conditions requiring special attention.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Roof Edge Flashings, Copings, Conductor Heads, and Overflow Scuppers:
1. Basis of Design: **Metal-Era Inc**;: www.metalera.com/#sle.

B. Other Acceptable Manufacturers:
1. ATAS International, Inc: www.atas.com/#sle.
2. Drexel Metals Inc: www.drexmet.com/#sle.
3. Hickman Edge Systems: www.hickmanedgesystems.com/#sle.

C. Expansion Joint Covers:
1. Construction Specialties, Inc: www.c-sgroup.com/#sle.
2. EMSEAL Joint Systems, Ltd: www.emseal.com/#sle.
3. MM Systems Corp: www.mmsystemscorp.com/#sle.

2.2 COPINGS AND ROOF EDGE SPECIALTIES

A. Roof Edge Flashings: Factory fabricated to sizes required; corners mitered; concealed fasteners.
1. Configuration: Fascia, and edge securement for roof membrane.
2. Pull-Off Resistance: Tested in accordance with ANSI/SPRI/FM 4435/ES-1 using test methods RE-1 and RE-2 to positive and negative design wind pressure as defined by applicable local building code and design criteria indicated on Structural drawings.
3. Material: Formed aluminum sheet, 0.040 inch thick, minimum.
4. Finish: 70 percent polyvinylidene fluoride.
5. Color(s): See Article "FINISHES" below and refer to drawing for specific applications of each color.
6. Basis-of-Design Product:
a) Hickman Edge Systems; TerminEdge Fascia: www.hickmanedgesystems.com/#sle.
b) **Metal-Era; Anchor-Tite Standard Fascia**.
1) **Alternate #10**: Equal product by Carlisle SynTec Systems (SecurEdge) must be used to achieve specified roofing system warranty .
7. Other Acceptable Products: Subject to compliance with requirements.
a) ATAS International, Inc; Rapid-Lok Extruded Fascia: www.atas.com/#sle.
b) Hickman Edge Systems; TerminEdge Fascia: www.hickmanedgesystems.com/#sle.

B. Copings: Factory fabricated to sizes required; corners mitered; concealed fasteners.
1. Configuration: Concealed continuous hold down cleat at both legs; internal splice piece at joints of same material, thickness, and finish as cap; concealed stainless steel fasteners.

2. Pull-Off Resistance: Tested in accordance with ANSI/SPRI/FM 4435/ES-1 using test method RE-3 to positive and negative design wind pressure as defined by applicable local building code and design criteria indicated on Structural drawings.
3. Wall Width: As indicated on drawings.
4. Outside Face Height: As indicated on drawings.
5. Inside Face Height: As indicated on drawings.
6. Material: Formed aluminum sheet, 0.050 inch thick, minimum.
7. Color(s): See Article "FINISHES" below and refer to drawings for specific applications of each color.
8. Basis-of-Design Product:
   a) Metal Era; **Perma-Tite Continuous Cleat Coping**.
      1) **Alternate #10**: Equal product by Carlisle SynTec Systems (SecurEdge) must be used to achieve specified roofing system warranty (for basis-of-design roofing membrane).
9. Other Acceptable Products: Subject to compliance with requirements.
   a) ATAS International, Inc; Rapid-Lok Coping: www.atas.com/#sle.
   b) Hickman Edge Systems; Formed Coping Plus: www.hickmanedgesystems.com/#sle.

C. Trim: Additional vertical and horizontal metal roof edge trim and drip edges at fascia locations. Factory fabricated to sizes required; corners mitered; concealed fasteners. Form cleats as indicated on drawings.
1. Face Heights: As indicated on drawings.
2. Material: Formed aluminum sheet, 0.050 inch thick, minimum.
3. Color(s): As indicated on drawings.

2.3 ROOF DRAINAGE SPECIALTIES

A. Overflow Scuppers: Manufactured with closure flange trim to exterior, 4-inch-wide wall flanges to interior, and base extending 4 inches beyond cant or tapered strip into field of roof.
1. Material: 0.050” aluminum
2. Picture Frames: Front and back, 3” wide.
3. Overall Sizes: Fabricate to size(s) indicated on drawngs.
4. Basis of Design Manufacturer: **Metal-Era; Thru-Wall Scupper.**

B. Gutters: Fabricated in uniform section lengths not exceeding 12 feet, with matching corner units, ends, outlet tubes, and other accessories. Elevate back edge at least 1 inch above front edge. Furnish flat-stock gutter straps, gutter brackets, expansion joints, and expansion-joint covers fabricated from same metal as gutters.
1. Gutters, Pull-Off Resistance: Tested in accordance with ANSI/SPRI/FM 4435/GT-1 using test methods G-1 and G-2 to positive and negative design wind pressure as defined by applicable local building code and design criteria indicated on Structural drawings.
2. Dimensions: See drawings for descriptions of "Gutter Profile 1" and "Gutter Profile 2".
3. Material: Formed aluminum sheet, 0.050 inch thick, minimum.
4. Basis-of-Design Product: **Metal-Era**; **Seal-Tite WR Gutter**.
5. Colors: Two custom colors.
   a) Color 1: Match EFCO "Mineral Brown PNTKYC34".
   b) Color 2: Match fiber cement panel color by Nichiha "Vintagewood".

C. Downspouts (also referred to as "RWL" on drawings): Profile as indicated on drawings, complete with mitered elbows, manufactured from the following exposed metal. Furnish with metal hangers, from same material as downspouts, and anchors.
   1. Material: Formed aluminum sheet, 0.050 inch thick, minimum.
   2. Basis-of-Design Product: **Metal-Era**; **Industrial Downspout (Closed Face Version)** and **Downspout Elbows**.
   3. Downspout Straps: **Style 1**.
   4. Color(s): See Article "FINISHES" below and refer to drawings for specific applications of each color.

D. Conductor Heads: Manufactured conductor heads, welded construction, each with flanged back and stiffened top edge, and of dimensions and shape indicated, complete with outlet tube that nests into upper end of downspout.
   1. Material: Formed aluminum sheet, 0.063 inch thick, minimum
   2. Basis-of-Design Product: **Metal-Era**; **Collector Box, Welded Version, Style 3**.
   3. Color(s): See Article "FINISHES" below and refer to drawings for specific applications of each color.

2.4 EXPANSION JOINT COVERS

A. Expansion Joint Covers: Composite construction of ____-inch wide flexible EPDM flashing of black color with closed cell urethane foam backing, each edge seamed to aluminum sheet metal flanges, designed for nominal joint width of 2 inches. Include special formed corners, tees, intersections, and wall flashings, each sealed watertight.

2.5 FINISHES

A. All Roof Edge and Roof Drainage Specialties: PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system; custom color to match approved sample.
   1. Colors: Custom colors.
      a) **Color 1**: Match EFCO "Mineral Brown PNTKYC34".
      b) **Color 2**: Match fiber cement panel color, Nichiha "Vintagewood".

2.6 ACCESSORIES

A. Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.

B. Fasteners: Roof specialty manufacturer's recommended fasteners, designed to meet performance requirements, suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:
   1. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.

C. Endwall Flashing: Match material and finish of roof specialty items.

D. Coping Cleats: Galvanized steel, gauge as recommended by roof specialty manufacturer.

E. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type joints with limited movement.

F. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

G. Adhesive for Anchoring to Roof Membrane: Compatible with roof membrane and approved by roof membrane manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that deck, curbs, roof membrane, base flashing, and other items affecting work of this Section are in place and positioned correctly.

3.2 INSTALLATION

A. Install roof specialties in accordance with manufacturer's written instructions and approved shop drawings. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, underlayments, sealants, and other miscellaneous items as required to complete roof-specialty systems.

B. Seal joints within components when required by component manufacturer.

C. Coordinate installation of components of this section with installation of roofing membrane and base flashings.

D. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer's written installation instructions.

E. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.
   1. Space movement joints at a maximum of 12 feet with no joints within 18 inches of corners or intersections unless otherwise indicated on Drawings.
   2. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.

F. Fastener Sizes: Use fasteners of sizes that penetrate substrate not less than recommended in writing by fastener manufacturer to achieve maximum pull-out resistance.

G. Seal concealed joints with butyl sealant as required by roof specialty manufacturer.

H. Seal joints as required for weathertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F.

3.3 INSTALLATION OF GUTTERS

A. Gutters: Join and seal gutter lengths. Allow for thermal expansion. Attach gutters to firmly anchored gutter supports spaced not more than 30 inches apart, unless otherwise indicated on drawings. Attach ends with rivets and seal to make watertight. Slope to downspouts.
   1. Install gutter with expansion joints at locations indicated but not exceeding 50 feet apart. Install expansion-joint caps.

3.4 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films as roof specialties are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain roof specialties in a clean condition during construction.

B. Replace roof specialties that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures, as determined by Architect.

END OF SECTION 07 7100

SECTION 07 7200 - ROOF ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Roof hatches, manual and automatic operation, including smoke vents.

B. Pipe portals.

C. Pipe box.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 01 7419 – Construction Waste Management and Disposal

C. Section 07 7100 - Roof Specialties: Other manufactured roof specialty items.

1.3 REFERENCE STANDARDS

A. 29 CFR 1910.23 - Ladders; current edition.

B. 29 CFR 1910.29 - Fall Protection Systems and Falling Object Protection - Criteria and Practices; Current Edition.

C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

D. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

E. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used.
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.
   4. Maintenance requirements.
   5. For smoke hatches, submit evidence of approval by evaluation agency specified.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:

1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Shop Drawings: Submit detailed layout developed for this project and provide dimensioned location and number for each type of roof accessory.

E. Certificate: For smoke hatches, provide certificate of approval from authority having jurisdiction.

F. Warranty Documentation:
1. Submit manufacturer warranty.
2. Ensure that forms have been completed in Owner's name and registered with manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 7419 - Construction Waste Management and Disposal for packaging waste requirements.

B. Store products in manufacturer's unopened packaging until ready for installation.

C. Store products under cover and elevated above grade.

1.6 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Manufacturer Warranty: Provide 5-year manufacturer warranty for defective components. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.1 ROOF HATCHES AND VENTS, MANUAL AND AUTOMATIC OPERATION

A. Roof Hatch Manufacturers:
1. Basis of Design: **BILCO Company; Type F**: www.bilco.com/#sle.

B. Other Acceptable Manufacturers:
1. Activar Construction Products Group, Inc. - JL Industries; Diamond Series Roof Hatches, Model _____: www.activarcpg.com/#sle.
2. Babcock-Davis; ThermalMAX: www.babcockdavis.com/#sle.
3. Best Access Doors; Series BA-GRH - Ladder Access Roof Hatch, Galvanized: www.bestaccessdoors.com/#sle.

C. Smoke and Heat Vent Manufacturers:
   1. Basis of Design: **BILCO Company; Type ACDSV**: www.bilco.com/#sle.

D. Other Acceptable Manufacturers:
   1. Babcock-Davis; SafeMax: www.babcockdavis.com/#sle.
   2. Best Access Doors; Series BA-ASV-DL - UL Listed Smoke Vent, Double Leaf, Aluminum: www.bestaccessdoors.com/#sle.
   3. Nystrom, Inc; SmokEscape (double leaf): www.nystrom.com/#sle.

E. Roof Hatches: Factory-assembled aluminum frame and cover, complete with operating and release hardware.
   1. Style: Provide flat metal covers unless otherwise indicated.
   2. Mounting: Provide frames and curbs suitable for mounting conditions as indicated on drawings.
   3. Thermally Broken Hatches: Provide insulation within frame and cover.
   4. For Ladder Access: Single leaf; 48 by 48 inches.
   5. Materials:
      a) Steel: 14 gauge steel, G-90 paint bond galvanized steel.
      b) Insulation: 3 inches thick polyisocyanurate - in cover and curb.
      c) Finish: Manufacturer's standard red oxide primer.
      d) Hardware: Stainless steel.

F. Smoke Vents: Factory-assembled aluminum frame and cover, complete with operating and release hardware, including curb-mounted fusible link.
   1. Style: Provide flat metal covers unless otherwise indicated.
   2. Mounting: Provide frames and curbs suitable for mounting conditions as indicated on drawings.
   3. Sound Rated Hatches: Two sets of double leaf doors with air space between upper and lower doors; upper doors to open upward, lower doors to open downward; minimum Sound Transmission Coefficient (STC) of 45 / Outdoor-Indoor Sound Transmission Coefficient (OITC) of 46.
   4. Thermally Broken Hatches: Provide insulation within frame and cover.
   5. Size: 96 inches by 48 inches; double-leaf style.
   6. Cover Requirements:
      a) Capable of remaining closed under 90 psf wind uplift force.
      b) Capable of opening against 10 psf (snow/wind/rain.
   7. Materials:
      a) Steel: 14 gauge steel, G-90 paint bond galvanized steel.
      b) Insulation: 4 inches thick mineral wool insulation.
      c) Finish: Manufacturer's standard red oxide primer.
      d) Hardware: Zinc plated/chromate sealed.
         1) Thermolatch Mechanism: Covers open only when manually activated or by heat at 165 deg. F (fusible link).
         2) Provide label with reset instructions at interior of hatch.

G. Frames and Curbs: Fully enclosed; one-piece curb and frame with integral cap flashing to receive roof flashings; extended bottom flange to suit mounting.
   1. Curb Height: 12 inches from finished surface of roof, minimum.

H. Metal Covers: Flush, insulated, hollow metal construction.
   1. Capable of supporting 40 psf live load.
   2. Gasket: Neoprene, continuous around cover perimeter.

I. Safety Railing System: Roof hatch safety rail system mounted directly to curb without penetration of roofing system.
   1. Railing Size: As indicated on drawings.
   2. Railing: Comply with 29 CFR 1910.23 for ladder safety, with a safety factor of two.
   3. Self-Closing Gate: Comply with 29 CFR 1910.29 for safe egress and fall protection through hatch opening.
   4. Posts and Rails: Galvanized steel tubing.
   5. Gate: Same material as railing; automatic closing with latch.
   6. Finish: Manufacturer's standard, factory applied finish.
   7. Gate Hinges and Post Guides: ASTM B221 (ASTM B221M), 6063 alloy, T5 temper aluminum.
   8. Mounting Brackets: Hot dipped galvanized steel, 1/4 inch thick, minimum.
   9. Products:
      a) Basis-of Design: **BILCO Company; Bil-Guard 2.0, Model RL2-F:** www.bilco.com/#sle.

J. Roof Ladder Safety Post: Provide at top of ladder terminating at roof hatch.
   1. Basis of Design: **BILCO; LadderUp Safety Post, Model LU-1.**
      Material and Finish: Steel with yellow powder coat finish.

2.2 PIPE PORTALS

A. Curb-Mounted Pipe Portal: Insulated roof-curb units with welded or mechanically fastened and sealed corner joints, straight sides and integrally formed deck-mounting flange at perimeter bottom; with weathertight curb cover with single or multiple collared openings and pressure-sealed conically shaped EPDM protective rubber caps sized for piping indicated, with stainless steel snaplock swivel clamps.
   1. Manufacturers:
      a) Greenheck Fan Corporation; www.greenheck.com.
      b) Portals Plus by Duravent; www.portalsplus.com.
      c) RPS Curbs; www.rpscurbs.com.

B. Pipe Flashing Portal: Formed aluminum membrane-mounting flashing flange and sleeve with collared opening and pressure-sealed conically shaped EPDM protective rubber cap (or "boot") sized for piping indicated, with stainless steel snaplock swivel clamps.
   1. Portals Plus by Duravent; www.portalsplus.com.RPS Curbs; www.rpscurbs.com.
   2. RPS Curbs; www.rpscurbs.com.

2.3 PIPE BOX

A. Pipe Box: Premium style pipe box designed to house and flash piping and conduit through the roof while allowing access via a slide top. Included closed cell foam for weatherproofing and insulation.
   1. Materials:
      a) Metal: 26 ga. Type 304 stainless steel.

b) Neoprene: Closed cell block foam.
c) Solder: Non-lead ASTM 96.5TS.

2. Basis of Design: **SBC Industries**; **Line Shack Model LS**.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using methods recommended by manufacturer for achieving acceptable results for applicable substrate under project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's written instructions and approved shop drawings, in manner that maintains roofing system weather-tight integrity.
   1. Install roof accessories level; plumb; true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.
   2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
   3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
   4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.

B. Roof-Hatch:
   1. Verify that roof hatch operates properly. Clean, lubricate, and adjust operating mechanism and hardware.
   2. Attach safety railing system to roof-hatch curb.

C. Heat and Smoke Vent:
   1. Install heat and smoke vent so top perimeter surfaces are level.
   2. Install and test heat and smoke vents and their components for proper operation in accordance with NFPA 204.

D. Preformed Flashing-Sleeve and Flashing-Pipe Portal: Secure flashing sleeve to roof membrane in accordance with flashing-sleeve manufacturer's written instructions; flash sleeve flange to surrounding roof membrane in accordance with roof membrane manufacturer's instructions.

E. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended in writing by manufacturer's written installation instructions.

1. Coat concealed side of uncoated aluminum and stainless steel roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof accessories for waterproof performance.

3.4 CLEANING

A. See Section 01 7000 - Execution and Closeout Requirements for additional requirements.

B. Remove temporary protective coverings and strippable films as roof accessories are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain roof accessories in a clean condition during construction.

C. Clean installed work to like-new condition, using materials and techniques recommended by hatch and vent manufacturer.

3.5 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

C. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures, as determined by Architect.

END OF SECTION 07 7200

SECTION 07 8100 - APPLIED FIRE PROTECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Applied fire protection of interior structural steel not exposed to damage or moisture.

B. Applied fire protection of structural steel exposed to damage or moisture.

C. Preparation of applied fire protection for application of exposed overcoat finish specified elsewhere.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

1.3 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

B. ASTM E605/E605M - Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members; 1993, with Editorial Revision (2015).

C. ASTM E736/E736M - Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members; 2019.

D. ASTM E759/E759M - Standard Test Method for Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members; 1992 (Reapproved 2020).

E. ASTM E760/E760M - Standard Test Method for Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members; 1992 (Reapproved 2020).

F. ASTM E859/E859M - Standard Test Method for Air Erosion of Sprayed Fire-Resistive Material (SFRMs) Applied to Structural Members; 1993 (Reapproved 2020).

G. ASTM E937/E937M - Standard Test Method for Corrosion of Steel by Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members; 1993 (Reapproved 2020).

H. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).

I. UL (FRD) - Fire Resistance Directory; Current Edition.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with placement of ceiling hanger tabs, mechanical component hangers, and electrical components.

B. Preinstallation Meeting: Convene one week before starting work of this section.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittals procedures.

B. Product Data: Provide data indicating product characteristics.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating

D. Manufacturer's Certificate: Certify that applied fireproofing products meet or exceed requirements of Contract Documents.

E. Test Reports: Reports from reputable independent testing agencies for proposed products, indicating compliance with specified criteria, conducted under conditions similar to those on project, as follows:
   1. Bond strength.
   2. Bond impact.
   3. Compressive strength.
   4. Fire tests using substrate materials similar those on project.

F. Manufacturer's Installation Instructions: Indicate special procedures.

G. Field Quality Control Submittals: Submit field test report.

H. Manufacturer's Qualification Statement.

I. Installer's Qualification Statement.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience

1.7 MOCK-UP

A. Construct mock-up, 100 square feet in size.

B. Comply with project requirements for fire ratings.

C. Locate where directed.

D. Examine installation within one hour of application to determine variances from specified requirements due to shrinkage, temperature, and humidity.

E. Where shrinkage and cracking are evident, adjust mixture and method of application as necessary; remove materials and re-construct mock-up.

F. Mock-up may remain as part of the Work.

1.8 FIELD CONDITIONS

A. Do not apply fireproofing when temperature of substrate material and surrounding air is below 40 degrees F or when temperature is predicted to be below said temperature for 24 hours after application.

B. Provide ventilation in areas to receive fireproofing during application and 24 hours afterward, to dry applied material.

C. Provide temporary enclosure to prevent spray from contaminating air.

1.9 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a one year period after Date of Substantial Completion.
   1. Include coverage for fireproofing to remain free from cracking, checking, dusting, flaking, spalling, separation, and blistering.
   2. Reinstall or repair failures that occur within warranty period.

PART 2 PRODUCTS

2.1 MANUFACTURERS

2.2 APPLIED FIRE PROTECTION ASSEMBLIES

A. Provide assemblies as indicated on Drawings.

B. UL listings with a Load Restriction are not allowed.

2.3 MATERIALS

A. Applied Fire Protection Material, Medium Density. Manufacturer's standard factory mixed material, which when combined with water is capable of providing indicated fire resistance, and complying with following requirements:
   1. Composition: Portland cement-based; not mineral-fiber-based.
   2. Bond Strength: 430 pounds per square foot, minimum, when tested in accordance with ASTM E736/E736M when set and dry.
   3. Dry Density: 21 lb/cu ft, minimum, when tested in accordance with ASTM E605/E605M.
   4. Compressive Strength: 7,344 psf , minimum, tested in accordance with ASTM E761.

5. Effect of Impact on Bonding: No cracking, spalling or delamination, when tested in accordance with ASTM E760/E760M.
6. Corrosivity: No evidence of corrosion, when tested in accordance with ASTM E937/E937M.
7. Air Erosion Resistance: Weight loss of 0.025 g/sq ft, maximum, when tested in accordance with ASTM E859/E859M after 24 hours.
8. Surface Burning Characteristics: Maximum flame spread index of 0 (zero) and maximum smoke developed index of 0 (zero), when tested in accordance with ASTM E84.
9. Effect of Deflection: No cracking, spalling, or delamination, when tested in accordance with ASTM E759/E759M.
10. Fungal Resistance: No growth after 28 days when tested according to ASTM G21.
11. Manufacturers:
    a) Basis-of-Design: Isolatek International; **CAFCO BLAZE-SHIELD HP.**
    b) Provide the basis of design or comparable product by one of the following, subject to compliance with requirements:
        1) Carboline: www.carboline.com.
        2) GCP Applied Technologies.
    c) Substitutions: See Section 01 6000 - Product Requirements.

B. Applied Fire Protection Material, High Density: Manufacturer's standard factory mixed material, which when combined with water is capable of providing indicated fire resistance, and complying with following requirements:
1. Composition: Portland cement-based; not mineral fiber-based.
2. Bond Strength: 1,000 psf, minimum, when tested in accordance with ASTM E736/E736M when set and dry.
3. Dry Density: 39 lb/cu ft, minimum, when tested in accordance with ASTM E605/E605M.
4. Compressive Strength: 43,200 psf minimum, tested in accordance with ASTM E761.
5. Effect of Impact on Bonding: No cracking, spalling or delamination, when tested in accordance with ASTM E760/E760M.
6. Corrosivity: No evidence of corrosion, when tested in accordance with ASTM E937/E937M.
7. Air Erosion Resistance: Weight loss of 0.025 g/sq ft, maximum, when tested in accordance with ASTM E859/E859M after 24 hours.
8. Surface Burning Characteristics: Maximum flame spread index of 0 (zero) and maximum smoke developed index of 0 (zero), when tested in accordance with ASTM E84.
9. Fungal Resistance: No growth after 28 days when tested according to ASTM G21.
10. Manufacturers:
    a) Basis-of-Design: Isolatek International; **CAFCO FENDOLITE M-II**.
    b) Provide the basis of design or comparable product by one of the following, subject to compliance with requirements:
        1) Carboline: www.carboline.com.
        2) GCP Applied Technologies.
    c) Substitutions: See Section 01 6000 - Product Requirements.

C. Applied Fire Protection Material, Low Density: Manufacturer's standard factory mixed material, which when combined with water is capable of providing indicated fire resistance, and complying with following requirements:
1. Composition: Portland cement-based; not mineral fiber-based.
2. Bond Strength: 600 psf, minimum, when tested in accordance with ASTM E736/E736M when set and dry.

3. Dry Density: Minimum average density of 15 lb/cu ft, with minimum individual density of any test sample of 14 lb/cu ft, when tested in accordance with ASTM E605/E605M.
4. Compressive Strength: 1,440 psf minimum, tested in accordance with ASTM E761.
5. Effect of Impact on Bonding: No cracking, spalling or delamination, when tested in accordance with ASTM E760/E760M.
6. Corrosivity: No evidence of corrosion, when tested in accordance with ASTM E937/E937M.
7. Air Erosion Resistance: Weight loss of 0.025 g/sq ft, maximum, when tested in accordance with ASTM E859/E859M after 24 hours.
8. Surface Burning Characteristics: Maximum flame spread index of 0 (zero) and maximum smoke developed index of 0 (zero), when tested in accordance with ASTM E84.
9. Fungal Resistance: No growth after 28 days when tested according to ASTM G21.
10. Manufacturers:
    a) Basis-of-Design: Isolatek International; **CAFCO BLAZE-SHIELD II HS**.
    b) Provide the basis of design or comparable product by one of the following, subject to compliance with requirements:
        1) Carboline: www.carboline.com.
        2) GCP Applied Technologies.
    c) Substitutions: See Section 01 6000 - Product Requirements.

2.4 ACCESSORIES

A. Primers: Primers approved by applied fire protection manufacturer and complying with one or both of the following requirements:
1. Primer and substrate are identical to those tested in required fire-resistance design by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
2. Primer's bond strength in required fire-resistance design complies with specified bond strength for applied fire protection material and with requirements in UL (FRD) or in the listings of another qualified testing agency acceptable to authorities having jurisdiction, based on a series of bond tests in accordance with ASTM E736/E736M.

B. Bonding Agent: Product approved by applied fire protection material manufacturer and complying with requirements in UL (FRD) or in the listings of another qualified testing agency acceptable to authorities having jurisdiction.

C. Overcoat: As recommended by manufacturer of applied fire protection material.

D. Water: Clean, potable.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surfaces are ready to receive fireproofing.

B. Verify that clips, hangers, supports, sleeves, and other items required to penetrate fireproofing are in place.

C. Verify that ducts, piping, equipment, or other items that would interfere with application of fireproofing have not been installed.

D. Verify that voids and cracks in substrate have been filled.

E. Verify that projections have been removed where fireproofing will be exposed to view as a finish material.

3.2 PREPARATION

A. Perform tests as recommended by fireproofing manufacturer in applications where adhesion of fireproofing to substrate is in question.

B. Remove incompatible materials that could effect bond by scraping, brushing, scrubbing, or sandblasting.

C. Prepare substrates to receive fireproofing in strict accordance with instructions of fireproofing manufacturer.

D. Prime substrates where included in fire-resistance design and where recommended in writing by applied fire protection material manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive fire protection.

E. Protect surfaces not scheduled for fireproofing and equipment from damage by overspray, fall-out, and dusting.

F. Close off and seal duct work in areas where fireproofing is being applied.

3.3 APPLICATION

A. Do not apply fireproofing directly over zinc-rich primers or galvanizing without the use of an approved primer.

B. Apply primer adhesive in accordance with manufacturer's instructions.

C. Apply fireproofing in uniform thickness and density as necessary to achieve required ratings.

3.4 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 01 4000 - Quality Requirements.

B. Inspect installed fireproofing after application and curing for integrity, prior to its concealment.
   1. Submit field test reports promptly to Contractor and Architect.

C. Ensure that actual thicknesses, densities, and bond strengths meet requirements for specified ratings and requirements of authorities having jurisdiction (AHJ).

D. Repair or replace applied fireproofing at locations where test results indicate fireproofing does not meet specified requirements.

E. Re-inspect installed fireproofing for integrity of fire protection, after installation of subsequent Work.

3.5 CLEANING

A. Remove excess material, overspray, droppings, and debris.

B. Remove fireproofing from materials and surfaces not required to be fireproofed.

C. At exposed fireproofing, clean surfaces that have become soiled or stained, using manufacturer's recommended procedures.

END OF SECTION 07 8100

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SECTION 07 8123 - INTUMESCENT FIRE PROTECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Thin-film intumescent fire protection.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 01 7419 – Construction Waste Management and Disposal

C. Section 07 8100 - Applied Fire Protection: Conventional cementitious and mineral fiber fireproofing.

D. Section 09 9123 - Interior Painting: Field-applied paints for coating and /or matching intumescent fireproofing.

1.3 REFERENCE STANDARDS

A. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness; 2015, with Editorial Revision (2017).

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

C. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2022.

D. SSPC-PA 2 - Procedure For Determining Conformance To Dry Coating Thickness Requirements; 2015, with Editorial Revision (2018).

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittals procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Performance characteristics and test results.
   2. Preparation instructions and recommendations.
   3. Storage and handling requirements and recommendations.
   4. Installation methods.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Verification Samples: For each thickness, color, sheen, and finish required, submit samples not less than 4 inches square on designated substrate illustrating finished appearance.

E. Certificates: Certify that intumescent fireproofing provided for this project meets or exceeds specified requirements in all respects.

F. Test Reports: Published fire resistive designs for structural elements of the types required for the project, indicating hourly ratings of each assembly.

G. Field Quality Control Submittals: Submit field test report.

H. Manufacturer's qualification statement.

I. Installer's qualification statement.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company that specializes in manufacturing the type of products specified, with minimum of ten years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least five years of documented experience.

1.6 MOCK-UP

A. MOCK-UPS

B. Provide a mock-up for evaluation of surface preparation techniques and application workmanship; approved mock-up will serve as a standard of comparison for subsequent work of this section.

C. Finish at least 100 sq ft of surface in areas as designated by Architect.

D. Evaluate mock-up for compliance with specified requirements, including thickness and finish texture.

E. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.

F. Refinish mock-up area as required to produce acceptable work.

G. Approved mock-up may remain as part of the project.

1.7 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 7419 - Construction Waste Management and Disposal for packaging waste requirements.

B. Deliver materials in manufacturer's original, unopened containers with identification labels and testing agency markings intact and legible.

C. Store products in manufacturer's unopened packaging until ready for installation.
   1. Store at temperatures not less than 50 degrees F in dry, protected area.
   2. Protect from freezing, and do not store in direct sunlight.
   3. Dispose of any materials that have come into contact with contaminants of any kind prior to application.

D. Dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.8 FIELD CONDITIONS

A. Protect areas of application from windblown dust and rain.

B. Maintain ambient field conditions, such as temperature, humidity, and ventilation, within limits recommended by manufacturer for optimum results. Do not install products under ambient conditions outside manufacturer's absolute limits.
   1. Provide temporary enclosures as required to control ambient conditions.
   2. Do not apply intumescent fireproofing when ambient temperatures are below 50 degrees F without specific approval from manufacturer.
   3. Ensure that relative humidity is between 40 and 60 percent in areas of application.
   4. Provide ventilation in enclosed spaces during application and for not less than 72 hours afterward.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Intumescent Thin-Film Fire Protection for Metal (IFRM):
   1. Basis of Design, **IFRM/P19**: Sherwin Williams; Firetex FX5090 Waterbased Intumescent Coating: www.industrial-sherwinwilliams.com
      a) Provide the basis of design product or a comparable product by one of the following, subject to compliance with requirements:
         1) Albi Protective Coatings:w www.albi.com.
         2) Carboline: www.carboline.com.
         3) Isolatek/CAFCO: www.isolatek.com.
      b) Color Topcoat **P19**: Must be compatible with IFRM and approved by IFRM manufacturer. See Section 09 9123.
   2. Substitutions: See Section 01 6000 - Product Requirements.

2.2 SYSTEM REQUIREMENTS

A. Fireproofing: Provide intumescent thin-film fire protection systems tested by an independent testing agency in accordance with ASTM E119 and acceptable to authorities having jurisdiction (AHJ).
   1. Provide assemblies listed by UL or FM and bearing listing agency label or mark.

2.3 MATERIALS

A. Fire Resistive Coating System **IFRM**: Thin film intumescent mastic fireproofing system for fire protection of structural steel.
   1. Surface Burning Characteristics: Class A, tested in accordance with ASTM E84.
   2. For Interior Use:
      a) Use only water-based products.
      b) Density: 12.0 lb/gal., nominal.
      c) Bond Strength: 480 psi, minimum, in accordance with ASTM D4541.
      d) Durometer Hardness, Type D: 65, minimum, in accordance with ASTM D2240.
      e) Impact Resistance: 160 inch-lb, minimum, in accordance with ASTM D2794.

B. Fire Resistive Finish Coating System **P19**: Thin film intumescent waterbased fire protection coating for use on interior exposed structural steel, intended to provide a smooth paint-like finish and serve as a topcoat for structrural steel.
   1. Applications: As indicated on the "Finish Product List" on the drawings and on the Finish Plan drawings.
   2. Surface Burning Characteristics: Class A, tested in accordance with ASTM E84.
   3. For Interior Use:
      a) Use only water-based products.
      b) Bond Strength: 540 psi, minimum, in accordance with ASTM D4541.
      c) Durometer Hardness, Type D: 70, minimum, in accordance with ASTM D2240.
      d) Impact Resistance: 83 inch-lb, minimum, in accordance with ASTM D2794.
      e) Primer: Steel must be primed, with primer approved by coating manufacturer.

C. Primers: Primers approved by intumescent fire protection manufacturers and complying with required fire-resistance design by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates to determine if they are in satisfactory condition to receive intumescent fire protection; verify that substrates are clean and free of oil, grease, incompatible primers, or other foreign substances capable of impairing bond to fireproofing system.

B. Do not begin installation until substrates have been properly prepared.

C. If substrate preparation is responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Thoroughly clean surfaces to receive fireproofing.

B. Repair substrates to remove surface imperfections that could effect uniformity of texture and thickness of fireproofing system, and remove minor projections and fill voids that could telegraph through finished work.

C. Prime substrates where included in fire-resistance design and where recommended in writing by intumescent fire protection material manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive fire protection.

D. Cover or otherwise protect other work that might be damaged by fallout or overspray of fireproofing system, and provide temporary enclosures as necessary to confine operations and maintain required ambient field conditions.

3.3 APPLICATION

A. A compatible primer must be applied to steel substrates prior to application of intumescent fireproofing.
   1. Use only primers approved by fireproofing manufacturer for each specific condition (bare steel, galvanized steel, and/or steel primed with zinc-rich primers).

B. Comply with manufacturer's instructions for each particular intumescent fire protection system installation application as indicated.

C. Apply manufacturer’s recommended primer to required coating thickness.

D. Apply fireproofing to full thickness over entire area of each substrate to be protected.

E. Apply coats at manufacturer’s recommended rate to achieve dry film thickness (DFT) as required for fire resistance ratings designated for each condition.

F. Apply intumescent fire protection by spraying to maximum extent possible, and as necessary complete coverage by roller application or other method acceptable to manufacturer.

G. Achieve uniform finished appearance complying with approved mock-up.

3.4 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 01 4000 - Quality Requirements.
   1. Arrange for testing of installed intumescent fire protection by an independent testing laboratory using magnetic pull-off dry film thickness gauge in accordance with SSPC-PA 2, and ensure it meets requirements of authorities having jurisdiction (AHJ).
   2. Submit field test reports promptly to Contractor and Architect.

B. Repair or replace intumescent fire protection at locations where test results indicate fireproofing does not meet specified requirements.

3.5 CLEANING

A. See Section 01 7000 - Execution and Closeout Requirements for additional requirements.

B. Immediately after installation of fireproofing in each area, remove overspray and fallout from other surfaces and clean soiled areas.

3.6 PROTECTION

A. Protect installed intumescent fire protection from damage due to subsequent construction activities, so fireproofing is without damage or deterioration before Date of Substantial Completion.

B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION 07 8123

SECTION 07 8400 - FIRESTOPPING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Firestopping systems.

B. Firestopping of joints and penetrations in fire-resistance-rated and smoke-resistant assemblies, whether indicated on drawings or not, and other openings indicated.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 01 7419 – Construction Waste Management and Disposal

C. Section 07 8100 - Applied Fire Protection.

1.3 REFERENCE STANDARDS

A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2022.

B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a (Reapproved 2017).

C. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems; 2015 (Reapproved 2019).

D. ASTM E2174 - Standard Practice for On-Site Inspection of Installed Firestop Systems; 2020a.

E. ASTM E2393 - Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers; 2020a.

F. ASTM E2307 - Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-story Test Apparatus; 2020.

G. ASTM E2837 - Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies; 2013 (Reapproved 2017).

H. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).

I. ITS (DIR) - Directory of Listed Products; Current Edition.

J. FM 4991 - Approval Standard for Firestop Contractors; 2013.

K. FM (AG) - FM Approval Guide; Current Edition.

L. UL 1479 - Standard for Fire Tests of Penetration Firestops; Current Edition, Including All Revisions.

M. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems; Current Edition, Including All Revisions.

N. UL (DIR) - Online Certifications Directory; Current Edition.

O. UL (FRD) - Fire Resistance Directory; Current Edition.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.

C. Product Data: Provide data on product characteristics, performance ratings, and limitations.

D. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit 5d: For non-preformed sealants, documentation including printed statement of VOC content.
   2. Laboratory Test Reports for Credit 5d: For non-preformed sealants, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
   3. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   4. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

E. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.

F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

G. Manufacturer's qualification statement.

H. Installer's qualification statement.

1.5 QUALITY ASSURANCE

A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
   1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.

2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at www.icc-es.org will be considered as constituting an acceptable test report.
3. Submission of actual test reports is required for assemblies for which none of the above substantiation exists.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Installer Qualifications: Company specializing in performing the work of this section and:
1. Trained by manufacturer.
2. Approved by Factory Mutual Research Corporation under FM 4991, or meeting any two of the following requirements:
3. Verification of minimum three years documented experience installing work of this type.
4. Verification of at least five satisfactorily completed projects of comparable size and type.
5. Licensed by local authorities having jurisdiction (AHJ).

1.6 MOCK-UPS

A. See Section 01 4000 - Quality Requirements for additional requirements.

B. Install one firestopping assembly representative of each fire rating design required on project.
1. Where one design may be used for different penetrating items or in different wall constructions, install one assembly for each different combination.

C. Obtain approval of authorities having jurisdiction (AHJ) before proceeding.

D. If accepted, mock-up will represent minimum standard for this work.

E. If accepted, mock-up may remain as part of this work. Remove and replace mock-ups not accepted.

1.7 FIELD CONDITIONS

A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation; maintain minimum temperature before, during, and for three days after installation of materials.

B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Firestopping Manufacturers:
1. 3M Fire Protection Products: www.3m.com/firestop/#sle.
2. Hilti, Inc: www.us.hilti.com/#sle.
3. Specified Technologies Inc: www.stifirestop.com/#sle.
4. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.
5. Substitutions: See Section 01 6000 - Product Requirements.

2.2 MATERIALS

A. Firestopping Materials: Any materials meeting requirements.

B. Mold and Mildew Resistance: Provide firestopping materials with mold and mildew resistance rating of zero(0) in accordance with ASTM G21.

C. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.

D. Fire Ratings: Refer to Drawings for required systems and ratings.

2.3 FIRESTOPPING ASSEMBLY REQUIREMENTS

A. Perimeter Fire Containment Firestopping: Use system that has been tested according to ASTM E2307 to have fire resistance F Rating equal to required fire rating of floor assembly.
   1. Movement: Provide systems that have been tested to show movement capability as indicated.
   2. Temperature Rise: Provide systems that have been tested to show T Rating as indicated.
   3. Air Leakage: Provide systems that have been tested to show L Rating as indicated.
   4. Where floor assembly is not required to have a fire rating, provide systems that have been tested to show L Rating as indicated.

B. Head-of-Wall (HW) Joint System Firestopping at Joints Between Fire-Rated Wall Assemblies and Non-Rated Horizontal Assemblies: Use system that has been tested according to ASTM E2837 to have fire resistance F Rating equal to required fire rating of wall assembly.
   1. Movement: Provide systems that have been tested to show movement capability as indicated.

C. Floor-to-Floor (FF), Floor-to-Wall (FW), Head-of-Wall (HW), and Wall-to-Wall (WW) Joints, Except Perimeter, Where Both Are Fire-Rated: Use system that has been tested according to ASTM E1966 or UL 2079 to have fire resistance F Rating equal to required fire rating of the assembly in which the joint occurs.
   1. Movement: Provide systems that have been tested to show movement capability as indicated.
   2. Air Leakage: Provide systems that have been tested to show L Rating as indicated.
   3. Watertightness: Provide systems that have been tested to show W Rating as indicated.
   4. Listing by FM (AG), ITS (DIR), UL (DIR), or UL (FRD) in their certification directories will be considered evidence of successful testing.

D. Through Penetration Firestopping: Use system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.
   1. Temperature Rise: Provide systems that have been tested to show T Rating as indicated.
   2. Air Leakage: Provide systems that have been tested to show L Rating as indicated.
   3. Watertightness: Provide systems that have been tested to show W Rating as indicated.
   4. Listing by FM (AG), ITS (DIR), UL (DIR), or UL (FRD) in their certification directories will be considered evidence of successful testing.

2.4 FIRESTOPPING SYSTEMS

A. Firestopping: Any material meeting requirements.
   1. Fire Ratings: Use system that is listed by FM (AG), ITS (DIR), or UL (FRD) and tested in accordance with ASTM E814, ASTM E119, or UL 1479 with F Rating equal to fire rating of penetrated assembly and minimum T Rating Equal to F Rating and in compliance with other specified requirements.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify openings are ready to receive the work of this section.

3.2 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other materials that could adversely affect bond of firestopping material.

B. Remove incompatible materials that could adversely affect bond.

C. Install backing materials to prevent liquid material from leakage.

3.3 INSTALLATION

A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.

B. Do not cover installed firestopping until inspected by Owner's Independent Testing Agency.

C. Do not cover installed firestopping until inspected by authorities having jurisdiction.

D. Install labeling required by code.

3.4 FIELD QUALITY CONTROL

A. Independent Testing Agency: Inspection agency employed and paid by Owner, will examine penetration firestopping in accordance with ASTM E2174 and ASTM E2393.

B. Repair or replace penetration firestopping and joints at locations where inspection results indicate firestopping or joints do not meet specified requirements.

3.5 CLEANING

A. Clean adjacent surfaces of firestopping materials.

3.6 PROTECTION

A. Protect adjacent surfaces from damage by material installation.

END OF SECTION 07 8400

SECTION 07 9200 - JOINT SEALANTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Nonsag gunnable joint sealants.

B. Self-leveling pourable joint sealants.

C. Joint backings and accessories, including secondary joint sealant.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures

B. Section 01 7419 – Construction Waste Management and Disposal

C. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions: Additional requirements for sealants and primers.

1.3 REFERENCE STANDARDS

A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2015.

B. ASTM C794 - Standard Test Method for Adhesion-In-Peel of Elastomeric Joint Sealants; 2018.

C. {RSTEMP#798}ASTM C834 - Standard Specification for Latex Sealants{CH#186315}.

D. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2018.

E. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

F. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems; 2016.

G. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.

H. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2018.

I. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants; 2018.

J. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints; 2019 (Reapproved 2020).

K. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness; 2015, with Editorial Revision (2017).

L. SCAQMD 1168 - Adhesive and Sealant Applications; 1989 (Amended 2017).

M. SWRI (VAL) - SWR Institute Validated Products Directory; Current Edition.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Submit manufacturer's technical datasheets for each product to be used; include the following:
   1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
   2. List of backing materials approved for use with the specific product.
   3. Backing material recommended by sealant manufacturer.
   4. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
   5. Substrates the product should not be used on.
   6. Substrates for which use of primer is required.
   7. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
   8. Sample product warranty.
   9. Certification by manufacturer indicating that product complies with specification requirements.
   10. SWRI Validation: Provide currently available sealant product validations as listed by SWRI (VAL) for specified sealants.

C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.

D. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit 5d: For sealants installed at the building interior, documentation including printed statement of VOC content.
   2. Laboratory Test Reports for Credit 5d: For sealants installed at the building interior, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
   3. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   4. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

E. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

F. Samples for Verification: Where custom sealant color is specified, obtain directions from Architect and submit at least two physical samples for verification of color of each required sealant.

G. Sustainable Design Documentation: For sealants and primers, submit VOC content and emissions documentation.

H. Preconstruction Laboratory Test Reports: Submit at least four weeks prior to start of installation.

I. Installation Plan: Submit at least four weeks prior to start of installation.

J. Preinstallation Field Adhesion Test Plan: Submit at least two weeks prior to start of installation.

K. Field Quality Control Plan: Submit at least two weeks prior to start of installation.

L. Preinstallation Field Adhesion Test Reports: Submit filled out Preinstallation Field Adhesion Test Reports log within 10 days after completion of tests; include bagged test samples and photographic records.

M. Installation Log: Submit filled-out log for each length or instance of sealant installed.

N. Field Quality Control Log: Submit filled-out log for each length or instance of sealant installed, within 10 days after completion of inspections/tests; include bagged test samples and photographic records, if any.

O. Manufacturer's qualification statement.

P. Installer's qualification statement.

Q. Executed warranty.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum seven years documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.

C. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

D. Preconstruction Laboratory Testing: Arrange for sealant manufacturer(s) to test each combination of sealant, substrate, backing, and accessories.
   1. Adhesion Testing: In accordance with ASTM C794.
   2. Compatibility Testing: In accordance with ASTM C1087.
   3. Allow sufficient time for testing to avoid delaying the work.
   4. Deliver sufficient samples to manufacturer for testing.

5. Report manufacturer's recommended corrective measures, if any, including primers or techniques not indicated in product data submittals.
6. Testing is not required if sealant manufacturer provides data showing previous testing, not older than 24 months, that shows satisfactory adhesion, lack of staining, and compatibility.

E. Installation Plan: Include schedule of sealed joints, including the following:
1. Joint width indicated in Contract Documents.
2. Joint depth indicated in Contract Documents; to face of backing material at centerline of joint.
3. Method to be used to protect adjacent surfaces from sealant droppings and smears, with acknowledgment that some surfaces cannot be cleaned to like-new condition and therefore prevention is imperative.
4. Approximate date of installation, for evaluation of thermal movement influence.
5. Installation Log Form: Include the following data fields, with known information filled out.
   a) Unique identification of each length or instance of sealant installed.
   b) Location on project.
   c) Substrates.
   d) Sealant used.
   e) Stated movement capability of sealant.
   f) Primer to be used, or indicate no primer is used.
   g) Size and actual backing material used.
   h) Date of installation.
   i) Name of installer.
   j) Actual joint width; provide space to indicate maximum and minimum width.
   k) Actual joint depth to face of backing material at centerline of joint.
   l) Air temperature.

F. Preinstallation Field Adhesion Test Plan: Include destructive field adhesion testing of one sample of each combination of sealant type and substrate, except interior acrylic latex sealants, and include the following for each tested sample.
1. Identification of testing agency.
2. Name(s) of sealant manufacturer's field representatives who will be observing.
3. Preinstallation Field Adhesion Test Log Form: Include the following data fields, with known information filled out.
   a) Substrate; if more than one type of substrate is involved in a single joint, provide two entries on form, for testing each sealant substrate side separately.
   b) Test date.
   c) Location on project.
   d) Sealant used.
   e) Stated movement capability of sealant.
   f) Test method used.
   g) Date of installation of field sample to be tested.
   h) Copy of test method documents.
   i) Age of sealant upon date of testing.
   j) Test results, modeled after the sample form in the test method document.
   k) Indicate use of photographic record of test.

G. Field Quality Control Plan:
1. Visual inspection of entire length of sealant joints.

2. Destructive field adhesion testing of sealant joints, except interior acrylic latex sealant.
   a) For each different sealant and substrate combination, allow for one test every 100 feet in the first 1,000 linear feet, and one test per 1,000 linear feet thereafter, or once per floor on each elevation.
   b) If any failures occur in the first 1,000 linear feet, continue testing at frequency of one test per 500 linear feet at no extra cost to Owner.
3. Field testing agency's qualifications.
4. Field Quality Control Log Form: Show same data fields as on Preinstallation Field Adhesion Test Log, with known information filled out and lines for multiple tests per sealant/substrate combinations; include visual inspection and specified field testing; allow for possibility that more tests than minimum specified may be necessary.

H. Field Adhesion Test Procedures:
1. Allow sealants to fully cure as recommended by manufacturer before testing.
2. Have a copy of the test method document available during tests.
3. Take photographs or make video records of each test, with joint identification provided in the photos/videos; for example, provide small erasable whiteboard positioned next to joint.
4. Record the type of failure that occurred, other information required by test method, and the information required on the Field Quality Control Log.
5. When performing destructive tests, also inspect the opened joint for proper installation characteristics recommended by manufacturer, and report any deficiencies.
6. Deliver the samples removed during destructive tests in separate sealed plastic bags, identified with project, location, test date, and test results, to Owner.
7. If any combination of sealant type and substrate does not show evidence of minimum adhesion or shows cohesion failure before minimum adhesion, report results to Architect.

I. Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Destructive Tail Procedure.
1. Sample: At least 18 inches long.
2. Minimum Elongation Without Adhesive Failure: Consider the tail at rest, not under any elongation stress; multiply the stated movement capability of the sealant in percent by two; then multiply 1 inch by that percentage; if adhesion failure occurs before the 1-inch mark is that distance from the substrate, the test has failed.
3. If either adhesive or cohesive failure occurs before minimum elongation, take necessary measures to correct conditions and retest; record each modification to products or installation procedures.
4. Record results on Field Quality Control Log.
5. Repair failed portions of joints.

J. Field Adhesion Tests of Joints: Test for adhesion using most appropriate method in accordance with ASTM C1521, or another applicable method as recommended by manufacturer.

1.6 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Manufacturer Warranty: Provide 5-year manufacturer warranty for repair or replacemtn of installed sealants and accessories that demonstrate deterioration or adhesive or cohesive failure under normal use within warranty period specified. Complete forms in Owner's name and register with manufacturer.

C. Correction Period: Correct defective work within 2-year period commencing on Date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

2.2 JOINT SEALANT APPLICATIONS

A. Scope:
   1. Exterior Joints:
      a) Do not seal exterior joints unless indicated on drawings as sealed.
      b) Seal the following joints:
         1) Wall expansion and control joints.
         2) Joints between doors, windows, and other frames or adjacent construction.
         3) Joints between different exposed materials.
   2. Interior Joints:
      a) Do not seal interior joints indicated on drawings as not sealed.
      b) Do not seal gaps and openings in gypsum board and suspended ceilings
      c) Do not seal through-penetrations in sound-rated assemblies that are also fire-rated assemblies.
      d) Seal the following joints:
         1) Joints between door frames, window frames, and other frames and adjacent construction.
         2) In sound-rated wall and ceiling assemblies, gaps at electrical outlets, wiring devices, and piping penetrations.
         3) In sound-rated wall and ceiling assemblies, seal joints between wall assemblies and ceiling assemblies; between wall assemblies and other construction; between ceiling assemblies and other construction.
   3. Do Not Seal:
      a) Intentional weep holes in masonry.
      b) Joints indicated to be covered with expansion joint cover assemblies.
      c) Joints where sealant is specified to be furnished and installed by manufacturer of product to be sealed.
      d) Joints where sealant installation is specified in other sections.

B. Type EJ1 - Exterior Joints: Use nonsag nonstaining silicone sealant, unless otherwise indicated.
   1. Type EJ2 - Lap Joints in Sheet Metal Fabrications: Butyl rubber, noncuring.

C. Type IJ1 - Interior Joints: Use nonsag polyurethane sealant, unless otherwise indicated.
   1. Type IJ2 - Not Used.
   2. Type IJ7 - Wall and Ceiling Joints in Wet Areas: Nonsag polyurethane sealant for continuous liquid immersion.
   3. Type IJ8 - Floor Joints in Wet Areas: Nonsag polyurethane non-traffic-grade sealant suitable for continuous liquid immersion.
   4. Type IJ3 - Joints between Tile in Wet Areas and Floors, Walls, and Ceilings: Mildew-resistant silicone sealant; white.

5. Type IJ4 - In Sound-Rated Assemblies: Acrylic emulsion latex sealant.
6. Type IJ5 - Narrow Control Joints in Interior Concrete Slabs: Self-leveling epoxy sealant.
7. Type IJ6 - Other Floor Joints: Self-leveling polyurethane traffic-grade sealant.

D. Interior Wet Areas: restrooms and food service areas; fixtures in wet areas include plumbing fixtures, food service equipment, countertops, cabinets, and other similar items.

E. Sound-Rated Assemblies: Walls and ceilings identified as STC-rated, sound-rated, or acoustical.

2.3 JOINT SEALANTS - GENERAL

A. Sealants and Primers: Provide products having lower volatile organic compound (VOC) content than indicated in SCAQMD 1168. See also Section 01 3566.42.

B. Sealant Colors:
1. Color and texture of sealants used with exposed masonry are to match color of mortar joints.
2. Color and texture of sealants used with unpainted concrete are to match color of adjacent concrete.
3. Color of sealants for other locations to be light gray, unless otherwise indicated.
4. Provide custom colors for use around window perimeters, to match window frame or masonry, or colors as determined by the Architect.
5. Provide custom colors for use at relieving angles. If custom colors are required, specify paint color and coordinate with sealant manufacturer for paint products to be used at relieving angles.
6. Match window perimeter sealant color to the color of window frame or masonry using custom color sealant. Sealant color at relieving angles to match mortar color. If manufacturer's standard colors do not match, use sealants that are available in custom colors. Specify paint color and coordinate with sealant manufacturer for paint products to be used.

2.4 NONSAG JOINT SEALANTS

A. Type EJ1 - Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
1. Movement Capability: Plus and minus 50 percent, minimum.
2. Non-Staining To Porous Stone: Non-staining to light-colored natural stone when tested in accordance with ASTM C1248.
3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
4. Hardness Range: 15 to 35, Shore A, when tested in accordance with ASTM C661.
5. Color: To be selected by Architect from manufacturer's standard range.
6. Service Temperature Range: Minus 20 to 180 degrees F.
7. Products:
   a) Dow; DOWSIL 795 Silicone Building Sealant: www.dow.com/#sle.
   b) Pecora Corporation; Pecora 890 NST (Non-Staining Technology): www.pecora.com/#sle.
   c) Tremco Commercial Sealants & Waterproofing; Spectrem 2: www.tremcosealants.com/#sle.

B. Type IJ3 - Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
   1. Color: White.

C. Type IJ1 - Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; not expected to withstand continuous water immersion or traffic.
   1. Movement Capability: Plus and minus 12.5 percent, minimum.
   2. Hardness Range: 20 to 35, Shore A, when tested in accordance with ASTM C661.
   3. Color: To be selected by Architect from manufacturer's standard range.
   4. Service Temperature Range: Minus 40 to 180 degrees F.
   5. Products:
      a) Pecora Corporation; DynaFlex: www.pecora.com/#sle.
      b) Sika Corporation; Sikaflex-1a: www.usa.sika.com/#sle.
      c) W. R. Meadows, Inc; POURTHANE NS: www.wrmeadows.com/#sle.
      d) Substitutions: See Section 01 6000 - Product Requirements.

D. Type IJ7 - Polyurethane Sealant for Continuous Water Immersion: ASTM C920, Grade NS, Uses M and A; single or multi-component; explicitly approved by manufacturer for continuous water immersion; suitable for traffic exposure when recessed below traffic surface .
   1. Movement Capability: Plus and minus 35 percent, minimum.
   2. Hardness Range: 20 to 35, Shore A, when tested in accordance with ASTM C661.
   3. Color: To be selected by Architect from manufacturer's standard range.
   4. Service Temperature Range: Minus 40 to 180 degrees F.
   5. Products:
      a) Sika Corporation; Sikaflex-1a: www.usa.sika.com/#sle.
      b) Tremco; Dymonic 100: www.tremcosealants.com.
      c) Substitutions: See Section 01 6000 - Product Requirements.

E. Type IJ4 - Acrylic Emulsion Latex: Water-based; {RS#798}, single component, nonstaining, nonbleeding, nonsagging; not intended for exterior use.
   1. Color: Standard colors matching finished surfaces, Type OP (opaque).
   2. Grade: {RS#798}; Grade 0 Degrees F (Minus 18 Degrees C).
   3. Products:
      a) Franklin International, Inc; Titebond Acoustical Smoke & Sound Sealant: www.titebond.com/#sle.
      b) Hilti, Inc; CP 506 Smoke and Acoustical Sealant: www.us.hilti.com/#sle.
      c) Specified Technologies Inc; Smoke N' Sound Acoustical Sealant: www.stifirestop.com/#sle.
      d) Tremco Commercial Sealants & Waterproofing; Tremstop Smoke and Sound: www.tremcosealants.com/#sle.

F. Type EJ2 - Noncuring Butyl Sealant: Solvent-based, single component, nonsag, nonskinning, nonhardening, nonbleeding; nonvapor permeable; intended for fully concealed applications.
   1. Products:
      a) Pecora Corporation; Pecora BA-98 Non-Skinning Butyl Sealant: www.pecora.com/#sle.
      b) Tremco Commercial Sealants & Waterproofing; Acoustical/Curtainwall Sealant: www.tremcosealants.com/#sle.

2.5 SELF-LEVELING JOINT SEALANTS

A. Type IJ8 - Self-Leveling Polyurethane Sealant for Continuous Water Immersion: Polyurethane; ASTM C920, Grade P, Uses M and A; single component; explicitly approved by manufacturer for traffic exposure and continuous water immersion.
   1. Movement Capability: Plus and minus 25 percent, minimum.
   2. Hardness Range: 35 to 55, Shore A, when tested in accordance with ASTM C661.
   3. Color: To be selected by Architect from manufacturer's standard range.
   4. Service Temperature Range: Minus 40 to 180 degrees F.
   5. Products:
      a) Sika Corporation; Sikaflex-1c SL: www.usa.sika.com/#sle.
      b) W. R. MEADOWS, Inc; POURTHANE SL: www.wrmeadows.com/#sle.
      c) Substitutions: See Section 01 6000 - Product Requirements.

B. Type IJ5 - Semi-Rigid Self-Leveling Epoxy Joint Filler: Epoxy or epoxy/polyurethane copolymer; intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.
   1. Composition: Multicomponent, 100 percent solids by weight.
   2. Durometer Hardness: Minimum of 85 for Type A or 35 for Type D, after seven days when tested in accordance with ASTM D2240.
   3. Color: To be selected by Architect from manufacturer's standard colors.
   4. Joint Width, Minimum: 1/8 inch.
   5. Joint Width, Maximum: 1/4 inch.
   6. Joint Depth: Provide product suitable for joints from 1/8 inch to 2 inches in depth including space for backer rod.
   7. Products:
      a) Adhesives Technology Corporation; CRACKBOND JF-90 HD: www.atcepoxy.com/#sle.
      b) Euclid Chemical Company; EUCO 700: www.euclidchemical.com/#sle.
      c) Mapei; Mapeiflex Joint Sealant EP 90/50: www.mapei.com/#sle.
      d) W.R. Meadows, Inc; Rezi-Weld Flex: www.wrmeadows.com/#sle.

C. Type IJ6 - Semi-Rigid Self-Leveling Polyurea Joint Filler: Two-component, 100 percent solids; intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.
   1. Durometer Hardness, Type A: 75, minimum, after seven days when tested in accordance with ASTM D2240.
   2. Color: Concrete gray.
   3. Color: To be selected by Architect from manufacturer's standard colors.
   4. Products:
      a) ARDEX Engineered Cements; ARDEX ARDISEAL RAPID PLUS: www.ardexamericas.com/#sle.
      b) Euclid Chemical Company; EUCO QWIKjoint UVR: www.euclidchemical.com/#sle.
      c) Mapei; Mapeiflex Joint Sealant PO 95/100: www.mapei.com/#sle.

2.6 ACCESSORIES

A. Sealant Backing Materials, General: Materials placed in joint before applying sealants; assists sealant performance and service life by developing optimum sealant profile and preventing three-sided adhesion; type and size recommended by sealant manufacturer for compatibility with sealant, substrate, and application.

B. Sealant Backing Rod, Closed-Cell Type:
   1. Cylindrical flexible sealant backings complying with ASTM C1330 Type C.
   2. Size: 25 to 50 percent larger in diameter than joint width.

C. Secondary Joint Sealant: Precompressed, self-expanding polyurethane foam sealant secondary to field-applied liquid sealants in exterior wall assemblies.
   1. Width(s): As indicated on drawings.
   2. Tensile Strength: 21 psi minimum, tested in accordance with ASTM D3574.
   3. Air Leakage: Pass, tested in accordance with ASTM E283.
   4. Water Penetration: Pass, tested in accordance with ASTM E331.
   5. Movement Capability: 25%+, 25%- (50% overall).
   6. Products:
      a) Balco; BBSW - Precompressed Secondary Seal: www.balcousa.com.
      b) Sika/Emseal; Backerseal: www.emseal.com.
      c) Sika/Emseal; 25V: www.emseal.com.

D. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

E. Masking Tape: Self-adhesive, nonabsorbent, nonstaining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.

F. Joint Cleaner: Noncorrosive and nonstaining type, type recommended by sealant manufacturer; compatible with joint forming materials.

G. Primers: Type recommended by sealant manufacturer to suit application; nonstaining.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that joints are ready to receive work.

B. Verify that backing materials are compatible with sealants.

C. Verify that backer rods are of the correct size.

D. Preinstallation Adhesion Testing: Install a sample for each test location indicated in the test plan.
   1. Test each sample as specified in PART 1 under QUALITY ASSURANCE article.
   2. Notify Architect of date and time that tests will be performed, at least seven days in advance.

3. Arrange for sealant manufacturer's technical representative to be present during tests.
4. Record each test on Preinstallation Adhesion Test Log as indicated.
5. If any sample fails, review products and installation procedures, consult manufacturer, or take other measures that are necessary to ensure adhesion; retest in a different location; if unable to obtain satisfactory adhesion, report to Architect.
6. After completion of tests, remove remaining sample material and prepare joints for new sealant installation.

3.2 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

E. Concrete Floor Joints That Will Be Exposed in Completed Work: Test joint filler in an inconspicuous area to verify that it does not stain or discolor slab.

3.3 INSTALLATION

A. Install this work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Provide joint sealant installations complying with ASTM C1193.

C. Install acoustical sealant application work in accordance with ASTM C919.

D. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.

E. Install bond breaker backing tape where backer rod cannot be used.

F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

G. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.

H. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

I. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete slab.

3.4 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements for additional requirements.

B. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.

C. Destructive Adhesion Testing: If there are any failures in first 1,000 linear feet, notify Architect immediately.

D. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

E. Repair destructive test location damage immediately after evaluation and recording of results.

END OF SECTION 07 9200

SECTION 07 9513 - EXPANSION JOINT COVER ASSEMBLIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Expansion joint cover assemblies for floor, wall, and ceiling surfaces.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 01 7419 – Construction Waste Management and Disposal.

1.3 REFERENCE STANDARDS

1.4 ADMINISTRATIVE REQUIREMENTS

A. Installation Templates: For frames and anchors to be embedded in concrete or masonry, furnish templates to relevant installers; include installation instructions and tolerances.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: For each type of expansion joint cover specified. Provide joint assembly profiles, profile dimensions, anchorage devices and available colors and finish.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Shop Drawings: Indicate joint and splice locations, miters, layout of the work, affected adjacent construction and anchorage locations.

E. Manufacturer's Installation Instructions: Indicate rough-in sizes and required tolerances for item placement.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Expansion Joint Cover Assemblies:

1. Basis of Design: Construction Specialties, Inc: www.c-sgroup.com/#sle, unless otherwise noted.
2. Other Acceptable Manufacturers, subject to compliance with requirements:
   a) Balco, Inc: www.balcousa.com/#sle.
   b) EMSEAL Joint Systems, Ltd: www.emseal.com/#sle.
   c) MM Systems Corp: www.mmsystemscorp.com/#sle.
   d) Sika Emseal; www.emseal.com
3. Substitutions: See Section 01 6000 - Product Requirements.

2.2 EXPANSION JOINT COVER ASSEMBLY APPLICATIONS

A. Interior Non-Fire-Rated Wall/Ceiling Joints - Gypsum Wallboard Ceilings **CWJ-1**:
   1. Basis of Design:
      a) **Construction Specialties, Inc; FWFC-200**: www.c-sgroup.com/#sle.
      b) Substitutions: See Section 01 6000 - Product Requirements.

B. Interior Non-Fire-Rated Wall/Ceiling Joints - Acoustic Panel Ceilings **CWJ-2**:
   1. Basis of Design:
      a) **Construction Specialties, Inc; FCFC-200**: www.c-sgroup.com/#sle.
      b) Substitutions: See Section 01 6000 - Product Requirements.

C. Interior Non-Fire-Rated Ceiling/Ceiling Joints - Gypsum Wallboard Ceilings **CCJ-1**:
   1. Basis of Design:
      a) **Construction Specialties, Inc; FWF-200**: www.c-sgroup.com/#sle.
      b) Substitutions: See Section 01 6000 - Product Requirements.

D. Interior Non-Fire-Rated Ceiling/Ceiling Joints - Acoustic Panel Ceilings **CCJ-2**:
   1. Basis of Design:
      a) **Construction Specialties, Inc; FCF-200:** www.c-sgroup.com/#sle.
      b) Substitutions: See Section 01 6000 - Product Requirements.

E. Interior Fire-Rated Floor/Wall Joints **IFJ-1**:
   1. Basis of Design:
      a) **Construction Specialties, Inc**; **GFSTW-200M W/FB**: www.c-sgroup.com/#sle.
      b) Substitutions: See Section 01 6000 - Product Requirements.

F. Interior Non-Fire-Rated Wall/Wall Joints (Flush) - **IWJ-1**:
   1. Basis of Design:
      a) **Construction Specialties, Inc; FWF-200:** www.c-sgroup.com/#sle.
      b) Substitutions: See Section 01 6000 - Product Requirements.

G. Interior Non-Fire-Rated Wall/Wall Joints (Corner) - **IWJ-2**:
   1. Basis of Design:
      a) **Construction Specialties, Inc; FCF-200:** www.c-sgroup.com/#sle.
      b) Substitutions: See Section 01 6000 - Product Requirements.

H. Exterior Wall Joints Subject to Thermal Movement **EWJ-1**:
   1. Basis of Design:
      a) **Construction Specialties, Inc; VF-200**: www.c-sgroup.com/#sle.
      b) Substitutions: See Section 01 6000 - Product Requirements.

I. Exterior Wall - Concealed Vertical and Horizontal Applications - Non-Fire-Rated:
   1. Basis of Design: **Tremco**; **Willseal 150:** tremcosealants.com.
   2. Joint Widths: As indicated on drawings.
   3. Color: Manufacturer's standard.
   4. Alternate Comparable Product:
      a) Sika; Emseal 25V: www.emseal.com.

J. Exterior Wall - Concealed Vertical and Horizontal Applications - Fire-Rated:
   1. Basis of Design: **Tremco**; **Willseal FR-V:** tremcosealants.com.
   2. Joint Widths: As indicated on drawings.
   3. Color: Manufacturer's standard.

2.3 EXPANSION JOINT COVER ASSEMBLIES

A. Expansion Joint Cover Assemblies - General: Factory-fabricated and assembled; designed to completely fill joint openings, sealed to prevent passage of air, dust, water, smoke; suitable for traffic expected.
   1. Joint Dimensions and Configurations: As indicated on drawings.
   2. Joint Cover Sizes: Selected to suit joint width and configuration, based on manufacturer's published recommendations and limitations.
   3. Lengths: Provide covers in full lengths required; avoid splicing wherever possible.
   4. Anchors, Fasteners, and Fittings: Provided by cover manufacturer.

B. Covers in Fire Rated Assemblies: Provide cover assembly having fire rating equivalent to that of assembly into which it is installed.

2.4 MATERIALS

2.5 ACCESSORIES

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that joint preparation and dimensions are acceptable and in accordance with manufacturer's requirements.

3.2 INSTALLATION

A. Install components and accessories in accordance with manufacturer's instructions.

B. Align work plumb and level, flush with adjacent surfaces.

C. Rigidly anchor to substrate to prevent misalignment.

3.3 PROTECTION

A. Do not permit traffic over unprotected floor joint surfaces.

END OF SECTION 07 9513

SECTION 08 1113 - HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Non-fire-rated hollow metal doors and frames.

B. Hollow metal frames for wood doors.

C. Fire-rated hollow metal doors and frames.

D. Thermally insulated exterior hollow metal doors with frames.

E. Bullet-resistant hollow metal frames for glazing.

F. Hollow metal borrowed lites glazing frames.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 01 7419 – Construction Waste Management and Disposal.

C. Section 08 0671- Door Hardware Schedule.

D. Section 08 1416 - Flush Wood Doors: Wood doors installed in hollow metal frames, and requirements for sound-rated doors.

E. Section 08 7100 - Door Hardware.

F. Section 08 8000 - Glazing: Glass for doors and borrowed lites.

G. Section 09 9123 - Interior Painting: Field painting.

1.3 ABBREVIATIONS AND ACRONYMS

A. ANSI: American National Standards Institute.

B. HMMA: Hollow Metal Manufacturers Association.

C. NAAMM: National Association of Architectural Metal Manufacturers.

D. NFPA: National Fire Protection Association.

E. SDI: Steel Door Institute.

F. UL: Underwriters Laboratories.

1.4 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2011.

C. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames; 2003 (R2009).

D. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2017.

E. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.

F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

G. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2023, with Editorial Revision.

H. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2023.

I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

J. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2016.

K. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

L. ITS (DIR) - Directory of Listed Products; Current Edition.

M. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.

N. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2011.

O. NAAMM HMMA 840 - Guide Specifications For Receipt, Storage and Installation of Hollow Metal Doors and Frames; 2007.

P. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames; 2014.

Q. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2019.

R. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2017.

S. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames; 2013.

T. UL (DIR) - Online Certifications Directory; Current Edition.

U. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

V. UL 752 - Standard for Bullet-Resisting Equipment; Current Edition, Including All Revisions.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.

E. Samples: Submit two samples of metal, 2 by 2 inches in size, showing factory finishes, colors, and surface texture.

F. Test Reports: Show compliance with specified requirements for the following:
   1. Sound-retardant doors and frames; sealed panel tests are not acceptable.
   2. Bullet resistant doors and/or frames.

G. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.

H. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.

I. Installer's Qualification Statement.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than seven years documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least five years of documented experience.

C. Maintain at project site copies of reference standards relating to installation of products specified.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Hollow Metal Doors and Frames:
1. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com/#sle.
2. Curries, an Assa Abloy Group company: www.assaabloydss.com/#sle.
3. Mesker, dormakaba Group: www.meskeropeningsgroup.com/#sle.
4. Republic Doors, an Allegion brand: www.republicdoor.com/#sle.
5. Steelcraft, an Allegion brand: www.allegion.com/#sle.
6. Substitutions: See Section 01 6000 - Product Requirements.

B. Exterior Insulated Hollow Metal Doors and Frames:
1. Basis-of-Design: Ceco; **Trio-E Energy Effficient Heavy Duty Exterior Doors** and **Thermal Break SQT** and **SRT** Frames.
2. Substitutions: See Section 01 6000 - Product Requirements.

C. Bullet-Resistant Hollow Metal Frames:
1. **Basis of Design**: Republic Doors, an Allegion brand; ME Series Frames: www.republicdoor.com/#sle.
2. Other Acceptable Manufacturers:
   a) Curries/ASSA ABLOY; Bullet Resistant Assemblies.
   b) Mesker, dormakaba Group; BR Series Bullet-Resistant Doors and Frames: www.meskeropeningsgroup.com/#sle.
3. Substitutions: See Section 01 6000 - Product Requirements.

2.2 PERFORMANCE REQUIREMENTS

A. Requirements for Hollow Metal Doors and Frames:
1. Steel Sheet: Comply with one or more of the following requirements; galvannealed steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
2. Accessibility: Comply with ICC A117.1 and ADA Standards.
3. Exterior Door Top Closures: Flush end closure channel, with top and door faces aligned.
4. Door Edge Profile: Manufacturers standard for application indicated.
5. Typical Door Face Sheets: Flush.

6. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
7. Zinc Coating for Typical Interior (where indicated) and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvannealed) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.
    a) Based on SDI Standards: Provide at least A40/ZF120 (galvannealed) when necessary, coating not required for typical interior door applications, and at least A60/ZF180 (galvannealed) for corrosive locations.

B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.3 HOLLOW METAL DOORS

A. Door Finish: Factory primed and field finished.

B. Exterior Doors: Thermally insulated.
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
    a) Level 3 - Extra Heavy-duty.
    b) Physical Performance Level A 1 000 000 cycles; in accordance with ANSI/SDI A250.4.
    c) Model 2 - Seamless.
    d) Door Face Metal Thickness: 16 gauge, 0.053 inch, minimum.
    e) Zinc Coating: A60/ZF180 galvannealed coating; ASTM A653/A653M.
2. Door Core Material: Polyurethane, 1.8 lbs/cu ft minimum density.
    a) Foam Plastic Insulation: Manufacturer's standard board insulation with maximum flame spread index (FSI) of 75, and maximum smoke developed index (SDI) of 450 in accordance with ASTM E84, and completely enclosed within interior of door.
3. Door Thermal Resistance: R-Value of 8.7, minimum, for installed thickness of polyurethane.
4. Door Thickness: 1-3/4 inches, nominal.
5. Weatherstripping: Refer to Section 08 7100.

C. Interior Doors, Non-Fire-Rated:
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
    a) Level 3 - Extra Heavy-duty.
    b) Physical Performance Level A 1 000 000 cycles; in accordance with ANSI/SDI A250.4.
    c) Model 2 - Seamless.
    d) Door Face Metal Thickness: 16 gage, 0.053 inch, minimum.
        1) Doors over 48" shall be minimum thickness of 0.0598 inch (16 ga).
2. Door Thickness: 1-3/4 inches, nominal.

D. Fire-Rated Doors:

1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
   a) Level 3 - Extra Heavy-duty.
   b) Physical Performance Level A 1 000 000 cycles; in accordance with ANSI/SDI A250.4.
   c) Model 2 - Seamless.
   d) Door Face Metal Thickness: 16 gauge, 0.053 inch, minimum.
2. Fire Rating: As indicated on Door Schedule, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").
3. Temperature-Rise Rating (TRR) Across Door Thickness: In accordance with local building code and authorities having jurisdiction.
4. Provide units listed and labeled by UL (DIR) or ITS (DIR).
   a) Attach fire rating label to each fire rated unit.
5. Door Core Material: Manufacturers standard core material/construction in compliance with requirements.
6. Door Thickness: 1-3/4 inches, nominal.

2.4 HOLLOW METAL FRAMES

A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.

B. Frame Finish: Factory primed and field finished.

C. Exterior Door Frames: Full profile/continuously welded type.
   1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A40/ZF120 coating.
   2. Frame Metal Thickness: 14 gauge, 0.067 inch, minimum.
   3. Weatherstripping: Separate, see Section 08 7100.

D. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
   1. Frame Metal Thickness: 14 gage, 0.067 inch, minimum.
   2. Door Frames for Openings More Than 48 Inches (1219 mm) Wide: Fabricated from 0.067inch- (14 Ga) thick steel sheet.
   3. Sound Transmission Class (STC) Rating of Door and Frame Assembly: STC of 40, minimum, calculated in accordance with ASTM E413, and tested in accordance with ASTM E90 - at locations indicated on the Door Schedule on the drawings.

E. Door Frames, Fire-Rated: Full profile/continuously welded type.
   1. Fire Rating: Same as door, labeled.
   2. Frame Metal Thickness: 14 gage, 0.067 inch, minimum.
   3. Door Frames for Openings More Than 48 Inches (1219 mm) Wide: Fabricated from 0.067inch- (14 Ga) thick steel sheet.

F. Frames for Wood Doors: Comply with frame requirements in accordance with corresponding door.

G. Borrowed Lites Glazing Frames: Construction and face dimensions to match door frames, and as indicated on drawings.

H. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.

I. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inches high to fill opening without cutting masonry units.

J. Frames Wider than 48 inches: Reinforce with steel channel fitted tightly into frame head, flush with top.

2.5 BULLET RESISTANT HOLLOW METAL FRAMES

A. Bullet-Resistant Frames for Glazing; Interior: Comply with UL 752; face welded construction, ground smooth, fully prepared and reinforced for hardware installation.
   1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
      a) Level 4 - Maximum-duty.
      b) Physical Performance Level A 1 000 000 cycles; in accordance with ANSI/SDI A250.4.
      c) Model 1 - Full Flush.
      d) Zinc Coating: A60/ZF180 galvannealed coating; ASTM A653/A653M.
   2. Bullet Resistance: UL 752, Threat Level Rating - Level 3.
   3. Frame Metal Thickness: 14 gauge, 0.067 inch, minimum.
   4. Glazing Thickness for Level 3: As indicated for glazing Type BG.
   5. Bullet-Resistant Glazing: See Type **BG**, furnished in Section 08 8000.

2.6 FINISHES

A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

B. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15 mil, 0.015 inch dry film thickness (DFT) per coat; provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
   1. Fire-Rated Frames: Comply with fire rating requirements indicated.

2.7 FRAME ANCHORS

A. Jamb Anchors:
   1. Masonry Type: Adjustable strap and stirrup or T-shaped anchors to suit frame size, not less than 0.042 inches thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inches thick.
   2. Stud Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inches thick.
   3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
   4. Postinstalled Expansion Type for In-place Concrete or Masonry: Minimum 3/8 inch diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

B. Floor Anchors: Formed from same material as frames, not less than 0.042 inches thick, and as follows:
   1. Monolithic Concrete Slabs: Clip type anchors, with two holes to receive fasteners.
   2. Separate Topping Concrete Slabs: Adjustable type anchors with extension clips, allowing not less than 2 inch height adjustment. Terminate bottom of frames at finish floor surface.

2.8 ACCESSORIES

A. Glazing: As specified in Section 08 8000, factory installed.

B. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.

C. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the work.

B. Examine rough-in for embedded and built-in anchors to verify actual locations before frame installation.

C. Verify that opening sizes and tolerances are acceptable.

D. Verify that finished walls are in plane to ensure proper door alignment.

E. Prepare written report, endorsed by the Installer, listing conditions detrimental to performance of the work.

F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling and dressing as required to make area smooth, flush and invisible on exposed faces.

B. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

C. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist and plumbness to the following tolerances:
   1. Squareness: Plus or minus 1/16", measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
   2. Alignment: Plus or minus 1/16" measured at jambs on a horizontal line parallel to plane of wall.
   3. Twist: Plus or minus 1/16" measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
   4. Plumbness: Plus or minus 1/16" measured at jambs on a perpendicular line from head to floor.

D. Drill and tap doors and frames to receive nontemplated, mortised and surface mounted door hardware.

3.3 INSTALLATION

A. Install doors and frames in accordance with manufacturer's instructions, approved shop drawings, and related requirements of specified door and frame standards or custom guidelines indicated.

B. Install fire rated units in accordance with NFPA 80.

C. Coordinate frame anchor placement with wall construction.
   1. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post installed expansion anchors.
      a) Floor anchors may be set with power actuated fasteners instead of post installed expansion anchors if so indicated and approved on shop drawings.
   2. Metal Stud Partitions: Solidly pack mineral fiber insulation behind frames.
   3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
   4. Concrete Walls: Solidly fill space between frame and concrete with grout. Take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
   5. In-Place Concrete or Masonry Construction: Secure frames in place with post installed expansion anchors. Countersink anchors, and fill and make smooth, flush and invisible on exposed faces.
   6. In-Place Gypsum Board partitions: Secure frames in place with post installed expansion anchors through floor anchors at each jamb. Countersink anchors and fill and make smooth, flush and invisible on exposed faces.
   7. Installation Tolerances: Adjust hollow metal frames for squareness, alignment, twist and plumbness.

D. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
   1. Non-Fire Rated Standard Steel Doors:
      a) Jambs and Head: 1/8" plus or minus 1/16".
      b) Between Edges of Pairs of Doors: 1/8" plus or minus 1/16".
      c) Between Bottom of Door and Top of Threshold: Maximum 3/8"
      d) Between Bottom of Door and Top of Finish Floor (no Threshold): Maximum 3/4"
   2. Fire Rated Doors: Install doors with clearances according to NFPA 80.
   3. Smoke Control Doors: Install doors according to NFPA 105.

E. Install door silencers in frames before grouting.
   1. Comply with recommended practice for hardware placement of doors and frames in accordance with ANSI/SDI A250.6 or NAAMM HMMA 861.

F. Install door hardware as specified in Section 08 7100.
   1. Comply with recommended practice for hardware placement of doors and frames in accordance with ANSI/SDI A250.6 or NAAMM HMMA 861.

G. Coordinate installation of electrical connections to electrical hardware items.

H. Touch up damaged factory finishes.

3.4 TOLERANCES

A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.

B. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.5 ADJUSTING

A. Adjust for smooth and balanced door movement.

B. Adjust sound-rated doors so that seals are fully engaged when door is closed.

C. Remove grout and other bonding material from hollow metal work immediately after installation.

D. Prime Coat Touch-up: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust inhibitive primer.

E. Metallic Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

3.6 SCHEDULE

A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION 08 1113

SECTION 08 1416 - FLUSH WOOD DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Flush wood doors; flush and flush glazed configuration; fire-rated, non-rated, and acoustical.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures

B. Section 01 7419 – Construction Waste Management and Disposal.

C. Section 08 1113 - Hollow Metal Doors and Frames.

D. Section 08 7100 - Door Hardware.

E. Section 08 8000 - Glazing.

F. Section 09 2116 - Gypsum Board Assemblies: Bullet-resistant sheathing and wallboard for bullet-resistant partitions and walls.

G. Section 09 9123 - Interior Painting: Field finishing of doors.

1.3 REFERENCE STANDARDS

A. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).

B. ASTM E413 - Classification for Rating Sound Insulation; 2016.

C. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014, with Errata (2018).

D. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.1; 2017, with Errata (2019).

E. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2019.

F. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

G. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; Current Edition, Including All Revisions.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit 5d: For adhesives, documentation including printed statement of VOC content.
   2. Product Data for Credit b4: For composite wood products, documentation indicating that product contains no urea formaldehyde.
   3. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
   4. Certificates for Credit d13: Chain-of-custody certificates indicating that products specified to be made from certified wood comply with forest certification requirements. Include documentation that manufacturer is certified for chain of custody by an FSC-accredited certification body. Inlcude statement indicating cost for each certified wood product.

D. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.
   1. Provide information as required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).

E. Samples: Submit two samples of door veneer, 6 by 6 inch in size illustrating wood grain, stain color, and sheen.

F. Test Reports: Show compliance with specified requirements for the following:
   1. Sound-retardant doors and frames; sealed panel tests are not acceptable.

G. Manufacturer's Installation Instructions: Indicate special installation instructions.

H. Installer's qualification statement.

I. Specimen warranty.

J. Warranty, executed in Owner's name.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section, with not less than seven years of documented experience.
   1. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.

B. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than five years of documented experience.

C. Woodwork Quality Assurance Program:
   1. Provide labels indicating that the installed work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.

2. Submit documentation upon completion of installation that verifies this work is in compliance with specified requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Package, deliver and store doors in accordance with specified quality standard.

B. Accept doors on site in manufacturer's packaging. Inspect for damage.

C. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation.

1.7 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Manufacturer Warranty: Provide manufacturer's warranty on interior doors for the life of the installation. Complete forms in Owner's name and register with manufacturer.
   1. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Wood Veneer Faced Doors:
   1. Oregon Door; Architectural Series: www.oregondoor.com/#sle.
   2. Oshkosh Door Company; Architectural Flush Wood Doors.
   3. **Basis-of-Design**: VT Industries, Inc; Heritage Collection Flush Wood Veneer Doors: www.vtindustries.com/#sle.

2.2 DOORS

A. Doors: See drawings for locations and additional requirements.
   1. Quality Standard: Premium Grade, Heavy Duty performance, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
   2. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.

B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
   1. Provide solid core doors at each location.
      a) Cores for Sound-Retardant Doors: Sound absorbent material encapsulated by stiles, rails, crossbands, and face veneers.
   2. Fire Rated Doors: Tested to ratings indicated on drawings in accordance with UL 10C - Positive Pressure; Underwriters Laboratories Inc (UL) or Intertek/Warnock Hersey (WHI) labeled without any visible seals when door is open.
   3. Smoke and Draft Control Doors: In addition to required fire rating, provide door assemblies tested in accordance with UL 1784 with maximum air leakage of 3.0 cfm per sq ft of door opening at 0.10 inch wg pressure at both ambient and elevated temperatures for "S" label; if necessary, provide additional gasketing or edge sealing.

4. Sound-Rated Doors: Minimum STC as indicated on drawings, calculated in accordance with ASTM E413, tested in accordance with ASTM E90.
5. Wood veneer facing with factory transparent finish as indicated on drawings.
   a) Refer to **WD1** and **WS1** on the "Finish Product List on the drawings.

2.3 DOOR AND PANEL CORES

A. Non-Rated Solid Core and 20 Minute Rated Doors: Type structural composite lumber core (SCLC), plies and faces as indicated.

B. Fire-Rated Doors: Mineral core type, with fire resistant composite core (FD), plies and faces as indicated above; with core blocking as required to provide adequate anchorage of hardware without through-bolting.

C. Sound-Rated Doors: Equivalent to type, with manufacturer's standard sound attenuation core construction as required to achieve STC rating specified; plies and faces as indicated above.

2.4 DOOR FACINGS

A. Veneer Facing for Transparent Finish: Select white maple, veneer grade in accordance with quality standard indicated, plain sliced (flat cut), with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face.
   1. Vertical Edges: Same species as face veneer.
   2. "Running Match" each pair of doors and doors in close proximity to each other.

B. Facing Adhesive: Type I - waterproof.

2.5 DOOR CONSTRUCTION

A. Fabricate doors in accordance with door quality standard specified.

B. Cores onstructed with stiles and rails:
   1. Provide solid blocks at lock edge for hardware reinforcement.
   2. Provide solid blocking for other throughbolted hardware.

C. Glazed Openings: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.

D. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.

E. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.

F. Provide edge clearances in accordance with the quality standard specified.

2.6 FINISHES - WOOD VENEER DOORS

A. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
   1. Transparent:

a) System - 11, Polyurethane, Catalyzed.
b) Stain: As selected by Architect.
   1) Refer to Casework Finish Type **WS1** on the "Finish Product List" on the drawings.
c) Sheen: Satin.

B. Factory finish doors in accordance with sample to be provided.

C. Seal door top edge with color sealer to match door facing.

2.7 ACCESSORIES

A. Hollow Metal Door Frames: As specified in Section 08 1113.

B. Glazing: As specified in Section 08 8000.

C. Glazing Stops: Wood, of same species as door facing, butted corners; prepared for countersink style tamper proof screws.

D. Door Hardware: See Sections 08 6710 and 08 7100.
   1. Sound-Rated Doors:
      a) Automatic Door Bottoms/Drop Seals: Provide type as required to meet specified sound rating.
      b) Contractor's option to have door bottoms factory- or field installed.
      c) Provide perimeter acoustic gasketing as specified in the Door Hardware sections.
      d) Provide astragals at double doors as specified in the Door Hardware sections.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Verify frames are solidly anchored, allowing no deflection when doors are installed.

D. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.2 PREPARATION

A. Allow doors to become acclimated to building temperature and relative humidity for a minimum of 24 hours before installation.

3.3 INSTALLATION

A. Install doors in accordance with manufacturer's instructions and specified quality standard.
   1. Install fire-rated doors in accordance with NFPA 80 requirements.

B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.

C. Use machine tools to cut or drill for hardware.

D. Coordinate installation of doors with installation of frames and hardware.

E. Coordinate installation of glazing.

3.4 TOLERANCES

A. Comply with specified quality standard for fit and clearance tolerances.

B. Comply with specified quality standard for telegraphing, warp, and squareness.

3.5 ADJUSTING

A. Adjust doors for smooth and balanced door movement.

B. Adjust closers for full closure.

C. Repair minor damages to finish in accordance with manufacturer's instructions and as approved by Architect.

D. Remove and replace damaged doors that cannot be successfully repaired, as determined by Architect.

3.6 CLEANING AND PROTECTION

A. Clean doors promptly after installation in accordance with manufacturer's instructions.

B. Do not use harsh cleaning materials or methods that could damage finish.

C. Protect installed doors from damage during construction.

3.7 SCHEDULE

A. Refer to door schedule on the drawings

END OF SECTION 08 1416

SECTION 08 3323 - OVERHEAD COILING DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Exterior coiling doors.

B. Electric operators and control stations.

C. Wiring from electric circuit disconnect to operators and control stations.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 01 7419 – Construction Waste Management and Disposal.

C. Section 05 5000 - Metal Fabrications: Delegated design requirements for secondary structural members supporting overhead coiling doors, furnished and installed by overhead coiling door provider.

D. Section 07 9200 - Joint Sealants: Sealing joints between frames and adjacent construction.

E. Section 08 7100 - Door Hardware: Cylinder cores and keys.

F. Section 26 0583 - Wiring Connections: Power to disconnect.

1.3 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

D. ITS (DIR) - Directory of Listed Products; Current Edition.

E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2018.

F. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts; 2000, with Errata (2008).

G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. UL (DIR) - Online Certifications Directory; Current Edition.

I. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: For each type and size of overhead coiling door, provide data on general construction, electrical equipment, and component connections and details.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Shop Drawings: Provide plans, elevations, sections and details. Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.
   1. Show locations of controls, locking devices, detectors or replaceable fusible links and other accessories.
   2. Include diagrams for power, signal, and control wiring.

E. Samples: Two slats, 2 by 6 inches in size illustrating shape, color and finish texture.

F. Manufacturer's Installation Instructions: Indicate installation sequence and procedures, adjustment and alignment procedures.

G. Manufacturer's qualification statement.

H. Installer's qualification statement.

I. Maintenance Data: Indicate lubrication requirements and frequency and periodic adjustments required.

J. Specimen warranty.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum 10 years of documented experience.

B. Installer Qualifications: Company specializing in performing work of type specified and with at least five years documented experience.

C. Products Requiring Electrical Connection: Listed and classified by ITS (DIR), UL (DIR), or testing firm acceptable to authorities having jurisdiction as suitable for purpose specified and indicated.

1.6 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Manufacturer Warranty: Provide 2-year manufacturer warranty against defects in materials and workmanship. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Overhead Coiling Metal Doors:
   1. **Basis-of-Design**: **Overhead Door Company; Stormtite AP Model 627**.

B. Other Acceptable Manufacturers:
   1. Alpine Overhead Doors, Inc; IMB-V7 - Insulated Roll Up Door: www.alpinedoors.com/#sle.
   2. CornellCookson; Thermiser Insulated Rolling Door: www.cooksondoor.com.
   3. Basis-of-Design: Overhead Door Company; Stormtite AP Model 627.
   4. Substitutions: See Section 01 6000 - Product Requirements.

2.2 PERFORMANCE CHARACTERISTICS

A. Wind Load: Manufacturer's standard design for 20 PSF wind load.

B. Operation: Design door assembly, including operator, to operate for not less than 20,000 cycles.

2.3 COILING DOORS

A. Exterior Coiling Doors: Steel slat curtain.
   1. Capable of withstanding positive and negative wind loads of 20 psf without undue deflection or damage to components.
   2. Sandwich Slats: Manufacturer's standard galvanized steel, 24 gauge, with core of CFC-free foamed-in-place polyurethane insulation; minimum R-value of 4.88.
   3. Nominal Slat Size: 2 inches wide by required length.
   4. Finish: Factory painted, color as selected.
   5. Hood Enclosure: Manufacturer's standard; galvanized steel.
   6. Electric operation.
   7. Mounting: As indicated on drawings.
   8. Locking Devices: Lock and latch handle on outside.

2.4 MATERIALS AND COMPONENTS

A. Metal Curtain Construction: Interlocking slats.

1. Curtain Bottom for Slat Curtains: Fitted with angles to provide reinforcement and positive contact in closed position.
   a) Material/Finish: Galvanized steel.
2. Weatherstripping for Exterior Doors: Moisture and rot proof, resilient type, located at jamb edges, bottom of curtain, and where curtain enters hood enclosure of exterior doors.
3. Steel Slats: Minimum thickness, 24 gauge, .0239 inch; ASTM A653/A653M galvanized steel sheet.
   a) Galvanizing: Minimum G90 coating.

B. Guide Construction: Continuous, of profile to retain door in place with snap-on trim, mounting brackets of same metal.

C. Guides - Angle: ASTM A36/A36M metal angles, size as required for wind loading.
1. Hot-dip galvanized in compliance with ASTM A123/A123M.

D. Brackets: Galvanized steel to support counterbalance, curtain, and hood.

E. Hood Enclosure and Trim: Internally reinforced to maintain rigidity and shape.

F. Lock Hardware:
1. Latchset Lock Cylinders: Standard mortise cylinder.
   a) Keying: Master keyed.
2. For motor operated units, additional lock or latching mechanisms are not required.
3. Latch Handle: Manufacturer's standard.

G. Roller Shaft Counterbalance: Steel pipe and helical steel spring system, capable of producing torque sufficient to ensure smooth operation of curtain from any position and capable of holding position at mid-travel; with adjustable spring tension; requiring 25 lb nominal force to operate.

2.5 ELECTRIC OPERATION

A. Operator, Controls, Actuators, and Safeties: Comply with UL 325; provide products listed by ITS (DIR), UL (DIR), or testing agency acceptable to authorities having jurisdiction.
1. Provide interlock switches on motor operated units.

B. Electric Operators:
1. Mounting: Side mounted.
2. Motor Enclosure:
3. Motor Rating: Size as recommended by manufacturer; continuous duty.
4. Motor Voltage: 120 volts, single phase, 60 Hz.
5. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.
6. Controller Enclosure: NEMA 250, Type 4.
7. Opening Speed: 12 inches per second.
8. Brake: Manufacturer's standard type, activated by motor controller.
9. Manual override in case of power failure.
10. See Section 26 0583 for electrical connections.

C. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated; enclose terminal lugs in terminal box sized to comply with NFPA 70.

D. Control Station: Provide standard three button, 'Open-Close-Stop' momentary-contact control device for each operator complying with UL 325.
   1. 24 volt circuit.
   2. Surface mounted, at interior door jamb.
   3. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325.
      a) Primary Device: Provide electric sensing edge, wireless sensing, NEMA 1 photo eye sensors, or NEMA 4X photo eye sensors as required with momentary-contact control device.

E. Safety Edge: Located at bottom of coiling door, full width, electro-mechanical sensitized type, wired to stop and reverse door direction upon striking object, hollow neoprene covered.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that adjacent construction is suitable for door installation.

B. Verify that electrical services have been installed and are accessible.

C. Verify that door opening is plumb, header is level, and dimensions are correct.

D. Notify Architect of any unacceptable conditions or varying dimensions.

E. Commencement of installation indicates acceptance of substrate and door opening conditions.

3.2 INSTALLATION

A. Install units in accordance with manufacturer's instructions.

B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.

C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.

D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

E. Coordinate installation of electrical service with Section 26 0583.

F. Complete wiring from disconnect to unit components.

G. Complete wiring from fire alarm system, where applicable

H. Install enclosure and perimeter trim.

3.3 TOLERANCES

A. Maintain dimensional tolerances and alignment with adjacent work.

B. Maximum Variation From Plumb: 1/16 inch.

C. Maximum Variation From Level: 1/16 inch.

D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 feet straight edge.

3.4 ADJUSTING

A. Adjust operating assemblies for smooth and noiseless operation.

3.5 CLEANING

A. Clean installed components.

B. Remove labels and visible markings.

END OF SECTION 08 3323

SECTION 08 3326 - OVERHEAD COILING GRILLES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Overhead coiling metal grilles and operating hardware; electrically operated.

B. Wiring from electric circuit disconnect to operator and to control station.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 01 7419 – Construction Waste Management and Disposal.

C. Section 05 5000 - Metal Fabrications: Delegated design requirements for secondary structural members supporting overhead coiling grilles, furnished and installed by overhead coiling grille provider.

D. Sections 08 0671 and 08 7100 - Door Hardware: Cylinder cores and keys.

E. Section 26 0583 - Wiring Connections: Power to disconnect.

1.3 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

B. ITS (DIR) - Directory of Listed Products; Current Edition.

C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2018.

D. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts; 2000, with Errata (2008).

E. NEMA MG 1 - Motors and Generators; 2018.

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. UL (DIR) - Online Certifications Directory; Current Edition.

H. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: For each type of coiling grille, provide data for general construction component connections and details, and electrical equipment.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional

D. Shop Drawings: Provide plans, elevations, sections, and details.Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.
   1. Include diagrams for power, signal, and control wiring.

E. Manufacturer's Installation Instructions: Indicate installation sequences and procedures, adjustment and alignment procedures.

F. Manufacturer's qualification statement.

G. Installer's qualification statement.

H. Specimen warranty.

I. Maintenance Data: Indicate lubrication requirements and frequency and periodic adjustments required.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years documented experience.

C. Products Requiring Electrical Connection: Listed and classified by ITS (DIR), UL (DIR), or testing firm acceptable to authorities having jurisdiction as suitable for purpose specified.

1.6 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Manufacturer Warranty: Provide 2-year manufacturer warranty against defects in materials and workmanship, on mechanical components, operator, and control panel. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design - Overhead Coiling Grilles:
   1. Cornell Iron Works, Inc; Visionaire MicroCoil Grille - Model ESG10: www.cornelliron.com/#sle.
   2. Substitutions: See Section 01 6000 - Product Requirements.

2.2 GRILLES AND COMPONENTS

A. Grille: Aluminum~~Stainless steel~~; horizontal bar curtain, coiling on overhead counterbalanced shaft.
   1. ~~Finish: No. 4 - Brushed.~~
   2. Finish: Anodized, clear.
   3. Lock Devices: Lock and latch handle on outside.
   4. Electric operation.
   5. Mounting: As indicated on Drawings.

B. Curtain: Round horizontal bars connected with vertical links.
   1. Horizontal bars: 5/16 inch diameter, 5056 H32 aluminum alloy.
   2. Bar spacing: 1-1/2 inch on center.
   3. Tube spacers: 1/2 inch diameter.
   4. Spacer spacing: 3-1/4 inch on center.
   5. Vertical links: 5/16 inch diameter, aluminum.
   6. Link spacing: 6 inch on center.
   7. Bar Ends: Provide with nylon runners for quiet operation.
   8. Bottom Bar: Back-to-back angles, extruded aluminum, with tubular resilient cushion.

C. Guides: Extruded aluminum~~stainless steel~~ angles, of profile to retain grille in place with snap-on trim, mounting brackets of same metal.
   1. ~~Tube-Mounted Guides: Heavy duty Type 304 stainless steel sections. Provide~~
   2. Finish: Clear anodized.

D. Hood Enclosure and Trim: Sheet metal; completely covering operating mechanisms; internally reinforced to maintain rigidity and shape.
   1. Material: Aluminum. ~~Stainless steel.~~
   2. Sheet Metal Thickness: ~~24 gauge, 0.0235 inch.~~ 0.040 inch.
   3. Finish: Anodized, clear.

E. Locking:
   1. Keyed cylinder locking into both jambs operable from both sides of curtain with motor interlock cutout switches.

F. Roller Shaft Counterbalance: Steel pipe and helical steel spring system, capable of producing torque sufficient to ensure smooth operation of curtain from any position and capable of holding position at mid-travel; with adjustable spring tension; requiring 25 lb nominal force to operate.

G. Brackets: Minimum 1/4 inch steel plate with permanently lubricated ball or roller bearings at rotating support points to support counterbalance shaft assembly and form end closures.
1. Zirconium treatment followed by a corrosion inhibitive baked-on zinc-rich gray polyester powder coat; minimum 2.5 mils (0.065 mm) cured film thickness.
2. ~~Finish: Hot-dip Galvanized, ASTM A 123, Grade 85 zinc coating, hot-dip galvanized after fabrication.~~

H. Trim Package: Minimum 16 gauge Type 304 #4 finish stainless steel. Custom-made to hide visible bolts, fasteners and other exposed hardware.

2.3 MATERIALS

A. Aluminum: ASTM B221 (ASTM B221M).

B. Galvanized Steel Sheet: ASTM A653/A653M, galvanized to minimum G90/Z275 coating.

2.4 ELECTRIC OPERATION

A. Operator, Controls, Actuators, and Safeties: Comply with UL 325; provide products listed by ITS (DIR), UL (DIR), or testing agency acceptable to authorities having jurisdiction.
1. Provide interlock switches on motor operated units.

B. Electric Operators:
1. Mounting: Side mounted.
2. Motor Enclosure:
a) Interior Coiling Grilles: NEMA MG 1, Type 1; open drip proof.
3. Motor Rating: As recommended by manufacturer for size and type of door; industrial duty, rated for mazimum 20 cycles per hour.
a) Basis-of-Design: Cornell; **Supply Model MG Electric Motor Operator**.
4. Motor Voltage: 120 volts, single phase, 60 Hz.
5. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.
6. Controller Enclosure: NEMA 250 Type 1.
7. Opening Speed: 12 inches per second.
8. Brake: Adjustable friction clutch type, activated by motor controller.
9. Manual override in case of power failure.
10. Refer to Section 26 0583 for electrical connections.

C. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated; enclose terminal lugs in terminal box sized to comply with NFPA 70.

D. Control Station: Provide flush mounted, "Open/Close" key switch with "Stop" push button; NEMA 1B, at each overhead coiling grille.
1. Cylinder type as required by Owner.

2. 24 volt circuit.
3. Surface mounted, at interior door jamb.
4. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325.
   a) Primary Device: Provide electric sensing edge, wireless sensing, NEMA 1 photo eye sensors, or NEMA 4X photo eye sensors as required with momentary-contact control device.

E. Safety Edge: Located at bottom of coiling grill, full width, electro-mechanical sensitized type, wired to stop and reverse grill direction upon striking object, hollow neoprene covered.
   1. Basis-of-Design: Cornell;

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that adjacent construction is suitable for door installation.

B. Verify that electrical services have been installed and are accessible.

C. Verify that door opening is plumb, header is level, and dimensions are correct.

D. Notify Architect of any unacceptable conditions or varying dimensions.

E. Commencement of installation indicates acceptance of substrate and door opening conditions.

3.2 INSTALLATION

A. Install grille unit assembly in accordance with manufacturer's instructions.

B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.

C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.

D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

E. Coordinate installation of electrical service with Section 26 0583.

F. Complete wiring from disconnect to unit components.

G. Install enclosure and perimeter trim.

3.3 TOLERANCES

A. Maintain dimensional tolerances and alignment with adjacent work.

B. Maximum Variation From Plumb: 1/16 inch.

C. Maximum Variation From Level: 1/16 inch.

D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 ft straight edge.

3.4 ADJUSTING

A. Adjust grille, hardware and operating assemblies for smooth and noiseless operation.

3.5 CLEANING

A. Clean grille and components.

B. Remove labels and visible markings.

END OF SECTION 08 3326

SECTION 08 4313 - ALUMINUM-FRAMED STOREFRONTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Aluminum-framed storefront, with vision glass.

B. Aluminum doors and frames.

C. Weatherstripping.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 01 7419 – Construction Waste Management and Disposal.

C. Section 07 9200 - Joint Sealants: Sealing joints between frames and adjacent construction.

D. Section 08 4413 - Glazed Aluminum Curtain Walls.

E. Sections 08 0671 and 08 7100 - Door Hardware: Hardware items other than specified in this section.

F. Section 08 8000 - Glazing: Glass and glazing accessories.

1.3 REFERENCE STANDARDS

A. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site; 2015.

B. AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems; 2015.

C. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document); 2015.

D. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.

E. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017a.

F. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017a.

G. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.

H. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

I. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.

J. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.

K. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014 (Reapproved 2021).

L. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic); 2019.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with installation of other components that comprise the exterior enclosure.

B. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware, and internal drainage details.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit 5d: For adhesives and sealants, documentation including printed statement of VOC content.
   2. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content. Provide documentation that aluminum has a minimum of 50% mixed pre- and post-consumer recycled content.
   3. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Shop Drawings: Provide project-specific plans, elevations, sections, and details. Indicate system dimensions, framed opening requirements and tolerances, affected related work, expansion and contraction joint location and details, and field welding required.
   1. Include design engineer's stamp or seal on shop drawings for attachments and anchors.
   2. Include details for integration with adjacent building materials.

3. Include details of provisions for assembly expansion and contraction and for draining moisture occurring withi the assembly to the exterior.
4. For entrance doors, include hardware schedule and indicate operating hardware types, functions, quantities, and locations.

E. Design Data: Provide framing member structural and physical characteristics, engineering calculations, and dimensional limitations.

F. Field Quality Control Submittals: Report of field testing for water penetration and air leakage.

G. Designer's qualification statement.

H. Manufacturer's qualification statement.

I. Installer's qualification statement.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in performing work of type specified and with at least ten years of documented experience.

B. Installer Qualifications: Company specializing in performing work of type specified and with at least five years of documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Handle products of this section in accordance with AAMA CW-10.

B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.8 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.9 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Correct defective Work within a one year period after Date of Substantial Completion.

C. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.

D. Provide ten year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Aluminum-Framed Storefronts:
   1. **Basis of Design: EFCO Corporation**; :ww.efcocorporation.com
   2. Alternate Acceptable Manufacturers: Subject to compliance with requirements:
      a) Kawneer North America: www.kawneer.com/#sle.
      b) Oldcastle BuildingEnvelope: www.oldcastlebe.com/#sle.
      c) YKK AP America, Inc: www.ykkap.com/commercial/#sle.
   3. Substitutions: See Section 01 6000 - Product Requirements.
      a) For any product not identified as "Basis of Design", submit information as specified for substitutions.

2.2 BASIS OF DESIGN -- FRAMING FOR INSULATING GLAZING

A. Triple-Set Style, Thermally Broken:
   1. Basis-of-Design: EFCO; **System 433 Triple Set.**
   2. Vertical Mullion Dimensions: 2 inches wide by 4-1/2 inches deep.

B. Substitutions: See Section 01 6000 - Product Requirements.
   1. For any product not identified as "Basis of Design", submit information as specified for substitutions.

2.3 BASIS OF DESIGN -- FRAMING FOR MONOLITHIC GLAZING

A. Center-Set Style:
   1. Basis of Design: EFCO;**Series 402 (NT)**.
   2. Vertical Mullion Dimensions: 2 inches wide by 4-1/2 inches deep.

B. Substitutions: See Section 01 6000 - Product Requirements.
   1. For any product not identified as "Basis of Design", submit information as specified for substitutions.

2.4 BASIS OF DESIGN -- SWINGING DOORS

A. Wide Stile, Monolithic Glazing:
   1. Basis of Design: **EFCO; Durastile D518**.
   2. Thickness: 2 inches.

B. Wide Stile, Insulating Glazing, Thermally-Broken:
   1. Basis of Design: **EFCO; Thermastile D502**.
   2. Thickness: 2 inches.

C. Substitutions: See Section 01 6000 - Product Requirements.
   1. For any product not identified as "Basis of Design", submit information as specified for substitutions.

2.5 ALUMINUM-FRAMED STOREFRONT

A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
   1. Finish: High performance organic coatings.
      a) Factory finish all surfaces that will be exposed in completed assemblies.
      b) Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.
      c) Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.
   2. Finish Color: As selected by Architect from manufacturer's standard line.
   3. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
   4. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
   5. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
   6. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
   7. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
   8. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
   9. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glazing and heel bead of glazing compound.

B. Performance Requirements
   1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
      a) Refer to Drawing S001 for structural design criteria, including design wind loads.
      b) Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.
   2. Air Leakage: 0.06 cfm/sq ft maximum leakage of storefront wall area when tested in accordance with ASTM E283/E283M at 1.57 psf pressure difference.
   3. Condensation Resistance Factor of Framing: 50, minimum, measured in accordance with AAMA 1503.

2.6 COMPONENTS

A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
   1. Framing members for interior applications need not be thermally broken.
   2. Glazing Stops: Flush.

B. Glazing: See Section 08 8000.

C. Swing Doors: Glazed aluminum.
   1. Top Rail: 3 5 inches wide.
   2. Vertical Stiles: 3 5 inches wide.
   3. Bottom Rail: 10 inches wide.
   4. Glazing Stops: Square.
   5. Finish: Same as storefront.

D. Trims and Sills: Miscellaneous metal trim pieces and exposed sills, finished to match curtain wall framing.
   1. Material: Aluminum, 6063-T6.
      a) Thickness: As indicated on drawings.
   2. Profiles: As indicated on drawings.

2.7 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M).

B. Sheet Aluminum: ASTM B209/B209M.

C. Fasteners: Stainless steel.

D. Exposed Flashings: Aluminum sheet, 20 gauge, 0.032 inch minimum thickness; finish to match framing members.

E. Concealed Flashings: Stainless steel, 26 gauge, 0.0187 inch minimum thickness.

F. Sill Flashing Sealant: Elastomeric, silicone or polyurethane, compatible with flashing material.

G. Sealant for Setting Thresholds: Non-curing butyl type.

H. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

I. Glazing Accessories: See Section 08 8000.

J. Shop and Touch-Up Primer for Steel Components: Zinc oxide, alkyd, linseed oil primer appropriate for use over hand cleaned steel.

K. Touch-Up Primer for Galvanized Steel Surfaces: SSPC-Paint 20, zinc rich.

2.8 FINISHES

A. Interior Storefront and Entrances: High Performance Organic Coating: Primer and topcoat coatings system based on super durable polyester resin powder containing high level of isophthalic acid; with minimum dry film thickness (DFT) of 2 to 3.5 mil, 0.0020 to 0.0035 inch over aluminum extrusions and panels; meeting requirements of AAMA 2604.

B. Exterior Storefront and Entrances: Superior Performing Organic Coatings System: Manufacturer's standard multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent polyvinylidene fluoride (PVDF) resin, and at least 80 percent of aluminum extrusion and panels surfaces having minimum total dry film thickness (DFT) of 1.2 mils, 0.0012 inch.

C. Color:
   1. Exterior Framing and Doors, Basis of Design: **EFCO Ultrapon "Mineral Brown".**
   2. Interior Framing and Doors: As selected by Architect from manufacturer's standard range.

D. Touch-Up Materials: As recommended by coating manufacturer for field application.

2.9 HARDWARE

A. For each door, include weatherstripping.

B. Other Door Hardware: See Section 08 7100.

C. Weatherstripping: Wool pile, continuous and replaceable; provide on all doors.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify dimensions, tolerances, and method of attachment with other work.

B. Verify that storefront wall openings and adjoining water-resistive and/or air barrier seal materials are ready to receive work of this section.

3.2 INSTALLATION

A. Install wall system in accordance with manufacturer's instructions and approved shop drawings.

B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

C. Provide alignment attachments and shims to permanently fasten system to building structure.

D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

E. Provide thermal isolation where components penetrate or disrupt building insulation.

F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.

G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.

H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

I. Install glass in accordance with Section 08 8000, using glazing method required to achieve performance criteria.

J. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.3 TOLERANCES

A. Maximum Variation from Plumb: 0.06 inch per 3 feet non-cumulative or 0.06 inch per 10 feet, whichever is less.

B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.4 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements for general testing and inspection requirements.

B. Water-Spray Test: Provide water spray quality test of installed storefront components in accordance with AAMA 501.2 during construction process and before installation of interior finishes.
   1. Perform a minimum of two tests in each designated area as indicated on drawings.
   2. Conduct tests in each area prior to 10 percent and 50 percent completion of this work.

C. Repair or replace storefront components that have failed designated field testing, and retest to verify performance complies with specified requirements.

3.5 ADJUSTING

A. Adjust operating hardware and sash for smooth operation.

3.6 CLEANING

A. Remove protective material from pre-finished aluminum surfaces.

B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths, and take care to remove dirt from corners and to wipe surfaces clean.

C. Upon completion of installation, thoroughly clean aluminum surfaces in accordance with AAMA 609 & 610.

3.7 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION 08 4313

SECTION 08 4413 - GLAZED ALUMINUM CURTAIN WALLS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Aluminum-framed curtain wall, with vision glazing and glass infill panels.

B. Vertical sunshade devices.

C. Firestopping between curtain wall and edge of floor slab.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 01 7419 – Construction Waste Management and Disposal.

C. Section 05 1200 - Structural Steel Framing: Steel attachment members.

D. Section 07 2500 - Weather Barriers: Sealing framing to water-resistive barrier installed on adjacent construction.

E. Section 07 8400 - Firestopping: Firestop at system junction with structure.

F. Section 07 9200 - Joint Sealants: Sealing joints between frames and adjacent construction.

G. Section 08 8000 - Glazing.

1.3 REFERENCE STANDARDS

A. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site; 2015.

B. AAMA 501.1 - Standard Test Method for Water Penetration of Windows, Curtain Walls and Doors Using Dynamic Pressure; 2017.

C. AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems; 2015.

D. AAMA 503 - Voluntary Specification for Field Testing of Newly Installed Storefronts, Curtain Walls and Sloped Glazing Systems; 2014.

E. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document); 2015.

F. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.

G. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017a.

H. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.

I. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

J. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.

K. ASTM C794 - Standard Test Method for Adhesion-In-Peel of Elastomeric Joint Sealants; 2018.

L. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.

M. ASTM E783 - Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors; 2002 (Reapproved 2018).

N. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference; 2015.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with installation of other components that comprise the exterior enclosure.

B. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, internal drainage details, glazing, and infill.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit 5d: For adhesives and sealants, documentation including printed statement of VOC content.
   2. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

3. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Shop Drawings: Provide project-specific elevations, plans, sections, and details. Indicate system dimensions, framed opening requirements and tolerances, attachments to related Work, expansion and contraction joint location and details, and field welding required.
   1. Include design engineer's stamp or seal on shop drawings for attachments and anchors.
   2. Include details for integration with adjacent building materials.
   3. Include details of provisions for assembly expansion and contraction and for draining moisture occurring withi the assembly to the exterior.
   4. Include full-size isometric details of each vertical-to-horizontal intersection of glazed aluminum curtain walls, showing the following:
      a) Joinery, including concealed welds.
      b) Anchorage.
      c) Expansion provisions.
      d) Glazing.
      e) Flashing and drainage.

E. Samples: Submit two samples 6 by 6 inches in size illustrating finished aluminum surface, for each color specified.

F. Design Data: Provide framing member structural and physical characteristics and engineering calculations, and identify dimensional limitations; include load calculations at points of attachment to building structure. All analysis data to be signed and sealed by the qualified professional engineer responsible for their preparation.

G. Test Reports: Submit results of full-size mock-up testing. Reports of tests previously performed on the same design are acceptable.

H. Test Reports: Test reports showing compliance with specified requirements, including ballistic resistance. Frame and glazing may be tested separately, provided that curtain wall test sample adequately simulates the glazing to be used.
   1. Security-strengthened glazing (Type ISG) for curtain wall frames is specified in Section 08 8000.
   2. Bullet resistant curtain wall is limited to specific curtain wall assemblies indicated on drawings.

I. Field Quality Control Submittals: Report of field testing for water penetration and air leakage.

J. Designer's Qualification Statement.

K. Manufacturer's Qualification Statement.

L. Installer's Qualification Statement.

M. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.6 QUALITY ASSURANCE

A. Designer Qualifications: Design curtain wall and its structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed at the State in which the Project is located.

B. ~~Full-Size Mock-up Testing: Have a specimen representative of project conditions tested by an independent testing agency for compliance with specified thermal, structural, air infiltration, and water penetration criteria.~~

C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with not less than five years of documented experience.

D. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Handle products of this section in accordance with AAMA CW-10.

B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.8 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.9 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Correct defective Work within a one-year period after Date of Substantial Completion.

C. Manufacturer Warranty: Provide 5-year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units. Complete forms in Owner's name and register with installer.

D. Finish Warranty: Provide ten-year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking. Complete forms in Owner's name and register with warrantor.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Glazed Aluminum Curtain Walls Manufacturers:
   1. Basis of Design: **EFCO Corporation**: www.efcocorp.com.
   2. Alternate Acceptable Manufacturers: Subject to compliance with specified requirements.
      a) Kawneer North America: www.kawneer.com/#sle.
      b) Oldcastle Building Envelope: www.oldcastlebe.com/#sle.
      c) Tubelite, Inc: www.tubeliteinc.com/#sle.
      d) YKK AP America, Inc: www.ykkap.com/commercial/#sle.
   3. Substitutions: See Section 01 6000 - Product Requirements.
      a) For any product not identified as "Basis of Design", submit information as specified for substitutions.

2.2 BASIS OF DESIGN - CURTAIN WALL SYSTEMS

A. Pressure Cap Four Sides; Not Unitized, Field Assembled:
   1. Basis of Design: EFCO Corporation; **System 5600, with Duracast Fiberglass Pressure Plate,** 2 1/4 inch (57 mm) wide face: www.efcocorporation.com.

B. Other Manufacturers: Provide either product identified as "Basis of Design" or an equivalent product of one of the manufacturers listed below.
   1. Kawneer: www.kawneer.us.com.
   2. Oldcastle Building Envelope: www.obe.cm.
   3. YKK AP: www.ykkap.com.

C. Substitutions: See Section 01 6000 - Product Requirements.
   1. For any product not identified as "Basis of Design", submit information as specified for substitutions.

2.3 CURTAIN WALL

A. Aluminum-Framed Curtain Wall: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
   1. Outside glazed, with pressure plate and mullion cover.
   2. Fabrication Method: Field fabricated stick system.
   3. Glazing Method: Field glazed system.
   4. Finish: Superior performing organic coatings.
   5. Provide flush joints and corners, weathersealed, accurately fitted and secured; prepared to receive anchors; fasteners and attachments concealed from view; reinforced as required for imposed loads.
   6. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
   7. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.

8. Maintain continuous air barrier and/or vapor retarder seal throughout assembly, primarily in line with inside pane of glazing and inner sheet of infill panel and heel bead of glazing compound.

B. Structural Performance Requirements: Design and size components to withstand the following load requirements without damage or permanent set.
   1. Design Wind Loads: Comply with structural design criteria indicated on Drawing S001 .
      a) Member Deflection: For spans less than 13 feet 6 inches, limit member deflection to flexure limit of glass in any direction, and maximum of 1/175 of span or 3/4 inch, whichever is less and with full recovery of glazing materials.
      b) Member Deflection: For spans over 13 feet 6 inches and less than 40 feet, limit member deflection to flexure limit of glass in any direction, and maximum of 1/240 of span plus 1/4 inch, with full recovery of glazing materials.
   2. Movement: Accommodate the following movement without damage to components or deterioration of seals:
      a) Expansion and contraction caused by 180 degrees F surface temperature.
      b) Expansion and contraction caused by cycling temperature range of 170 degrees F over a 12 hour period.
      c) Movement of curtain wall relative to perimeter framing.
      d) Deflection of structural support framing, under permanent and dynamic loads.

C. Water Penetration Resistance on Manufactured Assembly: No uncontrolled water on indoor face when tested as follows:
   1. Test Pressure Differential: 15 psf.
   2. Test Method: AAMA 501.1.

D. Air Leakage: 0.06 cfm/sq ft maximum leakage of wall area when tested in accordance with ASTM E283/E283M at 6.24 psf pressure difference across assembly.

E. Thermal Performance Requirements:
   1. Condensation Resistance Factor of Framing: 50, minimum, measured in accordance with AAMA 1503.
   2. Overall U-value Including Glazing: 0.32 Btu/(hr sq ft deg F), maximum.

F. Ballistic Resistance (Frames): Tested to meet UL 752, Level 3.

2.4 COMPONENTS

A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
   1. Framing members for interior applications need not be thermally broken.
   2. Cross-Section: As indicated on drawings.

B. Glazing: See Section 08 8000.

C. Fiberglass Pressure Plate: Fiberglass composite for enhanced thermal performance.
   1. Flexural strength: Minimum 82 ksi along the lineal's major axis.
   2. Material thermal conductivity: Maximum 2 BTU·in/hr·ft²·°F.

D. Sun Shades: Shop fabricated, shop finished, extruded aluminum sunshade louvers, free of defects impairing strength, durability or appearance.
   1. Sun Shade Configuration: As indicated on drawings.
   2. Louver Type: Tube. See drawings for profile.
   3. Materials: Aluminum, 6063-T6.
   4. Mounting Brackets: Same material and finish as sunshade louvers.
   5. Design Criteria: Design and fabricate to resist the same loads as curtain wall system as well as the following loads without failure, damage, or permanent deflection:
      a) Thermal Movement: Plus/minus 1/8 inch, maximum.
   6. Sizes: As indicated on drawings.
   7. Finish: Same as curtain wall mullion sections.
   8. Products:
      a) Same as manufacturer of curtain wall.
         1) Basis of Design: **EFCO; X-Therm E-Shades**.
      b) Substitutions: See Section 01 6000 - Product Requirements.

E. Trims and Sills: Miscellaneous metal trim pieces and exposed sills, finished to match curtain wall framing.
   1. Material: Aluminum, 6063-T6.
      a) Thickness: As indicated on drawings.
   2. Profiles: As indicated on drawings.

2.5 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M).

B. Sheet Aluminum: ASTM B209/B209M.

C. Structural Supporting Anchors: See Section 05 1200.

D. Structural Supporting Anchors Attached to Structural Steel: Design for bolted attachment.

E. Fasteners: Stainless steel; type as required or recommended by curtain wall manufacturer.

F. Exposed Flashings: Aluminum sheet, 20-gauge, 0.032-inch minimum thickness; finish to match framing members.

G. Concealed Flashings: Stainless steel, 26-gauge, 0.0187-inch minimum thickness.

H. Firestopping: See Section 07 8400.

I. Weatherseal Sealant: Silicone, with adhesion in compliance with ASTM C794; compatible with glazing accessories.

J. Sill Flashing Sealant: Elastomeric, silicone or polyurethane, and compatible with flashing material.

K. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

L. Glazing Accessories: See Section 08 8000.

2.6 FINISHES

A. Superior Performing Organic Coatings System: Manufacturer's standard multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent polyvinylidene fluoride (PVDF) resin, and at least 80 percent of aluminum extrusion and panels surfaces having minimum total dry film thickness (DFT) of 1.2 mils, 0.0012 inch.

B. Color, Basis-of-Design: **EFCO Ultrapon "Mineral Brown".**

C. Touch-Up Materials: As recommended by coating manufacturer for field application.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify dimensions, tolerances, and method of attachment with other related work.

B. Verify that curtain wall openings and adjoining water-resistive and air barrier seal materials are ready to receive work of this section.

C. Verify that anchorage devices have been properly installed and located.

3.2 INSTALLATION

A. Install curtain wall system in accordance with manufacturer's instructions and approved shop drawings.

B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

C. Provide alignment attachments and shims to permanently fasten system to building structure.

D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

E. Provide thermal isolation where components penetrate or disrupt building insulation.

F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.

G. Coordinate installation of firestopping at each floor slab edge.

H. Pressure Plate Framing: Install glazing and infill panels using exterior dry glazing method; see Section 08 8000.

I. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.3 TOLERANCES

A. Maximum Variation from Plumb: 0.06 inch per 3 feet noncumulative or 0.5 inches per 100 feet, whichever is less.

B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

C. Sealant Space Between Curtain Wall Mullions and Adjacent Construction: Maximum of 3/4 inch and minimum of 1/4 inch.

3.4 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements for general testing and inspection requirements.

B. Water-Spray Test: Provide water spray quality test of installed curtain wall components in accordance with AAMA 501.2 during construction process and before installation of interior finishes.
   1. Perform a minimum of two tests in each designated area as indicated on drawings.
   2. Conduct tests in each area prior to 10 percent and 50 percent completion of this work.

C. Provide field testing of installed curtain wall system by independent laboratory in accordance with AAMA 503 during construction process and before installation of interior finishes.
   1. Perform a minimum of two tests in each designated area as indicated on drawings.
   2. Conduct tests in each area prior to 10 percent and 50 percent completion of this work.
   3. Field test for water penetration in accordance with ASTM E1105 with uniform static air pressure difference (Procedure A) not less than 4.18 psf.
      a) Maximum allowable rate of water penetration in 15-minute test is 0.5 ounce that is not contained in an area with provisions to drain to exterior, or collected on surface of interior horizontal framing member.
   4. Field test for air leakage in accordance with ASTM E783 with uniform static air pressure difference of 1.57 psf.

D. Repair or replace curtain wall components that have failed designated field testing, and retest to verify performance complies with specified requirements.

3.5 CLEANING

A. Remove protective material from pre-finished aluminum surfaces.

B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths, take care to remove dirt from corners, and wipe surfaces clean.

C. Upon completion of installation, thoroughly clean aluminum surfaces in accordance with AAMA 609 & 610.

3.6 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion. ~~mm-dd-yyyy.~~

END OF SECTION 08 4413

SECTION 08 6300 - METAL-FRAMED SKYLIGHTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Aluminum-clad polymer-framed skylight system.

B. Skylight glazing.

C. Skylight safety screen.

D. Fasteners, anchors, reinforcement, and flashings.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 01 7419 – Construction Waste Management and Disposal.

C. Section 07 9200 - Joint Sealants: Sealing joints between skylight frames and adjacent construction.

D. Section 08 8000 - Glazing.

1.3 REFERENCE STANDARDS

A. AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems; 2015.

B. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document); 2015.

C. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017a.

D. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.

F. ASTM C794 - Standard Test Method for Adhesion-In-Peel of Elastomeric Joint Sealants; 2018.

G. ASTM D4479/D4479M - Standard Specification for Asphalt Roof Coatings - Asbestos-Free; 2007 (Reapproved 2018).

H. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.

I. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014 (Reapproved 2021).

J. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2023).

K. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide manufacturer's specifications, standard details, and installation requirements for skylights, glazing, and safety screen.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit 5d: For adhesives and sealants, documentation including printed statement of VOC content.
   2. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   3. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Shop Drawings: Provide plans, elevations, sections, and details.Indicate framed opening requirements and tolerances, spacing of members, anticipated deflection under load, affected related work, expansion and contraction joint locations and details, and sizes and locations for field welding.

E. Samples: Two samples, not less than 12 by 12 inches in size illustrating appearance of prefinished aluminum and specified glazing system, including glazed edge and corner.

F. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.

G. Design Data: Provide framing member structural and physical characteristics and engineering calculations, and identify dimensional limitations.
   1. Submit stamped calculations certified by a Professional Engineer located in the State where th project is located for review prior to fabrication.

H. Test Reports: Manufacturer's air and water resistance test reports showing compliance with requirements specified performance requirements. Test reports must show evidence that system experienced no uncontrolled water leakage after 150% positive and negative structural overload (ASTM E330) when system is retested in accordance with ASTM E331 at a static pressure of 15 psf (718 Pa). Include both published data and specific data prepared for this project.

I. Test Reports: Manufacturer's fall protection test reports showing manufacturer's glazing unit complies with requirements for fall protection.

J. Manufacturer's Installation Instructions: Indicate special procedures, safety precautions, and perimeter conditions requiring special attention.

K. Field Quality Control Submittals: Report of field testing for water penetration and air leakage.

L. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

M. Designer's qualification statement.

N. Manufacturer's qualification statement.

O. Installer's qualification statement.

P. Warranty: Sample of manufacturer warranty.

1.5 QUALITY ASSURANCE

A. Designer Qualifications: Design skylight system under direct supervision of a professional engineer experienced in design of system type specified and licensed in the State in which the Project is located.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with not fewer than 10 years of documented experience.

C. Installer Qualifications: Company specializing in performing the type of work specified in this section with at least seven years of documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Provide wrapping to protect prefinished aluminum surfaces. Do not use adhesive papers or spray coatings that bond when exposed to sunlight or weather.

1.7 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.8 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Manufacturer's Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of skylights that fail in materials or workmanship under normal use within specified warranty period. Failures include, but are not limited to, the following:
   1. Deterioration of metals, metal finishes and other materials beyond normal weathering.
   2. Water infiltration through skylight assembly.
   3. Warranty period:
      a) Skylight Assembly: 10 years from completion of work.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design:
   1. Velux America, Inc; VELUX Modular Skylight: www.veluxusa.com/#sle.

B. Other Acceptable Metal-Framed Skylights Manufacturers:
   1. Acurlite Structural Skylights Inc.; www.acurlite.com.
   2. Oldcastle Building Envelope: www.obe.com/#sle.
   3. Wasco Skylights - Part of the VELUX Group: www.wascoskylights.com/#sle.
   4. Substitutions: See Section 01 6000 - Product Requirements.
      a) For any product not identified as "Basis of Design", submit information as specified for substitutions.

2.2 ALUMINUM-CLAD COMPOSITE POLYMER-FRAMED SKYLIGHTS

A. System Description: Modular skylight daylighting assemblies with composite polymer structural frames, formed aluminum exterior cladding, and prefinished interior surfaces, factory-assembled and factory-glazed with insulating glass units, with mounting hardware, prefabricated prefinished modular flashing, and accessories as required to meet installation and performance requirements indicated.
   1. Basis of Design Product: **VELUX America LLC; HFC Fixed Velux Modular Skylights** in the following configuration:
      a) Pitched Installation: **VELUX Longlight**.

B. Unit Frames and Sash: Pultruded glass-fiber and polyurethane composite frames, with interior factory-finished with white polyurethane coating.

C. Weatherproofing Gaskets: Manufacturer's standard dual-seal EPDM rubber and PVC perimeter gaskets.

D. Mounting Hardware: Manufacturer's standard mill-galvanized steel brackets, factory- supplied with flashing kits.

E. Exterior Cladding: Manufacturer's standard factory-formed 0.06 inch (1.5 mm) thick extruded aluminum, powder-coated in manufacturer standard grey and supplied with flashing kits.

F. Flashings: Manufacturer's standard factory-formed minimum 0.03 inch (0.8 mm) thick roll-formed aluminum sheet, with integrated mineral wool insulation and snow stop, of type required by skylight unit configuration indicated on drawings, powder-coated in manufacturer standard grey.

2.3 PERFORMANCE REQUIREMENTS

A. General: Provide metal-framed skylights which have been manufactured, fabricated and installed to withstand loading required by the current edition of the International Building Code (IBC). Provide performance criteria required by these specifications without defects, damage or failure.

B. Provide metal-framed skylights that comply with the following:
   1. Unit Skylight Standard: AAMA/WDMA/CSA 101/I.S.2/A440 (NAFS-edition 2017).
   2. Structural Design: Design thrusting (or minimally-thrusting) framing system, including glazing material to support the following load requirements with maximum allowable deflection of any glazing support: Member not to exceed L/180 or 1" maximum for spans less than 20'-0", and L/240 for spans greater than 20'-0" of the unsupported span:
      a) Ground snow load (psf) plus dead load
      b) Ground wind speed (mph) plus dead load
      c) Concentrated live load of 250 pounds applied to any framing member at a location that will produce the most severe stress or deflection.
   3. Wind Loads: Test in accordance with ASTM E330/E330M, using loads 1.5 times the specified design pressures and 10 second duration of maximum load.
   4. Refer to Structural drawings for project-specific structural design criteria.
   5. Glazing Support Member Deflection Under Wind Load: 1/180 of span, maximum.
   6. Energy Performance:
      a) Maximum U-Value: 0.38 Btu/sq. ft. x h x deg F.
      b) Solar Heat Gain Coefficient: 0.22.
      c) Visible Light Transmittance: 0.42.
   7. Thermal Movement: Design system to accommodate thermal expansion and contraction over ambient temperature range of 100 degrees F, dynamic loading and release of loads, creep of concrete structural members, and deflection of structural support framing without damage to skylight system components or loss of weathertightness.
   8. Energy Code Compliance: Comply with ICC (IBC), ASHRAE Std 90.1 I-P, or the authorities having jurisdiction as required for metal-framed skylights.
   9. Air Leakage: 0.06 cfm/sq ft maximum leakage when tested at 1.57 psf pressure difference in accordance with ASTM E283/E283M.
   10. Water Penetration: None, when measured in accordance with ASTM E331 at a test pressure difference of 15 pounds per square foot.
   11. Surface Burning Characteristics of Frames: Provide frames meeting current North American Fenestration Standard (NAFS) and identical to specimens tested for fire-exposure behavior in accordance with test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
      a) Self-Ignition Temperature: 950 deg F or more with thickness indicated when tested per ASTM D 1929.
      b) Flash-Ignition Temperature: 806 deg F or more with thickness indicated when tested per ASTM D 1929.

c) Smoke Density: 70 or less when tested per ASTM D 2843.
d) Burning Characteristics: Tested and labeled in accordance with ASTM D 635: Class CC1.

2.4 GLAZING

A. High-Performance Low-E Insulating Laminated Glazing Unit:
1. Basis of Design Product: **VELUX, Type 11L Low Energy with Solar Protection Dual Pane**.
2. Outdoor lite: Fully hardened glass.
a) Thickness of outdoor glass lite: 0.24 inch (6 mm).
b) Coating: Sun protection coating referenced as Sun 1 (SunGuard SN 51 HT) on second surface.
3. Interspace: 0.87 inch thick, argon-filled.
4. Indoor lite: Two plies of float glass.
a) Minimum thickness of each glass ply: 0.19 inch.
b) Minimum thickness of interlayer: 0.03 inch.
5. Fall Protection Standard Compliance: 29 CFR 1910.29(e):
a) HFC fixed module 39.37 inches x 118.11 inches:
b) Static load: 400 pounds placed on center of glass with no damage.
c) Dynamic load: 100 pounds dropped from 20 feet (2000 lbf-ft) with no damage.

2.5 MATERIALS

A. Composite Polymer: 80 percent glass fiber and 20 percent two-component polyurethane resin formulated for use as pultruded structural composite.

B. Formed Aluminum: Sheet material of alloy 5052, 5005, or 6061-T651 members complying with ASTM B209/B209M, with minimum thickness 1/8 inch for structural members and 1/16 inch for non-structural members.

C. Insulating Glass: Sealed insulated units, outer pane of clear transparent, tempered glass; inner pane of clear transparent, laminated glass; space of sealed air, metal edge frame.
1. See Article 2.4 above.

D. Glazing Accessories: As recommended by manufacturer of skylight system.

E. Weatherseal Sealant: Silicone, with adhesion in compliance with ASTM C794; compatible with glazing accessories. See Section 07 9200.

F. Protective Back Coating: Asphaltic mastic, ASTM D4479/D4479M Type I.

G. Flashing: Matching finish of skylight frame system components; secure using un-concealed fastening method, and seal with weather-tight sealant.
1. Aluminum sheet, 20 gauge, 0.032 inch minimum thickness.

2.6 ACCESSORIES

A. Skylight Protection System: OSHA-compliant; nonpenetrating fall protection.

1. Provide skylight manufacturer's compatible exterior safety screen, fabricated from minimum 0.19 inch galvanized steel wire minimum into a 4-inch square mesh, capable of being permanently installed to the skylight curb.
2. Basis of Design Product:
   a) **VELUX Commercial; Exterior Safety Screen (CAEW/CAEB)**: www.veluxusa.com.
   b) _____.

2.7 FABRICATION

A. Provide manufactured modular skylight units completely factory-assembled including frames, sash, insulating glass units, flashings, and indicated accessories. Factory glaze units utilizing silicone-based exterior seal

B. Fabricate frame components to tolerances utilized on units tested to meet performance requirements, accommodating installation and movement of sash and dynamic movement of perimeter weather gasketing.

C. Incorporate permanent external drainage channels to manage water flow and drain to the exterior. Provide internal drainage of glazing spaces to exterior through gasketing.

D. Fabricate components to allow for expansion and contraction with minimum clearance and shim spacing around perimeter of assembly.

E. Prepare components to receive concealed anchorage devices, and ensure that fasteners will be concealed upon completion of installation.

F. Factory-glaze units with glazing selection specified.

2.8 FINISHES

A. High Performance Organic Coatings: AAMA 2604; multiple coats, thermally cured fluoropolymer system; interior surfaces only.
   1. Color: Match Architect's sample.
   2. Dry Film Thickness: Not less than 60 microns. ASTM D1400.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that structural curb is ready to receive skylight system. Coordinate installation of roofing and other adjacent work to ensure weathertight construction.

3.2 PREPARATION

A. Apply single coat of protective coating to concealed aluminum and steel surfaces in contact with dissimilar materials.

3.3 INSTALLATION

A. Install metal-framed skylights in accordance with manufacturer's written instructions, ASTM E2112, and approved shop drawings. Coordinate installation of units with installation of substrates, air and vapor retarders, roof insulation, roofing membrane, and flashing as required to ensure that each element of the Work performs properly and that finished installation is weather tight.
   1. Install skylights true to line and without distortion.
   2. Anchor skylights securely to supporting substrates.

B. Set skylight structure plumb, level, and true to line, without warp or rack of frames or glazing panels. Anchor securely in place in accordance with approved shop drawings.

C. Maintain assembly dimensional tolerances, aligning with adjacent work.

D. Where metal surfaces of skylights will contact incompatible metal or corrosive substrates, including preservative-treated wood, apply bituminous coating on concealed metal surfaces, or provide other permanent separation recommended in writing by skylight manufacturer.

E. Install base flashings in accordance with Section 07 6200.

F. Install glazing in accordance with manufacturer's recommended procedures.

G. Touch up damaged finishes so repair is imperceptible from 6 feet distance, and remove and replace components that cannot be acceptably touched up.

3.4 TOLERANCES

A. Maximum Variation from Plumb, Level, or Line: 1/8 inch per 10 feet, or 3/8 inch total in overall dimension.

B. Alignment of Two Adjoining Members Abutting in Plane: Within 1/16 inches.

3.5 FIELD QUALITY CONTROL

A. Provide services of metal-framed skylight manufacturer's field representative to observe for proper installation of system and submit report.

B. See Section 01 4000 - Quality Requirements for general testing and inspection requirements.

C. Water-Spray Test: Provide water spray quality test of installed metal-framed skylight components in accordance with AAMA 501.2 during construction process and before installation of interior finishes.
   1. Perform a minimum of two tests in each designated area as indicated on drawings.

D. Repair or replace metal-framed skylight components that have failed designated field testing, and retest to verify performance complies with specified requirements.

3.6 CLEANING

A. Upon completion of installation, thoroughly clean skylight aluminum surfaces in accordance with manufacturer's written instructions. Touch up damaged metal coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

B. Remove protective material from prefinished aluminum surfaces.

C. Remove excess sealant by methods recommended by skylight manufacturer.

D. Replace glazing that has been damaged during construction period.

E. Protect skylight surfaces from contact with contaminating substances resulting from construction operations.

END OF SECTION 08 6300

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SECTION 08 7100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes commercial door hardware for the following:

1. Swinging doors.
2. Sliding doors.
3. Other doors to the extent indicated.

B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Electromechanical door hardware.
3. Automatic operators.
4. Cylinders specified for doors in other sections.

C. Related Sections:

1. Division 08 Section “Hollow Metal Doors and Frames”.
2. Division 08 Section “Bullet Resistant Doors and Frame”.
3. Division 08 Section “Aluminum-Framed Entrances and Storefronts”.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. ICC/IBC - International Building Code.
3. NFPA 70 - National Electrical Code.
4. NFPA 80 - Fire Doors and Windows.
5. NFPA 101 - Life Safety Code.
6. NFPA 105 - Installation of Smoke Door Assemblies.
7. UL/ULC and CSA C22.2 - Standards for Automatic Door Operators Used on Fire and Smoke Barrier Doors and Systems of Doors.
8. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:

1. ANSI/BHMA Certified Product Standards - A156 Series.
2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
3. ANSI/UL 294 - Access Control System Units.
4. UL 305 - Panic Hardware.
5. ANSI/UL 437- Key Locks.

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing, fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
3. Content: Include the following information:

    a. Type, style, function, size, label, hand, and finish of each door hardware item.
    b. Manufacturer of each item.
    c. Fastenings and other pertinent information.
    d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
    e. Explanation of abbreviations, symbols, and codes contained in schedule.
    f. Mounting locations for door hardware.
    g. Door and frame sizes and materials.
    h. Warranty information for each product.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Shop Drawings: Details of electrified access control hardware indicating the following:

1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:

   a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
   b. Complete (risers, point-to-point) access control system block wiring diagrams.
   c. Wiring instructions for each electronic component scheduled herein.

2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

E. Informational Submittals:

1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

F. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

1.4 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).

C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.

1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

F. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.

G. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:

1. Function of building, purpose of each area and degree of security required.
2. Plans for existing and future key system expansion.
3. Requirements for key control storage and software.
4. Installation of permanent keys, cylinder cores and software.
5. Address and requirements for delivery of keys.

H. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
3. Review sequence of operation narratives for each unique access controlled opening.
4. Review and finalize construction schedule and verify availability of materials.

5. Review the required inspecting, testing, commissioning, and demonstration procedures

I. At completion of installation, provide written documentation that components were applied according to manufacturer's instructions and recommendations and according to approved schedule.

1.5 DELIVERY, STORAGE AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.6 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.

C. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.7 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship

within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Warranty Period: Unless otherwise indicated, warranty shall be one year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.

B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:

1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 BUTT HINGES

A. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.

1. Quantity: Provide the following hinge quantity:

a. Two Hinges: For doors with heights up to 60 inches.
b. Three Hinges: For doors with heights 61 to 90 inches.
c. Four Hinges: For doors with heights 91 to 120 inches.
d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:

    a. Widths up to 3’0”: 4-1/2” standard or heavy weight as specified.
    b. Sizes from 3’1” to 4’0”: 5” standard or heavy weight as specified.

3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:

    a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
    b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.

4. Hinge Options: Comply with the following:

    a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.

5. Manufacturers:

    a. McKinney (MK) - TA/T4A Series, 5-knuckle.

2.3 CONTINUOUS HINGES

A. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 continuous geared hinge. with minimum 0.120-inch thick extruded 6063-T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.

1. Where specified, provide modular continuous geared hinges that ship in two or three pieces and form a single continuous hinge upon installation.
2. Manufacturers:.

    a. Pemko (PE).

2.4 SLIDING AND FOLDING HARDWARE

A. Sliding and Folding Door Hardware: Hardware is to be of type and design as specified and should conform with ANSI/BHMA A156.14.

1. Sliding Bi-Passing Pocket Door Hardware: Provide complete sets consisting of track, hangers, stops, bumpers, floor channel, guides, and accessories indicated.
2. Cascading: Provide a bi-parting or single direction telescoping system as required with a minimum 200 lb. per door capacity.

3. Bi-folding Door Hardware: Rated for door panels weighing up to 125 lb.
4. Pocket Sliding Door Hardware: Rated for doors weighing up to 200 lb.
5. Manufacturers:

    a. Pemko (PE).

2.5 POWER TRANSFER DEVICES

A. Concealed Quick Connect Electric Power Transfers: Provide concealed wiring pathway housing mortised into the door and frame for low voltage electrified door hardware. Furnish with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.

1. Manufacturers:

    a. Pemko (PE) - EL-CEPT Series.
    b. Securitron (SU) - EL-CEPT Series.

B. Electric Door Wire Harnesses: Provide electric/data transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number and type of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.

1. Provide one each of the following tools as part of the base bid contract:

    a. McKinney (MK) - Electrical Connecting Kit: QC-R001.
    b. McKinney (MK) - Connector Hand Tool: QC-R003.

2. Manufacturers:

    a. McKinney (MK) - QC-C Series.

2.6 DOOR OPERATING TRIM

A. Flush Bolts and Surface Bolts: Provide products conforming to ANSI/BHMA A156.3 and A156.16, Grade 1.

1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.

2. Furnish dust proof strikes for bottom bolts.
3. Surface bolts to be minimum 8” in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
5. Manufacturers:

    a. Rockwood (RO).

B. Coordinators: ANSI/BHMA A156.3 door coordinators consisting of active-leaf, hold-open lever and inactive-leaf release trigger. Model as indicated in hardware sets.

1. Manufacturers:

    a. Rockwood (RO).

C. Door Push Plates and Pulls: ANSI/BHMA A156.6 door pushes and pull units of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.

1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
4. Pulls, where applicable, shall be provided with a 10” clearance from the finished floor on the push side to accommodate wheelchair accessibility.
5. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
6. Manufacturers:

    a. Rockwood (RO).

2.7 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:

1. Threaded mortise cylinders with rings and cams to suit hardware application.
2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.

3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
4. Tubular deadlocks and other auxiliary locks.
5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
6. Keyway: Match Facility Standard.

C. Patented Cylinders: ANSI/BHMA A156.5, Grade 1 Certified Products Directory (CPD) listed cylinders employing a utility patented and restricted keyway requiring the use of a patented key. Cylinders are to be protected from unauthorized manufacture and distribution by manufacturer's United States patents.

1. Patented key systems shall not be established with products that have an expired patent. Expired systems shall only be specified and supplied to support existing systems.
2. Manufacturers:

   a. Medeco (MC) - X4.

D. Keying System: Each type of lock and cylinders to be factory keyed.

1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
3. Existing System: Field verify and key cylinders to match Owner's existing system.

E. Key Quantity: Provide the following minimum number of keys:

1. Change Keys per Cylinder: Two (2)
2. Master Keys (per Master Key Level/Group): Five (5).
3. Construction Control Keys (where required): Two (2).
4. Permanent Control Keys (where required): Two (2).

F. Construction Keying: Provide temporary keyed construction cores.

G. Key Registration List (Bitting List):

1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
2. Provide transcript list in writing or electronic file as directed by the Owner.

2.8 MORTISE LOCKS AND LATCHING DEVICES

A. Mortise Locksets, Grade 1 (Heavy Duty): Provide ANSI/BHMA A156.13, Series 1000, Operational and Security Grade 1 Certified Products Directory (CPD) listed mortise locksets. Listed manufacturers shall meet all functions and features as specified herein.

1. Provide locksets with functions and features as follows:

    a. Heavy duty 12-gauge wrought steel case.
    b. Stainless steel 3/4" one-piece anti-friction reversible latchbolt with a one-piece hardened stainless steel 1” projection deadbolt.
    c. Where required by code, provide knurling or abrasive coating on all levers leading to hazardous areas.
    d. Meets UL and CUL Standard 10C Positive Pressure, Fire Test of Door Assemblies with levers that meet A117.1 Accessibility Code.
    e. Meets UL Certification Directory ZHLL.R21744 for products used in windstorm rated assemblies.
    f. Status indicators inside, outside, or on both sides of doors as specified; available with wording for “locked/unlocked”, “vacant/occupied” or custom wording options. Indicator to be located above the cylinder with the inside thumb-turn not blocking the visibility of the indicator status.
    g. Ten-year limited warranty for mechanical functions.

2. Manufacturers:

    a. Sargent Manufacturing (SA) - 8200 Series.

2.9 CYLINDRICAL LOCKS AND LATCHING DEVICES

A. Cylindrical Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.2, Series 4000, Operational Grade 1 Certified Products Directory (CPD) listed cylindrical locksets. Listed manufacturers shall meet all functions and features as specified herein.

1. Provide locksets with functions and features as follows:

    a. Meets ANSI/BHMA A156.41 for single motion egress.
    b. Where required by code, provide knurling or abrasive coating on all levers leading to hazardous areas.
    c. Meets UL and CUL Standard 10C Positive Pressure, Fire Test of Door Assemblies with levers that meet A117.1 Accessibility Code.
    d. Exceeds ANSI/BHMA A156.2 requirements by 2.6 times for 3,100 in-lb. abusive locked lever torque with no entry while maintaining egress.
    e. Exceeds ANSI/BHMA A156.2 requirements by 8 times for 1,600 lbs. offset lever pull with no entry for protection against attacks.
    f. Exceeds ANSI/BHMA A156.3 requirements by 2 times for latch retraction with 100 lb. preload while maintaining operation in warped doors.
    g. Exceeds ANSI/BHMA A156.3 requirements by 20 times for no access with minimum 100 vertical impacts for protection against vandalism attempts.
    h. Independent return springs allow lock to exceed ANSI/BHMA A156.2 Grade 1 cycle requirements without lever sag.
    i. Ten-year limited warranty for mechanical functions.

2. Manufacturers:

a. Sargent Manufacturing (SA) - 10X Line.

2.10 DEADLOCKS AND LATCHES

A. Cylindrical Deadlocks: ANSI/BHMA A156.36 Grade 1 Certified Products Directory (CPD) listed deadlocks to fit standard ANSI 161 preparation. Provide tapered collars to resist vandalism and 1" throw solid steel bolt with hardened steel roller pins. Deadlocks to be products of the same source manufacturer and keyway as other locksets.

1. Manufacturers:

a. Sargent Manufacturing (SA) - 480 Series.

B. Narrow Case Deadlocks and Deadlatches: ANSI/BHMA 156.13 Series 1000 Grade 1 narrow case deadlocks and deadlatches for swinging or sliding door applications. All functions shall be manufactured in a single sized case formed from 12 gauge minimum, corrosion resistant steel (option for fully stainless steel case and components). Provide minimum 2 7/8" throw laminated stainless steel bolt. Bottom rail deadlocks to have 3/8” diameter bolts.

1. Manufacturers:

a. Adams Rite Manufacturing (AD) - MS1850S / MS1950 Series.

2.11 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
4. Dustproof Strikes: BHMA A156.16.

2.12 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. Exit devices shall have a five-year warranty.
2. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
3. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.
4. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
5. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
6. Flush End Caps: Provide flush end caps made of architectural metal in the same finish as the devices as in the Hardware Sets. Plastic end caps will not be acceptable.
7. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.

    a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
    b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.

8. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
9. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
10. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
11. Rail Sizing: Provide exit device rails factory sized for proper door width application.
12. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed exit devices. Listed manufacturers shall meet all functions and features as specified herein.

1. Provide exit devices with functions and features as follows:

a. Where required by code, provide knurling or abrasive coating on all levers leading to hazardous areas.
b. Meets UL and CUL Standard 10C Positive Pressure, Fire Test of Door Assemblies with levers that meet A117.1 Accessibility Code.
c. Five-year limited warranty for mechanical features.

2. Electromechanical exit devices shall have the following functions and features:

a. Universal Molex plug-in connectors that have standardized color-coded wiring and are field configurable in fail safe or fail secure and operate from 12vdc to 24vdc regulated.
b. EcoFlex or equivalent technology that reduces energy consumption up to 92% as certified by GreenCircle.
c. Options to be available for request-to-exit or enter signaling, latchbolt and touchbar monitoring.
d. Field configurable electrified trim to fail-safe or fail-secure that operates from 12-24VDC.
e. Five-year limited warranty for electromechanical features.

3. Manufacturers:

a. Sargent Manufacturing (SA) - 80 Series.

2.13 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.

1. Heavy duty surface mounted door closers shall have a 30-year warranty.

2. Manufacturers:

   a. Sargent Manufacturing (SA) - 351 Series.
   b. Dorma 8900 Series.
   c. LCN Closers (LC) 4040XP Series.

2.14 ELECTROHYDRAULIC DOOR OPERATORS

A. Electrohydraulic Door Operators (High Traffic): Provide ANSI/BHMA A156.19 Certified Products Directory (CPD) listed low energy operators that meet ANSI/BHMA A156.4 requirements and are UL listed for use on fire rated doors and UL10C certified that comply with requirements for the Americans with Disabilities Act (ADA). Operators shall be verified by GreenCircle to offer energy savings of 19% when compared to similar products to accommodate openings up 250 pounds and 48” wide.

1. Provide operators with features as follows:

   a. Non-handed with push and pull side mounting.
   b. Operates as mechanical surface closer during close cycles, when door is opened manually or if power is off.
   c. Activation by push button, hands-free or radio frequency devices.
   d. On board electronics to collect usage and cycle count data to facilitate preventative maintenance/diagnostics.
   e. Two-year limited warranty.
   f. Wi-Fi interface where the operator is a secure, password protected WiFi hot spot with no connection to building’s IT required.
      1) Simple setup with no app required.
      2) View status and make adjustments without removing the cover.
      3) Built-in logic to support single use restroom applications with no external relay boards, logic modules, position switches required.
   g. Mounting backplate to simplify and speed up installation.

2. Operators shall have the following functionality:

   a. Adjustable Hold Open: Amount of time a door will stay in the full open position after an activation.

b. Blow Open for Smoke Ventilation: Door opens when signal is received from alarm system allowing air or smoke to flow through opening. Door will stay open until signal from alarm system is stopped.
c. Infinite Hold Open: Door will hold open at set position until power is turned off.
d. Obstruction Detection: Door closes if it hits an obstruction while opening; door will reverse to open position if it hits an obstruction while closing. Door will stop once it hits an obstruction and will rest against the obstruction until removed.
e. Open Delay: Delays operator opening for locking hardware.
f. Overload Safety Shut-Off: After two minutes of receiving a door activation signal, inverter times out and door closes to prevent motor/inverter damage.
g. Presence Detector Input: Input for external sensor to detect presence at door open or close position only.
h. Push & Go: As the door is manually opened, the operator "senses" movement and opens door to the full-open position.
i. Selector Mode Switch: Off disables the signal inputs unless Blow Open is activated, on activates the signal inputs, hold open activates the unit (unless Blow Closed is activated) to the hold open position.
j. Vestibule Delay: When the wall switch is pressed, first door in vestibule will open. Second door will open once vestibule door delay has expired. Delay is adjustable.

3. Manufacturers:

a. Norton Rixson (NO) - 6000 Series.

2.15 SURFACE MOUNTED CLOSER HOLDERS

A. Electromagnetic Door Holders: ANSI A156.15 electromagnetic door holder/releases with a minimum 20 to 40 pounds holding power and single coil construction able to accommodate.12VDC, 24VAC, 24VDC and 120VAC. Coils to be independently wound, employing an integral fuse and armatures to include a positive release button.

1. Manufacturers:

a. Norton Rixson (RF) - 980/990 Series.

2.16 ARCHITECTURAL TRIM

A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1” LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width

and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.

3. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.
4. Protection Plates: ANSI/BHMA A156.6 protection plates (kick, armor, or mop), fabricated from the following:

    a. Stainless Steel: 300 grade, 050-inch thick.

5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
6. Manufacturers:

    a. Rockwood (RO).

2.17 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Manufacturers:

    a. Rockwood (RO).

C. Overhead Door Stops and Holders: ANSI/BHMA A156.8, Grade 1 Certified Products Directory (CPD) listed overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.

1. Manufacturers:

    a. Norton Rixson (RF).

2.18 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and

provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.

1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NFPA 252, Standard Methods of Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Manufacturers:

1. Pemko (PE).

2.19 ELECTRONIC ACCESSORIES

A. Door Position Switches: Door position magnetic reed contact switches specifically designed for use in commercial door applications. On recessed models the contact and magnetic housing snap-lock into a 1" diameter hole. Surface mounted models include wide gap distance design complete with armored flex cabling. Provide SPDT, N/O switches with optional Rare Earth Magnet installation on steel doors with flush top channels.

1. Manufacturers:

a. Securitron (SU) - DPS Series.

B. Intelligent Switching Power Supplies: Provide power supplies with single, dual or multi-voltage configurations at 12 and/or 24VDC. Power Supply shall have battery backup function with an integrated battery charging circuit. The power supply shall have a standard, integrated Fire Alarm Interface (FAI). The power supply shall provide capability for secondary voltage, power distribution, direct lock control and network monitoring through add on modules. The power supply shall be expandable up to 16 individually protected outputs. Output modules shall

provide individually protected, continuous outputs and/or individually protected, relay controlled outputs. Network modules shall provide remote monitoring functions such as status reporting, fault reporting and information logging.

1. Manufacturers:

   a. Securitron (SU) - AQL Series.

2.20 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.21 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

A. Field Inspection (Punch Report): Reference Division 01 Sections “Closeout Procedures”. Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.

1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

1. Quantities listed are for each pair of doors, or for each single door.
2. The supplier is responsible for handing and sizing all products.
3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

B. Refer to Section 08 7101, Door Hardware Sets, for hardware sets.

END OF SECTION 087100

SECTION 08 7101 – DOOR HARDWARE SCHEDULE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section references specification sections relating to commercial door hardware for the following:

1. Swinging doors.
2. Sliding Doors.
3. Other doors to the extent indicated.

B. Commercial door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Electromechanical and access control door hardware.
3. Electromechanical and access control door hardware power supplies, back-ups and surge protection.
4. Automatic operators.
5. Cylinders specified for doors in other sections.

C. Related Sections:

1. Division 08 Section “Door Hardware”.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. ICC/IBC - International Building Code.
3. NFPA 70 - National Electrical Code.
4. NFPA 80 - Fire Doors and Windows.
5. NFPA 101 - Life Safety Code.
6. NFPA 105 - Installation of Smoke Door Assemblies.
7. State Building Codes, Local Amendments.

E. Standards: Reference Related Sections for requirements regarding compliance with applicable industry standards.

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."

2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.

3. Content: Include the following information:

a. Type, style, function, size, label, hand, and finish of each door hardware item.
b. Manufacturer of each item.
c. Fastenings and other pertinent information.
d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
e. Explanation of abbreviations, symbols, and codes contained in schedule.
f. Mounting locations for door hardware.
g. Door and frame sizes and materials.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Keying Schedule: Prepared under the supervision of the Owner, separate schedule detailing final keying instructions for locksets and cylinders in writing. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner to approve submitted keying schedule prior to the ordering of permanent cylinders.

D. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

E. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals. The manual to include the name, address, and contact information of the manufacturers providing the hardware and their nearest service representatives. The final copies delivered after completion of the installation test to include "as built" modifications made during installation, checkout, and acceptance.

F. Warranties and Maintenance: Special warranties and maintenance agreements specified in the Related Sections.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.5 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

1.6 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. Refer to "PART 3 – EXECUTION" for required specification sections.

PART 3 - EXECUTION

3.1 DOOR HARDWARE SETS

A. The door hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

1. Quantities listed are for each pair of doors, or for each single door.

2. The supplier is responsible for handing and sizing all products.

3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.

4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

B. Products listed in the hardware sets shall be supplied by and in accordance with the requirements described in the specification section as noted for each item.

1. Section 08 71 00 – Door Hardware.

C. Manufacturer's Abbreviations:

1. MK - McKinney
2. PE - Pemko
3. SU - Securitron
4. RO - Rockwood
5. SA - SARGENT
6. AD - Adams Rite
7. MC - Medeco

8. RF - Rixson
9. NO - Norton
10. OT - Other

Hardware Sets

Set: 1.0

Doors: 1041B

1	Continuous Hinge	DFM-SLF-HD1 PT x Length Required		PE
1	Electric Power Transfer	EL-CEPT	613E	SU
1	Rim Exit Device, Dummy	LC 16 55 56 8810 FLW	US10BE	SA
2	Cylinder	Mececo SFIC cylinder (Type as required)	13	MC
1	Conc Overhead Stop	6-X36	613E	RF
1	Surface Closer	351 O/P10 (Arm to suit)	US10BE	SA
1	Drop Plate	As required	US10BE	SA
1	Blade Stop Spacer Kit	As required	US10BE	SA
1	Sweep	3452_NB x Length Required		PE
1	Threshold	273x224_FGT x Length Required		PE
1	ElectroLynx Harness - Frame	QC-C1500P		MK
1	ElectroLynx Harness - Door	QC-CXXX (Size as required)		MK
1	Card Reader	By Security Supplier		
1	Position Switch	DPS - M/W		SU
1	Power Supply	AQL4-R8E1 x Relays as Required		SU
1	Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes: Perimeter seals by frame/door supplier.
Operational narrative: Authorized access by valid credential or key retracting latchbolt. Free egress. REX switch allows exit without alarm condition. Door position switches monitor open/closed status. Door remains latched and secure in event of power loss or fire alarm.

Set: 2.0

Doors: 1000B, 1102B

2	Continuous Hinge	DFM-SLF-HD1 PT x Length Required		PE
2	Electric Power Transfer	EL-CEPT	613E	SU

1	Removable Mullion	L980S / L980A (As Required) x Length Required	PC	SA
1	Rim Exit Device, Storeroom	LC 16 55 56 8804 FLW	US10BE	SA
1	Rim Exit Device, Dummy	LC 16 55 56 8810 FLW	US10BE	SA
4	Cylinder	Mecceo SFIC cylinder (Type as required)	13	MC
2	Conc Overhead Stop	6-X36	613E	RF
1	Automatic Opener	D6000 Series	689	NO
2	Sweep	3452_NB x Length Required		PE
1	Threshold	273x224_FGT x Length Required		PE
2	ElectroLynx Harness - Frame	QC-C1500P		MK
2	ElectroLynx Harness - Door	QC-CXXX (Size as required)		MK
1	Card Reader	By Security Supplier		
2	Position Switch	DPS - M/W		SU
1	Door Switch Set	565		NO
1	Power Supply	AQL4-R8E1 x Relays as Required		SU
1	Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes: Perimeter and meeting seals by frame/door supplier.
Operational narrative: Authorized access by valid credential or key retracting latchbolts. Free egress. Hands free entry/egress by operator via switches - exterior switch only active after presentation of valid credential or when doors are manually or electrically dogged. REX switch allows exit without alarm condition. Door position switches monitor open/closed status. Door remains latched and secure in event of power loss or fire alarm.

Set: 3.0

Doors: 1000A

2	Continuous Hinge	DFM-SLF-HD1 PT x Length Required		PE
2	Electric Power Transfer	EL-CEPT	613E	SU
1	Removable Mullion	L980S / L980A (As Required) x Length Required	PC	SA
1	Rim Exit Device, Storeroom	LC 16 55 56 8804 FLW	US10BE	SA
1	Rim Exit Device, Dummy	LC 16 55 56 8810 FLW	US10BE	SA
4	Cylinder	Mecceo SFIC cylinder (Type as required)	13	MC
2	Conc Overhead Stop	6-X36	613E	RF
2	Surface Closer	351 O/P10 (Arm to suit)	US10BE	SA
2	Drop Plate	As required	US10BE	SA
2	Blade Stop Spacer Kit	As required	US10BE	SA

2	Sweep	3452_NB x Length Required		PE
1	Threshold	273x224_FGT x Length Required		PE
2	ElectroLynx Harness - Frame	QC-C1500P		MK
2	ElectroLynx Harness - Door	QC-CXXX (Size as required)		MK
1	Card Reader	By Security Supplier		
2	Position Switch	DPS - M/W		SU
1	Power Supply	AQL4-R8E1 x Relays as Required		SU
1	Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes: Perimeter and meeting seals by frame/door supplier.
Operational narrative: Authorized access by valid credential or key retracting latchbolts. Free egress. REX switch allows exit without alarm condition. Door position switches monitor open/closed status. Door remains latched and secure in event of power loss or fire alarm.

Set: 4.0

Doors: 1116A, 1116B, 1117A, 1117B

1	Continuous Hinge	DFM-SLF-HD1-M x Length Required		PE
1	Rim Exit Device, Storeroom	LC 16 8804 FLW	US10BE	SA
1	Cylinder	Mececo SFIC cylinder (Type as required)	13	MC
1	Conc Overhead Stop	6-X36	613E	RF
1	Surface Closer	351 O/P10 (Arm to suit)	US10BE	SA
1	Drop Plate	As required	US10BE	SA
1	Blade Stop Spacer Kit	As required	US10BE	SA
1	Sweep	3452_NB x Length Required		PE
1	Threshold	273x224_FGT x Length Required		PE
1	Card Reader	By Security Supplier		
1	Position Switch	DPS - M/W		SU
1	Alarm	PZ1		SU

Notes: Perimeter and meeting seals by frame/door supplier.
Door position switches monitor open/closed status and sounds alarm upon unauthorized open status of door. Card reader shunts and reset local alarm.

Set: 5.0

Doors: 1028B, 1100B, 1102A, 2000A, 2000B, 2070A, 2070B, ST1-1B

2	Continuous Hinge	DFM-SLF-HD1-M x Length Required		PE
1	Removable Mullion	L980S / L980A (As Required) x Length Required	PC	SA
1	Rim Exit Device, Storeroom	LC 16 8804 FLW	US10BE	SA
1	Rim Exit Device, Dummy	LC 16 8810 FLW	US10BE	SA
4	Cylinder	Mececo SFIC cylinder (Type as required)	13	MC
2	Conc Overhead Stop	6-X36	613E	RF
2	Surface Closer	351 O/P10 (Arm to suit)	US10BE	SA
2	Drop Plate	As required	US10BE	SA
2	Blade Stop Spacer Kit	As required	US10BE	SA
2	Sweep	3452_NB x Length Required		PE
1	Threshold	273x224_FGT x Length Required		PE
2	Position Switch	DPS - M/W		SU

Notes: Perimeter and meeting seals by frame/door supplier.
Door position switches monitor open/closed status.

Set: 6.0

Doors: 1039C

1	Continuous Hinge	DFM-HD1 PT x Length Required		PE
1	Electric Power Transfer	EL-CEPT	613E	SU
1	Rim Exit Device, Storeroom	LC 16 55 56 8804 FLW	US10BE	SA
2	Cylinder	Mececo SFIC cylinder (Type as required)	13	MC
1	Surface Closer	351 CPS	US10BE	SA
1	Gasketing	303_S (Head & Jambs)		PE
1	Rain Guard	346_ x Width of Frame Head		PE
1	Sweep	3452_NB x Length Required		PE
1	Threshold	273x224_FGT x Length Required		PE
1	ElectroLynx Harness - Frame	QC-C1500P		MK
1	ElectroLynx Harness - Door	QC-CXXX (Size as required)		MK
1	Card Reader	By Security Supplier		
1	Position Switch	DPS - M/W		SU
1	Power Supply	AQL4-R8E1 x Relays as Required		SU
1	Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes: Operational narrative: Authorized access by valid credential or key retracting latchbolt. Free

egress. REX switch allows exit without alarm condition. Door position switches monitor open/closed status. Door remains latched and secure in event of power loss or fire alarm.

Set: 7.0

Doors: 1050A, 1080A, 1086D, 1100C

6	Hinge, Full Mortise, Hvy Wt	T4A3786 [NRP] FT	US10BE	MK
2	Electric Power Transfer	EL-CEPT	613E	SU
1	Removable Mullion	L980S / L980A (As Required) x Length Required	PC	SA
1	Rim Exit Device, Storeroom	LC 16 55 56 8804 FLW	US10BE	SA
1	Rim Exit Device, Dummy	LC 16 55 56 8810 FLW	US10BE	SA
4	Cylinder	Mececo SFIC cylinder (Type as required)	13	MC
2	Surface Closer	351 CPS	US10BE	SA
2	Astragal	29310_PK x Door Height		PE
1	Gasketing	5110_		PE
1	Gasketing	303_S (Head & Jambs)		PE
1	Rain Guard	346_ x Width of Frame Head		PE
2	Sweep	3452_NB x Length Required		PE
1	Threshold	273x224_FGT x Length Required		PE
2	ElectroLynx Harness - Frame	QC-C1500P		MK
2	ElectroLynx Harness - Door	QC-CXXX (Size as required)		MK
1	Card Reader	By Security Supplier		
2	Position Switch	DPS - M/W		SU
1	Power Supply	AQL4-R8E1 x Relays as Required		SU
1	Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes: Operational narrative: Authorized access by valid credential or key retracting latchbolts. Free egress. REX switch allows exit without alarm condition. Door position switches monitor open/closed status. Door remains latched and secure in event of power loss or fire alarm.

Set: 8.0

Doors: 1077, 1078, 1079, ST2-1B

6	Hinge, Full Mortise, Hvy Wt	T4A3786 [NRP] FT	US10BE	MK
2	Electric Power Transfer	EL-CEPT	613E	SU
1	Removable Mullion	L980S / L980A (As Required) x Length	PC	SA

		Required		
1	Rim Exit Device, Storeroom	LC 16 55 56 8804 FLW	US10BE	SA
1	Rim Exit Device, Dummy	LC 16 55 56 8810 FLW	US10BE	SA
4	Cylinder	Mececo SFIC cylinder (Type as required)	13	MC
2	Surface Closer	351 CPS	US10BE	SA
2	Astragal	29310_PK x Door Height		PE
1	Gasketing	5110_		PE
1	Gasketing	303_S (Head & Jambs)		PE
1	Rain Guard	346_ x Width of Frame Head		PE
2	Sweep	3452_NB x Length Required		PE
1	Threshold	273x224_FGT x Length Required		PE
2	Position Switch	DPS - M/W		SU

Notes: Door position switches monitor open/closed status.

Set: 9.0

Doors: 1000D, 1102C, 1102D

2	Continuous Hinge	DFM-SLF-HD1 PT x Length Required		PE
2	Electric Power Transfer	EL-CEPT	613E	SU
1	Removable Mullion	L980S / L980A (As Required) x Length Required	PC	SA
1	Rim Exit Device, Storeroom	LC 16 55 56 8804 FLW	US10BE	SA
1	Rim Exit Device, Dummy	LC 16 55 56 8810 FLW	US10BE	SA
4	Cylinder	Mececo SFIC cylinder (Type as required)	13	MC
2	Conc Overhead Stop	6-X36	613E	RF
1	Automatic Opener	D6000 Series	689	NO
2	Sweep	3452_NB x Length Required		PE
1	Threshold	271_		PE
2	ElectroLynx Harness - Frame	QC-C1500P		MK
2	ElectroLynx Harness - Door	QC-CXXX (Size as required)		MK
1	Card Reader	By Security Supplier		
2	Position Switch	DPS - M/W		SU
1	Door Switch Set	565		NO
1	Power Supply	AQL4-R8E1 x Relays as Required		SU
1	Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes: Perimeter and meeting seals by frame/door supplier.
Operational narrative: Authorized access by valid credential or key retracting latchbolts. Free egress. Hands free entry/egress by operator via switches - exterior switch only active after presentation of valid credential or when doors are manually or electrically dogged. REX switch allows exit without alarm condition. Door position switches monitor open/closed status. Door remains latched and secure in event of power loss or fire alarm.

Set: 10.0

Doors: 1000C

2	Continuous Hinge	DFM-SLF-HD1 PT x Length Required		PE
2	Electric Power Transfer	EL-CEPT	613E	SU
1	Removable Mullion	L980S / L980A (As Required) x Length Required	PC	SA
1	Rim Exit Device, Storeroom	LC 16 55 56 8804 FLW	US10BE	SA
1	Rim Exit Device, Dummy	LC 16 55 56 8810 FLW	US10BE	SA
4	Cylinder	Mececo SFIC cylinder (Type as required)	13	MC
2	Conc Overhead Stop	6-X36	613E	RF
2	Surface Closer	351 O/P10 (Arm to suit)	US10BE	SA
2	Drop Plate	As required	US10BE	SA
2	Blade Stop Spacer Kit	As required	US10BE	SA
2	Sweep	3452_NB x Length Required		PE
1	Threshold	271_		PE
2	ElectroLynx Harness - Frame	QC-C1500P		MK
2	ElectroLynx Harness - Door	QC-CXXX (Size as required)		MK
1	Card Reader	By Security Supplier		
2	Position Switch	DPS - M/W		SU
1	Power Supply	AQL4-R8E1 x Relays as Required		SU
1	Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes: Perimeter and meeting seals by frame/door supplier.
Door bottom by STC door assembly. Verify compatibility of specified hardware with the STC door assembly.
Operational narrative: Authorized access by valid credential or key retracting latchbolts. Free egress. REX switch allows exit without alarm condition. Door position switches monitor open/closed status. Door remains latched and secure in event of power loss or fire alarm.

Set: 11.0

Doors: 1086A, 1086B

2	Continuous Hinge	DFM-SLF-HD1-M x Length Required		PE
1	Removable Mullion	L980S / L980A (As Required) x Length Required	PC	SA
1	Rim Exit Device, Storeroom	LC 16 8804 FLW	US10BE	SA
1	Rim Exit Device, Dummy	LC 16 8810 FLW	US10BE	SA
4	Cylinder	Mececo SFIC cylinder (Type as required)	13	MC
1	Conc Overhead Stop	6-X36	613E	RF
2	Surface Closer	351 O/P10 (Arm to suit)	US10BE	SA
2	Drop Plate	As required	US10BE	SA
2	Blade Stop Spacer Kit	As required	US10BE	SA
1	Wall Stop	RM860 (or) RM856 (As required)	10BE	RO

Notes: Perimeter and meeting seals by frame/door supplier.

Set: 12.0

Doors: 1055D, 1100A

2	Continuous Hinge	DFM-SLF-HD1-M x Length Required		PE
1	Removable Mullion	L980S / L980A (As Required) x Length Required	PC	SA
1	Rim Exit Device, Storeroom	LC 16 8804 FLW	US10BE	SA
1	Rim Exit Device, Dummy	LC 16 8810 FLW	US10BE	SA
4	Cylinder	Mececo SFIC cylinder (Type as required)	13	MC
2	Conc Overhead Stop	6-X36	613E	RF
2	Surface Closer	351 O/P10 (Arm to suit)	US10BE	SA
2	Drop Plate	As required	US10BE	SA
2	Blade Stop Spacer Kit	As required	US10BE	SA

Notes: Perimeter and meeting seals by frame/door supplier.

Set: 13.0

Doors: 1002A, 1002B, 1010, 1019, 1020, 1055A

1	Continuous Hinge	DFM-SLF-HD1-M x Length Required		PE

1	Classroom Lock	LC 10XG37 LL	US10BE	SA
1	Cylinder	Mececo SFIC cylinder (Type as required)	13	MC
1	Conc Overhead Stop	6-X36	613E	RF
1	Surface Closer	351 O/P9 (Arm to suit)	US10BE	SA
1	Drop Plate	As required	US10BE	SA
1	Blade Stop Spacer Kit	As required	US10BE	SA

Notes: Perimeter and meeting seals by frame/door supplier.

Set: 14.0

Doors: 1099

2	Continuous Hinge	DFM-SLF-HD1-M x Length Required		PE
1	Dust Proof Strike	570	10BE	RO
2	Flush Bolt	555 / 557 (As Required; 12"/72" AFF)	US10B	RO
1	Mortise Deadlock	MS1950	628	AD
1	Cylinder	Mececo SFIC cylinder (Type as required)	13	MC
2	Push Bar & Pull	111A47 (Mtg type as required)	10BE	RO
2	Conc Overhead Stop	6-X36	613E	RF
2	Surface Closer	351 O/P10 (Arm to suit)	US10BE	SA
2	Drop Plate	As required	US10BE	SA
2	Blade Stop Spacer Kit	As required	US10BE	SA

Notes: Perimeter and meeting seals by frame/door supplier.

Set: 15.0

Doors: 2000C, 2000D, 2070C, 2070D

2	Continuous Hinge	DFM-SLF-HD1-M x Length Required		PE
2	Push Bar & Pull	111A47 (Mtg type as required)	10BE	RO
2	Conc Overhead Stop	6-X36	613E	RF
2	Surface Closer	351 O/P10 (Arm to suit)	US10BE	SA
2	Drop Plate	As required	US10BE	SA
2	Blade Stop Spacer Kit	As required	US10BE	SA
1	Threshold	271_		PE

Notes: Perimeter and meeting seals by frame/door supplier.

Set: 16.0

Doors: 1069, 1071B

3	Hinge, Full Mortise, Hvy Wt	T4A3786 [NRP] FT	US10BE	MK
1	Rim Exit Device, Storeroom	LC 8804 ETL	US10BE	SA
1	Cylinder	Mececo SFIC cylinder (Type as required)	13	MC
1	Surface Closer	351 P10	US10BE	SA
1	Wall Stop	RM860 (or) RM856 (As required)	10BE	RO
1	Gasketing	S88_ (Head & Jambs)		PE

Set: 17.0

Doors: 1048

6	Hinge, Full Mortise, Hvy Wt	T4A3786 [NRP] FT	US10BE	MK
1	Removable Mullion	L980S / L980A (As Required) x Length Required	PC	SA
1	Rim Exit Device, Storeroom	LC 16 8804 ETL	US10BE	SA
1	Rim Exit Device, Dummy	LC 16 8810 ETL	US10BE	SA
4	Cylinder	Mececo SFIC cylinder (Type as required)	13	MC
2	Surface Closer	351 P10	US10BE	SA
2	Wall Stop	RM860 (or) RM856 (As required)	10BE	RO
1	Gasketing	S88_ (Head & Jambs)		PE
1	Gasketing	5110_		PE

Set: 18.0

Doors: 1093, 1109B, 1112B

6	Hinge, Full Mortise, Hvy Wt	T4A3786 [NRP] FT	US10BE	MK
2	Surface Vert Rod Exit, Classroom	[12] LC NB8713 ETL	US10BE	SA
3	Cylinder	Mececo SFIC cylinder (Type as required)	13	MC
2	Surface Closer	351 P10	US10BE	SA
2	Kick Plate	K1050 10" high BEV CSK	US10BE	RO
2	Wall Stop	RM860 (or) RM856 (As required)	10BE	RO
2	Gasketing	S88_ (Head & Jambs)		PE

1	Gasketing	5110_		PE

Notes: At STC openings: Door bottom by STC door assembly. Verify compatibility of specified hardware with the STC door assembly.

Set: 19.0

Doors: 1112A

6	Hinge, Full Mortise, Hvy Wt	T4A3786 [NRP] FT	US10BE	MK
2	Surface Vert Rod Exit, Classroom	[12] LC NB8713 ETL	US10BE	SA
2	Cylinder	Mececo SFIC cylinder (Type as required)	13	MC
2	Surface Closer	351 P10	US10BE	SA
2	Kick Plate	K1050 10" high BEV CSK	US10BE	RO
2	Wall Stop	RM860 (or) RM856 (As required)	10BE	RO
1	Gasketing	S88_ (Head & Jambs)		PE
1	Gasketing	5110_		PE

Notes: Door bottom by STC door assembly. Verify compatibility of specified hardware with the STC door assembly.
Provide template for 180° swing as indicated on plans.

Set: 20.0

Doors: 1109A, 1118A, 1125A, 1126A

6	Hinge, Full Mortise, Hvy Wt	T4A3786 [NRP] FT	US10BE	MK
2	Surface Vert Rod Exit, Classroom	[12] LC NB8713 ETL	US10BE	SA
2	Cylinder	Mececo SFIC cylinder (Type as required)	13	MC
2	Surface Closer	351 P10	US10BE	SA
1	Surface Closer	351 CPS	US10BE	SA
2	Kick Plate	K1050 10" high BEV CSK	US10BE	RO
1	Wall Stop	RM860 (or) RM856 (As required)	10BE	RO
1	Gasketing	S88_ (Head & Jambs)		PE
1	Gasketing	5110_		PE

Notes: At STC openings: Door bottom by STC door assembly. Verify compatibility of specified hardware with the STC door assembly.

Set: 21.0

Doors: 1085B, 1085D, 1118B

6	Hinge, Full Mortise, Hvy Wt	T4A3786 [NRP] FT	US10BE	MK
2	Surface Vert Rod Exit, Classroom	[12] LC NB8713 ETL	US10BE	SA
2	Cylinder	Mececo SFIC cylinder (Type as required)	13	MC
2	Surface Closer	351 CPS	US10BE	SA
2	Kick Plate	K1050 10" high BEV CSK	US10BE	RO
1	Gasketing	S88_ (Head & Jambs)		PE
1	Gasketing	5110_		PE

Notes: At STC openings: Door bottom by STC door assembly. Verify compatibility of specified hardware with the STC door assembly.

Set: 22.0

Doors: 1060A, 1060B

6	Hinge, Full Mortise, Hvy Wt	T4A3786 [NRP] FT	US10BE	MK
1	Removable Mullion	L980S / L980A (As Required) x Length Required	PC	SA
1	Rim Exit Device, Exit Only	[12] 8810 EO	US10BE	SA
1	Rim Exit Device, Classroom	[12] LC 8813 ETL	US10BE	SA
2	Cylinder	Mececo SFIC cylinder (Type as required)	13	MC
2	Surface Closer	351 CPS	US10BE	SA
2	Astragal	29310_PK x Door Height		PE
1	Gasketing	S88_ (Head & Jambs)		PE
1	Gasketing	5110_		PE

Set: 23.0

Doors: 1124B, 1128A, 1128B, 1129A, 1129B

6	Hinge, Full Mortise, Hvy Wt	T4A3786 [NRP] FT	US10BE	MK
2	Surface Vert Rod Exit, Passage	[12] NB8715 ETL	US10BE	SA
2	Surface Closer	351 P10	US10BE	SA
2	Kick Plate	K1050 10" high BEV CSK	US10BE	RO
2	Wall Stop	RM860 (or) RM856 (As required)	10BE	RO
1	Gasketing	S88_ (Head & Jambs)		PE

Notes: At STC openings: Door bottom and astragal by STC door assembly. Verify compatibility of specified hardware with the STC door assembly.

Set: 24.0

Doors: 1047, ST1-1A

6	Hinge, Full Mortise, Hvy Wt	T4A3786 [NRP] FT	US10BE	MK
2	Surface Vert Rod Exit, Passage	[12] NB8715 ETL	US10BE	SA
2	Surface Closer	351 P10	US10BE	SA
2	Kick Plate	K1050 10" high BEV CSK	US10BE	RO
2	Wall Stop	RM860 (or) RM856 (As required)	10BE	RO
1	Gasketing	S88_ (Head & Jambs)		PE

Notes: Provide template for 180° swing as indicated on plans.

Set: 25.0

Doors: 1028A, 1050B, 1115A, 1115B, 1124A, 2020, 2054A, 2054B, 2091

6	Hinge, Full Mortise, Hvy Wt	T4A3786 [NRP] FT	US10BE	MK
2	Surface Vert Rod Exit, Passage	[12] NB8715 ETL	US10BE	SA
2	Surface Closer	351 P10	US10BE	SA
2	Kick Plate	K1050 10" high BEV CSK	US10BE	RO
2	Electromagnetic Holder	998M	613E	RF
2	Wall Stop	RM860 (or) RM856 (As required)	10BE	RO
1	Gasketing	S88_ (Head & Jambs)		PE

Notes: Holder connected to alarm system to release upon fire alarm or loss of power.

Set: 26.0

Doors: ST1-2, ST2-2

6	Hinge, Full Mortise, Hvy Wt	T4A3786 [NRP] FT	US10BE	MK
2	Surface Vert Rod Exit, Passage	[12] NB8715 ETL	US10BE	SA
2	Surface Closer	351 P10	US10BE	SA
2	Kick Plate	K1050 10" high BEV CSK	US10BE	RO

2	Electromagnetic Holder	998M	613E	RF
2	Wall Stop	RM860 (or) RM856 (As required)	10BE	RO
1	Gasketing	S88_ (Head & Jambs)		PE

Notes: Holder connected to alarm system to release upon fire alarm or loss of power.
Provide template for 180° swing as indicated on plans.

Set: 27.0

Doors: 1071A, ST2-1A

3	Hinge, Full Mortise, Hvy Wt	T4A3786 [NRP] FT	US10BE	MK
1	Rim Exit Device, Passage	[12] 8815 ETL	US10BE	SA
1	Surface Closer	351 P10	US10BE	SA
1	Kick Plate	K1050 10" high BEV CSK	US10BE	RO
1	Wall Stop	RM860 (or) RM856 (As required)	10BE	RO
1	Gasketing	S88_ (Head & Jambs)		PE

Set: 28.0

Doors: 1125B, 1126B

6	Hinge, Full Mortise, Hvy Wt	T4A3786 [NRP] FT	US10BE	MK
1	Dust Proof Strike	570	10BE	RO
2	Flush Bolt	555 / 557 (As Required; 12"/72" AFF)	US10B	RO
1	Deadbolt	LC 487	US10BE	SA
1	Cylinder	Mecceo SFIC cylinder (Type as required)	13	MC
2	Push Bar & Pull	111A47 (Mtg type as required)	10BE	RO
2	Surface Closer	351 P10	US10BE	SA
2	Kick Plate	K1050 10" high BEV CSK	US10BE	RO
2	Wall Stop	RM860 (or) RM856 (As required)	10BE	RO

Notes: At STC openings: Door bottom and astragal by STC door assembly. Verify compatibility of specified hardware with the STC door assembly.

Set: 29.0

Doors: 1044, 1072, 1111, 1123

6	Hinge, Full Mortise	TA2714 [NRP] FT	US10B	MK

1	Dust Proof Strike	570	10BE	RO
2	Flush Bolt	555 / 557 (As Required; 12"/72" AFF)	US10B	RO
1	Storeroom Lock	LC 10XG04 LL	US10BE	SA
1	Cylinder	Mececo SFIC cylinder (Type as required)	13	MC
1	Surface Closer	351 O/P9 (Arm to suit)	US10BE	SA
2	Kick Plate	K1050 10" high BEV CSK	US10BE	RO
2	Wall Stop	RM860 (or) RM856 (As required)	10BE	RO
1	Astragal	S772_ x Door Height		PE
1	Gasketing	S88_ (Head & Jambs)		PE

Set: 30.0

Doors: 1029, 1073A, 1073B, 2026, 2056, 2060, 2097

6	Hinge, Full Mortise	TA2714 [NRP] FT	US10B	MK
1	Dust Proof Strike	570	10BE	RO
1	Self Latch Flush Bolt Set	2845 / 2945 (As required)	10BE	RO
1	Storeroom Lock	LC 10XG04 LL	US10BE	SA
1	Cylinder	Mececo SFIC cylinder (Type as required)	13	MC
1	Conc Overhead Stop	1-X36	613E	RF
1	Surface Closer	351 O/P9 (Arm to suit)	US10BE	SA
2	Kick Plate	K1050 10" high BEV CSK	US10BE	RO
1	Wall Stop	RM860 (or) RM856 (As required)	10BE	RO
1	Astragal	S772_ x Door Height		PE
1	Gasketing	S88_ (Head & Jambs)		PE

Set: 31.0

Doors: 1040, 1065, 1083, 1120, 2022, 2093

6	Hinge, Full Mortise	TA2714 [NRP] FT	US10B	MK
1	Dust Proof Strike	570	10BE	RO
1	Self Latch Flush Bolt Set	2845 / 2945 (As required)	10BE	RO
1	Storeroom Lock	LC 10XG04 LL	US10BE	SA
1	Cylinder	Mececo SFIC cylinder (Type as required)	13	MC
2	Conc Overhead Stop	1-X36	613E	RF
1	Surface Closer	351 O/P9 (Arm to suit)	US10BE	SA
2	Kick Plate	K1050 10" high BEV CSK	US10BE	RO

1 Astragal	S772_ x Door Height		PE
1 Gasketing	S88_ (Head & Jambs)		PE

Set: 32.0

Doors: 1070, 1087

6	Hinge, Full Mortise	TA2714 [NRP] FT	US10B	MK
1	Dust Proof Strike	570	10BE	RO
1	Self Latch Flush Bolt Set	2845 / 2945 (As required)	10BE	RO
1	Storeroom Lock	LC 10XG04 LL	US10BE	SA
1	Cylinder	Mececo SFIC cylinder (Type as required)	13	MC
1	Coordinator	2600 Series x Wear Plates (size to opening)	Black	RO
2	Mounting Bracket	2601AB / C (Type as req)	Black	RO
2	Surface Closer	351 O/P9 (Arm to suit)	US10BE	SA
2	Kick Plate	K1050 10" high BEV CSK	US10BE	RO
2	Wall Stop	RM860 (or) RM856 (As required)	10BE	RO
1	Astragal	S772_ x Door Height		PE
1	Gasketing	S88_ (Head & Jambs)		PE

Set: 33.0

Doors: 1018, 1046, 1049, 1066, 1068, 1106, 2072, 2095

3	Hinge, Full Mortise	TA2714 [NRP] FT	US10B	MK
1	Storeroom Lock	LC 10XG04 LL	US10BE	SA
1	Cylinder	Mececo SFIC cylinder (Type as required)	13	MC
1	Surface Closer	351 O/P9 (Arm to suit)	US10BE	SA
1	Kick Plate	K1050 10" high BEV CSK	US10BE	RO
1	Wall Stop	RM860 (or) RM856 (As required)	10BE	RO
1	Gasketing	S88_ (Head & Jambs)		PE

Set: 34.0

Doors: 1082, 1092, 2024, 2058

3	Hinge, Full Mortise	TA2714 [NRP] FT	US10B	MK
1	Storeroom Lock	LC 10XG04 LL	US10BE	SA
1	Cylinder	Mececo SFIC cylinder (Type as required)	13	MC

1	Surface Closer	351 CPS	US10BE	SA
1	Kick Plate	K1050 10" high BEV CSK	US10BE	RO
1	Gasketing	S88_ (Head & Jambs)		PE

Set: 35.0

Doors: 1007, 1013, 1014, 1015, 1016, 1084A, 1089, 1097, 2030A, 2031, 2064, 2065A, 2074

3	Hinge, Full Mortise	TA2714 [NRP] FT	US10B	MK
1	Office Lock	LC 10XG05 LL	US10BE	SA
1	Cylinder	Mececo SFIC cylinder (Type as required)	13	MC
1	Wall Stop	RM860 (or) RM856 (As required)	10BE	RO
3	Silencer	608/609 (As required)		RO

Set: 36.0

Doors: 1038B

6	Hinge, Full Mortise	TA2714 [NRP] FT	US10B	MK
1	Dust Proof Strike	570	10BE	RO
2	Flush Bolt	555 / 557 (As Required; 12"/72" AFF)	US10B	RO
1	Classroom Lock	LC 10XG37 LL	US10BE	SA
1	Cylinder	Mececo SFIC cylinder (Type as required)	13	MC
2	Surf Overhead Stop	10-X36	613E	RF
2	Silencer	608/609 (As required)		RO

Set: 37.0

Doors: 1107, 1113, 1114

6	Hinge, Full Mortise	TA2714 [NRP] FT	US10B	MK
1	Dust Proof Strike	570	10BE	RO
1	Self Latch Flush Bolt Set	2845 / 2945 (As required)	10BE	RO
1	Classroom Lock	LC 10XG37 LL	US10BE	SA
1	Cylinder	Mececo SFIC cylinder (Type as required)	13	MC
1	Coordinator	2600 Series x Wear Plates (size to opening)	Black	RO
2	Mounting Bracket	2601AB / C (Type as req)	Black	RO
2	Surf Overhead Stop	10-X36	613E	RF
2	Surface Closer	351 O/P9 (Arm to suit)	US10BE	SA

2	Kick Plate	K1050 10" high BEV CSK	US10BE	RO
1	Astragal	S772_ x Door Height		PE
1	Gasketing	S88_ (Head & Jambs)		PE

Set: 38.0

Doors: 1004, 1009, 1021, 1023, 1024, 1033, 1034A, 1038A, 1039A, 1041A, 1051A, 1057, 1063, 1064, 1075A, 1075B, 1080B, 1085E, 2002, 2003A, 2006A, 2007B, 2008A, 2008B, 2011A, 2014A, 2019A, 2028, 2029, 2032, 2040A, 2044A, 2047A, 2048B, 2049A, 2049B, 2052A, 2073A, 2076A, 2077A, 2081, 2084A, 2085B, 2086A, 2086B, 2089A

3	Hinge, Full Mortise	TA2714 [NRP] FT	US10B	MK
1	Classroom Lock	LC 10XG37 LL	US10BE	SA
1	Cylinder	Mececo SFIC cylinder (Type as required)	13	MC
1	Wall Stop	RM860 (or) RM856 (As required)	10BE	RO
3	Silencer	608/609 (As required)		RO

Set: 39.0

Doors: 1034B, 1042, 1043, 2063

3	Hinge, Full Mortise	TA2714 [NRP] FT	US10B	MK
1	Classroom Lock	LC 10XG37 LL	US10BE	SA
1	Cylinder	Mececo SFIC cylinder (Type as required)	13	MC
1	Conc Overhead Stop	1-X36	613E	RF
1	Gasketing	S88_ (Head & Jambs)		PE

Set: 40.0

Doors: 1059, 1061, 1062, 1110, 1119, 1122, 2005A, 2007A, 2009, 2010A, 2013, 2015, 2016, 2017A, 2018A, 2039A, 2041A, 2042A, 2043A, 2046A, 2048A, 2050, 2051A, 2062, 2075A, 2078, 2079, 2080A, 2083A, 2085A, 2087, 2088A

3	Hinge, Full Mortise	TA2714 [NRP] FT	US10B	MK
1	Classroom Lock	LC 10XG37 LL	US10BE	SA
1	Cylinder	Mececo SFIC cylinder (Type as required)	13	MC
1	Surface Closer	351 O/P9 (Arm to suit)	US10BE	SA
1	Kick Plate	K1050 10" high BEV CSK	US10BE	RO
1	Wall Stop	RM860 (or) RM856 (As required)	10BE	RO
1	Gasketing	S88_ (Head & Jambs)		PE

Notes: At STC openings: Door bottom and astragal by STC door assembly. Verify compatibility of specified hardware with the STC door assembly.

Set: 41.0

Doors: 1006

3	Hinge, Full Mortise	TA2714 [NRP] FT	US10B	MK
1	Passage Latch	10XU15 LL	US10BE	SA
1	Conc Overhead Stop	1-X36	613E	RF
3	Silencer	608/609 (As required)		RO

Set: 42.0

Doors: 1090, 1091, 1094, 1095

3	Hinge, Full Mortise, Hvy Wt	T4A3786 [NRP] FT	US10BE	MK
1	Deadbolt	LC 487	US10BE	SA
1	Cylinder	Mecceo SFIC cylinder (Type as required)	13	MC
1	Push Plate	70C-RKW	10BE	RO
1	Door Pull	111 (Mtg type as required)	10BE	RO
1	Surface Closer	351 O/P9 (Arm to suit)	US10BE	SA
1	Wall Stop	RM860 (or) RM856 (As required)	10BE	RO
3	Silencer	608/609 (As required)		RO

Set: 43.0

Doors: 1012, 1025, 1030, 1031, 1032, 1052, 1074, 1081, 1096, 1103, 2023, 2025, 2057, 2059, 2094, 2096

3	Hinge, Full Mortise	TA2714 [NRP] FT	US10B	MK
1	Privacy Lock	LB LC V21 8267 LNL	US26D	SA
1	Cylinder	Mecceo SFIC cylinder (Type as required)	13	MC
1	Surface Closer	351 O/P9 (Arm to suit)	US10BE	SA
1	Kick Plate	K1050 10" high BEV CSK	US10BE	RO
1	Wall Stop	RM860 (or) RM856 (As required)	10BE	RO
1	Gasketing	S88_ (Head & Jambs)		PE
1	Coat Hook	RM801	US26D	RO

Set: 44.0

Doors: 1022, 1036

1	BiFold Door Hdwe	HF4/100A x Length Required		PE
2	Door Pull	110-RKW (Mtg type as required)	10BE	RO

Set: 45.0

Doors: 1085A, 1085C, 1086C

1	Cylinder	Mececo SFIC cylinder (Type as required)	13	MC
1	Door Hardware	Hardware by door manufacturer (Cylinder as required)		OT

Set: 46.0

Doors: 1039B

1	Cylinder	Mececo SFIC cylinder (Type as required)	13	MC
1	Position Switch	DPS - M/W		SU
1	Door Hardware	Hardware by door manufacturer (Cylinder as required)		OT

Notes: Door position switches monitor open/closed status.

Set: 47.0

Doors: Existing

1	Cylinder	Mececo SFIC cylinder (Type as required)	13	MC

Notes: Existing hardware to remain. Cylinder type and quantity per condition.

END OF SECTION 08 7101

SECTION 08 8000 - GLAZING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Insulating glass units.

B. Glazing units.

C. Plastic films.

D. Laminated glass interlayers.

E. Glazing compounds.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 01 7419 – Construction Waste Management and Disposal.

C. Section 06 4100 - Architectural Wood Casework: Casework with requirements for glass shelves and glass display doors.

D. Section 07 9200 - Joint Sealants: Sealants for other than glazing purposes.

E. Section 08 1416 - Flush Wood Doors: Glazed lites in doors.

F. Section 08 4313 - Aluminum-Framed Storefronts: Glazing installed in storefront assembly.

G. Section 08 4413 - Glazed Aluminum Curtain Walls: Glazing installed in curtain wall assembly.

H. Section 08 6300 - Metal-Framed Skylights: Glazing furnished as part of skylight units.

I. Section 08 8300 - Mirrors.

J. Section 10 2800 - Toilet Accessories: Mirrors.

1.3 REFERENCE STANDARDS

A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; Current Edition.

B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test; 2015.

C. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2019).

D. ASTM C1036 - Standard Specification for Flat Glass; 2016.

E. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.

F. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2014.

G. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.

H. ASTM C1349 - Standard Specification for Architectural Flat Glass Clad Polycarbonate; 2017.

I. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass; 2015.

J. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2016.

K. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2010.

L. GANA (GM) - GANA Glazing Manual; 2008.

M. GANA (SM) - GANA Sealant Manual; 2008.

N. GANA (LGRM) - Laminated Glazing Reference Manual; 2009.

O. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

P. IGMA TB-3001 - Guidelines for Sloped Glazing; 2001.

Q. IGMA TM-3000 - North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial & Residential Use; 1990 (2016).

R. ITS (DIR) - Directory of Listed Products; Current Edition.

S. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2017.

T. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2014, with Errata (2017).

U. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems; 2017.

V. UL (DIR) - Online Certifications Directory; Current Edition.

W. UL 752 - Standard for Bullet-Resisting Equipment; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting at least one week before starting work of this section; require attendance by each of the affected installers.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data on Insulating Glass Unit and Glazing Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.

C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.

D. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

E. Samples: Submit two samples 6 by 6 inch in size of glass units.

F. Certificate: Certify that products of this section meet or exceed specified requirements.

G. Manufacturer's qualification statement.

H. Installer's qualification statement.

I. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with GANA (GM), GANA (SM), GANA (LGRM), and IGMA TM-3000 for glazing installation methods. Maintain one copy on site.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten years of documented experience.
   1. Provide certified glass products through ANSI accredited certifications that include plant audits and independent laboratory performance testing.
      a) Insulating Glass Certification Council (IGCC).
      b) Safety Glazing Certification Council (SGCC).

C. Installer Qualifications: Company specializing in performing work of the type specified and with at least five years documented experience.

1.7 FIELD CONDITIONS

A. Do not install glazing when ambient temperature is less than 40 degrees F.

B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.8 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Insulating Glass Units: Provide a five (5) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including providing products to replace failed units.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Float Glass Manufacturers:
   1. Basis-of-Design: Vitro Architectural Glass (formerly PPG Glass): www.vitroglazings.com/#sle.
      a) Provide **Starphire UltraClear** glass for all exterior glazing units.

2.2 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
   1. Design Pressure: Calculated in accordance with applicable codes and design load data provided on the Drawings.
   2. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
   3. Seismic Loads: Design and size glazing components to withstand seismic loads and sway displacement in accordance with the requirements of ____ code.
   4. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
   5. Glass thicknesses listed are minimum.

B. Weather-Resistive Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure water-resistive barrier, vapor retarder, and/or air barrier.
   1. In conjunction with weather barrier related materials described in other sections, as follows:
      a) Air Barriers: See Section 07 2726.
   2. To utilize inner pane of multiple pane insulating glass units for continuity of vapor retarder and/or air barrier seal.
   3. To maintain a continuous vapor retarder and/or air barrier throughout glazed assembly from glass pane to heel bead of glazing sealant.

C. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
   1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
   2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
   3. Solar Optical Properties: Comply with NFRC 300 test method.

2.3 GLASS MATERIALS

A. Float Glass: Provide float glass based glazing unless otherwise indicated.
   1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality - Q3.
   2. Kind HS - Heat-Strengthened Type: Complies with ASTM C1048.
   3. Kind FT - Fully Tempered Type: Complies with ASTM C1048.
   4. Fully Tempered Safety Glass: Complies with ANSI Z97.1 or 16 CFR 1201 criteria for safety glazing used in hazardous locations.
   5. Impact Resistant Safety Glass: Complies with ANSI Z97.1 - Class B, or 16 CFR 1201 - Category I criteria.
   6. Thicknesses: As indicated; provide greater thickness as required for exterior glazing wind load design.

B. Laminated Glass: Float glass laminated in accordance with ASTM C1172.
   1. Laminated Safety Glass: Complies with ANSI Z97.1 - Class B or 16 CFR 1201 - Category I impact test requirements.
   2. Polyvinyl Butyral (PVB) Interlayer: 0.030 inch thick, minimum.

2.4 INSULATING GLASS UNITS

A. Insulating Glass Units: Types as indicated.
   1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
   2. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
   3. Warm-Edge Spacers: Low-conductivity thermoplastic with desiccant warm-edge technology design.
      a) Spacer Width: As required for specified insulating glass unit.
   4. Spacer Color: As selected by Architect from manufacturer's standard range.
   5. Edge Seal:
      a) Dual-Sealed System: Provide polyisobutylene sealant as primary seal applied between spacer and glass panes, and silicone, polysulfide, or polyurethane sealant as secondary seal applied around perimeter.
   6. Color: Black.
   7. Purge interpane space with dry air, hermetically sealed.

B. **Type IG** Insulating Glass Units: Vision glass, double glazed.
   1. Applications: Exterior glazing unless otherwise indicated.
   2. Space between lites filled with argon.
   3. Outboard Lite: Heat-strengthened float glass, 1/4 inch thick, minimum.

a) Tint: Clear.
b) Coating: Low-E (passive type), on #2 surface, medium iron glass.
1) Basis-of-Design: **Vitro Architectural Glass**; **Solarban 72 on Acuity Glass.**

4. Inboard Lite: Heat-strengthened float glass, 1/4 inch thick, minimum.
a) Tint: Clear.
b) Uncoated, medium iron glass.
1) Basis-of-Design Glass: **Vitro Architectural Glass; Acuity Glass**.
5. Total Thickness: 1 inch.
6. Visible Light Transmittance (VLT): 67 percent, nominal.
7. Solar Heat Gain Coefficient (SHGC): 0.28, nominal.

C. **Type ICS** Insulating Glass Units: Spandrel glazing.
1. Applications: Exterior spandrel glazing unless otherwise indicated.
2. Outboard Lite: Same as Type **IG**.
3. Inboard Lite: Heat-strengthened float glass, 1/4 inch thick.
a) Opacifier: Elastomeric coating, on #4 surface.
4. Total Thickness: 1 inch.
5. Glazing Method: Dry glazing method, gasket glazing.

D. **Type IL** Insulating Glass Units: Vision glass, double glazed, laminated.
1. Application: As indicated on drawings.
2. Space between lites filled with air.
3. Laminated Outboard Lite: Annealed float glass, 1/4 inch thick.
a) (2) layers 1/8 inch glass with 0.030 inch polyvinyl butyral (PVB) interlayer.
b) Tint: Clear.
c) Coating: Low-E (passive type), on #4 surface. See Type IG for low-e coating product..
4. Laminated Inboard Lite, Outer Pane: Annealed float glass, 1/4 inch thick.
a) (2) layers 1/8 inch glass with 0.030 inch polyvinyl butyral (PVB) interlayer.
b) Tint: Clear.
5. Laminated Inboard Lite, Inner Pane: Annealed float glass, 3/16 inch thick, minimum.
a) Tint: Clear.
6. Outside-Inside Transmission Class (OITC) rating of 33, with special acoustical spacer and edge seal.
a) Nominally equivalent to STC 42.
7. Total Thickness: 1-1/16 inch.

E. **Type IT** Insulating Glass Units: Safety glazing (tempered).
1. Applications:
a) Glazed lites in exterior doors, where indicated on the drawings.
b) Glazed sidelights and panels next to doors.
c) Other locations required by applicable federal, state, and local codes and regulations.
d) Other locations indicated on drawings.
2. Space between lites filled with argon.
3. Glass Type: Same as Type IG except use fully tempered float glass for both outboard and inboard lites.
4. Tint: Clear.
5. Total Thickness: 1 inch.
6. Visible Light Transmittance (VLT): 67 percent, nominal.

7. Solar Heat Gain Coefficient (SHGC): 0.28, nominal.
8. Glazing Method: Dry glazing method, gasket glazing.

F. **Type ISG -**Insulating Glass Units: Vision glass, double glazed, security glazing.
1. Applications: As indicated on the drawings.
2. Space between lites filled with argon.
   a) Air Space Depth: 3/8 inch.
3. Outboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
   a) Coating: Low-E (passive type), on #2 surface. Same as Type IG.
4. Inboard Lite: Laminated security glass - see Monolithic Glazing, **Type SG-1**.
   a) Tint: Clear.
5. Total Thickness: 1-1/16 inch.
6. Visible Light Reflectance, Outside: 13 percent, nominal.
7. Glazing Method: Dry glazing method, gasket glazing.

G. **Type IFG**- Insulating Glass Units: Vision glass, double glazed, with vision-obscuring acid-etching ("frosting") treatment.
1. Applications: Exterior glazing at locations indicated on the drawings.
2. Same as Type **IG**, with addition of vision-obscuring acid etching on #3 surface.

H. **Type IFSG -**Insulating Glass Units: Vision glass, double glazed, security glazing, with vision-obscuring acid-etching ("frosting") treatment.
1. Applications: As indicated on the drawings.
2. Space between lites filled with argon.
   a) Air Space Depth: 3/8 inch.
3. Outboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
   a) Coating: Low-E (passive type), on #2 surface. Same as Type IG.
4. Inboard Lite: Laminated security glass - see Monolithic Glazing, **Type SG-1.**
   a) Tint: Clear.
   b) Pattern: Vision-obscuring acid etching on #3 surface.
5. Total Thickness: 1-1/16 inch.
6. Visible Light Reflectance, Outside: 13 percent, nominal.
7. Glazing Method: Dry glazing method, gasket glazing.

2.5 GLAZING UNITS

A. **Type TS** Monolithic Safety Glazing: Non-fire-rated.
1. Applications:
   a) Interior glazing unless otherwise indicated.
   b) Glazed lites in doors, except fire doors.
   c) Glazed sidelights to doors, except in fire-rated walls and partitions.
   d) Other locations required by applicable federal, state, and local codes and regulations.
   e) Other locations indicated on drawings.
2. Glass Type: Fully tempered safety glass as specified.
3. Tint: Clear.
4. Thickness: 1/4 inch, nominal.
5. Glazing Method: Dry glazing method, gasket glazing.

B. **Type FR** Fire-Protection-Rated Glazing: Type, thickness, and configuration of glazing that contains flame, smoke, and does not block radiant heat, as required to achieve fire-doors indicated fire-rating period of 90 minutes or less.
   1. Applications:
      a) Glazing in fire-rated door assembly.
      b) Glazing in fire-rated window assembly.
      c) Other locations as indicated on drawings.
   2. Provide products listed by ITS (DIR) or UL (DIR) and approved by authorities having jurisdiction.
   3. Glazing Method: As required for fire rating.
   4. Markings for Fire-Protection-Rated Glazing Assemblies: Provide permanent markings on fire-protection-rated glazing in compliance with ICC (IBC), local building code, and authorities having jurisdiction
   5. Manufacturers:
      a) SAFTIFIRST, a division of O'Keeffe's Inc; SuperLite X-45: www.safti.com/#sle.
      b) SCHOTT North America Inc; PYRAN Platinum: www.us.schott.com/#sle.
      c) Technical Glass Products; Firelite Plus: www.fireglass.com/#sle.
      d) Vetrotech North America; Contraflam: www.vetrotechusa.com/#sle.
      e) Substitutions: See Section 01 6000 - Product Requirements.

C. **Type LS-1** Safety Glazing: Laminated glass, 2-Ply.
   1. Applications: Interior, locations as indicated on drawings.
   2. STC Rating: 35.
   3. Thickness: 1/4 inch.
   4. Outer Lite: Tempered glass, 1/8 inch.
   5. Interlayer: Polyvinyl butyral (PVB), thickness as required to meet performance criteria.
   6. Interlayer, Inboard Side : Polyvinyl butyral (PVB), 0.045 inch, or as required to meet performance criteria.
   7. Inside Lite: Tempered glass, 1/8 inch.

D. **Type LS-2** Safety Glazing: Laminated glass, 2-Ply.
   1. Applications: Interior, locations as indicated on drawings.
   2. Tint: Clear.
   3. STC Rating: 40.
   4. Thickness: 5/8 inch.
   5. Outer Lite: Tempered glass, 3/16 inch.
   6. Interlayer: Polyvinyl butyral (PVB), 0.060 inch.
   7. Inside Lite: Tempered glass, 1/8 inch.

E. Type **LS-3** Safety Glazing: Laminated glass, 2-Ply. Double glazed.
   1. Applications: Interior, locations as indicated on drawings.
   2. STC Rating: 45.
   3. Thickness: 2-1/2 inches inch.
   4. Outer Lite: Laminated annealed float glass, (2) layers of 1/8 inch glass.
      a) Interlayer: Polyvinyl butyral (PVB), 0.030 inch, or thickness as required to meet performance criteria.
   5. Inside Lite: Tempered glass, 1/4 inch.

F. **Type LS-4** ClearSafety Glazing: Double glazed, laminated glass, 2-Ply.

1. Applications: Interior, locations as indicated on drawings.
2. STC Rating: 50.
3. Thickness: 3 inches.
4. Outer Lite: Laminated annealed float glass, (2) layers of 1/4 inch glass.
   a) Interlayer: Polyvinyl butyral (PVB), 0.060 inch, or as required to meet performance criteria.
5. Inside Lite: Tempered glass, 1/2 inch.

G. Type **SG-1** - Security-strengthened laminated glass.
1. Basis-of-Design Product: Advanced Impact Technologies; **School Guard Glass SG4.**
2. Construction: Proprietary assembly consisting of outer layers of glass bonded to a custom security strengthened core substrate.
   a) Characteristics:
      1) Maximum 4.1 lbs/square foot.
      2) 5aa-1 rated for a minimum of 6 minutes.
      3) Thickness: 7/16 inch.
      4) Glass clad on outboard and inboard surfaces.
      5) Optical haze 1.8% maximum.
      6) Interlayer Color: Clear

H. **Type BG** Glass-Clad Polycarbonate Security Glazing: Laminated glass and polycarbonate, multi-ply; ASTM C1349.
1. Applications: Locations as indicated on drawings.
2. Tint: Clear.
3. Thickness: As required to meet performance criteria. Nominal 1 inch - 1.25 inch.
4. Outer Lite(s): Tempered glass.
5. Interlayers: Polyvinyl butyral (PVB), thickness as required to meet performance criteria.
6. Inside Lite: Polycarbonate.
7. Performance Criteria:
   a) Bullet Resistance: Pass UL 752 tests in compliance with ballistic criteria level and weapon description indicated; Level 3 - .44 magnum lead semi-wadcutter gas checked.
8. Glazing Method: As required to meet performance criteria.
9. Products - provide one of the following or an equivalent product complying with the specified requirements:
   a) Oldcastle Building Envelope; **ArmorResist Plus**.
   b) PRL Glass Systems Inc; **PRL 3004**.
   c) Total Security Solutions; **Glass-Clad Polycarbonate 1" No Spall**.
   d) [Vetrotech Saint Gobain;] **Polygard Bullet.**

2.6 PLASTIC FILMS

A. Type DF1 - Decorative Plastic Film: Polyester type.
1. Application: Locations as indicated on drawings.
2. Manufacturers:
   a) Basis-of-Design Manufacturer: Solyx.
      1) Refer to Finish Product List on the drawings for specific product, pattern, and color.

2.7 LAMINATED GLASS INTERLAYERS

A. Sound Control Polyvinyl Butyral (PVB) Interlayer for Laminated Glazing:
   1. Functionality: Post-breakage safety, security, and sound control.
   2. Applications:
   3. Color: Clear.
   4. Thickness: As required for indicated performance of laminated glass application, or as indicated.
   5. Improvement in Sound Transmission: Up to 3 dB.
   6. Manufacturers:
      a) Eastman Chemical Company; Saflex Acoustic PVB Interlayer: www.saflex.com/#sle.
      b) Kuraray America, Inc; Trosifol Sound Control (SC): www.kuraray.us.com/#sle.
      c) Sekisui S-LEC America, LLC; S-LEC Sound Acoustic Film: www.s-lec.us/#sle.

2.8 ACCESSORIES

A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch by width of glazing rabbet space minus 1/16 inch by height to suit glazing method and pane weight and area.

B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Continuous by one half the height of the glazing stop by thickness to suit application, self adhesive on one face.

C. Glazing Splines: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; color black.

PART 3 EXECUTION

3.1 VERIFICATION OF CONDITIONS

A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.

B. Verify that the minimum required face and edge clearances are being provided.

C. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.

D. Proceed with glazing system installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.3 INSTALLATION, GENERAL

A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.

B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.

C. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.

D. Set glass lites of system with uniform pattern, draw, bow, and similar characteristics.

E. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.

F. Prevent glass from contact with any contaminating substances that may be the result of construction operations such as, and not limited to the following; weld splatter, fire-safing, plastering, mortar droppings, and paint.

3.4 INSTALLATION - DRY GLAZING METHOD (GASKET GLAZING)

A. Application - Exterior and/or Interior Glazed: Set glazing infills from either the exterior or the interior of the building.

B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.

D. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

3.5 INSTALLATION - DRY GLAZING METHOD (TAPE AND GASKET SPLINE GLAZING)

A. Application - Exterior Glazed: Set glazing infills from the exterior of the building.

B. Cut glazing tape to length; install on glazing pane. Seal corners by butting tape and sealing junctions with butyl sealant.

C. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

D. Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.

E. Install removable stops without displacing glazing spline. Exert pressure for full continuous contact.

F. Carefully trim protruding tape with knife.

3.6 INSTALLATION - PRESSURE GLAZED SYSTEMS

A. Application - Exterior Glazed: Set glazing infills from exterior side of building.

B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.

D. Install pressure plates without displacing glazing gasket; exert pressure for full continuous contact.

E. Install cover plate.

3.7 INSTALLATION - PLASTIC FILM

A. Install plastic film with adhesive, applied in accordance with film manufacturer's instructions.

B. Place without air bubbles, creases or visible distortion.

C. Install film tight to perimeter of glass and carefully trim film with razor sharp knife. Provide 1/16 inch to 1/8 inch gap at perimeter of glazed panel unless otherwise required. Do not score the glass.

3.8 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements for additional requirements.

B. Monitor and report installation procedures and unacceptable conditions.

3.9 CLEANING

A. See Section 01 7419 - Construction Waste Management and Disposal, for additional requirements.

B. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.

C. Remove nonpermanent labels immediately after glazing installation is complete.

D. Clean glass and adjacent surfaces after sealants are fully cured, in accordance with manufacturer's instructions.

E. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.10 PROTECTION

A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

B. Protect installed glass from damage during construction.

C. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION 08 8000

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SECTION 08 8300 - MIRRORS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Glass mirrors.
   1. Film-backed safety glass **MR1**.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 01 7419 – Construction Waste Management and Disposal.

C. Section 10 2800 - Toilet Accessories: Metal mirror frames.

1.3 REFERENCE STANDARDS

A. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.

B. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.

C. GANA (GM) - GANA Glazing Manual; 2008.

D. GANA (SM) - GANA Sealant Manual; 2008.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data on Mirror Types: Submit structural, physical and environmental characteristics, size limitations, special handling and installation requirements.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Manufacturer's Certificate: Certify that mirrors, meets or exceeds specified requirements.

E. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with GANA (GM) and GANA (SM) for glazing installation methods.

B. Fabricate, store, transport, receive, install, and clean mirrors in accordance with manufacturer's recommendations.

1.6 FIELD CONDITIONS

A. Do not install mirrors when ambient temperature is less than 50 degrees F.

B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.7 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a [one] year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

2.2 MATERIALS

A. Mirror Design Criteria: Select materials and/or provide supports as required to limit mirror material deflection to 1/200, or to the flexure limit of glass, with full recovery of glazing materials, whichever is less.

B. Safety Glazing Products: For film-backed mirrors, provide products that comply with 16 CFR 1201, Category II.

C. Tempered Mirror Glass: ASTM C1048, FT, Condition A, mirror glazing quality for blemish requirements, tempered float glass before silver coating is applied; clear.
   1. Thickness: 1/4 inch.
   2. Size: As noted on drawings.

2.3 ACCESSORIES

A. Mirror Attachment Accessories: Stainless steel clips.

B. Mirror Adhesive: Silicone pre-polymer based, chemically compatible with mirror coating and wall substrate.

PART 3 EXECUTION

3.1 PREPARATION

A. Clean contact surfaces with solvent and wipe dry.

B. Seal porous mirror frames or recesses with substrate compatible primer or sealer. Prime surfaces scheduled to receive sealant.

C. Prepare installation in accordance with ASTM C1193 for solvent release sealants, and install sealant in accordance with manufacturer's instructions.

3.2 INSTALLATION

A. Install mirrors in accordance with manufacturer's recommendations.

B. Set mirrors plumb and level, and free of optical distortion.

C. Set mirrors with edge clearance free of surrounding construction including countertops or backsplashes.

D. Frameless Mirrors: Set mirrors in proper place with adhesive, applied in accordance with adhesive manufacturer's instructions.

3.3 CLEANING

A. Remove wet glazing materials from finish surfaces.

B. Remove labels after work is complete.

C. Clean mirrors and adjacent surfaces.

END OF SECTION 08 8300

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SECTION 08 9100 - LOUVERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Louvers, frames, and accessories.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 01 7419 – Construction Waste Management and Disposal.

C. Section 07 9200 - Joint Sealants: Sealing joints between frames and adjacent construction.

1.3 REFERENCE STANDARDS

A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017a.

B. AMCA 511 - Certified Ratings Program for Air Control Devices; 2010.

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

D. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data describing design characteristics, maximum recommended air velocity, design free area, materials and finishes.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Shop Drawings: Indicate louver layout plan and elevations, opening and clearance dimensions, and tolerances; head, jamb and sill details; blade configuration, screens, blank-off areas required, and frames. Show interface(s) with and connections to adjacent construction.

E. Test Reports: Independent agency reports showing compliance with specified performance criteria.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with minimum three years of documented experience.

1.6 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Provide five year manufacturer's warranty against distortion, metal degradation, and connection failures of louver components.
   1. Finish: Include twenty year coverage against degradation of exterior finish.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Louvers:
   1. Basis-of-Design: Airolite Company, LLC**; K6744**: www.airolite.com/#sle.
   2. Construction Specialties, Inc: www.c-sgroup.com/#sle.
   3. Greenheck.
   4. Ruskin Company: www.ruskin.com/#sle.
   5. Substitutions: See Section 01 6000 - Product Requirements.

2.2 LOUVERS

A. Louvers: Factory fabricated and assembled, complete with frame, mullions, and accessories; AMCA Certified in accordance with AMCA 511.
   1. Wind Load Resistance: Design to resist positive and negative wind load of 25 psf without damage or permanent deformation.
   2. Drainable Blades: Continuous rain stop at front or rear of blade aligned with vertical gutter recessed into both jambs of frame.
   3. Screens: Provide insect screens at intake louvers and bird screens at exhaust louvers.

B. Stationary Louvers: Drainable blade, extruded aluminum construction, with intermediate mullions matching frame.
   1. Free Area: 50 percent, minimum.
   2. Blades: Drainable.
   3. Frame: 4 inches deep, channel profile; corner joints mitered and , with continuous recessed caulking channel each side.
   4. Aluminum Thickness: Frame 12 gauge, 0.0808 inch minimum; blades 12 gauge, 0.0808 inch minimum.

5. Aluminum Finish: Superior performing organic coatings; finished after fabrication.
6. Construction: Mechanically fastened.

2.3 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M).

B. Steel Sheet: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.

C. Stainless Steel: ASTM A666, Type 304, soft temper, smooth surface, No. 4 brushed finish.

2.4 FINISHES

A. Superior Performing Organic Coatings System: Manufacturer's standard multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent polyvinylidene fluoride (PVDF) resin, and at least 80 percent of aluminum extrusion and panels surfaces having minimum total dry film thickness (DFT) of 1.2 mils, 0.0012 inch.

B. Color: As indicated on Drawings.

2.5 ACCESSORIES

A. Blank-Off Panels: Aluminum face and back sheets, polyisocyanurate foam core, 1-1/2 inch thick, painted black on exterior side; provide where duct connected to louver is smaller than louver frame, sealing off louver area outside duct.

B. Screens: Frame of same material as louver, with reinforced corners; removable, screw attached; installed on inside face of louver frame.

C. Bird Screen: Interwoven wire mesh of steel, 14 gauge, 0.0641 inch diameter wire, 1/2 inch open weave, diagonal design.

D. Insect Screen: 18 x 16 size aluminum mesh.

E. Fasteners and Anchors: Stainless steel.

F. Sealant for Setting Sills and Sill Flashing: Non-curing butyl type.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that prepared openings and flashings are ready to receive this work and opening dimensions are as indicated on shop drawings.

3.2 INSTALLATION

A. Install louver assembly in accordance with manufacturer's instructions.

B. Coordinate with installation of flashings by others.

C. Install louvers level and plumb.

D. Set sill members and sill flashing in continuous bead of sealant.

E. Align louver assembly to ensure moisture shed from flashings and diversion of moisture to exterior.

F. Secure louver frames in openings with concealed fasteners.

G. Coordinate with installation of mechanical ductwork.

3.3 CLEANING

END OF SECTION 08 9100

SECTION 08 9200 - LOUVERED EQUIPMENT ENCLOSURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Louvered screening panels for rooftop equipment enclosure.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 01 7419 – Construction Waste Management and Disposal.

1.3 REFERENCE STANDARDS

A. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Storage and handling requirements and recommendations.
   2. Installation methods.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Shop Drawings: Include plans, elevations, sections, and details of connections and bracing.
   1. Design Data: Include structural calculations indicating compliance with wind loading requirements, signed and sealed by the Professional Engineer supervising the connection design.

E. Delegated Design Submittal: As noted above at 1.4-C-1.

F. Manufacturer's qualification statement.

G. Designer's qualifications.

H. Specimen warranty.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with not less than ten years of documented experience.

B. Design louver attachment to structural steel support framing under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Comply with manufacturer's instructions for handling of screen products.

1.7 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Aluminum Finish Warranty: Provide 10-year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking. Complete forms in Owner's name and register with warrantor.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Louvered Equipment Enclosures:
1. Basis-of-Design: **PalmSHIELD Manufacturing**; **Palisade Fortress Alternating Louvers**.
2. Provide the basis of design or one of the following:
3. The Airolite Company; Type SV961: www. airolite.com.
4. Ametco; Saturn Louver: www.ametco.com.
5. Substitutions: See Section 01 6000 - Product Requirements.

2.2 APPLICATIONS

A. Screens for concealing equipment.

2.3 PERFORMANCE REQUIREMENTS

A. Wind Resistance: Design louvered enclosures to withstand positive and negative wind loading in accordance with applicable building code and design criteria indicate on Drawing S001.

2.4 VERTICAL LOUVERED EQUIPMENT ENCLOSURE

A. Louver fencing system consisting of vertical, fixed louver, modular fence panels fabricated with extruded aluminum framing bars and supported by extruded aluminum fence posts.
1. Louver Panel Height: As indicated on drawings.
2. Louver Panel Width: 6 feet maximum.

3. Openness: 33 percent.
4. Louver Components:
   a) Extended tubular louver planks for 1/8" overlapfor 100% direct visual screening.
   b) Fixed Louver Planks: 1" x 4" x 0.1250" 6063-T52 aluminum tubular planks
   c) Louver Vertical End Caps: 3 x ¼" 60601 -T6 aluminum bar framework supporting the louvers shall be welded. .
   d) Louver Top & Bottom Rail: 3" x 2" x 1/8" 6063-T6 aluminum tubular top and bottom rail.
   e) Louver Middle Rail (If required) 3" x 2" x 1/8" 6063-T6 aluminum tubular middle rail.
5. Support Components;
   a) Panel posts: 4 inch square by ¼ inch minimum extruded tubular aluminum sections with solid aluminum caps. Length as specified on the contract drawings.
6. Gates: Swing to exterior of enclosure, size as shown on drawings. All gate hardware to be furnished and installed by the louvered enclosure manufacturer.

B. Aluminum Finish: For aluminum fence panels, posts and gates.
   1. Polyester powder coating: Electrostatically applied colored polyester powder coating heat cured to chemically bond finish to metal substrate.
      a) Minimum hardness measured in accordance with ASTM D3363 2H.
      b) Direct impact resistance tested in accordance with ASTM D2794. Withstand 160 inch-pounds.
      c) Salt spray resistance tested in accordance with ASTM B117: No undercutting, rusting, or blistering after 500 hours in 5 percent salt spray at 95° F and 95% relative humidity after 1,000 hours, less than 3/16 inches undercutting.
      d) Weatherability tested in accordance with ASTM D822: No film failure and 88 percent gloss retention after 1 year exposure in South Florida with test panels tilted 45°.
   2. Color: Custom color, Color 3, match Architect's sample.

2.5 MATERIALS

A. Extruded Aluminum: ASTM B 221, Alloy 6063 – Temper T-6.

B. Sheet Aluminum: ASTM B211, Alloy 6063 – Temper T6.

C. Powder Coating Material Hardness: ASTM 3363 2H.

2.6 ACCESSORIES

A. Miscellaneous Trim: ASTM B209/B209M aluminum sheet, alloy 3005-H25 temper, or equivalent, formed to shapes indicated and finished to match other components.

B. Provide all fasteners and clip angles as required to secure louver screens to structural support framing. Refer to structural drawings for design and details of structural support framing.

C. Fasteners: Self-tapping stainless steel screws, as approved by manufacturer of equipment screens.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install equipment screens in accordance with manufacturer's printed instructions and as indicated on shop drawings.

B. Form tight joints and fit exposed connections accurately.

C. Do not install bent, bowed or otherwise damaged panels. Remove damaged components from site and replace.

D. Provide necessary fastenings and anchors required for a complete installation, and install units plumb, level, and in proper alignment with adjacent work.

E. Gates: Install gates and adjust hardware for smooth operation.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Protect metal surfaces from corrosion or galvanic action by application of a heavy coating of bituminous paint on surfaces that will be in contact with concrete, masonry or dissimilar metals.

C. Touch-up, repair, or replace damaged products before Date of Substantial Completion.

END OF SECTION 08 9200

SECTION 09 0561 - COMMON WORK RESULTS FOR FLOORING PREPARATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This section applies to floors identified in Contract Documents that are receiving the following types of floor coverings:
   1. Resilient tile and sheet.
   2. Carpet tile.
   3. Thin-set ceramic tile and stone tile.
   4. Fluid-applied flooring.
   5. Wood flooring.

B. Removal of existing floor coverings.

C. Preparation of new concrete floor slabs for installation of floor coverings.

D. Testing of concrete floor slabs for moisture, relative humidity, alkalinity (pH), and pull strength.

E. Remediation of concrete floor slabs due to unsatisfactory moisture or alkalinity (pH) conditions.
   1. Contractor shall perform all specified remediation of concrete floor slabs. If such remediation is indicated by testing agency's report and is due to a condition not under Contractor's control or could not have been predicted by examination prior to entering into the contract, a contract modification will be issued.

F. Patching compound.

G. MVE-control system.

1.2 RELATED REQUIREMENTS

A. Section 01 2100 - Allowances: Bid pricing for remediation treatments.

B. Section 01 2201 - Unit Prices: Bid pricing for remediation treatments.

C. Section 01 3566.42 - Sustainability Compliance Procedures.

D. Section 01 4000 - Quality Requirements: Additional requirements relating to testing agencies and testing.

E. Section 01 7419 - Construction Waste Management and Disposal: Handling of existing floor coverings removed.

F. Section 03 3000 - Cast-in-Place Concrete: Limitations on curing requirements for new concrete floor slabs.

1.3 PRICE AND PAYMENT PROCEDURES

A. Unit Prices: See Section 01 2201 - Unit Prices.

B. Unit Price for Alternate Flooring Adhesive: Do not include the cost of the alternate adhesive in the base bid; state on the bid form the unit price per square foot for using the alternate adhesive, in the event such remediation is required.
   1. Base the unit price on a total quantity calculated by assuming that only 50 percent of the flooring will require the alternate adhesive.

C. Unit Price for MVE Control System: Do not include the cost of the floor coating or underlayment in the base bid; state on the bid form the unit price per square foot for the floor coating or underlayment, installed, in the event such remediation is required.
   1. Base the unit price on the assumption that the floor area to be treated is primarily open, not divided into rooms and corridors.
   2. Base the unit price on a total quantity calculated by assuming that only 50 percent of the flooring will require the alternate adhesive.

1.4 DEFINITIONS

A. MVE: Moisture vapor emission.

1.5 REFERENCE STANDARDS

A. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 50 mm [2 in.] Cube Specimens); 2023.

B. ASTM C472 - Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters, and Gypsum Concrete; 2020.

C. ASTM D7234 - Standard Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers; 2019.

D. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2019, with Editorial Revision (2020).

E. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2016a.

F. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2019a.

G. ASTM F3010 - Standard Practice for Two-Component Resin Based Membrane-Forming Moisture Mitigation Systems for Use Under Resilient Floor Coverings; 2018.

H. ICRI 310.2R - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair; 2013.

I. RFCI (RWP) - Recommended Work Practices for Removal of Resilient Floor Coverings; 2011.

1.6 ADMINISTRATIVE REQUIREMENTS

A. Coordinate scheduling of cleaning and testing, so that preliminary cleaning has been completed for at least 24 hours prior to testing.

1.7 SUBMITTALS

A. Visual Observation Report: For existing floor coverings to be removed.

B. Floor Covering and Adhesive Manufacturers' Product Literature: For each specific combination of substrate, floor covering, and adhesive to be used; showing:
   1. Moisture and alkalinity (pH) limits and test methods.
   2. Manufacturer's required bond/compatibility test procedure.

C. MVE-Control System Product Data: Manufacturer's published data on each product to be used for remediation.
   1. Manufacturer's qualification statement.
   2. Certificate: Manufacturer's certification of compatibility with types of flooring applied over remedial product.
   3. Manufacturer's installation instructions.

D. Testing Agency's Report:
   1. Description of areas tested; include floor plans and photographs if helpful.
   2. Summary of conditions encountered.
   3. Moisture and alkalinity (pH) test reports.
   4. Copies of specified test methods.
   5. Recommendations for remediation of unsatisfactory surfaces.
   6. Submit report directly to Owner.
   7. Submit report not more than two business days after conclusion of testing.

E. Pull strength test report.

F. Copy of RFCI (RWP).

1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications: Provide products of this section manufactured by companies which have successfully specialized in production of this type of work for not less than 5 years.

B. MVE-Control (Remedial Material) System Installer Qualifications: An authorized representative who is factory trained and approved by manufacturer.

C. Moisture, alkalinity (pH), relative humidity, and pull strength testing will be performed by an independent testing agency employed and paid by Owner.

D. Testing Agency Qualifications: Independent testing agency experienced in the types of testing specified.
   1. Submit evidence of experience consisting of at least 3 test reports of the type required, with project Owner's project contact information.

E. Contractor's Responsibility Relating to Independent Agency Testing:
   1. Provide access for and cooperate with testing agency.
   2. Confirm date of start of testing at least 10 days prior to actual start.
   3. Allow at least 4 business days on site for testing agency activities.
   4. Achieve and maintain specified ambient conditions.
   5. Notify Owner when specified ambient conditions have been achieved and when testing will start.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, handle, and protect products in accordance with manufacturer's instructions and recommendations.

B. Deliver materials in manufacturer's packaging; include installation instructions.

C. Keep materials from freezing.

1.10 FIELD CONDITIONS

A. Ambient Limitations: Comply with MVE-control system manufacturer's written instructions for substrate and ambient temperatures, humidity, ventilation, and other conditions affecting system installation.
   1. Store system components in a temperature-controlled environment and protected from weather and at ambient temperature of not less than 50 deg F and not more than 85 deg F at least 48 hours before use.
   2. Maintain ambient temperature and relative humidity in installation areas within range recommended in writing by MVE-control system manufacturer, but not less than 65 deg F or more than 85 deg F and not less than 40 or more than 60 percent relative humidity, for 48 hours before installation, during installation, and for 48 hours after installation unless longer period is recommended in writing by manufacturer.
   3. Install MVE-control systems where concrete surface temperatures will remain a minimum of 5 deg F higher than the dew point for ambient temperature and relative humidity conditions in installation areas for 48 hours before installation, during installation, and for 48 hours after installation unless longer period is recommended in writing by manufacturer.

B. Maintain ambient temperature in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 65 degrees F or more than 85 degrees F.

C. Maintain relative humidity in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 40 percent and not more than 60 percent.

1.11 WARRANTY

A. Manufacturer's Special Warranty: Manufacturer and factory-trained Installer agree to repair or replace MVE-control system product that fails in materials or workmanship within specified warranty period.
   1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. MVE-Control System Capabilities: Capable of suppressing MVE without failure where installed on concrete that exhibits the following conditions:
   1. Relative Humidity: Maximum 100 percent when tested according to ASTM F2170 using in situ probes.

2.2 MATERIALS

A. Patching Compound: Floor covering manufacturer's recommended product, suitable for conditions, and compatible with adhesive and floor covering. In the absence of any recommendation from flooring manufacturer, provide a product with the following characteristics:
   1. Cementitious moisture-, mildew-, and alkali-resistant compound, compatible with floor, floor covering, and floor covering adhesive, and capable of being feathered to nothing at edges.
   2. Compressive Strength: 3000 psi, minimum, after 28 days, when tested in accordance with ASTM C109/C109M or ASTM C472, whichever is appropriate.

B. Alternate Flooring Adhesive: Floor covering manufacturer's recommended product, suitable for the moisture and pH conditions present; low-VOC. In the absence of any recommendation from flooring manufacturer, provide a product recommended by adhesive manufacturer as suitable for substrate and floor covering and for conditions present.

C. MVE-Control System: Single- or multi-layer coating or coating/overlay combination intended by its manufacturer to resist water vapor transmission to degree sufficient to meet flooring manufacturer's emission limits, resistant to the level of alkalinity (pH) found, and suitable for adhesion of flooring without further treatment.
   1. Thickness: As required for application and in accordance with manufacturer's installation instructions.
   2. MVE-Control System: ASTM F3010-qualified, fluid-applied, two-component, epoxy-resin, membrane-forming system; formulated for application on concrete substrates to reduce MVER to level required for installation of floor coverings indicated and acceptable to manufacturers of floor covering products indicated, including adhesives.
      a) Cementitious Underlayment Primer: If required for subsequent installation of cementitious underlayment products, provide MVE-control system manufacturer's primer to ensure adhesion of products to MVE-control system.
      b) Cementitious Underlayment: If required to maintain manufacturer's warranty, provide MVE-control system manufacturer's gypsum cement-based underlayment.
   3. Products:
      a) Basis-of-Design: ARDEX Engineered Cements; ARDEX MC RAPID: www.ardexamericas.com.
      b) Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with installer present, for compliance with requirements for maximum moisture content, installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.
   1. Installation of system indicates acceptance of surfaces and conditions.

3.2 CONCRETE SLAB PREPARATION

A. Perform following operations in the order indicated:
   1. Prepare and clean substrates according to MVE-control system manufacturer's written instructions to ensure adhesion of system to concrete.
   2. Prior to proceeding, refer to ASTM F710 . Concrete subfloors must be sound. Solid and clean, and free of all oil, grease, dirt, curing compounds, any substance that might act as a bond breaker, including coatings and other substances that are incompatible with MVE-control system and that contain soap, wax, oil, or silicone, using mechanical methods recommended in writing by MVE-control system manufacturer. Do not use solvents.
   3. Provide concrete surface profile complying with ICRI 310.2R CSP 3 by shot blasting using apparatus that abrades the concrete surface with shot, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
   4. After shot blasting, repair damaged and deteriorated concrete according to MVE-control system manufacturer's written instructions.
   5. Protect substrate voids and joints to prevent resins from flowing into or leaking through them.
   6. Moisture vapor emission tests; 3 tests in the first 1000 square feet and one test in each additional 1000 square feet, unless otherwise indicated or required by flooring manufacturer.
   7. Internal relative humidity tests in accordance with ASTM F2170; in same locations as moisture vapor emission tests, unless otherwise indicated.
   8. Alkalinity (pH) tests in accordance with ASTM F710; in same locations as moisture vapor emission tests, unless otherwise indicated.
   9. Pull strength tests for MVE-coating system, underlayment, patching compounds, etc. in accordance with ASTM D7234.
   10. Specified remediation, if required.
   11. Fill surface depressions and irregularities with patching and leveling materials.
   12. Fill surface cracks, grooves, control joints, and other nonmoving joints with crack-filling material.
   13. Allow concrete to dry, undisturbed, for period recommended in writing by MVE-control system manufacturer after surface preparation, but not less than 24 hours.
   14. Before installing MVE-control systems, broom sweep and vacuum prepared concrete.
   15. Pull strength test.
   16. Protection.

3.3 REMOVAL OF EXISTING FLOOR COVERINGS

A. Comply with local, State, and federal regulations and recommendations of RFCI (RWP), as applicable to floor covering being removed.

B. Dispose of removed materials in accordance with local, State, and federal regulations and as specified.

3.4 MOISTURE VAPOR EMISSION TESTING

A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.

C. Test in accordance with ASTM F1869 and as follows.

D. Plastic sheet test and mat bond test may not be substituted for the specified ASTM test method, as those methods do not quantify the moisture content sufficiently.

E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if test values exceed 3 pounds per 1000 square feet per 24 hours.

F. Report: Report the information required by the test method.

3.5 INTERNAL RELATIVE HUMIDITY TESTING

A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.

C. Test in accordance with ASTM F2170 Procedure A and as follows.

D. Testing with electrical impedance or resistance apparatus may not be substituted for the specified ASTM test method, as the values determined are not comparable to the ASTM test values and do not quantify the moisture content sufficiently.

E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if any test value exceeds 75 percent relative humidity.

F. Report: Report the information required by the test method.

3.6 ALKALINITY TESTING

A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

B. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if alkalinity (pH) test value is over 10.

3.7 ADHESIVE BOND AND COMPATIBILITY TESTING

A. Comply with requirements and recommendations of floor covering manufacturer.

3.8 PULL STRENGTH TESTING

A. Comply with requirements and recommendations of MVE-control system manufacturer.

3.9 APPLICATION OF MVE-CONTROL SYSTEM

A. Comply with requirements and recommendations of MVE-control system manufacturer.

END OF SECTION 09 0561

SECTION 09 2116 - GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Performance criteria for gypsum board assemblies.

B. Resilient sound isolation clips.

C. Acoustic insulation.

D. Cementitious backing board.

E. Gypsum wallboard.

F. Partition closure for junction of partition and exterior window wall.

G. Joint treatment and accessories.

H. Bullet resistant sheathing and wallboard.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 01 7419 – Construction Waste Management and Disposal.

C. Section 06 1000 - Rough Carpentry: Wood blocking product and execution requirements.

D. Section 07 8400 - Firestopping: Top-of-wall assemblies at fire rated walls.

E. Section 07 9200 - Joint Sealants: Sealing acoustical gaps in construction other than gypsum board or plaster work.

F. Section 09 2216 - Non-Structural Metal Framing.

1.3 REFERENCE STANDARDS

A. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 1999 (Reaffirmed 2016).

B. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2017.

C. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2017.

D. {RSTEMP#800}ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board{CH#59583}.

E. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2018.

F. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base; 2019.

G. ASTM C1288 - Standard Specification for Discrete Non-Asbestos Fiber-Cement Interior Substrate Sheets; 2017.

H. ASTM C1325 - Standard Specification for Fiber-Mat Reinforced Cementitious Backer Units; 2019.

I. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2017.

J. ASTM C1629/C1629M - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels; 2019.

K. ASTM C1658/C1658M - Standard Specification for Glass Mat Gypsum Panels; 2019, with Ediorial Revision (2020).

L. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2021.

M. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

N. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).

O. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2022.

P. ASTM E413 - Classification for Rating Sound Insulation; 2016.

Q. GA-216 - Application and Finishing of Gypsum Panel Products; 2016.

R. GA-226 - Application of Gypsum Board to Form Curved Surfaces; Gypsum Association; 2016.

S. UL 752 - Standard for Bullet-Resisting Equipment; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate the installation of gypsum board assemblies with size, location, and installation of service utilities.

B. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on gypsum board, accessories, and joint finishing system.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Shop Drawings: Indicate special details associated with fireproofing and acoustic seals.

E. Installer's Qualification Statement.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified and with at least five years of documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 7419 - Construction Waste Management and Disposal for packaging waste requirements.

B. Store gypsum products and accessories indoors and keep above freezing. Elevate boards above floor, on nonwicking supports, in accordance with manufacturer's recommendations.

PART 2 PRODUCTS

2.1 GYPSUM BOARD ASSEMBLIES

A. Provide completed assemblies complying with ASTM C840 and GA-216.
   1. See PART 3 for finishing requirements.

B. Interior Partitions: Provide completed assemblies with the following characteristics:
   1. Acoustic Attenuation: As indicated on the drawings.
   2. Deflection: L/240 unless otherwise noted or required by finish material ie tile walls L/360.
   3. Fire Rating: As indicated on the drawings.
   4. Acoustic Attenuation: STC of 45-49 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.

C. Shaft Walls at HVAC Shafts: Provide completed assemblies with the following characteristics:

1. Air Pressure Within Shaft: Sustained loads of 5 lbf/sq ft with maximum mid-span deflection of L/240. Walls with tile finish shall be L/360
2. Acoustic Attenuation: STC of 35-39 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.

D. Fire Rated Assemblies: Provide completed assemblies with the following characteristics:
1. Fire Rated Partitions: As indicated on the drawings.

2.2 METAL FRAMING MATERIALS

A. Nonstructural Steel Framing for Application of Gypsum Board: See Section 09 2216.

B. Structural Steel Framing for Application of Gypsum Board: See Section 05 4000.

C. Resilient Sound Isolation Clips: Steel resilient clips with molded rubber isolators, attaches to framing; improves noise isolation performance of wall and floor-ceiling assemblies.
1. Products:
a) Basis of Design: **Kinetics Noise Control; IsoMax**.
b) PAC International, Inc; RSIC-1: www.pac-intl.com.
c) Pliteq; GenieClip RST: www.pliteq.com.

2.3 BOARD MATERIALS

A. Manufacturers - Gypsum-Based Board:
1. American Gypsum Company: www.americangypsum.com.
2. CertainTeed Corporation: www.certainteed.com.
3. Georgia-Pacific Gypsum: https://buildgp.com.
4. National Gypsum Company; https://nationalgypsum.com.
5. USG Corporation; www.usg.com/content/usgcom/en.html.
6. Substitutions: See Section 01 6000 - Product Requirements.

B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
2. Glass mat faced gypsum panels, as defined in ASTM C1658/C1658M, suitable for paint finish, of the same core type and thickness may be substituted for paper-faced board.
3. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
a) Mold resistant board is required at all locations.
4. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
5. Thickness:
a) Vertical Surfaces: 5/8 inch.
b) Ceilings: 1/2 inch.
c) Multi-Layer Assemblies: Thicknesses as indicated on drawings.
6. Mold-Resistant, Paper-Faced Products:
a) American Gypsum Company; M-Bloc Type X: www.americangypsum.com.
b) Georgia-Pacific Gypsum; ToughRock Fireguard X Mold-Guard: https://buildgp.com.
c) National Gypsum Company; Gold Bond XP Gypsum Board: www.nationalgypsum.com.

C. Impact/Abuse Resistant Wallboard:
   1. Application: High-traffic areas indicated.
   2. Surface Abrasion: Level 3, minimum, when tested in accordance with ASTM C1629/C1629M.
   3. Indentation: Level 1, minimum, when tested in accordance with ASTM C1629/C1629M.
   4. Soft Body Impact: Level 3, minimum, when tested in accordance with ASTM C1629/C1629M.
   5. Hard Body Impact: Level 2, minimum, when tested in accordance with ASTM C1629/C1629M.
   6. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
   7. Type: Fire resistance rated Type X, UL or WH listed.
   8. Thickness: 5/8 inch.
   9. Edges: Tapered.
   10. Paper-Faced Products:
      a) American Gypsum Company; M-Bloc IR Type X: www.americangypsum.com.
      b) CertainTeed Corporation; Extreme Impact Resistant Drywall with M2Tech: www.certainteed.com.
      c) National Gypsum Company; Gold Bond Hi-Impact XP Gypsum Board: www.nationalgypsum.com.
      d) USG Corporation; USG Sheetrock Brand Mold Tough VHI Firecode X Panels: www.usg.com.

D. Tile Backing Board For Wet Areas: One of the following products:
   1. Application: Vertical surfaces behind tile in wet areas including toilet room plumbing fixture walls.
   2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
   3. ANSI Cement-Based Board: Non-gypsum-based; aggregated Portland cement panels with glass fiber mesh embedded in front and back surfaces complying with ANSI A118.9 or ASTM C1325.
      a) Thickness: 1/2 inch.
      b) Products:
         1) Custom Building Products; _____: www.custombuildingproducts.com.
         2) National Gypsum Company; PermaBase Cement Board: https://nationalgypsum.com.
         3) USG Corporation; Durock Brand Cement Board: www.usg.com.
         4) Substitutions: See Section 01 6000 - Product Requirements.
   4. ASTM Cement-Based Board: Non-gypsum-based, cementitious board complying with ASTM C1288.
      a) Thickness: 1/2 inch.
      b) Products:
         1) James Hardie Building Products, Inc; HardieBacker: www.jameshardie.com.
         2) Substitutions: See Section 01 6000 - Product Requirements.

E. Tile Backing Board For Non-Wet Areas: Water-resistant gypsum backing board as defined in ASTM C1396/C1396M; sizes to minimum joints in place; ends square cut.
   1. Application: Vertical surfaces behind thinset tile, except in wet areas.
   2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
   3. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.

4. Type X Thickness: 5/8 inch.
5. Edges: Tapered.
6. Products:
   a) CertainTeed Corporation; Diamondback 1/2" Tile Backer: www.certainteed.com.
   b) Georgia-Pacific Gypsum; DensShield Tile Backer: www.gpgypsum.com.
   c) National Gypsum Company; Gold Bond eXP Tile Backer: www.nationalgypsum.com.

F. Bullet Resistant Sheathing and Wallboard: Woven roving, multi-ply, ballistic grade fiberglass cloth with thermoset polyester resin; comply with UL 752 Level 1.

G. Shaftwall and Coreboard: Type X; 1 inch thick by 24 inches wide, beveled long edges, ends square cut.
1. Paper Faced Type: Gypsum shaftliner board or gypsum coreboard as defined ASTM C1396/C1396M; water-resistant faces.
2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
3. Paper-Faced Products:
   a) American Gypsum Company; M-Bloc Shaft Liner: www.americangypsum.com.
   b) CertainTeed Corporation; M2Tech Type X Shaftliner: www.certainteed.com.
   c) Georgia-Pacific Gypsum; ToughRock Shaftliner: www.gpgypsum.com.
   d) National Gypsum Company; Gold Bond Fire-Shield Shaftliner XP: www.nationalgypsum.com.
   e) USG Corporation; Sheetrock Brand Gypsum Liner Panels 1 in. (25.4 mm) SLX: www.usg.com/#sle.
   f) USG Corporation; Sheetrock Brand Mold Tough Gypsum Liner Panels 1 in. (25.4 mm) SLX: www.usg.com/#sle.

2.4 GYPSUM BOARD ACCESSORIES

A. Partition Closures: Extruded aluminum partition closures, pre-assembled, spring-loaded, with continuous gasketing, to fit over window mullions and provide complte gap closure for vertical junctures of interior partition and window walls.
1. Basis-of-Design: **Mull it Over Products; 55 Classic**.
2. Aluminum Extrusion: 6063 T5 temper.
3. Acoustical Material: As specified.
4. Accessories:
   a) Snap covers to conceal fasteners.
   b) Compressible gaskets.
5. Finish: Powder coat paint finish, color to match exterior aluminum frames.

B. Acoustic Insulation: ASTM C665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool. Thickness: As indicated on the drawings.
1. Basis-of-Design Products: Subject to compliance with requirements, provide one of the following:
   a) Rockwool North America (ROXUL); ROXUL AFB: www.rockwool.com.
   b) Thermafiber, Inc.; Thermafiber SAFB: www.thermafiber.com.
2. Substitutions: See 01 6000 - Product Requirements.

C. Sound Isolation Tape: Elastomeric foam tape for sound decoupling.

1. Surface Burning Characteristics: Provide assemblies with flame spread index of 75 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.
2. Tape Thickness: 1/4 inch.

D. Acoustical Sealant: As specified in Section 07 9200 - Joint Sealants.

E. Beads, Joint Accessories, and Other Trim: ASTM C1047, rigid plastic, galvanized steel, or rolled zinc, unless noted otherwise.
1. Rigid Corner Beads: Low profile, for 90 degree outside corners.
2. Expansion Joints:
a) Type: V-shaped PVC with tear away fins.

F. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
1. Paper Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
2. Joint Compound: Drying type, vinyl-based, ready-mixed.

G. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion resistant.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

3.2 SHAFT WALL INSTALLATION

A. Shaft Wall Liner: Cut panels to accurate dimension and install sequentially between special friction studs.

3.3 ACOUSTIC ACCESSORIES INSTALLATION

A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.

B. Sound Isolation Tape: Apply to vertical studs and top and bottom tracks/runners in accordance with manufacturer's instructions.

C. Acoustic Sealant: Install in accordance with manufacturer's instructions.

D. Resilient Sound Isolation Clips: Install in accordance with manufacturer's written instructions, at partition types indicated on drawings.

3.4 BOARD INSTALLATION

A. Comply with GA-216 and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

B. Single-Layer Non-Rated: Install gypsum board parallel to framing, with ends and edges occurring over firm bearing.

C. Double-Layer Non-Rated: Use gypsum board for first layer, placed parallel to framing or furring members, with ends and edges occurring over firm bearing. Place second layer perpendicular to framing or furring members. Offset joints of second layer from joints of first layer.
   1. Fastening Methods: Fasten base layers and face layers separately to supports with screws.
   2. It is not necessary to tape joints of base layer(s) in multi-layer gypsum board wall assemblies.

D. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.

E. Exposed Gypsum Board in Interior Wet Areas: Seal joints, cut edges, and holes with water-resistant sealant.

F. Cementitious Backing Board: Install over steel framing members where indicated, in accordance with ANSI A108/A118/A136.1 and manufacturer's instructions.

G. Installation on Metal Framing: Use screws for attachment of gypsum board.

H. Curved Surfaces: Apply gypsum board to curved substrates in accordance with GA-226.
   1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus 12 inch long straight sections at ends of curves and tangent to them.
   2. For double-layer construction, fasten base layer to studs with screws 16 inches o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches o.c.

I. Bullet Resistant Sheathing and Wallboard:
   1. Install bullet-resistant sheathing according to manufacturer's written recommendations and with manufacturer-approved fasteners.
   2. Cover all joints between boards with a 4-inch strip of the same thickness material as the boards, centered on the joint.

3.5 INSTALLATION OF TRIM AND ACCESSORIES

A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
   1. Not more than 30 feet apart on walls and ceilings over 50 feet long.

B. Corner Beads: Install at external corners, using longest practical lengths.

C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

3.6 JOINT TREATMENT

A. Paper Faced Gypsum Board: Use paper joint tape, embed with drying type joint compound and finish with drying type joint compound.

B. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
   1. Level 5: Walls and ceilings to receive semi-gloss or gloss paint finish and other areas specifically indicated.
   2. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
   3. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
   4. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.

C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
   1. Feather coats of joint compound so that camber is maximum 1/32 inch.
   2. Taping, filling, and sanding are not required at surfaces behind adhesive applied ceramic tile and fixed cabinetry.
   3. Taping, filling, and sanding are not required at base layer of double-layer applications.

D. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.

E. Fill and finish joints and corners of cementitious backing board as recommended by manufacturer.

3.7 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

3.8 CLEANING

A. See Section 01 7000 - Execution and Closeout Requirements for additional requirements.

3.9 PROTECTION

A. Protect installed gypsum board assemblies from subsequent construction operations.

3.10 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
   1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.

2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 2116

SECTION 09 2216 - NON-STRUCTURAL METAL FRAMING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Metal partition, ceiling, and soffit framing.

B. Framing accessories.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 01 7419 – Construction Waste Management and Disposal.

C. Section 05 4000 - Cold-Formed Metal Framing: Structural load bearing metal stud framing and Exterior wall stud framing.

D. Section 05 5000 - Metal Fabrications: Metal fabrications attached to stud framing.

E. Section 06 1000 - Rough Carpentry: Wood blocking within stud framing.

F. Section 07 8400 - Firestopping: Sealing top-of-wall assemblies at fire rated walls.

G. Section 07 9200 - Joint Sealants: Sealing acoustical gaps in construction other than gypsum board or plaster work.

H. Section 08 3100 - Access Doors and Panels.

I. Section 09 2116 - Gypsum Board Assemblies: Gypsum wallboard for non-structural metal wall framing; acoustic insulation; sound isolation clips for partitions.

J. Section 09 2116 - Gypsum Board Assemblies: Execution requirements for anchors for attaching work of this section.

1.3 REFERENCE STANDARDS

A. AISI S220 - North American Standard for Cold-Formed Steel Framing - Nonstructural Members; 2015.

B. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire; 2019.

C. ASTM A645/A645M - Standard Specification for Pressure Vessel Plates, 5% and 5-1/2% Nickel Alloy Steels, Specially Heat Treated; 2010 (Reapproved 2016).

D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

E. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members; 2015.

F. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories; 2020.

G. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings; 2020.

H. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2020.

I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

J. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2017.

K. ASTM E1190 - Standard Test Methods for Strength of Power-Actuated Fasteners Installed in Structural Members; 2011.

L. ASTM E488/E488M - Standard Test Methods for Strength of Anchors in Concrete Elements; 2022.

M. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).

N. ASTM E413 - Classification for Rating Sound Insulation; 2016.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Shop Drawings:
   1. Indicate prefabricated work, component details, stud layout, framed openings, anchorage to structure, acoustic details, type and location of fasteners, accessories, and items of other related work.
   2. Describe method for securing studs to tracks, splicing, and for blocking and reinforcement of framing connections.

C. Product Data: Provide data describing framing member materials and finish, product criteria, load charts, and limitations.

D. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

E. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

F. Sustainable Design Submittal: Documentation of recycled content and location of manufacture.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience and approved by manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packaging or bundles bearing brand name and identification of manufacturer.

B. Store all materials inside, under cover, in a manner to keep them dry, protected from weather, surface contamination, corrosion and damage from construction traffic and other causes.

PART 2 PRODUCTS

2.1 FRAMING MATERIALS

A. Fire Rated Assemblies: Comply with applicable code and as indicated on drawings.

B. Loadbearing Studs: As specified in Section 05 4000.

C. Steel Sheet: ASTM A1003/A1003M, subject to the ductility limitations indicated in AISI S220.
1. Structural Grade: As required to meet design criteria.
2. Corrosion Protection Coating Designation: G60, or equivalent in accordance with AISI S220.

D. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf.
1. Protective Coating: Coating with equivalent corrosion resistance of ASTM A653/A653M, G60 (Z180), hot-dip galvanized, unless otherwise indicated
2. Deflection at tile walls L/360 at 5 psf.
3. Studs: C shaped with flat or formed webs.
   a) Products:
      1) MarinoWARE; ViperStud Drywall Framing: www.marinoware.com/#sle.
      2) Substitutions: See Section 01 6000 - Product Requirements.
   b) Minimum Base-Metal Thickness: 0.0329 inch.
      1) No substitution of thinner base-metal thickness is permitted in locations where abuse/impact resistant gypsum wallboard is to be installed.

4. Paired Studs for Sound-Rated Assemblies: Engineered single-piece assemblies comprised of paired studs coupled by sound isolators, designed to replace conventional side-by-side, parallel, double-wall partition framing.
   a) Widths: As indicated on drawings.
   b) Products:
      1) MarinoWARE; SoundGuard Stud: www.marinoware.com/#sle.
      2) SCAFCO Corporation; SoundGuard Silent Steel Framing System: www.scafco.com/#sle.
      3) Substitutions: See Section 01 6000 - Product Requirements.
5. Runners: U shaped, sized to match studs.
6. Ceiling Channels: C shaped.
7. Furring: Hat-shaped sections, minimum depth of 7/8 inch.
   a) Minimum Base-Metal Thickness: 0.0329 inch.
8. Resilient Furring Channels: Single or double leg configuration; 1/2 inch channel depth.
   a) Products:
      1) ClarkDietrich; RC Deluxe Resilient Channel: www.clarkdietrich.com/#sle.
      2) Substitutions: See Section 01 6000 - Product Requirements.

E. Partition Head to Structure Connections: Provide track fastened to structure with legs of sufficient length to accommodate deflection, for friction fit of studs cut short and braced with continuous bridging on both sides.

F. Deflection and Firestop Track: Intumescent strip factory-applied to track flanges expands when exposed to heat or flames to provide a perimeter joint seal.

G. Sound Isolation Tape: Elastomeric foam tape for sound decoupling.
   1. Surface Burning Characteristics: Provide assemblies with flame spread index of 75 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.
   2. Tape Thickness: 1/4 inch.

2.2 SUSPENSION SYSTEM COMPONETS

A. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.0625 inch diameter wire, or double strand of 0.0475 inch diameter wire.

B. Hanger Attachments to Concrete:
   1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E488/E488M by an independent testing agency.
      a) Type: Postinstalled, expansion anchor.
   2. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E1190 by an independent testing agency.

C. Wire Hangers: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.162 inch inch diameter.

D. Grid Suspension System for Ceilings: ASTM A645/A645M, direct-hung system composed of main beams and cross-furring members that interlock.

2.3 AUXILIARY MATERIALS

A. Isolation Strip at Exterior Walls: Provide one of the following:
   1. Asphalt-Saturated Organic Felt: ASTM D226/D226M, Type I (No. 15 asphalt felt), nonperforated.
   2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

2.4 FABRICATION

A. Fabricate assemblies of framed sections to sizes and profiles required.

B. Fit, reinforce, and brace framing members to suit design requirements.

C. Fit and assemble in largest practical sections for delivery to site, ready for installation.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that rough-in utilities are in proper location.

3.2 INSTALLATION OF STUD FRAMING

A. Comply with requirements of ASTM C1007.

B. Extend partition framing to structure where indicated and to ceiling in other locations.

C. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.

D. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.

E. Align and secure top and bottom runners at 24 inches on center.

F. Where partition framing is subject to water on the floors during construction, provide a heavy coating of rust preventive paint, suitable for galvanized steel, on all surfaces of bottom runner tracks and the lower 3 inches of studs.
   1. Repair damaged and rusted areas of hot-dip galvanized coatings in accordance with ASTM A780/A780M.

G. At partitions indicated with an acoustic rating:

1. Provide components and install as required to produce STC ratings as indicated, based on published tests by manufacturer conducted in accordance with ASTM E90 with STC rating calculated in accordance with ASTM E413.
2. Place one bead of acoustic sealant between runners and substrate , studs and adjacent construction.
3. Place one bead of acoustic sealant between studs and adjacent vertical surfaces.
4. Sound Isolation Tape: Apply to vertical studs and top and bottom tracks/runners in accordance with manufacturer's instructions.

H. Fit runners under and above openings; secure intermediate studs to same spacing as wall studs.

I. Install studs vertically at spacing indicated on drawings.

J. Align stud web openings horizontally.

K. Secure studs to tracks using crimping method. Do not weld.

L. Stud splicing is not permissible.

M. Fabricate corners using a minimum of three studs.

N. Install double studs at wall openings, door and window jambs, not more than 2 inches from each side of openings.

O. Coordinate erection of studs with requirements of door frames; install supports and attachments.

P. Coordinate installation of bucks, anchors, and blocking with electrical, mechanical, and other work to be placed within or behind stud framing.

Q. Furring: Coordinate with sound isolation clip spacing and locations. Lap splices a minimum of 6 inches.

3.3 CEILING AND SOFFIT FRAMING

A. Comply with requirements of ASTM C754.

B. Install furring after work above ceiling or soffit is complete. Coordinate the location of hangers with other work.

C. Install furring independent of walls, columns, and above-ceiling work.

D. Securely anchor hangers to structural members or embed in structural slab. Space hangers as required to limit deflection to criteria indicated. Use rigid hangers at exterior soffits.

E. Space main carrying channels at maximum 72 inches on center, and not more than 6 inches from wall surfaces. Lap splice securely.

F. Securely fix carrying channels to hangers to prevent turning or twisting and to transmit full load to hangers.

G. Place furring channels perpendicular to carrying channels, not more than 2 inches from perimeter walls, and rigidly secure. Lap splices securely.

3.4 TOLERANCES

A. Maximum Variation From True Position: 1/8 inch in 10 feet.

END OF SECTION 09 2216

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SECTION 09 3000 - TILING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Tile for floor applications.

B. Tile for wall applications.

C. Tile for stairs.

D. Cementitious backer board as tile substrate.

E. Non-ceramic trim.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 01 7419 – Construction Waste Management and Disposal.

C. Section 07 9200 - Joint Sealants: Sealing joints between tile work and adjacent construction and fixtures.

D. Section 09 2116 - Gypsum Board Assemblies: Tile backer board.

E. Section 22 4000 - Plumbing Fixtures: Shower receptor.

1.3 REFERENCE STANDARDS

A. ANSI A108.1a - American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar; 2017.

B. ANSI A108.1b - American National Standard Specifications for Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar; 2017.

C. ANSI A108.1c - Specifications for Contractors Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Bed with Dry-Set or Latex-Portland Cement; 1999 (Reaffirmed 2016).

D. ANSI A108.2 - American National Standard General Requirements: Materials, Environmental and Workmanship; 2019.

E. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile-Setting Epoxy Adhesive; 2009 (Revised).

F. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar; 1999 (Reaffirmed 2010).

G. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy; 1999 (Reaffirmed 2010).

H. ANSI A108.8 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout; 1999 (Reaffirmed 2010).

I. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout; 1999 (Reaffirmed 2010).

J. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 2017.

K. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2018.

L. ANSI A108.12 - American National Standard for Installation of Ceramic Tile with EGP (Exterior Glue Plywood) Latex-Portland Cement Mortar; 1999 (Reaffirmed 2010).

M. ANSI A108.13 - American National Standard for Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone; 2005 (Reaffirmed 2016).

N. ANSI A108.19 - American National Standard Specifications for Interior Installation of Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs by the Thin-Bed Method Bonded with Modified Dry-Set Cement Mortar or Improved Modified Dry-Set Cement Mortar; 2017.

O. ANSI A108.20 - American National Standard Specifications for Exterior Installation of Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs; 2020.

P. ANSI A118.3 - American National Standard Specifications for Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive; 2013 (Revised).

Q. ANSI A118.7 - American National Standard Specifications for High Performance Cement Grouts for Tile Installation; 2010 (Reaffirmed 2016).

R. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 1999 (Reaffirmed 2016).

S. ANSI A118.15 - American National Standard Specifications for Improved Modified Dry-Set Cement Mortar; 2012.

T. ANSI A137.1 - American National Standard Specifications for Ceramic Tile; 2019.

U. ANSI A137.2 - American National Standard Specifications for Glass Tile; 2013.

V. ASTM C373 - Standard Test Methods for Determination of Water Absorption and Associated Properties by Vacuum Method for Pressed Ceramic Tiles and Glass Tiles and Boil Method for Extruded Ceramic Tiles and Non-tile Fired Ceramic Whiteware Products; 2018.

W. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel; 2018.

X. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2019.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, and setting details.

E. Samples: Mount tile and apply grout on two plywood panels, minimum 18 by 18 inches in size illustrating pattern, color variations, and grout joint size variations.

F. Installer's Qualification Statement.

G. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.

H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Tile: 2 percent of each size, color, and surface finish combination, but not less than 10 sf of each type.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum ten years of documented experience.

B. Installer Qualifications:

1. Company specializing in performing tile installation, with minimum of five years of documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.8 FIELD CONDITIONS

A. Do not install solvent-based products in an unventilated environment.

B. Maintain ambient and substrate temperature above 50 degrees F and below 100 degrees F during installation and curing of setting materials.

PART 2 PRODUCTS

2.1 TILE

A. Glazed Wall Tile**, Type CTW1 through CTW6**, Type CTW1 through CTW6, Type CTW1 through CTW6, Type CTW1 through CTW6**, Type CTW1 through CTW6:** ANSI A137.1 standard grade.
   1. Basis of Design Manufacturer: **Mosa / Creative Materials**.
      a) Products: As shown on the "Finish Product List" on the drawings
      b) Other Acceptable Manufactuers:
         1) Daltile.
         2) Garden State.
   2. Moisture Absorption: 7.0 to 20.0 percent as tested in accordance with ASTM C373.
   3. Size(s): As shown on the "Finish Product List" on the drawings
   4. Surface Finish: High gloss.
   5. Color(s): As indicated on drawings. Refer to the "Finish Product List".
   6. Substitutions: See Section 01 6000 - Product Requirements.

B. Porcelain Tile, Type PST1: ANSI A137.1 standard grade.
   1. Porcelain tile stair treads.
   2. Basis of Design Manufacturer: Mosa.
   3. Basis of Design Product: As indicated on the "Finish Product List" on the drawings.
   4. Moisture Absorption: 0 to 0.5 percent as tested in accordance with ASTM C373.
   5. Breaking Strength: > 250 lbs as tested in accordance with ASTM C648.
   6. Bond Strength: >50 psi as tested in accordance with ASTM C482.
   7. Size: As indicated on the "Finish Product List" on the drawings.
   8. Thickness: _____ inch.
   9. Surface Finish: Unglazed.
   10. Color(s): As indicated on drawings.

C. Porcelain Mosaic Tile, Type PTF1, PTB1: ANSI A137.1 standard grade.
   1. Porcelain mosaic tile for floor and base.
   2. Basis of Design : **Daltile; Keystones,** unless otherwise indicated on the "Finish Product List" on the drawings.
   3. Moisture Absorption: 0 to 0.5 percent as tested in accordance with ASTM C373.

4. Breaking Strength: > 250 lbs as tested in accordance with ASTM C648.
5. Bond Strength: >50 psi as tested in accordance with ASTM C482.
6. Size: 2 by 2 inch, nominal, unless otherwise indicated on the "Finish Product List" on the drawings.
7. Thickness: _____ inch.
8. Edges: Cushioned.
9. Surface Finish: Matte glazed.
10. Color(s): As indicated on drawings.
11. Base: Mosaic tile formed into a built-up cove base, by same manufacturer as flooring tile.
    a) Basis of Design: Model **MB5A** as indicated on the "Finish Product List" on the drawings.
12. Substitutions: See Section 01 6000 - Product Requirements.

2.2 TRIM AND ACCESSORIES

A. Non-Ceramic Trim: Satin natural anodized extruded aluminum, style and dimensions to suit application, for setting using tile mortar or adhesive.
   1. Applications:
      a) **Type TRM5** : Open edges of wall tile.
      b) **Type TRM4** : Wall corners, outside
      c) Stair Nosing: For porcelain tile stair treads.
         1) See Floor Type PST1 on the "Finish Product List".
   2. Manufacturers:
      a) Basis-of-Design: Schluter-Systems: www.schluter.com.
         1) Refer to the "Finish Product List" on the drawings for specific trim type products.
      b) Substitutions: See Section 01 6000 - Product Requirements.

2.3 SETTING MATERIALS

A. Improved Latex-Portland Cement Mortar Bond Coat: ANSI A118.15.
   1. Applications: Use this type of bond coat where indicated, and where no other type of bond coat is indicated.
   2. Products:
      a) Custom Building Products; Complete Contact-LFT Premium Rapid Setting Large Format Tile Mortar, with Multi-Surface Bonding Primer: www.custombuildingproducts.com.
      b) LATICRETE International, Inc; LATICRETE 254 Platinum LATICRETE 254 Platinum: www.laticrete.com.

B. Epoxy Adhesive and Mortar Bond Coat: ANSI A118.3.
   1. Applications: Floor tile at showers.
   2. Products:
      a) Custom Building Products; EBM-Lite Epoxy Bonding Mortar: www.custombuildingproducts.com.
      b) LATICRETE International, Inc;LATICRETE LATAPOXY 300 Adhesive: www.laticrete.com.
      c) Sika Corp; SikaTile 350 Flex Set: www.sika.com/#sle.

2.4 GROUTS

A. Provide setting and grout materials from same manufacturer.

B. High Performance Polymer Modified Grout: ANSI A118.7 polymer modified cement grout.
   1. Applications: Use this type of grout where indicated and where no other type of grout is indicated.
   2. Use sanded grout for joints 1/8 inch wide and larger; use unsanded grout for joints less than 1/8 inch wide.
   3. Color(s): As selected by Architect from manufacturer's full line.
   4. Products:
      a) ARDEX Engineered Cements; ARDEX FL: www.ardexamericas.com.
      b) Custom Building Products; Fusion Pro Single Component Grout: www.custombuildingproducts.com.
      c) H.B. Fuller Construction Products, Inc; TEC AccuColor Plus Grout: www.tecspecialty.com/#sle.
      d) LATICRETE International, Inc; LATICRETE PERMACOLOR Grout: www.laticrete.com.

C. Epoxy Grout: ANSI A118.3 chemical resistant and water-cleanable epoxy grout.
   1. Applications: Wet walls.
   2. Color(s): As selected by Architect from manufacturer's full line.
   3. Products:
      a) ARDEX Engineered Cements; ARDEX WA: www.ardexamericas.com/#sle.
      b) Custom Building Products; CEG-Lite 100% Solids Commercial Epoxy Grout: www.custombuildingproducts.com.
      c) LATICRETE International, Inc; LATICRETE SPECTRALOCK PRO Premium Grout: www.laticrete.com/#sle.

2.5 ACCESSORY MATERIALS

A. Backer Board: Cementitious type complying with ANSI A118.9; high density, glass fiber reinforced, 1/2 inch thick; 2 inch wide coated glass fiber tape for joints and corners.

B. Backer Board: Coated glass mat type complying with ASTM C1178/C1178M; inorganic fiberglass mat on both surfaces and integral acrylic coating vapor retarder.

C. Mesh Tape: 2 inch wide self-adhesive fiberglass mesh tape.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that subfloor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.

C. Verify that subfloor surfaces are dust free and free of substances that could impair bonding of setting materials to subfloor surfaces.

D. Verify that required floor-mounted utilities are in correct location.

3.2 PREPARATION

A. Protect surrounding work from damage.

B. Vacuum clean surfaces and damp clean.

C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

D. Install backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to a feather edge.

E. Prepare substrate surfaces for adhesive installation in accordance with adhesive manufacturer's instructions.

3.3 INSTALLATION - GENERAL

A. Install tile, thresholds, and stair treads and grout in accordance with applicable requirements of ANSI A108.1a through ANSI A108.20, manufacturer's instructions, and TCNA (HB) recommendations.
   1. Locate and install joints in accordance with TCNA (HB) EJ171 - Movement Joint Guidelines including but not limited to the following:
      a) Joint spacing for interior tile: 25 feet maximum in each direction.
      b) Joint spacing for interior tile exposed to direct sunlight (heat) or moisture: 12 feet maxium in each direction.
      c) Perimeter Joints: Locate joints where tile abuts restraining surfaces such as perimeter walls, dissimilar floor finishes, and columns.
      d) All expansion, control, construction, cold, saw-cut, isolation, contraction, and seismic joints should continue through the tilework, including such joints at vertical surfaces.
   2. Refer to drawings for tile joint layouts.

B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.

C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.

D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.

E. Form internal angles square and external angles with trim.

F. Install non-ceramic trim in accordance with manufacturer's instructions.

G. Sound tile after setting. Replace hollow sounding units.

H. Keep control and expansion joints free of mortar, grout, and adhesive.

I. Prior to grouting, allow installation to completely cure; minimum of 48 hours.

J. Grout tile joints unless otherwise indicated.

K. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

3.4 INSTALLATION - FLOORS - THIN-SET METHODS

A. Over interior concrete substrates, install in accordance with TCNA (HB) Method F113, dry-set or latex-Portland cement bond coat, with standard grout, unless otherwise indicated.
   1. Where waterproofing membrane is indicated, install in accordance with TCNA (HB) Method F122, with epoxy grout.

3.5 INSTALLATION - WALL TILE

A. Over cementitious backer units on studs, install in accordance with TCNA (HB) Method W244, using membrane at toilet rooms.

B. Over coated glass mat backer board on studs, install in accordance with TCNA (HB) Method W245.

C. Over gypsum wallboard on wood or metal studs install in accordance with TCNA (HB) Method W243, thin-set with dry-set or latex-Portland cement bond coat, unless otherwise indicated.

D. Over interior concrete and masonry install in accordance with TCNA (HB) Method W202, thin-set with dry-set or latex-Portland cement bond coat.

3.6 CLEANING

A. Clean tile and grout surfaces.

3.7 PROTECTION

A. Do not permit traffic over finished floor surface for 4 days after installation.

END OF SECTION 09 3000

SECTION 09 5100 - ACOUSTICAL CEILINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Suspended metal grid ceiling system.

B. Acoustical units.

1.2 RELATED REQUIREMENTS

A. Section 01 3329.04 – Material Content Form

B. Section 01 3566.42 - Sustainability Compliance Procedures.

C. Section 01 7419 – Construction Waste Management and Disposal.

1.3 REFERENCE STANDARDS

A. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2017.

B. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2013.

C. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2020.

D. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2019.

E. CHPS (HPPD) - High Performance Products Database; Current Edition at www.chps.net/.

F. UL (GGG) - GREENGUARD Gold Certified Products; Current Edition.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

B. Do not install acoustical units until after interior wet work is dry.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Shop Drawings: Indicate grid layout and related dimensioning, junctions with other ceiling finishes, and mechanical and electrical items installed in the ceiling.

C. Product Data: Provide data on suspension system components.

D. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

E. Samples: Submit two samples 6 by 6 inch in size illustrating material and finish of acoustical units.

F. Manufacturer's Installation Instructions: Indicate special procedures.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Acoustical Units: Quantity equal to 1 percent of total installed.

1.6 FIELD CONDITIONS

A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acoustic Tiles/Panels:
   1. Basis of Design: As indicated on the "Product Finish List" on drawings or as approved by the Architect from the following:
   2. Substitutions: See Section 01 6000 - Product Requirements.

B. Suspension Systems:
   1. Basis of Design: As indicated on the "Product Finish List" on drawings.
   2. Armstrong World Industries, Inc; _____: www.armstrong.com.
   3. Substitutions: See Section 01 6000 - Product Requirements.

2.2 PERFORMANCE REQUIREMENTS

A. Surface Burning Characteristics: Class A, per ASTM E84. Flame spread 25 or less, Smoke developed 50 or less.

2.3 ACOUSTICAL UNITS

A. Acoustical Units - General: ASTM E1264, Class A.
   1. VOC Content: Certified as Low Emission by one of the following:
      a) Product listing in UL (GGG).

b) Product listing in CHPS (HPPD).

B. Acoustical Panels**, Type APC1, APC3, APC4:** Mineral fiber with membrane-faced overlay, with the following characteristics:
1. Classification: ASTM E1264 Type IV.
   a) Form: 2, water felted.
   b) Pattern: "E" - lightly textured.
2. Size: 24 by 48 inches, unless otherwise indicated on the Finish Product List.
3. Thickness: 3/4 inch.
4. Ceiling Attenuation Class (CAC): 35, determined in accordance with ASTM E1264.
5. Panel Edge: Fineline bevel (FLB).
6. Colors: As indicated on drawings.
7. Suspension System: Exposed grid.
8. Basis of Design Product:
   a) USG Corporation; Mars Acoustical Panels: www.usg.com/ceilings/#sle.
      1) Refer to the "Finish Product List" on the drawings for additional information.
   b) Substitutions: See Section 01 6000 - Product Requirements.

C. Acoustical Panels Type **APC2**: Mineral fiber with membrane-faced overlay, with the following characteristics:
1. Classification: ASTM E1264 Type IV.
   a) Form: 2, water felted.
   b) Pattern: "E" - lightly textured.
2. Size: 24 by 48 inches, unless otherwise indicated on the Finish Product List.
3. NRC Range: .80 to .85, determined in accordance with ASTM E1264.
4. Ceiling Attenuation Class (CAC): 35, determined in accordance with ASTM E1264.
5. Panel Edge: Fineline bevel (FLB).
6. Color: As indicated on drawings.
7. Suspension System: Exposed grid.
8. Basis of Design Product:
   a) USG Corporation; Mars Healthcare Acoustical Panels: www.usg.com/ceilings/#sle.
      1) Refer to the "Finish Product List" on the drawings for additional information.
   b) Substitutions: See Section 01 6000 - Product Requirements.

2.4 SUSPENSION SYSTEM(S)

A. Exposed Suspension System: Hot-dip galvanized steel grid and cap.
1. Structural Classification: Intermediate-duty, when tested in accordance with ASTM C635/C635M.
2. Profile: Tee; 9/16 inch face width.
3. Finish: Baked enamel.
4. Color: White, except as noted below.
   a) APC5: Black.
5. Products:
   a) Basis-of-Design: USG Corporation; Donn Brand Centricitee DXT/DXLT 9/16 inch Acoustical Suspension System: www.usg.com/ceilings/#sle.

2.5 ACCESSORIES

A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.

B. Hanger Wire: 12 gauge, 0.08 inch galvanized steel wire.

C. Perimeter Moldings: Same material and finish as grid.
   1. Size: As required for installation conditions.
   2. Angle Molding: L-shaped, for mounting at same elevation as face of grid.
   3. Acoustical Sealant For Perimeter Moldings: Non-hardening, non-skinning, for use in conjunction with suspended ceiling system.

D. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that layout of hangers will not interfere with other work.

3.2 PREPARATION

A. Install after major above-ceiling work is complete.

B. Coordinate the location of hangers with other work.

3.3 INSTALLATION - SUSPENSION SYSTEM

A. Suspend ceiling hangers from building's structural members.
   1. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, post-installed mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
   2. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
   3. Do not attach hangers to steel deck tabs.
   4. Do not attach hangers to steel roof deck. Attach hangers to structural members.

B. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and manufacturer's instructions and as supplemented in this section.

C. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.

D. Locate system on room axis according to reflected plan.

E. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.

1. Install in bed of acoustical sealant.
2. Use longest practical lengths.

F. Suspension System, Non-Seismic: Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

G. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

H. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.

I. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.

J. Do not eccentrically load system or induce rotation of runners.

K. Form expansion joints as detailed. Form to accommodate plus or minus 1 inch movement. Maintain visual closure.

3.4 INSTALLATION - ACOUSTICAL UNITS

A. Install acoustical units in accordance with manufacturer's instructions.

B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.

C. Fit border trim neatly against abutting surfaces.

D. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.

E. Cutting Acoustical Units:
1. Cut to fit irregular grid and perimeter edge trim.
2. Make field cut edges of same profile as factory edges.
3. Double cut and field paint exposed reveal edges.

F. Where round obstructions occur, provide preformed closures to match perimeter molding.

3.5 TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

B. Install moldings and trim to substrate and level with ceiling suspension system to a tolerance of 1/8 inch in 12 feet, non-cumulative.

C. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

3.6 CLEANING

A. See Section 01 7000 - Execution and Closeout Requirements for additional requirements.

B. Clean surfaces in accordance with ceiling panel manufacturer's recommendations.

C. Replace damaged or abraded components.

3.7 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage

B. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 5100

SECTION 09 6429 - WOOD STRIP AND PLANK FLOORING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Wood plank flooring, nailed.

B. Secondary subflooring.

C. Sleepers.

D. Sheet vapor retarder.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

1.3 REFERENCE STANDARDS

A. NWFA (IG) - Installation Guidelines; Current Edition.

B. NWFA/NOFMA - International Standards for Unfinished Wood Flooring; 2018.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for flooring.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
   3. Certificates for Credit d13: Chain-of-custody certificates indicating that products specified to be made from certified wood comply with forest certification requirements. Include documentation that manufacturer is certified for chain of custody by an FSC-accredited certification body. Inlcude statement indicating cost for each certified wood product.

D. Shop Drawings: Indicate floor joint pattern and termination details.

E. Manufacturer's Instructions: Indicate standard and special installation procedures.

F. Maintenance Data: Include maintenance procedures and recommended maintenance materials.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Flooring Material: 10 square yards matching installed flooring.

1.5 QUALITY ASSURANCE

A. Perform work of this section in accordance with NWFA/NOFMA.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.

C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.6 FIELD CONDITIONS

A. Do not install wood flooring until wet construction work is complete and ambient air at installation space has moisture content stabilized at maximum moisture content of 40 percent.

B. Provide heat, light, and ventilation prior to installation.

C. Store materials in area of installation for minimum period of 24 hours prior to installation.

D. Maintain minimum room temperature of 65 degrees F for a period of two days prior to delivery of materials to installation space, during installation, and after installation.

PART 2 PRODUCTS

2.1 MATERIALS

A. Wood Plank Flooring **- Type WF1:**
   1. Species: Northern hard maple.
   2. Grade: Select and better.
   3. Cut: Edge grain.
   4. Moisture Content: 7 to 9 percent.
   5. Actual Thickness: 25/32 inch.
   6. Actual Width: 2-1/2 inches.
   7. Edge: Tongue and groove.
   8. End: End matched.
   9. Length: Random, minimum of 9 inches.
   10. Clear Finish.

B. Sleepers and Shims: Softwood lumber, pressure treated for moisture protection, 2 by 4 inch size.

C. Secondary Subflooring: 23/32 inch thick plywood minimum APA Rated Sheathing, span rating of 48 with tongue and groove edges; Exposure 1, sanded, preservative treated.

D. Vapor Retarder: Black polyethylene sheet, 6 mil thick; 2 inch wide tape for joint sealing.

2.2 ACCESSORIES

A. Transition Strip: Same species and finish as flooring material; profiles indicated.

B. Floor Finish: Polyurethane, to achieve high gloss surface; type recommended by flooring manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting this work.

B. Verify that concrete subfloor surface is smooth and flat to plus or minus 1/4 inch in 10 feet.

C. Verify that required floor-mounted utilities are in correct location.

3.2 PREPARATION

A. Sleepers and Shims:
1. Place vapor retarder over subfloor surface, lapping edges and ends minimum 6 inches and tape seal; spot glue in place.
2. Place sleepers over vapor retarder; space sleepers at 12 inches on center.
3. Shim underside of sleepers to achieve level line of plus or minus 1/4 inch in 10 feet.
4. Anchor sleepers to concrete substrate with explosive driven concrete nails; place nails at 16 inches on center.

B. Secondary Subflooring: Place plywood subflooring over sleepers.
1. Lay perpendicular to the sleepers, with end joints over sleepers, and nail at 12 inches on center.

C. Prepare substrate to receive wood flooring in accordance with manufacturer's and NWFA instructions.

D. Broom clean substrate.

3.3 INSTALLATION

A. Wood Flooring:
1. Install in accordance with manufacturer's and NWFA instructions; predrill and blind nail to subfloor.
2. Lay flooring parallel to length of room areas. Verify alignment as work progresses.
3. Arrange flooring with end matched grain set flush and tight.
4. Terminate flooring at centerline of door openings where adjacent floor finish is dissimilar; provide divider strips and transition strips in accordance with flooring manufacturer's recommendations and as indicated.
5. Install edge strips at unprotected or exposed edges, and where flooring terminates.
6. Secure edge strips before installation of flooring with stainless steel screws.
7. Install flooring tight to floor access covers.

8. Provide ____ inch expansion space at fixed walls and other interruptions.

B. Install base at floor perimeter to cover expansion space. Miter inside and outside corners.

C. Finishing:
1. Mask off adjacent surfaces before beginning sanding.
2. Sand flooring to smooth even finish with no evidence of sander marks. Take precautions to contain dust. Remove dust by vacuum.
3. Apply first coat, allow to dry, then buff lightly with steel wool to remove irregularities. Vacuum clean and wipe with damp cloth before applying succeeding coat.
4. Lightly buff between coats with steel wool and vacuum clean before applying succeeding coat.
5. Apply last coat of finish.

3.4 CLEANING

A. See Section 01 7000 - Execution and Closeout Requirements for additional requirements.

B. Clean and polish floor surfaces in accordance with floor finish manufacturer's instructions.

3.5 PROTECTION

A. Prohibit traffic on floor finish for 48 hours after installation.

B. Place protective coverings over finished floors; do not remove coverings until Date of Substantial Completion.

END OF SECTION 09 6429

SECTION 09 6466 - WOOD ATHLETIC FLOORING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Wood athletic flooring.

B. Subflooring.

C. Sheet vapor retarder.

D. Floor finishes.

E. Surface finishing.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 01 7419 – Construction Waste Management and Disposal.

C. Section 09 0561 - Common Work Results for Flooring Preparation: Removal of existing floor coverings, cleaning, and preparation.

D. Section 09 0561 - Common Work Results for Flooring Preparation: Concrete slab moisture and alkalinity testing and remediation procedures.

1.3 REFERENCE STANDARDS

A. MFMA (PUR) - Performance and Uniformity Rating Sport Specific Standards; current edition.

B. MFMA (SPEC) - Guide Specifications for Maple Flooring Systems; current edition.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for flooring, floor finish materials, and resilient cushion.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

3. Certificates for Credit d13: Chain-of-custody certificates indicating that products specified to be made from certified wood comply with forest certification requirements. Include documentation that manufacturer is certified for chain of custody by an FSC-accredited certification body. Inlcude statement indicating cost for each certified wood product.

D. Shop Drawings: Indicate floor joint pattern and termination details.
1. Indicate provisions for expansion and contraction, wall base, and game insert or socket devices.
2. Indicate size and type fasteners and anchors.
3. Indicate location, size, design, and color of game markings.

E. Samples: Submit two samples 6 by 6 inch in size showing floor finish, color, and sheen.

F. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.

G. Manufacturer's Instructions: Indicate standard and special installation procedures.

H. Maintenance Data: Include maintenance procedures and recommended maintenance materials.

I. Manufacturer's qualification statement.

J. Installer's qualification statement.

1.5 QUALITY ASSURANCE

A. Perform work of this section in accordance with MFMA (SPEC).

B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section.
1. Minimum ten years of documented experience.
2. Member mill of the Maple Flooring Manufacturers Association, Inc (MFMA).

C. Installer Qualifications: Company specializing in installing products specified in this section.
1. Minimum five years of documented experience.
2. MFMA accredited and approved by flooring manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 7419 - Construction Waste Management and Disposal for packaging waste requirements.

B. Deliver materials and store off the floor in a well-ventilated, weather-tight space.

1.7 FIELD CONDITIONS

A. Do not install wood flooring until wet construction work is complete and permanent heat and air conditioning is installed and operating.

B. Maintain room temperature between 55 degrees F and 75 degrees F and relative humidity between 35 to 50 percent for a period of seven days prior to delivery of materials to installation space, during installation, and not less than seven days after installation.

C. Acclimate wood flooring materials to installation space a minimum of 48 hours prior to installation.
   1. Do not install wood flooring materials until wood components adjust to relative humidity of, and are at same temperature as, spaces whjere they will be installed.
   2. Open sealed packages and spread products out to allow wood components to acclimatize immediately on moving wood components into spaces in which they will be installed.

D. After acclimatizing period, allow room envirionment to revert to relative humidity and ambient temperature planned for building occupancy. Flooring shall be designed to perform in non-air-conditioned and non-humidity-controlled spaces, such as a summer shut down of a school facility.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Wood Athletic Flooring:
   1. Basis of Design: Robbins Sports Surfaces**; Bio-Channel SB:** www.robbinsfloor.com/#sle.
   2. Substitutions: See Section 01 6000 - Product Requirements

2.2 WOOD ATHLETIC FLOORING

A. General: Wood athletic flooring, MFMA (PUR) compliant for application indicated; system components provided by single manufacturer.

B. Application: Gymnasium.

C. System Description:
   1. Fixed, cushioned sleeper with subfloor system, wood strip flooring.

2.3 COMPONENTS

A. Wood Strip Flooring**, Type WAF1:**
   1. Provide MFMA grade-marked flooring, stamped as manufactured by MFMA member mill.
   2. Species: Northern hard maple, kiln dried; tongue and groove edges, end matched.
   3. Grade: MFMA-RL Second and better.
   4. Cut: Flat-cut grain.
   5. Moisture Content: 7 to 9 percent.
   6. Thickness: 25/32 inch.
   7. Width: 2-1/2 inches.
   8. Length: Random, minimum of 9 inches.

B. Subflooring: Manufacturer's standard pre-engineered subfloor suitable for system indicated.
   1. Basis-of-Design subfloor includes:
      a) Bio-Channel SB Subfloor Panels, factory prepared to accept anchor channel and lineal strips.
      b) Cushion: 9/16 inch Zero/G Lineal Strip shock pad.
      c) 16 gauge metal anchor channels.

2. The use of power-actuated or pneumatic anchoring systems is not allowed. The floor system must be anchored using the drilled and pinned method.

C. Vapor Retarder: Polyethylene sheet, 6 mil thick; 2 inch wide tape for sealing sheet seams.

D. Fasteners: Manufacturer's standard type and size to suit application.

2.4 FINISHES

A. Floor Finishes: Types recommended by flooring manufacturer and complying with MFMA specifications.
1. Sealer: Water based urethane.
2. Finish Coats: Water based urethane; high gloss.

2.5 ACCESSORIES

A. Ventilating Base: Molded rubber, 4 inch high with a 3 inch toe, pre-molded outside corners; black color.
1. Refer to the Finish Product List on the drawings for Basis-of-Design product - Type **RB2**.

B. Thresholds: As specified in Section 08 7100 - Door Hardware.

C. Game Insert Devices: Cast aluminum type, with anchors.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting this work.

B. Verify that concrete subfloor surface is smooth and flat to plus or minus 1/8 inch in 10 feet.

C. Cementitious Subfloor Surfaces: Verify that substrates are ready for flooring installation by testing for moisture and alkalinity (pH).
1. Test in accordance with Section 09 0561.
a) Moisture content of the concrete slab shall not exceed 85% .
2. Obtain instructions if test results are not within limits recommended by flooring material manufacturer and adhesive materials manufacturer.

D. All work required to put the concrete subfloors in acceptable condition shall be the responsibility of the general contractor.

E. Verify that required floor-mounted utilities are in correct location.

3.2 PREPARATION

A. Prepare substrate to receive wood flooring in accordance with manufacturer's and MFMA instructions.

B. Vacuum clean substrate.

3.3 INSTALLATION

A. Place vapor retarder over concrete surface, overlap seams a minimum of 6 inches and seal with tape.

B. Cushioned Subfloor System: Install in accordance with manufacturer's instructions an approved shop drawings.

C. Wood Flooring:
   1. Install in accordance with manufacturer's and MFMA instructions.
   2. Lay flooring parallel to length of main playing area. Machine nail to subfloor with end joints properly driven up and proper spacing provided for humidity conditions.
   3. Provide 2” expansion voids at the perimeter and at all vertical obstructions.
      a) OPTION: Expansion rows will be evenly distributed with each row of flooring, with each space not exceeding 1/64”.
   4. Install edge strips at unprotected or exposed edges, and where flooring terminates.
   5. Provide 2 inch expansion space at walls and other interruptions.

D. Finishing:
   1. Mask off adjacent surfaces before beginning sanding.
   2. Sand flooring in accordance with manufacturer's instructions. Provide a smooth even finish with no evidence of sander marks. Remove dust by vacuum.
   3. Apply finishes in accordance with floor finish manufacturer's and MFMA instructions.
      a) Floor should be clean and completely free of dirt and sanding dust.
   4. Apply first coat, allow to dry, then buff lightly with recommended pad to remove irregularities. Vacuum clean and wipe with damp, lint-free cloth before applying succeeding coats.
   5. Apply game lines/markers in accordance with layout indicated on drawings.
      a) Lines shall be straight with sharp edges.
      b) Game line colors as selected by architect.
   6. Apply last coat of finish.

3.4 CLEANING

A. Clean floor surfaces in accordance with floor finish manufacturer's instructions.

3.5 PROTECTION

A. Prohibit traffic on finished floor for 72 hours after installation.

B. Place protective coverings over finished floors; do not remove coverings until Date of Substantial Completion.

END OF SECTION 09 6466

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SECTION 09 6500 - RESILIENT FLOORING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Resilient tile flooring.

B. Resilient base.

C. Resilient stair accessories.

D. Installation accessories.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 01 7419 – Construction Waste Management and Disposal.

C. Section 09 0561 - Common Work Results for Flooring Preparation: Removal of existing floor coverings, cleaning, and preparation.

1.3 REFERENCE STANDARDS

A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2019a, with Editorial Revision (2020).

B. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2019, with Editorial Revision (2020).

C. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile; 2004 (Reapproved 2018).

D. ASTM F1344 - Standard Specification for Rubber Floor Tile; 2015.

E. ASTM F1700 - Standard Specification for Solid Vinyl Floor Tile; 2020.

F. ASTM F1861 - Standard Specification for Resilient Wall Base; 2016.

G. ASTM F2169 - Standard Specification for Resilient Stair Treads; 2015 (Reapproved 2020).

H. ASTM F2195 - Standard Specification for Linoleum Floor Tile; 2018.

I. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2019.

J. RFCI (RWP) - Recommended Work Practices for Removal of Resilient Floor Coverings; 2011.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit 5d: For adhesives and sealant, documentation including printed statement of VOC content.
   2. Product Data for Credit 5d: For resilient tile flooring, documentation from an independent testing agency indicating compliance with the FLoorScore standard.
   3. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

D. Shop Drawings: Indicate seaming plans and floor patterns.

E. Verification Samples: Submit two samples, 6 by 6 inch in size illustrating color and pattern for each resilient flooring product specified.

F. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.

G. Certification: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of subfloor is acceptable.

H. Installer's Qualification Statement.

I. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

J. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Stair Materials: Quantity equivalent to 1 percent of each type and color.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing specified flooring with minimum seven years documented experience.

B. Installer Qualifications: Company specializing in installing specified flooring with minimum five years documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.

B. Store all materials off of the floor in an acclimatized, weather-tight space.

C. Maintain temperature in storage area between 55 degrees F and 90 degrees F.

D. Protect roll materials from damage by storing on end.

E. Do not double stack pallets.

1.7 FIELD CONDITIONS

A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

PART 2 PRODUCTS

2.1 TILE FLOORING

A. Vinyl Tile - Type **RT1** - **RT8**: Solid vinyl with color and pattern throughout thickness. ASTM F1700, Class III.
   1. Manufacturer:
      a) Basis-of-Design: **Mannington Commercia**l: www.manningtoncommercial.com#sle.
         1) Refer to the "Finish Product List" on the drawings for specific products, colors, and sizes.
      b) Other Acceptable Manufacturers:
         1) Shaw: www.shawcontract.com.
         2) Tandus: www.tarkettworldwide.com.
      c) Substitutions: See Section 01 6000 - Product Requirements.
   2. Minimum Requirements: Comply with ASTM F1700, of Class corresponding to type specified.
   3. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
   4. Chemical resistance: Pass, ASTM F925.
   5. Wear Layer Thickness: 0.020 inch.
   6. Total Thickness: 0.098 inch.

2.2 STAIR COVERING

A. Stair Treads with Integral Risers - Types **RST1, RST2**: Rubber; full height of riser, full width and depth of tread in one piece; tapered thickness.
   1. Manufacturers:
      a) Basis-of-Design: **Mannington Commercial**: www.manningtoncommercial.com#sle.
         1) Refer to the "Finish Product List" on the drawings for specific products, colors, and sizes.
      b) Other Acceptable Manufacturers:
         1) Nora: www.nora.com.
         2) Roppe: www.roppe.com.
         3) Tarkett/Johnsonite: tarkettworldwide.com.
      c) Substitutions: See Section 01 6000 - Product Requirements.
   2. Minimum Requirements: Comply with ASTM F2169, Type TS, rubber, vulcanized thermoset.

3. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
4. Nominal Thickness: 1/8 inch.
5. Nosing: Square.
6. Striping: 2 inch wide contrasting color abrasive strips.
7. Tread Texture: As shown on the "Finish Product List" on the drawings.
8. Colors: As indicated on drawings.
9. Tile for Landings: Provide floor tile to match material and color of stair treads and risers at intermediate stair landings.

2.3 RESILIENT BASE

A. Resilient Base - Type **RB1**: ASTM F1861, Type TS rubber, vulcanized thermoset; top set Style B, Cove.
   1. Exception: Provide Type A, Straight, at all carpet.
   2. Basis of Design: As shown on the "Finish Product List" on the drawings.
   3. Manufacturers:
      a) Basis-of-Design: **Mannington Commercial**: www.manningtoncommercial.com#sle.
      b) Other Acceptable Manufacturers:
         1) Nora: www.nora.com.
         2) Roppe: www.roppe.com.
         3) Tarkett/Johnsonite: tarkettworldwide.com.
      c) Substitutions: See Section 01 6000 - Product Requirements.
   4. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
   5. Height: 4 inches.
   6. Finish: Satin.
   7. Length: Roll.
   8. Color: As indicated on drawings.
   9. Accessories: Premolded external corners and internal corners.

B. Resilient Base - Type **RB2**: Vented version of **RB1**. refer to the "Finish Product List" on the drawings.
   1. Color: As indicated on drawings.

2.4 ACCESSORIES

A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.

B. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.

C. Adhesive for Vinyl Flooring:

D. Moldings, Transition and Edge Strips: Same material as flooring.
   1. Profiles as shown on the drawings

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.

C. Cementitious Subfloor Surfaces: Verify that substrates are ready for resilient flooring installation by testing for moisture and alkalinity (pH).
   1. Test in accordance with Section 09 0561.
   2. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

D. Verify that required floor-mounted utilities are in correct location.

3.2 PREPARATION

A. Prepare floor substrates as recommended by flooring and adhesive manufacturers, and as indicated in Section 09 0561, where applicable.
   1. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by flooring manufacturer. Do not use solvents.

B. Remove subfloor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with subfloor filler to achieve smooth, flat, hard surface.

C. Prohibit traffic until filler is fully cured.

D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile

3.3 INSTALLATION - GENERAL

A. Starting installation constitutes acceptance of subfloor conditions.

B. Install in accordance with manufacturer's written instructions.

C. Adhesive-Applied Installation:
   1. Spread only enough adhesive to permit installation of materials before initial set.
   2. Fit joints and butt seams tightly.
   3. Set flooring in place, press with heavy roller to attain full adhesion.

D. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.

3.4 INSTALLATION - TILE FLOORING

A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.

B. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

C. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

D. Adhere floor tiles to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.5 INSTALLATION - RESILIENT BASE

A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.

B. Miter internal corners. At external corners, use premolded units. At exposed ends, use premolded units.

C. Install base on solid backing. Bond tightly to wall and floor surfaces.

D. Scribe and fit to door frames and other interruptions.

3.6 INSTALLATION - STAIR COVERINGS

A. Install stair coverings in one piece for full width and depth of tread.

B. Adhere over entire surface. Fit accurately and securely.

3.7 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.

B. Clean in accordance with manufacturer's written instructions.

3.8 PROTECTION

A. Prohibit traffic on resilient flooring for 48 hours after installation.

B. Cover floor tile until Date of Substantial Completion.

END OF SECTION 09 6500

SECTION 09 6566 - RESILIENT ATHLETIC FLOORING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Vinyl sheet flooring, adhesively installed.

B. Rubber tile, adhesively installed.

C. Interlocking, loose-laid rubber tile.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 01 7419 – Construction Waste Management and Disposal.

C. Section 09 0561 - Common Work Results for Flooring Preparation: Independent agency testing of concrete slabs, removal of existing floor coverings, cleaning, and preparation.

D. Section 09 6500 - Resilient Flooring.

1.3 REFERENCE STANDARDS

A. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension; 2016.

B. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness; 2015, with Editorial Revision (2017).

C. SCS (CPD) - SCS Certified Products; Current Edition.

D. UL (GGG) - GREENGUARD Gold Certified Products; Current Edition.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's printed data sheets for products specified.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit 5d: For adhesives, documentation including printed statement of VOC content.
   2. Product Data for Credit 5d: For resilient athletic flooring, documentation from an independent testing agency indicating compliance with the FloorScore standard.
   3. Laboratory Test Reports for Credit 5d: For installation adhesives, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

4. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

D. Shop Drawings: Fabrication and installation details, and layout, colors, and widths of game lines and equipment locations.

E. Verification Samples: For each type and color of flooring specified provide actual flooring material specified, not less than 12 inch square, mounted on solid backing.

F. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.

G. Manufacturer's Instructions: Indicate standard and special installation procedures.

H. Installer's qualification statement.

I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Section 01 6000 - Product Requirements, for additional provisions.
2. Extra Flooring Material: 10 square yards matching installed flooring.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least three years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least five years of documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 7419 - Construction Waste Management and Disposal for packaging waste requirements.

B. Deliver materials to project site in unopened containers clearly labeled with manufacturer's name and identification of contents.

C. Store materials in dry and clean location until needed for installation. During installation, handle in a manner that will prevent marring and soiling of finished surfaces.

1.7 FIELD CONDITIONS

A. Maintain temperature in spaces to receive adhesively installed resilient flooring within range of 70 to 95 degrees F for not less than 48 hours before the beginning of installation and for not less than 48 hours after installation has been completed. Subsequently, do not allow temperature in installed spaces to drop below 50 degrees F or to go above 100 degrees F.

PART 2 PRODUCTS

2.1 PREFORMED ATHLETIC FLOORING

A. Vinyl Sheet Flooring **- Type RAF1**:

1. Basis of Design:
   a) **Gerflor USA, Inc; Taraflex Multi-Use 6.2**: www.gerflorusa.com, unless otherwise indicated on the "Finish Product List" on the drawings.
   b) Other Acceptable Manufacturers:
      1) MONDO: www.mondoworldwide.com.
      2) Thor: www.thorperformanceproducts.com.
2. Wearing Surface: Pure polyvinyl chloride, mechanically extruded and uniformly resilient material with uniform color throughout thickness.
3. Backing: Foamed plastic.
4. VOC Content: Certified as Low Emission by one of the following:
   a) Product listing in UL (GGG).
   b) FloorScore certified product listing in SCS (CPD).
5. Sheet Thickness: Minimum 5/32 inch.
6. Sheet Width: Minimum 48 inches.
7. Sheet Lengths: As necessary to minimize transverse seams.
8. Tensile Strength: Minimum 1000 psi, per ASTM D412.
9. Durometer Hardness, Type A: Minimum of 65, when tested in accordance with ASTM D2240.
10. Seaming Method: Welding with heat or chemical.
11. Surface Texture: Smooth.
12. Color: As selected from manufacturer's standards.
13. Substitutions: See Section 01 6000 - Product Requirements.

B. Rubber Tile Flooring **- Type RAFT1**: Recycled rubber tires and colored EPDM granules with urethane binder, formed into square tiles.
1. Basis of Design:
   a) **TOMKT; Atmosphere Metropolis Collection**: www.tomkt.com, unless otherwise indicated on the "Finish Product List" on drawings.
   b) Other Acceptable Manufacturers:
      1) Mats Inc.
      2) Mannington.
2. VOC Content: Certified as Low Emission by one of the following:
   a) Product listing in UL (GGG).
   b) FloorScore certified product listing in SCS (CPD).
3. Thickness: As indicated on the "Finish Product List" on drawings.
4. Size: As indicated on the "Finish Product List" on drawings.
5. Tensile Strength: Minimum 150 psi, per ASTM D412.
6. Durometer Hardness, Type A: Minimum of 65, when tested in accordance with ASTM D2240.
7. Density: 66 pcf, tested in accordance with ASTM D3676.
8. Critical Radiant Flux: Class I/Class II, ASTM E648 94A.
9. Tile Edge/Installation: Straight, adhesive installation.
10. Surface Texture: Smooth.
11. Color: As indicated on the "Finish Product List" on drawings..
12. Substitutions: See Section 01 6000 - Product Requirements.

2.2 ACCESSORIES

A. Leveling Compound: Latex-modified cement formulation as recommended by flooring manufacturer for substrate conditions.

B. Flooring Adhesive: Waterproof; types recommended by flooring manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates for conditions detrimental to installation of athletic flooring. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of athletic flooring to substrate.

C. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for resilient flooring installation by testing for moisture and pH.
   1. Test in accordance with Section 09 0561.
   2. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

3.2 PREPARATION

A. Prepare floor substrates for installation of flooring in accordance with Section 09 0561, and as recommended by flooring and adhesive manufacturers.

3.3 INSTALLATION

A. Starting installation constitutes acceptance of subfloor conditions.

B. Install in accordance with manufacturer's written instructions.

C. Resilient Sheet Flooring:
   1. Unroll flooring and allow to relax before beginning installation.
   2. Mix adhesive thoroughly and apply to substrate with notched trowel. Roll flooring into fresh adhesive, overlapping end seams and double cutting, butting factory edges and compression fitting.
   3. Roll entire flooring surface with steel roller to assure adhesion to substrate and eliminate air bubbles.
   4. Immediately remove any adhesive from flooring surface, using chemical recommended by flooring manufacturer.
   5. Weld seams using techniques and equipment recommended by manufacturer.
   6. Lay out game lines using tape and taping machine approved by flooring manufacturer. Apply game line paint with roller, and allow to dry before removing tape.
   7. Apply transparent top coat over flooring if recommended by manufacturer, to achieve a uniform finished appearance.

D. Rubber Tile Flooring:

1. Lay out center lines in spaces to receive tile flooring, based on location of principal walls. Start tile installation from center, and adjust as necessary to avoid tiles less than one-half width at perimeter.
2. Lay tiles square with room axis, matching for color and pattern by selecting from cartons and mixing as recommended by manufacturer.
3. Spread only enough adhesive to permit installation of materials before initial set.
4. Fit joints and butt seams tightly; press with heavy roller to attain full adhesion.

3.4 CLEANING

A. Clean flooring using methods recommended by manufacturer.

3.5 PROTECTION

A. Protect finished athletic flooring from construction traffic to ensure that it is without damage upon Date of Substantial Completion.

END OF SECTION 09 6566

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SECTION 09 6700 - FLUID-APPLIED FLOORING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fluid-applied flooring and base.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 01 7419 – Construction Waste Management and Disposal.

C. Section 07 9200 - Joint Sealants: Sealing joints between fluid-applied flooring and adjacent construction and fixtures.

D. Section 09 0561 - Common Work Results for Flooring Preparation: Concrete slab moisture and alkalinity testing and remediation procedures.

1.3 REFERENCE STANDARDS

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns and colors available.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Samples: Submit two samples, 6 by 6 inch in size illustrating color and pattern for each floor material for each color specified.

E. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.

F. Manufacturer's Installation Instructions: Indicate special procedures.

G. Applicator's Qualification Statement.

H. Maintenance Data: Include maintenance procedures, recommended maintenance materials, procedures for stain removal, repairing surface, and suggested schedule for cleaning.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum 7 years documented experience.

B. Applicator Qualifications: Company specializing in performing the work of this section.
   1. Minimum 3 years of documented experience.
   2. Approved by manufacturer.

C. Supervisor Qualifications: Trained by product manufacturer, under direct full time supervision of manufacturer's own foreman.

1.6 MOCK-UPS

A. See Section 01 4000 - Quality Requirements for additional requirements.

B. Construct mock-up(s) of fluid applied flooring to serve as basis for evaluation of texture and workmanship.
   1. Number of Mock-Ups to be Prepared: One for each flooring type specified.
   2. Use same materials and methods for use in the work.
   3. Use approved design samples as basis for mock-ups.
   4. Locate where directed.
   5. Minimum Size: 120 inches by 120 inches.

C. Obtain approval of mock-up by Architect before proceeding with work.

D. Approved mock-up may remain as part of the work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store resin materials in a dry, secure area.

B. Store materials for three days prior to installation in area of installation to achieve temperature stability.

1.8 FIELD CONDITIONS

A. Maintain minimum temperature in storage area of 55 degrees F.

B. Store materials in area of installation for minimum period of 24 hours prior to installation.

C. Maintain ambient temperature required by manufacturer 72 hours prior to, during, and 24 hours after installation of materials.

PART 2 PRODUCTS

2.1 FLUID-APPLIED FLOORING SYSTEMS

A. Fluid-Applied Flooring, Types **RF1**: Epoxy base coat(s) with broadcast quartz aggregate.

1. Basis of Design: Stonhard: **Stongard MD**, unless otherwise indicated on the "Finish Product List" on drawings.
   a) Substitutions: See Section 01 6000 - Product Requirements.
2. Flooring System Components: Provide all from a single source.
   a) Top Coat: Two-component, UV resistant, clear epoxy sealer.
      1) Basis-of-Design: Stonhard; **Stonkote CE4 (Medium Texture).**
   b) Aggregate: Colored quartz broadcast aggregate.
      1) Basis-of-Design: Stonhard; **Stonshield Aggregate**.
   c) Undercoat: Three-component epoxy formulation consisting of resin, curing agent, and fine aggregate.
      1) Basis-of-Design: Stonhard; **Stonshield Undercoat**.
   d) Primer: Primer of type and formulation recommended by the fluid-applied flooring manufacturer.
   e) Waterproofing Membrane: Two-component, free-flowing, 100% solids, urethane elastomeric waterproofing membrane.
      1) Basis-of-Design: **Stonhard**; **StonproofME7**.
      2) Other Acceptable Manufacturers: Subject to compliance with requirements.
         (a) Dur-A-Fl
         (b) Sherwin Williams.
3. System Thickness: 1/8 inch, nominal, when dry.
   a) Provide integral cove base as indicated on the "Finish Product List" on the drawings.
4. Texture: Slip resistant.
5. Color(s): As indicated on the "Finish Product List" on drawings.
6. Provide an integral base, 4 inches high, of same material as flooring, at all walls in spaces where fluid-applied flooring is scheduled.

B. Fluid-Applied Flooring, Types **RF2**: Epoxy base coat(s) with embedded quartz aggregate.
   1. Basis of Design: Stonhard: **Stonshield HRI**, unless otherwise indicated on the "Finish Product List" on drawings.
      a) Other Acceptable Manufacturers: Subject to compliance with requirements.
         1) Dur-A-Flex.
         2) Sherwin Williams.
      b) Substitutions: See Section 01 6000 - Product Requirements.
   2. Flooring System Components: Provide all from a single source.
      a) Top Coat: Two-component, UV resistant, clear epoxy sealer.
         1) Basis-of-Design: Stonhard; **Stonkote CE4 (Medium Texture).**
      b) Aggregate: Colored quartz broadcast aggregate.
         1) Basis-of-Design: Stonhard; **Stonshield Aggregate**.
      c) Undercoat: Three-component epoxy formulation consisting of resin, curing agent, and fine aggregate.
         1) Basis-of-Design: Stonhard; **Stonshield Undercoat**.
      d) Base: Three-component, troweled mortar base consisting of epoxy resin, curing agent, and fine graded silica aggregate.
         1) Basis-of-Design: Stonhard; **Stonshield HRI Base**.
      e) Primer: Primer of type and formulation recommended by the fluid-applied flooring manufacturer.
   3. System Thickness: 3/16 inch, nominal, when dry.
      a) Provide integral cove base as indicated on the "Finish Product List" on the drawings.
   4. Texture: Slip resistant.

5. Color(s): As indicated on the "Finish Product List" on drawings.
6. Provide an integral base, 4 inches high, of same material as flooring, at all walls in spaces where fluid-applied flooring is scheduled.

2.2 ACCESSORIES

A. For **RF1**: Fluid-applied flooring manufacturer's compatible waterproofing membrane.
   1. Basis-of-Design: Stonhard; **ME7** elastomeric waterproofing membrane.

B. Cant Strips: Molded of flooring resin material.

C. Subfloor Filler: Type recommended by fluid-applied flooring manufacturer.

D. Primer: Type recommended by fluid-applied flooring manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that subfloor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive flooring. Follow manufacturer's written requirements for substrate flatness.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive flooring.

C. Verify that subfloor surfaces are dust-free and free of substances that could impair bonding of materials to subfloor surfaces.

D. Cementitious Subfloor Surfaces: Verify that substrates are ready for fluid-applied flooring installation by testing for moisture and alkalinity (pH).
   1. Test in accordance with Section 09 0561 and as required by resinous flooring manufacturer.
   2. Obtain instructions if test results are not within limits recommended by fluid-applied flooring manufacturer.

E. Verify that required floor-mounted utilities are in correct location.

3.2 PREPARATION

A. Follow manufacturer's written requirements for substrate preparation.

B. Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes, and other defects with sub-floor filler.

C. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Grind irregularities above the surface level. Prohibit traffic until filler is cured.

D. Vacuum clean substrate.

E. Apply primer to surfaces required by flooring manufacturer.

3.3 INSTALLATION - ACCESSORIES

A. Install cant strips at base of walls where flooring is to be extended up wall as base.

3.4 INSTALLATION - FLOORING

A. Apply in accordance with manufacturer's written instructions.

B. Apply each coat to minimum thickness required by manufacturer.

C. Finish to smooth level surface.

D. At movable partitions install flooring under partitions without interrupting floor pattern.

E. Cove at vertical surfaces.

3.5 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

3.6 PROTECTION

A. Prohibit traffic on floor finish for 48 hours after installation.

B. Barricade area to protect flooring until fully cured.

END OF SECTION 09 6700

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SECTION 09 6813 - TILE CARPETING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Carpet tile, fully adhered.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 01 7419 - Construction Waste Management and Disposal: Reclamation/Recycling of new carpet tile scrap and removed carpet tile.

C. Section 03 3000 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors.

D. Section 09 0561 - Common Work Results for Flooring Preparation: Independent agency testing of concrete slabs, removal of existing floor coverings, cleaning, and preparation.

E. Section 09 6816 - Sheet Carpeting: Broadloom carpet.

1.3 REFERENCE STANDARDS

A. ASTM D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials; 2016.

B. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2019a, with Editorial Revision (2020).

C. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2019, with Editorial Revision (2020).

D. CRI 104 - Standard for Installation of Commercial Carpet; 2015.

E. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2019.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit 5d:
      a) For installation adhesives, documentation including printed statement of VOC content.

b) For carpet tile; documentation indicating complince with testing and product requirements of CRI's "Green Label Plus" program.

2. Laboratory Test Reports for Credit 5d: For carpet and installation adhesives, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Evironmental Chambers."
3. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
4. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional

D. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.

E. Submit two, 12 inch long samples of edge strip.

F. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

G. Concrete Sub-floor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.

H. Manufacturer's Qualification Statement.

I. Installer's Qualification Statement.

J. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

K. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Section 01 6000 - Product Requirements, for additional provisions.
2. Extra Carpet Tiles: Quantity equal to 1 percent of total installed of each color and pattern installed.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum seven years documented experience.

B. Installer Qualifications: Company specializing in installing carpet tile with minimum five years documented experience and approved by carpet tile manufacturer.

1.6 FIELD CONDITIONS

A. Store materials in area of installation for minimum period of 24 hours prior to installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Tile Carpeting: Basis of Design Manufacturers - see "Finish Product List" on the drawings.
   1. **CPT5**: Interface, Inc; : www.interfaceinc.com.
   2. **CPT 1-4**: Shaw Contract: www.shawcontract.com..
   3. Substitutions: See Section 01 6000 - Product Requirements.

B. Other Acceptable Manufacturers:
   1. Interface: www.interfaceinc.com.
   2. Mannington: www.manningtoncommercial.com.
   3. Tandus/Tarkett: www. tarketthome.com.

2.2 MATERIALS

A. Tile Carpeting**, Type CPT1 - CPT5**: Tufted, manufactured in one color dye lot.
   1. Basis of Design: As indicated on the "Finish Product List" on drawings.
   2. Tile Sizes: As indicated on the "Finish Product List" on drawings
   3. Colors: As indicated on the "Finish Product List" on drawings.
   4. Pattern: As indicated on the "Finish Product List" on drawings.
   5. Critical Radiant Flux: Minimum of 0.22 watts/sq cm, when tested in accordance with ASTM E648 or NFPA 253.
   6. Surface Flammability Ignition: Pass ASTM D2859 (the "pill test").
   7. Maximum Electrostatic Charge: 3 Kv. at 20 percent relative humidity.

B. Entry Carpet Tile - Type **EC1**.
   1. Basis of Design: As indicated on the "Finish Product List" on drawings.
   2. Critical Radiant Flux: Minimum of 0.22 watts/sq cm, when tested in accordance with ASTM E648 or NFPA 253.

2.3 ACCESSORIES

A. Edge Strips: Embossed aluminum, _____ color.

B. Adhesives:
   1. Compatible with materials being adhered; maximum VOC content of 50 g/L; CRI (GLP) certified; in lieu of labeled product, independent test report showing compliance is acceptable.

C. Carpet Tile Adhesive: Recommended by carpet tile manufacturer; releasable type.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that subfloor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.

B. Verify that subfloor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to subfloor surfaces.

C. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for flooring installation by testing for moisture and pH.
   1. Test in accordance with Section 09 0561.
   2. Obtain instructions if test results are not within limits recommended by flooring material manufacturer and adhesive materials manufacturer.

3.2 PREPARATION

A. Prepare floor substrates for installation of flooring in accordance with Section 09 0561 and as recommended by flooring and adhesive manufacturers.

3.3 INSTALLATION

A. Starting installation constitutes acceptance of subfloor conditions.

B. Install carpet tile in accordance with manufacturer's instructions.

C. Blend carpet from different cartons to ensure minimal variation in color match.

D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.

E. Lay carpet tile in square pattern, with pile direction parallel to next unit, set parallel to building lines.

F. Locate change of color or pattern between rooms under door centerline.

G. Trim carpet tile neatly at walls and around interruptions.

H. Complete installation of edge strips, concealing exposed edges.

3.4 CLEANING

A. See Section 01 7000 - Execution and Closeout Requirements for additional requirements.

B. Remove excess adhesive without damage, from floor, base, and wall surfaces.

C. Clean and vacuum carpet surfaces.

END OF SECTION 09 6813

SECTION 09 7200 - WALL COVERINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Surface preparation.

B. Wall covering.

C. Wall covering applied to ceiling clouds.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 01 7419 – Construction Waste Management and Disposal.

1.3 REFERENCE STANDARDS

A. ASTM D1308 - Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Coating Systems; 2020.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

C. ASTM F793/F793M - Standard Classification of Wall Coverings by Use Characteristics; 2015.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on wall covering and adhesive.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit 5d: For installation adhesives, documentation including printed statement of VOC content.
   2. Laboratory Test Reports for Credit 5d: For installation adhesives, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
   3. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   4. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Shop Drawings: Indicate wall elevations with seaming layout.

E. Samples: Submit two samples of wall covering, 4 by 4 inch in size illustrating color, finish, and texture.

F. Manufacturer's Installation Instructions: Indicate special procedures.

G. Maintenance Data: Submit data on cleaning, touch-up, and repair of covered surfaces.

H. Installer's Qualification Statement.

I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Wall Covering Materials: 25 linear feet of each color and pattern of wall covering; store where directed.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Inspect roll materials at arrival on site, to verify acceptability.

B. Protect packaged adhesive from temperature cycling and cold temperatures.

C. Do not store roll goods on end.

1.7 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the adhesive or wall covering product manufacturer.

B. Maintain these conditions 24 hours before, during, and after installation of adhesive and wall covering.

C. Provide lighting level of 80 ft candles measured mid-height at substrate surfaces.

PART 2 PRODUCTS

2.1 WALL COVERINGS

A. General Requirements:
   1. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84.

2. Chemical and Stain Resistance: No visible staining or discoloration and no damage to surface texture when tested in accordance with ASTM D1308.

B. Digital Wall CoveringTypes **VCG1-VCG9**: Vinyl roll stock, with a digital photographic image finish, conforming to the following:
   1. Comply with ASTM F793/F793M, Category V, Type II.
   2. Basis of Design Product: **Level Digital Wallcovering**; see Finish Product List on the drawings for specific customized graphic image selections..
      a) Substrate: 20-ounce printable vinyl with woven backing, unless otherwise indicated on the "Finish Product List" on drawings.
   3. Sustainability: Non-Phthalate and PFAS free.
   4. Fire Performance: Class A, per ASTM E 84.
   5. Lightfast: 200 hours minimum, when tested in accordance with AATCC 16.3, or equivalent.
   6. Chemical Resistance: Resistant to tempoprary staining of oils, fats, mild acids and alkalis.
   7. Physical Properties: Conforms to CFFA Quality Standard for Vinyl Coated Fabric Wallcoverings CFFA-W-101 (W-101).
   8. Substitutions: See Section 01 6000 - Product Requirements.

C. Wall Covering **WWC1**: Flexible 5-ply real wood veneer.
   1. Application: Finish for suspended gypsum board ceiling clouds. Apply to all visible surfaces of gypsum board, including vertical cloud edges.
   2. Fire Performance: Class A, per ASTM E 84.
   3. Basis of Design: **Surface Materials**; **Sanfoot Natural Wood Wallcoverings**: www.surfacematerials.com.
      a) Refer to the "Finish Product List" on the drawings for wood species and cut.
   4. Substitutions: See Section 01 6000 - Product Requirements.

D. Accessory Trim **TRM1**: Provide aluminum trim at all exposed edges of wallcoverings.

E. Adhesive: Type recommended by wall covering manufacturer to suit application to substrate.

F. Termination Trim: Extruded plastic, clear.

G. Substrate Filler: As recommended by adhesive and wall covering manufacturers; compatible with substrate.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that substrate surfaces are prime painted and ready to receive work, and comply with requirements of wall covering manufacturer.

B. Measure moisture content of surfaces using an electronic moisture meter. Do not apply wall coverings if moisture content of substrate exceeds level recommended by wall covering manufacturer.

C. Verify flatness tolerance of surfaces does not vary more than 1/8 inch in 10 feet nor vary at a rate greater than 1/16 inch/ft.

3.2 PREPARATION

A. Fill cracks in substrate and smooth irregularities with filler; sand smooth.

B. Wash impervious surfaces with tetra-sodium phosphate, rinse and neutralize; wipe dry.

C. Surface Appurtenances: Remove or mask electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.

D. Surfaces: Correct defects and clean surfaces that affect work of this section. Remove existing coatings that exhibit loose surface defects.

E. Vacuum clean surfaces free of loose particles.

3.3 INSTALLATION

A. Apply adhesive and wall covering in accordance with manufacturer's instructions.

B. Apply wall covering smooth, without wrinkles, gaps or overlaps. Eliminate air pockets and ensure full bond to substrate surface.

C. Butt edges tightly.

D. Overlap adjacent panels as recommended by manufacturer.

E. Horizontal seams are not acceptable.

F. Install wall covering before installation of bases and items attached to or spaced slightly from wall surface.

G. Do not install wall covering more than 1/4 inch below top of resilient base.

H. Cover spaces above and below windows, above doors, in pattern sequence from roll.

I. Install termination trim where applicable.

J. Remove excess adhesive while wet from seam before proceeding to next wall covering sheet. Wipe clean with dry cloth.

3.4 CLEANING

A. Clean wall coverings of excess adhesive, dust, dirt, and other contaminants, with materials recommended by the wallcovering manufacturer.

B. Reinstall wall plates and accessories removed prior to work of this section.

3.5 PROTECTION

A. Do not permit construction activities at or near finished wall covering areas. protect finished work until the Date of Substantial Completion.

END OF SECTION 09 7200

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SECTION 09 7800 - INTERIOR WALL PANELING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Wood wall panel system.
   1. Includes support framing for panel system.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 01 7419 – Construction Waste Management and Disposal.

C. Section 06 1000 - Rough Carpentry: Requirements for wood furring.

1.3 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit manufacturer's descriptive literature for each specified product. Include anchorage devices specific to project substrate types.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
   3. Certificates for Credit d13: Chain-of-custody certificates indicating that products specified to be made from certified wood comply with forest certification requirements. Include documentation that manufacturer is certified for chain of custody by an FSC-accredited certification body. Inlcude statement indicating cost for each certified wood product.

D. Shop Drawings: Submit elevations for each application and location. Indicate details of joints and attachments.
   1. Scale of Drawing Elevations: 1/4 inch to 1 foot, minimum.

E. Samples: Submit two samples 12 by 12 inches in size, indicating finish, surface design, and color for each type of panels; _____.

F. Certificates: Certify that products of this section meet or exceed specified requirements.

G. Manufacturer's Instructions: Provide manufacturer's installation instructions.

H. Manufacturer's qualification statement.

I. Installer's qualification statement.

J. Maintenance Data: Include recommended instructions, methods, and materials for cleaning wood wall paneling.

K. Warranty Documentation: Manufacturer warranty; ensure that forms have been completed in Owner's name and registered with manufacturer.

L. Specimen Warranty: Manufacturer warranty.

M. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Panels: Quantity equal to 5 percent of total installed.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least five years of documented experience.

B. Installer Qualifications: Company specializing in installing work of the type specified in this section, and with at least three years of documented experience.

1.6 MOCK-UPS

A. See Section 01 4000 - Quality Requirements for additional requirements.

B. Wood Wall Paneling: Construct a WWP] mock-up, nominally 4 feet wide by 8 feet high of each type of wood wall paneling specified, illustrating joints and trim.

C. Locate where directed.

D. Mock-ups may remain as part of the work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to project site in manufacturer's original packaging, marked with manufacturer's product identification.

B. Store panels vertically, indoors, on a clean, dry surface. Remove packaging and allow panels to acclimate to room temperature for 48 hours prior to installation.

C. Packaging Waste Management: See Section 01 7419.

1.8 FIELD CONDITIONS

A. Space Enclosure and Environmental Limitations: Do not install wood panel ceilings until spaces are enclosed and weatherproof, wet-work in spaces is completed and dry, work above ceilings is complete, and ambient temperature and humidity conditions are being maintained at the levels indicated for project when occupied for its intended use.

B. Ambient Conditions:
   1. Store panels in controlled conditions, with temperature range 60 - 80 degrees F and 25 -55% relative humidity.
   2. Do not install panels until they reach their equilibrium moisture content.

1.9 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Warranties: Provide owner with a (1) year warranty for material and workmanship on all installed products.
   1. Manufacturers: All materials, wood ceiling and grid, shall be warranted for (1) one year for material and workmanship.
   2. Installer: All work shall be warranted for (1) year from final acceptance of completed work.

PART 2 PRODUCTS

2.1 REGULATORY REQUIREMENTS

A. Surface Burning Classification: Provide wall paneling assemblies meeting Class A when tested in accordance with ASTM E84.

2.2 WOOD WALL PANELING

A. Type **WWP2**: Wood-veneered wall panels with acoustical backing for interior installation. Refer to the "Finish Product List" on the drawings.
   1. Basis of Design: **Armstrong**; **Woodworks Wall Panels**; www.armstrongceilings.com.
      a) Wood Veneer Species and Cut: Refer to the "Finish Product List" on the drawings.
      b) Panel Substrate: Fire-rated particleboard.
      c) Backing: Acoustical fleece.
      d) Edge: Square.
      e) Fire Performance: Class A, tested in accordance with ASTM E84.
      f) Mounting: Z-clip bars and Z-clips, furnished by the wall panel manufacturer.
         1) Products: Provide the Basis-of-Design product(s) or a comparable product(s) by another manufacturer. If proposing a comparable product, provide a Substitution Request Form to confirm compliance with all requirements.
         2) Substitutions: See Section 01 6000 - Product Requirements.

B. Accessories:
   1. Fasteners: Type(s) recommended by panel manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions and substrate flatness before starting work.

B. Verify that substrate surfaces for adhered items are clean and smooth.
   1. Test painted or wall covering surfaces for adhesion in inconspicuous area, as recommended by manufacturer.

C. Start of installation constitutes acceptance of project conditions.

3.2 INSTALLATION

A. Install panels in accordance with manufacturer's instructions.

B. Mount panels to support framing at wall with vertical joints plumb and horizontal joints level and pattern aligned with adjoining panels.

C. Install panels with manufacturer's recommended gaps for panel field and corner joints.

3.3 ADJUSTING

A. Replace paneling installed out of plumb and/or not aligned with adjacent panels or construction.

3.4 CLEANING

A. See Section 01 7000 - Execution and Closeout Requirements for additional requirements.

B. General: Clean exposed wood surfaces. Comply with manufacturer's instructions for cleaning and touchup of minor finish damage. Remove and replace wood components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

3.5 CLOSEOUT ACTIVITIES

A. See Section 01 7800 - Closeout Submittals for closeout submittals.

3.6 PROTECTION

A. Protect installed interior wall paneling from subsequent construction operations.

END OF SECTION 09 7800

SECTION 09 8300 - ACOUSTIC FINISHES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Acoustic insulation finishes.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 01 7419 – Construction Waste Management and Disposal.

C. Section 09 9123 - Interior Painting.

1.3 REFERENCE STANDARDS

A. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2023.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

C. ASTM E736/E736M - Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members; 2019.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit 5d: For coatings, documentation including printed statement of VOC content.
   2. Laboratory Test Reports for Credit 5d: For coatings, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
   3. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   4. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

C. Product Data: Manufacturer's data sheets for products specified.

D. Certificate: Certify that products meet or exceed specified requirements.

E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

F. Manufacturer's qualification statement.

G. Installer's qualification statement.

H. Maintenance Data: Provide manufacturer's data on maintenance and renewal of applied finishes.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum five years documented experience.

B. Installer Qualifications: Company specializing in installing work of type specified in this section, and with at least three years of documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Store and handle materials according to manufacturer's instructions.

1.7 FIELD CONDITIONS

A. Do not apply acoustical finishes when surface and ambient temperatures are outside the temperature ranges required by manufacturer.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acoustic Insulation Finishes:
   1. Basis of Design: International Cellulose Corporation**; K13 Sound Absorption Spray:** www.spray-on.com/#sle.
   2. Substitutions: See Section 01 6000 - Product Requirements.

2.2 ACOUSTIC INSULATION FINISHES

A. General:
   1. Provide materials compatible with one another and substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. Description: Spray-applied, recycled cellulose fibers with water-based adhesive.
   1. Bond Strength: Greater than 150 psf as tested in accordance with ASTM E736/E736M

2. Noise Reduction Coefficient (NRC) of 0.65, minimum, when tested in accordance with ASTM C423.
3. Surface Burning Characteristics: Class 1, Class A fire rating, flame spread index of 5 maximum; smoke developed index of 5 maximum; when tested in accordance with ASTM E84.
4. Installed Thickness: As required to achieve designated NRC.
5. Provide nonbridging coating to cover substrates.
6. Colors: As indicated on drawings. Refer to the "Finished Product List".

2.3 ACCESSORIES

A. Materials: Provide primers, sealers, cleaning agents, and clean up materials as required for completion of acoustic finish.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin application of acoustic finishes until substrates have been properly prepared.

B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Protect adjacent surfaces and materials not receiving coating from splatter and overspray.

B. Mask surface appurtenances including, but not limited to, exit signs, fire sprinkler escutcheons, HVAC grilles, light fixtures, and speaker grilles.

C. Replace damaged ceiling materials.

D. Prepare surfaces using cleaning methods recommended by the manufacturer.

E. Seal surfaces that may cause bleed through or staining of acoustic finish.

F. Seal surfaces that may cause bleed through or staining of wall covering.

3.3 APPLICATION

A. Apply in accordance with manufacturer's written instructions.

B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

C. Apply each coat to uniform appearance in thicknesses specified by manufacturer.

D. Reinstall surface appurtenances removed prior to finishing.

3.4 CLEANING

A. See Section 01 7419 - Construction Waste Management and Disposal for additional requirements.

B. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

C. Remove masking and covering and residue left from masking.

3.5 PROTECTION

A. Protect finishes from subsequent construction operations.

B. Touch-up damaged finishes.

END OF SECTION 09 8300

SECTION 09 8416 - FIXED SOUND-REFLECTIVE PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fixed sound-reflective ceiling panels.

B. Fixed sound-reflective wall panels.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

1.3 REFERENCE STANDARDS

A. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2023.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

C. ASTM E795 - Standard Practices for Mounting Test Specimens During Sound Absorption Tests; 2016.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate installation of sound-reflective panels with size, location, and installation of service utilities.

B. Preinstallation Meeting: Conduct preinstallation meeting one week prior to start of work of this section; require attendance by affected installers.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer's published data sheets for products specified.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Shop Drawings: Fabrication and installation details, panel layout. Include the following with panel layout drawings:
   1. Suspended ceiling system attachment locations to building structure.
   2. Lighting fixtures.
   3. Sprinklers.
   4. HVAC vents and diffusers.
   5. Audio-visual equipment.

E. Verification Samples: Fabricated samples of each type of panel specified; 12 by 12 inch, showing construction, edge details, and suspension method.

F. Test Reports: Certified test data from independent test agency verifying that panels meet specified requirements for acoustical and fire performance.

G. Manufacturer's qualification statement.

H. Installer's qualification statement.

I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project:
   1. See Section 01 6000 - Product Requirements for additional provisions.
   2. Extra Panels: 5 percent of each type installed, but not less than one of each type.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least five years of documented experience.

B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver in factory-wrapped bundles; open bundles to allow acclimation prior to installing.

B. Store panels flat, in dry, well-ventilated space.

C. Protect edges from damage.

PART 2 PRODUCTS

2.1 FIXED SOUND-REFLECTIVE PANELS

A. Thermoformed Plastic Sound-Reflective Panels for Ceilings, Type ADC1:
   1. Surface Burning Characteristics: Flame spread and smoke developed index of Class A, when tested in accordance with ASTM E84.
   2. Sound Absorption: Noise Reduction Coefficient (NRC) of 0.10 when tested in accordance with ASTM C423 for Type E-400 mounting, per ASTM E795.
   3. Mounting Method: Lay-in ceiling grid.
   4. Panel Size: As indicated on drawings, nominal.

5. Material Thickness: .125 inch.
6. Basis-of-Design Product: Kinetics Noise Control Inc.; **Geometric Sound Diffusers**. Refer to Finish Product List on the drawings for sizes and finishes.
7. Substitutions: See Section 01 6000 - Product Requirements.

B. Thermoformed Plastic Sound-Reflective Panels for Walls, Type ADP1, ADP2:
1. Surface Burning Characteristics: Flame spread and smoke developed index of Class A, when tested in accordance with ASTM E84.
2. Sound Absorption: Noise Reduction Coefficient (NRC) of 0.10 when tested in accordance with ASTM C423 for Type E-400 mounting, per ASTM E795.
3. Mounting Method: Z-clip and angle bracket mounted to wall.
4. Panel Size(s): As indicated on drawings, nominal.
5. Material Thickness: 125 inch.
6. Finish: Fabric facing.
7. Basis-of-Design Product: Kinetics Noise Control Inc.; **Geometric Sound Diffusers**. Refer to Finish Product List on the drawings for sizes and finish details.

2.2 ACCESSORIES

A. Direct-Mounting Accessories: Manufacturer's standard accessories for concealed support, designed to allow panel removal, supporting full weight of panels, and as follows:
1. Two-part clip and base-support bracket system; one part mechanically attached to back of panel and the other attached to substrate.

B. Ceiling-Suspended Accessories: Manufacturer's standard accessories at locations as indicated on each sound-reflective panel, sized appropriately for weight of panel.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates for conditions detrimental to installation of sound-reflective panels. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Lay out sound-reflective panels in pattern according to shop drawings.

3.2 INSTALLATION

A. Install sound-reflective panels in locations indicated, following manufacturer's installation instructions, approved shop drawings, and to suit conditions.

3.3 TOLERANCES

A. Maximum Variation From True Position: 1/16 inch.

B. Maximum Offset From True Alignment: 1/16 inch.

C. Maximum Variation From Flatness: 1/16 inch

D. Maximum Variation of Joint Width: 1/32 inch

3.4 CLEANING

A. See Section 01 7000 - Execution and Closeout Requirements for additional requirements.

B. Clean panels upon completion of installation from dust and other foreign materials, following manufacturer's instructions.

3.5 PROTECTION

A. Protect installed sound-reflective panels until Date of Substantial Completion.

B. Replace panels that cannot be cleaned and repaired.

END OF SECTION 09 8416

SECTION 09 8430 - SOUND-ABSORBING WALL AND CEILING UNITS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Sound-absorbing wall panels.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 01 7419 – Construction Waste Management and Disposal.

1.3 REFERENCE STANDARDS

A. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2023.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

C. ASTM E795 - Standard Practices for Mounting Test Specimens During Sound Absorption Tests; 2016.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer's printed data sheets for products specified.

C. Shop Drawings: Fabrication and installation details, panel layout, fabric orientation, and wood grain orientation.

D. Verification Samples: Fabricated samples of each type of panel specified; 12 by 12 inch, showing construction, edge details, and fabric covering.

E. Test Reports: Certified test data from an independent test agency verifying that panels meet specified requirements for acoustical and fire performance.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Panels: Quantity equal to 5 percent of total installed, but not less than one of each type.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with at least five years of documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect acoustical units from moisture during shipment, storage, and handling. Deliver in factory-wrapped bundles; do not open bundles until units are needed for installation.

B. Store units flat, in dry, well-ventilated space; do not stand on end.

C. Protect edges from damage.

PART 2 PRODUCTS

2.1 FABRIC-COVERED SOUND-ABSORBING UNITS

A. General:
   1. Prefinished, factory assembled fabric-covered panels.
   2. Surface Burning Characteristics: Flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.

B. Fabric-Covered Acoustical Panels for Walls **AWP1**:
   1. Basis of Design: **Kinetics Noise Control, Inc; Tuned Absorber/Diffuser (TAD) Panels**: www.kineticsnoise.com/#sle.
   2. Other Acceptable Manufacturers:
      a) Conwed: www.conwed.com.
      b) Decoustics: www.decoustic.org.

C. Fabric-Covered Acoustical Panels for Walls **AWP10**:
   1. Basis of Design: **Zintra Acoustic Solutions.**
      a) See Finish Product List for specific model types, fabric finshes and colors.
   2. Panel Core: Manufacturer's standard rigid or semi-rigid fiberglass core.
   3. Core Density: 6 to 7 lb/cu ft.
   4. Panel Sizes:
   5. Panel Thickness: As indicated on the "Finish Product List" on the drawings.
   6. Edges: Perimeter edges reinforced by a formulated resin hardener.
   7. Color: Refer to Finish Product List for specific finish.
   8. Mounting Method: On Z-clips.

D. Fabric-Covered Acoustical Panels for Walls **AWP2-AWP9, AWP11**:
   1. Basis of Design: **Conwed; Response**.
      a) See Finish Product List for specific model types, fabric finshes and colors.
   2. Other Acceptable Manufacturers:
      a) Decoustics: www.decoustic.org.
      b) Kinetics Noise Control; www.kineticsnoise.com.
   3. Panel Core: Manufacturer's standard rigid or semi-rigid fiberglass core.
      a) Facing: 1/8 inch impact-resistant surface laminated to core.
   4. Core Density: 6 to 7 lb/cu ft.
   5. Impact-Resistant Surface Density: 16 to 20 lb/cu. ft.
   6. Sound Absorption: Noise Reduction Coefficient (NRC) of 1.15 when tested in accordance with ASTM C423 for 2 1/8-inch thick panel.

7. Panel Sizes: As indicated on drawings.
8. Panel Thickness: As indicated on the Finish Product List on the drawings.
9. Edges: Perimeter edges reinforced by a formulated resin hardener.
10. Fabrics: As indicated on the Finish Product List on the drawings for each type of wall unit.
11. Color: As indicated on the Finish Product List on the drawings.
12. Mounting: On Z-bars.

2.2 CEMENTITIOUS WOOD FIBER UNITS

A. Basis-of-Design Product: Armstrong; **Tectum Finale.**

B. Cementitious Wood Fiber Units **SAC1**, **AWP12**: FSC-certified cementitious wood fiber acoustical wall and ceiling panels with built-in furring.
1. Surface Texture: Coarse.
2. Noise Reduction Coefficient (NRC) ASTM C 423: A Mounting – 0.85.
3. UL Classified Flame Spread: ASTM E 1264; Class A. Product must be able to meet this criteria after being painted six (6) times.
4. Dimensional Stability / Mold Resistance: HumiGuard Plus and no significant mold growth when tested by ASTM D 3273.
5. Panel Sizes: As indicated on the Finish Product List on the drawings.
6. Panel Thickness(es): As indicated on the Finish Product List on the drawings.
7. Finish(es): As indicated on the Finish Product List on the drawings.

2.3 FABRICATION

A. Fabric Wrapped, General: Fabricate panels to sizes and configurations as indicated, with fabric facing installed without sagging, wrinkles, blisters, or visible seams.

B. Tolerances: Fabricate to finished tolerance of plus or minus 1/16 inch for thickness, overall length and width, and squareness from corner to corner.

2.4 ACCESSORIES

A. Back-Mounting Accessories: Manufacturer's standard accessories for concealed support, designed to allow panel removal:

B. Trim **TRM2**: Provide aluminum trim for acoustical wall panels at locations indicated on the "Finish Product List" on the drawings.
1. Basis of Design: **Fry Reglet**: www.fryreglet.com. See Finish Product List for specific trim model.

C. Furring Strips: Metal hat channel.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates for conditions detrimental to installation of acoustical units. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install acoustical units in locations as indicated, following manufacturer's written installation instructions for each type of sound-absorbing wall and ceiling units.

B. Install mounting accessories and supports in accordance with approved shop drawings.

C. Align panels accurately, with edges plumb and top edges level. Scribe to fit accurately at adjoining work and penetrations.

3.3 CLEANING

A. Clean sound-absorptive panels upon completion of installation from dust and other foreign materials, following manufacturer's instructions.

3.4 PROTECTION

A. Provide protection of installed acoustical panels until Date of Substantial Completion.

B. Replace panels that cannot be cleaned and repaired to satisfaction of the Architect.

END OF SECTION 09 8430

SECTION 09 9123 - INTERIOR PAINTING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints.
1. Concrete Masonry Units
2. Steel
3. Wood
4. Gypsum Board

C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
2. Prime surfaces to receive wall coverings.
3. Mechanical and Electrical:
   a) In finished areas, paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
   b) In finished areas, paint shop-primed items.
   c) Paint interior surfaces of air ducts and convector and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
   d) Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.

D. Do Not Paint or Finish the Following Items:
1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
2. Items indicated to receive other finishes.
3. Items indicated to remain unfinished.
4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
5. Stainless steel, anodized aluminum, bronze, terne-coated stainless steel, and lead items.
6. Marble, granite, slate, and other natural stones.
7. Floors, unless specifically indicated.
8. Ceramic and other tiles.
9. Brick, architectural concrete, cast stone, integrally colored plaster, and stucco.
10. Glass.
11. Acoustical materials, unless specifically indicated.
12. Concealed pipes, ducts, and conduits.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 01 7419 – Construction Waste Management and Disposal.

C. Section 05 5000 - Metal Fabrications: Shop-primed items.

D. Section 07 8123 - Intumescent Fire Protection.

E. Section 09 9113 - Exterior Painting.

F. Section 09 9600 - High-Performance Coatings.

1.3 REFERENCE STANDARDS

A. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; Current Edition.

B. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition.

C. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).

D. SSPC-SP 2 - Hand Tool Cleaning; 2018.

E. SSPC-SP 3 - Power Tool Cleaning; 2018.

F. SSPC-SP 6 - Commercial Blast Cleaning; 2007.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide complete list of products to be used, with the following information for each:
   1. Manufacturer's name, product name and/or catalog number, and general product category (e.g., "alkyd enamel").
   2. MPI product number (e.g., MPI #47), where applicable.
   3. Cross-reference to specified paint system products to be used in project; include description of each system.
   4. Manufacturer's technical information and application instructions.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit 5d: For paints and coatings, documentation including printed statement of VOC content.
   2. Laboratory Test Reports for Credit 5d: For paints and coatings, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
   3. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

4. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
   1. Where sheen is specified, submit samples in only that sheen.
   2. Where sheen is not specified, submit each color in each sheen available.
   3. Where sheen is not specified, discuss sheen options with Architect before preparing samples, to eliminate sheens not required.

E. Samples: Submit two painted samples, illustrating selected colors and textures for each color and system selected with specified coats cascaded. Submit on aluminum sheet, 3 by 6 inch in size.

F. Certification: By manufacturer that paints and finishes comply with VOC limits specified.

G. Manufacturer's Instructions: Indicate special surface preparation procedures.

H. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.

I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store where directed.
   3. Label each container with color in addition to the manufacturer's label.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum ten years documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five years experience and approved by manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.7 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Do not apply materials when relative humidity exceeds 85 percent, at temperatures less than 5 degrees F above the dew point, or to damp or wet surfaces.

D. Minimum Application Temperatures for Paints: 50 degrees F for interiors unless required otherwise by manufacturer's instructions.

E. Provide lighting level of 80 fc measured mid-height at substrate surface.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Provide paints and finishes from the same manufacturer to the greatest extent possible.
   1. Substitution of MPI-approved products by a different manufacturer is preferred over substitution of unapproved products by the same manufacturer.

B. Paints:
   1. PPG Paints: https://www.ppgpaints.com.

2.2 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready mixed, unless intended to be a field-catalyzed paint.
   1. Where MPI paint numbers are specified, provide products listed in Master Painters Institute Approved Product List, current edition available at www.paintinfo.com, for specified MPI categories, except as otherwise indicated.
   2. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
   3. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
   4. Supply each paint material in quantity required to complete entire project's work from a single production run.
   5. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

B. Volatile Organic Compound (VOC) Content: Comply with Section 01 3566.42.

C. Flammability: Comply with applicable code for surface burning characteristics.

D. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.

E. Colors: As indicated on drawings. Refer to the "Finish Product List".
   1. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling under which they are mounted.

2.3 PAINT SYSTEMS - INTERIOR

A. Paint **P1**, **P3-P14, P22**:Interior Surfaces to be Painted, Unless Otherwise Indicated: Including gypsum board and concrete masonry units.
   1. One top coat and one coat primer.
   2. Top Coat(s): Institutional Low Odor/VOC Interior Latex**.**
      a) Products:
         1) Basis-of-Design: Benjamin Moore; **Scuff-X Interior Satin N486**.
         2) Other Acceptable Manufacturers (subject to compliance with requirements):
            (a) PPG; Pure Performance.
            (b) Sherwin Williams; ProMar 200 HP Series.
   3. Primer: As recommended by top coat manufacturer for specific substrate.

B. Paint **P2, P15 -** Medium Duty Trim/Frame.
   1. Medium duty applications include exposed steel columns, door frames, railings, handrails, guardrails, and steel stair stringers. Other metal surfaces where indicated on drawings. Refer to the "Finished Product List" on the drawings.
   2. Two top coats and one coat primer.
   3. Top Coat(s): Interior Light Industrial Coating, Water Based.
      a) Products:
         1) Basis-of-Design: Benjamin Moore; **Corotech Pre-Catalyzed Waterborne Epoxy Semi-Gloss V341**. (MPI #153).
      b) Other Acceptable Products:
         1) PPG Paints Pitt-Glaze WB1 Pre-Catalyzed Water-Borne Acrylic Epoxy, 16-510 Series, Semi-Gloss. (MPI #153)
         2) Sherwin-Williams Pro Industrial Pre-Catalyzed Waterbased Epoxy, Semi-Gloss. (MPI #141) (MPI #153).
   4. Top Coat Sheen:
      a) Semi-Gloss: MPI gloss level 5; use this sheen at all locations.
   5. Primer: As recommended by top coat manufacturer for specific substrate.

C. Paint **P16**: Low VOC, flat sheen, commercial/institutional latex for drywall ceilings.
   1. Two top coats and one coat primer.
      a) Basis-of-Design: Benjamin Moore; **Super Hide Zero VOC Interior Flat 355**.
      b) Color: As indicated on the "Finish Product List" on the drawings.
      c) Primer: As recommended by top coat manufacturer for specific substrate.
   2. Contractor's option to use dry fall products specified for Paint P17 (see below) for overhead applications of P16.

D. Paint **P17**Dry Fall: Metals; exposed structure and overhead-mounted services in utilitarian spaces, including shop primed steel deck, structural steel, metal fabrications, galvanized ducts, galvanized conduit, and galvanized piping.

1. Latex dry fall paint may also be applied directly over cementitious fireproofing.
2. Shop primer by others.
3. One top coat.
4. Top Coat: Latex Dry Fall; MPI #118, 155, or 226.
   a) Products:
      1) PPG Paints Speedhide Super Tech Water Based Interior Dry-Fog Latex, 6-725XI Series, Flat. (MPI #118)
      2) Benjamin Moore Latex Dry Fall Eggshell, 395. (MPI #118)
      3) Sherwin-Williams Pro Industrial Multi-Surface Acrylic, Matte.
5. Top Coat Sheen:
   a) Flat: MPI gloss level 1; use this sheen at all locations.
6. Primer: As recommended by top coat manufacturer for specific substrate.
7. Color(s): As indicated on the "Finish Product List" on the drawings.

E. Paint **P18**: Green screen paint, vinyl acrylic, low VOC, matte finish.
   1. Apply as required to achieve 2 mil dry film thickness.
   2. Basis-of-Design: Rosco; **Video Paint - Chroma Key Green**.
      a) Other Acceptable Products:
         1) PPG; Director's Choice Chroma Key Green.
   3. Primer: As recommended by top coat manufacturer for specific substrate.

F. Paint **P19**: Color topcoat applied over waterbased thin film intumescent coating for structural steel with a paint-like finish. Topcoat must be approved by the intumescent coating manufacturer. See Section 07 8123.
   1. Basis of Design: **Sherwin Williams**; **Pro Industrial DTM Acrylic**.
      a) Sheen(s): As selected by Architect.
   2. If an intumescent coating other than the basis of design product is selected, color topcoat must be approved by the manufacturer of the selected intumescent coating for compatibility with IFRM.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin application of paints and finishes until substrates have been adequately prepared.

B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

D. Test shop-applied primer for compatibility with subsequent cover materials.

E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
   1. Gypsum Wallboard: 12 percent.
   2. Masonry, Concrete, and Concrete Masonry Units : 12 percent.

3.2 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

D. Seal surfaces that might cause bleed through or staining of topcoat.

E. Masonry:

F. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.

G. Galvanized Surfaces:

H. Ferrous Metal:
   1. Solvent clean according to SSPC-SP 1.

3.3 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

D. Apply each coat to uniform appearance in thicknesses specified by manufacturer.

E. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.

F. Sand wood and metal surfaces lightly between coats to achieve required finish.

G. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

H. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.4 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection.

3.5 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.6 PROTECTION

A. Protect finishes until completion of project.

B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION 09 9123

SECTION 10 1100 - VISUAL DISPLAY UNITS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Porcelain enamel steel markerboards.

B. Magnetic markerboards.

C. Tackboards.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 06 1000 - Rough Carpentry: Blocking and supports.

1.3 REFERENCE STANDARDS

A. ANSI A208.1 - American National Standard for Particleboard; 2022.

B. ASTM A424/A424M - Standard Specification for Steel, Sheet, for Porcelain Enameling; 2018.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's data on chalkboard, markerboard, tackboard, tackboard surface covering, trim, and accessories.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit 5d: For installation adhesives, documentation including printed statement of VOC content.
   2. Laboratory Test Reports for Credit 5d: For installation adhesives, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
   3. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   4. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Shop Drawings: Provide a visula display unit schedule showing each type and size of unit specified. Indicate wall elevations, dimensions, joint locations, special anchor details.
   1. Provide mounting detail for each type of visual

E. Manufacturer's printed installation instructions.

F. Maintenance Data: Include data on regular cleaning, stain removal.

G. Warranty: Submit manufacturer's standard warranty for each product specified.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.

1.6 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a one-year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.1 VISUAL DISPLAY UNITS

A. Markerboards **WB**, **WB-R**: Porcelain enamel on steel, laminated to core.
   1. Steel Face Sheet Thickness: 24 gage, 0.0239 inch .
   2. Core: Particleboard, manufacturer's standard thickness, laminated to face sheet.
   3. Backing: Aluminum foil, laminated to core.
   4. Sizes: Standard and custom; as indicated on drawings.
   5. Accessories:
      a) Type WB: Magnetic marker holder.
      b) Type WB_R: Marker rail. Provide music staff lines where indicated on drawings.
   6. Products:
      a) Egan Visual Corporation; Egan Visual WhiteBoards: www.egan.com/#sle.
      b) Refer to the "Finish Product List" on drawings for product details.
      c) Substitutions: See Section 01 6000 - Product Requirements.

B. Magnetic Resinous Markerboards **VD1**: Glass-free, magnetic, non-staining, resinous panel. Frameless, with polished and beveled edges, shatterproof and optically clear
   1. Manufacturers:
      a) Basis-of-Design: Deko.
   2. Color: Selected by Architect from manufacturer's full range, unless a color selection is indicated on the "Finish Product List" on the Drawings.
   3. Size: Standard and custom; as indicated on drawings.
   4. Mounting: "Bond" setting (permanent)..
   5. Thermal Characteristics:
      a) Flame Spread Index: Class 3, tested in accordance with ASTM E 84.
      b) Smoke Developed Index: >450, tested in accordance with ASTM E 84.

c) Self Ignition Temperature, Light Transmitting Plastics: compliant with ASTM D 1929.
d) Burn Rate, Light Transmitting Plastics: compliant with ASTM D 635. Class CC2.
e) Smoke Density, Light Transmitting Plastics: compliant with ASTM D 2843.

6. Products:
   a) Basis of Design: d**eko LLC**; **Premier Markerboards**: dekomarkerboards.com.
   b) Refer to Finish Product List on the drawings for product details.
   c) Substitutions: See Section 01 6000 - Product Requirements.

C. Unframed Lineoleum **VD2**: Tackable linoleum sheet - linseed oil, cork, rosin binders and pigments calendared on jute backing, provided as rollgoods, cut to sizes indicated on drawings.
1. Linoleum Thickness: 1/4 inch.
2. Color: As indicated on the "Finish Product List" on the Drawings.
3. Surface Burning Characteristics: Class B, when tested in accordance with ASTM E84.
4. Installed Height and Length: As indicated on drawings.
5. Mounting: Adhesive-mounted directly to gypsum wallboard.
6. Trim **TRM3**: Provide aluminum trim at all exposed edges of tackboard **VD2**.
   a) Basis of Design: Fry Reglet: www.fryreglet.com. Refer to the "Finish Product List" on the drawings for specific trim model.
7. Products:
   a) Basis of Design: **Forbo Flooring Systems**; **Forbo Bulletin Board,** unless otherwise indicated on the Finish Product List on the drawings..
   b) Substitutions: See Section 01 6000 - Product Requirements.

D. Tackboards **TB1**: Tackable linoleum sheet - linseed oil, cork, rosin binders and pigments calendared on jute backing factory-mounted onto a backing panel and then factory fram
1. Linoleum Thickness: 1/4 inch.
2. Color: As indicated on the "Finish Product List" on the Drawings.
3. Surface Burning Characteristics: Class B, when tested in accordance with ASTM E84.
4. Installed Height and Length: As indicated on drawings.
5. Frame, **TB**: Extruded aluminum, with concealed fasteners.
6. Frame Profile: As indicated on drawings
7. Frame Finish, **TB**: Anodized, natural.
8. Products:
   a) Basis of Design: **Forbo Flooring Systems**; **Forbo Bulletin Board,** unless otherwise indicated on the Finish Product List on the drawings..
   b) Substitutions: See Section 01 6000 - Product Requirements.

2.2 MATERIALS

A. Porcelain Enameled Steel Sheet: ASTM A424/A424M, Type I, Commercial Steel, with fired-on vitreous finish.

B. Particleboard: ANSI A208.1; wood chips, set with waterproof resin binder, sanded faces.

C. Foil Backing: Aluminum foil sheet, 0.005 inch thick.

D. Adhesives: Type used by manufacturer.

2.3 ACCESSORIES

A. Mounting Adhesive: As recommended by manufacturer for the specific material and project conditions.

B. Temporary Protective Cover: Sheet polyethylene, 8 mil thick.

C. Mounting Brackets, Clips, Wires: Concealed. Furnished by manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that internal wall blocking is ready to receive work and positioning dimensions are as indicated on shop drawings.

C. Verify flat wall surface for frameless adhesive-applied boards.

3.2 PREPARATION

A. Acclimatize tackable wall panels by removing from packaging in installation area not less than 24 hours before application.

B. Remove switchplates, wall plates, and surface-mounted fixtures where tackable wall paneling is applied. Reinstall items on completion of installation.

C. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install boards in accordance with manufacturer's instructions and approved shop drawings.

B. Secure units level and plumb.

C. Butt Joints: Install with tight hairline joints.

D. Carefully cut holes in boards for thermostats.

E. Install visual display units in accordance with manufacturer's recommendations on specified substrates with concealed attachments.

3.4 CLEANING

A. Clean board surfaces in accordance with manufacturer's written instructions.

B. Cover with protective cover, taped to frame.

C. Remove temporary protective cover at Date of Substantial Completion.

END OF SECTION 10 1100

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SECTION 10 1416 - PLAQUES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Dedication plaque.

1.2 REFERENCE STANDARDS

A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.

B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

C. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

1.3 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer's product literature for each type of plaque sign, indicating style, font, foreground and background colors, locations, and overall dimensions of each sign.

C. Shop Drawings: Indicate dimensions, locations, elevations, materials, text and graphic layout, and attachment details.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Plaques:
   1. Basis-of-Design: Gemini; Cast & Precision Tooled Plaques.

2.2 REGULATORY REQUIREMENTS

A. Accessibility Requirements: Comply with ADA Standards and ICC A117.1 and applicable building codes, unless otherwise indicated; in the event of conflicting requirements, comply with the most restrictive requirements.

2.3 PLAQUES

A. Metal Plaques:
   1. Material: Aluminum casting.
   2. Material Thickness: 1/8 inch, minimum.
   3. Size: As indicated on drawings.
   4. Text and Typeface:
      a) Character Font: Helvetica, Arial, or other sans serif font. Font selection by Architect.

b) Character Case: Upper and lower case (title case).
c) Character Color: Contrast with background color.

5. Border Style: As selected by Architect from manufacturer's standard borders.
6. Background Texture: As selected by Architect from manufacturer's standard textures.
7. Surface Finish: Brushed, satin.
8. Mounting: Blind studs.

2.4 ACCESSORIES

A. Concealed Screws: Noncorroding metal; stainless steel, galvanized steel, chrome plated, or other.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install with horizontal edges level.

C. Locate plaque signs and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.

D. Protect from damage until mm-dd-yyyy; repair or replace damaged items.

END OF SECTION 10 1416

SECTION 10 1419 - DIMENSIONAL LETTER SIGNAGE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Dimensional letter signage.
   1. Section includes items noted in Alternate No. 6.

1.2 RELATED REQUIREMENTS

A. Section 01 2300 - Alternates.

1.3 REFERENCE STANDARDS

A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.

B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

C. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer's product literature for each type of dimensional letter sign, indicating style, font, colors, locations, and overall dimensions of each sign.

C. Shop Drawings:
   1. Include dimensions, locations, elevations, materials, text and graphic layout, and attachment details.

D. Samples: Submit one sample of each type of dimensional letter sign of size similar to that required for project, indicating sign style, font, and method of attachment.

E. Selection Samples: Where materials, colors, and finishes are not specified, submit two sets of selection charts or chips.

F. Verification Samples: Submit samples showing colors and finishes specified.

G. Manufacturer's Installation Instructions: Include installation templates and attachment devices.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Package dimensional letter signs as required to prevent damage before installation.

B. Store under cover and elevated above grade.

C. Store tape adhesive at a normal room temperature of 68 to 72 degrees F.

1.7 FIELD CONDITIONS

A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.

B. Maintain minimum ambient temperature during and after installation.

PART 2 PRODUCTS

2.1 REGULATORY REQUIREMENTS

A. Accessibility Requirements: Comply with ADA Standards and ICC A117.1 and applicable building codes, unless otherwise indicated; in the event of conflicting requirements, comply with the most restrictive requirements.

2.2 DIMENSIONAL LETTERS

A. Applications: Building mounted signage per Drawing A924.
   1. Use individual metal letters.
   2. Mounting Location: Exterior as indicated on drawings.
   3. Allow for total of 19 letters, height as indicated on drawings.
   4. Metal Letters:
      a) Material: Aluminum body with removable aluminum trim face and light-diffusing acrylic back face .
      b) Thickness: As indicated on drawings.
      c) Text and Typeface:
         1) Character Font: As indicated on drawings.
         2) Character Case: Upper case only.
      d) Finish: As selected by Architect from manufacturer's full range.
      e) Color: As selected by Architect from manufacturer's full range..
      f) Mounting: As indicated on drawings. Letters will be mounted to exterior face of building.
      g) Illumination: LED concealed inside lettering.

B. Applications: Street front signage.
   1. Use individual metal letters.
   2. Mounting Location: Exterior signage wall, as indicated on drawings.
   3. Metal Letters:
      a) Material: Aluminum sheet, flat.
      b) Text and Typeface:
         1) Character Font: As indicated on drawings.

2) Character Case: Upper case only.
c) Finish: Manufacturer's standard paint finish for exterior signage.
d) Color: As indicated on drawings. Two custom colors.
e) Mounting: Tape adhesive.

C. Applications: Room identification. Refer to Add Alternate No. 6, Section 01 2300.
1. Use individual metal letters.
2. Mounting Location: Interior as indicated on drawings.
3. Quantity and Height(s): Refer to signage plans and elevations on drawings.
4. Plastic Letters:
a) Material: Acrylic plastic sheet, flat.
b) Thickness: 1/8 inch minimum.
c) Text and Typeface:
1) Character Font: Helvetica, Arial, or other sans serif font.
2) Character Case: Upper case only.
d) Finish: As selected by Architect from manufacturer's full range.
e) Color: As selected. Custom color.
f) Mounting: Tape adhesive.

2.3 ACCESSORIES

A. Concealed Screws: Noncorroding metal; stainless steel, galvanized steel, chrome plated, or other.

B. Tape Adhesive: Double-sided tape, permanent adhesive.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

B. Notify Architect if conditions are not suitable for installation of signs; do not proceed until conditions are satisfactory.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions and approved shop drawings.

B. Install with horizontal edges level.

C. Locate dimensional letter signs and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.

D. Protect from damage until Date of Substantial Completion; repair or replace damaged items.

END OF SECTION 10 1419

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SECTION 10 1423 - PANEL SIGNAGE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Panel signage - interior and exterior.

B. Field-applied, vinyl-character signs.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

1.3 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer's product literature for each type of panel sign and vinyl-character sign, indicating styles, font, foreground and background colors, locations, and overall dimensions of each sign.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit 5d: For installation adhesives, documentation including printed statement of VOC content.
   2. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   3. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Shop Drawings:
   1. Include dimensions, locations, elevations, materials, text and graphic layout, attachment details, and schedules.
   2. Show locations of electrical service connections.
   3. Include diagrams for power, signal, and control wiring.

4. Schedule: Provide information sufficient to completely define each panel sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.
   a) When room numbers to appear on signs differ from those on drawings, include the drawing room number on schedule.
   b) When content of signs is indicated to be determined later, request such information from Owner through Architect at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
   c) Submit for approval by Owner through Architect prior to fabrication.

E. Samples: Submit two samples of each type of sign, of size similar to that required for project, indicating sign style, font, and method of attachment.

F. Verification Samples: Submit samples showing colors, materials, and finishes specified.
   1. Panel Sign: Not less than 12 inches square, including a corner
   2. Vinyl-character signs: Two full-size characters on solid white panel (drywall, MDF).

G. Manufacturer's Installation Instructions: Include installation templates and attachment devices.

H. Manufacturer's qualification statement.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Package signs as required to prevent damage before installation.

B. Package room and door signs in sequential order of installation, labeled by floor or building.

C. Store under cover and elevated above grade.

D. Store tape adhesive at normal room temperature.

1.7 FIELD CONDITIONS

A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.

B. Maintain minimum ambient temperature during and after installation.

PART 2 PRODUCTS

2.1 REGULATORY REQUIREMENTS

A. Accessibility Requirements: Comply with ADA Standards and ICC A117.1 and applicable building codes, unless otherwise indicated; in the event of conflicting requirements, comply with the most restrictive requirements.

2.2 PANEL SIGNAGE

A. Panel Signage for Interior:
   1. Application: Room and door signs.
   2. Description: Flat signs with applied character panel media, tactile characters.
   3. Sign Size: As indicated on drawings.
   4. Total Thickness: 1/8 inch.
   5. Sign Edges: Squared.
   6. Color and Font, unless otherwise indicated:
      a) Character Font: As indicated on the drawings.
      b) Character Case: As indicated on the drawings.
      c) Background Color: Custom color as noted on signage schedule.
      d) Accent Color: Custom color as noted on signage drawings and signage schedule.
      e) Character Color: White, unless otherwise noted on signage schedule.
   7. Material: Acrylic plastic base with applied plastic letters and braille.
   8. Profile: Flat panel without frame.
      a) Frame Finish: Black anodized.
   9. Tactile Letters: Raised 1/32 inch minimum.
   10. Braille: Grade II, ADA-compliant.
   11. One-Sided Wall Mounting: Tape adhesive.
   12. On-Glass Mounting: Tape adhesive, with matching back panel on opposite side of glass.
   13. Illumination System: Reverse cut out panel.
      a) Power: 120 V, 60 Hz, 1 phase, 15 A.

B. Panel Signage for Exterior:
   1. Application: Exterior door signs.
   2. Description: Flat signs with applied character panel media, tactile characters.
   3. Sign Size: As indicated on drawings.
   4. Total Thickness: 1/8 inch.
   5. Sign Edges: Squared.
   6. Color and Font, unless otherwise indicated:
      a) Character Font: As indicated on the drawings.
      b) Character Case: As indicated on the drawings.
      c) Background Color: Custom color to be selected by Architect.
      d) Character Color: White.
   7. Material: Exterior grade photopolymer aluminum panels.
      a) Provide exterior grade photopolymer panels composed of 0,32" thick exterior grade synthetic rubber-based polymer integrally bonded to .016" aluminum alloy base.
      b) Characters: Raised .032".
   8. Concealed Mounting: Provide sign panel that includes a backing plate mounted to wall with mechanical fasteners. Sign panel shall be adhered flush to backing plate with factory-applied double-sided adhesive tape. Panel shall be backed with .125" polycarbonate.
   9. Basis-of-Design Manufacturer: InPro SignScape, Muskego, WI.

2.3 FIELD-APPLIED, VINYL-CHARACTER SIGNS

A. Field-Applied, Vinyl-Character Sign **Type S**: Prespaced characters die cut from 3- to 3.5-mil thick, weather-resistant vinyl film with release liner on the back and carrier film on the front for on-site alignment and application.

1. Application: As indicated on drawings.
2. Vinyl Film: UV-resistant vinyl film of nominal thickness indicated, with pressure-sensitive, permanent adhesive on back; die cut to form characters or images as indicated on drawings.
3. Size: As indicated on drawings.
4. Substrate: Painted gypsum board, unless otherwise indicated on drawings.
5. Text and Font: As indicated on drawings.

2.4 SIGNAGE APPLICATIONS

A. Room and Door Signs:
1. Office Doors: Identify with room names and numbers to be determined later, not those indicated on drawings; provide "window" section for replaceable occupant name.
2. Conference and Meeting Rooms: Identify with room names and numbers to be determined later, not those indicated on drawings.
3. Service Rooms: Identify with room names and numbers to be determined later, not those indicated on drawings.
4. Rest Rooms: Identify with pictograms, the names "MEN" and "WOMEN", room numbers to be determined later, and braille.

2.5 ACCESSORIES

A. Concealed Screws: Noncorroding metal; stainless steel, galvanized steel, chrome plated, or other.

B. Exposed Screws: Chrome plated.

C. Tape Adhesive: Double-sided tape, permanent adhesive.

D. Electrical Components and Devices: Listed and labeled as defined in NFPA 70 by a qualified testing agency.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

B. Verify that power and data service is correctly sized and located to accommodate panel signs.

C. Notify Architect if conditions are not suitable for installation of signs; do not proceed until conditions are satisfactory.

3.2 INSTALLATION

A. General: Install in accordance with manufacturer's written instructions.
1. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
2. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.

3. Locate panel signs and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.

B. Mounting Methods:
   1. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.
   2. Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of adhesive symmetrically to back of sign and of suitable quantity to support weight of sign after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as sign is applied and to prevent visibility of cured adhesive at sign edges. Place sign in position, and push to engage adhesive. Temporarily support sign in position until adhesive fully sets.

C. Field-Applied, Vinyl-Character Signs: Clean and dry substrate. Align sign characters in final position before removing release liner. Remove release liner in stages, and apply and firmly press characters into final position. Press from the middle outward to obtain good bond without blisters or fishmouths. Remove carrier film without disturbing applied vinyl film

3.3 ADJUSTING AND CLEANING

A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.

B. Remove temporary protective coverings and strippable films as signs are installed.

C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 10 1423

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SECTION 10 1453 - TRAFFIC SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Division 00 Bidding and Contracting Requirements, and other Division 01 General Requirements Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes Traffic Control / Parking Signage.

B. Related Requirements:

1. Section 01 5000 - Temporary Facilities and Controls: Temporary, directional signs for construction personnel and visitors.

2. Division 01 Section(s) “Construction Waste Management and Disposal” and “Sustainability Compliance Procedures” for sustainability requirements.

3. Section 03 3000 - Cast-in-Place Concrete: Concrete footings.

4. Section 31 2300 – Excavation, Backfill, Compaction and Dewatering: Excavation for installation of concrete footings.

1.3 PRICE AND PAYMENT PROCEDURES

A. See Section 01 2200 - Unit Prices, for additional unit price requirements.

B. See Section 01 2300 - Alternates, for additional alternative requirements

1.4 REFERENCE STANDARDS

A. D.O.T. Manual - U. S. Department of Transportation Manual on Uniform Traffic Control Devices for Streets and Highways, latest edition.

B. ASTM F2408 - Standard Specification for Ornamental Fences Employing Galvanized Steel Tubular Pickets, 2016.

1.5 SUBMITTALS

A. Submit under provisions of Section 01 3000 - Administrative Requirements.

B. CTHPB Documentation Submittals: Comply with Section 01 3566.42 – Sustainability Compliance Procedures and provide the following in addition to other submittals:

1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

C. Product Data: Submit manufacturer's product data for the following:
   1. Traffic Control Signage.

D. Shop Drawings: All items listed under "Section Includes" paragraph of this Section.

1.6 QUALITY ASSURANCE

A. Testing Agency Services: Engage an independent laboratory to conduct tests and perform other services as required for quality control during construction.

B. Source of Materials:
   1. Obtain materials of each type from same source for the entire project.
   2. Manufacturer shall have minimum 5 years specializing in commercial quality products as specified.

C. Product Installation: Work shall be carried out by a company with not less than 5 years of successful experience of similar application and installed at least 5 jobs of similar size and complexity.

1.7 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver products and materials in original unopened packages, containers, or bundles with manufacturer's label intact and legible.

B. Remove items delivered in broken, damaged, rusted, or unlabeled condition from project site immediately.

C. Handle and store to avoid damage.

1.8 WARRANTY

A. For products noted in this section, provide manufacturer’s standard warranty, minimum of one year.

PART 2 PRODUCTS

2.1 SIGN PANELS

A. Sign Panel Material: 18-gauge reflective steel or aluminum with mounting holes and conforming to the Manual on Uniform Traffic Control Devices and local jurisdiction signage standards.

B. Traffic Control Sign Graphics: Sign lettering and graphics shall be provided in the sizes, colors, and letter styles as shown on the Drawings.

C. Sign Manufacturer: Subject to compliance with requirements, provide products by one of the following manufacturers or an approved equal:
   1. EMED Co., Inc.
   2. Seton Name Plate Company.

2.2 SIGN POSTS

A. Decorative Metallic-Coated Steel Tubular Picket Fence Posts: Comply with ASTM F2408, for light industrial (commercial) application (class) unless otherwise indicated.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   2. Basis-of-Design Product: Subject to compliance with requirements, provide sign posts as manufactured by Ameristar Fence Products or comparable product by one of the following:
      a) Master Halco.
      b) Merchants Metals; a division of MMI Products, Inc.
      c) BetaFence USA; a division of Betafence.
   3. Metallic-Coated Steel Sheet: Galvanized-steel sheet or aluminum-zinc alloy-coated steel sheet.
   4. Interior surface of tubes formed from uncoated steel sheet shall be coated with zinc-rich thermosetting coating to comply with ASTM F2408.

B. Posts: Square tubes 3 by 3 inches (76 by 76 mm) formed from 0.108-inch (2.74-mm) nominal-thickness, metallic-coated steel sheet or formed from 0.105-inch (2.66-mm) nominal-thickness steel sheet and hot-dip galvanized after fabrication.
   1. Size and length as indicated on the Drawings.
   2. No pre-punched openings.

C. Post Caps: Formed from steel sheet and hot-dip galvanized after forming.

PART 3 EXECUTION

3.1 STEEL SIGNAGE

A. Set securely, plumb, and level at locations and elevations indicated on Drawings.

B. Fasten securely with appropriate hardware.

C. Conform to state and local regulations.

END OF SECTION 10 1453

SECTION 101453 – TRAFFIC SIGNAGE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

All materials and construction methods shall conform to the Connecticut Department of Transportation Standard Specifications for Roads, Bridges, Facilities, and Incidental Construction Form 818 with modifications for the following items as stated in this specification:

- Sign Face - Sheet Aluminum (TYPE IX RETROREFLECTIVE SHEETING)
- Sign Face - Sheet Aluminum (TYPE XI RETROREFLECTIVE SHEETING)

1.2 SUMMARY

Section 12.08 is supplemented and amended as follows:

12.08.01—Description:

Add the following:

All signs shall use Type XI retroreflective sheeting with the exception of side-mounted signs with white background which shall be Type IX.

This item shall also include field testing of metal sign base posts as directed by the Engineer.

Signs shall conform to the sign details located at https://portal.ct.gov/DOT/Traffic-Engineering/Catalog-of-Signs with legend for variable signs as shown in the plans.

1.3 REFERENCES

State of Connecticut Department of Transportation Standard Specifications for Roads, Bridges, Facilities, and Incidental Construction Form 818, 2020 (Merged with Supplemental Specifications Dated July 2023)

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

12.08.03—Construction Methods:

Delete the last sentence and add the following:

Metal sign base posts shall be whole and uncut. Sign base post embedment and reveal lengths shall be as shown on the plans. The Contractor shall drive the metal sign base posts by hand tools, by mechanical means or by auguring holes. If an obstruction is encountered while driving or placing the metal sign base post, the Contractor shall notify the Engineer who will determine whether the obstruction shall be removed, the sign base post or posts relocated, or the base post installation in ledge detail shall apply. Backfill shall be thoroughly tamped after the posts have been set level and plumb.

Field Testing of Metal Sign Posts: When the sign installations are complete, the Contractor shall notify the Engineer the Project is ready for field testing. Based on the number of posts in the Project, the Engineer will select random sign base posts which shall be removed by the Contractor for inspection and measurement by the Engineer. After such inspection is completed at each base post location, the Contractor shall restore or replace such portions of the work to the condition required by the Contract. Refer to the table in 12.08.05 for the number of posts to be field tested.

END OF SECTION

SECTION 101454 – TRAFFIC SIGNAGE REMOVAL AND RELOCATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

All materials and construction methods shall conform to the Connecticut Department of Transportation Standard Specifications for Roads, Bridges, Facilities, and Incidental Construction Form 818 with modifications for the following item as stated in this specification:

- REMOVAL AND RELOCATION OF EXISTING SIGNS

1.2 SUMMARY

Section 12.06 is supplemented as follows:

Article 12.06.01 – Description is supplemented with the following:
Work under this item shall consist of the removal and/or relocation of designated side-mounted extruded aluminum and sheet aluminum signs, sign posts, sign supports, and foundations where indicated on the plans or as directed by the Engineer. Work under this item shall also include furnishing and installing new sign posts and associated hardware for signs designated for relocation.

1.3 REFERENCES

State of Connecticut Department of Transportation Standard Specifications for Roads, Bridges, Facilities, and Incidental Construction Form 818, 2020 (Merged with Supplemental Specifications Dated July 2023)

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

Section 12.06 is supplemented as follows:

Article 12.06.03 – Construction Methods is supplemented with the following:
The Contractor shall take care during the removal and relocation of existing signs, sign posts, and sign supports that are to be relocated so that they are not damaged. Any material that is damaged shall be replaced by the Contractor at no cost to the State.

Foundations and other materials designated for removal shall be removed and disposed of by the Contractor as directed by the Engineer and in accordance with existing standards for Removal of Existing Signing.

Sheet aluminum signs designated for relocation are to be re-installed on new sign posts.

END OF SECTION

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SECTION 10 1473 - PAINTED SIGNAGE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Wall-identification signs for fire and smoke assemblies.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 01 7419 – Construction Waste Management and Disposal.

C. Section 10 1423 - Panel Signage: Field-applied, vinyl-character signs.

1.3 DEFINITIONS

A. Accessible: In accordance with the accessibility standard.

B. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D523.

C. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.

D. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523M D523.

E. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D523.

F. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D523.

G. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D523.

1.4 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ASTM D523 - Standard Test Method For Specular Gloss; 2014 (18).

C. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: For paints and coatings, indicating VOC content.

1. If field-applied vinyl adhesive letters are proposed as the sign material, see Section 10 1423 for product data submittal requirements.

C. Samples: For each type of paint, paint system, color, and gloss; minimum 4 inches (100 mm) long in least dimension; on hardboard.
   1. Include stepped samples defining each separate coat, if any. Resubmit until each required sheen, color, and texture is achieved.
   2. For each painted color being matched to a standardized color-coding system, include the color chips from the color-coding-system company with samples.
   3. Include a list of materials for each coat of each sample.
   4. Label each sample for location and application.

D. Product Schedule: For painted signs. Use same designations indicated on Drawings or specified.

1.6 QUALITY ASSURANCE

A. Mockups: Prepare mockups of painted signs for each type of sign material and substrate indicated and each color and finish required to demonstrate aesthetic effects and to set quality standards for materials and execution. Duplicate appearance of approved sample submittals.
   1. Locate mockups on existing surfaces where directed by Architect.
   2. Sign Mockups: Two sign texts that represent surfaces and conditions for signage application under same conditions as the completed Work.
   3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).

PART 2 PRODUCTS

2.1 PAINTED SIGNS

A. Wall-Identification Sign Insert drawing designation: Sign applied directly on indicated substrate to identify fire and smoke assemblies, including preparatory treatment as required.
   1. Sign Material: Stenciled-on alkyd, latex, or VOC-compliant spray-applied paint or preprinted, self-adhesive decals.
   2. Font: Minimum 3 inches (76 mm) high characters in a contrasting color, with minimum 0.375-inch (9.5-mm) wide strokes.

B. Text:
   a) "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS."
   b) "FIRE WALL OR FIRE BARRIER - PROTECT ALL OPENINGS."
   c) "(__) HOUR FIRE AND SMOKE BARRIER - PROTECT ALL OPENINGS"
   d) "1-HOUR FIRE BARRIER - PROTECT ALL OPENINGS."

e) "2-HOUR FIRE BARRIER - PROTECT ALL OPENINGS."
f) "SMOKE BARRIER - PROTECT ALL OPENINGS."

2.2 PAINT MATERIALS

A. Sign Paints and Coatings: Inks, dyes, and paints that are recommended in writing by manufacturer for optimum adherence to substrate and are UV and water resistant for colors and exposure indicated.
   1. Compatibility: Provide paint materials that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
   2. Transition Coat: Paint manufacturer's recommended coating for use where a residual existing coating is incompatible with the paint system.

B. VOC Content: For field applications that are inside the weatherproofing system, verify paints and coatings comply with VOC content limits indicated in Section 01 3566.42.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with installer present, for compliance with requirements for conditions affecting performance. Comply with paint manufacturer's written instructions for inspection.

B. If existing surfaces cannot be prepared to an acceptable condition for proper painting, notify Architect in writing.

C. Proceed with installation only after unsatisfactory conditions have been corrected and surface is dry.
   1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 INSTALLATION

A. Appearance Standard: Completed sign work shall have a sharp and uniformly delineated appearance as viewed by Architect from building interior at 5 feet (1.5 m) away from painted surface and from building exterior at 20 feet (6 m) away from painted surface.

B. Comply with manufacturers' written instructions for surface preparation and paint-application for each substrate condition.

C. Apply a transition coat over incompatible existing coatings and substrate materials.

D. Apply primers, sealers, undercoats, and transition coats so that they do not extend beyond the limits of the painted signage. Remove excess without damaging the substrate.

E. Install signs level, plumb, true to line, with uniform delineation and borders, and at locations and heights indicated.
   1. Prespaced characters with template, cutout stencil, or ruler and straightedge.

3.3 MARKING FIRE AND SMOKE ASSEMBLIES

A. Wall-Identification Signs: Permanently identify both sides of each fire and smoke assembly indicated on Drawings. Place signs in accessible, concealed floor, floor-ceiling, or attic space at maximum 15 feet (4.57 m) from end of wall and at maximum intervals of 30 feet (9.14 m), measured horizontally along the assembly. Locate signs for greatest visibility in the space.

3.4 ADJUSTING AND CLEANING

A. Remove and reapply damaged or deformed signs and signs that do not comply with specified requirements. Reapply signs with damaged or deteriorated finishes that cannot be successfully repaired by finish touchup or similar minor repair procedures.

B. After completing sign application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

END OF SECTION 10 1473

SECTION 10 2113.19 - PLASTIC TOILET COMPARTMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Solid plastic toilet compartments.

1.2 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Blocking and supports.

B. Section 10 2800 - Toilet Accessories.

1.3 REFERENCE STANDARDS

A. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth; 2019.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on panel construction, hardware, and accessories.

C. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall supports, door swings.

D. Samples: Submit two samples of partition panels, 8 by 8 inch in size illustrating panel finish, color, and sheen.

E. Manufacturer's Installation Instructions: Indicate special procedures.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Solid Plastic Toilet Compartments:
   1. Basis-of-Design: **Scranton Products; Hiny Hiders Partitions**: www.scrantonproducts.com/#sle.
   2. Other Acceptable Manufacturers: Subject to compliance with requirements.
      a) ASI Global Partitions; SolidPlastic Partitions: www.asi-globalpartitions.com/#sle.
      b) Hadrian; Hadrian - Standard Series - Plastic: www.hadrian-inc.com/#sle.
   3. Substitutions: Section 01 6000 - Product Requirements.

2.2 PLASTIC TOILET COMPARTMENTS

A. Solid Plastic Toilet Compartments: Factory fabricated doors, pilasters, and divider panels made of solid molded high density polyethylene (HDPE), tested in accordance with NFPA 286; floor-mounted headrail-braced.
   1. Color: See Finish Product List "Finishes for Miscellaneous Items" on the drawings for color and texture.
   2. Doors:
      a) Thickness: 1 inch.
      b) Width: 24 inch.
      c) Width for Handicapped Use: 36 inch, out-swinging.
      d) Height: 55 inch.
   3. Panels:
      a) Thickness: 1 inch.
      b) Height: 55 inch.
      c) Depth: As indicated on Drawings.
   4. Pilasters:
      a) Thickness: 1 inch.
      b) Width: As required to fit space; minimum 3 inch.
   5. Overall Compartment Height (above finish floor): Coordinate with height shown on the drawings.

2.3 ACCESSORIES

A. Pilaster Shoes: Plastic, to match compartments, 3 inches high; concealing floor fastenings.
   1. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster.

B. Head Rails: Extruded aluminum, anti-grip profile.
   1. Size: Manufacturer's standard size.

C. Wall and Pilaster Brackets: Stainless steel; manufacturer's standard type for conditions indicated on drawings.

D. Attachments, Screws, and Bolts: Stainless steel , tamper proof type.
   1. For attaching panels and pilasters to brackets: Through-bolts and nuts ; tamper proof.

E. Hinges: Stainless steel, manufacturer's standard finish.

F. Door Hardware: Stainless steel, manufacturer's standard finish.
   1. Door Latch: Slide type with exterior emergency access feature.
   2. Provide door pull for outswinging doors.

G. Coat Hook: One per compartment, mounted on door.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify correct spacing of and between plumbing fixtures.

C. Verify correct location of built-in framing, anchorage, and bracing.

3.2 INSTALLATION

A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.

B. Maintain 3/8 inch to 1/2 inch space between wall and panels and between wall and end pilasters.

C. Attach panel brackets securely to walls using anchor devices.

D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.

E. Field touch-up of scratches or damaged finish will not be permitted. Replace damaged or scratched materials with new materials.

3.3 TOLERANCES

A. Maximum Variation From True Position: 1/4 inch.

B. Maximum Variation From Plumb: 1/8 inch.

3.4 ADJUSTING

A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.

B. Adjust hinges to position doors in partial opening position when unlatched. Return out-swinging doors to closed position.

C. Adjust adjacent components for consistency of line or plane.

END OF SECTION 10 2113.19

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SECTION 10 2123 - CUBICLE CURTAINS AND TRACK

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Suspended overhead curtain track and guides.

B. Surface mounted overhead curtain track and guides.

C. Cubicle curtains.

1.2 RELATED REQUIREMENTS

A. Section 05 5000 - Metal Fabrications: Track supports above ceiling.

B. Section 06 1000 - Rough Carpentry: Blocking and supports for track.

C. Section 09 5100 - Acoustical Ceilings: Suspended ceiling system to support track.

1.3 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

B. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films; 2019.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for curtain fabric characteristicsand curtain track.

C. Shop Drawings: Indicate a reflected ceiling plan view of curtain track, hangers and suspension points, attachment details, schedule of curtain sizes.

D. Samples: Submit two fabric samples, 6 by 6 inch in size illustrating fabric color.

E. Samples: Submit 12 by 12 inch sample patch of curtain cloth with representative top, bottom, and edge hem stitch detail, heading with reinforcement and carrier attachment to curtain header.

F. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.

G. Maintenance Data: Include recommended cleaning methods and materials and stain removal methods.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Accept curtain materials on site and inspect for damage.

B. Store curtain materials on site and deliver to Owner for installation when requested.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Cubicle Curtains **CC1**:
   1. Curtains: Refer to Finish Product List on the drawings for Basis-of-Design product.

B. Track:
   1. Construction Specialties, Inc; Track Systems: www.c-sgroup.com/#sle.
   2. Inpro; Optitrac: www.inprocorp.com/#sle.
   3. Substitutions: See Section 01 6000 - Product Requirements.

2.2 TRACKS AND TRACK COMPONENTS

A. Tracks: Extruded aluminum sections; one piece per track run.
   1. Profile: Channel.
   2. Mounting: Surface.
   3. Track End Stop: To fit track section.
   4. Track Bends: Minimum 12 inch radius; fabricated without deformation of track section or impeding movement of carriers.
   5. Suspension Rods: Tubular aluminum sections, sized to support design loads and designed to receive attachment from track and ceiling support.
   6. Escutcheons: Where suspension rod meets finished ceiling or structure, provide escutcheons to match rod finish.
   7. Finish on Exposed Surfaces: White enamel.

B. Curtain Carriers: Nylon rollers, size and type compatible with track; designed to eliminate bind when curtain is pulled; fitted to curtain to prevent accidental curtain removal.

C. Installation Accessories: Types required for specified mounting method and substrate conditions.

2.3 CURTAINS

A. Cubicle Curtains **CC1**:
   1. Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
   2. Inherently flame resistant or flameproofed; capable of passing NFPA 701 test.
   3. Material: Close weave polyester; anti-bacterial, self deodorizing, sanitized, and preshrunk.
   4. Open Mesh Cloth: Open weave to permit air circulation; flameproof material, manufacturer's standard color.
   5. Attachment of Curtain Fabric to Open Mesh Cloth: Manufacturer's standard sewn seam.

B. Curtain Fabrication:
   1. Width of curtain to be 10 percent wider than track length.
   2. Length of curtain to end 12 inches above finished floor.

3. Include open mesh cloth at top 20 inches of curtain for room air circulation, attached to curtain as specified above.
4. Curtain Heading: Fabric band matching curtain panel with metal grommet holes for carriers spaced 6 inches on center.
5. Seams and Hems: Manufacturer's standard fabrication method for securely sewn and finished seams and hems.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surfaces and supports above ceiling are ready to receive work of this Section.

3.2 INSTALLATION

A. Install curtain track to be secure, rigid, and true to ceiling line.

B. See Section 05 5000 for track supports above ceiling.

C. Install curtains on carriers ensuring smooth operation.

END OF SECTION 10 2123

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SECTION 10 2800 - TOILET ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Commercial toilet accessories.

B. Commercial shower and bath accessories.

C. Diaper changing stations.

D. Utility room accessories.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 01 7419 - Construction Waste Management and Disposal.

C. Section 06 1000: Concealed supports for accessories, including in wall framing and plates.

D. Section 10 2113.19 - Plastic Toilet Compartments.

1.3 REFERENCE STANDARDS

A. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2015a (Reapproved 2019).

B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.

D. ASTM B86 - Standard Specification for Zinc and Zinc-Aluminum (ZA) Alloy Foundry and Die Castings; 2018.

E. ASTM B456 - Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium; 2017.

F. ASTM C1036 - Standard Specification for Flat Glass; 2016.

G. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.

H. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror; 2018.

I. ASTM D4802 - Standard Specification for Poly(Methyl Methacrylate) Acrylic Plastic Sheet; 2016.

J. ASTM D5047 - Standard Specification for Polyethylene Terephthalate Film and Sheeting; 2017.

K. ASTM F2285 - Standard Consumer Safety Performance Specification for Diaper Changing Tables for Commercial Use; 2004, with Editorial Revision (2016).

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit data for each toilet accessory specified, describing size, finish, details of function, and attachment methods.

C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For accessories to include in maintenance manuals.

PART 2 PRODUCTS

2.1 OWNER-FURNISHED MATERIALS

A. Owner-Furnished Materials: Toilet paper dispensers, paper towel dispensers, soap/sanitizer dispensers, pad/tampon dispenser, and cleaning fluid dilution and dispensing system .

2.2 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Structural Performance: Design accessories and fasteners to comply with the following requirements:
   1. Grab Bars: Installed units are able to resist 250 lbf concentrated load applied in any direction and at any point.
   2. Shower Seats: Installed units are able to resist 250 lbf applied in any direction and at any point.

2.3 MATERIALS

A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.

B. Stainless Steel Sheet: ASTM A666, Type 304.

C. Stainless Steel Tubing: ASTM A269/A269M, Grade TP304 or TP316.

D. Galvanized Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.

E. Zinc Alloy: Die cast, ASTM B86.

F. Acrylic Plastic Sheet: ASTM D4802.

G. PETG Plastic Sheet: ASTM D5047.

H. Mirror Glass: Annealed float glass, ASTM C1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C1503.

I. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.

2.4 FINISHES

A. Stainless Steel: Satin finish, unless otherwise noted.

B. Chrome/Nickel Plating: ASTM B456, SC 2, polished finish, unless otherwise noted.

C. Baked Enamel: Pretreat to clean condition, apply one coat primer and minimum two coats epoxy baked enamel.

D. Powder-Coated Steel: Clean, degrease, and neutralize. Follow immediately with a phosphatizing treatment, prime coat, and two finish coats of powder coat enamel.

2.5 COMMERCIAL TOILET ACCESSORIES

A. Toilet Paper Dispenser **Tx**: Double roll, surface mounted, for coreless type rolls.
   1. Owner furnished, Contractor installed.
   2. Products:
      a) Georgia Pacific; Compact 2-Roll SIde-by-Side Coreless High-Capacity Toilet Paper Dispenser by GP Pro.
         1) Color: Black.

B. Toilet Paper Dispenser **Tx**: Four roll, surface mounted, for coreless type rolls.
   1. Owner furnished, Contractor installed.
   2. Products:
      a) Georgia Pacific; Compact Quad 4-Roll Coreless High-Capacity Toilet Paper Dispenser by GP Pro.
         1) Color: Black.

C. Automatic Paper Towel (Roll) Dispenser Type **Tx:** Automatic motion sensing mechanism with user-adjustable delay and paper towel length; battery powered.
   1. Owner furnished, Contractor installed.
   2. Mounting: Surface mounted.
   3. Minimum Capacity: 8-inch wide, 1150-foot long roll.

4. Product:
    a) **Georgia Pacific; Pacific Blue Ultra 8" Water Resistant High-Capacity Mechanical Touchless Paper Towel Dispenser by GP Pro**.

D. Automated Soap Dispenser - **Tx**: Liquid soap dispenser, wall-mounted, with stainless steel cover and window to gauge soap level, tumbler lock.
1. Minimum Capacity: 48 ounces.
2. Owner furnished, contractor installed.
3. Product:
    a) Georgia Pacific; **Pacific Blue Ultra Wall Mounted Manual Dispenser for Foaming Hand Soap and Hand Sanitizer by GP Pro**.
        1) Cover Color: Bl
            (a) Tx: Black
            (b) Tx: Stainless steel.

E. Mirror Unit Type **T4**: 0.05 inch (1.3 mm) thick stainless steel angle frame with manufacturer's standard corners; 1/4 inch thick annealed float glass; ASTM C1036 with silvering, protective and physical characteristics in compliance with ASTM C1503.
1. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
2. Size: As indicated on Drawings.
3. Basis-of-Design Product: Subject to compliance with requirements, provide **Bobrick Washroom Equipment, Inc; B-290 Series** or a comparable product by one of the following:
    a) American Specialties, Inc.; insert model number.
    b) Bradley Corporation; insert model number.

F. Mirror Unit Type **T8**: Full height mirror; 0.05 inch (1.3 mm) thick stainless steel angle frame with manufacturer's standard corners; 1/4 inch thick annealed float glass; ASTM C1036 with silvering, protective and physical characteristics in compliance with ASTM C1503.
1. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
2. Size: 24 inches wide by 60 inches high.
3. Basis-of-Design Product: Subject to compliance with requirements, provide **Bobrick Washroom Equipment, Inc; B-290 Series** or a comparable product by one of the following:
    a) American Specialties, Inc.; insert model number.
    b) Bradley Corporation; insert model number.

G. Grab Bar Types **T11 - T14**:
1. Mounting: Flanges with concealed fasteners.
2. Material and Finish: Stainless steel, 0.05-inch thick; smooth, No. 4 (satin) finish.
3. Outside Diameter: 1-1/2 inches.
4. Configurations and Lengths: As indicated on Drawings.
5. Basis-of-Design Product: Subject to compliance with requirements, **Bobrick Washroom Equipment, Inc.; Model No. 6806 Series Grab Bars**, or one of the following:
    a) American Specialties, Inc.; Model No. 3800.
    b) Bradley Corporation; Model No. 812.

c) Substitutions: Section 01 6000 - Product Requirements.

H. Partition-Mounted Two-Compartment Sanitary-Napkin Disposal Unit Type **T7A**: Stainless steel construction, mounted in partition between toilet compartments; self-closing, disposal-opening covers and hinged face panels with tumbler locksets; removable receptacles; No. 4 (satin) finish.
1. Basis-of-Design Product: Subject to compliance with requirements, provide **Bobrick Washroom Equipment, Inc; Model No. B-354 Partition-Mounted Sanitary Napkin Disposal** or comparable product by one of the following:
a) American Specialties, Inc.; Model No. 0472-1.
b) Bradley Corporation; Model No. 4721-15.
c) Substitutions: Section 01 6000 - Product Requirements.

I. Surface-Mounted Sanitary-Napkin Disposal Unit Type **T7B**: Stainless steel construction, surface-mounted sanitary-napkin disposal with self-closing, disposal-opening cover and hinged face panel with tumbler lockset; removable receptacle; No. 4 (satin) finish.
1. Basis-of-Design Product: Subject to compliance with requirements, provide **Bobrick Washroom Equipment, Inc; Model No. B-254 Surface-Mounted Sanitary Napkin Disposal** or comparable product by one of the following:
a) American Specialties, Inc.; Model No. 0473-1A.
b) Bradley Corporation; Model No. 4722-15.
c) Substitutions: Section 01 6000 - Product Requirements.

J. Surface-Mounted Sanitary Napkin/Tampon Vendor Type **T8A**: Steel cabinet and door; surface mounting; minimum 14 napkins and 22 tampons capacity; ADA-compliant push button dispensing; tumbler type lockset with separate lock and key for coin box, where applicable.
1. Owner furnished, Contractor installed.
2. Operation: No coin (free).
3. Product: **Hospeco; EvoGen EV1 Dual Pad/Tampon Dispenser.**
a) Finish**: Stainless steel**
b) Dimensions: 14" wide x 26" high x 5-5/8" deep.

2.6 COMMERCIAL SHOWER AND BATH ACCESSORIES

A. Shower Curtain Rod Type **T19**: Stainless steel tube, 1-1/4 inch outside diameter, 0.05 inch wall thickness, satin-finished, with 3 inch outside diameter, minimum 0.04 inch thick satin-finished stainless steel flanges, for installation with exposed fasteners.
1. Basis-of-Design Product: Subject to compliance with requirements, provide **Bobrick Washroom Equipment, Inc.; Model No. B-207 Heavy-Duty Shower Curtain Rod** or one of the following:
a) American Specialties, Inc; Model No. 1204: www.americanspecialties.com/#sle.
b) Bradley Corporation; Model No. 9539.
c) Substitutions: Section 01 6000 - Product Requirements.

B. Shower Curtain Type **T19A**:
1. Material: Nylon reinforced vinyl, 0.008 inch thick, matte finish, with integral antibacterial treatment, flameproof and stain-resistant.
2. Basis-of-Design Product: Subject to compliance with requirements, provide **Bobrick Washroom Equipment, Inc.; Model No. 204-2** or one of the following:

a) American Specialties, Inc.; Model No. 1200-V.
b) Bradley Corporation; Model No. 9537.
c) Substitutions: Section 01 6000 - Product Requirements.

C. Folding Shower Seat Type **T16:** Wall-mounted surface; welded tubular seat frame, structural support members, hinges, and mechanical fasteners of Type 304 stainless steel, L-shaped, right hand seat.
1. Seat: 0.500-inch thick solid Phenolic of one-piece construction; white color.
2. Size: 21 inches wide by 33 inches long.
3. Basis-of-Design Product: Subject to compliance with requirements, provide **Bobrick Washroom Equipment, Inc.; Model No. B-5181 Reversible Solid Phenolic Folding Shower Seat** or one of the following:
a) American Specialties, Inc.; Model No. 8206.
b) Bradley Corporation; Model No. 9569.
c) Substitutions: Section 01 6000 - Product Requirements.

D. Clothes Hook Type **T15**: Single-prong unit; 0.031-inch stainless steel flange and support arm, 0.063-inch stainless steel concealed wall plate, 0.142-inch stainless steel cap; No. 4 (satin) finish.
1. Application: ~~Typical at all offices.~~See drawings for locations.
2. Basis-of-Design Product: Subject to compliance with requirements, provide **Bobrick Washroom Equipment, Inc.; Model No. B-2116 Heavy-Duty Clothes Hook** or one of the following:
a) American Specialties, Inc.; Model No. 0751.
b) Bradley Corporation; Model No. 9119 (satin chrome finish).
c) Substitutions: Section01 6000-Product Requirements.

E. ~~Coat Hook Type T15A: Heavy-duty stainless steel, multi-prong, metal cleat panel and cover caps for concealed attachment, satin finish.~~
1. ~~Number of Hooks: Three (3).~~
2. ~~Dimensions: 18 inches long by 3-1/2 inches high nominal (cleat panel); 3-5/8 inches deep.~~
3. ~~Finish Material/Color: As selected by Architect from manufacturer's standard range.~~
4. ~~Product: **TAG Hardware; Coat Hook 300.3193**.~~
a) ~~Substitutions: Section 01 6000 - Product Requirements.~~

2.7 DIAPER CHANGING STATIONS

A. Baby Changing Station **T22**: Wall-mounted, folding, anti-microbial, baby changing station for use in commercial toilet facilities, meeting or exceeding ASTM F2285.
1. Unit to include a built-in liner dispenser.
2. Material: Polyethylene, with stainless steel front surface.
3. Mounting: Surface.
4. Color: As selected.
5. Minimum Rated Load: 250 pounds.
6. Basis of Design Product: Subject to compliance with requirements, provide **Koala Kare; KB200-SS Horizontal Mounted Baby Changing Station**, or a comparable product by one of the following;
a) American Specialties, Inc: wwww.americanspecialties.com.

b) Bradley Corporation: www.bradleycorp.com.
c) Include optional Braille label.
d) Substitutions: 01 6000 - Product Requirements.

2.8 UTILITY ROOM ACCESSORIES

A. Dilution and Dispensing System: Lockable storage and dispensing cabinet for up to 4 container, with dial control for dilution and dispensing of cleaning materials.
1. Owner furnished, Contractor installed.
2. Water pressure requirements: 25-80 psi, 40 preferred for optimal performance.
a) Flow Rate:
1) Bucket Fill: 3.5 gpm.
2) Bottle Fill: 1 gpm.
b) Fill Connections: Up to 4 bottle or bucket fills.
3. Product: **Spartan; VersaFill 3**.
a) Provide complete set of accessories with each unit, including but not limited to, procedures charts, labeling systems, bottle/bucket fill chart, and empy container replacement chart.

B. Combination Utility Shelf/Mop and Broom Holder T21: 0.05 inch thick stainless steel, Type 304, with 1/2 inch returned edges, 0.06 inch steel wall brackets.
1. Hooks: Two, 0.06 inch stainless steel rag hooks at shelf front.
2. Mop/broom holders: Three spring-loaded rubber cam holders at shelf front.
3. Length: 36 inches.
4. Products:
a) Basis of Design: Subject to compliance with requirements, provide **Bobrick; Model No. B-239 Utility Shelf with Mop/Broom Holders and Rag Hooks** or a comparable product by one of the following:
1) American Specialties, Inc: www.americanspecialties.com/#sle.
2) Bradley Corporation: www.bradleycorp.com.
3) _____.
4) Substitutions: 01 6000 - Product Requirements.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify exact location of accessories for installation.

3.2 PREPARATION

A. Deliver inserts and rough-in frames to site for timely installation.

B. Provide templates and rough-in measurements as required.

3.3 INSTALLATION

A. Install accessories in accordance with manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Grab Bars: Install to comply with specified structural-performance requirements.

C. Shower Seats: Install to comply with specified structural-performance requirements.

D. Mounting Heights: As required by accessibility regulations and as indicated on Drawing A701 - Typical Mouting Heights.

3.4 PROTECTION

A. Protect installed accessories from damage due to subsequent construction operations.

3.5 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Clean and polish exposed surfaces in accordance with manufacturer's written instructions.

END OF SECTION 10 2800

SECTION 10 4400 - FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fire extinguishers.

B. Fire extinguisher cabinets.

C. Accessories.

1.2 REFERENCE STANDARDS

A. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a (Reapproved 2017).

B. NFPA 10 - Standard for Portable Fire Extinguishers; 2017, with Errata (2018).

1.3 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide extinguisher operational features.

C. Shop Drawings: Indicate locations of cabinets and cabinet physical dimensions.

D. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.

E. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.4 FIELD CONDITIONS

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Fire Extinguishers:
1. Activar Construction Products Group, Inc. - JL Industries: www.activarcpg.com/#sle.
2. Kidde, a unit of United Technologies Corp: www.kidde.com/#sle.
3. Nystrom, Inc: www.nystrom.com/#sle.
4. Oval Brand Fire Products: www.ovalfireproducts.com/#sle.
5. Pyro-Chem, a Tyco Business: www.pyrochem.com/#sle.

B. Fire Extinguisher Cabinets and Accessories:
1. Activar Construction Products Group, Inc. - JL Industries: www.activarcpg.com/#sle.
2. Kidde, a unit of United Technologies Corp: www.kidde.com/#sle.
3. Larsen's Manufacturing Co: www.larsensmfg.com/#sle.

4. Nystrom, Inc: www.nystrom.com/#sle.
5. Oval Brand Fire Products; Cabinets for Low Profile Extinguishers: www.ovalfireproducts.com/#sle.

2.2 FIRE EXTINGUISHERS

A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.

B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gauge.
1. Class: A:B:C type.
2. Size: 10 pound.
3. Finish: Baked polyester powder coat, red color.
4. Temperature range: Minus 40 degrees F to 120 degrees F.

C. Dry Chemical Type Fire Extinguishers: Stainless steel tank, with pressure gauge.
1. Class: K type.
2. Size: 1.6 gallons.
3. Finish: Polished stainless steel.
4. Temperature range: Minus 20 degrees F to 120 degrees F.

2.3 FIRE EXTINGUISHER CABINETS

A. Fire Rating: Listed and labeled in accordance with ASTM E814 requirements for fire resistance rating of walls where being installed.

B. Cabinet Construction: Non-fire rated.
1. Formed primed steel sheet; 0.036 inch thick base metal.

C. Fire Rated Cabinet Construction: One-hour fire rated.
1. Steel; double wall or outer and inner boxes with 5/8 inch thick fire barrier material.

D. Cabinet Configuration: Semi-recessed type.
1. Size to accommodate accessories.
2. Trimless type.
3. Provide cabinet enclosure with right angle inside corners and seams, and with formed perimeter trim.

E. Door: 0.036 inch metal thickness, reinforced for flatness and rigidity with nylon catch. Hinge doors for 180 degree opening with continuous piano hinge.

F. Door Glazing: Acrylic plastic, clear, 1/8 inch thick, flat shape and set in resilient channel glazing gasket.

G. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.

H. Finish of Cabinet Exterior Trim and Door: Paint color as indicated on the Finish Product List "Finishes for Miscellaneous Items" on the drawings.

I. Finish of Cabinet Interior: White colored enamel.

2.4 ACCESSORIES

A. Extinguisher Brackets: Formed steel, chrome-plated.

B. Lettering: FIRE EXTINGUISHER decal, or vinyl self-adhering, pre-spaced black lettering in accordance with authorities having jurisdiction (AHJ).

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify rough openings for cabinet are correctly sized and located.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install cabinets plumb and level in wall openings, at height indicated on Drawing A701 - Typical Mounting Heights.

C. Secure rigidly in place.

D. Place extinguishers in cabinets.

END OF SECTION 10 4400

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SECTION 10 5113 - METAL LOCKERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Metal lockers.

B. Locker benches.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 06 1000 - Rough Carpentry: Wood blocking and nailers.

1.3 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2023, with Editorial Revision.

C. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer's published data on locker construction, sizes, and accessories.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Shop Drawings: Indicate locker plan layout, numbering plan and combination lock code. Provide plans, elevations, sections, and details. Show locations of ADA-compliant lockers.

E. Samples: Submit two samples 3 by 6 inches in size minimum showing color and finish of metal locker material, for each locker color specified.

F. Manufacturer's Installation Instructions: Indicate component installation assembly.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect locker finish and adjacent surfaces from damage.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Metal Lockers:
   1. Basis of Design: Penco; Welded Gen2.

B. Other Acceptable Manufacturers: Subject to compliance with requirements.
   1. Lyon Workspace Products: www.lyonworkspace.com/#sle.
   2. Republic Storage Systems Co: www.republicstorage.com/#sle.
   3. Substitutions: See Section 01 6000 - Product Requirements.

2.2 LOCKER APPLICATIONS

A. Student Lockers: **Types A and B**. Metal lockers, free-standing with matching closed base.
   1. Width: 9 inches 12 inches.
   2. Depth: 15 inches 18 inches.
   3. Height:
      a) Type A: 72 inches.
      b) Type B: 40 inches, nominal.
   4. Configurations: As indicated below.
      a) **Type A**: ~~Four tier~~. Double-tier.
      b) **Type B**: Single-tier.
   5. Fittings: Size and configuration as indicated on drawings.
      a) Provide additional shelf for accessibility compliance, as indicated on drawings. Provide at 5% of each locker type, or (1) minimum, whichever is greater.
      b) Hooks: One single prong.
   6. Ventilation: Louvers at top and bottom of door panel.
   7. Locking: Recessed lift handles with built-in padlock hasp.
      a) Accessible Lockers: Provide a built-in digital keypad lock.
   8. Provide sloped top, to the extent indicated on drawings.
   9. Color: To be selected from manufacturer's full range by Architect and allow for (3) additional custom accent colors, as indicated on the "Finish Product List - Finishes for Miscellaneous Items" on the drawings.

B. Custodial Lockers: **Type C**. Metal lockers, free-standing with matching closed base.
   1. Width: 18 inches.
   2. Depth: 18 inches.
   3. Height: 72 inches.
   4. Configuration: Single tier.
   5. Fittings: Size and configuration as indicated on drawings.

a) Hat shelf.
b) Hooks: One single prong.
c) Provide additional shelf for accessibility compliance, as indicated on drawings. Provide at 5% of each locker type, or (1) minimum, whichever is greater.

6. Locking: Recessed lift handles with built-in padlock hasp.
   a) Accessible Lockers: Provide a built-in digital keypad lock.
7. Provide sloped top, to extent indicated on drawings.
8. Color: To be selected from manufacturer's full range by Architect. Refer to "Finishes for Miscellaneous Items" on the "Finish Product List" on the drawings for additional information.

C. Athletic Lockers: **Types D and E**. Metal lockers, free-standing with matching closed base.
1. Width: 12 inch.
2. Depth: 18 inches.
3. Height: 72 inches.
4. Configurations:
   a) **Type D**: Two tier.
   b) **Type E**: Four tier.
5. Fittings: Size and configuration as indicated on drawings.
   a) Provide additional shelf for accessibility compliance, as indicated on drawings. Provide at 5% of lockers, or (1) minimum, whichever is greater - for Type D only,
6. Ventilation: Perforated side panels and doors.
7. Locking: Recessed lift handles with built-in padlock hasp at two-tier lockers.
   a) Four-tier lockers: Built-in padlock hasp.
   b) Accessible Lockers: Provide a built-in digital keypad lock.
8. Provide sloped top, to the extend indicated on drawings.
9. Color: To be selected from manufacturer's full range by Architect. Refer to "Finishes for Miscellaneous Items" on the "Finish Product List" on the drawings for additional information.

2.3 METAL LOCKERS

A. Accessibility: Design units indicated on drawings as 'accessible' to comply with ICC A117.1 and ADA Standards.

B. Locker Case Construction:
1. Heavy-Duty, Welded Construction: Made of formed and welded together sheet steel; metal edges finished smooth without burrs; baked enamel or powder coat finished inside and out.
   a) Assembly: Do not use bolts, screws, or rivets to assemble locker bodies.
   b) Locker Body Components: Formed and flanged from steel sheet of the following type and minimum thicknesses:
      1) Unperforated Steel Sheet: Commercial Steel (CS), Type B, supplied for exposed applications and complying with ASTM A1008/A1008M and the following:
         (a) Uncoated.
      2) Perforated Steel Sheet: Commercial Steel (CS), Type B, supplied for exposed applications and complying with ASTM A1008/A1008M and the following:

(a) Uncoated.
3) Body and Shelves: 16 gauge, 0.0598 inch.
4) Backs: 18 gauge, 0.0478 inch.
c) Frames: Formed channel shape, welded and ground flush, welded to body, resilient gaskets and latching for quiet operation.
1) Door Frame: 16 gauge, 0.0598 inch, minimum.
d) Where ends or sides are exposed, provide flush panel closures.
e) Provide filler strips where indicated or required, securely attached to lockers.

C. Latches and Door Handles: Manufacturer's standard.
1. Latching: Manufacturer's standard for locking arrangement selected.
a) Three-Point Lift Handle Gravity Latch: Pocket-mounted, provide for doors 18 inches or taller.
1) Handle Pocket, Recess: Stainless steel flush-mounted cup recessed into face of door.
2) Handle: Steel finger lift mechanism with exposed portion encased in molded plastic trigger.
(a) Padlock Eye: Integral with lift trigger, sized for use with 9/32 inch diameter padlock shackles.
3) Latching Mechanism: Spring activated nylon slide latch enclosed in steel latch channel allows closing of door while padlock or built-in lock is in position.
4) Lock Hole Filler Plate: Manufacturer's standard. Provide for lockers intended to be unsecured or secured with padlocks.
5) Rubber bumpers riveted to door stops for silent operation.

D. Hinges: Continuous piano hinge with powder coat finish to match locker color.

E. Sloped Top: 20 gauge, 0.0359 inch, with closed ends.

F. Coat Hooks: Stainless steel or zinc-plated steel.

G. Built-In Digital Keypad Locks:
1. Built-In Digital Keypad Lock: Battery-powered lock with alphanumeric keypad for 4-digit access code; optional access with programming, manager bypass, or user key.
a) Latch: Deadbolt.

2.4 LOCKER BENCHES

A. Locker Benches: Stationary type; bench top of laminated maple; painted steel pedestals.
1. Accessibility: Comply with ICC A117.1 and ADA Standards.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that prepared bases are in correct position and configuration.

B. Verify bases are properly sized.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions and approved shop drawings.

B. Place and secure on prepared base.

C. Install lockers plumb and square.

D. Secure lockers with anchor devices to suit substrate materials. Minimum Pullout Force: 100 pounds.

E. Bolt adjoining locker units together to provide rigid installation.

F. Install end panels, filler panels, and sloped tops.

G. Install fittings if not factory installed.

H. Replace components that do not operate smoothly.

3.3 CLEANING

A. Clean locker interiors and exterior surfaces.

END OF SECTION 10 5113

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SECTION 10 5502 - MAIL SORTER

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Mail sorter.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

1.3 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's specifications and descriptive literature, installation instructions, and maintenance information.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Samples: Submit two sets of manufacturer's available colors.

E. Warranty: Specimen warranty.

1.4 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Provide manufacturer's limited lifetime warranty against defects in materials or workmanship.

PART 2 PRODUCTS

2.1 MAIL SORTER

A. Mail Sorter **EQ11**: Mail sort modules set into an aluminum console frame, with open front mail slots and closed back.
   1. Sort Shelf Spacing: 1-inch increments.
   2. Sorting Shelf Capacity: Up to 35 lbs.

3. Sorting Shelf Size: Standard, for letter-size documents, unless otherwise indicated on drawings.
   a) Include manufacturer's standard mail slot label accessories.
4. Number of Slots: As indicated on drawings.
5. Slot Size: As indicated on drawings.
6. Riser height: As indicated on drawings.
7. Overall Size: As indicated on drawings.
8. Finish Color: As selected by Architect from the manufacturer's full range.
9. Basis of Design Product:
   a) **Hamilton Casework Solutions**; **Model S3-42CE03**: www.hamiltoncs.com.
   b) Other Acceptable Manufacturers (subject to compliance with requirements):
      1) Safco; www.safcoproducts.com.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install mail sorter in accordance with approved shop drawings and manufacturer's instructions.

END OF SECTION 10 5502

SECTION 10 7516 - GROUND-SET FLAGPOLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes:

1. Flagpole.
2. American Flags.

B. Related Requirements:

1. Division 00 Section "Geotechnical Data" for geotechnical report.

2. Division 01 Section(s) "Construction Waste Management and Disposal" and "Sustainability Compliance Procedures" for sustainability requirements

3. Division 03 Section "Cast-in-Place Concrete" for flagpole footing.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, operating characteristics, fittings, accessories, and finishes for flagpoles.

B. CTHPB Documentation Submittals: Comply with Section 01 3566.42 – Sustainability Compliance Procedures and provide the following in addition to other submittals:

1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

C. Shop Drawings: For flagpoles.

1. Include plans, elevations, and attachment details. Show general arrangement, jointing, fittings, accessories, grounding, anchoring, and support.
2. Include section, and details of foundation system.

D. Samples for Verification: For each type of exposed finish, in manufacturer's standard sizes.

E. Delegated-Design Submittal: For flagpoles.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For flagpoles to include in operation and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Flagpole Specialist Qualifications: A qualified flagpole installer specialist.

1.6 WARRANTY

A. For productions noted in this section, provide manufacturer’s standard warranty, minimum of one year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain flagpoles as complete units, including fittings, accessories, bases, and anchorage devices, from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 4000 "Quality Requirements", to design flagpole assemblies.

B. Seismic Performance: Flagpole assemblies shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

C. Structural Performance: Flagpole assemblies, including anchorages and supports, shall withstand design loads indicated within limits and under conditions indicated.

1. Wind Loads: Determine according to NAAMM FP 1001. Basic wind speed for Project location is Greenwich, Connecticut.
2. Base flagpole design on polyester, nylon or cotton flags of maximum standard size suitable for use with flagpole or flag size indicated, whichever is more stringent.

2.3 FLAGPOLE FITTINGS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. American Flagpole.
2. Eder Flag Manufacturing Company, Inc.
3. Morgan-Francis Flagpoles and Accessories.
4. Pole-Tech Company Inc.

B. Exposed Height: 40

C. Sleeve for Flagpole: Fiberglass or PVC pipe foundation sleeve, made to fit flagpole, for casting into concrete foundation.

D. Cast Aluminum Base: Provide cast aluminum octagonal base Model No. MF 3380-1 with painted finish to match color of flagpole as manufactured by Morgan-Francis Flagpoles and Accessories, 9850 East 30th Street, Indianapolis, IN 46229; (800) 814-9568, or approved equal.

E. Internal Halyard, Winch System: Manually operated winch with control stop device and removable handle, stainless-steel cable halyard, and concealed revolving truck assembly with plastic-coated counterweight and sling. Furnish flush access door secured with cylinder lock. Finish truck assembly to match flagpole.

1. Halyard Flag Snaps: Stainless-steel swivel snap hooks with neoprene or vinyl covers. Furnish two per halyard.
2. Plastic Halyard Flag Clips: Made from injection-molded, UV-stabilized, acetal resin (Delrin). Clips attach to flag and have two eyes for inserting both runs of halyards. Furnish two per halyard.

    a. Product: Subject to compliance with requirements, provide "Quiet Halyard" flag clasp by Acme/Lingo Flagpoles LLC.

F. American Flag:

1. Material: Nylon.
2. Construction: Sewn stripes, embroidered stars, constructed with heavy canvas heading material, 4 rows of stitching at the fly end, and rugged brass grommets. Flag shall be designed for outdoor use and to resist fading and fraying.
3. Size: 6 feet by 10 feet.

2.4 MISCELLANEOUS MATERIALS

A. Drainage Material: Crushed stone, or crushed or uncrushed gravel; coarse aggregate.

B. Elastomeric Joint Sealant: Multicomponent nonsag urethane, single-component nonsag urethane, or single-component neutral-curing silicone joint sealant as recommended by flagpole manufacturer and complying with requirements in Section 07 9200 "Joint Sealants".

C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

2.5 ALUMINUM FINISHES

A. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

1. Color: As selected from manufacturer's full range of colors by Landscape Architect.

PART 3 - EXECUTION

3.1 PREPARATION

A. Foundation Excavation: Excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete. Place and compact drainage material at excavation bottom.

B. Provide forms where required due to unstable soil conditions and for perimeter of flagpole base at grade. Secure and brace forms to prevent displacement during concreting.

C. Place concrete, as specified in Section 03 3000 "Cast-in-Place Concrete". Compact concrete in place by using vibrators. Moist-cure exposed concrete for no fewer than seven days or use nonstaining curing compound.

D. Trowel exposed concrete surfaces to a smooth, dense finish, free of trowel marks, and uniform in texture and appearance. Provide positive slope for water runoff to perimeter of concrete base.

3.2 FLAGPOLE INSTALLATION

A. General: Install flagpoles where indicated and according to Shop Drawings and manufacturer's written instructions.

END OF SECTION 10 7516

SECTION 11 0610 - STAGE RIGGING AND CURTAINS

PART 1 GENERAL

1.1 GENERAL PROVISIONS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 EXAMINATION OF SITE AND DOCUMENTS

A. Bidders are expected to examine and to be thoroughly familiar with all contract documents and with the conditions under which work will be carried out. The Awarding Authority (Owner) will not be responsible for errors, omissions and/or charges for extra work arising from General Contractor's or Trade Contractor's failure to familiarize themselves with the Contract Documents or existing conditions. By submitting a bid, the Bidder agrees and warrants that he has had the opportunity to examine the site and the Contract Documents, that he is familiar with the conditions and requirements of both and where they require, in any part of the work a given result to be produced, that the Contract Documents are adequate and that he will produce the required results.

1.3 SUMMARY

A. Section Includes
1. Motorized rigging system
2. Integrated lighting connector strips
3. Dead-hung pipes
4. Stage traveler track assemblies
5. Pipe battens
6. Electric batten cable management
7. Stage curtains
8. Accessories

B. Related Sections
1. Section 26 5561 – Theatrical Lighting
2. Division 26

1.4 REFERENCES

A. American National Standards Institute (ANSI)
1. E1.4-1 – Entertainment Technology – Manual Counterweight Rigging Systems
2. E1.4-2 – Entertainment Technology – Statically Suspended Rigging Systems
3. E1.6-1 – Entertainment Technology – Powered Hoist Systems

1.6 BID SUBMITTALS

A. Qualifications
1. Bidder shall be a system contractor, normally engaged in the full time business of rigging system installation. Provide evidence that the bidder has been in business for at least five years prior to bid date and has completed projects of similar size and scope.
2. References, including names and telephone numbers of individuals who may be contacted, showing satisfactory completion of five or more projects similar in scope and type to that specified herein.
3. Evidence of ability and affirmation of intent to meet the guarantee and service requirements stated herein.
4. Each vendor shall include a description of the professional and technical experiences background, qualifications and expertise of the organization's key personnel assigned to this project. The description shall show that bidder possesses the demonstrated skills and experience in specific areas of the project scope. In addition, Bidder shall identify a project manager for the project and shall provide resumes of all personnel who shall be assigned to this project. Bidder shall estimate the percentage of time each individual shall be working on this project.

B. Alternates
1. With system bid price, submit prices for equipment and installation of additional or reduced quantities of equipment as stated herein. Unless otherwise stated, all items herein are part of the base bid system.

C. Substitutions
1. Any request for a substitution for a specified product or material must be made, in writing, to the Architect. Such requests must not impact the project schedule.
2. Substitution requests will only be accepted if the Architect deems the product or materials to be an equal to the specified product. No substitutions may be made without written authorization from the Architect.
3. Any and all additional expenses incurred as a result of a requested substitution shall be borne solely by the Contractor. These expenses may include, but not be limited to, all fees and expenses incurred by the Architect in evaluating the substitution and additional costs to other contractors incurred by the substitution.

1.7 DEFINITIONS

A. Furnish – Purchase and/or fabricate the item and deliver to site.

B. Install – Perform the physical installation of the item on the site.

C. Provide – Furnish and install item or items, complete with any and all required accessories.

1.8 SYSTEM DESCRIPTION

A. System includes:

1. Motorized rigging system
2. Stage travelers, track and accessories
3. Masking drapery

1.9 SUBMITTALS

A. Provide submittals in accordance with requirements of Section 01 3000 – Administrative Requirements.

B. Product Data
1. Complete Bill of Materials.
2. Submit manufacturer's product data for all standard hardware including dimmers, wire rope compression sleeves, turnbuckles, shackles and wire rope.

C. Shop Drawings
1. Shop drawings shall be submitted in an expeditious manner. The timing of the submittal shall allow sufficient time for review, revision and resubmittal without impacting the project schedule.
2. Shop drawing sheet size shall be uniform with a minimum size of 24" x 36" and be printed in greyscale.
3. Shop drawings shall include the following
   a. ¼"=1'-0" scale plans and elevations including locations of electrical and control system components
   b. Electrical riser and wire termination diagrams
   c. Assembly drawings of all major components including weights, dimensions and finishes.
   d. Calculations of weight and loading bearing capacity of individual components and the full system. Indicate ultimate breaking strength and safety factor for all rigging components.
   e. Component and installation drawings and schedules showing all information necessary to fully explain the design features, appearance, function, fabrication, installation, and use of system components in all phases of operation.
   f. All rigging drawings shall be stamped by a licensed professional engineer. The engineer shall verify that the equipment supplied under this section meets or exceed the design criteria set forth in this specification and on the Drawings.
   g. Space for review stamps and comments.
   h. Complete list of all draperies indicating material, fullness, color, size and finishing details.
   i. 24-inch by 24-inch swatch of each fabric in the system.
4. Approval of the shop drawings does not relieve the Rigging Contractor of the responsibility of providing equipment in accordance with the specifications.

D. Quality Assurance/Control
1. Verify wire type, conduit size, and power requirements for all electrified elements in system.

E. Closeout Submittals

1. Submit documents in accordance with Division 1.
2. Within 45 days of acceptance testing, submit the following:
   a. One set of reproducible as-built drawings. These drawings shall include all adjustments made during the installation and acceptance testing processes.
   b. Upon completion of commissioning, the Contractor shall submit 3 copies of a detailed Operating and Maintenance Manual including as-built shop drawings, equipment descriptions, and parts lists. The Contractor shall go through the manual with personnel designated by the owner to demonstrate and explain the maintenance and operation of the systems.
   c. Draperies:
      1) Cleaning instructions.
      2) Compiled list of all periodic maintenance required for all components of the system.
      3) Original signed and notarized certificates with each fabric used affirming the fabrics satisfy all applicable codes.

1.10 QUALITY ASSURANCE

A. Qualifications
   1. The Contractor shall have a valid Contractor's License at the time of bid and throughout the project.

B. Pre-Installation Meetings
   1. Attend coordination meetings as required to ensure installation is coordinated with other trades.

C. All draperies shall be the fabricated by a single theatrical drapery contractor.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Packing, Shipping, Handling, and Unloading
   1. All shipping and trucking costs are the responsibility of the Contractor. Method of shipment is at the discretion of the Contractor.

B. Acceptance at Site
   1. Coordinate delivery and acceptance with the Construction Manager.

C. Storage and Protections
   1. Protect all equipment from damage and deterioration during all phases of work.

1.12 PROJECT CONDITIONS

A. Existing Conditions
   1. Verify all existing conditions and dimensions at the project site prior to preparing submittal drawings.

2. Verify final drapery dimensions in field prior to fabrication.

1.13 WARRANTY

A. The Rigging Contractor shall provide a two year written guarantee against defects in materials or workmanship. The warranty period shall start from the date of acceptance of the work by the Owner's Designated Representative. Any required maintenance or replacement shall be provided by the Contractor within fifteen days of notification by the Owner, except for safety related items, which shall be corrected within 48 hours of notification.

1.14 COMMISSIONING

A. Upon completion of the work, notify the Architect in writing that the system is ready for commissioning.

B. During commissioning the Owner's Designated Representative will verify that system operation is per specifications. Provide a representative on-site to assist in the commissioning of the system and fix minor problems as they are discovered.

1.15 OWNER'S INSTRUCTION

A. Provide in-depth training of the user's staff in the operation of system after completion of punch list items.

B. All training shall be performed by the staff of Contractor.

C. Signage with basic operating instructions and warnings shall be posted in the area where the equipment will be operated. Signage shall be in conformance with ANSI-Z535.

1.16 MAINTENANCE

A. Extra Materials
1. Provide maintenance materials to the Owner as required for routine maintenance of system and components for two years.

B. Maintenance Services
1. One year after acceptance testing a technician shall return to the project site to inspect, adjust, and repair the system. All labor and materials required to perform this service shall conform to these specifications.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Equipment Manufacturers
   1. Wenger/J.R. Clancy
   2. H&H Specialty
   3. Texas Scenic
   4. H&H Specialties
   5. Thern
   6. I. Weiss
   7. Electronic Theatre Controls (ETC)

B. Drapery Manufacturers
   1. Stage Decoration and Supply
   2. Rosebrand
   3. Major Theatre Equipment

2.2 MATERIALS

A. Materials shall conform to the following ASTM and ANSI standard specifications:
   1. A-36 -Specification for structural steel
   2. B18.2.1&2 - Specification for square and hex bolts and nuts
   3. B 106.1M – Design of Transmission Shafting
   4. B 17.1 – Keys and Keyseats

B. All overhead rigging elements including but not limited to mounting hardware, wire rope, wire rope fittings, and shackles to be designed to a safety factor of 10 times their rated breaking strength.

C. Cable Fittings:
   1. Cable clips shall conform to wire rope manufacturer's recommendations as to size, number, and method of installation. Clips shall be drop forged "Crosby" or approved equal. Under no circumstances may malleable cable clips be used in suspension or lifting lines.
   2. Swaged sleeve fittings shall be copper "Nicopress" or equal. Swaged fittings shall be installed per the fitting manufacturer's instructions, using the appropriate tools, and checked with a "Go - No go" gauge.
   3. Eyes shall be formed over galvanized wire rope thimbles of correct sizes.

D. All turnbuckles and shackles shall be drop forged and galvanized.

E. Draperies
   1. Provide vat-dyed fabrics that are inherently flame-resistant or fully flame retardant in accordance with NFPA 701 (2023) and the International Building Code.

2.3 FABRICATION

A. Fabrication Tolerances

1. The mechanical fabrication and workmanship shall incorporate best practices for good fit and finish. There shall be no burrs or sharp edges to cause a hazard or any sharp corners accessible to personnel.
2. All equipment shall be built and installed to facilitate future maintenance and replacement.

B. Drapery
1. Provide all fabric cuts with full length; no splices.
2. Provide draperies with sewn fullness and fabric types as indicated in the Drapery Schedule.
3. Remove all drapery fabric from bolts and inspect on illuminated (100 foot-candle minimum) table for flaws and imperfections. Cut out flawed section prior to sewing final product.
4. Provide all draperies with heavy-duty polyester webbing with a minimum weight of 2.8 oz per yard, double stitched as the top 2-3/4 inches apart and having machine set black anodized grommets on one foot centers.
5. Floor length draperies will have a six (6) inch bottom hem with suspended inner pocket containing #8 zinc coated chain weight. Lead tape, or any other toxic substances, shall not be incorporated into any product in this section. Leading hems of traveler curtains will use one-half width turnback. All other side hems will be two (2) inches.
6. All linings (where applicable) for draperies shall be attached to the face material by adjustable black hook-and-loop tape (one inch wide) and approximately 10” long, in two 5” sections arranged to be concealed from the face side. Tape sections are to be located at approximately 36” spacing along the bottom and 24” at the sides. Attach tapes to edge of vertical facebacks and top of bottom hem with mates attached to edge of lining.
7. Provide drapery lining with the same fullness as the face fabric and finish 2” shorter than the face fabric. Sew 10 inch bottom hem of lining to allow for shrinkage.
8. All draperies operating from traveler tracks shall have oblong spring, carabiner type snaps for each grommet location. All other draperies shall have black No. 4, 36” tie lines, knotted and tied.
9. Prior to sewing the bottom hem, the otherwise completed drapery sections shall be hung full height to their finished width and allowed to hang untouched for two weeks (minimum) after which the bottom shall be scribed and hemmed to the specified finished height. Scrims/Cycloramas shall have a pipe pocket in bottom hem. Scrims shall be finished at the top per above instructions and the bottom hem shall be six inches wide with an inner pocket pipe pocket.

2.4 FINISHES

A. Clean structural steel and fabricated steelwork of rust, scale and foreign matter by grinding. Finish steel with 1 coat of primer and 1 coat of enamel. Final finish shall be free of skips and runs. Touch up all field connections, welds and abraded areas after installation with primer and enamel.

B. All painted finished to be low-sheen black unless otherwise noted.

2.5 MOTORIZED HOISTS

A. General
1. Provide hoists manufactured and installed with the following safety factors:
   a. Cables and fittings: 10:1
   b. Maximum fleet angle: 1-1/2 degrees
   c. Steel: 5:1 from yield
   d. Bearings: Two times required load at full speed for 2000 hours.
2. Mechanical fabrication and workmanship shall incorporate best practices for good fit and finish. Remove all burrs or sharp edges that might cause a hazard to user or equipment.
3. Provide complete with compression tube, mule blocks and intermediate support steel.
4. Low trim for pipe battens: 4 foot above finished stage floor
5. Provide each hoist equipped with:
   a. Load sensing device
   b. Limit switches with hard-struck limits for normal and of travel and overtravel.
   c. Dual over-speed brake: spring applied, electrically released; capable of holding 150% of full load torque.
   d. Slack line detector
   e. Positional encoders
   f. Pipe batten
      1) Pipe batten shall be 1.5-inch nominal pipe thread schedule 40 pipe.
      2) Joints shall be internally sleeved with 18-inch long pipe and two bolts on either side of joint.
      3) Paint flat black.
      4) Provide safety-yellow vinyl end cap at each end of pipe batten.

B. Electric Batten Hoist
1. Batten payload capacity: per Drawings
2. Speed: 30 feet per minute
3. Integral cable management
4. Provide flexible multi-cable for distribution devices on electric battens. Provide junction box with terminal strip for attachment to wall or ceiling. Provide multi-cable of sufficient length to allow for full travel of electric. Provide with Kellems-style strain relief at junction box entry points.
5. Provide connector strip with hoist assembly: length, circuits, and connectors per Theatrical Lighting Drawings and Specifications
   a. Electronic Theatre Controls P1 Series
   b. JR Clancy Powerlift
   c. Vortek equal

2.6 MOTORIZED BATTEN

A. General
1. Hoists shall be purpose-designed and fabricated for overhead lifting of theatre lights in an auditorium or other places of public assembly where people shall move beneath the suspended or moving load. The systems shall incorporate mechanical, electrical and safety features that shall be inherent to this equipment; they shall provide an engineered,

efficient device for overhead lifting. Each hoist shall be fully tested throughout its full travel distance with all its lift lines terminated to the hoist before the hoist is shipped from the manufacturer

2. Provide hoists manufactured and installed with the following safety factors:
   a. Cables and fittings: 10:1
   b. Maximum fleet angle: 1-1/2 degrees
   c. Steel: 5:1 from yield
   d. Bearings: Two times required load at full speed for 2000 hours.
3. Mechanical fabrication and workmanship shall incorporate best practices for good fit and finish. Remove all burrs or sharp edges that might cause a hazard to user or equipment.
4. Provide each hoist equipped with:
   a. Load sensing device
   b. Limit switches with hard-struck limits for normal and of travel and overtravel.
   c. Dual over-speed brake: spring applied, electrically released; capable of holding 150% of full load torque.
   d. Slack line detector
   e. Positional encoders
   f. Pipe batten
5. Provide supplemental support steel as required to support device as shown on Drawings.

B. Batten Hoist
   1. Working load limit: 500 pounds
   2. Speed: 20 feet per minute
   3. Integral, helix-type cable management
   4. Dual 1/8-inch wire rope lift lines.
      a. Electronic Theatre Controls FlyPipe
      b. Equal
         1) Quantity: per Drawings

2.7 MOTORIZED HOIST CONTROL

A. General
   1. General
      a. Provide wall-mounted main control station with:
         1) Key-switch
         2) Display with feedback and hoist operating information including:
            a) Hoist name and number
            b) Hoist position relative to floor
            c) Load attached to batten
         3) Hold-to-operate up/down buttons
         4) E-stop button
         5) Wire remote control connection
         6) Hinged, locking door
         7) Surface mounted back box
   2. Operation
      a. Four hoists shall be selectable for operation at one time.
   3. Emergency Stop Button Stations

a. Provide E-stop button stations per drawings.
b. Wire to main controller.

4. Remote Pendant
   a. Provide push-button remote pendant with up, down, e-stop controls.
   b. Provide with 25-foot cable.
5. Product
   a. Electronic Theatre Controls QuickTouch Plus Mk2
   b. Equal

2.8 DEAD-HUNG BATTEN

A. Beam Clamp
1. Provide beam clamp with two 7-gauge painted steel plates with cut-out as required to grasp beam flange.
2. Provide beam clamp with ¼" round pin anchor shackle for attachment to support line.
3. Verify size of support steel in field before ordering beam clamp.

B. Support Line
1. Provide ¼" 7x19 galvanized wire rope
2. Minimum ultimate break strength: 7,000 pounds
3. Connect to pipe batten using copper compression sleeve, wire rope thimble, 24" length of 1/4" Grade 30 proof coil chain, and forged round pin shackle with cotter pin.

C. Batten
1. Material: 1-1/2 inch nominal pipe thread (NPT) schedule 40 steel pipe.
2. Sleeve: 18 inch long sleeve equally spaced around joined with two 3/8 inch hex head bolts and locking nuts perpendicular to each other on each side of joint.
3. Finish: flat black enamel
4. Ends: cover with brightly colored, closed end vinyl cap. Minimum length: 4 inches.
5. Center mark: 1 inch wide yellow stripe on stage centerline

2.9 STAGE TRAVELER TRACK ASSEMBLY

A. Provide bi-parting line-operated curtain track per Drawings for stage travelers.

B. Track
1. Material: 14 gauge 3 inch by 3 inch steel or aluminum channel
2. Color: black
3. Hanger: clamp to pipe batten
4. Hanger spacing: 6 feet on center
5. Center overlap: 3 feet

C. Carriers
1. Master carrier: one per traveler panel, each with four pairs of neoprene wheels attached to steel support plate.

2. Single Carrier: Two heavy-duty neoprene wheels on ball-bearing attached to steel support plate.
3. Trim chain: 4 inch long, attached to all carriers
4. Provide back pack guide for all carriers.

D. Pulley Blocks
1. Dead end pulley: 8 inch diameter Nylatron sheave on ball bearing.
2. Live end pulley: two 8 inch diameter Nylatron sheaves on ball bearings.
3. Floor Pulley: 8 inch diameter Nylatron sheave on ball bearing with eight inches of height adjustment. Provide with sandbag weight.

E. Operating Line
1. Material: ½ inch diameter braided black cotton cord with synthetic center in single, unspliced length.

F. Product
1. Automatic Devices Company Series 380 cord-operated bi-part curtain track
2. H&H Specialties equal

2.10 PIPE BATTENS

A. Batten
1. Material: 1-1/2 inch nominal pipe thread (NPT) schedule 40 steel pipe.
2. Sleeve: 24 inch long sleeve equally spaced around joined with two 3/8 inch hex head bolts and locking nuts perpendicular to each other on each side of joint.
3. Finish: flat black enamel
4. Ends: cover with brightly colored, closed end vinyl cap. Minimum length: 4 inches.
5. Center mark: 1 inch wide yellow stripe on stage centerline

B. General Purpose Batten Lift Line Attachment
1. Full pipe clamp with lift line adjustment mechanism.

2.11 DRAPERIES

A. Main Traveler
1. Material
a. 26 ounce IFR velour
b. 45 backing ends per inch
c. 51 pile ends per inch
d. 48 picks per inch
e. 1148 pile tufts per square inch
f. 120/1000 inch pile height
g. Acceptable Products
1) K-M Fabrics “Prestige”
2) Equals by JB Martin, Gerriets or DeBall
2. Color: Selected from the approved manufacturer’s complete selection of standard colors.

3. Hems
   a. Offstage: 4 inch
   b. Onstage: Half of width of fabric
4. Lining Black IFR Avora
5. Fullness: Box pleats one foot on center, per Drapery Schedule
6. Top Finish: Grommets and oblong spring-closure carabineer on one foot centers
7. Bottom Finish: 6 inch muslin chain pocket with #8 chain.

B. Leg and Side Masking Panel
   1. Material
      a. 20 ounce IFR velour
      b. 65 backing ends per inch
      c. 51 pile ends per inch
      d. 51 picks per inch
      e. 1658 pile tufts per square inch
      f. 130/1000 inch pile height
      g. Acceptable Products
         1) K-M Fabrics “Crescent”
         2) Equals by JB Martin, Gerriets or DeBall
   2. Color: Black
   3. Hems: 4 inch side hems
   4. Lining: None
   5. Fullness: Box pleats one foot on center, per Drapery Schedule
   6. Top Finish: Grommets and oblong spring-closure carabineer on one foot centers
   7. Bottom Finish: 6 inch muslin chain pocket with #8 chain.

C. Border
   1. Material
      a. 20 ounce IFR velour
      b. 65 backing ends per inch
      c. 51 pile ends per inch
      d. 51 picks per inch
      e. 1658 pile tufts per square inch
      f. 130/1000 inch pile height
      g. Acceptable Products
         1) K-M Fabrics “Crescent”
         2) Equals by JB Martin, Gerriets or DeBall
   2. Color: Black
   3. Hems: 4 inch side hems
   4. Lining: None
   5. Fullness: Box pleats one foot on center, per Drapery Schedule
   6. Top Finish: Grommets and 36 inch knotted black tie lines on one foot centers
   7. Bottom Finish: 6 inch muslin chain pocket with #8 chain.

D. Stage Traveler
   1. Material
      a. 20 ounce IFR velour
      b. 65 backing ends per inch
      c. 51 pile ends per inch
      d. 51 picks per inch
      e. 1658 pile tufts per square inch
      f. 130/1000 inch pile height
      g. Acceptable Products
         1) K-M Fabrics “Crescent”
         2) Equals by JB Martin, Gerriets or DeBall

2. Color: Black
3. Hems
   a. Offstage: 4 inch
   b. Onstage: Half of width of fabric
4. Fullness: Box pleats one foot on center, per Drapery Schedule
5. Lining: None
6. Top Finish: Grommets and oblong spring-closure carabineer on one foot centers
7. Bottom Finish: 6 inch muslin chain pocket with #8 chain.

E. Cyclorama
1. Material: Seamless bleached flame-retardant muslin
2. Seams: sewn horizontally
3. Color: White
4. Hems: 3 inch side hems
5. Lining: None
6. Top Finish: Grommets and 36 inch knotted black tie lines on one foot centers
7. Bottom Finish: 6 inch muslin pipe pocket behind bottom hem.

2.12 PIPE WEIGHT

A. Provide one-inch nominal NPT pipe with threaded ends and coupling for full width of draperies with pipe pocket bottoms.

B. Clean and paint fittings and pipe black.

PART 3 EXECUTION

3.1 INSTALLERS

A. Only qualified personnel shall install the equipment in this Section.

3.2 EXAMINATION

A. Site Verification of Conditions
1. The Contractor shall examine areas and conditions under which the equipment is to be installed and shall notify the Owner's Designated Representative in writing of conditions detrimental to the proper and timely completion of the work. If unsatisfactory conditions are present, do not proceed with work until they have been corrected.

3.3 INSTALLATION

A. The Contractor shall be responsible for storage of stage equipment, tools, and equipment during the period of the installation.

B. Extent: All specified equipment shall be installed by fully trained superintendents and workmen. Equipment shall be installed in a workman like manner, per plans and specifications. Equipment shall be aligned, adjusted, and trimmed for the most efficient operation, the greatest safety and for the best visual appearance.

C. Standards: Installation practices shall be in accordance with OSHA Safety and Health Standards and all local codes. All welding must be performed in full compliance with the latest edition of the Structural Welding Code (ANSI/AWS D1.1).

D. Alignment: Mule blocks, cable rollers and guides shall be installed, as required, to provide proper alignment, to maintain specified fleet angles, and to prevent contact with other surfaces.

E. Attachments: All equipment shall be securely attached to the building structure. Underhung blocks and mule blocks shall be welded in place unless otherwise directed.

F. Secure ("mouse") all turnbuckles with bailing wire after adjustment.

G. Finishes:
1. All welds must be touched up to match disturbed finishes.
2. All finishes which are disturbed during shipping and installation shall be touched up to match the original.

H. Drapery
1. All materials to be flame-proofed to conform to local code.
2. Allow all draperies to hang in place for 48 hours prior to inspection.
3. Install drapery after stage house is fully climate controlled. Do not install draperies if there is a planned prolonged shut-down of the stage or auditorium climate control system before substantial completion.

3.4 FIELD QUALITY CONTROL

A. Site Tests, Inspection
1. Inspect all equipment for defects prior to installation.
2. Upon completion of installation and wiring, test all system functions for complete operation.

3.5 CLEANING

A. Touch up scratches as required.

B. The Contractor shall be responsible for clean-up, including removal of all packing materials and the protection of surfaces and equipment provided by other contractors.

3.6 INSPECTION AND TESTING

A. Inspection: During the installation of equipment the Contractor shall arrange for access as necessary for inspection of equipment by the Owner's Designated Representatives.

B. System Inspection & Pre-Testing: On completion of installation and testing the Contractor shall conduct a complete pre-test of the system to ensure it is working properly and in conformance with this specification. This shall include a complete test of all electrical systems and components. All tests shall be conducted as if the Architect or Consultant were present and appropriate corrections made before the final inspection. Inspection shall be done using the rigging equipment manufacturer's written inspection forms.

3.7 DEMONSTRATION

A. Upon system substantial completion, notify Architect, in writing, that system is ready for demonstration and inspection.

B. Demonstrate operation of installed equipment for approval by the Architect and Owner.

C. Make adjustments and modifications to the system as directed by the Architect and/or Owner.

D. The cost of re-inspection and additional testing by the Architect, if required, due to lack of system completion and/or errors and omissions shall be borne by the Contractor or the Construction Manager, depending on the area of work in question. Additional inspections and testing will be carried out on a time and expenses basis with standard hourly billing rates.

3.8 FOLLOW-UP INSPECTION

A. One year after the completion of installation, the return to the site and provide the following services:
   1. Complete inspection of the rigging system.
   2. Make all required adjustments.
   3. Correct all warranty items.
   4. Provide written recommendations for necessary repairs or changes not included in the warranty.
   5. Conduct a 1 hour rigging operation and safety class.
   6. Provide a written proposal for the next year's maintenance visit.

END OF SECTION

SECTION 11 3013 - APPLIANCES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Kitchen appliances.
   1. Range and recirculating hood.
   2. Dishwasher.
   3. Refrigerator.

B. Laundry appliances.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 26 0583 - Wiring Connections: Electrical connections for appliances.

1.3 REFERENCE STANDARDS

A. UL (DIR) - Online Certifications Directory; Current Edition.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's data indicating dimensions, capacity, and operating features of each appliance specified.

1.5 QUALITY ASSURANCE

A. Electric Appliances: Listed and labeled by UL (DIR) and complying with NEMA Standards (National Electrical Manufacturers Association).

1.6 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Provide manufacturer's standard warranty for each manufacturer and model specified.

PART 2 PRODUCTS

2.1 KITCHEN APPLIANCES

A. Refrigerator**, EQ01:** Free-standing, side-by-side with bottom-mounted freezer, and frost-free. Large capacity. ADA-compliant. Counter depth.
   1. Capacity: Total minimum storage of 28 cubic ft; minimum 20 percent freezer capacity.
   2. Energy Usage: Minimum 20 percent more energy efficient than energy efficiency standards set by U.S. Department of Energy (DOE).

a) Energy Star certified.

3. Features: Include glass shelves and light in freezer compartment.
4. Exterior Finish: Stainless steel. Fingerprint resistant.
5. Basis-of Design Product: See Specialty Equipment Schedule on Drawing A912.
6. Substitutions: See Section 01 6000 - Product Requirements.

B. Refrigerator**, EQ02:** Free-standing, side-by side doors with bottom-mounted freezer, and frost-free. ADA compliant.

1. Capacity: Total minimum storage of 20 cubic ft; minimum 15 percent freezer capacity.
2. Energy Usage: Minimum 20 percent more energy efficient than energy efficiency standards set by U.S. Department of Energy (DOE).
3. Features: Include glass shelves and light in freezer compartment.
4. Exterior Finish: Stainless steel.
5. Basis-of Design Product: See Specialty Equipment Schedule on Drawing A912.
6. Substitutions: See Section 01 6000 - Product Requirements.

C. Refrigerator**, EQ04:** Free-standing, undercounter, and frost-free. ADA compliant.

1. Capacity: Total minimum storage of 3.1 cubic ft, nominal; no freezer.
2. Energy Usage: Minimum 20 percent more energy efficient than energy efficiency standards set by U.S. Department of Energy (DOE).
   a) Energy Star certified.
3. Features: Include glass shelves and light in freezer compartment.
4. Exterior Finish: Porcelain enameled steel, color white.
5. Basis-of Design Product: **Summit: Model ASDS2413**. See Specialty Equipment Schedule on Drawing A912.
6. Substitutions: See Section 01 6000 - Product Requirements.

D. Refrigerator**, EH02:** Free-standing, undercounter, and frost-free. ADA compliant.

1. Capacity: Total minimum storage of 3.2 cubic ft, nominal; no freezer.
2. Energy Usage: Minimum 20 percent more energy efficient than energy efficiency standards set by U.S. Department of Energy (DOE).
   a) Energy Star certified.
3. Features: Include glass shelves and light in freezer compartment.
4. Exterior Finish: Porcelain enameled steel, color white.
5. Basis-of Design Product: **Summit: Model CP34WADA, ADA Height**. See Specialty Equipment Schedule on Drawing A912.
6. Substitutions: See Section 01 6000 - Product Requirements.

E. Range**, EQ08**: Electric, free-standing, with glass-ceramic cooktop. ADA-compliant.

1. Size: 30 inches wide.
2. Oven: Self-cleaning.
3. Elements: Four (4).
4. Controls: Front controls.
5. Features: Include oven door window and oven light.
6. Exterior Finish: Stainless steel, color as indicated.
7. Basis-of Design Product: See Specialty Equipment Schedule on Drawing A912.
8. Substitutions: See Section 01 6000 - Product Requirements.

F. Range**, EQ09**: Electric, free-standing, induction range with glass-ceramic cooktop. ADA-compliant

1. Size: 36 inches wide.
2. Oven: Catalytic cleaning.
3. Features: Include quiet close door, oven door window and oven light.
4. Exterior Finish: Stainless steel.
5. Electrical: 208/240V.
6. Basis-of Design Product: See Specialty Equipment Schedule on Drawing A912.
7. Substitutions: See Section 01 6000 - Product Requirements.

G. Island Hood **EQ03**: Box canopy island hood.
1. Features: Integral lights, touch controls with LCD display.
2. Exhaust: Convertible - ducted / recirculating.
3. Exterior Finish: Stainless steel.
4. Electrical: 120V.
5. Basis-of Design Product: See Specialty Equipment Schedule on Drawing A912.

H. Cooking Exhaust**, EQ14**: Range hood.
1. Exhaust: Recirculating.
2. Features: Include cooktop light, backdraft damper, and removable grease filter.
3. Exterior Finish: Painted steel, color as indicated.
4. Basis-of Design Product: See Specialty Equipment Schedule on Drawing A912.
5. Substitutions: See Section 01 6000 - Product Requirements.

I. Dishwasher**, EQ05:** Undercounter. ADA compliant.
1. Front controls, digital.
2. Cycles: Five (5), including normal, short, and pot and pan.
3. Finish: Stainless steel , wiht stainless steel interior.
4. Basis-of Design Product: See Specialty Equipment Schedule on Drawing A912.
5. Substitutions: See Section 01 6000 - Product Requirements.

J. Finish Color for Appliances: Refer to "Finishes for Miscellanous Items" on the "Finish Product List" on the drawings.All finishes to be fingerprint-proof type.

2.2 LAUNDRY APPLIANCES

A. Clothes Washer**, EQ06:** Top-loading stationary.
1. Size: 4.5 cu.ft. capacity.
2. Controls: Rotary. Located on front of washing machine.
3. Cycles: Include normal, delicate, and sanitize.
4. Motor Speed: Single-speed.
5. Features: Include end of cycle signal.
6. Finish: Painted steel , color as indicated.
7. Basis-of Design Product: See Specialty Equipment Schedule on Drawing A912.
8. Substitutions: See Section 01 6000 - Product Requirements.

B. Clothes Dryer**, EQ07**: Electric, stationary.
1. Size: 7.5 cu.ft. capacity.
2. Controls: Rotary, with electronic LED.
3. Temperature Selections: Four.
4. Cycles: 10 total. Include normal, permanent press, knit/delicate, and air only.
5. Features: Include interior light and end of cycle signal.

6. Finish: Painted steel , color as indicated.
7. Basis-of Design Product: See Specialty Equipment Schedule on Drawing A912.
8. Substitutions: See Section 01 6000 - Product Requirements.

C. Finish Color for Appliances: Refer to "Finishes for Miscellanous Items" on the "Finish Product List" on the drawings.All finishes to be fingerprint-proof type.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify utility rough-ins are provided and correctly located.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Anchor built-in equipment in place.

3.3 ADJUSTING

A. Adjust equipment to provide efficient operation.

3.4 CLEANING

A. Remove packing materials from equipment and properly discard.

B. Wash and clean equipment.

END OF SECTION 11 3013

SECTION 11 4000 - FOODSERVICE EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of contract, including General and Supplementary Conditions and Division 01 Sections, apply to this Section.

1.2 SCOPE

A. Attention is directed to the detailed Item Specifications, which provide for minimum acceptable products. Item Specifications paragraphs may indicate materials or components that exceed the manufacturer's standards and are required for this project.

B. Cooperate and coordinate with others engaged on the project in order that work will progress on schedule.

C. Work to be performed under this Section is shown on Foodservice Equipment Drawings.

D. Install materials furnished under this Section, other than materials that are expressly noted for installation under other Sections. Installation work shall be performed by workmen compatible with those existent on the project site. Equipment shall be of the latest design; new and unused, unless indicated otherwise in the Item Specifications, complete with all standard parts for normal operations and including such accessories or materials as may be required to comply with these Specifications.

E. This Specification is to further describe and supplement the applicable Drawings. What is called for by either the Drawings and/or these Specifications shall be furnished and installed as part of this work. Any questions relative to discrepancies or omissions shall be submitted to the Architect.

F. Provide neatly punched openings or cutouts required to permit passage of plumbing and electrical services by related trades and to accommodate mounted switches and receptacles in the equipment.

G. Work in this Section shall include but shall not be limited to the following:
   1. Catalog items of equipment.
   2. Fabricated equipment other than catalog items.
   3. Plumbing trim consisting of mechanical system components required for standard operation of equipment items such as faucets and waste outlets. Vacuum breakers shall be furnished for equipment where water is introduced less than 2 in. above flood level.
   4. Electrical equipment forming an integral part of equipment items such as electric motors, heating elements, controls, switches, starters, temperature regulators and internal wiring to a control panel or switch, if mounted on the equipment.

H. Sustainable Design Intent: Comply with project requirements intended to achieve a rating, measured and documented according to the LEED Green Building Rating System, of the US Green Building Council.

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. Finished floor and walls, structural supports for all ceiling supported equipment, acoustical ceilings and related building.

B. Connecting piping, waste lines, traps and vent piping, complete with shut-off valves to all the equipment, and the rough-in for sanitary waste, domestic water, floor drains and plumbing fixtures except those provided under this Section, and related mechanical work.

C. Rough plumbing including, but not limited to shut-off valves and thermostatic mixing valves at hand washing sinks furnished hereunder: SECTION 220001-PLUMBING.

D. Exhaust ventilating systems complete with blowers, ductwork, hangers, access panels, and insulation between the exhaust collars and the exhaust blowers.

E. External wiring; the mounting and wiring of motor starters, solenoid valves, switches and receptacles not integral with the equipment; mounting and wiring of walk-in refrigerated room ceiling mount light fixtures; wiring of walk-in refrigerated room interior evaporator coils; connecting conduit, and external connections to equipment to the building electrical distribution system.

1.4 SUBMITTALS

A. Submit Shop Drawings for approval in accordance with the General Conditions.

B. Stub-in drawings shall indicate the layout of equipment and dimensioned locations of all services to the equipment.
1. Hand drawn scale: 1/2 in. = 1 ft., 0 in.
2. CAD drawn scale: 1/4 in. = 1 ft., 0 in.
3. Stubbed services shall include electrical, hot and cold water, floor drains or floor sinks, solid wastes and exhaust collar connections. Point of connection services shall include steam supply, condensate return, gas connection and indirect waste connections. Service dimensions shall include height measured from finish floor.
4. Electrical and plumbing services shall be indicated and coordinated on the same drawing.
5. Call-outs for each stub point indicated at the point, or clearly keyed to a schedule on the same drawing.
6. Special conditions plan shall include all floor recesses, curbs and special wall construction indicated and dimensioned.

C. Fabrication drawings shall be furnished for non-catalog items, showing plans, elevations and full construction details with gauges, components, fasteners, erection and connections. Drawings shall be to the minimum scale of 3/4 in. = 1 ft., 0 in.

D. Standard items of equipment, not built-in or part of other assemblies shall be submitted for approval in the form of bound catalog cuts. Each cut shall include a clearly marked item number, a listing of all optional accessories and finishes, and connection data.

E. Mechanical refrigeration system submittal shall include the firm name and address of the installation contractor and name of the qualified installer.

F. Energy Star - Specified Energy Star rated equipment and appliances shall serve as the standard for all types of equipment and appliances whenever possible. Kitchen Equipment Contractor shall clearly indicate that items are Energy Star rated both on the submittal cover sheet and manufacturer cut sheets.

G. Failure to comply with approved shop drawings shall be cause for rejection of an improperly built assembly.

1.5 SAMPLES

A. If the bidder's proposed equipment fabricator is unknown to the Consultant's office, immediately after award of contract, submit the following samples for selection and approval.
   1. Section of table showing edge, bullnose, framing, fasteners, gusset, leg, and foot, all assembled.
   2. Drawer assembly (will be returned for use on this project).

B. Work delivered to the job shall match approved samples.

1.6 GUARANTEES AND WARRANTIES

A. New equipment furnished for this facility shall be guaranteed for a period of not less than one calendar year beginning on the date of final acceptance of the work of this Section. In the case of a manufacturer whose standard warranty exceeds this period the longer period shall apply. Self-contained refrigeration units for reach-in refrigerators, freezers, ice cream chests and ice machines shall carry a five-year replacement warranty for the sealed unit. The guarantee shall protect against defective material, design and workmanship.

B. In addition to the guarantee called for under the General Conditions, this Contractor shall further agree that in the event of failure of any system or item of equipment or improper functioning of specified work during the guarantee period, he shall have "on call" competent service personnel available to make the necessary repairs or replacements of specified work promptly at no cost to the Owner. In the event that replacement of an entire item is required, the Owner will have the option of full use of the defective equipment until a replacement has been delivered and completely installed.

C. Furnish manufacturer's warranty for each item of standard equipment and a warranty on fabricated equipment. Submit guarantees and warranties to the Architect in accordance with conditions found in "Demonstration and Operating Instructions" paragraphs, contained in Part 3, this Section.

1.7 REGULATORY AGENCIES

A. Work shall be in accordance with the governing health, building and safety, and fire protection codes and regulations.

B. Standards of the National Sanitation Foundation (NSF) shall serve as guidelines for the work of this Section.

C. Electric equipment and accessories shall conform to the standards of the National Electric Manufacturers Association (NEMA), Underwriters Laboratories, Inc. (UL) or Electrical Testing Station (ETS).

D. Steam generating equipment and accessories shall conform to the standards of the American Society of Mechanical Engineers (ASME).

E. Gas fired equipment and accessories shall conform to the standards of the American Gas Association (AGA) and the American National Standards Institute (ANSI) Z83.11.

F. Energy Star - Specified Energy Star rated equipment and appliances shall serve as the standard for all types of equipment and appliances whenever possible.

1.8 EQUALITY OF MATERIALS AND EQUIPMENT

A. The base bid shall contain no substitutions to these drawings or specifications. Bidders may offer substitute equipment in a separate proposal, indicating the proposed model and sum to be added or deducted if the alternate item is accepted by the Owner. Each line item shall include delivery, installation and taxes. Decisions to accept or reject a piece of equipment shall be made by the Owner, and all decisions shall be final.

PART 2 - PRODUCTS

2.1 MATERIALS AND FINISHES

A. General
   1. Metals shall be free from defects impairing strength, durability or appearance, made of new materials with structural properties to withstand strains and stresses to which normally subject.
   2. Stock materials, patterns, products and methods of fabrication shall be approved provided that they conform to the requirements specified under Item Specifications.

B. Stainless Steel
   1. Stainless steel shall be non-magnetic corrosion resistant chromium-nickel steel, Type 302 or 304 (18-8 Alloy), polished to a Number 4 finish where exposed, unless otherwise noted. Minimum gauges shall be as specified under Item Specifications.

C. Galvanized (Galvannealed) Steel
1. Galvannealed steel shall be commercial quality with tight coat of zinc galvanizing metal applied to a soft steel sheet, subsequently passed through a 1200 degree F. oven, resulting in a spangle free paintable surface. Minimum gauges shall be as specified under Item Specifications.

D. Plastic Laminate Materials
1. The laminate facing shall be GP-50, .050 in. thick, general purpose, high pressure, decorative plastic laminate that meets or exceeds the requirements of NEMA Publication LD3-1985, and NSF Standard 35. The plastic laminate exposed surfaces shall be provided in accordance with the specified manufacturer, finish and color. Balancing sheet shall be backing grade GP-28 in matching color at semi-exposed and BK-20 unfinished where hidden.
2. Plastic laminate covered surfaces shall be factory fabricated with 3/4 in. thick core having plastic laminate facing on both faces and all edges, laminated with waterproof glue under pressure in accordance with the plastic laminate manufacturer's specifications.
3. The core shall be medium density phenolic resin particleboard conforming to ANSI A208.1, Type 2-M-2, 45 pound per cubic foot density minimum.
4. Provide veneer core plywood or solid hardwood edge banding for doors and vertical dividers or panels where hardware is attached to casework.
5. Hinges shall be articulated, spring loaded type equal to Grass CST65-170-F or Stanley, with quantity adequate to support the door without deformation. Do not provide handles on plastic laminate clad doors.

2.2 CONSTRUCTION

A. General
1. Flat metal work items of equipment, such as tables, sinks, or counter tops, and other non-catalog items described under Item Specifications, shall be manufactured by a food service equipment fabricator who has the plant, personnel and engineering facilities to properly design, detail and manufacture high quality food service equipment.
2. The equipment fabricator shall be subject to the approval of the Architect, Owner and Consultant. Refer to Paragraph 1.05, Samples.
3. Fabricated foodservice equipment shall be manufactured by one manufacturer, of uniform design, material and finish.
4. Equipment shall conform to the applicable requirements of current Federal, State, and Local Codes and Regulations.

B. Welding
1. The words "weld", "welded" or "welding" as used in this Section of the Specification shall mean that metal joints shall be continuously welded and the exposed parts ground smooth and polished to match adjoining surfaces. Welding electrodes shall match the material being welded.
2. Where spot welding is specified, the welds shall be a maximum spacing of 3 in. on center.
3. Where tack welding is specified, the pieces welded shall have 1/2 in. minimum lengths of welding material at 4 in. on center maximum spacing.

C. Grinding, Polishing and Finishing
   1. Exposed welding joints shall be ground flush with the adjoining material and neatly finished to harmonize therewith. Wherever material has been depressed or sunken by a welding operation, such depressions shall be suitably hammered and peened flush with the adjoining surfaces and, if necessary, again welded and ground to eliminate low spots. Ground surfaces shall be polished or buffed to a degree consistent with good workmanship. Coves shall be ground and polished to match adjoining material.
   2. Care shall be exercised in grinding operations to avoid excessive heating of metal and discoloration. Abrasives, wheels, and belts used in grinding stainless steel shall be iron free and shall have not been used on carbon steel. The texture of the final polishing operation shall be uniform and smooth. Grain direction shall be uniform, uni-directional for a total length of material. Cross grains and random polishing are not acceptable.
   3. The general finish of equipment shall be consistent throughout the job. Brake ends shall be free of open texture or orange peel appearance, and where brake work mars the uniform finish of the material, the marks shall be removed by grinding and polishing, and finishing. Sheared edges shall be free of burrs, projections or fins to eliminate all danger of laceration. Mitered or bullnosed corners shall be neatly finished with the underedge of the material neatly ground to a uniform condition and in no case will overlapping material be acceptable. The equipment surfaces, where exposed, shall be finished to a grained Number 4 (satin) finish unless otherwise specified. An exposed surface shall include an inside surface, which is exposed to view when a swinging or sliding door is opened. Underside of shelves need not be satin finish unless otherwise specified.
   4. Excessive distortion caused by welding shall be cause for rejection for that item of equipment.

2.3 BUY-OUT COMPONENTS

A. CASTERS: 5 in. diameter polyurethane tired, swivel, plate or stem mount to suit application, 300 pound capacity, brakes only if specified, NSF approved; Component Hardware C-21-3050 (plate/no brake), C21-3051 (plate/brake) C23-3350 (stem/no brake) or C23-3351 (stem/brake), or equal by Kason, or PDI Atlanta.

B. COUNTER LEGS: Stainless steel, 6 in. to 7-3/4 in. height adjustment; Component Hardware A72-0811, or A77-5048, or equal by Kason, or PDI Atlanta.

C. DOOR HINGES: Stainless steel, lift off type, swedged knuckle for minimum clearance, nylon bearings; Component Hardware M75-1002 or equal by Kason, or PDI Atlanta.

D. DRAWER PANS: Molded plastic or fiberglass, 20 in. by 20 in. by 5 in. deep, NSF approved; Component Hardware S80-2020, or equal by Kason, or PDI Atlanta.

E. DRAWER SLIDES: Stainless steel, NSF approved, full extension, 200 pound capacity with stainless steel ball bearing wheels; Component Hardware S-52 series, or equal by Kason, or PDI Atlanta.

F. FAUCET SETS, DECK MOUNTED: Chrome plated cast bronze with 1/2 in. IPS eccentric flanged female inlets on 8 in. centers, removable cartridges, lever handles, and aerator tip on

swivel nozzle or swivel gooseneck to suit the application; T&S Brass B-0221 or B-0321, or equal by Component Hardware, Chicago, or Fisher.

G. FAUCET SETS, POTWASHING SINK: Chrome plated cast bronze with removable cartridges, 3/4 in. passages, eccentric flanged female inlets on 8 in. centers with LL street EL inlets with locknuts, four prong handles, 12 in. swing spout; T&S Brass B-0290 or equal by Component Hardware, Chicago, or Fisher.

H. FAUCET SETS, SPLASH MOUNTED: Chrome plated cast bronze with 1/2 in. IPS eccentric flanged female inlets on 8 in. centers, removable cartridges, lever handles, and aerator tip on 12 in. swing spout; T&S Brass, B-0231-CC or equal by Component Hardware, Chicago, or Fisher. Provide each with a mounting kit.

I. GUSSETS: Stainless steel, stepped side, fully closed, NSF approved, mild steel interior reinforcement, wide flange for welding to framing, set screw anchor for leg; Component Hardware A20-0206C, or equal by Kason, or PDI Atlanta.

J. LEG AND BULLET FOOT ASSEMBLIES: Stainless steel tubing, 16 gauge, number 4 finish, adjustable bullet foot with minimum of 3 in. vertical travel, 2,000 pound capacity, top designed for mounting in gusset, length to suit application; Component Hardware A46-6272-C, or equal by Kason, or PDI Atlanta.

K. LEG AND FLANGED FOOT ASSEMBLIES: Stainless steel tubing, 16 gauge, number 4 finish, adjustable bullet foot with 3-1/2 in. diameter flange and two holes for securing to floor, minimum of 3 in. vertical travel, 2,000 pound capacity, top designed for mounting in gusset, length to suit application; Component Hardware A46-4272-C, or equal by Kason, or PDI Atlanta.

L. NUTS: Zinc plated "Pal Nuts" with integral cap and lockwasher; Component Hardware Q-34-1024 or equal by Kason, or PDI Atlanta.

M. SEALANT: Sealant for sealing equipment to walls or filling crevices between components. All materials listed below that are used in the building interior must not exceed the following requirements:
1. South Coast Air Quality Management District (SCAQMD) Rule #1168
2. For interior adhesives and sealants applied within the weatherproof barrier, submit a printed statement of VOC content.

N. SOUND DEADENING BASINS: Component Hardware Q75-1366 or equal by Kason, or PDI Atlanta

O. SOUND DEADENING TOPS AND SHELVES: Component Hardware Q85-5225, or equal by Kason, or PDI Atlanta, "Tacky Tape" installed between all channel or angle reinforced tops, drainboards or undershelves.

P. WASTE OUTLETS, CRUMB CUP: Stainless steel body, removable crumb cup stopper, gasket, coupling nut and sealing washer, 1-1/2 in. IPS, and optional 4 in. long nickel plated brass tailpiece with gasket; Component Hardware E38-1010, or equal by Kason, or PDI Atlanta.

Q. WASTE OUTLETS, LEVER OPERATED: Cast stainless steel rotary type with 1-1/2 in. NPS and 2 in. NPS threads, and removable beehive crumb-cup; Component Hardware DSS-8000 or equal by Component Hardware, Chicago, or Fisher.

R. WELD STUDS: Copper flashed steel with 10-24 threads, length to suit; Component Hardware Q-36, or equal by Kason, or PDI Atlanta.

S. GFCI RECEPTACLES: Pass & Seymour 2095-W, 115 volt, 20 amp GFCI Duplex Receptacle or equal.

2.4 FABRICATED COMPONENTS

A. Box Type Cabinet Construction
1. Sheet metal cabinet bases of box type construction shall be fabricated without general interior framing. Structural strength shall be achieved by the gauge of the metal and the formed angle and channel edges and corners. Vertical sections shall be closed. Cabinet base shall be fabricated of 18 gauge minimum of material specified at Item Specifications. Mount on counter legs or base as specified.
2. Intermediate shelf shall be fabricated of 16 gauge stainless steel with rear and sides turned up 1-1/2 in. tight to the cabinet sides. The front edge of shelf shall be turned down 1-1/2 in. and in 1/2 in. at 45 degrees and shelf spot welded in place. Reinforce underside with longitudinal 14 gauge channel on the centerline.
3. Bottom shelf shall be fabricated of 16 gauge stainless steel similar to the intermediate shelf except that the front edge shall be formed into a full width 1-1/2 in. by 4 in. welded in boxed channel. Rear edge shall be fitted with a full width channel. Underside shall be reinforced.

B. Counters and Drainboards
1. Counters, table tops and drainboards shall be 14 gauge stainless steel, of NSF construction, with edges per Item Specifications. Metal tops shall be made of the largest pieces available and shall appear as one piece with all field and shop joints reinforced and welded, ground and polished. Short pieces of metal will not be acceptable. Counter bends shall be not less than 1/8 in. radius. Wherever a fixture has a waste or drain outlet, the surface shall pitch toward the outlet.
2. Counters, table tops and drainboards shall be reinforced with channel or angle frame as specified in the Item Specifications. Framing shall be secured to the underside with sound deadening material sandwiched between the surfaces, weld studs, and nuts.
3. Wherever bolts or screws are welded to the underside of trim or tops, neatly finish the reverse side of the weld uniform with the adjoining surface of the trim or top. Depressions at these points will not be acceptable. Raise dimples and depressions by peening, or heating and shrinking, and grind and polish to present a flat surface.

C. Crossrails
1. Crossrails shall be not less than 1-1/4 in. outside diameter 16 gauge stainless steel tubing welded, ground and polished to a Number 4 finish. Crossrails shall be welded to legs at a height of 10 in. above finished floor, and shall extend from left to right between front legs, unless otherwise specified, and from front to back between all legs.

D. Drawer Assembly
1. Drawer assemblies shall consist of a removable drawer pan set in a removable 16 gauge stainless steel channel shaped drawer support frame with gusset plate reinforced corners.
2. Support frame shall have double pan front cover consisting of boxed 18 gauge stainless steel outer shell with welded corners, flush mounted recessed stainless steel pull, 20 gauge stainless steel back shell tack welded to outer shell with fiberglass sound deadening between. Drawer shall be provided with rubber bumpers to quiet closing. Support drawer frame on full extension drawer slides.
3. Drawer shall be suspended from table in a three-sided, 16 gauge stainless steel enclosure with flanged-in bottom edges, banded lower front, flanged-out front side and top edges. All sharp corners shall be broken and any exposed exterior threads of slide mounting bolts shall be provided with solid metal acorn nuts.
4. Component Hardware S91-0020 with thermoplastic pan is considered as equivalent to the above specified construction.

E. Edges
1. Marine: Bumped up 1/2 in. at 45 degrees and turned down 1-1/2 in. and in 1/2 in. at 45 degrees; corners welded and square.
2. Raised roll: Coved up and rolled 180 degrees on a 1-1/2 in. diameter with 3 in. height; corners welded and rounded or coved.
3. Rolled: Rolled 180 degrees on a 1-1/2 in. diameter; corners welded and bullnosed.
4. Short (6 in.) splash on counters and tables: Coved up 6 in., turned back to wall or equipment 1 in. and down 1/2 in.; ends welded closed. Secure tight to face of wall with clips unless specified otherwise and seal joint.
5. Tall (10 in.) splash on preparation sinks, dishtables, counter, and tables: Coved up 8-1/2 in., turned back to wall or equipment 1-1/2 in. at 45 degrees and down 1/2 in.; ends welded closed. Secure 3 in. off face of wall with brackets unless specified otherwise.
6. Turn down: Turn down 2 in. and in 1/2 in. at 45 degrees; corners welded and square.

F. Framing of Tops, Drainboards, Undershelves
1. Channel: Reinforce with 1 in. by 4 in. by 1 in. 14 gauge galvannnealed steel channels; stainless steel if exposed to view. Channels shall run front-to-back at all legs and longitudinally on the centerline. Cross and longitudinal members shall be welded into a single assembly at intersections and sharp corners shall be broken. Framing shall be secured to underside of tops with pairs of weld studs. Framing shall be installed maintaining NSF required clearance to adjacent vertical surfaces and edges of top. The following specified angle framing is considered superior to channel framing and may be used in its place.
2. Angle: 1-1/2 in. by 1-1/2 in. by 1/8 in. perimeter angle frame with crossmembers not over 30 in. on center. Framing shall be secured to top with weld studs, 18 in. on center maximum with three minimum studs on any single face of a table. Perimeter angle frame that is exposed to normal view, shall be stainless steel. Crossmembers and framing not unexposed to normal view shall be iron. Corners of angle frame shall be mitered, or notched and brake formed to form a closed corner. Corner gusset plates used for mounting of leg gussets shall be 1/8 in. thick and sealed to underside of the top. Iron framework joints shall be ground smooth, and shall be painted with a minimum of two coats of aluminum lacquer after degreasing. Framing shall be installed maintaining NSF

required clearance to adjacent vertical surfaces and edges of top. Channel framing shall not be considered equal to specified angle framing.

3. Sound deaden all horizontal framed surfaces with material sandwiched between the framing and the bottom of the surface.

G. Hinged Doors

1. Hinged doors shall be double pan type stainless steel construction with 18 gauge exterior and 20 gauge interior, welded corners, and 1/2 in. fiberglass insulation for sound deadening. Each door shall be provided with a stainless steel recessed handle, and an adjustable tension door catch equal to Component Hardware M22-2430. Doors shall close against the bottom shelf and flush with body of equipment.
2. Louvered hinged doors for ventilation shall be fabricated of the same components and provided with a full perimeter 3 in. wide channel reinforcing frame on the interior face. Remaining face shall be die punched with drip-proof louvers fully utilizing the remaining flat metal or a stainless steel flattened expanded metal grille per Item Specifications.

H. Sinks and Sink Inserts

1. Unless otherwise specified, sinks including sink inserts built into tops of fixtures, shall be made of 14 gauge stainless steel with all vertical and horizontal corners rounded to a radius of approximately 3/4 in. with the intersections meeting in a spherical section. Sinks shall be integrally welded to fixture tops.
2. Sinks with two or more compartments shall have full height, 1 in. thick double wall partitions consisting of two pieces of stainless steel back-to-back so fabricated that each compartment will be a deep bowl with coved corners. Partitions shall be welded in place to the bottom, front and back of the sink with smooth rounded coved corners. Top edges of the partitions shall be continuously welded. The front of the sinks shall consist of a stainless steel smooth, flush apron, same gauge as the sinks. Bottom and rear of partitions shall be closed. Sink dimensions contained in Item Specifications are inside dimensions.
3. Sinks shall be provided with integral 14 gauge stainless steel drainboards when specified. Drainboards and sink basins shall be pitched toward waste outlets and shall be self draining. The underside of all sink basins shall sound deadened. Sink units shall be provided with an integral splash at walls. Provide the necessary holes for the mounting of faucet sets.

I. Sliding Doors

1. Sliding doors shall be double pan type stainless steel construction with 18 gauge exterior and 20 gauge interior, welded corners, and 1/2 in. fiberglass insulation for sound deadening. Each door shall be provided with a stainless steel recessed handle. Provide sliding doors with nylon roller bearing sheaves and overhead track components equal to Component Hardware B58-5523 and 5513 sheaves, B57 track, B62-1093 nylon door guides and B60-1086 door stops.

J. Undershelves

1. Undershelf in an open type table shall be 16 gauge stainless steel unless otherwise noted. Edges shall be turned down 1-1/2 in. and in 1/2 in. at 45 degrees with corners notched out to fit legs to which shelf shall be welded from underside. Line up all edges of shelf with

centerline of legs. Reinforce underside with longitudinal 14 gauge channel on the centerline.

K. Wall Brackets
1. Dish tables, sinks and counters with sinks shall be securely anchored 3 in. off the face of the wall unless specified otherwise. Brackets shall be "Z" shaped and fabricated of 3 in. wide, 14 gauge stainless steel. Brackets shall be secured in a vertical attitude to the rear of equipment backsplash with weld studs, and to the wall with appropriate fasteners.
2. Counters that are specified tight-to-wall shall be secured in a hidden manner with steel clips, and the wall/fixture joint shall be sealed.

L. Wall Shelves
1. Wall shelves shall be fabricated of 16 gauge stainless steel, size per Item Specifications, with back and ends raised 1-1/2 in., front edges of ends angled back, all corners broken, and front turned down 1-1/2 in., and in 1/2 in. at 45 degrees. Shelf corners shall be welded, ground and polished. Mount shelf 1 in. off face of wall with suitable fasteners on 14 gauge stainless steel flag brackets, 48 in. on center maximum. Flag brackets shall have a web angle of 30 degrees, measured from horizontal.

2.5 ELECTRICAL EQUIPMENT AND WIRING

A. Under this Section, items of equipment having mounted electrical motors, electrical heating units, lighting fixtures, controllers, control stations, switches, receptacles and the like shall be internally wired as specified herein, terminating at a junction box mounted on the equipment and left ready for connection to the building electrical distribution system by the Electrical Contractor. Extra ceiling mount light fixtures for refrigerated rooms shall be delivered to Electrical Contractor for field installation and wiring. Connections to evaporator coils mounted inside refrigerated rooms shall be wired by the Electrical Contractor.

B. Provide openings or cutouts required to accommodate the switches and receptacles in the specified work, and the wiring in conduit from terminal blocks in junction boxes.

C. Electrically operated equipment and fabricator wiring shall conform to the requirements of Underwriter's Laboratories, Inc. Motors over one horsepower shall be equipped with overload protection.

D. Furnish wiring diagrams for equipment as requested by the Architect or Contractor.

2.6 ITEM SPECIFICATION

Item 1
MOP SINK CABINET
Make - Advance Tabco 9-OPC-84DR-300, or equal by IMC Teddy or Eagle
Size - 50-3/8” x 22-3/4" x 84" high, 12” deep basin
Description - Cabinet assembly shall be all standard heavy gauge type 304 stainless steel con-struction with satin finish, tile edge at rear of sink, vented cabinet walls, hinged double doors, four fixed intermediate shelves, two mop holders, stainless steel floor panel, and central mop sink drain with stainless steel strainer.
Accessories - Provide unit with K-240 faucet with K-244 hose and bracket, SU-27 door lock, K-94-BACK-300 stainless steel back panel, K-472 8” on center holes in back panel for ser-vice faucet. seal gaps at the wall.
Item 2
No item

Item 4
CLOTHES WASHER
Make - UniMac UFNE5BJP115TW01 or equal Wascomat or Speed Queen
Size - 27" x 27-3/4" x 40-1/2" high
Power - 20 amps circuit - 120/60/1 - cord and plug
Water factor - 3.7 gallons/ft3/cycle
Certification - Unit shall be Energy Star certified or performance equivalent.
Description - Washer shall be all standard front loading construction with white exterior, see-thru door with heavy duty stainless steel hinge, 3.42 cubic foot front loading stainless steel basket, detergent dispensers, electronic controls, three wash/rinse temperatures, and five selectable wash cycles.

Item 5
CLOTHES DRYER
Make - UniMac UDEE5BGS173CW01 or equal Wascomat or Speed Queen
Size - 27" x 28" x 40-1/2" high
Power - 30 amps circuit - 120/240/60/1 - cord and plug (NEMA 14-30P)
Description - Dryer shall be all standard front loading construction with white exterior, 7 cubic foot capacity, galvanized drum, electronic controls, lint filter, and interior light.

Item 6
STAFF LOCKER, TWO-TIER
Quantity - 4
Make - Tennsco DTS-151536-1 or equal
Size - 15” x 15” x 78” high
Description - Two-tier locker shall be all standard welded and assembled construction with door louvers for ventilation, three coat hooks per opening, positive two-point locking system on doors, door stiffeners for added rigidity, and mounted on legs. Color to be selected by Architect.

Item 7
No item

Item 8
No item

Item 9
STORAGE SHELVING, FIVE-TIER
Quantity - 19
Make - Metro Super Adjustable Super Erecta Chrome or equal by ISS or Cambro
Size - (2) 60" x 21", (1) 54" x 21", (11) 48" x 21", (2) 42" x 21", (2) 48" x 18", and (1) 42" x 18", all 74-5/8" high; five tier with bottom shelf up 14" clear above floor
Description - Unit shall be all standard construction with Super Adjustable Chrome plated wire shelves and tubular steel uprights with capped tops, adjustable feet, and 1" shelf height adjustment capability with Corner Release System. Each unit shall include four legs.

Item 10
DUNNAGE RACK
Quantity - 8
Make - New Age 2000 Series or equal by Channel or Kelmax
Size - (3) 60" x 20", (2) 54" x 20", (1) 48" x 20", (1) 42" x 20", and (1) 36" x 20", all 12" high
Description - Dunnage platforms shall be all standard construction with 1-1/2" x 1-3/4" x .070" thick wall extruded Type 6063-T5 aluminum tubing with four horizontal tubes and four legs welded together, and each unit capable of supporting a minimum of 2,500 pounds.

Item 11
WALK-IN COOLER
Make - American Panel or equal by Bally or Thermo-Kool
Size - 7'-2-1/2" x 11'-10-1/2" x 7'-10" high minimum inside dimensions; 7'-8" high after finished floor is installed by the General Contractor
Power - 1.1 KW - 120/60/1 to light fixtures, temperature monitor/alarm, and door defrost heater strip
Installation, Construction, Materials and Accessories - See Item 12
Guarantee - See Item 12

Item 12
WALK-IN FREEZER
Make - American Panel or equal by Bally or Thermo-Kool
Size - 8'-2" x 11'-10-1/2" x 7'-10" high minimum inside dimensions; 7'-8" high after finished floor is installed by the General Contractor.
Power - 1.3 KW - 120/60/1 to light fixtures, temperature monitor/alarm, door defrost heater strip, and pressure relief port
Installation - The walk-in refrigerated room assembly shall be installed in a 7" deep ID recess (below finished floor). Recess depth allows 1" for use of leveling sand; 4" for the insulated floor panels; 2" for concrete topping slab and epoxy finished floor that shall be carried in from the adjacent room and level to same. The finished floor and topping slab shall be furnished and installed by the General Contractor, and shall have sanitary cant joints at all interior and exposed exterior walls. The assembly shall be set level on a bed of clean, dry mason's sand. Shims are not acceptable for leveling material.
Construction - All standard construction per the manufacturer, modified to meet the specific following points:
- Walls to be 4" thick with CFC free urethane foam insulation, UL Class 1 rated
- Cam type locking devices

- 34" x 80" minimum door clearance
- Polished hardware (hinges and latch to match)
- Three hinges on doors (to include one Kason 1248 spring assist hinge per door)
- Leveraged pull handle (mechanical advantage type, Kason 1236 or equal)
- Quarter turn inside safety release lever handle mechanism (not screw type)
- Prewired door sections with heater wires and light fixtures and switches
- Kason 1806 LED light fixtures or Kason 1808 LED light fixtures
- Dial type thermometers at doors
- Model IC+ (with dry contacts) temperature and HACCP monitoring system at doors. Cooler and freezer alarms to interconnect with access control system for alert monitoring. This Contractor to provide each system with a pair of 22 gauge low voltage wires. Wires shall be installed by the Controls Contractor. Wires shall run from the dry contacts to the access control panel. This Contractor to verify length prior to purchasing. To avoid false triggering, provide a shielded two-conductor cable with the shield connected to the receiving equipment.
- NSF construction throughout with exception of buried floor panels
- Interior and exterior faces of doors and exposed exterior walls shall be provided with aluminum diamond tread plate protective material to a height of 48" above finished floor.

Minimum Cooler Insulation R-Values
Wall and Roof Panels (4 in.): R-29
Floors: R-25
Doors: R-32

Minimum Freezer Insulation R-Values
Wall and Roof Panels (4 in.): R-32
Floors: R-28
Doors: R-32

Minimum materials - Interior and exterior wall surfaces shall be clad with .038" pebble finished aluminum. The ceiling shall be finished in white polyester over 24 gauge galvanized steel. Interior floor shall be 14 gauge galvanized steel.

Accessories - Freezer shall be provided with an electrically heated pressure relief port. Each door shall be provided with a heated vision panel, 14-1/2" x 23" constructed of three panels of tempered unbreakable glass, electrically heated, with sealed air spaces between. Provide matching trim strips and closure panels to adjoining surfaces, fabricated per details, made of largest pieces available to minimize number of joints, and installed in accordance with NSF Brochure 770202, Installation Manual for Walk-in Refrigerators and Freezers. Provide eight total extra Kason 1806 LED OR Kason 1808 OR 1810LCT400 LED light fixtures for mounting in the rooms and deliver to Electrical Contractor for field installation.

Guarantee - The walk-in refrigerated room panels shall be guaranteed for a period of ten (10) years from the date of approved installation for defects in materials and workmanship when subjected to normal use and service; remainder of rooms for one year.

Item 13
MECHANICAL REFRIGERATION SYSTEM
Quantity - 2
Make - Heatcraft, Bohn, Larkin, Climate Control, Chandler

Scope - Furnish and install complete refrigeration systems for the walk-in refrigerated rooms in accordance with the plans. The systems shall include condensing units, evaporator coils, piping, all specified accessories, and those components required to provide complete and satisfactory systems in accordance with accepted refrigeration practice.

Important: The installation work shall be performed by a fully qualified refrigeration contractor employing a certified mechanic fully trained in the installation of commercial refrigeration systems. Submittal shall list the installing company and the qualified system installer.

Piping - Furnish and install the interconnecting piping between the condensing units and their respective unit coolers. Piping shall be installed in a neat and workmanlike manner with adjustable hangers spaced at no more than ten foot intervals on horizontal runs; six foot intervals, vertical runs.

Line sizes shall be in accordance with ASHRAE standards and best refrigeration practice to assure proper feed to evaporator, avoid excessive pressure drop, and prevent excessive amounts of lubricating oil from being trapped in any part of the system. Line sizing shall be such that it will protect the compressor from loss of lubrication at all times, prevent liquid refrigerant from entering the compressor during operating or idle time, and maintain a clean and dry system.

Refrigeration piping shall be Type L, ACR grade, hard drawn seamless copper tubing, wrought type copper fittings, and silver soldered joints. Precharged lines are not acceptable.

Furnish and install sleeves for refrigerant and evaporator drain piping wherever piping passes through a wall or ceiling. Sleeves shall be non-conductive gray plastic tubing, with interior dimension sized at least 1/4" larger than piping, and shall be neatly packed with brine putty after installation.

Furnish and install condensate drain piping from the unit cooler to an open drain. Piping shall consist of not less than 7/8" Type L copper tubing, supported 36" on center maximum, in such a way that there will be 1" clearance between the wall and the tubing. Provide a union or slip fitting at the connection to the evaporator drain pan to allow easy disassembly for service and cleaning. Drain piping shall be pitched 4" to the foot and carried through the wall of the refrigerated area. It shall be trapped to prevent entry of warm air and insects to the refrigerated rooms and discharged to a floor drain with the code required air gap. The exposed drain piping shall be spray painted.

Provide an electric drainline heater tape in the freezer, with a length equal to five wraps per foot of length of the drainline located within the freezer compartment. Wrap and secure in accordance with manufacturer's recommendations.

Provide chrome plated escutcheon plates at all exposed points where piping penetrates the wall or ceilings.

Insulation - Suction lines for refrigerated rooms having a temperature above freezing shall be covered with 3/4" wall thickness closed cell HT Armaflex insulation with ultra violet radiation protection.

Suction lines for refrigerated rooms having a temperature below freezing shall be covered with 1" wall thickness closed cell HT Armaflex insulation with ultra violet radiation protection.

The insulation shall be applied to these lines in accordance with manufacturer's recommendations, and as they are being installed so that insulation will not be split. All joints

shall be completely sealed with overlapping, cemented material to prevent the formation of frost on the lines.

Controls - Each evaporator shall be provided with an iNtelliGen electronic control as manufactured by Heatcraft Refrigeration. Provide each system with a pair of twisted 24 gauge low voltage wires, Belden 9841 or equal. Wires shall be installed by the Controls Contractor. Wires shall run from the dry contacts at the evaporators to the access control panel. Kitchen Equipment Contractor to verify length prior to purchasing. To avoid false triggering, provide a shielded two-conductor cable with the shield connected to the receiving equipment. The time clock and heater contactor shall be removed from the condensing unit. No control wiring will be required from evaporator to the condensing unit.

Refrigerant Testing - The entire system shall be pressure and leak tested at no less than 100 PSIG, cleaned and dehydrated by maintaining a vacuum of 500 microns or lower for a period of twelve hours. The required operating charge of refrigerant and oil, if necessary, shall be added and the entire system tested for performance. Each system shall be clearly marked as to the type refrigerant required.

Guarantee - The equipment shall be guaranteed to maintain the specified temperatures. All mechanical refrigeration equipment shall be mechanically guaranteed for a period of one year after date of acceptance by the Owner. The emergency service shall be provided free of charge, whenever necessary on a 24 hour, seven day-per-week basis during the guarantee period.

Any leaks that occur during the first year of operation after acceptance by the Owner, shall be repaired and the necessary refrigerant added at no expense to the Owner.

The year's service shall be provided by the installing company, and under no circumstances will the service policy be sublet to another refrigeration contractor. The name of the installer/service agency for the guarantee period shall be located at a prominent place on the condensing units.

The condensing units shall be provided with an additional four year parts warranty to commence upon the completion of the aforementioned guarantee, bringing the total parts warranty to five years.

Condensing Units - The condensing units shall consist of an EC energy saving motor with variable speed controller, compressor, refrigerant condenser, liquid receiver, compressor service valves, and a dual high-low pressure control. The units shall be as manufactured by Heatcraft Refrigeration.

The condensing units shall be outdoor type, wall mountable, and quiet type with an approximate 51 to 63 decibel rating at 100 percent fan speed. The compressor shall be Microchannel Coil Technology scroll type per schedule, and fitted with coated aluminum fin condenser, suction service valve, discharge service valve, compressor contactor, high and low pressure controls, receiver with fusible plug, liquid shut-off valve and charging port, mounted non-fused disconnect switch, waterproof electrical control box, discharge line vibration eliminator, weather resistant UL painted steel cabinet, access guard, liquid line assembly, suction line filter and vibration eliminator, crankcase heater, and 1-1/2" high raised steel base.

Mount on roof per drawings with structural supports, roof penetrations and weatherproofing provided by the General Contractor. Mount with clearance above roof deck per Manufacturers recommendation.

Evaporator Coils - Each evaporator shall be provided with iNtelliGen electronic control as manufactured by Heatcraft Refrigeration, thermostatic expansion valve, and solenoid valve. The time clock and heater contactor shall be removed from the condensing unit. No control wiring will be required from evaporator to the condensing unit. iNtelliGen Controls to include iIC integration card for BMS connection direct to evaporator controls.

The freezer shall be provided with an automatic electric defrost system consisting of one evaporator coil as indicated in the schedule. Evaporator shall be low profile type six fins per inch complete with variable speed EC energy saving fan motors with controller. Coil shall be NSF and UL Listed.

The cooler shall be provided with one evaporator coil as indicated in the schedule. Evaporator shall be low profile type six fins per inch complete with EC energy saving fan motors. Coil shall be NSF and UL Listed.

Furnish and install 1/4" minimum diameter stainless steel threaded mounting rods for the hanging of the evaporator coils, with stainless steel washers and nuts on the interior ends, and reinforcing angle at the exterior top of the room. Plated steel running thread is not acceptable.

Refrigeration Equipment Schedule

Cooler (11)	Room Temp: +35 degrees F			TD: 10 degrees F	
Condensing unit (13a)	Amps	Ref	BTU/hour	Evap Temp	Cond Temp
BCH0008MCACZC0017	4.7 - 208/3	448A	8,299	+25 degrees F	+95 degrees F
Evaporator coil (13b)	BTU/hour	CFM	Fan amps	Defrost amps	Defrost type
BEL0095AS6AMA	9,992	1,305	1.8 - 120/1	NA	Timed ambient

Freezer (12)	Room Temp: -10 degrees F			TD: 10 degrees F	
Condensing unit (13c)	Amps	Ref	BTU/hour	Evap Temp	Cond Temp
BCH0025LCACZC0017	8.7 - 208/3	448A	8,290	-20 degrees F	+95 degrees F
Evaporator coil (13d)	BTU/hour	CFM	Fan amps	Defrost amps	Defrost type
BEL0080BS6EEA	8,400	1,371	1 - 208/1	9.1 - 208/1	Timed electric

Item 13a
COOLER CONDENSING UNIT
Specified as part of Item 13

Item 13b
COOLER EVAPORATOR COIL
Specified as part of Item 13

Item 13c
FREEZER CONDENSING UNIT
Specified as part of Item 13

Item 13d
FREEZER EVAPORATOR COIL
Specified as part of Item 13

Item 14
MOBILE SHELVING UNIT, FOUR-TIER
Quantity - 10
Make - MetroMax Q*C166 or equal by Cambro or Fermod
Size - (4) 60" x 21", (1) 42" x 21", and (5) 36" x 21", all 69" high on casters; four tier
Description - Shelving unit shall be all standard construction and shall consist of four shelves with removable injection molded polypropylene mats with antimicrobial product protection, supported on epoxy coated steel shelf frames and similar uprights with capped tops, and mounted on 5" diameter polyurethane tired swivel casters with donut bumpers.
Accessories - Provide with polymer posts in lieu of standard.

Item 15
DUNNAGE RACK, MOBILE
Quantity - 4
Make - New Age 1200 Series or equal by Channel or Kelmax
Size - 36" x 20"
Description - Dunnage platforms shall be all standard construction with 1-1/2" x 1-3/4" x .070" thick wall extruded Type 6063-T5 aluminum tubing with four horizontal tubes and plate mounted casters with unit capable of supporting 1,000 pounds.
Accessories - Provide two total 1208 handles. All casters to swivel.

Item 16
No item

Item 17
ACCESSIBLE HAND SINK
Make - Advance 7-PS-25 modified or equal by IMC Teddy or Krowne
Size - 20 in. by 24 in. by 13 in. high overall, 14 in. by 16 in. by 5 in. deep sink bowl
Description - Unit shall be all standard stainless steel construction with wall mounting bracket. Mount on wall with rim at 34 in. above floor. Modify faucet holes to be two holes spaced 8 in. apart on center. Delete standard faucet.
Accessories - Provide with a deck mounted faucet set with wrist handles (Item 17a), deck mounted soap dispenser, 3 in. flat strainer type (non-basket, non-lever) open type waste, chrome plated tailpiece, "P" trap and clean-out cap. Provide with welded stainless steel right side splash.

Item 17a
FAUCET
Make - T&S Brass B-0322-04 modified or equal by Fisher or Encore
Description - Unit shall be all standard construction with deck mounted mixing body, 8" center inlets, and wrist blade handles. Modified unit shall be provided with B-0199-02F-12 aerator tip in lieu of the standard.

Item 18
HAND SINK
Quantity - 3
Make - Advance 7-PS-70-CM*C166 or equal by IMC Teddy or Krowne
Description - Unit shall be all standard stainless steel construction with mounting bracket. Mount on wall with rim at 36 in. above floor
Accessories - Provide with a splash mounted faucet set with wrist handles (Item 18a), 3 in. flat strainer type (non-basket, non-lever) open type waste, chrome plated tailpiece, "P" trap and clean-out cap. Provide one unit (adjacent to Item 93) with a left side welded stainless steel splash.

Item 18a
FAUCET
Quantity - 3
Make - T&S Brass B-0330-04 modified or Fisher 1953 modified, or Encore
Description - Unit shall be all standard construction with mixing body, 8 in. center inlets, and wrist blade handles. Modified unit shall be provided with 119X gooseneck with B-0199-02-F10 aerator tip in lieu of the standard.

Item 19
WASTE BIN
Quantity - 4
No work in this Section. Item to be provided by Owner.

Item 20
FLOOR PAN & GRATE
Make - Fabricate per General Construction this Section by Custom Metals of Massachusetts, SML Stainless Steel Group, or Julien Inc.
Size - 30" x 15" x 4" deep inside dimensions; 23" x 23" overall
Description - Pan shall be fabricated of 14 gauge stainless steel, all welded construction, pitched to a 4" outside diameter drain fitting with stainless steel removable, perforated basket. Two opposing sides shall be fitted with integral grate support ledges. Pan shall be set in floor so that grate ledges are parallel with cooking line aisle. Provide a model I4010 ADA compliant pultruded grate (Fibergrate Safe-T-Span) with 0.60" load bars, 0.4" clear slots and ends finished in accordance with manufacturer's instructions. Grate shall rest in pan so that slots are perpendicular to the cooking line aisle, and shall be cut in a manner that closed pockets will not be formed where they rest on the pan ledges.

Item 21
ICE MAKER WITH BIN
Make - Manitowoc IDT0500A/D-570 or equal by Scotsman or Hoshizaki
Size - 30 in. by 34 in. by 71-1/2 in. high
Power - 11.5 amps - 120/60/1
Capacity - 520 pounds of cubes per day at 70/50 degrees
Maximum Water Use - 19.9 gallons/100 Lbs of ice
Certification - Unit shall be Energy Star compliant
Description - Ice cuber shall be all standard construction with an air cooled condenser, automatic controls, R410A refrigerant, self cleaning and sanitizing system, digital display diagnostic, system information and programmable ice production, vertical freezing plate with half dice sized

cubes, bin level thermostat, and housed in a stainless steel cabinet with gray ABS accents. Bin shall have 383 pound capacity with compression molded composite resin base, hinged lift-up door, internal scoop holder, polyethylene liner and stainless steel exterior wrap. Mount on stainless steel adjustable legs. Provide unit with standard 3 year parts and labor warranty on total machine, 5 year parts and labor warranty on the evaporator and 5 year parts warranty on the compressor.

Item 22
WATER FILTER ASSEMBLY
Make - 3M ICE140-S*C166 or equal by Everpure or Selecto
Size - 5-1/4" x 5" x 15" verify clearance below to remove cartridge
Description - Unit shall be all standard construction and consist of a head assembly with integral mounting bracket, quarter-turn cartridge release mechanism, "valve-in-head" automatic shut-off upon removal of cartridge, pressure gauge, and filter cartridge with internal pre-filter membrane designed for ice makers. Cartridge shall be capable of removal to .2 micron or larger particles, remove chlorine and off tastes and odors, inhibit scale build-up, service flow rate of up to 3.34 gallons per minute, and meet requirements of NSF Standards 42 and 53 and be so listed.
Accessories - Provide three spare filter cartridges

Item 23
PAN RACK, MOBILE
Quantity - 4
Make - New Age 1332*C166 or equal by Channel
Size - 20-1/2 in. by 26 in. by 69 in. high
Capacity - Fifteen 18 in. by 26 in. pans on 4 in. centers
Description - Rack shall be fabricated of welded extruded aluminum 1 in. by 1 in. by .070 in. tubular uprights and framing, and 1-1/4 in. by 1-5/8 in. by .100 in. angle pan slides with corners chamfered and deburred. Gussets of 1-1/2 in. by 1-1/2 in. by 5/8 in. angle aluminum shall be welded to the bottom inside angles where horizontal bracing meets vertical uprights. Mount on platform type, 5 in. polyurethane tired swivel casters.

Item 24
No item

Item 25
CONVECTION OVEN DOUBLE
Make - Blodgett ZEPHAIRE-200-G-ES Double*C166 or equal by Southbend or Montague
Size - 38-1/4” x 46” to include fan motor by 70-5/8” high
Power - (2) 8 amps - 3/4 HP - 120/60/1 - cords and plugs
Rating - 3/4" gas inlet at 100,000 BTU/Hour
Description - Units shall be all standard construction with stainless steel front, sides and top, porcelain enameled steel interior with 29" x 28-1/4" x 20" high inside dimensions, 1” solid block insulation and 1" thick mineral fibre sheet insulation for 2” on insulation on top, back and sides, simultaneously operating doors with stainless steel framed dual pane thermal glass windows, removable rack supports capable of holding eleven racks and five chrome plated steel wire racks, electronic ignition with fail-safe controls, solid state manual controls with separate dials for temperature and time settings, timer with buzzer, removable dual tube burners, pressure regulators, two-speed blowers with thermal overload protection and door interlock, and interior

lighting with two halogen bake oven lamps. Provide standard one year parts and labor warranty on the total oven and additional three year warranty on the door assembly, parts only.
Accessories - Mount on heavy duty swivel casters. Manifold the two ovens for a single gas connection. SSD - solid state digital control with LED display, Cook & Hold and Pulse Plus.

Item 26
CONVECTION OVEN DOUBLE
Make - Blodgett ZEPHAIRE-200-G-ES Double*C166 or equal by Southbend or Montague
Size - 38-1/4” x 46” to include fan motor by 70-5/8” high
Power - (2) 8 amps - 3/4 HP - 120/60/1 - cords and plugs
Rating - 3/4" gas inlet at 100,000 BTU/Hour
Description - Units shall be all standard construction with stainless steel front, sides and top, porcelain enameled steel interior with 29" x 28-1/4" x 20" high inside dimensions, 1” solid block insulation and 1" thick mineral fibre sheet insulation for 2” on insulation on top, back and sides, simultaneously operating doors with stainless steel framed dual pane thermal glass windows, removable rack supports capable of holding eleven racks and five chrome plated steel wire racks, electronic ignition with fail-safe controls, solid state manual controls with separate dials for temperature and time settings, timer with buzzer, removable dual tube burners, pressure regulators, two-speed blowers with thermal overload protection and door interlock, and interior lighting with two halogen bake oven lamps. Provide standard one year parts and labor warranty on the total oven and additional three year warranty on the door assembly, parts only.
Accessories - Mount on heavy duty swivel casters. Manifold the two ovens for a single gas connection. SSD - solid state digital control with LED display, Cook & Hold and Pulse Plus.

Item 27
TEN-PAN STEAMER
Make - Cleveland 24CGA10.2ES*C166 or equal by Groen
Size - 24" x 33-1/8" x 69" high overall on 6" high legs
Power - 2.5 amps - 300 watts - 120/60/1
Rating - 3/4" gas inlet at 100,000 BTU/hour
Certification - Unit shall be Energy Star compliant
Description - Unit shall consist of a two five pan compartments mounted on a stainless steel cabinet base with 60 minute electro-mechanical timers with audible signal. Independently controlled cooking compartments shall be coved corner stainless steel construction with insulation and equipped with a two piece door with floating inner piece and reversible gasket. Base cabinet to have stainless steel top, sides, and pullout service drawer for controls and drain/power control system. Two independent steam generators shall be CSA Approved, 50,000 BTU/Hour capacity per compartment with electronic spark ignition, all required safety controls, automatic blowdown, automatic water fill, and a 15 psi safety release valve.
Accessories - Provide unit with six 12" x 20" x 2-1/2" deep perforated pans and four 12" x 20" x 2-1/2" deep solid pans.

Item 28
FOUR-BURNER RANGE WITH OVEN
Make - Vulcan 24S-4BN*C166 or equal by Garland or Southbend
Size - 24" x 32" x 37" high to work surface; 47" high overall
Rating - 3/4" gas inlet at 143,000 BTU/hour

Description - Range shall be all standard construction with fully welded aluminized steel frame, four 30,000 BTU/hour open burners with one pilot lights for every two burners, level cast iron removable grates, stainless steel front, sides, and back riser, 20-1/4" x 26" x 14-1/2" high thermostatically controlled 23,000 BTU/hour oven with two racks and safety pilot, full width pull-out crumb tray below burners, and provided with pressure regulator.
Accessories - Provide with Flame Safety device with manual spark ignition for all open top burners, and oven pilot. Provide a 10" high stainless steel flue riser. Mount unit on 5" diameter heavy duty swivel casters, two with brakes.

Item 29
GRIDDLE WITH MOBILE STAND
Make - AccuTemp GGF1201A4850-S2 or equal by Garland or Vulcan
Size - 48-1/4" x 38-1/3" x 19-5/8" high, 47-3/4" x 30" cooking surface
Rating - 3/4" rear gas connection at 85,000 BTU/hour
Description - Griddle shall be all standard construction with stainless steel body, 8 gauge stainless steel griddle plate with stainless steel splashes on three sides, a stainless steel grease trough, and stainless steel open leg stand with undershelf and mounted on swivel casters, two with brakes at front.

Item 30
WATER FILTER ASSEMBLY
Make - 3M ScaleGard HT SF165 Modified or equal by Everpure or Optipure
Description - Unit shall be all standard construction designed for wall mounting and consisting of a mounting bracket, quarter-turn cartridge release mechanism, manifold with integral pressure gauge, integral quarter turn shut-off valve, outlet check valve, filter cartridge with internal prefilter membrane and external scale feeder cartridge. Provide with HF95-CLX chloramine reduction filter cartridge in lieu of standard HF65 cartridge.
Accessories - Provide four spare HF95-CLX filter cartridges and four spare HF8-S cartridges.

Item 31
STAINLESS STEEL WALL FLASHING
Quantity - 2
Make - Fabricate per General Construction this Section by Custom Metals of Massachusetts, SML Stainless Steel Group, or Julien Inc.
Size - Approximately 13'-6" x 19" high extending from top of coved flooring material to bottom of UDS raceway in between UDS risers.

Item 32
UTILITY DISTRIBUTION SYSTEM
Make - CaptiveAire AM-UDW (Job # 6396593) or equal by Gaylord or Halton
Size - 18'-6" x 12" x 6'-8" high
Power - 50 amps circuit - 120/208/60/3
Rating - 2" gas manifold at 528 MBTU/Hour (1,450 MBTU/Hour capacity)
Description - Utility distribution system shall be all standard construction of 300 series stainless steel with primary service riser, secondary riser and a horizontal raceway with separate compartments for plumbing and electrical services. Raceway plumbing compartment shall include gas and water piping, service drops with shut-off valves, Dormont quick disconnect gas hoses and flexible water connectors. Raceway electrical compartment shall include wiring to appliance

connectors along and individual appliance electrical connectors with weatherproof covers. Primary service riser shall include load center with individual service breakers, main shunt trip breaker with reset handle, emergency kill switch, status indicators lights, hood control interface, gas delay reset, and GFI convenience outlet. Secondary riser shall include a pre-plumbed 2 in. electric gas valve, manual shut-off valves for gas and water supply, and GFI convenience outlet. Mount DCV interface screen in main service riser. Provide compartment in secondary riser for mounted water filter assembly (Item 30) with a vision port in the access panel at the filter gauge.

Item 33
EXHAUST VENTILATOR
Make - CaptiveAire 6024 ND-2 (Job # 6396593) or equal by Gaylord or Halton
Size - 10'-0 x 60" plus a 12" extended rear stand-off x 24" high plus 4" high collar, joined-to-end with Item 34 at right, mounted up 6'-8" above finished floor; flat bottom
Power - 120/60/1 power to lights from Item 35
Exhaust - 1,750 CFM thru a 14" diameter collar at -0.612" static pressure. Blower and ductwork provided and installed by Ventilation Contractor.
Description - Ventilator shall be of all standard construction, built of not less than 18 gauge 304 stainless steel throughout with welded joints and seams in accordance with NFPA-96, with reinforced front bottom edge with integral front baffle, double wall insulated front, and NSF Listed. Unit shall have grease collection trough, storage container, and hanger brackets. Provide with 430 stainless steel Captrate Grease-Stop Solo Filter UL classified S-baffle extractors that shall remove at least 75% of grease particles five microns in size, and 90% of grease particles seven microns in size and larger, with a corresponding pressure drop not to exceed 1.0 inches of water gauge. Provide all materials necessary for the hanging of the ventilator, and seal to wall.
Accessories - Provide unit with four recessed UL Listed light LED fixtures factory prewired and left ready for final connection by the Electrical Contractor. Provide closure trim per detail to a point 3" above finished ceiling to close to adjacent surfaces on two sides. Provide balancing damper and a full System Design Verification to be performed by a Factory Certified Technician once system start-up and inspections are completed.

Item 34
EXHAUST VENTILATOR
Make - CaptiveAire 6024 ND-2 (Job # 6396593) or equal by Gaylord or Halton
Size - 7'-6" plus a 12" utility cabinet on the right end x 60" plus a 12" extended rear stand-off x 24" high plus 4" high collar, joined-to-end with Item 33 at left, mounted up 6'-8" above finished floor; flat bottom
Power - 120/60/1 power to lights from Item 35
Exhaust - 1,688 CFM thru a 14" diameter collar at -0.681" static pressure. Blower and ductwork provided and installed by Ventilation Contractor.
Description - Ventilator shall be of all standard construction, built of not less than 18 gauge 304 stainless steel throughout with welded joints and seams in accordance with NFPA-96, with reinforced front bottom edge with integral front baffle, double wall insulated front, and NSF Listed. Unit shall have grease collection trough, storage container, and hanger brackets. Provide with 430 stainless steel Captrate Grease-Stop Solo Filter UL classified S-baffle extractors that shall remove at least 75% of grease particles five microns in size, and 90% of grease particles seven microns in size and larger, with a corresponding pressure drop not to exceed 1.0 inches of water gauge. Provide all materials necessary for the hanging of the ventilator, and seal to wall.

Accessories - Provide unit with three recessed UL Listed light LED fixtures factory prewired and left ready for final connection by the Electrical Contractor. Provide closure trim per detail to a point 3" above finished ceiling to close to adjacent surfaces on two sides. Provide balancing damper and a full System Design Verification to be performed by a Factory Certified Technician once system start-up and inspections are completed.

Item 35
VENTILATOR THERMOSTATIC AUTO-START CONTROL SYSTEM
Make - CaptiveAire SC-010110MA (Job # 6396593) or equal by Gaylord or Halton
Power - 15 amps circuit - 120/60/1 to logic controller
Scope - Furnish and install complete exhaust control system for the exhaust canopy in accordance with the plans and Manufacturers shop drawings. The system shall include programmable logic controller (PLC), stainless steel control enclosure, exhaust duct temperature sensors, room temperature sensor, LCD screen interface with cable, all specified accessories, and those components required to provide complete and satisfactory systems in accordance with accepted HVAC practice. System shall control Items 33 and 34. Mount system processor in the cabinet mounted on the right end of exhaust ventilator Item 34. Mount the room air temperature sensor on the wall 60" above the finished floor.
Important - The installation work shall be performed by a fully qualified contractor employing a certified mechanic fully trained in the installation of the hood control system. Submittal shall list the installing company and the qualified system installer. Provide wiring diagrams and guidance to related trades to achieve correct operation of the system.
Accessories - Provide BacNet monitoring system. Service Design Verification: Factory Services and on site coordination to be performed by the Manufacturers service technician (not a sales representative). On site supervision shall include two site visits: One visit to coordinate preparations for installation, and a second visit at startup and calibration.

Item 35a
VENTILATOR CONTROL INTERFACE SCREEN
Specified as part of Item 35

Item 35b
ROOM TEMPERATURE SENSOR
Specified as part of Item 35

Item 36
FIRE SUPPRESSION SYSTEM
Make - Ansul R-102 or equal by Kidde or Pyro-Chem
Power - 20 amps circuit - 120/60/1
Design - Provide an automatic liquid fire suppressant system sized to meet all local codes, UL 300 and NFPA Codes. System shall provide surface protection for cooking equipment, hood and the exhaust duct work, if required. Tanks shall be mounted the hood manufacturer provided utility cabinet and piping shall run hidden wherever possible. All pipes and fittings used to convey the chemical shall be scale free steel, 40 weight. Exposed piping located within the ventilator shall be stainless steel and limited to vertical drops only. Horizontal piping shall be run over the ventilator's top. Nozzles shall be swivel type with metal caps. Detection shall be fusible links rated per codes, and system shall rely on no outside source of power. The system shall be provided with a control box with indicator to indicate system status. Control head shall also

include integral micro switch offering "normally open" and "normally closed" terminals for use by the Electrical Contractor for the shut-down of equipment and the sounding of alarms, etc. Suppressant tanks shall be stainless steel. Provide and install a remote pull station per codes, complete with cables, conduit and pulleys. Coordinate installation of remote pull station with General Contractor to provide a flush mounted pull box with cable conduit concealed within walls. Provide system with class-K extinguisher with wall mount bracket. Delete standard gas valve and reset relay switch. Gas valve and reset switch shall be provided as part of Item 32.

Workmanship - Exposed stainless steel fittings and piping shall be assembled with special care to avoid marring or damaging the surfaces. Any pieces showing marks shall be removed and replaced with new materials. Chrome sleeves are not acceptable.

Test - Perform a puff test on the completed system and obtain the written approval of the local Fire Inspector.

Accessories - Provide metal blow-off caps on all nozzles.

Item 36a
FIRE EXTINGUISHER
Specified as part of Item 36

Item 37
No item

Item 38
No item

Item 39
MOBILE WORK TABLE
Quantity - 2

Make - Fabricate per General Construction this Section by Custom Metals of Massachusetts, SML Stainless Steel Group, or Julien Inc.

Size - 60" x 30" x 36" high

Construction - 14 gauge stainless steel top over angle frame with edges formed in turndown and mounted on four legs with gussets, 5" diameter swivel casters, two with brakes, and full undershelf.

Accessories - Drawer assembly.

Item 40
WASTE BARREL
Quantity - 2
No work in this Section. Item to be provided by Owner.

Item 41
COOK'S WORK TABLE WITH OVERSHELF

Make - Fabricate per General Construction this Section by Custom Metals of Massachusetts, SML Stainless Steel Group, or Julien Inc.

Size - 9'-0" x 30" x 36" high; overshelf 9'-0" long with shelf at 54" above floor; 20" deep shelf

Construction - 14 gauge stainless steel top over angle frame, edges formed in turndown, 3" turndown on rear edge, six legs with gussets, adjustable feet, flanged feet at the corners for securing to floor, two crossrails and partial undershelf. Overshelf shall be 16 gauge stainless steel, edges formed

in turndown, channel reinforced, and welded to three extended rear table legs with support webs, and supported in integrally welded inverted gussets with sleeved joints for rigidity.

Accessories - Drawer assembly. Provide two rigid stainless steel brackets for mounting of electric outlets in setback positions complete with work boxes, GFI receptacles and stainless steel cover plates. Prewire receptacles through table legs to a mounted junction box below the undershelf. Provide a stainless steel enclosed outlet box for mounting of electric outlet in setback position below the overshelf complete with GFI receptacle and stainless steel cover plate. Mount below the overshelf and prewire through upright and table leg to junction box mounted below the undershelf.

Item 42
ACCESSIBLE PREP STATION TABLE WITH SINK

Make - Fabricate per General Construction this Section by Custom Metals of Massachusetts, SML Stainless Steel Group, or Julien Inc.

Size - 9'-0" x 30" x 34" high, 14" x 16" by 6-1/2" deep integral sink basin; offset drain to rear right

Construction - 14 gauge stainless steel top over angle frame with edges formed in turndown, mounted on six legs with gussets and adjustable feet, flanged feet at corner for securing to floor, and five crossrails. Provide basin with a lift out, 16 gauge stainless steel cover with all edges flanged down 1 in. and corners rounded, provided with two neatly punched thumb holes, and designed to rest on 1/4 in. rod stock supports welded across the basin corners at proper height to provide a flush surface.

Accessories - Crumb cup waste outlet, T&S Brass B-0323-04 faucet, or equal by Fisher or Encore, with 6 in. wrist blade handles. Provide feet with 3 in. minimum height adjustment. Provide three rigid stainless steel brackets for mounting of electric outlets in setback positions complete with work boxes, GFI receptacles and stainless steel cover plates. Prewire receptacles through center rear table leg to a junction box mounted to the center leg and crossrail.

Item 43
MOBILE EQUIPMENT STAND

Quantity - 2

Make - Fabricate per General Construction this Section by Custom Metals of Massachusetts, SML Stainless Steel Group, or Julien Inc.

Size - 30 in. by 30 in. by 32 in. high

Construction - 14 gauge stainless steel top over channel frame, edges formed in turn down, mounted on four legs with gussets, undershelf, and 5 in. diameter casters, two with brakes.

Item 44
AUTOMATIC SLICER

Make - Hobart HS9 or equal by Bizerba or Globe

Power - 5.6 amps - 1/2 HP - 120/60/1 - cord and plug

Description - Slicer shall be all standard construction, automatic type with anodized cast aluminum housing and base, removable 13 in. diameter 304L stainless steel knife with removable ring guard cover, totally enclosed, permanently lubricated PSC knife motor, with poly-v belt drive, zero knife exposure, linear automatic carriage drive system with speeds of 28, 38, 48 and 58 strokes per minute, manual assist mode, and provided with thermoplastic coated steel feed grip, glass bead finished gauge plate and knife cover, tilting carriage, water protected push-button switches, top mounted and removable knife sharpener with two borazon stones, adjustable gauge plate from "0" to 1 in., lift lever system and rubber feet. Unit to be provided with

mechanical and electrical interlocks to include home position start, close gauge plate to stop, carriage will not tilt away or remove if gauge plate is not closed, locked gauge plate when carriage is removed, no-volt release, and 30 second automatic shut-off without carriage motion. Slicer shall be NSF 8 compliant.

Accessories - Provide unit with knife removal tool

Item 45
TWENTY-QUART MIXER
Make - Hobart HL-200 or equal by Globe or Univex
Power - 8 amps - 1/2HP - 120/60/1 - cord and plug
Description - Mixer frame and body shall be fabricated of welded heavy gauge steel finished in Hybrid Powder coat finish, and provided with a stainless steel splash guard at the column, stainless steel bowl guard with electrical interlock, single point bowl installation with swing-out bowl support, manual bowl lift and an attachment hub with No. 12 taper. Transmission shall be gear driven constant mesh heat treated and hardened gears on simi-lar shafts be mounted in ball bearings with recirculating oil and grease to all gears and shafts. Mixing action shall be planetary and shall have speeds of 59 (stir), 107, 198, 365, agitator RPM speeds as selected by an external dial. Speeds to be selectable on-the-fly and include a soft start and stir speed while lifting the bowl into place and controlled with a 15 minute timer with automatic time recall
Accessories - Provide mixer with a 20 quart stainless steel bowl, one flat "B" beater and one "D" wire loop whip with stainless steel wires.

Item 46
No item

Item 47
No item

Item 48
FOOD PROCESSOR
Make - Robot Coupe R301 Ultra Dice*C166 or equal by Berkel or Hobart
Power - 12 amps - 120/60/1 - cord and plug
Description - Combination food cutter shall be all standard construction with 1-1/2 HP direct drive fan cooled capacitor start motor with brake, magnetic interlocks, stainless steel cutter bowl with handle and see-thru lid, continuous feed top unit with attached large feed pusher, two standard discs and dicing kit.

Item 49
PREP TABLE WITH SINKS
Make - Fabricate per General Construction this Section by Custom Metals of Massachusetts, SML Stainless Steel Group, or Julien Inc.
Size - 9'-0" x 30" x 36" high to work surface plus 10" high splash at rear; two 18" x 20" x 10" deep integral sink basins
Construction - 14 gauge stainless steel top, basins and splash, channel reinforced, six legs with gussets and adjustable feet, partial undershelf, two crossrails, tall splash rear, and marine front and ends, secured 3" off face of wall.
Accessories - Drawer assembly, splash mounted faucet set and two 2" lever waste outlets.

Item 50
WALL SHELF
Make - Fabricate per General Construction this Section by Custom Metals of Massachusetts, SML Stainless Steel Group, or Julien Inc.
Size - 10 ft., 0 in. by 12 in. mounted 1 in. off face of wall up 54 in. above finished floor

Item 51
MOBILE HOT FOOD HOLDING CABINET, PASS-THRU
Quantity - 3
Make - Food Warming Equipment MTU-12P*C166 or equal by Vulcan or CresCor
Size - 29-3/4" x 30-1/4" x 69" high
Power - 13.85 amps - 16.5 KW - 120/60/1 - cord and plug
Certification - Unit shall be Energy Star compliant
Description - Cabinet shall be all standard construction with stainless steel interior and exterior, stainless steel base frame with tubular perimeter and 10 gauge stainless steel reinforcing plates at corners, high density fiberglass insulation on all sides, flush mounted door with high temperature gasket mounted on the cabinet, edge mounted heavy duty hinges and latch, twelve pair of removable universal chrome plated and epoxy coated rod type pan slides capable of supporting 18" x 26" or 12" x 20" pans on 4-1/2" centers, mounted thermometer, recessed controls, thermostatically controlled system with separate heat and humidity controls, air distribution blower and removable stainless steel reservoir, and 10' cord set and cord storage loop. Mount on 5" diameter plate mounted polyurethane tired casters; two swivel, two rigid. Provide with two year warranty.
Accessories - Provide unit with see-thru Lexan Dutch doors, perimeter vinyl bumper and push/pull handles.

Item 52
DROP CORD WITH INLINE GFCI
Quantity - 3
Make -World Cords (860/763-2100) Model 88-DC-2003-A4-GM
Power - 20 amps - 120/60/1
Description - Cord shall be all standard construction with female connector body, cord, strain relief, stainless steel ceiling plate, inline GFCI protection with integrated test and reset buttons, and manual reset. Cords shall be adjusted to hang to 78" above floor. Plastic wire ties are not acceptable for this work.

Item 53
MOBILE WORK TABLE
Quantity - 2
Make - Fabricate per General Construction this Section by Custom Metals of Massachusetts, SML Stainless Steel Group, or Julien Inc.
Size - 48" x 30" x 36" high
Construction - 14 gauge stainless steel top over angle frame with edges formed in turndown and mounted on four legs with gussets, 5" diameter swivel casters, two with brakes, and full undershelf.
Accessories - Drawer assembly.

Item 54
REFRIGERATOR, PASS-THRU
Make - Victory RSA-1D-S1-EW-PT-HD-HC, or equal by Continental or Turbo Air
Size - 31-1/4 in. by 35 in. by 84-1/4in. high overall
Capacity - 26.06 cubic feet
Power - 6.5 amps - 120/60/1 - cord and plug
Doors - Half height, control side hinged on left, servery side hinged on right
Certification - Unit shall be Energy Star compliant
Description - Refrigerator shall be all standard construction with stainless steel exterior, aluminum interior, self-closing door hardware with a hold-open at 120°, Humidity control wires around the door jamb, automatic LED interior lighting, exterior digital thermometer, heavy duty epoxy plated wire shelves adjustable in one inch increments, self-contained top mounted refrigeration system capable of maintaining a 33° to 38° temperature range with R-290 refrigerant, and condensate evaporator.
Accessories - Provide adjustable Type A/C tray slide kit spaced 3" on center in the top half, and two shelves in the bottom half. Provide unit mounted on casters.

Item 55
REFRIGERATOR, PASS-THRU
Make - Victory RSA-1D-S1-EW-PT-HD-HC, or equal by Continental or Turbo Air
Size - 31-1/4 in. by 35 in. by 84-1/4in. high overall
Capacity - 26.06 cubic feet
Power - 6.5 amps - 120/60/1 - cord and plug
Doors - Half height, control side hinged on right, servery side hinged on left
Certification - Unit shall be Energy Star compliant
Description - Refrigerator shall be all standard construction with stainless steel exterior, aluminum interior, self-closing door hardware with a hold-open at 120°, Humidity control wires around the door jamb, automatic LED interior lighting, exterior digital thermometer, heavy duty epoxy plated wire shelves adjustable in one inch increments, self-contained top mounted refrigeration system capable of maintaining a 33° to 38° temperature range with R-290 refrigerant, and condensate evaporator.
Accessories - Provide adjustable Type A/C tray slide kit spaced 3" on center in the top half, and two shelves in the bottom half. Provide unit mounted on casters.

Item 56
UTILITY CART
Quantity - 4
Make - Lakeside 521 or equal by Channel
Size - 32-5/8 in. by 19-3/8 in. by 34-1/2 in.
Description - Cart shall be all standard NSF construction, stainless steel throughout, with top and bottom shelves supported by an angle frame, and mounted on two 8 in. fixed and two 5 in. swivel casters. Capacity of cart to be 650 pounds.

Item 57
REFRIGERATOR, PASS-THRU
Make - Victory RSA-2D-S1-PT-HD-HC, or equal by Continental or Turbo Air
Size - 52-1/8 in. by 38-5/8 in. by 84-1/4 in. high overall
Capacity - 48.33 cubic feet
Power - 6.5 amps - 120/60/1 - cord and plug
Doors - Half height, standard hinging both sides
Certification - Unit shall be Energy Star compliant
Description - Refrigerator shall be all standard construction with stainless steel exterior, aluminum interior, self-closing door hardware with a hold-open at 120°, Humidity control wires around the door jamb, automatic LED interior lighting, exterior digital thermometer, heavy duty epoxy plated wire shelves adjustable in one inch increments, self-contained top mounted refrigeration system capable of maintaining a 33° to 38° temperature range with R-290 refrigerant, and condensate evaporator.
Accessories - Provide adjustable Type A/C tray slide kit spaced 3" on center in the top half, and two shelves in the bottom half. Provide unit mounted on casters.

Item 58
MOBILE WORK TABLE
Make - Fabricate per General Construction this Section by Custom Metals of Massachusetts, SML Stainless Steel Group, or Julien Inc.
Size - 60" x 30" x 36" high
Construction - 14 gauge stainless steel top over angle frame with edges formed in turndown and mounted on four legs with gussets, 5" diameter swivel casters, two with brakes, and full undershelf.
Accessories - Drawer assembly.

Item 59
No item

Item 60
No item

Item 61
FUTURE SERVING COUNTER
No work in this Section.

Item 62
REFRIGERATED SELF-SERVICE GRAB & GO CASE
Make - Structural Concepts CO45R*C166 (provide shop drawing for review) or equal by RPI
Size - 47-1/4" x 33" x 61-5/8" high
Power - 15.3 amps - 120/60/1 - cord and plug (NEMA L5-20P)
Description - Display case shall be all standard construction with black interior and display deck, solid black back panel, one piece formed ABS plastic tub, removable deck pan, top mounted LED lights, four tiers of adjustable solid metal shelves, mirrored interior ends, plastic laminate clad exterior in color as selected by Architect, digital thermometer, self-contained refrigeration system with adjustable control, condensate evaporator and coil capable of maintaining average product temperature of 40°F or less, and mounted on casters with levelers.

Accessories - Provide unit with cutaway ends, rear loading hinged door with lock, shelf lights, Clean Sweep coil cleaner, retractable night curtain, locking power cord, and premium exterior laminate option.

Item 63
HOT FOOD WELL, DROP-IN
Quantity - 4
Make - Wells MOD-100D or equal by Hatco or Alto-Shaam
Power - 0.9 KW - 208/60/1
Description - Modular food warmer shall be all standard construction and shall consist of a stainless steel mounting frame, gasket and locking system, stainless steel 6" deep "wet or dry" hot food well with 1" thick fiberglass insulation on five sides enclosed in an aluminized steel enclosure, and an infinite heat control with mounting panel for installation in the counter apron complete with gasket, lead wires encased in flexible armored conduit, drain outlet, and mounting hardware. Wells shall be Fabricator wired to a single point with disconnect switch in accordance with UL Requirements.
Accessories - Mount in a group and provide a quarter turn ball type shut-off valve and Fabricator installed 3/4" copper manifold connecting the wells, complete with cleanout, left ready for extending to the floor drain by the Plumbing Contractor.

Item 64
SERVING COUNTER
Make - Fabricate per General Construction this Section by Custom Metals of Massachusetts, SML Stainless Steel Group, or Julien Inc.
Size - 14'-0" x 33" plus 10" tray slide x 34" high; 32" high to top of trayslide; mitered trayslide corner per plan
Power - 20 amps circuit - 120/60/1 to each of two apron mounted GFI receptacles;
20 amps circuit - 120/60/1 to body mounted GFI receptacle;
20 amps circuit - 120/60/1 to body mounted NEMA L5-20R
American Disabilities Act Requirements - Food pans and breath guards shall be mounted in accordance with ADA code requirements for side reach per code section 4.2.6.
Construction - 14 gauge stainless steel top over angle frame with all edges turned down 2" and corners welded. Provide raw openings for the hot food wells and a flanged opening for the refrigerated pan with all edges flanged down 1" and corners filled and welded.

Mount on eight 2" square 16 gauge stainless steel tubular legs with Component Hardware A15-0851 adjustable feet. Reinforce between all front and end legs with 2" square stainless steel tubing welded in place 6-1/4" clear above floor. Provide similar reinforcement between rear legs where an undershelf does not exist.

Undershelves shall be fabricated of 16 gauge stainless steel with reinforcing and sound deadening as specified for open base table undershelves. Front face shall be turned down 1-1/2" and in 1/2" at 45°. Rear and ends shall be turned up 1-1/2" and corners welded. Weld to legs at a point 10" above floor. Shelf shall be mounted on the inside face of legs, not cut-out at each leg. Leave 2" clearance between the shelf edge and the counter front and end panels for passing of services by Related Trades.

Trayslide shall be fabricated of 14 gauge stainless steel with front and ends turned down and corners welded. Rear shall be turned up under the counter front edge Mount on Component Hardware J19-4966 brackets bolted through the front panels to reinforced area.

Front and ends of counter shall be provided with plastic laminate clad panels. Plastic laminate manufacturer shall be as selected by the Architect. Plastic laminate color shall be as selected by the Architect from Wilsonart's full range of colors. Panels shall be mounted with a minimum of joints. All joints to be hairline type. Joint between a front and end panel shall appear on the end panel face. Panels shall be secured to counter legs and crossrails with welded stainless steel clips and stainless steel wood screws. Do NOT secure THROUGH the legs or crossrails. Provide a continuous 14 gauge support-protector strip at the lower edge of all finish panels, extending 1/16" past front face.

Apron shall be provided per elevations, fabricated of 18 gauge stainless steel, and shall be used for the mounting of switches, outlets, and controls. Apron shall include a formed reinforced bottom edge and shall be set in 1" from leg face.

Accessories - Provide with a 66" long (between end posts on centers) Versa-Gard VG6S full-service food protector (Item 64a) with brushed stainless steel uprights, surface mount flanges, and mounted per plan. Provide with a 48" long (between end posts on centers) Versa-Gard VG9 self-service food protector display case (Item 64b) with brushed stainless steel uprights, surface mount flanges, and mounted per plan.

Item 64a
FULL-SERVICE GLASS FOOD PROTECTOR CASE
Specified as part of Item 64

Item 64b
TWO-TIER SELF-SERVE GLASS FOOD PROTECTOR CASE
Specified as part of Item 64

Item 65
FILL FAUCET
Quantity - 2
Make - T&S Brass B-0208 or equal by Fisher or Encore
Description - Unit shall be all standard construction with a B-199-02F-12 aerator tip.

Item 66
COLD WELL, DROP-IN
Make - Hatco CWB-3*C166 or equal by Atlas or Wells
Size - 45 in. by 27 in. by 25-1/2 in. high
Power - 3.8 amps - 1/4 HP - 120/60/1 phase - cord and plug
Description - The NSF 7 approved refrigerated drop-in well shall be standard construction per the manufacturer's standard details with an angled interior wall design. Unit shall utilize R-513A refrigerant and consist of aluminized steel housing with a stainless bezel, mounted electronic temperature control, pan support bars for full-size pans, condenser unit (can be rotated), compressor with flexible refrigerant lines, sight glass, service valves, receiver, and dryer/filter.

Accessories - Provide optional five year warranty on the compressor. Provide with 20 in. pan support bars and perforated false bottom. Provide loose control enclosure for mounting in counter apron.

Item 67
MILK COOLER
Make - Beverage-Air STF58HC-1-S*C166 or equal by Continental or True
Size - 58" x 34" x 47-3/4" high; sixteen 13" x 13" x 11" milk crate capacity
Power - 3.3 amps - 1/3 HP - 120/60/1 - cord and plug
Description - Dual access milk cooler shall be all standard construction with stainless steel interior and exterior fronts and ends, self-contained refrigeration system with thermostatic controls and blower, urethane foam insulation, exterior dial thermometer, and hinged and lockable drop-front covers. Interior shall be fitted with a vinyl coated wire rack. Mount on 4" diameter swivel casters and provide with R-290 refrigerant.
Accessories - Provide unit with optional five year compressor warranty.

Item 68
COLD WELL, DROP-IN
Make - Hatco CWB-3*C166 or equal by Atlas or Wells
Size - 45 in. by 27 in. by 25-1/2 in. high
Power - 3.8 amps - 1/4 HP - 120/60/1 phase - cord and plug
Description - The NSF 7 approved refrigerated drop-in well shall be standard construction per the manufacturer's standard details with an angled interior wall design. Unit shall utilize R-513A refrigerant and consist of aluminized steel housing with a stainless bezel, mounted electronic temperature control, pan support bars for full-size pans, condenser unit (can be rotated), compressor with flexible refrigerant lines, sight glass, service valves, receiver, and dryer/filter.
Accessories - Provide optional five year warranty on the compressor. Provide with 20 in. pan support bars and perforated false bottom. Provide loose control enclosure for mounting in counter apron.

Item 69
SERVING COUNTER
Make - Fabricate per General Construction this Section by Custom Metals of Massachusetts, SML Stainless Steel Group, or Julien Inc.
Size - 14'-0" x 33" plus 10" tray slide x 34" high; 32" high to top of trayslide; mitered trayslide corner per plan
Power - 20 amps circuit - 120/60/1 to apron mounted GFI receptacle;
20 amps circuit - 120/60/1 to body mounted GFI receptacle;
20 amps circuit - 120/60/1 to body mounted NEMA L5-20R
American Disabilities Act Requirements - Food pans and breath guards shall be mounted in accordance with ADA code requirements for side reach per code section 4.2.6.
Construction - 14 gauge stainless steel top over angle frame with all edges turned down 2" and corners welded. Provide raw openings for the hot food wells and a flanged opening for the refrigerated pan with all edges flanged down 1" and corners filled and welded.

Mount on eight 2" square 16 gauge stainless steel tubular legs with Component Hardware A15-0851 adjustable feet. Reinforce between all front and end legs with 2" square stainless steel

tubing welded in place 6-1/4" clear above floor. Provide similar reinforcement between rear legs where an undershelf does not exist.

Undershelves shall be fabricated of 16 gauge stainless steel with reinforcing and sound deadening as specified for open base table undershelves. Front face shall be turned down 1-1/2" and in 1/2" at 45°. Rear and ends shall be turned up 1-1/2" and corners welded. Weld to legs at a point 10" above floor. Shelf shall be mounted on the inside face of legs, not cut-out at each leg. Leave 2" clearance between the shelf edge and the counter front and end panels for passing of services by Related Trades.

Trayslide shall be fabricated of 14 gauge stainless steel with front and ends turned down and corners welded. Rear shall be turned up under the counter front edge Mount on Component Hardware J19-4966 brackets bolted through the front panels to reinforced area.

Front and ends of counter shall be provided with plastic laminate clad panels. Plastic laminate manufacturer shall be as selected by the Architect. Plastic laminate color shall be as selected by the Architect from Wilsonart's full range of colors. Panels shall be mounted with a minimum of joints. All joints to be hairline type. Joint between a front and end panel shall appear on the end panel face. Panels shall be secured to counter legs and crossrails with welded stainless steel clips and stainless steel wood screws. Do NOT secure THROUGH the legs or crossrails. Provide a continuous 14 gauge support-protector strip at the lower edge of all finish panels, extending 1/16" past front face.

Apron shall be provided per elevations, fabricated of 18 gauge stainless steel, and shall be used for the mounting of switches, outlets, and controls. Apron shall include a formed reinforced bottom edge and shall be set in 1" from leg face.

Accessories - Provide with a 66" long (between end posts on centers) Versa-Gard VG6S full-service food protector (Item 69a) with brushed stainless steel uprights, surface mount flanges, and mounted per plan. Provide with a 48" long (between end posts on centers) Versa-Gard VG9 self-service food protector display case (Item 69b) with brushed stainless steel uprights, surface mount flanges, and mounted per plan.

Item 69a
FULL-SERVICE GLASS FOOD PROTECTOR CASE
Specified as part of Item 69

Item 69b
TWO-TIER SELF-SERVE GLASS FOOD PROTECTOR CASE
Specified as part of Item 69

Item 70
HOT FOOD WELL, DROP-IN
Quantity - 4
Make - Wells MOD-100D or equal by Hatco or Alto-Shaam
Power - 0.9 KW - 208/60/1
Description - Modular food warmer shall be all standard construction and shall consist of a stainless steel mounting frame, gasket and locking system, stainless steel 6" deep "wet or dry" hot food well

with 1" thick fiberglass insulation on five sides enclosed in an aluminized steel enclosure, and an infinite heat control with mounting panel for installation in the counter apron complete with gasket, lead wires encased in flexible armored conduit, drain outlet, and mounting hardware. Wells shall be Fabricator wired to a single point with disconnect switch in accordance with UL Requirements.

Accessories - Mount in a group and provide a quarter turn ball type shut-off valve and Fabricator installed 3/4" copper manifold connecting the wells, complete with cleanout, left ready for extending to the floor drain by the Plumbing Contractor.

Item 71
REFRIGERATED SELF-SERVICE GRAB & GO CASE
Make - Structural Concepts CO45R*C166 (provide shop drawing for review) or equal by RPI
Size - 47-1/4" x 33" x 61-5/8" high
Power - 15.3 amps - 120/60/1 - cord and plug (NEMA L5-20P)
Description - Display case shall be all standard construction with black interior and display deck, solid black back panel, one piece formed ABS plastic tub, removable deck pan, top mounted LED lights, four tiers of adjustable solid metal shelves, mirrored interior ends, plastic laminate clad exterior in color as selected by Architect, digital thermometer, self-contained refrigeration system with adjustable control, condensate evaporator and coil capable of maintaining average product temperature of 40°F or less, and mounted on casters with levelers.
Accessories - Provide unit with cutaway ends, rear loading hinged door with lock, shelf lights, Clean Sweep coil cleaner, retractable night curtain, locking power cord, and premium exterior laminate option.

Item 72
TWO-TIER HEATED SHELF
Make - Hatco GRSDS/H-36D*C166 or equal
Size - 36" x 24" x 32-1/2" high
Power - 15.1 amps - 1.81 KW - 120/60/1 - cord and plug (NEMA 5-20P)
Description - Unit shall be all standard construction with two heated shelves, one slanted and one flat, with Hardkote finish, constructed of stainless steel and extruded aluminum with tempered glass end panels, incandescent lights, dividers, and thermostatic controls.

Item 73
SERVING COUNTER
Make - Fabricate per General Construction this Section by Custom Metals of Massachusetts, SML Stainless Steel Group, or Julien Inc.
Size - 10'-0" x 33" plus 10" tray slide x 34" high; 32" high to top of trayslide; mitered trayslide corner per plan
Power - 20 amps circuit - 120/60/1 to each of three apron mounted GFI receptacles
American Disabilities Act Requirements - Food pans and breath guards shall be mounted in accordance with ADA code requirements for side reach per code section 4.2.6.
Construction - 14 gauge stainless steel top over angle frame with all edges turned down 2" and corners welded.

Mount on six 2" square 16 gauge stainless steel tubular legs with Component Hardware A15-0851 adjustable feet. Reinforce between all front and end legs with 2" square stainless steel

tubing welded in place 6-1/4" clear above floor. Provide similar reinforcement between rear legs where an undershelf does not exist.

Undershelves shall be fabricated of 16 gauge stainless steel with reinforcing and sound deadening as specified for open base table undershelves. Front face shall be turned down 1-1/2" and in 1/2" at 45°. Rear and ends shall be turned up 1-1/2" and corners welded. Weld to legs at a point 10" above floor. Shelf shall be mounted on the inside face of legs, not cut-out at each leg. Leave 2" clearance between the shelf edge and the counter front and end panels for passing of services by Related Trades.

Trayslide shall be fabricated of 14 gauge stainless steel with front and ends turned down and corners welded. Rear shall be turned up under the counter front edge Mount on Component Hardware J19-4966 brackets bolted through the front panels to reinforced area.

Front and ends of counter shall be provided with plastic laminate clad panels. Plastic laminate manufacturer shall be as selected by the Architect. Plastic laminate color shall be as selected by the Architect from Wilsonart's full range of colors. Panels shall be mounted with a minimum of joints. All joints to be hairline type. Joint between a front and end panel shall appear on the end panel face. Panels shall be secured to counter legs and crossrails with welded stainless steel clips and stainless steel wood screws. Do NOT secure THROUGH the legs or crossrails. Provide a continuous 14 gauge support-protector strip at the lower edge of all finish panels, extending 1/16" past front face.

Apron shall be provided per elevations, fabricated of 18 gauge stainless steel, and shall be used for the mounting of switches, outlets, and controls. Apron shall include a formed reinforced bottom edge and shall be set in 1" from leg face.

Item 74
NOVELTY ICE CREAM DISPLAY FREEZER
No work in this Section. Item to be provided by Owner’s Vendor.

Item 75
No item

Item 76
No item

Item 77
FUTURE MOBILE CASHIER STAND
No work in this Section.

Item 78
FUTURE CASHIER TERMINAL
No work in this Section.

Item 79
WORKTOP GLASS DOOR DISPLAY REFRIGERATOR
Make - Continental SW36NGD or equal by Beverage Air or True
Size - 36" x 31-1/2" x 35-1/4" high
Power - 2.5 amps - 120/60-1 - cord and plug
Description - Unit shall be all standard construction per the Manufacturer's specification.
Accessories - Provide with door lock.

Item 80
MOBILE CASHIER STAND
Quantity - 2 (one left, one right)
Make - Fabricate per General Construction this Section by Custom Metals of Massachusetts, SML Stainless Steel Group, or Julien Inc.
Size - 30" x 30" x 36" high main section with 42" x 10" trayslide set at 32" above floor; mitered trayslide corner per plan
Construction - 14 gauge stainless steel top over angle frame with all edges turned down 2" and corners welded. Mount on four 2" square legs with crossrails on three sides, footrest set in 8", undershelf and plastic laminate clad panels on three sides and a solid mounted trayslide all of similar construction to the serving counter. Mount trayslide on fold-down brackets. Provide 3" diameter grommeted hole in top below rear of cashier terminal for passage of cables. Provide 5" diameter swivel casters; two with brakes.
Accessories - Provide unit with a Component Hardware S95-1000 locking cashier drawer.

Item 81
CASHIER TERMINAL
Quantity - 3
No work in this Section. Item to be provided by Owner.

Item 82
MOBILE CONDIMENT COUNTER
Quantity - 2
Make - Fabricate per General Construction this Section by Custom Metals of Massachusetts, SML Stainless Steel Group, or Julien Inc.
Size - 48" x 27" x 34" high
Construction - 14 gauge stainless steel top over angle frame with all edges turned down 2" and corners welded. Mount on four 2" square legs with undershelf and plastic laminate clad panels on four sides all of similar construction to the serving counter. Rear face shall be provided with a pair of hinged doors in a 36" wide opening. Provide 5" diameter swivel casters; two with brakes.

Item 83
MOBILE CASHIER STAND
Make - Fabricate per General Construction this Section by Custom Metals of Massachusetts, SML Stainless Steel Group, or Julien Inc.
Size - 30" x 30" x 36" high main section with two 42" x 10" trayslides set at 32" above floor; mitered trayslide corners per plan
Construction - 14 gauge stainless steel top over angle frame with all edges turned down 2" and corners welded. Mount on four 2" square legs with crossrails on three sides, footrest set in 8", undershelf and plastic laminate clad panels on three sides and a solid mounted trayslide all of

similar construction to the serving counter. Mount trayslides on fold-down brackets. Provide 3" diameter grommeted hole in top below rear of cashier terminal for passage of cables. Provide 5" diameter swivel casters; two with brakes.

Accessories - Provide unit with a Component Hardware S95-1000 locking cashier drawer.

Item 84
No item

Item 85
No item

Item 86
ROLL-DOWN SHUTTER
Make - Raynor DuraShutter Select/surface mount or equal by Alpine or Cornell
Size - Opening approximately 36" wide x 50" high; verify
Description - Assembly shall be all standard construction and shall consist of a self-coiling rolling counter shutter, all anodized aluminum construction with interlocking extruded slats, extruded aluminum bottom bar with rubber astragal, designed for surface type mounting with extruded guides with wool pile inserts, and complete with recessed inside lifting handles and thumb-turn locks, and complete covers.
Installation - Install with tracks located 1" clear above table surface to permit proper cleaning.

Item 87
SOILED WARE TABLE WITH INTEGRAL PASS-THRU WINDOW FRAME
Make - Fabricate per General Construction this Section by Custom Metals of Massachusetts, SML Stainless Steel Group, or Julien Inc.
Size - Approximately 10'-1" x 30" plus 48" x 30" return to dishwasher, plus pass-thru x 34" high plus 10" high splash at walls; 3" high raised open roll on working faces; 36" x 49" pass thru with 35" sill height; 18" x 18" x 8" deep integral sink
Construction - 14 gauge stainless steel top, sink basin and splash, channel frame, nine legs with gussets, adjustable feet, and eight crossrails. Secure 3" off wall, except at end secure to wall and seal. Turn end down into dishwasher and secure with stainless steel machine screws. Top of splash shall be fitted with integral flat spot for mounting of the pre-rinse fixture. Top shall pass through the wall and be an integral part of the pass window. Pass-thru ledge shall extend through the wall and be secured to the frame. Provide a 16 gauge stainless steel telescoping window frame at the opening with front edges turned out 2" and returned 1/2". Rear edges to be turned out 2-1/2" flat to wall. Integral scrapping sink shall be provided with a 2" x 1/4" bar stock rack guide attached to the reinforced splash with stainless steel through bolts. Sink shall be provided with two 16 gauge perforated stainless steel scrapping baskets, 6" deep, on 1/2" high angle legs set back to clear the basin cove, and integral tubular handles flush with counter tops.
Accessories - Provide unit with a 2" free flow waste outlet Component Hardware D36-2080

Item 88
HOSE REEL ASSEMBLY
Make - T&S Brass B-7102-U1JXS9E or equal by Fisher or Reel Craft
Size - 12 foot hose, 3/8" ID
Maximum Water Use - 1.07 Gallons per minute

Description - Unit shall be all standard construction with stainless steel open type reel, adjustable bumper, blue hose, B-107-J low flow spray valve, heat resistant spray valve handle, chrome risers, two wall brackets, continuous pressure vacuum breaker with integral check valve, 36" flexible water hose, control valve, and deck type base faucet, designed for wall mounting per plan up 7'-6" measured at the inlet.

Accessories - Provide with G019430-45 stainless steel wall mount swing bracket. Provide modified risers sized for assembled installation under an 9'-0" high ceiling.

Installation - The hose reel bracket for wall mounted units shall be rotated 90° downward and installed such that it allows the hose to hang straight down and parallel to the wall. Refer to T&S Brass instructions manual page four figure one for further details.

Item 89

WAREWASHER, RACK CONVEYOR

Make - Hobart CL44eN-BAS R-L*C166, or equal by Champion or Stero

Size - 43-1/2 in. by 30-1/8 in. by 65-1/2 in. high

Power - 68 amps - 480/60/3

Conveyor speed - 5.6 feet per minute; 202 racks per hour

Maximum Water Usage - 0.62 gallon per rack

Certification - Unit shall be Energy Star compliant

Description - Unit shall be standard construction, double tank, fully automatic, rack conveyor type with l6 gauge stainless steel wash and rinse chambers, welded stainless steel frame and motor supports, stainless steel chambers, housing, insulated inspection doors and legs with adjustable feet. Conveyor structure, tracks, and drive unit to be all stainless steel with a conveyor speed of 5.6 feet per minute. Warewasher to be complete with with 30 KW booster heater, insulated cabinet style doors, dirty water indicator, configurable de-lime notification, top mounted computer controls with "start/stop" button and digital display, NSF approved pot and pan cycle mode, 19-1/2 in. standard chamber height, and and ten plastic racks.

Accessories - Provide with 30 KW internal booster heater, two standard vent hoods with 4 in. by 16 in. stainless steel stacks all welded water tight complete with locking dampers, table limit switch, drain water tempering kit, and four plastic peg racks and two plastic flat racks.

Item 90

STAINLESS STEEL VENT DUCTS

Quantity - 2

Make - Fabricate per General Construction this Section by Custom Metals of Massachusetts, SML Stainless Steel Group, or Julien Inc.

Size - 4" x 16" with length as necessary to reach 3" above finished ceiling

Construction - 18 gauge stainless steel welded exhaust ducts, sized to suit the vent stacks. Ducts shall be provided with a one-piece perimeter angle collar at the ceiling, installed "leg up".

Item 91

WATER FILTER ASSEMBLY

Make - WaterSpec WS-SSEXT or equal by 3M or Everpure

Description - Unit shall be all standard construction designed for vertical wall mounting per plan and consisting of a mounting bracket, manifold, and filter cartridge with housing. Assembly shall have an operating inlet water temperature range of 35 to 160 degrees Fahrenheit.

Accessories - Provide four spare SS-EXT filter cartridges.

Item 92
CLEAN WARE TABLE
Make - Fabricate per General Construction this Section by Custom Metals of Massachusetts, SML Stainless Steel Group, or Julien Inc.
Size - 87" x 30" x 34" high plus 10" splash at walls; 3" high raised roll at front
Construction - 14 gauge stainless steel top and splash over channel frame with raised roll front, tall splash at rear and end, turned down into dishwasher and secured with stainless steel machine screws, and mounted on four legs with gussets, adjustable feet and undershelf. Secure table 3" off face of wall.

Item 93
THREE-COMPARTMENT SINK
Make - Fabricate per General Construction this Section by Custom Metals of Massachusetts, SML Stainless Steel Group, or Julien Inc.
Size - 11'-6" x 30" x 34" high plus 10" high splash at walls; 3" high raised open roll at front and ends; three 21" x 27" x 12" deep integral sink basins
Construction - 14 gauge stainless steel top, basins and splash, stainless steel channel reinforced, four legs with gussets, adjustable feet, and three lengths of crossrail. Secure 3" off face of wall.
Accessories - Provide unit with two splash mounted pot sink faucet sets and three 2" lever waste outlets.

Item 94
WALL SHELF
Make - Fabricate per General Construction this Section by Custom Metals of Massachusetts, SML Stainless Steel Group, or Julien Inc.
Size - 60" x 12" mounted 60" above floor
Construction - Wall shelf shall be fabricated of 16 gauge stainless steel with back and ends raised 1-1/2", front edges of ends angled back, all corners broken, and front turned down 1-1/2", and in 1/2" at 45°. Shelf corners shall be welded, ground and polished. Mount shelf 1" off face of wall with suitable fasteners on 14 gauge stainless steel flag brackets, 48" on center maximum. Flag brackets shall have a web angle of 30° measured from horizontal.

Item 95
MOBILE SHELVING UNIT, FOUR-TIER
Quantity - 4
Make - MetroMax Q*C166 or equal by Cambro or Fermod
Size - (2) 48" x 24", and (2) 36" x 24", all 69" high on casters; four tier
Description - Shelving unit shall be all standard construction and shall consist of four shelves with removable injection molded polypropylene mats with antimicrobial product protection, supported on epoxy coated steel shelf frames and similar uprights with capped tops, and mounted on 5" diameter polyurethane tired swivel casters with donut bumpers.
Accessories - Provide with polymer posts in lieu of standard.

PART 3 - EXECUTION

3.1 SANITATION REQUIREMENTS

A. Equipment specified herein shall be fabricated to conform to the "Food Service Equipment Standards" of the National Sanitation Foundation prepared by the Committee on Food Service Standards, and published by the National Sanitation Foundation, Ann Arbor, Michigan. Any differences of opinion on sanitation will be referred to the State Department of Health for a ruling.

B. Equipment shall be installed in accordance with the manufacturer's instructions and the best practices of the food service industry, with careful attention to eliminating all cracks, crevices and concealed spaces in wet areas that would be difficult to clean or keep free of vermin and soil.

3.2 EXAMINATION AND ACCEPTANCE

A. Determine whether the General Contractor will furnish and provide temporary power and light, openings and storage space to permit scheduled delivery of equipment. Verify water pressure and provide necessary reducing valves.

B. Examine space in which specified work is to be installed to assure that conditions are satisfactory for the installation of specified work. Report in writing to the Architect, any deficiency in the work of other contractors affecting specified work. Commencement of specified work will be construed as acceptance of space conditions.

C. Obtain and verify all measurements and conditions on the job, and assume responsibility in respect to same.

D. Inspect flooring and raised concrete bases, wall finishes, painting, ceiling installation and all related work for readiness to commence installation of foodservice equipment. Verify the existence of required mechanical and electrical rough-ins.

3.3 CLEANING UP

A. Debris and surplus materials resulting from installation work shall be removed promptly as work progresses, to a location indicated by the General Contractor.

B. Following completion, and before final acceptance by the Owner, clean finished surfaces in accordance with the manufacturer's instructions, and leave specified work free of imperfections.

C. Provide Architect or Consultant with a loose leaf bound manual of operating data and maintenance instructions containing complete description, wiring diagrams, operating data, maintenance requirements and other information pertaining to the proper operation and upkeep of the various items of electrical or mechanical equipment. Include names, addresses and telephone numbers of authorized service agencies for all items. Arrange all material in

alphabetical order by Manufacturer. Provide with a list of equipment to include make, model, and serial number where applicable. Book shall be turned over to Owner after review and approval.

D. Submit guarantees and warrantees to the Architect in the above specified manual with all warranty cards completed and becoming effective at the time the equipment was satisfactorily demonstrated.

3.4 PROTECTION OF WORK

A. Protect specified work from damage during transportation to the project site, storage at the site, during installation, and after completion until acceptance by the Owner.

B. Protect adjacent work under other contracts during installation until completion of specified work. After completion, the contractor for other work shall be responsible for the protection of his work until acceptance by the Owner.

C. Damaged work as determined by the Architect, shall be repaired or replaced as determined by the Architect.

3.5 DEMONSTRATION AND OPERATING INSTRUCTIONS

A. Before final acceptance, and by appointment with the Owner and his representatives, completely demonstrate with power, the correct operation of each new item of operating equipment.

B. Prior to the demonstration, turn on all mechanical and electrical foodservice equipment. Test for leaks, poor connections, and inadequate or faulty performance and correct if necessary. Adjust for proper operation. Thermostatically controlled equipment and equipment with automatic features shall be operated for a sufficient length of time with proper testing equipment to prove controls are functioning as intended. Recalibrate thermostats if necessary.

C. Provide Architect or Consultant with a loose leaf bound manual of operating data and maintenance instructions containing complete description, wiring diagrams, operating data, maintenance requirements and other information pertaining to the proper operation and upkeep of the various items of electrical or mechanical equipment. Include names, addresses and telephone numbers of authorized service agencies for all items. Arrange all material in alphabetical order by Manufacturer. Book shall be turned over to Owner after review and approval.

D. Submit guarantees and warranties to the Architect in the above specified manual with all warranty cards completed and becoming effective at the time the equipment was satisfactorily demonstrated.

END OF SECTION 114000

SECTION 11 5400 - ART EQUIPMENT

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Kiln.
   1. Kilns for Art Department use.
      a) A. Related Sections include the following:
   2. Division 23 and 26 Sections for services and connections to miscellaneous equipment.

1.2 SUBMITTALS

A. Product data for each type of equipment specified, with installation instructions for each unit built-in or connected to other construction. Include methods of installation for each type of substrate.

B. Shop drawings showing installation details of accessories permanently affixed to construction, including full-scale installation details of special conditions, where applicable.

C. Qualification Data: For qualified Installer.

D. Warranty: Sample of Special warranty specified in this Section.

1.3 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each equipment item to include in operation and maintenance manuals.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer for installation and maintenance of equipment items required for this Project.

B. Source Limitations: Obtain equipment items through one source from a single manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to project site in original factory wrappings and containers, clearly labeled with identification of manufacturer, brand name, and lot number. Store materials in original undamaged packages and containers, inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, humidity; laid flat, blocked off ground to prevent sagging and warping.

B. Comply with instructions and recommendations of manufacturer for special delivery, storage, and handling requirements.

1.6 SEQUENCE AND SCHEDULING

A. Sequence installation of miscellaneous equipment with existing adjacent construction to minimize possibility of damage and soiling during remainder of construction period.

1.7 WARRANTY

A. Special Warranties: Manufacturer's standard form in which manufacturer agrees to repair or replace equipment items or components that fail in materials or workmanship within specified warranty period.
   1. Three year limited parts warranty from date of Substantial Completion.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Products: The design for each miscellaneous equipment item is based on the product named, to be compatible with the existing kiln. Subject to compliance with requirements, provide the named products. No substitutions will be permitted.

B. Basis-of-Design Manufacturer: L & L Kiln Mfg, Inc., www.hotkilns.com.

2.2 KILNS

A. Kiln **EV01**: Top-loading kiln.
   1. Basis-of-Design: L & L Kiln; **Easy-Fire e23T-3-208-3P**.
   2. Temperature Rating: Cone 10.
   3. Size:
      a) Inside Dimensions: 22.3” diameter x 17” high.
      b) Volume: 6.7 cubic feet.
      c) Outside Dimensions: 30" wide x 68” high x 40" deep.
   4. Construction:
      a) Assembly: Two 9 inch high sections stack on top of each other.
      b) Stainless steel jacket wrapped around a 3-inch thick firebrick lining with three clamps on each section. Brick has a reflective coating to protect it and prevent dusting.
      c) Firebrick Thickness: 3 inches.
   5. Stand: Heavy duty 14 gauge full solid steel stand with multiple bends for strength. Bolt-on legs and feet protectors.
   6. Lid: Spring loaded hinge allowing lid to be self-supporting.
   7. Elements: Heavy-duty, 2 elements per 9 inch section. Elements held in place by hard ceramic holders.
   8. Control Panel: Control electronics and operating elements provided in a separate, insulated control panel module mounted to the front of the kiln and connected to the kiln element connection box. Control panel and element box are hinged for access and maintenance and can be removed for servicing.

a) Control Basis-of-Design: **Genesis Touchscreen Control with Dynamic Zone Control** by L&L Kilns. Wi-fi enabled touchscreen interface, includes graphical display of firing process and built-in diagnsotic testing. ~~**Dyna Trol** with 4 Easy-Fire programs, 6 Vary-Fire programs, Pre-Heat, , Delay, Program and Segment Review, and Diagnostics. Alos included dynamic zone control as a standard feature.~~

9. UL Listing: c-MET-us listed to UL499 standards.
10. Electrical Specifications:
    a) Power Cord: NEMA 15-50 cord for three phase, included with kiln.
    b) Wattage: 11,000 at 30.5 amps.
    c) Voltage/Phase: 208V / 3-phase.
    d) Elements: All elements are of equal resistance value. T models have six elements.

B. Kiln Instructions:
1. Provide complete visual instuctions with control reference, process information, assembly, troubleshooting, and parts list. In addition available web videos show how to assemble the kiln and how to fire it.

2.3 KILN EXHAUST VENT

A. Basis-of-Design Product: L & L Kiln; **Vent-Sure** kiln downdraft exhaust vent system
1. Downdraft Vent: Vent system shall pull air from the bottom of the kiln to ventilate fumes from the kiln under vacuum, venting kiln fumes to the exterior. The downdraft ventilation system shall produce better firing by promoting higher temperature uniformity in the kiln; up to a 1/2 cone improvement.
2. Voltage and Amperage: 120 volts at 1.37 Amps.
3. On/Off Switch and Cord: Switch on six-foot long cord.
4. Flexible Exhaust Ductwork: 3-inch diameter flexible and expandable aluminum duct with necessary hose clamps, length as required.
5. Fan Motor Capacity: 130 CFM.
6. Vent Control: A vacuum bypass on the kiln bypass/collection box shall adjust the amount of venting from the system.

2.4 FURNITURE KIT

A. Furniture Kit: Set of shelves, posts, and heat-resistant gloves intended to allow stacking and handling of ceramic items inside the kiln. Compatible with specified kiln.

B. Basis of Design: **L&L Kilns**; Model #**H-E-K23T/3H**.

PART 3 - EXECUTION

3.1 COORDINATION

A. Verify that room contruction and finishes, and electrical connections are ready for equipment installation.

3.2 INSTALLATION

A. Verify that materials are those specified before installing.

B. Local dealer, or manufacturer's representative, shall unpack and then assemble any loose or optional parts, provide initial start-up operations, and verify functioning of all control and program sequences.

C. Install accessories after other finishing operations, including painting, have been completed.

D. Free Standing Units: Install freestanding units in scheduled locations.

E. Wall Mounted Units: Install wall mounted units with wall brackets in accordance with manufacturer's written instructions.

F. Adjust accessory items for proper operation. Clean and polish exposed surfaces, using materials and methods recommended by the manufacturer.

3.3 PROTECTION

A. Protect units against damage during remainder of construction period, complying with manufacturer's directions.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain the kiln(s).

B. See Section 01 7900 - Demonstration and Training for general requirements for demonstration and training.

END OF SECTION 11 5400

SECTION 11 5410 - TECHNICAL EDUCATION EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Woodworking equipment.

B. Spray booth.

C. Laser tools.

D. 3D printer.

1.2 RELATED REQUIREMENTS

A. Division 26 Section "Wiring".

1.3 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meetings: Review installation requirements, rough-ins, and equipment locations with Owner, Architect, and applicable contractors.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide manufacturer's product data for each item specified. Include installation instructions and owner's manual for use and care of equipment.
   1. Provide wiring diagrams for applicable items.

C. Installer's qualification statement.

D. Operation and Maintenance Data: For spray booth.

E. Executed warranty.

F. Specimen warranty.
   1. For each different item specified.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least ten years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least five years of documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 7419 - Construction Waste Management and Disposal for packaging waste requirements.

B. Deliver equipment to project site in manufacturer's original sealed packaging.

C. Store equipment in accordance with each manufacturers' instructions until time of installation.

1.7 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Manufacturer's standard warranty against manufacturing defects in materials and workanship, for each item indicated on the "Specialty Equipment List" on the drawings.

PART 2 PRODUCTS

2.1 OWNER-FURNISHED PRODUCTS

A. See Specialty Equipment Schedule on Drawing A912 for items that are Owner-furnished, Contractor-installed (O/C).

2.2 MANUFACTURERS

A. Equipment Nos. **EC01 - EC13**: See "Specialty Equipment List" on the drawings for Basis of Design manufacturers and products, and electrical and other utility requirements.

B. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify utility rough-ins are provided and correctly located.

3.2 INSTALLATION

A. Install each item in accordance with item manufacturer's written instructions.

B. Install equipment rigid, straight, plumb, and level.

C. Secure equipment with manufacturer's recommended anchoring devices.

3.3 ADJUSTING

A. Adjust operating equipment for proper operation; remove and replace equipment causing noise or vibration; lubricate equipment as recommended by manufacturer.

3.4 CLEANING

A. See Section 01 7000 - Execution and Closeout Requirements for additional requirements.

3.5 CLOSEOUT ACTIVITIES

A. See Section 01 7800 - Closeout Submittals for additional submittals.

B. See Section 01 7900 - Demonstration and Training for additional requirements.

C. Demonstrate proper operation of of each item of equipment specified to Owner's designated representative.

D. Training: Train Owner's personnel on operation and maintenance of the following:
   1. Spray booth.
   2. Training Reference: Operation and maintenance manual and additional training materials as required.
   3. Provide minimum of one hour of training.

3.6 PROTECTION

A. Protect installed equipment from subsequent construction operations.

END OF SECTION 11 5410

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SECTION 11 6623 - GYMNASIUM EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Basketball backboards, goals, and support framing.

B. Floor sleeves for net and goal posts.

C. Wall mounted protection pads.

D. Gym divider curtains.

E. Volleyball nets and posts, and accessories.

1.2 RELATED REQUIREMENTS

A. Section 05 5000 - Metal Fabrications: Requirements for secondary structural members supporting gymnasium equipment, furnished and installed by gymnasium equipment provider.

B. Section 26 0583 - Wiring Connections.

1.3 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

B. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2023).

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth; 2019.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Large Components: Ensure that large components can be moved into final position without damage to other construction.

B. Electrically Operated Equipment: Coordinate location and electrical characteristics of service connection.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's data showing configuration, sizes, materials, finishes, hardware, and accessories; include:
   1. Electrical characteristics and connection locations.
   2. Fire rating certifications.
   3. Manufacturer's installation instructions.

C. Shop Drawings: For custom fabricated equipment indicate, in large scale detail, construction methods; method of attachment or installation; type and gauge of metal, hardware, and fittings; plan front elevation; elevations and dimensions; minimum one cross section; utility requirements as to types, sizes, and locations.

D. Design Data: Submit manufacturer’s design data, including loads to be transmitted to building structural members with requirements of any additional structure needed.

E. Samples: Submit samples of wall pad coverings in manufacturer's available range of colors.

F. Operating and maintenance data for each operating equipment item.

G. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than 10 years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified with minimum 5 years of experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to project site in manufacturer's original packaging with factory original labels attached.

B. Store products indoors and elevated above floor; prevent warping, twisting, or sagging.

C. Store products in accordance with manufacturer's instructions; protect from extremes of weather, temperature, moisture, and other damage.

1.8 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Backstop: Maufacturer's 25-year limited warranty.

C. Glass Backboard: Limited lifetime warranty against breaks and/or cracks for the life of the backboard, subject to normal use and conditions.

D. Divider Curtain System: One year manufacturer warranty

E. Wall Padding: Provide one year manufacturer warranty for defects in materials and workmanship.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Gymnasium Equipment:
   1. Basis-of-Design: **Porter Athletic Equipment Company**: www.porterathletic.com.
   2. Other Acceptable Manufacturers: Subject to compliance with requirements.
      a) Draper, Inc: www.draperinc.com.
      b) Jaypro Sports: www.jaypro.com.

2.2 GENERAL REQUIREMENTS

A. See drawings for sizes and locations, unless noted otherwise.

B. Where mounting dimensions or sizes are not indicated, comply with applicable requirements of the following:
   1. National Federation of State High School Associations (NFHS) sports rules.

C. Provide mounting plates, brackets, and anchors of sufficient size and strength to securely attach equipment to building structure; comply with requirements of Contract Documents.

D. Hardware: Heavy duty steel hardware, as recommended by manufacturer.

E. Electrical Wiring and Components: Comply with NFPA 70; provide UL-listed equipment.

F. Structural Steel Fabrications: Welded in accordance with AWS D1.1/D1.1M, using certified welders.

2.3 GYMNASIUM DIVIDER CURTAINS

A. Gymnasium Divider Curtains:
   1. Curtain Material: Class A rated, self-extinguishing vinyl coated polyester complying with NFPA 101.
   2. Upper Section: 8 oz/sq yd polyester.
      a) Color: Manufacturers standard color.
      b) Overall Curtain Height: As indicated on drawings.
   3. Lower Section: 19 oz/sq yd solid vinyl coated polyester.
      a) Color: As selected by Architect.
      b) Height Above Floor: Manufacturer's standard height.
   4. Operation: Vertical lift center roll-up.
   5. Width: As indicated on drawings.
   6. Basis-of-Design Product: Porter Athletic; **#92082000 - Center Roll GymnasiumDivider Curtain.**
   7. Accessory Items:

a) Safety strap with a fail-safe locking mechanism that automatically locks the divider curtain into position at any point in the raising/lowering cycle in the event of a hoisting apparatus malfunction.
   1) Basis-of-Design: Porter Athletic; **No. 797 Locking Safety Strap**.
b) Electric winch with high torque pulley for curtain operation. Worm gear type winch, with 1 hp motor, furnished with mounting brackets.
   1) Basis-of-Design: Porter Athletic; **No. 713HT Electric Winch**.

2.4 BASKETBALL

A. Basketball System: Backstop assembly, backboard, and goal.

B. Wall-Mounted Backstop Assemblies: Wall-mounted steel frame assembly capable of mounting both rectangular and fan-shaped backboards.
1. Distance of Backboard From Wall: 48 - 120 inches, adjustable.
2. Framing: Up-folding retractable framing.
3. Folding Control System: Electric hoist with 115 volt actuator, integral limit switches that provide automatic shut-off in both positions, and safety catch with automatic reset.
4. Height Adjuster: Raises or lowers assembly by 2 feet to adjust goal height.
   a) Height Control System: Manual winch.
      1) Basis-of-Design: Porter Athletic; **00900506 - Center Strut Height Adjuster**.
5. Framing Color: As selected from manufacturer's standard selection.
6. Basis-of-Design Product: Porter Athletic; **90219000 - Up Fold Backstop**.
7. Accessory Items:
   a) Safety strap with a fail-safe locking mechanism that automatically locks the backstop into position at any point in the raising/lowering cycle in the event of a hoisting apparatus malfunction.
      1) Basis-of-Design: Porter Athletic; **No. 797 Locking Safety Strap**.
   b) Electric winch with high torque pulley for backstop operation. Worm gear type winch, with 1 hp motor, furnished with mounting brackets.
      1) Basis-of-Design: Porter Athletic; **No. 713HT Electric Winch**.

C. Ceiling-Suspended Backstop Assemblies: Capable of mounting both rectangular and fan-shaped backboards.
1. Framing: Center strut; forward folding framing.
2. Folding Control System: Electric hoist that folds backstop with 115 volt actuator, integral limit switches that provide automatic shut-off in both positions, and safety catch with automatic reset.
3. Height Adjuster: Raises or lowers assembly by 2 feet to adjust goal height.
   a) Height Control System: Manual winch.
      1) Basis-of-Design: Porter Athletic; **00900506 - Center Strut Height Adjuster**.
4. Framing Color: As selected from manufacturer's standard selection.
5. Basis-of-Design Product: Porter Athletic; **90917000- Forward Fold Backstop**.
6. Accessory Items:
   a) Safety strap with a fail-safe locking mechanism that automatically locks the backstop into position at any point in the raising/lowering cycle in the event of a hoisting apparatus malfunction.
      1) Basis-of-Design: Porter Athletic; **No. 797 Locking Safety Strap**.
   b) Electric winch with high torque pulley for backstop operation. Worm gear type winch, with 1 hp motor, furnished with mounting brackets.

1) Basis-of-Design: Porter Athletic; **No. 713HT Electric Winch**.

D. Backboards: Tempered glass, rectangular shaped.
1. Frame: Brushed aluminum edge, steel mounting.
2. Dimensions: 42 inches high by 72 inches wide
3. Glass Thickness: 1/2 inches.
4. Markings: Painted.
5. Provide safety padding for bottom edge of backboard.
a) Basis-of-Design: Porter Athletic; **00326xxx - Pro Padding Kit**.
b) Material: Polyurethane foam, 9 lb density, with integral skin.
c) Color: As selected by Architect from manufacturer's standard colors.
6. Color: Manufacturer's standard.
7. Basis-of-Design Product: Porter Athletic; **208 - Rectangular Glass Backboard.**

E. Goals: Steel rim, mounted to backboard, with attached nylon net; complete with mounting hardware.
1. Net Attachment Device: Tube-tie.
2. Breakaway mechanism, 230 lbs.
3. Provide mounting plate and mounting hardware.
4. Finish: Powder coat orange.
5. Basis-of-Design Product: Porter Athletic; **236154 - Powr-Flex II Goal**.

2.5 CONTROLS FOR GYMNSIUM EQUPMENT

A. Gymnasium Control Center: Wall-mounted touchpad control system capable of operating basketball backstops, electric height adjusters, divider curtain, and scoreboard. Control system to include:
1. Wall-mounted LED touchpad, quantity as required to operate the equipment indicated below.
2. Quantity of dual powered relay control panels required to operate six (6) backstops and one (1) divider curtain.
3. Four-digit programmable security code.
4. Wall-mounted equipment legend.

B. Basis-of-Design: Porter Athletic; **02555-000 Powr-Touch 2.5 Simultaneous Operation Gymnasium Control Cemter.**
1. Touchpad: **12555-100 Powr-Touch 2.5 Electronic Touchpad.**
2. Control Panel: **12555-200 Powr-Touch 2.5 Electronic Control Panel**.

2.6 FLOOR-MOUNTED EQUIPMENT

A. Volley Ball Nets and Posts, and Accessories: Packaged set of volleyball equipment, consisting of one court system of adjustable posts, net, and tensioning winch meeting requirements for FIVB, USA Volleyball, NCAA and NFHS competition requirements; judge's stand; net atennae; and protective padding.
1. Posts: 3-1/2 inch O.D. schedule 80 aluminum tube with 1 inch height adjustments between 42 and 96 inches.
2. Net: 4 inch square #36 nylon cord with vinyl coated polyester hem, double stitched around the perimeter.
3. Tensioning Winch: Manual crank heavy duty, self-locking worm gear mechanism.

4. Protective Pads for : Polyethylene foam covered with polyester reinforced vinyl fabric.
   a) Color: As selected by Architect from manufacturer's standard colors.
5. Judge's Stand: Freestanding, mobile, metal framed judge's stand with vinyl cushion and protective padding.
   a) Cushion Color: As selected by Architect from manufacturer's standard colors.
   b) Padding Color: As selected by Architect from manufacturer's standard colors
6. Net Antennae: Pair of manufacturer's standard red-and-white fiberglass rods with integral clamp.
7. Basis-of-Design: Porter Athletic; **19610XX Powr-Rib II Volleyball Package**.

B. Volleyball Transporter: Heavy duty steel tube-framed mobile transporter with net storage pouch, storage shelf, and steel hooks for purpose of storing and transporting judge's stand, volleyball uprights, nets, antennae, and upright pads.
   1. Basis-of-Design: Porter Athletic; **00956-100 Transporter**.

C. Floor Sleeves for Posts (Volleyball): Metal sleeve, with latch cover, cast into concrete subfloor to hold poles for nets and goals; installed flush with finish floor surface.
   1. Latch Cover: Brass, round; tamper resistant lock with key.
   2. Sleeve: Steel.
   3. Round Pole Diameter: 3-1/2 inches.
   4. Depth of Sleeve: 9 inches from floor surface to bottom, including latch cover.
   5. Basis-of-Design: Porter Athletic; **00870-100** and **00870-200Floor Sleeves**.

2.7 WALL PADDING

A. Wall Padding: Foam filling bonded to backing board, wrapped in covering; each panel fabricated in one piece.
   1. Surface Burning Characteristics: Flame spread index (FSI) of 25 or less, smoke developed index (SDI) of 450 or less, Class A, when tested in accordance with ASTM E84 as a complete panel.
   2. Flammability: Comply with NFPA 286
   3. Flame Resistant per NFPA 701.
   4. Impact Performance: Meet or exceed requirements of ASTM F2440.
   5. Pad Size: 2'-0" wide by 6'-0" high.
   6. Covering: Vinyl-coated polyester fabric, mildew and rot resistant; stapled to back of board.
      a) Color: As selected from manufacturer's standard range.
      b) Texture: Embossed leather-look.
      c) Fabric Weight: 14 oz/sq yd, minimum.
   7. Foam, Fire-Rated: Open cell polychloroprene (Neoprene), with 5.5 pcf nominal density.
   8. Foam Thickness: 2 inches.
   9. Backing Board: Oriented strand board.
      a) Thickness: 7/16 inch, minimum.
   10. Mounting: Removable; Z-clips fixed to wall and to padding.
      a) Material: Extruded aluminum, 6063-T5, with predrilled holes.
      b) Padding Mounting Height: 4 inches maximum above floor surface.
      c) Basis-of-Design: Porter Athletic; **347100 & 347200 "Z" Clips**.
   11. Basis-of-design Product: Porter Athletic; **No. 560 - DuraSafe Wall Pad**.

B. Specially Shaped Padding: Same construction as standard padding; custom fabricate to fit irregularly shaped members, areas, and protrusions in gymnasium as indicated; provide padding for:
   1. Wall corners.
   2. Exposed steel tube columns.

PART 3 EXECUTION

3.1 EXAMINATION

A. Take field measurements to ensure proper fitting of work. If taking field measurements before fabrication will delay work, allow for adjustments within recommended tolerances.

B. Inspect areas and conditions before installation, and notify Architect in writing of unsatisfactory or detrimental conditions.

C. Do not proceed with this work until conditions have been corrected; commencing installation constitutes acceptance of work site conditions.

D. Verify that electrical services are correctly located and have proper characteristics.

3.2 INSTALLATION

A. Install in accordance with Contract Documents, approved shop drawings, and manufacturer's instructions.

B. Coordinate installation of inserts and anchors that must be built in to flooring or subflooring.

C. Install equipment rigid, straight, plumb, and level.

D. Secure equipment with manufacturer's recommended anchoring devices.

E. Install wall padding securely, with edges tight to wall and without wrinkles in fabric covering.

F. Separate dissimilar metals to prevent electrolytic corrosion.

3.3 ADJUSTING

A. Verify proper placement of equipment.

B. Verify proper placement of equipment anchors and sleeves, and use actual movable equipment to be anchored if available.

C. Adjust operating equipment for proper operation; remove and replace equipment causing noise or vibration; lubricate equipment as recommended by manufacturer.

3.4 CLEANING

A. Remove masking or protective covering from finished surfaces.

B. Clean equipment in accordance with manufacturer's recommendations.

3.5 PROTECTION

A. Protect installed products until Date of Substantial Completion.

B. Replace damaged products before Date of Substantial Completion.

END OF SECTION 11 6623

SECTION 11 6643 - INTERIOR ELECTRONIC SCOREBOARD

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Section includes: Interior, electronic, multi-sport basketball/volleyball/wrestling scoreboard including control center, and other accessories for complete functional installation.

1.2 RELATED REQUIREMENTS

A. Section 11 66 23 - Gymnasium Equipment.

1.3 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product data: For scoreboards, controls, and accessories.

1.4 QUALITY ASSURANCE

A. Source limitation: All components including scoreboard, control center, control cable, and other accessories and installation hardware shall be products of a single manufacturer.

B. Manufacturer qualifications: Company specializing in manufacturing products specified in this section, with not less than ten years of documented experience.

C. Scoreboards and other electrical components shall be certified for use in United States by Underwriter Laboratories, (UL), Inc. and shall bear UL label only.

D. Scoreboards and other electrical components shall be electrically grounded in accordance with National Electrical Code (NEC), Article 600.

1.5 WARRANTY

A. See Section 01 7800-Closeout Submittals, for additional warranty requirements.

B. Provide 5-year manufacturer warranty against defects in workmanship or materials.

PART 2 - PRODUCTS

2.1 SCOREBOARDS

A. Type: Interior, multi-purpose basketball/volleyball/wrestling electronic scoreboard with two integral horns, LED displays for time, scores, period, bonus, double bonus, and next possession arrows.
   1. Basis-of-desgn: Nevco; **Model 2700-NL** (Non-lit caption plates).
   2. Size: 8 feet long x 3 feet high x 8 inches deep.
   3. Approximate hanging weight: 71 pounds.
   4. Large black and white captions providing maximum visibility:

a) 6 inches high: "Home", "Guests", and "period".
   1) LED displays:
b) Timing: White 13-inch high digits.
c) Team scores: White 13-inch high digits.
d) Period: White 9 inch-high digits.
e) Next possession: White arrow for each team.
f) Include bonus and double bonus in the form of a 4 inch White LED “B”.
g) Provide Advertising /Team logo area 12” x 12” minimum.
h) No captions shall be applied directly to the face of the scoreboard. All caption plates will be changeable and made of polyvinylchloride with vinyl lettering applied.

5. Suspension mounting attachments will be included.
6. Power requirement: All options included: 126 Watts, MAX, 100-240 Volts AC w/Power Factor Correction.

2.2 MATERIALS

A. Aluminum face and perimeter frame: Fabricated from 0.050 inch minimum thickness, ASTM B221 aluminum sheet.

B. Finish: Acrylic polyurethane paint.

C. Electronics: Low voltage, solid state, 2-wire cable, multiplex system, quartz crystal controlled.

D. Provide fiber optic communication interface to reduce threat of damage from electrical storms.

E. LED (light emitting diode) units: Seven-bar, segmented digits in protective aluminum cover, rated typical life 100,000 hours, and designed to provide excellent visibility from all angles and sides.

F. Provide location specific universal power cord with plug for world-wide installation.

G. Control cable where required shall be UL listed, 2-wire, type RG-58/U, coaxial cable, 1/4 inch diameter.

H. Junction boxes where required: Sheet metal box and cover, 4-1/2 x 2-1/8 x 2-1/8 inches min. complying with NEMA standards.

2.3 CONTROL CENTER

A. Type: Wireless, microprocessor based, operator's control center with receiver unit mounted at scoreboard and designed to operate different models of scoreboard by interchange of keyboard overlay.
   1. Basis-of-Design: Nevco; **Model MPCW.**
   2. Unit shall comply with Part 15 of FCC Rules regarding interference.
   3. Console: High impact, break-resistant gray plastic, nominal dimensions 11 x 9-1/2 x 4-1/8 inches.
   4. Features:
      a) Control can be used to operate both wireless and wired scoreboards.
      b) Power on-off switch.
      c) Split and raised 40 key keyboards, internal beeper acknowledging each entry, and bookmark capabilities.

d) Keyboard overlays for scoreboard or accessory.
e) Remote hand-held main time switch with integral horn button.
f) Provide with LED displays, lithium cell battery backup to maintain scoreboard memory and time of day, self test mode, power on-off switch, alternate time control, and multiple scoreboard operation.
g) Timer features: Time of day display, multiple time out timers with warning, interval horn, upcount auto stop with horn, and 1/10th second display during last minute.
h) Dimmer control for scoreboard.

5. Receiver: Sturdy impact resistant construction, 6 x 4 x 1.5 inches with 4 inch antenna and mounted at scoreboard.
6. Maximum range: 1,000 feet from control center to receiver.
7. Power adapters: Provide for each control center.
   a) Input: 120 volts, 0.4 amps, 50/60 Hz.
   b) Output: 9 volts, 1.67 amps, 15 watts.
   c) Provide option of battery supply for control operation if utility power not available.
8. Provide carrying case for control center and hand-held switch; Model CC-3 as manufactured by Nevco Inc..
   a) Size: 18-1/2 x 14-1/2 x 6 inches.
   b) Construction: Double wall, high density black polyethylene with padded interior, mechanical latches, and hinges.

PART 3 - EXECUTION

3.1 PREPARATION

A. Verify exact scoreboard and control center quantities and junction box locations with Architect.

B. Coordinate requirements for electrical power, wall blocking, auxiliary framing and supports, and other components to be provided under other Specification Sections to ensure adequate provisions are made for complete, functional installation of scoreboards.

C. Coordinate scoreboard electrical requirements to ensure proper power source, conduit, wiring, and boxes are provided. Prior to installation, verify type and location of power supply.

3.2 INSTALLATION

A. Install scoreboards and accessories in accordance with manufacturer's instructions and approved installation drawings.

B. Before installation, field test scoreboards and accessories for operating functions. Ensure that scoreboards accurately perform all operations. Correct deficiencies.

C. Rigidly mount scoreboards and accessories level and plumb with brackets and fasteners.

D. Clean exposed surfaces.

E. Protect scoreboards and finishes from other construction operations.

3.3 DEMONSTRATING AND TRAINING

A. See Section 01 7900 - Demonstration and Training for additional requirements.

END OF SECTION 11 6643

SECTION 11 6833 ATHLETIC FIELD EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Ball Field Equipment
2. Ball Field ~~Dugouts~~ **Shade Structures**
3. Ball Field Benches **& Bleacher Seating**
4. Soccer Goals

B. Related Requirements:

1. Division 01 Section(s) "Construction Waste Management and Disposal" and "Sustainability Compliance Procedures" for sustainability requirements.

2. Division 03 Section "Cast-in-Place Concrete" for installing site furnishings cast in concrete footings.

3. Division 05 Section "Metal Fabrications" for metal fabrication requirements

4. Division 31 Section "Excavation, Backfill, Compaction and Dewatering" for excavation for installing concrete footings.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Provide athletic field equipment manufacturer's product data indicating materials of construction, compliance with specified standards, installation procedures, and necessary safety limitations.

B. LEED Submittals:

1. Product Data for Credit MR 4.1 and Credit MR 4.2: For products having recycled content, documentation indicating percentages by weight of postconsumer and pre-consumer recycled content. Include statement indicating cost for each product having recycled content.
2. Certificates for Credit MR 7: Chain-of-custody certificates indicating that wood components of site furnishings comply with forest certification requirements. Include

documentation that manufacturer is certified for chain of custody by an FSC-accredited certification body. Include statement indicating cost for each certified wood product.

C. Samples for Initial Selection: For units with factory-applied finishes.

D. Samples for Verification: For each type of exposed finish, not less than 6-inch- (152-mm-) long linear components and 4-inch- (102-mm-) square sheet components.

E. Shop Drawings: Benches Submit detailed scale drawings showing athletic field equipment and perimeter layout.

1. Indicate locations and dimensions of footings and anchorage points.

2. Identify mounting elevations in relation to fixed survey point on site, and subgrade elevation.

3. Indicate location of underground utilities, storm drainage system, and irrigation system.

F. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacture

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store equipment on project site in accordance with manufacturer's recommendations.

B. Store materials in a dry, covered area, and elevated above grade.

1.6 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Provide minimum 1year manufacturer warranty for allathletic field equipment.

PART 2 - PRODUCTS

2.1 ATHLETIC FIELD EQUIPMENT – GENERAL

A. Provide equipment that complies with NFHS requirements.

B. Provide equipment that complies with FIFA requirement

C. Coordinate field grading as required for proper placement and arrangement of equipment, refer to Section 31 2205 for additional information

2.2 BALL FIELD EQUIPMENT

A. Ball Field Bases: Anchored bases for field, locations as indicated on drawings:
1. Size: 15 inch by 15 inch (381 mm by 381 mm) and 3 inch (76 mm) thick.
2. Base Support Plate: Rust resistant, steel anchor system and stanchion pan.
3. Base: Tough pebble embossed, UV resistant rubber top that prevents spikes from slipping or puncturing base surface, heavy duty polyurethane foam pad interior, with reinforced non-collapsing side walls.

B. Ball Field Home Plate for locations as indicated on drawings:
4. Description: Tough molded rubber, colored white, with 3/4 inch (19 mm)3/4 inch (19mm) wide beveled black perimeter.
5. Size: 17 inch (43.2 cm)wide across front, 8-1/2 inch (21.6 cm)long on each side, and two 12 inch (30.5 cm)long edges on rear at 45 degree angle to sides creating point at back.
6. Plate Support Plate: Rust resistant, steel anchor system and stanchion pan including hardware for base assembly, anchor, and base plug.

C. Pitcher's Plate:
1. Description: Heavy duty, UV resistant rubber system in whitecolor; size of 6 inch by 24inch (152 mm by 610 mm)by 11/16 inch (17.5 mm)thick.
Anchored Assembly: Welded assembly with double metal stanchion, anchor, and hardware set below exposed pitching rubber.

D. Soccer Goals / Appurtenances:
1. Shall be existing equipment salvaged during site preparation for re-use.

2.2 BALLFIELD ~~DUGOUTS~~ SHADE STRUCTURES

A. Basis-of-Design Product: Subject to compliance with requirements, provide all equipment and materials, and do all work necessary to furnish and install the Game Shade Dugouts as manufactured by Sports Field Specialties Inc. (888) 975-3343, www.sportsfieldspecialties.com or a comparable product by the following:
1. JW Industries, Inc., www.jwindustriesinc.com (920)865-7307
2. Beacon Athletics (Premium Team Dugouts) (800)747-5985

B. Product:
1. Baseball/Softball Model No. GD10x24

C. Requirements:
1. Building Code: ASCE 7-10.
2. Maximum Wind Speed Rating: 140mph, Exposure Category C.
3. Maximum Ground Snow Load: 60psf.
4. Seismic Design Category E, Ss=1.5g, S1=0.75g.
5. Roof Pitch: 2 inch rise back-to-front

D. Components:

1. GameShade Dugouts:

a. Overall Dimensions:

1) Baseball Structure: 10 feet wide x 24 feet long.

2) Softball Structure: 10 feet wide x 24 feet long.

b. Structural Columns Fabricated of:

1) 3-1/2 inch square structural steel tube with factory pre-drilled A36 steel base mounting plates and A36 steel roof and column cap plates.

c. Roof Frame Fabricated of:

1) 5 inch x 2 inch x 3/16 inch structural steel rectangular perimeter, transverse, and longitudinal roof tubes.

d. Roofing Material: 29 gauge, rib-style corrugated metal with j-channel drip cap installed on front and sides.

e. Column attachment hardware: Galvanized steel. Carbon steel anchoring hardware.

f. Anchoring Hardware: Carbon Steel.

g. Accessories: Epoly and lifting eye bolts.

h. Metal Finish: Powder Coated Primer and Coated Finish

1) Column Color: As selected by Owner from manufacturer's full range.

2) Roof Color: As selected by Owner from manufacturer's full range.

2. Vinyl-coated Chain Link Fence:

a. Materials: Conforming to Section 32 3113 – Chain Link Fences and Gates.

b. Connection: Attach fencing beneath shade structure to structure column.

c. Locations: As indicated on Drawings

d. Color: Black.

~~E. Dugout Enclosure~~

~~1. Height: See plan and details for height.~~

~~2. Color / Finish: All metals shall be galvanized w/"Black" powder coated PVC (Match ballfield chain link fencing).~~

~~F. Roof~~

~~1. Provide heavy duty corrugated metal roof with side trim as per details. Secure a per delegated design recommendations.~~

~~2. Color / Finish: "Dark Green" powder coated PVC~~

~~G. Concrete Floor and Base~~

~~1. Provide 4,000 psi Heavy Duty Concrete as specified and detailed for paving sections.~~

~~2. Finish: Medium broom finish w/ 2" smooth border at all edges and joints.~~

~~H. Appurtenances~~

~~1. Provide heavy duty stainless steel bolts, hinges, hooks, etc.as per delegated design and as recommended by the manufacturer.~~

~~2. Gate Latches: Provide heavy duty stainless steel self closing lockable latches as per delegated design and as recommended by the manufacturer.~~

~~I. Delegated Design: The Contractor shall provide shop drawings demonstrating compliance with the design intent per the details which are to be sealed / signed by a licensed Engineer.~~

2.3 ATHLETIC BENCHES & BLEACHER SEATING

A. Site Benches
1. Basis-of-Design Product: Subject to compliance with requirements, provide Two-Tier Polyboard Team Benches as manufactured by Sports Field Specialties Inc., (888) 975-3343,www.sportsfieldspecialties.com or a comparable product by the following, as approved by the Landscape Architect
   a. Dant Clayton Corporation, www.dantclayton.com (800) 626-2177
   b. SturdiSteel Grandstands, www.sturdisteel.com (800)433-31116
2. Length:
   Softball **Shade Structures Benches** ~~Dugouts~~: 2@ 20-feet (240-inches) long x 24 inches tall x 16 inches deep
   Softball **Bleacher Seating** ~~Spectators~~: 2@ 20-feet (240-inches) long x 24 inches tall x 16 inches deep
   Baseball **Shade Structures Benches** ~~Dugouts~~: 2@ 20-feet (240-inches) long x 24 inches tall x 16 inches deep
   Baseball **Bleacher Seating** ~~Spectators~~: 2@ 40-feet (**480**~~240~~-inches) long x 24 inches tall x 16 inches deep
3. Securement: All securement hardware shall be Stainless Steel.
4. Description: Two-tier seating with aluminum welded frame and synthetic polyboard planking.
5. Frame Finish: Powercoat. Color as selected by Owner from manufacturer's full range.
6. Polyboard Color: As selected by Owner from manufacturer's full range.
7. Logos on Ends of Benches: Two logos per team bench area.
8. Mounting: Permanent – Stainless Steel
9. Concrete Base: Provide 4000lb concrete base as detailed.

B. Materials:
1. Extruded Aluminum: ASTM B221 or ASTM B221M, Alloy 6061, 6062, or 6063.
2. Tensile Strength: 39,000 psi (270 MPa), minimum.
3. Yield Point: 36,500 psi (250 MPa), minimum.

~~C. Delegated Design: The Contractor shall provide shop drawings demonstrating compliance with the design intent which are to be sealed / signed by a licensed Engineer. See Item 2.4 A.3 above for special requirements.~~

2.4 GENERAL FABRICATION

A. Metal Components: Form to required shapes and sizes with true, consistent curves, lines, and angles. Separate metals from dissimilar materials to prevent electrolytic action.

B. Welded Connections: Weld connections continuously. Weld solid members with full-length, full-penetration welds and hollow members with full-circumference welds. At exposed connections, finish surfaces smooth and blended so no roughness or unevenness shows after finishing and welded surface matches contours of adjoining surfaces.

C. Pipes and Tubes: Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section

of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.

D. Exposed Surfaces: Polished, sanded, or otherwise finished; all surfaces smooth, free of burrs, barbs, splinters, and sharpness; all edges and ends rolled, rounded, or capped.

E. Factory Assembly: Assemble components in the factory to greatest extent possible to minimize field assembly. Clearly mark units for assembly in the field.

2.5 GENERAL FINISH REQUIREMENTS

A. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance of the Work.

B. Verify that athletic field equipment footings have been installed in proper locations and at proper elevations.

C. Verify location of underground utilities and facilities in athletic field equipment area; damage to underground utilities and facilities will be repaired at Contractor's expense.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.

B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.

C. Install site furnishings level, plumb, true, and securely anchored at locations indicated on Drawings.

D. Post Setting: Set cast-in support posts in concrete footing with smooth top, shaped to shed water. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at correct angle and are aligned and at correct height and spacing. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.

E. Posts Set into Voids in Concrete: Form or core-drill holes for installing posts in concrete to depth recommended in writing by manufacturer of site furnishings and 3/4 inch (19 mm) larger than OD of post. Clean holes of loose material, insert posts, and fill annular space between post and concrete with non-shrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.

3.3 INSTALLING BALL FIELD EQUIPMENT

A. Stake locations of athletic field equipment elements, including necessary athletic field perimeters, surfacing, access and egress points, hard surfaces, walls, fences, and/or structures. Do not proceed with this work until revised drawings have been provided, showing any corrected layout, and that any obstructions have been removed or approved corrections to layout have been made.

B. Anchors: Install Base Anchors true and level per Manufacturer's recommendations.

C. Bases: Install Per Manufacturer's instructions. Protect from damage until acceptance by Owner.

3.4 BALLFIELD ~~DUGOUTS~~ SHADE STRUCTURES AND ATHLETIC BENCHES

A. General:
1. Mark locations of ~~dugouts~~ **shade structures** and benches, hard surfacing, access and egress points, fences, etc. To confirm layout. Do not proceed with this work until revised drawings have been provided, showing any corrected layout, and that any obstructions have been removed or approved corrections to layout have been made.
2. Coordinate this work with concrete work and all other trades as may affect the dugouts.
3. Install ~~dugouts~~ **shade structures** in locations as shown and per approved Shop Drawings per "Delegated Design".
4. Securement: Secure to concrete base with stainless steel hardware in conformance with approved shop drawings.

3.5 CLEANING AND PROTECTION

A. After installation, clean soiled site furnishing surfaces according to manufacturer's written instructions. Protect from damage until acceptance by Owner.

END OF SECTION 11 6833

SECTION 11 7300 - PATIENT CARE EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Height-adjustable changing table.

B. Biohazard containers.

C. Opt scope (opthalmoscope kit)

D. Medical locking cabinet.

1.2 RELATED REQUIREMENTS

A. Section 10 2123 - Cubicle Curtains and Track: Patient-room cubicles.

1.3 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: For each type of product.

C. Shop Drawings:
   1. Include plans, elevations, sections, and details.
   2. Include details of components. Indicate location and size of each field connection.
   3. Height-Adjustable Table: Include diagrams for service connections and power, signal, and control wiring.

D. Samples: For each exposed product and for each color and texture specified, 6 inches long in size.

E. Samples for Verification: For each type of product required, prepared on samples of size indicated below:
   1. Include samples of accessories to verify color and finish selection.

F. Operation and Maintenance Data: For products to include in operation and maintenance manuals.

1.5 WARRANTY

A. Height-Adjustable Table: Provide manufacturer's standard 5-year warranty against defects in materials or manufacturing.

PART 2 PRODUCTS

2.1 PATIENT CARE EQUIPMENT

A. Height-Adjustable Changing Table **EQ13**:
   1. Description: Height adjustable horizontal unit electrically operated with wired hand control and with safety rail and receiver tray.
      a) Weight Capacity: 500 lbs.
   2. Mounting: Surface mounted, foldable by pneumatic shock-absorbing mechanism.
   3. Components: All components sealed and waterproof.
   4. Electrical Characteristics: Manufacturer's standard actuator and control system, with integrated 24-V transformer, powered by a single 120-V electrical receptacle.
   5. Materials and Finish: Stainless steel, ASTM A480/A480M No. 4 (satin) finish, with PVC mattress.
   6. Color: Graphite Gray.
   7. Height Adjustment Control: Wired remote control unit
   8. Basis-of-Design Product:
      a) **MAX-Ability; Pressalit 3000 Height Adjustable Changing Table, Adult Size (R8592318301).**
      b) See Specialty Equipment List on Drawing A912.
   9. Substitutions: See Section 01 6000 - Product Requirements.

B. Biohazard Container **EH01**: Lockable surface mounted sharps container.
   1. Basis-of-Design Product: See Specialty Equipment List on Drawing A912.
      a) Provide the basis-of-design product or an equal approved by Architect.
   2. Mounting: Surface mounted.
   3. Material and Finish: Stainless steel,, No.4 finish (satin).
      a) Cabinet: heavy gauge stainless steel.
      b) Door: 22 gauge stainless steel with heavy duty stainless steel piano hinge.
      c) Flange: 22 gauge stainless steel beveled flange, one-piece seamless construction, 1-inch wide with 1/4-inch return.
      d) Skirt: 22 gauge stainless steel.
      e) Container: Unit sized to fit BD brand sharps collector, 5.4 quart capacity.
      f) Lockset: Tumbler type

C. Opthalmoscope Kit **EH03**: Wall transformer kit with opthalmoscope and otoscope wiht polycarbonate corded handles.
   1. Basis-of-Design Product: See Specialty Equipment List on Drawing A912.
      a) Provide the basis-of-design product or an equal approved by Architect.
   2. Opthalmoscope: BETA200LED.
   3. Otoscope: BETA200LED.
   4. Electrical Characteristics: 100-240VAC / 50-60 Hz.
   5. Class: II.
   6. Protection Class: IP 40.
   7. Size: 7.1 inches x 9.2 inches x 3.9 inches.
   8. Attributes:
      a) Handles switch on and off automatically when placed on the charger.
      b) Integrated anti-theft system hel;ps prevent unauthorized removal of instrument heads.

c) LED instruments have 100,000 hour life
d) Housing is flat with no opening and no on/off switch in order to improve hygiene and reduce risk of cross-contamination.

D. Medical Locking Cabinet **EH01**: Surface-mounted, double-door steel cabinet with high security pick-resistant tubular locks and individual key for each door, with two adjustable steel shelves, and full-length piano hinges.
1. Basis-of-Design Product: See Specialty Equipment List on Drawing A912.
a) Provide the basis-of-design product or an equal approved by Architect.
2. Size: 15 inches high x 11 inches wide x 4 inches deep.

E. Undercounter Refrigerator **EH02**: See Section 11 3013.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ADJUSTING

A. Adjust products for proper function and operation to comply with manufacturer's written instructions.

3.3 PROTECTION

A. Protect installed products from damage for the remainder of the construction period.

B. Repair damaged products according to manufacturer's written instructions. If damaged products cannot be successfully repaired, as determined by Architect, remove and replace damaged products.

END OF SECTION 11 7300

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SECTION 12 2401 - WINDOW SHADES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Furnish and install the following:
   1. Interior roller shades.
      a) Chain driven, manually operated roller shades.
      b) Motorized roller shades (line voltage).
   2. Shade fabric:
      a) Light filtering roller shades

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures: Special administrative and procedure requirements related to Connecticut High Performance (Green) Building Standards.

B. Section 01 74 19 - Construction Waste Management and Disposal: Procedural and administrative requirements for construction recycling.

C. Section 06 10 00 - Rough Carpentry: Concealed wood blocking for attachment of headrail brackets.

1.3 REFERENCE STANDARDS

A. AERC 100 - Standard for Rating the Energy Performance of Fenestration Attachments; 2019.

B. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.

C. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2023.

D. ASTM E795 - Standard Practices for Mounting Test Specimens During Sound Absorption Tests; 2016.

E. ASTM E2180 - Standard Test Method for Determining the Activity of Incorporated Antimicrobial Agent(s) in Polymeric or Hydrophobic Materials; 2018.

F. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).

G. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions From Indoor Sources Using Environmental Chambers; 2017, v1.2.

H. HPDC (PR) - Health Product Declaration Collaborative HPD Public Repository; 2017.

I. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films; 2019.

J. WCMA A100.1 - Safety of Window Covering Products; 2018.

K. WELL (IWBI) - International WELL Building Institute WELL Rating System, WELL V2.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

B. Sequencing:
   1. Take field measurements for each opening are taken with field conditions in place before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of work.
   2. Do not install shades until final surface finishes and painting are complete.

1.5 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets, including materials, finishes, fabrication details, dimensions, profiles, mounting requirements, and accessories.
   1. Note on submittals any deviations from specified requirements and the reasons thereof.

C. Shop Drawings: Include shade schedule indicating size, location, and keys to details, head, jamb, and sill details, mounting dimension requirements for each product and condition, and direction of operation.

D. Samples:
   1. Fabric Samples:
      a) For Initial Selection: Include fabric samples in full range of available colors and patterns.
      b) For Verification: Minimum size 8-inch by 10-inch sample, representing actual materials, color, and pattern.
   2. Hardware Samples:
      a) Include hardware samples in full range of available colors and patterns.
         1) Including but not limited to – Shade housing or valance, fascia, cassette, brackets, end caps, and external hem bars,

E. Operation and Maintenance Data: Operation and maintenance instructions for shade systems and shade fabrics.
   1. Manufacturer's Instructions: Include instructions for storage, handling, protection, examination, preparation, and installation of product.

F. Certifications:

1. Authorization for deviations from specifications: If any deviations from specifications have been accepted, include written description and reasons for deviations. Include authorization for change signed by Owner, Architect, Engineer, and person submitting change. Authorization for change shall also clearly indicate party responsible for remedying defects.
2. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least ten years of documented experience.

G. Specimen warranty: Provide sample copies of manufacturers' actual warranties for all materials to be furnished under this Section, clearly defining all terms, conditions, and time periods for the coverage thereof.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver prefabricated shades to site in labeled protective packages, uniquely identified for each intended location and store shades in accordance with manufacturer's recommendations.

B. Store materials in manner recommended by shade manufacturer, inside, under cover, and in manner to keep them dry, protected from moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction traffic and other causes.

C. Schedule delivery of shades to prevent delays of work and minimize on-site storage.

1.7 FIELD CONDITIONS

A. Ambient Conditions: Install roller shades after finish work, including painting, is complete and ambient temperature and humidity conditions are maintained at levels indicated for Project when occupied for its intended use.

1.8 WARRANTY

A. See Section 017800 - Closeout Submittals for additional warranty requirements.

B. Special Warranty: Provide manufacturer's special 25-year warranty, transferable to Owner, project-based, specified, and commencing on the Date of Substantial Completion. Complete forms in Owner's name and register with warrantor.

PART 2 PRODUCTS

2.1 MANUFACTURERS – ROLLER SHADES

A. Basis of Design: To establish a standard of quality, design and function desired, Drawings and specifications have been based on the following:
   1. Basis of Design: **Rollease Acmeda Contract –** Stamford, CT
      a) Manufacturer Representative: For samples, product documentation, certifications, dealer, or installer inquiries please contact: Apex Lighting+Building Solutions at: shadedivision@apexltg.com or (877) 886-2843.

B. Other Acceptable Manufacturers: Subject to compliance with requirements.
   1. Hunter Douglas Inc.; Designer Roller Shades: www.hunterdouglas.com.

2. Lutron; Contract Roller Shades: www.lutron.com.
3. MechoShade Systems LLC; Manual Mecho 5 and Electroshade: www.mechoshade.com.

C. Substitutions: See Sections 01 6000 - Product Requirements and 01 2500 - Substitution Procedures.

2.2 ROLLER SHADES

A. General: Provide shade system that operates smoothly when shades are raised or lowered with components that are easy to remove or adjust without removal of mounted shade brackets.
1. Performance Requirements:
a) Design and size components to support shade system dead loads and to withstand live loads caused by positive and negative wind pressure acting normal to plane of window wall on exterior shade systems.
b) Operating Cord Safety: Comply with requirements of ANSI/WCMA A100.1-2022 regarding operating cord safety on window coverings.

B. Manually Operated Clutch and Chain Interior Roller Shade System **RS1**:
1. Description: Single roller, manually operated fabric window shade system with mounting brackets, roller tubes, hem bars, hardware, and other components necessary for complete installation.
a) Fabric Drop Orientation: Regular roll. Unless otherwise indicated on drawings.
b) Mounting Positions: Provide universal hardware and brackets with ability to mount and affix to top, side, or face. As indicated on drawings.
2. Manual Clutch Operator: Manufacturer's standard material and design; UV-stabilized fiberglass reinforced nylon construction and tempered high carbon steel internal springs, self-lubricating.
a) Clutch and Chain Operation: Right side. Unless otherwise indicated on drawings.
b) Drive Chain: Continuous loop stainless steel beaded ball chain, 120 lb (54 kg) minimum breaking strength. Provide upper and lower limit stops.
c) Shade Lift Assistance: Manufacturer's standard spring device contained in idler end of roller tube to reduce force required to lift shades; as required based on shade weight.
d) Chain tensioning device: Must comply with ANSI/WCMA A100.1-2022.
3. Mounting System and Hardware: Fascia with end caps.
a) Mounting Brackets: Zinc plated or powder-coated, cold-rolled steel universal brackets. Must have ability for linking brackets for multiple shade bands.
b) Type and Size: As recommended by manufacturer for mounting indicated and to accommodate shade fabric roll-up size and weight.
c) Fascia: Extruded aluminum, required to conceal shade mounting, attachable to mounting end caps, without exposed fasteners
1) Color: Clear Anodized Aluminum
4. Roller Tubes: As required for type of shade operation; designed for removal without removing mounting hardware.
a) Material: Extruded aluminum with engineered wall & ribs to lock the clutch and idle end plug into place, providing strength & durability.
b) Size: As recommended by manufacturer; selected for suitability for installation conditions, span, and weight of shades.
c) Fabric Attachment: Switch fabric changer spline attachment; fabric hook attached to top edge of shade fabric engages flexible tube hook that drops down from tube.

d) Roller tubes capable of being removed and reinstalled without affecting roller shade limit adjustments.

5. Hembars: Designed to maintain bottom of shade straight and flat; selected from manufacturer's standard options.
   a) Style: Closed pocket; aluminum elliptical slat inside pocket with heat-sealed ends.
6. Accessories:
   a) Exposed Headbox: Extruded aluminum, size as required to conceal shade mounting; powder coat finish.
      1) Color: As selected by Architect.

C. Motorized Roller Shade System **RS2**:
1. Description: Single roller, motor-operated fabric window shade system with motor, mounting brackets, roller tubes, hem bars, hardware, and other components necessary for complete installation.
2. Basis of Design: **Automate AC Series** by **Rollease Acmeda**.
3. Electrical Type: Line voltage, 120V.
4. Controller: Wall switch.
5. Accessories:
   a) Exposed Headbox: Extruded aluminum, size as required to conceal shade mounting; powder coat finish.
      1) Color: As selected by Architect.

2.3 ROLLER SHADE FABRIC

A. Light Filtering Fabric:
1. Basis of Design: **Ambient Renew** by **Rollease Acmeda**.
2. Shade cloth material shall hang flat without buckling or distortion. The edge when trimmed shall hang straight without raveling. The unguided shade band shall roll up true and straight, without shifting sideways more than 1/8 inch in either direction due to warp distortion or weave design.
   a) Application: **RS1** and **RS2**.
   b) Fabric Drop Orientation: Regular roll, unless otherwise indicated on drawings.
   c) Color and openness selections chosen by architect from the manufacturers full range of standard selections.
   d) Nonflammable, color-fast, impervious to heat and moisture, and able to retain its shape under normal operation.
   e) Material: 100 percent polyester. Free of lead, phthalates, PVC, formaldehyde, and fragrances.
   f) Substitutions: See Section 016000 - Product Requirements.
      1) Submit proposed substitutions in writing for approval by Architect a minimum of 10 working days prior to bid date and make them available to bidders. Accompany proposed substitutions with certification of compliance with specifications, listing exceptions.

2.4 ROLLER SHADE FABRICATION

A. Dimensional Tolerances: Fabricate shades to fit openings within specified tolerances. Based on mounting conditions as indicated in drawings.
1. Vertical Dimensions:

a) Inside Mount: Fill openings from head to sill with 1/2-inch(13 mm) space between bottom bar and window sill.
b) Outside Mount: Cover window frames, trim, and casings completely.

2. Horizontal Dimensions:
   a) Inside Mounting: Provide symmetrical light gaps on both sides of shade not to exceed 5/8-inch(16 mm) total.
   b) Outside Mounting: Extend shades 2 inches(50 mm) beyond jambs on each side.
3. Banded Shades: Fabricate banded shades marked on plans and drawings.
4. Fabric shall hang straight and flat without buckling or distortion. Fabric edges shall be straight and without ravels.

PART 3 EXECUTION

3.1 EXAMINATION

A. Field Measurements: Verify actual measurements of openings by field measurements before fabrication; show recorded measurements on shop drawings.

B. Examine finished openings for deficiencies that may preclude satisfactory installation.

C. Start of installation is considered acceptance of substrates.

3.2 PREPARATION

A. Prepare surfaces using methods recommended by manufacturer for achieving best result for substrate under project conditions.

B. Coordinate with window installation and placement of concealed blocking to support shades.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions and approved shop drawings, using mounting devices as indicated.

B. Replace shades that exceed specified dimensional tolerances at no extra cost to Owner.

C. Adjust level, projection, and shade centering from mounting bracket. Verify there is no telescoping of shade fabric. Ensure smooth shade operation.

3.4 CLEANING

A. See Section 017000 - Execution and Closeout Requirements for additional requirements.

B. Clean soiled shades and exposed components as recommended by manufacturer.

C. Replace shades that cannot be cleaned to "like new" condition.

3.5 CLOSEOUT ACTIVITIES

A. See Section 017800 - Closeout Submittals for closeout submittals.

B. Care and Maintenance: Please provide care and maintenance documents for all systems and fabrics listed in this specification.

C. Demonstration: Demonstrate operation and maintenance of window shade system to Owner's personnel.

3.6 PROTECTION

A. Protect installed products from subsequent construction operations.

B. Touch-up, repair, or replace damaged products before Date of Substantial Completion.

3.7 MAINTENANCE

A. See Section 017000 - Execution and Closeout Requirements for additional requirements relating to maintenance service.

B. Upon Request: Provide to Owner, a proposal as alternate to base bid, a separate renewable maintenance contract for service and maintenance of shade system for one year from Date of Substantial Completion. Include complete description of preventive maintenance, systematic examination, adjustment, parts and labor, cleaning, and testing, with detailed schedule.

END OF SECTION 12 2401

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SECTION 12 3553.19 - WOOD LABORATORY CASEWORK

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Standard and custom wood cabinets and cabinet hardware.

B. Tables.

C. Acid storage cabinets.

D. Solvent storage cabinets.

E. Laboratory sinks.

F. Pegboards.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 06 1000 - Rough Carpentry: Blocking and nailers for anchoring casework.

C. Section 07 9200 - Joint Sealants: Sealing joints between casework and countertops and adjacent walls, floors, and ceilings.

D. Section 12 3600 - Countertops: Epoxy resin countertops for laboratory casework.

1.3 DEFINITIONS

A. Exposed: Portions of casework visible when drawers and cabinet doors are closed, including end panels, bottoms of cases more than 42 inches above finished floor, tops of cases less than 72 inches above finished floor and all members visible in open cases or behind glass doors.

B. Semi-Exposed: Portions of casework and surfaces behind solid doors, tops of cases more than 72 inches above finished floor and bottoms of cabinets more than 30 inches but less than 42 inches above finished floor.

C. Concealed: Sleepers, web frames, dust panels and other surfaces not generally visible after installation and cabinets less than 30 inches above finished floor.

1.4 REFERENCE STANDARDS

A. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.

B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

D. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2022.

E. BHMA A156.9 - American National Standard for Cabinet Hardware; 2015.

F. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; 2016.

G. NFPA 30 - Flammable and Combustible Liquids Code; 2018.

H. SEFA 1 - Laboratory Fume Hoods; 2010.

I. SEFA 2 - Installations; 2010.

J. SEFA 3 - Laboratory Work Surfaces; 2010.

K. SEFA 7 - Laboratory Fixtures; 2010.

L. SEFA 8W - Laboratory Grade Wood Casework; 2016.

M. SEFA 11 - Liquid Chemical Storage Cabinets; 2012.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate installation of casework with related items.

B. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

1.6 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Component dimensions, configurations, construction details, joint details, attachments; manufacturer's catalog literature on hardware, accessories, and service fittings, if any.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit b4: For composite wood products, documentation indicating that product contains no urea formaldehyde.
   2. Laboratory Test Reports for Credit b4: For ccomposite wood and agrifiber products, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
   3. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

4. Certificates for Credit d13: Chain-of-custody certificates indicating that products specified to be made from certified wood comply with forest certification requirements. Include documentation that manufacturer is certified for chain of custody by an FSC-accredited certification body. Inlcude statement indicating cost for each certified wood product.

D. Shop Drawings: Indicate casework types, sizes, and locations, using large scale plans, elevations, and cross sections. Include rough-in and anchors and reinforcements placement dimensions and tolerances, clearances required, and utility locations, if any. Include coordinated information for laboratory equipment specified in another section and/or furnished by Owner.

E. Samples For Color Selection: Wood samples, fully finished, for color and species selection. Minimum Sample Size: 2 inches by 3 inches.

F. Test Reports: From independent laboratory indicating compliance with referenced chemical-resistance standards for cabinet finish and liner materials.

G. Installer's qualification statement.

H. Maintenance Data: Manufacturer's recommendations for care and cleaning.

I. Finish touch-up kit for each type and color of materials provided.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than 7 years of documented experience and approved by manufacturer.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect items provided by this section, including finished surfaces and hardware items during handling and installation. For metal surfaces, use polyethylene film or other protective material standard with the manufacturer.

B. Acceptance at Site:
1. Do not deliver or install casework until the conditions specified under Part 3, Examination Article of this section have been met. Products delivered to sites that are not enclosed and/or improperly conditioned will not be accepted if warping or damage due to unsatisfactory conditions occurs.

C. Storage:
1. Store casework in the area of installation. If necessary, prior to installation, temporarily store in another area, meeting the environmental requirements specified under Part 3, "Site Verification of Conditions" paragraph of this section.

1.9 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Correct defective work within a five year period after Date of Substantial Completion, at no additional cost to Owner. Defects include, but are not limited to:
   1. Ruptured, cracked, or stained finish coating.
   2. Discoloration, or lack of finish integrity.
   3. Cracking or peeling of finish.
   4. Failure of hardware.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Wood Laboratory Casework:
   1. CiF Lab Solutions LP: www.cifsolutions.com/#sle.
   2. Kewaunee Scientific Corp: www.kewaunee.com/#sle.
   3. Mott Manufacturing: www.mott.ca/#sle.

B. Countertops:
   1. Durcon (Epoxy resin, Solid phenolic): www.durcon.com/#sle.

2.2 WOOD LABORATORY CASEWORK

A. Wood Laboratory Casework: Solid wood and wood panel construction; each unit self-contained and not dependent on adjacent units or building structure for rigidity; in sizes necessary to avoid field cutting except for scribes and filler panels. Include adjustable levelers for base cabinets.
   1. Style: Flush overlay. Ease doors and drawer fronts slightly at edges.
   2. Cabinet Nominal Dimensions: Unless otherwise indicated, provide cabinets of widths and heights indicated on drawings, and with following front-to-back dimensions:
      a) Base Cabinets: 22 inches.
      b) Tall Cabinets: 22 inches.
      c) Upper Cabinets: 16 inches.
   3. Construction: Joints doweled, glued and screwed, except drawers may be lock-shoulder jointed; with interior of units smooth and flush; cabinet bottom flush with top of face frame; without gaps or inaccessible spaces or areas where dirt or moisture could accumulate.
   4. Structural Performance: In addition to the requirements of SEFA 3, SEFA 7, and SEFA 8W, components safely support the following minimum loads:
      a) Base Units: 500 pounds per linear foot across the cabinet ends.
      b) Suspended Units: 300 pounds static load.
      c) Tables: 300 pounds, minimum, on four legs.
      d) Drawers: 125 pounds, minimum.
      e) Hanging Wall Cases: 300 pounds.
   5. Fittings and Fixture Locations: Cut and drill counter tops, backs, and other components for service outlets and fixtures.
   6. Removable back panels on base cabinets. Provide partial height back panels at sink cabinets.
   7. Factory-finish all exposed and semi-exposed surfaces with the same finish.

a) Finish Performance: Provide finish on all surfaces having chemical resistance of Level 0 (no change) or Level 1 (slight change of gloss or slight discoloration) according to SEFA 8W and no visible effect when surface is exposed to:
   1) Hot water at temperature between 190 degrees F and 205 degrees F trickled down the test surface at 45 degree angle for 5 minutes.
   2) Constant moisture in the form of 2 by 3 by 1 inch thick cellulose sponge kept continually saturated with water and in contact with test surface for 100 hours.
b) Preparation: Wood sanded smooth, free from dust and mill marks.
c) Stain: Single application of clean, manufacturer-recommended stain of selected color; tinted coating not acceptable.
d) Coating: Clear, superior-quality, chemical-resistant acyclic urethane; applied in accordance with manufacturer instructions, force-dried, sanded and wiped clean.
e) Coats: Multiple coats as required to achieve minimum 1.5 mil dry film thickness.
f) Appearance: Clear satin gloss; not cloudy or muddy.

B. Acid Storage Cabinets: Construction identical to other cabinets, with following exceptions:
1. Completely lined with corrosion-resistant liner material; stainless steel fasteners for all connections and hardware inside cabinets.
2. Shelves: Removable, same material as cabinet, covered with corrosion-resistant liner.
3. Bottom Pan: Liquid-tight liner covering entire bottom of acid-storage cabinet.
4. Vents: Comply with SEFA 1.

C. Solvent (Flammable and Combustible Liquids) Storage Cabinets: Construction identical to other cabinets, with following exceptions:
1. Construct to NFPA 30 and applicable OSHA requirements.
2. Comply with SEFA 11.
3. Fire Resistance: Maximum internal temperature of 325 degrees F at the center, and 1 inch from top of the cabinet when cabinet is subjected to a ten minute fire test that simulates fire exposure of a standard time-temperature curve specified in ASTM E119.
4. Shelves: Full depth, adjustable.
5. Bottom Pan: 2 inches deep, liquid-tight pan covering entire bottom of cabinet.
6. Cabinet Hardware: UL-listed.
   a) Hinges: Full-length stainless steel continuous (piano) hinges.
   b) Door Handles: Manufacturer's standard, with slip-resistant grip.
7. Vents: Provide venting capable of achieving ten air changes per hour.
   a) Tie into building hazardous exhaust system.
   b) Vent Connections: 1-1/2 inch minimum diameter, corrosion-resistant piping having flame spread index of 25 or less when tested in accordance with ASTM E84.
   c) Vent each cabinet separately with sufficient mixing distance for incompatible chemicals.
   d) Provide minimum of two vents with fire arrestor for each cabinet.
8. Signage: Provide manufacturer's standard signage reading "FLAMMABLE - KEEP FIRE AWAY" or similar message in bright red color.

D. Mobile Tables: With standard aprons manufactured of not less than 3/4 by 3 1/2 inch solid lumber, machined to receive corner blocks, and bolted to 2 1/8 by 2 1/8 inch solid hardwood legs. 3/8 inch leveling devices, and slip-on type black PVC shoes.
1. Provide table legs designed to receive locking swivel casters.
   a) Caster wheels of non-marring type urethane tires in gray or black color.

2. Table Drawers: Where indicated, manufacturer's standard drawers. Single drawer for tables up to 48 inches wide, two drawers for wider tables.

2.3 CABINET HARDWARE

A. Manufacturer's standard types, styles, and finishes.

B. Comply with BHMA A156.9 requirements.

C. Finish of exposed stainless steel components: No.4 finish.

D. Locks: Provide locks on casework drawers and doors where indicated. Lock with 5 pin cylinder and 2 keys per lock.

E. Shelves in Cabinets:
1. Shelf Standards and Rests: Vertical standards with rubber button fitted rests, satin chromium plated over nickel on base material.

F. Swinging Doors:
1. Hinges: Offset pin, number as required by referenced standards for width, height, and weight of door.
2. Catches: Magnetic.
3. Pulls: Chrome wire pulls, 4 inches wide.
4. Drawers:
   a) Pulls: Chrome wire pulls, 4 inches wide.
   b) Slides: Steel, full extension arms, ball bearings; self-closing; capacity as recommended by manufacturer for drawer height and width.

2.4 COUNTERTOPS

A. Countertops: Epoxy resin countertops - see Section 12 3600.

2.5 SINKS

A. Laboratory sinks.
1. General: Manufacturer's adjustable support system for undermount sink installation.
2. Sink : Single-bowl.
   a) Material: Stainless Steel

2.6 PEGBOARDS

A. Drying Rack **ES02**: Stainless steel pegboards with pre-drilled or punched holes in a staggered pattern, designed to accept removable white polypropylene pegs. With each pegboard include a stainless steel drip-trough with drain outlet and matching diameter 36 inches long PVC drain hose.
1. Size: As indicated on drawings.
2. Basis of Design Product: See Specialty Equipment Schedule on Drawing A912.

2.7 GOGGLE SANITIZING CABINETS

A. Goggle Cabinet Metal **ES01**: Lockable cabinet with UV lamp and power cord for sanitizing goggles and safety glasses.
   1. Capacity: (36) goggles minimum.
   2. Operation: Lamp automatically switches off if door is opened during sanitizing process.
   3. Basis of Design Product: See Specialty Equipment Schedule on Drawing A912.

2.8 MATERIALS

A. Wood-Based Materials:
   1. Solid Wood: Air-dried to 4.5 percent moisture content, then tempered to 6 percent moisture content before use.
   2. Composite Wood Panels: Containing no urea-formaldehyde resin binders.

B. Exposed Solid Wood: Clear, dry, sound, plain sawn, selected for compatible grain and color, no defects.

C. Exposed Hardwood Plywood: Veneer core; HPVA HP-1 Grade AA, Type I; same species as exposed solid wood, clear, compatible grain and color, no defects. Band exposed edges with solid wood of same species as veneer.

D. Stainless Steel Sheet: ASTM A666 Type 304.

E. Solvent-Resistant Liner Material: High-density, asbestos-free, non-combustible, calcium-silicate-based panel consisting of autoclaved Portland cement, mineral fillers and synthetic fibers.

F. Solvent-Resistant Liner Material: Polypropylene.

G. Sealant for Use in Casework Installation:
   1. One component, clear silicone base sealant, chemical curing complying with ASTM C920, Type S, Grade NS, Class 25, Use NT, when tested to glass and aluminum, anti-fungus composition.

2.9 ACCESSORIES

A. Toespace Grilles: Manufacturer's standard grille.

PART 3 EXECUTION

3.1 EXAMINATION

A. Site Verification of Environmental Conditions:
   1. Do not deliver casework until the following conditions have been met:
      a) Building has been enclosed (windows and doors sealed and weather-tight).
      b) An operational HVAC system that maintains temperature and humidity at occupancy levels has been put in place.
      c) Ceiling, overhead ductwork, piping, and lighting have been installed.

d) Installation areas do not require further "wet work" construction.

B. Verify adequacy of support framing and anchors.

C. Verify that service connections are correctly located and of proper characteristics.

3.2 INSTALLATION

A. Perform installation in accordance with manufacturer's instructions, approved shop drawings, and with SEFA 2.

B. Use anchoring devices to suit conditions and substrate materials encountered. Use concealed fasteners to the greatest degree possible. Use exposed fasteners only where allowed by approved shop drawings, or where concealed fasteners are impracticable.

C. Set casework items plumb and square, securely anchored to building structure.
1. Base Cabinets: Examine floor levelness and flatness of installation space. Do not proceed with installation if encountered floor conditions required more than 3/4 inch leveling adjustment. When installation conditions are acceptable, for each space, establish the high point of the floor. Set and make level and plumb first cabinet in relation to this high point.
2. Wall Cabinets: Examine wall surfaces in installation space. Do not proceed with installation if the following conditions are encountered:
   a) Maximum variation from plane of masonry wall exceeds 1/4 inch in 10 ft and 1/2 inch in 20 ft or more, and/or maximum variation from plumb exceeds 1/4 inch per story.
   b) Maximum Variation of finished gypsum board surface from true flatness exceeds 1/8 inch in 10 feet in any direction.

D. Align cabinets to adjoining components, install filler and/or scribe panels where necessary to close gaps.

E. Fasten together cabinets in continuous runs, with joints flush, uniform and tight. Misalignment of adjacent units not to exceed 1/16 inch. In addition, do not exceed the following tolerances:
1. Variation of Tops of Base Cabinets from Level: 1/16 inch in 10 feet.
2. Variation of Faces of Cabinets from a True Plane: 1/8 inch in 10 feet.
3. Variation of Adjacent Surfaces from a True Plane (Lippage): 1/32 inch.
4. Variation in Alignment of Adjacent Door and Drawer Edges: 1/16 inch.

F. Secure upper and floor cabinets to concealed blocking at gypsum board assemblies.

G. Separate dissimilar metals to prevent galvanic action.

H. Base Cabinets: Fasten cabinets to service space framing and/or wall substrates, with fasteners spaced not more than 16 inches on center. Bolt adjacent cabinets together with joints flush, tight, and uniform.
1. Where base cabinets are installed away from walls or service space framing, anchor to floor at toe space at not more than 24 inches on center, and at sides of cabinets with not less than two fasteners per side.

I. Wall Cabinets: Fasten to hanging strips, and/or wall substrates. Fasten each cabinet through back, near top, at not less than 16 inches on center.

J. Install hardware uniformly and precisely. Set hinges snug and flat in mortises.

K. Vented Cabinets: Install in strict compliance with manufacturer's written installation instructions.
   1. Use only rigid materials for venting. No flexible materials permitted.

L. Countertops:
   1. Coordinate installation of the work of this section with the installation of laboratory casework countertops specified in Section 12 3600.
   2. Install countertops in one true plane, with ends abutting at hairline joints, and no raised edges.

M. Replace units that are damaged, including those that have damaged finishes.

3.3 ADJUSTING

A. Adjust operating parts, including doors, drawers, hardware, and fixtures to function smoothly.

3.4 CLEANING

A. Clean casework and other installed surfaces thoroughly.

3.5 PROTECTION

A. Do not permit finished casework to be exposed to continued construction activity.

B. Protect casework and countertops from ongoing construction activities. Prevent installers from standing on or storing tools and materials on casework or countertops.

C. Repair damage that occurs prior to Date of Substantial Completion, including finishes, using methods prescribed by manufacturer; replace units that cannot be repaired to like-new condition.

END OF SECTION 12 3553.19

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SECTION 12 3600 - COUNTERTOPS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Countertops for architectural cabinet work.

B. Countertops for manufactured wood laboratory casework.

C. Countertops for lockers.

D. Wall-hung counters and vanity tops.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 01 7419 - Construction Waste Management and Disposal.

C. Section 06 4100 - Architectural Wood Casework.

1.3 REFERENCE STANDARDS

A. ANSI A208.1 - American National Standard for Particleboard; 2022.

B. ANSI A208.2 - American National Standard for Medium Density Fiberboard for Interior Use; 2016.

C. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position; 2018.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

E. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014, with Errata (2018).

F. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.1; 2017, with Errata (2019).

G. ISFA 2-01 - Classification and Standards for Solid Surfacing Material; 2013.

H. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

I. PS 1 - Structural Plywood; 2023.

J. SEFA 2 - Installations; 2010.

K. SEFA 3 - Laboratory Work Surfaces; 2010.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Specimen warranty.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
   3. Certificates for Credit d13: Chain-of-custody certificates indicating that products specified to be made from certified wood comply with forest certification requirements. Include documentation that manufacturer is certified for chain of custody by an FSC-accredited certification body. Inlcude statement indicating cost for each certified wood product.

D. Shop Drawings: Complete details of materials and installation ; combine with shop drawings of cabinets and casework specified in other sections.

E. Verification Samples: For each finish product specified, minimum size 6 inches square, representing actual product, color, and patterns.

F. Test Reports: Chemical resistance testing, showing compliance with specified requirements.

G. Installer's qualification statement.

H. Installation Instructions: Manufacturer's installation instructions and recommendations.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than 7 years of documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.7 FIELD CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.1 COUNTERTOPS

A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS), unless noted otherwise.

B. Quality Standard: SEFA 3 for laboratory worksurfaces.

C. Epoxy Resin Countertops **SOSF5**: Filled epoxy resin molded into homogenous, non-porous sheets; no surface coating and color and pattern consistent throughout thickness; with integral or adhesively seamed components.
   1. Manufacturers:
      a) Durcon, Inc: www.durcon.com/#sle.
      b) Substitutions: See Section 01 6000 - Product Requirements.
   2. Flat Surface Thickness: 1 inch, nominal.
   3. Flammability: Self-extinguishing, when tested in accordance with ASTM D635.
   4. Surface Finish: Smooth, non-glare.
   5. Color: As indicated on the "Finish Product List" on the drawings.
   6. Exposed Edge Shape: 3/16 inch radius corner.
   7. Back and End Splashes: Same material, same thickness; separate for field attachment.
   8. Fabricate in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 11 - Countertops, Premium Grade.

D. Solid Surfacing Countertops **SOSF1-3**: Solid surfacing sheet or plastic resin casting over continuous substrate.
   1. Flat Sheet Thickness: 1/2 inch, minimum.
   2. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA 2-01 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
      a) Basis of Design Manufacturers: As indicated for specific "SOSF" types on the Finish Product List" on the drawings.
         1) Dupont; Corian: www.corian.com/#sle.
         2) Durat; distributor www. connply.com
         3) Formica Corporation: www.formica.com/#sle.
         4) Other Acceptable Manufacturers:
            (a) Dupont;[Corian]: www.corian.com/#sle.
            (b) Formica Corporation[<>]: www.formica.com/#sle.
            (c) US Surfaces; LivingStone: www.livingstonesurfaces.com.
         5) Substitutions: See Section 01 6000 - Product Requirements.

b) Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
c) NSF approved for food contact.
d) Finish on Exposed Surfaces: Matte, gloss rating of 5 to 20.

3. Other Components Thickness: 1/2 inch, minimum.
4. Exposed Edge Treatment: Built up to minimum 1-1/4 inch thick; square edge.
5. Back and End Splashes: Same sheet material, square top; minimum 4 inches high.
6. Skirts: As indicated on drawings.
7. Fabricate in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 11 - Countertops, Custom Grade.

2.2 MATERIALS

A. Wood-Based Components:
1. Wood fabricated from old growth timber is not permitted.
2. Composite Wood and Agrifiber Products: See Section 01 3566.42.

B. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 3/4 inch thick; join lengths using metal splines.

C. Particleboard for Supporting Substrate: ANSI A208.1 Grade 2-M-2, 45 pcf minimum density; minimum 3/4 inch thick; join lengths using metal splines.

D. Medium Density Fiberboard for Supporting Substrate: ANSI A208.2.

E. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.

F. Joint Sealant: Mildew-resistant silicone sealant, white.

2.3 FABRICATION

A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
1. Join lengths of tops using best method recommended by manufacturer.
2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.

B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
2. Height: 4 inches, unless otherwise indicated.

C. Solid Surfacing: Fabricate tops and wall panels up to 144 inches long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.
1. Integral sinks: Shop-mount securely to countertop with adhesives, using flush configuration, as per manufacturer's instructions, and as detailed on drawings.

D. Wall-Mounted Counters: Provide skirts and aprons as indicated on drawings, finished to match.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install laboratory worksurface countertops in compliance with requirements of SEFA 2.

B. Install vanities in accordance with manufacturer’s instructions and approved shop drawings

C. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.

D. Attach epoxy resin countertops using compatible adhesive.

E. Apply sealer products in accordance with manufacturer's written instructions.

F. Seal joint between back/end splashes and vertical surfaces.

3.4 TOLERANCES

A. Variation From Horizontal: 1/8 inch in 10 feet, maximum.

B. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.

C. Field Joints: 1/8 inch wide, maximum.

3.5 CLEANING

A. Clean countertops surfaces thoroughly.

3.6 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION 12 3600

SECTION 12 6100 - FIXED AUDIENCE SEATING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fixed, upholstered audience seating.

B. Seating accessories.

1.2 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

C. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2023.

D. ASTM A879/A879M - Standard Specification for Steel Sheet, Zinc Coated by the Electrolytic Process for Applications Requiring Designation of the Coating Mass on Each Surface; 2012 (Reapproved 2017).

E. ASTM D3597 - Standard Specification for Woven Upholstery Fabrics--Plain, Tufted, or Flocked; 2002, with Editorial Revision (2018).

F. ASTM E1352 - Standard Test Method for Cigarette Ignition Resistance of Mock-Up Upholstered Furniture Assemblies; 2016.

G. ASTM E1537 - Standard Test Method for Fire Testing of Upholstered Furniture; 2016.

H. BIFMA X5.4 - Public and Lounge Seating; 2020.

I. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; 2016.

J. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

K. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

L. NFPA 261 - Standard Method of Test for Determining Resistance of Mock-Up Upholstered Furniture Material Assemblies to Ignition by Smoldering Cigarettes; 2018.

M. UL 10B - Standard for Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination with Electrical Work: Coordinate installation of wiring to ensure that floor-mounted junction boxes are completely beneath seats and free of aisle spaces.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's printed data sheets for products specified.

C. Shop Drawings: Provide plans, elevations, sections, and attachment details. Include fabrication and installation details, chair layouts and dimensions and seat numbering scheme.
   1. Field Measurements: Verify seating layout by field measurements and record field dimensions on shop drawings.
   2. Seating Layout: Show seating layout, aisle widths, aisle-end alignment or stepping, row-lettering and chair-numbering scheme, chair widths, and chair spacing in each row.
   3. Accessories: Show locations and features of accessories, including electrical devices , and accessibility provisions.

D. Selection Samples: Manufacturer's color charts and swatches for fabric upholstery, indicating full range of materials, colors, and patterns available.

E. Verification Samples: Two swatches of each different upholstery fabric specified, minimum 3 inches by 3 inches.

F. Material Certificates: For each type of flame-retardant treatment of upholstery fabric.

G. Installer's qualification statement.

H. Warranty: Submit installer warranty and ensure that forms have been completed in Owner's name and registered with installer.

I. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

J. Maintenance Materials:
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Fabric: Quantity sufficient for reupholstering 5 percent of installed seating.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer certified in writing by the seating manufacturer to be qualified for installation of specified seating.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver seats to project site in unopened containers clearly labeled with manufacturer's name and identification of contents.

B. Store seating units in dry and clean location until needed for installation. During installation, handle in a manner that will prevent marring and soiling of finished surfaces.

1.7 FIELD CONDITIONS

A. Ambient Conditions: Do not install seating until space is enclosed and weatherproof, wet-work in space is complete and nominally dry, installation of finishes including painting is complete, and ceilings are complete.

B. Ambient Conditions: Continuously maintain ambient temperature and humidity conditions at values near those indicated for final occupancy for minimum of one week before, during, and after installation of seating.

1.8 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Manufacturer Warranty: Provide 5-year manufacturer warranty for interior fixed audience seating. Complete forms in Owner's name and register with manufacturer.

C. Installer Warranty: Correct defective Work within a [one] year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Fixed Audience Seating:
   1. **Basis-of-Design**: Hussey Seating Company**; Quattro Chair System**: www.husseyseating.com/#sle.
      a) Model - Chair Type: **Quattro Traditional**.
      b) Series: **Classic.**
      c) Back Foam: 2 inches.
      d) Armrest Type: Polymer.
      e) Standards: Traditional.
      f) Chair Mount: Floor mount.
      g) End Panels: Plastic laminate, Tapered Style.
      h) Bottom Cover: Standard.
      i) Seat Foam: Standard, 3 inches thick.
      j) Seat Cover Tailoring: Waterfall.
      k) Seat Back Shape: Soft Square Polymer, 33 inches.
   2. Other Acceptable Manufacturers:
      a) Interkal LLC: www.interkal.com.
      b) Irwin Seating Company: www.irwinseating.com.

B. Substitutions: See Section 01 6000 - Product Requirements.

C. Provide all fixed audience seating by one manufacturer.

2.2 UPHOLSTERED SEATING

A. Description: Fixed seating system designed to permit radial installation using common middle support standards in each row and aisle standards aligned as indicated on drawings. Width of seats not less than 22 inches, except exit seat locations may be reduced to 20 inches to complete specific row dimensions.

B. Performance Criteria:
   1. Structural Performance: Engineer, fabricate and install fixed audience seating to the following structural loads without exceeding allowable design working stresses of materials involved, including anchors and connection. Apply each load to produce maximum stress in each respective component of each audience seat unit.
      a) Seat shall withstand an evenly distributed 600 lb. static load without failure or irregularities that would impair usefulness.
      b) Armrests shall withstand, without failure, a 200 lb static load applied both perpendicular to and vertically down on the arm.
      c) Back shall withstand an evenly distributed front or rear static load of 450 lbs.
   2. Fire Retardance of Upholstered Seating: Self-extinguishing when mock-up is exposed to smoldering cigarettes in accordance with ASTM E1352 or NFPA 261.
   3. ~~Fire Retardance of Fixed Audience Seating: Maximum instantaneous net peak rate of heat release of 250 kW or less, and total energy released during first 5 minutes of 40 mJ or less, when tested in accordance with ASTM E1537.~~
   4. Flammability:
      a) Upholstery materials shall meet requirements as set forth in the state of California Bureau of Home Furnishings Technical Bulletin 117.
      b) Fire-performance Characteristics of Seat Padding: Provide seating that complies with test method: California Technical Bulletin 117
      c) Cushioning and padding shall be self-extinguishing as defined in the requirements as set forth in the State of California Bureau of Home Furnishings Technical Bulletin 117.
   5. Strength and Durability: Comply with BIFMA X5.4 standards for seats, backs, armrests, and standards.

C. Backs: Fixed type; two-panel construction with fabric covering over padding and protective back panel, with installed height not less than 32 inches above finished floor.
   1. Structural Support (Inner Back): Molded hardwood plywood, not less than 11-ply, 5/8 inch thick.
   2. Padding: Polyurethane foam not less than 2 inches thick bonded to structural support.
   3. Covering: Fabric bonded to padding and fastened by upholstery technique that facilitates replacement.
      a) Seat Fabric **UPH2**: Custom selection by Architect. Refer to the "Finish Product List" on the drawings for specific fabric products, colors, and patterns.
   4. Outer Back: One-piece injection molded high-impact plastic, with scuff-resistant textured surface.

D. Seats: Hinged type, constructed to permit reupholstering without removing seat from chair.
   1. Seat Assembly: Padded and upholstered top surface, a polypropylene bottom shell with dual contours, and a dual sprung lifting mechanism. Seat shall have the ability to achieve a full fold position when rearward pressure is applied.

2. Bottom Cover: Polypropylene plastic, covering the mechanical parts of the lifting hinge and upholstered seat topper.

E. Standards: 1" x 3" x 16 gauge seamless oval mechanical tubing. Standards utilizing an open seam (not welded) are not acceptable.
1. Floor Mounted: Floor mounted standards shall have a 7 gauge formed steel foot, full perimeter welded to the upright tubular member. The floor mount standards shall be manufactured to match floor inclines in order to maintain proper seat height and angle.

F. Hinges: Self-lubricating, noiseless steel hinges with brass alloy bearings or nylon bushings, equipped with spring mechanism that causes unoccupied seat to rise automatically to uniform 3/4 fold, with 100 percent fold when additional pressure is applied.

G. Arm Rests: Locate at aisles and between chairs; mount to support standard with concealed fasteners; exposed surfaces of molded high-impact plastic.
1. Provide swing-up armrests at end standards for ADA compliance, at not less than five percent of fixed seats. Each accessible chair shall include the universal accessibility symbol on the end aisle standard for clear identification.

H. End Panels: One piece panels fastened securely to aisle standards with concealed fasteners, configured as follows:
1. Shape: As noted in Article 2.1.
2. Finish: Plastic laminate.

I. Aisle Lights: Integral low voltage aisle light system operating from a transformer system supplied by fixed seating manufacturer. "Low Voltage Luminaire" electrical system approved by Underwriters Laboratories Inc. Aisle lights to be mounted onto end panel or aisle standard and furnished with cover as an integral part of the chair standard.
1. Mounting Height: As selected by Architect from fixed seating manufacturer's standard options.

2.3 MATERIALS

A. Sheet Steel: ASTM A879/A879M, Commercial Steel (CS) or Drawing Steel (DS) electrogalvanized sheet, 04Z (12G) coating class on both surfaces; chemically treated for baked enamel finish.

B. Steel Plates and Bars: ASTM A36/A36M; minimum 1/4 inch thick.

C. Steel Tubes: AISI/SAE1008/1010/1015, ASTM A500/A500M, Grade B cold-formed structural tubing; minimum wall thickness of 0.083 inch.

D. Hardwood Plywood: HPVA HP-1; face veneers for exposed surfaces Grade A as selected by Architect from the manufacturer's standard options, with no visible defects; concealed surface veneers of sound grade hardwood.

E. Plastic Laminate: NEMA LD 3, Type 1, Grade GP 50, nominal thickness 0.050 inch; colors and patterns as selected from manufacturer's standards.

F. Polypropylene Sheet: Molded high density plastic with minimum tensile strength of 3300 psi, integral color pigments, and textured, scuff-resistant surface finish.

G. Polyurethane Foam: Density not less than 1.8 lb/cu ft, fire retardant, non-hardening and non-oxidizing, with high resistance to alkalis, oils, moisture, and mildew.

H. Upholstery Fabric: ASTM D3597 heavy-duty plain woven nylon fabric, treated to resist cigarette ignition and staining; color(s) and pattern(s) as indicated on the Finish Product List on the drawings.

2.4 FINISHES

A. Ferrous Metals: Manufacturer's standard electrostatic epoxy-polyester oven baked powder coating in semi luster black color textured finish, applied over conversion coating appropriate to base metal.

B. Hardwood Plywood: Manufacturer's standard clear low-gloss finish.

C. Finish Colors: For polymer components, metal components, and plastic laminates - refer to "Finishes for Miscellanous Items" on the "Finish Product List" on the drawings.

2.5 ACCESSORIES

A. Seat and Aisle Numbers: Manufacturer's standard seat numbers securely fastened to front edge of folding seats and row numbers securely fastened to aisle arm rests; anodized aluminum finish, with letters and numbers countersunk and filled with black paint; recessed mounting.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates for conditions detrimental to installation of fixed audience seating. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's installation instructions and approved shop drawings.

B. Anchor support standards securely to substrate with at least two anchoring devices recommended by manufacturer.
   1. Vary width of seats and backs as required to optimize sightlines, and comply with the ADA Standards for row and aisle widths.
   2. In curved rows, install standards to form smooth radius, without breaks or angled chords

3.3 ADJUSTING

A. Adjust seat mechanisms to ensure that seats in each row are aligned when unoccupied.

B. Repair minor abrasions and imperfections in painted finishes with a coating that matches factory-applied finish; replace units that cannot be repaired to unblemished appearance.

C. Replace upholstery fabric damaged or soiled during installation.

END OF SECTION 12 6100

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SECTION 12 6613 - TELESCOPING BLEACHERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Telescoping bleachers.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

1.3 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position; 2018.

C. ASTM D1929 - Standard Test Method for Determining Ignition Temperature of Plastics; 2020.

D. ASTM D2843 - Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics; 2019.

E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

F. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021.

G. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2023).

H. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel; 2018, with Errata (2022).

I. NFPA 102 - Standard for Grandstands, Folding and Telescopic Seating, Tents, and Membrane Structures; 2016.

J. PS 1 - Structural Plywood; 2023.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage handling and requirements.
   3. Installation methods.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Shop Drawings: For telescoping stands in both stacked and extended positions. Provide plans, elevations, sections, and details. Show seat heights, row spacing and rise, aisle widths and locations, assembly dimensions, anchorage to supporting structure, material types and finishes.
   1. Provide drawings customized to this project.
   2. Include Professional Engineer certification.

E. Verification Samples: For each seat color finish, submit samples of actual finish or product, for verification of color selection.

F. Product Test Reports: Load test to all loads, observed by a qualified independent testing laboratory, and certified by a registered professional structural engineer verifying the integrity of the manufacturer's design.

G. Professional Engineer's certification statement - or - Professional Engineer's seal on each sheet of shop drawing submittal(s).

H. Operation and Maintenance Data: Manufacturer's operation and maintenance instructions, including annual inspection and maintenance and bi-annual inspection by a Professional Engineer or manufacturer factory service personnel.

I. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.

J. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than ten years of documented experience.

B. Installer Qualifications: Manufacturer's installation crew.

C. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M, AWS D1.3/D1.3M, and no more than 12 months before the start of scheduled welding work.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver telescoping stands in manufacturers packaging clearly labeled with manufacturer name and content.

B. Store, in original packaging, under cover and elevated above grade.

C. Handle bleacher equipment in a manner to prevent damage.

D. Deliver the telescoping stands at a scheduled time for installation that will not interfere with other trades operating in the building when at all possible.

1.7 PROJECT CONDITIONS

A. Field Measurements: Coordinate actual dimensions of construction affecting telescoping stands installation by accurate field measurements before fabrication. Show recorded measurements on final shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid delay of Work.

1.8 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Manufacturer's Warranty: Includes the repair or replacement of the defective product; or defective component thereof, with a comparable product; or component thereof, or a refund of the purchase price prorated over the warranty period.
   1. Includes: Labor, materials, and freight for replacement or repairs.
   2. Structural Component parts of Understructure Warranty Period: 10 years from Date of Acceptance
   3. Decking systems, seating collections, portable and integral dolly systems, end closure curtains, surface material finishes Warranty Period 5 years from Date of Substantial Completion.

C. Correct defective Work within a five year period after Date of Substantial Completion. Replace parts that fail under normal use at no extra charge to Owner.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Telescoping Bleachers:
   1. Basis-of-Design: Hussey Seating Company**; MAXAM Telescopic Gym Seat System:** www.husseyseating.com/#sle.
   2. Alternate Acceptable Manufacturers:
      a) Interkal LLC: www.interkal.com.
      b) Irwin Seating Company: www.irwinseating.com.
   3. Substitutions: See Section 01 6000 - Product Requirements.

2.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Engineer, fabricate and install telescopic gym seating systems to the following structural loads without exceeding allowable design working stresses of materials involved, including anchors and connections. Apply each load to produce maximum stress in each respective component of each telescoping stand unit according to ICC 300, current edition.

B. System Design Criteria:
   1. Gymnasium seat assembly: Design to support and resist, in addition to its own weight, the following forces:
   2. Live load of 120 lbs. per linear foot on seats and decking
   3. Uniformly distributed live load of not less than 100 psf of gross horizontal projection.
   4. Parallel sway load of 24 lbs. per linear foot of row combined with (b.) above
   5. Perpendicular sway load of 10 lbs. per linear foot of row combined with uniformly distributed live load above.
   6. Parallel and Perpendicular sway loads are not applied concurrently.
   7. Hand Railings, Posts and Supports: Engineered to withstand the following forces applied separately:
      a) Concentrated load of 200 lbs. applied at any point and in any direction.
      b) Uniform load of 50 lbs. per foot applied in any direction.
   8. Guard Railings, Post and Supports: Engineered to withstand the following forces applied separately:
      a) Concentrated load of 200 lbs. applied at any point and in any direction along top rail.
      b) Uniform load of 50 lbs. per foot applied in any direction at top rail
      c) Uniform load of 50 lbs. applied on an area equal to 1 ft^2 applied on all guardrail infill panels.
      d) Vertical: 100 pounds per linear foot, applied vertically to top of guardrail.

2.3 TELESCOPING BLEACHERS

A. Wall-Attached Telescoping Bleachers: Forward-folding system with the rear of the understructure permanently attached to the floor and to the rear wall. Rear wall provides structural support and must support loads imposed by the bleacher.
   1. Provide a design certified by a licensed Professional Engineer licensed in the State in which the Project is located.
   2. Design to comply with applicable requirements of NFPA 102 and requirements of code authorities having jurisdiction; where conflicts between requirements occur, comply with whichever is more stringent.
   3. Standard Extension: Top row fixed to floor, adjacent to wall under overhang, forward extension (away from wall); attachment to wall prohibited.
   4. Wheelchair Spaces: Allow portions of first row, as indicated, to be manually retracted without affecting other rows; provide removable railings at row two behind wheelchair spaces in compliance with ADA Standards.
      a) Basis of Design: **Hussey Seating Company**; **Flex-Row**.
      b) Refer to drawings for quantity of wheelchair spaces to be provided.
   5. Cutouts: Fit units to irregular wall surfaces, columns, pilasters, roof drain leaders, and other obstructions; take field measurements prior to fabrication.

6. Operation: Manual. User operates system by manually pulling/pushing each section with operating handles

B. Dimensions:
1. See drawings for overall banklength.
2. Tiers: ~~Three (3)~~. **See Drawings**
3. Rise Per Row: 9 5/8 inches.
4. Row Spacing: 22 inches.
5. Aisle Width: 54 inches.
6. Closed Dimension: 4 feet 5 inches nominal.
7. Open Dimension: 6 feet nominal.

C. Structural Supports/Understory: Steel or aluminum; manufacturer's standard wheeled carriages supporting each tier separately, with moving parts permanently lubricated and metal parts cushioned to prevent metal-to-metal contact during operation.
1. Design so that each row carriage so that it will individually support the design loads and is self supporting when fully assembled without dependence on platform panels or boards, seats, or fascia.
2. Welding: In accordance with AWS D1.1/D1.1M and AWS D1.3/D1.3M.
3. Bolting: Use lock-washers or locknuts.
4. Wheels: Minimum 5 inch diameter by 1-1/8 inch wide, with non-marring rubber tires; ball, roller, or oil-impregnated metal bearings; minimum of 2 wheels at each floor support.
5. Finish: Manufacturer's standard rust-inhibitive powder coating.
6. Row Locking: Automatically mechanically lock each carriage to adjacent carriages when fully extended.
7. Unlocking: Provide single manual release mechanism to allow retraction of all carriages, concealed behind skirt board of first row.
a) Provide adjustable stops to allow field adjustment of row spacings.

2.4 SEAT AND PLATFORM COMPONENTS

A. Seat/Fascia Assembly: Continuous, molded UV-stabilized high-density polyethylene plastic, seat minimum 1 inch thick, homogeneous color throughout.
1. Shape: Ergonomically contoured, with internal ribs spaced for natural flexibility; rear edge cantilevered to provide toe room of not less than 3 inches; no openings to trap debris.
2. Fire Retardance: Self-ignition temperature of 650 degrees F or greater when tested in accordance with ASTM D1929; smoke developed index of 450 or less, when tested in accordance with ASTM E84, or 75 or less when tested in thickness intended for use in accordance with ASTM D2843; and burning extent of 1 inch or less when tested in thickness intended for use in accordance with ASTM D635.
3. Provide integally molded end caps of same material and finish on each exposed end.
4. Provide ntegrally molded end caps at aisle end locations.
5. Provide integrally molded rear closure panel at back of seat
6. ~~Seat and Row Numbers: Provide integrally molded recessed pockets and number plates.~~
7. Basis of Design: **Hussey Seating: Courtside Collection XC10**.

B. Platform, Tread, and Step Structure: Plywood decking continuously supported on front and rear with side joints tongue-and-grooved.

1. Plywood: PS 1, 5-ply southern pine or polyethylene-overlaid douglas fir or southern pine, Grade A-C.
   a) Plywood Thickness: 5/8 inch, minimum.
   b) Plywood Finish: Clear urethane, high gloss finish.
2. Front (Nose), Rear, and Intermediate Supports: Steel channel or tube, hot-dipped galvanized.
   a) Finish: Rust-inhibiting black finish.
3. Steps:
   a) Removeable Front Aisle Steps: At each vertical aisle location front aisle step. Front steps shall engage with front row to prevent accidental separation or movement. Provide four non-skid rubber feet each 1 inchin diameter. Full radius end caps on all four edges.
   b) Provide end caps of same material and finish on each exposed end.

2.5 HANDRAILS AND RAILINGS

A. Provide the following railings:
   1. Aisle Handrails: Single post folding railing segment mounted in center of aisle at every other row beginning at row 2.
   2. End of Row Guardrails: Self-storing, at open ends of sections beginning at row 2.
   3. ~~Top Row Rear Guardrail: Non-removable self-storing, mounted behind rear seat with tubular supports, running full width of section.~~
   4. Height: 42 inches above adjacent platform or tread.

B. Railing Construction: Round steel pipe or tube, with formed elbows at corners and caps at ends of straight runs.
   1. Steel: 1-1/2 inch minimum outside diameter, with 11 gauge, 0.12 inch minimum wall thickness; powder coated.
   2. Color: Black.

2.6 FABRICATION

A. Fabricate understructure from structural-steel members in size, spacing, and form required to support design loads specified in referenced safety standard.

B. Weld understructure to comply with applicable AWS standards.

C. Round corners and edges of components and exposed fasteners to reduce snagging and pinching hazards.

2.7 ACCESSORIES

A. Fillers and Closures:
   1. Top Row: Provide seat level rear filler panels to close openings between top row seat and wall; finish to match platforms.
   2. Sides of Extended Units: Vinyl curtains.
   3. Vinyl Curtains: 18 ounce vinyl with grommets; color as selected from manufacturer's standard palette.

B. Fasteners: Provide hardware and fasteners in accordance with manufacturer's recommendations.

C. Anchorage: As indicated on drawings; provide hardware in accordance with manufacturer's recommendations.

2.8 FINISHES

A. Finish Colors: Refer to "Finishes for Miscellanous Items" on the "Finish Product List" on the drawings.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas where telescoping stands are to be installed, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the work.

B. Do not begin installation until substrates have been properly prepared and area has been cleared of obstructions.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's written instructions and approved shop drawings.

B. Do not field cut or alter seats, fascia, or structural members without approval.

C. Provide manufacturer's field representative to inspect completed installation.

3.4 ADJUSTING

A. Lubricate, test, and adjust each moving assembly to ensure proper operation in compliance with manufacturer's written operating instructions.

3.5 CLEANING

A. Clean exposed and semi-exposed assembly surfaces.

B. Touch up finishes on damaged or soiled areas.

3.6 CLOSEOUT ACTIVITIES

A. Demonstration and Training: Provide manufacturer's field representative to demonstrate to and train Owner's operating personnel in proper operation, adjustment, and maintenance of telescoping bleachers.
   1. Location: On site using installed equipment.
   2. Time: As agreed between Owner and Contractor.

3.7 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair, or replace damaged products before Date of Substantial Completion.

END OF SECTION 12 6613

SECTION 12 9300 - SITE FURNISHINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. ADA / Traffic Control Bollards.
2. Electronic ADA Stanchion.
3. Bicycle Racks.
4. Metal Screen Fencing.
5. Site Benches.
6. Site Planters
7. Security Lift Arm Barrier & Communication Stanchion
8. Barrier Swing Gate
9. ADA Door Access Stanchion
10. Playground Equipment / Improvements

B. Related Requirements:

1. Division 01 Section(s) “Construction Waste Management and Disposal” and “Sustainability Compliance Procedures” for sustainability requirements.

2. Division 03 Section "Cast-in-Place Concrete" for installing site furnishings cast in concrete footings.

3. Division 05 Section "Metal Fabrications" for metal fabrication requirements

4. Division 04 Section "Cast Stone Masonry" for cast stone units into which metal skateboard deterrents are to be installed.

5. Division 31 Section "Excavation, Backfill, Compaction and Dewatering" for excavation for installing concrete footings.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. LEED Submittals:

1. Product Data for Credit MR 4.1 and Credit MR 4.2: For products having recycled content, documentation indicating percentages by weight of postconsumer and pre-consumer recycled content. Include statement indicating cost for each product having recycled content.
2. Certificates for Credit MR 7: Chain-of-custody certificates indicating that wood components of site furnishings comply with forest certification requirements. Include documentation that manufacturer is certified for chain of custody by an FSC-accredited certification body. Include statement indicating cost for each certified wood product.

C. Samples for Initial Selection: For units with factory-applied finishes.

D. Samples for Verification: For each type of exposed finish, not less than 6-inch- (152-mm-) long linear components and 4-inch- (102-mm-) square sheet components.

E. Shop Drawings: Dumpster Screening Fence at Service Dock.

1.4 INFORMATIONAL SUBMITTALS

A. Material Certificates: For site furnishings.

1. Wood Preservative Treatment: Include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For site furnishings to include in maintenance manuals.

1.6 WARRANTY

A. For products noted in this section, provide manufacturer's standard warranty, minimum of one year.

PART 2 - PRODUCTS

2.1 ADA / TRAFFIC CONTROL BOLLARDS

A. Steel Pipe Fixed Bollards: Concrete filled steel pipe with plain shaft.
1. Shape: Round.
2. Width: As indicated on Drawings.
3. Width: 6" inches.
4. Height Above Grade: As indicated on Drawings.
5. Materials:
   a) Steel Pipe: ASTM A53/A53M, standard weight.
   b) Factory Finish: hot-dip galvanized 05 0513 - Shop-Applied Coatings for Metal.
6. Mounting: In-ground.
7. Accessories: Plastic Cover

a) Material: LDPE plastic injected with UV resistor fade resistant additive.
b) Wall Thickness: ¼ inch
c) Size: Designed to fit over 6-inch diameter pipe.
d) Height: Cut to length as required to meet design intent per detail / field conditions.
e) Field Cut: Clean cut square hole in top to accept sign posts as required.
f) Color: Black
g) Basis-of-design: Ideal Shield, 2525 Clark Street, Detroit, MI 48209 (866) 825-8659 or one of the following acceptable products.
1 Emedco
2 Bollards and Sleeves, LLC

B. Steel Pipe Entry Stanchion: Concrete filled steel pipe with plain shaft. Removable Bollards
1. Shape: Square. Provide Model MCSP-SS2-EZ as manufactured by MaxiForce (1-410-522-9888).
2. Width: As indicated on Drawings.
3. Height Above Grade: 32” As indicated on Drawings.
4. Cap: Flat steel plate at angle as indicated on Drawings.
5. Materials:
a) Steel Pipe: ASTM A53/A53M, standard weight.
b) Factory Finish: hot-dip galvanized 05 0513 - Shop-Applied Coatings for Metal.
c) Final Finish: Field painted conforming to Section 09 9113 - Exterior Painting. Standard Manufacturer’s Finish
d) Color: Shall be Bengal Light Grey or as selected by Architect from manufacturer's standard range.
e) Color: As indicated on metal finish schedule.
6. Mounting: In-ground per manufacturer’s recommendations.

2.2 BICYCLE RACKS

A. Dero Rolling Rack
1. Product: RR5H
2. Length: 111”
3. Capacity: 11 Bikes
4. Finish: Stainless Steel
5. Material: 2” schedule 40 pipe
6. Mounting: In-ground
7. Basis-of-design Product: Rolling Rack by Dero, A Playcore Company or one of the following acceptable products.
a. Bikeparking.com
b. Madrax

2.3 METAL SCREEN FENCING

A. Metal Screen Fencing
1. Height: Varies, see plan and details for height.
2. Color: Match architectural screen fencing for roof utilities.

3. Basis-of-design: Pallisade Fortress Screen Fence as provided by PalmSHIELD [300 East Locust St. Carter Lake, IA 51510 Phone: 531-329-4406 Web: www.palmshieldlouvers.com]
4. Or one of the following acceptable products.
   a. - Alt. 1. Ametco with Saturn infill pattern. Matches Palmshield.
   b. - Alt. 2. Airolite - SV691 vertical panels. Need full structural framing to attach to

B. Appurtenances
1. Hinges at Dumpster Enclosure: Provide heavy-duty stainless steel hinges as per delegated design and as recommended by the manufacturer.
2. Latches: Provide heavy-duty stainless steel self-closing lockable latches as per delegated design and as recommended by the manufacturer.

C. Delegated Design: The Contractor shall provide shop drawings demonstrating compliance with the design intent which are to be sealed / signed by a licensed Engineer.

2.4 SITE BENCHES

A. Site Benches
1. Length: As detailed
2. Base: As detailed – All securement hardware shall be Stainless Steel.
3. Wood Bench: Shall be natural edged wood cut from existing trees to be salvaged for this purpose. Contractor shall meet with Landscape Architect in the field to select trees for this purpose prior to clearing operations.
4. Color: Natural / Clear
5. Basis-of-Design Product: Custom Bench per detailing shown by City Bench - 73 Maple Ave. Higganum, CT. 06441 , or one of the following acceptable products.
   a. New England Antique Lumber
   b. Pristine Custom Wood Furniture

B. Concrete Base: Provide 3000lb concrete base as detailed.

C. Delegated Design: The Contractor shall provide shop drawings demonstrating compliance with the design intent which are to be sealed / signed by a licensed Engineer. See Item 2.4 A.3 above for special requirements.

2.5 SITE PLANTERS

A. Basis of Design: Provide the following planters as manufactured by Wausau Tile (wtile@wausautile.com) or one of the following acceptable products:
1. Garden Planters: Model TF4213 Form Rectangular Concrete Planter. Size: 96”L x 48”W x 36” H w/ 2” drain hole. Finish / Color: Weatherstone “Misty Grey”.
2. Tree Planters: Model TF4209 Form Square Concrete Planter. Size: 72”L x 72”W x 36” H w/ 2” drain hole. Finish / Color: Weatherstone “Misty Grey”.

2.6 SECURITY LIFT ARM BARRIER AND COMMUNICATION STANCHION

A. Basis of Design: Provide LiftMaster Model MADCBB3 Mega Arm Barrier w/ communicating stanchion as provided by Elite (1-800-555-6017) or one of the following acceptable products:
   1. Hysecurity Model STRONGARMPARK DC14 Barrier Gate Opener w/ communicating stanchion as provided by Elite (1-800-555-6017)
   2. Doorking Model 1601-380 Parking Barrier Arm w/ communicating stanchion as provided by Elite (1-800-555-6017) or one of the following acceptable products:

B. Concrete Base: Provide 43000lb concrete base as detailed.

C. Delegated Design: The Contractor shall provide shop drawings demonstrating compliance with the design intent which are to be sealed / signed by a licensed Engineer.

2.7 BARRIER SWING GATE

A. Provide Barrier Swing Gate as detailed:
   1. Size / Configuration: As detailed
   2. Finish / Color: All surfaces shall be “Black” Colorgalv finish.
   3. Reflective Tape: Color-White
   4. Locking Hardware: Shall be Stainless Steel

B. Concrete Base: Provide 4000lb concrete base as detailed Size per delegated design recommendation..

C. Delegated Design: The Contractor shall provide shop drawings demonstrating compliance with the design intent which are to be sealed / signed by a licensed Engineer.

2.8 ADA DOOR ACCESS STANCHION

A. Provide Stanchion as detailed:
   1. Size / Configuration: As detailed
   2. Finish / Color: All surfaces shall be “Black” Colorgalv finish.

B. Concrete Base: Provide 4000lb concrete base as detailed Size per delegated design recommendation..

C. Delegated Design: The Contractor shall provide shop drawings demonstrating compliance with the design intent which are to be sealed / signed by a licensed Engineer.

2.9 PLAYGROUND EQUIPMENT / IMPROVEMENTS

A. Playground Striping: Provide playground basketball court, game, and graphic striping as shown on drawings. Contractor shall provide shop drawings indicating the layout and colors of the striping to be provided. Colors (up to 5) shall be as determined by the Landscape Architect. Paint shall be as recommended for use on a bituminous surface specifically for playground use.

B. Basketball Hoops:
   1. Basis of Design: Provide Model GS 54 (Color: black) as manufactured by Goalrilla (www.goalrilla.com) or one of the following acceptable products:

      a. Lifetime Model 71525 (www.lifetime.com)
      b. Spalding U-Turn In-Ground Basketball Hoop (www.spalding.com)

C. Concrete Base: Provide 4000lb concrete base as detailed Size per delegated design recommendation..

D. Delegated Design: The Contractor shall provide shop drawings demonstrating compliance with the design intent.

2.10 GENERAL FABRICATION

A. Metal Components: Form to required shapes and sizes with true, consistent curves, lines, and angles. Separate metals from dissimilar materials to prevent electrolytic action.

B. Welded Connections: Weld connections continuously. Weld solid members with full-length, full-penetration welds and hollow members with full-circumference welds. At exposed connections, finish surfaces smooth and blended so no roughness or unevenness shows after finishing and welded surface matches contours of adjoining surfaces.

C. Pipes and Tubes: Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.

D. Exposed Surfaces: Polished, sanded, or otherwise finished; all surfaces smooth, free of burrs, barbs, splinters, and sharpness; all edges and ends rolled, rounded, or capped.

E. Factory Assembly: Assemble components in the factory to greatest extent possible to minimize field assembly. Clearly mark units for assembly in the field.

2.11 GENERAL FINISH REQUIREMENTS

A. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.12 PRECAST CONCRETE FINISHES

A. Exposed faces shall be free of joint marks, grain, and other obvious defects. Corners, including false joints shall be uniform, straight, and sharp. Finish exposed-face surfaces of architectural precast concrete units to match approved sample.

1. Acid-Etched Finish: Use acid and hot-water solution, equipment, application techniques, and cleaning procedures to expose aggregate and surrounding matrix surfaces. Protect hardware, connections, and insulation from acid attach.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.

B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.

C. Install site furnishings level, plumb, true, and securely anchored at locations indicated on Drawings.

D. Post Setting: Set cast-in support posts in concrete footing with smooth top, shaped to shed water. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at correct angle and are aligned and at correct height and spacing. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.

E. Posts Set into Voids in Concrete: Form or core-drill holes for installing posts in concrete to depth recommended in writing by manufacturer of site furnishings and 3/4 inch (19 mm) larger than OD of post. Clean holes of loose material, insert posts, and fill annular space between post and concrete with non-shrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.

3.3 INSTALLING IRON BOLLARDS

A. Fill metal-capped bollards solidly with concrete and allow concrete to cure seven days before installing.

B. Anchor bollards in place with concrete footings. Center and align bollards in holes 6 inches (150 mm) above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.

1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.

3.4 TRAFFIC CONTROL / PARKING SIGNAGE

A. Excavation: Excavate for signage bases to elevations and dimensions indicated.

B. Install sign posts in locations indicated and as detailed on the drawings. Secure signage using mounting methods of types described and complying with manufacturer's written instructions. All securement hardware shall be S.S. Care shall be taken not to damage sign faces during securement due to over-tightening or scratching.

C. Verify that guide rail posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting.

3.5 CLEANING AND PROTECTION

A. After installation, clean soiled site furnishing surfaces according to manufacturer's written instructions. Protect from damage until acceptance by Owner.

END OF SECTION 12 9300

SECTION 14 2100 - ELECTRIC TRACTION ELEVATORS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Complete electric traction elevator systems.
   1. Passenger type.
   2. The work required under this section consists of all labor, materials and services required for the complete installation (including operational verification) of all the equipment required for the elevator(s) as herein specified.

1.2 RELATED REQUIREMENTS

A. Section 01 3566.42 - Sustainability Compliance Procedures.

B. Section 03 3000 - Cast-in-Place Concrete.

C. Section 05 50 00 – Metal Fabrications: Delegated design requirements for pit ladder, divider beams, supports for entrances and rails, and hoisting beam at top of elevator hoistway.

D. Section 07 1300 - Sheet Waterproofing: Waterproofing of elevator pit.

E. Section 21 1300 - Fire-Suppression Sprinkler Systems.

F. Section 26 0533.13 - Conduit for Electrical Systems: Electrical conduit requirements.

G. Section 26 0583 - Wiring Connections: Wiring connection requirements.

1.3 REFERENCE STANDARDS

A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2014 (2015 Errata).

B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

C. AISC 360 - Specification for Structural Steel Buildings; 2022.

D. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.

E. ASME A17.1 - Safety Code for Elevators and Escalators Includes Requirements for Elevators, Escalators, Dumbwaiters, Moving Walks, Material Lifts, and Dumbwaiters with Automatic Transfer Devices; 2022.

F. ASME A17.2 - Guide for Inspection of Elevators, Escalators, and Moving Walks Includes Inspection Procedures for Electric Traction and Winding Drum Elevators, Hydraulic Elevators, Inclined Elevators, Limited-Use/Limited-Application Elevators, Private Residence Elevators, Escalators, Moving Walks, and Dumbwaiters; 2020.

G. ASME QEI-1 - Standard for the Qualification of Elevator Inspectors; 2018.

H. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

I. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes; 2023.

J. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

K. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.

L. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

M. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.

N. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021.

O. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2023).

P. ITS (DIR) - Directory of Listed Products; Current Edition.

Q. NEMA MG 1 - Motors and Generators; 2018.

R. NFPA 13 - Standard for the Installation of Sprinkler Systems; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

S. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

T. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2019.

U. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic); 2019.

V. UL (DIR) - Online Certifications Directory; Current Edition.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate work with other installers to provide necessary conduits for proper installation of wiring, including but not limited to the following:
      a) Elevator pit for lighting and sump pump.
      b) Automatic transfer switch from controller cabinet.
      c) Fire alarm panel from controller cabinet.
   2. Coordinate work with other installers for equipment provisions necessary for proper elevator operation, including but not limited to the following:
      a) Automatic transfer switches with auxiliary contacts for emergency power transfer status indication.

b) Shunt trip devices for automatic disconnection of elevator power prior to fire suppression system activation; include provisions for shunt trip power monitoring.

B. Preinstallation Meeting: Convene meeting at least one week prior to start of this work.
1. Review schedule of installation, proper procedures and conditions, and coordination with related work.
2. Review use of elevator for construction purposes, hours of use, scheduling of use, cleanliness of car, employment of operator, and maintenance of system.

C. Construction Use of Elevator: Not permitted.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Submit data on following items:
1. Car, guide rails, buffers, and other components in hoistway.
2. Maximum rail bracket spacing.
3. Maximum loads imposed on guide rails requiring load transfer to building structure.
4. Signal and operating fixtures, operating panels, and indicators.
5. Car design, dimensions, layout, and components.
6. Car and hoistway door and frame details.
7. Clearances and travel of car.
8. Clear inside hoistway and pit dimensions.
9. Electrical characteristics and connection requirements.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 - Sustainability Compliance Procedures and provide the following in addition to other submittals:
1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Shop Drawings: Include appropriate plans, elevations, sections, diagrams, and details on following items:
1. Elevator Equipment and Machines: Size and location of driving machines, power units, controllers, governors, and other components.
2. Hoistway Components: Size and location of car machine beams, guide rails, buffers, ropes, and other components.
3. Rail bracket spacing; maximum loads imposed on guide rails requiring load transfer to building structural framing.
4. Individual weight of principal components; load reaction at points of support.
5. Loads on hoisting beams.
6. Clearances and over-travel of car and counterweight.
7. Locations in hoistway and machine room of traveling cables and connections for car lighting and telephone.

8. Location and sizes of hoistway and car doors and frames.
9. Calculated heat dissipation of elevator equipment in machine room.
10. Interface with building security system.
11. Electrical characteristics and connection requirements.
12. Indicate arrangement of elevator equipment and allow for clear passage of equipment through access openings.

E. Samples: Submit samples illustrating car floor material, car interior finishes, car and hoistway door and frame finishes, and handrail material and finish in the form of cut sheets, finish color selection brochures, or physical samples.

F. Designer's qualification statement.

G. Manufacturer's qualification statement.

H. Installer's qualification statement.

I. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.

J. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

K. Operation and Maintenance Data:
1. Parts catalog with complete list of equipment replacement parts; identify each entry with equipment description and identifying code.
2. Operation and maintenance manual.
3. Schematic drawings of equipment and wiring diagrams of installed electrical equipment with list of corresponding symbols to identify markings on machine room and hoistway apparatus.

1.6 QUALITY ASSURANCE

A. Designer Qualifications: Design guide rails under direct supervision of a licensed Professional Structural Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum ten years documented experience.

C. Installer Qualifications: Supervisor along with trained elevator installation personnel on staff of elevator equipment manufacturer.

D. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and no more than 12 months before start of scheduled welding work.

E. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of type specified in this section.

F. Products Requiring Fire Resistance Rating: Listed and classified by ITS (DIR), UL (DIR), or testing agency acceptable to authorities having jurisdiction.

G. Products Requiring Electrical Connection: Listed and classified by UL (DIR) or testing agency acceptable to authorities having jurisdiction as suitable for the purpose indicated in construction documents.

1.7 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Provide manufacturer's warranty for defective material and workmanship for one year from Date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Electric Traction Elevators:
   1. Basis-of-Design: **Otis Elevator Company; Gen3 Edge:** www.otis.com/#sle.
   2. Other Acceptable Manufacturers:
      a) KONE: www.kone.us/#sle.
      b) ThyssenKrupp Elevator: www.thyssenkruppelevator.com/#sle.

B. Substitutions: See Section 01 6000 - Product Requirements.

C. Source Limitations: Provide elevator and associated equipment and components produced by a single manufacturer and obtained from a single supplier.

2.2 ELECTRIC TRACTION ELEVATORS

A. Electric Traction Passenger Elevator: Gearless machine-room-less elevator where all components fit inside the hoistway with the controller in the top landing entrance frame.
   1. Drive System: Regenerative.
   2. Operation Control Type:
      a) Selective Collective Automatic Operation Control.
   3. Service Control Type:
      a) Standard service control only.
   4. Interior Car Height: 93 inch.
   5. Rated Net Capacity: 3500 pounds.
   6. Rated Speed: 150 feet per minute.
   7. Hoistway Size: As indicated on drawings.
   8. Interior Car Platform Size: 77-9/16 inch wide by 77-9/16 inch deep.
   9. Elevator Pit Depth: 48 inch.
   10. Overhead Clearance at Top Floor to Hoist Beam: 127 inches.
   11. Travel Distance: As indicated on drawings.
   12. Number of Stops: As indicated on drawings.
   13. Number of Openings: One Front; one Rear.

2.3 COMPONENTS

A. Elevator Equipment:

1. Motors, Controllers, Controls, Buttons, Wiring, Devices, and Indicators: Comply with NFPA 70 requirements; see Section 26 0583 for additional information.
2. Guide Rails, Cables, Counterweights, Sheaves, Buffers, Attachment Brackets, and Anchors: Design criteria for components includes safety factors in accordance with applicable requirements of Elevator Code, ASME A17.1.
3. Buffers:
   a) Spring type for elevators with speed less than or equal to 200 feet per minute.
4. Lubrication Equipment: Manufacturer's standard, as required.

B. Electrical Equipment:
1. Motors: NEMA MG 1.
2. Spare Conductors: Provide ten percent in extra conductors and two pairs of shielded audio cables in traveling cables.
3. Include wiring and connections to elevator devices remote from hoistway and between elevator machine room. Provide additional components and wiring to suit machine room layout. See Section 26 0583.

2.4 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with ASME A17.1, applicable local codes, and authorities having jurisdiction (AHJ).

B. Accessibility Requirements: Comply with ADA Standards.

C. Perform structural steel design, fabrication, and installation in accordance with AISC 360.

D. Comply with seismic design requirements in accordance with ASME A17.1, applicable local codes, and authorities having jurisdiction (AHJ).
1. Comply with Elevator Safety Requirements for Seismic Risk Zone in accordance with ASME A17.1, ASCE 7, and other related requirements.

E. Perform welding of steel in accordance with AWS D1.1/D1.1M.

F. Fabricate and install door and frame assemblies in accordance with NFPA 80 and complying with requirements of authorities having jurisdiction (AHJ).

G. Perform electrical work in accordance with NFPA 70.

H. Comply with venting or pressurization of hoistway design in accordance with HVAC system requirements and authorities having jurisdiction (AHJ).

I. Comply with fire protection sprinkler system of hoistway design in accordance with NFPA 13 requirements and authorities having jurisdiction (AHJ). See Section 21 1300.

2.5 OPERATION CONTROLS

A. Elevator Controls: Provide landing operating panels and landing indicator panels.
1. Landing Operating Panels: Metallic type, one for originating "Up" and one for originating "Down" calls, one button only at terminating landings; with illuminating indicators.
2. Landing Indicator Panels: Illuminating.
3. Comply with ADA Standards for elevator controls.

B. Interconnect elevator control system with building security, fire alarm, card access, smoke alarm, and building management control systems.

C. Door Operation Controls:
   1. Program door control to open doors automatically when car arrives at floor landing.
   2. Render "Door Close" button inoperative when car is standing at dispatch landing with doors open.
   3. Door Safety Devices: Moveable, retractable safety edges, quiet in operation; equipped with photo-electric light rays.

D. Provide "Firefighter's Emergency Operation" in accordance with ASME A17.1, applicable building codes, and authorities having jurisdiction (AHJ).
   1. Designated Landing: Main Lobby.

2.6 OPERATION CONTROL TYPE

A. Selective Collective Automatic Operation Control: Applies to car in single elevator shaft.
   1. Refer to description provided in ASME A17.1.
   2. Automatic operation by means of one button in the car for each landing served and by "UP" and "DOWN" buttons at the landings.
   3. Stops are registered by momentary actuation of landing car buttons without consideration of the number of buttons actuated or the sequence buttons actuated, but the stops are made in the order that landings are reached in each direction of travel.
   4. All "UP" landing calls are made when car is traveling in the up direction.
   5. All "DOWN" landing calls are made when car is traveling in the down direction.
   6. Uppermost and lowermost calls are answered as soon as they are reached without consideration of the car travel direction.

2.7 EMERGENCY POWER

A. Set-up elevator operation to run with elevator emergency power supply when the normal building power supply fails, and in compliance with ASME A17.1 requirements.

B. Elevator Emergency Power Supply: Supplied by battery backup; provide elevator system components as required for emergency power characteristics.

C. Emergency Lighting: Comply with ASME A17.1 elevator lighting requirements.

D. Provide operational control circuitry for adapting the change from normal to emergency power.

E. Upon transfer to emergency power, advance one elevator at a time to a preselected landing, stop car, open doors, disable operating circuits, and hold in standby condition.

2.8 MATERIALS

A. Rolled Steel Sections, Shapes, Rods: ASTM A36/A36M.

B. Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.

C. Stainless Steel Sheet: ASTM A666, Type 304; No. 4 Brushed finish unless otherwise indicated.

D. Stainless Steel Bars, Shapes and Moldings: ASTM A276/A276M, Type 304.

E. Extruded Aluminum: ASTM B221 (ASTM B221M), natural anodized finish unless otherwise indicated.

2.9 CAR AND HOISTWAY ENTRANCES

A. Elevator, Passenger:
   1. Car and Hoistway Entrances, Each Elevator Floor Lobby:
      a) Hoistway Fire Rating: As indicated on drawings.
      b) Elevator Door Fire Rating: 1 Hour.
      c) Framed Opening Finish and Material: Brushed stainless steel.
      d) Car Door Material: Stainless steel, with rigid sandwich panel construction.
      e) Hoistway Door Material: Stainless steel, with rigid sandwich panel construction.
      f) Door Type: Double leaf.
      g) Door Operation: Side opening, two speed.
      h) Door Width: 42 inch.
      i) Door Height: 84 inch.
      j) Sills: Extruded aluminum.

B. Sills/Thresholds: Configure to align with frame return and coordinate with floor finish.

2.10 CAR EQUIPMENT AND MATERIALS

A. Elevator Car, Passenger:
   1. Car Operating Panel: Provide main; flush-mounted applied face plate, with illuminated call buttons corresponding to floors served with "Door Open" button, "Door Close" button, and alarm button.
      a) Panel Material: Stainless steel; one per car.
      b) Car Floor Position Indicator: Above door with illuminating position indicators.
      c) Locate alarm button where it is unlikely to be accidentally actuated; not more than 54 inch above car finished floor.
      d) Provide matching service cabinet integral with front return panel, with hinged door and keyed lock in each car.
      e) Provide following within service cabinet as part of car operating panel:
         1) Switch for each auxiliary operational control, keyed.
         2) Switches for fan, light, and inspection control.
         3) Emergency light.
         4) Telephone cabinet and hard-wired connection with telephone.
         5) Control for each other special feature specified.
         6) Convenience outlet receptacle; 110 VAC, 15 amps.
   2. Ventilation: Single-speed fan with grille in ceiling.
   3. Flooring: Resilient tile, type as indicated on the Finish Product List on the drawings.
   4. Wall Base: Recessed stainless steel, 4 inch high.
   5. Front Return Panel: Stainless steel.
   6. Door Wall: Stainless steel.
   7. Side Walls: Plastic laminate, as selected by Architect..
   8. Rear Wall: Plastic laminate, as selected by Architect.
   9. Ceiling:

a) Canopy Ceiling: Stainless steel.
b) Lighting: Four LED fixtures, recessed.

B. Car Accessories:
1. Certificate Frame: Stainless steel frame glazed with clear tempered glass, and attached with tamper-proof screws.
2. Protective Pads: Canvas cover, padded with impact-resistant fill material, sewn with piping edges; fire resistant in compliance with ASME A17.1; brass grommets for supports, covering side and rear walls and front return, with cut-out for control panel; provide one set for each elevator.
a) Color: Tan.
b) Provide at least 4 inch clearance from bottom of pad to finished floor.
c) Pad Supports: Stainless steel studs, and mounted from ceiling frame.

2.11 FINISHES

A. Powder Coat on Steel: Clean and degrease metal surface; apply one coat of primer; two coats of powder coat.

B. Baked Enamel on Steel: Clean and degrease metal surface; apply one coat of primer sprayed and baked; two coats of enamel sprayed and baked.

C. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20 Type I - Inorganic, comply with VOC limitations of authorities having jurisdiction (AHJ).

D. Clear Anodized Finish: Class I, AAMA 611 AA-M12C22A41 clear anodic coating with electrolytically deposited organic seal; not less than 0.7 mils, 0.0007 inch thick.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting this work.

B. Verify that hoistway and pit are ready for work of this section.

C. Verify hoistway shaft and openings are of correct size and within tolerance.

D. Verify location and size of machine foundation and position of machine foundation bolts.

E. Verify that electrical power is available and of correct characteristics.

3.2 PREPARATION

A. Arrange for temporary electrical power for installation work and testing of elevator components. See Section 01 5000 - Temporary Facilities and Controls for additional requirements.

B. Maintain elevator pit excavation free of water.

3.3 INSTALLATION

A. Coordinate this work with installation of hoistway wall construction.

B. Install system components, and connect equipment to building utilities.

C. Provide conduit, electrical boxes, wiring, and accessories; see Sections 26 0533.13 and 26 0583.

D. Mount machines and motors on vibration and acoustic isolators.
   1. Place on structural supports and bearing plates.
   2. Securely fasten to building supports.
   3. Prevent lateral displacement.

E. Install hoistway, elevator equipment, and components in accordance with approved shop drawings.

F. Install guide rails to allow for expansion and contraction movement of guide rails.

G. Accurately machine and align guide rails, forming smooth joints with machined splice plates.

H. Bolt or weld brackets directly to structural steel hoistway framing.

I. Field Welds: Chip and clean away oxidation and residue with wire brush; spot prime with two coats.

J. Install hoistway door sills, frames, and headers in hoistway walls; grout sills in place, set hoistway floor entrances in alignment with car openings, and align plumb with hoistway.

K. Structural Metal Surfaces: Clean surfaces of rust, oil, or grease; wipe clean with solvent; prime with two coats.

L. Adjust equipment for smooth and quiet operation.

3.4 TOLERANCES

A. Guide Rail Alignment: Plumb and parallel to each other in accordance with ASME A17.1 and ASME A17.2.

B. Car Movement on Aligned Guide Rails: Smooth movement, without any objectionable lateral or oscillating movement or vibration.

3.5 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements for additional requirements.

B. Testing and inspection by regulatory agencies will be performed at their discretion.
   1. Schedule tests with agencies and notify Owner and Architect.
   2. Obtain permits as required to perform tests.
   3. Document regulatory agency tests and inspections in accordance with requirements.
   4. Perform tests required by regulatory agencies.

5. Furnish test and approval certificates issued by authorities having jurisdiction (AHJ).

C. Perform testing and inspection in accordance with requirements.
1. Inspectors shall be certified in accordance with ASME QEI-1.
2. Perform tests in accordance with ASME A17.2.
3. Provide at least two weeks written notice of date and time of tests and inspections.
4. Supply instruments and execute specific tests.

D. Operational Tests:
1. Perform operational tests in the presence of Owner and Architect.
2. At an agreed time, and the building occupied with normal building traffic, conduct tests to verify performance.
a) Furnish event recording of each landing call registrations, time initiated, and response time throughout entire working day.

3.6 ADJUSTING

A. Adjust for smooth acceleration and deceleration of car to minimize passenger discomfort.

B. Adjust with automatic floor leveling feature at each floor landing to reach 1/4 inch maximum from flush with sill.

3.7 CLEANING

A. See Section 01 7000 - Execution and Closeout Requirements for additional requirements.

B. Remove protective coverings from finished surfaces.

C. Clean surfaces and components in accordance with manufacturers written instructions.

3.8 CLOSEOUT ACTIVITIES

A. See Section 01 7800 - Closeout Submittals for closeout submittals.

B. Demonstrate proper operation of equipment to Owner's designated representative.

3.9 PROTECTION

A. Do not permit construction traffic within car after cleaning.

B. Protect installed products until Date of Substantial Completion.

C. Touch up, repair, or replace damaged products and materials before Date of Substantial Completion.

END OF SECTION 14 2100

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Project Manual For

Volume 3 of 4

Divisions 21 - 26

TOWN OF GREENWICH
GREENWICH CENTRAL MIDDLE SCHOOL

Phase 2 of 3 – Building Construction, Demolition, and Sitework

9 Indian Rock Lane
Greenwich, Connecticut 06830

SLAM

The S/L/A/M Collaborative

State Project No.: 057-0114 N
Project No.: 22367.00
Issued for: Constr. Docs. – July 8, 2024
Bidding/Permit – Sept. 30, 2024

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SECTION 21 0400 - GENERAL CONDITIONS FOR FIRE PROTECTION TRADES

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. This section applies to certain sections of Division 26, "Electrical," and this section applies to all sections of Divi 21, "Fire Protection" of this project specification unless specified otherwise in the individual sections.

C. The Drawings of other trades (Architectural, Food Service, Structural, Landscape, Civil, Mechanical, Plumbing, Electrical, Communications and Fire Alarm) shall be examined for coordination and familiarity of work with other Contractors. Any duplication or omission of provisions in this project should be brought to the attention of the Owners prior to Bidding.

1.2 DESCRIPTION

A. The General Conditions and Supplementary General Conditions are a part of this Division and are to be considered a part of this Contract.

B. Where items of the General Conditions and Supplementary General Conditions are repeated in other Sections of the Specifications, it is merely intended to qualify or to call particular attention to them. It is not intended that any other parts of the General Conditions and Supplementary General Conditions shall be assumed to be omitted if not repeated therein. This Section applies equally and specifically to all Contractors supplying labor and/or equipment and/or materials as required under each Section of this Division. Where conflicts exist between the drawings and the specifications or between this section of the specifications and other sections, the more stringent or higher cost option shall apply.

1.3 INTENT

A. It is the intent of the Specifications and Drawings to call for finished work, tested and ready for operation.

B. Any apparatus, appliance, material or work not shown on drawings but mentioned in the specifications, or vice versa, or any incidental accessories necessary to make the work complete and perfect in all respects and ready for operation as determined by good trade practice even if not particularly specified, shall be furnished, delivered and installed under their respective Divisions without any additional expense to the Owner.

C. Minor details not usually shown or specified but necessary for proper installation and operation shall be included in the work as though they were hereinafter shown or specified.

D. Work under each Section shall include giving written notice to the Owner and Engineer of any materials or apparatus believed inadequate or unsuitable; in violation of laws, ordinances, rules or regulations of authorities having jurisdiction; and any necessary items of work omitted. In the absence of such written notice, it is mutually agreed that work under each Section includes the cost of all required items for the accepted, satisfactory functioning of the entire system without extra compensation.

1.4 DEFINITIONS

A. "Approved equal" also known as "alternative" mean any product which in the opinion of the Engineer is equal in quality, arrangement, appearance, and performance to the product specified.

B. Directed: Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean "directed by the Engineer," "requested by the Engineer," and similar phrases.

C. "Finished" refers to all rooms and areas to be specified to receive architectural treatment as indicated on the drawings. All rooms and areas not covered, including underground tunnels and areas above ceilings shall be considered not finished, unless otherwise noted.

D. "Furnish" or "supply" shall mean purchase, deliver to, and off-load at the job site, ready to be installed including where appropriate all necessary interim storage and protection.

E. No Exceptions Taken – reviewed and determined to be in general conformance with contract documents.

F. Indicated: The term "indicated" refers to graphic representations, notes, or schedules on the Drawings, other paragraphs or schedules in the Specifications, and similar requirements in the Contract Documents. Where terms such as "shown," "noted," "scheduled," and "specified" are used, it is to help the reader locate the reference; no limitation on location is intended.

G. "Install" shall mean set in place complete with all mounting facilities and connections as necessary ready for normal use or service.

H. "Lead Free" shall mean not more than .25% in the wetted surface area.

I. "Product" shall mean any item of equipment, material, fixture, apparatus, appliance or accessory installed under this Division.

J. "Provide" shall mean furnish (or supply) and install as necessary.

K. Regulation: The term "Regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

L. Remove: The term “remove” means “to disconnect from its present position, remove from the premises and to dispose of in a legal manner.”

M. Special Warranties: The term “Special Warranties” are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

N. Standard Product Warranties: The term “Standard Product Warranties” are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

O. “Subcontractor” means specifically the subcontractor working under this Division. Other Contractors are specifically designated “Fire Protection Subcontractor”, “General Contractor” and so on. Note: Take care to ascertain limits of responsibility for connecting equipment which requires connections by two or more trades.

P. Substitutions: Requests for changes in products, materials, equipment, and methods of construction proposed by the Contractor are considered requests for "substitutions."

Q. “Wiring” shall mean cable assembly, raceway, conductors, fittings and any other necessary accessories to make a complete wiring system.

1.5 DRAWINGS

A. Drawings are diagrammatic and indicate the general arrangement of systems and work included in the Contract. Consult the Architectural Drawings and Details for exact location of fixtures and equipment; where same are not definitely located, obtain this information from the Architect. (Do not scale the drawings)

B. Work under each Section shall closely follow Drawings in layout of work; check Drawings of other Divisions to verify spaces in which work will be installed. Maintain maximum headroom; where space conditions appear inadequate, Owner and Engineer shall be notified before proceeding with installations.

C. The Owner may, without extra charge, make reasonable modifications in the layout as needed to prevent conflict with work of other trades and/or for proper execution of the work.

D. Where variances occur between the Drawings and Specifications or within either of the Documents, the item or arrangement of better quality, shall be included in the Contract price. The Owner and Engineer shall decide on the item and the manner in which the work shall be installed.

1.6 SURVEYS AND MEASUREMENTS

A. The Contractor shall base all measurements, both horizontal and vertical, from established bench marks. All work shall agree with these established lines and levels. Verify all measurements at the site and check the correctness of same as related to the work.

B. Should the Contractor discover any discrepancies between actual measurements and those indicated which prevent following good practice or which interfere with the intent of the Drawings and Specifications, the Engineer will be notified and work will not proceed until instructions from the Engineer are received.

1.7 CODES AND STANDARDS

A. Reference Standard Compliance
   1. Where equipment or materials are specified to conform to industry and technical society reference standards of the organizations such as American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), National Electrical Manufacturers Association (NEMA), and Underwriters Laboratories Inc. (UL), submit proof of such compliance. The label or listing by the specified organization will be acceptable evidence of compliance.
   2. Independent Testing Organization Certificate: In lieu of the label or listing indicated above, submit a certificate from an independent testing organization, competent to perform testing, and approved by the Engineer. The certificate shall state that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard.

B. The Following Codes and Standards listed below apply to all Fire Protection work. Wherever Codes and/or Standards are mentioned in these Specifications, the latest applicable edition or revision shall be followed:
Building Code Including all Supplements
Fire Safety Code Including all Supplements
Construction Standards and Guidelines
Building Standards Guidelines – Compliance for High Performance Buildings
The International Building Code
The International Mechanical Code
The International Fire Protection Code
The International Energy Conservation Code
NFPA 13, Standard for Installation of Sprinkler Systems
NFPA 70, the National Electrical Code
NFPA 101, the Life Safety Code
ASHRAE 90.1 and International Energy Conservation Code

C. The following Standards shall be used where referenced by the following abbreviations:
AIA American Institute of Architects

ANSI	American National Standards Institute
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASPE	American Society of Plumbing Engineers
ASTM	American Society of Testing and Materials
AWS	American Welding Society
CISPI	Cast Iron Soil Pipe Institute
EJMA	Expansion Joint Manufacturing Association
EPA	Environmental Protection Agency
FM	Factory Mutual
FSSC	Federal Specification
HIS	Hydraulic Institute Standards
IEEE	Institute of Electrical and Electronics Engineers
IRI	Industrial Risk Insurers
ISO	Insurance Services Office
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NSC	National Safety Council
OSHA	Occupational Safety and Health Administration
UL	Underwriters' Laboratories

D. All materials furnished and all work installed shall comply with the rules and recommendations of the NFPA, the requirements of the local utility companies, the recommendations of the fire insurance rating organization having jurisdiction and the requirements of all Governmental departments having jurisdiction.

E. The Contractor shall include in the work, without extra cost to the Owner, any labor, materials, services, apparatus and Drawings in order to comply with all applicable laws, ordinances, rules and regulations, whether shown on Drawings and/or specified or not.

1.8 PERMITS AND FEES

A. The Contractor shall give all necessary notices, obtain all permits; and pay all Government and State sales taxes and fees where applicable, and other costs, including utility connections or extensions in connection with the work, file all necessary Drawings, prepare all documents and obtain all necessary approvals of all Governmental and State departments having jurisdiction, obtain all required certificates of inspection for his work, and deliver a copy to the Owner and Engineer before request for acceptance and final payment for the work.

1.9 EQUIPMENT SUBSTITUTIONS

A. Certain manufacturers of material, apparatus or appliances are indicated in the drawings and specifications for this project. These items have been used as the basis of design, and

as a convenience in fixing the minimum standard of workmanship, finish and design that is required. If the Contractors uses an "approved equal" alternative to the basis of design, and if the features of that alternative have an impact on other components of the Project, the Contractor shall include the necessary adjustments in those components, whether for architectural, structural, mechanical, electrical, fire protection, or any other elements, plus any adjustments for difference in performance.

B. Where one name only is used and is followed by the words "or approved equal", the Contractor must use the item named or he is required to apply for a substitution. Where one name only is used, the Contractor must use that item named.

C. Where no specific make of material, apparatus or appliance is mentioned, any first-class product made by a reputable manufacturer may be submitted for Architect and Engineer review.

D. Where the Contractor proposes to use an item that is different from the basis of design in the Drawings and specifications, and that will require the redesign of the structure, partitions, foundations, piping, wiring or any other component of the mechanical, plumbing, electrical, or architectural layout, the Contractor shall provide the necessary redesign of those components.

E. Where the Contractor proposes to deviate (provide an equivalent or request for substitution) from the basis of design scheduled equipment or materials as hereinafter specified or shown on the drawings, they are required to submit a requested for substitution in writing. The Contractor shall state in their request whether it is a substitution, equivalent or a non approved equivalent to that specified and the amount of credit or extra cost involved. A copy of said request shall be included in the Base Bid with manufacturer's equipment cuts. The Base Bid shall be based on using the materials and equipment as specified with no exceptions.

F. If an alternative or substitute item results in a difference in quantity and arrangement of piping, ductwork, valves, pumps, insulation, wiring, conduit, and equipment from that specified or indicated on the Drawings, the Contractor shall furnish and install any such additional equipment required by the system, at no additional cost to the Owner including any costs added to other trades due to the equivalent change from the basis of design detailed in the drawings or included within the specifications.

G. .Equipment, material or devices submitted for review as an "equivalent" shall meet the following requirements:

1. The equivalent shall have the same construction features such as, but not limited to:
    a. Material thickness, gauge, weight, density, etc.
    b. Welded, riveted, bolted, etc., construction
    c. Finish, undercoating, corrosion protection
2. The equivalent shall perform with the same or better operating efficiency.

3. The equivalent shall be locally represented by the manufacturer for service, parts and technical information.
4. The equivalent shall bear the same labels of performance certification as is applicable to the specified item, such as UL or NEMA labels.

H. Equipment, material or devices submitted for review as a "substitution" shall meet the following requirements:
1. Substitution Request Submittal: Requests for substitution will be considered if received in writing 14 days before the bid date. Requests received later than 14 days before the bid date may be considered or rejected at the discretion of the Engineer/Owner. Once the Contractor submits a complete request for substitution as determined by the engineer, the engineer reserves the right to request the time necessary to evaluate the request for substitution and review it with the Owner.
2. Submit three (3) copies of each request for substitution for consideration.
3. Identify the product, or the fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:
    a. Product Data, including Drawings and descriptions of products, fabrication and installation procedures.
    b. Samples, where applicable or requested.
    c. A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements such as size, weight, durability, performance and visual effect.
    d. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Owner and separate Contractors that will become necessary to accommodate the proposed substitution.
    e. A statement indicating the substitution's effect on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.
    f. Cost information, including a proposal of the net change, if any in the Contract Sum.
    g. Certification by the Contractor that the substitution proposed is equal-to or better in every significant respect to that required by the Contract Documents, and that it will perform adequately in the application indicated. Include the Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of the failure of the substitution to perform adequately.
    h. Engineer's Action: Within one week of receipt of the request for substitution, the Engineer will notify the Contractor of acceptance or rejection of the proposed substitution. If a decision on use of a proposed

substitute cannot be made or obtained within the time allocated, use the product specified by name. Acceptance of a product substitution will be in the form of an Addendum.

i. Other Conditions: The Contractor's substitution request will be received and considered by the Engineer when one or more of the following conditions are satisfied, as determined by the Engineer; otherwise requests will be returned without action except to record noncompliance with these requirements.

1) The request is directly related to an "or equal" clause or similar language in the Contract Documents.

2) The specified product or method of construction cannot be provided within the Contract Time. The request will not be considered if the product or method cannot be provided as a result of failure to pursue the Work promptly or coordinate activities properly.

3) A substantial advantage is offered the Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear. Additional responsibilities for the Owner may include additional compensation to the Engineer for redesign and evaluation services, increased cost of other construction by the Owner or separate Contractors, and similar considerations.

1.10 SUBMITTAL PROCEDURES

A. Provide Submittals in accordance with the requirements of Division 01 and as indicated in the following.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that require sequential activity.
2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination. The Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing: Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for resubmittals.

1. Allow two weeks for initial review. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. The Engineer will promptly advise the Contractor when a submittal being processed must be delayed for coordination.

2. If an intermediate submittal is necessary, process the same as the initial submittal.
3. Allow two weeks for reprocessing each submittal.
4. No extension of Contract Time will be authorized because of failure to transmit submittals to the Engineer sufficiently in advance of the Work to permit processing.

D. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block. Submittals shall be arranged in order of specification sections.
1. Include the following information on the label for processing and recording action taken.
   a. Project name.
   b. Date.
   c. Name and address of Engineer.
   d. Name and address of Contractor.
   e. Name and address of subcontractor.
   f. Name and address of supplier.
   g. Name of manufacturer.
   h. Number, title and paragraph of appropriate Specification Section.
   i. Drawing number and detail references, as appropriate.

E. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to Engineer using a transmittal form. Submittals received from sources other than the Contractor will be returned without action. On the transmittal, record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.

F. Except for submittals for record, information or similar purposes, the Engineer will review each submittal, mark to indicate action taken, and return promptly. Compliance with specified characteristics is the Contractor's responsibility.

G. Action Stamp: The Engineer will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, to indicate the action taken.

1.11 SHOP DRAWINGS

A. Submit neatly prepared information, drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered Shop Drawings.

B. The Contractor shall submit for review detailed shop drawings of all equipment and material specified in each section and coordinated sprinkler layouts. No material or

equipment may be delivered to the job site or installed until the Contractor has received shop drawings for the particular material or equipment which have been properly reviewed. Shop drawings shall be submitted within 60 days after award of Contract before any material or equipment is purchased. The Contractor shall submit for review copies of all shop drawings to be incorporated in the Fire Protection Contract. Refer to Division 01 for the quantity of copies required for submission. Where quantities are not specified, provide seven (7) copies for review.

C. Provide shop drawings for all devices specified under equipment specifications for all systems. Shop drawings shall include manufacturers' names, catalog numbers, cuts, diagrams, dimensions, identification of products and materials included, compliance with specified standards, notation of coordination requirements, notation of dimensions established by field measurement and other such descriptive data as may be required to identify and accept the equipment. A complete list in each category (example: all fixtures), of all shop drawings, performance cuts, material lists, etc., shall be submitted to the Engineer at one time. No consideration will be given to a partial shop drawing submittal.

D. When a submittal could involve more than one trade, e.g., valves, piping, etc., the submitted shall be separated by traded involved, ie. HVAC, plumbing, electrical, etc.

E. Where multiple quantities or types of equipment are being submitted, provide a cover sheet (with a list of contents) on the submittal identifying the equipment or material being submitted.

F. The Contractor shall furnish all necessary templates, patterns, etc., for installation work and for the purpose of making adjoining work conform; furnish setting plans and shop details to other trades as required.

G. "No Exception Taken" rendered on shop drawings shall not be considered as a guarantee of measurements or building conditions. Where drawings are reviewed, review does not mean that drawings have been checked in detail; said approval does not in any way relieve the Contractor from his responsibility or necessity of furnishing material or performing work as required by the Contract Drawings and Specifications. Verify available space prior to submitting shop drawings. Review of shop drawings shall not apply to quantity of material.

H. After shop drawings have been reviewed, with no exceptions taken, no further changes will be allowed without the written consent of the Engineer.

I. Shop drawing submittal sheets which may show items that are not being furnished shall have those items crossed off to clearly indicate which items will be furnished.

J. Bidders shall not rely on any verbal clarification of the Drawings and/or Specifications. Any questions shall be referred to the Engineer in writing at least five (5) working days prior to Bidding to allow for issuance of an Addendum.

K. Do not use Shop Drawings without an appropriate final stamp indicating action taken in connection with construction.

1.12 COORDINATION DRAWINGS

A. Prepare coordination drawings drawn in the latest AutoCAD version in accordance with Division 01 to a minimum scale of 1/4"=1'-0" detailing major elements, components, and systems of fire protection equipment and materials in relationship with other systems, installations, and building components. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:

1. The Contractor shall indicate the proposed locations of piping, conduit, ductwork, equipment, and materials. Include the following:
    a. Clearances for servicing and maintaining equipment and space for equipment disassembly required for periodic maintenance.
    b. Equipment connections and support details.
    c. Exterior wall and foundation penetrations.
    d. Fire-rated wall and floor penetrations.
    e. Sizes and locations of required concrete pads and bases.

B. Indicate scheduling, sequencing, movement, and positioning of large equipment into the building during construction.

C. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.

D. Prepare reflected ceiling plans to coordinate and integrate installations, air outlets and inlets, light fixtures, communication systems components, sprinklers, and other ceiling-mounted items.

E. The Contractor and each subcontractor shall sign and date each coordination drawing prior to submission.

F. Work shall not be performed until coordination drawings have been approved by the architect and engineer.

G. Electronic copies of the MEP floor plans are available to use as a basis for preparing coordination drawings and can be provided by the Engineer. The cost for these floor plans is a lump sum fee of $ 1,000.00. If the Contractor elects to obtain the Engineers electronic files an Electronic Drawing File Release Form must be submitted with payment. This form must be signed by the Contractor, Owner, and Architect. Upon receipt of a signed copy of the Electronic Drawing File Release Form, and payment, the Engineer will provide copies of the electronic files for the Contractor's use. A copy of the Electronic Drawing File Release Form is appended to the end of this specification section

1.13 COORDINATION WITH OTHER DIVISIONS

A. All work shall be carried out in conjunction with other trades and full cooperation shall be given in order that all work may proceed with a minimum of delay and interference. Particular emphasis is placed on timely installation of major apparatus and furnishing other Contractors, especially the Contractor or Construction Manager, with information as to openings, chases, sleeves, bases, inserts, equipment locations, panels, etc., required by other trades.

B. The Contractors are required to examine all of the Project Drawings and mutually arrange work so as to avoid interference with the work of other trades. In general, ductwork, HVAC piping, sprinkler piping and drainage lines take precedence over water, gas and electrical conduits. The Engineer shall make final decisions regarding the arrangement of work which cannot be agreed upon by the Contractors.

C. Where the work of the Contractor will be installed in close proximity to or will interfere with work of other trades, the Contractors will cooperate in working out space conditions to make a satisfactory adjustment.

D. If the work under a Section is installed before coordinating with other Divisions or Sections or so as to cause interference with work of other Sections, the necessary changes to correct the condition shall be made by the Contractor causing the interference without extra charge to the Owner.

1.14 WORKMANSHIP

A. Service Support: The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

B. Modification of References: In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears.

C. The Contractor shall furnish the services of an experienced superintendent who shall be constantly in charge of the installation of the work together with all skilled workmen, fitters, metal workers, welders, helpers and laborers required to unload, transfer, erect, connect, adjust, start, operate and test each system.

D. Unless otherwise specifically indicated on the Drawings or Specifications, all equipment and materials shall be installed with the acceptance of the Engineer and in accordance with the recommendations of the manufacturer. This includes the performance of such tests as the manufacturer recommends.

E. All labor for installation of Fire Protection systems shall be performed by experienced, skilled tradesmen under the supervision of a licensed journeyman foreman. All work shall be of a quality consistent with good trade practice and shall be installed in a neat, workmanlike manner. The Engineer reserves the right to reject any work which, in his opinion, has been installed in a substandard, dangerous or unserviceable manner. The Contractor shall replace said work in a satisfactory manner at no extra cost to the Owner.

1.15 TEMPORARY UTILITIES

A. General: Provide new materials and equipment; if acceptable to the Engineer, undamaged previously used materials in serviceable condition may be used. Provide materials suitable for the use intended.

B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities, or permit them to interfere with progress. Do not allow hazardous dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.

C. First Aid Supplies: Comply with governing regulations.

D. Fire Extinguishers: Provide hand-carried, portable UL-rated, class "A" fire extinguishers for temporary offices and similar spaces. In other locations provide hand-carried, portable, UL-rated, class "ABC" dry chemical extinguishers, or a combination of extinguishers of NFPA recommended classes for the exposures.

E. Utilities: Engage the appropriate local utility company to install temporary service or connect to existing service. Where the company provides only part of the service, provide the remainder with matching, compatible materials and equipment; comply with the company's recommendations.

1. Use Charges: Cost or use charges for temporary facilities are not chargeable to the Owner or Engineer, and will not be accepted as a basis of claims for a Change Order.

F. Water Service: Install water service and distribution piping of sizes and pressures adequate for construction until permanent water service is in use.

G. Environmental Protection: Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result. Avoid use of tools and equipment which produce harmful noise. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near the site.

H. Termination and Removal: Unless the Engineer requires that it be maintained longer, remove each temporary facility when the need has ended, or when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if

necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces and replace construction that cannot be satisfactorily repaired. Materials and facilities that constitute temporary facilities are property of the Contractor. The Owner reserves the right to take possession of Project identification signs.

1.16 PROJECT PHASING

A. Work under each Section shall include all necessary temporary connections, equipment, piping, heating, temperature control work, fire stopping, water heaters, labor, and material as necessary to accommodate the phasing of Construction as developed by the General Contractor or Construction Manager and approved by the Owner. All existing systems that pass-thru an area of the building shall remain operational during all phases of construction. No extra compensation shall be granted the Contractor for work required to maintain existing systems operational or to accommodate the construction phasing of the project.

1.17 PROTECTION OF MATERIALS AND EQUIPMENT

A. Work under each Section shall include protecting the work and material of all other Sections from damage by work or workmen and shall include making good all damage thus caused.

B. The Contractor shall be responsible for work and equipment until the facility has been accepted by the Owner. Protect work against theft, injury or damage and carefully store material and equipment received on site which is not immediately installed. Close open ends of work with temporary covers or plugs during construction to prevent entry of foreign material.

C. Work under each Section includes receiving, unloading, uncrating, storing, protecting, setting in place and completely connecting equipment supplied under each Section. Work under each Section shall also include exercising special care in handling and protecting equipment and fixtures, and shall include the cost of replacing any of the equipment and fixtures which are missing or damaged.

D. Equipment and material stored on the job site shall be protected from the weather, vehicles, dirt and/or damage by workmen or machinery. Insure that all electrical or absorbent equipment or material is protected from moisture during storage.

1.18 ADJUSTING AND TESTING

A. After all the equipment and accessories to be furnished are in place, they shall be put in final adjustment and subjected to such operating tests so as to assure the Engineer that they are in proper adjustment and in satisfactory, permanent operating condition.

B. Where requested by the Engineer, a factory-trained service representative shall inspect the installation and assist in the initial startup and adjustment to the equipment. The period of these services shall be for such time as necessary to secure proper installation and adjustments. After the equipment is placed in permanent operation, the service representative shall supervise the initial operation of the equipment and instruct personnel responsible for operation and maintenance of the equipment. The service representative shall notify the Contractor in writing that the equipment was installed according to manufacturer's recommendations and is operating as intended by the manufacturer.

1.19 CLEANING

A. The Contractor shall thoroughly clean and flush all piping and equipment of all foreign substances, oils, burrs, solder, flux, etc., inside and out before being placed in operation.

B. If any part of a system should be stopped or damaged by any foreign matter after being placed in operation, the system shall be disconnected, cleaned and reconnected wherever necessary to locate and/or remove obstructions. Any work damaged in the course of removing obstructions shall be repaired or replaced when the system is reconnected at no additional cost to the Owner.

C. During the course of construction, all pipes shall be capped in an acceptable manner to insure adequate protection against the entrance of foreign matter.

D. Upon completion of all work under the Contract, the Contractor shall remove from the premises all rubbish, debris and excess materials left over from his work. Any oil or grease stains on floor areas caused by the Contractor shall be removed and floor areas left clean.

E. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.
   1. Remove labels that are not permanent labels.
   2. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compound and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
   3. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films and similar foreign substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.
   4. Wipe surfaces of fire protection equipment. Remove excess lubrication and other substances.

F. Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove and dispose of ALL waste materials, packaging material,

skids etc. from the site and dispose of in a lawful manner in accordance with municipal, state and federal regulations.

G. Where extra materials of value remaining after completion of associated Work have become the Owner's property, arrange for disposition of these materials as directed.

1.20 OPERATING AND MAINTENANCE

A. Upon completion of all work and tests, the Contractor shall furnish the necessary skilled labor and helpers for operating his system and equipment for a period specified under each applicable Section of this Division. During this period, he shall fully instruct the Owner or the Owner's representative in the operation, adjustment and maintenance of all equipment furnished. The Contractor shall give at least seven (7) days notice to the Owner and the Engineer in advance of this period.

B. The Contractor shall include the maintenance schedule for the principal items of equipment furnished under this Division.

C. The Contractor shall physically demonstrate procedures for all routine maintenance of all equipment furnished under each respective Section to assure accessibility to all devices.

D. An authorized manufacturer's representative shall attest in writing that the equipment has been properly installed prior to startup of any major equipment. The following equipment will require this inspection: pumps; controls, water heaters, compressors, boilers etc. These letters shall be bound into the operating and maintenance books.

E. Refer to individual trade Sections for any other particular requirements related to operating instructions.

F. Demonstration shall be recorded on (2) USB Flash drives and be turned over to the Owner.

1.21 OPERATING AND MAINTENANCE MANUALS

A. Prepare operating and maintenance manuals in accordance with the requirements of Division 01 and as follows. The Contractor shall prepare six (6) copies of a complete maintenance and operating instructions manual, bound in booklet form. Organize operating and maintenance data into suitable sets of manageable size. Bind properly indexed data in individual heavy-duty 3-ring vinyl-covered binders, with pocket folders for folded sheet information and designation partitions with identification tabs. Mark appropriate identification on front and spine of each binder.

B. Manual shall include the following:
   1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
   2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
   3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
   4. Servicing and operating instructions including lubrication charts and schedules.
   5. Emergency and safety instructions.
   6. Spare parts list.
   7. Copies of warranties.
   8. Wiring diagrams.
   9. Recommended "turn around" cycles.
   10. Inspection procedures.
   11. Approved Shop Drawings and Product Data.
   12. Equipment Start-up Reports.

C. Include in the manual, a tabulated equipment schedule for all equipment. Schedule shall include pertinent data such as: make, model number, serial number, voltage, normal operating current, belt size, bearing number, etc. Schedule shall include maintenance to be done and frequency.

D. Maintenance and instruction manuals shall be submitted to the Owner at the same time as the seven (7) day notice is given prior to the instruction period.

1.22 ACCEPTANCES

A. The equipment, materials, workmanship, design and arrangement of all work installed under the Fire Protection Sections shall be subject to the review of the Engineer.

B. Within 30 days after the awarding of a Contract, the Fire Protection Contractor shall submit to the Engineer, for review, a list of manufacturers of equipment proposed for the work under the Fire Protection Sections. The intent to use the exact manufacturers and models specified does not relieve the Contractor of the responsibility of submitting such a list.

C. If extensive or unacceptable delivery time is expected on a particular item of equipment specified, the Contractor shall notify the Owner and Engineer, in writing, within 30 days of award of the Contract. In such instances, equipment substitutions may be made pending acceptance by the Engineer or the Owner’s representative.

D. Where any specific material, process or method of construction or manufactured article is specified by reference to the catalog number of a manufacturer, the Specifications are to be used as a guide and are not intended to take precedence over the basic duty and performance specified or noted on the Drawings. In all cases, the Fire Protection Contractor shall verify the duty specified with the specific characteristics of the equipment offered for review. Equipment characteristics are to be used as mandatory requirements where the Contractor proposes to use an acceptable equivalent.

E. If material or equipment is installed before it is reviewed and/or approved, the Contractor shall be liable for its removal and replacement at no extra charge to the Owner if, in the opinion of the Engineer, the material or equipment does not meet the intent of, or standard of quality implied by, the Drawings and Specifications.

F. Failure on the part of the Engineer to reject shop drawings or to reject work in progress shall not be interpreted as acceptance of work not in conformance with the Drawings and/or Specifications. Work not in conformance with the Drawings and/or Specifications shall be corrected whenever it is discovered.

1.23 RECORD DRAWINGS

A. General: Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the Engineer's reference during normal working hours.

B. Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark whichever drawing is most capable of showing conditions fully and accurately. Give particular attention to concealed elements that would be difficult to measure and record at a later date. Items to be indicated include but are not limited to:

1. Dimensional change
2. Revision to drawing detail
3. Location and depth of underground utility
4. Revision to pipe routing
5. Revision to electrical circuitry
6. Actual equipment location
7. Pipe size and routing
8. Location of concealed internal utility
9. Changes made by Change Order
10. Details not on original Contract Drawing
11. Information on concealed elements which would be difficult to identify or measure later

C. Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the Work.

D. Mark new information that is important to the Owner, but was not shown on Contract Drawings or Shop Drawings.

E. Note related Change Order numbers where applicable.

F. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each set.

G. These shall be clearly marked for Record Drawings on a clean set of reproducible paper copies at the completion of the work and turned over to the Owner.

H. Final record documents shall be prepared in the latest AutoCAD version and USB of all drawings and a clean set of reproducible paper copies shall be turned over to the Owner at the completion of the work.

1.24 WARRANTIES AND BONDS

A. The following general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturers standard warranties on products and special warranties are to be included:
   1. General close-out requirements included in Division 01.
   2. Specific requirements for warranties for the Work and products and installation that are specified to be warranted, are included in the individual Sections of Divisions-02 through -50.
   3. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.

B. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

C. Separate Prime Contracts: Each prime Contractor is responsible for warranties related to its own Contract.

1.25 WARRANTY REQUIREMENTS

A. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.

B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

D. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, right and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.

E. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.

F. The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

G. Submit written warranties to the Engineer prior to the date certified for Substantial Completion. If the Engineer's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Engineer.

H. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Engineer within fifteen days of completion of that designated portion of the Work.

I. When a special warranty is required to be executed by the Contractor, or the Contractor and a subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner through the Engineer for approval prior to final execution.
   1. Refer to individual Sections of Divisions-02 through -50 for specific content requirements, and particular requirements for submittal of special warranties.

J. Form of Submittal: At Final Completion compile two copies of each required warranty and bond properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.

K. Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2" by 11" paper.

1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address and telephone number of the installer.
2. Identify each binder on the front and the spine with the typed or printed title "WARRANTIES AND BONDS," the Project title or name, and the name of the Contractor.
3. When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

1.26 GUARANTEES

A. The Contractor shall guarantee all material and workmanship under these Specifications and the Contract for a period of one (1) year from the date of final acceptance by Owner. During this guarantee period, all defects developing through faulty equipment, materials or workmanship shall be corrected or replaced immediately by this Contractor without expense to the Owner. Such repairs or replacements shall be made to the Engineer's satisfaction.

B. Contractor shall provide name, address, and phone number of all contractors and subcontractors and associated equipment they provided.

1.27 PROJECT CLOSE-OUT

A. Contractor shall submit annual maintenance proposal to the Architect/Engineer for review and approval as part of the close out documents.

B. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents in accordance with Division 01.

C. Deliver tools, spare parts, extra stock, and similar items.

D. Complete start-up testing of systems, including measuring and documenting all required startup checklist requirements documented in installation and maintenance instructions by the equipment manufacturer, and instruction of the Owner's operating and maintenance personnel. Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.

E. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.

F. Field Observation Procedures: On receipt of a request for an Engineers Field Observation, the Engineer will advise the Contractor of unfulfilled requirements. The Engineer will advise the Contractor of construction that must be completed or corrected before the certificate will be issued.

1. The Engineer will repeat the Field Observation when requested and assured that the Work has been substantially completed.
2. Results of the completed list of unfulfilled items will form the basis of requirements for final acceptance.

END OF SECTION

Electronic Drawing File Release Form

DELIVERY OF ELECTRONIC FILES FOR: _____

Project Name

In accepting and utilizing any drawings or other data on any form of electronic media generated and provided by the Design Professional, the Contractor covenants and agrees that all such drawings and data are instruments of service of the Design Professional, who shall be deemed the author of the drawings and data, and shall retain all common law, statutory law and other rights, including copyrights.

The Contractor further agrees not to use these drawings and data, in whole or in part, for any purpose or project other than the project which is the subject of this Agreement. The Client agrees to waive all claims against the Design Professional resulting in any way from any unauthorized changes or reuse of the drawings and data for any other project by anyone other than the Design Professional.

In addition, the Contractor agrees, to the fullest extent permitted by law, to indemnify and hold the Design Professional harmless from any damage, liability or cost, including reasonable attorneys' fees and costs of defense, arising from any changes made by anyone other than the Design Professional or from any reuse of the drawings and data without the prior written consent of the Design Professional.

Under no circumstances shall transfer of the drawings and other instruments of service on electronic media for use by the Client be deemed a sale by the Design Professional, and the Design Professional makes no warranties, either express or implied, of merchantability and fitness for any particular purpose.

_____ _____

Contractor's Signature Date

_____

Company - Title

_____ _____

Architects' Signature Date

_____

Firm - Title

_____ _____

Owner's Signature Date

_____

Company - Title

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SECTION 21 0433 - HEAT TRACING FOR FIRE SUPPRESSTION PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Self-regulating freeze protection electric heating cable for fire suppression piping.

B. Controls.

C. Connection kits.

D. Accessories.

1.2 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Division 21 – Fire Suppression

C. Division 26 – Electrical

1.3 REFERENCE STANDARDS (follow the most currently adopted amended version)

A. Canadian Standards Association
   1. CSA C22.2 NO. 130 – Requirements for Electrical Resistance Trace Heating and Heating Device Sets.

B. Institute of Electrical and Electronics Engineers
   1. IEEE 515.1 – Standard for the Testing, Design, Installation, and Maintenance of Electrical Resistance Trace Heating for Commercial Applications.

C. National Fire Protection Association
   1. NFPA 13 – Standard for the Installation of Sprinkler Systems.
   2. NFPA 13D – Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings.
   3. NFPA 13R – Standard for the Installation of Sprinkler Systems in Low Rise Residential Occupancies.
   4. NFPA 14 – Standard for the Installation of Standpipe and Hose Systems.
   5. NFPA 70 – National Electric Code (NEC).

D. Underwriters Laboratories Inc.
   1. UL 508 – Standard for Industrial Control Equipment
   2. UL 515A - Outline of Investigation for Electrical Resistance Tracing Heating and Associated Controls for use in Sprinkler and Standpipe Systems
   3. UL864 – Standard for Control Units and Accessories for Fire Alarm Systems

4. UL 1053 – Standard for Safety Ground-Fault Sensing and Relaying Equipment

1.4 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

B. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

C. Coordinate the work with other trades to provide ground fault protection for electric heat tracing circuits as required by NFPA 70.

D. Coordinate the work with other trades to provide circuit breaker ratings suitable for installed circuit lengths.

1.5 SUBMITTALS

A. See Division 01 - Administrative Requirements, for submittal procedures.

B. Product Data: For each type of product.
   1. Include the following:
      a. Heating cable data sheet.
      b. Fire sprinkler freeze protection design guide.
      c. System installation and operation manual.
      d. System installation details.
      e. Connection kits and accessories data sheet.
      f. Controller data sheet.
      g. Controller wiring diagram.
   2. Include rated capacities, operating characteristics, and furnished specialties and accessories.
   3. Schedule heating capacity, length of cable, and electrical power requirement for each electric heating cable required.
   4. Include heat loss calculations for each pipe including pipe and insulation characteristics, heat loss, and watts per foot supplied by the heating cable.

C. Shop Drawings: For electric heating cable.
   1. Include plans, elevations, sections, and attachment details.
   2. Include diagrams for power, signal, and control wiring.
   3. Manufacturer to produce detailed design as described below.

D. Testing Instructions and Reporting Form: Provide documentation for use in preinstallation testing of heat-tracing system.

E. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation. Delegated design submittals include:

1. Heat Trace Circuit Layout Drawings, including:
   a. Location/Identification of area to be traced.
   b. Heater circuit number.
   c. Electrical load.
   d. Heater catalog numbers.
   e. Heater termination points.
   f. Start-up temperature.
   g. Location of all components.
   h. Material list and quantities of all components.
   i. Heating cable layout.
2. Heat Trace Isometric, including:
   a. Location of line.
   b. Piping line numbers.
   c. Valves, pumps, flanges, fittings, instruments.
   d. Heat loss and heater output.
   e. Electrical load.
   f. Heater catalog number.
   g. Heater termination points.
   h. Design parameters.
   i. Insulation type and thickness.
   j. Position of all components.
   k. Material schedule listing all components and quantities used.
   l. Panel ID number.
3. Pipe Freeze Protection Detail Drawings: Project-specific Detail Drawings, including details showing:
   a. Installation and positioning of all components.
   b. Proper amounts of tracing for valves, pumps, flanges, fittings, instruments, etc.
   c. Junction box layouts.
4. Control Panel Drawings: Drawings for each control panel shall include the following:
   a. Physical arrangement and structural detail drawings.
   b. Complete power and control wiring diagrams showing all internal wiring connections for electrical and instrument components in each control panel. All wires, terminals, and devices shall be numbered and tagged in accordance with system elementary diagrams.
5. System Wiring Diagram: Project-specific drawings (if applicable) including:
   a. Interconnect of all major components.
   b. Assignment of circuiting.
   c. Connection of circuit wiring in terminal blocks.
   d. Connection of sensor wiring.
   e. Connection of external alarm wiring.
6. Controller Setpoint Schedule (if applicable) showing the following:
   a. Circuit addresses.
   b. Circuit set points.
   c. Circuit alarms and settings.

1.6 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For electric heating cables to include in operation and maintenance manuals.

B. Testing: Completed system test report.

C. Project Record Documents: Record actual locations of electric heat tracing lines and controls.

D. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications:
   1. Company specializing in manufacturing products specified in this section with minimum three years of experience.
   2. ISO-09001 registered.
   3. Provide products compliant with UL 515A, CSA 22.2 No 130-16, and IEEE 515.1 requirements.

B. Installer Qualifications:
   1. Company specializing in performing work of the type specified and with at least three years of experience.
   2. Electrical connections to be performed by licensed electrician.

C. Certification: Entire system (Heating Cable, Connection Kits and Controls) shall be UL listed and marked for freeze protection of standpipes, mains, and branch fire sprinkler piping.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying the following:
   1. Product and Manufacturer.
   2. Length/Quantity.
   3. Lot Number.
   4. Installation and Operation Manual.
   5. Material Safety Data Sheet (MSDS).

B. Store heating cable in clean, dry location with a temperature range of 0 to 140 deg F.

C. Protect heating cable ends from moisture ingress until final termination of the heating cable is complete.

1.10 WARRANTY

A. See Division 01 - Closeout Submittals, for additional warranty requirements.

B. Provide two-year manufacturer warranty for cables, connection kits, accessories, and controls.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Complete pipe freeze protection system for insulated pipes exposed to the risk of freezing. System consists of a self-regulating heating cable, connection kits, accessories, and energy-efficient control and monitoring controller. The heating cable shall have a polyolefin jacket for aboveground fire sprinkler piping, including standpipes, mains, and branch fire sprinkler piping,

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage manufacturer to design complete and functional heat-tracing system as required by Project documents.

2.3 SELF-REGULATING FREEZE PROTECTION ELECTRIC HEATING CABLE

A. Manufacturers:
1. Chromalox CPR Self-Regulating, Heating Cable
2. RAYCHEM, a brand of nVent; XL-Trace Edge Pipe Freeze/Flow Maintenance
3. Thermon Manufacturing Company; FLX Series.
4. Substitutions: See Division 01 - Product Requirements.

B. Source Limitations: Obtain heat-tracing components and controllers from single manufacturer. To ensure system integrity and meet warranty requirements, only components and controllers supplied by cable manufacturer are to be used.

C. Comply with UL 515A, CSA 22.2 No 130-16, and IEEE 515.1 requirements.

D. Provide products listed, classified, and labeled by FM and UL specifically for use in fire suppression systems.

E. Heating Element:
1. Provide pair of parallel No.16 tinned or nickel coated stranded copper bus wires embedded in cross-linked conductive polymer core with varying heat output in response to temperature along its length.
2. Terminations: Waterproof, factory assembled, non-heating leads with connector at one end and watertight seal at opposite end.
3. Cable shall be capable of crossing over itself without overheating.

F. Electrical Insulating Jacket: Flame retardant polyolefin.

G. Ground Braid: Tinned-copper braid. Minimum 70 percent for ground path and mechanical ruggedness.

H. Outer Jacket: Provide polyolefin outer jacket with UV inhibitor. Outer jacket to be printed with the following information:
1. Name of manufacturer, trademark, or other recognized symbol of identification.
2. Catalog number, reference number, or model.
3. Month and year of manufacture, date coding, applicable serial number, or equivalent.
4. Agency listing or approval.
5. Applicable environmental or area use requirements, such as NEMA 4, Type 4, IP ratings, and hazardous (classified) location markings including temperature rating.
6. Any applicable warning/caution statements such as "WARNING: De-energize circuit before removing cover.

I. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

J. Capacities and Characteristics:
a. Refer to drawings.

K. Electrical Characteristics:
1. Refer to drawings for electrical information.
2. Refer to Division 26.

2.4 CONTROLS

A. Single-Circuit Local Digital Controller.

1. Control self-regulating heating cable via programmable single-circuit controller to provide adjustable maintained temperatures in the range of 32 to 104 deg F.
2. Provide one controller for each heat-tracing circuit, [as indicated on heat-tracing schedule].
3. Controller must have two temperature sensor inputs.
4. Controller shall be able to use two temperature sensors per circuit with ability to assign any of them for high temperature cut-out function.
5. External thermostatic control devices for high limit or high temperature cutout are not permitted.
6. Controller shall include user-defined filters for temperature alarms to avoid nuisance alarms.
7. Controller shall have ground fault current sensing and relaying equipment that complies with UL1053 requirements.
8. External ground fault devices are not permitted.
9. Controller shall have user-defined settings for ground fault alarm and trip levels.
10. Controller shall store at least 100 past events/alarms to aid maintenance.
11. Controller Capabilities:
a. Supply Voltage: 100 to 277 V ac.

b. Enclosure: Type 12 (indoor use).
c. Operating Temperature Range: 32 to 104 deg F (0 to 40 deg C).
d. Display: 5" touchscreen color display.
e. Control: DP mechanical relay type.
f. Control Algorithms: [Ambient On/Off. Line Sensing.] [Proportional Ambient Sensing Control for energy savings.]
g. Monitoring:
    1) Temperature:
        a) Low Alarm: -40 to 190 deg F.
        b) High Alarm: 32 to 190 deg F.
    2) Ground Fault:
        a) Alarm Range: 20 to 200 mA.
        b) Trip Range: 20 to 200 mA.
    3) Current:
        a) Low Alarm: Built-in 0.25 A
    4) Autocycle Diagnostics: Built-in (Daily)
h. Temperature Sensor Inputs:
    1) Quantity: Two.
    2) Type: Thermistor 2 K-Ohm / 77°F (25°C), 2-wire.
i. Alarm Outputs:
    1) AC Relay: Single pole double throw relay, volt-free; maximum switching capacity (resistive load only) 1 A/24 VDC, 1A/24 VAC.
    2) Outputs: Normally Open or Normally Closed.
j. Stored Parameters:
    1) Time stamp.
    2) Warning.
    3) Event description.
    4) Device ID.
    5) Language.
    6) Country.
    7) Control mode.
    8) Cable type.
    9) Supply voltage.
    10) Sensor 1 and 2.
    11) Setpoint.
    12) Deadband.
    13) Minimum expected ambient temperature.
    14) Power adjustment.
    15) GFCI current.
    16) Load current.
    17) Board temperature.
k. Alarm Conditions:
    1) Low and High temperature.
    2) Ground fault alarm and trip.
    3) RTD failure.
l. Communications:
    1) Alarm relay to fire alarm panel
m. Temperature Sensors: [Select One]

1) Fire sprinkler control – Contractor shall use one sensor provided for ambient temperature sensing and second sensor provided for pipe temperature sensing for each 465 controller.
2) Contractor shall be able to program the controller to keep the heating cable powered in case of temperature sensor failure.

12. Approval: The complete heat trace system (heating cable, connection kits, and controller) shall be UL Listed (VGNJ) and marked for intended use of freeze protection of standpipes, mains and branch fire sprinkler piping.

B. Multi-Circuit Distributed Digital Control System:
1. Control and monitor pipe freeze protection for fire protection circuits using a centralized control system with distributed power and control modules.
2. Multi-application: Distributed digital control system shall be pre-programmed with parameters to provide concurrent control for heating cables used for pipe freeze protection, flow maintenance, fire sprinkler piping, hot water temperature maintenance, surface snow melting, roof and gutter de-icing, freezer frost heave prevention, and floor heating applications.
3. Central User Interface Terminal: For all programming.
   a. Certification: CSA Certified.
   b. Terminal Display: Color LCD display with password protection to prevent unauthorized system access.
   c. Capable of communicating with up to 52 power control panels, where each panel can control up to five circuits and accept up to five temperature inputs.
   d. Digital control system shall be capable of assigning up to four temperature inputs per heat-tracing circuit.
   e. Capable of communicating with up to 16 remote monitoring modules, where each module can accept up to eight temperature inputs.
   f. USB port to allow for quick and easy software update.
   g. Programmable Alarm Contacts: Three, including an alarm light on enclosure cover.
   h. Provide separate offline software tool to allow users to preprogram digital control system and transfer program via USB drive or Ethernet.
   i. Enclosure: NEMA 4 for indoor or outdoor locations.
4. Power Control Panels:
   a. Certification: UL Listed.
   b. Enclosure: NEMA 4/12 enclosure approved for nonhazardous indoor and outdoor locations.
   c. Provide ground-fault and line current sensing alarming, switching and temperature inputs for five heat-tracing circuits.
   d. Contactors: Five 3-pole, 30A contactors, EMR type.
   e. Capable of operating at 120 to 277 V.
   f. Alarm contact, including alarm light on panel cover.
5. Digital Controller:
   a. Integrated adjustable GFPD (10 to 200 mA).
   b. Capable of being configured for On/Off, ambient sensing, PASC, and timed duty cycle control modes based on application. PASC control

proportionally energizes power to heating cable to minimize energy based on ambient sensed conditions.

c. Upon communication loss with user interface terminal, panels shall control with last downloaded set point.

d. Include built-in self-test feature to verify proper functionality of heating cable system.

e. BMS Communication Protocol: By [Modbus] [BACnet or Metasys N2].

f. Variables monitored by digital controller and reported back to BMS include:

1) Temperature.

2) Ground-fault.

3) Current draw.

4) Power consumption.

5) Associated alarms.

6. Approval: Complete heat trace system (heating cable, connection kits, and controller) shall be listed by a Nationally Recognized Testing Laboratory (NRTL), and marked for intended freeze protection of standpipes, mains, and branch fire sprinkler piping.

2.5 CONNECTION KITS

A. Provide power connection, splice/tee, and end seal kits compatible with the heating cable and without requiring cutting of the cable core to expose bus wires.

B. Provide with NEMA 4X rating for prevention of corrosion and water ingress.

C. Provide UV stabilized components.

D. Certification: UL Listed.

2.6 ACCESSORIES

A. Cable Installation Accessories: Fiberglass tape, cable ties, connection kits, and end seals all furnished by manufacturer or as recommended in writing by manufacturer.

B. Identification: Provide and install "Electric Heat Traced" labels on exterior of pipe insulation every 10 ft. on opposite sides of pipe, and on all splices, tees, crosses, and power connections for the entire length of heat traced piping.

C. Thermal Pipe Insulation:

1. Pipes to be thermally insulated in accordance with manufacturer's written requirements.

2. Thermal Insulation: Flame retardant, [closed-cell] [or] [fiberglass] with waterproof covering.

D. Control Accessories

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine surfaces and substrates to receive electric heating cables for compliance with requirements for installation tolerances and other conditions affecting performance.
   1. Prior to installation of heating cable system, verify that all piping, to be heat traced has passed all hydrostatic/pressure test and is signed off by plumbing inspector.
   2. Ensure surfaces and pipes in contact with electric heating cables are free of burrs and sharp protrusions.

B. Preinstallation Testing:
   1. Prior to installation of heating cable on piping, an insulation resistance test shall be performed by installing contractor to ensure integrity of heating cable as describe in installation and maintenance manual.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

D. Verify fire suppression piping sizing, lengths and sprigs are as shown on the drawings.

E. Verify required power is available, in proper location, and ready for use.

F. Installer to verify that all fire sprinkler piping has been properly prepared for heating cable installation. Notify General Contractor or Construction Manager if unsatisfactory conditions exist prior to installation of Fire Suppression Piping Heat Tracing System.

3.2 PREPARATION

A. Clean exposed surfaces prior to installation.

B. Prepare surfaces using approved methods as recommended by manufacturer.

C. Protect all heating cable ends from moisture ingress until cable is terminated with end seals.

3.3 INSTALLATION

A. Install electric heating cable where indicated and in accordance with IEEE 515.1, UL515A, NFPA 70 and NFPA 13.

B. Install in accordance with manufacturer's written installation instructions.

C. Comply with applicable local building codes and requirements of authorities having jurisdiction.

D. All heat-tracing components including power connections, splices, tees, and crosses or end seal, must be installed above grade and protected from abuse or damage. In accordance with NEC and CEC, electrical connections are not permitted to be installed below grade.

E. In the field, all heating cables shall be tested with a Megohmmeter at the following intervals.
   1. When received at Project site before installation.
   2. After installation, but before insulation is installed.
   3. After insulation is installed.
   4. At final commissioning prior to being energized.
   5. Insulation resistance must exceed 1,000 megohms at 2,500 V dc.
   6. All results must meet manufacturer's specification.

F. Install electric heating cables after piping has passed all hydrostatic pressure testing and before insulation is installed.

G. Install insulation over piping with electric cables in accordance with Section 210700 – Fire-Suppression Systems Insulation.

H. Identification:
   1. After thermal insulation installation, apply external pipeline decals to indicate presence of the heat tape to thermal insulation cladding at intervals not to exceed 20 ft including cladding over each valve or other equipment that may require maintenance.
   2. Refer to Division 21.

I. Set field-adjustable switches and circuit-breaker trip ranges.

3.4 CONNECTIONS

A. Ground equipment in accordance with Division 26.

B. Connect wiring in accordance with Division 26.

C. Connect heat-tracing controls to fire-alarm system in accordance with NFPA 13. Comply with requirements in Division 28.

3.5 FIELD QUALITY CONTROL

A. See Division 01 - Quality Requirements, for additional requirements.

B. Manufacturer's Field Service: Initial start-up and field testing (commissioning) of system shall be performed by factory technician in accordance with Owner's requirements.
   1. System shall be commissioned in accordance with manufacturer’s installation and operation manual.
   2. Field Visits to be scheduled at the following intervals:
      a. Preinstallation training.
      b. Final electrical insulation resistance (megger) testing of heating cable after insulation has been installed.
      c. Final commissioning including controller programming (if applicable).
   3. Technician to verify:
      a. Controller parameters are set to the application requirements.

b. Controller alarm contacts are properly connected to the BMS, as applicable.

C. Controls:
1. Verify control parameters are set to the application requirements.
2. Verify factory provided digital temperature controller is correctly configured with the building automation system.

D. Submit written test and inspection reports showing values measured on each test for each cable.

3.6 CLOSEOUT ACTIVITIES

A. See Division 01 - General Requirements.

B. Demonstrate operation of controls.

3.7 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

SECTION 21 0516 - EXPANSION FITTINGS AND LOOPS FOR FIRE-SUPPRESSION PIPING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section "Summary."

1.2 SUMMARY

A. Section Includes:
1. Flexible pipe connectors.
2. Expansion joints.
3. Expansion compensators.
4. Pipe alignment guides.
5. Swivel joints.
6. Pipe anchors.

B. Related Sections:
1. 21 - Common Work Results for Fire Suppression: Product and installation requirements for piping used in fire protection systems.
2. Section 21 - Vibration and Seismic Controls for Fire-Suppression Piping and Equipment: Product and installation requirements for vibration isolators used in piping systems.
3. Section 21 – Wet-Pipe Sprinkler System.

1.3 REFERENCES

A. American Society of Mechanical Engineers:
1. ASME B31.9 - Building Services Piping.
2. ASME Section IX - Boiler and Pressure Vessel Code - Welding and Brazing Qualifications.

B. American Welding Society:
1. AWS D1.1 - Structural Welding Code - Steel.

1.4 DESIGN REQUIREMENTS

A. Provide structural work and equipment required for expansion and contraction of piping. Verify anchors, guides, and expansion joints provide and adequately protect system.

1.5 SUBMITTALS

A. Section 01 - Submittal Procedures: Requirements for submittals.

B. Shop Drawings: Indicate layout of piping systems, including flexible connectors, expansion joints, expansion compensators, loops, offsets and swing joints. Submit shop drawings sealed by a registered professional engineer.

C. Product Data:
1. Flexible Pipe Connectors: Indicate maximum temperature and pressure rating, face-to-face length, live length, hose wall thickness, hose convolutions per foot and per assembly, fundamental frequency of assembly, braid structure, and total number of wires in braid.
2. Expansion Joints: Indicate maximum temperature and pressure rating, and maximum expansion compensation.

D. Design Data: Indicate criteria and show calculations. Submit calculations sealed by a registered professional engineer.

E. Manufacturer's Installation Instructions: Submit special procedures.

F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

G. Welders' Certificate: Include welders' certification of compliance with ASME Section IX. AWS D1.1.

H. Manufacturer's Field Reports: Indicate results of inspection by manufacturer's representative.

1.6 CLOSEOUT SUBMITTALS

A. Section 01 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of flexible pipe connectors, expansion joints, anchors, and guides.

C. Operation and Maintenance Data: Submit adjustment instructions.

1.7 QUALITY ASSURANCE

A. Perform Work in accordance with ASME B31.9 code for installation of piping systems and ASME Section IX for welding materials and procedures.

B. Perform Work in accordance with the Connecticut State Building Code and Connecticut State Fire Safety Code.

1.8 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

C. Design expansion compensating system under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of Connecticut.

1.9 PRE-INSTALLATION MEETINGS

A. Section 01 - Administrative Requirements: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Section 01 - Product Requirements: Product storage and handling requirements.

B. Accept expansion joints on site in factory packing with shipping bars and positioning devices intact. Inspect for damage.

C. Protect equipment from exposure by leaving factory coverings, pipe end protection, and packaging in place until installation.

1.11 WARRANTY

A. Section 01 - Execution and Closeout Requirements: Product warranties and product bonds.

B. Furnish one year manufacturer warranty for leak free performance of packed expansion joints.

1.12 EXTRA MATERIALS

A. Section 01 - Execution and Closeout Requirements: Spare parts and maintenance products.

B. Supply two 12 ounce containers of packing lubricant and cartridge style grease gun.

PART 2 PRODUCTS

2.1 FLEXIBLE PIPE CONNECTORS

A. Manufacturers:
   1. Mason.
   2. Metraflex.
   3. Vibration Eliminator.
   4. Substitutions: Section 01 - Product Requirements.
   5. Inner Hose: Carbon Steel.
   6. Exterior Sleeve: Double braided stainless steel.
   7. Pressure Rating: 125 psig WSP and 450 degrees F.

8. Joint: Flanged.
9. Size: Use pipe-sized units.
10. Maximum offset: 3/4 inch on each side of installed center line.

2.2 EXPANSION JOINTS

A. Manufacturers:
1. Metraflex.
2. Mason.
3. Vibration Elimination.
4. Substitutions: Section 01 60 00 - Product Requirements.
5. Pressure Rating: 200 psig WOG and 250 degrees F.
6. Maximum Compression: 1-3/4 inch.
7. Maximum Extension: 1/4 inch.
8. Joint: Flanged.
9. Size: Use pipe sized units
10. Application: Steel piping 3 inch and smaller.

2.3 ACCESSORIES

A. Manufacturers:
1. Metraflex.
2. Mason.
3. Vibration Elimination.
4. Substitutions: Section 01 60 00 - Product Requirements.

B. Pipe Alignment Guides: Two piece welded steel with enamel paint, bolted, with spider to fit standard pipe, frame with four mounting holes, clearance for minimum 1 inch thick insulation, minimum 3 inch travel.

C. Swivel Joints: Fabricated steel body, double ball bearing race, field lubricated, with rubber (Buna-N) o-ring seals.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install Work in accordance with ASME B31.9.

B. Install flexible pipe connectors on pipes connected to equipment supported by vibration isolation. Refer to Section 21. Provide line size flexible connectors.

C. Install flexible connectors at right angles to displacement. Install one end immediately adjacent to isolated equipment and anchor other end. Install in horizontal plane unless indicated otherwise.

D. Rigidly anchor pipe to building structure. Provide pipe guides to direct movement only along axis of pipe. Erect piping so strain and weight is not on cast connections or apparatus.

E. Provide support and anchors for controlling expansion and contraction of piping. Provide loops, pipe offsets, and swing joints, or expansion joints where required. Refer to Section 21 for pipe hanger installation requirements.

F. Provide grooved piping systems with minimum one joint per inch pipe diameter instead of flexible connector supported by vibration isolation. Grooved piping systems need not be anchored.

G. Provide expansion loops as required.

3.2 MANUFACTURER'S FIELD SERVICES

A. Section 01 - Quality Requirements: Manufacturers' field services.

B. Furnish inspection services by flexible pipe manufacturer's representative for final installation and certify installation is in accordance with manufacturer's recommendations and connectors are performing satisfactorily.

END OF SECTION

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SECTION 21 0533 - HEAT TRACING FOR PLUMBING PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Self-regulating freeze protection electric heating cable

B. Self-regulating hot water maintenance electric heating cable

C. Self-regulating grease waste flow maintenance heating cable

D. Cable outer jacket markings.

E. Connection kits.

F. Accessories.

G. Controls.

1.2 RELATED REQUIREMENTS

A. Section 220400 – General conditions for Plumbing Trades

B. Section 220500 – Common Work Results for Plumbing

C. Section 220700 - Plumbing Insulation.

D. Section 221005 - Plumbing Piping.

E. Section 223000 - Plumbing Piping Specialties.

F. Division 26 – Electrical

1.3 REFERENCE STANDARDS (follow the most currently adopted amended version)

A. IEEE 515.1 - IEEE Standard for the Testing, Design, Installation, and Maintenance of Electrical Resistance Trace Heating for Commercial Applications.

B. ITS (DIR) - Directory of Listed Products.

C. NFPA 70 - National Electrical Code.

D. FM Global:

E. Underwriters Laboratories Inc.: UL515 Electric Resistance Trace Heating for Commercial Applications

1.4 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

B. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

C. Coordinate the work with other trades to provide ground fault protection for electric heat tracing circuits as required by NFPA 70.

D. Coordinate the work with other trades to provide circuit breaker ratings suitable for installed circuit lengths.

1.5 SUBMITTALS

A. See Division 01 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for electric heat tracing.

C. Shop Drawings: Indicate electric heat tracing layout, electrical terminations, thermostats, controls, and branch circuit connections.

D. Manufacturer's Installation Instructions: Indicate installation instructions and recommendations.

E. Field Quality Control Submittals: Indicate test reports and inspection reports.

F. Project Record Documents: Record actual locations of electric heat tracing lines and thermostats.

G. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions of equipment and controls, maintenance and repair data, and parts listings.

H. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

C. Copies of Documents at Project Site: Maintain at the project site a copy of each referenced document that prescribes execution requirements.

1.7 WARRANTY

A. See Division 01 - Closeout Submittals, for additional warranty requirements.

B. Provide two-year manufacturer warranty for cables, connection kits, accessories, and controls.

PART 2 PRODUCTS

2.1 SELF-REGULATING FREEZE PROTECTION ELECTRIC HEATING CABLE

A. Manufacturers:
1. Chromalox, Inc; SRL Series
2. Raychem; XL-Trace Series
3. Thermon Manufacturing Company; BSX Series.
4. Substitutions: See Division 01 - Product Requirements.

B. Provide products listed, classified, and labeled by FM and UL, or testing firm acceptable to authorities having jurisdiction (AHJ).

C. Factory Rating and Testing: Comply with IEEE 515.1.

D. Heating Element:
1. Provide pair of parallel No.16 tinned or nickel coated stranded copper bus wires embedded in cross-linked conductive polymer core with varying heat output in response to temperature along its length.
2. Terminations: Waterproof, factory assembled, non-heating leads with connector at one end and watertight seal at opposite end.
3. Capable of crossing over itself without overheating.

E. Insulated Jacket: Flame retardant polyolefin.

F. Cable Cover: Provide tinned copper and polyolefin outer jacket with UV inhibitor.

G. Electrical Characteristics:
1. Refer to drawings for electrical information.
2. Refer to Division 26.

2.2 SELF-REGULATING HOT WATER MAINTENANCE ELECTRIC HEATING CABLE

A. Manufacturers:
1. Chromalox, Inc; HWM Series
2. Raychem; HWAT-R2 Series
3. Thermon Manufacturing Company; HSX Series.
4. Substitutions: See Division 01 - Product Requirements.

B. Provide products listed, classified, and labeled by FM and UL, or testing firm acceptable to authorities having jurisdiction (AHJ).

C. Factory Rating and Testing: Comply with IEEE 515.1.

D. Verify the operating and maximum system temperature for domestic hot water applications is compatible with the manufacturer's trace heater rating.

E. Insulated Jacket: Flame retardant fluoropolymer or polyolefin.

F. Cable Cover: Provide tinned copper and fluoropolymer or polyolefin outer jacket with UV inhibitor

G. Electrical Characteristics:
1. Refer to drawings for electrical information.
2. Refer to Division 26.

2.3 SELF-REGULATING GREASE WASTE FLOW MAINTENANCE HEATING CABLE

A. Manufacturers:
1. Chromalox; SRF Series
2. Thermon Manufacturing Company; BSX Series
3. Raychem; XL-Trace Series
4. Substitutions: See Division 01 - Product Requirements.

B. Provide products listed, classified, and labeled by FM and UL, or testing firm acceptable to authorities having jurisdiction (AHJ).

C. Factory Rating and Testing: Comply with IEEE 515.1.

D. Verify the operating and maximum system temperature needed for grease waste applications are compatible with the manufacturer's trace heater rating.

E. Cable Cover: Provide Tinned Copper braid and silicon or thermoplastic fluoropolymer outer jacket.

F. Electrical Characteristics:
1. Refer to drawings for electrical information.
2. Refer to Division 26.

2.4 CABLE OUTER JACKET MARKINGS

A. Name of manufacturer, trademark, or other recognized symbol of identification.

B. Catalog number, reference number, or model.

C. Month and year of manufacture, date coding, applicable serial number, or equivalent.

D. Agency listing or approval.

E. Applicable environmental or area use requirements, such as NEMA 4, Type 4, IP ratings, and hazardous (classified) location markings including temperature rating.

F. Any applicable warning/caution statements such as "WARNING: De-energize circuit before removing cover.

2.5 CONNECTION KITS

A. Provide power connection, splice/tee, and end seal kits compatible with the heating cable and without requiring cutting of the cable core to expose bus wires.

B. Provide with NEMA 4X rating for prevention of corrosion and water ingress.

C. Provide UV stabilized components.

2.6 ACCESSORIES

A. Provide Accessories As Indicated or As Required for Complete Installation, Including but Not Limited To:
1. High temperature, glass filament tape for attachment of heating cable to metal piping.
2. Aluminum self-adhesive tape for attachment of heating cable to plastic piping.
3. Heat-conductive putty.
4. Cable ties.
5. Silicone end seals and splice kits.
6. Installation clips.
7. Warning labels for attachment to exterior of piping insulation. Refer to Division 22.

2.7 CONTROLS

A. Pipe Mounted Thermostats:
1. Remote bulb unit with adjustable temperature range from 30 to 50 degrees F.
2. Snap-action, open-on-rise, single pole switch with minimum current rating adequate for the connected cable.
3. Remote bulb on capillary, resistance temperature device (RTD) or thermistor for direct sensing of pipe wall temperature.
4. Control Enclosure: Corrosion resistant and waterproof.

B. Provide minimum 30 ampere contactor to indicate operational status and on/off control.

C. Line sensing high-limit temperature control and high-limit alarm.

D. Programmable Controller:
1. Micro-processor based.
2. Capable of four separate schedules.
3. On/Off/Auto switch.
4. 365 day calendar with 20 programmable holidays.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that piping and equipment are ready to receive work.

B. Verify field measurements are as shown on shop drawings.

C. Verify required power is available, in proper location, and ready for use.

3.2 PREPARATION

A. Clean exposed surfaces prior to installation.

B. Prepare surfaces using approved methods as recommended by manufacturer.

3.3 INSTALLATION

A. Install in accordance with manufacturer's written installation instructions.

B. Comply with installation requirements of IEEE 515.1 and NFPA 70, Article 427.

C. Apply heating cable on pipe with fiberglass tape only after piping has successfully completed any required pressure testing.

D. Comply with applicable local building codes and requirements of authorities having jurisdiction.

E. Grounding: Refer to Division 26.

F. Identification:
   1. After thermal insulation installation, apply external pipeline decals to indicate presence of the thermal insulation cladding at intervals not to exceed 20 ft (6 m) including cladding over each valve or other equipment that may require maintenance.
   2. Refer to Division 22.

G. Equipment Wiring: Refer to Division 26.

H. Electrical Connections: Refer to Division 26.

3.4 FIELD QUALITY CONTROL

A. See Division 01 - Quality Requirements, for additional requirements.

B. Perform start-up by factory technician or factory representative as per Owner's requirements.

C. Field Testing and Inspections:
   1. Commission system in accordance with installation and operation manual.

2. Inspect for sources of water entry and proper sealing.
3. Inspect weather barrier to confirm that no sharp edges are contacting the trace heating.
4. Insulation Resistance: Greater than 20 megohms at a test voltage of 2500 VDC for polymer insulated trace heaters.
5. Test heating cable integrity with megohmmeter at the following intervals:
   a. Before installing the cable.
   b. After cable has been installed onto the piping.
   c. After installing the connection kits.
   d. After the installation of thermal insulation onto the piping.
   e. Prior to initial start-up (commissioning).
6. Measure voltage and current at each unit.
7. Controls:
   a. Verify control parameters are set to the application requirements.
   b. Verify factory provided digital temperature controller is correctly configured with the building automation system.
8. Submit written test report showing values measured on each test for each cable.

3.5 CLOSEOUT ACTIVITIES

A. See Division 01 - General Requirements.

B. Demonstrate operation of controls.

3.6 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

SECTION 21 0548 - VIBRATION AND SEISMIC CONTROLS FOR FIRE-SUPPRESSION PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Seismic restraints for fire protection piping and equipment.
2. Certification of seismic restraint designs and installation supervision.
3. Certification of seismic attachment of housekeeping pads.

B. Related Sections:
1. Division 03 - Cast-In-Place Concrete: Execution requirements for placement of isolators in floating floor slabs specified by this section and product requirements for concrete for placement by this section.
2. Division 07 - Joint Protection: Product requirements for joint sealers specified for placement by this section.
3. Section 21 – Common work results for Fire-Suppression.
4. Section 21 - Expansion Fittings and Loops for Fire-Suppression Piping: Product requirements for anchors and piping expansion compensation.
5. Section 23 – General Conditions for Mechanical Trades.

1.2 REFERENCES

A. National Fire Protection Association
1. NFPA 13 – Standard for the Installation of Sprinkler Systems
2. NFPA 20 – Standard for the Installation of Stationary Pumps for Fire Protection

1.3 PERFORMANCE REQUIREMENTS

A. Provide seismic restraints in accordance with the requirements of NFPA 13 and NFPA 20.

1.4 SUBMITTALS

A. Division 01 - Submittal Procedures: Submittal procedures.

B. Shop Drawings:
1. Submit fabrication details for equipment bases including dimensions, structural member sizes and support point locations.
2. Provide all details of suspension and support for ceiling suspended equipment.
3. Where walls, floors, slabs or supplementary steel work are used for seismic restraint locations, details of acceptable attachment methods for ducts, conduit and pipe must be included and approved before the condition is accepted for installation. Restraint manufacturers' submittals must include spacing, static loads and seismic loads at all attachment and support points.

4. Provide specific details of seismic restraints and anchors; include number, size and locations for each piece of equipment.

C. Product Data:
1. Catalog cuts or data sheets on specific restraints detailing compliance with the specification.
2. Detailed schedules of flexible and rigidly mounted equipment, showing seismic restraints by referencing numbered descriptive drawings.

D. Seismic Certification and Analysis:
1. Seismic restraint calculations must be provided for all connections of equipment to the structure. Calculations must be stamped by a registered professional engineer with at least five years of seismic design experience, licensed in the state of the job location.
2. All restraining devices shall have a preapproval number from California OSHPD or some other recognized government agency showing maximum restraint ratings. Preapprovals based on independent testing are preferred to preapprovals based on calculations. Where preapproved devices are not available, submittals based on independent testing are preferred. Calculations (including the combining of tensile and shear loadings) to support seismic restraint designs must be stamped by a registered professional engineer with at least five years of seismic design experience and licensed in the state of the job location. Testing and calculations must include both shear and tensile loads as well as one test or analysis at 45° to the weakest mode.
3. Analysis must indicate calculated dead loads, static seismic loads and capacity of materials utilized for connections to equipment and structure. Analysis must detail anchoring methods, bolt diameter, embedment and/or welded length.

E. Manufacturer's Responsibilities:
1. Provide installation instructions, drawings and trained field supervision to insure proper installation and performance.
2. Provide written certification that isolators meet or exceed specified requirements.

1.5 CLOSEOUT SUBMITTALS

A. Division 01 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of seismic restraints.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

C. Design application of seismic restraints under direct supervision of Professional Engineer experienced in design of this Work and licensed in the State where the Project is located.

1.7 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. All seismic restraints described in this section shall be the product of a single manufacturer

B. Provide products manufactured by one of the following:
   1. Mason Industries
   2. Vibration Eliminator
   3. Vibro-Acoustics Ltd.
   4. Metraflex Company
   5. Substitutions: Refer to Division 01

2.2 SEISMIC CABLE RESTRAINTS

A. Seismic Cable Restraints shall consist of galvanized steel aircraft cables sized to resist seismic loads with a minimum safety factor of two and arranged to provide all-directional restraint.

B. Cables must be prestretched to achieve a certified minimum modulus of elasticity.

C. Cable end connections shall be steel assemblies that swivel to final installation angle and utilize two clamping bolts to provide proper cable engagement.

D. Cables must not be allowed to bend across sharp edges.

E. Cable assemblies shall have an Anchorage Preapproval “OPA” Number from OSHPD in the State of California verifying the maximum certified load ratings.

F. Cable assemblies shall be type SCB at the ceiling and at the clevis bolt, SCBH between the hanger rod nut and the clevis or SCBV if clamped to a beam, all as manufactured by Mason Industries, Inc.

2.3 SEISMIC SOLID BRACES

A. Seismic solid braces shall consist of steel angles or channels to resist seismic loads with a minimum safety factor of 2 and arranged to provide all directional restraint.

B. Seismic solid brace end connectors shall be steel assemblies that swivel to the final installation angle and utilize two through bolts to provide proper attachment.

C. Seismic solid brace assembly shall have anchorage preapproval “OPA” number from OSHPD in the state of California verifying the maximum certified load ratings.

D. Solid seismic brace assemblies shall be type SSB, SSBS or SSRF as manufactured by Mason Industries, Inc.

2.4 SEISMIC ROD CLAMPS

A. Steel angles, sized to prevent buckling, shall be clamped to pipe or equipment rods utilizing a minimum of three ductile iron clamps at each restraint location when required. Welding of support rods is not acceptable.

B. Rod clamp assemblies shall have an Anchorage Preapproval "OPA" Number from OSHPD in the State of California.

C. Rod clamp assemblies shall be type SRC or UC as manufactured by Mason Industries, Inc.

2.5 CLEVIS CROSS BRACE

A. Pipe clevis cross bolt braces are required in all restraint locations. They shall be special purpose preformed channels deep enough to be held in place by bolts passing over the cross bolt.

B. Clevis cross braces shall have an Anchorage Preapproval "OPA" Number from OSHPD in the State of California.

C. Clevis cross brace shall be type CCB as manufactured by Mason Industries, Inc.

2.6 STUD WEDGE ANCHORS

A. Stud wedge anchors shall be manufactured from full diameter wire, not from undersized wire that is "rolled up" to create the thread.

B. The stud anchor shall also have a safety shoulder which fully supports the wedge ring under load.

C. The stud anchors shall have an evaluation report number from the I.C.B.O Evaluation Service, Inc. verifying its allowable loads.

D. Drill-in stud wedge anchors shall be type SAS as manufactured by Mason Industries, Inc.

2.7 FEMALE WEDGE ANCHORS

A. Female wedge anchors are preferred in floor locations so isolators or equipment can be slid into place after the anchors are installed.

B. Anchors shall be manufactured from full diameter wire, and shall have a safety shoulder to fully support the wedge ring under load.

C. Female wedge anchors shall have an evaluation report number from the I.C.B.O Evaluation Service, Inc. verifying to its allowable loads.

D. Drill-in female wedge anchors shall be type SAB as manufactured by Mason Industries, Inc.

2.8 STAINLESS STEEL HOSE

A. Flexible stainless steel hose shall have stainless steel braid and carbon steel fittings. Sizes 3" (75mm) and larger shall be flanged. Smaller sizes shall have male nipples. Minimum lengths shall be as tabulated:

Flanged

3" x 14" (75 x 350mm)	6" x 20" (150 x 500mm)	12" x 28" (300 x 700mm)
4" x 15" (100 x 375mm)	8" x 22" (200 x 550mm)	14" x 30" (350 x 750mm)
5" x 19" (125 x 475mm)	10" x 26" (250 x 650mm)	16" x 32" (400 x 800mm)
Male Nipples		
1/2" x 9" (12 x 225mm)	11/4" x 12" (32 x 300mm)	2" x 14" (50 x 350mm)
3/4" x 10" (19 x 250mm)	11/2" x 13" (38 x 325mm)	21/2" x 18" (64 x 450mm)
1" x 11" (25 x 275mm)		

B. Hoses shall be installed on the equipment side of the shut-off valves horizontally and parallel to the equipment shafts wherever possible.

C. Hoses shall be type BSS as manufactured by Mason Industries, Inc.

2.9 HOUSEKEEPING PAD ANCHORS

A. Housekeeping pad anchors shall consist of a ductile iron casting that is tapered and hexagonal, smaller at its base than at its top.

B. The upper portion shall have holes for rebar to pass through.

C. The anchor shall be continuously threaded from top to bottom for the attachment of soleplates.

D. Housekeeping pad anchors shall be attached to the structural slab using a stud wedge anchor.

E. Housekeeping pad anchors shall be type HPA and stud wedge anchor shall be type SAS both as manufactured by Mason Industries, Inc.

2.10 FLEXIBLE EXPANSION LOOP

A. All sprinkler pipe passing through or crossing building seismic joints, shall contain a flexible expansion loop, designed for seismic movement.

B. Flexible loops shall impart no thrust loads to building structure.

C. Loops shall be located at, or near, the building seismic joint. Seismic bracing shall not pass through building seismic joint and shall not connect or tie together different sides or

parts of building structure. Refer to architectural drawings for locations of building seismic joints.

D. Flexible loops shall be capable of movement in the X, Y, and Z planes.

E. All flexible loop connections to sprinkler piping shall be installed, inspected, and tested in accordance with current NFPA-13 standards.

F. Flexible loops shall consist of two flexible sections of hose and braid, two 90 degree elbows, and 180 degree return. Loops shall include a factory supplied, center support nut located at the bottom of the 180 degree return, and a drain/air release plug. Materials of construction and end fitting type shall be consistent with pipe material and equipment/pipe connection fittings.

G. Alternatively, the flexible loop shall consist of two flexible sections of hose and braid, two 45 degree elbows, and 90 degree return. Loops shall include a factory supplied, center support nut located at the bottom of the 90 degree return, and a drain/air release plug. Materials of construction and end fitting type shall be consistent with pipe material and equipment/pipe connection fittings

H. Flexible expansion/seismic loops to be Metraloop Fireloop or Metraloop Firevoop as manufactured by The Metraflex Company, Chicago, IL.

I. Provide seismic breakaway hangers where recommended by the flexible expansion loop manufacturer. Seismic breakaway hanger shall be by the same manufacturer as the flexible expansion loop.

PART 3 EXECUTION

3.1 EXAMINATION

A. Division 01 - Administrative Requirements: Coordination and project conditions.

B. Verify equipment and piping is installed before work in this section is started.

3.2 INSTALLATION

A. All seismic restraint systems must be installed in strict accordance with the manufacturers written instructions and all certified submittal data.

B. Installation of seismic restraints must not cause any change of position of equipment or piping resulting in stresses or misalignment.

C. Bring to the architects/engineers attention any discrepancies between the specifications and the field conditions or changes required due to specific equipment selection, prior to installation. Corrective work necessitated by discrepancies after installation shall be at the responsible contractor’s expense.

D. Correct, at no additional cost, all installations which are deemed defective in workmanship and materials at the contractor's expense.

E. Overstressing of the building structure must not occur because of overhead support of equipment. Contractor must submit loads to the structural engineer of record for approval. Generally bracing may occur from:
   1. Flanges of structural beams.
   2. Upper truss cords in bar joist construction.
   3. Cast in place inserts or wedge type drill-in concrete anchors.

F. Seismic cable restraints shall be installed slightly slack to avoid short circuiting the isolated suspended equipment, piping or conduit.

G. Seismic cable assemblies are installed taut on non-isolated systems. Seismic solid braces may be used in place of cables on rigidly attached systems only.

H. At locations where seismic cable restraints or seismic solid braces are located, the support rods must be braced when necessary to accept compressive loads.

I. At all locations where seismic cable restraints or seismic solid braces are attached to pipe clevis's, the clevis cross bolt must be reinforced with a preformed heavy gauge channel cross brace.

J. Drill-in concrete anchors for ceiling and wall installation shall be stud wedge anchors or female wedge anchors for floor mounted equipment.

K. All fire protection piping shall be braced in accordance with NFPA 13 and 14.

END OF SECTION

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SECTION 21 1313 - WET-PIPE SPRINKLER SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes wet-pipe sprinkler system, system design, installation, and certification.

B. Related Sections:
1. Section 21 - Common Work Results for Fire Suppression: Product and execution requirements for pipe, fittings, valves, hangers, supports, identification and painting for placement by this section.
2. Section 21 – Expansion Fittings and Loops for Fire-Suppression Equipment.
3. Section 21 - Vibration and Seismic Controls for Fire-Suppression Piping and Equipment: Product and installation requirements for vibration isolators used in piping systems.
4. Section 21 – Fire Pumps.
5. Section 22 – General Conditions for Fire Suppression Trades
6. Section 26 - Equipment Wiring Connections: Execution requirements for electric connections to equipment specified by this section.

1.2 REFERENCES

A. National Fire Protection Association:
1. NFPA 13 - Installation of Sprinkler Systems.
2. NFPA 14 - Standard for the Installation of Standpipe and Hose Systems.
3. NFPA 15 - Standard for Water Spray Fixed Systems for Fire Protection.
4. NFPA 24 - Installation of Private Fire Service Mains and Their Appurtenances.

B. Factory Mutual:
1. FM - Factory Mutual Approval Guide.

C. Underwritters Laboratory:
1. UL - Fire Resistance Directory.

1.3 SYSTEM DESCRIPTION

A. Provide a wet pipe system hydraulically designed in accordance with NFPA 13 and all requirements of the local Authority Having Jurisdiction.

B. System to provide coverage for entire building.

C. Provide system to NFPA Standard occupancy requirements as noted on the drawings.

D. Hydraulic data and water supply information shall be as noted on the drawings.

E. Interface system with building fire alarm system.

F. The sprinkler locations and piping arrangements indicated on the contract documents are diagrammatic. It is the responsibility of the contractor to fully coordinate sprinkler and piping locations with all other trades.

G. Sprinkler locations indicated on the Contract Documents indicate sprinkler coverage utilizing standard coverage sprinklers maximum 225 square feet per sprinkler for light hazard and 130 square feet per sprinkler for ordinary hazard. Extended coverage sprinklers shall not be installed in any locations unless specifically indicated on the Contract Document drawings.

H. All sprinklers installed in a light hazard classification occupancy shall be a listed quick response type.

I. Provide fire department connections as indicated on Drawings.

1.4 SUBMITTALS

A. Division 01 – General Requirements: Submittal procedures.

B. Where the terms “authorities having jurisdiction” is used, within this Specification, it is intended to include the Insurance Underwriter and all regulatory agencies having vested interest in this project.

C. Shop Drawings:
1. Provide fire protections shop drawings drawn to a minimum scale of ¼”=1’-0”. Shop drawings shall be in accordance with the requirements of NFPA 13. Indicate pipe materials used, joining methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.
2. Provide hydraulic calculations, detailed pipe layout, hangers and supports, components and accessories. Indicate system controls.
3. All sprinkler drawings and calculations shall bear the seal of a Professional Engineer licensed in the State where the project is located. Seal and signature shall not be copied and shall be provided as an original on drawings and each calculation.
4. Sprinklers shall be as shown on drawings and submittals and shall be specifically identified with the applicable style or series designation as published in the appropriate agency listing or approval. Trade names or other abbreviated designations are not permitted.

D. Product Data: Provide data on sprinklers, valves, and specialties, including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.

E. After successful review by the Engineer, submit sprinkler layout shop drawings, product data, and hydraulic calculations to authority having jurisdiction, Fire Marshall, and Owner's insurance underwriter for approval. Submit proof of approval to Architect/Engineer.

F. Grooved joint couplings and fittings shall be shown on shop drawings and product submittals and shall be specifically identified with the applicable Victaulic style or series designation.

G. Manufacturer's Certificate: Certify that system has been tested and meets or exceeds specified requirements and all code requirements.

1.5 CLOSEOUT SUBMITTALS

A. Division 01 – General Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of sprinklers and deviations of piping from drawings. Indicate drain and test locations.

C. Operation and Maintenance Data: Submit components of system, servicing requirements, record drawings, inspection data, replacement part numbers and availability, and location and numbers of service depot.

1.6 QUALITY ASSURANCE

A. Workmanship and Qualifications: All materials and equipment shall be installed in accordance with NFPA and all applicable local codes and ordinances. The Sprinkler Contractor shall be state licensed to install sprinkler systems. The Sprinkler Contractor shall make sure that all work and materials conform to the requirements set forth by this Specification. Fire protection equipment shall be installed to conform to NFPA as applicable, and devices used shall be listed and approved by Underwriters laboratories (UL) and/or Factory Mutual (FM).

B. Codes and Standards: All work shall be equal or superior to that required by codes, regulations, ordinances, and laws imposed by the jurisdictional authorities, including those of state codes, the State Fire Marshall, local ordinances and OSHA. Nothing in the Specifications permit violations of such directives, and where conflict occurs, the directive shall govern, except where superior work is specified or indicated.

C. In addition to complying with the above codes and regulations, comply with the requirements of the following:
1. NFPA Standard 13.
2. NFPA Standard 24.
3. State Building and Fire Codes.
4. Local Jurisdictional Authorities.

D. All grooved joint couplings, fittings, valves, and specialties shall be the products of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components.

E. Valves: Bear UL and/or FM label or marking. Provide manufacturer's name and pressure rating marked on valve body.

F. All items of similar class shall be the products of the same manufacturer. All valves, accessory items, etc., shall be from the same source.

G. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years experience.

H. Installer: Company specializing in performing work of this Section with minimum five years experience.

I. Design sprinkler system under direct supervision of a Professional Engineer experienced in design of this Work and licensed in the State where the project is located.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.8 PRE-INSTALLATION MEETINGS

A. Division 01 – General Requirements: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Section 01 - Product Requirements: Product storage and handling requirements.

B. Deliver and store products in shipping containers, with labeling in place.

C. All equipment, valves, gages and etc., shall be covered and protected during the execution of the work. All equipment and piping shall be protected from freezing. Labeling to remain in place.

D. All unloading, hauling, and handling of materials shall be the responsibility of the Sprinkler Contractor.

E. The Sprinkler Contractor can obtain information on available storage space on site from the Owner when making examination of the site.

1.10 WARRANTY

A. Division 01 – General Requirements: Product warranties and product bonds.

1.11 EXTRA MATERIALS

A. Division 01 – General Requirements: Spare parts and maintenance products.

B. Furnish extra sprinklers under provisions of NFPA 13.

C. Furnish suitable wrenches for each sprinkler type.

D. Provide metal storage cabinet adjacent to the sprinkler riser.

PART 2 PRODUCTS

2.1 SPRINKLERS

A. Manufacturers:
1. Viking.
2. Tyco.
3. Victaulic.
4. Grinnell Corp.
5. Reliable Sprinkler Corp.
6. Substitutions: Division 01 – General Requirements

B. All sprinklers shall be adjustable, glass bulb, automatic sprinklers with ½ inch orifice and 5.6 K-factor unless noted otherwise. Type of sprinkler head shall be as indicated on the plans and in accordance with the following.

C. Sprinkler bodies shall be die-cast brass, with hex shaped wrench boss integrally cast into the sprinkler body to reduce the risk of damage during installation.

D. Unless noted otherwise, ordinary temperature rated sprinkler heads shall be used throughout the building.

E. Where sprinklers will be installed in close proximity to heat sources and special locations, as identified in NFPA 13, temperature ratings shall be in accordance with the requirements of NFPA 13

F. Where plans call for extended coverage sprinkler heads coordinate coverage requirements with required pressure and K-factor.

G. Spare Sprinklers: The Sprinkler Contractor shall furnish spare automatic sprinklers in accordance with the requirements of NFPA for stock of extra sprinklers. The sprinklers shall be packed in a suitable container and shall be representative of, and in proportion to, the number of each type and temperature rating of the sprinklers installed. The Sprinkler Contractor shall furnish no less than two special sprinkler wrenches, or at least one wrench for each container or sprinkler box, whichever is greater.

H. In areas where sprinkler heads are subject to physical damage, provide sprinkler guard assembly over head, finish to match sprinkler finish. This shall include but not limited to the following locations.
1. Heads in elevator shafts.
2. Heads under lower rakes of stairways.
3. Heads in electrical rooms, boiler rooms and other mechanical rooms.
4. Heads installed 7'-0" or less above finished floors.
5. Heads in gymnasium/fitness center areas.

I. Sprinklers shall be in accordance with the schedule indicated on the plans.

2.2 BURIED PIPING

A. Ductile Iron Pipe: ANSI/AWWA C151, cement lined.
1. Fittings: ANSI/AWWA C110, standard thickness.
2. Joints: ANSI/AWWA C111, rubber gasket.

2.3 ABOVE GROUND PIPING

A. Steel Pipe: ASTM A53, ASTM A795 or ASTM A135; Schedule 40 steel. Schedule 10 steel pipe shall be allowed for pipe sizes 1 ¼" diameter and larger when roll grooved mechanical couplings are used.
1. Fittings:
a. Cast Iron Fittings: ANSI/ASME B16.1, flanges and flanged fittings; ANSI/ASME B16.4, screwed fittings.
b. Malleable Iron Fittings: ANSI/ASME B16.3, screwed Class 300 type. Threads shall conform to ANSI/ASTM A47.
c. Grooved Mechanical Fittings: ANSI A21.10/AWWA C-110 ductile iron; ASTM A536 Grade 65-45-12 ductile iron; ASTM A234 Grade WPB; or factory fabricated from carbon steel pipe conforming to ASTM A53; with grooves or shoulders designed to accept grooved end couplings. Fittings shall be of the same manufacturer as the adjoining couplings. Grooved Mechanical Couplings: ASTM A536 Grade 65-45-12, ductile iron housing, elastomer gasket with nuts and bolts to secure roll grooved pipe and fittings.

Fire Protection Service	Temperature Range	Gasket Recommendation
Dry Systems	Ambient	FlushSeal®, or EZ Style 009 design Grade EPDM, Type A
Freezer Applications	-40°F to 0°F	FlushSeal®, Grade L, Silicone
Water/Wet Systems	Ambient	C-Shape or EZ Style 009

1) Rigid Type Couplings: Housings cast with offsetting, angle-pattern bolt pads to provide rigidity and system support and hanging in accordance with NFPA-13.
a) 1-1/4" through 4": Factory assembled for direct stab installation without field disassembly. Victaulic Style 009 EZ.

b) 5" through 8": Victaulic FireLock™ Style 005.
c) 10" and larger: Victaulic Zero-Flex® Style 07.

2) Flexible Type Couplings: Use in locations where vibration attenuation and stress relief are required, and for seismic considerations in accordance with the manufacturer's instructions. Victaulic Style 75.

B. Copper Tubing: ASTM B75; ASTM B88; or ASTM B251; Type L , hard drawn, seamless.
1. Fittings:
a. ANSI/ASME B16.18, cast copper alloy pressure fittings, or ANSI/ASME B16.22, wrought copper and copper alloy solder joint pressure fittings.
2. Joints:
a. ASTM B32, solder, Grade 95TA.
b. Grooved Mechanical Couplings: ASTM A536 Grade 65-45-12, ductile iron housing, FlushSeal® or QuickVic elastomer gasket with nuts and bolts to secure roll grooved pipe and fittings. Housings cast with offsetting, angle-pattern bolt pads to provide rigidity, and manufactured to connect copper tubing and fittings without flaring. Victaulic Style 606 or Style 607 "QuickVic" stab-on couplings.

C. CPVC Pipe: ASTM F442/F442M, SDR 13.5.
1. Fittings: ASTM F438 schedule 40, or ASTM F439 schedule 80, CPVC.
2. Joints: ASTM F493, solvent weld.

2.4 OUTLET FITTINGS

A. Rubber-gasketed outlet fittings that are used on sprinkler systems shall meet the following requirements:
1. Be installed in accordance with the listing and manufacturer's installation instructions
2. Have all disks retrieved
3. Have smooth bores cut into the pipe, with all cutting residue removed
4. Not be modified

2.5 UNIONS AND DIELECTRIC CONNECTIONS

A. Unions for Pipe 2 Inches (50 mm) and Under:
1. Ferrous Piping: 150 psig (1034 kPa) malleable iron, threaded.
2. Copper Pipe: Bronze, soldered joints.

B. Dielectric Connections: Union, waterway fitting, or flange with water impervious isolation barrier; Victaulic Style 47 or Watts 3000 Series or approved equal.

2.6 PIPE HANGERS AND SUPPORTS

A. Conform to NFPA 13.

B. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron or Carbon steel, adjustable swivel, split ring.

C. Hangers for Pipe Sizes 2 inch and Over: Carbon steel, adjustable, clevis.

D. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.

E. Wall Support for Pipe Sizes to 3 inches: Cast iron hook.

F. Wall Support for Pipe Sizes 4 inches and Over: Welded steel bracket and wrought steel clamp.

G. Vertical Support: Steel riser clamp.

H. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

I. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

2.7 ALARM CHECK VALVES

A. Manufacturers:
1. Viking.
2. Tyco.
3. Victaulic.
4. Grinnell Corp.
5. Reliable Sprinkler Corp.
6. Substitutions: Division 01 – General Requirements.

B. Wet Pipe Alarm Valve:
1. Check type valve with Nitrile seat o-ring aluminum bronze clapper with EPDM seal to automatically actuate electrically and hydraulically operated alarms, with pressure retard chamber and variable pressure trim. Valve internal components shall be replaceable without removing valve from the installed position. Valve shall be Series 751 as manufactured by Victaulic Co or engineer approved equal.
2. Provide retard chamber as part of wet alarm valve trim to allow for pressure fluctuations. Retard chamber shall be Victaulic Series 752 or engineer approved equal by manufacturers listed above. Provide all other trim as recommended by the manufacturer.
3. Alarm check valve assembly shall allow discharge of one or more sprinklers to activate electric and hydraulic alarms.

2.8 SPRAY HEADS

A. Manufacturers:
1. Viking
2. Tyco
3. Grinnell Corp.
4. Reliable Sprinkler Corp.
5. Substitutions: Not Permitted.

B. Furnish materials in accordance with NFPA standards.

C. Product Description: Brass with solid cone discharge, 30 degrees of arc with blow-off dust cap.

2.9 FIRE HOSE CABINETS

A. Manufacturers:
1. Crocker.
2. Potter Roemer.
3. Allenco.
4. Substitutions: Division 01

B. Hose Cabinets:
1. Style: Recessed mounted unless otherwise indicated. Fire rated when installed in fire rated assemblies.
2. Tub: 18 gage thick steel, prepared for pipe and accessory rough in.
3. Door: 20 gage thick steel, with solid door panel, hinged, positive latch device.
4. Finish: Enameled, color as selected by Architect.

C. Hose: 1-1/2 inch diameter, 100 feet long, of latex lined, linen hose; mildew and rot-resistant.

D. Nozzle: Chrome plated brass; combination fog, straight stream, and adjustable shut-off.

2.10 VALVES

A. Manufacturers:
1. Kennedy.
2. Fairbanks.
3. Stockham.
4. Victaulic.
5. Nibco.
6. Substitutions: Division 01 – General Requirements.

B. Hose Station Valve: Angle type, brass with chrome plated finish, 1-1/2 inch nominal size with automatic ball drip.

C. Hose Connection Valve: Angle type; brass with chrome plated finish; 2-1/2 inch size, thread to match fire department hardware, 300 psi working pressure, with threaded cap and chain of chrome plated finish.

D. Pressure reducing Valve: Straight away type; brass with chrome plated finish with inner hydraulic controls. 1-1/2 inch size, fire department thread, 400 psi inlet pressure, with threaded cap and chain of chrome plated finish.

2.11 PIPING SPECIALTIES

A. Manufacturers:
1. Potter.
2. Potter-Roemer.
3. System Sensor.
4. Victaulic.
5. Viking.
6.

B. Electric Alarm: Electrically operated red enameled gong with pressure alarm switch, 120 volt with weatherproof back box.

C. Water Flow Switch: Vane type switch for mounting horizontal or vertical, with two form C contacts; rated 10 amp at 120 volt.

D. Valve Tamper Supervisory Switch: Two form C contacts; rated 10 amp at 120 volt. UL listed and FM approved. Up to 2" – Potter Model PCVS-1. Over 2" switch shall be Potter Model OSYSU-2.

E. Pressure Switch: ½ inch male pressure connection to alarm valve riser and actuated by any flow of water in excess of one sprinkler. Maximum pressure rating 175 psi, weather-proof with tamper resistant screws, rated 10 amps at 120 volt.

F. Pressure Gage: Rated for 300 psi use, 3-1/2" in diameter.

2.12 FIRE DEPARTMENT CONNECTION

A. Fire department connection shall be 2-1/2" x 2-1/2" x 4", polished brass, single clapper, pedestal mounted siamese type connection. Provide with polished brass identification plate.

B. Clapper design shall allow for one or both inlets to be pressurized during operation.

C. Provide polished brass cast aluminum alloy caps and chains for protection of the 2-1/2" inlets.

D. The fire department connection shall be constructed of cast brass with brass clapper, brass swivel couplings and a brass hinge pin. The words "AUTO SPKR" and "F.D. Conn" shall be cast in raised letters on the body.

E. Fire department connection threads shall match the local fire departments standard.

F. Drain: 3/4 inch automatic drip, install at low point after check valve, pipe to building exterior.

G. Label: "Standpipe - Fire Department Connection"..

PART 3 EXECUTION

3.1 PREPERATION

A. Coordinate work of this Section with other affected work.

B. Prepare piping connections to equipment with grooved joint couplings, flanges, or unions.

3.2 INSTALLATION

A. Install equipment in accordance with manufacturers instructions.

B. Install fire protection systems in accordance with NFPA 13 for sprinkler systems

C. Impairments to the existing water supplies shall be minimized. All work shall be complete before making the final connections to the existing water supplies. The Contractor shall notify the owners representative before impairing any fire protection equipment.

D. The Contractor shall maintain a clean and orderly site during the installation of the sprinkler system. Materials shall not be stored in the halls or other public areas.

E. Cutting, welding and other hot work shall not be permitted without permission from the building owner. Contractor shall provide a fire watch for one hour after all welding

F. The required tests shall be witnessed by the Fire Marshall, authority having jurisdiction, Owner's insurance underwriter and Architect/Engineer.

G. Provide reduced pressure backflow preventer assembly Double check valve assembly with detector check assembly sprinkler system water source connection. Install a drain line from the air gap fitting and terminate at the nearest floor drain. The backflow preventer shall be installed at a minimum height to allow installation of the air gap fitting, but shall not be installed at more than 5’0” above finished floor for maintenance.

H. Locate fire department connection with sufficient clearance from walls, obstructions, etc., to allow full swing of fire department wrench handle. Coordinate the exact location of the fire department connection with the local fire officials. Installation shall conform to the local fire officials requirements.

I. Installation of Alarm Valves: Install a test line from the test connection to the exterior of the building. Provide gate valves at each line. Minimum alarm valve riser shall be 4-inch.

J. Locate outside alarm gong on building wall as indicated

K. Center heads in two directions in ceiling tile and provide piping offsets as required.

L. Sprinkler Bulb protector must remain in place until the sprinkler is completely installed. Remove the bulb protector by hand after installation and before the system is placed in service. (Do not use any tools to remove the bulb protector.)

M. Do not install sprinklers that have been dropped, damaged, or show a visible loss of fluid. Never install sprinklers with cracked bulbs.

N. Install and connect to fire pump system in accordance with Section 21 – Fire Pumps and NFPA 20.

O. Coordinate flow switches, tamper switches, and all other sprinkler devices with the fire alarm system.

P. Provide wire guards on sprinklers as indicated on drawings.

Q. Place pipe runs to minimize obstruction to other work.

R. Install piping in concealed spaces above finished ceilings.

S. Pipe and fitting shall be installed per the manufacture's installation requirements. The fire protection contractor shall furnish all materials necessary to meet these requirements including but not limited to hangers, support, insulation, shields, sleeves and power supplies.

T. Hydrostatically test entire system in accordance with the requirements of NFPA 13.

U. Install air compressor on vibration isolators. Pipe receiver tank drain to nearest floor drain.

V. Require test be witnessed by Authority having jurisdiction.

3.3 INTERFACE WITH OTHER PRODUCTS

A. Verify signal devices are installed and connected to fire alarm system.

3.4 CLEANING

A. Section 01 - Execution and Closeout Requirements: Final cleaning.

B. Flush entire piping system of foreign matter.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 - Execution and Closeout Requirements: Protecting installed construction.

B. Apply masking tape or paper cover to protect concealed sprinklers, cover plates, and sprinkler escutcheons not receiving field paint finish. Remove after painting. Replace painted sprinklers with new.

3.6 IDENTIFICATION

A. Provide and apply signs to control, drain, test and alarm valves to identify their purpose and function.

B. Provide and permanently attach hydraulic calculations data nameplate at the controlling valve for the sprinkler system. Provide lettering size and style from NFPA's suggested styles.

3.7 TESTING

A. Section 21 - Common Work Results for Fire Suppression.

END OF SECTION

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SECTION 21 3000 - FIRE PUMPS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes fire pump package, fire pump, motor, electric jockey pump, controllers and accessories.

B. Related Sections:
1. Section 21 – Expansion Fittings and Loops for Fire-Suppression Piping.
2. Section 21 - Vibration and Seismic Controls for Fire-Suppression Piping and Equipment: Product requirements for pump isolators for placement by this section.
3. Section 21 – Wet Pipe Sprinkler Systems.
4. Section 23 – General Conditions for Mechanical Trades.
5. Section 23 - Pipes and Tubes for HVAC Piping and Equipment: Product and execution requirements for piping for placement by this section.
6. Section 23 - HVAC Insulation: Product and execution requirements for pipe and equipment insulation for placement by this section.
7. Section 26 - Equipment Wiring Connections: Execution requirements for pumps specified by this section.

1.2 REFERENCES

A. FM Global:
1. FM - Approval Guide, A Guide to Equipment, Materials & Services Approved By Factory Mutual Research For Property Conservation.

B. National Electrical Manufacturers Association:
1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
2. NEMA MG 1 - Motors and Generators.

C. National Fire Protection Association:
1. NFPA 13 - Installation of Sprinkler Systems.
2. NFPA 14 - Installation of Standpipe and Hose Systems.
3. NFPA 20 - Standard for the Installation of Centrifugal Fire Pumps.
4. NFPA 24 - Private Fire Service Mains and their Appurtenances
5. NFPA 37 - Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines.
6. NFPA 70 – National Electric Code.

D. Underwriters Laboratories Inc.:
   1. UL 448 - Pumps for Fire Protection Service.
   2. UL 778 - Motor Operated Water Pumps.
   3. UL 1478 - Fire Pump Relief Valves.
   4. UL - Fire Protection Equipment Directory.

1.3 SYSTEM DESCRIPTION

A. Electric motor horizontal, in-line, fire pump with jockey pump. System will include electric controllers and automatic transfer switch.

B. Piping and equipment arrangements indicated on the contract documents are diagrammatic. It is the responsibility of the Contractor to fully coordinate piping and equipment locations with all other trades.

1.4 SUBMITTALS

A. Section 01 - Submittal Procedures: Submittal procedures.

B. Where the terms “authority having jurisdiction” is used within this specification, it is intended to include the Insurance Underwriter and all regulatory agencies having vested interest in this project.

C. Shop Drawings: Indicate detailed layout, general assembly, components and accessories, dimensions, weights, clearances, and methods of assembly.

D. Product Data: Provide manufacturers literature including general assembly, pump curves showing performance characteristics with pump and system, operating point indicated, NPSH curve, controls, wiring diagrams, and service connections.

E. Manufacturer's Installation Instructions: Indicate support details, connection requirements, and start-up instructions for fire pump system.

F. Manufacturer’s Certificate: Certify that fire pumps meet or exceed specified requirements at specified operating conditions. Submit summary and results of shop tests performed in accordance with NFPA 20.

G. Field Reports: Indicate summary of results of hydrostatic test and field acceptance tests performed in accordance with NFPA 20.

H. All drawings shall bear the seal of a Professional Engineer licensed in the State of Connecticut.

I. Hydraulic calculations verifying the required size of the fire pump.

1.5 CLOSEOUT SUBMITTALS

A. Section 01 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of components and accessories.

C. Operation Data: Include manufacturers instructions, start-up data, trouble-shooting check lists, for pumps, drivers, and controllers.

D. Maintenance Data: Include manufacturers literature, cleaning procedures, replacement parts lists, and repair data for pumps, drivers and controllers.

E. Record actual locations of equipment and deviations of piping from drawings. Indicate drain and test locations.

1.6 QUALITY ASSURANCE

A. Workmanship and Qualifications: All materials and equipment shall be installed in accordance with NFPA Standard 20 and all applicable local codes and ordinances. The Sprinkler Contractor shall be state licensed to install sprinkler systems. The Sprinkler Contractor shall make sure that all work and materials conform to the requirements set forth by this Specification. Fire protection equipment shall be installed to conform to NFPA Standard 20 as applicable, and devices used shall be listed and approved by Underwriters laboratories (UL) and/or Factory Mutual (FM).

B. Codes and Standards: All work shall be equal or superior to that required by codes, regulations, ordinances, and laws imposed by the jurisdictional authorities. Nothing in the Specifications permit violations of such directives, and where conflict occurs, the directive shall govern, except where superior work is specified or indicated.

C. In addition to complying with the above codes and regulations, comply with the requirements of the following:
   1. NFPA Standard 20.
   2. State Building and Fire Codes.
   3. Local Jurisdictional Authorities.

D. Maintain one copy of document on site.

E. Installer: Company specializing in performing work of this Section with minimum five years experience.

F. Design fire pump and related appurtenances under direct supervision of a Professional Engineer experienced in design of this Work and licensed in the State where the project is located.

G. All items of similar class shall be the products of the same manufacturer. All valves, accessory items, etc., shall be from the same source.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

C. Design fire pump system under direct supervision of Professional Engineer experienced in design of this Work and licensed in the State of Connecticut.

1.8 PRE-INSTALLATION MEETINGS

A. Section 01 - Administrative Requirements: Pre-installation meeting.

B. Convene minimum week prior to commencing work of this section.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Section 01 - Product Requirements: Product storage and handling requirements.

B. Accept fire pumps and components on site in factory packing. Inspect for damage. Comply with manufacturers rigging and installation instructions.

C. Store products in shipping containers and maintain in place until installation. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

D. Fire Pump and all equipment, valves, alarms, gages and etc., shall be covered and protected from physical damage including effects of weather, water, and construction debris during the execution of the work. All equipment shall be protected from freezing. Labeling to remain in place.

E. All unloading, hauling, and handling of materials shall be the responsibility of the Sprinkler Contractor.

F. The Sprinkler Contractor can obtain information on available storage space on site from the Owner when making examination of the site.

1.10 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.11 WARRANTY

A. Section 01 - Execution and Closeout Requirements: Product warranties and product bonds.

B. For products noted in this section, provide manufacturer’s standard warranty, minimum of one year.

1.12 MAINTENANCE SERVICE

A. Section 01 - Execution and Closeout Requirements: Maintenance service.

B. Furnish service and maintenance of fire pump, driver, and controller for two years from Date of Substantial Completion.

1.13 EXTRA MATERIALS

A. Section 01 - Execution and Closeout Requirements: Spare parts and maintenance products.

B. Furnish one set of gaskets for each pump type and model supplied.

PART 2 PRODUCTS

2.1 FIRE PUMPS

A. Manufacturers:
1. Peerless.
2. Armstrong.
3. Aurora.

B. Substitutions: Section 0 - Product Requirements

2.2 HORIZONTAL BASE MOUNTED PUMPS

A. Type: UL 448 and UL 778, horizontal shaft, single stage, double suction, direct connected, horizontally split casing, for 250 psi maximum working pressure.

B. Casing: Cast iron, with suction and discharge gage ports, renewable bronze casing wearing rings, seal flush connection, drain plug, flanged suction and discharge.

C. Impeller: Bronze double suction fully enclosed, balanced and keyed to shaft.

D. Bearings: Grease lubricated ball bearings, replaceable without opening casing.

E. Shaft: Alloy steel with replaceable bronze shaft sleeve.

F. Seal: Packing gland with minimum four rings graphite impregnated packing and bronze lantern rings, 230 degrees F maximum continuous operating temperature.

G. Drive: Flexible coupling with coupling guard.

H. Base plate: Cast iron or fabricated steel with integral drain rim.

I. Performance: Flow: 400 gpm, at 40 psi.

J. Motor: Squirrel cage induction type; in open drip proof NEMA MG-1 enclosure, 3500 rpm, maximum. Refer to Section 21 05 13. The fire pump shall be capable of delivering not less than 150% of rated capacity at not less than 65% of rated pressure.

K. Pump shall be of approved manufacturer

2.3 FIRE PUMP ACCESSORIES

A. Eccentric suction reducer and OS&Y gate or butterfly valve on suction side of pump.

B. Concentric increaser and check valve in pump discharge and OS&Y gate or butterfly valve on system side of check valve.

C. Fire pump bypass fitted with OS&Y gate or butterfly valves and check valve.

D. Main relief-valve, UL 1478,

E. Suction pressure gage, 4-1/2 inch diameter dial with snubber, valve cock and lever handle.

F. Discharge pressure gage mounted on board attached to pump, with snubber, valve cock and lever handle.

G. Casing 3/4 inch relief valve.

H. Float operated 3/4 inch automatic air release valve.

I. Hose valve manifold with 2-1/2 inch hose gate valves with caps and chains.

J. Flow metering system for closed loop testing.

2.4 ELECTRIC MOTOR DRIVE

A. Motor: Squirrel cage induction type; in open drip proof NEMA MG-1 enclosure, 1800 rpm. Refer to Section 21 05 13.

B. Controller: Limited service type with across the line starter, in NEMA 250 Type 2 enclosure, including the following:
1. Disconnect Switch: Externally operable, quick break type.
2. Circuit Breaker: Size to NFPA 20, minimum 65,000 amperes interrupting capacity.
3. Motor Starter: Energized automatically through pressure switch or manually by externally operable handle.
4. Pressure Switch: Set to cut in at 10 psi.
5. Running Period Timer: Keeps motor in operation when started automatically, for minimum of seven minutes.
6. Pilot Lamp: Indicates circuit breaker closed and power available.
7. Test Accessories: Ammeter test link and voltmeter test studs.
8. Alarm Relay: Energizes alarm to indicate circuit breaker open or power failure.

9. Switch Relay: For remote start.
10. Manual Selector Station: On enclosure marked "Automatic" and "Non-Automatic."

2.5 ELECTRIC FIRE PUMP CONTROLLER

A. The fire pump controller shall be Tornatech, or approved equal.

B. Motor starter shall be across-the line type.

C. The withstand rating of the fire pump controller shall be 100,000 amps. The fire pump controller shall be house in a NEMA 2 enclosure. The controller shall incorporate the display and printer module PRS99 accessible through a hinged operator door and microprocessor based controller ATS99.

D. The controller shall be supplied with the following externally mounted components approved to match the NEMA rating of the enclosure.
1. One common operating handle for both isolating switch and circuit breaker mechanically interlocked with the enclosure door to prohibit access to the interior in the “On” position complete with an interlock defeater screw and padlock provision in the “Off” position.
2. One pump “Start” pushbutton and one “Stop” pushbutton.
3. One “Emergency” start and run handle mechanism latch able in the “On” position.
4. Manual and Emergency starts command shall be independent of micro-controller ATS99.

E. The controller shall incorporate a Display/Annunciator & Printer module accessible through a hinged operator door.

F. The Digital display shall have a precision of 2%, be back lighted and show the following:
1. All 3x line-to-line voltages.
2. System frequency.
3. All 3x line-to-line amperages.
4. True elapsed run time (based on current read out).
5. Pressure system settings and system pressure in PSI.
6. Alarm conditions:
   a. Pump starting failure.
   b. Over current problem.
   c. Under current problem.
   d. Pressure transducer problem.

G. Annunciator shall be powered by high luminosity LEDS indicating:
1. Power available.
2. System trouble.
3. Phase reversal.
4. Low system pressure.

H. The printer shall be accessible without opening the main controller door and allow for:
   1. Previous seven (7) days events & alarm summary (using print button).
   2. Previous seven (7) days pressure over time fluctuations (using print button).

I. Cut-in and cut out pressures shall be live settable without opening main controller door.

J. The Display/Annuciator & Printer module shall also incorporate an Alarm Reset and a Paper feed push button.

K. The following control components shall be mounted inside the controller:
   1. One pressure transducer rated for 300 psi.
   2. One micro controller module ATS99 factory set and mechanically protected and shielded. This micro controller shall provide.
      a. Lock rotor protection set at 300% and automatically tripping within 8-20 seconds at 600% of full load current.
      b. Phase sequence / loss monitoring and alarms.
      c. Minimum run period timer (disarmable).
      d. Sequential start timer (adjustable).
      e. Weekly test (electrical initiation).
      f. Voltage and current sensing (all phases).
      g. Pressure sensing (300 psi transducer).
      h. Automatic start sequence.
      i. System trouble fail safe alarm.
   3. Two control terminals to provide for the connection of a momentary remote start contact.
   4. Individual alarm contacts (10A. 250VAC):
      a. Power or phase failure and / or circuit breaker in open position DPDT.
      b. Pump run 1 N/O-1 N/C.
      c. Phase reversal DPDT.
      d. Trouble (alarm condition) DPDT.

L. Power Circuit Components:
   1. The controller shall be supplied with the following power components:
      a. One molded case isolating switch.
      b. One molded case circuit breaker rated at a minimum of not less than 115% of full load motor current. The circuit breaker magnetic trip shall be adjusted to a minimum of 13 times the fire pump full load motor current with provisions for higher settings. The molded case switch and circuit breaker shall be of the same frame size.
      c. One reduced voltage automatic autotransformer closed transition type motor starter.

M. Automatic Transfer Switch:
   1. The transfer switch shall be housed within the full service fire pump controller enclosure separated by a dividing wall and accessible by an individual access door.

2. The automatic power transfer switch assembly shall meet the requirements of the NFPA 20-1999 and UL218 standards and be listed and approved for fire pump service by cULus, FM and N.Y. City.
3. The transfer switch shall be supplied with the following externally mounted components match the NEMA rating of the associated fire pump controller.
   a. One operating handle for the molded case isolating switch of the alternate power supply, mechanically interlocked with the enclosure door to prohibit access to the interior in the "On" position, complete with defeater screw and padlock in the "Off" position.
   b. One alarm buzzer energized when the isolating switch is left in the "Off" position.
4. The Display/Annunciator & Printer module in the fire pump section of the controller shall also contain the following features for the transfer switch.
   a. The Annunciator shall be powered by high luminosity LED's indicating:
   b. .

2.6 PRESSURE BOOSTER (JOCKEY) PUMP

A. Manufacturers:
   1. Peerless
   2. Armstrong
   3. Aurora
   4. Substitutions: Section 01 - Product Requirements.

B. Electrically operated horizontal close-coupled type with standard open drip-proof horizontal motor.

C. Control by automatic jockey pump controller with full voltage starter and minimum run timer to start pump on pressure drop in system and stay in operation for minimum period of time. Fire pump starts automatically on further pressure drop or on jockey pump failure.

2.7 ELECTRICAL CHARACTERISTICS AND COMPONENTS

A. Electrical Characteristics: In accordance with Section 26 05 03 and the following:
   1. 25 hp
   2. 460 volts, three phase, 60 Hz.

B. Motors: In accordance with Section 21

C. Disconnect Switch: Factory mount in control panel.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install fire pump system in accordance with NFPA 20.

C. Provide access space around pumps for service. Provide no less than minimum as recommended by manufacturer.

D. Install fire suppression piping in accordance with Section 21. Decrease from line size with long radius reducing elbows or reducers. Support piping adjacent to pump such that no weight is carried on pump casings. For base mounted pumps, provide supports under elbows on pump suction and discharge.

E. Provide drains for bases and seals, piped to and discharging into floor drains.

F. Install pump on vibration isolators. Refer to Section 21.

G. Install piping associated with pump and pump casing.

H. Connect to electrical service. Refer to Section 26 05 03.

I. Lubricate pumps before start-up.

J. Check, align, and certify base mounted pumps by qualified millwright prior to start-up.

K. The fire pump shall be hydrostatically tested to twice the working pressure, but in no case, less than 250 psig.

L. The fire pump shall be given a complete factory performance test and characteristics curves prepared from the test results shall be furnished.

M. Fire pump and all associated equipment shall be installed in a free standing structure located on the project site dedicated for fire pump, refer to Architectural drawings.

N. Provide Fire Pump remote annunciator, locate at main entrance to building or adjacent to fire alarm control panel or as directed by the local authority having jurisdiction.

Provide full size bypass with check valve and OS&Y gate valve on fire pump suction side to fire pump discharge side.

O. Provide test loop separate from bypass, provide with flow meter and butterfly valve

3.2 FIELD QUALITY CONTROL

A. Section 01 - Quality Requirements

B. Perform flow test on entire system in accordance with NFPA 20.

C. Schedule test to be witnessed by authority having jurisdiction,

3.3 DEMONSTRATION AND TRAINING

A. Demonstrate automatic operation of system including verification of pressure switch set points.

END OF SECTION

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SECTION 22 0400 - GENERAL CONDITIONS FOR PLUMBING TRADES

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. This section applies to certain sections of Division 26, "Electrical," and this section applies to all sections of Division 22, "Plumbing" of this project specification unless specified otherwise in the individual sections.

C. The Drawings of other trades (Architectural, Food Service, Structural, Landscape, Civil, Mechanical, Fire Protection and Electrical) shall be examined for coordination and familiarity of work with other Contractors. Any duplication or omission of provisions in this project should be brought to the attention of the Owners prior to Bidding.

1.2 DESCRIPTION

A. The General Conditions and Supplementary General Conditions are a part of this Division and are to be considered a part of this Contract.

B. Where items of the General Conditions and Supplementary General Conditions are repeated in other Sections of the Specifications, it is merely intended to qualify or to call particular attention to them. It is not intended that any other parts of the General Conditions and Supplementary General Conditions shall be assumed to be omitted if not repeated therein. This Section applies equally and specifically to all Contractors supplying labor and/or equipment and/or materials as required under each Section of this Division. Where conflicts exist between the drawings and the specifications or between this section of the specifications and other sections, the more stringent or higher cost option shall apply.

1.3 INTENT

A. It is the intent of the Specifications and Drawings to call for finished work, tested and ready for operation. Provide all parts necessary for the intended use, fully complete and operational, and installed in professional manner in accordance with the design intent.

B. Any apparatus, appliance, material or work not shown on drawings but mentioned in the specifications, or vice versa, or any incidental accessories necessary to make the work complete and ready for operation as determined by good trade practice even if not particularly specified, shall be furnished, delivered and installed under their respective Divisions without any additional expense to the Owner.

C. Minor details not usually shown or specified but necessary for proper installation and operation shall be included in the work as though they were hereinafter shown or specified.

D. Work under each Section shall include giving written notice to the Owner and Engineer of any materials or apparatus believed inadequate or unsuitable; in violation of laws, ordinances, rules or regulations of authorities having jurisdiction; and any necessary items of work omitted. In the absence of such written notice, it is mutually agreed that work under each Section includes the cost of all required items for the accepted, satisfactory functioning of the entire system without extra compensation.

1.4 DEFINITIONS

A. “Approved equal” also known as “alternative” mean any product which in the opinion of the Engineer is equal in quality, arrangement, appearance, and performance to the product specified.

B. No Exceptions Taken – reviewed and determined to be in general conformance with contract documents.

C. Directed: Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean "directed by the Engineer," "requested by the Engineer," and similar phrases.

D. “Finished” refers to all rooms and areas to be specified to receive architectural treatment as indicated on the drawings. All rooms and areas not covered, including underground tunnels and areas above ceilings shall be considered not finished, unless otherwise noted.

E. “Furnish” or “supply” shall mean purchase, deliver to, and off-load at the job site, ready to be installed including where appropriate all necessary interim storage and protection.

F. Indicated: The term "indicated" refers to graphic representations, notes, or schedules on the Drawings, other paragraphs or schedules in the Specifications, and similar requirements in the Contract Documents. Where terms such as "shown," "noted," "scheduled," and "specified" are used, it is to help the reader locate the reference; no limitation on location is intended.

G. “Install” shall mean set in place complete with all mounting facilities and connections as necessary ready for normal use or service.

H. "Lead Free" shall mean not more than .25% in the wetted surface area.

I. No Exceptions Taken – reviewed and determined to be in general conformance with contract documents.

J. “Product” shall mean any item of equipment, material, fixture, apparatus, appliance or accessory installed under this Division.

K. “Provide” shall mean furnish (or supply) and install as necessary.

L. Regulation: The term "Regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

M. Remove: The term “remove” means “to disconnect from its present position, remove from the premises and to dispose of in a legal manner.”

N. Special Warranties: The term “Special Warranties” are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

O. Standard Product Warranties: The term “Standard Product Warranties” are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

P. “Subcontractor” means specifically the subcontractor working under this Division. Other Contractors are specifically designated “Plumbing Subcontractor”, “General Contractor” and so on. Note: Take care to ascertain limits of responsibility for connecting equipment which requires connections by two or more trades.

Q. Substitutions: Requests for changes in products, materials, equipment, and methods of construction proposed by the Contractor are considered requests for "substitutions."

R. “Wiring” shall mean cable assembly, raceway, conductors, fittings and any other necessary accessories to make a complete wiring system.

1.5 CONTRACT DOCUMENTS

A. The two dimensional drawings govern the construction. They show the design intent and are part of the Contract Documents. BIM models are not part of contract documents. They are developed for convenience only.

B. Drawings are diagrammatic and indicate the general arrangement of systems and work included in the Contract. Consult the Architectural Drawings and Details for exact location of fixtures and equipment; where same are not definitely located, obtain this information from the Architect. (Do not scale the drawings)

C. Work under each Section shall closely follow Drawings in layout of work; check Drawings of other Divisions to verify spaces in which work will be installed. Maintain maximum headroom; where space conditions appear inadequate, Owner and Engineer shall be notified before proceeding with installations.

D. The Owner may, without extra charge, make reasonable modifications in the layout as needed to prevent conflict with work of other trades and/or for proper execution of the work.

1.6 DISCREPANCIES IN DOCUMENTS

A. Where variances occur between the Drawings and Specifications or within either of the Documents, the item or arrangement of better quality, shall be included in the Contract price. The Owner and Engineer shall decide on the item and the manner in which the work shall be installed.

B. Where Drawings or Specifications conflict or are unclear, submit clarification request in writing before Award of Contract. Otherwise, Architect's interpretation of Contract Documents shall be final, and no additional compensation shall be permitted due to discrepancies or un-clarities thus resolved.

C. Where Drawings or Specifications do not coincide with manufacturers' recommendations or with applicable codes and standards, submit clarification request in form of an RFI before installation. Otherwise, make changes in installed work required for compliance with manufacturer instructions or codes and standards within Contract Price.

D. Where insufficient information exists in the documents to precisely describe a certain component or subsystem, or the routing of a component or its coordination with other building elements, where notification required by Paragraph (B) above has not been submitted, provide the specific component or subsystem with all parts necessary for the intended use, fully complete and operational, and installed in professional manner either concealed or exposed in accordance with the design intent.

E. Where discrepancies exist between the mechanical, plumbing, fire protection, and electrical drawings in regards to what trade owns disconnects or starters, the discrepancy shall be brought to the Architect’s attention in accordance with paragraph (B) above. If the scope is not resolved prior to the Award of Contract, Division 26 shall provide such items.

1.7 SURVEYS AND MEASUREMENTS

A. Before submitting the Bid, the Contractors shall visit the site and become thoroughly familiar with all existing conditions under which work will be installed. This Contract includes all modifications of existing systems required for the installation of new equipment. This Contract includes all necessary offsets, transitions and modifications required to install all new equipment in existing spaces. All new and existing equipment and systems shall be fully operational under this Contract before the job is considered complete. The Contractors shall be held responsible for any assumptions made, any omissions or errors made as a result of their failure to become fully familiar with the existing conditions at the site and the Contract Documents.

B. The Contractor shall base all measurements, both horizontal and vertical, from established bench marks. All work shall agree with these established lines and levels. Verify all measurements at the site and check the correctness of same as related to the work.

C. Should the Contractor discover any discrepancies between actual measurements and those indicated which prevent following good practice or which interfere with the intent of the Drawings and Specifications, the Engineer will be notified and work will not proceed until instructions from the Engineer are received.

1.8 CODES AND STANDARDS

A. Reference Standard Compliance

1. Where equipment or materials are specified to conform to industry and technical society reference standards of the organizations such as American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), National Electrical Manufacturers Association (NEMA), and Underwriters Laboratories Inc. (UL), submit proof of such compliance. The label or listing by the specified organization will be acceptable evidence of compliance.

2. Independent Testing Organization Certificate: In lieu of the label or listing indicated above, submit a certificate from an independent testing organization, competent to perform testing, and approved by the Engineer. The certificate shall state that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard.

B. Wherever Codes and/ or standards are mentioned in these specifications, the latest applicable edition or revision of the local building or life safety code shall be followed.

C. The following Standards shall be used where referenced by the following abbreviations:

ACGIH	American Conference of Governmental Industrial Hygienists
AGA	American Gas Association
AIA	American Institute of Architects
ANSI	American National Standards Institute
API	American Petroleum Institute
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASPE	American Society of Plumbing Engineers
ASSE	American Society of Sanitary Engineers
ASTM	American Society of Testing and Materials
AWS	American Welding Society
AWWA	American Water Works Association
CGA	Compressed Gas Association

CSA	Canadian Standards Association
CISPI	Cast Iron Soil Pipe Institute
EJMA	Expansion Joint Manufacturing Association
EPA	Environmental Protection Agency
FM	Factory Mutual
FSSC	Federal Specification
HIS	Hydraulic Institute Standards
IEEE	Institute of Electrical and Electronics Engineers
IRI	Industrial Risk Insurers
ISO	Insurance Services Office
MCAA	Mechanical Contractors Association of America
NBS	National Bureau of Standards
NEBB	National Environmental Balancing Bureau
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NOFI	National Oil Fuel Institute
NSC	National Safety Council
NSF	National Sanitation Foundation
OSHA	Occupational Safety and Health Administration
PDI	Plumbing and Drainage Institute
SBI	Steel Boiler Industry (Division of Hydronics Institute)
SDWA	Safe Drinking Water Act
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
STI	Steel Tank Institute

UL	Underwriters' Laboratories

D. All materials furnished and all work installed shall comply with the rules and recommendations of the NFPA, the requirements of the local utility companies, the recommendations of the fire insurance rating organization having jurisdiction and the requirements of all Governmental departments having jurisdiction.

E. The Contractor shall include in the work, without extra cost to the Owner, any labor, materials, services, apparatus and Drawings in order to comply with all applicable laws, ordinances, rules and regulations, whether shown on Drawings and/or specified or not.

1.9 PERMITS AND FEES

A. The Contractor shall give all necessary notices, obtain all permits; and pay all Government and State sales taxes and fees where applicable, and other costs, including utility connections or extensions in connection with the work, file all necessary Drawings, prepare all documents and obtain all necessary approvals of all Governmental and State departments having jurisdiction, obtain all required certificates of inspection for his work, and deliver a copy to the Owner and Engineer before request for acceptance and final payment for the work.

1.10 EQUIPMENT EQUIVALENTS AND SUBSTITUTIONS

A. Certain manufacturers of material, apparatus or appliances are indicated in the drawings and specifications for this project. These items have been used as the basis of design, and as a convenience in fixing the minimum standard of quality, finish and design that is required. If the Contractors uses an “approved equal” alternative to the basis of design, and if the features of that alternative have an impact on other components of the Project, the Contractor shall include the necessary adjustments in those components, whether for architectural, structural, mechanical, electrical, fire protection, or any other elements, plus any adjustments for difference in performance.

B. Where no specific make of material, apparatus or appliance is mentioned, any first-class product made by a reputable manufacturer may be submitted for Architect and Engineer review.

C. Where the Contractor proposes to use an item that is different from the basis of design in the Drawings and specifications, and that will require the redesign of the structure, partitions, foundations, piping, wiring or any other component of the mechanical, electrical, or architectural layout, the Contractor shall provide the necessary redesign of those components.

D. Where the Contractor proposes to deviate (provide an equivalent or request for substitution) from the basis of design scheduled equipment or materials as hereinafter specified or shown on the drawings, they are required to submit a requested for substitution in writing. The Contractor shall state in their request whether it is a substitution, equivalent or a non-approved equivalent to that specified and the amount of credit or extra cost involved. A copy of said request shall be included in the Base Bid with manufacturer’s equipment cuts. The Base Bid shall be based on using the materials and equipment as specified with no exceptions.

E. If an alternative or substitute item results in a difference in quantity and arrangement of structure, piping, ductwork, valves, pumps, insulation, wiring, conduit, and equipment from that specified or indicated on the Drawings, the Contractor shall furnish and install any such additional equipment required by the system, at no additional cost to the Owner including any costs added to other trades due to the equivalent change from the basis of design detailed in the drawings or included within the specifications.

F. Equipment, material or devices submitted for review as a "substitution" shall meet the following requirements:

1. Substitution Request Submittal: Requests for substitution will be considered if received in writing 14 days before the bid date. Requests received later than 14 days before the bid date may be considered or rejected at the discretion of the Engineer/Owner. Once the Contractor submits a complete request for substitution as determined by the engineer, the engineer reserves the right to request the time necessary to evaluate the request for substitution and review it with the Owner.

2. Identify the product, or the fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:

   a. Product Data, including Drawings and descriptions of products, fabrication and installation procedures.

   b. Samples, where applicable or requested.

   c. A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements such as size, weight, durability, performance and visual effect.

   d. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Owner and separate Contractors that will become necessary to accommodate the proposed substitution.

   e. A statement indicating the substitution's effect on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.

   f. Cost information, including a proposal of the net change, if any in the Contract Sum.

   g. Certification by the Contractor that the substitution proposed is equal-to or better in every significant respect to that required by the Contract Documents, and that it will perform adequately in the application indicated. Include the Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of the failure of the substitution to perform adequately.

h. Engineer's Action: Within one week of receipt of the request for substitution, the Engineer will notify the Contractor of acceptance or rejection of the proposed substitution. If a decision on use of a proposed substitute cannot be made or obtained within the time allocated, use the product specified by name. Acceptance of a product substitution will be in the form of an Addendum.

i. Other Conditions: The Contractor's substitution request will be received and considered by the Engineer when one or more of the following conditions are satisfied, as determined by the Engineer; otherwise requests will be returned without action except to record noncompliance with these requirements.

1) The request is directly related to an "or equal" clause or similar language in the Contract Documents.

2) The specified product or method of construction cannot be provided within the Contract Time. The request will not be considered if the product or method cannot be provided as a result of failure to pursue the Work promptly or coordinate activities properly.

3) A substantial advantage is offered the Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear. Additional responsibilities for the Owner may include additional compensation to the Engineer for redesign and evaluation services, increased cost of other construction by the Owner or separate Contractors, and similar considerations.

1.11 SUBMITTAL PROCEDURES

A. Provide Submittals in accordance with the requirements of Division 01 and as indicated in the following.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that require sequential activity.

2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination. The Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing: Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for resubmittals.

1. Allow ten business days for initial review. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. The Engineer will promptly advise the Contractor when a submittal being processed must be delayed for coordination.

2. If an intermediate submittal is necessary, process the same as the initial submittal.

3. Allow ten business days for reprocessing each submittal.

4. No extension of Contract Time will be authorized because of failure to transmit submittals to the Engineer sufficiently in advance of the Work to permit processing.

D. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block. Submittals shall be arranged in order of specification sections.

1. Include the following information on the label for processing and recording action taken.

a. Project name.

b. Date.

c. Name and address of Engineer.

d. Name and address of Contractor.

e. Name and address of subcontractor.

f. Name and address of supplier.

g. Name of manufacturer.

h. Number, title and paragraph of appropriate Specification Section.

i. Drawing number and detail references, as appropriate.

E. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to Engineer using a transmittal form. Submittals received from sources other than the Contractor will be returned without action. On the transmittal, record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.

F. Except for submittals for record, information or similar purposes, the Engineer will review each submittal, mark to indicate action taken, and return promptly. Compliance with specified characteristics is the Contractor's responsibility.

G. Action Stamp: The Engineer will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, to indicate the action taken.

1.12 SHOP DRAWINGS

A. Submit neatly prepared information, drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered Shop Drawings.

B. The Contractor shall submit for review detailed shop drawings of all equipment and material specified in each section and coordinated plumbing layouts. No material or equipment may be delivered to the job site or installed until the Contractor has received shop drawings for the particular material or equipment which have been properly reviewed. Shop drawings shall be submitted within 60 days after award of Contract before any material or equipment is purchased. The Contractor shall submit for review all shop drawings to be incorporated in the Plumbing Contract.

C. Provide shop drawings for all devices specified under equipment specifications for all systems. Shop drawings shall include manufacturers' names, catalog numbers, cuts, diagrams, dimensions, identification of products and materials included, compliance with specified standards, notation of coordination requirements, notation of dimensions established by field measurement and other such descriptive data as may be required to identify and accept the equipment. A complete list in each category (example: all fixtures), of all shop drawings, performance cuts, material lists, etc., shall be submitted to the Engineer at one time. No consideration will be given to a partial shop drawing submittal.

D. When a submittal could involve more than one trade, e.g., valves, piping, etc., the submitted shall be separated by traded involved, ie. HVAC, plumbing, fire protection, etc.

E. Where multiple quantities or types of equipment are being submitted, provide a cover sheet (with a list of contents) on the submittal identifying the equipment or material being submitted.

F. The Contractor shall furnish all necessary templates, patterns, etc., for installation work and for the purpose of making adjoining work conform; furnish setting plans and shop details to other trades as required.

G. "No Exception Taken" rendered on shop drawings shall not be considered as a guarantee of measurements or building conditions. Where drawings are reviewed, review does not mean that drawings have been checked in detail; said approval does not in any way relieve the Contractor from his responsibility or necessity of furnishing material or performing work as required by the Contract Drawings and Specifications. Verify available space prior to submitting shop drawings. Review of shop drawings shall not apply to quantity of material.

H. After shop drawings have been reviewed, with no exceptions taken, no further changes will be allowed without the written consent of the Engineer.

I. Shop drawing submittal sheets which may show items that are not being furnished shall have those items crossed off to clearly indicate which items will be furnished.

J. Bidders shall not rely on any verbal clarification of the Drawings and/or Specifications. Any questions shall be referred to the Engineer in writing at least five (5) working days prior to bidding to allow for issuance of an Addendum.

K. Do not use Shop Drawings without an appropriate final stamp indicating action taken in connection with construction.

L. All submittals shall be made in electronic PDF format with searchable OCR (Optical Character Recognition) format. This excludes scanned and faxed materials.

1.13 COORDINATION DRAWINGS AND BIM MODEL

A. Coordination drawings are required for all fire protection, plumbing, mechanical and electrical trades. The content and procedures described in Division 01 shall be followed, with the additional requirements specifically for the plumbing and electrical trades as described in this Section. If a BIM model is not used on this project, the below requirements shall be accomplished in CAD.

B. Prepare coordination drawings in accordance with Division 01 to a minimum scale of 1/4"=1'-0" detailing major elements, components, and systems of mechanical equipment and materials in relationship with other systems, installations, and building components. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:

1. The Contractor shall indicate the proposed locations of piping, conduit, ductwork, equipment, and materials. Include the following:

   a. Clearances for servicing and maintaining equipment, including tube removal, filter removal, and space for equipment disassembly required for periodic maintenance.

   b. Equipment connections and support details.

   c. Exterior wall and foundation penetrations.

   d. Fire-rated wall and floor penetrations.

   e. Sizes and locations of required concrete pads and bases.

C. Indicate scheduling, sequencing, movement, and positioning of large equipment into the building during construction.

D. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.

E. Prepare reflected ceiling plans to coordinate and integrate installations, air outlets and inlets, light fixtures, communication systems components, sprinklers, and other ceiling-mounted items.

F. The Contractor and each subcontractor shall sign and date each coordination drawing prior to submission.

G. Work shall not be performed until coordination drawings have been approved by the architect and engineer.

H. Electronic copies of the MEP floor plans and/or BIM model are available to use as a basis for preparing coordination drawings and can be provided by the Engineer. If the Contractor elects to obtain the Engineers electronic files an Electronic Drawing File Release Form must be submitted. This form must be signed by the Contractor, Owner, and Architect. Upon receipt of a signed copy of the Electronic Drawing File Release Form, the Engineer will provide copies of the electronic files for the Contractor's use. A copy of the Electronic Drawing File Release Form is appended to the end of this specification section

I. Review by Engineer of coordination drawings is limited to confirming that requirements for coordination and preparation of plans have been complied with by the Contractor and shall not diminish responsibility under this Contract for final coordination of installation and maintenance clearances of all systems and equipment with Architectural, Structural, Mechanical, Electrical and other related work.

1.14 COORDINATION WITH OTHER DIVISIONS

A. All work shall be carried out in conjunction with other trades and full cooperation shall be given in order that all work may proceed with a minimum of delay and interference. Particular emphasis is placed on timely installation of major apparatus and furnishing other Contractors, especially the Contractor or Construction Manager, with information as to openings, chases, sleeves, bases, inserts, equipment locations, panels, etc., required by other trades.

B. The Contractors are required to examine all of the Project Drawings and mutually arrange work so as to avoid interference with the work of other trades. In general, ductwork, HVAC piping, sprinkler piping and drainage lines take precedence over water, gas and electrical conduits. The Engineer shall make final decisions regarding the arrangement of work which cannot be agreed upon by the Contractors.

C. Where the work of the Contractor will be installed in close proximity to or will interfere with work of other trades, the Contractors will cooperate in working out space conditions to make a satisfactory adjustment.

D. If the work under a Section is installed before coordinating with other Divisions or Sections or so as to cause interference with work of other Sections, the necessary changes to correct the condition shall be made by the Contractor causing the interference without extra charge to the Owner.

E. The two dimensional drawings are diagrammatic. They indicate general arrangements of mechanical systems and other work, and are intended to convey sufficient information for skilled contractors and tradespeople to furnish and install complete systems. They are not intended to be absolutely precise; they are not intended to specify or to show every offset, fitting, and component. The purpose of the drawings is to indicate a systems concept, the main components of the systems, and the approximate geometrical relationships. Based on the systems concept, the main components, and the approximate geometrical relationships, provide all other components and materials to make the systems fully complete, coordinated with other systems and the structure and space available, and operational. Similarly, the drawings do not show all offsets required for coordination nor do they show the exact routings and locations needed to coordinate with structure and other trades in order to avoid interferences and to meet ceiling heights and other Architectural requirements. Establish and provide offsets, changes in direction, and exact routings to coordinate all systems. Where conflicts or potential conflicts exist and engineering guidance is desired, submit a “Request for Information” (RFI).

F. Controls contractor shall coordinate and sequences of operation with all other trades as necessary to provide a complete and functioning system.

1.15 QUALITY CONTROL

A. Service Support: The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

B. Modification of References: In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears.

C. The Contractor shall furnish the services of an experienced superintendent who shall be constantly in charge of the installation of the work together with all skilled tradespeople, fitters, metal workers, welders, helpers and laborers required to unload, transfer, erect, connect, adjust, start, operate and test each system.

D. Unless otherwise specifically indicated on the Drawings or Specifications, all equipment and materials shall be installed with the acceptance of the Engineer and in accordance with the recommendations of the manufacturer. This includes the performance of such tests as the manufacturer recommends.

E. All labor for installation of plumbing systems shall be performed by experienced, skilled tradespeople under the supervision of a licensed journeyman foreman. All work shall be of a quality consistent with good trade practice and shall be installed in a neat, professional manner. The Engineer reserves the right to reject any work which, in their opinion, has been installed in a substandard, dangerous or unserviceable manner. The Contractor shall replace said work in a satisfactory manner at no extra cost to the Owner.

1.16 SHUTDOWNS

A. When installation of a new system requires the temporary shutdown of an existing operating system, the connection of the new system shall be performed at such time as designated by the Owner.

B. The Engineer and the Owner shall be notified in writing of the estimated duration of the shutdown period at least ten (10) days in advance of the date the work is to be performed.

C. Work shall be arranged for continuous performance whenever possible. The Contractor shall provide all necessary labor, including overtime if required, to assure that existing operating services will be shut down only during the time actually required to make necessary connections.

1.17 TEMPORARY UTILITIES

A. General: Provide new materials and equipment; if acceptable to the Engineer, undamaged previously used materials in serviceable condition may be used. Provide materials suitable for the use intended.

B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities, or permit them to interfere with progress. Do not allow hazardous dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.

C. First Aid Supplies: Comply with governing regulations.

D. Fire Extinguishers: Provide hand-carried, portable UL-rated, class "A" fire extinguishers for temporary offices and similar spaces. In other locations provide hand-carried, portable, UL-rated, class "ABC" dry chemical extinguishers, or a combination of extinguishers of NFPA recommended classes for the exposures.

E. Utilities: Engage the appropriate local utility company to install temporary service or connect to existing service. Where the company provides only part of the service, provide the remainder with matching, compatible materials and equipment; comply with the company's recommendations.

1. Use Charges: Cost or use charges for temporary facilities are not chargeable to the Owner or Engineer, and will not be accepted as a basis of claims for a Change Order.

F. Water Service: Install water service and distribution piping of sizes and pressures adequate for construction until permanent water service is in use.

G. Environmental Protection: Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result. Avoid use of tools and equipment

which produce harmful noise. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near the site.

H. Termination and Removal: Unless the Engineer requires that it be maintained longer, remove each temporary facility when the need has ended, or when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces and replace construction that cannot be satisfactorily repaired. Materials and facilities that constitute temporary facilities are property of the Contractor. The Owner reserves the right to take possession of Project identification signs.

1.18 EQUIPMENT ACCESS

A. Appliances, controls devices, valves and accessories that utilize energy shall be accessible for inspection, service, repair and replacement without disabling the function of a fire-resistance-rated assembly or removing permanent construction, other appliances, venting systems or any other piping not connected to the appliance being inspected, serviced, repaired or replaced. A level working space not less than 30 inches deep and 30 inches wide shall be provided in front of the control side to service an appliance.

1.19 PROJECT PHASING

A. Work under each Section shall include all necessary temporary connections, equipment, piping, heating, temperature control work, fire stopping, water heaters, labor, and material as necessary to accommodate the phasing of Construction as developed by the General Contractor or Construction Manager and approved by the Owner. All existing systems that pass-thru an area of the building shall remain operational during all phases of construction. No extra compensation shall be granted the Contractor for work required to maintain existing systems operational or to accommodate the construction phasing of the project.

1.20 PROTECTION OF MATERIALS AND EQUIPMENT

A. Work under each Section shall include protecting the work and material of all other Sections from damage by work or tradespeople and shall include making good all damage thus caused.

B. The Contractor shall be responsible for work and equipment until the facility has been accepted by the Owner. Protect work against theft, injury or damage and carefully store material and equipment received on site which is not immediately installed. Close open ends of work with temporary covers or plugs during construction to prevent entry of foreign material.

C. Work under each Section includes receiving, unloading, uncrating, storing, protecting, setting in place and completely connecting equipment supplied under each Section. Work under each Section shall also include exercising special care in handling and protecting equipment and fixtures, and shall include the cost of replacing any of the equipment and fixtures which are missing or damaged.

D. Equipment and material stored on the job site shall be protected from the weather, vehicles, dirt and/or damage by tradespeople or machinery. Insure that all electrical or absorbent equipment or material is protected from moisture during storage.

1.21 ADJUSTING AND TESTING

A. After all the equipment and accessories to be furnished are in place, they shall be put in final adjustment and subjected to such operating tests so as to assure the Engineer that they are in proper adjustment and in satisfactory, permanent operating condition.

B. Where requested by the Engineer, a factory-trained service representative shall inspect the installation and assist in the initial startup and adjustment to the equipment. The period of these services shall be for such time as necessary to secure proper installation and adjustments. After the equipment is placed in permanent operation, the service representative shall supervise the initial operation of the equipment and instruct personnel responsible for operation and maintenance of the equipment. The service representative shall notify the Contractor in writing that the equipment was installed according to manufacturer's recommendations and is operating as intended by the manufacturer.

1.22 CLEANING

A. The Contractor shall thoroughly clean and flush all piping and equipment of all foreign substances, oils, burrs, solder, flux, etc., inside and out before being placed in operation.

B. If any part of a system should be stopped or damaged by any foreign matter after being placed in operation, the system shall be disconnected, cleaned and reconnected wherever necessary to locate and/or remove obstructions. Any work damaged in the course of removing obstructions shall be repaired or replaced when the system is reconnected at no additional cost to the Owner.

C. During the course of construction, all pipes shall be capped in an acceptable manner to insure adequate protection against the entrance of foreign matter.

D. Upon completion of all work under the Contract, the Contractor shall remove from the premises all rubbish, debris and excess materials left over from his work. Any oil or grease stains on floor areas caused by the Contractor shall be removed and floor areas left clean.

E. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.

1. Remove labels that are not permanent labels.

2. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compound and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.

3. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films and similar foreign substances. Restore reflective

surfaces to their original reflective condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.

4. Wipe surfaces of plumbing equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition.

F. Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove and dispose of ALL waste materials, packaging material, skids etc. from the site and dispose of in a lawful manner in accordance with municipal, state and federal regulations.

G. Where extra materials of value remaining after completion of associated Work have become the Owner's property, arrange for disposition of these materials as directed.

1.23 OPERATING AND MAINTENANCE

A. Upon completion of all work and tests, the Contractor shall furnish the necessary skilled labor and helpers for operating his system and equipment for a period specified under each applicable Section of this Division. During this period, he shall fully instruct the Owner or the Owner's representative in the operation, adjustment and maintenance of all equipment furnished. The Contractor shall give at least seven (7) days' notice to the Owner and the Engineer in advance of this period.

B. The Contractor shall include the maintenance schedule for the principal items of equipment furnished under this Division.

C. The Contractor shall physically demonstrate procedures for all routine maintenance of all equipment furnished under each respective Section to assure accessibility to all devices.

D. An authorized manufacturer's representative shall attest in writing that the equipment has been properly installed prior to startup of any major equipment. The following equipment will require this inspection: pumps; controls, water heaters, compressors, boilers etc. These letters shall be bound into the operating and maintenance books.

E. Refer to individual trade Sections for any other particular requirements related to operating instructions.

F. Demonstration shall be recorded on USB Flash drive and turned over to the Owner. Video recording shall be done in a professional manner with quality video (1080p resolution) and clear audible sound.

1.24 OPERATING AND MAINTENANCE MANUALS

A. Prepare operating and maintenance manuals in accordance with the requirements of Division 01 and as follows. The Contractor shall prepare up to six (6) copies of a complete maintenance and operating instructions manual, bound in booklet form. Organize operating and maintenance data into suitable sets of manageable size. Bind

properly indexed data in individual heavy-duty 3-ring vinyl-covered binders, with pocket folders for folded sheet information and designation partitions with identification tabs. Mark appropriate identification on front and spine of each binder.

B. Manual shall include the following:

1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.

2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.

3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.

4. Servicing and operating instructions including lubrication charts and schedules.

5. Emergency and safety instructions.

6. Spare parts list.

7. Copies of warranties.

8. Wiring diagrams.

9. Recommended "turn around" cycles.

10. Inspection procedures.

11. Approved Shop Drawings and Product Data.

12. Equipment Start-up Reports.

13. Balance reports.

C. Include in the manual, a tabulated equipment schedule for all equipment. Schedule shall include pertinent data such as: make, model number, serial number, voltage, normal operating current, belt size, bearing number, etc. Schedule shall include maintenance to be done and frequency.

D. Maintenance and instruction manuals shall be submitted to the Owner at the same time as the seven (7) day notice is given prior to the instruction period.

1.25 ACCEPTANCES

A. The equipment, materials, quality, design and arrangement of all work installed under the Plumbing Sections shall be subject to the review of the Engineer.

B. Within 30 days after the awarding of a Contract, the Plumbing Contractor shall submit to the Engineer, for review, a list of manufacturers of equipment proposed for the work under the Plumbing Sections. The intent to use the exact manufacturers and models specified does not relieve the Contractor of the responsibility of submitting such a list.

C. If extensive or unacceptable delivery time is expected on a particular item of equipment specified, the Contractor shall notify the Owner and Engineer, in writing, within 30 days of award of the Contract. In such instances, equipment substitutions may be made pending acceptance by the Engineer or the Owner's representative.

D. Where any specific material, process or method of construction or manufactured article is specified by reference to the catalog number of a manufacturer, the Specifications are to be used as a guide and are not intended to take precedence over the basic duty and performance specified or noted on the Drawings. In all cases, the Plumbing Contractor shall verify the duty specified with the specific characteristics of the equipment offered for review. Equipment characteristics are to be used as mandatory requirements where the Contractor proposes to use an acceptable equivalent.

E. If material or equipment is installed before it is reviewed and/or approved, the Contractor shall be liable for its removal and replacement at no extra charge to the Owner if, in the opinion of the Engineer, the material or equipment does not meet the intent of, or standard of quality implied by, the Drawings and Specifications.

F. Failure on the part of the Engineer to reject shop drawings or to reject work in progress shall not be interpreted as acceptance of work not in conformance with the Drawings and/or Specifications. Work not in conformance with the Drawings and/or Specifications shall be corrected whenever it is discovered.

1.26 RECORD DRAWINGS

A. General: Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the Engineer's reference during normal working hours.

B. Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark whichever drawing is most capable of showing conditions fully and accurately. Give particular attention to concealed elements that would be difficult to measure and record at a later date. Items to be indicated include but are not limited to:

1. Dimensional change
2. Revision to drawing detail
3. Location and depth of underground utility
4. Revision to pipe routing
5. Revision to electrical circuitry

6. Actual equipment location

7. Pipe size and routing

8. Location of concealed internal utility

9. Changes made by Change Order

10. Details not on original Contract Drawing

11. Information on concealed elements which would be difficult to identify or measure later

C. Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the Work.

D. Mark new information that is important to the Owner, but was not shown on Contract Drawings or Shop Drawings.

E. Note related Change Order numbers where applicable.

F. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each set.

G. Final record documents shall be prepared in the latest electronic version and on USB Flash drive of all drawings and a clean set of reproducible paper copies shall be turned over to the Owner at the completion of the work.

1.27 WARRANTIES AND BONDS

A. The following general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturers' standard warranties on products and special warranties are to be included:

1. General close-out requirements included in Division 01.

2. Specific requirements for warranties for the Work and products and installation that are specified to be warranted, are included in the individual Sections of Divisions-02 through -50.

3. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.

B. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

C. Separate Prime Contracts: Each prime Contractor is responsible for warranties related to its own Contract.

1.28 WARRANTY REQUIREMENTS

A. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.

B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

D. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, right and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.

E. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.

F. The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

G. Submit written warranties to the Engineer prior to the date certified for Substantial Completion. If the Engineer's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Engineer.

H. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Engineer within fifteen days of completion of that designated portion of the Work.

I. When a special warranty is required to be executed by the Contractor, or the Contractor and a subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner through the Engineer for approval prior to final execution.

1. Refer to individual Sections of Divisions-02 through -50 for specific content requirements, and particular requirements for submittal of special warranties.

J. Form of Submittal: At Final Completion compile two copies of each required warranty and bond properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.

K. Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2" by 11" paper.

1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address and telephone number of the installer.

2. Identify each binder on the front and the spine with the typed or printed title "WARRANTIES AND BONDS," the Project title or name, and the name of the Contractor.

3. When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

1.29 GUARANTEES

A. The Contractor shall guarantee all material and installation quality under these Specifications and the Contract for a period of one (1) year from the date of final acceptance by Owner. During this guarantee period, all defects developing through faulty equipment, materials or installation quality shall be corrected or replaced immediately by this Contractor without expense to the Owner. Such repairs or replacements shall be made to the Engineer's satisfaction.

B. Contractor shall provide name, address, and phone number of all contractors and subcontractors and associated equipment they provided.

1.30 PROJECT CLOSE-OUT

A. Submit specific warranties, quality bonds, maintenance agreements, final certifications and similar documents in accordance with Division 01.

B. Deliver tools, spare parts, extra stock, and similar items.

C. Complete start-up testing of systems, including measuring and documenting all required startup checklist requirements documented in installation and maintenance instructions by the equipment manufacturer, and instruction of the Owner's operating and maintenance personnel. Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.

D. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.

E. Field Observation Procedures: On receipt of a request for an Engineers Field Observation, the Engineer will advise the Contractor of unfulfilled requirements. The Engineer will advise the Contractor of construction that must be completed or corrected before the certificate will be issued. Contractor shall submit written response to each corrective item including specific photos prior to final Engineering inspection.

1. The Engineer will repeat the Field Observation when requested and assured that the Work has been substantially completed.

2. Results of the completed list of unfulfilled items will form the basis of requirements for final acceptance.

END OF SECTION

Electronic Drawing File Release Form

DELIVERY OF ELECTRONIC FILES FOR: _____
Project Name

In accepting and utilizing any drawings or other data on any form of electronic media generated and provided by the Design Professional, the Contractor covenants and agrees that all such drawings and data are instruments of service of the Design Professional, who shall be deemed the author of the drawings and data, and shall retain all common law, statutory law and other rights, including copyrights.

The Contractor further agrees not to use these drawings and data, in whole or in part, for any purpose or project other than the project which is the subject of this Agreement. The Contractor agrees to waive all claims against the Design Professional resulting in any way from any unauthorized changes or reuse of the drawings and data for any other project by anyone other than the Design Professional.

In addition, the Contractor agrees, to the fullest extent permitted by law, to indemnify and hold the Design Professional harmless from any damage, liability or cost, including reasonable attorneys' fees and costs of defense, arising from any changes made by anyone other than the Design Professional or from any reuse of the drawings and data without the prior written consent of the Design Professional.

Under no circumstances shall transfer of the drawings and other instruments of service on electronic media for use by the Client be deemed a sale by the Design Professional, and the Design Professional makes no warranties, either express or implied, of merchantability and fitness for any particular purpose.

_____	_____
Contractor's Signature	Date
_____	
Company - Title	
_____	_____
Architects' Signature	Date
_____	
Firm - Title	
_____	_____
Owner's Signature	Date
_____	
Company - Title	

SECTION 22 0516 - EXPANSION FITTINGS AND LOOPS FOR PLUMBING PIPING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Design of expansion system and anchors
2. Flexible pipe connectors.
3. Expansion joints.
4. Expansion compensators.
5. Pipe alignment guides.
6. Swivel joints.
7. Pipe anchors.

B. Related Sections:
1. Section 22 – General Conditions for Plumbing Trades
2. Section 22 – Common Work Results for Plumbing: Product and installation requirements for piping hangers and supports.
3. Section 22 - Vibration and Seismic Controls for Plumbing Piping and Equipment: Product and installation requirements for vibration isolators used in piping systems.
4. Section 22 – Plumbing Piping: Product and installation requirements for piping used in domestic water systems.

1.2 REFERENCES

A. American Society of Mechanical Engineers:
1. ASME B31.9 - Building Services Piping.
2. ASME Section IX - Boiler and Pressure Vessel Code - Welding and Brazing Qualifications.

B. American Welding Society:
1. AWS D1.1 - Structural Welding Code - Steel.

1.3 DESIGN REQUIREMENTS

A. Provide design, details, work and equipment required for expansion and contraction of hot water and hot water return piping systems. Verify anchors, guides, and expansion joints provide and adequately protect system.

B. Provide structural work and equipment required for expansion and contraction of piping. Verify anchors, guides, and expansion joints provide and adequately protect system.

C. Expansion Compensation Design Criteria:
1. Installation Temperature: 50 degrees F.
2. Domestic Hot Water: 140 degrees F.
3. Domestic Hot Water Recirculation: 110 degrees F.

4. Safety Factor: 30 percent.

1.4 SUBMITTALS

A. See Division 01 – General Requirements: Requirements for submittals.

B. Pipe Expansion Analysis, Design and Certification:
1. Provide pipe expansion and anchoring calculations for all domestic hot water and domestic hot water recirculation piping systems including connections to equipment, fixtures, appliances, and to the structure. Piping layouts and associated calculations must be stamped by a registered professional engineer with at least five years of pipe expansion experience, licensed in the state of the job location.
2. Analysis must indicate calculated dead loads, active expansion loads and capacity of materials utilized for connections to equipment, fixtures, appliances, and structure. Analysis must detail anchoring methods, bolt diameter, embedment and/or welded length. All expansion and anchoring devices shall be designed to accept the forces as calculated.

C. Shop Drawings: Indicate layout of piping systems, including flexible connectors, expansion joints, expansion compensators, loops, offsets and swing joints.

D. Product Data:
1. Flexible Pipe Connectors: Indicate maximum temperature and pressure rating, face-to-face length, live length, hose wall thickness, hose convolutions per foot and per assembly, fundamental frequency of assembly, braid structure, and total number of wires in braid.
2. Expansion Joints: Indicate maximum temperature and pressure rating, and maximum expansion compensation.

E. Manufacturer's Installation Instructions: Submit special procedures.

F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

G. Welders' Certificate: Include welders' certification of compliance with ASME Section IX or AWS D1.1 as applicable

H. Manufacturer's Field Reports: Indicate results of inspection by manufacturer's representative.

1.5 CLOSEOUT SUBMITTALS

A. See Division 01 – General Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of flexible pipe connectors, expansion joints, anchors, and guides.

C. Operation and Maintenance Data: Submit adjustment instructions.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with ASME B31.9 code for installation of piping systems and ASME Section IX for welding materials and procedures.

B. All pre-manufactured expansion fittings and loops installed on the domestic water system shall meet the requirements of SDWA 1417.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years of experience.

B. Installer: Company specializing in performing work of this section with minimum three years of experience.

C. Design expansion compensating system under direct supervision of professional engineer experienced in design of this work and licensed at project location.

1.8 PRE-INSTALLATION MEETINGS

A. See Division 01 – General Requirements: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.

1.9 DELIVERY, STORAGE, AND HANDLING

A. See Division 01 – General Requirements: Product storage and handling requirements.

B. Accept expansion joints on site in factory packing with shipping bars and positioning devices intact. Inspect for damage.

C. Protect equipment from exposure by leaving factory coverings, pipe end protection, and packaging in place until installation.

1.10 WARRANTY

A. See Division 01 – General Requirements: Product warranties and product bonds.

1.11 EXTRA MATERIALS

A. See Division 01 – General Requirements: Spare parts and maintenance products.

B. Supply two 12 ounce containers of packing lubricant and cartridge style grease gun.

PART 2 PRODUCTS

2.1 FLEXIBLE PIPE CONNECTORS - STEEL

A. Manufacturers:
1. Metraflex Company – SLPC
2. Mason Industries Inc. / Mercer Rubber Company; - FFLSS Series
3. Flexicraft FF Series
4. Substitutions: See Division 01 - General Requirements and 22 04 00 – General Requirements.

B. Inner Hose: 304 Stainless Steel

C. Exterior Sleeve: Single braided, type 304 stainless steel

D. Pressure Rating: 125 psi minimum working pressure at 70 degrees F.

E. Fittings Materials of construction and end fitting type shall be consistent with pipe material and equipment/ pipe connection fittings. Copper fittings shall not be attached to stainless steel hose.

F. Size: Use pipe sized units.

G. Maximum offset: 3/4 inch on each side of installed center line.

2.2 FLEXIBLE PIPE CONNECTORS - COPPER

A. Manufacturers:
1. Metraflex Company Series BBSC
2. Mason Industries Inc. Series CPSB
3. Flexicraft Series SS
4. Substitutions: See Division 01 - General Requirements and 22 04 00 – General Requirements.

B. Inner Hose: Bronze.

C. Exterior Sleeve: Braided bronze.

D. Pressure Rating: 125 psi minimum working pressure at 70 degrees F.

E. Fittings Materials of construction and end fitting type shall be consistent with pipe material and equipment/ pipe connection fittings. Copper fittings shall not be attached to stainless steel hose.

F. Maximum offset: 1/2 inch on each side of installed center line.

G. NSF 61 and NSF 372 certified for use with potable water

2.3 EXPANSION JOINTS - COPPER WITH PACKED SLIDING SLEEVE (AXIAL MOVEMENT)

A. Manufacturers:
   1. Hyspan Precision Products – Series 8500
   2. Mason Industries / Mercer Rubber Company Type ECGWN
   3. Flexicraft Compensator Series
   4. Substitutions: See Division 01 - General Requirements and 22 04 00 – General Requirements.

B. Working Pressure: 125 psi.

C. Maximum Temperature: 250 degrees F.

D. Joint: Flanged.

E. Size: Use pipe sized units.

F. Application: Copper or steel piping 2 inches and over.

2.4 EXPANSION LOOPS - HOSE AND BRAID

A. Manufacturers:
   1. Metraflex Company: Metraloop
   2. Mason Industries / Mercer Rubber Company: FFL Series or CPSB Series
   3. Flexicraft: SS Connector Series
   4. Substitutions: See Division 01 - General Requirements and 22 04 00 – General Requirements.

B. Provide flexible loops with two flexible sections of hose and braid, two 90 degree elbows, and 180 degree return with support bracket and air release or drain plug.

C. Provide flexible loops capable of movement in the x, y, and z planes. Flexible loops to impart no thrust loads to the building structure.

D. Flexible Connectors: Flanged or as specified in 22 0503 Pipe and Tubes for Plumbing and Equipment, braided type with wetted components of stainless steel, sized to match piping.
   1. Maximum Allowable Working Pressure: 150 psig at 120 degrees F.
   2. Accommodate the Following:
      a. Axial Deflection in Compression and Expansion: To be determined by the Professional Engineer providing calculations.
      b. Lateral Movement: To be determined by the Professional Engineer providing calculations.
      c. Angular Rotation: 15 degrees.
      d. Force developed by 1.5 times specified maximum allowable operating pressure.
   3. End Connections: Same as specified for pipe jointing.
   4. Provide necessary accessories including, but not limited to, swivel joints.

2.5 EXPANSION ACCESSORIES

A. Manufacturers:
   1. Metraflex
   2. Mason Industries / Mercer Rubber Company
   3. Vibration Eliminator
   4. Substitutions: See Division 01 - General Requirements and 22 04 00 – General Requirements.

B. Pipe Alignment Guides: Two piece welded steel with enamel paint, bolted, with spider to fit standard pipe, frame with four mounting holes, clearance for insulation, minimum 3 inch travel.

C. Swivel Joints: Bronze, double ball bearing race, field lubricated, with Buna-N o-ring seals.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install Work in accordance with ASME B31.9

C. Install flexible pipe connectors on pipes connected to equipment supported by vibration isolation. Refer to Section 22 05 48. Provide line size flexible connectors.

D. Install flexible connectors at right angles to displacement. Install one end immediately adjacent to isolated equipment and anchor other end. Install in horizontal plane unless indicated otherwise.

E. Rigidly anchor pipe to building structure. Provide pipe guides to direct movement only along axis of pipe. Erect piping so strain and weight is not on cast connections or apparatus.

F. Provide support and anchors for controlling expansion and contraction of piping. Provide loops, pipe offsets, and swing joints, or expansion joints where required. Refer to Section 22 05 00 for pipe hanger installation requirements.

G. Provide grooved piping systems with minimum three flexible couplings per flexible connector supported by vibration isolation.

H. Provide expansion loops as indicated on Drawings.

3.2 MANUFACTURER'S FIELD SERVICES

A. See Division 01 – General Requirements: Manufacturers' field services.

B. Furnish inspection services by flexible pipe manufacturer's representative for final installation and certify installation is in accordance with manufacturer's recommendations and connectors are performing satisfactorily.

PIPING SYSTEM	PIPING MATERIAL	PIPE SIZE	CONDITION REQUIRING EXPANSION JOINT OR EXPANSION LOOP (ALL CONDITIONS ASSUME "OFFSET LEG" AT END OF RUNS ARE MINIMUM 12'0" LONG)
Domestic hot water supply and recirculation piping (all temperatures)	Copper	Up to 3 inches	All straight sections of piping over 90' long. All straight sections of piping where "offset leg" is less than 12'0"
Domestic hot water supply and recirculation piping (all temperatures)	Steel	Up to 2 inches	All straight sections of piping over 140' long.
Domestic hot water supply and recirculation piping (all temperatures)	Steel	2" to 4"	All straight sections of piping over 90' long

END OF SECTION

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SECTION 22 0517 - SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pipe sleeves.

B. Stack sleeves fittings.

C. Sleeve-seal systems.

1.2 RELATED REQUIREMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

B. Division 07 – Thermal and Moisture Protection.

C. Division 09 – Finishes.

D. Section 22 – General-Duty Valves for Plumbing Piping.

E. Section 22 – Identification for Plumbing Piping and Equipment

F. Section 22 – Plumbing Insulation.

1.3 REFERENCE STANDARDS

A. ASTM C592 - Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type); 2016.

B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems.

1.4 SUBMITTALS

A. See Division 01 - General Requirements, for submittal procedures.

B. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years experience.

B. Installer Qualifications: Company specializing in performing work of the type specified this section.
   1. Minimum three years experience.

C. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store sleeve and sleeve seals in shipping containers, with labeling in place.

B. Provide temporary protective coating on cast iron and steel sleeves if shipped loose.

1.7 WARRANTY

A. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.1 SLEEVES

A. Materials
   1. Cast-Iron Pipe Sleeve: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated
   2. Galvanized Steel Pipe Sleeve: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
   3. Galvanized-Steel Sheet Sleeve: 0.0239-inch thickness; round tube closed with longitudinal joint.

2.2 STACK SLEEVE FITTINGS

A. Manufacturers
   1. Zurn Industries, LLC
   2. Jay R. Smith Mfg. Co.
   3. MIFAB, Inc.
   4. Josam
   5. Substitutions: See Division - 01 General Requirements.

B. Stack Sleeve Fitting
   1. Galvanized cast iron sleeve with integral flashing flange. Provide underdeck clamp where required.

2.3 SLEEVE-SEAL SYSTEMS

A. Manufacturers:
   1. Flexicraft Industries; PipeSeal.
   2. Metraflex

3. Link-Seal
4. Substitutions: See Division - 01 General Requirements.

B. Modular/Mechanical Seal:
1. Synthetic rubber interlocking links continuously fill annular space between pipe and wall/casing opening.
2. Provide watertight seal between pipe and wall/casing opening.
3. Elastomer element size and material in accordance with manufacturer's recommendations.
4. Glass reinforced plastic pressure end plates.

PART 3 EXECUTION

3.1 GENERAL

A. Lay out penetration and sleeve openings in advance, to permit provision in work. Coordinate work with architectural and structural work. Set sleeves in forms before concrete is poured. Provide remedial work where sleeves are omitted or improperly placed. Remedial work includes core drilling (see requirements below) for penetrations if walls are poured, or otherwise constructed, without required sleeves. Provide core drilling (see requirements below) of existing construction. Do not penetrate structural members without Structural Engineer's/Architect's written approval.

B. Install piping and pipe sleeves to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

C. Sleeve installation shall meet NFPA-101 requirements, UL rated assemblies requirements, and materials requirements of these specifications. Submit a list of the UL listed details that the Contractor intends on using on this project in all rated assemblies.

D. Sleeves that penetrate outside walls, basement slabs, footings and beams shall be waterproof. Sleeves that penetrate floors shall be waterproof.

E. Where pipes passing through openings are exposed in finished rooms, finishes of filling materials shall match and be flush with adjoining floor, ceiling, and wall finishes.

F. Identify unused sleeves and slots for future installation. Fill slots, sleeves and other openings in floors or walls if not used. Fill spaces in openings after installation of pipe. Fill for floor penetrations shall prevent passage of water, smoke, fire, and fumes. Fill shall be fire resistant in fire floors and walls, and shall prevent passage of air, smoke and fumes.

G. Do not support piping risers or conduit on sleeves.

H. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 for materials.

I. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements. Verify final equipment locations for roughing-in.

J. Structural Considerations: Do not penetrate building structural members unless indicated.

3.2 APPLICATIONS

A. Use sleeves and sleeve seals for the following piping-penetration applications:
   1. Exterior Concrete Walls Above Grade:
      a. Cast-iron pipe sleeves or galvanized-steel pipe sleeves.
   2. Exterior Concrete Walls Below Grade:
      a. Cast-iron pipe sleeves with sleeve-seal system or galvanized-steel-pipe sleeves with sleeve-seal system.
      b. Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
   3. Concrete Slabs-on-Grade:
      a. Cast-iron pipe sleeves with sleeve-seal system, or galvanized-steel-pipe sleeves with sleeve-seal system.
      b. Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
   4. Concrete Slabs above Grade:
      a. Galvanized-steel-pipe sleeves, or stack sleeve fittings
   5. Interior Partitions:
      a. Cast iron pipe sleeves, galvanized-steel-pipe sleeves, or galvanized-steel-sheet sleeves.
   6. Floors with membrane waterproofing:
      a. Stack sleeve fittings.

3.3 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.

C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.
   1. Cut sleeves to length for mounting flush with both surfaces.
      a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.
   2. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.

D. Install sleeves for pipes passing through interior partitions.
   1. Cut sleeves to length for mounting flush with both surfaces.
   2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.

3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Division 07 – Thermal and Moisture Protection

E. Sleeves for insulated pipe in non-fire rated construction shall accommodate continuous insulation without compression.

F. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified Division 07 – Thermal and Moisture Protection

3.2 STACK-SLEEVE-FITTING INSTALLATION

A. Install stack-sleeve fittings in new slabs as slabs are constructed.

B. Install fittings that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.

C. Secure flashing between clamping flanges for pipes penetrating floors with membrane waterproofing. Comply with requirements for flashing specified in Division 07 – Thermal and Moisture Protection

D. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level.

E. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.

F. Using grout, seal the space around outside of stack-sleeve fittings.

G. Fire-Barrier Penetrations: Maintain indicated fire rating of floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Division 07 – Thermal and Moisture Protection.

3.3 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.

B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size.

C. Position piping in center of sleeve.

D. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve.

E. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

F. Install in accordance with manufacturer's recommendations.

3.4 CORE DRILLING

A. Core drilling shall be avoided in new construction. Set sleeves prior to installation of structure for passage of pipes, conduit and ducts. Where core drilling is unavoidable (e.g. when individual sleeves are not installed or incorrectly located) or required by renovation projects, locate required openings prior to coring and submit locations for review.

B. Coordinate openings with other Divisions.

C. Do not disturb existing systems. Protect areas from damage.

D. Thoroughly investigate existing conditions in vicinity of required opening prior to coring.

3.5 CLEANING

A. Upon completion of work, clean all parts of the installation.

B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

END OF SECTION

SECTION 22 0519 - METERS AND GAGES FOR PLUMBING PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Positive displacement meters.

B. Liquid flow meters.

C. Pressure gages and pressure gage taps.

D. Thermometers and thermometer wells.

1.2 RELATED REQUIREMENTS

A. Division 01 – General Requirements

B. Division 22 – Plumbing

1.3 REFERENCE STANDARDS

A. American Society of Mechanical Engineers
1. ASME B40.100 - Pressure Gauges and Gauge Attachments.
2. ASME MFC-3M - Measurement of Fluid Flow in Pipes Using Orifice, Nozzle and Venturi

B. American Society for Testing and Materials
1. ASTM E1 - Standard Specification for ASTM Liquid-in-Glass Thermometers.
2. ASTM E77 - Standard Test Method for Inspection and Verification of Thermometers.

C. American Water Works Association
1. AWWA C700 - Cold-Water Meters -- Displacement Type, Metal Alloy Main Case.
2. AWWA C701 - Cold-Water Meters -- Turbine Type, for Customer Service.
3. AWWA C702 - Cold-Water Meters -- Compound Type.
4. AWWA C707 - Encoder-Type Remote Registration Systems for Cold-Water Meters
5. AWWA C708 - Cold-Water Meters – Multi-jet Type
6. AWWA C710 - Cold-Water Meters - Displacement Type, Plastic Main Case
7. AWWA C712 - Cold-Water Meters - Single jet Type
8. AWWA C713 - Cold-Water Meters - Fluidic-Oscillator Type
9. AWWA C715 - Cold-Water Meters - Electromagnetic and Ultrasonic Type for Revenue Applications
10. AWWA M6 - Water Meters - Selection, Installation, Testing, and Maintenance.

D. Underwriters' Laboratories
   1. UL 404 - Gauges, Indicating Pressure, for Compressed Gas Service; Current Edition, Including All Revisions.

1.4 SUBMITTALS

A. See Division 01 – General Requirements, for submittal procedures.

B. Product Data: Provide list that indicates use, operating range, total range and location for manufactured components.

C. Project Record Documents: Record actual locations of components and instrumentation.

D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Extra Pressure Gages: One of each type and size.
   2. Extra Thermometers: One of each type and size.

1.5 FIELD CONDITIONS

A. Do not install instrumentation when areas are under construction, except for required rough-in, taps, supports and test plugs.

PART 2 PRODUCTS

2.1 ULTRASONIC FLOW WETER (5/8” TO 2”)

A. Manufacturers:
   1. Neptune
   2. Badger Meter
   3. Sensus
   4. Substitutions: See Division 01 – General Requirements.

B. Meter shall comply with the safe water drinking act and shall be certified to NSF/ANSI Standards 61 as well as AWWA C715

C. Meter shall be solid state ultrasonic type suitable for potable water applications

D. Meter Construction:
   1. Lead-free bronze alloy meter housing, ultrasonic transducers, a meter-control circuit board with associated wiring, LCD and battery.
   2. Wetted elements are limited to the pressure vessel and transducers.
   3. The electronic components are housed and fully potted within a molded, engineered polymer enclosure, which is attached to the meter housing.
   4. The transducers extend through the housing and are sealed by O-rings
   5. Meter register includes a 9 digit LCD display. In addition to total gallons consumption the LCD display shall provide the following alarms:
      a. Leak
      b. Reverse flow

c. Empty pipe
d. Low battery

E. Operating Conditions:
1. Maximum operating pressure: 175 psi
2. Operating Water Temperature Range: 33 to 122
3. Environmental Conditions: 14 to 149

F. Endpoint Specifications
1. Remote reading capability shall be provided by meter endpoint.
2. Endpoint shall be integral to the meter register or separate, suitable for remote mounting.
3. Endpoint power: Lithium battery with capacitor
4. Transmitter Specifications:
a. Two-way endpoint
b. Transmissions
1) Standard mobile message
2) Standard fixed network message
3) LoRa fixed network message (only on LoRaWAN model)
c. Transmitter Channels:
1) 50 (R900 mobile and fixed network messages)
2) 64 (LoRa fixed network message)
d. FCC Verification: Part 15.247
1) Channel Frequency: 902 to 928 MHz
2) Frequency hopping, spread-spectrum
e. Meter Reading & Flag Interval:
1) Every 15 minutes
2) Leak, Backflow, Tamper, excessive flow, low battery
f. Data Logging Interval:
1) 96 days of hourly data
5. Environmental Conditions
a. Operating Temperature: -22ºF to +149ºF (-30ºC to +65ºC)
b. Storage Temperature: -40°F to +158°F (-40°C to +70°C)
c. Operating Humidity: 100% condensing, fully submersible (Pit Set version only)
6. Materials
a. Register Housing:
1) Engineer polymer
2) Roll-sealed copper (Pit Set version only)
3) Lens: Tempered Glass

2.2 INSERTION TURBINE FLOWMETERS

A. Manufacturers
1. Onicon Model F-1000 Series
2. Badger
3. Substitutions: See Division 01 – General Requirements.

B. Meter shall comply with the safe water drinking act and shall be certified to NSF/ANSI Standards 61 as well as AWWA C701

C. Description:
1. Provide an insertion turbine flowmeter complete with NIST traceable, wet calibrated flow-measuring element, integral transmitter, installation valves, depth gage and calibration certificate.
2. Flowmeter shall be wet tappable, allowing insertion and removal from the flow stream without system shutdown.

D. Application Range:
1. This contractor shall be responsible for selecting the flowmeter options submitted based on the application.
2. Flowmeter shall be constructed, calibrated, and scaled for the intended application in terms of pipe size, pipe material, installation requirements, expected flow rate, ambient conditions and fluid characteristics which include but are not limited to pressure, temperature, conductivity, and viscosity.

E. Sensing Technology:
1. Axial Turbine flow-measuring element; either single or dual turbine based on application requirements.

F. Design:
1. Axial insertion turbine design with electronic impedance-based sensing circuit. Dual insertion turbine shall incorporate two contra rotating turbines and an averaging circuit to reduce measurement errors due to flow distortions, such as swirl, when installed in piping configurations with reduced straight run.
2. Single axial turbine sensing element acceptable for line sizes 1.25” and larger.
3. Dual axial turbine sensing element acceptable for line sizes 2.5” and larger.

G. Construction:
1. Plated brass or 316L stainless steel with attached tag indicating calibration information.

H. Maximum Pressure Rating:
1. 400 psig

I. Maximum Temperature Rating:
1. 280 deg F

J. End Connections:
1. For NPS 1” and Smaller: Threaded or sweat.
2. For NPS 1.25” and Larger: 1” Male NPT for use with 1” full port Isolation Valve, Minimum.

K. Flow Range:
1. Flow-measuring element and transmitter shall cover operating range of equipment or system served.

L. Accuracy:
1. Flowmeter shall provide calibrated outputs, directly from the integral transmitter, throughout the operating range with the accuracy stated as follows:
   a. Plus or minus 0.5% of rate at calibrated velocity
   b. Plus or minus 1.0% of rate from 3.0 to 30.0 ft/sec velocity (10:1 turndown).
   c. Plus or minus 2.0% of rate from 0.4 to 20 ft/sec velocity (50:1 turndown).

M. Calibration:
1. Each flowmeter shall receive a wet calibration, within the expected operating range, against a primary volumetric standard that is traceable to NIST.

2.3 PRESSURE GAGES

A. Manufacturers:
1. Dwyer Instruments, Inc
2. Moeller Instrument Company, Inc
3. Omega Engineering, Inc
4. H.O. Trerice Co.
5. Substitutions: See Section 01 6000 - Product Requirements.

B. Pressure Gages: ASME B40.100, UL 393 stainless steel case, phosphor bronze bourdon tube, rotary brass movement, brass socket, with front recalibration adjustment, black scale on white background. Meets NSF/ANSI Standards 372 and 61
1. Case: Steel with brass bourdon tube.
2. Size: 2-1/2 inch (115 mm) diameter.
3. Full Scale Accuracy: 1.6%.
4. Scale: Psi and kPa.
5. Range: 0 to 100 psi
6. Maximum Temperature: 150°F

2.4 PRESSURE GAGE TAPPINGS

A. Gage Cock: Tee or lever handle, brass for maximum 150 psi (1034 kPa).
1. Manufacturers:
   a. WIKA Instrument Corporation
   b. H.O. Trerice Co.
   c. Cincinnati Valve Company
   d. Substitutions: See Division 01 - Product Requirements.

B. Needle Valve: Brass, 1/4 inch (6 mm) NPT for minimum 150 psi (1034 kPa).
1. Manufacturers:
   a. WIKA Instrument Corporation
   b. H.O. Trerice Co.
   c. Cincinnati Valve Company
   d. Substitutions: See Division 01- Product Requirements.

C. Pulsation Damper: Pressure snubber, brass with 1/4 inch (6 mm) connections.
1. Manufacturers:
a. WIKA Instrument Corporation
b. H.O. Trerice Co.
c. Cincinnati Valve Company
d. Substitutions: See Division 01 - Product Requirements.

2.5 STEM TYPE THERMOMETERS

A. Manufacturers:
1. Dwyer Instruments, Inc .
2. Omega Engineering, Inc.
3. Weksler Glass Thermometer Corp.
4. H.O. Trerice Co..
5. Winters Instruments
6. Substitutions: See Division 01 - Product Requirements.

B. Thermometers - Fixed Mounting: Straight or 90 degree angle mounting as required by field conditions
1. Size: 9 inch scale.
2. Fill Type: Blue or red appearing non-toxic liquid in glass
3. Case: Cast aluminum, epoxy coated or enamel finish
4. Window: Clear acrylic.
5. Stem: Brass.
6. Tube: Stem front magnifying type
7. Accuracy: 2 percent, per ASTM E77.
8. Calibration: Degrees F.

C. Thermometers - Adjustable Angle: cast aluminum adjustable joint with positive locking device; adjustable 360 degrees in horizontal plane, 180 degrees in vertical plane.
1. Size: 9 inch scale.
2. Fill Type: Blue or red appearing non-toxic liquid in glass
3. Case: Cast aluminum, epoxy coated or enamel finish
4. Window: Clear acrylic.
5. Stem: Brass.
6. Tube: Stem front magnifying type
7. Accuracy: 2 percent, per ASTM E77.
8. Calibration: Degrees F.

2.6 DIAL THERMOMETERS

A. Manufacturers:
1. Dwyer Instruments, Inc.
2. Omega Engineering, Inc.
3. Weksler Glass Thermometer Corp.
4. H.O. Trerice Co..
5. Winters Instruments
6. Substitutions: See Division 01 - Product Requirements.

B. Thermometers - Fixed Mounting: Dial type, white with black markings and black pointer, hermetically sealed lens.
   1. Size: 5 inch diameter dial.
   2. Case: Stainless steel
   3. Stem: Stainless steel
   4. Coil: Bimetalic, silicon damping
   5. Lens: Clear glass.
   6. External reset
   7. Accuracy: 1 percent.
   8. Calibration: Degrees F.

C. Thermometers - Adjustable Angle: Dial type, white with black markings and black pointer, hermetically sealed lens.
   1. Size: 5 inch diameter dial.
   2. Case: Stainless steel
   3. Stem: Stainless steel
   4. Coil: Bimetalic, silicon damping
   5. Lens: Clear glass.
   6. External reset
   7. Accuracy: 1 percent.
   8. Calibration: Degrees F.

D. Remote Mounted Thermometers: Dial type vapor or liquid actuated, white with black markings and black pointer.
   1. Size: 4-1/2 inch diameter dial.
   2. Case: Aluminum with black finish
   3. Case mounting: Surface mounted back flange with bottom outlet, surface mounted back flange with back outlet or flush mounted back outlet. Contractor to coordinate with site conditions
   4. Movement: Brass or copper bulb, copper or bronze braided capillary
   5. Lens: Clear glass.
   6. Length of Capillary: Minimum 5 feet.
   7. Accuracy: 2 percent.
   8. Calibration: Degrees F.

E. Remote Mounted Thermometers: Dial type vapor or liquid actuated, white with black markings and black pointer.
   1. Size: 3-1/2 inch diameter dial.
   2. Case: Stainless steel
   3. Case mounting: Adjustable angle with mounting bracket, surface mounted back flange with bottom outlet, surface mounted back flange with back outlet or flush mounted back outlet. Contractor to coordinate with site conditions
   4. Movement: Brass or copper bulb, copper or bronze braided capillary
   5. Lens: Clear acrylic.
   6. Length of Capillary: Minimum 5 feet.
   7. Accuracy: 2 percent.
   8. Calibration: Degrees F.

2.7 THERMOMETER SUPPORTS

A. Manufacturers:
1. Dwyer Instruments, Inc.
2. Omega Engineering, Inc.
3. Weksler Glass Thermometer Corp.
4. H.O. Trerice Co..
5. Winters Instruments
6. Substitutions: See Division 01 - Product Requirements.

B. Thermometer supports shall be by the same manufacturer as the thermometers

C. Socket: Brass separable sockets for thermometer stems with or without extensions as required, and with cap and chain.

2.8 TEST PLUGS

A. Manufacturers:
1. Dwyer Instruments, Inc.
2. Omega Engineering, Inc.
3. Weksler Glass Thermometer Corp.
4. H.O. Trerice Co..
5. Winters Instruments
6. Substitutions: See Division 01 - Product Requirements.

B. Test Plug: 1/4 inch or 1/2 inch brass fitting and cap for receiving 1/8 inch outside diameter pressure or temperature probe with neoprene core for temperatures up to 200 degrees F.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install meters with isolating valves on inlet and outlet. Provide full line size, valved bypass for meters. Valve on bypass shall be lockable.

C. Provide pressure gage on inlet and discharge of each pump.

D. Provide test plugs before and after strainers.

E. Install pressure gages with pulsation dampers. Provide gage cock to isolate each gage. Extend nipples to allow clearance from insulation.

F. Install thermometers in piping systems in sockets in short couplings. Enlarge pipes smaller than 2-1/2 inch for installation of thermometer sockets. Ensure sockets allow clearance from insulation.

G. Provide instruments with scale ranges selected according to service with largest appropriate scale.

H. Install gages and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.

I. Adjust gages and thermometers to final angle, clean windows and lenses, and calibrate to zero.

3.2 SCHEDULES

A. Pressure Gages
   1. Locations as shown on the plans
   2. Scale Range:
      a. Pumps, 0 to 160 psi.
      b. Expansion tanks, 0 to 160 psi.
      c. Pressure tanks, 0 to 160 psi.
      d. Pressure reducing valves, 0 to 160 psi.
      e. Backflow preventers, 0 to 160 psi.

B. Stem Type Thermometers
   1. Location as shown on the plans
   2. Scale Range: Domestic hot water supply and recirculation, 30 to 180 degrees F.

END OF SECTION

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SECTION 22 0523 - GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Gate valves.
2. Ball valves.
3. Check valves.
4. Temperature and pressure relief valve.
5. Automatic balancing valves.
6. Balancing valves.
7. Thermostatic balancing valves

B. Related Sections:
1. Division 01 – General Requirements.

2. Division 22 – Plumbing

1.2 REFERENCES

A. American Society of Sanitary Engineering
1. ASSE 1003 - Performance Requirements for Water Pressure Reducing Valves for Potable Water Distribution Systems

B. Manufacturers Standardization Society of the Valve and Fittings Industry:
1. MSS SP 67 - Butterfly Valves.
2. MSS SP 70 - Cast Iron Gate Valves, Flanged and Threaded Ends.
3. MSS SP 71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends.
4. MSS SP 78 - Cast Iron Plug Valves, Flanged and Threaded Ends.
5. MSS SP 80 - Bronze Gate, Globe, Angle and Check Valves.
6. MSS SP 110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.
7. MSS SP 125 - Check Valves: Gray Iron and Ductile Iron, In-Line, Spring-Loaded, Center-Guided
8. MSS SP 139 – Copper Alloy Gate, Globe, Angle, and Check Valves for Low Pressure/Low Temperature Plumbing Applications

C. National Sanitation Foundation
1. NSF 61 – Drinking Water System Components – Health Effects
2. NSF 372 – Drinking Water System Components - Lead Content

D. Safe Drinking Water Act:
1. SDWA 1417 - Reduction of Lead in Drinking Water.

1.3 SUBMITTALS

A. Division 01 – General Requirements: Requirements for submittals.

B. Product Data: Submit manufacturers catalog information with valve data and ratings for each service.

C. Manufacturer's Installation Instructions: Submit hanging and support methods, joining procedures.

D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS

A. Division 01 - General Requirements: Requirements for submittals.

B. Project Record Documents: Record actual locations of valves

C. Operation and Maintenance Data: Submit installation instructions, spare parts lists, exploded assembly views.

1.5 QUALITY ASSURANCE

A. For drinking water service, provide valves complying with NSF 61.

B. All valve manufacturers shall demonstrate that valve products have been certified per NSF/ANSI Standard 372.

C. All valves installed on the domestic water system shall have labeling of lead content engraved on the valve body.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years experience.

B. Installer: Company specializing in performing work of this section with minimum 3 years experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Division 01 - General Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

C. Provide temporary protective coating on cast iron and steel valves.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Division 01 – General Requirements: Environmental conditions affecting products on site.

B. Do not install valves underground when bedding is wet or frozen.

1.9 WARRANTY

A. Division 01 – General Requirements: Requirements for warranties.

B. Furnish one year manufacturer warranty for valves excluding packing.

PART 2 PRODUCTS

2.1 GATE VALVES

A. Manufacturers:
1. Apollo
2. Milwaukee Valve Co.
3. NIBCO, Inc.
4. American Valve Co.
5. Watts
6. Division 01 – General Requirements

B. 2 inches and Smaller: MSS SP 139, Class 300, bronze body, bronze trim, lead free, threaded bonnet, non-rising stem, hand-wheel, inside screw, solid wedge disc, solder, threaded or press ends

C. 2 1/2 inches and Larger: MSS SP 70, Class 175, cast iron body, bronze trim, bolted bonnet, rising stem, hand-wheel, outside screw and yoke, solid wedge disc with bronze seat rings, flanged ends. Furnish chain-wheel operators for valves 6 inches and larger mounted over 8 feet above floor.

2.2 BALL VALVES

A. Manufacturers:
1. Apollo
2. Milwaukee Valve Co.
3. NIBCO, Inc.
4. American Valve Co.
5. Watts
6. Substitutions: Division 01 – General Requirements

B. 2 inches and Smaller: MSS SP 110, 600 psi WOG, two piece bronze body, lead free, type 316 stainless steel ball, full port, teflon seats, stainless steel blow-out proof stem, threaded, solder, or press ends with lever handle.

C. 2 inches and Smaller: MSS SP 110, Class 600, bronze, three piece body, lead free, type 316 stainless steel ball, full port, teflon seats, blow-out proof stem, threaded, solder, or press ends, lever handle.

2.3 CHECK VALVES

A. Manufacturers:
1. Apollo
2. Milwaukee Valve Co.
3. NIBCO, Inc.
4. American Valve Co.
5. Watts
6. Substitutions: Division 01 – General Requirements

B. Horizontal Swing Check Valves:
1. 2 inches and Smaller: MSS SP 139, 200 psi non-shock cold working pressure, 100 psi at 250 °F maximum pressure/temperature. Bronze body, PTFE seat, solder, threaded, or press ends.

C. Spring Loaded Check Valves:
1. 2 inches and Smaller: MSS SP 139, 250 psi non-shock cold working pressure, bronze or brass body, stainless steel spring, PTFE disc, in-line spring lift check, solder or press ends.
2. 2-1/2 inches and Larger: MSS SP 125, Class 125, lead free, wafer style, cast iron body, bronze seat, center guided bronze disc, stainless steel spring and screws, flanged ends.

2.4 TEMPERATURE AND PRESSURE RELIEF VALVES

A. Manufacturers:
1. Apollo Valves
2. Watts
3. Zurn
4. Substitutions: Division 01 – General Requirements

B. Bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labeled.

2.5 AUTOMATIC BALANCING VALVE

A. Manufacturers
1. IMI Flow Design Inc.
2. Nibco
3. Caleffi
4. Substitutions: Division 01 – General Requirements

B. Body: Brass with brass unions or stainless steel with nickel plated unions.

C. Threaded, soldered or press inlet and outlet connection.

D. Automatic flow cartridge, polymer or stainless steel cartridge, stainless steel spring, factory set calibration.

E. Maximum operating temperature: 180 degrees F.

F. NSF 61 certification.

2.6 BALANCING VALVES

A. Manufacturers
1. Bell & Gossett
2. Caleffi
3. Nibco
4. Watts
5. Substitutions: Division 01 – General Requirements

B. Construction: Brass or bronze body, temperature and pressure test plug on inlet and outlet, threaded, solder or press connections. Valves shall provide positive shut-off.

C. Calibration: Control flow within 5 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control.

D. NSF 61 Certification

2.7 THERMOSTATIC BALANCING VALVES

A. Maunfacturers
1. Caleffi
2. Danfoss
3. Viega
4. ThermOmegaTech Inc. CircuitSolver
5. Substitutions: Division 01 – General Requirements

B. Thermostatic Balance Valve
1. The valve shall be certified lead free according to NSF/ANSI 61 standards.
2. The valve body shall be constructed out of stainless steel.
3. The valve shall be rated for 150 PSIG working pressure and 250°F max. temperature.
4. The valve shall be capable of providing a hot water return temperature of 105°F to 140°F. Set point shall be factory set or field adjustable.

C. Thermostatic Balance Valve Accessories: Where valve does not come with the following accessories integral to the valve, provide with the following accessories installed at each valve.
1. Thermometer
2. PEX ends
3. Press connect ends.
4. Integrated check valve.
5. Shutoff valves.

PART 3 EXECUTION

3.1 EXAMINATION

A. Division 01 – General Requirements: Verification of existing conditions before starting work.

B. Verify piping system is ready for valve installation.

3.2 INSTALLATION

A. Install valves with stems upright or horizontal, not inverted.

B. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.

C. Install 3/4 inch ball valves with cap for drains at main shut-off valves, low points of piping, bases of vertical risers, and at equipment.

D. Install valves with clearance for installation of insulation and allowing access.

E. Provide access where valves and fittings are not accessible. Coordinate size and location of access doors with Division 08 - Openings.

3.3 VALVE APPLICATIONS

A. Install shutoff and drain valves at locations indicated on Drawings and in accordance with this Section.

B. Install ball or gate valves for shut-off and to isolate equipment, part of systems, or vertical risers.

C. Install ball or globe valves for throttling, bypass, or manual flow control services.

D. Install spring loaded check valves on discharge of water pumps.

E. Install lever and weight lever and spring check valves on discharge of pumps in pumped sanitary pumped storm water piping.

F. Install manual balancing valves, automatic balancing valves or thermostatic balancing valves where indicated on the domestic hot water return system.

G. Provide line sized isolation valves on all domestic water branches greater than ¾” when more than two fixtures are supplied.

H. Install ball or gate valves in domestic water systems for shut-off service.

I. Install ball and butterfly valves in domestic water systems for throttling service.

J. Install ball or gate valves in sanitary systems for shut-off service.

K. Install ball or gate valves in storm water systems for shut-off service.

END OF SECTION

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SECTION 22 0529 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Pipe hangers and supports.
2. Hanger rods.
3. Inserts.
4. Flashing.
5. Formed steel channel.
6. Equipment bases and supports.

B. Related Sections:
1. Division 03- Concrete Section 23 04 00 – General Conditions for Mechanical Trades
2. Division 07 - Thermal and Moisture Protection
3. Division 09 - Finishes
4. Section 22 – General Conditions for Plumbing Trades
5. Section 22 - Pipes and Tubes for Plumbing Piping and Equipment:
6. Section 22 - Vibration and Seismic Controls for Plumbing Piping and Equipment:
7. Section 22 - General Service Compressed-Air Systems
8. Section 22 - Swimming Pool Plumbing Systems
9. Section 22 - Medical Gas and Vacuum Systems

1.2 REFERENCES

A. American Society of Mechanical Engineers:
1. ASME B31.1 - Power Piping.
2. ASME B31.5 - Refrigeration Piping and Heat Transfer Components.
3. ASME B31.9 - Building Services Piping.

B. ASTM International:
1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
2. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
3. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems
4. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers.
5. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems.

C. American Welding Society:
1. AWS D1.1 - Structural Welding Code - Steel.

D. FM Global:
1. FM - Approval Guide, A Guide to Equipment, Materials & Services Approved By Factory Mutual Research For Property Conservation.

E. Manufacturers Standardization Society of the Valve and Fittings Industry:
1. MSS SP 58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation

F. Underwriters Laboratories Inc.:
1. UL 263 - Fire Tests of Building Construction and Materials.
2. UL 723 - Tests for Surface Burning Characteristics of Building Materials.
3. UL 1479 - Fire Tests of Penetration Firestops.
4. UL 2079 - Tests for Fire Resistance of Building Joint Systems.
5. UL - Fire Resistance Directory.

1.3 SUBMITTALS

A. Division 01 - General Requirements

B. Shop Drawings: Indicate system layout with location including critical dimensions, sizes, and pipe hanger and support locations and detail of trapeze hangers.

C. Product Data: Submit manufacturers catalog data including load capacity.

D. Manufacturer's Installation Instructions: Submit special procedures and assembly of components.

E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with AWS D1.1 for welding hanger and support attachments to building structure.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years of experience.

B. Installer: Company specializing in performing Work of this section with minimum 3 years of experience.

1.6 PRE-INSTALLATION MEETINGS

A. Division 01 - General Requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Division 01- General Requirements.

B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

C. Protect from weather and construction traffic, dirt, water, chemical, and damage, by storing in original packaging.

1.8 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.9 WARRANTY

A. Division 01 - General Requirements.

PART 2 PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

A. Manufacturers:
1. Globe Pipe Hanger Products Inc.
2. Anvil International
3. Empire Industries
4. Hilti Inc.
5. Substitutions: Division 01- General Requirements

B. Plumbing Piping - DWV:
1. Conform to ASME B31.9, ASTM F708, or MSS SP 58.
2. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron or carbon steel, adjustable swivel, split ring.
3. Hangers for Pipe Sizes 2 inches and Larger: Carbon steel, adjustable, clevis.
4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
5. Wall Support for Pipe Sizes 3 inches and Smaller: Cast iron hook.
6. Wall Support for Pipe Sizes 4 inches and Larger: Welded steel bracket and wrought steel clamp.
7. Vertical Support: Steel riser clamp.
8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

C. Plumbing Piping - Water:
1. Conform to ASME B31.9, ASTM F708, or MSS SP 58.
2. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron or carbon steel, adjustable swivel, split ring.

3. Hangers for Pipe Sizes 2 inches and Larger: Carbon steel, adjustable, clevis.
4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
5. Wall Support for Pipe Sizes 3 inches and Smaller: Cast iron hook.
6. Wall Support for Pipe Sizes 4 inches and Larger: Welded steel bracket and wrought steel clamp.
7. Vertical Support: Steel riser clamp.
8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
9. Copper Pipe Support: Copper-plated, Carbon-steel ring.

D. Natural Gas / LP Gas Piping:
1. Conform to MSS SP 58.
2. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Carbon steel, adjustable swivel, split ring.
3. Hangers for Pipe Sizes 2 inches and Larger: Carbon steel, adjustable, clevis.
4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
5. Wall Support for Pipe 3 inches and Smaller: Cast iron hook.
6. Vertical Support: Steel riser clamp.
7. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

2.2 ACCESSORIES

A. Hanger Rods: Mild steel threaded both ends, threaded on one end, or continuous threaded as required by application.

2.3 INSERTS

A. Manufacturers:
1. HiltiInc.
2. Anvil International
3. Eaton
4. 3M
5. Substitutions: Refer to Division 01 – General Requirements.

B. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.4 FLASHING

A. Refer to Division 07 - Thermal and Moisture Protection

2.5 SLEEVES

A. Manufacturers:
1. Flexicraft Industries; Pipe Wall Sleeve
2. Metraflex; Pipe Wall Sleeve
3. CCI Pipeline; Pipe Wall Sleeve
4. GPT – Centuryline Sleeve Series
5. Substitutions: See Division 01 - General Requirements and 22 04 00 – General Requirements.

B. Vertical Piping:
1. Sleeve Length: 1 inch above finished floor.
2. Provide sealant for watertight joint.
3. Blocked Out Floor Openings: Provide 1-1/2 inch angle set in silicon adhesive around opening.
4. Drilled Penetrations: Provide 1-1/2 inch angle ring or square set in silicone adhesive around penetration.

C. Sheet Metal: Pipe passing through interior walls, partitions, and floors, unless steel or brass sleeves are specified below.

D. Pipe Passing Through Below Grade or Exterior Walls:
1. Anchored Sleeve - Zinc coated or cast iron pipe.
2. Provide watertight space with link rubber or modular seal between sleeve and pipe on both pipe ends.

E. Clearances:
1. Provide allowance for insulated piping.
2. Wall, Floor, Floor, Partitions, and Beam Flanges: 1 inch greater than external; pipe diameter.
3. All Rated Openings: Caulked tight with fire stopping material conforming to ASTM E814-13A in accordance with Division 07 Thermal and Moisture Protection to prevent the spread of fire, smoke, and gases.

F. Sleeves for Pipes through Non-fire Rated Floors: 18 gage thick galvanized steel.

G. Sleeves for Pipes through Non-fire Rated Walls, and Potentially Wet Floors: Steel pipe or 18 gage thick galvanized steel.

H. Sealant: refer to Division 07 Thermal and Moisture Protection.

2.6 MECHANICAL SLEEVE SEALS

A. Manufacturers:
1. Thunderline Link-Seal, Inc.
2. NMP Corporation
3. Fernco
4. BWM

5. Substitutions: Refer to Division 01 – General Requirements.

B. Product Description: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

C. Provide NSF 61 certified assembly when used in potable water storage tank applications.

2.7 FORMED STEEL CHANNEL

A. Manufacturers:
1. Allied Tube & Conduit Corp.
2. B-Line Systems
3. Midland Ross Corporation, Electrical Products Division
4. Unistrut Corp.
5. Substitutions: Refer to Division 01 – General Requirements

B. Product Description: Galvanized 12 gage thick steel. With holes 1-1/2 inches on center.

PART 3 EXECUTION

3.1 EXAMINATION

A. Division 01 - General Requirements.

B. Verify openings are ready to receive sleeves.

C. Verify openings are ready to receive firestopping.

3.2 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter affecting bond of firestopping material.

B. Remove incompatible materials affecting bond.

C. Install backing and damming materials to arrest liquid material leakage.

D. Obtain permission from Architect/Engineer before using powder-actuated anchors.

E. Obtain permission from Architect/Engineer before drilling or cutting structural members.

3.3 INSTALLATION - INSERTS

A. Install inserts for placement in concrete forms.

B. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.

C. Provide hooked rod to concrete reinforcement section for inserts carrying pipe 4 inches and larger.

D. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

E. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut flush with top of slab.

3.4 INSTALLATION - PIPE HANGERS AND SUPPORTS

A. Install in accordance with ASME B31.1, ASME B31.5, ASME 31.9, ASTM F708, or MSS SP 58.

B. Support horizontal piping as scheduled.

C. All pipe hangers and supports shall be sized in accordance with the manufacturer's guidelines to support the piping based on final layout coordinated by the contractor.

D. Install hangers with minimum 1/2 inch space between finished covering and adjacent work.

E. Place hangers within 12 inches of each horizontal elbow.

F. Use hangers with 1-1/2 inch minimum vertical adjustment.

G. Support horizontal cast iron pipe adjacent to each hub, with 5 feet maximum spacing between hangers.

H. Support vertical piping at every floor. Support vertical cast iron pipe at each floor at hub.

I. Where piping is installed in parallel and at same elevation, provide multiple pipe or trapeze hangers.

J. Support riser piping independently of connected horizontal piping.

K. Provide copper plated hangers and supports for copper piping.

L. Design hangers for pipe movement without disengagement of supported pipe.

M. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

N. Provide clearance in hangers and from structure and other equipment for installation of insulation. Refer to Section 22 Provide supplemental angles, channels and formed steel supports to support piping, ductwork, equipment, etc. from building's structure. Piping, ductwork, equipment, etc. shall not be supported from the roof deck.

3.5 INSTALLATION - EQUIPMENT BASES AND SUPPORTS

A. Provide housekeeping padsof concrete, minimum 4 inches thick and extending 6 inches beyond supported equipment. Refer to Division 01

B. Using templates furnished with equipment, install anchor bolts, and accessories for mounting and anchoring equipment.

C. Construct supports of steel members, formed steel channel or steel pipe and fittings. Brace and fasten with flanges bolted to structure.

D. Provide rigid anchors for pipes after vibration isolation components are installed. Refer to Section 21.

3.6 INSTALLATION - FLASHING

A. Refer to Division 08 - Openings

B. Provide flexible flashing and metal counterflashing where piping penetrates weather or waterproofed walls, floors, and roofs.

C. Flash vent and soil pipes projecting 3 inches minimum above finished roof surface with lead worked 1 inch minimum into hub, 8 inches minimum clear on sides with 24 x 24 inches sheet size. For pipes through outside walls, turn flanges back into wall and caulk, metal counter-flash, and seal.

D. Flash floor drains in floors with topping over finished areas with lead, 10 inches clear on sides with minimum 36 x 36 inch sheet size. Fasten flashing to drain clamp device.

E. Seal floors, showers, and mop sink drains watertight to adjacent materials.

F. Adjust storm collars tight to pipe with bolts; caulk around top edge. Use storm collars above roof jacks. Screw vertical flange section to face of curb.

3.7 INSTALLATION - SLEEVES

A. Exterior watertight entries: Seal with mechanical sleeve seals.

B. Set sleeves in position in forms. Provide reinforcing around sleeves.

C. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.

D. Extend sleeves through floors 1inch above finished floor level. Caulk sleeves.

E. Where piping penetrates floor, ceiling, or wall, close off space between pipe and adjacent work with stuffing, and firestopping insulation and caulk airtight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.

F. Install chrome plated steel,, or stainless steel escutcheons at finished surfaces.

3.8 FIELD QUALITY CONTROL

A. Refer to Division 01 - Quality Requirements and Execution and Closeout Requirements.

3.9 CLEANING

A. Refer to Division 01 - Execution and Closeout Requirements:

3.10 PROTECTION OF FINISHED WORK

A. Refer to Division 01 Execution and Closeout Requirements

3.11 SCHEDULES

PIPE HANGER SPACING		
PIPE MATERIAL	MAXIMUM HORIZONTAL SPACING Feet	MAXIMUM VERITCAL SPACING Feet
ABS pipe, all sizes	4	10[a]
Brass, all sizes	10	10
Cast Iron, all sizes	5	15
Cast Iron, all sizes, with 10 foot length of pipe	10	15
CPVC, 1 inch and smaller, 140°F and below	3	10[a]
CPVC, 1 inch and smaller, above 140°F	2.5	10
CPVC, 1-1/4 inches and larger, 140°F and below	4	10 [a]
CPVC, 1-1/4 inches and larger, above 140°F	3	10
Copper Pipe, all sizes	6	10
Copper Tube, 1-1/4 inches and smaller	6	10
Copper Tube, 1-1/2 inches and larger	10	10
PEX, 1” and smaller	2.67 (32 inches)	4 [a]
PEX, 1 ¼” and larger	4	10 [a]
PVC 1 1/2 inch and smaller, 100°F and below	3	10 [a]
PVC 1-1/2 inch and smaller, above 100°F	2	10
PVC 2 inch and larger, 100°F and below	4	10 [a]
PVC 2 inch and larger, above 100°F	3	10
Steel, 3 inches and smaller	7	15
Steel, 4 inches and larger	12	15

a. For sizes 2 inches and smaller, a guide shall be installed midway between required vertical supports. Such guides shall prevent pipe movement in a direction perpendicular to the axis of the pipe.
b. Hanger rods shall be sized in accordance with rod manufacturer's recommendations.
c. Where hanger manufacturer recommends spacing that varies from the above table, the more stringent spacing requirement shall be followed.

END OF SECTION

SECTION 22 0548 - VIBRATION AND SEISMIC CONTROLS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 INTENT

A. All plumbing equipment and piping as noted on the equipment schedule or in the specification shall be mounted on vibration isolators to prevent the transmission of vibration and mechanically transmitted sound to the building structure. Vibration isolators shall be selected in accordance with the weight distribution so as to produce reasonably uniform deflections.

B. All isolators and isolation materials shall be of the same manufacturer and shall be certified by the manufacturer.

C. It is the intent of the seismic portion of this specification to keep all mechanical and electrical building system components in place during a seismic event.

D. All such systems must be installed in strict accordance with seismic codes, component manufacturer's recommendations and building construction standards. Whenever a conflict occurs between the manufacturer's recommendations or construction standards, the most stringent shall apply.

E. This specification is considered to be minimum requirements for seismic consideration and is not intended as a substitute for legislated, more stringent, national, state or local construction requirements (i.e. California Title 24, California OSHPD, Canadian Building Codes, or other requirements).

F. Any variance or non-compliance with these specification requirements shall be corrected by the contractor in an approved manner.

1.2 SUMMARY

A. Section Includes:
   1. Certification of seismic restraint designs and installation supervision.
   2. Certification of seismic attachment of housekeeping pads.
   3. NOTE: For all mechanical and electrical systems. Equipment buried underground is excluded but entry of services through the foundation wall is included.
   4. Seismic restraint products
      a. Vibration isolation elements.
      b. Equipment isolation bases.
      c. Piping flexible connections.
      d. Seismic restraints for isolated and non-isolated mechanical and electrical items.
   5. Inertia bases.

B. Related Sections:
1. Division 01 – General Requirements
2. Division 03 – Concrete: Execution requirements for placement of isolators in floating floor slabs specified by this section and product requirements for concrete for placement by this section.
3. Division 07 – Thermal and Moisture Protection: Product requirements for joint sealers specified for placement by this section.
4. Section 22 – General Conditions for Plumbing Trades
5. Section 22 – Common Work Results for Plumbing: Product requirements for pipe hangers and supports.

1.3 REFERENCES

A. American National Standards Institute:
1. ANSI S1.4 - Sound Level Meters.
2. ANSI S1.8 - Reference Quantities for Acoustical Levels.
3. ANSI S12.36 - Survey Methods for the Determination of Sound Power Levels of Noise Sources.

B. Air-Conditioning and Refrigeration Institute:
1. ARI 575 - Method of Measuring Machinery Sound within Equipment Space.

C. American Society of Heating, Refrigerating and:
1. ASHRAE Handbook - HVAC Applications.

1.4 RELATED WORK

A. Housekeeping Pads
1. Housekeeping pad reinforcement and monolithic pad attachment to the structure details and design shall be prepared by the restraint vendor if not already indicated on the drawings.
2. Housekeeping pads shall be coordinated with restraint vendor and sized to provide a minimum edge distance of ten (10) bolt diameters all around the outermost anchor bolt to allow development of full drill-in wedge anchor ratings. If cast-in anchors are to be used, the housekeeping pads shall be sized to accommodate the ACI requirements for bolt coverage and embedment.

B. Supplementary Support Steel
1. Contractor shall supply supplementary support steel for all equipment, piping, ductwork, etc. including roof mounted equipment, as required or specified.

C. Attachments
1. Contractor shall supply restraint attachment plates cast into housekeeping pads, concrete inserts, double sided beam clamps, etc. in accordance with the requirements of the vibration vendor's calculations.

1.5 SEISMIC FORCE LEVELS

A. Installations shall be designed to safely accept external forces determined in accordance with the International Building Code –2003, Section 1621 in any direction for all rigidly supported equipment without failure and permanent displacement of the equipment. Seismic restraints shall not short circuit vibration isolation systems or transmit objectionable vibration or noise.

1.6 PERFORMANCE REQUIREMENTS

A. Provide vibration isolation on motor driven equipment over 0.5 hp, plus connected piping.

B. Provide minimum static deflection of isolators for equipment as follows:
   1. Basement, Over 20 hp
      a. 400 - 600 rpm: 2 inch
      b. 600 - 800 rpm: 1 inch
      c. 800 - 900 rpm: 0.5 inch
      d. 1100 - 1500 rpm: 0.2 inch
      e. Over 1500 rpm: 0.15 inch

C. Consider upper floor locations critical unless otherwise indicated.

D. Use concrete inertia bases for motors in excess of 40 hp and on base mounted pumps over 10 hp.

E. Maintain sound level of spaces at levels not to exceed those listed below by utilizing acoustical devices.

F. Maintain rooms at following maximum sound levels, in Noise Criteria (NC) as defined by ASHRAE Handbook., HVAC Applications
   1. Schools
      a. Lecture and classrooms: 25
      b. Open-plan classrooms: 30

1.7 DEFINITIONS

A. Life Safety Systems:
   1. All systems involved with and/or connected to emergency power supply including all generators, transfer switches, transformers and all flow paths to fire protection and/or emergency lighting systems.
   2. All medical and life support systems.
   3. Fresh air relief systems on emergency control sequence including air handlers, conduit, duct, dampers, etc.

B. Positive Attachment:
   1. A positive attachment is defined as a cast-in anchor, a drill-in wedge anchor, a double sided beam clamp loaded perpendicular to a beam, or a welded or bolted connection to structure. Single sided "C" type beam clamps for support rods of

overhead piping, ductwork, fire protection, electrical conduit, bus duct, or cable trays, or any other equipment are not acceptable on this project as seismic anchor points.

C. Transverse Bracing:
1. Restraint(s) applied to limit motion perpendicular to the centerline of the pipe, duct or conduit.

D. Longitudinal Bracing:
1. Restraint(s) applied to limit motion parallel to the centerline of the pipe, duct or conduit.

E. Failure
1. For the purposes of this project, failure is defined as the discontinuance of any attachment point between equipment or structure, vertical permanent deformation greater than 1/8" (3mm) and/or horizontal permanent deformation greater that 1/4" (6mm).

1.8 SUBMITTALS

A. Division 01 – General Requirements: Submittal procedures.

B. Shop Drawings:
1. Submit fabrication details for equipment bases including dimensions, structural member sizes and support point locations.
2. Provide Drawings showing methods of suspension and support guides for conduit, piping and ceiling hung equipment.
3. Record actual locations and installation of vibration isolators and seismic restraints including attachment points.
4. Where walls, floors, slabs or supplementary steel work are used for seismic restraint locations, details of acceptable attachment methods for conduit and pipe must be included and approved before the condition is accepted for installation. Restraint manufacturers' submittals must include spacing, static loads and seismic loads at all attachment and support points.
5. Provide specific details of seismic restraints and anchors; include number, size and locations for each piece of equipment.
6. Drawings showing methods for isolation of conduits and pipes penetrating walls and floor slabs.
7. Specific details of restraints including anchor bolts for mounting and maximum loading at each location, for each piece of equipment and/or pipe locations.

C. Product Data: Submit schedule of vibration isolator type with location and load on each. Submit catalog information indicating, materials, dimensional data, pressure losses, and acoustical performance for standard sound attenuation products.

D. Seismic Certification and Analysis:
1. Seismic restraint calculations must be provided for all connections of equipment to the structure. Calculations must be stamped by a registered professional

engineer with at least five years of seismic design experience, licensed in the state of the job location.

2. All restraining devices shall have a preapproval number from California OSHPD or some other recognized government agency showing maximum restraint ratings. Preapprovals based on independent testing are preferred to preapprovals based on calculations. Where preapproved devices are not available, submittals based on independent testing are preferred. Calculations (including the combining of tensile and shear loadings) to support seismic restraint designs must be stamped by a registered professional engineer with at least five years of seismic design experience and licensed in the state of the job location. Testing and calculations must include both shear and tensile loads as well as one test or analysis at 45 degrees to the weakest mode.
3. Analysis must indicate calculated dead loads, static seismic loads and capacity of materials utilized for connections to equipment and structure. Analysis must detail anchoring methods, bolt diameter, embedment and/or welded length. All seismic restraint devices shall be designed to accept, without failure, the forces detailed in section 1.06 acting through the equipment center of gravity. Overturning moments may exceed forces at ground level.

E. Design Data: Submit calculations indicating maximum room sound levels are not exceeded. Use sound power levels of actual equipment to be installed on project. Analysis shall include breakout noise calculations. In the absence of specified background sound level criteria, the guidelines as express in Table 34 of Chapter 47, "Sound and Vibration Control" of the 2003 ASHRAE Handbook – HVAC Applications, shall be used.

F. Manufacturer's Installation Instructions: Submit special procedures and setting dimensions. Indicate installation requirements maintaining integrity of sound isolation.

G. Manufacturer's Certificate: Certify isolators meet or exceed specified requirements.

H. Manufacturer's Field Reports: Indicate sound isolation installation is complete and in accordance with instructions.

1.9 CLOSEOUT SUBMITTALS

A. Division 01 – General Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of hangers including attachment points.

1.10 QUALITY ASSURANCE

A. Perform Work in accordance with ANSI S12.36.

1.11 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing Work of this section with minimum three years Documented experience.

C. Design application under direct supervision of Professional Engineer experienced in design of this Work and licensed at Project location.

1.12 PRE-INSTALLATION MEETINGS

A. Division 01 – General Requirements: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.

1.13 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.14 CONTRACTOR'S RESPONSIBILITIES

A. Contractor shall have the following responsibilities:
   1. Determine vibration isolation and seismic restraint sizes and locations per specifications.
   2. Provide and install isolation systems and seismic restraints as scheduled or specified.
   3. Guarantee specified isolation system deflection.
   4. Provide installation instructions, drawings and field supervision to assure proper installation and performance.
   5. Provide installation instructions, drawings and trained field supervision to insure proper installation and performance.
   6. Substitution of "Internally Isolated" plumbing equipment in lieu of the specified isolation of this section is acceptable

1.15 WARRANTY

A. Division 01 – General Requirements: Product warranties and product bonds.

B. Furnish five YEar manufacturer warranty for inertia bases.

PART 2 PRODUCTS

2.1 INERTIA BASES

A. Manufacturers:
1. Mason
2. Vibration Eliminator
3. Vibro-Acoustics Ltd.
4. Substitutions: Division 01 – General Requirements

B. Structural Bases:
1. Design: Sufficiently rigid to prevent misalignment or undue stress on machine, and to transmit design loads to isolators and snubbers.
2. Construction: Welded structural steel with gusset brackets, supporting equipment and motor with motor slide rails.

C. Concrete Inertia Bases:
1. Mass: Minimum of 1.5 times weight of isolated equipment.
2. Construction: Structured steel channel perimeter frame, with gusset brackets and anchor bolts, adequately reinforced, concrete filled.
3. Connecting Point: Reinforced to connect isolators and snubbers to base.
4. Concrete: Reinforced 3,000 psi concrete.

2.2 VIBRATION ISOLATORS

A. Manufacturers:
1. Mason
2. Vibration Eliminator
3. Amber Booth
4. Substitutions: Division 01 – General Requirements

B. Open Spring Isolators:
1. Spring Isolators:
   a. For Exterior and Humid Areas: Furnish hot dipped galvanized housings and neoprene coated springs.
   b. Code: Color code springs for load carrying capacity.
2. Springs: Minimum horizontal stiffness equal to 75 percent vertical stiffness, with working deflection between 0.3 and 0.6 of maximum deflection.
3. Spring Mounts: Furnish with leveling devices, minimum 0.25 inch thick neoprene sound pads, and zinc chromate plated hardware.
4. Sound Pads: Size for minimum deflection of 0.05 inch; meet requirements for neoprene pad isolators.

C. Restrained Spring Isolators:
1. Spring Isolators:
   a. For Exterior and Humid Areas: Furnish hot dipped galvanized housings and neoprene coated springs.

b. Code: Color code springs for load carrying capacity.

2. Springs: Minimum horizontal stiffness equal to 75 percent vertical stiffness, with working deflection between 0.3 and 0.6 of maximum deflection.
3. Spring Mounts: Furnish with leveling devices, minimum 0.25 inch thick neoprene sound pads, and zinc chromate plated hardware.
4. Sound Pads: Size for minimum deflection of 0.05 inch; meet requirements for neoprene pad isolators.
5. Restraint: Furnish mounting frame and limit stops.

D. Closed Spring Isolators:
1. Spring Isolators:
a. For Exterior and Humid Areas: Furnish hot dipped galvanized housings and neoprene coated springs.
b. Code: Color code springs for load carrying capacity.
2. Type: Closed spring mount with top and bottom housing separated with neoprene rubber stabilizers.
3. Springs: Minimum horizontal stiffness equal to 75 percent vertical stiffness, with working deflection between 0.3 and 0.6 of maximum deflection.
4. Housings: Incorporate neoprene isolation pad meeting requirements for neoprene pad isolators, and neoprene side stabilizers with minimum 0.25 inch clearance.

E. Restrained Closed Spring Isolators:
1. Spring Isolators:
a. For Exterior and Humid Areas: Furnish hot dipped galvanized housings and neoprene coated springs.
b. Code: Color code springs for load carrying capacity.
2. Type: Closed spring mount with top and bottom housing separated with neoprene rubber stabilizers.
3. Springs: Minimum horizontal stiffness equal to 75 percent vertical stiffness, with working deflection between 0.3 and 0.6 of maximum deflection.
4. Housings: Incorporate neoprene isolation pad meeting requirements for neoprene pad isolators, and neoprene side stabilizers with minimum 0.25 inch clearance and limit stops.

F. Spring Hanger:
1. Spring Isolators:
a. For Exterior and Humid Areas: Furnish hot dipped galvanized housings and neoprene coated springs.
b. Code: Color code springs for load carrying capacity.
2. Springs: Minimum horizontal stiffness equal to 75 percent vertical stiffness, with working deflection between 0.3 and 0.6 of maximum deflection.
3. Housings: Incorporate neoprene isolation pad meeting requirements for neoprene pad isolators.
4. Misalignment: Capable of 20 degree hanger rod misalignment.

G. Neoprene Pad Isolators:
1. Rubber or neoprene-waffle pads.
a. 30 durometer.
b. Minimum 1/2 inch thick.

c. Maximum loading 40 psi.
d. Height of ribs: not to exceed 0.7 times width.

2. Configuration: Single layer

H. Rubber Mount or Hanger: Molded rubber designed for 0.5 inches deflection with threaded insert.

I. Glass Fiber Pads: Neoprene jacketed pre-compressed molded glass fiber.

J. Seismic Snubbers:
1. Type: Non-directional and double acting unit consisting of interlocking steel members restrained by neoprene elements.
2. Neoprene Elements: Replaceable, minimum of 0.75 inch thick.
3. Capacity: 4 times load assigned to mount groupings at 0.4 inch deflection.
4. Attachment Points and Fasteners: Capable of withstanding 3 times rated load capacity of seismic snubber.

PART 3 EXECUTION

3.1 EXAMINATION

A. Division 01 – General Requirements: Coordination and project conditions.

B. Verify equipment and piping is installed before work in this section is started.

3.2 INSTALLATION

A. Install isolation for motor driven equipment.

B. Bases:
1. Set steel bases for 1 inch clearance between housekeeping pad and base.
2. Set concrete inertia bases for 2 inch clearance between housekeeping pad and base.

C. Adjust equipment level.

D. Install spring hangers without binding.

E. On closed spring isolators, adjust so side stabilizers are clear under normal operating conditions.

F. Prior to making piping connections to equipment with operating weights substantially different from installed weights, block up equipment with temporary shims to final height. When full load is applied, adjust isolators to load to allow shim removal.

G. Provide pairs of horizontal limit springs on fans with more than 6.0 inch static pressure, and on hanger supported, horizontally mounted axial fans.

H. Support piping connections to isolated equipment resiliently for scheduled distance.
1. Up to 4 inch Diameter: First three points of support.
2. 5 to 8 inch Diameter: First four points of support.
3. 10 inch Diameter and Over: First six points of support.
4. Select three hangers closest to vibration source for minimum 1.0 inch static deflection or static deflection of isolated equipment. Select remaining isolators for minimum 1.0 inch static deflection or 1/2 static deflection of isolated equipment.

3.3 FIELD QUALITY CONTROL

A. Division 01 – General Requirements: Field inspecting, testing, adjusting, and balancing.

B. Inspect isolated equipment after installation and submit report. Include static deflections.

C. After start-up, final corrections and balancing of systems take octave band sound measurements over full audio frequency range in areas adjacent to plumbing equipment rooms, duct and pipe shafts, and other critical locations. Provide one-third octave band measurements of artificial sound sources in areas indicated as having critical requirements. Submit complete report of test results including sound curves.

D. Furnish services of testing agency to take noise measurement. Use meters meeting requirements of ANSI S1.4.

3.4 SCHEDULES

A. Pipe Isolation Schedule:

Pipe Size Inch	Isolated Distance from Equipment
1	120 diameters
2	90 diameters
3	80 diameters
4	75 diameters
6	60 diameters
8	60 diameters
10	54 diameters
12	50 diameters

3.5 VIBRATION ISOLATION AND SEISMIC RESTRAINT INSTALLATION

A. Horizontal pipe isolation: The first three pipe hangers in the main lines near the mechanical equipment shall be as described in specification 11. Specification 11 hangers must also be used in all transverse braced isolated locations. Brace hanger rods with SRC clamps specification 14. Horizontal runs in all other locations throughout the building

shall be isolated by hangers as described in specification 10. Floor supported piping shall rest on isolators as described in specification 6. Heat exchanger's and expansion tanks are considered part of the piping run. The first three isolators from the isolated equipment will have the same static deflection as specified for the mountings under the connected equipment. If piping is connected to equipment located in basements and hangs from ceilings under occupied spaces the first three hangers shall have 0.75" deflection for pipe sizes up to and including 3", 1 1/2" deflection for pipe sizes up to and including 6", and 2 1/2" deflection thereafter. Hangers shall be located as close to the overhead structure as practical. Where piping connects to mechanical equipment install specification 23 expansion joints or specification 24 stainless hoses if 23 is not suitable for the service.

B. Riser isolation: Risers shall be suspended from specification 10 hangers or supported by specification 5 mountings, anchored with specification 25 anchors, and guided with specification 26 sliding guides. Steel springs shall be a minimum of 0.75" except in those expansion locations where additional deflection is required to limit load changes to $\pm$ 25% of the initial load. Submittals must include riser diagrams and calculations showing anticipated expansion and contraction at each support point, initial and final loads on the building structure, spring deflection changes and seismic loads. Submittal data shall include certification that the riser system has been examined for excessive stresses and that none will exist in the proposed design.

C. Seismic Restraint of Piping

1. Seismically restrain all piping listed as a, b or c below. Use specification 12 cables if isolated. Specification 12 or 13 restraints may be used on unisolated piping.
   a. Fuel oil piping, gas piping, medical gas piping, and compressed air piping that is 1" I.D. or larger.
   b. Piping located in boiler rooms, mechanical equipment rooms, and refrigeration equipment rooms that is 1 1/4" I.D. and larger.
   c. All other piping 2 1/2" diameter and larger.
2. Transverse piping restraints shall be at 40' maximum spacing for all pipe sizes, except where lesser spacing is required to limit anchorage loads.
3. Longitudinal restraints shall be at 80' maximum spacing for all pipe sizes, except where lesser spacing is required to limit anchorage loads.
4. Where thermal expansion is a consideration, guides and anchors may be used as transverse and longitudinal restraints provided they have a capacity equal to or greater than the restraint loads in addition to the loads induced by expansion or contraction.
5. For fuel oil and all gas piping transverse restraints must be at 20' maximum and longitudinal restraints at 40' maximum spacing.
6. Transverse restraint for one pipe section may also act as a longitudinal restraint for a pipe section of the same size connected perpendicular to it if the restraint is installed within 24" of the elbow or TEE or combined stresses are within allowable limits at longer distances.
7. Hold down clamps must be used to attach pipe to all trapeze members before applying restraints in a manner similar to clevis supports.
8. Branch lines may not be used to restrain main lines.
9. Cast iron pipe of all types, glass pipe and any other pipes joined with a four band shield and clamp assembly in Zones 2B, 3 and 4 shall be braced as in sections

3.2.D.2 and 3. For Zones 0, 1 and 2A, 2 band clamps may be used with reduced spacings of 1/2 of those listed in sections 3.2.D.2 and 3.

D. Vibration Isolation and Seismic Restraint of Plumbing Equipment
1. All equipment shall be vibration isolated and seismically restrained as per the schedules in part 3.5 of this specification.
2. Equipment mounted on housekeeping pads: Pads shall be properly doweled or expansion shielded to deck to meet acceleration criteria.
3. Requirements for installation on concrete inertia bases shall be as follows:
a. Minimum operating clearance between concrete inertia and base and housekeeping pad or floor shall be 2".
b. The equipment structural steel or concrete inertia base shall be placed in position and supported temporarily by blocks or shims, as appropriate, prior to the installation of the machine or isolators.
c. The isolators shall be installed without raising the machine and frame assembly.
d. After the entire installation is complete and under full operational load, the isolators shall be adjusted so that the load is transferred from the blocks to the isolators. When all isolators are properly adjusted, the blocks or shims shall be barely free and shall be removed.
e. Install equipment with flexibility in wiring connection.
f. Verify that all installed isolator and mounting systems permit equipment motion in all directions. Adjust or provide additional resilient restraints to flexibly limit start-up equipment lateral motion to 1/4".
g. Prior to start-up, clean out all foreign matter between bases and equipment. Verify that there are no isolation short circuits in the base, isolators, or seismic restraints.

3.6 SEISMIC RESTRAINT EXCLUSIONS

A. General: All mechanical and electrical components and systems that are considered exempt from the requirement for seismic restraint, in accordance with The International Building Code – 2003, Section.1621 and all related State of Connecticut Supplements, shall not require seismic restraint.

B. Piping
1. Piping in boiler and mechanical rooms less than 1 1/4" inside diameter.
2. All other piping less than 2 1/2" inside diameter.
3. All piping suspended by individual hangers 12" or less as measured from the top of the pipe to the bottom of the support where the hanger is attached. However, if the 12" limit is exceeded by any hanger in the run, seismic bracing is required for the run.
4. The 12" exemption applies for trapeze supported systems if the top of each item supported by the trapeze qualifies.

3.7 INSPECTION

A. Examine systems under provisions of Division 01.

B. On completion of installation of all vibration isolation devices herein specified, the local representative shall inspect the completed system and report in writing any installation error, improperly elected isolation devices, or other faults in the system that could affect the performance of the system. Contractor shall submit a report to the Owner, including the manufacturers representatives' final report, indicating all isolation reported as properly installed or requiring correction, and include a report by the Contractor on steps taken to properly complete the isolation work.

END OF SECTION

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SECTION 22 0553 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Nameplates.

B. Tags.

C. Pipe markers.

D. Underground pipe warning tape

E. Ceiling grid markers

1.2 RELATED REQUIREMENTS

A. Division 09 - Finishes: Identification painting.

1.3 REFERENCE STANDARDS

A. American Society of Mechanical Engineers:
   1. ASME A13.1 - Scheme for the Identification of Piping Systems

B. American Society for Testing Materials
   1. ASTM D709 - Standard Specification for Laminated Thermosetting Materials

C. National Fire Protection Association
   1. NFPA 99 - Standard for Health Care Facilities

1.4 SUBMITTALS

A. See Division 01 – General Requirements, for submittal procedures.

B. Product Data: Provide manufacturers catalog literature for each product required.

C. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.

D. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

E. Manufacturer's Installation Instructions: Indicate special procedures, and installation.

F. Project Record Documents: Record actual locations of tagged valves.

1.5 QUALITY ASSURANCE

A. Conform to NFPA 99 requirements for labeling and identification of medical gas piping systems and accessories.

B. Conform to ASME A13.1 for color scheme for identification of piping systems and accessories.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Identification products shall be provided by the following manufacturers:
   1. Craftmark Pipe Markers
   2. Brimar Industries, Inc.
   3. Kolbi Pipe Marker Co.
   4. Seton Identification Products
   5. Substitutions: See Division 01 - General Requirements.

B. All identification products shall be by a single manufacturer

2.2 NAMEPLATES

A. Description: Laminated three-layer plastic with engraved letters.
   1. Letter Color: White.
   2. Letter Height: 1/4 inch.
   3. Background Color: Black.
   4. Plastic: Conform to ASTM D709.

2.3 TAGS

A. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.

B. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

C. Valve Tag Chart: Typewritten letter size list of applied tags and location in anodized aluminum frame.

2.4 PIPE MARKERS

A. Comply with ASME A13.1.

B. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

C. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

2.5 UNDERGROUND PIPE WARNING TAPE

A. Detectable Underground Warning Tape: Bright colored continuously printed, 2 mil clear film laminated to ½ mil Aluminum Foil Center Core. Suitable for direct burial. Designed for detectability by non-ferrous locator. Minimum widths as follows:
   1. 2" width for burial depths of up to 12"
   2. 3" width for burial depth of 12" to 18"
   3. 6" width for burial depth of 18" to 24"

B. Provide with a continuous printed message similar to "Caution Water Line Buried Below".

2.6 CEILING GRID MARKERS

A. Description: 10 mil self-stick vinyl -7/8" diameter markers. Color coded.

B. Color code as follows:
   1. Plumbing Valves: Green.

2.7 LABELING MATERIALS

A. Radon duct piping shall be labeled using pipe markers as described in Section 2.4 above.

B. Electrical disconnects, mechanical equipment and controls shall be labeled name plates as described in Section 2.2 above.

C. System Primary Label shall be made of durable materials. All label lettering and other annotation on systems shall be of a color in contrast to the color of the background on which the lettering is applied. All label titles shall be with lettering of a height of not less than 1/4 inch. Additional information on the labels shall be with lettering of a height of not less than 1/8 inch.

D. Duct Piping
   1. Interior duct piping shall be marked with not less than one label at each floor level with label titles stating "Radon Reduction System" or similar wording. Labels shall be affixed at intervals not greater than 10 feet along the developed length of piping.
   2. Radon pipe discharge shall be provided with labeling similar to "Caution, radon discharged fumes do not breathe fumes".

E. Electrical Disconnects
   1. Disconnects such as switches or the receptacles providing power to plugged connections for mitigation system fans shall be marked to indicate their purpose. The label title shall identify that the disconnect is a component of a mitigation system such as with the text "Radon Fan", and can include instructions such as

"Caution – Radon Fan", "Radon Fan – Leave Switch On" or "Radon Fan – Leave Plugged In."

2. Circuit breaker(s) protecting the mitigation system fan circuit(s) should also be labeled with the text "Radon" or "Radon Fan."

F. Mechanical Equipment and Controls

1. Mechanical equipment that is part of the Radon Reduction System shall be labeled with a label title stating "Radon Reduction System" or similar wording to identify the item as a component of a mitigation system.
   a. System controls shall have a label on or in close proximity to the mechanism that describes the purpose of the control and instructions for operation.
   b. System control settings for any mechanical equipment shall be clearly marked to indicate the settings that existed at the time mitigation goals were achieved.
2. System Primary Label
   a. A system description label shall be placed on a primary component of each system (e.g. on duct piping near an active soil depressurization fan monitor), or within 12 inches of the electric service panel or other prominent location.
   b. The label title shall state, "Radon Reduction System" or similar wording and include:
      1) The date of installation;
      2) An advisory stating that the building should be tested for radon at least every 2 years or as required or recommended by state or federal agencies;
      3) An advisory stating that the system should be evaluated for mechanical performance quarterly or as otherwise stipulated for frequency of inspections in an operation, maintenance, and monitoring plan.
      4) The installer's name, phone number and applicable certification identification.
      5) The party responsible for operation, maintenance, and monitoring plan. The label shall state: "This system is under the care, custody and control of _____." (Insert name and phone number).
      6) Notice of additional state or federal resources for radon information (e.g., www.epa.gov/radon; the radon hotline 1-800-SOS-RADON); and the state or local U.S. radon office as found at www.epa.gov/radon/find-information-aboutlocal-radon-zones-and-state-contact-information.

PART 3 EXECUTION

3.1 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

B. Prepare surfaces in accordance with Division 09 – Finishes, for stencil painting.

3.2 INSTALLATION

A. Install identifying devices after completion of testing and installation of coverings and painting.

B. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion.

C. Install tags using corrosion resistant chain. Number tags consecutively by location.

D. Install plastic pipe markers in accordance with manufacturer's instructions.

E. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

F. Install detectable underground warning tape 6 to 8 inches below finished grade, directly above buried pipe.

G. Install piping identification on medical gas systems. Refer to Section 22 60 13.

3.3 APPLICATIONS

A. Identify water heaters, pumps, tanks, and water treatment devices with plastic nameplates. Identify in-line pumps and other small devices with tags.

B. Identify control panels and major control components outside panels with plastic nameplates.

C. Identify valves in main and branch piping with tags.

D. Identify piping, concealed or exposed, with plastic pipe markers
   1. Identify service, and flow direction.
   2. Install in clear view and align with axis of piping.
   3. Locate identification not to exceed 20 feet on straight runs including risers and drops.
   4. For concealed piping identification shall be located not to exceed 10 feet.
   5. Locate identification adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.

E. Identify underground utilities with detectable underground warning tape.

F. Provide ceiling grid markers to locate valves above T-bar type panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

SECTION 22 0700 - PLUMBING INSULATION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Plumbing piping insulation, jackets and accessories.
2. Plumbing equipment insulation, jackets and accessories.

B. Related Sections:
1. Division 01 General Requirements
2. Division 07 - Firestopping
3. Division 09 - Finishes

1.2 REFERENCES (follow the most currently adopted amended version)

A. ASTM International:
1. ASTM A240 - Standard Specification for Chromium and Chromium-Nickel Stainless
2. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
3. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
4. ASTM C14 - Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe.
5. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
6. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement.
7. ASTM C449 - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement.
8. ASTM C450 - Standard Practice for Fabrication of Thermal Insulating Fitting Covers for NPS Piping, and Vessel Lagging.
9. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
10. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation.
11. ASTM C534 - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
12. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation.
13. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation.
14. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications
15. ASTM C585 - Standard Practice for Inner and Outer Diameters of Thermal Insulation for Nominal Sizes of Pipe and Tubing.

16. ASTM C610 - Standard Specification for Molded Expanded Perlite Block and Pipe Thermal Insulation.
17. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
18. ASTM C921 - Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
19. ASTM C1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.
20. ASTM C1410 - Standard Specification for Cellular Melamine Thermal and Sound-Absorbing Insulation.
21. ASTM D1056 - Standard Specification for Flexible Cellular Materials--Sponge or Expanded Rubber.
22. ASTM D1785 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
23. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics.
24. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
25. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
26. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
27. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

B. Underwriters Laboratories Inc.:
1. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.3 SUBMITTALS

A. Division 01 – General Requirements

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

C. Manufacturer's Instructions: Indicate installation procedures necessary to ensure acceptable workmanship and installation standards will be achieved.

D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

A. Pipe insulation manufactured in accordance with ASTM C585 for inner and outer diameters.

B. Factory fabricated fitting covers manufactured in accordance with ASTM C450.

C. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.

D. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum three years of experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping. Store all insulation materials in a clean, dry environment.

1.6 FIELD CONDITIONS

A. Maintain ambient conditions required by manufacturers of each product.

B. Maintain temperature before, during, and after installation for minimum of 24 hours.

1.7 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.8 WARRANTY

A. Division 01 - Execution and Closeout Requirements.

1.9 SCHEDULING

A. Schedule insulation application after pressure and leak testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

PART 2 PRODUCTS

2.1 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency. Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

2.2 MANUFACTURER

A. Pre-Molded Glass Fiber (PGF):
   1. Johns Manville Corporation – Microlok HP Pipe Insulation
   2. CertainTeed Corporation - Crimpwrap

3. Knauf Insulation – Earthwool
4. Owens Corning Corporation; SSL II w ASJ:
5. Substitutions: Refer to Division 01 – General Requirements.

B. Manufacturers for Closed Cell Elastomeric (CCE) Pipe Insulation Products:
1. Armacell LLC - AP Armaflex 25/50
2. Aeroflex USA, Inc – Aerocel –SSPT w/SaniGuard
3. K-Flex USA LLC – Insul-tube
4. Substitutions: See Division 01 – General Requirements.

C. Manufacturers for PVC Jacketing (PVC):
1. Johns Manville - Zeston
2. P.I.C. Plastics Inc.
3. Proto Corporation
4. Substitutions: Division 01.

D. Manufacturers for Aluminum Jacketing (ALM):
1. Johns Manville
2. ITW Insulation Systems
3. RPR Products – Insul-Mate
4. Substitutions: Division 01.

2.3 PIPE INSULATION

A. Pre-Molded Glass Fiber (PGF) Pipe Insulation:
1. ASTM C547 and ASTM C795, rigid molded, noncombustible with jacket.
2. 'K' Value: ASTM C177, 0.24 at 75 degrees F.
3. Maximum Service Temperature: 850 degrees F.
4. Maximum Moisture Absorption: 0.2 percent by volume.
5. Vapor Barrier Jacket: Outer film layer, kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96 of 0.02 perm-inches.
6. Vapor Barrier Lap Adhesive: Compatible with insulation.

B. Closed Cell Elastomeric (CCE) Pipe Insulation:
1. Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534 Grade 3; use molded tubular material wherever possible.
2. 'K' Value: ASTM C177, between 0.21 and 0.27 at mean rating temperature of 75 degrees F
3. Minimum Service Temperature: Minus 40 degrees F
4. Maximum Service Temperature: 220 degrees F
5. Connection: Waterproof vapor barrier adhesive.
6. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.

2.4 JACKETS

A. Polyvinyl-chloride Plastic Pipe Jacket (PVC):
   1. Jacket: One piece molded type fitting covers and sheet material, off-white color.
      a. Minimum Service Temperature: 0 degrees F.
      b. Maximum Service Temperature: 150 degrees F.
      c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96
      d. Thickness: 10 mil.
      e. Connections: Brush on welding adhesive.
   2. Covering Adhesive Mastic: Compatible with insulation.

B. Aluminum Jacket (ALM): ASTM B209 formed aluminum sheet.
   1. Thickness: 0.016 inch sheet.
   2. Finish: Smooth.
   3. Joining: Longitudinal slip joints and 2 inch laps.
   4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
   5. Metal Jacket Bands: 3/8 inch wide; 0.010 inch thick stainless steel.

2.5 PIPE INSULATION ACCESSORIES

A. Vapor Retarder Lap Adhesive: Compatible with insulation.

B. Covering Adhesive Mastic: Compatible with insulation.

C. Piping 1-1/2 inches diameter and smaller: Galvanized steel insulation protection shield. MSS SP-69, Type 40. Length: Based on pipe size and insulation thickness.

D. Piping 2 inches diameter and larger: hydrous calcium silicate. Inserts length: not less than 6 inches long, matching thickness and contour of adjoining insulation.

E. Closed Cell Elastomeric Insulation Pipe Hanger: Polyurethane insert with aluminum single piece construction with self-adhesive closure. Thickness to match pipe insulation.

F. Valve insulation Wraps: White, noncombustible, conforming to ASTM E 84. Match insulation thickness to pipe size. Valve covers shall be easily removable.

2.6 EQUIPMENT INSULATION

A. Pre-Molded Glass Fiber (PGF) Equipment Insulation:
   1. ASTM C553; glass fiber, flexible or semi-rigid, noncombustible.
   2. Thermal Conductivity: 0.24 at 75 degrees F
   3. Operating Temperature Range: 0 to 450 degrees F
   4. Density: 3 pound per cubic foot

B. Closed Cell Elastomeric (CCE) Equipment Insulation:
   1. ASTM C534, Type II, flexible, closed cell elastomeric insulation, sheet.
   2. 'K' Value: ASTM C177, between 0.21 and 0.27 at mean rating temperature of 75 degrees F
   3. Operating Temperature Range: Range: Minus 70 to 220 degrees F

2.7 EQUIPMENT INSULATION ACCESSORIES

A. Vapor Retarder Lap Adhesive: Compatible with insulation.

B. Covering Adhesive Mastic: Compatible with insulation.

C. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.

D. Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement: ASTM C449/C449M.

E. Adhesives: Compatible with insulation. Refer to manufacturers' installation manual.

PART 3 EXECUTION

3.1 EXAMINATION

A. Protect insulation from exposure to moisture prior to and after installation. All insulation other than flexible elastomeric that becomes wet shall be replaced at no cost to the project.

B. Verify that piping and equipment has been tested before applying insulation materials.

C. Verify that piping and equipment surfaces are clean and dry, with foreign material removed.

3.2 INSTALLATION - PIPING

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with North American Insulation Manufacturers Association (NAIMA) National Insulation Standards.

C. Piping and fittings exposed to view: Provide with PVC Plastic pipe jacketing and fittings for additional protection. Locate insulation and cover seams in least visible locations.

D. Continue insulation through penetrations of building assemblies or portions of assemblies having fire resistance rating of one hour or less. Provide intumescent firestopping when continuing insulation through assembly. Finish at supports, protrusions, and interruptions. Refer to Section 07 for penetrations of assemblies with fire resistance rating greater than one hour.

E. Insulated pipes conveying fluids below ambient temperature:
   1. Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
   2. Furnish factory-applied or field-applied vapor retarder jackets. Secure factory-applied jackets with pressure sensitive adhesive self-sealing longitudinal laps and butt strips. Secure field-applied jackets with outward clinch expanding staples and seal staple penetrations with vapor retarder mastic.

F. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor retarder adhesive or PVC fitting covers.

G. Pre-molded Glass Fiber (PFG) insulated pipes conveying fluids above or below ambient temperature:
   1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
   2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with PVC fitting covers.

H. For hot piping conveying fluids, insulate flanges and unions at equipment.

I. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations of building assemblies or portions of assemblies having fire resistance rating of one hour or less. Provide intumescent firestopping when continuing insulation through assembly. Finish at supports, protrusions, and interruptions. . Refer to Section 07 – Thermal and Moisture Protection for penetrations of assemblies with fire resistance rating greater than one hour.

J. Buried Piping: Provide closed cell elastomeric insulation with all-purpose service jacket with self-sealing lap.

K. Heat Traced Piping: Insulate fittings, joints, and valves with insulation of like material, and finish as adjoining pipe. Size large enough to enclose pipe and heat tracer and according to the heat trace manufacturer's installation instructions. Verify required thickness with heat trace manufacturer's installation instructions. Cover with aluminum jacket with seams located on bottom of horizontal piping.

L. Inserts and Shields:
   1. Application: Piping 1-1/2 inches diameter or larger.
   2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
   3. Insert location: Between support shield and piping and under the finish jacket.
   4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
   5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.

M. Closed Cell Elastomeric (CCE) Insulation:
1. Push insulation on to piping.
2. Miter joints at elbows.
3. Seal seams and butt joints with manufacturer's recommended adhesive.
4. When application requires multiple layers, apply with joints staggered.
5. Insulate fittings and valves with insulation of like material and thickness as adjacent pipe.

N. Prepare pipe insulation for finish painting. Refer to Division 09.

3.3 INSTALLATION - EQUIPMENT

A. Factory Insulated Equipment: Do not insulate.

B. Exposed Equipment: Locate insulation and cover seams in least visible locations.

C. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface. On cold equipment, use vapor retarder cement.

D. Equipment Containing Fluids Below Ambient Temperature:
1. Insulate entire equipment surfaces.
2. Apply insulation close to equipment by grooving, scoring, and beveling insulation. Fasten insulation to equipment with studs, pins, clips, adhesive, wires, or bands.
3. Furnish factory-applied or field-applied vapor retarder jackets. Secure factory-applied jackets with pressure sensitive adhesive self-sealing longitudinal laps and butt strips. Secure field-applied jackets with outward clinch expanding staples and seal staple penetrations with vapor retarder mastic.
4. Finish insulation at supports, protrusions, and interruptions.

E. Equipment Containing all Fluids Above Ambient Temperature:
1. Insulate flanges and unions with removable sections and jackets.
2. Install insulation with factory-applied or field applied jackets, with or without vapor barrier. Finish with glass cloth and adhesive.
3. Finish insulation at supports, protrusions, and interruptions.

F. Nameplates and ASME Stamps: Bevel and seal insulation around; do not cover with insulation.

G. Equipment Requiring Access for Maintenance, Repair, or Cleaning: Install insulation for easy removal and replacement without damage.

3.4 PIPE INSULATION SCHEDULE

A. Provide insulation materials and thicknesses scheduled for each system type and pressure/temperature range. If more than one material is listed for a system, selection from materials listed is Division 22 option.

B. Insulation for pre-insulated piping shall meet all specified requirements.

C. Insulation thickness shall be coordinated with heat trace manufacturers' installation instructions. Listed sizes on schedule shall be used as minimum sizes only.

Domestic Hot Water Supply and Recirculation Systems				
Insulation Type	Pipe Size (inch)	Indoor - Minimum Thickness (inch)	Factory Applied Jacket	Field Applied Jacket
Pre-Molded Glass Fiber (PFG)	1-1/4 inches and smaller	1.0	ASJ-SSL	Indoor: PVC for exposed piping finished space and mechanical rooms.
	1-1/2 inches and larger	1.5		
Closed Cell Elastomeric (CCE)	1-1/4 inches and smaller	1.0	ASJ-SSL	Indoor: PVC for exposed piping finished space and mechanical rooms.
	1-1/2 inches and larger	1.5		

Domestic Cold Water Supply Systems				
Insulation Type	Pipe Size (inch)	Indoor - Minimum Thickness (inch)	Factory Applied Jacket	Field Applied Jacket
Pre-Molded Glass Fiber (PFG)	1-1/4 inches and smaller	0.5	ASJ-SSL	Indoor: PVC for exposed piping finished space and mechanical rooms.
	1-1/2 inches and larger	1.0		
Closed Cell Elastomeric (CCE)	1-1/4 inches and smaller	0.5	ASJ-SSL	Indoor: PVC for exposed piping finished space and mechanical rooms.
	1-1/2 inches and larger	1.0		

Storm Systems: Horizontal Above Ground Within Building (All Piping)				
Insulation Type	Pipe Size (inch)	Indoor - Minimum Thickness (inch)	Factory Applied Jacket	Field Applied Jacket
Pre-Molded Glass Fiber (PFG)	All Sizes	0.5	ASJ-SSL	Indoor: PVC for exposed piping finished space and mechanical rooms.
Closed Cell Elastomeric (CCE)	All Sizes	0.5	ASJ-SSL	Indoor: PVC for exposed piping finished space and mechanical rooms.

Sanitary and Storm PVC Systems: Vertical Above Ground Within Building				
Insulation Type	Pipe Size (inch)	Indoor - Minimum Thickness (inch)	Factory Applied Jacket	Field Applied Jacket
Pre-Molded Glass Fiber (PFG)	All Sizes	0.5	ASJ-SSL	Indoor: PVC for exposed piping finished space and mechanical rooms. Outdoor: ALM
Closed Cell Elastomeric (CCE)	All Sizes	0.5	ASJ-SSL	Indoor: PVC for exposed piping finished space and mechanical rooms. Outdoor: ALM

Roof Drain Body			
Insulation Type	Indoor - Minimum Thickness (inch)	Factory Applied Jacket	Field Applied Jacket
Pre-molded Glass Fiber (PFG)	0.5	N/A	Indoor: N/A Outdoor: N/A
Closed Cell Elastomeric (CCE)	0.5	N/A	Indoor: N/A Outdoor: N/A

Domestic Hot Water Storage Tank			
Insulation Type	Indoor - Minimum Thickness (inch)	Factory Applied Jacket	Field Applied Jacket
Pre-molded Glass Fiber (PFG)	1.5	N/A	Indoor: N/A Outdoor: ALM
Closed Cell Elastomeric (CCE)	1.5	N/A	Indoor: N/A Outdoor: ALM

END OF SECTION

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SECTION 22 1005 - PLUMBING PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pipe, pipe fittings, specialties, and connections for piping systems.
   1. Domestic water.
   2. Storm water.
   3. Sanitary waste and vent.
   4. Chemical resistant waste and vent
   5. Grease waste and vent
   6. Radon Piping
   7. Flanges, unions, and couplings.

1.2 RELATED REQUIREMENTS

A. Division 01 – General Requirements.

B. Division 07 - Thermal and Moisture Protection

C. Division 08 – Openings.

D. Division 09 - Finishes.

E. Division 22 – Plumbing

F. Division 31 - Earthwork

G. Division 33 - Utilities.

1.3 REFERENCE STANDARDS – Most Currently adopted versions and amendments for the location of the project.

A. American National Standards Institute
   1. ANSI Z21.22 - American National Standard for Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems; and addenda A&B.
   2. ANSI Z223.1 - National Fuel Gas Code.

B. American Society of Mechanical Engineers
   1. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
   2. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings.
   3. ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings - DWV.
   4. ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV.
   5. ASME B16.51: Copper and Copper Alloy Press-Connect Pressure Fittings
   6. ASME B31.9 - Building Services Piping.

7. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Welding, Brazing, and Fusing Qualifications.

C. American Society of Sanitary Engineering
1. ASSE 1003 - Performance Requirements for Water Pressure Reducing Valves for Domestic Water Distribution Systems.

D. American Society for Testing and Materials
1. ASTM A47 - Standard Specification for Ferritic Malleable Iron Castings.
2. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
3. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings.
4. ASTM A536 – Ductile Iron Castings
5. ASTM B32 - Standard Specification for Solder Metal.
6. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes.
7. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
8. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube.
9. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings.
10. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
11. ASTM D1622 – Standard Test Method for Apparent Density of Rigid Cellular Plastics
12. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
13. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
14. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems.
15. ASTM D2657 – Standard Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings
16. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings.
17. ASTM D2683 - Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing.
18. ASTM D2729 – Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
19. ASTM D2855 - Standard Practice for the Two-Step (Primer & Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets.
20. ASTM D3035 – Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter:
21. ASTM D3261 – Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing
22. ASTM D3311 – Standard Specification for Drain, Waste, and Vent (DWV) Plastic Fittings Patterns

23. ASTM D3350 – Standard Specification for Polyethylene Plastics Pipe and Fittings Materials
24. ASTM F493 - Standard Specification for Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings.
25. ASTM F876 - Standard Specification for Crosslinked Polyethylene (PEX) Tubing.
26. ASTM F877 - Standard Specification for Crosslinked Polyethylene (PEX) Plastic Hot- and Cold-Water Distribution Systems.
27. ASTM F1055 – Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene and Crosslinked Polyethylene (PEX) Pipe and Tubing
28. ASTM F1960 - Standard Specification for Cold Expansion Fittings with PEX Reinforcing Rings for Use with Cross-linked Polyethylene (PEX) Tubing.
29. ASTM F2389 - Standard Specification for Pressure-rated Polypropylene (PP) Piping Systems

E. American Welding Society
1. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2011-AMD 1.

F. American Water Works Association
1. AWWA C104/A21.4-08 – Cement-mortar Lining for Ductile-iron Pipe and Fittings for Water
2. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems.
3. AWWA C110/A21.10 - Ductile-Iron and Gray-Iron Fittings.
4. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
5. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast.
6. AWWA C606 - Grooved and Shouldered Joints.
7. AWWA C651 - Disinfecting Water Mains.
8. AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, 1/2 In. Through 3 In., for Water Service.
9. AWWA C906 – Polyethylene (PE) Pressure Pipe and Fittings, 4 In. Through 65 In., for Waterworks

G. Cast Iron Soil Pipe Institute
1. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications.
2. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.

H. CSA Group
1. CSA B137.11 - Polypropylene (PP-R) Pipe and Fittings for Pressure Applications

I. Manufacturers Standardization Society
1. MSS SP-60 – Connecting Flange Joints between Tapping Sleeves and Tapping Valves

J. National Sanitation Foundation
1. NSF 14 – Plastics Piping System Components and Related Materials
2. NSF 61 - Drinking Water System Components - Health Effects.
3. NSF 372 - Drinking Water System Components - Lead Content.

K. Plastic Pipe Institute
1. PPI TR-4 - PPI Listing of Hydrostatic Design Basis (HDB), Hydrostatic Design Stress (HDS), Strength Design Basis (SDB), Pressure Design Basis (PDB), and Minimum Required Strength (MRS) Ratings For Thermoplastic Piping Materials or Pipe.

1.4 SUBMITTALS

A. See Division 01- General Requirements

B. Product Data: Provide data on pipe materials, pipe fittings, , and accessories. Provide manufacturer's catalog information.

C. Welder Certificate: Include welder's certification of compliance with ASME BPVC-IX.

D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Division 01 -General Requirements.

1.5 QUALITY ASSURANCE

A. Perform work in accordance with applicable codes.

B. Welding Materials and Procedures: Conform to ASME BPVC-IX and applicable state labor regulations.

C. Welder Qualifications: Certified in accordance with ASME BPVC-IX.

D. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

E. To assure uniformity and compatibility of piping components in grooved piping systems, all grooved products utilized shall be supplied by a single manufacturer. Grooving tools shall be supplied by the same manufacturer as the grooved components.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

B. Installer: Company specializing in performing Work of this section with minimum three years experience.

1.7 PRE-INSTALLATION MEETINGS

A. Division 01 General Requirements: Pre-installation meeting.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Division 01 General Requirements: Product storage and handling requirements.

B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

C. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.9 FIELD CONDITIONS

A. Division 01 General Requirements: Product Requirements.

B. Do not install underground piping when bedding is wet or frozen.

C. Verify field measurements prior to fabrication.

1.10 WARRANTY

A. Division 01 General Requirements: Execution and Closeout Requirements: Product warranties and product bonds.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.2 DOMESTIC WATER SERVICE PIPING, BURIED

A. Copper Tubing: ASTM B88, Type K, annealed.
   1. Fittings: ASME B16.18, cast copper, or ASME B16.22, wrought copper.
   2. Joints: Compression connection or brazed, AWS A5.8 BCuP silver/phosphorus/copper alloy with melting range 1190 to 1480 °F.

B. Copper Pipe: ASTM B42, Type K, hard drawn.
   1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.
   2. Joints: ASTM B32, alloy Sn95 solder.
   3. Joints: AWS A5.8M/A5.8, BCuP copper/silver braze.

C. Ductile Iron Pipe: AWWA C151/A21.51.
1. Lining: AWWA C104/A21.4-08 cement mortar lining
2. Fittings: AWWA C110, Ductile or gray iron, standard thickness.
3. Joints: AWWA C111/A21.11, rubber gasket with 3/4 inch (19 mm) diameter rods.
4. Jackets: AWWA C105 polyethylene jacket.

2.3 DOMESTIC WATER PIPING, BELOW GRADE

A. Copper Tubing
1. Tubing: ASTM B88, Type K, annealed.
2. Fittings: ASME B16.18, cast copper, or ASME B16.22, wrought copper.
3. Joints: Compression connection or brazed, AWS A5.8 BCuP silver/phosphorus/copper alloy with melting range 1190 to 1480 °F.
4. Tubing shall be installed with no joints below grade.

B. Copper Piping, Pre-Insulated
1. Manufacturers:
   a. Rovanco Piping Systems, Inc.
   b. Tricon Piping Systems, Inc.
   c. Thermacor Process Inc.
   d. Ricwil Piping Systems
   e. Perma-Pipe International Holdings, Inc.
   f. Substitutions – See Division 01
2. Description: Factory fabricated piping with carrier pipe, insulation and casing.
3. Carrier Pipe: Type L Hard Drawn Copper Tubing conforming to ASTM B88 in 20-foot lengths
4. Carrier Pipe Insulation:
   a. Hi-temp Polyurethane Foam insulation.
   b. K-Factor: .147 to .165
   c. Minimum density of 2 PCF
   d. Closed cell content of 90% to 95%
   e. Compressive strength of 35 PSI
   f. Maximum carrier fluid temperature of 250ºF
   g. Conform to ASTM standard D1621, D1622, D1623, D2126, and D2842 completely filling the annular space between the carrier pipe and jacketing.
5. Casing: High-density PVC, ASTM D-1784.
6. Joining Method: Straight lengths of pipe will be joined by solder connection, ASTM B32, alloy Sn95 solder.
7. Fittings and Field Joints:
   a. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.
   b. Fittings will be insulated and jacketed with materials supplied by the system supplier and as per manufacturer's standard procedures.
8. End Seals: Each length of pre-insulated pipe will be fitted with a watertight mastic end seal at jacket and pipe surfaces. Field cuts will be sealed with a field applied end seal.
9. Anchors: Pipe shall be anchored per system supplier's recommendations.

Piping Material	Application
Copper Tubing	Below grade

2.4 DOMESTIC WATER PIPING, ABOVE GRADE

A. Copper Tube: ASTM B88, Type L, hard drawn.
   1. Fittings:
      a. Soldered fittings, ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze. ASTM B32, alloy Sn95 solder.
      b. Mechanical press-connect fittings, ASME B16.51, Cast-bronze or wrought-copper fitting with EPDM-rubber, O-ring seal in each end. Unpressed fitting identification feature to the fitting wall.
      c. Mechanical roll groove fittings,
         1) 2"-8" (DN50-DN200) for copper tubing consisting of ductile iron cast housings, synthetic rubber gasket, with plated nuts and bolts to secure unit together. Couplings shall be manufactured to connect copper tubing sized tube and fittings. (Flaring of tube and fitting ends to IPS dimensions is not allowed.)
         2) Coupling Housings: Ductile iron, ASTM A536, coated with copper colored alkyd enamel. Housings cast with offsetting, angle-pattern bolt pads to provide rigidity.
         3) Coupling Gaskets: Gasket shall be Grade EPDM designed for operating temperatures from -30 °F to +250 °F.

Piping Material	Application
Copper Tubing	Above grade

2.5 STORM WATER PIPING, BURIED

A. Solid-Wall PVC Pipe: ASTM D2665, drain, waste, and vent.
   1. Cellular-Core PVC Pipe will not be accepted.
   2. PVC Socket Fittings: ASTM D2665, made to ASTM D3311, drain, waste, and vent patterns.
   3. PVC Pressure Fittings: ASTM D2466, Socket Type
   4. Primer: ASTM F656.
   5. Solvent Cement: ASTM D2564.

B. Applications: Provide piping products of the types indicated on the plans and in accordance with the following.

Piping Material	Application
Solid-Wall PVC Pipe	All buried storm water piping

2.6 STORM WATER PIPING, ABOVE GRADE

A. Solid-Wall PVC Pipe: ASTM D2665, drain, waste, and vent.
   1. Cellular-Core PVC Pipe will not be accepted.
   2. PVC Socket Fittings: ASTM D2665, made to ASTM D3311, drain, waste, and vent patterns.
   3. PVC Pressure Fittings: ASTM D2466, Socket Type
   4. Solvent Cement: ASTM D2564.

B. Applications: Provide piping products of the types indicated on the plans and in accordance with the following.

Piping Material	Application
Solid-Wall PVC Pipe	All above ground storm piping

2.7 SANITARY WASTE AND VENT BELOW GRADE

A. Solid-Wall PVC Pipe: ASTM D2665, drain, waste, and vent.
   1. Cellular-Core PVC Pipe will not be accepted.
   2. PVC Socket Fittings: ASTM D2665, made to ASTM D3311, drain, waste, and vent patterns.
   3. PVC Pressure Fittings: ASTM D2466, Socket Type
   4. Solvent Cement: ASTM D2564.

B. Applications: Provide piping products of the types indicated on the plans and in accordance with the following.

Piping Material	Application
Solid-Wall PVC Pipe	All below grade sanitary waste and vent piping

2.8 SANITARY WASTE AND VENT PIPING, ABOVE GRADE

A. Copper Tube: ASTM B306, DWV
   1. Fittings: ASME B16.23, cast-copper-alloy or ASME B16.29, wrought-copper, solder-joint fittings.
   2. Joints: ASTM B32, lead free with ASTM B813, water-flushable flux

B. Solid-Wall PVC Pipe: ASTM D2665, drain, waste, and vent.
   1. Cellular-Core PVC Pipe: ASTM F891, Schedule 40 will not be accepted.
   2. PVC Socket Fittings: ASTM D2665, made to ASTM D3311, drain, waste, and vent patterns.
   3. PVC Pressure Fittings: ASTM D2466, Socket Type
   4. Solvent Cement: ASTM D2564.

C. Applications: Provide piping products of the types indicated on the plans and in accordance with the following.

Piping Material	Application
Copper Tube: ASTM B306, DWV	
Solid-Wall PVC Pipe	All above grade vent piping. Above grade sanitary piping where the temperature of the waste stream does not exceed 120 °F.

2.9 RADON PIPING

A. PVC Pipe: ASTM D1785, Schedule 40, polyvinyl chloride (PVC) material, bell and spigot style solvent sealed joint ends.
1. Fittings: ASTM D2466, Schedule 40, PVC.
2. Joints: ASTM D2855, solvent weld with ASTM D2564 Solvent cement.

B. PVC Pipe – Perforated: ASTM D2729, polyvinyl chloride (PVC) material, bell and spigot style solvent sealed joint ends. Perforated pipe shall be supplied with two rows of 1/2" diameter holes every five inches. Rows shall be parallel to the pipe axis and are 120° apart.
1. Fittings: ASTM D2466, Schedule 40, PVC.
2. Joints: ASTM D2855, solvent weld with ASTM D2564 Solvent cement.

C. Applications: Provide piping products of the types indicated on the plans and in accordance with the following.

Piping Material	Application
PVC Pipe	All radon vent piping
PVC Pipe - Perforated	Below grade radon collection piping

2.10 FLANGES, UNIONS, AND COUPLINGS

A. Unions for Pipe Sizes 3 Inches and Under:
1. Ferrous pipe: Class 150 malleable iron threaded unions.
2. Copper tube and pipe: Class 150 bronze unions with soldered joints.

B. Flanges for Pipe Size Over 1 Inch:
1. Ferrous Pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
2. Copper Tube and Pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.

C. Mechanical Couplings for Grooved and Shouldered Joints: Two or more curved housing segments with continuous key to engage pipe groove, circular C-profile gasket, and bolts to secure and compress gasket.
1. Dimensions and Testing: In accordance with AWWA C606.
2. Housing Material: Provide ASTM A47 malleable iron, ductile iron, or galvanized.
3. Gasket Material: EPDM suitable for operating temperature range from minus 30 °F to 230 °F.
4. Gasket Material: Nitrile rubber suitable for operating temperature range from minus 20 °F to 180 °F.
5. Bolts and Nuts: Hot dipped galvanized or zinc-electroplated steel.
6. When pipe is field grooved, provide coupling manufacturer's grooving tools.
7. Manufacturers:
   a. Grinnell Products, a Tyco Business
   b. Bristol Metals
   c. Viega LLC
   d. Victaulic Company
   e. Substitutions: Division 01 - General Requirements.

D. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier are required where two dissimilar metal products are connected within a system.

2.11 GREASE WASTE AND VENT PIPING

A. CPVC Pipe: ASTM F2618, Schedule 40, Chlorinated polyvinyl chloride (CPVC), bell and spigot style solvent sealed joint ends.
1. Fittings: ASTM F2618, Schedule 40, CPVC, drainage pattern fitings
2. Joints: solvent weld with ASTM F493 solvent cement
3. Buried pipe shall be installed in accordance with ASTM D2321 and ASTM F1668
4. Pipe and fittings shall be products of a single manufacturer

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that excavations are to required grade, dry, and not over-excavated.

3.2 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt, on inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

D. Install piping to maintain headroom, conserve space, and not interfere with use of space.

E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 22 05 16.

F. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 220700.

G. Provide access where valves and fittings are not exposed.
   1. Coordinate size and location of access doors with Division 08 Openings.

H. Establish elevations of buried piping outside the building to ensure not less than the local area's frost depth of cover.

I. Install vent piping penetrating roofed areas to maintain integrity of roof assembly and a minimum of 25 feet from an air intake; refer to Division 08 – Openings.

J. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.

K. Provide support for utility meters in accordance with requirements of utility companies.

L. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finished painting.
   1. Painting of plumbing systems and components are specified in Division 09 - Finishes.

M. Excavate and backfill in accordance with Division 31- Earthwork requirements.

N. Install bell and spigot pipe with bell end upstream.

O. Install water piping to ASME B31.9.

P. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.

Q. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.

R. Fusion Welding of Joints

1. Install fittings and joints using socket-fusion, elecrofusion, or butt-fusion as applicable for the fitting type. All fusion-weld joints shall be made in accordance with the pipe and fitting manufacturer's specifications and product standards.
2. Fusion-weld tooling, welding machines, and electrofusion devices shall be as specified by the pipe and fittings manufacturer.
3. Prior to joining, the pipe and fittings shall be prepared in accordance with ASTM D2657, ASTM F 2389 and the manufacturer's specifications.
4. Joint preparation, setting and alignment, fusion process, cooling times and working pressure shall be in accordance with the pipe and fitting manufacturer's specifications.

S. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

3.4 TOLERANCES

A. Sanitary Drainage Piping: slope to sanitary drain at minimum of 1/4" per foot for horizontal piping 3" and smaller. Slope sanitary drain at minimum of 1/8" per foot for horizontal piping larger than 3 inches.

3.5 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A. Prior to starting work, verify system is complete, flushed and clean.

B. Ensure acidity (pH) of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).

C. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.

D. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.

E. Maintain disinfectant in system for 24 hours.

F. If final disinfectant residual tests less than 25 mg/L, repeat treatment.

G. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.

H. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

3.6 SERVICE CONNECTIONS

A. Provide new sanitary sewer services. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.

B. Provide new water service complete with approved reduced pressure backflow preventer and, pressure reducing valve, and sand strainer.
   1. Provide sleeve in wall for service main and support at wall with reinforced concrete bridge. Caulk enlarged sleeve and make watertight with pliable material. Anchor service main inside to concrete wall.
   2. Provide 18 gage, 0.0478 inch galvanized sheet metal sleeve around service main to 6 inch above floor and 6 feet minimum below grade. Size for minimum of 2 inches of loose batt insulation stuffing.

END OF SECTION

SECTION 22 1123 - FUEL GAS PIPING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Natural gas/LP gas piping buried beyond 10 of building.
2. Natural gas/LP gas piping buried within 10 of building.
3. Natural gas/LP gas piping above grade.
4. Unions and flanges.
5. Valves.
6. Pipe hangers and supports.
7. Strainers.
8. Natural gas pressure regulators.
9. Natural gas pressure relief valves.
10. Underground pipe markers.
11. Bedding and cover materials.

B. Related Sections:
1. Division 05- Metals
2. Division 07 - Thermal and Moisture Protection.
3. Division 08 - Openings
4. Division 09- Finishes
5. Division 22 – Plumbing
6. Division 31 - Earthwork
7. Division 33 - Utilities

1.2 REFERENCES – Most Currently adopted versions and amendments for the location of the project.

A. American National Standards Institute:
1. ANSI Z21.15 - Manually Operated Gas Valves for Appliances, Appliance Connector Valves and Hose End Valves.

B. American Society of Mechanical Engineers:
1. ASME B16.3 - Malleable Iron Threaded Fittings.
2. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes.
3. ASME B16.33 - Manually Operated Metallic Gas Valves for Use in Gas Piping Systems Up to 125 psig (sizes 1/2 - 2).
4. ASME B31.9 - Building Services Piping.
5. ASME Section IX - Boiler and Pressure Vessel Code - Welding and Brazing Qualifications.

C. ASTM International:
1. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

2. ASTM A234 - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
3. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
4. ASTM B280 - Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.
5. ASTM B749 - Standard Specification for Lead and Lead Alloy Strip, Sheet, and Plate Products.
6. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers.

D. American Welding Society:
1. AWS D1.1 - Structural Welding Code - Steel.

E. American Water Works Association:
1. AWWA C105 - American National Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems.

F. Manufacturers Standardization Society of the Valve and Fittings Industry:
1. MSS SP 58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
2. MSS SP 67 - Butterfly Valves.
3. MSS SP 78 - Cast Iron Plug Valves, Flanged and Threaded Ends.
4. MSS SP 110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

G. National Fire Protection Association:
1. NFPA 54 - National Fuel Gas Code.
2. NFPA 58 – National Liquefied Petroleum Gas Code

H. Underwriters Laboratories Inc.:
1. UL 842 - Valves for Flammable Fluids.

1.3 SYSTEM DESCRIPTION

A. Where more than one piping system material is specified, provide compatible system components and joints. Use non-conducting dielectric connections when joining dissimilar metals in systems.

B. Provide flanges, unions, or couplings at locations requiring servicing. Use unions, flanges, or couplings downstream of valves and at equipment connections. Do not use direct welded or threaded connections to valves, equipment.

C. Provide pipe hangers and supports in accordance with ASME B31.9.

D. Use plug, ball, or butterfly valves for shut-off and to isolate equipment, part of systems, or vertical risers.

1.4 SUBMITTALS

A. Division 01 – General Requirements

B. Product Data:
   1. Piping: Submit data on pipe materials, fittings, and accessories. Submit manufacturers catalog information.
   2. Valves: Submit manufacturers catalog information with valve data and ratings for each service.
   3. Hangers and Supports: Submit manufacturers catalog information including load capacity.
   4. Piping Specialties: Submit manufacturers catalog information including capacity, rough-in requirements, and service sizes for the following:
      a. Strainers.
      b. Natural gas pressure regulators.
      c. Natural gas pressure relief valves.

C. Design Data: Indicate pipe size. Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers.

D. Test Reports: Indicate results of piping system pressure test.

E. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

F. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within previous 12 months.

1.5 CLOSEOUT SUBMITTALS

A. Division 01 - General Requirements.

B. Project Record Documents: Record actual locations of valves piping system, and system components.

C. Operation and Maintenance Data: Submit for valves, gas pressure regulators installation instructions, spare parts lists, and exploded assembly views.

1.6 QUALITY ASSURANCE

A. Perform gas Work in accordance with NFPA 54 and NFPA 58 (where applicable).

B. Perform Work in accordance with applicable code and local gas company requirements.

C. Perform Work in accordance with ASME B31.9 code for installation of piping systems and ASME Section IX for welding materials and procedures.

D. Perform Work in accordance with applicable code and authority having jurisdiction, AWS D1.1 for welding hanger and support attachments to building structure.

E. Furnish shutoff valves complying with ASME B16.33 or ANSI Z21.15.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience approved by manufacturer.

C. Design piping system, hangers and supports under direct supervision of Professional Engineer experienced in design of this Work and licensed in the State of the Project location.

1.8 PRE-INSTALLATION MEETINGS

A. Division 01 - General Requirements

B. Convene minimum one week prior to commencing work of this section.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Division 01 - General Requirements

B. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

C. Protect piping and fittings from soil and debris with temporary end caps and closures. Maintain in place until installation. Furnish temporary protective coating on cast iron and steel valves.

1.10 ENVIRONMENTAL REQUIREMENTS

A. Division 01 - General Requirements.

B. Do not install underground piping when bedding is wet or frozen.

1.11 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.12 COORDINATION

A. Division 01 - General Requirements

B. Coordinate trenching, excavating, bedding and backfilling of buried piping systems with requirements of Division 31 - Earthwork.

1.13 WARRANTY

A. Division 01 - General Requirements

B. Furnish five-year manufacturer warranty for valves excluding packing.

1.14 EXTRA MATERIALS

A. Division 01 - General Requirements

B. Furnish two packing kits for each type and size valve.

PART 2 PRODUCTS

2.1 NATURAL GAS /LP GAS PIPING, EQUIPMENT CONNECTIONS

A. Steel Pipe: ASTM A53 Schedule 40 black.
   1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M forged steel welding type.
   2. Joints: Threaded for pipe 2 inch and smaller; welded for pipe 2-1/2 inches and larger.

B. Corrugated Stainless Steel Tubing: ANSI LC 1.

2.2 NATURAL GAS / LP GAS PIPING, BURIED BEYOND 10 FEET OF BUILDING

A. Steel Pipe: ASTM A53 Schedule 40 black.
   1. Fittings: ASTM A234, wrought steel welding type, with AWWA C105/A21.5 polyethylene jacket or double layer, half-lapped 10 mil polyethylene tape.
   2. Joints: ASME B31.1, welded.

B. Polyethylene Pipe: ASTM D2513, SDR 11.
   1. Fittings: ASTM D2683 or ASTM D2513 socket type.
   2. Joints: Fusion welded.

2.3 NATURAL GAS / LP GAS PIPING, BURIED WITHIN 10 FEET OF BUILDING

A. Steel Pipe: ASTM A53 Schedule 40 black.
   1. Fittings: ASTM A234, wrought steel welding type.
   2. Joints: ASME B31.1, welded.
   3. Jacket: AWWA C105/A21.5 polyethylene jacket or double layer, half-lapped 10 mil polyethylene tape.

2.4 NATURAL GAS / LP GAS PIPING, ABOVE GRADE

A. Steel Pipe: ASTM A53 Schedule 40 black.
   1. Fittings: ASME B16.3, malleable iron, or ASTM A234, wrought steel welding type.
   2. Joints: Threaded or welded to ASME B31.1.

B. Copper Tube: ASTM B88 or ASTM B280, Type L (A).
   1. Fittings: ASME B16.26, cast bronze.
   2. Joints: Flared.

2.5 REGULATOR VENT PIPING, ABOVE GRADE

A. Indoors: Same as gas piping, above grade.

B. Outdoors: PVC pipe, tubing, and fittings, UL 651.

2.6 UNIONS AND FLANGES

A. Unions for Pipe 2 inches and Smaller:
   1. Ferrous Piping: Class 150, malleable iron, threaded.
   2. Copper Piping: Class 150, bronze unions with soldered.
   3. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

B. Flanges for Pipe 2-1/2 inches and Larger:
   1. Ferrous Piping: Class 150, forged steel, slip-on flanges.
   2. Copper Piping: Class 150, slip-on bronze flanges.
   3. Gaskets: 1/16 inch thick preformed neoprene gaskets.

2.7 BALL VALVES

A. Manufacturers:
   1. Crane Valve, North America
   2. Hammond Valve
   3. Milwaukee Valve Company
   4. NIBCO, Inc.
   5. Stockham Valves & Fittings
   6. Watts
   7. Substitutions: Division 01 - General Requirements.

B. 1/4 inch to 1 inch: MSS SP 110, Class 125, two piece, threaded ends, bronze body, chrome plated bronze ball, reinforced teflon seats, blow-out proof stem, lever handle, UL 842 listed for flammable liquids and LPG, full port.

C. 1-1/4 inch to 3 inches: MSS SP 110, Class 125, two piece, threaded ends, bronze body, chrome plated bronze ball, reinforced teflon seats, blow-out proof stem, lever handle, UL 842 listed for flammable liquids and LPG, conventional port.

2.8 PLUG VALVES

A. Manufacturers:
   1. DeZURIK, Unit of SPX Corp.
   2. Flow Control Equipment, Inc.
   3. Homestead Valve
   4. Substitutions: Division 01 - General Requirements.

B. 2 inches and Smaller: MSS SP 78, Class 150 construction, round port, full pipe area, pressure lubricated, teflon packing, threaded ends. Furnish one plug valve wrench for every ten plug-valves with minimum of one wrench.

C. 2-1/2 inches and Larger: MSS SP 78, Class 150 round port, full pipe area, pressure lubricated, teflon packing, flanged ends. Furnish wrench-operated.

2.9 BUTTERFLY VALVES

A. Manufacturers:
1. Crane Valve, North America
2. Hammond Valve
3. Milwaukee Valve Company
4. NIBCO, Inc.
5. Stockham Valves & Fittings
6. Watts
7. Substitutions: Division 01 - General Requirements.

B. 2 inches and Smaller: MSS SP 67, 175 psi, bronze body, Viton seals, stainless steel trim, lever handle UL 842 listed for gas service, threaded ends, full port.

2.10 PIPE HANGERS AND SUPPORTS

A. Refer to Section 22 – Common work results for plumbing for hanger and support material and dimensional requirements.

B. Refer to schedule in this section for spacing and dimensional requirements.

2.11 STRAINERS

A. Manufacturers:
1. Mueller Steam Specialty
2. Armstrong
3. Spirax Sarco, Inc.
4. Yarway
5. Substitutions: Division 01 - General Requirements.

B. 2 inch and Smaller: Screwed brass or iron body for 175 psig working pressure, Y pattern with 1/32 inch stainless steel perforated screen.

C. 2-1/2 inch to 4 inches: Flanged iron body for 175 psig working pressure, Y pattern with 3/64 inch stainless steel perforated screen.

D. 5 inch and Larger: Flanged iron body for 175 psig working pressure, basket pattern with 1/8 inch stainless steel perforated screen.

2.12 NATURAL GAS PRESSURE REGULATORS

A. Manufacturers:
1. Invensys
2. Maxitrol
3. Dormont
4. Substitutions: Division 01 – General Requirements

B. Product Description: Spring loaded, general purpose, self-operating service regulator including internal relief type diaphragm assembly and vent valve. Diaphragm case can be rotated 360 degrees in relation to body.
1. Comply with ANSI Z21.80.
2. Temperatures: minus 20 degrees F to 150 degrees F.
3. Body: steel.
4. Spring case, lower diaphragm casing, union ring, seat ring and disk holder: Aluminum.
5. Disk, diaphragm, and O-ring: Nitrile
6. Maximum inlet pressure: 150 psig.
7. Furnish sizes 2 inches and smaller with threaded ends. Furnish sizes 2-1/2 inches and larger with flanged ends.

2.13 BEDDING AND COVER MATERIALS

A. Bedding: Refer to Division 31 – Earthwork

B. Cover: Refer to Division 31 – Earthwork

C. Soil Backfill from Above Pipe to Finish Grade: Refer to Division 31 – Earthwork

PART 3 EXECUTION

3.1 EXAMINATION

A. Division 01 – General Requirements

B. Verify excavations are to required grade, dry, and not over-excavated.

3.2 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt, on inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.3 INSTALLATION - INSERTS

A. Refer to 22 0500 – Common Work Results for Plumbing Trades.

3.4 INSTALLATION - BURIED PIPING SYSTEMS

A. Install natural gas / LP gas piping in accordance with NFPA 54 and NFPA 58.

B. Establish elevations of buried piping with not less than 3 ft of cover.

C. Remove scale and dirt on inside of piping before assembly.

D. Pipe trench excavation, bedding material and backfilling shall be in accordance with Division 31 – Earthwork

E. Route pipe in straight line.

F. Install pipe to allow for expansion and contraction without stressing pipe or joints.

G. Install trace wire continuous above pipe line; coordinate with Division 31 - Earthwork

H. Pipe Cover and Backfilling:
   1. Backfill trench in accordance with Division 31 - Earthwork

3.5 INSTALLATION - ABOVE GROUND PIPING SYSTEMS

A. Install natural gas piping in accordance with NFPA 54 and NFPA 58.

B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

C. Route piping in orderly manner and maintain gradient.

D. Where required, bend pipe with pipe bending tools in accordance with procedures intended for that purpose.

E. Install piping to conserve building space and not interfere with use of space.

F. Size and install gas piping to provide sufficient gas to supply maximum appliance demand at pressure higher than appliance minimum inlet pressure.

G. Group piping whenever practical at common elevations.

H. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

I. Sleeve pipe passing through partitions, walls and floors. Refer to Section 22 0500.

J. Install firestopping at fire rated construction perimeters and openings containing penetrating sleeves and piping. Refer to Division 07 – Thermal and Moisture Protection.

K. Provide clearance for installation of insulation and access to valves and fittings.

L. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors with Division 08 - Openings.

M. Where pipe support members are welded to structural building framing, scrape, brush clean, weld, and apply one coat of zinc rich primer. Refer to Division 05 – Metals.

N. Provide support for utility meters in accordance with requirements of utility company.

O. Install vent piping from gas pressure reducing valves to outdoors and terminate in weatherproof hood. Protect vent against entry of insects and foreign material.
1. Minimum Vent Size: Connection size at regulator vent connection.
2. Run individual vent line from each relief device, independent of breather vents.
3. Provide min. 25 feet separation between vent termination and mechanical air intakes and similar opening.

P. Prepare pipe, fittings, supports, and accessories not pre-finished, ready for finish painting. Refer to Division 09 - Finishes.

Q. Install identification on piping systems including underground piping. Refer to Section 22 0500.

R. Install valves with stems upright or horizontal, not inverted.

S. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

T. Install gas pressure regulator with tee fitting between regulator and upstream shutoff valve. Tee fitting shall be 10 pipe diameters upstream of regulator minimum. Cap or plug one opening of tee fitting.

U. Install gas pressure regulator with independent vent full size opening on regulator and terminate outdoors.

V. Provide gas service complete with gas meter and regulators.

W. Provide regulators on each piece of equipment and appliances, sized in accordance with equipment manufacturer.

X. Provide flexible pipe as final connection to roof mounted mechanical equipment when seismic roof curbs are used.

3.6 FIELD QUALITY CONTROL

A. Division 01 – General Requirements.

B. Where gas appliance will be damaged by test pressure, disconnect appliance and cap piping during pressure test. Reconnect appliance after pressure test and leak test connection.

C. Where gas appliance is designed for operating pressures equal to or greater than piping test pressure, provide gas valve to isolate appliance or equipment from gas test pressure.

D. Pressure test fuel gas piping in accordance with NFPA 54 and NFPA 58.

E. Inspect, test and purge gas piping in accordance with NFPA 54 and NFPA 58, applicable codes, and local gas company requirements. Where new branch piping is extended from existing system, pressure test new branch piping only. Leak test joint between new and existing piping with noncorrosive leak detection fluid or other approved method.

F. When pressure tests do not meet specified requirements, remove defective work, replace and retest.

G. Immediately after gas is applied to a new system, or a system has been restored after gas service interruption, check pipe for leakage.
   1. Where leakage is detected, shut off gas supply until necessary repairs are complete.

H. Do not place appliances in service until leak testing and repairs are complete.

3.7 SCHEDULES

A. Pipe Hanger Spacing:

PIPE SIZE Inches	COPPER TUBING MAXIMUM HANGER SPACING Feet	STEEL PIPE MAXIMUM HANGER SPACING Feet	COPPER TUBING MINIMUM HANGER ROD DIAMETER Inches	STEEL PIPE MINIMUM HANGER ROD DIAMETER Inches
½	4	6	3/8	3/8
¾	6	8	3/8	3/8
1	6	8	3/8	3/8
1-1/4	8	10	3/8	3/8
1-1/2	8	10	3/8	3/8
2	8	10	3/8	3/8
2-1/2	8	10	1/2	1/2
3	8	10	1/2	1/2
4	8	10	5/8	5/8

END OF SECTION

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SECTION 22 1124 - DOMESTIC WATER PUMPS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. System lubricated circulators.
2. In-line circulator pumps.
3. Pressure booster systems.
4. Domestic hot water recirculation pump controls.

B. Related Sections:
1. Division 03 - Cast-In-Place Concrete: Execution requirements for placement of concrete house keeping pads specified by this section.
2. Division 22 – Plumbing
3. Division 26 – Electrical

1.2 REFERENCES

A. American Society of Mechanical Engineers:

B. ASTM International:

C. National Electrical Manufacturers Association:
1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

D. National Sanitation Foundation
1. NSF 61 - Drinking Water System Components - Health Effects.
2. NSF 372 - Drinking Water System Components - Lead Content.

1.3 SUBMITTALS

A. Division 01 – General Requirements

B. Product Data:
1. Pumps: Submit pump type, capacity, certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable. Include electrical characteristics and connection requirements.

C. Manufacturer's Installation Instructions: Submit installation instructions for pumps, valves and accessories.

1.4 CLOSEOUT SUBMITTALS

A. Division 01 – General Requirements: Closeout procedures.

B. Operation and Maintenance Data: Submit spare parts list, exploded assembly views and recommended maintenance intervals.

1.5 QUALITY ASSURANCE

A. For drinking water service, provide pumps complying with NSF 61.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

B. Installer: Company specializing in performing Work of this section with minimum three years experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Division 01 – General Requirements.

B. Accept pumps and equipment on site in shipping containers with labeling in place. Inspect for damage.

1.8 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.9 WARRANTY

A. Division 01 – General Requirements.

1.10 EXTRA MATERIALS

A. Division 01 – General Requirements.

PART 2 PRODUCTS

2.1 IN-LINE CIRCULATOR PUMPS

A. Manufacturers:
   1. Taco
   2. Bell & Gossett
   3. Grundfos
   4. Substitutions Division 01 – General Requirements.

B. Casing: Bronze rated for 125 psig working pressure with stainless steel rotor assembly.

C. Impeller: Bronze.

D. Shaft: Alloy steel with integral thrust collar and two, bronze sleeve bearings.

E. Seal: Carbon rotating against stationary ceramic seat.

F. Drive: Flexible coupling.

2.2 HOT WATER RECIRC PUMP CONTROLS

A. Refer to plumbing drawings for location of pump.
   1. Pump shall be allowed to operate during occupied periods, including occupied override periods.
   2. When return water temperature is 5 degrees F lower than supply temperature, pump shall run until temperature is equal to hot water supply temperature.
      a. Provide pipe mounted AI temperature sensor at the recirculation pump inlet and the master mixing valve discharge.
   3. Provide audible alarm for pump failure.

B. Provide BAS monitoring of the points listed below:
   1. Pump status (On/Off).
   2. Pump failure.
   3. Hot water return temperature.

PART 3 EXECUTION

3.1 FIELD QUALITY CONTROL

A. Division 01 – General Requirements: Field inspecting, testing, adjusting, and balancing.

B. Test pumps and systems to verify capacity, sequence of operation and flow.

3.2 START-UP AND TRAINING

A. Manufacturer’s representative to review and approve installation.

B. Manufacturer’s representative to participate in start-up of domestic water booster systems.

C. Manufacturer’s representative to provide operator training in the operation, maintenance and adjustment of the domestic water booster systems.

3.3 PERFORMANCE

A. Refer to pump schedule.

3.4 PUMPS

A. Provide pumps to operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.

B. Install long radius reducing elbows or reducers between pump and piping. Support piping adjacent to pump so no weight is carried on pump casings. For close coupled or base mounted pumps, install supports under elbows on pump suction and discharge line sizes 4 inches and over. Support suction guide and discharge elbow from a floor stand with rubber and shear sandwich pad isolators or from above with hangers and spring isolators.

C. Install pumps on vibration isolators. Provide vibration isolated pipe hangers (resilient support) next to pumps on piping.

D. Install flexible connectors at or near pumps where piping configuration does not absorb vibration.

E. Provide air cock and drain connection on horizontal pump casings.

F. Check, align, and certify alignment of base mounted pumps prior to start-up.

G. Install [close coupled and] base mounted pumps on concrete housekeeping base, with anchor bolts, set and level, and grout in place.

H. Check motor and pump lubrication points, fill oil reservoir on in-inline of pumps.

I. Install pumps in accordance with manufacturer’s requirements.

END OF SECTION

SECTION 22 1500 - GENERAL SERVICE COMPRESSED-AIR SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Compressed air piping.
2. Unions and flanges.
3. Valves.
4. Strainers.
5. Flexible connectors.
6. Relief valves.
7. Compressed air outlets.
8. Air compressor.
9. Refrigerated compressed air dryer.
10. Desiccant compressed air dryer.
11. Air receiver.
12. Air pressure reducing valve.
13. Pressure regulators.
14. Compressed air filters.
15. Hose connectors.

B. Related Sections:
1. Division 03 – Concrete: Execution requirements for equipment bases specified by this section.
2. Division 07 - Thermal and Moisture Protection: Product requirements for firestopping for placement by this section.
3. Division 09- Finishes: Execution requirements for painting material specified by this section
4. Division 22 – Plumbing
5. Division 26 – Electrical: Execution requirements for electric connections specified by this section.

1.2 REFERENCES

A. American Society of Mechanical Engineers:
1. ASME B16.3 - Malleable Iron Threaded Fittings.
2. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
3. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
4. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes.
5. ASME B31.1 - Power Piping.
6. ASME B31.9 - Building Services Piping.
7. ASME Section VIII - Boiler and Pressure Vessel Code - Pressure Vessels.
8. ASME Section IX - Boiler and Pressure Vessel Code - Welding and Brazing Qualifications.

B. ASTM International:
1. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
2. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
3. ASTM A234- Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
4. ASTM A312 - Standard Specification for Seamless and Welded Austenitic Stainless Steel Pipes.
5. ASTM A395- Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures.
6. ASTM A536 - Standard Specification for Ductile Iron Castings.
7. ASTM B32 - Standard Specification for Solder Metal.
8. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings.
9. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
10.

C. American Welding Society:
1. AWS A5.8 - Specification for Filler Metals for Brazing and Braze Welding.
2. AWS D1.1 - Structural Welding Code - Steel.

D. Manufacturers Standardization Society of the Valve and Fittings Industry:
1. MSS SP 58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
2. MSS SP 67 - Butterfly Valves.
3. MSS SP 70 - Cast Iron Gate Valves, Flanged and Threaded Ends.
4. MSS SP 71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends.
5. MSS SP 80 - Bronze Gate, Globe, Angle and Check Valves.
6. MSS SP 89 - Pipe Hangers and Supports - Fabrication and Installation Practices.
7. MSS SP 110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

E. National Electrical Manufacturers Association:
1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

1.3 SUBMITTALS

A. Division 01 - General Requirements

B. Shop Drawings: Indicate piping system schematic with electrical and connection requirements general assembly of components, mounting and installation details, and general layout of control and alarm panels.

C. Product Data:
1. Piping: Submit data on pipe materials, fittings, and accessories.
2. Valves: Submit manufacturers catalog information with valve data and ratings for each service.
3. Hangers and Supports: Submit manufacturers catalog information including load capacity.

4. System Components: Submit manufacturers catalog information including capacity, component sizes, rough-in requirements, and service sizes. When applicable, include electrical characteristics and connection requirements.
5. Compressors: Submit type, capacity, and performance characteristics. Include electrical characteristics and connection requirements.

D. Manufacturer's Installation Instructions: Submit hoisting and setting requirements, starting procedures.

E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS

A. Division 01 - General Requirements

B. Project Record Documents: Record actual locations of equipment piping, valves, outlets and components.

C. Operation and Maintenance Data: Submit assembly views, lubrication instructions, replacement part numbers and availability.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with ASME B31.1 AND B31.9 code for installation of piping systems and ASME Section IX for welding materials and procedures.

B. Perform Work in accordance with AWS D1.1 for welding hanger and support attachments to building structure.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

B. Installer: Company specializing in performing work of this section with minimum three years experience and approved by manufacturer.

1.7 PRE-INSTALLATION MEETINGS

A. Division 01- General Requirements.

B. Convene minimum one week prior to commencing work of this section.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Division 01 - General Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Accept equipment on site in factory fabricated containers with shipping skids and plastic pipe end protectors in place. Inspect for damage.

C. Protect piping and equipment from weather and construction traffic. Maintain factory packaging and caps in place until installation.

D. Deliver each length of piping with manufacturer's plugged or capped ends and keep sealed until installation.

E. Deliver fittings, valves, and other components in sealed containers and keep sealed until installation.

1.9 WARRANTY

A. Division 01 – General Requirements

B. Furnish manufacturer's standard warranty for pumps, compressors, refrigerated dryers and valves excluding packing.

1.10 MAINTENANCE MATERIALS

A. Division 01 – General Requirements

B. Furnish two, one quart containers of compressor oil.

PART 2 PRODUCTS

2.1 COMPRESSED AIR PIPING

A. Steel Pipe: ASTM A53, Schedule 40 black.
   1. Fittings: ASME B16.3, malleable iron, or ASTM A234, forged steel welding type.
   2. Joints: Threaded or Pressure-Sealed for pipe 2 inch and smaller; welded or grooved for pipe 2-1/2 inches and larger.

B. Copper Tubing: ASTM B88, Type L drawn.
   1. Fittings: ASME B16.18 cast copper alloy or ASME B16.22, wrought copper and bronze.
   2. Tee Connections: Mechanically extracted collars with notched and dimpled branch tube or Mechanical T.
   3. Joints: ASTM B32, Alloy Grade Sb5 tin-antimony, or Alloy Grade Sn95 tin-silver, lead free solder. .

C. Copper Tubing: ASTM B88, Type L drawn.
   1. Copper Press Fittings: Conforming to ASME B16.18 cast copper alloy or ASME B16.22, wrought copper and bronze with Nitrile O-ring seals.
   2. Joints: Compression type made with manufacturer's tool.

D. Copper Tubing: ASTM B88, Type L, annealed.
   1. Fittings: ASME B16.26 cast bronze.
   2. Joints: Flared.

E. Copper Tubing: ASTM B88, Type L, drawn, rolled grooved ends.
   1. Fittings: ASME B16.18 cast copper alloy, or ASME B16.22 wrought copper and bronze, or ASTM B584 bronze sand castings, grooved ends.
   2. Joints: Grooved mechanical couplings meeting ASTM F1476.
      a. Housing Clamps: ASTM A395and ASTM A536 ductile iron, enamel coated, compatible with copper tubing sizes, to engage and lock designed to permit some angular deflection, contraction, and expansion.
      b. Gasket: Elastomer composition for operating temperature range from 86 degrees F to 180 degrees F.
      c. Accessories: [Steel] [Stainless steel] bolts, nuts, and washers.

2.2 UNIONS AND FLANGES

A. Unions for Pipe 2 inches and Smaller:
   1. Ferrous Piping: Class 150, malleable iron, threaded.
   2. Copper Piping: Class 150, bronze unions with [soldered] [brazed joints].
   3. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.
   4. Stainless Steel Piping: 300 psig, threaded type with compression type ends.

B. Flanges for Pipe 2-1/2 inches and Larger:
   1. Ferrous Piping: Class 150, forged steel, slip-on flanges or grooved flange adapter.
   2. Copper Piping: Class 150, slip-on bronze flanges or grooved flange adapter.
   3. Gaskets: 1/16 inch thick preformed neoprene gaskets.

2.3 GATE VALVES

A. Manufacturers:
   1. Crane Valve, North America
   2. Hammond Valve
   3. Milwaukee Valve Company
   4. Stockham Valves & Fittings
   5. Watts
   6. Nibco
   7. Substitutions: Division 01 - General Requirements.

B. 2 inches and Smaller: MSS SP 80, Class 125 , bronze body, bronze trim, threaded bonnet, non-rising stem, hand-wheel, inside screw with back-seating stem, solid wedge disc, alloy seat rings, solder or threaded ends.

C. 2-1/2 inches and Larger: MSS SP 70, Class 125, cast iron body, bronze trim, bolted bonnet, non-rising stem, hand-wheel, outside screw and yoke, solid wedge disc with bronze seat rings, flanged ends. Furnish chain-wheel operators for valves 6 inches and larger mounted over 8 feet above floor.

2.4 BALL VALVES

A. Manufacturers:
1. Crane Valve, North America
2. Hammond Valve
3. Milwaukee Valve Company
4. Stockham Valves & Fittings
5. Nibco
6. Watts
7. Jamesbury
8. Substitutions: Division 01 - General Requirements.

B. 2 inches and Smaller: MSS SP 110, Class 150, bronze, two piece body, [chrome plated bronze] [type 316 stainless steel] ball, full port, teflon seats, blow-out proof stem, solder or threaded ends with union, lever handle .

2.5 CHECK VALVES

A. Horizontal Swing Check Valves:
1. Manufacturers:
   a. Crane Valve, North America
   b. Hammond Valve
   c. Milwaukee Valve Company
   d. Stockham Valves & Fittings
   e. Nibco
   f. Watts
   g. Victaulic
   h. Substitutions: Division 01 - General Requirements.
2. 2 inches and Smaller: MSS SP 80, Class 150, bronze body and cap, bronze seat, Buna-N disc, solder or threaded ends.
3. 2-1/2 inches and Larger: MSS SP 71, Class 125, cast or ductile iron body, bolted or coupled cap, bronze, ductile iron or cast iron disc, renewable disc seal and seat, flanged or grooved ends.

2.6 STRAINERS

A. Manufacturers:
1. Mueller Steam Specialty
2. O.C. Keckley Company
3. Spirax Sarco, Inc.
4. Yarway
5. Armstrong
6. Victaulic
7. Substitutions: Division 01 - General Requirements.

B. 2 inch and Smaller: Y pattern, ASTM B62 bronze body, threaded or soldered ends, Class 150, 1/32 inch, 60 mesh stainless steel perforated screen.

2.7 PIPE HANGERS AND SUPPORTS

A. Refer to Section 220529 – Hangers and Supports for Plumbing Piping and Equipment

2.8 FLEXIBLE CONNECTORS

A. Manufacturers:
   1. Flex-Hose Co., Inc.
   2. Flex-Weld, Inc./Keflex
   3. The Metraflex Company
   4. Twin City Hose, Inc.
   5. USHose Corp.
   6. Substitutions: Division 01 - Product Requirements.

B. 2 inches and Smaller: Corrugated stainless steel hose with single layer of stainless steel exterior braiding, Schedule 40 black steel ends; maximum working pressure 190 psig, threaded or soldered connections.

2.9 RELIEF VALVES

A. Manufacturers:
   1. Wilkerson
   2. Norgren
   3. Hankinsen
   4. Substitutions: Division 01 - General Requirements.

B. Relief Valves: Bronze body, Teflon seat, stainless steel stem and springs, automatic, direct pressure actuated capacities ASME certified and labeled.

2.10 COMPRESSED AIR OUTLETS

A. Manufacturers:
   1. Hansen.
   2. Parker Hannifin
   3. Grimmell
   4. Substitutions: Division 01 - General Requirements.

B. Compressed Air Outlets: Quick Connector: 3/8 inch brass, snap on connector with self closing valve.

2.11 AIR COMPRESSOR

A. Manufacturers:
   1. Ingersoll-Rand
   2. Quincy
   3. Joy
   4. Champion
   5. Substitutions: Division 01 - General Requirements.

B. Air Compressor: [Simplex] [Duplex] [tank mounted] compressor unit consisting of air-cooled compressor, air receiver, after cooler, and operating controls.

C. Reciprocating Compressors:
1. Unit: Reciprocating compressor with positive displacement oil pump lubrication system, suction inlet screen, discharge service valves, on cast iron or welded steel base for motor and compressor with provision for V-belt adjustment.
2. Automatic Capacity Reduction Equipment: Suction valve unloading device with lifting mechanism operated by [oil pressure] [gas discharge pressure] [solenoid valve] [centrifugal force]. Furnish unloaded compressor start.
3. Motor: Constant speed 1800 rpm with electronic overheating protection in each phase with full voltage starting.
4. Control Panel: Factory mounted and wired, NEMA 250 Type 4 enclosure, steel construction, with power and control wiring, [molded-case disconnect switch,] factory wired for single point power connection.
    a. Starter: Furnish with manual reset current overload protection, starter relay, control power transformer, terminal strip for connection to interface equipment.
    b. Safety Controls: Manually reset low oil pressure cutout.
    c. Panel Face: Compressor run light, start-stop switch, elapsed time meter.

D. Screw Compressors:
1. Unit: Direct drive, open drive, 3600 RPM, fixed compression, rotary screw compressor with control panel.
2. Features: Differential pressure oil pump, oil separator and filter, oil charging valve, compressor bearings with ABMA 9 L10 life expectancy at 100,000 hours.
3. Motor: Open drip proof flange squirrel cage induction, close coupled to compressor. Refer to Section 21 05 13.
4. Control Panel: Factory mounted and wired NEMA 250 Type 4 enclosure, with starter and refrigeration controls including:
    a. Non-fused molded-case, disconnect switch.
    b. Single point power connection and grounding lug.
    c. Anti-recycle timer.
    d. Solid state overload relay for each compressor.
    e. Phase loss-reversal monitor.
    f. Cycle counter and hour meter for each compressor.
    g. Automatic shutdown on compressor overload.
5. Automatic Capacity Reduction: Continuously variable slide valve with infinitely variable control to 25 percent of full load.

E. Scroll Compressors:
1. Unit: Single stage, air cooled, scroll compressor continuous duty rated with sealed bearings and with PTFE tip seals between scroll halves. Rated for 120 psig discharge pressure. Mounted on welded steel base for motor and compressor with provision for V-belt adjustment.
2. Furnish [each] compressor with integral air-cooled after cooler designed for maximum approach temperature of 15 degrees F at 100 degrees F and complete with automatic drain valve.

3. Furnish discharge piping of [each] compressor with integral valve to provide load-less starting and shall prevent less than 1/4 revolution of reverse rotation of scroll at shutdown.
4. Motor: Constant speed 1800 rpm with electronic overheating protection in each phase with full voltage starting. Refer to Section 21 05 13.
5. Control Panel: Factory mounted and wired, NEMA 250 Type 4 enclosure, steel construction, with power and control wiring, [molded-case disconnect switch,] factory wired for single point power connection.
   a. Starter: Furnish with manual reset current overload protection, starter relay, control power transformer, terminal strip for connection to interface equipment.
   b. Safety Controls: Manually reset low oil pressure cutout.
   c. Panel Face: Compressor run light, start-stop switch, elapsed time meter.

F. Capacity: Refer to schedule on plans

G. Controls:
1. Pressure Switch: Line voltage contactor to break at 100 psi with minimum differential of 20 psi.

H. Wiring Terminations: Furnish terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box.

I. Disconnect Switch: Factory mount on equipment under provisions of Division 26.

J. Cord and Plug: Furnish unit with 6 foot cord and plug for connection to electric wiring system including grounding connector.

2.12 REFRIGERATED COMPRESSED AIR DRYER

A. Manufacturers:
1. Ingersoll-Rand
2. Speedaire
3. Hankinsen
4. Substitutions: Division 01 - General Requirements.

B. Refrigerated Air Dryer: Self contained mechanical refrigeration type complete with heat exchanger, refrigeration compressor, automatic controls, moisture removal trap, internal wiring and piping, and full refrigerant charge.

C. Air Connections: Inlet and outlet connections at same level, factory insulated.

D. Heat Exchangers: Air to air and refrigerant to air coils. Furnish heat exchangers with automatic control system to bypass refrigeration system on low or no load condition.

E. Moisture Separator: Centrifugal type located at discharge of heat exchanger.

F. Refrigeration Unit: Hermetically sealed type to operate continuously to maintain specified 21 degrees F dew point. House unit in steel cabinet with access door and panel for maintenance and inspection.

G. Accessories: Air inlet temperature gage, air inlet pressure gage, on/off switch, high temperature light, power on light, refrigerant gage , air outlet temperature gage, air outlet pressure gage.

H. Capacity: Refer to schedule on plans

I. Electrical Characteristics: Refer to schedule on plans Wiring Terminations: Furnish terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box.

J. Disconnect Switch: Factory mount on equipment under provisions of Division 26.

K. Cord and Plug: Furnish unit with 6 foot cord and plug for connection to electric wiring system including grounding connector.

2.13 AIR RECEIVER

A. Manufacturers:
1. Speedaire
2. Hanson
3. Steel Fab
4. Kaeser
5. Substitutions: Division 01 - General Requirements.

B. Air Receiver: [Vertical] [Horizontal], built to ASME Section VIII regulations for working pressure of 125 psi. Flange or screw inlet and outlet connections.

C. Fittings: Adjustable pressure regulator, safety valve, pressure gage, drain valve, and automatic float actuated condensate trap.

2.14 AIR PRESSURE REDUCING VALVE

A. Manufacturers:
1. Wilkerson
2. Norgren
3. Hankinson
4. Substitutions: Division 01 - General Requirements.

B. Air Pressure Reducing Valve: Consisting of automatic reducing valve and bypass, and low pressure side relief valve and gage. [Furnish oil separator [as indicated on Drawings]].

C. Valve Capacity: Reduce pressure from 200 psi to 30 psi, adjustable upward from reduced pressure.

2.15 PRESSURE REGULATORS

A. Manufacturers:
   1. Wilkerson
   2. Norgren
   3. Hankinson
   4. Substitutions: Division 01 - General Requirements.

B. Pressure Regulators: [Diaphragm] [Pilot] operated, bronze body, direct acting, spring loaded, manual pressure setting adjustment, rated for 250 psig inlet pressure.

C. Pressure Regulators: Aluminum alloy or plastic body, diaphragm operated, direct acting, spring loaded, manual pressure setting adjustment, and rated for 250 psig inlet pressure.

2.16 COMPRESSED AIR FILTERS

A. Manufacturers:
   1. Donaldson
   2. General
   3. Milton
   4. Substitutions: Division 01 - General Requirements.

B. Mechanical Separation Filter: 2 stage. Furnish with deflector plates, resin impregnated ribbon type filters with 40 micron thick edge filtration and drain valve.

C. Coalescing Filters: Furnish with activated carbon capable of removing water and oil aerosols, with color-change dye indicating when carbon is saturated and warning light indicating when maximum pressure drop has been exceeded.

2.17 HOSE CONNECTORS

A. Manufacturers:
   1. Hansen
   2. Parker Hannifin
   3. Grinnell
   4. Substitutions: Division 01 - General Requirements.

B. Hose Connectors: Corrugated stainless steel tubing with stainless steel wire braid covering and ends welded to inner tubing.

C. Working Pressure: 250 psig minimum.

D. End Connections:
   1. 2 inches and Smaller: Threaded steel pipe nipple.
   2. 2-1/2 inches and Larger: Class 150 Flanges.

PART 3 EXECUTION

3.1 EXAMINATION

A. Division 01 - General Requirements.

B. Verify excavations are to required grade, dry, and not over-excavated.

C. Verify connection to existing piping system size, location, and invert are as indicated on Drawings.

3.2 PREPARATION

A. Ream pipe and tube ends. Remove burrs. [Bevel or groove plain end ferrous pipe.]

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare piping connections to equipment with flanges or unions or grooved joints.

D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

3.3 INSTALLATION - INSERTS

A. Provide inserts for placement in concrete forms.

B. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.

C. Provide hooked rod to concrete reinforcement section for inserts carrying pipe 4 inches and larger.

D. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

E. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut [above] [flush with top of] [recessed into and grouted flush with] slab.

3.4 INSTALLATION - ABOVE GROUND PIPING - COMPRESSED AIR SYSTEMS

A. Install drip connections with valves at low points of piping system.

B. Install take-off to outlets from top of main, with shut off valve after take off. Slope take-off piping to outlets.

C. Install compressed air couplings, female quick connectors, and pressure gages [where outlets are indicated] [].

D. Install tees instead of elbows at changes in direction of piping. Fit open end of each tee with plug.

E. Cut pipe and tubing accurately and install without springing or forcing.

F. Slope piping in direction of flow.

G. Install pipe sleeves where pipes and tubing pass through walls, floors, roofs, and partitions. Refer to Section 22 05 29.

H. Install firestopping at fire rated construction perimeters and openings containing penetrating sleeves and piping. Refer to Division 07.

I. Install pipe identification in accordance with Section 22 05 53.

J. Except where indicated, install manual shut off valves with stem vertical and accessible for operation and maintenance.

K. Install strainers on inlet side of pressure reducing valves. Install pressure reducing valves with bypasses and isolation valves to allow maintenance without interruption of service.

L. Install strainers on inlet side of pressure regulators.

3.5 INSTALLATION - EQUIPMENT

A. Install air compressor on concrete housekeeping pad, minimum 3-1/2 inches high and 6 inches larger than compressor base on each side. Refer to Division 03.

B. Install air compressor unit on vibration isolators. Level and bolt in place. Refer to Section 22 05 48.

C. Install air valve and drain connection on horizontal casing.

D. Install line size shut-off valve and check valve on compressor discharge.

E. Install replaceable cartridge type filter silencer for each compressor.

F. Install shut-off valve on water inlet to after cooler. Pipe drain to floor drain.

G. Install condensate drain piping to nearest floor drain.

H. Install bypass with valves around air dryer. Use factory insulated inlet and outlet connections.

I. Provide bypass with valves, around receivers.

3.6 FIELD QUALITY CONTROL

A. Division 01 – General Requirements

B. Compressed Air Piping Leak Test: Prior to initial operation, clean and test compressed air piping in accordance with ASME B31.1 and ASME B31.9.

C. Verify for atmospheric pressure in piping systems, other than system under test.

D. Test system with dry compressed air or dry nitrogen with test pressure in piping system at 50 psi.

3.7 CLEANING

A. Division 01 – General Requirements.

B. Blow systems clear of free moisture and foreign matter.

END OF SECTION

SECTION 22 3000 - PLUMBING EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Water Heaters:
   1. Commercial gas fired.

B. Packaged water heating systems.

C. Domestic water heat exchangers.

D. Domestic hot water storage tanks.

E. Diaphragm-type compression tanks.

1.2 RELATED REQUIREMENTS

A. Division 01 – General Requirements

B. Section 22 - Vibration and Seismic Controls for Plumbing Piping and Equipment.

C. Section 26 - Equipment Wiring: Electrical characteristics and wiring connections.

1.3 REFERENCE STANDARDS See Division 01 - General Requirements

A. ABMA STD 9 - Load Ratings and Fatigue Life for Ball Bearings.

B. ABMA STD 11 - Load Ratings and Fatigue Life for Roller Bearings.

C. ANSI Z21.10.1 - Gas Water Heaters - Volume I - Storage Water Heaters with Input Ratings of 75,000 Btu per Hour or Less.

D. ANSI Z21.10.3 - Gas-Fired Water Heaters - Volume III - Storage Water Heaters with Input Ratings Above 75,000 Btu per Hour, Circulating and Instantaneous.

E. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1 - Rules for Construction of Pressure Vessels.

F. CSA P.3 - Testing Method for Measuring Energy Consumption and Determining Efficiencies of Gas-Fired Storage Water Heaters; 2004 (Reaffirmed 2015).

G. ICC (IPC) - International Plumbing Code

H. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

I. NEMA MG 1 - Motors and Generators.

J. NFPA 31 - Standard for the Installation of Oil Burning Equipment.

K. NFPA 70 - National Electrical Code.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation Meeting: Conduct a pre-installation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

B. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.5 SUBMITTALS

A. See Division 01 - Administrative Requirements, for submittals procedures.

B. Product Data:
1. Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.
2. Indicate pump type, capacity, power requirements.
3. Provide certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
4. Provide electrical characteristics and connection requirements.

C. Shop Drawings:
1. Indicate heat exchanger dimensions, size of tappings, and performance data.
2. Indicate dimensions of tanks, tank lining methods, anchors, attachments, lifting points, tappings, and drains.

D. Manufacturer's Instructions.

E. Project Record Documents: Record actual locations of components.

F. Operation and Maintenance Data: Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.

G. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

H. Project Record Documents: Record actual locations of components.

I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Division 01 - Product Requirements, for additional provisions.
2. Extra Pump Seals: One of each type and size.
3. Extra Water Softener Salt: 50 pounds (22.7 kg).

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. Certifications:
1. Water Heaters: NSF approved.
2. Gas Water Heaters: Certified by CSA International to ANSI Z21.10.1, as applicable, in addition to requirements specified elsewhere.
3. Electric Water Heaters: UL listed and labeled to UL 174.
4. Oil-Fired Water Heaters: To NFPA 31.
5. Pressure Vessels for Heat Exchangers: ASME labeled to ASME BPVC-VIII-1.
6. Water Tanks: ASME labeled to ASME BPVC-VIII-1.
7. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

C. Identification: Provide pumps with manufacturer's name, model number, and rating/capacity identified by permanently attached label.

D. Performance: Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, operate within 25 percent of midpoint of published maximum efficiency curve.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.8 WARRANTY

A. See Division 01 - Closeout Submittals, for additional warranty requirements.

B. Provide five year manufacturer warranty for domestic water heaters.

PART 2 PRODUCTS

2.1 WATER HEATERS

A. Manufacturers:
1. A.O. Smith Water Products Co;
2. State Industries;
3. PVI Ind.
4. Laars
5. Rheem Manufacturing Company: www.rheem.com.
6. Substitutions: See Division 01 - Product Requirements.

B. Commercial Gas Fired:
1. Type: Automatic, natural gas-fired, vertical storage.
2. Performance:

a. Energy Factor: 95%
b. Storage Capacity: 100 gal
c. First Hour Rating: 326 gal.
d. Input: 199,000 Btuh at sea level.
e. Minimum Recovery Rate: 233 gph with 100 degrees F temperature rise.
f. Maximum Working Pressure: 150 psig.

3. Tank: Glass lined welded steel ASME labeled; multiple flue passages, 4 inch diameter inspection port, thermally insulated with minimum 2 inches glass fiber, encased in corrosion-resistant steel jacket; baked-on enamel finish; floor shield and legs.
4. Accessories:
   a. Water Connections: Brass.
   b. Dip Tube: Brass.
   c. Drain valve.
   d. Anode: Magnesium.
   e. Temperature and Pressure Relief Valve: ASME labeled.
5. Certified For The Following Applications:
   a. Automatic storage water heater.
   b. Automatic circulating tank water heater.
   c. For operation at 180 degrees F.
   d. For operation on combustible floors.
   e. For operation in high altitude installations.
6. Controls: Automatic water thermostat with temperature range adjustable from 120 to 180 degrees F, automatic reset high temperature limiting thermostat factory set at 195 degrees F, gas pressure regulator, multi-ribbon or tubular burner, 100 percent safety shut-off pilot and thermocouple, flue baffle and draft hood.
7. Controls: Automatic direct immersion thermostat with temperature range adjustable minimum 175 degrees F differential, automatic reset high temperature limiting thermostat factory set at 195 degrees F, gas pressure regulator, multi-ribbon or tubular burner, 100 percent safety shut-off pilot and thermocouple, intermittent electronic ignition monitoring pilot and main flame, trial for re-ignition for momentary loss of flame, shutdown of pilot and main burner in "2 to 4" seconds after loss of flame, and automatic flue damper.

2.2 ELECTRICAL WORK

A. Provide electrical motor driven equipment specified complete with motors, motor starters, controls, and wiring.

B. Electrical characteristics to be as specified or indicated.

C. Furnish motor starters complete with thermal overload protection and other appurtenances necessary for the motor control specified.

D. Supply manual or automatic control and protective or signal devices required for the operation specified, and any control wiring required for controls and devices not shown.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install plumbing equipment in accordance with manufacturer's instructions, as required by code, and complying with conditions of certification, if any.

B. Coordinate with plumbing piping and related fuel piping work to achieve operating system.

C. Domestic Water Heat Exchangers:
1. Install domestic water heat exchangers with clearance for tube bundle removal without disturbing other installed equipment or piping.
2. Support unit on pipe stand.
3. Pipe relief valves and drains to nearest floor drain.
4. Connect steam branch line from top of main. Pipe in flexible manner, pitched with steam flow, with pipe union connections. Provide steam pressure gage at exchanger inlet.
5. Provide steam traps and valves as indicated.
6. Pitch shell for condensate drain to traps.

D. Domestic Water Storage Tanks:
1. Provide steel pipe support, independent of building structural framing members.
2. Clean and flush prior to delivery to site. Seal until pipe connections are made.

END OF SECTION

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SECTION 22 4000 - PLUMBING FIXTURES AND SPECIALTIES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Attention is directed to the following specifications sections, which are hereby made a part of this Section of the Specifications.
1. Division 01 - General Requirements
2. Division 07 – Thermal and Moisture Protection: Product requirements for calking between fixtures and building components for placement by this section.
3. Division 11 – Equipment.
4. Division 12 – Furnishings: “Plastic Laminate-Clad Countertops”
5. Division 12 – Furnishings: “Solid Surface Countertops”
6. Section 22 – Identification for Plumbing Piping and Equipment.
7. Section 22 – Hangers and Supports for Plumbing Piping and Equipment.
8. Section 22 – General Conditions for Plumbing Trades
9. Section 22 – Common Work Results for Plumbing.
10. Section 22 – Plumbing Insulation.
11. Section 22 - Plumbing piping: Supply connections to plumbing fixtures.
12. Section 22 – General Duty Valves for Plumbing Piping.
13. Section 22 – Hangers and Supports for Plumbing Piping and Equipment.
14. Section 22 - Plumbing Equipment.
15. Section 22 – Plumbing Pumps
16. Section 26 - Equipment Wiring Connections: Execution requirements for electric connections to sensor valves and faucets specified by this section.

1.2 SUMMARY

A. Section includes the following plumbing fixtures:
1. Drinking fountains.
2. Electric water coolers
3. Janitors sinks.
4. Lavatories.
5. Bathtubs
6. Showers Enclosures.
7. Shower Receptors.
8. Sinks.
9. Wash Fountains
10. Urinals.
11. Water closets.

B. Section includes the following plumbing specialties:
1. Area drains.
2. Reduced Pressure Principal Backflow Preventers.
3. Double Check Valve Backflow Preventer Assemblies.
4. Cleanouts.
5. Downspout Boots.
6. Downspout Nozzles.
7. Emergency Eye and Face Wash.

8. Emergency Shower
9. Emergency Combination Shower with Eye and Face Wash.
10. Expansion tanks.
11. Fixture supports.
12. Floor drains.
13. Floor sinks.
14. Trench drains.
15. Planter Drains.
16. Hose bibs.
17. Indirect waste funnel.
18. Lavatory insulation kit.
19. Neutralization tanks.
20. Plumbing traps.
21. Recessed valve boxes.
22. Roof drains.
23. Overflow drains.
24. Sediment interceptors.
25. Trap primers.
26. Wall hydrants.
27. Water hammer arrestors.
28. Water Meters.
29. Stops

1.3 REFERENCES

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design.

B. American National Standards Institute:
1. ANSI 61 - Drinking Water System Components
2. ANSI A112.21.1 - Floor Drains.
3. ANSI A112.21.2 - Roof Drains.
4. ANSI A112.26.1 - Water Hammer Arrestors.
5. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
6. ANSI Z124.1 - Plastic Bathtub Units.
7. ANSI Z124.2 - Plastic Shower Units.
8. ANSI Z358.1 - Emergency Eyewash and Shower Equipment.
9. ANSI/ASSE 1011 - Hose Connection Vacuum Breakers.
10. ANSI/ASSE 1019 - Wall Hydrants, Frost Proof Automatic Draining Anti-Backflow Types.

C. Air-Conditioning and Refrigeration Institute:
1. ARI 1010 - Self-Contained, Mechanically Refrigerated Drinking-Water Coolers.

D. American Society of Mechanical Engineers:
1. ASME A112.6.3 – Floor and Trench Drains
2. ASME A112.6.4 – Roof, Deck, and Balcony Drains
3. ASME A112.18.1 - Plumbing Supply Fittings.
4. ASME A112.18.1M – Plumbing Fixture Fittings.
5. ASME A112.18.2 – Plumbing Waste Fittings.
6. ASME A112.19.1 - Enameled Cast Iron and Enameled Steel Plumbing Fixtures.
7. ASME A112.19.2 - Ceramic Plumbing Fixtures.

8. ASME A112.19.3 - Stainless Steel Plumbing Fixtures
9. ASME A112.19.4M - Porcelain Enameled Formed Steel Plumbing Fixtures.
10. ASME A112.19.5 - Flush Valves and Spuds for Water Closets, Urinals, and Tanks.
11. ASME A112.19.14 - Six-Liter Water Closets Equipped with Dual Flushing Device.
12. ASME A112.19.15 - Bathtub/Whirlpool Bathtubs with Pressure Sealed Doors.
13. ASME A112.19.19 Vitreous China Non-water Urinals
14. ASME A112.6.1 - Supports for Off-the-Floor Plumbing Fixtures for Public Use.
15. ASME A112.36.2M – Cleanouts.

E. American Society of Testing and Materials
1. ASTM A888-20 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications
2. ASTM A48/A48M - Standard Specification for Gray Iron Castings.
3. ASTM C1613-17 - Standard Specification for Precast Concrete Grease Interceptor Tanks
4. ASTM F409 – Standard Specifications for Thermoplastic and Replaceable Plastic Tube and Tubular Fittings.
5. ASTM F2649-14 - Standard Specification for Corrugated High Density Polyethylene (HDPE) Grease Interceptor Tanks
6. ASTM D-4101 - Standard Classification System and Basis for Specification for Polypropylene Injection and Extrusion Materials

F. American Society of Safety Engineers
1. ASSE 1012, Performance Requirements For Backflow Preventers With An Intermediate Atmospheric Vent
2. ASSE 1013, Performance Requirements for Reduced Pressure Principle Backflow Preventers
3. ASSE 1016/ASME A112.1016/CSA B125.16-11, Performance Requirements for Automatic Compensating Valves for Individual Showers and Tub/Shower Combinations
4. ASSE 1017, Performance Requirements for Temperature Actuated Mixing Valves for Hot Water Distribution Systems
5. ASSE 1062, Performance Requirements for Temperature Actuated Flow Reduction (TAFR) Valves for Individual Fixture Fittings
6. ASSE 1066, Performance Requirements for Individual Pressure Balancing In-Line Valves for Individual Fixture Fittings
7. ASSE 1069, Performance Requirements for Automatic Temperature Control Mixing Valves
8. ASSE 1070/ASME A112.1070/CSA B125.70-15, Performance Requirements for Water Temperature Limiting Devices
9. ASSE 1071, Performance Requirements for Temperature Actuated Mixing Valves for Plumbed Emergency Equipment

G. American Society of Heating, Refrigeration and Air Conditioning Engineers:
1. ASHRAE Std 18 - Methods of Testing for Rating Drinking Water Coolers with Self-Contained Mechanical Refrigeration.

H. International Association of Plumbing and Mechanical Officials:
   1. IAPMO IGC 187 – Roof Drains with Integral Overflow Drain.
   2. IAPMO Z124 - Plastic Plumbing Fixtures.
   3. IAPMO Z403-13 - Terrazzo, Concrete, and Natural Stone Plumbing Fixtures

I. International Surface Fabricators Association
   1. ISFA 2-01 – Classification and Standards for Solid Surfacing Material

J. National Sanitation Foundation:
   1. NSF 61 - Drinking Water System Components - Health Effects.
   2. NSF 372 - Drinking Water System Components - Lead Content.

K. Plumbing Drainage institute:
   1. PDI WH-201 – Water Hammer Arresters.

1.4 SUBMITTALS

A. Division 01 - General Requirements.

B. Product Data: Submit catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.

C. Shop Drawings: Indicate dimensions, weights, and placement of openings and holes.

D. Samples: Submit two lavatory supply fittings fixtures for color matching.

E. Manufacturer's Installation Instructions: Submit installation methods and procedures. Indicate assembly and support requirements

F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

G. Sustainable Design Documentation: Submit appropriate evidence that materials used in potable water systems comply with the specified requirements.

H. Maintenance Data: Include fixture trim exploded view and replacement parts lists.

I. Waterless Urinals: Submit recommended frequency of maintenance and parts replacement, methods of cleaning, sources of replacement supplies and parts.

J. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.5 CLOSEOUT SUBMITTALS

A. Division 01 - General Requirements.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with State of CT standard.

B. Provide products requiring electrical connections listed and classified by Underwriters Laboratories Inc., as suitable for purpose specified and indicated.

C. Provide plumbing fixture fittings in accordance with ASME A112.18.1 that prevent backflow from fixture into water distribution system.

D. Maintain one copy of each document on site.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

B. Installer: Company specializing in performing Work of this section with minimum three years experience.

1.8 REGULATORY REQUIREMENTS

A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.9 MOCKUP

A. Division 01 - General Requirements.

B. Construct mockup of typical bathroom group.

C. Locate where directed by Architect/Engineer.

D. Incorporate accepted mockup as part of Work.

1.10 PRE-INSTALLATION MEETINGS

A. Division 01 - General Requirements.

B. Convene minimum one week prior to commencing work of this section.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Division 01 - General Requirements.

B. Accept products on site in factory packaging. Inspect for damage.

C. Protect installed fixtures and specialties from damage by securing areas and by leaving factory packaging in place to protect fixtures and specialties, and prevent use.

1.12 WARRANTY

A. Division 01 - General Requirements.

B. Furnish manufacturer warranty for plumbing fixtures.

1.13 EXTRA MATERIALS

A. Division 01 - General Requirements.

B. Furnish two sets of faucet washers flush valve service kits lavatory supply fittings shower heads toilet seats.

C. Provide two loose keys for hose bibs and wall hydrants.

D. Furnish supply of chemicals for treatment and testing during warranty period of solar hot water system.

PART 2 PRODUCTS

2.1 GENERAL

A. See schedule on drawings for additional requirements and accessories.

B. Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.2 ELECTRIC WATER COOLERS

A. Electric Water Cooler Manufacturers:
1. Elkay.
2. Haws.
3. Oasis.
4. Murdock.
5. Substitutions: Division 01 - General Requirements.

B. Water Cooler: ARI 1010

C. All components of the electric water cooler in the wetted surface material shall be lead free in accordance with SDWA 1417
1. Capacity: 8 gallons per hour of 50 degrees F water with inlet at 80 degrees F (27 degrees C) and room temperature of 90 degrees F, when tested in accordance with ASHRAE Std 18.
2. Electrical: 115 V, 60-Hertz compressor, 6-foot cord and plug for connection to electric wiring system including grounding connector. Refer to division 26 plans and specifications.

2.3 MOP SINKS

A. Manufacturers:
1. American Standard
2. Acorn
3. Fiat
4. Kohler Co.
5. Just
6. Substitutions: Division 01 - General Requirements.

B. IAPMO Z403-13; Molded stone basin and integral drain body.

C. IAPMO Z124; Plastic basin and integral drain body.

D. Supply Faucets
1. Manufacturers
   a. Speakman
   b. American Standard, Inc.
   c. Kohler Company
   d. Zurn Industries, Inc.
   e. Symmons
   f. T&S Brass
   g. Chicago Faucets
   h. Substitutions: Division 01 - General Requirements.

E. Faucet and Trim: ASME A112.18.1, strainers, eccentric adjustable inlets, integral screwdriver stops with covering caps and adjustable threaded wall flanges.

F. Provide a combination service sink faucet and eyewash/drench hose unit, complete with thermostatic mixing valve.

2.4 LAVATORIES (PUBLIC)

A. Manufacturers:
1. American Standard
2. Willoughby
3. Bradley
4. Kohler Co.
5. Crane
6. Acorn
7. Substitutions: Division 01 - General Requirements.

B. Basin: ASME A112.19.2; Vitreous China Wall Hung Basin: with 4 inch high back, , rectangular basin with splash lip, front overflow, and soap depression.

C. Basin: ASME A112.19.2; Vitreous China Counter Top Basin: self-rimming counter top lavatory, front overflow, soap depression, seal of putty, calking, or concealed vinyl gasket.

D. Basin: ASME A112.19.2; Vitreous China Under-Mount Basin: ASME A112.19.2; front overflow, mounting kit and template by manufacturer.

E. Basin: ASME A112.19.1; Cast Iron Wall Hung Basin: porcelain enameled cast iron, minimum, with 4 inch high back,

F. Basin: ASME A112.19.4M; Steel Counter Top Basin: porcelain on steel self-rimming,, front overflow, soap depression, seal of putty, calking, or concealed vinyl gasket.

G. Supply Faucets
1. Manufacturers
   a. American Standard, Inc.
   b. Kohler Company
   c. Delta.
   d. Symmons
   e. T&S Brass
   f. Chicago Faucets
   g. Substitutions: Division 01 - General Requirements.
2. Supply Fitting: ASME A112.18.1; chrome plated supply fitting with open grid strainer, water economy aerator with maximum
3. Sensor Operated Metering Faucet: ASME A112.18.1; chrome plated with metering options.

H. For public hand washing facilities, provide tempered water through regulating device conforming to ASSE 1070.

I. Waste Fittings: ASME A112.18.2 or ASTM F 409.

J. Accessories:
1. Chrome plated 17 gage brass P-trap with clean-out plug and arm with escutcheon.
2. Perforated open strainer.
3. Screwdriver stops.
4. Rigid supplies.
5. Trap and waste insulated and offset to meet ADA compliance.

K. Wall Mounted Carrier: ASME A112.6.1; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, concealed arm supports, bearing plate and studs. See drawings for additional requirements and accessories.

L. Lavatory faucet controls shall be located within 13 inches from leading edge of lavatories in accordance with federal register rules and regulations.

2.5 LAVATORIES (PRIVATE)

A. Manufacturers:
1. American Standard
2. Delta
3. Bradley
4. Kohler Co.
5. Crane
6. Acorn
7. Substitutions: Division 01 - General Requirements.

B. Basin: ASME A112.19.2; Vitreous China Counter Top Lavatory: Self-rimming counter top lavatory, front overflow, seal of putty, caulking, or concealed vinyl gasket.

C. Basin: ASME A112.19.2; Vitreous China Wall Hung Basin: 4 inch high back, rectangular basin with splash lip, front overflow, and soap depression.

D. Supply Fitting: ASME A112.18.1: chrome plated combination supply fitting with pop-up waste, chrome plated brass P-trap with clean-out plug and arm with escutcheon.

E. Lavatory faucet controls shall be located within 13 inches from leading edge of lavatories in accordance with federal register rules and regulations.

F. Supply Faucets
1. Manufacturers
   a. American Standard, Inc.
   b. Kohler Company
   c. Delta Industries, Inc.
   d. Symmons
   e. T&S Brass
   f. Chicago Faucets
   g. Substitutions: Division 01 - General Requirements.
2. Supply Fitting: ASME A112.18.1; chrome plated supply fitting with open grid strainer, water economy aerator
3. Sensor Operated Metering Faucet: ASME A112.18.1; chrome plated with metering options.
4. Metered Faucet: ASME A112.18.1; chrome plated metered mixing faucet with

G. For public hand washing facilities, provide tempered water through regulating device conforming to ASSE 1070.

H. Waste Fittings: ASME A112.18.2 or ASTM F 409.

I. Accessories:
1. Chrome plated 17 gage brass P-trap with clean-out plug and arm with escutcheon.
2. Perforated open strainer.
3. Screwdriver stops.
4. Rigid supplies.
5. Trap and waste insulated and offset to meet ADA compliance.

J. Wall Mounted Carrier: ASME A112.6.1; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, concealed arm supports, bearing plate and studs. See drawings for additional requirements and accessories.

2.6 SHOWERS

A. Manufacturers:
1. Symmons.
2. American Standard
3. Kohler Co.

4. Substitutions: Division 01 - General Requirements:

B. Trim: ASME A112.18.1; concealed shower supply with indexed handles, bent shower arm with flow control and adjustable spray ball joint showerhead with maximum 2.5 gpm flow, and escutcheon.

C. Trim: ASME A112.18.1; concealed rough brass metering valve with closed fluid metering system adjustable from 5 to 120 seconds, chrome plated push button and escutcheon, wheel handle stop.

D. Trim: ASME A112.18.1; concealed shower supply with pressure balanced thermostatic mixing valves, integral service stops, hand held shower with 60 inch metal clad hose and slide bar, female inlet.

E. Trim: ASME A112.18.1; concealed shower supply with pressure balanced mixing valves, integral service stops, bent shower arm with adjustable spray ball joint shower head with maximum flow 2.5 gpm, and escutcheon.

F. Trim: ASME A112.18.1; concealed straight way pattern valve with indexed cross handle.

G. Shower Head:
1. ASME A112.18.1; chrome plated vandal-proof institutional head with integral wall bracket, built-in 2.5 gpm flow control.

H. Low-Flow Shower Head:
1. ASME A112.18.1; chrome plated vandal-proof institutional head with integral wall bracket, built-in 1.5 gpm flow control.

I. Ultra-Low-Flow Shower Head:
1. ASME A112.18.1; chrome plated vandal-proof institutional head with integral wall bracket, built-in 0.8 gpm flow control.

2.7 SINKS

A. Manufacturers:
1. American Standard.
2. Elkay.
3. Just.
4. Kohler Co.
5. Crane.
6. Substitutions: Division 01 - General Requirements.

B. Single Compartment Bowl: ASME A112.19.3; 18 gage thick, Type 302 stainless steel. Self-rimming and undercoated, with stainless steel drain 3-1/2 inch crumb cup and tailpiece, ledge back drilled for trim. See drawings for additional requirements and accessories.

C. Double Compartment Bowl: ASME A112.19.3; 18 gage thick, Type 302 stainless steel. Self-rimming and undercoated, with stainless steel drains 3-1/2 inch crumb cups and tailpieces, ledge back drilled for trim. See drawings for additional requirements and accessories.

D. Enameled Bowl: ASME A112.19.4M; steel, porcelain enameled, single compartment, outside dimensions, self-rimming and undercoated, with 3-1/2 inch diameter crumb cup and chromed brass tailpiece, ledge back drilled for trim.

E. Supply Faucets
1. Manufacturers
   a. American Standard.
   b. Kohler Co.
   c. Zurn.
   d. Symmons.
   e. T&S Brass.
   f. Chicago Faucets.
   g. Substitutions: Division 01 - General Requirements.
2. Supply Fitting: ASME A112.18.1; chrome plated supply fitting with open grid strainer, water economy aerator with maximum
3. Sensor Operated Metering Faucet: ASME A112.18.1; chrome plated with metering options.

F. For public hand washing facilities, provide tempered water through regulating device conforming to ASSE 1070.

G. Accessories: Chrome plated 17-gauge brass P-trap with clean-out plug and arm with escutcheon, screwdriver stop, and rigid supplies. Trap and waste insulated and offset to meet ADA compliance.

H. Sink faucet controls shall be located within 13 inches from leading edge of sink in accordance with federal register rules and regulations.

I. Science room sinks: Provide point of use dilution tank under sink. Orion Style 8 or approved equal.

J. Art room sinks: Provide plaster trap under sink. J.R. Smith model 8710 or approved equal.

2.8 URINALS – WALL HUNG

A. Manufacturers:
1. American Standard Plumbing
2. Kohler Co.
3. Zurn
4. Toto
5. Crane
6. Substitutions: Division 01 - General Requirements.

B. Urinal: vitreous china, wall hung siphon jet urinal with shields, integral trap, removable stainless steel strainer, 3/4 inch top spud, steel supporting hanger.

C. Valve: ASME A112.18.1; exposed chrome plated, diaphragm type with oscillating handle, integral screwdriver stop ,vacuum breaker; maximum 1 gallon flush volume.

D. Wall Mounted Carrier: ASME A112.6.1; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, threaded fixture studs for fixture hanger, bearing studs. See drawings for additional requirements and accessories.

E. Provide elastomeric gasket complying with ASME A112.4.3, or approved setting compound, for fixture to flange connection.

2.9 WATER CLOSETS – FLUSH VALVE

A. Manufacturers:
1. American Standard
2. Gerber Plumbing Fixtures LLC
3. Zurn
4. Toto
5. Kohler Co.
6. Crane
7. Substitutions: Division 01 - General Requirements

B. Bowl: ASME A112.19.2M; wall hung, siphon jet vitreous china closet bowl, with elongated rim, 1-1/2 inch top spud, china bolt caps.

C. Flush Valve Manufacturers:
1. Sloan
2. American Standard
3. Zurn
4. Hydrotek
5. Substitutions: Division 01 - General Requirements.

D. Seat: Solid white plastic, open front, extended back, brass bolts, without cover. See drawings for additional requirements and accessories.

E. Wall Mounted Carrier: ASME A112.6.1; cast iron frame, integral drain hub and vent, adjustable spud, lugs for floor and wall attachment, threaded fixture studs with nuts and washers.

2.10 REDUCED PRESSURE BACKFLOW PREVENTERS

A. Manufacturers:
1. Watts.
2. Zurn.
3. Apollo Valves.
4. Substitutions: See Division 01 - General Requirements.

B. Reduced Pressure Backflow Preventers:
1. ASSE 1013; bronze body with bronze internal parts and stainless steel springs; two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve that opens under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two gate valves, strainer, and four test cocks.

C. In cold water branch lines serving HVAC equipment, provide all-bronze backflow preventers with strainer, air gap drain funnel and quarter-turn full-port ball valves.

D. For cold water service and hot water 3" and smaller, provide all-bronze flanged backflow preventers with OS&Y gate valves, strainer and air gap drain funnel. For hot water units provide high temperature rated components.

E. For cold water service 4" and larger, provide epoxy-coated cast iron backflow preventers with OS&Y gate valves, strainer and air gap drain funnel.

F. All backflow preventers shall be installed so they can be easily accessed for testing and maintenance, install 36" above floor, pipe vent discharge to floor drain.

2.11 DOUBLE CHECK VALVE ASSEMBLIES

A. Manufacturers:
1. Watts.
2. Zurn.
3. Apollo Valves

B. Substitutions: See Division 01 - General Requirements.

C. ASSE 1012; Bronze body with corrosion resistant internal parts and stainless steel springs; two independently operating check valves with intermediate atmospheric vent.

2.12 CLEANOUTS

A. Manufacturers:
1. Josam.
2. J.R. Smith.
3. Zurn.
4. Watts.
5. Wade.
6. Substitutions: Division 01 - General Requirements.

B. ASME A112.36.2M; Cleanouts: Cast iron body with adjustable scoriated nickel bronze top and vandal proof screws.

C. Interior Finished Wall Cleanouts: Line type with cast iron body, round epoxy coated gasketed cover and round stainless steel access cover secured with machine screw.

D. Interior Unfinished Accessible Areas: Caulked or threaded type. Provide stack cleanouts on vertical rainwater leaders.

E. Cleanout plugs shall be screwed brass installed either in cast iron-caulked ferrules or directly into threaded drainage fittings. Above floor cleanouts on stacks may be "Dandy" cleanouts.

F. Refer to other Sections of the Specification for access doors which may be used in lieu of covers specified below.

G. Cleanouts are to be accessible and locations coordinated with cabinetry, shelving and other architectural details. DO NOT place cleanouts where they will not be readily accessible.

2.13 EMERGENCY EYE AND FACE WASH

A. Emergency Wash Manufacturers:
1. Haws Corporation.
2. Bradley Corp.
3. Guardian.
4. Speakman
5. Substitutions: Division 01 - General Requirements.

B. ANSI Z358.1; wall-mounted, self-cleaning, non-clogging eye and face wash with quick opening, full-flow valves, stainless steel eye and face wash receptor, twin eye wash heads and face spray ring, stainless steel dust cover, copper alloy control valve and fittings.

C. Provide thermostatic pressure balancing anti-scald mixing valve on inlet pipe with temperature gauge.

2.14 EXPANSION TANKS

A. Manufacturers:
1. Amtrol.
2. Bell and Gossett.
3. Taco.
4. Watts.

B. Substitutions: Division 01 - General Requirements Construction: Welded steel, ASME labeled, tested and stamped in accordance with Section 8D of ASME Code; supplied with National Board Form U-1, rated for working pressure of 125 psig, with flexible EPDM diaphragm sealed into tank, and steel legs or saddles.

2.15 FIXTURE SUPPORTS

A. Manufacturers:
1. J.R. Smith.
2. Josam.
3. Wade.
4. Zurn.
5. MIFAB.
6. Substitutions: Division 01 - General Requirements.

B. ASME A112.6.1M; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, threaded studs for fixture hanger, bearing plate and studs.

C. For each wall-hung lavatory, urinal, water cooler, drinking fountain and water closet, provide concealed carrier suited for fixture, location, wall thickness and material.

D. Concealed carriers with exposed arms for sinks and lavatories shall have acid-resisting enamel finish.

2.16 FLOOR DRAINS

A. Manufacturers:
1. Josam.
2. J.R. Smith
3. Watts.
4. Wade.
5. Zurn
6. Substitutions: Division 01 - General Requirements.

B. ANSI A112.21.1, Round adjustable nickel-brass strainer, cast iron body, cast iron drainage flange, flashing clamp, and sediment bucket, provide with trap primer.

C. ANSI A112.21.1. Square, cast iron, drainage flange with weep holes, and internal cast iron dome strainer: Provide trap primer.

D. Drains shall have traps.

2.17 FLOOR SINK

A. Manufacturers:
1. Josam.
2. J.R. Smith.
3. Watts.
4. Zurn.
5. Wade
6. Substitutions: Division 01 - General Requirements.

B. ANSI A112.21.1. Square, cast iron, drainage flange with weep holes, and internal cast iron dome strainer: Provide trap primer.

C. Provide full, half, quarter grates, or less grate as required to suit job conditions.

2.18 TRENCH DRAINS

A. ASME A112.6.3; Trench drain system assembled from factory fabricated, polymer concrete castings in standard lengths and variable depths, with integral joint flanges and integral grating support rails; includes joint gaskets and grating.

2.19 HOSE BIBS

A. Manufacturers:
1. Woodford.
2. Josam.
3. Wade.
4. Zurn.
5. Watts.
6. Substitutions: Division 01 - General Requirements.

B. ANSI/ASSE 1011; Bronze or brass with integral mounting flange.

2.20 WALL/ROOF HYDRANTS

A. Manufacturers:
1. Woodford.
2. Josam.
3. Wade.
4. Zurn.
5. Watts.
6. Substitutions: Division 01 - General Requirements..

B. Wall Hydrant: ANSI/ASSE 1019; self-draining type, lead free, freeze proof with removable key.

2.21 INDIRECT WASTE FUNNEL

A. F-1: Indirect waste funnel shall be:
1. For pipe 3" and smaller: J.R. Smith #3821.

B. Funnel shall have cast iron P-trap, cleanout, necessary adaptor for threaded outlet connection, trap primer and piping to prevent trap evaporation.

2.22 LAVATORY INSULATION KIT

A. Manufacturers:
1. McGuire
2. Truebro
3. Plumerex
4. Substitutions: Division 01 - General Requirements.

B. ANSI A177.1; Where Lavatories are noted to be insulated for ADA compliance, furnish safety covers consisting of insulation kit of molded closed cell vinyl construction, 3/16 inch thick, white color, for insulating tailpiece, P-trap, valves, and supply piping. Furnish with weep hole and angle valve access covers.

2.23 NEUTRALIZATION TANKS

A. Manufacturers:
1. Watts.
2. Orion
3. Zurn
4. Substitutions: Division 01 - General Requirements

B. ASTM D-4101; Polypropylene. Provide with heavy-duty Gamma top for easy access to tank.

2.24 OVERFLOW DRAINS

A. Manufacturers:
1. Josam.
2. J.R. Smith.
3. Watts.

4. Froet.
5. Wade.
6. Substitutions: Division 01 - General Requirements..

B. ANSI A112.21.2, cast iron body, flashing clamp, cast iron grate. Provide with standpipe interior to dome cover and extended to 2 inches above flood elevation.

2.25 PLUMBING TRAPS

A. Manufacturers:
1. McGuire Manufacturing Co.
2. Josam.
3. Wade.
4. Zurn.
5. Substitutions: Division 01 - General Requirements.

B. ASTM A888-20; Fixture traps shall be 17 gauge or heavier material; other traps shall be of same size and material as pipe on which trap occurs.

C. Provide cleanout for each trap. Running traps shall have double hubs for two cleanouts.

D. Provide deep traps with 4” minimum seal, for floor drains.

2.26 RECESSED VALVE BOXES

A. Manufacturers:
1. Woodford.
2. Josam.
3. Wade.
4. Zurn.
5. Watts.
6. Substitutions: Division 01 - General Requirements.

B. ASME A112.18.1;

C. Refrigerator: Plastic preformed rough-in box with brass water control valve.

D. Washing Machine: Plastic preformed rough-in box with brass water control valve, socket for 2 inch waste, and cover.

2.27 ROOF DRAINS

A. Manufacturers:
1. Josam.
2. JR Smith.
3. Watts.
4. Froet.
5. Wade.
6. Substitutions: Division 01 - General Requirements.

B. ANSI A112.21.2, adjustable, coated cast iron construction with large sump and flange, large cast iron dome, non-puncturing flashing clamp with integral gravel stop, underdeck clamp.

C. Where vertical roof leaders are higher than 20 feet or connect with horizontal offset less than 10 feet, provide Wade #W-3900 expansion joint. (DO WE EVER SEE THIS DONE?)

2.28 TRAP PRIMERS

A. Manufacturers:
1. Woodford.
2. Josam.
3. Wade.
4. Zurn.
5. Watts.
6. PPP.
7. Substitutions: Division 01 - General Requirements.

B. ASSE 1018; Corrosion resistant brass, temperature range –40 to 450 degrees, ½" male inlet and ½" female outlet, pressure operating range 35 to 75 psig.

2.29 WATER HAMMER ARRESTORS

A. Manufacturers:
1. Woodford.
2. Josam.
3. Wade.
4. Zurn.
5. Watts.
6. Substitutions: Division 01 - General Requirements.

B. ANSI A112.26.1; sized in accordance with PDI, precharged, suitable for operation in temperature range -100 to 300 degrees F (-73 to 149 degrees C) and maximum 250

2.30 STOPS

A. Manufacturers:
1. Brass Craft.
2. Watts.
3. Nibco.
4. McGuire.
5. Substitutions: Division 01 - General Requirements.

B. ASME A112.18.1;

C. Chrome plated angle brass supply stop valve with full turn brass stem, lead free, inlet shall be 1/2-inch sweat, outlet shall be 3/8-inch compression.

PART 3 EXECUTION

3.1 EXAMINATION

A. Division 01 - General Requirements

B. Verify walls and floor finishes are prepared and ready for installation of fixtures.

C. Verify electric power is available and of correct characteristics.

D. Confirm millwork is constructed with adequate provision for installation of counter top lavatories and sinks.

3.2 PREPARATION

A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

B. Coordinate cutting and forming of roof and floor construction to receive drains to required invert elevations.

3.3 INSTALLATION

A. Install Work in accordance with State of Connecticut standards.

B. Install in accordance with manufacturer's instructions.

C. Install each fixture with trap, easily removable for servicing and cleaning.

D. Provide chrome plated rigid supplies to fixtures with screwdriver stops, reducers, and escutcheons.

E. Install components level and plumb.

F. Install and secure fixtures in place with wall carriers and bolts.

G. Seal fixtures to wall and floor surfaces with sealant as specified in Section 07 92 00, color to match fixture.

H. Solidly attach water closets to floor with lag screws. Lead flashing is not intended hold fixture in place.

I. For ADA accessible water closets, install flush valve with handle to wide side of stall.

J. Refer to architectural drawing for required mounting heights of fixtures.

K. Install in accordance with manufacturer's instructions.

L. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.

M. Cleanouts shall be same size as the pipes served, up to 4 inches; 5 and 6 inch pipes shall have 4 inch cleanouts; 8 inch pipes shall have 6 inch cleanouts; 10 inch pipes and larger shall have 8 inch cleanouts.

N. Install components level and plumb.

O. Install water hammer arrestors with isolation valve in accessible locations.

P. Trap primers shall be installed to serve all floor drains, provide distribution units as required for all drains.

Q. Provide 1/2 grate cover on all floor sinks as required for discharge pipe into floor sink, cut inlet pipe on 45 degree angle.

R. Trap primer connections shall be installed on cold water piping 1 ½ inch diameter or less.

3.4 INTERCEPTORS

A. Provide sediment interceptors for all art room sinks, maintain clearances as required by the manufacturer.

B. Provide grease interceptor to intercept all drainage from kitchen drains, installation shall conform to all State of CT Health Department requirements.

3.5 NEUTRALIZATION TANKS

A. Provide acid neutralization tank to serve all science classroom sinks, maintain clearances as required by the manufacturer.

B. Provide pipe connections and venting requirements as required by the tank manufacturer.

3.6 INTERFACE WITH OTHER PRODUCTS

A. Review millwork shop-drawings. Confirm location and size of fixtures and openings before rough in and installation.

3.7 ADJUSTING

A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.8 CLEANING

A. Division 01 - General Requirements: Product Requirements: Final cleaning.

B. Clean plumbing fixtures and equipment.

3.9 PROTECTION OF INSTALLED CONSTRUCTION

A. Division 01 - General Requirements: Product Requirements: Protecting installed construction.

B. Do not permit use of fixtures before final acceptance.

3.10 COMMISSIONING OF EQUIPMENT

A. Engage a factory-authorized service representative, who is familiar with this project, to participate and assist, if necessary, in the functional performance testing of this equipment with the Commissioning Agent.

END OF SECTION

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SECTION 23 0400 - GENERAL CONDITIONS FOR MECHANICAL TRADES

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to all Divisions 23 Sections.

B. This section applies to certain sections of Division 26, "Electrical," and this section applies to all sections of Division 23, "Mechanical" of this project specification unless specified otherwise in the individual sections.

C. The Drawings of other trades (Architectural, Food Service, Structural, Landscape, Civil, Mechanical, Fire Protection and Plumbing) shall be examined for coordination and familiarity of work with other Contractors. Any duplication or omission of provisions in this project should be brought to the attention of the Owners prior to Bidding.

1.2 DESCRIPTION

A. The General Conditions and Supplementary General Conditions are a part of this Division and are to be considered a part of this Contract.

B. Where items of the General Conditions and Supplementary General Conditions are repeated in other Sections of the Specifications, it is merely intended to qualify or to call particular attention to them. It is not intended that any other parts of the General Conditions and Supplementary General Conditions shall be assumed to be omitted if not repeated therein. This Section applies equally and specifically to all Contractors supplying labor and/or equipment and/or materials as required under each Section of this Division. Where conflicts exist between the drawings and the specifications or between this section of the specifications and other sections, the more stringent or higher cost option shall apply.

1.3 INTENT

A. It is the intent of the Specifications and Drawings to call for finished work, tested and ready for operation. Provide all parts necessary for the intended use, fully complete and operational, and installed in professional manner in accordance with the design intent.

B. Any apparatus, appliance, material or work not shown on drawings but mentioned in the specifications, or vice versa, or any incidental accessories necessary to make the work complete and ready for operation as determined by good trade practice even if not particularly specified, shall be furnished, delivered and installed under their respective Divisions without any additional expense to the Owner.

C. Minor details not usually shown or specified but necessary for proper installation and operation shall be included in the work as though they were hereinafter shown or specified.

D. Work under each Section shall include giving written notice to the Owner and Engineer of any materials or apparatus believed inadequate or unsuitable; in violation of laws, ordinances, rules or regulations of authorities having jurisdiction; and any necessary items of work omitted. In the absence of such written notice, it is mutually agreed that work under each Section includes the cost of all required items for the accepted, satisfactory functioning of the entire system without extra compensation.

1.4 DEFINITIONS

A. No Exceptions Taken – reviewed and determined to be in general conformance with contract documents.

B. “Approved equal” mean any product which in the opinion of the Engineer is equal in quality, arrangement, appearance, and performance to the product specified.

C. Directed: Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean "directed by the Engineer," "requested by the Engineer," and similar phrases.

D. “Finished” refers to all rooms and areas to be specified to receive architectural treatment as indicated on the drawings. All rooms and areas not covered, including underground tunnels and areas above ceilings shall be considered not finished, unless otherwise noted.

E. “Furnish” or “supply” shall mean purchase, deliver to, and off-load at the job site, ready to be installed including where appropriate all necessary interim storage and protection.

F. Indicated: The term "indicated" refers to graphic representations, notes, or schedules on the Drawings, other paragraphs or schedules in the Specifications, and similar requirements in the Contract Documents. Where terms such as "shown," "noted," "scheduled," and "specified" are used, it is to help the reader locate the reference; no limitation on location is intended.

G. “Install” shall mean set in place complete with all mounting facilities and connections as necessary ready for normal use or service.

H. “Product” shall mean any item of equipment, material, fixture, apparatus, appliance or accessory installed under this Division.

I. “Provide” shall mean furnish (or supply) and install as necessary.

J. Regulation: The term "Regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

K. Remove: The term “remove” means “to disconnect from its present position, remove from the premises and to dispose of in a legal manner.”

L. Special Warranties: The term “Special Warranties” are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

M. Standard Product Warranties: The term “Standard Product Warranties” are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

N. “Subcontractor” means specifically the subcontractor working under this Division. Other Contractors are specifically designated “Plumbing Subcontractor”, “General Contractor” and so on. Note: Take care to ascertain limits of responsibility for connecting equipment which requires connections by two or more trades.

O. Substitutions: Requests for changes in products, materials, equipment, and methods of construction proposed by the Contractor are considered requests for "substitutions."

P. “Wiring” shall mean cable assembly, raceway, conductors, fittings and any other necessary accessories to make a complete wiring system.

1.5 CONTRACT DOCUMENTS

A. The two dimensional drawings govern the construction. They show the design intent and are part of the Contract Documents. BIM models are not part of contract documents. They are developed for convenience only.

B. Drawings are diagrammatic and indicate the general arrangement of systems and work included in the Contract. Consult the Architectural Drawings and Details for exact location of fixtures and equipment; where same are not definitely located, obtain this information from the Architect. (Do not scale the drawings)

C. Work under each Section shall closely follow Drawings in layout of work; check Drawings of other Divisions to verify spaces in which work will be installed. Maintain maximum headroom; where space conditions appear inadequate, Owner and Engineer shall be notified before proceeding with installations.

D. The Owner may, without extra charge, make reasonable modifications in the layout as needed to prevent conflict with work of other trades and/or for proper execution of the work.

1.6 DISCREPANCIES IN DOCUMENTS

A. Where variances occur between the Drawings and Specifications or within either of the Documents, the item or arrangement of better quality, shall be included in the Contract price. The Owner and Engineer shall decide on the item and the manner in which the work shall be installed.

B. Where Drawings or Specifications conflict or are unclear, submit clarification request in writing before Award of Contract. Otherwise, Architect's interpretation of Contract

Documents shall be final, and no additional compensation shall be permitted due to discrepancies or un-clarities thus resolved.

C. Where Drawings or Specifications do not coincide with manufacturers' recommendations or with applicable codes and standards, submit clarification request in form of an RFI before installation. Otherwise, make changes in installed work required for compliance with manufacturer instructions or codes and standards within Contract Price.

D. Where insufficient information exists in the documents to precisely describe a certain component or subsystem, or the routing of a component or its coordination with other building elements, where notification required by Paragraph (B) above has not been submitted, provide the specific component or subsystem with all parts necessary for the intended use, fully complete and operational, and installed in professional manner either concealed or exposed in accordance with the design intent.

E. Where discrepancies exist between the mechanical, plumbing, fire protection, and electrical drawings in regards to what trade owns disconnects or starters, the discrepancy shall be brought to the Architect's attention in accordance with paragraph (B) above. If the scope is not resolved prior to the Award of Contract, Division 26 shall provide such items.

1.7 CODES AND STANDARDS

A. Reference Standard Compliance

1. Where equipment or materials are specified to conform to industry and technical society reference standards of the organizations such as American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), National Electrical Manufacturers Association (NEMA), and Underwriters Laboratories Inc. (UL), submit proof of such compliance. The label or listing by the specified organization will be acceptable evidence of compliance.

2. Independent Testing Organization Certificate: In lieu of the label or listing indicated above, submit a certificate from an independent testing organization, competent to perform testing, and approved by the Engineer. The certificate shall state that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard.

B. Wherever Codes and/or Standards are mentioned in these Specifications, the latest applicable edition or revision of the local building or life safety code shall be followed.

C. The following Standards shall be used where referenced by the following abbreviations:

AABC Associated Air Balance Council

ACGIH American Conference of Governmental Industrial Hygienists

ADC	Air Diffusion Council
AGA	American Gas Association
AIA	American Institute of Architects
AMCA	Air Moving and Conditioning Association
ANSI	American National Standards Institute
API	American Petroleum Institute
ARI	Air Conditioning and Refrigeration Institute
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASPE	American Society of Plumbing Engineers
ASSE	American Society of Sanitary Engineers
ASTM	American Society of Testing and Materials
AWS	American Welding Society
AWWA	American Water Works Association
CGA	Compressed Gas Association
CSA	Canadian Standards Association
CISPI	Cast Iron Soil Pipe Institute
EJMA	Expansion Joint Manufacturing Association
EPA	Environmental Protection Agency
FM	Factory Mutual
FSSC	Federal Specification
HIS	Hydraulic Institute Standards
IEEE	Institute of Electrical and Electronics Engineers
IRI	Industrial Risk Insurers
ISO	Insurance Services Office
MCAA	Mechanical Contractors Association of America
NBS	National Bureau of Standards
NEBB	National Environmental Balancing Bureau

NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NOFI	National Oil Fuel Institute
NSC	National Safety Council
NSF	National Sanitation Foundation
OSHA	Occupational Safety and Health Administration
PDI	Plumbing and Drainage Institute
SBI	Steel Boiler Industry (Division of Hydronics Institute)
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
STI	Steel Tank Institute
UL	Underwriters' Laboratories

D. All materials furnished and all work installed shall comply with the rules and recommendations of the NFPA, the requirements of the local utility companies, the recommendations of the fire insurance rating organization having jurisdiction and the requirements of all Governmental departments having jurisdiction.

E. The Contractor shall include in the work, without extra cost to the Owner, any labor, materials, services, apparatus and Drawings in order to comply with all applicable laws, ordinances, rules and regulations, whether shown on Drawings and/or specified or not.

1.8 PERMITS AND FEES

A. The Contractor shall give all necessary notices, obtain all permits; and pay all Government and State sales taxes and fees where applicable, and other costs, including utility connections or extensions in connection with the work, file all necessary Drawings, prepare all documents and obtain all necessary approvals of all Governmental and State departments having jurisdiction, obtain all required certificates of inspection for his work, and deliver a copy to the Owner and Engineer before request for acceptance and final payment for the work.

1.9 EQUIPMENT EQUIVALENTS AND SUBSTITUTIONS

A. Certain manufacturers of material, apparatus or appliances are indicated in the drawings and specifications for this project. These items have been used as the basis of design, and as a convenience in fixing the minimum standard of quality, finish and design that is required. If the Contractors uses an "approved equal" alternative to the basis of design, and if the features of that alternative have an impact on other components of the Project, the Contractor shall include the necessary adjustments in those components, whether for architectural, structural, mechanical, electrical, fire protection, or any other elements, plus any adjustments for difference in performance.

B. Where no specific make of material, apparatus or appliance is mentioned, any first-class product made by a reputable manufacturer may be submitted for Architect and Engineer review.

C. Where the Contractor proposes to use an item that is different from the basis of design in the Drawings and specifications, and that will require the redesign of the structure, partitions, foundations, piping, wiring or any other component of the mechanical, electrical, or architectural layout, the Contractor shall provide the necessary redesign of those components.

D. Where the Contractor proposes to deviate (provide an equivalent or request for substitution) from the basis of design scheduled equipment or materials as hereinafter specified or shown on the drawings, they are required to submit a requested for substitution in writing. The Contractor shall state in their request whether it is a substitution, equivalent or a non approved equivalent to that specified and the amount of credit or extra cost involved. A copy of said request shall be included in the Base Bid with manufacturer's equipment cuts. The Base Bid shall be based on using the materials and equipment as specified with no exceptions.

E. If an alternative or substitute item results in a difference in quantity and arrangement of structure, piping, ductwork, valves, pumps, insulation, wiring, conduit, and equipment from that specified or indicated on the Drawings, the Contractor shall furnish and install any such additional equipment required by the system, at no additional cost to the Owner including any costs added to other trades due to the equivalent change from the basis of design detailed in the drawings or included within the specifications.

F. Equipment, material or devices submitted for review as a "substitution" shall meet the following requirements:

G. Substitution Request Submittal: Requests for substitution will be considered if received in writing 14 days before the bid date. Requests received later than 14 days before the bid date may be considered or rejected at the discretion of the Engineer/Owner. Once the Contractor submits a complete request for substitution as determined by the engineer, the engineer reserves the right to request the time necessary to evaluate the request for substitution and review it with the Owner.

H. Identify the product, or the fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:

1. Product Data, including Drawings and descriptions of products, fabrication and installation procedures.

2. Samples, where applicable or requested.

3. A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements such as size, weight, durability, performance and visual effect.

4. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Owner and separate Contractors that will become necessary to accommodate the proposed substitution.

5. A statement indicating the substitution's effect on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.

6. Cost information, including a proposal of the net change, if any in the Contract Sum.

7. Certification by the Contractor that the substitution proposed is equal-to or better in every significant respect to that required by the Contract Documents, and that it will perform adequately in the application indicated. Include the Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of the failure of the substitution to perform adequately.

8. Engineer's Action: Within one week of receipt of the request for substitution, the Engineer will notify the Contractor of acceptance or rejection of the proposed substitution. If a decision on use of a proposed substitute cannot be made or obtained within the time allocated, use the product specified by name. Acceptance of a product substitution will be in the form of an Addendum.

9. Other Conditions: The Contractor's substitution request will be received and considered by the Engineer when one or more of the following conditions are satisfied, as determined by the Engineer; otherwise requests will be returned without action except to record noncompliance with these requirements.

    a. The request is directly related to an "or equal" clause or similar language in the Contract Documents.

    b. The specified product or method of construction cannot be provided within the Contract Time. The request will not be considered if the product or method cannot be provided as a result of failure to pursue the Work promptly or coordinate activities properly.

    c. A substantial advantage is offered the Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear. Additional responsibilities for the Owner may include additional compensation to the Engineer for redesign and evaluation services, increased cost of other construction by the Owner or separate Contractors, and similar considerations.

1.10 SUBMITTAL PROCEDURES

A. Provide Submittals in accordance with the requirements of Division 1 and as indicated in the following.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that require sequential activity.

2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination. The Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing: Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for resubmittals.

1. Allow ten business days for initial review. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. The Engineer will promptly advise the Contractor when a submittal being processed must be delayed for coordination.

2. If an intermediate submittal is necessary, process the same as the initial submittal.

3. Allow ten business days for reprocessing each submittal.

4. No extension of Contract Time will be authorized because of failure to transmit submittals to the Engineer sufficiently in advance of the Work to permit processing.

D. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block. Submittals shall be arranged in order of specification sections.

1. Include the following information on the label for processing and recording action taken.

a. Project name.

b. Date.

c. Name and address of Engineer.

d. Name and address of Contractor.

e. Name and address of subcontractor.

f. Name and address of supplier.

g. Name of manufacturer.

h. Number, title and paragraph of appropriate Specification Section.

i. Drawing number and detail references, as appropriate.

E. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to Engineer using a transmittal form. Submittals received from sources other than the Contractor will be returned without action. On the transmittal, record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.

F. Except for submittals for record, information or similar purposes, the Engineer will review each submittal, mark to indicate action taken, and return promptly. Compliance with specified characteristics is the Contractor's responsibility.

G. Action Stamp: The Engineer will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, to indicate the action taken.

1.11 SHOP DRAWINGS

A. Submit neatly prepared information, drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered Shop Drawings.

B. The Contractor shall submit for review detailed shop drawings of all equipment and material specified in each section and coordinated ductwork layouts. No material or equipment may be delivered to the job site or installed until the Contractor has received shop drawings for the particular material or equipment which have been properly reviewed. Shop drawings shall be submitted within 60 days after award of Contract before any material or equipment is purchased. The Contractor shall submit for review all shop drawings to be incorporated in the Mechanical Contract.

C. Provide shop drawings for all devices specified under equipment specifications for all systems. Shop drawings shall include manufacturers' names, catalog numbers, cuts, diagrams, dimensions, identification of products and materials included, compliance with specified standards, notation of coordination requirements, notation of dimensions established by field measurement and other such descriptive data as may be required to identify and accept the equipment. A complete list in each category (example: all fixtures), of all shop drawings, catalog cuts, material lists, etc., shall be submitted to the Engineer at one time. No consideration will be given to a partial shop drawing submittal.

D. When a submittal could involve more than one trade, e.g., valves, piping, etc., the submitted shall be separated by traded involved, ie. HVAC, plumbing, fire protection, etc.

E. Where multiple quantities or types of equipment are being submitted, provide a cover sheet (with a list of contents) on the submittal identifying the equipment or material being submitted.

F. The Contractor shall furnish all necessary templates, patterns, etc., for installation work and for the purpose of making adjoining work conform; furnish setting plans and shop details to other trades as required.

G. "No Exception Taken" rendered on shop drawings shall not be considered as a guarantee of measurements or building conditions. Where drawings are reviewed, review does not mean that drawings have been checked in detail; said approval does not in any way relieve the Contractor from his responsibility or necessity of furnishing material or performing work as required by the Contract Drawings and Specifications. Verify available space prior to submitting shop drawings. Review of shop drawings shall not apply to quantity of material.

H. After shop drawings have been reviewed, with no exceptions taken, no further changes will be allowed without the written consent of the Engineer.

I. Shop drawing submittal sheets which may show items that are not being furnished shall have those items crossed off to clearly indicate which items will be furnished.

J. Bidders shall not rely on any verbal clarification of the Drawings and/or Specifications. Any questions shall be referred to the Engineer in writing at least five (5) working days prior to Bidding to allow for issuance of an Addendum.

K. Do not use Shop Drawings without an appropriate final stamp indicating action taken in connection with construction.

L. All submittals shall be made in electronic PDF format with searchable OCR (Optical Character Recognition) format. This excludes scanned and faxed materials.

1.12 COORDINATION DRAWINGS AND BIM MODEL

A. Coordination drawings are required for all mechanical and electrical trades. The content and procedures described in Division 01 shall be followed, with the additional requirements specifically for the mechanical and electrical trades as described in this Section. If a BIM model is not used on this project, the below requirements shall be accomplished in CAD.

B. Prepare coordination drawings accordance with Division 1, at 1 to 1 (full) scale prepared at ¼" = 1' -0" detailing major elements, components, and systems of mechanical equipment and materials in relationship with other systems, installations, and building components. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:

1. The Contractor shall indicate the proposed locations of piping, conduit, ductwork, equipment, and materials. Include the following:

   a. Clearances for servicing and maintaining equipment, including tube removal, filter removal, and space for equipment disassembly required for periodic maintenance.

b. Equipment connections and support details.

c. Exterior wall and foundation penetrations.

d. Fire-rated wall and floor penetrations.

e. Sizes and locations of required concrete pads and bases.

C. Indicate scheduling, sequencing, movement, and positioning of large equipment into the building during construction.

D. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.

E. Prepare reflected ceiling plans to coordinate and integrate installations, air outlets and inlets, light fixtures, communication systems components, sprinklers, and other ceiling-mounted items.

F. The Contractor and each subcontractor shall sign and date each coordination drawing prior to submission.

G. Work shall not be performed until coordination drawings have been approved by the architect and engineer.

H. Electronic copies of the MEP floor plans and/or BIM model are available to use as a basis for preparing coordination drawings and can be provided by the Engineer. If the Contractor elects to obtain the Engineers electronic files an Electronic Drawing File Release Form must be submitted. This form must be signed by the Contractor, Owner, and Architect. Upon receipt of a signed copy of the Electronic Drawing File Release Form, the Engineer will provide copies of the electronic files for the Contractor's use. A copy of the Electronic Drawing File Release Form is appended to the end of this specification section

I. Review by Engineer of coordination drawings is limited to confirming that requirements for coordination and preparation of plans have been complied with by the Contractor and shall not diminish responsibility under this Contract for final coordination of installation and maintenance clearances of all systems and equipment with Architectural, Structural, Mechanical, Electrical and other related work.

1.13 COORDINATION WITH OTHER DIVISIONS

A. All work shall be carried out in conjunction with other trades and full cooperation shall be given in order that all work may proceed with a minimum of delay and interference. Particular emphasis is placed on timely installation of major apparatus and furnishing other Contractors, especially the Contractor or Construction Manager, with information as to openings, chases, sleeves, bases, inserts, equipment locations, panels, etc., required by other trades.

B. The Contractors are required to examine all of the Project Drawings and mutually arrange work so as to avoid interference with the work of other trades. In general, ductwork,

HVAC piping, sprinkler piping and drainage lines take precedence over water, gas and electrical conduits. The Engineer shall make final decisions regarding the arrangement of work which cannot be agreed upon by the Contractors.

C. Where the work of the Contractor will be installed in close proximity to or will interfere with work of other trades, the Contractors will cooperate in working out space conditions to make a satisfactory adjustment.

D. If the work under a Section is installed before coordinating with other Divisions or Sections or so as to cause interference with work of other Sections, the necessary changes to correct the condition shall be made by the Contractor causing the interference without extra charge to the Owner.

E. The two dimensional drawings are diagrammatic. They indicate general arrangements of mechanical systems and other work, and are intended to convey sufficient information for skilled contractors and tradespeople to furnish and install complete systems. They are not intended to be absolutely precise; they are not intended to specify or to show every offset, fitting, and component. The purpose of the drawings is to indicate a systems concept, the main components of the systems, and the approximate geometrical relationships. Based on the systems concept, the main components, and the approximate geometrical relationships, provide all other components and materials to make the systems fully complete, coordinated with other systems and the structure and space available, and operational. Similarly, the drawings do not show all offsets required for coordination nor do they show the exact routings and locations needed to coordinate with structure and other trades in order to avoid interferences and to meet ceiling heights and other Architectural requirements. Establish and provide offsets, changes in direction, and exact routings to coordinate all systems. Where conflicts or potential conflicts exist and engineering guidance is desired, submit a “Request for Information” (RFI).

F. Controls contractor shall coordinate and sequences of operation with all other trades as necessary to provide a complete and functioning system.

1.14 QUALITY CONTROL

A. Service Support: The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

B. Modification of References: In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears.

C. The Contractor shall furnish the services of an experienced superintendent who shall be constantly in charge of the installation of the work together with all skilled tradespeople, fitters, metal workers, welders, helpers and laborers required to unload, transfer, erect, connect, adjust, start, operate and test each system.

D. Unless otherwise specifically indicated on the Drawings or Specifications, all equipment and materials shall be installed with the acceptance of the Engineer and in accordance with the recommendations of the manufacturer. This includes the performance of such tests as the manufacturer recommends.

E. All labor for installation of mechanical systems shall be performed by experienced, skilled tradespeople under the supervision of a licensed journeyman foreman. All work shall be of a quality consistent with good trade practice and shall be installed in a neat, professional manner. The Engineer reserves the right to reject any work which, in their opinion, has been installed in a substandard, dangerous or unserviceable manner. The Contractor shall replace said work in a satisfactory manner at no extra cost to the Owner.

1.15 SHUTDOWNS

A. When installation of a new system requires the temporary shutdown of an existing operating system, the connection of the new system shall be performed at such time as designated by the Owner.

B. The Engineer and the Owner shall be notified in writing of the estimated duration of the shutdown period at least ten (10) days in advance of the date the work is to be performed.

C. Work shall be arranged for continuous performance whenever possible. The Contractor shall provide all necessary labor, including overtime if required, to assure that existing operating services will be shut down only during the time actually required to make necessary connections.

1.16 TEMPORARY UTILITIES

A. General: Provide new materials and equipment; if acceptable to the Engineer, undamaged previously used materials in serviceable condition may be used. Provide materials suitable for the use intended.

B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities, or permit them to interfere with progress. Do not allow hazardous dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.

C. First Aid Supplies: Comply with governing regulations.

D. Fire Extinguishers: Provide hand-carried, portable UL-rated, class "A" fire extinguishers for temporary offices and similar spaces. In other locations provide hand-carried, portable, UL-rated, class "ABC" dry chemical extinguishers, or a combination of extinguishers of NFPA recommended classes for the exposures.

E. Utilities: Engage the appropriate local utility company to install temporary service or connect to existing service. Where the company provides only part of the service, provide the remainder with matching, compatible materials and equipment; comply with the company's recommendations.

1. Use Charges: Cost or use charges for temporary facilities are not chargeable to the Owner or Engineer, and will not be accepted as a basis of claims for a Change Order.

F. Water Service: Install water service and distribution piping of sizes and pressures adequate for construction until permanent water service is in use.

G. Temporary Heat-Cool-Dehumidification: Provide temporary services required by construction activities, for curing or drying of completed installations or protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate temporary services to produce the ambient condition required and minimize consumption of energy. The building's permanent HVAC systems shall not be used for these purposes.

H. Environmental Protection: Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result. Avoid use of tools and equipment which produce harmful noise. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near the site.

I. Termination and Removal: Unless the Engineer requires that it be maintained longer, remove each temporary facility when the need has ended, or when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces and replace construction that cannot be satisfactorily repaired. Materials and facilities that constitute temporary facilities are property of the Contractor. The Owner reserves the right to take possession of Project identification signs.

1.17 EQUIPMENT ACCESS

A. Appliances, controls devices, heat exchangers and HVAC system components that utilize energy shall be accessible for inspection, service, repair and replacement without disabling the function of a fire-resistance-rated assembly or removing permanent construction, other appliances, venting systems or any other piping or ducts not connected to the *appliance* being inspected, serviced, repaired or replaced. A level working space not less than 30 inches deep and 30 inches wide (762 mm by 762 mm) shall be provided in front of the control side to service an *appliance*.

1.18 BUILDING FLUSH-OUT

A. Building flush-out shall begin after construction ends and finishes are installed but prior to building occupancy. Prior to building flush-out, HVAC systems shall be balanced per Specification Section 23 05 93. Flush-out shall not occur until contractor receives permission to proceed from the Owner or Owner's representative..

B. Building flush-out procedures shall include continuously operating all the building's new ventilation systems at maximum design outside air flow rates. For constant volume HVAC systems, ventilation systems shall operate at maximum design supply air flow rates.

G. Contractor shall include hourly trend log and record during duration of building flush out.

H. Log to include hours, airflow, temperature, and RH% of space and be summarized to confirm performance.

I. Install new filtration media at end of flush-out and reset controls sequence of operation as needed.

J. CT HIGH PERFORMANCE BUILDING REQUIREMENTS

1. After construction ends and with all interior finishes installed but prior to building occupancy, flush the building continuously for at least ten days with outside air while maintaining an internal temperature between 60°F and 78°F and relative humidity no higher than 60%. Do not ―bake out‖ the building by increasing the temperature of the space. Alternatively, use the following strategy: Flush out each space separately until 3,500 cubic feet of outside air per square foot of floor space has been delivered to that space. The space shall then be ventilated at the rate of 0.3 cubic feet per minute per square foot of floor space or the design minimum outside air rate, whichever is greater. This shall be performed for a minimum of three hours prior to occupancy and then during occupancy until a total of 14,000 cubic feet of outside air per square foot of floor area has been delivered to that space.

    a. Compliance Assistance for Optional Strategy: Perform a building flush-out by supplying outside air continuously for ten days while maintaining an internal temperature of at least 60˚F but no warmer than 78°Fand relative humidity no higher than 60%.

    b. Alternative Compliance Pathway for Optional Strategy: Flush out each space separately with outside air until 3,500 cubic feet of outside air has been delivered for each square foot of floor area. Then ventilate the area at the rate of 0.3 cubic feet of outside air per square foot of floor space or the design outside air rate, whichever is greater, at least three hours prior to occupancy. Maintain that ventilation rate until a total of 14,000 cubic feet of outside air per square foot of floor areas has been delivered to the space.

K. Contractor shall include hourly log and record during duration of building flush out.

L. Log to include hours, airflow, temperature, and RH% of space and be summarized to confirm performance.

M. Install new filtration media at end of flush-out and reset controls sequence of operation as needed.

1.19 PROJECT PHASING

A. Work under each Section shall include all necessary temporary connections, equipment, piping, heating, temperature control work, fire stopping, water heaters, labor, and material as necessary to accommodate the phasing of Construction as developed by the General Contractor or Construction Manager and approved by the Owner. All existing systems that pass-thru an area of the building shall remain operational during all phases of construction. No extra compensation shall be granted the Contractor for work required to maintain existing systems operational or to accommodate the construction phasing of the project.

1.20 PROTECTION OF MATERIALS AND EQUIPMENT

A. Work under each Section shall include protecting the work and material of all other Sections from damage by work or workpeople and shall include making good all damage thus caused.

B. The Contractor shall be responsible for work and equipment until the facility has been accepted by the Owner. Protect work against theft, injury or damage and carefully store material and equipment received on site which is not immediately installed. Close open ends of work with temporary covers or plugs during construction to prevent entry of foreign material.

C. Work under each Section includes receiving, unloading, uncrating, storing, protecting, setting in place and completely connecting equipment supplied under each Section. Work under each Section shall also include exercising special care in handling and protecting equipment and fixtures, and shall include the cost of replacing any of the equipment and fixtures which are missing or damaged.

D. Equipment and material stored on the job site shall be protected from the weather, vehicles, dirt and/or damage by tradespeople or machinery. Insure that all electrical or absorbent equipment or material is protected from moisture during storage.

1.21 ADJUSTING AND TESTING

A. After all the equipment and accessories to be furnished are in place, they shall be put in final adjustment and subjected to such operating tests so as to assure the Engineer that they are in proper adjustment and in satisfactory, permanent operating condition.

B. Where requested by the Engineer, a factory-trained service representative shall inspect the installation and assist in the initial startup and adjustment to the equipment. The period of these services shall be for such time as necessary to secure proper installation and adjustments. After the equipment is placed in permanent operation, the service representative shall supervise the initial operation of the equipment and instruct personnel responsible for operation and maintenance of the equipment. The service representative shall notify the Contractor in writing that the equipment was installed according to manufacturer's recommendations and is operating as intended by the manufacturer.

1.22 CLEANING

A. The Contractor shall thoroughly clean and flush all piping, ducts and equipment of all foreign substances, oils, burrs, solder, flux, etc., inside and out before being placed in operation.

B. If any part of a system should be stopped or damaged by any foreign matter after being placed in operation, the system shall be disconnected, cleaned and reconnected wherever necessary to locate and/or remove obstructions. Any work damaged in the course of removing obstructions shall be repaired or replaced when the system is reconnected at no additional cost to the Owner.

C. During the course of construction, all ducts and pipes shall be capped in an acceptable manner to insure adequate protection against the entrance of foreign matter.

D. Upon completion of all work under the Contract, the Contractor shall remove from the premises all rubbish, debris and excess materials left over from his work. Any oil or grease stains on floor areas caused by the Contractor shall be removed and floor areas left clean.

E. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.

1. Remove labels that are not permanent labels.

2. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compound and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.

3. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films and similar foreign substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.

4. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.

F. Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove and dispose of ALL waste materials, packaging material, skids etc. from the site and dispose of in a lawful manner in accordance with municipal, state and federal regulations.

G. Where extra materials of value remaining after completion of associated Work have become the Owner's property, arrange for disposition of these materials as directed.

1.23 OPERATING AND MAINTENANCE

A. Upon completion of all work and tests, the Contractor shall furnish the necessary skilled labor and helpers for operating his system and equipment for a period specified under each applicable Section of this Division. During this period, the contractor shall fully instruct the Owner or the Owner's representative in the operation, adjustment and maintenance of all equipment furnished. The Contractor shall give at least seven (7) days notice to the Owner and the Engineer in advance of this period.

B. The Contractor shall include the maintenance schedule for the principal items of equipment furnished under this Division.

C. The Contractor shall physically demonstrate procedures for all routine maintenance of all equipment furnished under each respective Section to assure accessibility to all devices.

D. An authorized manufacturer's representative shall attest in writing that the equipment has been properly installed prior to startup of any major equipment. The following equipment will require this inspection: pumps; air conditioning equipment, controls, air handling equipment, compressors, boilers etc. These letters shall be bound into the operating and maintenance books.

E. Refer to individual trade Sections for any other particular requirements related to operating instructions.

F. Demonstration shall be recorded on USB Flash drive turned over to the Owner. Video recording shall be done in a professional manner with quality video (1080p resolution) and clear audible sound.

1.24 OPERATING AND MAINTENANCE MANUALS

A. Prepare operating and maintenance manuals in accordance with the requirements of Division 1 and as follows. The Contractor shall prepare up to six (6) copies of a complete maintenance and operating instructions manual, bound in booklet form. Organize operating and maintenance data into suitable sets of manageable size. Bind properly indexed data in individual heavy-duty 3-ring vinyl-covered binders, with pocket folders for folded sheet information and designation partitions with identification tabs. Mark appropriate identification on front and spine of each binder.

B. Manual shall include the following:

1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.

2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.

3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.

4. Servicing and operating instructions including lubrication charts and schedules.

5. Emergency and safety instructions.

6. Spare parts list.

7. Copies of warranties.

8. Wiring diagrams.

9. Recommended "turn around" cycles.

10. Inspection procedures.

11. Approved Shop Drawings and Product Data.

12. Equipment Start-up Reports.

13. Temperature control diagrams and written sequences of operations.

14. Balance reports.

C. Include in the manual, a tabulated equipment schedule for all equipment. Schedule shall include pertinent data such as: make, model number, serial number, voltage, normal operating current, belt size, filter quantities and sizes, bearing number, etc. Schedule shall include maintenance to be done and frequency.

D. Maintenance and instruction manuals shall be submitted to the Owner at the same time as the seven (7) day notice is given prior to the instruction period.

1.25 ACCEPTANCES

A. The equipment, materials, quality, design and arrangement of all work installed under the Mechanical Sections shall be subject to the review of the Engineer.

B. Within 30 days after the awarding of a Contract, the Mechanical Contractor shall submit to the Engineer, for review, a list of manufacturers of equipment proposed for the work under the Mechanical Sections. The intent to use the exact manufacturers and models specified does not relieve the Contractor of the responsibility of submitting such a list.

C. If extensive or unacceptable delivery time is expected on a particular item of equipment specified, the Contractor shall notify the Owner and Engineer, in writing, within 30 days of award of the Contract. In such instances, equipment substitutions may be made pending acceptance by the Engineer or the Owner’s representative.

D. Where any specific material, process or method of construction or manufactured article is specified by reference to the catalog number of a manufacturer, the Specifications are to be used as a guide and are not intended to take precedence over the basic duty and performance specified or noted on the Drawings. In all cases, the Mechanical Contractor

shall verify the duty specified with the specific characteristics of the equipment offered for review. Equipment characteristics are to be used as mandatory requirements where the Contractor proposes to use an acceptable equivalent.

E. If material or equipment is installed before it is reviewed and/or approved, the Contractor shall be liable for its removal and replacement at no extra charge to the Owner if, in the opinion of the Engineer, the material or equipment does not meet the intent of, or standard of quality implied by, the Drawings and Specifications.

F. Failure on the part of the Engineer to reject shop drawings or to reject work in progress shall not be interpreted as acceptance of work not in conformance with the Drawings and/or Specifications. Work not in conformance with the Drawings and/or Specifications shall be corrected whenever it is discovered.

1.26 RECORD DRAWINGS

A. General: Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the Engineer's reference during normal working hours.

B. Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark whichever drawing is most capable of showing conditions fully and accurately. Give particular attention to concealed elements that would be difficult to measure and record at a later date. Items to be indicated include but are not limited to:

1. Dimensional change
2. Revision to drawing detail
3. Location and depth of underground utility
4. Revision to pipe routing
5. Revision to electrical circuitry
6. Actual equipment location
7. Duct size and routing
8. Location of concealed internal utility
9. Changes made by Change Order
10. Details not on original Contract Drawing
11. Information on concealed elements which would be difficult to identify or measure later

C. Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the Work.

D. Mark new information that is important to the Owner, but was not shown on Contract Drawings or Shop Drawings.

E. Note related Change Order numbers where applicable.

F. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each set.

G. Final record documents shall be prepared in the latest electronic version and on USB Flash drive of all drawings and a clean set of reproducible paper copies shall be turned over to the Owner at the completion of the work.

1.27 WARRANTIES AND BONDS

A. The following general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturers standard warranties on products and special warranties are to be included:

1. General close-out requirements included in Division 1.

2. Specific requirements for warranties for the Work and products and installation that are specified to be warranted, are included in the individual Sections of Divisions-2 through -50.

3. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.

B. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

C. Separate Prime Contracts: Each prime Contractor is responsible for warranties related to its own Contract.

1.28 WARRANTY REQUIREMENTS

A. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.

B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or

rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

D. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, right and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.

E. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.

F. The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

G. Submit written warranties to the Engineer prior to the date certified for Substantial Completion. If the Engineer's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Engineer.

H. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Engineer within fifteen days of completion of that designated portion of the Work.

I. When a special warranty is required to be executed by the Contractor, or the Contractor and a subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner through the Engineer for approval prior to final execution.

1. Refer to individual Sections of Divisions-2 through -50 for specific content requirements, and particular requirements for submittal of special warranties.

J. Form of Submittal: At Final Completion compile two copies of each required warranty and bond properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.

K. Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2" by 11" paper.

1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address and telephone number of the installer.

2. Identify each binder on the front and the spine with the typed or printed title "WARRANTIES AND BONDS," the Project title or name, and the name of the Contractor.

3. When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

1.29 GUARANTEES

A. The Contractor shall guarantee all material and installation quality under these Specifications and the Contract for a period of one (1) year from the date of final acceptance by Owner. During this guarantee period, all defects developing through faulty equipment, materials or installation quality shall be corrected or replaced immediately by this Contractor without expense to the Owner. Such repairs or replacements shall be made to the Engineer's satisfaction.

B. Contractor shall provide name, address, and phone number of all contractors and subcontractors and associated equipment they provided.

1.30 PROJECT CLOSE-OUT

A. Submit specific warranties, quality bonds, maintenance agreements, final certifications and similar documents in accordance with Division 1.

B. Deliver tools, spare parts, extra stock, and similar items.

C. Complete start-up testing of systems, including measuring and documenting all required startup checklist requirements documented in installation and maintenance instructions by the equipment manufacturer, and instruction of the Owner's operating and maintenance personnel. Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.

D. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.

E. Field Observation Procedures: On receipt of a request for an Engineers Field Observation, the Engineer will advise the Contractor of unfulfilled requirements. The Engineer will advise the Contractor of construction that must be completed or corrected before the certificate will be issued. Contractor shall submit written response to each corrective item including specific photos prior to final Engineering inspection.

1. The Engineer will repeat the Field Observation when requested and assured that the Work has been substantially completed.

2. Results of the completed list of unfulfilled items will form the basis of requirements for final acceptance.

END OF SECTION

Electronic Drawing File Release Form

DELIVERY OF FILES FOR: _____
Project Name

In accepting and utilizing any drawings or other data on any form of electronic media generated and provided by the Design Professional, the Client covenants and agrees that all such drawings and data are instruments of service of the Design Professional, who shall be deemed the author of the drawings and data, and shall retain all common law, statutory law and other rights, including copyrights.

The Client further agrees not to use these drawings and data, in whole or in part, for any purpose or project other than the project which is the subject of this Agreement. The Client agrees to waive all claims against the Design Professional resulting in any way from any unauthorized changes or reuse of the drawings and data for any other project by anyone other than the Design Professional.

In addition, the Client agrees, to the fullest extent permitted by law, to indemnify and hold the Design Professional harmless from any damage, liability or cost, including reasonable attorneys' fees and costs of defense, arising from any changes made by anyone other than the Design Professional or from any reuse of the drawings and data without the prior written consent of the Design Professional.

Under no circumstances shall transfer of the drawings and other instruments of service on electronic media for use by the Client be deemed a sale by the Design Professional, and the Design Professional makes no warranties, either express or implied, of merchantability and fitness for any particular purpose.

_____ _____
Client's Signature Date

_____
Company - Title

_____ _____
Architects' Signature Date

_____
Firm - Title

_____ _____
Owner's Signature Date

_____
Company - Title

SECTION 23 0516 - EXPANSION FITTINGS AND LOOPS FOR HVAC PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Design of expansion systems and anchors

B. Flexible pipe connectors.

C. Expansion joints and compensators.

D. Pipe Alignment Guides

E. Swivel Joints

F. Pipe Anchors

1.2 RELATED REQUIREMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

B. Division 23 specifications

1.3 REFERENCE STANDARDS (follow the most currently adopted amended version)

A. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.

B. ASME B16.5 - Pipe Flanges and Flanged Fittings NPS 1/2 through NPS 24 Inch Standard.

C. ASME B16.11 - Forged Fittings, Socket-welding and Threaded.

D. ASME B31.9 – Building Services Piping

E. ASME Section IX – Boiler and Pressure Vessel Code- Welding and Brazing Qualifications.

F. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

G. AWS D1.1 – Structural Welding Code- Steel.

H. EJMA (STDS) - EJMA Standards.

I. FM (AG) - FM Approval Guide.

J. ITS (DIR) - Directory of Listed Products.

K. UL (DIR) - Online Certifications Directory.

1.4 DESIGN REQUIREMENTS

A. Provide design, details, work and equipment required for expansion and contraction of hot water and steam piping systems. Verify anchors, guides, and expansion joints provide and adequately protect system.

B. Provide structural work and equipment required for expansion and contraction of piping. Verify anchors, guides, and expansion joints provide and adequately protect system.

C. Expansion Compensation Design Criteria:
1. Installation Temperature: 50°F.
2. Hot Water Heating System Temperature: 210°F.
3. Refrigerant System Temperature: Refer to manufacturers design literature.
4. Safety Factor: 30%.

1.5 SUBMITTALS

A. Pipe Expansion Analysis, Design and Certification:
1. Provide pipe expansion and anchoring calculations for all refrigerant, steam and hot water piping systems including connections to equipment and to the structure. Piping layouts and associated calculations must be stamped by a registered professional engineer with at least five years of pipe expansion experience, licensed in the state of the job location.
2. Analysis must indicate calculated dead loads, active expansion loads and capacity of materials utilized for connections to equipment and structure. Analysis must detail anchoring methods, bolt diameter, embedment and/ or welded length. All expansion and anchoring devices shall be designed to accept the forces as calculated.

B. Shop Drawings: Indicate layout of piping systems, including flexible connectors, expansion joints, expansion compensators, loops, offsets and swing joints. Indicate installed locations of flexible pipe connectors, expansion joints, anchors and guides.

C. Product Data:
1. Flexible Pipe Connectors: Indicate maximum temperature and pressure rating, face-to-face length, live length, hose wall thickness, hose convolutions per foot and per assembly, fundamental frequency of assembly, braid structure, and total number of wires in braid.
2. Expansion Joints: Indicate maximum temperature and pressure rating, and maximum expansion compensation.

D. Manufacturer's Instructions: Indicate manufacturer's installation instructions, special procedures, and external controls.

E. Maintenance Data: Include adjustment instructions.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. Extra Packing for Packed Expansion Joints: One set for each joint.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five years' experience.

B. Installer: Company specializing in performing work of this section with minimum five years' experience.

C. Design expansion compensating system under direct supervision of a Professional Engineer experienced in design of this work and licensed in state which the work will occur.

PART 2 PRODUCTS

2.1 MANUFACTURERS:

A. Mason Industries

B. The Metraflex Company

C. UniSource Manufacturing

2.2 FLEXIBLE PIPE CONNECTORS - STEEL PIPING

A. Inner Hose: Bronze.

B. Exterior Sleeve: Single braided, stainless steel.

C. Pressure & Temperature Rating: 125 psi and 450°F.

D. Joint: Flanged.

E. Size: Use pipe sized units.

F. Maximum offset: 3/4 inch on each side of installed center line.

2.3 FLEXIBLE PIPE CONNECTORS - COPPER PIPING SERVING WATER SYSTEMS

A. Inner Hose: Bronze.

B. Exterior Sleeve: Braided bronze.

C. Pressure & Temperature Rating: 125 psi and 450°F.

D. Joint: Flanged.

E. Size: Use pipe sized units.

F. Maximum offset: 3/4 inch on each side of installed center line.

G. Application: Copper piping serving water-based systems.

2.4 FLEXIBLE PIPE CONNECTORS - COPPER PIPING SERVING REFRIGERANT SYSTEMS

A. Inner Hose: Stainless Steel.

B. Exterior Sleeve: Braided 304 Stainless Steel

C. Pressure Rating: 650 psi.

D. Joint: Brazed.

E. Size: Use pipe sized units.

F. Maximum offset: 3/4 inch on each side of installed center line.

G. Application: Refrigerant Piping.

H. Certifications: UL Listed for Refrigeration Service.

2.5 EXPANSION JOINTS - STAINLESS STEEL BELLOWS TYPE

A. Pressure & Temperature Rating: 125 psi and 400°F.

B. Maximum Compression: 1-3/4 inches.

C. Maximum Extension: 1/4 inch.

D. Joint: Flanged.

E. Size: Use pipe sized units.

F. Application: Steel piping 3 inches and under.

2.6 EXPANSION JOINTS - EXTERNAL RING CONTROLLED STAINLESS STEEL BELLOWS TYPE

A. Pressure & Temperature Rating: 125 psi and 400°F.

B. Maximum Compression: 15/16 inch.

C. Maximum Extension: 5/16 inch.

D. Maximum Offset: 1/8 inch.

E. Joint: Flanged.

F. Size: Use pipe sized units.

G. Accessories: Internal flow liner.

H. Application: Steel piping over 2 inches.

2.7 EXPANSION JOINTS - DOUBLE SPHERE, FLEXIBLE COMPENSATOR

A. Body: Multi-Layered Kevlar with EPDM.

B. Pressure & Temperature Rating, Sizes 3/4 Inch to 1-1/4" Inch: 150 psi and 210°F.

C. Pressure & Temperature Rating, Sizes 1-1/2 Inch to 12 Inch: 150 psi and 250°F.

D. Pressure & Temperature Rating, Sizes 14 Inch to 24 Inch: 105 psi and 250°F.

E. Maximum Compression: 1/2 inch.

F. Maximum Elongation: 3/8 inch.

G. Maximum Offset: 3/8 inch.

H. Maximum Angular Movement: 15 degrees.

I. Joint: Tapped steel flanges.

J. Size: Use pipe sized units.

K. Accessories: Control cables.

L. Application: Steel piping 2 inches and over.

2.8 EXPANSION JOINTS - TWO-PLY BRONZE BELLOWS TYPE

A. Construction: Bronze with anti-torque device, limit stops, internal guides.

B. Pressure & Temperature Rating: 125 psi and 400°F.

C. Maximum Compression: 1-3/4 inches.

D. Maximum Extension: 1/4 inch.

E. Joint: Soldered.

F. Size: Use pipe sized units.

G. Application: Copper piping.

2.9 EXPANSION JOINTS - LOW PRESSURE COMPENSATOR WITH TWO-PLY BRONZE BELLOWS

A. Working Pressure: 75 psi.

B. Maximum Temperatures: 250°F.

C. Maximum Compression: 1/2 inch.

D. Maximum Extension: 5/32 inch.

E. Joint: Soldered.

F. Size: Use pipe sized units.

G. Application: Copper or steel piping 3 inches and under.

2.10 EXPANSION JOINTS - STEEL WITH PACKED SLIDING SLEEVE

A. Working Pressure and Temperature: Class 150.

B. Joint: Flanged.

C. Size: Use pipe sized units.

D. Application: Steel piping 2 inches and over.

2.11 EXPANSION JOINTS - COPPER WITH PACKED SLIDING SLEEVE

A. Working Pressure: 125 psi.

B. Maximum Temperature: 250°F.

C. Joint: Flanged.

D. Size: Use pipe sized units.

E. Application: Copper or steel piping 2 inches and over.

2.12 EXPANSION LOOPS - HOSE AND BRAID

A. Provide flexible loops with two flexible sections of hose and braid, two 90 degree elbows, and 180 degree return with support bracket and air release or drain plug.

B. Provide flexible loops capable of movement in the x, y, and z planes. Flexible loops to impart no thrust loads to the building structure.

C. Flexible Connectors: Flanged, braided type with wetted components of stainless steel, sized to match piping.
   1. Maximum Allowable Working Pressure & Temperature: 150 psig at 120°F.
   2. Accommodate the Following:
      a. Axial Deflection in Compression and Expansion: To be determined by the Professional Engineer providing calculations.
      b. Lateral Movement: To be determined by the Professional Engineer providing calculations.
      c. Angular Rotation: 15 degrees.
      d. Force developed by 1.5 times specified maximum allowable operating pressure.
   3. End Connections: Same as specified for pipe jointing.
   4. End Connections: Flanged ductile iron; complying with ASME B16.1 Class 125.
   5. End Connections: Threaded; complying with ASME B16.11.
   6. Provide necessary accessories including, but not limited to, swivel joints.

2.13 EXPANSION JOINTS - EXTERNALLY PRESSURIZED EXPANSION JOINTS

A. Construction: Stainless steel with anti-torque device, limit stops, internal guides.

B. Maximum Allowable Working Pressure & Temperature: 150 psig at 700°F.

C. Maximum Axial Compression: 4 inches.

D. End Connections: Flanged by weld end.

E. Size: Use pipe sized units.

F. Application: Steel piping 2 inches and over.

2.14 PIPE ALIGNMENT GUIDES

A. Two piece welded steel with enamel paint, bolted, with spider to fit standard pipe, frame with four mounting holes, clearance for minimum 1 inch thick insulation, minimum 3 inches travel

2.15 SWIVEL JOINTS

A. Fabricated steel body, double ball bearing race, field lubricated, with rubber (Buna-N) o-ring seals.

2.16 PIPE ANCHORS

A. All-directional acoustical pipe anchor, consisting of two sizes of steel tubing separated by a minimum 1/2" thick 60 durometer neoprene. Vertical restraint shall be provided by similar material arranged to prevent vertical travel in either direction. Allowable loads on the isolation material should not exceed 500 PSI and the design shall be balanced for equal resistance in any direction.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with EJMA (Expansion Joint Manufacturers Association) Standards.

C. Install flexible pipe connectors on:
   1. Pipes connected to pumps.
   2. Refrigerant piping connections to equipment per recommendations of equipment manufacturer.
   3. Pipes connected to equipment supported by vibration isolation. Provide line size flexible connectors.

D. Install flexible connectors at right angles to displacement. Install one end immediately adjacent to isolated equipment and anchor other end. Install in horizontal plane unless indicated otherwise.

E. Rigidly anchor pipe to building structure. Provide pipe guides so movement is directed along axis of pipe only. Erect piping such that strain and weight is not on cast connections or apparatus.

F. Provide support and anchors for controlling expansion and contraction of piping. Provide loops, pipe offsets, and swing joints, or expansion joints where required.

G. For systems using grooved piping systems, provide with minimum one joint per inch pipe diameter instead of flexible connector supported by vibration isolation.

H. Provide piping expansion loops at all building expansion joints as indicated on drawings.

I. Provide piping expansion joints or expansion loops as indicated below:
   1. Provide and install pipe expansion joints or expansion loops at all conditions listed below and as required to minimize stress on the piping systems.
   2. Provide pipe guides at inlet and outlet of each expansion joint and expansion loop.
   3. Where expansion joints or loops are required, provide pipe anchors at ends of each straight length of run.
   4. Provide and install expansion joints, expansion loops, pipe guides and anchors per ASHRAE guidelines and manufacturer’s recommendations.

PIPING SYSTEM	PIPING MATERIAL	PIPE SIZE	Condition Requiring expansion joint or expansion loop (all conditions assume "offset leg" at end of runs are minimum 12'0" long)
Hot water supply and return (all temperatures)	Copper	Up to 3 inches	All straight sections of piping over 90' long. All straight sections of piping where "offset leg" is less than 12'0"
Hot water supply and return Steam supply and return (all temperatures)	Steel	Up to 2 inches	All straight sections of piping over 140' long.
Hot water supply and return Steam supply and return (all temperatures)	Steel	2" to 4"	All straight sections of piping over 90' long
Hot water supply and return Steam supply and return (all temperatures)	Steel	5" to 8"	All straight sections of piping over 45' long

END OF SECTION

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SECTION 23 0517 - SLEEVES AND SLEEVE SEALS FOR HVAC PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pipe sleeves.

B. Manufactured sleeve-seal systems.

1.2 RELATED REQUIREMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

B. Division 07 – Thermal and Moisture Protection.

C. Division 09 - Finishes.

D. Section 23 0523 - General-Duty Valves for HVAC Piping.

E. Section 23 0553 - Identification for HVAC Piping and Equipment: Piping identification.

F. Section 23 0700 - HVAC Insulation.

1.3 REFERENCE STANDARDS (follow the most currently adopted amended version)

A. ASTM C592 - Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type).

B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems.

1.4 SUBMITTALS

A. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

B. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. Extra Valve Stem Packings: Two for each type and size of valve.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified this section.
   1. Minimum three years experience.
   2. Approved by manufacturer.

C. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store sleeve and sleeve seals in shipping containers, with labeling in place.

B. Provide temporary protective coating on cast iron and steel sleeves if shipped loose.

1.7 WARRANTY

A. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.1 PIPE SLEEVES

A. Materials
   1. Galvanized-Steel Sheet: 0.0239-inch 0.6-mm minimum thickness; round tube closed with longitudinal joint.
   2. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

2.2 MANUFACTURED SLEEVE-SEAL SYSTEMS

A. Manufacturers:
   1. Flexicraft Industries; PipeSeal.
   2. Metraflex
   3. Link-Seal
   4. Substitutions: See Division - 01 General Requirements.

B. Modular/Mechanical Seal:
   1. Synthetic rubber interlocking links continuously fill annular space between pipe and wall/casing opening.
   2. Provide watertight seal between pipe and wall/casing opening.
   3. Elastomer element size and material in accordance with manufacturer's recommendations.
   4. Glass reinforced plastic pressure end plates.

PART 3 EXECUTION

3.1 GENERAL

A. Lay out penetration and sleeve openings in advance, to permit provision in work. Coordinate work with architectural and structural work. Set sleeves and conduit in forms before concrete is poured. Provide remedial work where sleeves and conduits are omitted or improperly placed. Remedial work includes core drilling (see requirements below) for penetrations if walls are poured, or otherwise constructed, without required sleeves. Provide core drilling (see requirements below) of existing construction. Do not penetrate structural members without Structural Engineer's/Architect's written approval.

B. Sleeve installation shall meet NFPA-101 requirements, UL rated assemblies requirements, and materials requirements of these specifications. Submit a list of the UL listed details that the Contractor intends on using on this project in all rated assemblies.

C. Sleeves that penetrate outside walls, basement slabs, footings and beams shall be waterproof. Sleeves that penetrate floors shall be fireproof and waterproof.

D. Identify unused sleeves and slots for future installation. Fill slots, sleeves and other openings in floors or walls if not used. Fill spaces in openings after installation of pipe, duct, conduit or cable. Fill for floor penetrations shall prevent passage of water, smoke, fire, and fumes. Fill shall be fire resistant in fire floors and walls, and shall prevent passage of air, smoke and fumes.

E. Do not support piping risers or conduit on sleeves.

F. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 7 for materials.

G. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements. Verify final equipment locations for roughing-in.

3.2 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and foreign material, from inside and outside, before assembly.

3.3 APPLICATIONS

A. Provide sleeves when penetrating footings, floors, walls, partitions, and other building components as follows:
   1. Interior walls, partitions, and floors: galvanized-steel sheet, unless steel or brass sleeves are specified elsewhere.
   2. Below Grade Exterior Walls: Zinc coated or cast iron pipe with mechanical sleeve seals. Provide watertight space with link rubber or modular seal between sleeve and pipe on both pipe ends.

3. Above Grade Exterior Walls: steel pipe sleeve with mechanical sleeve seals.
4. Mechanical, Laundry, and Animal Room Floors above Basement: Galvanized steel pipe or black iron pipe with asphalt coating. Connect sleeve with floor plate except in mechanical rooms.
5. Concrete and masonry walls, concrete floor and roof slabs: galvanized-steel sheet
6. Floors with membrane waterproofing: stack sleeve fittings

3.4 INSTALLATION

A. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.

B. Install piping to conserve building space, to not interfere with use of space and other work.

C. Install piping and pipe sleeves to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

D. Install sleeves that are large enough to provide 1/4 inch annular clear space between sleeve and pipe or pipe insulation. Sleeves for insulated pipe and duct in non-fire rated construction shall accommodate continuous insulation without compression. Sleeves and/or penetrations in fire rated construction shall be packed with fire rated material that shall maintain the fire rating of the wall. Seal ends of penetrations to provide continuous vapor barrier where insulation is interrupted.

E. Where pipes passing through openings are exposed in finished rooms, finishes of filling materials shall match and be flush with adjoining floor, ceiling, and wall finishes.

F. Inserts:
1. Provide inserts for placement in concrete formwork.
2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.

G. Structural Considerations:
1. Do not penetrate building structural members unless indicated.

H. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.
1. Underground Piping: Mechanically expandable chloroprene inserts with bitumen sealed metal components.
2. Aboveground Piping:
   a. Pack solid using mineral fiber conforming to ASTM C592.
   b. Fill space with an elastomer caulk to a depth of 0.50 inch where penetrations occur between conditioned and unconditioned spaces.

3. All Rated Openings: Caulk tight with fire stopping material conforming to ASTM E814 in accordance with Division 07 to prevent the spread of fire, smoke, and gases.
4. Caulk exterior wall sleeves watertight with Mechanically expandable chloroprene inserts with mastic-sealed components.

I. Vertical Piping:
1. Sleeve Length: 1 inch above finished floor.
2. Provide sealant for watertight joint.
3. Blocked Out Floor Openings: Provide 1-1/2 inch angle set in silicon adhesive around opening.
4. Drilled Penetrations: Provide 1-1/2 inch angle ring or square set in silicone adhesive around penetration.

J. Clearances:
1. Provide allowance for insulated piping.
2. Wall, Floor, Floor, Partitions, and Beam Flanges: 1 inch greater than external; pipe diameter.
3. All Rated Openings: Caulked tight with fire stopping material conforming to ASTM E814 in accordance with Division 07 to prevent the spread of fire, smoke, and gases.

K. Manufactured Sleeve-Seal Systems:
1. Install manufactured sleeve-seal systems in sleeves located in grade slabs and exterior concrete walls at piping entrances into building.
2. Provide sealing elements of the size, quantity, and type required for the piping and sleeve inner diameter or penetration diameter.
3. Locate piping in center of sleeve or penetration.
4. Install field assembled sleeve-seal system components in annular space between sleeve and piping.
5. Tighten bolting for a water-tight seal.
6. Install in accordance with manufacturer's recommendations.

L. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

3.5 CLEANING

A. Upon completion of work, clean all parts of the installation.

B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

END OF SECTION

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SECTION 23 0523 - GENERAL-DUTY VALVES FOR HVAC PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Applications.

B. General requirements.

C. Angle valves.

D. Globe valves.

E. Ball valves.

F. Butterfly valves.

G. Check valves.

H. Gate valves.

I. Plug valves.

J. Chainwheels.

1.2 RELATED REQUIREMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

B. Section 23 04 00 – General Conditions for Mechanical Trades

1.3 ABBREVIATIONS AND ACRONYMS

A. CWP: Cold working pressure.

B. EPDM: Ethylene propylene copolymer rubber.

C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.

D. NRS: Nonrising stem.

E. OS&Y: Outside screw and yoke.

F. PTFE: Polytetrafluoroethylene.

G. RS: Rising stem.

H. SWP: Steam working pressure.

I. TFE: Tetrafluoroethylene.

1.4 REFERENCE STANDARDS (follow the most currently adopted amended version)

A. API STD 594 - Check Valves: Flanged, Lug Wafer, and Butt-Welding.

B. ASME B1.20.1 - Pipe Threads, General Purpose (Inch).

C. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250;.

D. ASME B16.5 - Pipe Flanges and Flanged Fittings NPS 1/2 Through NPS 24 Metric/Inch Standard.

E. ASME B16.10 - Face-to-Face and End-to-End Dimensions of Valves.

F. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.

G. ASME B16.34 - Valves - Flanged, Threaded and Welding End.

H. ASME B31.1 - Power Piping.

I. ASME B31.9 - Building Services Piping.

J. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Welding, Brazing, and Fusing Qualifications.

K. ASTM A48/A48M - Standard Specification for Gray Iron Castings.

L. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.

M. ASTM A216/A216M - Standard Specification for Steel Castings, Carbon, Suitable for Fusion Welding, for High-Temperature Service.

N. ASTM A395/A395M - Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures.

O. ASTM A536 - Standard Specification for Ductile Iron Castings.

P. ASTM A582/A582M - Standard Specification for Free-Machining Stainless Steel Bars;.

Q. ASTM B61 - Standard Specification for Steam or Valve Bronze Castings.

R. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings.

S. AWWA C606 - Grooved and Shouldered Joints.

T. MSS SP-45 - Bypass and Drain Connections.

U. MSS SP-67 - Butterfly Valves.

V. MSS SP-68 - High Pressure Butterfly Valves with Offset Design.

W. MSS SP-70 - Cast Iron Gate Valves, Flanged and Threaded Ends.

X. MSS SP-71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends.

Y. MSS SP-72 - Ball Valves with Flanged or Butt-Welding Ends for General Service.

Z. MSS SP-78 - Cast Iron Plug Valves, Flanged and Threaded Ends.

AA. MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves.

BB. MSS SP-85 - Cast Iron Globe & Angle Valves, Flanged and Threaded Ends.

CC. MSS SP-108 - Resilient-Seated Cast Iron Eccentric Plug Valves.

DD. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

EE. MSS SP-125 - Gray Iron and Ductile Iron In-Line, Spring-Loaded, Center-Guided Check Valves.

1.5 SUBMITTALS

A. Product Data: Provide data on valves including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.

B. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

C. Maintenance Materials: Furnish Owner with one wrench for every five plug valves, in each size of square plug valve head.

1.6 QUALITY ASSURANCE

A. Manufacturer:
   1. Obtain valves for each valve type from single manufacturer.
   2. Company must specialize in manufacturing products specified in this section, with not less than three years of documented experience.

B. Welding Materials and Procedures: Conform to ASME BPVC-IX.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:
   1. Minimize exposure of operable surfaces by setting plug and ball valves to open position.
   2. Protect valve parts exposed to piped medium against rust and corrosion.
   3. Protect valve piping connections such as grooves, weld ends, threads, and flange faces.
   4. Adjust globe, gate, and angle valves to the closed position to avoid clattering.
   5. Secure check valves in either the closed position or open position.
   6. Adjust butterfly valves to closed or partially closed position.

B. Use the following precautions during storage:
   1. Maintain valve end protection and protect flanges and specialties from dirt.
      a. Provide temporary inlet and outlet caps.
      b. Maintain caps in place until installation.
   2. Store valves in shipping containers and maintain in place until installation.
      a. Store valves indoors in dry environment.
      b. Store valves off the ground in watertight enclosures when indoor storage is not an option.

C. Exercise the following precautions for handling:
   1. Handle large valves with sling, modified to avoid damage to exposed parts.
   2. Avoid the use of operating handles or stems as rigging or lifting points.

PART 2 PRODUCTS

2.1 GENERAL

A. See Drawings for specific valve locations.

B. Refer to Part 3 for applications.

C. Substitutions of valves with higher CWP classes or SWP ratings for same valve types are permitted when specified CWP ratings or SWP classes are not available.

2.2 GENERAL REQUIREMENTS

A. Valve Pressure and Temperature Ratings: No less than rating indicated; as required for system pressures and temperatures.

B. Valve Sizes: Match upstream piping unless otherwise indicated.

C. Valve Actuator Types:
   1. Gear Actuator: Quarter-turn valves 8 NPS and larger.
   2. Handwheel: Valves other than quarter-turn types.
   3. Hand Lever: Quarter-turn valves 6 NPS and smaller except plug valves.
   4. Wrench: Plug valves with square heads.

5. Chainwheel: Device for attachment to valve handwheel, stem, or other actuator, of size and with chain for mounting height, as indicated in the "Valve Installation" Article.

D. Valves in Insulated Piping: Provide 2 inch stem extensions and the following features:
1. Gate Valves: Rising stem.
2. Ball Valves: Extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
3. Butterfly Valves: Extended neck.
4. Memory Stops: Fully adjustable after insulation is installed.

E. Memory Stops: Fully adjustable after insulation is installed.

F. Valve-End Connections:
1. Threaded End Valves: ASME B1.20.1.
2. Flanges on Iron Valves: ASME B16.1 for flanges on iron valves.
3. Pipe Flanges and Flanged Fittings 1/2 NPS through 24 NPS: ASME B16.5.
4. Solder Joint Connections: ASME B16.18.
5. Grooved End Connections: AWWA C606.

G. General ASME Compliance:
1. Ferrous Valve Dimensions and Design Criteria: ASME B16.10 and ASME B16.34.
2. Power Piping Valves: ASME B31.1.
3. Building Services Piping Valves: ASME B31.9.

H. Bronze Valves:
1. Fabricate from dezincification resistant material.
2. Copper alloys containing more than 15 percent zinc are not permitted.

I. Valve Bypass and Drain Connections: MSS SP-45.

J. Source Limitations: Obtain each valve type from a single manufacturer.

2.3 BRONZE GLOBE VALVES

A. Class 125: CWP Rating: 200 psig:.
1. Comply with MSS SP-80, Type 1.
2. Body: Bronze; ASTM B62, with integral seat and screw in bonnet.
3. Ends: Threaded or solder joint.
4. Stem and Disc: Bronze or PTFE
5. Packing: Asbestos free.
6. Handwheel: Malleable iron or bronze.
7. Manufacturers:
a. Nibco Inc.
b. Grinnell
c. Crane Co.
d. Milwaukee Valve Co.

2.4 IRON GLOBE VALVES

A. Class 125: CWP Rating: 200 psig:, and Class 250: CWP Rating: 500 psig:.
   1. Comply with MSS SP-85, Type I.
   2. Body: Gray iron; ASTM A126, with bolted bonnet.
   3. Ends: Flanged.
   4. Trim: Bronze.
   5. Packing and Gasket: Asbestos free.
   6. Operator: Handwheel or chainwheel.
   7. Manufacturers:
      a. Nibco Inc.
      b. Grinnell
      c. Crane Co.
      d. Milwaukee Valve Co.

2.5 BRASS BALL VALVES

A. Two Piece, Full Port, Ball Valves with Stainless Steel Trim:
   1. Comply with MSS SP-110.
   2. SWP Rating: 150 psig.
   3. CWP Rating: 600 psig.
   4. Body: Forged brass.
   5. Ends: Sweat, Press, Threaded.
   6. Seats: PTFE
   7. Stem: Stainless Steel.
   8. Ball: Chrome-plated brass or Stainless steel, vented
   9. Manufacturers:
      a. Apollo
      b. Nibco
      c. Watts

B. Two Piece, Full Port, Bronze Ball Valves with Stainless-Steel Trim:
   1. Comply with MSS SP-110.
   2. SWP Rating: 150 psig.
   3. CWP Rating: 600 psig.
   4. Body: Bronze.
   5. Ends: Sweat, Press, Threaded.
   6. Seats: PTFE.
   7. Stem: Bronze, brass orstainless steel
   8. Ball: Chrome plated brass or stainless steel, vented

2.6 IRON, SINGLE FLANGE BUTTERFLY VALVES

A. Lug type: Bi-directional dead end service without downstream flange.
   1. Comply with MSS SP-67, Type I.
   2. CWP Rating: 150 psig or 200 psig.
   3. Body Material: ASTM A126 cast iron, ASTM A536 ductile iron.
   4. Stem: One or two-piece stainless steel.
   5. Seat: NBR.

6. Disc: Coated ductile iron.
7. Manufacturers:
   a. Nibco, Inc.
   b. Crane Co.
   c. Grinnell
   d. Hammond Valve
   e. Milwaukee Valve Co.
   f. Bray International

2.7 IRON, GROOVED-END BUTTERFLY VALVES

A. CWP Rating: 175 psig, 300 psig: 8 NPS or smaller, 200 psig: 10 NPS or larger.
   1. Comply with MSS SP-67, Type I.
   2. Body: Coated ductile iron.
   3. Stem: Stainless steel.
   4. Disc: Coated ductile iron.
   5. Disc Seal: EPDM.
   6. Manufacturers:
      a. Nibco, Inc.
      b. Crane Co.
      c. Grinnell
      d. Hammond Valve
      e. Milwaukee Valve Co.
      f. Bray International

2.8 HIGH-PERFORMANCE SINGLE FLANGE BUTTERFLY VALVES

A. Lug type: Bi-directional dead end service without downstream flange.
   1. Comply with MSS SP-68.
   2. Class 150: CWP Rating: 285 psig, Class 300: CWP Rating: 720 psig.
   3. Body: Provide carbon steel, cast iron, ductile Iron, stainless steel.
   4. Seat: Metal or reinforced PTFE.
   5. Offset stem: Stainless steel.
   6. Disc: 316 Stainless Steel
   7. Manufacturers:
      a. Nibco, Inc.
      b. Crane Co.
      c. Grinnell
      d. Hammond Valve
      e. Milwaukee Valve Co.
      f. Bray International

2.9 BRONZE LIFT CHECK VALVES

A. Class 125:
   1. Comply with MSS SP-80, Type 1, Metal Disc to Metal Seat, Type 2, Nonmetallic Disc to Metal Seat.
   2. CWP Rating: 200 psig.
   3. Design: Vertical flow.

4. Body: Bronze.
5. Ends: Threaded.
6. Disc (Type 1): Bronze.
7. Disc (Type 2): NBR or PTFE.
8. Manufacturers:
   a. Crane Co.
   b. Nibco, Inc.
   c. Milwaukee Valve Co.
   d. Mueller Steam Specialty

2.10 BRONZE SWING CHECK VALVES

A. Class 125: CWP Rating: 200 psig, Class 150: CWP Rating: 300 psig.
1. Comply with MSS SP-80, Type 3.
2. Body Design: Horizontal flow.
3. Body Material: Bronze, ASTM B62.
4. Ends: Threaded.
5. Disc: Bronze.
6. Manufacturers:
   a. Crane Co.
   b. Nibco, Inc.
   c. Milwaukee Valve Co.

2.11 IRON SWING CHECK VALVES

A. Class 125: CWP Rating: 200 psig with Metal Seats, Class 125: CWP Rating: 150 psig with Metal Seats, Class 250: CWP Rating: 500 psig with Metal Seats, Class 250: CWP Rating: 300 psig with Metal Seats, Class 125: CWP Rating: 200 psig with Nonmetallic-to-Metal Seats.
1. Comply with MSS SP-71, Type I.
2. Design: Clear or full waterway with flanged ends.
3. Body: Gray iron with bolted bonnet in accordance with ASTM A126.
4. Trim: Bronze.
5. Disc Holder: Bronze.
6. Disc: PTFE or TFE.
7. Gasket: Asbestos free.

B. Manufacturers:
   a. Crane Co.
   b. Nibco, Inc.
   c. Milwaukee Valve Co.

2.12 IRON, CENTER-GUIDED SILENT CHECK VALVES

A. Class 125, Globe:
1. Comply with MSS SP-125.
2. 2-1/2 NPS to 12 NPS, CWP Rating: 200 psig.
3. 14 NPS to 24 NPS, CWP Rating: 150 psig.
4. Body Material: ASTM A126, gray iron.

5. Style: Spring loaded.
6. Ends: Flanged.
7. Metal Seat: Bronze.
8. Resilient Seat: EPDM, NBR
9. Manufacturers:
    a. Nibco, Inc
    b. Mueller Steam Specialty
    c. Watts

B. Class 150, Globe:
1. Comply with MSS SP-125.
2. 2-1/2 NPS to 12 NPS, CWP Rating: 300 psig.
3. 14 NPS to 24 NPS, CWP Rating: 250 psig.
4. Body Material: ASTM A395/A395M or ASTM A536, ductile iron.
5. Style: Spring loaded.
6. Ends: Flanged.
7. Metal Seat: Bronze.
8. Resilient Seat: EPDM, NBR
9. Manufacturers:
    a. Nibco, Inc.
    b. Mueller Steam Specialty
    c. Watts

2.13 BRONZE GATE VALVES

A. Non-Rising Stem (NRS), Rising Stem (RS):
1. Comply with MSS SP-80, Type I.
2. Class125: CWP Rating: 200 psig.
3. Class 150: CWP Rating: 300 psig.
4. Body Material: Bronze with integral seat and union-ring bonnet.
5. Ends: Threaded.
6. Stem: Bronze.
7. Disc: Solid wedge; bronze.
8. Packing: Asbestos free.
9. Handwheel: Malleable iron, bronze, or aluminum.
10. Manufacturers:
    a. Crane Co.
    b. Milwaukee Valve Co.
    c. Watts
    d. Nibco, Inc.

2.14 IRON GATE VALVES

A. NRS, OS & Y
1. Comply with MSS SP-70, Type I.
2. Class 125: 2-1/2 NPS to 12 NPS, CWP Rating: 200 psig.
3. Class 125: 14 NPS to 24 NPS, CWP Rating: 150 psig.
4. Class 250: 2-1/2 NPS to 12 NPS, CWP Rating: 500 psig.
5. Class 250: 14 NPS to 24 NPS, CWP Rating: 300 psig.

6. Body Material: Gray iron with bolted bonnet.
7. Ends: Flanged.
8. Trim: Bronze.
9. Disc: Solid wedge.
10. Packing and Gasket: Asbestos free.
11. Manufacturers:
    a. Crane Co.
    b. Milwaukee Valve Co.
    c. Watts
    d. Nibco, Inc.

2.15 ECCENTRIC PLUG VALVES

A. Resilient Seating with Flanged Ends.
1. Comply with MSS SP-108.
2. CWP Rating: 175 psig minimum.
3. Body and Plug: Gray or ductile iron.
4. Bearings: Oil-impregnated bronze or Stainless Steel.
5. Stem-Seal Packing: Asbestos free.
6. Plug, Resilient-Seating Material: Approved for potable water service.
7. Manufacturers:
    a. Mueller
    b. Stockham
    c. DeZurik

2.16 CHAINWHEELS

A. Description: Valve actuation assembly with sprocket rim, brackets, and chain.
1. Brackets: Type, number, size, and fasteners required to mount actuator on valve.
2. Attachment: For connection to ball, butterfly, plug valve stems.
3. Sprocket Rim with Chain Guides: Ductile iron include zinc coating.
4. Chain: Hot-dip galvanized steel. Sized to fit sprocket rim.
5. Manufacturers:
    a. Babbitt Steam Specialty Co.
    b. Roto Hammer Industries
    c. Trumbull Industries

PART 3 EXECUTION

3.1 EXAMINATION

A. Discard all packing materials and verify that valve interior, including threads and flanges are completely clean without signs of damage or degradation that could result in leakage.

B. Verify valve parts to be fully operational in all positions from closed to fully open.

C. Confirm gasket material to be suitable for the service, to be of correct size, and without defects that could compromise effectiveness.

D. Should valve is determined to be defective, replace with new valve.

3.2 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.3 VALVE APPLICATION

A. Valves on condenser water, chilled water, hot water and glycol services shall be as shown in the following tables. If valve applications are not indicated, use the following:
   1. Shutoff Service: Ball, butterfly, or gate valves.
   2. Butterfly Valve Dead-End Service: Single-flange (lug) type.
   3. Throttling Service except Steam: Globe or butterfly valves.
   4. Pump-Discharge Check Valves:
      a. NPS 2 and Smaller: Spring wafer check valve with bronze disc.
      b. NPS 2-1/2 and Larger: Iron, center-guided, metal -seat check valves.

B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.

C. Select valves with end connections as indicated in the tables. For applications not listed in the tables select valves, except wafer types, with the following end connections:
   1. For Copper Tubing, NPS 2 and Smaller: Threaded ends.
   2. For Steel Piping, NPS 2 and Smaller: Threaded ends.
   3. For Steel Piping, NPS 2-1/2 to NPS 4: Flanged ends.
   4. For Steel Piping, NPS 5 and Larger: Flanged ends.

GLYCOL, CHILLED AND CONDENSER WATER SERVICE
Maximum 150°F and 150 psig (1/2 inch - 12 inches), 125 psig (14 inches - 24 inches)

Specialty	Application	Type	Size (inches)	Body/Seat Body/Trim	Minimum Rating[1,2]
Ball Valve	Isolation (with locking handle) and Modulation	Full Port 3-pc.	1/2 - 2	Bronze/Teflon	400 psig WOG
		Full Port 2 pc.	1/2 - 2	Bronze/Teflon	400 psig WOG
Gate Valve	Not Used				
Globe Valve	ATC Modulation	Control Valve	1/2 - 2	Bronze/Metal	400 psig WOG
			2-1/2 - 6	Bronze/Metal	400 psig WOG
Butterfly Valve	Isolation and Modulation	General Service	2-1/2 - 12	Ductile Iron/EPDM	175 psig CWP 150 psig bi-directional shutoff 150 psig dead end service

		General Service	14 - 24	Ductile Iron/EPDM	150 psig CWP 150 psig bi-directional shutoff 150 psig dead end service
Plug Valve	Manual Balancing	Non-lubricated	3 - 12	Steel/Iron	Class 125
Check Valve	Pumps	Silent	1/2 - 2	Bronze/Bronze	200 psig WOG
		Silent Globe	2-1/2 - 24	Iron/Bronze	Class 125
	Piping	Y-Pattern Swing	1/2 - 2	Bronze/Bronze	200 psig WOG
			2-1/2 - 24	Iron/Bronze	Class 125
Strainer	Control Valves and Flow Meters	Y-Type	1/2 -2	Bronze/Stainless (1/16 inch dia.)	200 psig WOG
			2-1/2 - 4	Iron/Stainless (1/16 inch dia.)	Class 125
			5 - 24	Iron/Stainless (1/8 inch dia.)	Class 125
	Pump Suction	In-Line Y-Type	1/2 - 2	Bronze/Stainless (1/16 inch dia.)	200 psig WOG
			2-1/2 - 4	Iron/Stainless (3/16 inch dia.)[3]	Class 125
			5 - 24	Iron/Stainless (1/4 inch dia.)[3]	Class 125
		Angle Suction Diffuser End Suction Pumps	2 - 12	Iron/Stainless (3/16 inch dia.)[3] Start Up Strainer = 16 Mesh Bronze	Class 125

These are minimum ratings for ASTM A126, Class B and ASTM B-61 and 62. For higher pressures and temperatures, adjust these values to include static head plus 1.1 times pressure relief valve setting plus pump shutoff head pressure. For actual maximum allowable valve and strainer ratings, refer to "Pressure-Temperature Ratings - Non Shock" tables and "Adjusted Pressure Ratings" for copper tube, soldered end valves [and strainers].

SWP=Steam Working Pressure CWP=Cold Water Working Pressure
WSP=Working Steam Pressure WOG=Water, Oil or Gas
Class=ANSI Standard

Use 1/8 inch dia for plate heat exchanger application.

Coordinate connection type with piping system.

GLYCOL, CHILLED AND CONDENSER WATER SERVICE
Maximum 150°F and 275 psig (1/2 inch - 24 inches)

Specialty	Application	Type	Size (inches)	Body/Seat Body/Trim	Minimum Rating[1,2]
Ball Valve	Isolation (with locking handle) and Modulation	Full Port 2 pc.	1/2 - 2	Bronze/Teflon	600 psig WOG
Gate Valve	Not Used				

Globe Valve	ATC Modulation	Control Valve	1/2 - 2	Bronze/Metal	600 psig WOG
			2-1/2 - 6	Bronze/Metal	600 psig WOG
Butterfly Valve	Isolation and Modulation	High Performance	2-1/2 - 24	Carbon Steel/PTFE	285 psig CWP
Plug Valve	Manual Balancing	Non-lubricated	3 - 12	Steel/Iron	Class 300
Check Valve	Pumps	Silent	1 - 2	Bronze/Bronze	Class 300
		Silent Globe	2-1/2 - 24	Iron/Bronze	Class 250
	Piping	Y-Pattern Swing	1/2 - 2	Bronze/Bronze	Class 300
			2-1/2 - 24	Iron/Bronze	Class 250
Strainer	Control Valves and Flow Meters	Y-Type	1/2 - 2	Bronze/Stainless (1/16 inch dia.)	Class 250
			2-1/2 - 4	Iron/Stainless (1/16 inch dia.)	Class 250
			5 - 24	Iron/Stainless (1/8 inch dia.)	Class 250
	Pump Suction	In-Line Y-Type	1/2 - 2	Iron/Stainless (1/16 inch dia.)	Class 250
			2-1/2 - 4	Iron/Stainless (3/16 inch dia.)[3]	Class 250
			5 - 24	Iron/Stainless (1/4 inch dia.)[3]	Class 250
		Angle Suction Diffuser End Suction Pumps	2 - 12	Iron/Stainless (3/16 inch dia.)[3] Start Up Strainer = 16 Mesh Bronze	Class 250

These are minimum ratings. For higher pressures and temperatures, adjust these values to include static head plus 1.1 times pressure relief valve setting plus pump shutoff head pressure. For actual maximum allowable valve and strainer ratings, refer to "Pressure-Temperature Ratings - Non Shock" tables.

SWP=Steam Working Pressure CWP=Cold Water Working Pressure

WSP=Working Steam Pressure WOG=Water, Oil or Gas

Class=ANSI Standard

Use 1/8 inch dia for plate heat exchanger application.

Coordinate connection type with piping system.

GLYCOL, CHILLED AND CONDENSER WATER SERVICE

Maximum 150°F and 500 psig (½" - 24")/300 psig (14"-24")

Specialty	Application	Type	Size (inches)	Body/Seat Body/Trim	Minimum Rating[1,2]
Ball Valve	Isolation (with locking handle) and Modulation	Full Port 2 pc.	1/2 - 2	Bronze/Teflon	600 psig WOG
Gate Valve	Not Used				
Globe Valve	ATC Modulation	Control Valve	1/2 - 2	Bronze/Metal	600 psig WOG

			2-1/2 - 6	Bronze/Metal	600 psig WOG
Butterfly Valve	Isolation and Modulation	High Performance	2-1/2 - 24	Carbon Steel/PTFE	740 psig CWP
Plug Valve	Manual Balancing	Non-lubricated	3 -12	Steel/Iron	Class 300
Check Valve	Pumps	Silent	1 - 2	Bronze/Bronze	Class 300
		Silent Globe	2-1/2 - 24	Iron/Bronze	Class 250
	Piping	Y-Pattern Swing	1/2 - 2	Bronze/Bronze	Class 300
			2-1/2 - 24	Iron/Bronze	Class 250
Strainer	Control Valves and Flow Meters	Y-Type	1/2 - 2	Bronze/Stainless (1/16" dia.)	Class 250
			2-1/2 - 4	Iron/Stainless (1/16" dia.)	Class 250
			5 - 24	Iron/Stainless (1/8" dia.)	Class 250
	Pump Suction	In-Line Y-Type	1/2 - 2	Iron/Stainless (1/16" dia.)	Class 250
			2-1/2 - 4	Iron/Stainless (3/16" dia.)[3]	Class 250
			5 - 24	Iron/Stainless (¼" dia.)[3]	Class 250
		Angle Suction Diffuser End Suction Pumps	2 - 12	Iron/Stainless (3/16" dia.)[3] Start Up Strainer = 16 Mesh Bronze	Class 250

These are minimum ratings. For higher pressures and temperatures, adjust these values to include static head plus 1.1 times pressure relief valve setting plus pump shutoff head pressure. For actual maximum allowable valve and strainer ratings, refer to "Pressure-Temperature Ratings - Non Shock" tables.

SWP=Steam Working Pressure CWP=Cold Water Working Pressure
WSP=Working Steam Pressure WOG=Water, Oil or Gas
Class=ANSI Standard

Use 1/8 inch dia for plate heat exchanger application.

Coordinate connection type with piping system.

GLYCOL AND HOT WATER SERVICE
Maximum 250°F and 175 psig (½"-12")/125 psig (14"-24")

Specialty	Application	Type	Size (inches)	Body/Seat, Body/Trim	Minimum Rating1,2
Ball Valve	Isolation (with locking handle) and Modulation	Full Port 3-pc.	1/2 - 2	Bronze/Teflon	400 psig WOG
		Full Port 2 pc.	1/2 - 2	Bronze/Teflon	400 psig WOG

Gate Valve	Not Used				
Globe Valve	ATC Modulation	Control Valve	1/2 - 2	Bronze/Metal	400 psig WOG
			2-1/2 - 6	Bronze/Metal	400 psig WOG
Butterfly Valve	Isolation and Modulation	General Service	2-1/2 - 12	Ductile Iron/EPDM	200 psig CWP 200 psig bi-directional shutoff 200 psig dead end service
			14 - 24	Ductile Iron/EPDM	150 psig CWP 150 psig bi-directional shutoff 150 psig dead end service
Plug Valve	Manual Balancing	Non-lubricated	3 -12	Steel/Iron	Class 125
Check Valve	Pumps	Silent	1/2 - 2	Bronze/Bronze	200 psig WOG
		Silent Globe	2-1/2 - 24	Iron/Bronze	Class 125
	Piping	Y-Pattern Swing	1/2 - 2	Bronze/Bronze	200 psig WOG
			2-1/2 - 24	Iron/Bronze	Class 125
Strainer	Control Valves and Flow Meters	Y-Type	1/2 - 2	Bronze/Stainless (1/16" dia.)	200 psig WOG
			2-1/2 - 4	Iron/Stainless (1/16" dia.)	Class 125
			5 - 24	Iron/Stainless (1/8" dia.)	Class 125
	Pump Suction	In-Line Y-Type	1/2 - 2	Bronze/Stainless (1/16" dia.)	200 psig WOG
			2-1/2 - 4	Iron/Stainless (3/16" dia.)[3]	Class 125
			5 -24	Iron/Stainless (¼" dia.)[3]	Class 125
		Angle Suction Diffuser End Suction	2 - 12	Iron/Stainless (3/16" dia.)[3] Start Up Strainer = 16	Class 125

		Pumps		Mesh Bronze	

These are minimum ratings for ASTM A126, Class B and ASTM B-61 and 62. For higher pressures and temperatures, adjust these values to include static head plus 1.1 times pressure relief valve setting plus pump shutoff head pressure. For actual maximum allowable valve and strainer ratings, refer to "Pressure-Temperature Ratings - Non Shock" tables and "Adjusted Pressure Ratings" for copper tube, soldered end valves [and strainers].

SWP=Steam Working Pressure CWP=Cold Water Working Pressure
WSP=Working Steam Pressure WOG=Water, Oil or Gas
Class=ANSI Standard

Use 1/8 inch dia for plate heat exchanger application.

Coordinate connection type with piping system.

GLYCOL AND HOT WATER SERVICE
Maximum 225°F and 250 psig (½"-24")

Specialty	Application	Type	Size (inches)	Body/Seat, Body/Trim	Minimum Rating1,2
Ball Valve	Isolation (with locking handle) and Modulation	Full Port 3-pc.	1/2 - 2	Bronze/Teflon	400 psig WOG
		Full Port 2 pc.	1/2 - 2	Bronze/Teflon	400 psig WOG
Gate Valve	Not Used				
Globe Valve	ATC Modulation	Control Valve	1/2 - 2	Bronze/Metal	400 psig WOG
			2-1/2 - 6	Bronze/Metal	600 psig WOG
Butterfly Valve	Isolation and Modulation	High Performance	2-1/2 - 24	Carbon Steel/PTFE	285 psig CWP
Plug Valve	Manual Balancing	Non-lubricated	3 - 12	Steel/Iron	Class 250
Check Valve	Pumps	Silent	1 - 2	Bronze/Bronze	Class 250
		Silent Globe	2-1/2 - 24	Iron/Bronze	Class 250
	Piping	Y-Pattern Swing	1 -2	Bronze/Bronze	Class 250
			2-1/2 - 24	Iron/Bronze	Class 250
Strainer	Control Valves and Flow Meters	Y-Type	1/2 - 2	Bronze/Stainless (20 mesh)	400 psi WOG
			2-1/2 - 4	Iron/Stainless (1/16" dia.)	Class 250
			5 - 24	Iron/Stainless (1/8" dia.)	Class 250
	Pump Suction	In-Line Y-Type	1/2 - 2	Bronze/Stainless (1/16" dia.)	400 psig WOG
			2-1/2 - 4	Iron/Stainless (3/16" dia.)[3]	Class 250
			5 - 24	Iron/Stainless (¼" dia.)[3]	Class 250

		Angle Suction Diffuser End Suction Pumps	2 - 12	Iron/Stainless (3/16" dia.)[3] Start Up Strainer = 16 Mesh Bronze	Class 250

These are minimum ratings for ASTM A126, Class B and ASTM B-61 and 62. For higher pressures and temperatures, adjust these values to include static head plus 1.1 times pressure relief valve setting plus pump shutoff head pressure. For actual maximum allowable valve and strainer ratings, refer to "Pressure-Temperature Ratings - Non Shock" tables and "Adjusted Pressure Ratings" for copper tube, soldered end valves [and strainers].

SWP=Steam Working Pressure CWP=Cold Water Working Pressure
WSP=Working Steam Pressure WOG=Water, Oil or Gas
Class=ANSI Standard

Use 1/8 inch dia for plate heat exchanger application.

Coordinate connection type with piping system.

HOT WATER SERVICE
Maximum 250°F and 400 psig (½"-12")/250 psig (14"-24")

Specialty	Application	Type	Size (inches)	Body/Seat, Body/Trim	Minimum Rating1,2
Ball Valve	Isolation (with locking handle) and Modulation	Full Port 3-pc.	1/2 - 2	Bronze/Teflon	Do not use
		Full Port 2 pc.	1/2 - 2	Bronze/Teflon	600 psig WOG
Gate Valve	Not Used				
Globe Valve	ATC Modulation	Control Valve	1/2 = 2	Bronze/Metal	600 psig WOG
			2-1/2 - 6	Bronze/Metal	600 psig WOG
Butterfly Valve	Isolation and Modulation	High Performance	2-1/2 - 24	Carbon Steel/PTFE	740 psig CWP
Plug Valve	Manual Balancing	Non-lubricated	3 - 12	Steel/Iron	Class 250
Check Valve	Pumps	Silent	1 - 2	Bronze/Bronze	Class 250
		Silent Globe	2-1/2 - 24	Iron/Bronze	Class 250
	Piping	Y-Pattern Swing	1 - 2	Bronze/Bronze	Class 250
			2-1/2 - 24	Iron/Bronze	Class 250
Strainer	Control Valves and Flow Meters	Y-Type	1/2 - 2	Bronze/Stainless (20 mesh)	600 psig WOG
			2-1/2 - 4	Iron/Stainless (1/16" dia.)	Class 250
			5 - 24	Iron/Stainless (1/8" dia.)	Class 250
	Pump Suction	In-Line Y-Type	1/2 - 2	Bronze/Stainless (1/16" dia.)	600 psig WOG

			2-1/2 - 4	Iron/Stainless (3/16" dia.)[3]	Class 250
			5 - 24	Iron/Stainless (¼" dia.)[3]	Class 250
		Angle Suction Diffuser End Suction Pumps	2 -12	Iron/Stainless (3/16" dia.)[3] Start Up Strainer = 16 Mesh Bronze	Class 250
These are minimum ratings for ASTM A126, Class B and ASTM B-61 and 62. For higher pressures and temperatures, adjust these values to include static head plus 1.1 times pressure relief valve setting plus pump shutoff head pressure. For actual maximum allowable valve and strainer ratings, refer to "Pressure-Temperature Ratings - Non Shock" tables and "Adjusted Pressure Ratings" for copper tube, soldered end valves [and strainers]. SWP=Steam Working Pressure CWP=Cold Water Working Pressure WSP=Working Steam Pressure WOG=Water, Oil or Gas Class=ANSI Standard Use 1/8 inch dia for plate heat exchanger application. Coordinate connection type with piping system.					

3.4 INSTALLATION

A. Provide unions or flanges with valves to facilitate equipment removal and maintenance while maintaining system operation and full accessibility for servicing.

B. Provide separate valve support as required and locate valve with stem at or above center of piping, maintaining unimpeded stem movement.

C. Where valve support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.

D. Install check valves where necessary to maintain direction of flow as follows:
   1. Lift Check: Install with stem plumb and vertical.
   2. Swing Check: Install horizontal maintaining hinge pin level.
   3. Orient plate-type, center-guided into horizontal or vertical position, between flanges.

E. Provide chainwheels on operators for valves 4 NPS and larger where located 96 NPS or more above finished floor, terminating 60 NPS above finished floor.

END OF SECTION

SECTION 23 0529 - HANGERS AND SUPPORTS FOR HVAC PIPING, DUCTWORK AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pipe hangers and supports.

B. Duct hangers and supports

C. Hanger rods.

D. Inserts.

E. Flashing.

F. Formed steel channel.

G. Equipment bases and supports.

1.2 RELATED REQUIREMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.3 REFERENCES

A. American Society of Mechanical Engineers:
   1. ASME B31.1 - Power Piping.
   2. ASME B31.5 - Refrigeration Piping.
   3. ASME B31.9 - Building Services Piping.

B. ASTM International:
   1. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
   2. ASTM E814 - Standard Test Method for Fire Tests of Through Penetration Fire Stops.
   3. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers.
   4. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems.

C. American Welding Society:
   1. AWS D1.1 - Structural Welding Code - Steel.

D. FM Global:
   1. FM - Approval Guide, A Guide to Equipment, Materials & Services Approved By Factory Mutual Research For Property Conservation.

E. Manufacturers Standardization Society of the Valve and Fittings Industry:
1. MSS SP 58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
2. MSS SP 69 - Pipe Hangers and Supports - Selection and Application.
3. MSS SP 89 - Pipe Hangers and Supports - Fabrication and Installation Practices.

F. Intertek Testing Services (Warnock Hersey Listed):
1. WH - Certification Listings.

1.4 PERFORMANCE REQUIREMENTS

A. Contractor shall design supports for multiple pipes and/or ducts, including pipe and duct stands, capable of supporting combined weight of supported systems, system contents, and fluid.

B. Contractor shall design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.5 SUBMITTALS

A. Shop Drawings: Indicate system layout with location including critical dimensions, sizes, and pipe hanger and support locations and detail of trapeze hangers.

B. Product Data:
1. Hangers and Supports: Submit manufacturers catalog data including load capacity.

C. Design Data: Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers. Indicate calculations used to determine load carrying capacity of trapeze, multiple pipe, and riser support hangers.

D. Welding certificates.

E. Manufacturer's Installation Instructions:
1. Hangers and Supports: Submit special procedures and assembly of components.

1.6 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel." and AWS D1.3, "Structural Welding Code--Sheet Steel."

B. Welding: Qualify procedures and personnel according to the following:
1. AWS D1.1, "Structural Welding Code--Steel."
2. AWS D1.2, "Structural Welding Code--Aluminum."
3. AWS D1.3, "Structural Welding Code--Sheet Steel."

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing Work of this section with minimum 3 years documented experience.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

B. Protect from weather and construction traffic, dirt, water, chemical, and damage, by storing in original packaging.

1.9 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.10 WARRANTY

A. Furnish five year manufacturer warranty for pipe hangers and supports.

PART 2 PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

A. Description: MSS SP-58, Types 1 through 58, factory-fabricated components. Refer to Part 3 "Hanger and Support Applications" Article for where to use specific hanger and support types.

B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. B-Line Systems, Inc.
2. National Pipe Hanger Corporation
3. Empire Industries, Inc.
4. Globe Pipe Hanger Products Inc.
5. Michigan Hanger Co.
6. PHD Manufacturing, Inc.
7.

C. Galvanized, Metallic Coatings: Pre-galvanized or hot dipped.

D. Nonmetallic Coatings: Plastic coating, jacket, or liner.

E. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion for support of bearing surface of piping.

2.2 DUCT HANGERS AND SUPPORTS

A. Shall be in accordance with SMACNA's 2005 "HVAC Duct Construction Standards - Metal and Flexible" except non-engineered wire hangers are not permitted. Engineered cable support systems may be used if they meet SMACNA, Ductmate or approved equal.

B. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.

C. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.

D. Strap and Rod Sizes: Comply with SMACNA's 2005 "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1 (Table 5-1M), "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct.

E. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.

F. Steel Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A 492.

G. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.

H. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

I. Trapeze and Riser Supports:
   1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
   2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
   3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate

2.3 ACCESSORIES

A. Hanger Rods: Mild steel threaded both ends, threaded on one end, or continuous threaded.

2.4 THERMAL SHIELD INSERTS

A. Description: 100-psig- minimum, compressive-strength insulation insert encased in sheet metal shield. Insert shall be capable of supporting weight of pipe, insulations and fluid without crushing.

B. Manufacturers:
   1. Carpenter & Paterson, Inc.
   2. ERICO/Michigan Hanger Co.
   3. PHS Industries, Inc.
   4. Pipe Shields, Inc.

5. Rilco Manufacturing Company, Inc.
6. Value Engineered Products, Inc.

C. Insulation-Insert Material for Cold Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate or ASTM C 552, Type II cellular glass with vapor barrier.

D. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate or ASTM C 552, Type II cellular glass.

E. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

F. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

G. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.5 FASTENER SYSTEMS

A. Mechanical-Expansion Anchors: Insert-wedge-type zinc-coated or stainless steel, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

B. Manufacturers:
1. B-Line Systems, Inc.; a division of Cooper Industries.
2. Empire Industries, Inc.
3. Hilti, Inc.
4. ITW Ramset/Red Head.
5. MKT Fastening, LLC.
6. Powers Fasteners.

2.6 MISCELLANEOUS MATERIALS

A. Hanger Rods: Mild steel threaded both ends, threaded on one end, or continuous threaded.

B. Pipe Stands, General: Shop or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.

C. Equipment Supports: Welded, shop- or field-fabricated equipment support made from structural-steel shapes.

D. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

E. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

2.7 FORMED STEEL CHANNEL

A. Manufacturers:
1. Allied Tube & Conduit Corp.
2. B-Line Systems
3. Midland Ross Corporation, Electrical Products Division
4. Unistrut Corp.

B. Product Description: Galvanized 12 gage thick steel. With holes 1-1/2 inches on center.

PART 3 EXECUTION

3.1 PIPE HANGER AND SUPPORT APPLICATIONS

A. Specific hanger and support requirements are specified in other Division 23 Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized, metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use padded hangers for piping that is subject to scratching.

F. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system specific sections, install the following types:
1. MSS Type 1 - Adjustable, Steel Clevis Hangers: For suspension of non-insulated or insulated stationary pipes, 2 inch to 30 inch size.
2. MSS Type 2 - Yoke-Type Pipe Clamps: For suspension of 120 to 450 deg F pipes, 4 inch to 16 inch size, requiring up to 4 inches of insulation.
3. MSS Type 3 - Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps: For suspension of pipes, 3/4 inch to 24 inch size, requiring clamp flexibility and up to 4 inches of insulation.
4. MSS Type 4 - Steel Pipe Clamps: For suspension of cold and hot pipes, 1/2 inch to 24 inch size, if little or no insulation is required.
5. MSS Type 5 - Pipe Hangers: For suspension of pipes, 1/2 inch to 4 inch size, to allow off-center closure for hanger installation before pipe erection.
6. MSS Type 12 - Extension Hinged or 2-Bolt Split Pipe Clamps: For suspension of non-insulated stationary pipes, 3/8 inch to 3 inch size.
7. MSS Type 24 - U-Bolts: For support of heavy pipes, 1/2 inch to 30 inch.
8. MSS Type 26 - Clips: For support of insulated pipes not subject to expansion or contraction.

9. MSS Type 36 - Pipe Saddle Supports: For support of pipes, 4 inch to 36 inch size, with steel pipe base stanchion support and cast-iron floor flange.
10. MSS Type 37 - Pipe Stanchion Saddles: For support of pipes, 4 inch to 36 inch size, with steel pipe base stanchion support and cast-iron floor flange and with U-bolt to retain pipe.
11. MSS Type 38 - Adjustable, Pipe Saddle Supports: For stanchion-type support for pipes, 2-1/2 inch to 36 inch size, if vertical adjustment is required, with steel pipe base stanchion support and cast-iron floor flange.
12. MSS Type 41 - Single Pipe Rolls: For suspension of pipes, 1 inch to 30 inch size, from 2 rods if longitudinal movement caused by expansion and contraction might occur.
13. MSS Type 43 - Adjustable Roller Hangers: For suspension of pipes, 2-1/2 inch to 20 inch size, from single rod if horizontal movement caused by expansion and contraction might occur.
14. MSS Type 44 - Complete Pipe Rolls: For support of pipes, 2 inch to 42 inch size, if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.
15. MSS Type 45 - Pipe Roll and Plate Units: For support of pipes, 2 inch to 24 inch, if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is not necessary.
16. MSS Type 46 - Adjustable Pipe Roll and Base Units: For support of pipes, 2 inch to 30 inch size, if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.

G. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. MSS Type 8 - Extension Pipe or Riser Clamps: For support of pipe risers, ¾ inch to 20 inch size.
2. MSS Type 42 - Carbon- or Alloy-Steel Riser Clamps: For support of pipe risers, 3/4 inch to 20 inch size, if longer ends are required for riser clamps.

H. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. MSS Type 13 - Steel Turnbuckles: For adjustment up to 6 inches for heavy loads.
2. MSS Type 14 - Steel Clevises: For 120 to 450 deg F piping installations.
3. MSS Type 15 - Swivel Turnbuckles: For use with MSS Type 11, split pipe rings.
4. MSS Type 16 - Malleable-Iron Sockets: For attaching hanger rods to various types of building attachments.
5. MSS Type 17 - Steel Weldless Eye Nuts: For 120 to 450 deg F piping installations.

I. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
   1. MSS Type 18 - Steel or Malleable Concrete Inserts: For upper attachment to suspend pipe hangers from concrete ceiling.
   2. MSS Type 19 - Top-Beam C-Clamps: For use under roof installations with bar-joist construction to attach to top flange of structural shape.
   3. MSS Type 20 - Side-Beam or Channel Clamps: For attaching to bottom flange of beams, channels, or angles.
   4. MSS Type 21 - Center-Beam Clamps: For attaching to center of bottom flange of beams.
   5. MSS Type 22 - Welded Beam Attachments: For attaching to bottom of beams if loads are considerable and rod sizes are large.
   6. MSS Type 23 - C-Clamps: For structural shapes.
   7. MSS Type 25 - Top-Beam Clamps: For top of beams if hanger rod is required tangent to flange edge.
   8. MSS Type 27 - Side-Beam Clamps: For bottom of steel I-beams.
   9. MSS Type 28 - Steel-Beam Clamps with Eye Nuts: For attaching to bottom of steel I-beams for heavy loads.
   10. MSS Type 29 - Linked-Steel Clamps with Eye Nuts: For attaching to bottom of steel I-beams for heavy loads, with link extensions.
   11. MSS Type 30 - Malleable Beam Clamps with Extension Pieces: For attaching to structural steel.
   12. Welded-Steel Brackets: For support of pipes from below, or for suspending from above by using clip and rod. Use one of the following for indicated loads:
      a. Light (MSS Type 31): 750 lb.
      b. Medium (MSS Type 32): 1500 lb.
      c. Heavy (MSS Type 33): 3000 lb.
   13. MSS Type 34 - Side-Beam Brackets: For sides of steel or wooden beams.
   14. MSS Type 57 - Plate Lugs: For attaching to steel beams if flexibility at beam is required.
   15. MSS Type 58 - Horizontal Travelers: For supporting piping systems subject to linear horizontal movement where headroom is limited.

J. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
   1. MSS Type 39 - Steel Pipe-Covering Protection Saddles: To fill interior voids with insulation that matches adjoining insulation.
   2. MSS Type 40 - Protection Shields: Of length recommended in writing by manufacturer to prevent crushing insulation.
   3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

K. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
   1. MSS Type 47 - Restraint-Control Devices: Where indicated to control piping movement.
   2. MSS Type 48 - Spring Cushions: For light loads if vertical movement does not exceed 1-1/4 inches.

3. MSS Type 49 - Spring-Cushion Roll Hangers: For equipping Type 41 roll hanger with springs.
4. MSS Type 50 - Spring Sway Braces: To retard sway, shock, vibration, or thermal expansion in piping systems.
5. MSS Type 51 - Variable-Spring Hangers: Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from hanger.
6. MSS Type 52 - Variable-Spring Base Supports: Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from base support.
7. MSS Type 53 - Variable-Spring Trapeze Hangers: Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from trapeze support.
8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:
   a. Horizontal (MSS Type 54): Mounted horizontally.
   b. Vertical (MSS Type 55): Mounted vertically.
   c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.

L. Comply with MSS SP-69 for trapeze pipe hanger selections and applications that are not specified in piping system Sections.

M. Comply with MFMA-102 for metal framing system selections and applications that are not specified in piping system Sections.

3.2 PIPE HANGER AND SUPPORT INSTALLATION

A. Steel Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

B. Trapeze Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping and support together on field-fabricated trapeze pipe hangers.
1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D1.1.

C. Metal Framing System for Multiple Hangers: Arrange for grouping of parallel runs of piping and support together on field-assembled metal framing systems.

D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

E. Fastener System Installation:
   1. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

F. Pipe Stand Installation:
   1. Pipe Stand Types except Curb-Mounting Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
   2. Curb-Mounting-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. Refer to Division 07 Section "Roof Accessories" for curbs.
   3. Floor Support: concrete pier or steel support.

G. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

H. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

I. Install lateral bracing with pipe hangers and supports to prevent swaying.

J. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

K. Load Distribution: Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

L. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.1 (for power piping) and ASME B31.9 (for building services piping) are not exceeded.

M. Insulated Piping: Comply with the following:
   1. Attach clamps and spacers to piping.
      a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
      b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
      c. Do not exceed pipe stress limits according to ASME B31.1 for power piping and ASME B31.9 for building services piping.
   2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
4. Shield Dimensions for Pipe: Not less than the following:
   a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
   b. NPS 4: 12 inches long and 0.06 inch thick.
   c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
   d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
   e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.
5. Pipes NPS 8 and Larger: Include wood inserts.
6. Insert Material: Length at least as long as protective shield.
7. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

N. Design hangers for pipe movement without disengagement of supported pipe.

O. Provide clearance in hangers and from structure and other equipment for installation of insulation. Refer to Section 23 07 00 Provide supplemental angles, channels and formed steel supports to support piping, ductwork, equipment, etc. from building's structure. Piping, ductwork, equipment, etc. shall not be supported from the roof deck.

3.3 DUCT HANGER AND SUPPORT INSTALLATION

A. Comply with SMACNA's 2005 "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."

B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
1. Where practical, install concrete inserts before placing concrete.
2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
5. Do not use powder-actuated concrete fasteners for seismic restraints.

C. Hanger Spacing: Comply with SMACNA's 2005 "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1 (Table 5-1M), "Rectangular Duct Hangers Minimum Size," and Table 5- 2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.

D. Hangers Exposed to View: Threaded rod and angle or channel supports.

3.4 EQUIPMENT BASES AND SUPPORTS

A. Provide housekeeping pads of concrete, minimum 3-1/2 inches thick and extending 6 inches beyond supported equipment. Refer to Section 03 30 00.

B. Using templates furnished with equipment, install anchor bolts, and accessories for mounting and anchoring equipment.

C. Construct supports to suspend equipment from structure overhead or to support equipment above floor. Fabricate supports from welded-structural steel shapes. Brace and fasten with flanges bolted to structure.

D. Provide rigid anchors for pipes after vibration isolation components are installed. Refer to Section 23 05 48.

3.5 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.
   4. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

3.6 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.7 SCHEDULES

A. Copper and Steel Pipe Hanger Spacing:

PIPE SIZE Inches	COPPER TUBING MAXIMUM HANGER SPACING Feet	STEEL PIPE MAXIMUM HANGER SPACING Feet	COPPER TUBING HANGER ROD DIAMETER Inches	STEEL PIPE HANGER ROD DIAMETER Inches
1/2	5	7	3/8	3/8
3/4	5	7	3/8	3/8
1	6	7	3/8	3/8
1-1/4	7	7	3/8	3/8
1-1/2	8	9	3/8	3/8
2	8	10	3/8	3/8
2-1/2 (Note 2)	9	11	1/2	1/2
3	10	12	1/2	1/2
4	12	14	1/2	5/8
5	13	16	1/2	5/8
6	14	17	5/8	3/4
8	16	19	3/4	3/4

B. Plastic and Ductile Iron Pipe Hanger Spacing:

PIPE MATERIAL	MAXIMUM HANGER SPACING Feet	HANGER ROD DIAMETER Inches
ABS (All sizes)	4	3/8
FRP (All Sizes)	4	3/8
Ductile Iron (Note 2)		
PVC (All Sizes)	4	3/8

C. Note 1: Refer to manufacturer's recommendations for grooved end piping systems.

D. Note 2: 20 feet maximum spacing, minimum of one hanger for each pipe section close to joint behind bell. Provide hanger at each change of direction and each branch connection. For pipe sizes 6 inches and smaller, subjected to loadings other than weight of pipe and contents, limit span to maximum spacing for water service steel pipe.

END OF SECTION

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SECTION 23 0548 - VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Equipment support bases.

B. Vibration isolators, non-seismic type

C. Vibration isolators, seismic type

D. Seismic snubber assemblies.

E. Seismic restraints for suspended components and equipment

F. Roof curbs.

1.2 RELATED REQUIREMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

B. Division 03 - Concrete.

C. Section 23 0400 – General Conditions for Mechanical Trades.

D. Section 23 05 16 – Expansion Fittings and Loops for HVAC Pipe

1.3 REFERENCE STANDARDS (follow the most currently adopted amended version)

A. Air Movement and Control Association International, Inc.:
   1. AMCA 300 - Reverberant Room Method for Sound Testing of Fans.

B. American National Standards Institute:
   1. ANSI S1.4 - Sound Level Meters.
   2. ANSI S1.8 - Reference Quantities for Acoustical Levels.
   3. ANSI S1.13 - Methods for the Measurement of Sound Pressure Levels in Air.
   4. ANSI S12.36 - Survey Methods for the Determination of Sound Power Levels of Noise Sources.

C. Air-Conditioning and Refrigeration Institute:
   1. ARI 575 - Method of Measuring Machinery Sound within Equipment Space.

D. American Society of Heating, Refrigerating and Air Conditioning:
   1. ASHRAE 68 - Laboratory Method of Testing In-Duct Sound Power Measurement Procedure for Fans.

2. ASHRAE Handbook - HVAC Applications.

E. ASTM International:
1. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
2. ASTM E477 - Standard Test Method for Measuring Acoustical and Airflow Performance of Duct Liner Materials and Prefabricated Silencers.
3. ASTM E596 - Standard Test Method for Laboratory Measurement of the Noise Reduction of Sound-Isolating Enclosures.

F. Sheet Metal and Air Conditioning Contractors' National Association:
1. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.
2. SMACNA - Seismic Restraint Manual Guidelines for Mechanical Systems
3.

G. American Society of Civil Engineers
1. ASCE - Minimum Design Loads for Buildings and Other Structures.

H. FEMA
1. FEMA 412 - Installing Seismic Restraints for Mechanical Equipment.
2. FEMA 413 - Installing Seismic Restraints for Electrical Equipment.
3. FEMA 414 - Installing Seismic Restraints for Duct and Pipe.
4. FEMA E-74 - Reducing the Risks of Nonstructural Earthquake Damage.

I. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; International Accreditation Service, Inc.

1.4 INTENT

A. All mechanical equipment, piping and ductwork as noted on the equipment schedule or in the specification shall be mounted on or suspended from vibration isolators to prevent the transmission of vibration and mechanically transmitted sound to the building structure. Vibration isolators shall be selected in accordance with the weight distribution so as to produce reasonably uniform deflections.

B. All isolators and isolation materials shall be of the same manufacturer and shall be certified by the manufacturer.

C. It is the intent of the seismic portion of this specification to keep all mechanical and electrical building system components in place during a seismic event.

D. All such systems must be installed in strict accordance with seismic codes, component manufacturer's recommendations and building construction standards. Whenever a conflict occurs between the manufacturer's recommendations or construction standards, the most stringent shall apply.

E. This specification is considered to be minimum requirements for seismic consideration and is not intended as a substitute for legislated, more stringent, national, state or local

construction requirements (i.e. California Title 24, California OSHPD, Canadian Building Codes, or other requirements).

F. Any variance or non-compliance with these specification requirements shall be corrected by the contractor in an approved manner.

1.5 SUBMITTALS

A. Product Data: Submit schedule of vibration isolator type with location and load on each. Submit catalog information indicating, materials, dimensional data, pressure losses, and acoustical performance for standard sound attenuation products.Shop Drawings:
   1. Provide schedule of vibration isolator type with location and load on each.
   2. Fully dimensioned fabrication drawings and installation details for vibration isolation bases, member sizes, attachments to isolators, and supported equipment.
   3. Include auxiliary motor slide bases and rails, base weights, inertia bases, concrete weights, equipment static loads, support points, vibration isolators, and detailed layout of isolator location and orientation with static and dynamic load on each isolator.
   4. Include selections from prescriptive design tables that indicate compliance with the applicable building code and the vibration isolator manufacturer's requirements.
   5. Clearly indicate the load and capacity assumptions selected. Include copies of any calculations.

B. Seismic Certification and Analysis:
   1. Include the calculations that indicate compliance with the applicable building code for seismic controls and the vibration isolator manufacturer's requirements.
   2. Include the seal of the Professional Structural Engineer registered where the Project is located, on the drawings and calculations which at a minimum include the following:
      a. Seismic Restraint Details: Detailed drawings of seismic restraints and snubbers including anchorage details that indicate quantity, diameter, and depth of penetration, edge distance, and spacing of anchors.
      b. Equipment Seismic Qualification Certification: Certification by the manufacturer or responsible party that each piece of equipment provided will withstand seismic force levels as specified in the applicable building code for seismic controls.
         1) Basis for Certification: Indicate whether the withstand certification is based on actual testing of assembled components, on calculations, or on historic data.
         2) Indicate equipment to be sufficiently durable to resist design forces and or remain functional after the seismic event.
      c. Dimensioned outline drawings of equipment identifying center of gravity, locations, and provisions for mounting and anchorage.
      d. Detailed description of the equipment anchorage devices on which the certifications are based.
      e. Statement of Special Inspections: Prepared by the registered design professional in responsible charge.

C. Delegated-Design Submittal:
   1. For each vibration isolation device.
      a. Include design calculations and details for selecting vibration isolators, vibration isolation bases, and appropriate attachment methods for all equipment.
      b. Design Calculations: Calculate static and dynamic loading due to equipment weight and required to select vibration isolators and for designing vibration isolation bases.
         1) Coordinate design calculations with wind load calculations required for equipment mounted outdoors. Comply with requirements in other Sections for equipment mounted outdoors.
      c. Riser Supports: Include riser diagrams and calculations showing anticipated expansion and contraction at each support point, initial and final loads on building structure and spring deflection changes. Include certification that riser system was examined for excessive stress and that none exists.
   2. Mechanical equipment, appliances, ductwork, and supports that are exposed to wind shall be designed to resist the wind pressures determined in accordance with the International Building Code.
      a. Design Calculations: Calculate loading due to wind pressure and required to select vibration isolators and for designing vibration isolation bases.
      b. Include the seal of the Professional Structural Engineer registered where the Project is located, on the drawings and calculations.

D. Manufacturer's Instructions: Indicate installation instructions with special procedures and setting dimensions.

1.6 QUALITY ASSURANCE

A. Perform design and installation in accordance with applicable codes.

B. Designer Qualifications: Perform design under direct supervision of a Professional Engineer experienced in design of this type of work and registered and licensed in the State in which the Project is located.

C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
   1. Member of Vibration Isolation and Seismic Control Manufacturers Association (VISCMA).

D. Installer Qualifications: Company specializing in performing the work of this section with minimum 3 years of experience.

E. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

F. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.7 SEISMIC FORCE LEVELS

A. Installations shall be designed to safely accept external forces determined in accordance with the International Building Code –2015, Section 1613 and ASCE 7 in any direction for all rigidly supported equipment without failure and permanent displacement of the equipment. Seismic restraints shall not short circuit vibration isolation systems or transmit objectionable vibration or noise.

B. Seismic restraints for all systems shall be installed in accordance with:

C.

1.	Code	IBC-2015
2.	Use group	Refer to Architectural Drawings
3.	Seismic design category	Refer to Architectural Drawings
4.	Site Classification	Refer to Architectural Drawings
5.	Building I_p (Importance Factor)	Importance Factor = 1.0
6.	All Life safety systems	Importance Factor = 1.5
7.	Emergency Electrical	Importance Factor = 1.5
8.	HVAC	
	a. Heat recovery piping system	Importance Factor = 1.0
9.	Other systems	
	a. All other ductwork systems	Importance Factor = 1.5
	b. Critical Control conduits	Importance Factor = 1.5

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Mason Industries.

B. Kinetics Noise Control, Inc.

C. Vibration Eliminator Company, Inc.

2.2 VIBRATION ISOLATORS, NON-SEISMIC TYPE

A. Elastomeric Pads:
1. Material: Oil, ozone, and oxidant resistant rubber, neoprene or other elastomeric compounds.
2. Thickness: 0.25 inch minimum.
3. Assembly: Single or multiple layers using bonded, galvanized sheet metal separation plate between each layer with load plate providing evenly distributed load over pad surface.
4. Surface Pattern: Smooth, ribbed or waffle pattern.

B. Elastomeric Mounts:
1. Material: Oil, ozone, and oxidant resistant rubber, neoprene or other elastomeric compounds.

2. Assembly: Encapsulated load transfer plate bolted to equipment and base plate with anchor hole bolted to supporting structure.

C. Open Steel Springs:
1. Assembly: Freestanding, laterally stable without housing.
2. Outside spring
3. Leveling Device: Rigidly connected to equipment or frame.

D. Restrained Steel Springs:
1. Housing: Rigid blocking during rigging prevents equipment installed and operating height from changing during temporary weight reduction.
2. Equipment Wind Loading: Adequate means for fastening isolator top to equipment and isolator base plate to supporting structure.

E. Elastomeric Hangers:
1. Housing: Steel construction containing elastomeric isolation element to prevent rod contact with housing and short-circuiting of isolating function.
2. Incorporate steel load distribution plate sandwiching elastomeric element to housing.

F. Spring Hanger:
1. Description: Steel construction containing stable steel spring and integral elastomeric element preventing metal to metal contact. Mountings shall have leveling bolts that shall be rigidly bolted to the equipment. Spring diameters shall be no less than 0.8 of the compressed height of the spring at rated load.
2. Housing: Steel construction containing stable steel spring and integral elastomeric element preventing metal to metal contact.
3. Bottom Opening: Sized to allow plus/minus 15 degrees rod misalignment.

G. Combination Elastomeric-Spring Hanger:
1. Housing: Steel construction containing stable steel spring with elastomeric element in series isolating upper connection of hanger box to building structure.
2. Bottom Opening: Sized to allow plus/minus 15 degrees rod misalignment.

H. Thrust Restraints:
1. Housing: Steel construction containing stable steel spring and integral elastomeric element installed in pairs to resist air pressure thrusts.
2. Bottom Openings: Sized to allow plus/minus 15 degrees rod misalignment.

2.3 VIBRATION ISOLATORS, SEISMIC TYPE

A. Coil Springs Consisting of Single Elements:
1. Housing Manufactured from cast iron material.
2. Ductile Material: Designed and rated for seismic applications.
3. Spring: Restrained by housing without significant degradation of vibration isolation capabilities during normal equipment operating conditions.
4. Resilient Snubbing Grommet System: Incorporated and designed with clearances of no more than 0.25 inch in any direction preventing direct metal-to-metal contact between supported member and fixed restraint housing.

5. Resilient Pad: Located in series with spring.
6. Coil Springs: Color coded elements to have a lateral stiffness greater than 0.8 times the rated vertical stiffness with 50 percent overload capacity.
7. Finish: Suitable for the application.

B. All Directional Elastomeric:
1. Material: Molded from oil, ozone, and oxidant resistant compounds.
2. Operating Parameters: Designed to operate within the isolator strain limits providing maximum performance and service life.
3. Attachment Method: Encapsulated load transfer plate bolted to equipment and base plate with anchor hole bolted to supporting structure.
4. Rating: Cast iron and aluminum housings rated for seismic restraint applications.
5. Minimum Operating Static Deflections: Deflections indicated in project documents are not to exceed published load capacities.

2.4 SEISMIC SNUBBER ASSEMBLIES

A. Comply with:
1. ASHRAE (HVAC) Handbook - HVAC Applications.
2. FEMA 412.
3. FEMA 413.
4. FEMA 414.
5. FEMA E-74.
6. SMACNA (SRM).

B. All Directional External:
1. Application: Minimum three (3) snubbers are required for each equipment installation, oriented properly to restrain isolated equipment in all directions.
2. Construction: Interlocking steel construction attached to the building structure and equipment in a manner consistent with anticipated design loads.
3. Performance: Equipment movement at each snubber location limited to a maximum of 0.25 inches in any direction without significantly degrading the vibration isolation capability of the isolator during normal operating conditions.
4. Resilient Pad: Minimum 0.25 inch thick cushions any impact and prevents metal-to-metal contact.

C. Lateral External:
1. Application: Minimum three (3) snubbers are required for each stable equipment installation, oriented properly to restrain isolated equipment in all lateral directions where uplift forces are zero or addressed by other restraints.
2. Construction: Steel construction attached to the building structure and equipment in a manner consistent with anticipated design loads.
3. Performance: Equipment movement at each snubber location limited to a maximum of 0.25 inches in any direction without significantly degrading the vibration isolation capability of the isolator during normal operating conditions.
4. Resilient Pad: Minimum 0.25 inch thick cushions any impact and prevents metal-to-metal contact.

D. Omni Directional External:
   1. Application: Minimum four (4) snubbers are required for each stable equipment installation, oriented properly to restrain isolated equipment in all lateral directions.
   2. Construction: Steel construction attached to the building structure and equipment in a manner consistent with anticipated design loads.
   3. Performance: Equipment movement at each snubber location limited to a maximum of 0.25 inches in any direction without significantly degrading the vibration isolation capability of the isolator during normal operating conditions.
   4. Resilient Pad: Minimum 0.25 inch thick cushions any impact and prevents metal-to-metal contact.

E. Horizontal Single Axis External:
   1. Application: Minimum four (4) snubbers are required for each stable equipment installation, oriented properly to restrain isolated equipment in all lateral directions where uplift forces are zero or addressed by other restraints.
   2. Construction: Steel construction attached to the building structure and equipment in a manner consistent with anticipated design loads.
   3. Performance: Equipment movement at each snubber location limited to a maximum of 0.25 inches in any direction without significantly degrading the vibration isolation capability of the isolator during normal operating conditions.
   4. Resilient Pad: Minimum 0.25 inch thick cushions any impact and prevents metal-to-metal contact.

2.5 SEISMIC RESTRAINTS FOR SUSPENDED COMPONENTS AND EQUIPMENT

A. Comply with:
   1. ASHRAE (HVACA) Handbook - HVAC Applications.
   2. FEMA 412.
   3. FEMA 413.
   4. FEMA 414.
   5. FEMA E-74.
   6. SMACNA (SRM).

B. Cable Restraints:
   1. Wire Rope: Steel wire strand cables sized to resist seismic loads in all lateral directions.
   2. Protective Thimbles: Eliminates potential for dynamic cable wear and strand breakage.
   3. Size: Based on the lesser of cable capacity or anchor load taking into account bracket geometry.
   4. Connections:
      a. Use overlapping wire rope U clips, cable clamping bolts, swaged sleeves or seismically rated tool-less wedge insert lock connectors.
      b. Internally brace clevis hanger bracket cross bolt to prevent deformation.
   5. Vertical Suspension Rods: Attach required bracing of sufficient strength to prevent rod buckling from vertical compression forces utilizing series of attachment clips.

C. Rigid Restraints:
1. Structural Element: Sized to resist seismic loads in all lateral directions and carry both compressive and tensile loading.
2. Size: Based on the lesser of cable capacity or anchor load taking into account bracket geometry.
3. Connections: Internally brace clevis hanger bracket cross bolt to prevent deformation.
4. Static Support System: Anchorage capable of carrying additional tension loads generated by the vertical component of the rigid brace compression which is additive to any static load requirements on the system.
5. Vertical Suspension Rods: Attached required bracing of sufficient strength to prevent rod buckling from vertical compression forces utilizing series of attachment clips.

2.6 EQUIPMENT SUPPORT BASES

A. Spring Isolated Steel Rails:
1. Construction: Engineered, structural steel frames with welded brackets for side mounting of the isolators. Roof Rails shall be flashed and waterproofed into the roof's membrane waterproofing system.
2. Frames: Square, rectangular or T-shaped.
3. Design: Sufficiently rigid to prevent misalignment or undue stress on machine, and to transmit design loads to isolators and snubbers.
4. Applications: Adjustable motor slide rails for centrifugal fans.

B. Concrete Inertia Bases:
1. Construction: Engineered, steel forms, with integrated isolator brackets and anchor bolts, welded or tied reinforcing bars running both ways in a single layer.
2. Size: 6 inches minimum depth and sized to accommodate elbow supports.
3. Mass: Minimum of 1.5 times weight of isolated equipment.
4. Connecting Point: Reinforced to connect isolators and snubbers to base including template and fastening devices for equipment.
5. Concrete: Filled on site with minimum 3000 psi concrete. See Section 03 3000 for additional requirements.
6. Applications: Adjustable motor slide rails for centrifugal fans.

2.7 ROOF CURBS

A. Vibration Isolation Curbs:
1. Non-Seismic Curb Rail:
a. Location: Between existing roof curb and rooftop equipment.
b. Construction: Aluminum.
c. Integral vibration isolation to conform to requirements of this section.
d. Weather exposed components consist of corrosion resistant materials.
2. Non-Seismic Curb:
a. Location: Between structure and rooftop equipment.
b. Construction: Aluminum.
c. Integral vibration isolation to conform to requirements of this section.
d. Weather exposed components consist of corrosion resistant materials.

3. Seismic Curb:
   a. Location: Between structure and rooftop equipment.
   b. Construction: Steel.
   c. Integral vibration isolation to conform to requirements of this section.
   d. Snubbers consist of minimum 0.25 inch thick resilient pads to avoid metal-to-metal contact without compromising vibration isolating capabilities.
   e. Weather exposed components consist of corrosion resistant materials.

B. Seismic Type Non-Isolated Curb and Fabricated Equipment Piers:
1. Location: Between structure and rooftop equipment.
2. Construction: Steel.
3. Weather exposed components consist of corrosion resistant materials.

PART 3 EXECUTION

3.1 INSTALLATION - GENERAL

A. Install in accordance with manufacturer's instructions.

B. Bases:
1. Set steel bases for one inch clearance between housekeeping pad and base.
2. Set concrete inertia bases for 2 inches clearance between housekeeping pad and base.
3. Adjust equipment level.

C. On closed spring isolators, adjust so side stabilizers are clear under normal operating conditions.

D. Prior to making piping connections to equipment with operating weights substantially different from installed weights, block up equipment with temporary shims to final height. When full load is applied, adjust isolators to load to allow shim removal.

E. Provide pairs of horizontal limit springs on fans with more than 6.0 inches WC static pressure, and on hanger supported, horizontally mounted axial fans.

F. Support piping connections to equipment mounted on isolators using isolators or resilient hangers for scheduled distance.
1. Up to 4 Inches Pipe Size: First three points of support.
2. 5 to 8 Inches Pipe Size: First four points of support.
3. 10 inches Pipe Size and Over: First six points of support.
4. Select three hangers closest to vibration source for minimum 1.0 inch static deflection or static deflection of isolated equipment. Select remaining isolators for minimum 1.0 inch static deflection or 1/2 static deflection of isolated equipment.

G. All vibration isolators and seismic restraint systems must be installed in strict accordance with the manufacturers written instructions and all certified submittal data.

H. Installation of vibration isolators and seismic restraints must not cause any change of position of equipment, piping or ductwork resulting in stresses or misalignment.

I. No rigid connections between equipment and the building structure shall be made that degrades the noise and vibration control system herein specified.

J. The contractor shall not install any equipment, piping, duct or conduit that makes rigid connections with the building unless isolation is not specified. "Building" includes, but is not limited to, slabs, beams, columns, studs and walls. Any conflicts with other trades that will result in rigid contact with equipment or piping due to inadequate space or other unforeseen conditions should be brought to the architects/engineers attention prior to installation. Corrective work necessitated by conflicts after installation shall be at the responsible contractor's expense.

K. Bring to the architects/engineers attention any discrepancies between the specifications and the field conditions or changes required due to specific equipment selection, prior to installation. Corrective work necessitated by discrepancies after installation shall be at the responsible contractor's expense.

L. Cast in place inserts or wedge type drill-in concrete anchors. All vibration isolators, base frames and inertia bases to conform to all uniform deflection and stability requirements under all operating loads.

M. Steel springs to operate in the linear portion of the load versus deflection curve over deflection range of not less than 50 percent above specified deflection.

N. Lateral to vertical stiffness ratio to not exceed 0.08 with spring deflection at minimum 75 percent of specified deflection.

O. All equipment mounted on vibration isolated bases to have minimum operating clearance of 2 inches between the base and floor or support beneath unless noted otherwise.

3.2 INSTALLATION OF CONCRETE INERTIA BASES

A. Minimum operating clearance between concrete inertia and base and housekeeping pad or floor shall be 2".

B. The equipment structural steel or concrete inertia base shall be placed in position and supported temporarily by blocks or shims, as appropriate, prior to the installation of the machine or isolators.

C. The isolators shall be installed without raising the machine and frame assembly.

D. After the installation is complete and under full load, the isolators shall be adjusted so that the load is transferred from the blocks to the isolators. When all isolators are properly adjusted, the blocks or shims shall be removed.

E. Verify that all installed isolator and mounting systems permit equipment motion in all directions. Adjust or provide additional resilient restraints to flexibly limit start-up equipment lateral motion to 1/4".

F. Prior to start-up, clean out all foreign matter between bases and equipment. Verify that there are no isolation short circuits in the base, isolators, or seismic restraints.

3.3 PIPING SYSTEM VIBRATION ISOLATION

A. Vibration isolators for suspended piping:
   1. Provide spring hangers for all piping in equipment rooms and up to 50 ft from vibration-isolated equipment and PRV stations. The first three hangers from the equipment shall be provided with the same deflection as the equipment isolators, with a maximum limitation of 2 in. deflection. Remaining hangers shall be spring or combination spring and elastomeric with 0.75 in. deflection. The first two hangers adjacent to the equipment shall be the positioning or pre-compressed type. Provide positioning hangers for all isolated piping 8 in. and larger. Piping over 2 inches in diameter suspended below or within 50 ft of conference rooms, classrooms and auditorium areas shall be hung with isolation hangers.

B. Vibration isolators for floor-supported piping:
   1. Provide vibration isolators for floor supports for piping in equipment rooms to isolate equipment. Isolators shall be selected according to the guidelines for hangers. The first two adjacent floor supports shall be the restrained spring type, with a restraint/blocking feature to prevent load transfer to equipment flanges as the piping is filled or drained. Provide a slide plate where pipe is subjected to large thermal movement (PTFE, graphite, or steel) and shall be installed on top of the isolator. Provide a thermal barrier when rubber products are installed directly beneath steam or hot-water lines.

3.4 INSTALLATION - SEISMIC

A. Comply with:
   1. ASHRAE (HVACA) Handbook - HVAC Applications.
   2. FEMA 412.
   3. FEMA 413.
   4. FEMA 414.
   5. FEMA E-74.
   6. SMACNA (SRM).

B. Seismic Snubbers:
   1. Provide on all isolated equipment, piping and ductwork.
   2. Provide minimum of four seismic snubbers located close to isolators.
   3. Snub equipment designated for post-disaster use to 0.05 inch maximum clearance.
   4. Snub all other equipment between 0.15 inch and 0.25 inch clearance.

C. Floor and Base-Mounted Equipment, Vibration Isolated Equipment and associated Vibration and Seismic Controls for Connections:
   1. Install equipment anchorage items designed to resist seismic design force in any direction.
   2. Install vibration and seismic controls designed to include base and isolator requirements.
   3. Provide flexible connections between equipment and interconnected piping.
   4. Provide isolators and restraints designed for amplified code forces per ASCE 7 and with demonstrated ability to resist required forces including gravity, operational and seismic forces.
   5. Where equipment is not designed to be point loaded, provide base capable of transferring gravity and seismic demands from equipment to isolator base plate anchorage.
   6. Where concrete floor thickness is less than required for expansion anchor installation, install through bolt in lieu of expansion anchor.
   7. Where timber/wood floor or other substrate is inadequate for installation of lag bolts, screws or other mechanical fasteners, install supplemental framing or blocking to transfer loads to structural elements.

D. Suspended Mechanical Equipment:
   1. Provide supports and bracing to resist seismic design force in any direction.
   2. Provide flexible connections between equipment and interconnected piping.
   3. Brace equipment hung from spring mounts using cable or other bracing that will not transmit vibration to the structure.
   4. Use of proprietary restraint systems with a certificate of compliance, verified and listed by an accredited inspection body is acceptable (pending shop drawing approval), as an alternative to project specific seismic bracing design.

E. Wall mounted Mechanical Equipment:
   1. Provide support and bracing to resist seismic design force in any direction.
   2. Install backing plates or blocking as required to deliver load to primary wall framing members.
   3. Anchoring to gypsum wallboard, plaster or other wall finish that has not been engineered to resist imposed loads is not permitted.

F. Piping:
   1. Provide seismic bracing in accordance ASCE 7.
   2. Provide supports, braces, and anchors to resist gravity and seismic design forces.
   3. Provide flexible connections between floor mounted equipment and suspended piping; between unbraced piping and restrained suspended items; as required for thermal movement; at building separations and seismic joints; and wherever relative differential movements could damage pipe in an earthquake.
   4. Brace resiliently supported pipe with cable bracing or alternate means designed to prevent transmission of vibrations and noise to the structure.
   5. Brace every run 5.0 feet or more in length with two transverse and one longitudinal bracing locations.

6. Pipes and Connections Constructed of Ductile Materials (copper, ductile iron, steel or aluminum and brazed, welded or screwed connections):
   a. Provide transverse bracing at spacing not more than 40.0 feet on center.
   b. Provide longitudinal bracing at spacing not more than 80.0 feet on center.
7. Pipes and Connections Constructed of Non Ductile Materials (cast iron, no-hub, plastic or non-UL listed grooved coupling pipe):
   a. Provide transverse bracing at spacing not more than 20.0 feet on center.
   b. Provide longitudinal bracing at spacing not more than 40.0 feet on center.
8. Provide lateral restraint for risers at not more than 30 feet on center or as required for horizontal runs, whichever is less.
9. Piping Explicitly Exempt from Seismic Bracing Requirements:
   a. Provide flexible connections between piping and connected equipment, including in-line devices such as VAV boxes and reheat coils.
   b. Install piping consistent with ASCE 7, such that swinging of the pipes will not cause damaging impact with adjacent components, finishes, or structural framing while maintaining clear horizontal distance of 67 percent of the hanger length between subject components.
   c. Provide swing restraints as required to control potential impact due to limited space between subject components.
10. Use of proprietary restraint systems with a certificate of compliance, verified and listed by an accredited inspection body is acceptable (pending shop drawing approval), as an alternative to project specific seismic bracing design.
11. Re-use of Existing Hangers:
    a. Re-using existing hangers at locations of seismic bracing are to be judged on a case-by-case basis by the registered project design professional.
    b. Unless otherwise shown on the drawings, it is assumed all hangers supporting new piping, located at a seismic brace, will be new.

G. Ductwork:
1. Provide seismic bracing for ducts with cross sectional area greater than 6 sq ft (independent of duct contents).
2. Provide seismic bracing for all ducts containing hazardous materials.
3. Provide supports, braces, and anchors to resist gravity and seismic design forces.
4. Install ducts and duct risers designed to accommodate interstory drift.
5. Independently support in-line devices weighing more than 20 pounds.
6. Independently support and brace all in-line devices weighing more than 75 pounds.
7. Provide unbraced piping attached to braced in-line equipment with adequate flexibility to accommodate differential displacements.
8. Positively attach dampers, louvers, diffusers and similar appurtenances to ductwork with mechanical fasteners.
9. Install duct supports designed to resist not less than 150 percent of the duct weight.

10. 1The use of power driven fasteners is prohibited in the hanging of ducts weighing over 10 pounds per lineal foot for seismic design categories D, E, and F.
11. 1Use of proprietary restraint systems with a certificate of compliance, verified and listed by an IAS AC172 accredited inspection body or otherwise accepted by applicable codes is acceptable (pending shop drawing approval), as an alternative to project specific seismic bracing design.

H. Tanks:
1. Install tank anchorage, tank legs and/or supporting structure designed to resist design force.
2. Provide flexible connections between tank and interconnected piping.

3.5 FIELD QUALITY CONTROL

A. Inspect isolated equipment after installation and submit report. Include static deflections.

B. Perform testing and inspections of the installation in accordance with Section 01 4533.

3.6 SCHEDULE

A. Provide vibration isolators and equipment bases for all rotating, piston driven or vibrating equipment in accordance with the following schedules. Selection of equipment isolators shall be based on approved equipment shop drawings.

B. This section does not apply to surface mounted, fractional horsepower HVAC equipment such as ceiling fans and VRF cassette units; install per manufacturers' instructions.

Base & Isolator Types			
Base Types		Isolator Types	
None	No base, isolators attached directly to equipment. Suspend equipment securely from structure or floor-mount equipment on concrete housekeeping pad.	EL	Elastomeric pad, floor mount or hanger. Use restrained elastomeric mount where seismic restraint is required.
Steel	Structural steel rails or base.	Spring	Spring floor isolator or hanger. Use restrained spring isolator where seismic restraint is required.
Inertia Base	Concrete inertia base.		
Curb	Roof curb or curb rails		

Vibration Isolation - Chillers												
Type	HP	RPM	Equipment Location									Table Notes
			Slab on Grade			Upper Floor			Roof			
			Base Type	Isolator Type	Min Defl., (in.)	Base Type	Isolator Type	Min Defl., (in.)	Base Type	Isolator Type	Min Defl., (in.)	
All	All	All	None	EL	0.25	None	EL	0.25	Curb or Steel	Spring	1.5	1,2
Notes: Increase isolator deflection so isolator stiffness is less than one-tenth the stiffness of the supporting structure, as defined by the deflection due to load at the equipment support. Where equipment manufacturer indicates component cannot be installed directly on individual isolators, provide equipment manufacturer recommended supplemental support (base type).												

Vibration Isolation - Pumps												
Type	HP	RPM	Equipment Location									Table Notes
			Slab on grade			Indoors, mounted to structure			Roof			
			Base Type	Isolator Type	Min Defl., (in.)	Base Type	Isolator Type	Min Defl., (in.)	Base Type	Isolator Type	Min Defl., (in.)	
Close Coupled	≤7.5	All	N/A	N/A	N/A	None	Spring	0.75	N/A	N/A	N/A	2
	≥10	All	N/A	N/A	N/A	None	Spring	1.5	N/A	N/A	N/A	2
Base-mounted Inline	5 to 25	All	N/A	N/A	N/A	None	Spring	1.5	N/A	N/A	N/A	2
	≥30	All	N/A	N/A	N/A	Inertia Base	Spring	2.5	N/A	N/A	N/A	1
End suction and split case	≤40	All	N/A	N/A	N/A	Inertia Base	Spring	1.5	N/A	N/A	N/A	1
	50 to 125	All	N/A	N/A	N/A	Inertia Base	Spring	2.5	N/A	N/A	N/A	1

	≥150	All	N/A	N/A	N/A	Inertia Base	Spring	3.5	N/A	N/A	N/A	1

Notes:

Pumps: Concrete Inertia bases strength and shape shall accommodate base elbow supports. Concrete Inertia bases shall be designed for a thickness of one-tenth the longest dimension with minimum thickness as follows: (1) for up to 30 hp, 6 in.; (2) for 40 to 75 hp, 8 in.; and (3) for 100 hp and up, 12 in. Pumps over 75 hp and multistage pumps shall be provided with supplemental restraining devices.

Spring isolators shall be provided for pumps suspended from structure. Floor mounted pumps do not require spring isolators.

Vibration Isolation - Axial Fans

Type	Static Press-sure	RPM	Equipment Location									Table Notes
			Slab on Grade			Upper Floor			Roof			
			Base Type	Isolator Type	Min Defl., (in.)	Base Type	Isolator Type	Min Defl., (in.)	Base Type	Isolator Type	Min Defl., (in.)	
Up to 22 in. diameter	All	All	None	EL	0.25	None	Spring	0.75	Curb or Steel	Spring	0.75	1,3
24 in. diameter & up	≤2 in. SP	Up to 300	Steel	Spring	2.5	Steel	Spring	3.5	Curb or Steel	Spring	3.5	3
		300 to 500	Steel	Spring	0.75	Steel	Spring	1.5	Curb or Steel	Spring	1.5	3
		501 and up	Steel	Spring	0.75	Steel	Spring	1.5	Curb or Steel	Spring	1.5	3
	≥2.1 in. SP	Up to 300	Inertia Base	Spring	2.5	Inertia Base	Spring	3.5	Curb or Steel	Spring	3.5	3
		300 to 500	Inertia Base	Spring	1.5	Inertia Base	Spring	1.5	Curb or Steel	Spring	1.5	2,3
		501 and up	Inertia Base	Spring	0.75	Inertia Base	Spring	1.5	Curb or Steel	Spring	1.5	2.3

Notes:

Where equipment manufacturer indicates component cannot be installed directly on individual isolators provide equipment manufacturer recommended supplemental support (base type).

Select isolator deflection so that resonance frequency is 40 percent or less of the lowest normal operating speed of equipment. Add a 1 in. thick pad to the base plate of spring isolators.

To limit undesirable movement, thrust restraints are required for all ceiling-suspended and floor-mounted units operating at 2 in. of water or more total static pressure.

Vibration Isolation – Centrifugal and Mixed-Flow Fans

Type	HP	RPM	Equipment Location									Table Notes
			Exterior, Slab on Grade			Indoors			Roof			
			Base Type	Isolator Type	Min Defl., (in.)	Base Type	Isolator Type	Min Defl., (in.)	Base Type	Isolator Type	Min Defl., (in.)	
Up to 22 in. diameter	All	All	Steel	EL	0.25	Steel	Spring	0.75	Curb or Steel	Spring	0.75	3
24 in. diameter & up	≤40	Up to 300	Steel	Spring	2.5	Steel	Spring	3.5	Curb or Steel	Spring	3.5	2
		300 to 500	Steel	Spring	1.5	Steel	Spring	1.5	Curb or Steel	Spring	1.5	2
		501 and up	Steel	Spring	0.75	Steel	Spring	0.75	Curb or Steel	Spring	0.75	2
	≥50	Up to 300	Inertia Base	Spring	2.5	Inertia Base	Spring	3.5	Curb or Steel	Spring	3.5	1,2,3
		300 to 500	Inertia Base	Spring	1.5	Inertia Base	Spring	1.5	Curb or Steel	Spring	1.5	1,2,3
		501 and up	Inertia Base	Spring	1.0	Inertia Base	Spring	1.5	Curb or Steel	Spring	1.5	1,2,3
Roof Curb	All	All	N/A	N/A	N/A	N/A	N/A	N/A	Curb	None	N/A	

Mounted Ventilators												

Notes:

Increase isolator deflection so isolator stiffness is less than one-tenth the stiffness of the supporting structure, as defined by the deflection due to load at the equipment support.

Select isolator deflection so that resonance frequency is 40 percent or less of the lowest normal operating speed of equipment. Add a 1 in. thick pad to the base plate of spring isolators.

Provide thrust restraints for all ceiling-suspended and floor-mounted units operating at 2 in. of water or more total static pressure.

General Note for Fans: For fans operating under 300 rpm, select isolator deflection so the isolator natural frequency is 40 percent or less than the fan speed. Flexible duct connectors shall be installed at the intake and discharge of all fans and air-handling equipment to reduce vibration transmission to air duct structures. Provide thrust restraints with same deflection as isolators for all fans and all base-mounted and suspended air-handling equipment operating at 2 in. or more total static pressure. Adjust restraint movement under normal operational static pressures.

Vibration Isolation – Propeller Fans

Type	HP	RPM	Equipment Location									Table Notes
			Exterior, Slab on Grade			Indoors			Roof			
			Base Type	Isolator Type	Min Defl., (in.)	Base Type	Isolator Type	Min Defl., (in.)	Base Type	Isolator Type	Min Defl., (in.)	
Wall-mounted	All	All	None	None	None	None	EL	0.25	None	EL	0.25	
Roof-mounted	All	All	None	None	None	Steel or Curb	Spring	1.5	Curb or Steel	Spring	1.5	

Vibration Isolation – Air-Cooled Condensing Units

Type	Tons	RPM	Equipment Location									Table Notes
			Exterior, Slab on Grade			Indoors			Roof			
			Base Type	Isolator Type	Min Defl., (in.)	Base Type	Isolator Type	Min Defl., (in.)	Base Type	Isolator Type	Min Defl., (in.)	
Individual	≤5	All	None	EL	0.25	N/A	N/A	N/A	Curb or	EL	0.25	1

Condensing Units									Steel			
	>5-<10	All	None	EL	0.25	N/A	N/A	N/A	Curb or Steel	Spring	0.75	1
	≥10	All	None	EL	0.25	N/A	N/A	N/A	Curb or Steel	Spring	1.5	1
Multi-split and VRF Condensing Units	All	All	None	EL	0.25	N/A	N/A	N/A	Curb or Steel	EL	0.25	1

Notes:

Where available, use of equipment manufacturer internal isolators meeting the above requirements is acceptable. Coordinate with equipment manufacturer. Provide documentation in both equipment submittals and in submittals for this Section.

Vibration Isolation – Air Handling Units (Including AHU, DOAS, RTU, MAU, BCU, H&V Units)												
Type	Fan HP, Static Pressure	RPM	Equipment Location									Table Notes
			Slab on Grade			Indoors			Roof			
			Base Type	Isolator Type	Min Defl., (in.)	Base Type	Isolator Type	Min Defl., (in.)	Base Type	Isolator Type	Min Defl., (in.)	
All	≤10	All	None	Spring	0.75	None	Spring	0.75	Curb or Steel	Spring	0.75	5
	≥15, ≤4 in. SP	Up to 300	None	Spring	0.75	None	Spring	3.5	Curb or Steel	Spring	3.5	1,3, 4,5
		300 to 500	None	Spring	0.75	None	Spring	2.5	Curb or Steel	Spring	2.5	3,5
		501 and up	None	Spring	0.75	None	Spring	1.5	Curb or Steel	Spring	1.5	3,5
	≥15, ≥4 in.	Up to	None	Spring	0.75	None	Spring	3.5	Curb or	Spring	3.5	1,2, 3,4,

	SP	300							Steel			5
		300 to 500	None	Spring	0.75	None	Spring	2.5	Curb or Steel	Spring	2.5	1,2, 3,5
		501 and up	None	Spring	0.75	None	Spring	1.5	Curb or Steel	Spring	2.5	1,2, 3,5

Notes:

Where available, use of packaged equipment manufacturer internal isolators meeting the above requirements is acceptable. Coordinate with equipment manufacturer. Provide documentation in both equipment submittals and in submittals for this Section.

Increase isolator deflection so isolator stiffness is less than one-tenth the stiffness of the supporting structure, as defined by the deflection due to load at the equipment support.

Where equipment manufacturer indicates component cannot be installed directly on individual isolators provide equipment manufacturer recommended supplemental support (base type).

Select isolator deflection so that resonance frequency is 40 percent or less of the lowest normal operating speed of equipment. Add a 1 in. thick pad to the base plate of spring isolators.

Provide thrust restraints for all ceiling-suspended and floor-mounted units operating at 2 in. of water or more total static pressure.

General Note for Air-Handling Equipment: For fans operating under 300 rpm, select isolator deflection so the isolator natural frequency is 40 percent or less than the fan speed. Flexible duct connectors shall be installed at the intake and discharge of all fans and air-handling equipment to reduce vibration transmission to air duct structures. Provide thrust restraints with the same deflection as isolators for all fans and all base-mounted and suspended air-handling equipment operating at 2 in. or more total static pressure. Adjust restraint movement under normal operational static pressures.

Vibration Isolation – Ducted Rotating Equipment												
Type	Airflow (CFM)	RPM	Equipment Location									Table Notes
			Exterior, Slab on Grade			Indoors			Roof			
			Base Type	Isolator Type	Min Defl., (in.)	Base Type	Isolator Type	Min Defl., (in.)	Base Type	Isolator Type	Min Defl., (in.)	
Fan-powered VAV boxes	≤600	All	N/A	N/A	N/A	None	EL	0.25	N/A	N/A	N/A	

Suspended Fan coil units Suspended Cabinet heaters and unit heaters	≥601 - 2000	All	N/A	N/A	N/A	None	Spring	0.75	N/A	N/A	N/A	
Floor-Mounted Fan coil units	≤600	All	N/A	N/A	N/A	None	EL	0.25	N/A	N/A	N/A	
  Floor-Mounted Cabinet heaters and unit heaters	≥601 - 2000	All	N/A	N/A	N/A	None	EL	0.25	N/A	N/A	N/A	
Small in-line fans	≤600	All	N/A	N/A	N/A	None	EL	0.25	N/A	N/A	N/A	

END OF SECTION

SECTION 23 0553 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Nameplates.

B. Tags.

C. Duct Markers.

D. Pipe markers.

E. Warning Signs and Labels

F. Warning Tags

G. Radon Labels

H. Ceiling Tacks

1.2 RELATED REQUIREMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

B. Division 09- Finishes.

1.3 REFERENCE STANDARDS (follow the most currently adopted amended version)

A. ASME A13.1 - Scheme for the Identification of Piping Systems.

B. ASTM D709 - Standard Specification for Laminated Thermosetting Materials.

1.4 SUBMITTALS

A. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.

B. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

C. Product Data: Provide manufacturers catalog literature for each product required.

D. Manufacturer's Installation Instructions: Indicate special procedures, and installation.

E. Project Record Documents:
1. Valve Schedules: For each piping system. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
2. Equipment Schedules: For each item of equipment to be labeled. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

PART 2 PRODUCTS

1.5 EQUIPMENT NAMEPLATES

A. Manufacturers:
1. Advanced Graphic Engraving, LLC
2. Brimar Industries, Inc; Kolbi Pipe Marker Co.
3. Seton Identification Products

B. Metal Labels for Equipment:
1. Material and Thickness: Brass, 0.032-inch, Stainless steel, 0.025-inch, Aluminum, 0.032-inchor anodized aluminum, 0.032-inchminimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
3. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inchfor viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
4. Fasteners: Stainless-steel rivets or self-tapping screws.
5. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

C. Plastic Labels for Equipment:
1. Material and Thickness: Conform to ASTM D709. Multilayer, multicolor, plastic labels for mechanical engraving, minimum 1/16 inchthick, and having predrilled holes for attachment hardware.
2. Letter Color: White.
3. Background Color: Black.
4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch
6. Minimum Letter Size: 1/4 inchfor name of units if viewing distance is less than 24 inches, 1/2 inchfor viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

7. Fasteners: Stainless-steel rivets or self-tapping screws.
8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

D. Label Content: Include equipment's Drawing designation or unique equipment number.

1.6 TAGS

A. Manufacturers:
1. Advanced Graphic Engraving
2. Brady Corporation
3. Brimar Industries, Inc
4. Kolbi Pipe Marker Co
5. Seton Identification Products, a Tricor Company
6. Substitutions: See Division 01-General Requirements.

B. Metal Tags: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware. Brass wire-link, beaded chain or S-hook fasteners. Minimum 1-1/2 inch diameter with smooth edges.

1.7 DUCT MARKERS

A. Manufacturers:
1. Brimar Industries, Inc
2. Kolbi Pipe Marker Co
3. Seton Identification Products

B. General Requirements for Manufactured Duct Labels: Preprinted self-adhesive, premium grade vinyl, color-coded, with lettering indicating service, and showing flow direction.

C. Material: High gloss acrylic adhesive-backed vinyl film 0.0032 inch printed with UV and chemical resistant inks.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

E. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

F. Contents: Include identification of duct service using same designations or abbreviations as used on Drawings, duct size, and an arrow indicating flow direction.
1. Flow-Direction Arrows: Integral with duct system service lettering to accommodate both directions, or as separate unit on each duct label to indicate flow direction.
2. Lettering Size: Prepared with letter sizes according to ASME A13.1, at least 1-1/2 inches high.

1.8 PIPE MARKERS

A. Manufacturers:
1. Brady Corporation

2. Brimar Industries, Inc
3. Kolbi Pipe Marker Co
4. MIFAB, Inc
5. Seton Identification Products

B. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

C. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

E. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

F. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.
1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: Prepared with letter sizes according to ASME A13.1, at least 1-1/2 incheshigh.

1.9 WARNING SIGNS AND LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inchthick, and having predrilled holes for attachment hardware.

B. Letter Color: White.

C. Background Color: Red.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

F. Minimum Letter Size: 1/4 inchfor name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

G. Fasteners: Stainless-steel rivets or self-tapping screws.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Label Content: Include caution and warning information, plus emergency notification instructions.

1.10 WARNING TAGS

A. Warning Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with matte finish suitable for writing.
   1. Size: Approximately 4 by 7 inches.
   2. Fasteners: Reinforced grommet and wire or string.
   3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
   4. Color: Red, white, black.

1.11 RADON LABELS

A. Radon pipe discharge shall be provided with labeling similar to the following:
   1. Caution, radon discharged fumes do not breathe fumes.

B. Radon fan and associated equipment shall be provided with labeling similar to the following:
   1. Caution, this is a component of radon reduction system, don to alter or disconnect.

C. Radon fan power and electrical devices shall be provided with labeling similar to the following:
   1. Caution, radon fan circuit do not turn off.

D. Radon fan switch shall be provided with labeling similar to the following:
   1. Caution, radon fan switch, leave on.

E. Radon reduction system labels shall be provided with labeling similar to the following:
   1. Labeling with information for:
      a. Installed By:
      b. Phone number:
      c. Installation Date:
      d. License / Certificate #:
      e. Initial Vacuum pressure:
      f. Note: It is advised that this building be tested for radon at least every two years as required or recommend by state and local agencies.

1.12 CEILING TACKS

A. Manufacturers:
   1. Brimar
   2. Craftmark

B. Seton Identification ProductsDescription: Steel with 3/4 inch diameter color coded head.

C. Color code as follows:
   1. HVAC Equipment: Yellow.
   2. Fire Dampers and Smoke Dampers: Red.
   3. Heating/Cooling Valves: Blue.

PART 2 EXECUTION

2.1 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

2.2 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment, including all scheduled equipment on the drawings, air terminal units, automatic control devices, control panels, instruments, relays and major control components.

B. Locate equipment labels where accessible and readable from the floor.

C. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

2.3 VALVE TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application:
   1. Valve-Tag Size and Shape: 1-1/2 inches, round.
   2. Valve-Tag Color: Natural
   3. Letter Color: Black

2.4 PIPE LABEL INSTALLATION

A. Install plastic pipe markers in accordance with manufacturer's instructions.

B. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

C. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
   1. Near each valve and control device.
   2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
   3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
   4. At access doors, manholes, and similar access points that permit view of concealed piping.
   5. Near major equipment items and other points of origination and termination.
   6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
   7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

D. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.

E. Pipe Label Color Schedule:
   1. Potable, Cooling, Heating and Other Water Piping:
      a. Background Color: Green.
      b. Letter Color: White.
   2. Combustible Fluid Piping:
      a. Background Color: Brown.
      b. Letter Color: White.
   3. Flammable & Oxidizing Fluid Piping:
      a. Background Color: Yellow.
      b. Letter Color: Black.
   4. Toxic & Corrosive Piping:
      a. Background Color: Orange.
      b. Letter Color: Black.

F. Identify valves in main and branch piping with tags.

2.5 DUCT LABEL INSTALLATION

A. Install duct labels with permanent adhesive on air ducts in the following color codes:
   1. Blue: For cold-air supply ducts.
   2. Yellow: For hot-air supply ducts.
   3. Green: For exhaust-, outside-, relief-, return-, and mixed-air ducts.
   4. ASME A13.1 Colors and Designs: For hazardous material exhaust.

B. Locate labels near points where ducts enter into concealed spaces and at maximum intervals of 50 feet in each space where ducts are exposed or concealed by removable ceiling system.

2.6 CEILING TACK INSTALLATION

A. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

2.7 WARNING-TAG INSTALLATION

A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION

SECTION 23 0593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Testing, adjustment, and balancing of air systems.

B. Testing, adjustment, and balancing of hydronic, steam, and refrigerating systems.

C. Measurement of final operating condition of HVAC systems.

D. Sound measurement of equipment operating conditions.

E. Vibration measurement of equipment operating conditions.

1.2 RELATED REQUIREMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

1.3 REFERENCE STANDARDS (follow the most currently adopted amended version)

A. AABC (NSTSB) - AABC National Standards for Total System Balance

B. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems.

C. NEBB (TAB) - Procedural Standards for Testing Adjusting and Balancing of Environmental Systems;.

D. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing;.

1.4 SUBMITTALS

A. Installer Qualifications: Submit name of adjusting and balancing agency and TAB supervisor for approval within 30 days after award of Contract.

B. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
   1. Submit to Architect.
   2. Submit to the Commissioning Authority.
   3. Submit to Engineer of Record.
   4. Submit six weeks prior to starting the testing, adjusting, and balancing work.
   5. Include certification that the plan developer has reviewed the contract documents, the equipment and systems, and the control system with the Architect and other installers to sufficiently understand the design intent for each system.

6. Include at least the following in the plan:
   a. Preface: An explanation of the intended use of the control system.
   b. List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
   c. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
   d. Identification and types of measurement instruments to be used and their most recent calibration date.
   e. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
   f. Final test report forms to be used.
   g. Detailed step-by-step procedures for TAB work for each system and issue, including:
      1) Terminal flow calibration (for each terminal type).
      2) Diffuser proportioning.
      3) Branch/submain proportioning.
      4) Total flow calculations.
      5) Rechecking.
      6) Diversity issues.
   h. Criteria for using air flow straighteners or relocating flow stations and sensors; analogous explanations for the water side.
   i. Details of how TOTAL flow will be determined; for example:
      1) Air: Sum of terminal flows via control system calibrated readings or via hood readings of all terminals, supply (SA) and return air (RA) pitot traverse, SA or RA flow stations.
      2) Water: Pump curves, circuit setter, flow station, ultrasonic, etc.
   j. Specific procedures that will ensure that both air and water side are operating at the lowest possible pressures and methods to verify this.
   k. Confirmation of understanding of the outside air ventilation criteria under all conditions.
   l. Method of verifying and setting minimum outside air flow rate will be verified and set and for what level (total building, zone, etc.).
   m. Method of checking building static and exhaust fan and/or relief damper capacity.
   n. Methods for making coil or other system plant capacity measurements, if specified.
   o. Time schedule for TAB work to be done in phases (by floor, etc.).
   p. Description of TAB work for areas to be built out later, if any.
   q. Time schedule for deferred or seasonal TAB work, if specified.
   r. False loading of systems to complete TAB work, if specified.
   s. Exhaust fan balancing and capacity verifications, including any required room pressure differentials.
   t. Interstitial cavity differential pressure measurements and calculations, if specified.
   u. differential pressure measurements and calculations between the building and its exterior.

v. Procedures for field technician logs of discrepancies, deficient or uncompleted work by others, contract interpretation requests and lists of completed tests (scope and frequency).
w. Procedures for formal progress reports, including scope and frequency.
x. Procedures for formal deficiency reports, including scope, frequency and distribution.

C. Control System Coordination Reports: Communicate in writing to the controls installer all setpoint and parameter changes made or problems and discrepancies identified during TAB that affect, or could affect, the control system setup and operation.

D. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
1. Submit under provisions of Division 01 – General Conditions.
2. Submit to the Commissioning Authority within two weeks after completion of testing, adjusting, and balancing.
3. Revise TAB plan to reflect actual procedures and submit as part of final report.
4. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect and Engineer of Record and for inclusion in operating and maintenance manuals.
5. Provide reports in soft cover, letter size, 3-ring binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.
6. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
7. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
8. Units of Measure: Report data in both I-P (inch-pound) units.
9. Include the following on the title page of each report:
    a. Name of Testing, Adjusting, and Balancing Agency.
    b. Address of Testing, Adjusting, and Balancing Agency.
    c. Telephone number of Testing, Adjusting, and Balancing Agency.
    d. Project name.
    e. Project location.
    f. Project Architect.
    g. Project Engineer.
    h. Project Contractor.
    i. Project altitude.
    j. Report date.

E. Project Record Documents: Record actual locations of flow measuring stations and balancing valves and rough setting.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

A. Perform total system balance in accordance with one of the following:
   1. AABC (NSTSB), AABC National Standards for Total System Balance.
   2. ASHRAE Std 111, Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems.
   3. NEBB Procedural Standards for Testing Adjusting Balancing of Environmental Systems.
   4. SMACNA (TAB)Maintain at least one copy of the standard to be used at project site at all times.

B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.

C. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.

D. TAB Agency Qualifications:
   1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
   2. Having minimum of three years documented experience.
   3. Certified by one of the following:
      a. AABC, Associated Air Balance Council completion submit AABC National Performance Guaranty.
      b. NEBB, National Environmental Balancing Bureau
      c. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute

E. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.

3.2 EXAMINATION

A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
   1. Systems are started and operating in a safe and normal condition.
   2. Temperature control systems are installed complete and operable.
   3. Proper thermal overload protection is in place for electrical equipment.
   4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
   5. Duct systems are clean of debris.
   6. Fans are rotating correctly.
   7. Fire and volume dampers are in place and open.

8. Air coil fins are cleaned and combed.
9. Access doors are closed and duct end caps are in place.
10. Air outlets are installed and connected.
11. Duct system leakage is minimized.
12. Hydronic systems are flushed, filled, and vented.
13. Pumps and fans are rotating correctly.
14. Proper strainer baskets are clean and in place.
15. Service and balance valves are open.

3.3 PREPARATION

A. Hold a pre-balancing meeting at least one week prior to starting TAB work.
   1. Require attendance by all installers and control providers whose work will be tested, adjusted, or balanced.

3.4 ADJUSTMENT TOLERANCES

A. Air Handling Systems: Adjust to within plus or minus 10 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.

B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

C. Hydronic Systems: Adjust to within plus or minus 10 percent of design.

3.5 RECORDING AND ADJUSTING

A. Field Logs: Maintain written logs including:
   1. Running log of events and issues.
   2. Discrepancies, deficient or uncompleted work by others.
   3. Contract interpretation requests.
   4. Lists of completed tests.

B. Ensure recorded data represents actual measured or observed conditions.

C. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.

D. Mark on the drawings the locations where traverse and other critical measurements were taken and cross reference the location in the final report.

E. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.

F. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

G. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner.

H. Check and adjust systems approximately two seasons after final acceptance and submit report.

3.6 AIR SYSTEM PROCEDURE

A. Work with Control vendor to establish minimum setpoints necessary to satisfy contract documents. Iterative testing to determine these minimum setpoints will be expected to be in the submittals.

B. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.

C. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.

D. Measure air quantities at air inlets and outlets.

E. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.

F. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.

G. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.

H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.

I. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.

J. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.

K. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.

L. For variable air volume system powered units set volume controller to air flow setting indicated. Confirm connections properly made and confirm proper operation for automatic variable air volume temperature control.

3.7 WATER SYSTEM PROCEDURE

A. Work with Control vendor to establish minimum setpoints necessary to satisfy contract documents. Iterative testing to determine these minimum setpoints will be expected in the submittals.

B. Adjust water systems to provide required or design quantities.

C. Use calibrated Venturi tubes, orifices, or other metered fittings and pressure gages to determine flow rates for system balance. Where flow metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.

D. Adjust systems to provide specified pressure drops and flows through heat transfer elements prior to thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.

E. Effect system balance with automatic control valves fully open to heat transfer elements.

F. Effect adjustment of water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shut-off valves for balancing unless indexed for balance point.

G. Where available pump capacity is less than total flow requirements or individual system parts, full flow in one part may be simulated by temporary restriction of flow to other parts.

3.8 COMMISSIONING

A. See Division 01 General Requirements for additional requirements.

3.9 SCOPE

A. Test, adjust, and balance the following:
1. Plumbing Pumps.
2. Boiler Feedwater Pumps.
3. HVAC Pumps.
4. Boilers
5. Chillers
6. Air Cooled Refrigerant Condensers.
7. Packaged Roof Top Heating/Cooling Units.
8. Packaged Terminal Air Conditioning Units.
9. Air Handling Units.
10. Dedicated Outdoor Air Units.
11. Fans.
12. Air Terminal Units.
13. Air Inlets and Outlets.
14. Chilled Beams
15. Heat Pump

3.10 MINIMUM DATA TO BE REPORTED

A. Electric Motors:
1. Manufacturer.
2. Model/Frame.
3. HP/BHP.
4. Phase, voltage, amperage; nameplate, actual, no load.
5. RPM.
6. Service factor.
7. Starter size, rating, heater elements.
8. Sheave Make/Size/Bore.
9. VFD Setpoints.
10. ECM Setpomts.

B. V-Belt Drives:
1. Identification/location.
2. Required driven RPM.
3. Driven sheave, diameter and RPM.
4. Belt, size and quantity.
5. Motor sheave diameter and RPM.
6. Center to center distance, maximum, minimum, and actual.

C. Pumps:
1. Identification/number.
2. Manufacturer.
3. Size/model.
4. Impeller.
5. Service.
6. Design flow rate, pressure drop, BHP.
7. Actual flow rate, pressure drop, BHP.
8. Discharge pressure.
9. Suction pressure.
10. Total operating head pressure.
11. Shut off, discharge and suction pressures.
12. Shut off, total head pressure.

D. Combustion Equipment:
1. Boiler manufacturer.
2. Model number.
3. Serial number.
4. Firing rate.
5. Overfire draft.
6. Gas meter timing dial size.
7. Gas meter time per revolution.
8. Gas pressure at meter outlet.
9. Gas flow rate.
10. Heat input.
11. Burner manifold gas pressure.

12. Percent carbon monoxide (CO).
13. Percent carbon dioxide (CO2).
14. Percent oxygen (O2).
15. Percent excess air.
16. Flue gas temperature at outlet.
17. Ambient temperature.
18. Net stack temperature.
19. Percent stack loss.
20. Percent combustion efficiency.
21. Heat output.

E. Air Cooled Condensers:
1. Identification/number.
2. Location.
3. Manufacturer.
4. Model number.
5. Serial number.
6. Entering DB air temperature, design and actual.
7. Leaving DB air temperature, design and actual.
8. Number of compressors.

F. Chillers:
1. Identification/number.
2. Manufacturer.
3. Capacity.
4. Model number.
5. Serial number.
6. Evaporator entering water temperature, design and actual.
7. Evaporator leaving water temperature, design and actual.
8. Evaporator pressure drop, design and actual.
9. Evaporator water flow rate, design and actual.
10. Condenser entering water temperature, design and actual.
11. Condenser pressure drop, design and actual.
12. Condenser water flow rate, design and actual.

G. Heat Exchangers:
1. Identification/number.
2. Location.
3. Service.
4. Manufacturer.
5. Model number.
6. Serial number.
7. Steam pressure, design and actual.
8. Primary water entering temperature, design and actual.
9. Primary water leaving temperature, design and actual.
10. Primary water flow, design and actual.
11. Primary water pressure drop, design and actual.
12. Secondary water leaving temperature, design and actual.
13. Secondary water flow, design and actual.

14. Secondary water pressure drop, design and actual.

H. Cooling Coils:
1. Identification/number.
2. Location.
3. Service.
4. Manufacturer.
5. Air flow, design and actual.
6. Entering air DB temperature, design and actual.
7. Entering air WB temperature, design and actual.
8. Leaving air DB temperature, design and actual.
9. Leaving air WB temperature, design and actual.
10. Water flow, design and actual.
11. Water pressure drop, design and actual.
12. Entering water temperature, design and actual.
13. Leaving water temperature, design and actual.
14. Saturated suction temperature, design and actual.
15. Air pressure drop, design and actual.

I. Heating Coils:
1. Identification/number.
2. Location.
3. Service.
4. Manufacturer.
5. Air flow, design and actual.
6. Water flow, design and actual.
7. Water pressure drop, design and actual.
8. Entering water temperature, design and actual.
9. Leaving water temperature, design and actual.
10. Entering air temperature, design and actual.
11. Leaving air temperature, design and actual.
12. Air pressure drop, design and actual.

J. Air Moving Equipment:
1. Location.
2. Manufacturer.
3. Model number.
4. Serial number.
5. Arrangement/Class/Discharge.
6. Air flow, specified and actual.
7. Return air flow, specified and actual.
8. Outside air flow, specified and actual.
9. Total static pressure (total external), specified and actual.
10. Inlet pressure.
11. Discharge pressure.
12. Sheave Make/Size/Bore.
13. Number of Belts/Make/Size.
14. Fan RPM.

K. Return Air/Outside Air:
1. Identification/location.
2. Design air flow.
3. Actual air flow.
4. Design return air flow.
5. Actual return air flow.
6. Design outside air flow.
7. Actual outside air flow.
8. Return air temperature.
9. Outside air temperature.
10. Required mixed air temperature.
11. Actual mixed air temperature.
12. Design outside/return air ratio.
13. Actual outside/return air ratio.

L. Exhaust Fans:
1. Location.
2. Manufacturer.
3. Model number.
4. Serial number.
5. Air flow, specified and actual.
6. Total static pressure (total external), specified and actual.
7. Inlet pressure.
8. Discharge pressure.
9. Sheave Make/Size/Bore.
10. Number of Belts/Make/Size.
11. Fan RPM.

M. Duct Leak Tests:
1. Description of ductwork under test.
2. Duct design operating pressure.
3. Duct design test static pressure.
4. Duct capacity, air flow.
5. Maximum allowable leakage duct capacity times leak factor.
6. Test apparatus:
    a. Blower.
    b. Orifice, tube size.
    c. Orifice size.
    d. Calibrated.
7. Test static pressure.
8. Test orifice differential pressure.
9. Leakage.

N. Air Monitoring Stations:
1. Identification/location.
2. System.
3. Size.
4. Area.
5. Design velocity.

6. Design air flow.
7. Test velocity.
8. Test air flow.

O. Flow Measuring Stations:
1. Identification/number.
2. Location.
3. Size.
4. Manufacturer.
5. Model number.
6. Serial number.
7. Design Flow rate.
8. Design pressure drop.
9. Actual/final pressure drop.
10. Actual/final flow rate.
11. Station calibrated setting.

P. Terminal Unit Data:
1. Manufacturer.
2. Type, constant, variable, single, dual duct.
3. Identification/number.
4. Location.
5. Model number.
6. Size.
7. Minimum static pressure.
8. Minimum design air flow.
9. Maximum design air flow.
10. Maximum actual air flow.
11. Inlet static pressure.

Q. Air Distribution Tests:
1. Air terminal number.
2. Room number/location.
3. Terminal type.
4. Terminal size.
5. Area factor.
6. Design velocity.
7. Design air flow.
8. Test (final) velocity.
9. Test (final) air flow.
10. Percent of design air flow.

END OF SECTION

SECTION 23 0700 - HVAC INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. HVAC piping insulation, jackets and accessories.

B. HVAC equipment insulation, jackets and accessories.

C. HVAC ductwork insulation, jackets, and accessories.

1.2 RELATED REQUIREMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

B. Division 07 – Firestopping

C. Division 09- Finishes

D. Section 23 0553- Identification of HVAC Piping and Equipment

E. Section 23 3100- HVAC ducts and casings

F. Section 23 2113 – Hydronic Piping

1.3 REFERENCES STANDARDS (follow the most currently adopted amended version)

A. ASTM International:
1. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
2. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement.
3. ASTM C449/C449M - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement.
4. ASTM C450 - Standard Practice for Fabrication of Thermal Insulating Fitting Covers for NPS Piping, and Vessel Lagging.
5. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation.
6. ASTM C534 - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
7. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation.
8. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
9. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.

10. ASTM C585 - Standard Practice for Inner and Outer Diameters of Rigid Thermal Insulation for Nominal Sizes of Pipe and Tubing (NPS System).
11. ASTM C591 - Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.
12. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
13. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
14. ASTM C921 - Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
15. ASTM C1071 - Standard Specification for Thermal and Acoustical Insulation (Glass Fiber, Duct Lining Material).
16. ASTM C1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.
17. ASTM C1290 - Standard Specification for Flexible Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Ducts.
18. ASTM D1785 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
19. ASTM D4637 - Standard Specification for EPDM Sheet Used in Single-Ply Roof Membrane.
20. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials.
21. ASTM E162 - Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source.

B. Sheet Metal and Air Conditioning Contractors':
   1. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.

C. Underwriters Laboratories Inc.:
   1. UL 1978 - Standard for Safety for Grease Ducts.

1.4 SUBMITTALS

A. Product Data: Submit product description, thermal characteristics and list of materials and thickness for each service, and location.

B. Manufacturer's Instructions: Indicate installation procedures necessary to ensure acceptable workmanship and that installation standards will be achieved.

C. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

A. Test pipe insulation for maximum flame spread index of 25 and maximum smoke developed index of not exceeding 50 in accordance with ASTM E84.

B. Pipe insulation manufactured in accordance with ASTM C585 for inner and outer diameters.

C. Factory fabricated fitting covers manufactured in accordance with ASTM C450.

D. Duct insulation, Coverings, and Linings: Maximum 25/50 flame spread/smoke developed index, when tested in accordance with ASTM E84, using specimen procedures and mounting procedures of ASTM E 2231.

E. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section with not less than three years of documented experience.

F. Applicator Qualifications: Company specializing in performing the type of work specified in this section, with minimum three years of experience and approved by manufacturer.

1.6 PRE-INSTALLATION MEETINGS

A. Convene minimum one week prior to commencing work of this section.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping. Store all insulation materials in a clean, dry environment.

1.8 FIELD CONDITIONS

A. Maintain ambient conditions required by manufacturers of each product.

B. Maintain temperature before, during, and after installation for minimum of 24 hours.

1.9 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.10 SCHEDULING

A. Schedule insulation application after pressure and leak testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

PART 2 PRODUCTS

2.1 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
   1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
   2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

2.2 MANUFACTURER

A. Manufacturers for Flexible Glass Fiber (FGF), Pre-Molded Glass Fiber (PGF) and Rigid Glass Fiber (RGF) Insulation Products:
   1. Knauf Insulation
   2. Johns Manville Corporation
   3. Owens-Corning.
   4. Substitutions: Division 01.

B. Manufacturers for Closed Cell Elastomeric (CCE) Insulation Products:
   1. Aeroflex. USA, Inc.
   2. Armacell, LLC (Interior- ArmaFlex, Exterior- ArmaTuff)
   3. K-Flex USA LLC
   4. Substitutions: Division 01.

C. Manufacturers for Polyisocyanurate Foam Insulation Products: (steam only)
   1. Dow Chemical Company.
   2. Owens-Corning
   3. Johns Manville Corporation
   4. Substitutions: Division 01.

D. Manufacturers for Fire Rated (FR) Insulation Products:
   1. 3M Fire Barrier Duct Wrap 615+.
   2. Morgan Theramal Ceramics Pyroscat DuctWrap XL.
   3. Unifrax FyreWrap Elite 1.5.
   4. Substitutions: Division 01.

E. Manufacturers for Jacketing (PVC):
   1. Johns Manville
   2. P.I.C. Plastics Inc.
   3. Proto Corporation
   4. Substitutions: Division 01.

F. Manufacturers for Jacketing (ALM):
1. Childers Brand
2. ITW Insulation Systems
3. RPR Products
4. Substitutions: Division 01.

G. Manufacturers for exterior pipe/ duct waterproof jacketing (WJ):
1. Polyguard Products, Inc.; Alumaguard 60.
2. Venture Tape Corporation; VentureClad Plus.
3. MFM Building Products Corp: Flex Clad 400
4. Substitutions: Division 01.

2.3 PIPE INSULATION

A. Pre-Molded Glass Fiber (PGF) Insulation:
1. ASTM C547 and ASTM C795, rigid molded, noncombustible.
2. 'K' ('Ksi') Value: ASTM C177, 0.24 at 75°F.
3. Maximum Service Temperature: 850°F.
4. Maximum Moisture Absorption: 0.2 percent by volume.
5. Vapor Barrier Jacket: White kraft paper with glass fiber yarn, bonded to aluminized film; self-sealing lap, moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches (ASJ-SSL).

B. Closed Cell Elastomeric (CCE) Insulation:
1. Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 3; use molded tubular material wherever possible.
2. Minimum Service Temperature: Minus 40°F.
3. Maximum Service Temperature: 220°F.
4. Connection: Waterproof vapor barrier adhesive.

2.4 PIPE INSULATION JACKETS

A. Polyvinyl-chloride (PVC): Plastic Pipe Jacket.
1. Product Description: ASTM D1785, One piece molded type fitting covers and sheet material, off-white color.
2. Thickness: 10 mil.
3. Connections: Brush on welding adhesive.

B. Aluminum (ALM): Self-Adhesive Waterproofing Jacket. Minimum 12 mil thick, vapor barrier and waterproofing membrane for installation over insulation located aboveground outdoors; UV resistant, zero permeability with textured aluminum-foil facing, impact and tear resistant.

2.5 PIPE INSULATION ACCESSORIES

A. Vapor Retarder Lap Adhesive: Compatible with insulation.

B. Covering Adhesive Mastic: Compatible with insulation.

C. Piping 1-1/2 inches diameter and smaller: Galvanized steel insulation protection shield. MSS SP-69, Type 40. Length: Based on pipe size and insulation thickness.

D. Piping 2 inches diameter and larger: hydrous calcium silicate. Inserts length: not less than 6 inches long, matching thickness and contour of adjoining insulation.

E. Closed Cell Elastomeric Insulation Pipe Hanger: Polyurethane insert with aluminum single piece construction with self-adhesive closure. Thickness to match pipe insulation.

F. Valve insulation Wraps: White, noncombustible, conforming to ASTM E 84. Match insulation thickness to pipe size. Valve covers shall be easily removable.

2.6 EQUIPMENT INSULATION

A. Closed Cell Elastomeric (CCE) Insulation:
1. Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 3, in sheet form.
2. Minimum Service Temperature: -40°F.
3. Maximum Service Temperature: 220°F.
4. Connection: Waterproof vapor barrier adhesive.

B. EQUIPMENT INSULATION JACKETS – For exterior mounted equipment only

C. PVC Plastic Equipment Jacket:
1. Product Description: ASTM D1785, sheet material, off-white color.
2. Minimum Service Temperature: -40°F.
3. Maximum Service Temperature: 150°F.
4. Water Vapor Permeance: ASTM E96/E96M; 0.02 perms.
5. Thickness: 10 mil.
6. Connections: Pressure sensitive color matching vinyl tape.

D. Aluminum Equipment Jacket:
1. ASTM B209
2. Thickness: 0.020 inch thick sheet.
3. Finish: Smooth.
4. Joining: Longitudinal slip joints and 2 inch laps.
5. Fittings: 0.02 inch thick die shaped fitting covers with factory attached protective liner.
6. Metal Jacket Bands: 3/8 inch wide; 0.02 inch thick aluminum.

2.7 EQUIPMENT INSULATION ACCESSORIES

A. Vapor Retarder Lap Adhesive: Compatible with insulation.

B. Covering Adhesive Mastic: Compatible with insulation.

C. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.

D. Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement: ASTM C449/C449M.

E. Pump body insulation: Provide insulation for pump body and components on chilled water systems. Provide pre-cut insulation from manufacturer or provide field fabricated insulation to ensure pump body and components are completely protected.

F. Adhesives: Compatible with insulation. Refer to manufacturers' installation manual.

2.8 DUCTWORK INSULATION

A. Flexible Glass Fiber (FGF) Insulation: ASTM C553 Type I, II, or III, ASTM C1290 Type III, in accordance to NFPA 90A and NFPA 90B for duct coverings, with ASTM C1136 foil scrim kraft (FSK).
1. Thermal performance: 1.0 lb/ft^3, 7.4 ft^2 hr °F/btu minimum R-value for 2" thick at 75°F mean temperature per ASTM C177 and ASTM C518.
2. Operating temperature range: 40°F to 250°F.
3. Water vapor permeance: 0.02 perms maximum per ASTM E96.
4. Water vapor sorption: 5% by weight maximum per ASTM C1104.
5. Corrosiveness: Does not accelerate per ASTM C665.
6. Fungi growth: No fungi growth per ASTM C1338.

B. Rigid Glass Fiber (RGF) Insulation: Glass fiber board, ASTM C 612 Type 1A or 1B, in accordance to NFPA 90A and NFPA 90B for duct coverings, with ASTM C 1136 foil scrim kraft (FSK).
1. Thermal performance: 8.7 ft^2 hr °F/btu minimum R-value for 2" thick at 75°F mean temperature per ASTM C177 and ASTM C518.
2. Operating temperature range: 0°F to 450°F.
3. Water vapor permeance: 0.02 perms maximum per ASTM E96.
4. Water vapor sorption: 5% by weight maximum per ASTM C1104.
5. Corrosiveness: Does not accelerate per ASTM C665.
6. Fungi growth: No fungi growth per ASTM C1338.

C. Closed Cell Elastomertic (CCE) Insulation:
1. Thermal performance: 8.0 ft^2 hr °F/btu minimum R-value for 2" thick at 75°F mean temperature per ASTM C177 and ASTM C518.
2. Operating temperature range: -40°F to 220°F.
3. Water absorption: 0.2% by volume per ASTM C 209 or ASTM C1763.
4. Water vapor permeability: 0.08 perm-in per ASTM E 96.
5. Ultraviolet (UV) resistance: Excellent per ASTM G 53 or ASTM G 90.
6. Weatherability: Excellent per ASTM D 471.

D. Fire Rated (FR) Insulation:
1. Inorganic blanket encapsulated with scrim reinforced foil meeting UL 1978
2. Thermal Conductivity: 0.42 at 500°F.
3. Weight: 1.4 pound per square foot.
4. Surface Burning Characteristics: Maximum 0/0 flame spread/smoke developed index when tested in accordance with ASTM E84.

E. Technical Data:
1. Insulation shall pass when tested in accordance with the following:
a. Non-combustibility per ASTM E136.
b. Fire resistance (wall) per ASTM E119.
c. Durability test per ASTM C518.
d. Internal fire test per ASTM E2336.
e. Fire engulfment (duct) per ASTM E814.
f. ULC grease duct test protocol.
g. Grease duct clearances per UL1978.
h. Air duct ventilation enclosure per ISO6944.
2. Thermal performance: 6.3 ft^2 hr °F/btu minimum R-value for 1-1/2" thick at 75°F mean temperature per ASTM C177 and ASTM C518.

2.9 DUCTWORK JACKETS

A. Aluminum (ALM): Self-Adhesive Waterproofing Jacket: Minimum 12 mil thick, vapor barrier and waterproofing membrane for installation over insulation located aboveground outdoors; UV resistant, zero permeability with textured aluminum-foil facing, impact and tear resistant.

2.10 DUCTWORK INSULATION ACCESSORIES

A. Vapor Retarder Tape:
1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

B. Vapor Retarder Lap Adhesive: Compatible with insulation.

C. Adhesive: Waterproof, ASTM E162 fire-retardant type.

D. Liner Fasteners: Galvanized steel, self-adhesive pad with head.

E. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.

F. Lagging Adhesive: Fire retardant type with maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

G. Impale Anchors: Galvanized steel, 12 gage self-adhesive pad.

H. Adhesives: Compatible with insulation.

I. Membrane Adhesives: As recommended by membrane manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Protect insulation from exposure to moisture prior to and after installation. All insulation other than flexible elastomeric that becomes wet shall be replaced at no cost to the project.

B. Verify piping, equipment and ductwork has been tested before applying insulation materials.

C. Verify piping, equipment and ductwork surfaces are clean and dry, with foreign material removed.

3.2 INSTALLATION - PIPING SYSTEMS

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with NAIMA National Insulation Standards.

C. Piping Exposed to View in Finished Spaces Provide with PVC Plastic pipe jacketing for additional protection. Locate insulation and cover seams in least visible locations.

D. Piping Exposed to view in mechanical spaces. Provide with PVC Plastic pipe jacketing for additional protection. Locate insulation and cover seams in least visible locations.

E. Continue insulation through penetrations of building assemblies or portions of assemblies having fire resistance rating of one hour or less. Provide intumescent firestopping when continuing insulation through assembly. Finish at supports, protrusions, and interruptions. Refer to Section 07 for penetrations of assemblies with fire resistance rating greater than one hour.

F. Piping Systems Conveying Fluids Below Ambient Temperature:
   1. Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
   2. Furnish factory-applied or field-applied vapor retarder jackets. Secure factory-applied jackets with pressure sensitive adhesive self-sealing longitudinal laps and butt strips. Secure field-applied jackets with outward clinch expanding staples and seal staple penetrations with vapor retarder mastic.
   3. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor retarder adhesive or PVC fitting covers.

G. For all hot piping conveying fluids, insulate flanges and unions at equipment.

H. Glass fiber insulated pipes conveying fluids above ambient temperature.
   1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.

2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.

I. Inserts and Shields:
1. Application: Piping 1-1/2 inches diameter or larger.
2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
3. Insert location: Between support shield and piping and under the finish jacket.
4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.

J. Insulation Terminating Points:
1. Coil Branch Piping 1 inch and Smaller: Terminate hot water piping at union upstream of the coil control valve.
2. Chilled Water Coil Branch Piping: Insulate chilled water piping and associated components up to coil connection.
3. Condensate Piping: Insulate entire piping system and components to prevent condensation.

K. Closed Cell Elastomeric Insulation:
1. Push insulation on to piping.
2. Miter joints at elbows.
3. Seal seams and butt joints with manufacturer's recommended adhesive.
4. When application requires multiple layers, apply with joints staggered.
5. Insulate fittings and valves with insulation of like material and thickness as adjacent pipe.

L. Closed Cell Elastomeric Insulation Pipe Hanger:
1. Install insulated pipe hangers at support locations.
2. Pipe clamps to be installed over insulation not directly to piping.

M. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

N. Buried Piping: Provide factory fabricated assembly with inner all-purpose service jacket with self-sealing lap, and asphalt impregnated open mesh glass fabric, with one mil thick aluminum foil sandwiched between three layers of bituminous compound; outer surface faced with a polyester film.

O. Heat Traced Piping: Insulate fittings, joints, and valves with insulation of like material, thickness, and finish as adjoining pipe. Size large enough to enclose pipe and heat tracer. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

P. Install valve bags on all chilled water valves unless otherwise indicated. Valve bags shall be easily removable for servicing of valves.

Q. Prepare pipe insulation for finish painting. Refer to Division 09.

3.3 INSTALLATION - EQUIPMENT

A. Factory Insulated Equipment: Do not insulate.

B. Exposed Equipment: Locate insulation and cover seams in least visible locations.

C. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface. On cold equipment, use vapor retarder cement.

D. Equipment Containing Fluids Below Ambient Temperature:
1. Insulate entire equipment surfaces.
2. Apply insulation close to equipment by grooving, scoring, and beveling insulation. Fasten insulation to equipment with studs, pins, clips, adhesive, wires, or bands.
3. Furnish factory-applied or field-applied vapor retarder jackets. Secure factory-applied jackets with pressure sensitive adhesive self-sealing longitudinal laps and butt strips. Secure field-applied jackets with outward clinch expanding staples and seal staple penetrations with vapor retarder mastic.
4. Finish insulation at supports, protrusions, and interruptions.

E. Equipment Containing all Fluids Above Ambient Temperature:
1. Insulate flanges and unions with removable sections and jackets.
2. Install insulation with factory-applied or field applied jackets, with or without vapor barrier. Finish with glass cloth and adhesive.
3. Finish insulation at supports, protrusions, and interruptions.

F. Nameplates and ASME Stamps: Bevel and seal insulation around; do not cover with insulation.

G. Equipment Requiring Access for Maintenance, Repair, or Cleaning: Install insulation for easy removal and replacement without damage.

3.4 INSTALLATION - DUCTWORK SYSTEMS

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with NAIMA National Insulation Standards.

C. Protect insulation from exposure to moisture prior to and after installation. All insulation other than flexible elastomeric that becomes wet shall be replaced at no cost to the project.

D. Duct dimensions indicated on Drawings are finished inside dimensions.

E. Insulated ductwork conveying air below ambient temperature:
1. Provide insulation with vapor retarder jackets.
2. Finish with tape and vapor retarder jacket.

3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.

F. Insulated ductwork conveying air above ambient temperature:
1. Provide with or without standard vapor retarder jacket.
2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.

G. External Elastomeric Duct Insulation:
1. Adhere to clean oil-free surfaces with full coverage of adhesive.
2. Seal seams and butt joints with manufacturer's recommended adhesive.
3. When application requires multiple layers, apply with joints staggered.
4. Insulate standing metal duct seams with insulation of like material and thickness as adjacent duct surface. Apply adhesive at joints with flat duct surfaces.
5. Lift ductwork off trapeze hangers and insert spacers.

H. Kitchen Exhaust Ductwork:
1. Cover duct by wrapping with insulation using overlap method and butt joint with collar method.
2. Overlap seams of each method by 3 inches.
3. Attach insulation using steel banding or by welded pins and clips.
4. Install insulation without sag on underside of ductwork. Use additional fasteners to prevent sagging.

I. Ducts Exterior to Building:
1. Install insulation according to external duct insulation paragraph above.
2. Provide external insulation with vapor retarder jacket. Cover with outdoor jacket finished with caulked aluminum jacket with seams located on bottom side of horizontal duct section.
3. Finish with aluminum duct jacket.
4. Calk seams at flanges and joints. Located major longitudinal seams on bottom side of horizontal duct sections.

J. Duct Acoustical Liner
1. Ductwork shall still be insulated per this specification even if the ductwork is acoustically lined. Acoustically lined ductwork does not negate the use of wrap as insulation.

K. Prepare duct insulation for finish painting. Refer to Division 09.

3.5 SCHEDULES

A. Ductwork Schedules
1. Items Not Insulated:
a. Fibrous-glass ducts.
b. Factory-insulated flexible ducts.
c. Factory-insulated plenums and casings.
d. Vibration-control devices.

e. Factory-insulated access panels and doors.
f. Stair pressurization supply ductwork.
g. Exhaust not connected to energy recovery system (unless indicated within tables below)

2. Provide insulation materials and thicknesses identified below. If more than one material is listed for a duct location, selection from materials listed is Division 23 option.

Heating and Cooling Supply and Heat/ Energy Recovery System Exhaust and Return Ducts Climate Zone 5, 6, 7 and 8				
Description	Minimum As-Installed R-Value	Insulation Type	Minimum Thickness (inches)	Jacketing
Exterior to building envelope	R-12.0	Closed Cell Elastomeric (CCE)	3.0	ALM
Concealed within thermal envelope of building	R-6.0	Flexible Glass Fiber (FGF)	2.0	FSK
Exposed in mechanical room	R-6.0	Rigid Glass Fiber (RGF)	2.0	FSK

Unconditioned Outside Air Intake Ducts and Exhaust/Relief Duct Inside Building Envelope Climate Zones 2 Through 8				
Description	Minimum As-Installed R-Value	Insulation Type	Minimum Thickness (inches)	Jacketing
For outside air intakes, all ductwork between the building envelope and the first system heating coil, cooling coil or air handling unit connection.	R-12.0	Flexible Glass Fiber (FGF)	3.0	FSK
		Rigid Glass Fiber (RGF)	3.0	FSK
For exhaust/relief ducts, all ductwork between the building envelope and first system isolation damper.	R-12.0	Flexible Glass Fiber (FGF)	3.0	FSK
		Rigid Glass Fiber (RGF)	3.0	FSK

Oven, Dishwash, Warewash and Shower Exhaust Ducts Climate Zones 0 Through 8				
Description	Minimum As-Installed R-Value	Insulation Type	Minimum Thickness (inches)	Jacketing
Concealed in unconditioned spaces including shafts, mechanical spaces, non-plenum return ceiling cavities and crawlspaces (ventilated and non- ventilated)	R-3.5	Flexible Glass Fiber (FGF)	1.5	FSK

Concealed, Type I (Grease), Commercial, Kitchen Hood Exhaust Duct and Plenums Climate Zones 0 Through 8				
Description	Minimum As-Installed R-Value	Insulation Type	Minimum Thickness (inches)	Jacketing
All ductwork.	N/A	Fire Rated (FR)	Number of Layers and Thickness Required to Meet 2-Hour Fire Rating for Grease Ducts	N/A

3.6 DUCT LINER

A. See Section 23 3100 - HVAC Ducts and Casings, for duct liner specifications

3.7 PIPE INSULATION SCHEDULE

A. Provide insulation materials and thicknesses scheduled for each system type and pressure/temperature range. If more than one material is listed for a system, selection from materials listed is Division 23 option.

B. For dual temperature systems (heating and cooling), provide thickness equal to greater of heating or cooling scheduled value. Dual temperature piping shall also meet all vapor barrier requirements for cooling insulation (perm rating).

C. Insulation for pre-insulated piping shall meet all specified requirements.

D. Insulate piping operating at temperatures below 40°F and systems operating between 40°F to 65°F in accordance with NAIMA Guide to Insulating Chilled Water Piping Systems with Mineral Fiber Pipe Insulation. Comply with all recommendations including but not limited to the requirement for vapor dams every fourth section of insulation.

Heating Hot Water Systems					
Insulation Type	Pipe Size (inch)	Indoor - Minimum Thickness (inch)	Outdoor - Minimum Thickness (inch)	Factory Applied Jacket	Field Applied Jacket
Pre-Molded Glass Fiber (PGF)	Less than 1 to 1.5	1.5	3.0	ASJ-SSL	Indoor: PVC for exposed piping finished space and mechanical rooms. Outdoor: ALM
	1.5 and Larger	2.0	4.0		

Cooling and Glycol Energy Recovery Systems: 40 deg F to 65 deg F Applies to the Following Systems: Chilled Water					
Insulation Type	Pipe Size (inch)	Indoor - Minimum Thickness (inch)	Outdoor - Minimum Thickness (inch)	Factory Applied Jacket	Field Applied Jacket
Closed Cell Elastomeric (CCE)	Less than 1 to 1.5	0.5	3.0	N/A	Indoor: PVC for exposed piping finished space and mechanical rooms Outdoor: ALM
	1.5 and Larger	1.0	3.0		

All Outdoor Heat Traced Piping				
Insulation Type	Pipe Size (inch)	Minimum Thickness (inch)	Factory Applied Jacket	Field Applied Jacket
Pre-Molded Glass Fiber (PGF)	Less than 1	1.25*	ASJ-SSL	Outdoor: ALM
	1 to Less than 1.5	1.5*		
	1.5 to 2	2.0*		
	2.5 to 3	3.0*		
	4	4.0*		

1. *Insulation thickness to be determined by heat trace manufacturer installation instructions

Cooling Coil Condensate Piping, Outdoor Cooling Tower Makeup Water Piping and Equipment Drain Piping: All					
Insulation Type	Pipe Size (inch)	Indoor - Minimum Thickness (inch)	Outdoor - Minimum Thickness (inch)	Factory Applied Jacket	Field Applied Jacket
Closed Cell Elastomeric (CCE)	All Sizes	0.75	2.0	N/A	Indoor (CCE): N/A Outdoor (CCE): ALM

Refrigerant Piping					
Insulation Type	Pipe Size (inch)	Indoor - Minimum Thickness (inch)	Outdoor - Minimum Thickness (inch)	Factory Applied Jacket	Field Applied Jacket
Closed Cell Elastomeric (CCE)	Less than 3	1.0	1.0	N/A	Indoor: N/A Outdoor: ALM

E. EQUIPMENT INSULATION SCHEDULE

F. Provide insulation materials and thicknesses scheduled for each system type and pressure/temperature range. If more than one material is listed for a system, selection from materials listed is Division 23 option.

Chilled Water: Pump Bodies, Air Separators, Expansion Tanks				
Insulation Type	Indoor - Minimum Thickness (inch)	Outdoor - Minimum Thickness (inch)	Factory Applied Jacket	Field Applied Jacket
Closed Cell Elastomeric (CCE)	1.0	1.5	N/A	Indoor: N/A Outdoor: ALM

END OF SECTION

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SECTION 23 0900 - INSTRUMENTATION AND CONTROLS FOR HVAC

PART 1 GENERAL

1.1 SECTION INCLUDES

A. System Description

B. Operator Interface

C. General Purpose Digital Controllers

D. Unitary Or Terminal Digital Controllers

E. Input/Output Interface

F. Bridges And Routers

G. Gateways

H. Panels

I. Power Supplies And Line Filtering

J. Local Area Network (Lan)

K. System Software

L. Controller Software

M. Input Hardware

N. Thermostats

O. Humidistats

P. Time Clocks

Q. Control Valves

R. Dampers

S. Actuators

T. Wire, Cable And Network Accessories

1.2 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. This Section includes provision of control sequences for HVAC systems, subsystems, and equipment indicated on the drawings and other Division 23 specification sections.

C. Section 23 0400 – General Conditions for Mechanical Trades.

D. Section 26 2717 - Equipment Wiring: Electrical characteristics and wiring connections.

E. Section 28 3100 - Fire Detection and Alarm.

1.3 REFERENCE STANDARDS (follow the most currently adopted amended version)

A. ANSI/CEA 709.1.D - Control Network Protocol Specification.

B. ASHRAE Std 135 - BACnet - A Data Communication Protocol for Building Automation and Control Networks.

C. MIL-STD-810 - Environmental Engineering Considerations and Laboratory Tests; Revision G.

D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. UL (DIR) - Online Certifications Directory.

1.4 DEFINITIONS

A. Backbone: The high traffic density connectivity portion of the communication network.

B. Bridge: A device that connects two or more LAN segments at the physical and data link layers. This device may also perform message filtering if programmed to do so.

C. Browser: A computer program that accesses and displays information from the Internet or intranet.

D. Client: A system or device that makes use of another device for some particular purpose through a system request.

E. Device (BACnet): A device, real or virtual, that supports digital communication using the BACnet protocol. Examples would be an operator terminal, router, unitary controller, etc.

F. Ethernet: Ethernet is a widely used Local Area Network (LAN). Ethernet, which conforms to IEEE Standard 802.3.

G. Events: Changes in the state of an object, typically between Normal, Off-Normal, and Fault Condition. Events may be reported to other BACnet devices.

H. Firewall: A security mechanism placed at the connection between networks and/or at networks outside connections. The firewall restricts access to the network.

I. Gateway: A device that connects two or more dissimilar networks by message translation and signal conditioning, permitting information exchange among them. A gateway would be necessary to translate LonWorks messages to the BACnet form.

J. Gbps: Gigabits per second. A unit of data transfer speed equal to 1024 Mbps.

K. GUI: Graphical User Interface, a type of Operator Interface Device for a BAS.

L. Hertz: A unit of measure equal to an oscillation per second.

M. HTML: The source form used for documents on the Internet or on an intranet. HTML embeds commands that determine formatting along with the text to be displayed.

N. Instance: A number which uniquely identifies an object within a device (e.g., Analog Input No.1, No. 2, etc.). Device Objects are required to have an instance number that is unique to their internetwork. Instance numbers may range from 0 to 4194303.

O. ID: Identification (name, number, plate, or tag).

P. IP: Internet Protocol. The protocol that defines both the format of packets used on a TCP/IP internet or intranet and the mechanism for routing a packet to its destination.

Q. IP address: A 32-bit address assigned to a device that uses TCP/IP protocols.

R. Kbps: A unit of data transfer equal to 1024 bits per second.

S. LAN: A LAN is a network of interconnected hardware devices sharing resources within a relatively small geographic area.

T. Mbps: A unit of data transfer equal to 1024 Kbps.

U. MS/TP: The Master-Slave/Token-Passing EIA-485 LAN developed for BACnet by ASHRAE. Operates at 9600, 19.2K, 38.4K and 76.8 K BPS. Master nodes (devices) pass around a speaking token which entitles the holder to initiate BACnet messages. Slave nodes can only respond to messages from Masters.

V. Native BACnet: A Building Automation System that uses the BACnet protocol for its data transfer between hardware devices and operator interface devices.

W. Object Identifier: A 32-bit number which uniquely identifies an object within a device, or the device object internetwork-wide. 10 bits represent the object type and 22 bits the instance number.

X. PC: Personal Computer.

Y. Peer-to-Peer Communication: Communication between equals. In BACnet, application programs (performing the functions of the BACnet devices on which they run) in devices of the appropriate conformance class talk to each other as peers, using the Protocol Stacks to deliver their message to each other. Likewise, Network Layers may talk as peers to determine how to route messages.

Z. Physical Segment: A single continuous medium 9-wire to which BACnet nodes are attached.

AA. PID: Proportional Integral and Derivative.

BB. Protocol: A design that specifies the details of how digital devices interact.

CC. Repeater: A device that connects two or more physical segments of a LAN at the physical layer and exactly reproduces the electrical signals on either side so that nodes on either side of the repeater are considered to be on the same network.

DD. Router: A device which connects two or more networks, of same or different types, so that a BACnet message may be transferred across the appropriate networks to reach its destination.

EE. RS-232-C: The technical name of the standard for serial data connections such as those between a computer and a keyboard.

FF. Server: A computer or hardware device which stores the resources accessed by other computers or hardware devices (clients).

GG. TCP/IP: The protocol suite used in the Internet. Although the suite contains many protocols, TCP and IP are two of the most important.

HH. Unitary Controller: Devices which controls and/or monitors a single piece of equipment.

II. WEB: A synonym for the World Wide Web. In modern usage pertains to both the Internet and to intranets using the TCP/IP Protocol.

1.5 GENERAL REQUIREMENTS

A. All work of this section shall be coordinated and provided by the single Building Management System (BMS) Contractor.

B. The BMS work shall consist of the provision of all labor, materials, tools, equipment, software, software licenses, software configurations and database entries, interfaces, wiring, tubing, installation, labeling, engineering, calibration, documentation, samples, submittals, testing, commissioning, training services, permits and licenses, transportation, shipping, handling, administration, supervision, management, insurance, temporary protection, cleaning, cutting and patching, warranties, services, and items, even though these may not be specifically mentioned in these Division documents which are required for the complete, fully functional and commissioned BMS.

C. The BMS shall perform all sequences of operation which may be listed on control drawings. Controls supplier shall provide all devices necessary to completely perform sequences whether such devices are explicitly shown on the drawings specified, or not shown or specified.

D. Where other Sections include a requirement for manufacturer equipment controllers (e.g. chillers, boilers, packaged units that are specified with packaged controls), this Section shall be responsible for provision of control components and software required to perform sequences of operation outlined that are in addition to the capabilities of the controllers provided with the manufacturer equipment. Coordinate and integrate all equipment controllers.

E. Each component of the system, including the LANs and software, shall be in full compliance with ASHRAE Standard 135, commonly referred to as BACnet.

F. Provide the services of control manufacturer's representative to be on site during startup, testing and balancing procedures, detailed in Part 3 of this specification. Representative shall be part of manufacturer's service organization and shall be skilled in the adjustment and calibration of all control devices as well as being capable of modifying and checking system software.

1.6 ADMINISTRATIVE REQUIREMENTS

A. The work of this Division shall be scheduled, coordinated, and interfaced with the associated work of other trades.

B. If the Contractor believes there are conflicts or missing information in the project documents, the Contractor shall promptly request clarification and instruction from the design team.

C. Pre-installation Meeting: Conduct a pre-installation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

D. Scheduling: Coordinate with Owner and General Contractor. Manage and coordinate the BMS work in a timely manner in consideration of the Project schedules. Coordinate with the associated work of other trades so as to not impede or delay the work of associated trades.

1.7 COORDINATION

A. Coordinate locations of thermostats, humidistats, and other exposed control sensors with plans and room details before installation.

B. Coordinate work under provisions of General Conditions and Division 1 as applicable.

C. Coordinate material delivery to comply with project schedule.

D. Coordinate conduit, and wiring installation with other trades to avoid conflicts.

E. Coordinate panel locations and installation with other trades to avoid conflicts and to provide power and other requirements.

1.8 SUBMITTALS

A. Product Data: Include manufacturer's technical literature for each control device. Indicate dimensions, capacities, performance characteristics, electrical characteristics, finishes for materials, and installation and startup instructions for each type of product indicated.
1. DDC System Hardware: Bill of materials of equipment indicating quantity, manufacturer, and model number. Include technical data for operator workstation equipment, interface equipment, control units, transducers/transmitters, sensors, actuators, valves, relays/switches, control panels, and operator interface equipment.
2. Control System Software: Include technical data for operating system software, operator interface, color graphics, information on programmability and other third-party applications.
3. Controlled Systems: Instrumentation list with element name, type of device, manufacturer, model number, and product data.

B. Shop Drawings: Submit shop drawings containing the following information for each control system:
1. System architecture diagram: Indicate programmable control unit locations, and trunk data conductors.
2. Schematic control diagrams: Submit diagrams of each controlled system with control points labeled and control elements graphically shown, with wiring.
3. Floor plans: Show sizes and locations of components, horizontal routing and risers.
4. Points list: List connected data points, including connected control unit and input device.
5. Sequence of operation: Written detailed operational description of sequences
6. Schedule of dampers: Include size, leakage, pressure drop and other flow characteristics.
7. Schedule of valves: Including flow, pressure drop, valve coefficient (CV), shut-off head, maximum controllable differential pressure range and other flow characteristics.

C. Wiring Diagrams: Submit wiring diagrams, detailing wiring for power, signal, and control systems and differentiating clearly between manufacturers installed and field installed wiring.

D. Sample Covers: Submit samples of each type of space sensor cover for approval prior to ordering the covers.

E. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owners name and registered with manufacturer.

1.9 RECORD DOCUMENTATION

A. General: Manuals shall be furnished as files in portable document format (PDF). One complete set of manuals shall be furnished before the contract is complete. The manuals shall include the name, address and telephone number of each subcontractor installing equipment and systems and of the local representative for each specific item of equipment and each system provided. A logically organized table of contents shall be included with dynamic links to view all data sheets.

B. Hardware Manual: The hardware manual shall describe the system and each piece of equipment provided.

C. Software Manual: The software manual shall describe programming and testing, starting with a system overview and proceeding to a detailed description of each software module. The manual shall be oriented to programmers and shall describe calling requirements, data exchange requirements, data file requirements, and other information necessary to enable proper integration, loading, testing, and program execution.

D. Operations Manual: The Operations manual shall describe the operations of the complete system.

E. Maintenance Manual: The maintenance manual shall provide descriptions of maintenance for each piece of equipment, including inspection, periodic preventative maintenance, fault diagnosis, and repair or replacement of defective components.

F. Project Drawings: Record actual locations of control components, including panels, thermostats, and sensors. Accurately record actual location of control components, including panels, thermostats, and sensors. Revise shop drawings to reflect actual installation and operating sequences.

1.10 QUALITY ASSURANCE

A. Products shall be standard manufacturer products having been in commercial or industrial use for at least one year prior to the bid date for this project. Products shall comply with the following as a minimum:
1. NFPA 90A, “Installation of Air Conditioning and Ventilation Systems.”
2. NISTIR 6392 for digital system control components.
3. ANSI/ASHRAE Standard 135-1995 for BACnet compatible system control components.
4. Applicable provisions of NFPA code.
5. Applicable provisions of NEC.

~~B. Designer Qualifications: Perform design of system software under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.~~

C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.

D. Installer Qualifications: Company specializing in performing work of the type specified and with minimum three years of documented experience.

E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and certified and marked for intended use.

F. Comply with ASHRAE 135 for DDC system components.

1.11 PERFORMANCE REQUIREMENTS

A. Accuracy: Report values and maintain measured variables within tolerances as follows:
1. Water Temperature: Plus or minus 1 deg F.
2. Water Flow: Plus or minus 5 percent of full scale.
3. Water Pressure: Plus or minus 2 percent of full scale.
4. Space Temperature: Plus or minus 1 deg F.
5. Ducted Air Temperature: Plus or minus 1 deg F.
6. Outside Air Temperature: Plus or minus 2 deg F.
7. Dew Point Temperature: Plus or minus 3 deg F.
8. Temperature Differential: Plus or minus 0.25 deg F.
9. Relative Humidity: Plus or minus 5 percent.
10. Airflow (Pressurized Spaces): Plus or minus 3 percent of full scale.
11. Airflow (Measuring Stations): Plus or minus 5 percent of full scale.
12. Airflow (Terminal): Plus or minus 10 percent of full scale.
13. Air Pressure (Space): Plus or minus 0.01-inch wg.
14. Air Pressure (Ducts): Plus or minus 0.1-inch wg.
15. Carbon Monoxide: Plus or minus 5 percent of reading.
16. Carbon Dioxide: Plus or minus 50 ppm.
17. Electrical: Plus or minus 5 percent of reading.

B. Alarm Response Time: Annunciate alarm at workstation within 45 seconds. Multiple workstations must receive alarms within five seconds of each other.

1.12 WARRANTY

A. Correct defective Work within a five year period after Substantial Completion.

B. Provide five year manufacturer's warranty for field programmable micro-processor based units.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Provide operator workstation software, controller software, and custom application programming language, building controllers, programmable application controllers and application specific controllers from only one of the following manufacturers.
1. Distech Controls- CTC (Town of Greenwich Controls System)

B. Other products specified herein (such as sensors, valves, dampers and actuators) need not be manufactured by the above manufacturers, unless otherwise noted.

2.2 SYSTEM DESCRIPTION

A. The system shall consist of a series of digital controllers interconnected by the LAN. One or more operator interface devices shall be connected to the LAN to provide access to the controllers for the purpose of receiving information or issuing commands. The controllers shall be located adjacent to the equipment they monitor or control and shall be sized for the task assigned to them. The system shall utilize distributed processing architecture and one controller shall be provided for each major piece of equipment controlled or monitored except that the equipment associated with the chiller plant and the heating plant shall be controlled from multiple controllers if necessary.

B. The communication network between building controllers shall be BACnet over Ethernet or BACnet over IP. The communication network between unitary or terminal unit controllers shall be BACnet MS/TP over EIA-485. BACnet Point-To-Point may be used for communication between the network and modems, line drivers or other data communication equipment.

C. The BAS software shall be designed around the open standards of web technology. The BAS server shall communicate using the ASHRAE BACnet/IP protocol. The Server shall be accessed using a web browser. The web browser Graphical User Interface shall support Microsoft browsers, and Windows as well as non-Windows operating systems. No special software shall be required for the PC's/PDA's used to access the BAS via a web browser.

D. Input devices such as temperature sensors, humidity sensors, pressure sensors, motor current sensors, relays and other devices to sense or measure conditions of equipment or space, shall be provided as part of the system to meet the requirements of the sequences of operation.

E. Output devices such as valves, dampers, damper operators, relays, solenoids, transducers, or other devices to control equipment, shall be provided as part of the system to meet the requirements of the sequences of operation.

F. System Software:
1. Provide and install the software indicated in Part 2 of this specification. The database required for implementation shall be provided, including point description, alarm limit, calibration variable graphics, report, and point summaries.
2. The system described herein is a distributed processing system, which utilizes DDC to perform each logic and control decision and operation for each piece of equipment. An OID shall not be required to operate the system. Each item of large equipment, such as air handling units, boilers and PDDU units, shall be provided with a separate digital controller panel (DCP) with readout capability. Each equipment shall be controlled by a separate application-specific field controller (ASC).

G. Labeling: Provide a comprehensive labeling system for each wiring and component using the designations shown on the approved submittals.

H. Electrical Work: Provide the BAS power and control wiring required. This shall include power requirements for control panels, field controllers, sensors and other control devices. Provide transformers necessary to step down from the available voltage to the voltage required to operate the control system products and control devices.

I. Other Work: The work included under this Division shall include the drawings, specifications, submittals, equipment, labor, materials, technical supervision, transportation, training services, documentation, warranty, and other appurtenant work as required to furnish and install a fully operational system to monitor and control, set forth, in strict accordance with these specifications and subject to the terms and conditions of the Contract. An apparatus, appliance, material or work not shown on the drawings but mentioned in the specifications, or vice versa, or incidental accessories necessary to make the work entirely complete and ready for operation, even if not particularly specified, shall be furnished, delivered and installed by the Contractor without additional expense to the Owner.

J. Completion: It is the intention of the specifications and drawings to call for furnished work, tested, and ready for operation. Wherever the word "provide" is used, it shall mean "provide and install complete and ready for use."

K. Omissions: Minor details not usually shown or specified but necessary for proper installation and operations shall be included, as if herein specified and/or shown.

2.3 OPERATOR INTERFACE

A. General:
1. PC Based Work Station shall reside on high speed network with building controllers and be connected to server for full access to all system information
2. Workstation, controllers, and control backbone shall communicate using BACnet protocol and addressing.

B. Personal Computer: PC compatible with sufficient memory and hard drive storage to support graphics, reports, and communication requirements. Furnish with the following minimum requirements:
1. Processor: Intel i5 4.0 GHz.
2. Hard Drive: 1 TB
3. Memory: 8 Gigabyte DDR4 SDRAM.
4. Mouse And keyboard.
5. Monitor: Minimum of 24 inch color, flat panel display.
6. Operating System: Windows 10
7. Printer: Furnish each operator workstation with color ink jet printer and associated cables. Printer capable of minimum of 14 pages per minute (PPM) operation and compatible with standard parallel or USB communications or network capable.

C. Laptop: PC compatible with sufficient memory and hard drive storage to support graphics, reports, and communication requirements. Furnish with the following minimum requirements:
1. Processor: Intel i5 4.0 GHz.
2. Hard Drive: 1 TB
3. Memory: 8 Gigabyte DDR4 SDRAM.
4. Mouse: two-button optical type wireless.
5. Keyboard: 104 key.

2.4 GENERAL PURPOSE DIGITAL CONTROLLERS

A. General Purpose Digital Controllers shall be BTL listed.

B. Communication Speed: Controllers shall communicate using Ethernet or BACnet/IP using an unshielded twisted pair at the Data Link Layer.

C. General Specification: Each General Purpose Digital Controller shall be capable of stand-alone DDC operation utilizing its own minimum 16-bit processor, non-volatile flash memory, input/output, 10-bit A to D conversion, hardware clock/calendar, and voltage transient and lightning protection devices. Firmware revisions to the controller shall be made from the BAS server or remotely over the intranet or Internet. Controllers shall not require component changes to implement firmware revisions.

D. Self-Test Diagnostics: Each controller shall include self-test diagnostics, enabling the controller to automatically report malfunctions to the server.

E. Each General Purpose Multiple Application Digital Controller shall contain both software and firmware to perform full DDC Proportional, Integral, and Derivative (PID) control loops and programs.

F. Input/Output Processing:
1. Digital outputs shall be relays, each configured as normally open or normally closed. Each output shall have a manual Hand-Off-Auto switch to allow for override and a LED to indicate the operating mode of the output.
2. Universal inputs shall be Thermistor, RTD 0-10VDC, 0-20 mA, resistive and dry contact.
3. Analog output shall be electronic, voltage mode 0-10 VDC, current mode 4-20mA.

G. Power and Noise Immunity:
1. Maintain operation at 90 to 110 percent of nominal voltage rating.
2. Perform orderly shutdown below 80 percent of nominal voltage.
3. Operation protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W. at 3 feet.

2.5 UNITARY OR TERMINAL DIGITAL CONTROLLERS

A. BACnet BIBBs: The Unitary Controllers shall use BACnet as the native communications protocol between controllers on the unitary controller network and shall be classified as AACs, ASCs, or SAs by the BACnet Testing Laboratory.

B. Communication Speed: The communication between unitary controllers shall be 38.4 Kbps, minimum, over EIA-485, using MS/TP architecture.

C. Sensor Support: Each unitary controller shall be able to support various types of zone temperature sensors, such as temperature sensor only, temperature sensor with built-in local override switch, and temperature sensor with built-in set point adjustment switch.

D. Each Unitary Controller for VAV application shall have a built-in air flow transducer for accurate air flow measurement in order to provide the pressure independent VAV operation, and an integral direct-coupled electronic actuator.

E. Visual Status: Each unitary controller and unitary controller interface shall have LED indication for visual status of communication, power, and each output.

F. Standalone Algorithm: In the event of a loss of communication, each Unitary Controller shall control from a stand-alone algorithm to maintain the assigned space temperature until communication with the unitary control module interface is restored.

G. Input/Output Processing:
1. Digital Outputs shall be relays, 24 Volts AC or DC maximum, having 3-amp maximum current. Each relay shall be configured as normally open or normally closed, and either dry contact or bussed.
2. Universal Inputs shall be Thermistor, RTD, dry contacts or 0-5VDC.
3. Enhanced Zone Sensor Input: The input shall provide one Thermistor input, one local setpoint adjustment, one timed local override switch, and one occupancy LED indicator.
4. Analog Output electronic, voltage made 0-10VDC or current mode 4-20mA or 3-wire floating.

2.6 INPUT/OUTPUT INTERFACE

A. Hardwired inputs and outputs tie into the DDC system through building, custom application, or application specific controllers.

B. All Input/Output Points:
1. Protect controller from damage resulting from any point short-circuiting or grounding and from voltage up to 24 volts of any duration.
2. Provide universal type for building and custom application controllers where input or output is software designated as either binary or analog type with appropriate properties.

C. Binary Inputs:
1. Allow monitoring of On/Off signals from remote devices.
2. Provide wetting current of 12 mA minimum, compatible with commonly available control devices and protected against the effects of contact bounce and noise.
3. Sense dry contact closure with power provided only by the controller.

D. Pulse Accumulation Input Objects: Conform to all requirements of binary input objects and accept up to 10 pulses per second.

E. Analog Inputs:
1. Allow for monitoring of low voltage 0 to 10 VDC, 4 to 20 mA current, or resistance signals (thermistor, RTD).
2. Compatible with and field configurable to commonly available sensing devices.

F. Binary Outputs:
1. Used for On/Off operation or a pulsed low-voltage signal for pulse width modulation control.
2. Outputs provided with three position (On/Off/Auto) override switches.
3. Status lights for building and custom application controllers to be selectable for normally open or normally closed operation.

G. Analog Outputs:
1. Monitoring signal provides a 0 to 10 VDC or a 4 to 20 mA output signal for end device control.
2. Provide status lights and two position (AUTO/MANUAL) switch for building and custom application controllers with manually adjustable potentiometer for manual override on building and custom application controllers.

H. Tri State Outputs:
1. Coordinate two binary outputs to control three point, floating type, electronic actuators without feedback.
2. Limit the use of three point, floating devices to the following zone and terminal unit control applications:
   a. VAV terminal units.
   b. Duct mounted heating coils.
   c. Zone dampers.
   d. Radiation.
3. Control algorithms run the zone actuator to one end of its stroke once every 24 hours for verification of operator tracking.

I. System Object Capacity:
1. System size to be expandable to twice the number of input output objects required by providing additional controllers, including associated devices and wiring.
2. Hardware additions or software revisions for the installed operator interfaces are not to be required for future, system expansions.

2.7 BRIDGES AND ROUTERS

A. The controller network shall use BACnet as its native communication protocol. Network bridges and routers must be of a modular design to ensure reliability and system performance. Routers and bridges must be used between system LANs and between the system and third party devices requiring interfaces.

B. BACnet Router: The central system shall use the building's Local Area Network (LAN) for communication. The communication between the central server and the controllers shall be BACnet/IP. A router shall be provided as required to bridge BACnet/IP and the data link used between controllers (BACnet Ethernet and BACnet MS/TP). Proprietary networks and proprietary protocols are not acceptable. The BACnet routers shall utilize flash memory to allow firmware upgrades to be performed remotely.

C. Unitary Controller Router: A router shall be provided as required to bridge between the unitary controller network and the main controller network.

2.8 GATEWAYS

A. Bi-Directional Protocol Translator (BPT): The Building Automation System shall establish an interconnection, which appears to the operator to be seamless, between the building's electrical and/or mechanical subsystems, as well as other manufacturers' control systems as may be installed in the future. These systems shall be controlled, monitored, and programmed with the same programming language used for the other control modules.

1. The BPT shall be a microprocessor-based communication device to provide seamless, two-way translation between two or more standard or non-standard protocols.
2. The BPT shall be available for a variety of Data Link/Physical Layer configurations, including PTP (point-to-point) via EIA-232, MS/TP via EIA-485, and ARCNET.
3. In addition to BACnet, the BPT shall also support other protocols including Modbus, JBus and other protocols as specified herein for electrical/mechanical subsystems.
4. The BPT shall have at least three communications ports: One shall be for communication between native BACnet controllers residing on the controller network; the other two ports shall have the ability to be configured for different protocols.
5. The BPT shall provide full custom programmability of the data flowing between the networks, using the same graphic programming as specified herein. The system shall have the ability to create custom building control strategies using global data between networks.

2.9 PANELS

A. Cabinet: Each DDC Controller shall be enclosed in a field panel or equipment enclosure with relays and controls mounted in cabinet and temperature indicators, pressure gauges, pilot lights, push buttons and switches flush on cabinet panel face. The field panel cabinet shall be general purpose utility enclosures with enameled finished face panel. Provide sufficient access for wire and conduit to enter the cabinet. Each of the field control panel locks for the project shall be keyed alike.
   1. Locations outdoors and/or in wet ambient conditions: Provide waterproof enclosure rated for operation at 32-122 degrees F.
   2. Locations in conditioned space: Provide dustproof enclosure

B. Each panel shall include the following:
   1. Receptacles: Provide a 20 ampere duplex receptacle inside or immediately adjacent to the field control panel.
   2. Master Disconnect Switch: Provide a master electrical power disconnect switch inside the field control panel to disconnect the external power to the cabinet for maintenance and repair. The disconnect switch shall not affect the duplex receptacle hereinbefore specified.
   3. Terminal Strips: Provide screw type terminal strips in the field control panel for the termination of field wiring. Lay out terminal strips in a neat and orderly fashion and label each termination. Wiring entering the panel shall be routed through the panel wire-ways in a neat and workmanlike manner, properly tied or laced and terminated.

2.10 POWER SUPPLIES AND LINE FILTERING

A. Power Supplies:
   1. Provide UL listed control transformers with Class 2 current limiting type or over-current protection in both primary and secondary circuits for Class 2 service as required by the NEC.
   2. Limit connected loads to 80 percent of rated capacity.
   3. Match DC power supply to current output and voltage requirements.
   4. Unit to be full wave rectifier type with output ripple of 5.0 mV maximum peak to peak.
   5. Regulation to be 1 percent combined line and load with 100 microsecond response time for 50 percent load changes.
   6. Provide over-voltage and over-current protection to withstand a 150 percent current overload for 3 seconds minimum without trip-out or failure.
   7. Operational Ambient Conditions: 32 to 120 degrees F.
   8. EM/RF meets FCC Class B and VDE 0871 for Class B and MIL-STD 810 for shock and vibration.
   9. Line voltage units UL recognized and CSA approved.

B. Power Line Filtering:
1. Provide external or internal transient voltage and surge suppression component for all workstations and controllers.
2. Minimum surge protection attributes:
a. Dielectric strength of 1000 volts minimum.
b. Response time of 10 nanoseconds or less.
c. Transverse mode noise attenuation of 65 dB or greater.
d. Common mode noise attenuation of 150 dB or greater at 40 to 100 Hz.

2.11 LOCAL AREA NETWORK (LAN)

A. Provide communication between control units over local area network (LAN).
1. LAN Capacity: Not less than 60 stations or nodes.
2. Break in Communication Path: Alarm and automatically initiate LAN reconfiguration.
3. LAN Data Speed: Minimum 100 MBps
4. Communication Techniques: Allow interface into network by multiple operation stations and by auto-answer/auto-dial modems. Support communication over telephone lines utilizing modems.
5. Transmission Median: Fiber optic or single pair of solid 24 gage twisted, shielded copper cable.
6. Network Support: Time for global point to be received by any station, shall be less than 3 seconds. Provide automatic reconfiguration if any station is added or lost. If transmission cable is cut, reconfigure two sections with no disruption to system's operation, without operator intervention.
7. Where used, LAN controller cards shall be standard “off the shelf” products available through normal PC vendor channels.

2.12 SYSTEM SOFTWARE

A. System Software Overview: The BAS Contractor shall provide the OID software required for efficient operation of the BAS specified herein. Software shall be modular in design to provide maximum flexibility, expandability, and to permit future revision of the system. The functionality described herein shall be regarded as a minimum. The system software shall include the following, as a minimum:
1. Complete database entry.
2. Configuration of the controller and operator workstation application programs to provide the sequence of operation indicated.
3. Dynamic color Graphics of each system.
4. Configuration of the reports and point summaries indicated.
5. Event/alarms comprised of Urgent Alarms, Alarms, and Messages as specified.

B. Graphical User Interface (GUI) Software
1. The GUI shall be a 32-bit full-featured software application compatible with Windows 10. The intent of the GUI is to provide an easy to use graphical OID that enables operators to manage their facilities on a day-to-day basis. The user may navigate within the system to check on environmental conditions, setpoints, schedules, etc. Using a mouse, it shall be possible to easily navigate through floor plans and different areas within a facility or multiple facilities. In addition,

manual commands may be used to navigate directly to each point in the system and a tree structure shall show the control system hierarchy.

C. Workstation Applications Editors:
1. Database Creation and Modification. Changes shall be done utilizing standard procedures and while the system is on-line and operating. The system shall allow changes to be made either at the local site through a portable computer or at the central OID.
2. The system shall permit the operator to perform the following, as a minimum:
a. Add and delete BACnet objects and points
b. Assign BACnet Object/Device Instance numbers and Network numbers
c. Modify point parameters, control sequences and programs
d. Reconfigure application programs
e. Create and/or modify graphics

2.13 CONTROLLER SOFTWARE

A. The system shall continuously perform DDC functions at the local control module in a stand alone mode. The operator shall be able to design and modify the control loops to meet the requirements of the system being operated. The operators shall use system-provided displays for tuning of PID loops. These displays shall include the past three input variable values, the setpoint for the loop, the sample interval and the results of the PID effects on the final output.

B. Each control module shall perform the following functions:
1. Identify and report alarm condition.
2. Execute each application programs indicated in the sequences of operation.
3. Execute DDC algorithms.
4. Trend and store data.
5. Maintain time-of-day schedules.

C. Software Integration: The programs should be integrated into a single working system and each of the above functions should be executed in real time and automatically when needed, such as to optimize the controlled equipment.

D. System Security: User access secured via user passwords and user names.

E. Object or Object Group Scheduling:
1. Weekly Schedules Based on Separate, Daily Schedules:
a. Include start, stop, optimal stop, and night economizer.
b. 10 events maximum per schedule.
c. Start/stop times adjustable for each group object.
2. Exception Schedules:
a. Based on any day of the year.
b. Defined up to one year in advance.
c. Automatically discarded and replaced with standard schedule for that day of the week upon execution.

3. Holiday or Special Schedules:
   a. Capability to define up to 99 schedules.
   b. Repeated annually.
   c. Length of each period is operator defined.

F. Provide standard application for equipment coordination and grouping based on function and location to be used for scheduling and other applications.

G. Alarms:
1. Binary object is set to alarm based on the operator specified state.
2. Analog object to have high/low alarm limits.
3. All alarming is capable of being automatically and manually disabled.
4. Alarm Reporting:
   a. Operator determines action to be taken for alarm event.
   b. Alarms to be routed to appropriate workstation.

H. Maintenance Management: System monitors equipment status and generates maintenance messages based upon user-designated run-time limits.

I. Sequencing: Application software based upon specified sequences of operation

J. PID Control Characteristics:
1. Direct or reverse action.
2. Anti-windup.
3. Calculated, time-varying, analog value, positions an output or stages a series of outputs.
4. User selectable controlled variable, set-point, and PED gains.

K. Power Failure/Automatic Restart:
1. Power failures shall cause the control module to go into an orderly shutdown with no loss of program memory.
2. Upon resumption of power, the Control module shall automatically restart and printout the time and date of the power failure and restoration at the respective OID.
3. Prior to taking action, the controller shall look at the actual time-of-day and the programmed schedule for the controlled systems. If systems are operating, the restart program shall automatically restart affected field equipment. The operator shall be able to define an automatic power up time delay for each piece of equipment under control.

L. Staggered Start Application:
1. Prevents all controlled equipment from simultaneously restarting after power outage.
2. Order of equipment startup is user selectable.

M. Energy Calculations:
1. Accumulated instantaneous power or flow rates are converted to energy use data.
2. Algorithm calculates a rolling average and allows window of time to be user specified in minute intervals.

3. Algorithm calculates a fixed window average with a digital input signal from a utility meter defining the start of the window period that in turn synchronizes the fixed-window average with that used by the power company.

N. Anti-Short Cycling:
1. All binary output objects protected from short-cycling.
2. Allows minimum on-time and off-time to be selected.

O. On-Off Control with Differential:
1. Algorithm allows binary output to be cycled based on a controlled variable and set-point.
2. Algorithm to be direct-acting or reverse-acting incorporating an adjustable differential.

P. Run-Time Totalization:
1. Totalize run-times for all binary input objects.
2. Provides operator with capability to assign high run-time alarm.

2.14 INPUT HARDWARE

A. Temperature Sensors: Vibration and corrosion resistant, for wall, immersion, or duct mounting as required.
1. General purpose temperature sensors
   a. Accuracy: +/-0.5 degrees F at calibration point.
2. Outside Air Temperature Sensors
   a. Description: Designed to withstand the environmental conditions to which they will be exposed. They shall also be provided with a solar shield. Sensors exposed to wind velocity pressures shall be shielded by a perforated plate that surrounds the sensor element. Temperature transmitters shall be of NEMA 3R construction and rated for ambient temperatures.
   b. Accuracy: within +/- 1 degrees F in the range of -52 degrees F to 120 degrees F.
3. Room Temperature Sensors:
   a. Description: Steel cover plate with insulated back and security screws. Color per architect.
4. Room temperature sensors with slide switch
   a. Description: Construct for surface mounting. Provide setpoint reset slide switch with an adjustable temperature range.
   b. Accuracy: +/-0.5 degrees F in the range of 32 degrees F to 96 degrees F.
5. Room Temperature Sensors with Integral Digital Display:
   a. Description: Construct for surface mounting with four button keypad with the following capabilities:
      1) Indication of space temperature.
      2) Setpoint adjustment to accommodate room setpoint,
      3) Display and control fan operation status.
      4) Manual occupancy override and indication of occupancy status.
      5) Controller mode status.

6. Chilled water and condenser water sensors
   a. Accuracy: +/-0.25 degrees F in the range 30 degrees F to 70 degrees F.
7. Hot water temperature sensors
   a. Accuracy: +/-0.75 degrees F over the range of 50 degrees F to 250 degrees F.
8. Thermo wells:
   a. When thermo wells are required, the sensor and well shall be supplied as a complete assembly, including wellhead and Greenfield fitting. Thermo wells shall be pressure rated and constructed in accordance with the system working pressure. Thermo wells and sensors shall be mounted in a threadolet or 1/2" NFT saddle and allow access to the sensor for repair or replacement. Thermo wells shall be constructed of 316 stainless steel.
9. Ceiling and Recessed Mount Temperature Sensors:
   a. Description: Ceiling-mounted sensor in a low-profile housing.
10. Temperature Averaging Elements
   a. Accuracy: +/- 1 degrees F.
   b. Applications: Use on duct sensors for ductwork 10 sq ft or larger, where prone to stratification and for all mixed air and heating coil discharge sensors regardless of duct size.
11. Duct Mount Sensors
   a. Description: Duct mount sensors shall mount in an electrical box through a hole in the duct, and be positioned so as to be easily accessible for repair or replacement. Duct sensors shall be insertion type and constructed as a complete assembly, including lock nut and mounting plate. For outdoor air duct applications, a weatherproof mounting box with weatherproof cover and gasket shall be used.

B. Humidity Sensors: Vibration and corrosion resistant, for wall, immersion, or duct mounting as required.
1. Room Sensors
   a. Description With locking cover, matching room temperature sensors, span of 25% to 90% R.H.
   b. Accuracy: ± 3% of operating range, with linear output
2. Duct and Outside Air Sensors
   a. Description: With element guard and mounting plate, range of 0% to 100% R.H., with repeatable accurate readings from 10% to 90% R.H.
   b. Accuracy: ± 1% of operating range, with linear output

C. Differential Water Pressure Sensors
1. Manufacturers:
   a. Setra
   b. Mamac
   c. Automation Components Inc. (ACI)
   d. Greystone
2. Description: Industrial quality probe with pressure transducer designed to transmit a proportional 4 to 20 mA or 0-10VDC output in response to variation of differential pressure at water pressure sensing points. Pressure transmitters shall be selected with suitable range for expected input, temperature compensated, and constructed to withstand 100% pressure over-range without damage, and to hold

calibrated accuracy when subject to a momentary 40% over-range input. A minimum of a NEMA 1 housing shall be provided for the transmitter. Differential pressure transmitters used for flow measurement shall be sized to the flow sensing device, and shall be supplied with Tee fittings and shut-off valves in the high and low sensing pick-up lines.

3. Transmitters shall be located in accessible local control panels wherever possible.
4. Accuracy: 1% of full scale, maintain up to 20 to 1 ratio turndown.

D. Differential Air Pressure Sensors
1. Manufacturers:
   a. Setra
   b. Mamac
   c. Automation Components Inc. (ACI)
   d. Greystone
2. Description: Air Static Pressure and Differential Pressure Sensors shall consist of a probe with pressure transducer designed to transmit a proportional 4 to 20 mA or 0-10VDC output in response to variation of differential pressure at air pressure sensing points. Pressure transmitters shall be selected with suitable range for expected input, temperature compensated, and constructed to withstand 100% pressure over-range without damage, and to hold calibrated accuracy when subject to a momentary 40% over-range input. A minimum of a NEMA 1 housing shall be provided for the transmitter. Transmitters shall be located in accessible local control panels wherever possible.
3. Accuracy: 2% of full scale with repeatability of 0.5%.
4. Range:
   a. Building Static Pressure Range: 0 inch to 0.25 inch wg.
   b. Duct Static Pressure Range: 0 inch to 5 inches wg.
   c. End of Line Primary Fan System Discharge Duct Static Pressure Range: 0 to 4 inches wg.
   d. Return Air and Outside Air Static Pressure Range: -2 to +2 inches wg.

E. Fluid Flow Monitoring
1. Electromagnetic type (Pipes 3” or larger)
   a. Manufacturer and model: Onicon F3500
   b. Description: Electromagnetic type with integral microprocessor-Based electronics, NEMA 4 enclosure, and 316L stainless steel wetted components, analog output signal. The meter shall have an accuracy of +/-1.0% from 2 to 20 ft/sec. Provide remote mounted LCD read-out panel or unit mounted.
2. Electromagnetic type (Pipes smaller than 3”)
   a. Manufacturer and model: Onicon F3100
   b. Electromagnetic type with integral microprocessor-Based electronics, NEMA 4 enclosure, analog output signal. The meter shall have an accuracy of +/-0.4% ft/sec from 3.3 to 33 ft/sec. Provide remote mounted LCD read-out panel or unit mounted.

F. BTU Monitoring
1. Manufacturer and model: Onicon System 10
2. Description: Two matched temperature sensors and flow meter, microprocessor-based controller, designed to provide full energy, flow and temperature data at local LCD panel and over a serial network interface. Calibrated using application specific flow and temperature data and provided with a certificate of calibration.

G. Airflow Measuring Sensors (AFMS)
1. Thermal Dispersion Type
   a. Description: Thermal airflow stations with one or more bead-in-glass thermistor sensor nodes mounted in a probe with a stainless steel mounting bracket, and a remotely mounted microprocessor-based transmitter at each measurement location compatible with BMS. Provide the number of independent sensor nodes as recommended by the airflow station manufacturer based on the duct size.
   b. Sensing-Node Temperature Accuracy: Within 0.15 deg F (0.08 deg C) over an operating range of minus 20 to plus 160 deg F (minus 28.9 to plus 71.1 deg C) and humidity range of 0 to 100 percent RH.
   c. Airflow Station Accuracy: Within 3 percent of reading for ducted applications, and within 5 percent of reading for non-ducted applications.
2. Pitot-Tube Type
   a. Description: Multiple total- and static-pressure sensors positioned at the center of equal area of the station cross section and interconnected by respective averaging manifolds. Provide the number of independent sensors recommended by the airflow station manufacturer in written instructions based on the duct size.
   b. Casing: Galvanized sheet steel at least 0.079 inch (2.0 mm) thick with coating complying with ASTM A653/A653M, G90 (Z275). Casings shall be stainless steel, 0.0781 inch (2.0 mm) thick, when connected to stainless duct and aluminum, 0.063 inch (1.6 mm) thick, when connected to aluminum duct.
   c. Straightener or equalizer: Type 3003 aluminum or Type 316 stainless steel, depending on casing material. Use stainless steel for units with stainless-steel casings.
   d. Pressure sensor array: Drawn copper or stainless-steel tubing. Use stainless steel for units with stainless-steel casings. Copper tubing shall comply with ASTM B75 and ASTM B280. Minimum tube wall thickness shall be 0.030 inch (0.8 mm). Include internal piping and external pressure transmitter ports.
   e. Performance:
      1) Pressure Loss: 0.015-inch wg (3.8 Pa) at 1000 fpm (5 m/s), or 0.085-inch wg (22.5 Pa) at 2000 fpm (10 m/s).
      2) Accuracy: Within 2 percent of actual airflow.
      3) Self-Generated Sound: NC 40 and sound level within the duct shall not be amplified.
      4) Performance rated and tested according to AMCA 610. Each station shall bear the AMCA seal.

3. Piezometer Ring Fan Inlet Airflow Sensor
   a. Description: Multiple pressure sensor points strategically placed along the circumference of the inlet cone and internally connected to an averaging ring manifold located behind the inlet cone. Sensor points shall not protrude beyond the surface of the inlet cone nor be adversely affected by particle contamination present in the airstream. Sensor shall be non-intrusive and not impact fan performance. Product shall be a standard offering of the fan manufacturer and include published literature with supporting test data to validate sensor performance.
   b. Accuracy: within 5 percent of actual airflow.

H. Status and Safety Switches
1. General Requirements and application: Switches shall be provided to monitor equipment status, safety conditions, and generate alarms at the BMS when a failure or abnormal condition occurs. Safety switches shall be provided with two sets of contacts and shall be interlock wired to shut down respective equipment.
   a. Status Inputs for Fans: Differential-pressure switch with adjustable range of 0 to 5 inches wg. or current sensing switch, as indicated on the control diagrams.
   b. Status Inputs for Pumps: Differential-pressure switch piped across pump with adjustable pressure-differential range of 5 psig to 1.5 times the design pump operating pressure differential, or current sensing switch, as indicated on the control diagrams.
   c. Status Inputs for Electric Motors: Current-sensing relay with current transformers, adjustable and set to 175 percent of rated motor current.
2. Current Sensing Switches
   a. The current sensing switch shall be self-powered with solid-state circuitry and a dry contact output. It shall consist of a current transformer, a solid state current sensing circuit, adjustable trip point, solid state switch, SPDT relay, and an LED indicating the on or off status. A conductor of the load shall be passed through the window of the device. It shall accept over-current up to twice its trip point range.
   b. Current sensing switches shall be calibrated to show a positive run status only when the motor is operating under load. A motor running with a broken belt or coupling shall indicate a negative run status.
3. Air Filter Status Switches
   a. Differential pressure switches used to monitor air filter status shall be of the automatic reset type with SPDT contacts rated for 2 amps at 120VAC.
   b. A complete installation kit shall be provided, including: static pressure tops, tubing, fittings, and air filters.
   c. Provide appropriate scale range and differential adjustment for intended service.
4. Air Flow Switches
   a. Differential pressure flow switches shall be bellows actuated mercury switches or snap acting micro-switches with appropriate scale range and differential adjustment for intended service.
5. Air Pressure Safety Switches

a. Air pressure safety switches shall be of the manual reset type with SPDT contacts rated for 2 amps at 120VAC.
b. Pressure range shall be adjustable with appropriate scale range and differential adjustment for intended service.

6. Water Flow Switches
   a. Bellows-actuated mercury or snap-acting type, with appropriate scale range and differential adjustment, with stainless-steel or bronze paddle. For chilled-water applications, provide vapor-proof type.
7. Low Temperature Limit Switches
   a. The low temperature limit switch shall be of the manual reset type with Double Pole/Single Throw snap acting contacts rated for 16 amps at 120VAC.
   b. The sensing element shall be a minimum of 15 feet in length and shall react to the coldest 18-inch section. Element shall be serpentined across the leaving side of the coil surface in accordance with manufacturers recommended installation procedures.
   c. For large duct areas where the sensing element does not provide full coverage of the air stream, additional switches shall be provided as required to provide full protection of the air stream.
8. Damper Position Indication
   a. Potentiometer mounted in enclosure with adjustable crank arm assembly connected to damper to transmit 0 - 100 percent damper travel.

I. Vibration Switches: Designed to provide vibration protection for rotating machinery operating within the range of 120 to 60,000 rpm. Provide two limit set points, one set for the maximum allowable vibration (in/sec), and the other set for a percentage of that setting, tripping the alarm relay when that percentage is reached. Provide a built-in, adjustable time delay to prevent trips due to transient vibrations. Switch shall be wired for automatic remote reset and enclosed in water-tight housing.

J. Water Detectors: External tape-style sensor with contacts to connect to a monitoring system. Gold-plated probes and microchip technology for detection of conductive liquids. Weatherproof enclosure with LED indication if water detected.

K. Power Monitoring Devices:
1. Manufacturers:
   a. Veris Industries
2. Current measurement shall be by a combination current transformer and a current transducer. The current transformer shall be sized to reduce the full amperage of the monitored circuit to a maximum 5 Amp signal, which will be converted to a 4-20 mA DDC compatible signal for use by the BAS.
3. Current Transformer: A split core current transformer shall be provided to monitor motor amps.
   a. Operating frequency – 50 - 400 Hz.
   b. Insulation – 0.6 Kv class 10Kv BIL.
   c. UL recognized.
   d. Five amp secondary.
   e. Select current ration as appropriate for application.

4. Current Transducer: A current to voltage or current to mA transducer shall be provided. The current transducer shall include:
   a. 6X input over amp rating for AC inrushes of up to 120 amps.
   b. Manufactured to UL 1244.
   c. Accuracy: +.5%, Ripple +1%.
   d. Minimum load resistance 30kOhm.
   e. Input 0-20 Amps.
   f. Output 4-20 mA.
   g. Transducer shall be powered by a 24VDC regulated power supply (24 VDC +5%).

L. Carbon Dioxide Sensors: Electronic, designed to monitor CO2 levels in HVAC systems for use in demand controlled ventilation systems according to ASHRAE Standard 62. Units shall have linear analog output of 0-10VDC/4-21mA, over a range of 0-3000 ppm of CO2. Units shall be furnished with a 5-year calibration guarantee.

M. Oxygen Sensor: Wall-mounted, single detectors, using solid-state zircon cell sensing, suitable over a temperature range of minus 32 to plus 1100 deg F (0 to 593 deg C), calibrated for 0 to 5 percent, with continuous or averaged reading, 4 to 20 mA output.

N. Occupancy Sensor: Passive infrared, with time delay, daylight sensor lockout, sensitivity control, and 180-degree field of view with vertical sensing adjustment, flush mounting for finished areas (offices, entries, etc.), and wall mounted for storage areas, garages, shops, etc.

2.15 THERMOSTATS

A. General: Refer to control sequences and diagrams for application requirements. Manufacturer's standard thermostats shall meet the applicable requirements listed below, unless thermostat is specified in other sections.

B. Combination Thermostat and Fan Switches: Line-voltage thermostat with two-, three-, or four-position, push-button or lever-operated fan switch. Label switches "FAN ON-OFF," "FAN HIGH-LOW-OFF," or "FAN HIGH-MED-LOW-OFF." Provide unit for mounting on two-gang switch box. Separate heating and cooling setpoint with locking exposed setpoint adjustment. Automatic switching from heating to cooling.

C. Electric microcomputer-based room thermostats: 7-day programmable with automatic switching from heating to cooling, short-cycle protection, battery replacement without program loss, LCD display including room temperature, setpoint and mode.

D. Low-Voltage, On-Off Thermostats: NEMA DC 3, 24-V, bimetal-operated mercury-switch type, with adjustable anticipation heater.

E. Line-Voltage, On-Off Thermostats: Bimetal-actuated, open contact or bellows-actuated, enclosed, snap-switch type, or equivalent solid-state type, with heat anticipator, integral manual on-off-auto selector switch. Thermostats that control electric heating loads directly shall be provided with off position on dial wired to break ungrounded conductors.

F. Remote-Bulb Thermostats: On-off or modulating type, liquid filled to compensate for changes in ambient temperature, with copper capillary and bulb, unless otherwise indicated.
1. Bulbs in water lines with separate wells of same material as bulb.
2. Bulbs in air ducts with flanges and shields.
3. Averaging Elements: Copper tubing with either single- or multiple-unit elements, extended to cover full width of duct or unit, adequately supported.
4. Scale settings and differential settings are clearly visible and adjustable from front of instrument.
5. On-Off Thermostat: With precision snap switches, with electrical ratings required by application.
6. Modulating Thermostats: Construct so complete potentiometer coil and wiper assembly is removable for inspection or replacement without disturbing calibration of instrument.

G. Fire-Protection Thermostats: UL listed with fixed or adjustable settings to operate at not less than 75 deg F above normal maximum operating temperature, with the following:
1. Compliant with latest issue of NFPA 90A.
2. Reset: Manual
3. Dual-Temperature Thermostats: Automatic changeover from normal setting to lower unoccupied setting, with manual-reset lever to permit return to normal temperatures during unoccupied cycles, with automatic reset to normal during next cycle of operation.

H. Immersion Thermostats: Remote-bulb or bimetal rod-and-tube type, proportional acting with adjustable throttling range and adjustable set point.

I. Airstream Thermostats: Two-pipe, fully proportional, single-temperature type, with adjustable set point in middle of range and adjustable throttling range, plug-in air gauge test fitting or permanent pressure gage, remote bulb, bimetal rod and tube, or averaging element.

J. Heating/Cooling Valve-Top Thermostats: Proportional acting for modulating flow, molded-rubber diaphragm, remote-bulb liquid-filled element, direct or reverse acting with minimum valve shutoff differential pressure of 25 psig, and cast housing with position indicator and adjusting knob.

2.16 HUMIDISTATS

A. Electric Duct-Mounted Humidistats: Insertion, 2-position type with adjustable 2 percent throttling range, 20 to 80 percent operating range, single- or double-pole contacts.

2.17 TIME CLOCKS

A. Seven day programming switch timer with synchronous timing motor and seven day dial, continuously charged Ni-cad battery driven power failure 8 hour carry over and multiple switch trippers to control systems for minimum of two and maximum of eight signals per day with two normally open and two normally closed output switches.

B. Solid state programmable time control, 24 hour battery carry over, duty cycling.

2.18 CONTROL VALVES

A. General: All automatic control valves shall be factory fabricated, of type, body material, and pressure class based on maximum pressure and temperature rating of the piping system in which the valve is being installed, and be suitable for the system flow conditions and close against the differential pressures involved. Valves shall be fully proportioning and provide near linear heat transfer control. The valves shall be quiet in operation and fail-safe open, closed, or in their last position. All valves shall operate in sequence with another valve when required by the sequence of operations. All control valves shall be sized by the control manufacturer, and shall be guaranteed to meet the heating and cooling loads, as specified.

B. Sizing and application: Valves shall be globe, ball, and/or butterfly, as required by the specific application. Modulating water valves shall be sized per manufacturer's recommendations for the given application.
   1. Liquid Control Valves (water and glycol)
      a. Two-position service: Line size unless otherwise indicated.
      b. Two-way modulating service (non-pressure independent): Pressure drop shall be equal to the pressure drop through heat exchanger (load), 50 percent of the pressure difference between supply and return pipe mains, or 5 psi whichever is greater. Minimum Cv shall be calculated at 10 percent of design flow, with a coincident pressure differential equal to the system design pump head.
      c. Three-way modulating service: Pressure drop equal to the pressure drop through the coil exchanger (load), 5 psi maximum.
      d. For pressure independent valves, select for a differential pressure range of 5 to 50 psig.
      e. Close-off (differential) Pressure Rating: Valve actuator and trim shall be furnished to provide the following minimum close-off pressure ratings:
         1) Two-way: 150 percent of total system (pump) head.
         2) Three-way: 300 percent of pressure differential between ports A and B at design flow or 100 percent of total system (pump) head.

C. Ball Valves NPS 2 and Smaller:
   1. Description: Forged brass body with nickel plating, characterized stainless steel ball and trim, and Teflon seats and seals.
   2. Application: Characterized Ball valves shall be used for hot and condenser water applications, water terminal reheat coils, radiant panels, unit heaters, package air conditioning units, and fan coil units except those described hereinafter.
   3. Manufacturers:
      a. Belimo CCV
      b. Siemens
      c. Johnson Controls

D. Globe Pattern:
1. Application: Modulating valves of the single-seat type with equal percentage flow characteristics shall be used for all AHU, ERU and special applications as indicated.
2. Manufacturers:
   a. Belimo
   b. Siemens
   c. Johnson Controls
3. Up to 2 inches (50 mm): Bronze body, bronze trim, rising stem, renewable composition disc, screwed ends with backseating capacity repackable under pressure.
4. Over 2 inches: Iron body, bronze trim, rising stem, plug-type disc, flanged ends, renewable seat and stainless steel disc.
5. Hydronic Systems:
   a. Rate for service pressure of 125 psig at 250 degrees F.
   b. Replaceable plugs and seats of stainless steel.
   c. Two way valves shall have equal percentage characteristics, three way valves linear characteristics. Size two way valve operators to close valves against pump shut off head.
6. Steam Systems:
   a. Rate for service pressure of 125 psig at 250 degrees F.
   b. Replaceable plugs and seats of stainless steel. Pressure drop across any steam valve at maximum flow shall be as shown on the Drawings.
   c. Valves shall have modified linear characteristics.

E. Butterfly Pattern:
1. Application: High Performance Butterfly valves shall be acceptable for modulating large flow applications greater than modulating plug valves, and for all two-position, open/close applications. In-line and/or three-way butterfly valves shall be heavy-duty pattern with a body rating comparable to the pipe rating, replaceable lining suitable for temperature of system, and a stainless steel vane.
2. Sizing: Valves for modulating service shall be sized and travel limited to 50 degrees of full open. Valves for isolation service shall be the same as the pipe. Valves in the closed position shall be bubble-tight.
3. Manufacturers:
   a. Nibco, Inc.
   b. Crane Co.
   c. Grinnell
   d. Hammond Valve
   e. Milwaukee Valve Co.
   f. Bray International
4. Lug type: Bi-directional dead end service without downstream flange.
   a. Body: Carbon steel, cast iron, ductile Iron or stainless steel.
   b. Seat: Metal or reinforced PTFE.
   c. Offset stem: Stainless steel.
   d. Disc: 316 Stainless Steel

F. Pressure Independent Control Valves

1. Application: Provide pressure independent flow control valves as specified within the drawings and schedules.
2. Description:
   a. Body: Forged brass, nickel plated body
   b. Packing: EPDM O-rings, lubricated.
   c. Trim: Chrome plated brass stem, chrome plated brass ball with equal percentage flow characteristics, fiberglass reinforced Teflon PTFE seats.
   d. Pressure Rating: 600 psi (1/2" to 1") and 400 psi (1-1/4" to 2")
   e. Temperature Ratings: Media temperature range 0ºF to 212ºF
   f. Close Off Pressure Rating: 200 PSI
3. Manufacturers:
   a. Griswold
   b. Belimo
   c. FDI
4. Accuracy: The flow shall not vary more than +/- 5% due to system static pressure fluctuations across the valve with a minimum of 5 PSID across the valve from 0 to 100% full rated flow with an equal percentage characteristic.
5. Sizing: sized by the maximum coil capacity in GPM, not the conventional Cv method.
6. Provide PT ports to verify flow.
7. The manufacturer shall warranty all components for a period of 5 years from the date of production, with the first two years unconditional.

G. Terminal Unit Control Valves:
1. Bronze or brass body, bronze trim, two- or three-port as indicated, stainless steel ball union and threaded ends, 100 psi close-off rating.
2. Rating: Class 125 for service at 862 kPa (125 psig) and 121 deg C (250 deg F) operating conditions.
3. Flow Characteristics: Two-way valves shall have equal percentage characteristics; three-way valves shall have linear characteristics.

H. 6-Way Ball Valve with Characterizing Discs (CBVS & CBVM):
1. Materials:
   a. Body: Nickel plated brass
   b. Ball: Chrome plated brass
   c. Stem/Extension/Seals: Nickel plated brass, double EPDM O-rings
   d. Seat/Seals: PTFE (Teflon)/EPDM O-rings
   e. Characterizing Disc: Chrome Plated Steel
2. Piping Connections: NPS ½ (DN 15) through NPS 1 (DN 25): (6), female NPT
3. Media: Water (maximum 60% glycol solution)
4. Performance:
   a. Media Temperature: 43 deg F to 180 deg F (6 deg C to 82 deg C)
   b. Pressure:
      1) Body: 232 psig (16kPa)
      2) Maximum Operating Differential: 15 psid (103kPa)
      3) Close-off (valve and actuation assembly): 50 psid (345kPa)
   c. Leakage: 0%
5. The valve shall incorporate a loop pressure relief to release any pressure build up in the loop when the valve is in the isolated position.

6. Labeling: Valve body shall be furnished with a label containing the following date:
   a. Manufacturer's name and model number
   b. Nominal size

2.19 DAMPERS

A. General: The BMS Contractor shall furnish all automatic dampers unless provided as standard from equipment manufacturer. All automatic dampers shall be sized for the application by the BMS Contractor or as specifically indicated on the Drawings.

B. Sizing and Application: All dampers used for throttling airflow shall be of the opposed blade type arranged for normally open or normally closed operation, as required. The damper is to be sized so that, when wide open, the pressure drop is a sufficient amount of its close-off pressure drop to shift the characteristic curve to near linear. All dampers used for two-position, open/close control and mixing boxes shall be parallel blade type arranged for normally open or closed operation, as required.

C. Airfoil Blade Dampers
   1. General: Double skin construction with linkage out of the air stream
   2. Manufacturers:
      a. Johnson Controls D-7250 D-1250 or D-1300
      b. Ruskin CD50
      c. Vent Products 5650.
      d. Tamco
   3. Application: whenever the damper face velocity exceeds 1500 FPM or system pressure exceeds 2.5" w.g., but no more than 4000 FPM or 6" w.g.

D. One-Piece Rolled Blade Damper
   1. Manufacturers:
      a. Johnson Controls D-1600
      b. Ruskin CD36
      c. Vent Products 5800
      d. Tamco
   2. Performance: Dampers shall be tight closing, low leakage type, with synthetic elastomer seals on the blade edges and flexible stainless steel side seals. Dampers of 48"x48" size shall not leak in excess of 8.0 cfm per square foot when closed against 4" w.g. static pressure when tested in accordance with AMCA Std. 500.
   3. Construction:
      a. Frames: Galvanized steel, welded or riveted with corner reinforcement, minimum 12 gage, 0.1046 inch.
      b. Blades: Galvanized steel, maximum blade size 8 inches wide, 48 inches long, minimum 22 gage, 0.0299 inch, attached to minimum 1/2 inch shafts with set screws.
      c. Blade Seals: Synthetic elastomeric inflatable mechanically attached, field replaceable.
      d. Jamb Seals: Spring stainless steel.
      e. Shaft Bearings: Oil impregnated sintered bronze.
      f. Linkage Bearings: Oil impregnated sintered bronze.

4. Application: face velocities of 1500 FPM or below.

2.20 ACTUATORS

A. General: Size to operate with sufficient reserve power to provide smooth modulating action or two-position action over the entire operating range. Provide proportional or two-position type as indicated in the sequence of operation, with current limiting circuitry or microprocessor overload protection.

B. Manufacturers:
1. Johnson Controls
2. Honeywell
3. Belimo
4. Siemens

C. Electronic Damper Actuators
1. Modulating and two-position actuators shall be provided as required by the sequence of operations and as indicated on drawings. Damper sections shall be sized based on actuator manufacturer's recommendations for face velocity, differential pressure and damper type. The actuator mounting arrangement and spring return feature shall permit normally open or normally closed positions of the dampers, as required. All actuators (except terminal units) shall be furnished with mechanical spring return unless otherwise specified in the sequences of operations. All actuators shall have external adjustable stops to limit the travel in either direction and a gear release to allow manual positioning.
2. Modulating actuators shall accept 24 VAC or VDC power supply, consume no more than 15 VA, and be UL listed. The control signal shall be 2-10 VDC or 4-20 mA, and the actuator shall provide a clamp position feedback signal of 2-10 VDC. The feedback signal shall be independent of the input signal and may be used to parallel other actuators and provide true position indication. The feedback signal of one damper actuator for each separately controlled damper shall be wired back to a terminal strip in the control panel for trouble-shooting purposes.
3. Two-position or open/closed actuators shall accept 24 or 120 VAC power supply and be UL listed. Isolation, smoke, exhaust fan, and other dampers, as specified in the sequence of operations, shall be furnished with adjustable end switches to indicate open/closed position or be hard wired to start/stop associated fan. Two-position actuators, as specified in sequences of operations as "quick acting," shall move full stroke within 20 seconds. All smoke damper actuators shall be quick acting.
4. Electronic damper actuators shall be direct shaft mount.

D. Electronic Valve Actuators:
1. Modulating and two-position actuators shall be provided as required by the sequence of operations. Actuators shall provide the minimum torque required for proper valve close-off against the system pressure for the required application. The valve actuator shall be sized Based on valve manufacturer's recommendations for flow and pressure differential. All actuators shall fail in the last position unless specified with mechanical spring return in the sequence of

operations. The spring return feature shall permit normally open or normally closed positions of the valves, as required. All direct shaft mount rotational actuators shall have external adjustable stops to limit the travel in either direction.

2. Modulating Actuators shall accept 24 VAC or VDC and 120 VAC power supply and be UL listed. The control signal shall be 2-10 VDC or 4-20 mA and the actuator shall provide a clamp position feedback signal of 2-10 VDC. The feedback signal shall be independent of the input signal, and may be used to parallel other actuators and provide true position indication. The feedback signal of each valve actuator (except terminal valves) shall be wired back to a terminal strip in the control panel for trouble-shooting purposes.
3. Two-position or open/closed actuators shall accept 24 or 120 VAC power supply and be UL listed. Butterfly isolation and other valves, as specified in the sequence of operations, shall be furnished with adjustable end switches to indicate open/closed position or be hard wired to start/stop the associated pump or heat exchanger.

2.21 WIRE, CABLE AND NETWORK ACCESSORIES

A. Exposed cables installed in air plenums shall be specifically listed for air plenum use. (See specifications for specific wire and cable installation requirements.)

B. Cables, both fiber and copper, shall be as recommended by the manufacturer of the BAS, and shall be as required to support the specified LAN BACnet transmission type.

C. Network Repeater: Provide network repeaters as required to isolate and boost RS-485 signals. Provide power connection and NEMA enclosure as required.

PART 3 EXECUTION

2.22 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that conditioned power supply is available to the control units and to the operator work station. Verify that field end devices, wiring, and pneumatic tubing is installed prior to installation proceeding.

2.23 INSTALLATION

A. Provide a complete, neat and workmanlike installation. Use only manufacturer employees who are skilled, experienced, trained, and familiar with the specific equipment, software, standards and configurations to be provided for this Project.

B. Install control units and other hardware in position on permanent walls where not subject to excessive vibration.

C. Install software in control units and in operator work station. Implement all features of programs to specified requirements and appropriate to sequence of operation.

D. Provide with 120v AC, 15 amp dedicated emergency power circuit to each programmable control unit.

E. Provide conduit and electrical wiring in accordance with Section 26. Electrical material and installation shall be in accordance with appropriate requirements of Division 26.

F. Combination fire Smoke dampers shall be installed by division 23, powered by division 26, interconnecting control wiring between duct mounted smoke detector and fire/smoke damper by BMS contractor, alarm points, status/position, shut down of unit and notification by BMS contractor.

G. Furnish and install all access doors.

H. BMS Wiring

1. All conduit, wiring, accessories and wiring connections required for the installation of the Building Management System, as herein specified, shall be provided by the BMS Contractor unless specifically shown on the Electrical Drawings under Division 26 Electrical. All wiring shall comply with the requirements of applicable portions of Division 26 and all local and national electric codes, unless specified otherwise in this section.
2. All BMS wiring materials and installation methods shall comply with BMS manufacturer recommendations.
3. The sizing, type and provision of cable, conduit, cable trays, and raceways shall be the design responsibility of the BMS Contractor. If complications arise, however, due to the incorrect selection of cable, cable trays, raceways and/or conduit by the BMS Contractor, the Contractor shall be responsible for all costs incurred in replacing the selected components.
4. Class 2 Wiring
    a. All exposed Class 2 (24VAC or less) wiring shall be installed in conduit unless otherwise specified.
    b. Conduit is not required for Class 2 wiring in concealed accessible locations. Class 2 wiring not installed in conduit shall be supported every 5’ from the building structure utilizing metal hangers designed for this application. Wiring shall be installed parallel to the building structural lines. All wiring shall be installed in accordance with local code requirements.
    c. The use of plenum rated cable, not in conduit, in areas such as drop ceilings and wall cavities is acceptable.
    d. Class 2 signal wiring and 24VAC power can be run in the same conduit. Power wiring 120VAC and greater cannot share the same conduit with Class 2 signal wiring.
5. Provide for complete grounding of all applicable signal and communications cables, panels and equipment so as to ensure system integrity of operation. Ground cabling and conduit at the panel terminations. Avoid grounding loops.

I. BMS Line Voltage Power Source

1. 120-volt AC circuits used for the Building Management System shall be taken from panel boards and circuit breakers provided by Division 26.
2. Circuits used for the BMS shall be dedicated to the BMS and shall not be used for any other purposes.
3. DDC terminal unit controllers may use AC power from motor power circuits.

J. BMS Raceway
1. All wiring shall be installed in conduit or raceway except as noted elsewhere in this specification. Minimum control wiring conduit size 3/4".
2. All conduits and raceways shall be installed level, plumb, at right angles to the building lines and shall follow the contours of the surface to which they are attached.
3. Flexible Metal Conduit shall be used for vibration isolation and shall be limited to 3 feet in length when terminating to vibrating equipment. Flexible Metal Conduit may be used within partition walls. Flexible Metal Conduit shall be UL listed.

K. Penetrations
1. Provide fire stopping for all penetrations used by dedicated BMS conduits and raceways.
2. All openings in fire proofed or fire stopped components shall be closed by using approved fire resistive sealant.
3. All wiring passing through penetrations, including walls shall be in conduit or enclosed raceway.
4. Penetrations of floor slabs shall be by core drilling. All penetrations shall be plumb, true, and square.

L. BMS Identification Standards
1. Node Identification. All nodes shall be identified by a permanent label fastened to the enclosure. Labels shall be suitable for the node location.
   a. Cable types specified in Item A shall be color coded for easy identification and troubleshooting.

M. BMS Panel Installation
1. The BMS panels and cabinets shall be located as indicated at an elevation of not less than 2 feet from the bottom edge of the panel to the finished floor. Each cabinet shall be anchored per the manufacturer's recommendations.
2. The BMS contractor shall be responsible for coordinating panel locations with other trades and electrical and mechanical contractors.

2.24 COMMISSIONING

A. Start and commission systems. Allow sufficient time for start-up and commissioning prior to placing control systems in permanent operation.

B. The Contractor shall provide the services of a factory authorized service representative to assist an independent commissioning agent to start up the BAS, and to commission each component included in the BAS.

C. Controls and Safeties: Test, and set each of the digital and analog sensing and actuating devices. Test each instrumentation device by making a comparison between the central computer or field control panel display and the reading at the device, using an instrument traceable to the National Bureau of Standards, which shall be at least twice as accurate as the device to be tested. Record the measured value and displayed value for each device in the Commissioning Report.

D. Operational Tests: The Contractor shall conduct an operational test of each system and subsystem, including each of the associated field control panels, components, and field devices, to verify the proper sequence of operation and the actual performance of the installed BAS subsystem.

E. Documentation: Provide written documentation of the system commissioning and performance verification processes described above, including an itemized inspection and validation report complete with dates and second test results, and a performance test report for each system and each Sequence of Operation.

2.25 DEMONSTRATION AND INSTRUCTIONS

A. General: The contractor shall demonstrate the operation of the BAS hardware, software, and each of the related components, systems and subsystems to the satisfaction of the Owner. The Contractor shall schedule the demonstration with the Owner's representative at least 2 weeks in advance of the proposed demonstration. Demonstration shall not be scheduled until each of the hardware and software submittals, and the Commissioning Test Report are received and approved. If the work fails to conform to Contract specifications, scheduling of additional site visits by the Contractor for re-demonstration is required.

B. Personnel and Equipment: The Contractor shall supply the required personnel and equipment for the demonstration, including, but not limited to, instruments, ladders, paper, etc. The contractor-supplied personnel shall be competent with and knowledgeable of the project-specific hardware, software, and the HVAC systems. Complete training documentation and a complete copy of the BAS submittals shall be on file at the job site.

C. Physical Demonstration of Response to System Conditions: System acceptance shall include demonstrations that each of the components function properly by actual response to system conditions that may be encountered. The Contractor shall furnish the materials such as sources of temporary heating and cooling necessary to cause the system components to go through the required sequences. Computer simulations of possible operating conditions are not acceptable for demonstration of system performance. Proposed methods of demonstrating component operation shall be submitted to the Owner. Representatives of Owner will also witness the tests.

D. Orientation and training: Provide services of qualified technical personnel for three 6-hour days at project site to instruct Owner's personnel in operation and maintenance of the installed BAS.

2.26 ACCEPTANCE

A. Upon completion of the installation and commissioning of the systems, the contractor shall notify the owner's representative in writing, together with a copy of the commissioning report, that the system is complete and ready for acceptance testing. The owner's representative shall schedule a starting day for system acceptance testing. The contractor shall demonstrate calibration, testing, and adjusting of points or systems selected by the owner's representative. After an adequate sampling of points and sequences have been verified to satisfy the owner's representative that the system is performing in accordance with the contract documents, the system shall be accepted and the warranty period shall begin.

2.27 MAINTENANCE

A. See Section 01 - Execution and Closeout Requirements, for additional requirements relating to maintenance service.

B. Provide service and maintenance of energy management and control systems for one years from Date of Substantial Completion.

C. Provide two complete inspections, one in each season, to inspect, calibrate, and adjust controls as required, and submit written reports.

D. Provide complete service of systems, including service calls to inspect, calibrate, and adjust controls, and submit written reports.

END OF SECTION

SECTION 23 0993 - SEQUENCE OF OPERATIONS

PART 1 GENERAL

1.1 SUMMARY

A. Related Sections:
1. Section 23 0400 – General Conditions for Mechanical Trades
2. Section 23 0900 - Instrumentation and Control for HVAC: For equipment, devices, and system components to implement sequences of operation.
3. Section 23 09 00 - Direct-Digital Control System for HVAC: For equipment, devices, system components, and software to implement sequences of operation.
4. Division 26 - Electrical
5. Division 27 - Communication
6. Division 28 - Electronic Safety and Security.

1.2 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate mechanical system controlled and control system components.
1. Label with settings, adjustable range of control and limits. Submit written description of control sequence.
2. Submit flow diagrams for each control system, graphically depicting control logic.
3. Submit draft copies of graphic displays indicating mechanical system components, control system components, and controlled function status and value.
4. Coordinate submittals with information requested in Section 23 0900 and 23 0923.

1.3 CLOSEOUT SUBMITTALS

A. Section 01 77 00 - Closeout Procedures.

B. Project Record Documents: Record actual locations of components and set points of controls, including changes to sequences made after submission of shop drawings.

PART 2 PRODUCTS

A. Not Used.

PART 3 EXECUTION

3.1 GENERAL

A. Provide all controls, low voltage control wiring, hardware points (analog in, analog out, binary in, binary out) and accessories as required to perform the control sequences indicated. Additionally, provide hardware points indicated regardless that such points may not be required to perform the control sequences indicated.

B. Unless otherwise indicated, setpoints and values listed in the sequence of controls shall be adjustable by the Owner thru the DDC(direct digital controls) or BMS(Building Management System)(BMS and DDC are used interchangeably and share same meaning) graphical interface; the Owner shall not be required to edit operating code in order to change any of the setpoints and values.

C. Heating shall only be enabled when the system is indexed to heating mode (shall occur when outside air temperature is below 65 degrees F). Devices such as CUH and UH shall operate on a soft permissive, only allowing fans to start and control valves to open when system is in heating mode, use of aquastats is not acceptable.

D. Temperature Sensors
   1. General
      a. Where temperature ranges, reset temperatures, setback temperatures, setup temperatures, deadbands, override times, etc. are indicated, those values shall be adjustable both globally and locally.
      b. There shall be two independent interfaces for global settings for the following space categories.
         1) Corridors, restrooms, vestibules, storage rooms, janitor closets, electrical closets, data closets/rooms, and mechanical rooms
         2) Other spaces
      c. Each temperature control zone shall be initially set to default to the global settings, with a flag or similar to override the global setting for each of the values for that zone.
      d. The values indicated herein shall be the initial global settings.
   2. Corridors, restrooms, vestibules, storage rooms, janitor closets, electrical closets, data closets/rooms, and mechanical rooms
      a. Unless otherwise indicated, temperature sensors shall be the brushed chrome dead front type sensors.
      b. Occupied Global Setpoint
         1) Heating (defined as outside air temperature is below 65 degrees F): 68 degrees F.
         2) Cooling (defined as outside air temperature is above 68 degrees F): 75 degrees F.
      c. Unoccupied Global Setpoint
         1) Heating: 62 degrees F.
         2) Cooling: 82 degrees F.

3. Other spaces
   a. The space temperature, humidity sensor and CO2 sensor shall be a combination 3 in 1 sensor where all 3 are serving the same space. Include an extra 20 combination sensors as attic stock for immediate backup.
   b. Provide separate CO2 space sensors where combination 3 in 1 sensors are not used.
   c. The space sensor shall communicate via analog control signal or BACnet communicating control signal.
   d. This sensor shall not have display.
   e. The sensor shall have a setpoint resistive slider for temperature adjustment.
   f. The sensor shall have an override push button for unoccupied over-ride where noted. Upon activation of the occupied override, the space will go to occupied mode for a specific period of time. Set override time at 3 hours initially (configurable).
   g. Occupied Global Setpoint
      1) The space temperature setpoint shall be at 68 degrees F when the outside air temperature is below 65 degrees F, and shall be at 75 degrees F when the outside air temperature is above 68 degrees F.
   h. Occupied Global Setpoint
      1) Heating: 62 degrees F.
      2) Cooling: 82 degrees F.
   i. Occupied Override
      1) Where occupancy sensors (refer to electrical power drawings for occupancy sensor quantities and locations) are located in the same space as a temperature sensor, the auxiliary contacts of the occupancy sensors shall be connected to the BMS for occupied override purposes.
         a) Occupied mode
            (1) Spaces indexed to occupied mode shall remain in occupied mode unless the occupancy sensors do not detect occupancy for 10 minutes continuously. At 10 minutes since the last detection of occupancy, the cooling and heating setpoints of the spaces shall be reset to 3°F higher and 3°F lower than the setpoint respectively.
            (2) Once in unoccupied mode, the cooling and heating setpoints shall remain at the reset temperatures (3°F higher and lower) until the occupancy sensors detect occupancy for 5 minutes continuous. At 5 minutes continuous occupancy, the occupied setpoint shall be restored.
         b) Unoccupied mode
            (1) Spaces indexed to unoccupied mode shall remain in unoccupied mode unless the occupancy sensors detect occupancy for 10

minutes continuously. At 10 minutes continuous occupancy, the occupied setpoint shall be used.

(2) Once in the occupied mode, the setpoint shall remain at the occupied setpoint until the occupancy sensors do not detect occupancy for 5 minutes continuous. At 5 minutes since the last

(3) detection of occupancy, the unoccupied setpoints shall be restored.

c) See the lighting plans for the locations of the occupancy sensors.

E. Occupied/Unoccupied Programming

1. The HVAC equipment shall be indexed to warm-up and cool-down modes via the BMS, optimal start/stop shall be programmed in for all equipment so that equipment start and start times are determined based on outside air conditions and system learns based on past building history. The operator station software configuration shall allow the Owner to easily select the occupied and unoccupied hours by individual zone, global by air handler, or global by building. The BMS shall trend the outside air temperature with respect to the warm-up times, and shall optimize the warm-up times such that the spaces reach occupied temperature by the time selected.
2. Terminal heating and cooling units
   a. Warm-up (morning): Units shall operate in the warm-up mode until the space reaches the occupied temperature setpoint, at which point the unit shall be indexed to the occupied mode.
   b. Cool-down (evening): Units shall operate in the cool-down mode until the space reaches the unoccupied temperature setpoint, at which point the unit shall be indexed to the unoccupied mode.

F. Air handling units: Shall remain in the warm-up mode until all spaces served reach occupied temperature setpoints, at which point the units shall be indexed to occupied mode.

3.2 CONTROL DEVICES

A. All devices and sensors shall be adjustable. BMS shall display setpoints and actual conditions/status of all control devices and position of all actuators (damper and valve, with the exception of at Fin Tube, CUH, FCU and UH where position/status of actuators is not required at control valve) at the central personal computer (PC) thru the use of end switches and potentiometers integral to actuators.

B. Motorized dampers shall be 120V power. BMS contractor shall provide a RIB relay or similar at all locations to control the 120 volt circuit.

3.3 TERMINAL UNIT SEQUENCING

A. Where there are more than one heating source per zone, perimeter fin-tube radiation shall be the 1st heating stage during unoccupied and occupied mode.

3.4 ECONOMIZER COOLING

A. Where economizer cooling is indicated as the first stage of cooling, the economizer cooling sequence of control shall be as follows:
   1. Economizer cooling shall be enabled when all of the following are true (see also paragraph 2.):
      a. The outside air temperature is less than 65 degrees F.
      b. The outside air temperature is less than the return air temperature.
      c. The outside air enthalpy is less than 22 btu/lb.
      d. The outside air enthalpy is less than the return air enthalpy.
   2. The BMS system operator shall, via single click editing, be easily able to select any or all of items a. thru d. of the previous paragraph for economizer enabling, for individual air handling systems and for air handling systems globally. Additionally, the BMS system operator shall be easily able to globally change the setpoints for items a. and c. of the previous paragraph.
   3. Economizer cooling shall be integrated; economizer cooling shall continue to operate during stages of mechanical cooling as long as all four of the conditions indicated in paragraph 1 are true (or as selected by the system operator per paragraph 2).
   4. When both mechanical cooling is anticipated to be required the next day (by trending the outside air enthalpy), and economizer cooling is available during the unoccupied cycle, economizer cooling shall be operated during the unoccupied cycle to pre-cool the spaces served by the air handler to 70 degrees F.

3.5 HEATING HOT WATER COILS

A. Integral to Air Handling Units & Dedicated Outdoor Air Units: See sequence of operation for air handling units and dedicated outdoor air units.

3.6 CHILLED WATER COILS

A. Integral to Air Handling Units & Dedicated Outdoor Air Units: See sequence of operation for air handling units and dedicated outdoor air units.

3.7 HIGH VOLUME LOW SPEED FANS (HVLS) (CF-A)

A. General: Units shall maintain space temperature setpoint through manufacturers supplied controllers with BACnet interface.

B. Limits and Alarms:
   1. Unit fault code input from BACnet interface. Alarm shall be generated at operator work station. Alarm shall identify code and brief verbal description.

C. Point List:
   1. All points shall be shown on graphics.
   2. All BACnet point shall be made available by the equipment control system

3.8 CHILLED BEAM CONTROL:

A. General: BMS shall command zone into morning warmup mode, unoccupied mode and occupied mode.

B. Zone consist of the following:
   1. Chilled beam control
   2. Perimeter heat control

C. Morning warm-up mode:
   1. BMS shall enable morning warm-up mode based on schedule and when outdoor air temperature is less than 65 °F and morning dewpoint mode is not enabled. BMS shall enable the following morning warm-up control sequence:
      a. 6-way valve shall modulate open to maintain space temperature set point.

D. Morning warm-up mode:
   1. BMS shall enable morning warm-up mode based on schedule and when outdoor air temperature is less than 65 °F and morning dewpoint mode is not enabled. BMS shall enable the following morning warm-up control sequence:
      a. 6-way valve shall modulate open to maintain space temperature set point.

E. Unoccupied mode with perimeter heat:
   1. BMS shall enable unoccupied mode based on schedule.
   2. Unoccupied heating mode:
      a. 6-way valve shall modulate to maintain unoccupied space temperature set point.

F. Unoccupied mode:
   1. BMS shall enable unoccupied mode based on schedule.
      a. 6-way valve shall modulate to maintain unoccupied space temperature set point.

G. Occupied mode:
   1. BMS shall enable occupied mode based on schedule. In occupied mode, space shall be in either heating mode or cooling mode or high limit dewpoint mode or stand-by mode.
   2. Reset space temperature setpoints based occupancy sensor or vacancy sensor status.
   3. Unoccupied / Occupied heating mode:
      a. Heating mode shall be enabled when space temperature is below setpoint and space dewpoint temperature is not above set point.
      b. In heating mode, 6-way valve shall modulate to maintain space temperature set point.
   4. Unoccupied / Occupied cooling mode
      a. Cooling mode shall be enabled when space temperature is above setpoint and space dewpoint temperature is not above set point.
      b. In cooling mode, modulate chilled water flow through chilled beam.

5. Unoccupied / Occupied high limit dewpoint mode
   a. High limit dewpoint mode shall be enabled when space temperature dewpoint is above setpoint.
   b. In high limit dewpoint mode, BMS shall command the 6-way control valve closed if the supply air dewpoint temperature is greater than space dewpoint temperature.

H. Limits and Alarms:
1. DOA discharge air dewpoint temperature shall be less than CHWS water temperature. If DOA discharge air temperature dew point is within a 2°F approach of the CHWS water temperature, BMS shall enable the following control sequence:
   a. All 6-way valve serving associated DOA unit shall be commanded to fully closed position
   b. Alarm issued to the operator's work station.
2. Space dewpoint shall be less than CHWS water temperature. If space dew point is within a 2°F approach of the CHWS water temperature, BMS shall enable the following control sequence:
   a. 6-way valve in associated zone shall be commanded to fully closed position.
   b. Alarm issued to the operator's work station.
3. If pipe condensate sensor is activated, BMS shall enable the following control sequence:
   a. 6-way valve in associated zone shall be commanded to fully closed position.
4. If space temperature does not match setpoint for a predetermined time period, alarm shall be generated at the operator workstation.

I. Points List
1. All points shall be shown on graphics.
2. All setpoints shall be adjustable unless otherwise noted.

CHILLED BEAM ZONE POINT LIST						
Control Point Name	Hardware Points				Software Points	
	AI	AO	BI	BO	AV	BV
Occupancy/Vacancy sensor(s) status, see drawings for qty.			×			
Space sensor unoccupied over-ride			×			
space temperature	×					
space humidity	×					
Setpoint adjustment	×					
Space CO2	×					
DTS pipe temp	×					
6-way control valve control		×				
Pipe condensate sensor (mount on DTS)			×			

Enable chilled beam or perimeter heat as stage 1 heat or stage 2 heat						×
Morning warm-up heating space temp setpoint					×	
Morning space dewpoint setpoint					×	
occupied cooling space temp setpoint					×	
occupied standby cooling space temp setpoint					×	
unoccupied cooling space temp setpoint					×	
occupied heating space temp setpoint stage 1					×	
unoccupied heating space temp setpoint stage 1					×	
occupied heating space temp setpoint stage 2					×	
occupied standby heating space temp setpoint					×	
unoccupied heating space temp setpoint stage 2					×	
space dewpoint setpoint					×	
DOA discharge air dewpoint temp / CHWS water temperature 2˚F approach setpoint.					×	
Space dewpoint / CHWS water temperature 2˚F approach setpoint.					×	
morning warm-up space temperature alarm					×	
morning dewpoint space temperature alarm					×	
occupied cooling space temperature alarm					×	
unoccupied cooling space temperature alarm					×	
occupied heating space temperature alarm					×	
unoccupied heating space temperature alarm					×	
space dewpoint alarm					×	
DOA discharge air dewpoint temp / CHWS water temperature 2˚F approach Alarm.					×	
Space dewpoint / CHWS water temperature 2˚F approach alarm.					×	
Condensate switch alarm						×
Window switch alarm						×
DTS temperature setpoint limit (Heating)					×	
DTS temperature alarm (Heating)						×
DTS temperature setpoint limit (Cooling)					×	
DTS temperature alarm (Cooling)						×

3.9 FANS

A. General: Each fan shall have status provided at the DDC (direct digital controls system) display as well as generate an alarm at the DDC display if fan failure occurs.

B. Kitchen Exhaust Fans (KHEF-1)
1. Run Conditions - Interlocked:
   a. The fan shall be interlocked to run whenever the associated hood runs unless shutdown on safeties.
2. Operation:
   a. The fan shall be commanded on when kitchen hood is turned on. The motorized dampers on the return ductwork shall close and AHU return

fan serving space shall turn down to match reduced CFM. The exhaust fan shall not start until proof (by end switch) that the motorized dampers on the return is open.

b. The fan shall have a user definable (adj.) minimum runtime.

C. Dishwasher Exhaust Fan (DWEF-1)

1. Run Conditions - Interlocked:
   a. The fan shall be interlocked to run whenever the associated dishwasher runs unless shutdown on safeties.
2. Fan:
   a. The fan shall have a user definable (adj.) minimum runtime.

D. General Exhaust Fans (EF-1 & EF-2): Fan shall be turned on/ off via wall switch. Location of switch to be coordinated with teacher preferred location.

E. Kiln Exhaust Fan:

1. Run Conditions - Interlocked:
   a. The fan shall be interlocked to run whenever the associated kiln runs unless shutdown on safeties.
2. Fan:
   a. The fan shall have a user definable (adj.) minimum runtime.

F. Dryer Exhaust Ventilator (DEF-1):

1. Run Conditions - Interlocked:
   a. The fan shall be interlocked to run whenever the associated dryer runs unless shutdown on safeties.
2. Fan:
   a. The fan shall have a user definable (adj.) minimum runtime.

G. Radon Exhaust Fans: Shall operate continuously (24 hours a day, 7 days a week)

H. Limits and Alarms:

1. If fan command does not match fan operating status, BMS shall enable the following control sequence:
   a. Command fan to not operate.
   b. Close damper
   c. alarm shall be generated at the operator workstation
2. If damper command does not match damper position status, BMS shall enable the following control sequence:
   a. Command fan to not operate.
   b. Close damper
   c. alarm shall be generated at the operator workstation

I. Points List
1. All points shall be shown on graphics.
2. All setpoints shall be adjustable unless otherwise noted.

FAN POINT LIST						
Control Point Name	Hardware Points				Software Points	
	AI	AO	BI	BO	AV	BV
Fan enable command				×		
Fan run status			×			
Damper actuator command				×		
Damper actuator closed position status			×			
Fan run status alarm						×
Damper position alarm						×

3.10 CABINET UNIT HEATER / UNIT HEATER

A. General: BMS shall command zone into morning warmup mode, unoccupied mode and occupied mode.

B. Morning warm-up mode:
1. BMS shall enable morning warm-up mode based on schedule.
2. Fan shall operate
3. Valve shall cycle as required to maintain morning warmup heating set point.

C. Unoccupied heating mode:
1. BMS shall enable unoccupied mode based on schedule.
2. Fan shall operate
3. Valve shall modulate as required to maintain unoccupied heating set point.

D. Occupied heating mode:
1. BMS shall enable unoccupied mode based on schedule.
2. Fan shall operate
3. Valve shall modulate as required to maintain occupied heating set point.

E. Limits and Alarms:
1. If space temperature does not match setpoint for a predetermined time period, alarm shall be generated at the operator workstation.

F. Points List
1. All points shall be shown on graphics.
2. All setpoints shall be adjustable unless otherwise noted.

CABINET UNIT HEATERS POINT LIST						
Control Point Name	Hardware Points				Software Points	
	AI	AO	BI	BO	AV	BV
Space temperature	×					
Fan enable command				×		
Fan run status			×			
HW control valve command		x				
Morning warm-up space temperature setpoint					×	
Unoccupied space temperature setpoint					×	
Occupied space temperature setpoint					×	
Fan run status alarm						×
Morning warm-up space temperature alarm					×	
Unoccupied space temperature alarm					×	
Occupied space temperature alarm					×	

3.11 PERIMETER HEAT (RADIANT CEILING PANEL & FINNED TUBE RADIATORS).

A. General: BMS shall command zone into morning warmup mode, unoccupied mode and occupied mode.

B. Morning warm-up mode:
1. BMS shall enable morning warm-up mode based on schedule.
2. Valve shall cycle as required to maintain morning-warm-up heating set point.

C. Unoccupied heating mode:
1. BMS shall enable unoccupied mode based on schedule.
2. Valve shall cycle as required to maintain unoccupied heating set point.

D. Occupied heating mode:
1. BMS shall enable unoccupied mode based on schedule.
2. Valve shall cycle as required to maintain occupied heating set point.

E. Limits and Alarms:
1. If space temperature does not match setpoint for a predetermined time period, alarm shall be generated at the operator workstation.

F. Points List
1. All points shall be shown on graphics.
2. All setpoints shall be adjustable unless otherwise noted.

PERIMETER HEAT POINT LIST						
Control Point Name	Hardware Points				Software Points	
	AI	AO	BI	BO	AV	BV
Occupancy/Vacancy sensor(s) status, see drawings for qty.			×			
Space sensor unoccupied over-ride			×			
space temperature	×					
Setpoint adjustment	×					
Perimeter heat control valve control		×				
Moring warm-up heating space temp setpoint					×	
occupied heating space temp setpoint					×	
unoccupied heating space temp setpoint					×	
morning warm-up space temperature alarm					×	
occupied heating space temperature alarm					×	
unoccupied heating space temperature alarm					×	

3.12 GLYCOL MAKE UP PACKAGES

A. General: BMS shall monitor glycol make-up system regardless of heating of cooling plant operation.

B. Connect to the alarm contacts of the glycol make-up package.
1. Provide the following points and controls for the glycol make-up package.
a. Alarm.

C. Limits and Alarms:
1. If glycol package general alarm is, alarm shall be generated at the operator workstation.
2. If the glycol level drops below setpoint, an alarm shall be generate at the operator workstation.

D. Points List
1. All points shall be shown on graphics.
2. All setpoints shall be adjustable unless otherwise noted.

GLYCOL MAKE-UP POINT LIST						
Control Point Name	Hardware Points				Software Points	
	AI	AO	BI	BO	AV	BV
Glycol general alarm contact status			×			
Glycol general alarm						×
Glycol level alarm			x			

3.13 GLYCOL REFRACTOMETER

A. General: BMS shall read glycol value in percentage regardless of heating of cooling plant operation.

B. Limits and Alarms:
1. When glycol reading is less than 27% or less, alarm shall be generated at the operator workstation.

C. Point List:
1. All points shall be shown on graphics.
2. All setpoints shall be adjustable unless otherwise noted.

GLYCOL REFRACTOMETER POINT LIST						
Control Point Name	Hardware Points				Software Points	
	AI	AO	BI	BO	AV	BV
Glycol reading					×	
Glycol percentage					×	
Glycol low percentage alarm					×	

3.14 FAN COIL UNIT

A. General: BMS shall command zone into morning warmup mode, unoccupied mode, and occupied mode if any of the following devises are not activated.
1. Internal safety devices.
2. Fire Alarm Control Panel.

B. ATC shall be responsible for providing all controls on fan coil unit. Intent is to have ATC provide and field mount all controllers and end-devices unless otherwise noted.

C. Unoccupied Control:
1. BAS shall enable unoccupied heating mode when the unit is scheduled accordingly and the heating plant is enabled.

2. Fan Control:
   a. Unoccupied mode: Supply fan shall be off unless unoccupied heating mode or unoccupied cooling mode is activated.
3. Heating Mode Control:
   a. When space temperature decreases below setpoint, BMS shall command the following control sequence.
      1) Supply fan shall be commanded to operate continuously.
      2) Hot water control valve shall modulate as required to maintain discharge air temperature setpoint.
4. Cooling Mode Control:
   a. When space temperature increases above setpoint, BMS shall command the following control sequence.
      1) Supply fan shall be commanded to operate continuously.
      2) Chilled water control valve shall modulate as required to maintain discharge air temperature setpoint.
5. Morning Warm-Up Mode Control:
   a. BAS shall enable morning warm-up mode when the unit is scheduled accordingly and the heating plant is enabled.
6. Fan Control:
   a. Unoccupied mode: Supply fan shall be commanded to operate continuously.
7. Heating Mode Control:
   a. When space temperature decreases below setpoint, Hot water control valve shall modulate as required to maintain discharge air setpoint
8. Morning Cool-down Mode Control:
   a. BAS shall enable morning cool-down mode when the unit is scheduled accordingly and the chiller plant is enabled.
9. Fan Control:
   a. Unoccupied mode: Supply fan shall be commanded to operate continuously.
10. Cooling Mode Control:
    a. When space temperature increases above setpoint, Chilled water control valve shall modulate as required to maintain discharge air setpoint

D. Occupied Control:
1. Occupied Fan Control:
   a. Supply fan shall be off unless occupied heating mode or occupied cooling mode is activated.
2. Occupied Heating Mode Control:
   a. BAS shall enable occupied heating mode when the unit is scheduled accordingly and the heating plant is enabled.
   b. When space temperature decreases below setpoint, hot water control valve shall modulate as required to maintain discharge air temperature setpoint.
3. Occupied Cooling Mode Control:
   a. BAS shall enable occupied cooling mode when the unit is scheduled accordingly and the chiller plant is enabled.

b. When space temperature increases above setpoint, chilled water control valve shall modulate as required to maintain discharge air temperature setpoint.

E. Limits and Alarms:
1. If space temperature does not match setpoint for a predetermined time period, alarm shall be generated at the operator workstation.
2. If fan command does not match fan operating status, BMS shall enable the following control sequence:
   a. Command fan to not operate.
   b. alarm shall be generated at the operator workstation
3. If clog filter condition is activated, alarm shall be generated at the operator workstation.

F. Point List:
1. All points shall be shown on graphics.
2. All setpoints shall be adjustable unless otherwise noted.

FCU POINT LIST						
Control Point Name	Hardware Points				Software Points	
	AI	AO	BI	BO	AV	BV
Occupancy/Vacancy sensor(s) status, see drawings for qty.			×			
space temperature	×					
Space sensor unoccupied over-ride			×			
Setpoint adjustment	×					
Space humidity	×					
Space CO2 sensor	×					
Supply fan enable command				×		
Supply fan run status			×			
Chilled water valve control		×				
Hot water valve control		×				
Duct temp setpoint (heating/cooling)					×	
Duct temp alarm (heating/cooling)						×
Occupied cooling space temp setpoint					×	
unoccupied cooling space temp setpoint					×	
occupied heating space temp setpoint stage					×	
unoccupied heating space temp setpoint stage					×	
Heating discharge air setpoint					×	
Cooling discharge air setpoint					×	
morning warm-up space temperature alarm					×	
occupied cooling space temperature alarm					×	
unoccupied cooling space temperature alarm					×	
occupied heating space temperature alarm					×	
unoccupied heating space temperature alarm					×	
Heating discharge air temperature alarm					×	

Cooling discharge air temperature alarm					×	
Supply fan run status alarm						×
Hot water valve position alarm					×	
Chilled water valve position alarm					×	

3.15 SINGLE ZONE VARIABLE VOLUME AIR HANDLING UNIT (RTU-1 & RTU-2)

A. General: BMS shall command zone into morning warmup mode, unoccupied mode, occupied mode and demand control ventilation mode if any of the following devises are not activated.
   1. Internal safety devices.
   2. Fire Alarm Control Panel.
   3. Low temperature limit.

B. Zone consist of the following:
   1. Air handling unit (AHU) control
   2. Demand control ventilation

C. ATC shall be responsible for providing all controls on air handling unit. Intent is to have ATC provide and field mount all controllers and end-devices unless otherwise noted.

D. Unoccupied and Morning Warm-Up Control:
   1. Unoccupied damper actuator control:
      a. Outside air damper shall be fully closed.
      b. Exhaust air damper shall be fully closed.
      c. Return air damper fully opened.
   2. Unoccupied and Morning Warm-Up Energy Wheel Control:
      a. Energy wheel shall not operate.
   3. Unoccupied and Morning Warm-Up Fan Control:
      a. Supply fan VFD shall be off unless unoccupied heating mode or unoccupied cooling mode is activated.
      b. Relief fan VFD shall be off.
   4. Unoccupied Heating Mode Control:
      a. BAS shall enable unoccupied heating mode when the unit is scheduled accordingly and the heating plant is enabled.
      b. When space temperature decreases below setpoint, Hot water control valve shall modulate as required to maintain discharge air temperature setpoint.
   5. Morning Warm-Up Mode Control:
      a. BAS shall enable morning warm-up heating mode when the unit is scheduled accordingly and the heating plant is enabled.
         1) When space temperature decreases below setpoint, BMS shall command the following control sequence.
         2) Cycle perimeter heat valve open
         3) Supply fan VFD shall modulate the supply fan to predetermined frequency setpoint
         4) Hot water control valve shall modulate as required to maintain discharge air temperature setpoint.

6. Unoccupied Cooling Mode Control:
   a. BAS shall enable unoccupied cooling mode when the unit is scheduled accordingly and either the chiller plant is enabled or outdoor air temperature is consistent with economizer operations.
   b. When space temperature increases above setpoint, BMS shall command the following control sequence.
      1) Supply fan VFD shall modulate the supply fan to predetermined frequency setpoint
      2) Chilled water control valve shall modulate as required to maintain discharge air temperature setpoint.

E. Occupied Mode Control:
1. Occupied damper actuator control:
   a. Outside air damper shall open to minimum ventilation damper position.
   b. Relief air damper shall fully open.
   c. Return air damper shall open to minimum ventilation damper position.
   d. Minimum damper position shall be determined by TAB contractor.
2. Occupied Mode Energy Wheel Control:
   a. Energy wheel shall operate continuously unless unit is in economizer mode.
3. Occupied Mode Fan Control:
   a. Supply fan VFD shall modulate the supply fan to predetermined frequency setpoint
   b.
   c. Relief VFD fan speed shall track outdoor airflow.
   d. When outdoor airflow value measured at the OA AFMS is < 25% of the schedule outdoor airflow capacity, exhaust fan shall be commanded off.
   e. When outdoor airflow value measured at the OA AFMS is ≥ 25% of the scheduled outdoor airflow capacity, exhaust fan speed shall modulate as required to maintain exhaust airflow setpoint measured at the exhaust fan inlet AFMS. Exhaust air setpoint shall be determined as follows:
      1) EA Setpoint = OA airflow measured at the OA AFMS x 0.95%
4. Occupied Heating Mode Control:
   a. BAS shall enable occupied heating mode when the unit is scheduled accordingly and the heating plant is enabled.
   b. When space temperature decreases below setpoint, Hot water control valve and supply fan VFD shall modulate as required to maintain discharge air temperature setpoint.
5. Occupied Cooling Mode Control:
   a. BAS shall enable occupied cooling mode when the unit is scheduled accordingly and the chiller plant is enabled.
   b. When space temperature increases above setpoint, BMS shall command the following control sequence.
      1) Economizer cooling mode: When all of the outdoor air conditions are true as stated in the economizer cooling description section, Economizer cooling shall enable.
      2) When space temperature increases above setpoint and economizer mode is enabled, BMS shall command the following control sequence.

a) Exhaust air damper shall fully open.
b) Modulate outdoor air damper, return air damper, and supply fan VFD as required to maintain discharge air temperature set point.
c) Modulate exhaust fan as required to maintain space pressure differential as related to adjacent space.

3) Mechanical cooling mode: When any of the outdoor air conditions are not true as stated in the economizer cooling description section, Mechanical cooling shall enable.

4) When space temperature increases above setpoint and mechanical mode is enabled, BMS shall command the following control sequence.
a) Reset air dampers to normal operating mode.
b) Modulate chilled water control valve and supply fan VFD as required to maintain discharge air temperature setpoint.

6. Occupied Dehumidification Mode Control:
a. When the mixed air dewpoint is above setpoint and heating or cooling mode is not activated, BAS shall enable the following control sequence:
1) Modulate cooling coil to maintain discharge air dewpoint setpoint.
2) Command wrap around heat pipe solenoids to open or close, or coil bypass damper to modulate as required to maintain discharge air temperature setpoint.

F. Demand control ventilation:
1. BAS shall enable demand control ventilation (DCV) shall be enabled during occupied mode. DCV shall be locked out from operating when economizer cooling is enabled. DCV shall be allowed to operate simultaneously with cooling and heating control sequence.
2. When space CO2 level decrease below setpoint, BAS shall command the following control sequence:
a. Exhaust air damper shall fully open.
b. Modulate outdoor air damper and mixed air damper as required to maintain space CO2 setpoint.
c. Modulate exhaust fan as required to maintain space pressure differential as related to adjacent space.

G. Limits and Alarms:
1. If discharge air temperature does not match setpoint for a predetermined time period, alarm shall be generated at the operator workstation.
2. If space temperature does not match setpoint for a predetermined time period, alarm shall be generated at the operator workstation.
3. If space CO2 does not match setpoint for a predetermined time period, alarm shall be generated at the operator workstation.
4. If space pressure does not match setpoint for a predetermined time period, alarm shall be generated at the operator workstation.
5. If fan command does not match fan operating status, BMS shall enable the following control sequence:

a. Command fan to not operate.
b. Close damper
c. alarm shall be generated at the operator workstation

6. If fan VFD fault in activated, BMS shall enable the following control sequence:
7. alarm shall be generated at the operator workstation
8. If low limit freeze-stat is activated, BMS shall enable the following control sequence:
   a. Command fan to not operate
   b. Command mixed air damper to fully open, OA damper and exhaust air damper to close
   c. Fully open Hot water control valve.
   d. Alarm shall be generated at the operator workstation
9. If valve command does not match valve position status, BMS shall enable the following control sequence:
   a. alarm shall be generated at the operator workstation
10. If damper command does not match damper position status, BMS shall enable the following control sequence:
    a. Command fan to not operate.
    b. alarm shall be generated at the operator workstation
11. If clog filter condition is activated, alarm shall be generated at the operator workstation.
12. If energy wheel command does not match operating status, alarm shall be generated at the operator work station.

H. Point List:
1. All points shall be shown on graphics.
2. All setpoints shall be adjustable unless otherwise noted.
3. Coordinate wrap-around heat pipe hardware point types and quantities with equipment furnished by manufacturer.

SINGLE ZONE VARIABLE AIR VOLUME AIR HANDLING UNIT (AHU)						
Control Point Name	Hardware Points				Software Points	
	AI	AO	BI	BO	AV	BV
Space sensor unoccupied over-ride			×			
space temperature	×					
space humidity	×					
Setpoint adjustment	×					
Space CO2	×					
Space Pressure	×					
High pressure discharge air pressure switch			×			
Discharge air temperature sensor	×					
Discharge air humidity sensor	×					
Return air temperature sensor	×					
Return air humidity sensor	×					
FAS status			×			
Supply fan enable command				×		
Supply fan VFD speed control		×				

Supply fan VFD speed feedback					x	
Supply fan VFD speed fault			×			
Supply fan run status			×			
Relief fan enable command				×		
Relief fan VFD speed control		×				
Relief fan VFD speed feedback					x	
Relief fan VFD speed fault			×			
Exhaust fan run status			×			
Wrap-around coil solenoid valve (circuit-01) (3)				x		
Wrap-around coil solenoid valve (circuit-02) (3)				x		
Wrap-around coil solenoid valve (circuit-03) (3)				x		
Wrap-around coil bypass damper (3)		x				
Chilled water valve control		×				
Chilled water valve position	×					
Hot water valve control		×				
Hot water valve position	×					
Low limit freeze stat			x			
Mixed air averaging temperature sensor	x					
Mixed air humidity sensor	×					
Energy wheel enable				x		
Energy wheel run status			x			
Energy wheel damper control (Exhaust air)				x		
Energy wheel damper end-switch (Exhaust air)			x			
Energy wheel damper control (Outdoor air)				x		
Energy wheel damper end-switch (Exhaust air)			x			
Return air damper control		x				
Return air damper feedback	x					
Exhaust air damper control		x				
Exhaust air damper feedback	x					
Outdoor air damper control		x				
Outdoor air damper feedback	x					
Outdoor airflow (CFM)	x					
Duct temperature setpoint (heating/cooling)					×	
Duct temperature alarm (heating/cooling						×
Occupied cooling space temp setpoint					×	
unoccupied cooling space temp setpoint					×	
occupied heating space temp setpoint stage 1					×	
unoccupied heating space temp setpoint stage 1					×	
occupied heating space temp setpoint stage 2					×	
unoccupied heating space temp setpoint stage 2					×	
occupied space CO2 setpoint					×	
occupied space pressure setpoint					×	
Heating discharge air setpoint					×	
Cooling discharge air setpoint					×	
Economizer – mechanical cooling change over						×
Supply fan minimum airflow speed (value determined by TAB), value not adjustable					×	

Exhaust fan minimum airflow speed (value determined by TAB), value not adjustable					×	
Supply fan maximum airflow speed (value determined by TAB), value not adjustable					×	
Exhaust fan maximum airflow speed (value determined by TAB), value not adjustable					×	
morning warm-up space temperature alarm					×	
occupied cooling space temperature alarm					×	
unoccupied cooling space temperature alarm					×	
occupied heating space temperature alarm					×	
unoccupied heating space temperature alarm					×	
occupied space CO2 alarm					×	
occupied space pressure alarm					×	
Heating discharge air temperature alarm					×	
Cooling discharge air temperature alarm					×	
FAS alarm						×
Supply fan run status alarm						×
Supply fan VFD fault alarm						×
Relief fan run status alarm						×
Relief fan VFD fault alarm						×
Low limit freeze-stat alarm						×
Hot water valve position alarm					×	
Chilled water valve position alarm					×	
Mixed air damper position alarm					×	
Outdoor air damper position alarm					×	
Relief air damper position alarm					×	
Clog filter alarm						×
Energy wheel alarm						×
Relief airflow setpoint					×	
Energy wheel bypass damper position alarm						×

3.16 MULTIZONE VARIABLE VOLUME AIR HANDLING UNIT (RTU-3)

A. General:

1. ATC shall be responsible for providing all controls on air handling unit. Intent is to have ATC provide and field mount all controllers
2. Other than damper actuators and VFDs, ATC shall provide all end devices required to provide the sequence of operation.
3. Upon detection of smoke by any of the duct mount smoke detectors or by any other signal from the fire alarm system, the supply fan and the exhaust fan shall be shut off, the energy recovery wheel shall be shut off, the outside air dampers shall close, the exhaust air dampers shall close, and the control valves shall close.
4. Provide with static pressure sensor at discharge of supply fan and exhaust fan, display reading on BMS graphic.

B. Supply fan control:
   1. General:
      a. The outside air control damper shall be closed when the supply fan is off and during unoccupied mode; the damper shall be open when the supply fan is on during occupied mode. The supply fan shall not start until proof (by end switch) that either the outside air control damper or the return air bypass damper is open.
      b. When operating in unoccupied mode, a variable frequency drive shall modulate the supply fan to maintain a constant supply duct static pressure of 1.0" wg. The supply duct static pressure sensor shall be located approximately 2/3 the distance from the supply fan to the furthest motorized damper served by the air handling unit. Under normal occupied mode, supply fan shall be controlled to maintain duct static pressure determined during testing and balancing
   2. Morning warm-up: The supply fan shall be on.
   3. Occupied: The supply fan shall be on.
   4. Unoccupied: The supply fan shall be off except when 25% of the VAV zones fall below unoccupied space temperature setpoint at which point the variable frequency drive shall modulate the supply fan to 30% power. If, after 10 minutes, the temperature in the critical space is still dropping, VFD shall modulate fan between minimum and maximum power to maintain the space heating setpoint.

C. Return Fan:
   1. The return fan shall run whenever the supply fan runs.
   2. Occupied: The return fan shall be on.
   3. Unoccupied: The return fan shall be off.
   4. Occupied Mode Fan Control:
      a. The controller shall measure return plenum static pressure and modulate the return fan VFD speed to maintain a return plenum static pressure setpoint of 0.2 in H2O (adj.). The return fan VFD speed shall not drop below 20% (adj.).

D. Outside Air (OA), Return Air (RA) and Exhaust Air (EA) Energy Wheel Bypass (EWB) Control Dampers
   1. Morning warm-up mode:
      a. RA and EWB damper shall be open.
      b. OA and EA Damper shall be closed
   2. Unoccupied mode:
      a. RA and EWB damper shall be open.
      b. OA and EA Damper shall be closed
   3. Occupied mode (Economizer):
      a. RA and OA damper modulate to maintain DAT setpoint.
      b. EA damper shall be open.
      c. EWB damper shall be open.
   4. Occupied mode (Mechanical Cooling):
      a. RA and OA damper modulate to pre-determined minimum ventilation position.
      b. EA damper shall be open.

E. Supply Air Temperature Control
1. General: The heating coil control valve, the chilled water control valve, and energy wheel shall be controlled to maintain a supply air temperature sequence.
2. Heating Mode:
a. Hot Water valve operation when outside ambient temperature is <36F. HW valve shall maintain minimum 25% open when outside ambient temperature is <36F.
b. Morning-up (morning): The control valve shall modulate to maintain a discharge air temperature of 90°F until the space served is at heating setpoint.
c. Occupied Heating Mode: The return air sensor shall reset discharge air temperature to maintain the following schedule:
1) An inversely proportional linear algorithm shall modulate the heating coil control valve to maintain a discharge air temperature of 62°F at 75°F return air temperature or greater and 68°F at 70°F return air temperature or less.
d. Cool-down (evening): The control valve shall be closed.
e. Unoccupied: The control valve shall be closed except upon call for unoccupied heating; the control valve shall modulate to maintain a discharge air temperature of 90°F until the spaces served are at heating setpoint.
3. Cooling Mode:
a. General: Chilled water coil cooling shall be enabled only when the economizer, if enabled, is at 100% outside air, the hot water control valve is closed, the building is indexed to cooling mode and the outside air is above 55F.
b. Occupied Cooling Mode: The return air sensor shall reset discharge air temperature to maintain the following schedule:
1) An inversely proportional linear algorithm shall modulate the chilled water coil control valve to maintain a discharge air temperature of 55°F at 75°F return air temperature or greater and 62°F at 70°F return air temperature or less.
c. Cool-down (evening): The chilled water control valve shall be closed.

F. Dehumidification Mode Control:
1. During occupied mode, when the mixed air dewpoint is above setpoint and heating or cooling mode is not activated, BAS shall enable the following control sequence:
a. Modulate cooling coil to maintain discharge air dewpoint setpoint.
b. Command wrap around heat pipe solenoid valves to open or close, or coil bypass damper to modulate as required to maintain discharge air temperature setpoint.

G. Demand control ventilation:
1. Demand control ventilation (DCV) shall be enabled during occupied mode. DCV shall be locked out from operating when economizer cooling is enabled.
2. DCV shall be allowed to operate simultaneously with cooling and heating control sequence.

3. When space CO2 levels decrease below setpoint, BAS shall command the following control sequence:
   a. Exhaust air damper shall fully open.
   b. Modulate outdoor air damper and mixed air damper as required to maintain space CO2 setpoint.
   c. Modulate exhaust fan as required to maintain space pressure differential as related to adjacent space.

H. Point List:
1. All points shall be shown on graphics.
2. All setpoints shall be adjustable unless otherwise noted.
3. Coordinate wrap-around heat pipe hardware point types and quantities with equipment furnished by manufacturer.

VARIABLE VOLUME AIR HANDLING UNIT (AHU)						
Control Point Name	Hardware Points				Software Points	
	AI	AO	BI	BO	AV	BV
discharge air temperature sensor	×					
discharge air humidity sensor	×					
energy wheel discharge air temperature	×					
energy wheel discharge air humidity	×					
High pressure discharge air pressure switch			×			
Duct pressure sensor	×					
Return air temperature sensor	×					
Return air humidity sensor	×					
Return air CO2 sensor	×					
Return air plenum static pressure	×					
Space pressure sensor	×					
Space pressure sensor	×					
FAS status			×			
Supply fan enable command				×		
Supply fan VFD speed control		×				
Supply fan VFD speed feedback					x	
Supply fan VFD speed fault			×			
Supply fan run status			×			
Exhaust fan enable command				×		
Exhaust fan VFD speed control		×				
Exhaust fan VFD speed feedback					x	
Exhaust fan VFD speed fault			×			
Exhaust fan run status			×			
Chilled water valve control		×				
Chilled water valve position	×					
Hot water valve control		×				
Hot water valve position	×					
Low limit freeze stat			x			

Mixed air damper control		x				
Mixed air damper feedback	x					
Energy wheel enable				x		
Energy wheel run status			x			
Energy Wheel EA damper control		x				
Energy Wheel OA damper control		x				
Energy wheel EA damper feedback	x					
Exhaust air damper control		x				
Exhaust air damper feedback	x					
Outdoor air damper control		x				
Outdoor air damper feedback	x					
Outdoor airflow (CFM)	x					
CHWS temperature	x					
CHWR temperature	x					
HWS temperature	x					
HWR temperature	x					
Wrap-around coil solenoid valve (circuit-01) (3)				x		
Wrap-around coil solenoid valve (circuit-02) (3)				x		
Wrap-around coil solenoid valve (circuit-03) (3)				x		
Wrap-around coil bypass damper (3)		x				
Energy wheel damper control (Exhaust air)				x		
Energy wheel damper end-switch (Exhaust air)			x			
Energy wheel damper control (Outdoor air)				x		
Energy wheel damper end-switch (Exhaust air)			x			
Space pressure setpoint					x	
duct temperature sensor setpoint (heating, cooling)					×	
duct temperature sensor alarm (heating, cooling)						×
Economizer – mechanical cooling change over						×
Supply fan minimum airflow speed (value determined by TAB), value not adjustable					×	
Exhaust fan minimum airflow speed (value determined by TAB), value not adjustable					×	
Supply fan maximum airflow speed (value determined by TAB), value not adjustable					×	
Exhaust fan maximum airflow speed (value determined by TAB), value not adjustable					×	
Supply fan run status alarm						×
Supply fan VFD fault alarm						×
Exhaust fan run status alarm						×
Exhaust fan VFD fault alarm						×
Low limit freeze-stat alarm						×
Hot water valve position alarm					×	
Chilled water valve position alarm					×	
Mixed air damper position alarm					×	
Outdoor air damper position alarm					×	
Exhaust air damper position alarm					×	

Clog filter alarm						×
Energy wheel alarm						×
Exhaust air flow setpoint					×	
Energy wheel bypass damper position alarm						×

3.17 DEDICATED OUTSIDE AIR HANDLING UNITS (DOA-1, DOA-2, DOA-3, DOA-4, DOA-5)

A. General:
1. ATC shall be responsible for providing all controls on air handling unit. Intent is to have ATC provide and field mount all controllers
2. Other than damper actuators and VFDs, ATC shall provide all end devices required to provide the sequence of operation.
3. Upon detection of smoke by any of the duct mount smoke detectors or by any other signal from the fire alarm system, the supply fan and the exhaust fan shall be shut off, the energy recovery wheel shall be shut off, the outside air dampers shall close, the exhaust air dampers shall close, and the control valves shall close.
4. Provide with static pressure sensor at discharge of supply fan and exhaust fan, display reading on BMS graphic.

B. Supply fan control:
1. General:
   a. The outside air control damper shall be closed when the supply fan is off and during unoccupied mode; the damper shall be open when the supply fan is on during occupied mode. The supply fan shall not start until proof (by end switch) that either the outside air control damper or the return air bypass damper is open.
   b. When operating in unoccupied mode, a variable frequency drive shall modulate the supply fan to maintain a constant supply duct static pressure of 1.0” wg. The supply duct static pressure sensor shall be located approximately 2/3 the distance from the supply fan to the furthest motorized damper served by the air handling unit. Under normal occupied mode, supply fan shall be controlled to maintain duct static pressure determined during testing and balancing
2. Morning warm-up: The supply fan shall be on.
3. Morning Dewpoint high limit: The supply fan shall be on.
4. Occupied: The supply fan shall be on.
5. Cool-down (evening): The supply fan shall be off.
6. Unoccupied: The supply fan shall be off except upon a call for 2nd stage of heating (any chilled beam heating control valve open for 10 minutes or greater shall be 1st stage) at which point the variable frequency drive shall modulate the supply fan to 30% power. If, after 10 minutes, the temperature in the critical space is still dropping, VFD shall modulate fan between minimum and maximum power to maintain the space heating setpoint.
7. Outside Air Damper operation when outside ambient temperature is <36F. Sequence below is in order of operation:
   a. Open heating valve to 80% for 3 minutes (adj.).
   b. Open OA damper.

c. Start supply fan.
d. Release heating valve to normal heating operation.

8. Hot Water valve operation when outside ambient temperature is <36F. HW valve shall maintain minimum 25% open when outside ambient temperature is <36F.

C. Exhaust Fan and Exhaust Air Control Damper
1. Morning warm-up: The exhaust fan shall be off.
2. Morning dewpoint high limit: The exhaust fan shall be off.
3. Occupied: The exhaust fan shall be on.
4. Cool-down (evening): The exhaust fan shall be off.
5. Unoccupied: The exhaust fan shall be off.
6. Occupied Mode Fan Control:
a. Exhaust VFD fan speed shall track supply airflow as follow:
b. Exhaust fan speed shall modulate as required to maintain exhaust airflow setpoint measure at the exhaust fan inlet AFMS. Exhaust air setpoint shall be determined as follows:
c. EA Setpoint = SA airflow measured at the supply fan inlet AFMS x 0.95% (positive pressure factor) x 0.95% (wheel bypass factor)

D. Return Air and Exhaust Air Bypass Control Dampers
1. Morning warm-up: The return air bypass damper shall be open.
2. Morning dewpoint high limit: The return air bypass damper shall be open.
3. Occupied: The return air bypass damper and the exhaust air bypass damper shall be closed, except upon the following conditions:
a. When the wheel is operating, the exhaust air bypass damper shall operate to limit the exhaust air temperature to minimum 25□F, for frost control. The return air bypass damper shall remain closed during frost control.
b. When the wheel is off, the exhaust air bypass damper shall be open.
4. Cool-down (evening): The return air bypass damper shall be open and the exhaust air bypass damper shall be closed.
5. Unoccupied: The return air bypass damper shall be open and the exhaust air bypass damper shall be closed.

E. Occupied mode: the unit will operate with 100% outside air.

F. Supply Air Temperature Control
1. General: The heating coil control valve, the chilled water control valve, the heat wheel and passive dehumidification wheel shall be controlled to maintain a supply air temperature/dewpoint sequence.
2. Heating Mode:
a. Hot Water valve operation when outside ambient temperature is <36F. HW valve shall maintain minimum 25% open when outside ambient temperature is <36F.
b. Morning-up (morning): The control valve shall modulate to maintain a discharge air temperature of 90°F until the space served is at heating setpoint.
c. Occupied Heating Mode: The return air sensor shall reset discharge air temperature to maintain the following schedule:

1) An inversely proportional linear algorithm shall modulate the heating coil control valve to maintain a discharge air temperature of 55°F at 75°F return air temperature and 62°F at 70°F return air temperature.

d. Cool-down (evening): The control valve shall be closed.

e. Unoccupied: The control valve shall be closed except upon call for unoccupied heating; the control valve shall modulate to maintain a discharge air temperature of 90°F until the spaces served are at heating setpoint.

1) The supply fan shall cycle as needed to maintain and CO2 levels below 1000 ppm, maintain the heating setback temperature at 60deg (adj) when economizer is available.

3. Cooling Mode:

a. General: Chilled water coil cooling shall be enabled only when the economizer, if enabled, is at 100% outside air, the hot water control valve is closed, the building is indexed to cooling mode and the outside air is above 55 degrees F.

b. Morning dewpoint high limit mode: The chilled water control valve shall modulate as the passive dehumidification wheel turns so that supply air dewpoint of 52°F is achieved. The unit shall remain in warm dewpoint mode until all space dewpoint sensors achieve a setpoint of 55 degrees F.

c. Occupied Cooling Mode: The return air sensor shall reset discharge air temperature to maintain the following schedule:

1) An inversely proportional linear algorithm shall modulate the chilled water coil control valve to maintain a discharge air temperature of 55°F at 75°F return air temperature and 62°F at 70°F return air temperature.

2) Should the supply air dewpoint exceed 52°F, a dewpoint algorithm shall modulate the chilled water coil control valve to maintain 52°F supply air dewpoint.

d. Cool-down (evening): The chilled water control valve shall be closed.

e. Unoccupied: The chilled water control valve shall be closed.

1) The supply fan shall cycle as needed to maintain and CO2 levels below 1000 ppm, maintain the cooling setback temperature at 60deg (adj) when economizer is available.

G. Transition from Unoccupied to Occupied - When the unit transitions from unoccupied mode to the occupied mode, morning warm-up / morning cool-down / morning high limit dewpoint routines shall be activated. The morning warm-up / morning cool-down / morning high limit dewpoint routine shall be active for a minimal 1-hour(adj.) period. During morning warm-up or morning cool down or morning high limit dewpoint periods, if the building has reached the occupied temperature before the 1-hour minimum time has elapsed, the DOA shall continue to operate the supply fan to maintain duct static pressure, keep the VAV boxes open 100%, and control Supply Air Temperature to the building temperature setpoint to avoid over heating or cooling the building. The morning warm-up / cool down routines shall terminate when the building is indexed to occupied mode.

1. Morning Warm-Up - When morning high limit dewpoint is not enabled there is a call for heating and space temperature is 2°F or more below the occupied heating setpoint a morning warm-up sequence shall be activated. During warm-up the supply fan shall be turned on and shall modulate to maintain the supply air static pressure, the exhaust fan shall remain off, the outside air damper shall remain closed, the recirculation damper shall be commanded open, and the heating capacity shall be enabled at full capacity, and the VAV zone dampers shall be commanded to 100% open.
   a. Outside Air Damper operation when outside ambient temperature is <36F. Sequence below is in order of operation:
      1) Open heating valve to 80% for 3 minutes.
      2) Open OA damper.
      3) Start supply fan.
      4) Release heating valve.
   b. Hot Water valve operation when outside ambient temperature is <36F. HW valve shall maintain minimum 25% open when outside ambient temperature is <36F.
2. Morning Cool-down - When morning warm-up high limit is not enabled and there is a call for cooling and space temperature is 2°F or more over the occupied cooling setpoint a morning cool-down sequence shall be activated. During morning cool-down, the supply fan shall be turned on and shall modulate to maintain the supply air static pressure, the exhaust fan shall remain off, the outside air damper shall remain closed, the recirculation damper shall be commanded open, and the cooling capacity shall be enabled at full capacity, and the VAV zone dampers shall be commanded to 100% open.
3. Morning high Limit Dewpoint – If the outdoor air dewpoint temperature is above setpoint, the supply fan and dehumidification wheel shall be commanded on. If the supply fan or the dehumidification wheel status does not match the commanded value after a delay (30 sec. adj.) the wheel shall be commanded off, and an alarm shall be generated at the OWS. The Chilled Water Coil shall modulate to maintain the Supply Air Dewpoint at Setpoint (52F adj.) and the Reheat Coil Control Valve shall modulate to maintain the Supply Air Temperature at Setpoint (68 °F)

H. Dehumidification Control: The Air Handling Unit Controller Shall Operate the Dehumidification Wheel, Energy Recovery Wheel, Chilled Water Coil Control Valve, and Heating Coil Control Valve in series to maintain zone relative humidity.
1. When Outside Air Dewpoint Temperature is above Supply Air Dewpoint Setpoint (52F adj.), and the economizing mode is not active, The Energy Recovery Wheel shall be commanded on and the Energy Recovery Wheel bypass damper shall be open to the Recovery Wheel position. If the energy recovery wheel status does not match the commanded value after a delay (30 sec. adj.) the wheel shall be commanded off, the bypass dampers shall be commanded open to the bypass position, and an alarm shall be generated at the OWS. The dehumidification wheel shall be commanded on. If the Dehumidification wheel status does not match the commanded value after a delay (30 sec. adj.) the wheel shall be commanded off, and an alarm shall be generated at the OWS. The Chilled Water Coil shall modulate to maintain the Supply Air Dewpoint at

Setpoint (52F adj.) and the Reheat Coil Control Valve shall modulate to maintain the Supply Air Temperature at Setpoint (55F cooling, adj., 80F heating, adj.)

2. When Outside Air Dewpoint Temperature is above Supply Air Dewpoint Setpoint (52F adj.), and the economizing mode is active, The Energy Recovery Wheel shall be commanded off and the Energy Recovery Wheel bypass damper shall be open to the bypass position. The dehumidification wheel shall be commanded on. If the Dehumidification wheel status does not match the commanded value after a delay (30 sec. adj.) the wheel shall be commanded off, and an alarm shall be generated at the OWS. The Chilled Water Coil shall modulate to maintain the Supply Air Dewpoint at Setpoint (52F adj.) and the Reheat Coil Control Valve shall modulate to maintain the Supply Air Temperature at Setpoint (55F cooling, adj., 80F heating, adj.) If Chilled Water Coil Control Valve is 100% open for 10 min. (adj.) and Supply Air Dewpoint remains above setpoint, the Energy Recovery Wheel Shall be commanded on. And the bypass dampers will modulate open to the energy recovery wheel to maintain Supply Air Dewpoint at setpoint. If the energy recovery wheel status does not match the commanded value after a delay (30 sec. adj.) the wheel shall be commanded off, the bypass dampers shall be commanded open to the bypass position, and an alarm shall be generated at the OWS.
3. When Outside Air Dewpoint Temperature is below Supply Air Dewpoint Setpoint (52F adj.), and the economizing mode is not active, The Energy Recovery Wheel shall be commanded on and the Energy Recovery Wheel bypass damper shall modulate to maintain the Supply Air Dewpoint at Setpoint (52F adj.) If the energy recovery wheel status does not match the commanded value after a delay (30 sec. adj.) the wheel shall be commanded off, the bypass dampers shall be commanded open to the bypass position, and an alarm shall be generated at the OWS. The dehumidification wheel shall be commanded off. The Chilled Water and Hot Water Coils shall modulate to maintain the Supply Air Temperature at Setpoint (55F cooling, adj., 80F heating, adj.)
4. When Outside Air Dewpoint Temperature is below the Supply Air Dewpoint Setpoint (52F adj.), and the economizing mode is active, The Energy Recovery Wheel shall be commanded off and the Energy Recovery Wheel bypass damper shall modulate in series with the Chilled Water and Hot Water Coil Control Valves to maintain Supply Air Temperature at Setpoint (55F cooling, adj., 80F heating, adj.). The dehumidification wheel shall be commanded off.
5. When both the Outside Air Dewpoint and Drybulb Temperatures are below the Supply Air Setpoints, The Energy Recovery Wheel shall be commanded on and the Energy Recovery Wheel bypass damper shall modulate to maintain the Supply Air Temperature at Setpoint (55F cooling, adj., 80F heating, adj.) and Supply Air Dewpoint at or below Setpoint (52F, adj.). If the energy recovery wheel status does not match the commanded value after a delay (30 sec. adj.) the wheel shall be commanded off, the bypass dampers shall be commanded open to the bypass position, and an alarm shall be generated at the OWS. The dehumidification wheel shall be commanded off. If the Energy Wheel Bypass Damper is 100% open to the Energy Recovery Wheel, and Supply Air Temperature remains below Setpoint, the Heating Coil Control valve shall modulate to maintain the Supply Air Temperature Setpoint.

I. Point List:

1. All points shall be shown on graphics.
2. All setpoints shall be adjustable unless otherwise noted.

DOA POINT LIST						
Control Point Name	Hardware Points				Software Points	
	AI	AO	BI	BO	AV	BV
DOA discharge air temperature sensor	×					
DOA discharge air humidity sensor	×					
DOA SA energy wheel discharge air temperature	×					
DOA SA energy wheel discharge air humidity	×					
Duct pressure sensor	×					
Return air temperature sensor	×					
Return air CO2 sensor	×					
FAS status			×			
Supply fan enable command				×		
Supply fan VFD speed control		×				
Supply fan VFD speed feedback					x	
Supply fan VFD speed fault			×			
Supply fan run status			×			
Exhaust fan enable command				×		
Exhaust fan VFD speed control		×				
Exhaust fan VFD speed feedback					x	
Exhaust fan VFD speed fault			×			
Exhaust fan run status			×			
Chilled water valve control		×				
Hot water valve control		×				
Low limit freeze stat			x			
Mixed air damper control		x				
Mixed air damper feedback	x					
Energy wheel enable				x		
Energy wheel run status			x			
Dehumidification wheel enable				x		
Dehumidification wheel speed control		x				
Dehumidification wheel run status			x			
Dehumidification wheel EA damper control		x				
Dehumidification wheel EA damper feedback	x					
Exhaust air damper control		x				
Exhaust air damper feedback	x					
Outdoor air damper control		x				
Outdoor air damper feedback	x					
Outdoor airflow (CFM)	x					
CHWS temperature	x					
CHWR temperature	x					
HWS temperature	x					
HWR temperature	x					

Duct temperature setpoint (cooling, heating, dehumidification)					×	
Duct temperature Alarm (cooling, heating, dehumidification)						×
Economizer – mechanical cooling change over						×
Supply fan minimum airflow speed (value determined by TAB), value not adjustable					×	
Exhaust fan minimum airflow speed (value determined by TAB), value not adjustable					×	
Supply fan maximum airflow speed (value determined by TAB), value not adjustable					×	
Exhaust fan maximum airflow speed (value determined by TAB), value not adjustable					×	
Supply fan run status alarm						×
Supply fan VFD fault alarm						×
Exhaust fan run status alarm						×
Exhaust fan VFD fault alarm						×
Low limit freeze-stat alarm						×
Hot water valve position alarm					×	
Chilled water valve position alarm					×	
Mixed air damper position alarm					×	
Outdoor air damper position alarm					×	
Exhaust air damper position alarm					×	
Clog filter alarm						×
Energy wheel alarm						×
Dehumidification wheel alarm						×
Exhaust Airflow Setpoint					×	

J. CDQ and ERV wheel controls: Occupied Control Modes for CDQ in a Dedicated Outdoor-Air System with Total-Energy Recovery and Preheat. Refer to the following table.

Control Mode		Psychrometric Conditions[1]	Control Actions
O1a	Full recovery, dehumidification[8] (stage 1)	*h*oa > *h*ra DPToa > target DPTca	• Rotate the total-energy wheel • Close both the supply- side and exhaust-side total-energy wheel bypass dampers • Rotate the CDQ wheel • Close the CDQ wheel bypass dampers • Modulate the cooling coil to meet target DPTca • Preheat coil is off

O1b	Full recovery, dehumidification[8] (stage 2)	*h*oa > *h*ra DPToa > target DPTca and Cooling valve is 100% open for 10 min[8]	• Rotate the total-energy wheel • Close both the supply- side and exhaust-side total-energy wheel bypass dampers • Rotate the CDQ wheel • Close the CDQ wheel bypass dampers • Open the cooling coil valve to 100% • Modulate the preheat coil to meet target DPTca, but do not allow DBTcc > DBTcc,design • Operate in this mode until preheat coil valve has been closed for 10 minutes
O2b	Full recovery, dehumidification[8] (stage 1)	*h*oa < *h*ra DPToa > target DPTca	• Rotate the total-energy wheel • Close both the supply- side and exhaust-side total-energy wheel bypass dampers • Rotate the CDQ wheel • Close the CDQ wheel bypass dampers • Modulate the cooling coil to meet target DPTca • Preheat coil is off

O2c	Full recovery, dehumidification[8] (stage 2)	*h*oa < *h*ra DPToa > target DPTca and Cooling valve is 100% open for 10 min[8]	• Rotate the total-energy wheel • Close both the supply- side and exhaust-side total-energy wheel bypass dampers • Rotate the CDQ wheel • Close the CDQ wheel bypass dampers • Open the cooling coil valve to 100% • Modulate the preheat coil to meet target DPTca, but do not allow DBTcc > DBTcc,design • Operate in this mode until preheat coil valve has been closed for 10 minutes
03	Partial recovery, cooling	DPToa < target DPTca DBToa > DBTra	• Rotate the total-energy wheel • Modulate the exhaust-side bypass damper to control wheel capacity and maintain target DPTca • Stop the CDQ wheel (but operate it for 12 minutes once every 4 hours) • Keep the CDQ wheel bypass dampers closed • Modulate the cooling coil to meet target DBTca • Preheat coil is off •

O4	No recovery, cooling	DPToa < target DPTca DBTca < DBToa < DBTra	• Stop the total-energy wheel (but operate it for 2 minutes once every 4 hours)[6] • Fully open both the supply-side and exhaust-side bypass dampers[4] • Stop the CDQ wheel (but operate it for 12 minutes once every 4 hours) • Keep the CDQ wheel bypass dampers closed • Modulate the cooling coil to meet target DBTca • Preheat coil is off •
O5	Partial recovery (heating)	DPToa < target DPTca DBToa < DBTca	• Rotate the total-energy wheel • Close the supply-side total-energy wheel bypass damper • Modulate the exhaust- side total-energy wheel bypass damper to control wheel capacity and maintain target DBTca, and maintain DPTca at or below target • Stop the CDQ wheel (but operate it for 12 minutes once every 4 hours) • Open the CDQ wheel bypass dampers • Cooling coil is off • Preheat coil is off •

O6	Full recovery, supplemental heating	DPToa < target DPTca and exhaust-side bypass damper has reached the fully-closed position	• Rotate the total-energy wheel • Close both the supply- side and exhaust-side total-energy wheel bypass dampers • Stop the CDQ wheel (but operate it for 12 minutes once every 4 hours) • Open the CDQ wheel bypass dampers • Cooling coil is off • Modulate the preheat coil as needed to meet target DBTca
O7	Full recovery, supplemental heating, frost prevention	DBToa <= DBT frost threshold	• Rotate the total-energy wheel • Close the exhaust-side total-energy wheel bypass damper • Modulate the supply- side total-energy wheel bypass damper to maintain the DBT leaving the exhaust side of the total-energy wheel at setpoint • Stop the CDQ wheel (but operate it for 12 minutes once every 4 hours) • Open the CDQ wheel bypass dampers • Cooling coil is off • Modulate the preheat coil as needed to meet target DBTca

K. Unoccupied Control Modes for CDQ in a Dedicated Outdoor-Air System with Total-Energy Recovery and Preheat

Control Mode		Psychrometric Conditions[1]	Control Actions
U1	Off	DPTspace < unoccupied DPTsetpoint[2]	• Stop both supply and exhaust fans • Close the OA and EA dampers • Open the RA damper • Stop the total-energy wheel • Stop the CDQ wheel • Cooling coil is off • Preheat coil is off
U2a	Unoccupied dehumidification (stage 1)	DPTspace > unoccupied DPTsetpoint[3] and DPToa > target DPTca	• Turn on the supply fan • Stop the exhaust fan • Close the OA and EA dampers • Open the RA damper • Stop the total-energy wheel • Rotate the CDQ wheel • Close the CDQ wheel bypass dampers • Open cooling coil valve to 100% • Preheat coil is off • Operate in this mode until DPTspace drops 3°F below the unoccupied DPTsetpoint
U2b	Unoccupied dehumidification (stage 2)	DPTspace > unoccupied DPTsetpoint + 2°F[3] and DPToa > target DPTca	• Turn on the supply fan • Stop the exhaust fan • Close the OA and EA dampers • Open the RA damper • Stop the total-energy wheel • Rotate the CDQ wheel • Close the CDQ wheel bypass dampers • Open cooling coil valve to 100% • Open preheat coil valve to 100% • Operate in this mode until DPTspace drops 3°F below the unoccupied DPTsetpoint

U3	Unoccupied economizer dehumidification	DPTspace > unoccupied DPTsetpoint and DPToa < target DPTca[4]	• Turn on both the supply and exhaust fans • Open both the OA and EA dampers • Close the RA damper • Stop the CDQ wheel • Open the CDQ wheel bypass dampers • Cooling coil is off • Modulate the preheat coil as needed to meet target DBTca • Operate in this mode until DPTspace drops 3°F below the unoccupied DPTsetpoint
U4	Unoccupied cooling	DBTspace > unoccupied cooling setpt and DPTspace < unoccupied DPTsetpoint	• Turn on the supply fan • Stop the exhaust fan • Close the OA and EA dampers • Open the RA damper • Stop the total-energy wheel • Rotate the CDQ wheel • Close the CDQ wheel bypass dampers • Cooling coil if off • Preheat coil is off
U5	Unoccupied heating	DBTspace < unoccupied heating setpt and DPTspace < unoccupied DPTsetpoint	• Turn on the supply fan • Stop the exhaust fan • Close the OA and EA dampers • Open the RA damper • Stop the total-energy wheel • Rotate the CDQ wheel • Close the CDQ wheel bypass dampers • Cooling coil if off • Preheat coil is off

[1] OA = outdoor air, RA = return air, CA = air leaving cooling coil, SA = supply air, PH = preheat, DBT = dry-bulb temperature, DPT = dew-point temperature, RH = relative humidity

[2] The primary concern with humidity during unoccupied periods is to avoid condensation on surfaces of the chilled beams upon startup. Keeping the space dew point from becoming extremely high during the unoccupied mode helps minimize the risk of condensation when the system starts back up in cooling mode.

[3] This system has two stages of dehumidification: Stage 1 is to turn on the CDQ wheel, Stage 2 is to activate the preheat coil to increase the dehumidification capacity of the CDQ wheel. Stage 1 is activated when the space DPT reach a certain

threshold, defined here as unoccupied DPTsetpoint. Stage 2 is activated when the space DPT reaches unoccupied DPTsetpoint + 2°F, which occurs because stage 1 did not provide enough dehumidification under the current conditions. The 2°F offset is only suggestions and can be adjusted for the specific application.
[4] When the outdoor dewpoint is dry, it can be used to dehumidify the space. How much drier the outdoor air needs to be depends on the current latent load in the space and the airflow.

3.18 BOILERS

A. The boilers shall be enabled when the system is indexed to heating mode.

B. The Building Automation System will Communicate with Boiler Manufacturer Supplied Control Panels (ACS and Boiler valve Controller) via BacNet.

C. This division shall wire manufacturer supplied control panels and boiler isolation valves so as to provide a complete and operational system.
1. Once the hot water system flow is established, the BMS shall enable the Boiler Manufacturer Control Panel via the BACnet communication interface. The BMS shall monitor the boilers status and alarms via the communication interface, and monitor the dry contact alarm at the central Boiler Control Panel. The BMS contractor shall be responsible for installation and wiring of the Boiler Manufacturer Control Panel, Outdoor, System Supply and Return Temperature, and Individual Boiler Supply and Return Temperature sensors, and interlock wiring of the primary pumps and individual boiler isolation valves.
2. Once enable, the boiler manufacturer control panel will command the associated primary pump and enable and modulate the boilers in sequence based on its on outdoor air reset curve (adj.) to maintain supply water temperature at the reset setpoint.

D. Boilers B-1, B-2 shall be configured by on board integral boiler controls in a defined by manufacturer as parallel firing operation, such that B-1 shall fire and ramp up to 50 % fire, if at this time the heating hot water supply loop water temperature continues to drop B-1 shall lower to 35% fire and B-2 shall fire and ramp up to 50 % fire then the two boilers shall adjust firing rate as to maintain heating hot water supply temperature in accordance with water reset schedule below.

E. Alarms: Boiler failure alarm condition from the boiler internal control panel.

F. The heating hot water supply temperature shall be reset based on outside air temperature in accordance with:
1. Warm Up: Heating hot water supply temperature shall be 160F at 0F (and below) and shall reset to 125F at 60F.
2. Occupied: Heating hot water supply temperature shall be 120F at 0F (and below) and shall reset to 100F at 60F.
3. Unoccupied: Heating hot water supply temperature shall be 135F at 0F (and below) and shall reset to 125F at 60F.

G. Limits and Alarms:

1. If boiler enable status does not match command, alarm shall be generated at the operator workstation.
2. Boiler fault code input from Boiler BACnet interface. Alarm shall be generated at operator work station. Alarm shall identify code and brief verbal description.

H. Point List:
1. All points shall be shown on graphics.
2. All setpoints shall be adjustable unless otherwise noted.
3. All BACnet point shall be made available by the equipment control system

BOILER PLANT POINT LIST						
Control Point Name	Hardware Points				Software Points	
	AI	AO	BI	BO	AV	BV
Boiler controller enable				×		
Boiler HWS Setpoint		×				
Boiler 1 HWS temperature	×					
Boiler 2 HWS temperature	×					
HWS Header temperature	×					
HWR Header temperature	×					
Boiler 1 Fault Status			×			
Boiler 2 Fault Status			×			
Boiler 1 Isolation Valve End-Switch Status			×			
Boiler 2 Isolation Valve End-Switch Status			×			
Water Flow Rate	×					
OA temperature	×					
HWS Header temperature, wired to boiler controller					×	
Boiler low flow set point					×	
OA temperature, wired to boiler controller					×	
HWS Header temperature setpoint					×	
HWS Header temperature setpoint, Boiler controller BACnet input					×	
OA temperature setpoint, Boiler controller BACnet input					×	
Boiler status, Boiler controller BACnet input, point per boiler						×
Boiler firing rate in, boiler controller BACnet input, point per boiler					×	
Boiler firing rate out, boiler controller BACnet input, point per boiler					×	
Boiler run low cycles, boiler controller BACnet input, point per boiler					×	
Boiler run low hours, boiler controller BACnet input, point per boiler					×	
# of boilers firing, boiler controller BACnet input						×

Boiler fire rate (%), boiler controller BACnet input, point per boiler					×	
Boiler low flow alarm					×	
HWS Header temperature alarm					×	
Boiler fault log code alarm, boiler controller BACnet input						×

3.19 WATER HEATERS

A. The Building Automation System will communicate with Water Heater Manufacturer Supplied Control Panel via Bacnet.

B. This division shall wire manufacturer supplied control panels so as to provide a complete and operational system.

C. The following points will be made available for monitoring/control of each boiler:
1. Status
2. Water Temp
3. Firing Rate out
4. Run cycles low
5. Run hours low
6. Fire rate in
7. % rate of fire

D. Limits and Alarms:
1. If water heater enable status does not match command, alarm shall be generated at the operator workstation.
2. Water heater fault code input from Water Heater BACnet interface. Alarm shall be generated at operator work station. Alarm shall identify code and brief verbal description.

E. Point List:
1. All points shall be shown on graphics.
2. All setpoints shall be adjustable unless otherwise noted.
3. All BACnet point shall be made available by the equipment control system.

WATER HEATER POINT LIST						
Control Point Name	Hardware Points				Software Points	
	AI	AO	BI	BO	AV	BV
Water heater controller enable				×		
Water heater status, Boiler controller water heater controller BACnet input, point per water heater						×
Water heater firing rate in, water heater controller BACnet input, point per water heater					×	
Water heater firing rate out, water heater controller BACnet input, point per water heater					×	

Water heater run low cycles, water heater controller BACnet input, point per water heater					×	
Boiler run low hours, water heater controller BACnet input, point per water heater					×	
# of water heater firing, water heater controller BACnet input,						×
Water heater fire rate (%), water heater controller BACnet input, point per water heater					×	
Water heater fault log code alarm, water heater						×
controller BACnet input						

3.20 PUMPS

A. Pumps HWP-1 & HWP-2 (~~Building Heating~~ Primary Hot Water Pumps)

1. General

a. ~~Pumps shall be configured in a lead/lag configuration. The lead and lag designations shall be rotated weekly.~~ When a boiler is enabled, BMS shall start respective primary hot water pump. Boiler shall not start until flow is proven through respective flow switches. If flow status is not proven, lead boiler shall not be energized, lag boiler shall be energized and an alarm shall be activated at the central PC. Pumps are equipped with VFD's for balancing purposes.

b. ~~The lead pump shall operate continuously at temperatures below 65 degrees F.~~ BMS shall command the primary pumps and modulate speeds per boiler manufacturer control signal.

c. ~~The speed of the lead pump shall modulate to maintain the system differential pressure setpoint.~~ The BMS shall monitor hot water supply and return temperatures at locations shown on the floor plans independent form the boiler controls.

d. All setpoints shall be field adjusted during the commissioning period to meet the requirements of actual field conditions

~~e. The lag pump shall be off, except shall operate upon failure of the lead pump. Pump failure shall be by current sensor.~~

2. Alarms

a. High hot water temperature supply (HWS) temperature: 180F.

b. Low hot water temperature supply (HWS) temperature: 60F.

c. High hot water supply/return pressure difference: 25% greater than setpoint.

d. Low hot water supply/return pressure difference: 25% lower than setpoint.

e. ~~Lead~~ pump failure.

B. Pumps CHWP-1 & CHWP-2 (Primary Chilled Water Pumps)

1. General

a. ~~Pumps shall be configured in a lead/lag configuration. The lead and lag designations shall be rotated weekly.~~ When a chiller is enabled, respective primary chilled water pump shall start. Chiller shall not start until flow is proven through respective flow switches. If flow status is

not proven, lead chiller shall not be energized, lag chiller shall be energized and an alarm shall be activated at the central PC. Pumps are equipped with VFD's for balancing purposes.

b. ~~The speed of the lead pump shall modulate to maintain the system differential pressure setpoint.~~ BMS shall command the primary pumps and modulate speeds per chiller manufacturer control signal.

c. ~~All setpoints shall be field adjusted during the commissioning period to meet the requirements of actual field conditions.~~ Shut down: When chiller is de-energized, respective pumps shall continue to run for 5 minutes and then turn off. Pumps shall not stop until confirmation that respective chiller's compressor has shut down (chiller stop confirmation).

d. Minimum pump speed shall be limited using pressure sensors across chiller barrels shown on piping diagrams, curves from specific chiller shall be utilized to determine minimum flow, minimum flow thru chillers shall be manufactures recommendation plus 10%. Bypass valve shown on piping plans shall be modulated to maintain minimum flow thru chiller.

2. Alarms

~~a. Dual supply temperature sensor error: If two temperature sensors on CBCS before pumps read greater that 10% different.~~

b. High ~~chilled beam~~ chilled water supply/return pressure difference: 25% greater than setpoint.

c. Low chilled beam chilled water supply/return pressure difference: 25% lower than setpoint.

3. Hardware Points (in addition to those required by the sequence of control)

a. Binary In: Pump variable frequency drive fault.

b. Analog In: Pump variable frequency drive speed.

C. Pumps ~~CBWP-1 & CBWP-2~~ MCHWP-1A & MCHWP-1B (chilled beam chilled water system pumps)

1. General

a. Pumps shall be configured in a lead/lag configuration. The lead and lag designations shall be rotated weekly.

b. The speed of the lead pump shall modulate to maintain the system differential pressure setpoint.

c. All setpoints shall be field adjusted during the commissioning period to meet the requirements of actual field conditions

2. Alarms

a. Dual supply temperature sensor error: If two temperature sensors on CWCS before pumps read greater that 10% different.

b. High chilled beam chilled water supply/return pressure difference: 25% greater than setpoint.

c. Low chilled beam chilled water supply/return pressure difference: 25% lower than setpoint.

3. Hardware Points (in addition to those required by the sequence of control)

a. Binary In: Pump variable frequency drive fault.

b. Analog In: Pump variable frequency drive speed.

D. ~~Pumps HXP-1 & HXP-2 (Heat Exchanger pumps)~~

1. ~~General~~
   a. ~~Pumps shall be configured in a lead/lag configuration. The lead and lag designations shall be rotated weekly.~~
   b. ~~The speed of the lead pump shall modulate to maintain the system differential pressure setpoint.~~
   c. ~~All setpoints shall be field adjusted during the commissioning period to meet the requirements of actual field conditions~~
2. ~~Alarms~~
   a. ~~Dual supply temperature sensor error: If two temperature sensors on CBCS before pumps read greater that 10% different.~~
   b. ~~High chilled beam chilled water supply/return pressure difference: 25% greater than setpoint.~~
   c. ~~Low chilled beam chilled water supply/return pressure difference: 25% lower than setpoint.~~
3. ~~Hardware Points (in addition to those required by the sequence of control)~~
   a. ~~Binary In: Pump variable frequency drive fault.~~
   b. ~~Analog In: Pump variable frequency drive speed.~~

E. Pumps HWP-3A/HWP-3B & CHWP-3A/CHWP-3B (Secondary Pumping Systems)
1. Lead hot water pump or lead chilled water pump shall start per sequences of operation described in other sections of this specification.
2. To prevent short cycling, the pump shall run for a minimum time and be off for a minimum time (both user adjustable).
3. Designation of lead, lag, and standby pump shall be automatically alternated based on user defined run times or day of the week.
4. When the lead pump is enabled, the pump VFD status determines if the motor is operating. After an operator definable feedback time delay, if there is an indication that the pump is not operating, the standby pump shall be enabled and an alarm shall be generated. Conversely, if status is detected while pump is turned off, a separate alarm shall be generated.
5. The three variable speed hot water pumps shall operate in a lead/lag/stand by fashion.
   a. The lead pump shall run first.
   b. If any pump fails, the next available pump shall stage on and the failed pump shall be removed from operation.
   c. Additional pumps shall stage on as required to maintain hot/chilled water differential pressure. If the lead pump reached 90% capacity, and couldn't maintain the desired set point for more than 10 min (adj.), the lead pump shall ramp down to 50% and the lag pump shall ramp up to 50% to match the lead. The pumps shall work in conjunction to meet the differential pressure set point. If the two operating pumps (lead and lag) maintain the desire set point at 40% capacity each for 10min (adj), the lag pump shall be disabled, and the lead pump shall ramp up to maintain the deferential pressure set point.
6. Alarms shall be provided for each pump as follows:
   a. Failure: Commanded on, but the status is off.
   b. Running in Hand: Commanded off, but the status is on.
   c. Runtime Exceeded: Status runtime exceeds a user definable limit.
   d. VFD Fault.

7. Hot Water Differential Pressure Control:
   a. The controller shall measure the hot water differential pressure and modulate the lead/lag hot/chilled water pump VFDs in sequence to maintain its hot/chilled water differential pressure setpoint. All setpoints shall be field adjusted during the commissioning period to meet the requirements of actual field conditions.
8. The lead pump shall run anytime the manager is enabled. On dropping hot/chilled water differential pressure, additional pumps shall stage on and modulate to maintain setpoint as follows:
   a. The controller shall modulate the lead pump to maintain setpoint.
   b. If the lead pump cannot maintain setpoint and its speed rises above 90% (adj.), the second pump shall stage on and modulate in unison with the lead pump.
9. Alarms shall be provided as follows:
   a. High Hot/chilled Water Differential Pressure: If the hot water differential pressure is 25% (adj.) greater than setpoint.
   b. Low Hot Water Differential Pressure: If the hot/chilled water differential pressure is 25% (adj.) less than setpoint.
10. Pump VFD Operation - Hot/chilled Water Differential Pressure (DP) Reset.
   a. BMS shall reset the differential pressure (DP) setpoint based on control valve positions. There are multiple DPT's. BMS contractor shall assign each control valve to a specific DPT that it is served by.
   b. Differential setpoint shall operate between a low limit and an upper limit. The baseline operating setpoints shall be based on values determined during Testing, Adjusting and Balancing (TAB).
      1) DP operating setpoint.
      2) DP Low limit.
      3) DP upper limit.
   c. BMS shall command DP setpoint to either increase or decrease or remain at present value.
   d. BMS shall poll position of all control valves every five (5) minutes.
   e. If any of the following are true, operating DP setpoint shall increase by 10% per polling interval until the upper limit is reached.
   f. More than 60% of the 2-position control valves are fully open.
   g. Any modulating control valve is 80% open or greater.
   h. If all of the following are true, operating DP setpoint shall decrease by 10% per polling interval until the lower limit is reached.
   i. Less than 40% of the 2-position control valves are fully opened
   j. All modulating control valves are less than 60% open.
   k. BMS shall trend the DP command setpoint and actual DP value.
   l. If DP value decreases 25% below the low limit or increases 25% above high limit for a period of 15 minutes, BMS shall issue alarm at the operator work station.

PUMPS POINT LIST		
Control Point Name	Hardware Points	Software Points

	AI	AO	BI	BO	AV	BV
HWP-1, 2 pump distribution HWS pressure	×					
HWP-1, 2 pump distribution HWR pressure	×					
CHWP-1, 2 pump distribution CHWS pressure	×					
CHWP-1, 2 pump distribution CHWR pressure	×					
~~CBWP~~ MCHWP-1A, 1B pump distribution MCHWS pressure	×					
~~CBWP~~ MCHWP-1A, 1B pump distribution MCHWR pressure	×					
~~HXP-1, 2~~ HWP-3A, 3B pump distribution HWS	x					
~~HXP-1, 2~~ HWP-3A, 3B pump distribution HWR	x					
CHWP-3A, 3B pump distribution CHWS pressure	x					
CHWP-3A, 3B pump distribution CHWR pressure	x					
HWP-1 pump enable command, Typical point for HWP-2, CHWP-1, 2, ~~CBWP-1, 2, HXP-1,2~~ HWP-3A/3B, CHWP-3A/3B, MCHWP-1A/1B				×		
HWP-1 pump VFD speed control. Typical point for HWP-2, CHWP-1, 2, ~~CBWP-1, 2, HXP-1,2~~ HWP-3A/3B, CHWP-3A/3B, MCHWP-1A/1B		×				
HWP-1 pump VFD speed feedback. Typical point for HWP-2, CHWP-1, 2, ~~CBWP-1, 2, HXP-1,2~~ HWP-3A/3B, CHWP-3A/3B, MCHWP-1A/1B					x	
HWP-1 pump VFD speed fault. Typical point for HWP-2, CHWP-1, 2, ~~CBWP-1, 2, HXP-1,2~~ HWP-3A/3B, CHWP-3A/3B, MCHWP-1A/1B			×			
HWP-1 current switch pump run status. Typical point for HWP-2, CHWP-1, 2, ~~CBWP-1, 2, HWRP-1, HWRP-2, HXP-1,2~~ HWP-3A/3B, CHWP-3A/3B, MCHWP-1A/1B			×			
HWP-1, 2 differential pressures Setpoint					×	
CHWP-1, 2 differential pressures Setpoint					×	
~~CBWP-1, 2~~ MCHWP-1A/1B differential pressures Setpoint					×	
HWP-3A/3B differential pressures Setpoint					×	
CHWP-3A/3B differential pressures Setpoint					×	
HWP-1, 2 low differential pressures alarm					×	
CHWP-1, 2 low differential pressures alarm					×	
~~CBWP-1, 2~~ MCHWP-1A/1B low differential pressures alarm					×	
HWP-3A/3B low differential pressures alarm					×	
CHWP-3A/3B low differential pressures alarm					×	
HWP-1, 2 high differential pressures alarm					×	
CHWP-1, 2 high differential pressures alarm					×	
~~CBWP-2A, 2~~ MCHWP-1A/1B high differential pressures alarm					×	

~~HXP-1,2, 2~~ HWP-3A/3B high differential pressures alarm					x	
~~HXP-1,2, 2 CHWP-3A/3B low differential~~					x	
HWP-1 pump run status alarm. Typical point for HWP-2, CHWP-1, 2, ~~CHWP-1, 2, HXP-1,2~~ HWP-3A/3B, CHWP-3A/3B, MCHWP-1A/1B						×
HWP-1 pump VFD fault alarm. Typical point for HWP-2, CHWP-1, 2, ~~CHWP-1, 2, HXP-1,2~~ HWP-3A/3B, CHWP-3A/3B, MCHWP-1A/1B						×

3.21 HEAT EXCHANGER CONTROL VALVE

A. General
1. Valve shall be enabled when chiller plant is enabled. When enabled, valve shall modulate as required to maintain chilled beam supply water temperature.

B. Point List:
1. All points shall be shown on graphics.
2. All setpoints shall be adjustable unless otherwise noted.

HEAT EXCHANGER POINT LIST						
Control Point Name	Hardware Points				Software Points	
	AI	AO	BI	BO	AV	BV
Heat exchanger valve control		×				
Valve position	×					
CBWS temperature	×					
CBWR temperature	×					
CHWS temperature	×					
CHWR temperature	×					
Valve position alarm						×
CBCS temperature alarm					×	

3.22 CHILLER PLANT

A. General
1. The chiller plant shall be enabled when the system is indexed to cooling mode. Minimum ON/OFF times will prevent short-cycling of chillers and pumps. When chiller plant is enabled, lead secondary chilled water pump shall start (see Secondary Pumping Systems Description above).
   a. Chiller shall not operate at more then 50% capacity during nighttime hours between 10pm and 7am to keep sound levels under the local nighttime ordinance limit.
2. When a chiller is enabled, respective primary chilled water pump shall start. Chiller shall not start until flow is proven through respective flow switches. If flow status is not proven, lead chiller shall not be energized, lag chiller shall be

energized and an alarm shall be activated at the central PC. Pumps are equipped with VFD's for balancing purposes.

3. Chillers shall be sequenced as required to maintain desired set point through a lead/lag array. Alternation of chiller lead/lag designation shall be based on operator defined run times. BMS shall monitor secondary chilled water flow rates and temperatures and chiller control panel for demand to start and stop lag chiller.
4. Each chiller shall stage through its internal controls to maintain chilled water supply setpoint. Chiller shall monitor CHW return temperature to determine staging.
5. Shut down: When chiller is de-energized, respective pumps shall continue to run for 5 minutes and then turn off. Pumps shall not stop until confirmation that respective chiller's compressor has shut down (chiller stop confirmation).
6. Chilled water supply temperature shall be maintained between minimum setpoint of remains 42°F and maximum of 55°F.
7. CHW supply temperature setpoint shall be reset based upon position and demand at each CHW valve. If no zone is in the maximum cooling position, the CHW supply temperature setpoint shall be increased. This reset function is based on the following operator changeable variables. They are:
   a. The length of time between reset adjustments.
   b. The decrease in CHW supply temperature setpoint that is desired when the CHW valve its maximum open position.
   c. The increase in CHW supply temperature setpoint that is desired when none of the CHW valves are in a maximum open position.
   d. Demand for dehumidification.
8. If the ambient temperature dropped below 0ºF, primary pumps shall run at 40% capacity.

B. The Building Automation System will Communicate with Chiller Manufacturer Supplied Control Panels via BacNet Protocol.
   1. The operation of the chiller shall be by controls integral to the chiller, including but not limited to controlling of the control valves installed on the discharge of the chillers. Chillers shall not start until proof by end switch that control valves have opened. The DDC shall enable the chillers and shall determine the chilled water supply temperature.

C. BMS shall monitor chilled water flow rate through each chiller

D. Chiller factory controller shall command automatic isolation valve to open. ATC shall furnish and wire isolation valve.

E. Chiller Demand Limiting: Chiller sequencing through chillers or BMS shall be capable of monitoring and reducing peak power demand through the limiting of chiller system capacity.

F. Twenty points shall be made available for monitoring/control at the DDC workstation points will be determined by engineer when Chiller Make is determined.

G. Limits and Alarms:

1. If chilled water supply (CHWS) temperature serving AHU/DOA/FCU does not match setpoint for a predetermined time period, alarm shall be generated at the operator workstation.
2. If chilled water supply temperature (CHWS) serving chilled beam does not match setpoint for a predetermined time period, alarm shall be generated at the operator workstation.
3. If chilled water supply temperature (CHWS) serving chilled beam drop below low temperature setpoint, BMS shall enable the following control sequence:
   a. CWP-2A and CWP-2B shall be commanded off
   b. 6-way chilled beam valve shall be commanded to the fully closed position
4. If chiller enable status does not match command, alarm shall be generated at the operator workstation.
5. If water flow rate via water flow meter is less than minimum flow rate set point, BMS shall enable the following control sequence:
   a. Disable chiller control system
   b. Issue alarm to operator workstation
6. Chiller fault code input from BACnet interface. Alarm shall be generated at operator work station. Alarm shall identify code and brief verbal description.

H. Point List:
1. All points shall be shown on graphics.
2. All setpoints shall be adjustable unless otherwise noted.
3. All BACnet point shall be made available by the equipment control system

CHILLER PLANT POINT LIST						
Control Point Name	Hardware Points				Software Points	
	AI	AO	BI	BO	AV	BV
OA temperature	x					
OA Humidity	x					
OA CO2	x					
Chiller Control Panel enable				x		
Chiller Control Panel Alarm				x		
Chiller CHWS Setpoint		x				
CHWS temperature (Chiller-1)	x					
CHWS temperature (Chiller-2)	x					
~~CHWS temperature (Chiller-3)~~	x					
CHWS temperature (Chiller Header)	x					
CHWR temperature (Chiller Header)	x					
CBWS temperature (Chiller Header)	x					
CBWR temperature (Chiller Header)	x					
CHWS (flow meter)	x					
CH-1 Water flow rate (flow meter)	x					
CH-2 Water flow rate (flow meter)	x					
CH-1 Isolation Valve Control		x				
CH-1 Isolation Valve position	x					

CH-2 Valve 1 Isolation Control		x				
CH-2 Isolation Valve position	x					
Chiller BACnet Factory Control Enable				x		
CHWS temperature setpoint (AHU/DOA/FCU)					x	
CHWS temperature setpoint (chilled beam)					x	
CHWS low temperature setpoint (chilled beam), not adjustable					x	
CH-1 low flow setpoint, not adjustable					x	
CH-2 low flow setpoint, not adjustable					x	
CHWS header temperature alarm					x	
CHWS header temperature alarm					x	
CH-1 low flow alarm, not adjustable					x	
CH-2 low flow alarm, not adjustable					x	
CH-1 CHWS temperature alarm					x	
CH-2 CHWS temperature alarm					x	
Chiller fault log code alarm, chiller controller BACnet input						×

3.23 SPLIT SYSTEM AC UNIT SYSTEMS

A. General: Units shall maintain space temperature setpoint through manufacturers supplied BACnet controllers Limits and Alarms:
   1. If space temperature setpoint for a predetermined time period, alarm shall be generated at the operator workstation.
   2. AC unit fault code input from BACnet interface. Alarm shall be generated at operator work station. Alarm shall identify code and brief verbal description.

B. Point List:
   1. All points shall be shown on graphics.
   2. All setpoints shall be adjustable unless otherwise noted.
   3. All BACnet point shall be made available by the equipment control system

3.24 GENERATOR

A. Monitor Generator and provide the following:
   1. Generator Run Status
   2. Generator Alarm Status

B. Point List:
   1. All points shall be shown on graphics.
   2. All setpoints shall be adjustable unless otherwise noted.

GENERATOR POINT LIST						
Control Point Name	Hardware Points				Software Points	
	AI	AO	BI	BO	AV	BV

Generator run status			×			
Generator alarm input control signal			×			

3.25 WALK-IN COOLER / WALK-IN FREEZER

A. Mount a temperature sensor in both the freezer and refrigerator. Provide an alarm condition at the DDC user workstation when either reaches 10 degrees above the set point.

B. Point List:
1. All points shall be shown on graphics.
2. All setpoints shall be adjustable unless otherwise noted.

REFRIGERATOR - FREEZER POINT LIST						
Control Point Name	Hardware Points				Software Points	
	AI	AO	BI	BO	AV	BV
Refrigerator temperature, provide point for each refrigerator	×					
Freezer temperature, provide point for each	×					
refrigerator						
Refrigerator temperature setpoint, provide point for each refrigerator					×	
Freezer temperature setpoint, provide point for each refrigerator					×	
Refrigerator temperature alarm, provide point for each refrigerator					×	
Freezer temperature alarm, provide point for each refrigerator					×	

3.26 DOMESTIC HOT WATER

A. Domestic Hot Water Recirculation Pumps:
1. Refer to plumbing drawings for location of pumps.
2. Pump shall be allowed to operate during occupied periods, including occupied override periods.
3. When return water temperature is 5 degrees F lower than supply temperature pump shall run until temperature is equal to hot water supply temperature.
4. Alarm: Pump Failure.

B. Domestic Hot Water Heaters:
1. Refer to plumbing drawings for location of water heaters and associated aquastats
2. The Building Automation System will communicate with Water Heater Manufacturer Supplied Control Panel via Bacnet.
3. Monitor hot water supply temperature.

C. Master Mixing valve:
1. The Building Automation System will communicate with Master Mixing Valve Manufacturer Supplied Control Panel via Bacnet.
2. Monitor: inlet hot water temperature, inlet cold water temperature, return water temperature.
3. Alarm: loss of power, blocked temperature probe, out of range temperature, maintenance required

3.27 GAS PRESSURE REGULATOR

A. Monitor gas pressure regulator and provide status

3.28 KILN & ASSOCIATED EXHAUST FAN CONTROL

A. Provide control wiring between the manufacturers kiln controller and the associated exhaust fan. Provide status and alarm for fan back to BMS.

3.29 LIGHTING CONTROLS INTERLOCK

A. Corridor Lighting:
1. BMS to provide building time schedule to corridor lighting control. Coordinate with Division 26.

B. Exterior lighting:
2. BMS to provide building time schedule to corridor lighting control. Coordinate with Division 26.

3.30 UTILITY MONITORING

C. BAS shall monitor, totalize, and trend the following utilities:
1. Natural Gas service pressure sensor after gas regulator shall be monitored and provided by ATC.
   a. Gas pressure sensor shall be NOSHOK, Series 625 or equivalent.
   b. Sensor shall be connected to the BMS.
   c. Sensor shall monitor and trend gas pressure.
   d. Provide (5) pressure sensors, coordinate locations with plumbing contractor.
2. Electric metering:
   a. BMS meters shall be installed by Division 26.
   b. Meters shall be provided by Division 26, wiring required to monitor meter provided by Division 23. Totalizing and programming by the Division 23 Contractor.
   c. Meter control wiring shall be provided by ATC and programming to display totalized metering within the BMS graphical display. Metering shall include the following. Please also note, for each category listed below there may be several meters that will need to be totalized and displayed. Refer to Electrical Drawings (Power Riser Diagram) for total quantity of meters for each category:
      1) Meter Total Building Electrical Load

2) Meter Lighting panelboards
3) Meter Power panelboards
4) Meter General Purpose panelboards
5) Meter Elevator
6) EV Charging

3.31 HEAT RECOVERY VENTILATION UNIT (HRV-1)

A. General:
1. ATC shall be responsible for providing all controls on air handling unit. Intent is to have ATC provide and field mount all controllers
2. Other than damper actuators and VFDs, ATC shall provide all end devices required to provide the sequence of operation.
3. Upon detection of smoke by any of the duct mount smoke detectors or by any other signal from the fire alarm system, the supply fan and the exhaust fan shall be shut off, the outside air dampers shall close, the exhaust air dampers shall close, and the control valves shall close.
4. Provide with static pressure sensor at discharge of supply fan, display reading on BMS graphic.

B. Supply fan control:
1. General:
   a. The outside air control damper shall be closed when the supply fan is off and during unoccupied mode; the damper shall be open when the supply fan is on during occupied mode. The supply fan shall not start until proof (by end switch) that either the outside air control damper or the return air bypass damper is open.
   b. Supply fan VFD shall modulate the supply fan to predetermined frequency setpoint
2. Morning warm-up: The supply fan shall be on.
3. Occupied: The supply fan shall be on.
4. Unoccupied: The supply fan shall be off except when unoccupied heating mode is enabled.

C. Exhaust Fan
1. Morning warm-up: The exhaust fan shall be off.
2. Occupied: The exhaust fan shall be on.
3. Unoccupied: The exhaust fan shall be off.
4. Occupied Mode Fan Control: Fan VFD shall modulate the supply fan to predetermined frequency setpoint

D. Outside Air (OA), Return Air (RA) and Exhaust Air (EA) Energy Wheel Bypass (EWB) Control Dampers
1. Morning warm-up mode:
   a. RA and EWB damper shall be open.
   b. OA and EA Damper shall be closed
2. Unoccupied mode:
   a. RA and EWB damper shall be open.

b. OA and EA Damper shall be closed

3. Occupied mode (Economizer):
   a. RA and OA damper modulate to maintain DAT setpoint.
   b. EA damper shall be open.
   c. EWB damper shall be open.
4. Occupied mode (Mechanical Cooling):
   a. RA and OA damper modulate to predetermined minimum ventilation position.
   b. EA damper shall be open.

E. Supply Air Temperature Control
1. General: The heating coil control valve, the chilled water control valve, and energy wheel shall be controlled to maintain a supply air temperature sequence.
2. Heating Mode:
   a. Hot Water valve operation when outside ambient temperature is <36F. HW valve shall maintain minimum 25% open when outside ambient temperature is <36F.
   b. Morning-up (morning): The control valve shall modulate to maintain a discharge air temperature of 90°F until the space served is at heating setpoint.
   c. Occupied Heating Mode: The return air sensor shall reset discharge air temperature to maintain the following schedule:
      1) An inversely proportional linear algorithm shall modulate the heating coil control valve to maintain a discharge air temperature of 62°F at 75°F return air temperature or greater and 68°F at 70°F return air temperature or less.
   d. Cool-down (evening): The control valve shall be closed.
   e. Unoccupied: The control valve shall be closed except upon call for unoccupied heating; the control valve shall modulate to maintain a discharge air temperature of 90°F until the spaces served are at heating setpoint.
3. Cooling Mode:
   a. General: Chilled water coil cooling shall be enabled only when the economizer, if enabled, is at 100% outside air, the hot water control valve is closed, the building is indexed to cooling mode and the outside air is above 55F.
   b. Occupied Cooling Mode: The return air sensor shall reset discharge air temperature to maintain the following schedule:
      1) An inversely proportional linear algorithm shall modulate the chilled water coil control valve to maintain a discharge air temperature of 55°F at 75°F return air temperature or greater and 62°F at 70°F return air temperature or less.
   c. Cool-down (evening): The chilled water control valve shall be closed.

F. Occupied Dehumidification Mode Control:
1. When the mixed air dewpoint is above setpoint and heating or cooling mode is not activated, BAS shall enable the following control sequence:
   a. Modulate cooling coil to maintain discharge air dewpoint setpoint.

b. Command wrap around heat pipe solenoids to open or close, or coil bypass damper to modulate as required to maintain discharge air temperature setpoint.

G. Point List:

1. All points shall be shown on graphics.
2. All setpoints shall be adjustable unless otherwise noted.
3. Coordinate wrap-around heat pipe hardware point types and quantities with equipment furnished by manufacturer.

HEAT RECOVERY VENTILATION UNIT						
Control Point Name	Hardware Points				Software Points	
	AI	AO	BI	BO	AV	BV
discharge air temperature sensor	×					
discharge air humidity sensor	×					
HX Core discharge air temperature	×					
HX Core discharge air humidity	×					
High pressure discharge air pressure switch			×			
Duct pressure sensor	×					
Return air temperature sensor	×					
Return air humidity sensor	×					
Return air CO2 sensor	×					
FAS status			×			
Supply fan enable command				×		
Supply fan VFD speed control		×				
Supply fan VFD speed feedback	×				x	
Supply fan VFD speed fault			×			
Supply fan run status			×			
Exhaust fan enable command				×		
Exhaust fan VFD speed control		×				
Exhaust fan VFD speed feedback	×				x	
Exhaust fan VFD speed fault			×			
Exhaust fan run status			×			
Chilled water valve control		×				
Chilled water valve position	×					
Hot water valve control		×				
Hot water valve position	×					
Low limit freeze stat			x			
Mixed air damper control		x				
Mixed air damper feedback	x					
Energy Wheel EA damper control		x				
Energy Wheel OA damper control		x				
Energy wheel EA damper feedback	x					
Exhaust air damper control		x				
Exhaust air damper feedback	x					

Outdoor air damper control		x				
Outdoor air damper feedback	x					
Outdoor airflow (CFM)	x					
CHWS temperature	x					
CHWR temperature	x					
HWS temperature	x					
HWR temperature	x					
HX Core damper control (Exhaust air)				x		
HX Core damper end-switch (Exhaust air)			x			
HX Core damper control (Outdoor air)				x		
HX Core damper end-switch (Exhaust air)			x			
Wrap-around coil solenoid valve (circuit-01) (3)				x		
Wrap-around coil solenoid valve (circuit-02) (3)				x		
Wrap-around coil solenoid valve (circuit-03) (3)				x		
Wrap-around coil bypass damper (3)		x				
Discharge temp setpoint					×	
Discharge temp alarm						×
Economizer – mechanical cooling change over						×
Supply fan minimum airflow speed (value determined by TAB), value not adjustable					×	
Exhaust fan minimum airflow speed (value determined by TAB), value not adjustable					×	
Supply fan maximum airflow speed (value determined by TAB), value not adjustable					×	
Exhaust fan maximum airflow speed (value determined by TAB), value not adjustable					×	
Supply fan run status alarm						×
Supply fan VFD fault alarm						×
Exhaust fan run status alarm						×
Exhaust fan VFD fault alarm						×
Low limit freeze-stat alarm						×
Hot water valve position alarm					×	
Chilled water valve position alarm					×	
Mixed air damper position alarm					×	
Outdoor air damper position alarm					×	
Exhaust air damper position alarm					×	
Clog filter alarm						×
Exhaust air flow setpoint					×	

3.32 AIR FILTRATION UNITS (AFU-A)

A. General: Each unit shall have status provided at the DDC (direct digital controls system) display as well as generate an alarm at the DDC display if fan failure occurs.

B. AFU unit shall be turned on/ off via wall switch. Refer to drawings for switch location.

C. Limits and Alarms:

1. If fan command does not match fan operating status, BMS shall enable the following control sequence:
   a. Command fan to not operate.
   b. alarm shall be generated at the operator workstation

Points List:

2. All points shall be shown on graphics.
3. All setpoints shall be adjustable unless otherwise noted.

AIR FILTRATION UNIT POINT LIST						
Control Point Name	Hardware Points				Software Points	
	AI	AO	BI	BO	AV	BV
Fan enable command				×		
Fan run status			×			
Clog filter alarm						×

3.33 DUST COLLECTOR

A. General: Dust Collector shall have status provided at the DDC (direct digital controls system) display as well as generate an alarm at the DDC display if fan failure occurs.

B. Run Conditions - Interlocked:

   a. The dust collector shall be interlocked to run whenever the associated equipment runs unless shutdown on safeties.

2. Operation:
   a. The unit shall be commanded on when any of the connected dust collection equipment is energized.
   b. .

DUST COLLECTOR POINT LIST						
Control Point Name	Hardware Points				Software Points	
	AI	AO	BI	BO	AV	BV
Fan enable command				×		
Fan run status			×			
Clog filter alarm						×
Duct pressure sensor	x					
Return air temperature sensor	x				×	

END OF SECTION

SECTION 23 2113 - HYDRONIC PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Heating water piping, buried.

B. Heating water piping, above ground.

C. Glycol piping, buried.

D. Glycol piping, above ground.

E. Chilled water piping, buried.

F. Chilled water piping, above grade.

G. Coil condensate drain piping

H. Condenser water piping, buried.

I. Condenser water piping, above ground.

J. Radiant heating piping.

K. Equipment drains and over flows.

L. Unions and flanges.

1.2 RELATED SECTIONS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

1.3 REFERENCES

A. American Society of Mechanical Engineers:
   1. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
   2. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
   3. ASME B31.9 - Building Services Piping.
   4. ASME Section IX - Boiler and Pressure Vessel Code - Welding and Brazing Qualifications.

B. ASTM International:
   1. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

2. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
3. ASTM B32 - Standard Specification for Solder Metal.
4. ASTM B75 – Standard Specification for Seamless Copper Tube.
5. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
6. ASTM B584 - Standard Specification for Copper Alloy Sand Castings for General Applications.
7. ASTM D1785 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
8. ASTM D2235 - Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.
9. ASTM D2241 - Standard Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter.
10. ASTM D2464 - Standard Specification for Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
11. ASTM D2466 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
12. ASTM D2467 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
13. ASTM D2564 - Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.
14. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
15. ASTM F437 - Standard Specification for Threaded Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.
16. ASTM F438 - Standard Specification for Socket-Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40.
17. ASTM F439 - Standard Specification for Socket-Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.
18. ASTM F441/F441M - Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80.
19. ASTM F493 - Standard Specification for Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings.
20. ASTM F876 - Standard Specification for Crosslinked Polyethylene (PEX) Tubing.
21. ASTM F877 - Standard Specification for Crosslinked Polyethylene (PEX) Plastic Hot-and Cold-Water Distribution Systems.
22. ASTM F1476 - Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications.

C. American Welding Society:
1. AWS A5.8 - Specification for Filler Metals for Brazing and Braze Welding.
2. AWS D1.1 - Structural Welding Code - Steel.

1.4 SYSTEM DESCRIPTION

A. Where more than one piping system material is specified, provide compatible system components and joints. Use non-conducting dielectric connections whenever jointing dissimilar metals in open systems.

B. Provide flanges, union, and couplings at locations requiring servicing. Use unions, flanges, and Grooved coupling couplings downstream of valves and at equipment or apparatus connections. Do not use direct welded or threaded connections to valves, equipment or other apparatus.

1.5 SUBMITTALS

A. Shop Drawings: Indicate layout of piping system, including equipment, critical dimensions, and sizes.
   1. Grooved joint couplings and fittings shall be shown on drawings and product submittals, and be specifically identified with the applicable Grooved coupling style or series number.

B. Product Data:
   1. Piping: Submit data on pipe materials, fittings, and accessories. Submit manufacturers catalog information.

C. Test Reports: Indicate results of piping system pressure test.

D. Welders' Certificates.

1.6 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of valves equipment and accessories.

1.7 QUALITY ASSURANCE

A. Perform Work in accordance with ASME B31.9 code for installation of piping systems and ASME Section IX for welding materials and procedures.

B. Perform Work in accordance with applicable authority for welding hanger and support attachments to building structure.

C. To assure uniformity and compatibility of piping components in grooved piping systems, all grooved products utilized shall be supplied by a single manufacturer. Grooving tools shall be supplied by the same manufacturer as the grooved components.

1.8 QUALIFICATIONS

A. Fabricator or Installer: Company specializing in performing Work of this section with minimum three years documented experience.

B. Installers of Pressure-Sealed Joints: Installers shall be certified by pressure-seal joint manufacturer as having been trained and qualified to join piping with pressure-seal pipe couplings and fittings.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

B. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

PART 2 PRODUCTS

2.1 STEEL PIPE AND FITTINGS

A. Steel Pipe: ASTM A53/A53M., black steel with plain ends; welded and seamless, Grade
1. Fittings: ASME B16.3, malleable iron or ASTM A234/A234M, forged steel welding type.
2. Joints: Threaded for pipe 2 inch and smaller; welded for pipe 2-1/2 inches and larger.
3. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

B. Steel Pipe, grooved joints: ASTM A53/A53M, black steel with grooved ends.
1. Fittings: ASTM A536 ductile iron, or ASTM A53 forged steel or fabricated from carbon steel pipe, grooved ends designed to accept Grooved coupling standard or AGS “W” series couplings.
2. Joints: Grooved mechanical couplings meeting ASTM F1476.
   a. Housing Clamps: STM A536 ductile iron, enamel coated, compatible with steel piping sizes, rigid or flexible type.
      1) Rigid Type: 2 inch through 12 inch: “Installation ready” rigid coupling with offsetting, angle pattern bolt pads designed for direct ‘stab’ installation onto grooved end pipe without prior disassembly of the coupling, no torque requirement and Grade “EHP” EPDM gasket.
      2) Rigid Type: 14 inch through 24 inch: AGS grooves, wide housing key with flat bolt pads. Grade “E” EPDM FlushSeal® gasket.
      3) Flexible Type: 2 inch through 24” inch: Use in locations where vibration attenuation and stress relief are required. Flexible couplings may be used in lieu of flexible connectors for vibration isolation at equipment connections. Three (3) couplings, for each connector, shall be placed in close proximity to the source of vibration.
   b. Grade “E” EPDM Gasket: Elastomer composition for operating temperature range from -30 degrees F to 230 degrees F.

c. Grade "EHP" EPDM Gasket: Elastomer composition for operating temperature range from -30 degrees F to 250 degrees F
d. Accessories: Steel bolts, nuts, and washers.

C. Stainless Steel Pipe: ASTM A312, Schedule 10S for 2 inch and smaller, Type 304/304L, full finish annealed pipe.
1. Fittings: Precision cold drawn austenitic stainless steel, Type 304/304L, complete with synthetic rubber O-rings.
2. Joints: Press-seal
a. O-rings: EPDM Elastomer composition for operating temperature range from -30 degrees F to 250degrees F.
b. 500 PSI rated

2.2 PRE-INSULATED PIPING SYSTEM

A. Pre-Insulated Steel Piping System:
1. Carrier Pipe: Steel Pipe: ASTM A53/A53M., Schedule 40, black steel with plain ends; welded and seamless, Grade B
2. Insulation: Closed Cellular Foam
3. Outer Jacket: PVC.
4. Joints: Welded
5. Manufacturers:
a. Rovanco
b. Perm-a-Pipe

B. Pre-Insulated Polyethylene Piping System:
1. Carrier Pipe: PEX A crosslinked polyethylene pipe for hot service, HDPE suitable for temperatures 180 Deg. F to -20 Deg. F for cold service.
2. Insulation: Flexible urethane
3. Outer Jacket: Polyethylene, corrugated to be flexible.
4. Joints: Electrofusion
5. Manufacturers:
a. Rovanco Rhinoflex
b. Uponor Ecoflex

2.3 COPPER PIPE AND FITTINGS

A. Drawn-Temper Copper Tubing, solder joints: ASTM B88, Type K, L, or M as specified in part 3 for application.
1. Fittings:
a. ASME B16.22, solder wrought copper.
2. Prohibited Tee Connections: Mechanically extracted collars with notched and dimpled branch tube (T-Drill) fittings are prohibited.
3. Joints: Solder, lead free, ASTM B32, 95-5 tin-antimony, or tin and silver, with melting range 430 to 535 degrees F.

B. Drawn-Temper Copper Tubing, press-seal joints: ASTM B88, Type L or M as specified in section 3 for application.
1. Press Fittings: IAPMO PS 117, ANSI LC1002, NSF61-G

2. Housing: Copper.
3. O-Rings and Pipe Stops: EPDM.
4. Tools: Manufacturer's special tools.
5. Minimum 200-psig working-pressure rating at 250 deg F.

2.4 POLYETHYLENE PIPE AND FITTINGS

A. Polyethylene Pipe: ASTM F876 and ASTM F877, cross-linked polyethylene, 100 psig operating pressure at 180 degrees F.
1. Fittings: Brass and copper.
2. Joints: Mechanical compression fittings.

B. Composite Polyethylene Pipe: Aluminum tube laminated between two layers of cross-linked polyethylene, 125 psig operating pressure at maximum 140degrees F.
1. Fittings: Brass flared compression.
2. Joints: Fittings adapt to copper tubing or copper tube fittings, threaded pipe and fittings, and copper compression fittings.

2.5 PLASTIC PIPE AND FITTINGS

A. PVC Pipe: ASTM D1785, Schedule 40, polyvinyl chloride (PVC) material.
1. Fittings: ASTM D2466, Schedule 40, PVC.
2. Joints: ASTM D2855, solvent weld with ASTM D2564 solvent cement. Prime joints with a contrasting color.
a. PVC solvent cement shall have a VOC content of 510 g/L or less.
b. Adhesive primer shall have a VOC content of 550 g/L or less.

B. CPVC Pipe: ASTM F441/F441M, Schedule 40, chlorinated polyvinyl chloride (CPVC) material.
1. Fittings: ASTM F438, CPVC, Schedule 40, socket type.
2. Joints: ASTM D2846/D2846M, solvent weld with ASTM F493 solvent cement. Prime joints with a contrasting color.
a. CPVC solvent cement shall have a VOC content of 490 g/L or less.
b. Adhesive primer shall have a VOC content of 550 g/L or less.

C. Plastic-to-metal transition fittings: One-piece fitting with one threaded brass or copper insert and one solvent-cement-joint end of material and wall thickness to match plastic pipe material.

2.6 UNIONS AND FLANGES

A. Unions for Pipe 2 inches and Smaller:
1. Ferrous Piping: Class 150 malleable iron, threaded.
2. Copper Piping: Class 150, bronze unions with soldered.
3. Dielectric Connections:
a. Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.
b. Waterway fitting with zinc electroplated steel or ductile iron body, male thread, grooved, or plain end, water impervious isolation barrier.

4. PVC Piping: PVC.
5. Plastic-to-metal transition unions: Brass or copper end, solvent-cement-joint end of material and wall thickness to match plastic pipe material, rubber gasket, and threaded union.

B. Flanges for Pipe 2-1/2 inches and Larger:
1. Ferrous Piping:
   a. Class 150 forged steel, slip-on flanges.
   b. Grooved joint flange adapter, flat face, for direct connection to ANSI Class 125 and 150 flanges. For direct connection to ANSI Class 300 flanges
   c. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
2. Copper Piping:
   a. Class 150, slip-on bronze flanges.
   b. Grooved joint flange adapter, flat face, for direct connection to ANSI Class 125 and 150 flanges.
3. PVC Piping: PVC flanges.
4. Gaskets: 1/16 inch thick preformed neoprene gaskets.

C. PVC Pipe Materials: For connections to equipment and valves with threaded connections, furnish solvent-weld socket to screwed joint adapters and unions, or ASTM D2464, Schedule 80, threaded, PVC pipe.

PART 3 EXECUTION

3.1 PIPING APPLICATIONS

A. Hot-water heating piping, chilled water piping, condenser water piping, aboveground, 2-inch and smaller, shall be the following:
1. Type L (Type B), drawn-temper copper tubing, wrought-copper fittings, and soldered joints.
2. Type L (Type B), drawn-temper copper tubing, wrought-copper fittings, and press-seal joints where exposed and where installed above accessible ceilings only.

B. Hot-water heating piping, chilled water piping, condenser water piping, aboveground, 2-1/2 inch and larger shall be any of the following:
1. Type L (Type B), drawn-temper copper tubing, wrought-copper fittings, and soldered joints.
2. Type L (Type B), drawn-temper copper tubing, wrought-copper fittings, and press-seal joints [where exposed and where installed above accessible ceilings only].
3. Schedule 40 steel pipe, wrought-steel fittings and wrought-cast or forged-steel flanges and flange fittings, and welded and flanged joints.
4. Schedule 40 steel pipe, grooved, mechanical joint coupling and fittings; and grooved, mechanical joints where exposed and where installed above accessible ceilings only.

C. Hot-water heating piping, chilled water piping, condenser water piping, belowground, 2-inch to 5-in size shall be the following:
   1. Pre-Insulated Steel Piping System

D. Hot-water heating piping, chilled water piping, condenser water piping, belowground, 1-1/2 inch and smaller shall be the following:
   1. Preinsulated Polyethylene Pipe

E. Makeup-water piping installed aboveground shall be the following:
   1. Type L (Type B), drawn-temper copper tubing, wrought-copper fittings, and soldered joints.

F. Makeup-Water Piping Installed Belowground and within Slabs: Type K, annealed-temper copper tubing, wrought-copper fittings, and soldered joints. Use the fewest possible joints.

G. Condensate-Drain Piping: Type M (PVC for non-plenum applications), drawn-temper copper tubing, wrought-copper fittings, and soldered joints.

H. Blowdown-Drain Piping: Same materials and joining methods as for piping specified for the service in which blowdown drain is installed.

I. Air-Vent Piping:
   1. Inlet: Same as service where installed with metal-to-plastic transition fittings for plastic piping systems according to piping manufacturer's written instructions.
   2. Outlet: Type K, annealed-temper copper tubing with soldered or flared joints.

J. Safety-Valve-Inlet and -Outlet Piping for Hot-Water Piping: Same materials and joining methods as for piping specified for the service in which safety valve is installed with metal-to-plastic transition fittings for plastic piping systems according to piping manufacturer's written instructions.

3.2 EXAMINATION

A. Verify excavations are to required grade, dry, and not over-excavated.

3.3 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel or groove plain end ferrous pipe.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare piping connections to equipment with flanges or unions.

D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

E. After completion, fill, clean, and treat systems. Refer to Section 23 25 00.

3.4 INSTALLATION - PIPE HANGERS AND SUPPORTS

A. Install pipe hangers and supports in accordance with Section 23 05 29.

3.5 INSTALLATION - BURIED PIPING SYSTEMS

A. Verify connection size, location, and invert are as indicated on Drawings.

B. Establish minimum separation from other services, sanitary sewer piping in accordance with code.

C. Remove scale and dirt on inside of piping before assembly.

D. Excavate pipe trench in accordance with Section 31 23 16.

E. Install heating water, chilled water, condenser water piping in accordance with ASME B31.1.

F. Place bedding material at trench bottom to provide uniform bedding for piping, level bedding materials in one continuous layer not per manufacture's recommendations. Coordinate with Division 31 specifications.

G. Install pipe on prepared bedding.

H. Route pipe in straight line.

I. Install piping specialties in accordance with Section 23 21 16.

J. Install pipe to allow for expansion and contraction without stressing pipe or joints.

K. Install shutoff and drain valves at locations indicated on Drawings in accordance with this Section.

L. Install plastic ribbon tape continuously over top of pipe. Coordinate with Section 31 specifications.

3.6 INSTALLATION - ABOVE GROUND PIPING SYSTEMS

A. Install Work in accordance with Owner's guidelines.

B. Route piping parallel to building structure and maintain gradient.

C. Install piping to conserve building space, and not interfere with use of space.

D. Group piping whenever practical at common elevations.

E. Sleeve pipe passing through partitions, walls and floors. Refer to Section 23 05 29.

F. Install firestopping at fire rated construction perimeters and openings containing penetrating sleeves and piping.

G. Install pipe identification in accordance with Section 23 05 53.

H. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

I. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors.

J. Slope hydronic piping and arrange systems to drain at low points.

K. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.

L. Prepare unfinished pipe, fittings, supports, and accessories, ready for finish painting. Refer to Section 09 90 00.

M. Install valves with stems upright or horizontal, not inverted.

N. Insulate piping and equipment; refer to Section 23 07 00.

3.7 PIPE JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

D. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8/A5.8M.

E. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
   1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
   2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

F. Welded Joints: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.

G. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

H. Grooved joint piping systems: Install in accordance with the manufacturer's guidelines and recommendations.
1. The gasket style and elastomeric material (grade) shall be verified as suitable for the intended service as specified. Gaskets shall be supplied by the grooved coupling manufacturer. Grooved end shall be clean and free from indentations, projections and roll marks in the area from pipe end to groove for proper gasket sealing.
2. A factory trained field representative shall provide on-site training to contractor's field personnel in the installation of grooved piping products. Factory trained representative shall periodically review the product installation. Contractor shall remove and replace any improperly installed products.
3. Use roll sets or cut groovers compatible with the pipe material and wall thickness per manufacturer's installation instructions.

I. Press connections: Copper and copper alloy press connections shall be made in accordance with the manufacturer's installation instructions. The tubing shall be fully inserted into the fitting and the tubing marked at the shoulder of the fitting. The fitting alignment shall be checked against the mark on the tubing to assure the tubing is fully engaged (inserted) in the fitting. The joints shall be pressed using the tool(s) recommended by the manufacturer. Contractor shall be trained on the use and installation of the system by manufacturer's representative.

3.8 FIELD QUALITY CONTROL

A. Comply with Division 1.

B. Prepare hydronic piping according to ASME B31.9 and as follows:
1. Leave joints, including welds, uninsulated and exposed for examination during test.
2. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.
3. Flush hydronic piping systems with clean water; then remove and clean or replace strainer screens.
4. Isolate equipment from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.
5. Install safety valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.

C. Perform the following tests on hydronic piping:
   1. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.
   2. While filling system, use vents installed at high points of system to release air. Use drains installed at low points for complete draining of test liquid.
   3. Isolate expansion tanks and determine that hydronic system is full of water.
   4. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the system's working pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed 90 percent of specified minimum yield strength or 1.7 times the "SE" value in Appendix A in ASME B31.9, "Building Services Piping." Pressure test for press-seal fittings shall not exceed 85 psi. If there is a significant drop in pressure, the system shall be walked to check for un-pressed fittings. Should an un-pressed fitting be located, the pressure should be released from the system and the un-pressed fitting shall be pressed.
   5. After hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.
   6. Prepare written report of testing.

D. Perform the following before operating the system:
   1. Open manual valves fully.
   2. Inspect pumps for proper rotation.
   3. Set makeup pressure-reducing valves for required system pressure.
   4. Inspect air vents at high points of system and determine if all are installed and operating freely (automatic type), or bleed air completely (manual type).
   5. Set temperature controls so all coils are calling for full flow.
   6. Inspect and set operating temperatures of hydronic equipment, such as boilers, chillers, cooling towers, to specified values.
   7. Verify lubrication of motors and bearings.

E. Test hydronic piping systems in accordance with ASME B31.9.

F. Pressure test to identify un-pressed fittings: Utilizing air or water, the system shall be pressurized, not to exceed 85 psi. If there is a significant drop in pressure, the system shall be walked to check for un-pressed fittings. Should an un-pressed fitting be located, the pressure should be released from the system and the un-pressed fitting shall be pressed. If no un-pressed fitting is identified the system shall be pressurized to test pressures required by code, not to exceed 600 psi.

G. HANGERS AND SUPPORTS

1. Comply with requirements in Division 23 "Hangers and Supports for HVAC Piping and Equipment" for hanger, support, and anchor devices. Comply with the following requirements for maximum spacing of supports.

PIPE SIZE Inches	COPPER TUBING MAXIMUM HANGER SPACING Feet	STEEL PIPE MAXIMUM HANGER SPACING Feet	COPPER TUBING HANGER ROD DIAMETER Inches	STEEL PIPE HANGER ROD DIAMETER Inches
1/2	5	7	3/8	3/8
3/4	5	7	3/8	3/8
1	6	7	3/8	3/8
1-1/4	7	7	3/8	3/8
1-1/2	8	9	3/8	3/8
2	8	10	3/8	3/8
2-1/2 (Note 1)	9	11	1/2	1/2
3	10	12	1/2	1/2
4	12	14	1/2	5/8
5	13	16	1/2	5/8
6	14	17	5/8	3/4
8	16	19	3/4	3/4
10	18	22	3/4	7/8
12	19	23	3/4	7/8

H. Plastic and Ductile Iron Pipe Hanger Spacing:

PIPE HANGER SPACING		
PIPE MATERIAL	MAXIMUM HANGER SPACING Feet	HANGER ROD DIAMETER Inches
ABS (All sizes)	4	3/8
FRP (All Sizes)	4	3/8
Ductile Iron (Note 2)		
PVC (All Sizes)	4	3/8

I. Note 1: Refer to manufacturer's recommendations for grooved end piping systems.

J. Note 2: 20 feet maximum spacing, minimum of one hanger for each pipe section close to joint behind bell. Provide hanger at each change of direction and each branch connection. For pipe sizes 6 inches and smaller, subjected to loadings other than weight of pipe and contents, limit span to maximum spacing for water service steel pipe.

END OF SECTION

SECTION 23 2114 - HYDRONIC SPECIALTIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Expansion tanks.

B. Air vents.

C. Air separators.

D. Suction diffusers.

E. Pump connectors.

F. Combination pump discharge valves.

G. Pressure-temperature test plugs.

H. Balancing valves.

I. Combination flow controls.

J. Flow meters.

K. Radiator valves.

L. Relief valves.

M. Pressure reducing valves.

N. Thermometers

O. Pressure Gauges

P. Glycol system.

1.2 RELATED REQUIREMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

B. Section 22 - Plumbing Piping Specialties: Backflow preventers.

C. Section 23 - Hydronic Piping.

D. Section 23 - HVAC Water Treatment: Pipe cleaning.

1.3 REFERENCE STANDARDS (follow the most currently adopted amended version)

A. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.

B. ASME B16.5 - Pipe Flanges and Flanged Fittings NPS 1/2 Through NPS 24 Metric/Inch Standard.

C. ASME B16.11 - Forged Fittings, Socket-welding and Threaded.

D. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1 - Rules for Construction of Pressure Vessels.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate the installation of work of this section with size, location and installation of service utilities.

B. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

C. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.5 SUBMITTALS

A. Product Data: Provide product data for manufactured products and assemblies required for this project. Include component sizes, rough-in requirements, service sizes, and finishes. Include product description and model.

B. Certificates: Inspection certificates for pressure vessels from authority having jurisdiction.

C. Manufacturer's Installation Instructions: Indicate hanging and support methods, joining procedures.

D. Maintenance Contract.

E. Project Record Documents: Record actual locations of flow controls.

F. Maintenance Data: Include installation instructions, assembly views, lubrication instructions, and replacement parts list.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Extra Glycol Solution: One container, 5 gallon size.
   2. Differential Pressure Meter: For each type of balancing valve and automatic flow control valve, include flow meter, probes, hoses, flow charts, and carrying case.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

B. Provide temporary protective coating on cast iron and steel valves.

C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.1 EXPANSION TANKS

A. Manufacturers:
1. Armstrong Fluid Technology
2. Amtrol Inc
3. ITT Bell & Gossett
4. Taco, Inc;

B. Construction: Welded steel, tested and stamped in accordance with ASME BPVC-VIII-1; supplied with National Board Form U-1, rated for working pressure of 125 psi, with flexible EPDM diaphragm or bladder sealed into tank, and steel support stand.

C. Accessories: Pressure gauge and air-charging fitting, tank drain; pre-charge to 12 psi.

D. Automatic Cold Water Fill Assembly: Pressure reducing valve, reduced pressure double check back flow preventer, test cocks, strainer, vacuum breaker, and valved by-pass.

2.2 AIR VENTS

A. Manufacturers:
1. Armstrong International, Inc.
2. ITT Bell & Gossett
3. Taco, Inc.

B. Manual Type: Short vertical sections of 2 inch diameter pipe to form air chamber, with 1/8 inch brass needle valve at top of chamber.

C. Float Type:
1. Brass or semi-steel body, copper, polypropylene, or solid non-metallic float, stainless steel valve and valve seat; suitable for system operating temperature and pressure; with isolating valve.
2. Cast iron body and cover, float, bronze pilot valve mechanism suitable for system operating temperature and pressure; with isolating valve.

D. Washer Type:
1. Brass with hygroscopic fiber discs, vent ports, adjustable cap for manual shut-off, and integral spring loaded ball check valve.

2.3 AIR SEPARATORS

A. In-line Air Separators:
1. Manufacturers:
a. Armstrong Fluid Technology
b. ITT Bell & Gossett
c. Taco, Inc
d. Spirotherm
2. Brass/Bronze for sizes 2 inch and smaller tested and stamped in accordance with ASME BPVC-VIII-1; for 125 psi operating pressure.

B. Centrifugal Air Separators/Strainers:
1. Manufacturers:
a. Armstrong Fluid Technology
b. ITT Bell & Gossett
c. Taco, Inc
d. Spirotherm
2. Steel, tested and stamped in accordance with ASME BPVC-VIII-1; for 125 psi operating pressure, with integral bronze strainer, tangential inlet and outlet connections, and internal stainless steel air collector tube.

C. Air/Dirt Separators:
1. Manufacturers:
a. Armstrong Fluid Technology
b. ITT Bell & Gossett
c. Taco, Inc
d. Spirotherm
2. Tank: Fabricated steel tank; tested and stamped in accordance with ASME BPVC-VIII-1; for 150 psi operating pressure and 270 degrees F maximum operating temperature; subject to the requirements of the application and the manufacturer's standard maximum operating conditions.
3. Coalescing Medium: Provide structured stainless steel medium filling the entire vessel to suppress turbulence and provide air elimination efficiency of 100 percent free air, 100 percent entrained air, and 99.6 percent dissolved air at the installed location.
4. Air Vent: Integral float actuated air vent at top fitting of tank rated at 150 psi, threaded to the top of the separator.

5. Inlet and Outlet Connections: Threaded for 2 NPS and smaller; Class 150 flanged connections for 2-1/2 NPS and larger.
6. Blowdown Connection: Threaded.

2.4 STRAINERS

A. Manufacturers:
1. Armstrong International, Inc.
2. Watts
3. Grinnell Products

B. Size 2 inch and Under:
1. Screwed brass or iron body for 175 psi working pressure, Y pattern with 1/32 inch stainless steel perforated screen.

C. Size 2-1/2 inch to 4 inch:
1. Provide flanged iron body for 175 psi working pressure, Y pattern with 3/64 inch stainless steel perforated screen.

D. Size 5 inch and Larger:
1. Provide flanged iron body for 175 psi working pressure, basket pattern with 1/8 inch stainless steel perforated screen.

2.5 SUCTION DIFFUSERS

A. Manufacturers:
1. Armstrong Fluid Technology
2. ITT Bell & Gossett
3. Taco, Inc
4. Victaulic

B. Fitting: Angle pattern, cast-iron body, threaded for 2 inch and smaller, flanged for 2-1/2 inch and larger, rated for 175 psi working pressure, with inlet vanes, cylinder strainer with 3/16 inch diameter openings, disposable 5/32 inch mesh strainer to fit over cylinder strainer, 20 mesh start up screen, and permanent magnet located in flow stream and removable for cleaning.

C. Accessories: Adjustable foot support, blowdown tapping in bottom, gauge tapping in side.

2.6 PUMP CONNECTORS

A. Manufacturers:
1. The Metraflex Company Flexicraft Mason Industries

B. Stainless-Steel Bellow, Flexible Connectors:
1. Body: Stainless-steel bellows with woven, flexible, bronze or stainless steel, wire-reinforcing protective jacket.
2. End Connections: Threaded or flanged to match equipment connected.

3. Performance: Capable of 3/4-inch misalignment.
4. CWP Rating: 150 psig.
5. Maximum Operating Temperature: 250 deg F.

C. Spherical, Rubber, Flexible Connectors:
1. Body: Fiber-reinforced rubber body.
2. End Connections: Steel flanges drilled to align with Classes 150 and 300 steel flanges.
3. Performance: Capable of misalignment.
4. CWP Rating: 150 psig.
5. Maximum Operating Temperature: 250 deg F.

2.7 PRESSURE-TEMPERATURE TEST PLUGS

A. Manufacturers:
1. Ferguson Enterprises Inc
2. Peterson Equipment Company Inc
3. Sisco Manufacturing Company Inc
4. Substitutions: See Section 01 - Product Requirements.

B. Construction: Brass body designed to receive temperature or pressure probe with removable protective cap, and Neoprene rated for minimum 200 degrees F .

C. Application: Use extended length plugs to clear insulated piping.

2.8 BALANCING VALVES - MANUAL

A. Manufacturers:
1. Armstrong Fluid Technology
2. ITT Bell & Gossett
3. Taco, Inc
4. Nexus
5. Grisworld
6. Tour & Anderson

B. Brass or Bronze, Calibrated-Orifice, Balancing Valves:
1. Construction: Bronze or brass alloy housing, ball or plug type with calibrated orifice or venturi. The valve shall come fully assembled and be permanently marked to show direction of flow.
2. CWP rating: 400PSI/250°F.
3. Pressure gauge connections: dual pressure/temperature test valves for flow reading, and a union end which will accept various end pieces.
4. The body design shall allow inspection or repair of handle operated stem without disturbing piping connections. The repairable stem shall include two Teflon seals and one EPDM O-ring for protection against chemicals and modulating temperature.

C. Cast-Iron or Steel, Calibrated-Orifice, Balancing Valves:
1. Body: Cast-iron or steel body, ball, plug, or globe pattern with calibrated orifice or venturi.
2. Ball: Brass or stainless steel.
3. Stem Seals: EPDM O-rings.
4. Disc: Manufacturer standard construction.
5. Seat: PTFE.
6. End Connections: Flanged or grooved.
7. Pressure Gauge Connections: Integral seals for portable differential pressure meter.
8. Handle Style: Lever, with memory stop to retain set position.
9. CWP Rating: Minimum 125 psig.
10. Maximum Operating Temperature: 250 deg F.
1.

2.9 BALANCING VALVES AUTOMATIC

A. Manufacturers:
1. Nexus UltraMatic UM Series
2. Grisworld Isolator R Series
3. Flow Design AC Series
4. Victaulic 76B Series

B. Description:
1. Brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet with combination blow-down and back-flush drain.
2. Calibration: Control within 10 percent of design flow over entire operating pressure with a maximum operating temperature of at least 232 deg F.
3. Control Mechanism: Either piston and spring or diaphragm and orifice plates are acceptable types. For piston and spring types: Stainless steel or nickel plated brass piston or regulator cup, operating against stainless steel helical or wave formed spring. For diaphragm and orifice plate types: elastomeric polymer diaphragm with polyphenylsulfone orifice seat.
4. Accessories: In-line strainer on inlet and ball valve on outlet.
5. Manufacturer shall be able to provide certified independent laboratory tests verifying accuracy of performance. (Consult the factory for details).
6. All flow control valve cartridges shall be warranted by the manufacturer for five years from date of sale.
7. The body design shall allow inspection or removal of 20 mesh stainless steel strainer without disturbing piping connections.
8. Ball Valve shall be made of brass. Maximum pressure rating of 400 PSI. Ball Valve shall include a union end which will accept various end pieces.
9. The body design shall allow inspection or repair of handle operated stem without disturbing piping connections. The repairable stem shall include two Teflon seals and one EPDM O-ring for protection against chemicals and modulating temperature.

10. A pressure/temperature test valve, manual air vent and drain valve shall be included.
11. Dual pressure or pressure/temperature test valves for verifying accuracy of flow performance shall be provided for all valve sizes.
12. Valve shall have a body tag to indicate model number and a hanging tag showing Cv and flow/delta P reading required for specific flow rate.

2.10 COMBINATION FLOW CONTROLS

A. Manufacturers:
1. Armstrong Fluid Technology
2. ITT Bell & Gossett
3. Taco, Inc
4. Nexus
5. Grisworld

B. Size 2 inch and Under:
1. 300 psi, threaded or soldered ends; non-ferrous Ametal® brass copper alloy body, EPDM o-ring seals. 4-turn digital readout handwheel for balancing, hidden memory feature with locking tamper-proof setting. Victaulic / TA Hydronics Series 787, 78K STAD or 786 STAS.

C. Size 2-1/2 inch and Larger:
1. 250 psi Flanged or 350 psi Grooved ends, ASTM A536 ductile iron body, all other metal parts of Ametal® brass copper alloy, EPDM O-ring seals. 8, 12 or 16 turn digital readout handwheel for balancing, hidden memory feature with locking tamper-proof setting. Victaulic / TA Hydronics Series 789 STAG or 788 STAF
2. Coil hook-up assemblies may be used to reduce installation time and space requirements. Victaulic TA Series 799 or 79V Koil Kit coil pack assembly. Coil pack can include; Victaulic Series 78U union port fitting, Series 78Y strainer/ball valve or Series 78T union/ball valve combination, and two flexible hoses

2.11 FLOW METERS (stand-alone type) Refer to 230900 for BAS flow meters

A. Manufacturers:
1. Dwyer Instruments, Inc
2. EMCO Flow Systems
3. Davis Instruments

B. Orifice principle by-pass circuit with direct reading gauge, soldered or flanged piping connections for 125 psi working pressure, with shut off valves, and drain and vent connections.

C. Direct reading with insert pitot tube, threaded coupling, for 150 psi working pressure, maximum 240 degrees F, 5 percent accuracy.

D. Cast iron, wafer type, orifice insert flow meter for 250 psi working pressure, with read-out valves equipped with integral check valves with gasketed caps.

E. Calibrated, plug type balance valve with precision machined orifice, readout valves equipped with integral check valves and gasketed caps, calibrated nameplate and indicating pointer.

F. Cast iron or bronze, globe style, balance valve with handwheel with vernier type ring setting and memory stop, drain connection, readout valves equipped with integral check valves and gasketed caps.

G. Portable meter consisting of case containing one, 3 percent accuracy pressure gauge with 0-60 feet pressure range for 500 psi maximum working pressure, color coded hoses for low and high pressure connections, and connectors suitable for connection to read-out valves.

H. Portable meter consisting of case containing two, 3 percent accuracy pressure gauges with 0-135 inches and 0-60 feet pressure ranges for 500 psi maximum working pressure, color coded hoses for low and high pressure connections, and connectors suitable for connection to read-out valves.

2.12 RADIATOR VALVES

A. Manufacturers:
1. Armstrong International, Inc
2. ITT Bell & Gossett
3. Danfos
4. Watts

B. Angle or straight pattern, rising stem, inside screw globe valve for 125 psi working pressure, with bronze body and integral union for screwed connections, renewable composition disc, plastic wheel handle for shut-off service, and lockshield key cap and set screw memory bonnet for balancing service.

2.13 DIAPHRAGM-OPERATED SAFETY VALVES: ASME LABELED.

A. Manufacturers:
1. AMTROL, Inc.
2. Armstrong Pumps, Inc.
3. Bell & Gossett Domestic Pump.
4. Conbraco Industries, Inc.
5. Spence Engineering Company, Inc.
6. Watts Regulator Co.

B. Construction:
1. Body: Bronze or brass.
2. Disc: Glass and carbon-filled PTFE.
3. Seat: Brass.
4. Stem Seals: EPDM O-rings.
5. Diaphragm: EPT.
6. Wetted, Internal Work Parts: Brass and rubber.
7. Inlet Strainer: 304 or 316 stainless steel, removable without system shutdown.

8. Valve Seat and Stem: Noncorrosive.

C. Valve Size, Capacity, and Operating Pressure: Comply with ASME Boiler and Pressure Vessel Code: Section IV, and selected to suit system in which installed, with operating pressure and capacity factory set and field adjustable.

2.14 PRESSURE REDUCING VALVES

A. Manufacturers:
1. Armstrong International, Inc
2. ITT Bell & Gossett
3. Taco, Inc
4. Watts

B. Operation: Automatically feeds make-up water to the hydronic system whenever pressure in the system drops below the pressure setting of the valve. Refer to Section 23 2113.

C. Construction
1. Valve Body: Constructed of bronze, cast iron, brass, iron
2. Disc: Glass and carbon-filled PTFE.
3. Seat: Brass.
4. Stem Seals: EPDM O-rings.
5. Diaphragm: EPT.

D. Provide integral check valve and strainer.

E. Maximum Inlet Pressure: 100 psi.

F. Maximum Fluid Temperature: 180 degrees F.

G. Operating Pressure Range: Between 10 psi and 25 psi.

2.15 THERMOMETERS

A. Manufacturers:
1. Trerice
2. Winters
3. Weiss

B. Thermometer: ASTM E1, adjustable angle, red appearing mercury, lens front tube, cast aluminum case with enamel finish, cast aluminum adjustable joint with positive locking device.
1. Size: Minimum 7 inch scale.
2. Window: Clear glass or Lexan.
3. Stem: Aluminum or Brass, length to suit installation.
4. Accuracy: ASTM E77 2 percent.
5. Calibration: Degrees F.

2.16 THERMOMETER SUPPORTS

A. Socket: Brass separable sockets for thermometer stems with or without extensions, and with cap and chain].

B. Flange: 3 inch outside diameter reversible flange, designed to fasten to sheet metal air ducts, with brass perforated stem.

2.17 PRESSURE GAUGES

A. Manufacturers:
   1. Trerice
   2. Winters
   3. Weiss

B. Gauge: ASME B40.1, with bourdon tube, rotary brass movement, brass socket, front calibration adjustment, black scale on white background.
   1. Case: Sealed types, Aluminum or Stainless steel.
   2. Movement: Mechanical, with link to pressure element and connection to pointer.
   3. Dial Size: Minimum 4-1/2 inch diameter.
   4. Mid-Scale Accuracy: Grade A, plus or minus one percent.
   5. Scale: Psi, or both psi and kPa.

2.18 AUTOMATIC MAKEUP / GLYCOL MAKEUP SYSTEMS

A. Manufacturers
   1. Wessels
   2. Bell and Gossett
   3. Armstrong

B. The pumping assembly shall be mounted in a sturdy steel frame with legs to keep it off the floor. It shall include a 1.80 GPM at 70 psig pump, a ½ HP motor, a magnetic starter, a pressure tank with a pressure control, a priming valve, a PRV, shut-off valves, strainer and a pressure gauge. Provide Protective Skirt. Pump shall be 240 volt, single phase.

C. It shall feature a cut-off and alarm arrangement which will stop the pump in case of excessive pressure, or a low solution level, high level and activate an audible (which can be silenced) and a visual alarm. A 110 V signal shall also be available for a remote alarm to DDC.

D. A translucent 50 gallon polyethylene solution container, complete with a lid, shall be mounted on the pumping assembly and shall include a strainer and a shut off valve.

2.19 GLYCOL SOLUTION

A. Manufacturers:
   1. DowFrost - Model - HD.
   2. Houghton Chemical – Model – Safe-T-Therm.
   3. Interstate Chemicals – Model – InterCool P300.

4. Substitutions: See Section 01 - Product Requirements.

B. Inhibited propylene glycol and water solution mixed 30 percent glycol - 70 percent water, suitable for temperatures from -40 degrees F to 250 degrees F.

PART 3 EXECUTION

3.1 INSTALLATION – HYDRONIC PIPING SPECIALTIES

A. Install specialties in accordance with manufacturer's instructions.

B. Install thermowells of sizes required to match thermometer connectors. Include bushings if required to match sizes. Install thermowells with extension on insulated piping. Fill thermowells with heat-transfer medium.

C. Install gauges and thermometers in locations where they are easily read from normal operating level.

D. Install direct-mounted thermometers in thermowells and adjust vertical and tilted positions.

E. Install duct-thermometer mounting brackets in walls of ducts. Attach to duct with screws.

F. Install direct-mounted pressure gauges in piping tees with pressure gauge located on pipe at the most readable position. Install valve and snubber in piping for each pressure gauge for fluids (except steam).

G. Install thermowells with socket extending one-third of pipe diameter or to center of pipe and in vertical position in piping tees.

H. Where large air quantities can accumulate, provide enlarged air collection standpipes.

I. Provide manual air vents at system high points and as indicated.

J. For automatic air vents in ceiling spaces or other concealed locations, provide vent tubing to nearest drain.

K. Provide air separator on suction side of system circulation pump and connect to expansion tank.

L. Provide valved drain and hose connection on strainer blow down connection.

M. Provide pump suction fitting on suction side of base mounted centrifugal pumps where indicated. Remove temporary strainers after cleaning systems.

N. Provide combination pump discharge valve on discharge side of base mounted centrifugal pumps where indicated.

O. Support pump fittings with floor mounted pipe and flange supports.

P. Provide radiator valves on water inlet to terminal heating units such as radiation, unit heaters, and fan coil units.

Q. Provide radiator balancing valves on water outlet from terminal heating units such as radiation, unit heaters, and fan coil units.

R. Provide relief valves on pressure tanks, load side of heat exchangers, expansion tanks, and elsewhere as required by ASME Boiler and Pressure Vessel Code. Comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1, for installation requirements.

S. Select system relief valve capacity so that it is greater than make-up pressure reducing valve capacity. Select equipment relief valve capacity to exceed rating of connected equipment.

T. Pipe relief valve outlet to nearest floor drain.

U. Where one line vents several relief valves, make cross sectional area equal to sum of individual vent areas.

V. Clean and flush glycol system before adding glycol solution. Refer to Section 23 25 00 - HVAC Water Treatment.

W. Feed glycol solution to system through make-up line with pressure regulator, venting system high points. Set to fill at [height of the building] times .433psi/ft + 5 psi.

X. Perform tests determining strength of glycol and water solution and submit written test results.

3.2 INSTALLATION - THERMOMETERS AND GAUGES

A. Install one pressure gauge for each pump, locate taps before strainers and on suction and discharge of pump; pipe to gauge.

B. Install pressure gauges with pulsation dampers. Provide needle valve or ball valve to isolate each gauge. Extend nipples to allow clearance from insulation.

C. Install thermometers in piping systems in sockets in short couplings. Enlarge pipes smaller than 2-1/2 inches for installation of thermometer sockets. Allow clearance from insulation.

D. Install thermometer sockets adjacent to controls systems thermostat, transmitter, or sensor sockets.

E. Coil and conceal excess capillary on remote element instruments.

F. Provide instruments with scale ranges selected according to service with largest appropriate scale.

G. Install gauges and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.

H. Adjust gauges and thermometers to final angle, clean windows and lenses, and calibrate to zero.

3.3 THERMOMETER SCALE RANGE SCHEDULE

A. Scale Range for Chilled-Water Piping: 0 to 100 deg F

B. Scale Range for Condenser-Water Piping: 0 to 150 deg F

C. Scale Range for Heating, Hot-Water Piping: 20 to 240 deg F

D. Scale Range for Air Ducts: 0 to 150 deg F

3.4 PRESSURE GAUGE SCALE RANGE SCHEDULE

A. Scale Range for Chilled-Water Piping: 0 to 200 psi

B. Scale Range for Condenser-Water Piping: 0 to 200 psi

C. Scale Range for Heating, Hot-Water Piping: 0 to 200

3.5 MAINTENANCE

A. Provide service and maintenance of glycol system for one year from date of Substantial Completion at no extra charge to Owner.

B. Perform monthly visit to make glycol fluid concentration analysis on site with refractive index measurement instrument. Report findings in writing.

C. Explain corrective actions to Owner's maintenance personnel in person.

END OF SECTION

SECTION 23 2123 - HYDRONIC PUMPS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. In-line circulators.

B. Vertical in-line pumps.

1.2 RELATED REQUIREMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

B. Division 03 - Cast-in-Place Concrete related sections.

C. Section 23 0548 - Vibration and Seismic Controls for HVAC Piping and Equipment.

D. Section 23 0700 - HVAC Insulation.

E. Section 23 2113 - Hydronic Piping.

F. Section 23 2114 - Hydronic Specialties.

G. Section 26 0503 - Equipment Wiring Connections.

1.3 REFERENCE STANDARDS (follow the most currently adopted amended version)

A. NEMA MG 1 - Motors and Generators

B. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.

C. NFPA 70 - National Electrical Code.

D. UL 778 - Standard for Motor-Operated Water Pumps.

E. NEMA 250- Enclosures for Electrical Equipment (1000 Volts Maximum)

1.4 SUBMITTALS

A. Product Data: Provide certified pump curves showing performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable. Include electrical characteristics and connection requirements. Submit also, manufacturer model number, dimensions, service clearances and finishes.

B. Millwright's Certificate: Certify that base mounted pumps have been aligned.

C. Manufacturer's Installation Instructions: Indicate hanging and support requirements and recommendations.

D. Operation and Maintenance Data: Include installation instructions, assembly views, lubrication instructions, and replacement parts list.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Division 01 - General Requirements.
2. Extra Pump Seals: (1) for each type and size of pump.
3. Extra Cartridges for Side-Stream Filters: One set for each filter.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacture, assembly, and field performance of pumps, with minimum three years of documented experience.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Armstrong Pumps Inc.

B. Bell & Gossett.

C. Grundfos.

D. Taco Inc.

E. Wilo

2.2 HVAC PUMPS - GENERAL

A. Provide pumps that operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.

B. Minimum Quality Standard: UL 778.

C. Products Requiring Electrical Connection: Listed and classified by UL or testing agency acceptable to Authority Having Jurisdiction as suitable for the purpose specified and indicated.

2.3 IN-LINE CIRCULATORS

A. Type: Horizontal shaft, single stage, direct connected, with resiliently mounted motor for in-line mounting, oil lubricated, for 125 psig maximum working pressure unless otherwise indicated on the pump schedule.

B. Casing: Cast iron, with flanged pump connections.

C. Impeller: Non-ferrous keyed to shaft.

D. Bearings: Oil-lubricated bronze sleeve.

E. Shaft: Alloy steel with bronze sleeve, integral thrust collar.

F. Seal: Mechanical seal, 225°F maximum continuous operating temperature unless otherwise indicated on the pump schedule.

G. Drive: Flexible coupling.

H. Performance & Electrical Characteristics: See Pump Schedule on drawings.

I. Electrical Characteristics:
1. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70.

2.4 VERTICAL IN-LINE PUMPS

A. Type: Vertical, single stage, close coupled, radially or horizontally split casing, for in-line mounting, for 175 psi working pressure unless otherwise indicated on the pump schedule.

B. Casing: Cast iron, with suction and discharge gage port, casing wear ring, seal flush connection, drain plug, flanged suction and discharge.

C. Impeller: Bronze, fully enclosed, keyed directly to motor shaft or extension.

D. Shaft: Carbon steel with stainless steel impeller cap screw or nut and bronze sleeve.

E. Seal: Mechanical seal, 225°F maximum continuous operating temperature unless otherwise indicated on the pump schedule.

F. Performance & Electrical Characteristics: See Pump Schedule on drawings.

G. Electrical Characteristics:
1. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70.

2.5 DUAL VERTICAL IN-LINE PUMPS

A. Description:
1. Single stage, single suction type, dual vertical inline design pump with integrated intelligent controls. The cast casing with equal size suction and discharge flanges, each having separate tapped flush line and pressure gauge connections, shall incorporate two radially split, single stage centrifugal pumps.
2. The inlet and outlet ports on the casing shall be a common size, so that both units may operate in parallel or individually in duty / standby operation

3. The discharge port shall be fitted with a component that allows each unit to operate independently, without bypassing fluid through the idle pump and for duty / standby operation
4. Mechanical Seals: Split-coupled serviceable without disturbing motor, controls or piping connections.

B. Design Criteria
1. Design pump for variable flow applications and selected for hydraulic design conditions and minimum system pressure with BMS control.
2. Meet or exceed energy saving requirements of ASHRAE 90.1 2013 by pump selection, based on optimum performance at part load, to save 70% of design flow energy at 50% part-load
3. Design pumping units to UL STD 778 & CSA STD C22.2 No.108

C. Casing:
1. Ductile iron ASTM A536 Grade 65-45-12, e-coated
2. Test casing to 150 % maximum working pressure.
3. Ensure casing is radially split to allow for removal of rotating element without disturbing pipe connections.
4. Casing wetted surfaces shall be e-coated to prevent seizing of impeller to casing after periods of inactivity
5. Drill and tap casing for gauge ports on both suction and discharge connections.
6. Drill and tap casing at lowest point for drain port.

D. Impeller:
1. To ASTM A743 CF8M, stainless steel 316, fully enclosed and dynamically balanced to ANSI G6.3 and fitted to shaft with key. Use two-plane balancing when installed impeller diameter is less than 6 times impeller width.

E. Pump Shafts:
1. Split-coupled: Stainless steel to ASTM A582/A582M, Grade 416.

F. Coupling
1. Rigid spacer type, high tensile aluminum.
2. Design coupling for easy removal on site to reveal space between pump and motor shaft.
3. Ensure revealed space is sufficient for removal of mechanical seal components without disturbing pump, controls or motor.
4. Include an OSHA compliant coupling guard.
5. Include lower seal chamber throttle bushing to ensure seals maintain positive cooling and lubrication.

G. Flanges: To ANSI/ASME B16.5, Class 125.

H. Flush Line: 3/8 inch braided stainless steel complete with vent.

I. Casing O-ring: EPDM.

J. Mechanical Seal: Non-potable, Outside balanced seal design and rated to 200°F maximum

1. Rotating face: Resin bonded carbon
2. Stationary face: Sintered Silicon Carbide
3. Seal rotating hardware: Stainless Steel
4. Secondary / shaft seal elastomer: Viton

K. Permanent Magnet Motor: To IE5 efficiency
1. Enclosure: TEFC.
2. Efficiency: IE5 efficiency To IEC 60034-30-1

L. Controls:
1. Integrated with UL type 12 minimum enclosure rating, sensorless controls complete with fused disconnect switch and menu-driven graphical touchscreen interface.
2. Provide near unity displacement power factor (cos Ø) without need for external power factor correction capacitors at all loads and speeds using VVC-PWM type integrated controls
   a. Incorporate DC link reactors for reduction of mains borne harmonic currents and DC link ripple current to increase DC link capacitor lifetime.
   b. Fit RFI filters as standard to ensure integrated controls meets low emission and immunity requirements.
   c. Ensure additional 3 % AC line reactor is available for controls with saturating (non linear) DC link reactors.
3. Orientation: Controls face pump discharge.
4. Protocol: BACnet™ MS/TP
5. Sensorless override for BAS/BMS control signal.
6. Enclosure: UL Type 12
7. EMI/RFI Control: Integrated filter designed to DIN EN61800-3.
8. Harmonic suppression: Equivalent: 5% impedance AC line reactor to mitigate harmonics to support IEEE 519 system requirements.
9. Cooling: Fan cooled, surface cooling.
10. Ambient working conditions: 14°F to +113°F, up to 3300 feet above sea level.
11. Analog I/O: 2 inputs minimum, 1 output minimum.
12. Digital I/O: 2 inputs minimum, 2 outputs minimum.
13. Pulse inputs: 2 programmable minimum.
14. Relay outputs: 2 programmable minimum.
15. Communications ports: 1- RS485.
16. One volt free contact.
17. Auto alarm reset.
18. Software: Ensure software for sensorless control includes automatic speed control in variable volume systems without need for pump mounted (internal/external) or remotely mounted differential pressure sensor.
    a. Operating mode under sensorless control: Quadratic Pressure Control (QPC).
       1) Ensure head reduction with reducing flow conforms to quadratic control curve.
       2) Head at zero flow: 40 % minimum of design duty head.
    b. Linear or Proportional Pressure Control without sensor is unacceptable.
    c. Ensure control mode setting and minimum/maximum head setpoints are user adjustable using built-in programming interface.

d. Ensure integrated control software is capable of controlling pump performance for non-overloading power at every point of operation.
e. Ensure integrated control software is capable of flow rate display and data output of ± 5% accuracy to BAS/BMS.
f. Ensure the controls can display and digitally transmit real-time flow & head values
g. For multiple pump configuration ensure duty/standby is applied

M. Pump Motor And Controls Protection
1. Include protection as follows:
a. Motor phase to phase fault.
b. Motor phase to ground fault.
c. Loss of supply phase.
d. Over voltage.
e. Under voltage.
f. Motor over temperature.
g. Inverter overload.
h. Over current
2. Ensure controls run automatic motor adaptation (AMA) for superior motor protection and control.

PART 3 EXECUTION

3.1 PREPARATION

A. Verify that electric power is available and of the correct characteristics.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide access space around pumps for service. Provide no less than minimum space recommended by manufacturer.

C. Provide pumps to operate at specified system fluid temperatures without vapor binding and cavitation. Pumps shall be non-overloading where indicated on the pump schedule.

D. Provide separate inlet and outlet shut-off valves. See 23 2114 for valve kits for system lubricated circulators.

E. Full Line size is the piping size shown on the drawings for the inlet and outlet of each pump and is NOT the pump inlet and outlet connection size.

F. Provide full line size isolation valve, pressure gauge, strainer and flex connector on inlet of all pumps. Provide full line size flex connector, check valve, balance valve, pressure gauge and isolation valve on outlet of all pumps. These items are to be provided for all cases whether indicated on not. Provide pipe reducer on outlet to connect full line size to pump outlet size. Balance valve on VFD driven pumps are not required. Provide pump

suction diffuser on all base mounted pumps. See valve section for specific valve requirements.

G. Provide air cock and drain connection on horizontal pump casings.

H. Provide drains for bases and seals, piped to and discharging into floor drains.

I. Check, align, and certify alignment of base-mounted pumps prior to start-up.

J. Install close-coupled and base-mounted pumps on concrete housekeeping base, with anchor bolts, set and level, and grout in place. Refer to Division 03 concrete related sections.

K. Lubricate pumps before start-up.

END OF SECTION

SECTION 23 2500 - HVAC WATER TREATMENT

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. System cleaner.
2. Closed system treatment (water).
3. Chemical feeder equipment including associated feeders, pumps, tanks, controls, meters and valves.
4. Test equipment.

1.2 REFERENCES

A. National Electrical Manufacturers Association:
1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

1.3 PERFORMANCE REQUIREMENTS

A. Provide Premixed Inhibited Propylene Glycol at the specified Percentage.

B. Provide distilled water for mixing with the inhibited propylene glycol at the specified percentage.

C. Closed hydronic systems, including hot-water heating, chilled water, shall have the following water qualities:
1. pH: Maintain a value within 9.0 to 10.5 (6.5 – 8.5 for Aluminum Heat Exchangers).
2. "P" Alkalinity: Maintain a value within 100 to 500 ppm.
3. Boron: Maintain a value within 100 to 200 ppm.
4. Chemical Oxygen Demand (systems without glycol): Maintain a maximum value of 100 ppm.
5. Soluble Copper: Maintain a maximum value of 0.20 ppm.
6. TDS: Maintain a maximum value of 10 ppm.
7. Ammonia: Maintain a maximum value of 20 ppm.
   a. Free Caustic Alkalinity: Maintain a maximum value of 20 ppm.
8. Microbiological Limits:
   a. Total Aerobic Plate Count: Maintain a maximum value of 1000 organisms/ml.
   b. Total Anaerobic Plate Count: Maintain a maximum value of 100 organisms/ml.
   c. Nitrate Reducers: Maintain a maximum value of 100 organisms/ml.
   d. Sulfate Reducers: Maintain a maximum value of 0 organisms/ml.
   e. Iron Bacteria: Maintain a maximum value of 0 organisms/ml.

D. Open hydronic systems, including condenser water, shall have the following water qualities:
   1. pH: Maintain a value within 8.0 to 9.1.
   2. "P" Alkalinity: Maintain a maximum value of 100 ppm.
   3. Chemical Oxygen Demand: Maintain a maximum value of 100 ppm.
   4. Soluble Copper: Maintain a maximum value of 0.20ppm.
   5. TDS: Maintain a maximum value of 10 ppm.
   6. Ammonia: Maintain a maximum value of 20 ppm.
   7. Free "OH" Alkalinity: Maintain a maximum value of 0 ppm
   8. Microbiological Limits:
      a. Total Aerobic Plate Count: Total Aerobic Plate Count: Maintain a maximum value of 10,000organisms/ml.
      b. Total Anaerobic Plate Count: Maintain a maximum value of 1000 organisms/ml.
      c. Nitrate Reducers: Maintain a maximum value of 100 organisms/ml.
      d. Sulfate Reducers: Maintain a maximum value of 0 organisms/ml.
      e. Iron Bacteria: Maintain a maximum value of 0 organisms/ml.
   9. Polymer Testable: Maintain a minimum value within 10 to 40 range.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate system schematic, equipment locations, and controls schematics, electrical characteristics and connection requirements.

C. Product Data: Submit chemical treatment materials, chemicals, and equipment including electrical characteristics and connection requirements.

D. Manufacturer's Installation Instructions: Submit placement of equipment in systems, piping configuration, and connection requirements.

E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

F. Manufacturers Field Reports: Indicate start-up of treatment systems when completed and operating properly. Indicate analysis of system water after cleaning and after treatment.

1.5 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Closeout products.

B. Project Record Documents: Record actual locations of equipment and piping, including sampling points and location of chemical injectors.

C. Operation and Maintenance Data: Submit data on chemical feed pumps, agitators, and other equipment including spare parts lists, procedures, and treatment programs. Include step by step instructions on test procedures including target concentrations.

1.6 QUALITY ASSURANCE

A. Maintain one copy of each document on site.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience, and with service facilities within 100 miles of Project with water analysis laboratories and full time service personnel.

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.8 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.9 WARRANTY

A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.

B. Furnish one year manufacturer warranty for pumps, valves and water meters.

1.10 MAINTENANCE SERVICE

A. Section 01 70 00 - Execution and Closeout Requirements: Maintenance service.

B. Furnish monthly technical service visits, for one years starting at Date of Substantial Completion, to perform field inspections and make water analysis on site. Detail findings in writing on proper practices, chemical treating requirements and corrective actions needed. Submit two copies of field service report after each visit.

C. Furnish laboratory and technical assistance services during this maintenance period.

D. Furnish on site inspections of equipment during scheduled or emergency shutdown to properly evaluate success of water treatment program, and make recommendations in writing based upon these inspections.

1.11 MAINTENANCE MATERIALS

A. Section 01 70 00 - Execution and Closeout Requirements: Spare parts and maintenance products.

B. Furnish chemicals for treatment and testing during warranty period.

PART 2 PRODUCTS

2.1 SYSTEM CLEANER

A. Manufacturers:
   1. Biomin
   2. Culligan
   3. Aptech
   4. Substitutions: Section 01 60 00 - Product Requirements.

B. Product Description: Liquid alkaline compound with emulsifying agents and detergents to remove grease and petroleum products; sodium tri-Poly phosphate and sodium molybdate.

C. Biocide; chlorine release agents including sodium hypochlorite or calcium hypochlorite, or microbiocides including quaternary ammonia compounds, tributyl tin oxide, methylene bis (thiocyanate), or isothiazolones.

2.2 TREATMENT CHEMICALS

A. Chemicals shall be as recommended by water-treatment system manufacturer that are compatible with piping system components and connected equipment, and that can attain water quality specified in Part 1 "Performance Requirements" Article.

2.3 MANUAL CHEMICAL-FEED EQUIPMENT

A. Bypass Feeders: Steel, with corrosion-resistant exterior coating, minimum 3-1/2-inch fill opening in the top, and NPS 3/4 bottom inlet and top side outlet. Quarter turn or threaded fill cap with gasket seal and diaphragm to lock the top on the feeder when exposed to system pressure in the vessel.
   1. Capacity: 2 gal..
   2. Minimum Working Pressure: 125 psig.

2.4 SOLUTION METERING PUMP

A. Manufacturers:
   1. B+G
   2. Taco
   3. Watts
   4. Substitutions: Section 01 60 00 - Product Requirements.

B. Positive displacement, diaphragm pump with adjustable flow rate, thermoplastic construction, continuous-duty fully enclosed electric motor and drive, and [built-in] relief valve.

C. Electrical: Cord and Plug: Furnish unit with cord and plug for connection to electric wiring system including grounding connector.

2.5 SOLUTION TANKS

A. Manufacturers:
1. B+G
2. Taco
3. Watts

B. 50 gallon capacity, polyethylene, self-supporting, graduated markings; molded fiberglass cover with recess for mounting pump, agitator, and liquid level switch.

2.6 AGITATOR

A. Manufacturers:
1. B+G
2. Taco
3. Watts

B. Totally enclosed electric motor, cast iron clamp and motor mount, 5/8 inch diameter coated Type 316 stainless steel propeller.

C. Electrical Characteristics:
1. Cord and Plug: Furnish unit with cord and plug for connection to electric wiring system including grounding connector.

2.7 LIQUID LEVEL SWITCH

A. Manufacturers:
1. Honeywell
2. Ernst
3. Ametek

B. Polypropylene housing with integrally mounted PVC air trap, receptacles for connection to metering pump, and low level alarm.

2.8 CONDUCTIVITY CONTROLLER

A. Manufacturers:
1. LMI Liquitron
2. Osmonics
3. Walchem

B. Packaged monitor controller with solid state circuiting, five percent accuracy, linear dial adjustment, built-in calibration switch, on-off switch and light, control function light, output to control circuit.

2.9 WATER METER

A. Manufacturers:
1. Davis
2. Dwyer
3. Erdco

B. Displacement type cold-water meter with sealed, tamper-proof magnetic drive, impulse contact register , single-pole, double-throw, dry contact switch.

2.10 SOLENOID VALVES

A. Manufacturers:
1. Asco
2. Parker
3. Magnatrol

B. Forged brass body globe pattern, normally open or closed as required, general-purpose solenoid enclosure, and continuous duty coil.

2.11 MERS

A. Manufacturers:
1. ABB
2. Intermatic
3. Square D
4.

B. Electronic timers, infinitely adjustable over full range, 150 second and five minute range, mounted together in cabinet with hand-off-automatic switches and status lights.

2.12 TEST EQUIPMENT

A. Furnish white enamel test cabinet with local and fluorescent light, capable of accommodating 4 - 10 ml zeroing titration burettes and associated reagents.

B. Furnish following test kits:
1. Alkalinity titration test kit.
2. Chloride titration test kit.
3. Sulphite titration test kit.
4. Total hardness titration test kit.
5. Low phosphate test kit.
6. Conductivity bridge, range 0 - 10,000 micro-ohms.
7. Creosol red pH slide, complete with reagent.
8. Portable electronic conductivity meter.
9. High nitrite test kit.

PART 3 EXECUTION

3.1 PREPARATION

A. Operate, fill, start and vent systems prior to cleaning. Use water meter to record capacity in each system. Place terminal control valves in open position during cleaning.

3.2 CLEANING

A. Concentration:
   1. As recommended by manufacturer.
   2. One pound per 100 gallons of water contained in the system.
   3. One pound per 100 gallons of water for hot systems and one pound per 50 gallons of water for cold systems.

B. Hot Water Heating Systems:
   1. Apply heat while circulating, slowly raising temperature to 160 degrees F and maintain for 12 hours minimum.
   2. Remove heat and circulate to 100 degrees F or less; drain systems as quickly as possible and refill with clean water.
   3. Circulate for 6 hours at design temperatures, then drain.
   4. Refill with clean water and repeat until system cleaner is removed.

C. Chilled Water Systems:
   1. Circulate for 48 hours, then drain systems as quickly as possible.
   2. Refill with clean water, circulate for 24 hours, then drain.
   3. Refill with clean water and repeat until system cleaner is removed.

D. Use neutralizer agents on recommendation of system cleaner supplier and acceptance of Architect/Engineer.

E. Flush open systems and glycol filled closed systems with clean water for one hour minimum. Drain completely and refill.

F. Remove, clean, and replace strainer screens.

G. Inspect, remove sludge, and flush low points with clean water after cleaning process is completed. Include disassembly of components as required.

3.3 CLOSED SYSTEM TREATMENT

A. Provide one bypass feeder on each system. Install isolating and drain valves and interconnecting piping. Install around balancing valve downstream of circulating pumps and as indicated on Drawings.

B. Introduce closed system treatment through bypass feeder when required or indicated by test.

C. Install 3/4 inch water coupon rack around circulating pumps with space for 4 test specimens.

3.4 DEMONSTRATION

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for demonstration and training.

B. Engage a factory-authorized service representative to train Owner's maintenance personnel. Furnish minimum two-hour training course for operating personnel, instruction to include installation, care, maintenance, testing, and operation of water treatment systems. Arrange course at start up of systems.

END OF SECTION

SECTION 23 3100 - HVAC DUCTS AND CASINGS

PART 1 GENERAL

1.1 SECTION INCLUDES:

A. Duct Materials.

B. Duct Liner

C. Non-Insulated Flexible ducts.

D. Insulated flexible ducts.

E. Single wall spiral round ducts.

F. Double wall spiral insulated round ducts.

G. Transverse duct connection system.

H. Kitchen hood exhaust ductwork fabrication.

I. Fabric Ductwork

1.2 RELATED SECTIONS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

1.3 REFERENCES

A. ASTM International:
1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
2. ASTM A90/A90M - Standard Test Method for Weight Mass of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.
3. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
4. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
5. ASTM A568/A568M - Standard Specification for Steel, Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for.
6. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
7. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.

8. A1011/A1011M-07 Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
9. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
10. ASTM C14 - Standard Specification for Concrete Sewer, Storm Drain, and Culvert Pipe.
11. ASTM C443 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
12. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

B. National Fire Protection Association:
1. NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems.
2. NFPA 90B - Standard for the Installation of Warm Air Heating and Air Conditioning Systems.
3. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations.

C. Sheet Metal and Air Conditioning Contractors:
1. SMACNA - Fibrous Glass Duct Construction Standards.
2. SMACNA - HVAC Air Duct Leakage Test Manual.
3. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.

D. Underwriters Laboratories Inc.:
1. UL 181 - Factory-Made Air Ducts and Connectors.

1.4 PERFORMANCE REQUIREMENTS

A. ~~Delegated Duct Design:~~ Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements and design criteria indicated in "Duct Schedule" Article.

B. Structural Performance: Duct hangers and supports shall withstand the effects of gravity loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"

C. Variation of duct configuration or sizes other than those of equivalent or lower loss coefficient is not permitted except by written permission. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts.

1.5 SUBMITTALS

A. Shop Drawings: Submit duct fabrication drawings, drawn to scale not smaller than 1/4 inch equals 1 foot, on drawing sheets same size as Contract Documents, indicating:

1. Fabrication, assembly, and installation details, including plans, elevations, sections, details of components, and attachments to other work.
2. Duct layout, indicating pressure classifications and sizes in plan view. For exhaust duct systems, indicate classification of materials handled as defined in this section.
3. Fittings.
4. Reinforcing details and spacing.
5. Seam and joint construction details.
6. Penetrations through fire rated and other walls.
7. Terminal unit, coil, and humidifier installations.
8. Hangers and supports, including methods for building attachment, vibration isolation, and duct attachment.

B. Product Data: Submit data for duct materials, duct liner, duct connectors.

C. Test Reports: Indicate pressure tests performed. Include date, section tested, test pressure, and leakage rate, following SMACNA HVAC Air Duct Leakage Test Manual.

1.6 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.7 QUALITY ASSURANCE

A. Perform Work in accordance with SMACNA - HVAC Duct Construction Standards - Metal and flexible.

B. Construct ductwork to NFPA 90A, NFPA 90B and NFPA 96 standards as applicable.

1.8 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Do not install duct sealant when temperatures are less than those recommended by sealant manufacturers.

B. Maintain temperatures during and after installation of duct sealant.

1.10 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

PART 2 PRODUCTS

2.1 DUCT MATERIALS

A. Galvanized Steel Ducts: ASTM A653/A653M galvanized steel sheet, lock-forming quality, having G90 (zinc coating of in conformance with ASTM A90/A90M.

B. Steel Ducts: ASTM A1008/A1008M, with oiled, matte finish for exposed ducts.

C. Aluminum Ducts: ASTM B209; aluminum sheet, alloy 3003-H14. Aluminum Connectors and Bar Stock: Alloy 6061-T6 or of equivalent strength. Mill finish for concealed ducts, and standard, one-side bright finish for duct surfaces exposed to view.

D. Stainless Steel Ducts: ASTM A480/A480M, Type 316 Exposed surface finish shall be No. 2B, No. 2D, No. 3, or No. 4 as indicated in the "Duct Schedule" Article

E. Fasteners: Rivets, bolts, or sheet metal screws.

F. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

2.2 DUCT LINER

A. Fibrous-Glass Duct Liner
   1. Manufacturers:
      a. CertainTeed Corporation; Insulation Group.
      b. Johns Manville.
      c. Knauf Insulation.
      d. Owens Corning.
   2. Comply with ASTM C 1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."
   3. Antimicrobial Erosion-Resistant Coating: Apply to the surface of the liner that will form the interior surface of the duct to act as a moisture repellent and erosion-resistant coating. Antimicrobial compound shall be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.
   4. Water-Based Liner Adhesive: Comply with NFPA 90A or NFPA 90B and with ASTM C 916.
      a. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. ~~Flexible Elastomeric Duct Liner:~~
~~1. Manufacturers:~~
~~a. Aeroflex USA Inc.~~
~~b. Armacell LLC~~
~~c. K-Flex~~
~~1. Description: Elastomeric foam duct liner, integral EPA registered antimicrobial agent, complying with NFPA 90A or NFPA 90B.~~
~~2. Thermal Conductivity: 0.27 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.~~
~~3. Surface Burning Characteristics: Maximum flame spread index of 25 and maximum smoke developed index of 50 when tested according to UL 723; certified by an NRTL.~~
~~4. Liner Adhesive: As recommended by insulation manufacturer and complying with NFPA 90A or NFPA 90B.~~
~~a. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).~~

2.3 NON-INSULATED FLEXIBLE DUCTS

A. Manufacturers:
1. Thermaflex Technaflex
2. Tuttle + Bailey
3. Flexmaster

B. Product Description: UL 181, Class 1, aluminum laminate and polyester film with latex adhesive supported by helical-wound spring steel wire.
1. Pressure Rating: 10 inches wg positive and 1.0 inches wg negative.
2. Maximum Velocity: 4000 fpm.
3. Temperature Range: -20 degrees F to 210 degrees F.

2.4 INSULATED FLEXIBLE DUCTS

A. Manufacturers:
1. Thermaflex
2. Technaflex
3. Tuttle + Bailey
4. Flexmaster

B. Product Description: UL 181, Class 1, aluminum laminate and polyester film with latex adhesive supported by helical wound spring steel wire; fiberglass insulation; polyethylene or aluminized vapor barrier film.
1. Pressure Rating: 10 inches wg positive and 1.0 inches wg negative.
2. Maximum Velocity: 4000 fpm.
3. Temperature Range: -20 degrees F to 210 degrees F.
4. Thermal Resistance: 6square feet-hour-degree F per BTU.
5. Vapor Barrier Permeance: 0.05 perm per ASRM E96, Procedure A

2.5 SEALANTS AND GASKETS

A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.

B. Water-Based Joint and Seam Sealant:
1. General: Brush-on, water-resistant, mold and mildew resistant, indoor and outdoor use, compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.
2. Solids Content: Minimum 65 percent.
3. Shore A Hardness: Minimum 20.
4. VOC: Maximum 75 g/L (less water).
5. Maximum Static-Pressure Class: 10-inch wg, positive and negative.

C. Flanged Joint Sealant: Comply with ASTM C 920.
1. General: Single-component, acid-curing, silicone, elastomeric.
2. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

D. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

E. Round Duct Joint O-Ring Seals:
1. Seal shall provide maximum leakage class of3 cfm/100 sq. ft. at 1-inch wg and shall be rated for10-inch wg static-pressure class, positive or negative.

2.6 SINGLE WALL SPIRAL ROUND DUCTS

A. Manufacturers include, but are not limited to:
1. McGill AirFlow Corporation
2. Semco Incorporated
3. Tangent Air Corp
4. Spiral Mfg. Co., Inc.

B. Product Description: UL 181, Class 1, round spiral lockseam duct constructed of galvanized steel.

C. Construct ducts and fittings gauge per the latest edition of SMACNA.

2.7 DOUBLE WALL SPIRAL INSULATED ROUND DUCTS

A. Manufacturers include, but are not limited to:
1. McGill AirFlow Corporation
2. Semco Incorporated

3. Tangent Air Corp
4. Spiral Mfg. Co., Inc.

B. Product Description: Machine made from round spiral lock seam duct with light reinforcing corrugations, galvanized steel outer wall, 2 inch thick glass fiber insulation, perforated galvanized steel inner wall; fittings manufactured with perforated inner wall.

C. Construct round duct with the following minimum gages:

Diameter	Gauge
3 inches to 14 inches	26
15 inches to 26 inches	24
28 inches to 36 inches	22
38 inches to 50 inches	20
52 inches to 84 inches	18

D. Construct round fittings with the following minimum gages:

Diameter	Gauge
3 inches to 14 inches	24
15 inches to 26 inches	22
28 inches to 36 inches	20
38 inches to 50 inches	20
52 inches to 60 inches	18
62 inches to 84 inches	16

2.8 TRANSVERSE DUCT CONNECTION SYSTEM

A. Manufacturers:
1. United McGill
2. Semco
3. ACME
4. Nufab

B. Product Description: [SMACNA "E" rated] [SMACNA "F" rated] [or] [SMACNA "J" rated] rigidity class connection, interlocking angle and duct edge connection system with sealant, gasket, cleats, and corner clips.

2.9 DUCTWORK FABRICATION

A. Fabricate and support rectangular ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible . Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

B. Fabricate and support round ducts with longitudinal seams in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible (Round Duct Construction Standards). Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

C. TDC connections on all ductwork where any dimension exceeds 12 inches. Slip and drive connection acceptable on duct sizes less than 12" x 12".

D. Construct T's, bends, and elbows with minimum radius 1-1/2 times centerline duct width. Where not possible and where rectangular elbows are used, provide [airfoil] turning vanes. Where acoustical lining is indicated, furnish turning vanes of perforated metal with glass fiber insulation.

E. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.

F. Fabricate continuously welded round and oval duct fittings two gages heavier than duct gages indicated in SMACNA Standard. Minimum 4 inch cemented slip joint, brazed or electric welded. Prime coat welded joints.

G. Provide standard 45-degree lateral wye takeoffs. When space does not allow 45-degree lateral wye takeoff, use 90-degree conical tee connections.

H. Seal joints between duct sections and duct seams with welds, gaskets, mastic adhesives, mastic plus embedded fabric systems.
1. Sealants, Mastics: Conform to UL 181A. Provide products bearing appropriate UL 181A markings.
2. Do not provide sealing products not bearing UL approval markings.

2.10 KITCHEN HOOD EXHAUST DUCTWORK FABRICATION

A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible and NFPA 96.

B. Exposed Kitchen Hood Exhaust Ducts: Construct of stainless steel ASTM A240/A240M OR ASTM 666, type 316using continuous external welded joints.

C. Concealed Kitchen Hood Exhaust Ducts: Construct of 16 gage carbon steel or 18 gage stainless steel ASTM ASTM A240/A240M OR ASTM 666, type 316 using continuous external welded joints.

D. Grease Duct: Provide factory built commercial grease ducts labeled and listed in accordance with UL 1978.

2.11 FABRIC DUCTWORK

A. Manufacturers:
1. FabricAir Combi-70
2. DuctSox
3. KE Fibertec
4. No Substitutions Acceptable.

B. Product Description: Non-metal ductwork as indicated on drawings and by requirements of this section.

C. Colors: The colors of the fabric duct shall be as follows:
1. Colors Gymnasium B – 3001 Blue
2. Gymnasium E – 3001 Blue
3. Multipurpose Room D103 – 3003 Dark Gray
4. Corridor D201 - 3002 Orange
5. Cafeteria A104 – 3002 Orange

D. Fabric is a woven fire retardant and permeable fabric complying with the following characteristics:
1. Fabric: 100% Flame Retardant Polyester
2. Weight: 8.5 oz./yd² per ASTM D3776
3. Shrinkage: Max. 0,5% per DIN EN 26 630
4. Color: By Architect
5. Temperature Range: -40°F to +284°F
6. Permeability: 2 (+/- 5%) per ASTM D737, Frazier – calandering of fabric NOT accepted
7. Fire Retardancy: Must meet the requirements in NFPA 90-A, ICC AC-167 and UL2518

E. SYSTEMS FABRICATION REQUIREMENTS
1. Fabric duct installed 20 feet or more above finished floor shall have the "Oriflow" dispersion option with rows of 1" diameter holes at 4 o'clock and 8 o'clock positions.
2. Fabric Duct installed in the 8 to 12 foot above finished floor range shall have the "microflow" dispersion option.
3. Color of nozzles must match color of fabric.
4. Location and number of nozzles to be specified and approved by manufacturer.
5. The system is made of permeable fabric. Permeability of fabric must be reached based on weave construction only and weave must have gone through thermo fixation in order to secure same permeability after wash. Fabric with permeability obtained based on calandering is not accepted.
6. Provide system in sections optimized for maintenance, connected by zippers. Zippers must provide closure completely around the circumference to prevent leakage. Required number of zippers as specified by manufacturer.
7. Each section to have a unique tag including information about: manufacturers order number, position, diameter of section, length of section, maintenance instruction, code compliance and contact details for spare parts.

8. Fabric system shall include connectors to attach to suspension system listed below.

F. DESIGN PARAMETERS
1. Use fabric air diffusers only for positive pressure air distribution.
2. Do not use fabric air diffusers in concealed locations.
3. Fabric diffusers shall be designed from minimum 0.25" water gage to 3" as the maximum – 0.5" being the standard.
4. Design temperatures between –40°F and 284°F
5. Manufacturer shall approve all technical design parameters.

G. HANGERS AND SUPPORT
1. Provide all hangers and support for complete system. All hangers shall be by ductwork manufacturer. Provide all hangers so when ductwork is unpressurized ductwork will not lose shape.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify sizes of equipment connections before fabricating transitions.

3.2 INSTALLATION

A. General:
1. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.
2. Install and seal ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
3. During construction, install temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
4. Use crimp joints with or without bead or beaded sleeve couplings for joining round duct sizes 8inch and smaller.
5. Install duct hangers and supports in accordance with Section 23 05 29.
6. Use double nuts and lock washers on threaded rod supports.
7. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
8. Install ducts with a clearance of 1 inch (25 mm), plus allowance for insulation thickness.
9. Do not route ducts through transformer vaults or electrical equipment rooms and enclosures.

10. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches (38 mm).
11. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Division 23, Air Duct Accessories for fire and smoke dampers.

B. Flexible ductwork
1. When located above ceilings, support flexible duct from above; flexible duct shall not touch the ceiling.
2. Minimize kinks and sags
3. Flexible duct shall be located only where concealed and accessible.
4. Non-insulated flexible ductwork: Provide when the metal ductwork connected to is not insulated.
5. Insulated flexible ductwork: Provide when the metal ductwork connected to is insulated. R-value of flexible ductwork insulation shall meet or exceed the R-value of the metal ductwork insulation.
6. Elbow supports: Provide above flexible ductwork connections to ceiling diffusers. Use cable ties as indicated in the manufacturer's installation instructions.
7. Connections to rigid ductwork: Provide both a drawband and two layers of duct tape lapped approximately 25% at each connection of flexible ductwork to rigid ductwork. Drawbands shall be the non-metallic type listed and labeled in accordance with UL 181B. Duct tape shall be listed and labeled in accordance with UL 181B.

C. Kitchen Hood Exhaust Ducts
1. Install kitchen range hoods in accordance with NFPA 96. Refer to Section 11 40 00.
2. Install residue traps in kitchen hood exhaust ducts at base of vertical risers with provisions for clean out.
3. Kitchen hood exhaust ducts: Use stainless steel for ductwork exposed to view and stainless steel or carbon steel where ducts are concealed.

D. For outdoor ductwork, protect ductwork, ductwork supports, linings and coverings from weather.

3.3 DUCT SEALING

A. Duct Seal Level Description

Seal Level	Sealing Requirements*
A	All transverse joints, longitudinal seams, and duct wall penetrations. Pressure sensitive tape shall not be used as the primary sealant, unless it has been certified to comply with UL-181A or UL0181B by an independent testing laboratory and the tape is used in accordance with that certification
B	All transverse joints, longitudinal seams. Pressure sensitive tape shall not be used as the primary sealant, unless it has been certified to comply with UL-181A or UL0181B by an independent testing laboratory and the tape is used in accordance with that certification.
C	Transverse joints only.
Notes: Longitudinal seams are joints oriented in the direction of flow. Transverse joints are connections of two duct sections oriented perpendicular to airflow. Duct wall penetrations are openings made by any screw fastener, pipe, rod, or wire. Spiral lock seams in a round or flat oval duct need not be sealed. All other connections are considered transverse joints, including but not limited to spin-ins, taps, and other branch connections, access door frames and jambs, duct connections to equipment, etc.	

B. Minimum Duct Seal Levels

Duct Type				
Duct Location	Supply		Exhaust	Return
	2-in. or less (1)	Greater than 2-in. (1)		
Outdoor	A	A	C	A
Unconditioned Space (2)	B	A	C	B
Conditioned Space	C	B	B	C
Notes: Duct design static pressure classification Includes indirectly conditioned spaces such as return air plenums				

3.4 INTERFACE WITH OTHER PRODUCTS

A. Install openings in ductwork where required to accommodate thermometers and controllers. Install pitot tube openings for testing of systems. Install pitot tube complete

with metal can with spring device or screw to prevent air leakage. Where openings are provided in insulated ductwork, install insulation material inside metal ring.

B. Connect air terminal units to supply ducts directly or with five foot maximum length of flexible duct. Do not use flexible duct to change direction.

3.5 CONCEALED GREASE DUCT TESTING

A. Prior to concealing, wrapping, or insulating grease ductwork, or placing grease duct in service, perform leakage test in accordance with ICC IMC, in presence of authority having jurisdiction.

B. Perform light test by pulling minimum 100 W light through duct and observing for light leaks at duct joints.

C. Test complete extent of duct installed, including joint at which duct connects to exhaust hood.

3.6 CLEANING

A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.

B. Duct cleaning is required if test sections of metal duct system, chosen randomly by Owner, for cleanliness according to "Vacuum Test" in NADCA ACR, "Assessment, Cleaning and Restoration of HVAC Systems." do not meet the following criteria:
   1. Cleanliness Level: Net weight of debris collected on the filter media shall not exceed 0.75 mg/100 sq. cm.

C. Clean duct system and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air flow, clean one half of system completely before proceeding to other half. Protect equipment with potential to be harmed by excessive dirt with temporary filters, or bypass during cleaning.

D. Clean duct systems with high power vacuum machines. Protect equipment with potential to be harmed by excessive dirt with filters, or bypass during cleaning. Install access openings into ductwork for cleaning purposes.

3.7 DUCTWORK LEAKAGE TESTING

A. The following ductwork systems shall be pressure/leakage tested:
   1. All ductwork to be concealed in a sheetrock, concrete block or other permanent chase shall be pressure tested before ductwork is concealed.

2. 2012 IECC REQUIREMENTS
   a. All ductwork systems listed below that are constructed and installed for 3" w.c. or more (positive or negative).
3. For ductwork leakage testing: "Ductwork main" shall be defined as all ductwork serving more than one grille or diffuser.
4. All ductwork outside of the building insulation envelope shall be pressure tested.

B. Testing shall conform to the following:
1. Test static pressure must be the lower of 125% of the external static pressure of the air moving equipment or the construction static pressure class of the ductwork.
2. Test in accordance with SMACNA HVAC Air Duct Leakage Test Manual. Maximum Allowable Leakage shall be in accordance with Duct Pressure Class rating listed below and Leakage Class listed here-in.
3. For Ductwork Pressure Class 3" w.c: Leakage Class shall be 8.
4. For Ductwork Pressure Class 2" w.c or less: Leakage Class shall be 16.
5. Testing shall occur after ductwork has been cleaned, but before duct insulation is applied or ductwork is concealed.

C. Duct Leakage Test Report shall include:
1. Date of test.
2. Name of company and person conducting the test.
3. Name of company and person witnessing the test.
4. Description of ductwork tested. Provide drawings to indicate section of ductwork being tested. Labeling on the drawings shall correspond to labeling in the report.
5. Surface area (square feet) of section of ductwork being tested.
6. Duct design operating pressure (inches w.c.)
7. P = Duct design test static pressure (inches w.c.)
8. Duct capacity, air flow
9. CL= Specified Leakage Class.
10. F = Leakage factor (CFM / 100 sf of duct area)
11. Maximum allowable leakage (CFM)
12. Test apparatus
    a. Blower
    b. Orifice tube size
    c. Orifice size
    d. Calibrated
13. Test orifice differential pressure (inches w.c.)

3.8 SCHEDULES

A. Ductwork Material Schedule:

AIR SYSTEM	MATERIAL
~~Supply (Heating Systems)~~ Supply and Return Ductwork associated with RTU's, DOAS, and FCU's	Galvanized Steel, Aluminum
~~Supply (System with Cooling Coils)~~ Outside Air and Exhaust Ductwork associated with DOAS	Galvanized Steel, Aluminum,
~~Buried Supply or Return~~	~~Pre-engineered HDPE system, Fiber Reinforced Plastic~~
~~Return and Relief~~ Supply and Return Ductwork associated with HRV-1 and FCU's in the Locker Room Area	~~Galvanized Steel,~~ Aluminum
General Exhaust	Galvanized Steel, Aluminum
Kitchen Hood Exhaust	~~Steel, Stainless Steel~~ Concealed Ductwork: Carbon Steel, Stainless Steel or Pre-fabricated Grease Duct System. Ductwork Exposed to View: Stainless Steel or Pre-fabricated Grease Duct System.
Dishwasher Exhaust	Stainless Steel~~, Aluminum~~
Fume Hood Exhaust	Stainless Steel
Outside Air Intake	Galvanized Steel
Combustion Air	Galvanized Steel
Emergency Generation Ventilation	Galvanized Steel
Dust Collector Exhaust (Interior)	Galvanized Steel (factory fabricated)
Dust Collector Exhaust (Exterior)	Stainless Steel

B. Ductwork Pressure Class Schedule:

AIR SYSTEM	PRESSURE CLASS
Supply Ductwork (upstream of VAV boxes terminal units and/or final balancing damper)	3 inch wg regardless of velocity.
Supply Ductwork (downstream of VAV boxes and terminal units and/or final balancing damper)	1 inch wg regardless of velocity.
RTU and DOAS Return and Relief	~~2~~ 3-inch wg regardless of velocity.

Return associated with terminal units (VAV's, FCU's, etc.)	1-inch wg regardless of velocity.
Outside Air Intake Ductwork	2-inch wg regardless of velocity.
General Exhaust	1 inch wg regardless of velocity.
Dishwasher Exhaust	2 inch wg
Fume Hood Exhaust	Negative 2 inch wg
Dust Collector Exhaust	Negative 10 inch wg
All Others Not Identified	1.5x maximum anticipated system pressure

C. Ductwork Liner Schedule:

AIR SYSTEM	THICKNESS
10 ft downstream of VAV box	1 inch
10 ft upstream / downstream of fan coil unit	1 inch
First 10 ft of supply and return/ exhaust from ~~AHU~~ RTU/ERV/DOAS	1 inch
Transfer air ducts	1 inch
All supply and return ductwork associated with RTU-2 serving the Auditorium.	1 inch

END OF SECTION

SECTION 23 3300 - AIR DUCT ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES:

A. Back-draft dampers.

B. Combination fire-and-smoke dampers.

C. Duct access doors.

D. Dynamic fire dampers.

E. Ceiling fire dampers.

F. Smoke dampers.

G. Volume control dampers.

H. Flexible duct connections.

I. Duct test holes.

1.2 RELATED SECTIONS:

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

B. Section 23 04 00 – General Conditions for Mechanical Trades

C. Section 23 09 23 - Direct-Digital Control System for HVAC: Execution and Product requirements for connection and control of Combination Smoke and Fire Dampers for placement by this section.

D. Section 23 31 00 - HVAC Ducts: Requirements for duct construction and pressure classifications.

E. Section 26 05 03 - Equipment Wiring Connections: Execution requirements for connection of electrical Combination Smoke and Fire Dampers specified by this section.

1.3 REFERENCES (follow the most currently adopted amended version)

A. Air Movement and Control Association International, Inc.:
   1. AMCA 500 - Test Methods for Louvers, Dampers, and Shutters.

B. ASTM International:
   1. ASTM E1 - Standard Specification for ASTM Thermometers.

C. National Fire Protection Association:
   1. NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems.
   2. NFPA 92A - Recommended Practice for Smoke-Control Systems.

D. Sheet Metal and Air Conditioning Contractors:
   1. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.

E. Underwriters Laboratories Inc.:
   1. UL 555 - Standard for Safety for Fire Dampers.
   2. UL 555C - Standard for Safety for Ceiling Dampers.
   3. UL 555S - Standard for Safety for Smoke Dampers.

1.4 SUBMITTALS

A. Shop Drawings: Indicate for shop fabricated assemblies including volume control dampers, duct access doors and duct test holes.

B. Product Data: Submit data for shop fabricated assemblies and hardware used.

C. Product Data: Submit for the following. Include where applicable electrical characteristics and connection requirements.
   1. Fire dampers including locations and ratings.
   2. Smoke dampers including locations and ratings.
   3. Backdraft dampers.
   4. Flexible duct connections.
   5. Volume control dampers.
   6. Duct access doors.
   7. Duct test holes.

D. Product Data: For fire dampers, smoke dampers, combination fire and smoke dampers submit the following:
   1. Include UL ratings, dynamic ratings, leakage, pressure drop and maximum pressure data.
   2. Indicate materials, construction, dimensions, and installation details.
   3. Damper pressure drop ratings based on tests and procedures performed in accordance with AMCA 500.

E. Manufacturer's Installation Instructions: Submit for Fire and Combination Smoke and Fire Dampers.

F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.5 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of access doors test holes and dampers.

B. Operation and Maintenance Data: Submit for Combination Smoke and Fire Dampers.

1.6 QUALITY ASSURANCE

A. Dampers tested, rated and labeled in accordance with the latest UL requirements.

B. Damper pressure drop ratings based on tests and procedures performed in accordance with AMCA 500.

C. Maintain one copy of each document on site.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.8 PRE-INSTALLATION MEETINGS

A. Convene minimum one week prior to commencing work of this section.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Protect dampers from damage to operating linkages and blades.

B. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer and material.

C. Storage: Store materials in a dry area indoor, protected from damage.

D. Handling: Handle and lift dampers in accordance with manufacturer's instructions. Protect materials and finishes during handling and installation to prevent damage.

1.10 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.11 COORDINATION

A. Coordinate Work where appropriate with building control Work.

1.12 WARRANTY

A. Furnish one year manufacturer warranty for duct accessories.

1.13 EXTRA MATERIALS

A. Fusible Links: Furnish quantity equal to 10 percent of number installed.

PART 2 PRODUCTS

2.1 BACK-DRAFT DAMPERS

A. Manufacturers:
   1. Ruskin CB series
   2. Price BDD Series
   3. Greenheck EM Series

B. Product Description: Multi-Blade, back-draft dampers: Parallel-action, gravity-balanced, extruded aluminum. Blades, maximum 6 inch width, center pivoted, with flexible vinyl sealed edges. Blades linked together in rattle-free manner with 90-degree stop, steel ball bearings, and plated steel pivot pin. Furnish dampers with adjustment device to permit setting for varying differential static pressure.

2.2 COMBINATION FIRE AND SMOKE DAMPERS

A. Manufacturers:
   1. Ruskin
   2. Price
   3. Greenheck
   4. Pottorff
   5. Nailor

B. Type: Dynamic, fabricate in accordance with NFPA 90A, UL 555, and UL 555S.

C. Fire Resistance: 1-1/2 hours through penetrations with fire resistance ratings of less than 3 hours and 3 hours through penetrations with fire resistance ratings of 3 hours or more.

D. Leakage Rating: Class II, maximum of 20 cfm at 4 inches wg differential pressure.

E. Damper Temperature Rating: 250 degrees F for all except smoke control systems. Smoke control systems must be 350 degrees F rated.

F. UL 555S Differential Pressure Rating: 6 in. wg.

G. UL 555S Velocity Rating: 2000 fpm

H. Frame: minimum16 gage, galvanized steel.

I. Blades:
   1. Style: Airfoil-shaped, single piece, double skin.
   2. Action: Opposed or parallel.
   3. Orientation: Horizontal.
   4. Material: Minimum 16 gage equivalent thickness, galvanized steel.
   5. Width: Maximum 6 inches.

J. Bearings: Stainless steel or Bronze Oilite pressed into frame.

K. Seals: Silicone blade edge seals and flexible stainless steel jamb seals.

L. Linkage: Concealed in frame.

M. Release Device: Electric resettable link to allow damper to be automatically reset with an open & closed indicator.

N. Actuator: shall be qualified in accordance with UL 555S to the temperature rating of the damper. Provide with damper

O. Operators: UL listed and labeled spring return electric type suitable for 120 volt, single phase, 60 Hz. Provide end switches to indicate damper position. Locate damper operator on exterior of duct and link to damper operating shaft.

P. Fusible Link Release Temperature: 165 degrees F.

Q. Finish: Mill galvanized.

R. Factory installed sleeve provided with mounting angles. Furnish silicone caulk factory applied to sleeve at damper frame to comply with leakage rating requirements. Provide out-of-partition type dampers with fire rated sleeve where conditions do not allow installation of damper within partition.

S. Smoke Detector: Duct mounted smoke detectors shall be furnished by Div. 28, installed by Div. 23. Power wiring by Div. 26, control wiring by Div. 28.

2.3 DUCT ACCESS DOORS

A. Manufacturers:
1. Ruskin
2. Elgen
3. Greenheck
4. Buckley
5. Kees
6. Pottorff

B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible Figures 7-2, "Duct Access Doors and Panels," and 7-3, "Access Doors - Round Duct."

C. Fabrication: Rigid and close fitting of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ductwork, furnish minimum 1 inch thick insulation with sheet metal cover.
1. Less than 12 inches square, secure with sash locks.
2. Up to 18 inches Square: Furnish two hinges and two sash locks.
3. Up to 24 x 48 inches: Three hinges and two compression latches.
4. Larger Sizes: Furnish additional hinge.
5. Access panels with sheet metal screw fasteners are not acceptable.

D. Materials
   1. Aluminum construction: Minimum 0.032" thick aluminum double wall door, minimum 0.032" thick aluminum frame. Provide for aluminum duct.
   2. Steel construction: Minimum 24 gauge galvanized double wall door, minimum 24 gauge galvanized frame. Provide for galvanized steel duct.
   3. Stainless steel construction: Minimum 24 gauge stainless steel double wall door, minimum 22 gauge stainless steel frame. Provide for stainless steel or aluminum duct.

E. Low Pressure Rectangular (Non-Grease-Ducts):
   1. Door: For insulated ducts, provide double wall door with 1" or 2" insulation cavity – as necessary to accommodate required insulation. For non-insulated ducts, provide single wall door.
   2. Gasket: Closed cell neoprene.
   3. Hardware: Double (opposite side) cam latches or single cam latch with full length (piano style) hinge.
   4. Insulation: Glass fiber type, 1" thick for ductwork with up to 1" thick acoustical lining or insulation wrap, 2" thick for ductwork with 1-1/2" and over acoustical lining or insulation wrap.

F. Low Pressure Round & Oval Duct (Non-Grease Ducts),
   1. Insulated duct, low pressure (3" wg): Welded construction, 18 gauge galvanized steel, 24 gauge galvanized double wall door, double cam latches or single cam latch with full length (piano style) hinge, 2" thick glass fiber insulation.
   2. Non-Insulated duct, low pressure (6" wg): 16 gauge galvanized door, plated steel full length (piano style) hinge, zinc plated draw latch(es) and keeper(s), closed cell neoprene gasket.

G. High pressure (10" wg): 18 gauge galvanized steel, 24 gauge galvanized double wall door, double cam latches or single cam latch with full length (piano style) hinge, 2" thick glass fiber insulation.
   1. Hardware:
      a. Cam latch type: Cam latches on (4) sides - (1) cam latch per side for 6"x6", (2) cam latches per side for 8"x8" and over.
      b. Hinge type: Cam latches on (3) sides, (1) cam latch per side for up to 16"x16", (2) cam latches per side for 18"x18" and over.
   2. Application: For ductwork rated over 3" pressure class positive or negative, provide high pressure access doors.

H. Grease Ducts: 16 gauge galvanized door, 16 gauge cold rolled steel (CRS) frame, 2,300°F ceramic fire gasket, UL 1978 Listed. Provide access doors where indicated on the drawings and where cleanouts are required by IMC Section 506.3.

2.4 DYNAMIC FIRE DAMPERS

A. Manufacturers:
   1. Ruskin
   2. Price
   3. Greenheck

4. Nailor
5. Pottorff

B. Fabricate in accordance with NFPA 90A and UL 555.

C. Fire Resistance: 1-1/2 hours through penetrations with fire resistance ratings of less than 3 hours and 3 hours through penetrations with fire resistance ratings of 3 hours or more.

D. Dynamic Closure Rating: Dampers classified for dynamic closure to 2000 fpm and 4 inches wg static pressure.

E. Construction:
1. Integral Sleeve Frame- Galvanized steel in gauges required by manufacturer's UL listing. Length: Minimum 20 gage formed Sleeve length shall extend approximately 3" on either side of the wall or floor to facilitate joining the collar to the duct.
2. Blades:
   a. Style: Curtain type, blades outside of airstream.
   b. Action: Spring or gravity closure upon fusible link release.
   c. Material: Minimum 24 gage roll formed, galvanized steel.
3. Closure Springs: Type 301 stainless steel, constant force type, if required.

F. Fusible Link Release Temperature: 165 degrees F.

G. Mounting: Vertical or horizontal as indicated on Drawings.

H. Finish: Mill galvanized.

2.5 CEILING FIRE DAMPERS

A. Manufacturers:
1. Ruskin CFD(R) series
2. Price
3. Greenheck
4. Nailor
5. Pottorff

B. Fire Rating: UL 555C classified and labeled as a 1-1/2 or 3 hour ceiling damper to match the roof/ceiling assembly.

C. Air Flow Rating: UL approved for dual directional air flow.

D. Frame: minimum 3 inches by minimum 20 gage galvanized steel with roll formed ridge for blade stop.

E. Blades:
1. Style: Two-piece, single-thickness with blade insulation, hinged in center, and held open with fusible link.
2. Action: Butterfly.

3. Orientation: Horizontal.
4. Material: Minimum 24 gage galvanized steel.

F. Hinge: Spring stainless steel, mechanically attached to blades.

G. Mounting: Horizontal.

H. Temperature Release Device: Fusible link, 165 degrees F.

I. Finish: Mill galvanized.

J. Performance Data:
1. Pressure Drop: Maximum 0.1 inches w.g. at 500 fpm across 18 x 18 inch damper.

K. Fusible Volume Adjust damper: UL classified.

L. Extended Frame (if required):
1. Rectangular Dampers: 6 inches thru11 inches.
2. Round Dampers: 6-1/2 inches thru11-1/2 inches.

2.6 SMOKE DAMPERS

A. Manufacturers:
1. Ruskin
2. Air Balance
3. Greenheck
4. Nailor
5. Pottorff

B. Fabricate in accordance with NFPA 90A and UL 555S.

C. Fire Resistance: 1-1/2 hours through penetrations with fire resistance ratings of less than 3 hours and 3 hours through penetrations with fire resistance ratings of 3 hours or more.

D. Leakage Rating: Class I, maximum of 8 cfm at 4 inches wg differential pressure..

E. Damper Temperature Rating: 250 degrees F.

F. Frame: 16 gage, galvanized steel.

G. Blades:
1. Style: Airfoil-shaped, single piece, double skin.
2. Action: Opposed.
3. Orientation: Horizontal.
4. Material: Minimum 13 gage equivalent thickness, galvanized steel.
5. Width: Maximum 6 inches.

H. Bearings: Stainless steel pressed into frame.

I. Seals: Silicone blade edge seals and flexible stainless steel jamb seals.

J. Linkage: Concealed in frame.

K. Operators: UL listed and labeled spring return electric type suitable for 120 volt, single phase, 60 Hz. Provide end switches to indicate damper position. Locate damper operator on exterior of duct and link to damper operating shaft.

L. Sleeve: Factory installed 16 gage sleeve, minimum 12 inches long.

M. Finish: Mill galvanized.

N. Smoke Detector: Duct mounted smoke detectors are furnished by Div. 28, installed by Div. 23. Power wiring by Div. 26, control wiring by Div. 28

2.7 VOLUME CONTROL DAMPERS

A. Manufacturers:
1. Ruskin
2. Nailor
3. Greenheck
4. Flexmaster
5. McGill Airflow
6. Nailor
7. Pottorff

B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.

C. Splitter Dampers:
1. Material: Same gage as duct to 24 inches size in both dimensions, and two gages heavier for sizes over 24 inches.
2. Blade: Fabricate of single thickness sheet metal to streamline shape, secured with continuous hinge or rod.
3. Operator: Minimum 3/8 inch diameter rod in self aligning, universal joint action, flanged bushing with set screw.
4. Single Blade Dampers: Fabricate for duct sizes up to 12 x 48 inch.

D. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 x 72 inch. Assemble center and edge crimped blades in prime coated or galvanized frame channel with suitable hardware.

E. End Bearings: Except in round ductwork 12inches and smaller, furnish end bearings. On multiple blade dampers, furnish oil-impregnated nylon or sintered bronze bearings. Furnish closed end bearings on ducts having pressure classification over 2 inches wg..

F. Quadrants:
1. Furnish locking, indicating quadrant regulators on single and multi-blade dampers.
2. On insulated ducts mount quadrant regulators on standoff mounting brackets, bases, or adapters.

3. Where rod lengths exceed 30 inches furnish regulator at both ends.

2.8 FLEXIBLE DUCT CONNECTIONS

A. Manufacturers:
1. Ventfabrics Inc. Ventglas
2. United McGill
3. Elgen
4. DuroDyne
5. Ventfabrics
6. Ductmate Industries

B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.

C. Materials: Flame-retardant or noncombustible fabrics.

D. Coatings and Adhesives: Comply with UL 181, Class 1.

E. Metal-Edged Connectors: Factory fabricated with a fabric strip minimum 3-1/2 inches wide attached to two strips of galvanized or aluminum sheet steel. Provide metal compatible with connected ducts.

F. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
1. Minimum Weight: 26 oz./sq. yd.
2. Tensile Strength: 480 lbf/inchin the warp and 360 lbf/inchin the filling.
3. Service Temperature: Minus 40 to plus 200 deg F.

G. Outdoor System, Flexible Connector Fabric: Glass fabric double coated with weatherproof, synthetic rubber resistant to UV rays and ozone.
1. Minimum Weight: 24 oz./sq. yd.
2. Tensile Strength: 530 lbf/inchin the warp and 440 lbf/inchin the filling.
3. Service Temperature: Minus 50 to plus 250 deg F

H. High-Temperature System, Flexible Connectors: Glass fabric coated with silicone rubber.
1. Minimum Weight: 16 oz./sq. yd.
2. Tensile Strength: 285 lbf/inchin the warp and 185 lbf/inchin the filling.
3. Service Temperature: Minus 67 to plus 500 deg F

I. High-Corrosive-Environment System, Flexible Connectors:Glass fabric with chemical-resistant coating.
1. Minimum Weight: 14 oz./sq. yd.
2. Tensile Strength: 450 lbf/inchin the warp and 340 lbf/inchin the filling.
3. Service Temperature: Minus 67 to plus 500 deg F

J. Leaded Vinyl Sheet: Minimum 0.55 inch thick, 0.87 lbs. per sq ft, 10 dB attenuation in 10 to 10,000 Hz range.

2.9 DUCT TEST HOLES

A. Manufacturers:
   1. Dwyer
   2. Flow Kinetics
   3. Air Balance
   4. Substitutions: Division 01 - General Requirements.

B. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Furnish extended neck fittings to clear insulation.

2.10 DUCT SILENCERS

A. Manufacturers:
   1. IAC
   2. Kinetics Noise Control
   3. McGill AirSilence
   4. Ruskin
   5. Vibro-Acoustics.

B. Silencers shall be constructed in accordance with ASHRAE and SMACNA standards. Silencers shall not fail structurally when subjected to a differential air pressure of 8 inches water gauge.

C. Outer casing: ASTM A 653/A 653M minimum 22 gauge G90 galvanized sheet steel.

D. Casing seams and joints: Lock-formed and sealed or stitch welded and sealed.

E. Inner perforated metal liner: ASTM A 653/A 653M minimum 26 gauge G90 galvanized sheet steel.

F. Media: Acoustic quality, shot-free glass fiber insulation with long, resilient fibers bonded with a thermosetting resin. Glass fiber density and compression shall be as required to insure conformance with laboratory test data. Glass fiber shall be packed with a minimum of 15% compression during silencer assembly. Media shall be Type, Dimensions, and Performance: As indicated on the duct silencer schedule.

G. Rectangular elbow silencers: Acoustical splitters shall be internally radiused and aerodynamically designed for efficient turning of the air. Half and full splitters shall be provided as necessary to achieve the scheduled insertion loss. Silencers with a turning cross-section dimension greater than 48” shall have at minimum two half splitters and one full splitter.

H. Transitional silencers: Transitioning shall occur internal to the silencer such that the height of the gap or air passage is uniformly changing with the length of the splitters.

2.11 REMOTE DAMPER OPERATORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following :
   1. Pottorff.
   2. Ventfabrics, Inc.
   3. Young Regulator Company.

B. Description: Cable system designed for remote manual damper adjustment.

C. Tubing: Brass, Copper or Aluminum.

D. Cable: Stainless steel.

E. Wall-Box Mounting: Recessed.

F. Wall-Box Cover-Plate Material: Painted steel.

2.12 TURNING VANES

A. Manufacturers:
   1. Ductmate Industries, Inc.
   2. Duro Dyne Inc.
   3. Elgen Manufacturing.
   4. METALAIRE, Inc.
   5. SEMCO Incorporated.
   6. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Manufactured Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.

C. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 4-3, "Vanes and Vane Runners," and 4-4, "Vane Support in Elbows."

D. Vane Construction: Single wall for ducts up to 48 inches wide and double wall for larger dimensions.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify rated walls are ready for fire damper installation.

B. Verify ducts and equipment installation are ready for accessories.

C. Check location of air outlets and inlets and make necessary adjustments in position to conform to architectural features, symmetry, and lighting arrangement.

3.2 INSTALLATION.

A. Install in accordance with NFPA 90A, and follow SMACNA HVAC Duct Construction Standards - Metal and Flexible. Refer to Section 23 31 00 for duct construction and pressure class.

B. Install motorized back-draft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated on Drawings.

C. Access Doors: Install access doors of type suitable for application at the following locations:
1. Spaced every 50 feet of straight duct.
2. Upstream of each elbow.
3. Upstream of each reheat coil.
4. Before and after each duct mounted filter.
5. Before and after each duct mounted coil.
6. Before and after each duct mounted fan.
7. Before and after each automatic control damper.
8. Before and after each fire damper, smoke damper, combination fire and smoke damper.
9. Downstream of each VAV box.
10. Install at locations for cleaning kitchen exhaust ductwork in accordance with NFPA 96.

D. Access Door Sizes: Install minimum 8 x 8 inch size for hand access, 18 x 18 inch size for shoulder access. Install 4 x 4 inch for balancing dampers only. Review locations prior to fabrication.
1. Mark access doors for fire and smoke dampers on outside surface, with minimum 1/2 inch high letters reading: FIRE/SMOKE DAMPER, SMOKE DAMPER, OR FIRE DAMPER.

E. Install temporary duct test holes and required for testing and balancing purposes. Cut or drill in ducts. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

F. Install fire dampers, combination fire and smoke dampers and smoke dampers at locations as indicated on Drawings and as indicated in specifications. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges. Install dampers and accessories with required clearance for access. Provide all power and control wiring for a complete and operable system.
1. Install smoke dampers and combination smoke and fire dampers in accordance with NFPA 92A.
2. Install dampers square and free from racking with blades running horizontally.
3. Do not compress or stretch damper frame into duct or opening.
4. Handle damper using sleeve or frame. Do not lift damper using blades, actuator, or jack shaft.
5. Install bracing for multiple section assemblies to support assembly weight and to hold against system pressure. Install bracing as needed.

3.3 DEMONSTRATION

A. Demonstrate re-setting of fire dampers to Owner's representative.

END OF SECTION

SECTION 23 3400 - HVAC FANS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Cabinet exhaust fans.

B. Ceiling exhaust fans.

C. Downblast roof exhausters

D. Inline centrifugal fans

E. Kitchen hood upblast roof exhausters.

F. Motors and drives.

G. Fan accessories.

H. HVLS (High Volume Low Speed) Fans

I. Dryer Booster Fans

J. Dust collectors

K. Air Filtration Unit

1.2 RELATED REQUIREMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

B. Section 23 0548 - Vibration and Seismic Controls for HVAC Piping and Equipment.

C. Section 23 0700 - HVAC Insulation.

D. Section 23 3300 - Air Duct Accessories: Dampers.

E. Section 26 0503 - Equipment Wiring Connections.

F. REFERENCE STANDARDS (follow the most currently adopted amended version)ABMA STD 9 - Load Ratings and Fatigue Life for Ball Bearings.

G. ABMA STD 11 - Load Ratings and Fatigue Life for Roller Bearings.

H. AMCA (DIR) - (Directory of) Products Licensed Under AMCA International Certified Ratings Program.

I. AMCA 99 - Standards Handbook.

J. AMCA 210 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating.

K. AMCA 300 - Reverberant Room Method for Sound Testing of Fans.

L. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data;.

M. NEMA MG 1 - Motors and Generators.

N. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible.

O. UL-705 – Standard for Safety for Power Ventilators

1.3 SUBMITTALS

A. Product Data: Provide data on centrifugal fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, sound power levels for both fan inlet and outlet at rated capacity, and electrical characteristics and connection requirements.

B. Shop Drawings: Indicate assembly of centrifugal fans and accessories including fan curves with specified operating point clearly plotted, sound power levels for both fan inlet and outlet at rated capacity, and electrical characteristics and connection requirements.

C. Manufacturer's Instructions: Include complete installation instructions.

D. Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

E. Maintenance Materials: Furnish for Owner's use in maintenance of project.

F. Extra Materials:
1. Fan Belts: One set for each individual fan.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect motors, shafts, and bearings from weather and construction dust.

1.6 FIELD CONDITIONS

A. Permanent fans may not be used for ventilation during construction.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. The following list of manufacturers applies to all fans unless otherwise noted in sections below.
   1. Greenheck Fan Corporation
   2. Loren Cook Company
   3. PennBarry
   4. Twin City Fan & Blower

2.2 STARTERS, DRIVES & DISCONNECTS

A. Provide starters and disconnect switches for fans not scheduled to be controlled by a variable speed controller..

B. Provide belt or direct drive fans as indicated on project schedules. Where belt drives are indicated provide the following:
   1. Belts, pulleys, and keys oversized for a minimum of 150 percent of driven horsepower.
   2. Belts: Static free and oil resistant.
   3. Fully machined cast iron type, keyed and securely attached to the wheel and motor shafts.
   4. Motor pulley adjustable for final system balancing.
   5. Readily accessible for maintenance.
   6. Sheaves: For V-belt drives, provide cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheaves selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

C. Disconnect Switches:
   1. Factory mounted and wired.
   2. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
      a. Indoor Clean, Dry Locations: Type 1.
      b. Outdoor Locations: Type 3R.
   3. Finish for Painted Steel Enclosures: Provide manufacturer's standard, factory applied gray, unless otherwise indicated.
   4. Positive electrical shutoff.
   5. Wired from fan motor to junction box installed within motor compartment.

2.3 ROOF CURBS

A. Provide roof curbs for roof-mounted fans with bottom duct connections. Provide equipment curbs or rails for roof-mounted fans with side duct connections.

B. Self-flashing of galvanized steel with continuously welded seams, built-in cant strips, insulation and curb bottom, curb bottom, factory installed nailer strip. Provide pitched roof curb for sloped roofs so that the tops of curbs are level and such that the lowest clearances from the tops of the roof curbs to the roofs conform to the height requirements below.

C. Curb Height: 24 inches for intakes and 14 inches for exhausts.

2.4 CABINET AND CEILING EXHAUST FANS

A. Manufacturers, Starters, Drives, Disconnects, and Roof Curbs
1. Refer to Section 2.1.

B. Centrifugal Fan Unit: V-belt or direct driven with galvanized steel housing lined with acoustic insulation, resilient mounted motor, gravity backdraft damper in discharge.

C. Grille: Molded white plastic.

2.5 DOWNBLAST ROOF EXHAUSTERS

A. Manufacturers, Starters, Drives, Disconnects, and Roof Curbs
1. Refer to Section 2.1.
    a. Housing:
        1) Construct of heavy gage aluminum including curb cap, windband, and motor compartment.
        2) Rigid internal support structure.
        3) One-piece fabricated or fully welded curb-cap base to windband for leak proof construction.
        4) Construct drive frame assembly of heavy gage steel, mounted on vibration isolators.
        5) Provide breather tube for fresh air motor cooling and wiring.

B. Shafts and Bearings:
1. Fan Shaft:
    a. Ground and polished steel with anti-corrosive coating.
    b. First critical speed at least 25 percent over maximum cataloged operating speed.
2. Bearings:
    a. Permanently sealed or pillow block type.
    b. Minimum L10 life in excess of 100,000 hours (equivalent to L50 average life of 500,000 hours), at maximum cataloged operating speed.
    c. 100 percent factory tested.

C. Accessories:
1. Automatic Belt Tensioner: Automatic device that adjusts for correct belt tension.

1. Birdscreen: Provide galvanized steel construction.
2. Dampers: Provide motorized type.
3. Finishes: Factory primed.
4. Hinge Kit:
   a. Aluminum hinges.
   b. Hinges and restraint cables mounted to base.
5. Tie-down Points: Four brackets located on windband secures fan in heavy wind applications.
6. External motor speed controllers for field mounting.

2.6 INLINE CENTRIFUGAL FANS

A. Manufacturers, Starters, Drives, Disconnects, and Roof Curbs
   1. Refer to Section 2.1.

B. Centrifugal Fan Unit: V-belt or direct driven with galvanized steel housing lined with acoustic insulation, resilient mounted motor, gravity backdraft damper in discharge.

2.7 KITCHEN HOOD UPBLAST ROOF EXHAUSTERS

A. Manufacturers, Starters, Drives, Disconnects, and Roof Curbs
   1. Refer to Section 2.1.

B. Belt Drive Fan:
   1. Fan Wheel:
      a. Type: Non-overloading, backward inclined centrifugal.
      b. Material: Aluminum.
      c. Statically and dynamically balanced.
   2. Motors:
      a. Open drip-proof (ODP).
      b. Heavy duty ball bearing type.
      c. Mount on vibration isolators or resilient cradle mounts, out of air stream.
      d. Fully accessible for maintenance.
   3. Housing:
      a. Construct of heavy gage aluminum including curb cap, windband, and motor compartment.
      b. Rigid internal support structure.
      c. One-piece fabricated or fully welded curb-cap base to windband for leak proof construction.
      d. Construct drive frame assembly of heavy gage steel, mounted on vibration isolators.
      e. Provide breather tube for fresh air motor cooling and wiring.

C. Shafts and Bearings:
   1. Fan Shaft:
      a. Ground and polished steel with anti-corrosive coating.
      b. First critical speed at least 25 percent over maximum cataloged operating speed.
   2. Bearings:

a. Permanently sealed or pillow block type.
b. Minimum L10 life in excess of 100,000 hours (equivalent to L50 average life of 500,000 hours), at maximum cataloged operating speed.
c. 100 percent factory tested.

D. Drain Trough: Allows for single-point drainage of water, grease, and other residues.

E. Accessories:
1. Automatic Belt Tensioner: Automatic device that adjusts for correct belt tension for single drives.
2. Clean Out Port: Removable grease repellent compression rubber plug allows access for cleaning wheel through wind band.
3. Roof Curb Extension: Vented curb extension where required for compliance with minimum clearances required by NFPA 96.
4. Dampers: Provide motorized type.
5. Drain Connection:
   a. Aluminum construction.
   b. Allows single-point drainage of grease, water, or other residues.
6. Finishes: Factory primed.
7. Grease Trap:
   a. Aluminum.
   b. Includes drain connection.
   c. Collects grease residue.
8. Hinge Kit:
   a. Aluminum hinges.
   b. Hinges and restraint cables mounted to base (sleeve).
   c. Allows fan to tilt away for access to wheel and ductwork for inspection and cleaning.
9. Heat Baffle: Prevents heat from radiating into motor compartment.
10. Tie-down Points: Four brackets located on wind band secures fan in heavy wind applications.
11. External motor speed controllers for field mounting.
12. UL-762 Rating.

2.8 HVLS (HIGH VOLUME LOW SPEED) FANS

A. Manufacturers:
1. Hunter Industrial
2. MacroAir Fans
3. Big Ass Fans
4. Substitutions: Section 01 60 00 - Product Requirements.

B. Fans shall be supported from structure, direct drive permanent split capacitor type; with rolled edge design fan blade set.

C. Provide with accessories as shown on plans.

D. Provide with (1) wall mounted controller to control (4) fans. Furnish and install control panel with Bacnet card and fire alarm relay.

E. Color selected by architect.

2.9 DRYER BOOSTER INLINE FANS

A. Manufacturers:
1. Fantech
2. Enervex
3. US Draft

B. Fan: Inline fan with galvanized steel housing and baked powder-coat finish. Backward inclined blades of the motorized impeller allow lint to pass through the fan. Fan shall be UL 705.

C. Pressure Switch: pressure switch automatically activates the booster fan when dryer comes on. Includes 18" of pressure sensing tubing with mounting grommet.

D. Indicator Panel: Wall-mount, low voltage indicator panel features an LED light that indicates to the owner that the fan is working properly. The indicator panel will alert of problems such as no power, blocked duct, locked motor rotor and low speed conditions. A 50 foot cable is included to connect the indicator panel to the booster fan. Panel shall have Bacnet compatibility for monitoring and alarms.

2.10 DUST COLLECTOR

A. Manufacturers:
1. Sternvent, DKPD Series.
2. American Air Filter Arrestall.
3. Donaldson DFE Series.
4. Substitutions: Section 01 60 00 – Product Requirements.

B. Furnish and install, where shown on plans, a high efficiency filter type dust collector with integral blower sized for design air flow as shown on the schedule.

C. Dust collector shall be self-cleaning fabric type complete with cotton filters, backward inclined blower, motorized shaker, factory wired controller and external discharge silencer. Manufacturer's literature shall state that dust collector and selected filter spacing is designed for the collection of wood dust.

D. Dust collector shall be airtight, all steel construction with sealed seams and gasketed quick opening doors with 1/4 turn knobs. Housing shall be a minimum of 14-ga. mild steel. Unit shall consist of a filter section, with sloped roof to shed rain and a funnel bottom section without slide gates or doors to allow downflow of dust directly into (2) 55-gallon drum assemblies furnished by manufacturer. Inlet, with baffle, shall be centered for even distribution of dust to the drums. Designs with inlet on narrow side shall not be accepted. Include an explosion relief vent, in the dirty section of the filter housing, per NFPA 664.

E. Unit to include a multi-pocket filter modules, which is sewn from 8-ounce cotton sateen fabric designed to deliver in excess of 99.5% efficiency by weight on industrial dusts. The filters shall have closed bottom and open top pockets, for the wood waste to remain on the

outside surfaces of the filter media. Inside of each pocket shall be a rigid insert separator to prevent collapse of filters and loss of the effective filter area. Flat shaker fingers located at the bottom of the filter module shall prevent adjoining pockets from touching one another and blanking off. The filter pocket spacing shall be wide spacing to permit the collected dust to be shaken off the exterior of the filters and recommended by the manufacturer for the collection of wood dust. Total airflow to filter fabric area (air to cloth ratio) shall not exceed 10 CFM per square foot.

1. Filter designs with open bottoms that allow wood waste to enter the inside of the filters will not be accepted, because of the potential for wood waste to bridge and not shake down.
2. Each filter module shall be secured in place by two lever, operated over-center, locking mechanisms to assure a positive seal and allow for easy removal of filters from outside of unit. Designs which require entry into unit (confined space) or require hand tools to remove the filters, for filter maintenance, are not acceptable.

F. Filters will be cleaned automatically after a fifteen second delay following the shutdown of the blower, by the oscillating action delivered by the motorized eccentric driven shaker assembly, which imparts a rapid and strong vibratory force throughout the entire surface of each individual filter pocket to dislodge the dust. Filters that are suspended from bungee cords or rubber bands are not acceptable.

G. Operation of the automatic shaker shall be controlled by a solid state, dual mode timer with adjustable shaker cycle range from 1.8 - 180 seconds. ABB VFD with manual bypass for blower motor, magnetic starter with overload relay for shaker motor and transformer in a NEMA12 control panel for indoor mounting & wiring by contractor. Outdoor NEMA 3R safety disconnect switch shipped loose for field mounting & wiring by contractor. Also included shall be a push button station for remote mounting.

1. Provide BACnet interface control to BMS.

H. The control panel wiring shall be either UL or ETL labeled for compliance with 508A. Control panels not labeled by dust collector manufacturer shall be labeled, in field, by a certified UL or ETL representative, prior to placing equipment in operation.

I. The integral non-sparking AMCA Type C direct drive blower shall be located on the clean air side of the filters, top mounted at the factory and be of the backward inclined design with a dynamically balanced impeller. It shall be driven by 3450 RPM, TEFC motor. The blower shall be tested in accordance with AMCA Standard 210. A factory-supplied cover shall protect the motor cooling fan from ice.

J. Discharge noise from the blower shall be attenuated by an external field supported duct silencer fabricated with 4.75 lb. density inorganic mineral or glass fiber. This media shall be protected from erosion by the air flow through the use of galvanized perforated metal with aerodynamic leading and trailing edges to insure maximum acoustical insertion loss at minimum static pressure drop. Lining of the fan scroll, instead of an external silencer, shall not be accepted.

K. Interior and exterior carbon steel surfaces shall be coated with two-part epoxy primer and exterior painted with two-part urethane enamel. Final color chosen by architect.

2.11 AIR FILTRATION UNIT

A. Manufacturers:
   1. Monoxivent 3000 Series
   2. Parker Hannifin Dust Hog DA Series
   3. Camfil CamCleaner CCH Series
   4. Substitutions: Section 01 – Product Requirements.

B. Furnish and install, where shown on plans, an air filtration unit with integral blower sized for design air flow as shown on the schedule.

C. Unit Casing
   1. The unit casing shall be fabricated of minimum 20 gauge galvanized steel panels.
   2. Unit casing shall be painted. Final color chosen by architect from manufacturers' standard paint chart.
   3. The unit casing shall allow for access to the filter media through the front of the unit.

D. Blower:
   1. The blower shall be a direct drive, dynamically balanced, forward curved, double width/double inlet (DWDI) or airfoil blade plenum centrifugal type, installed on the clean air side of the filter.
   2. The blower shall discharge through a double deflection grille with adjustable blades.

E. Filters:
   1. The unit shall include a filter static pressure gauge or indicator to indicate filter dirt loading.
   2. The unit shall be equipped with the following filters tested in accordance with ASHRAE 52.2:
      a. MERV 7, Pleated Panel Type Pre-filter
      b. MERV 14, Multi-Pocket Bag Type Primary Filter

F. Electrical:
   1. Units shall be furnished with single point power connection.
   2. Units shall be furnished with a NEMA 250, Type 1 electrical enclosure.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install fans with resilient mountings and flexible electrical leads. Refer to Section 23 0548.

C. Install flexible connections between fan inlet and discharge ductwork; refer to Section 23 0548. Ensure metal bands of connectors are parallel with minimum one inch flex between ductwork and fan while running.

D. Install fan restraining snubbers; refer to Section 23 0548. Adjust snubbers to prevent tension in flexible connectors when fan is operating.

E. Provide safety screen where inlet or outlet is exposed.

F. Provide motorized dampers on discharge of exhaust fans and as indicated; refer to Section 23 3100.

END OF SECTION

SECTION 23 3600 - AIR TERMINAL UNITS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Single-duct terminal units.
   1. Single-duct, constant-volume units.
   2. Single-duct, variable-volume units.

1.2 RELATED REQUIREMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

B. Section 22 0513 - Common Motor Requirements for Plumbing Equipment.

C. Section 22 0548 - Vibration and Seismic Controls for Plumbing Piping and Equipment.

D. Section 23 0513 - Common Motor Requirements for HVAC Equipment.

E. Section 23 0548 - Vibration and Seismic Controls for HVAC Piping and Equipment.

F. Section 23 0913 - Instrumentation and Control Devices for HVAC: Thermostats and actuators.

G. Section 23 0923 - Direct-Digital Control System for HVAC.

H. Section 23 0993 - Sequence of Operations for HVAC Controls.

I. Section 23 2113 - Hydronic Piping: Connections to heating coils.

J. Section 23 2114 - Hydronic Specialties: Connections to heating coils.

K. Section 23 3100 - HVAC Ducts and Casings.

L. Section 23 3300 - Air Duct Accessories.

M. Section 23 3700 - Air Outlets and Inlets.

N. Section 23 8200 - Convection Heating and Cooling Units: Air coils.

O. Section 26 2717 - Equipment Wiring: Electrical characteristics and wiring connections.

1.3 REFERENCE STANDARDS (follow the most currently adopted amended version)

A. AHRI 410 - Forced-Circulation Air-Cooling and Air-Heating Coils

B. AHRI 880 (I-P) - Performance Rating of Air Terminals.

C. AHRI 885 - Procedure for Estimating Occupied Space Sound Levels in the Application of Air Terminals and Air Outlets.

D. ASHRAE Std 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.

E. ASHRAE Std 62.1 - Ventilation for Acceptable Indoor Air Quality.

F. ASHRAE Std 130 - Methods of Testing Air Terminal Units.

G. ASTM A492 - Standard Specification for Stainless Steel Rope Wire.

H. ASTM A603 - Standard Specification for Zinc-Coated Steel Structural Wire Rope.

I. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material).

J. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

K. ASTM E488 - Standard Test Methods for Strength of Anchors in Concrete Elements.

L. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

M. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction.

N. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems.

O. SMACNA (SRM) - Seismic Restraint Manual Guidelines for Mechanical Systems; Sheet Metal and Air Conditioning Contractors' National Association.

P. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors.

Q. UL 94 - Tests for Flammability of Plastic Materials for Parts in Devices and Appliances.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

B. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.5 SUBMITTALS

A. Product Data: Provide data indicating configuration, general assembly, and materials used in fabrication. Include catalog performance ratings that indicate air flow, static pressure, and NC designation. Include electrical characteristics and connection requirements.

B. Shop Drawings: Indicate configuration, general assembly, and materials used in fabrication, and electrical characteristics and connection requirements.
   1. Include schedules listing discharge and radiated sound power level for each of second through sixth octave bands at inlet static pressures of 1 to 4 inch wg .

C. Certificates: Certify that coils are tested and rated in accordance with AHRI 410.

D. Manufacturer's Installation Instructions: Indicate support and hanging details, installation instructions, recommendations, and service clearances required.

E. Project Record Documents: Record actual locations of units and locations of access doors required for access of valving.

F. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts lists. Include directions for resetting constant-volume regulators.

G. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

H. Maintenance Materials: Furnish for Owner's use in maintenance of project.

I. Extra Materials:
   1. Motors: One of each type and size.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.7 WARRANTY

A. Provide one year manufacturer warranty for air terminal units.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. The following list of manufacturers applies to all air terminal units unless otherwise noted in sections below.
   1. Price Industries
   2. Titus
   3. Carnes
   4. Nailor Industries

5. Trane
6. Carrier
7. Johnson Controls Inc. / Enviro-Tec

2.2 SINGLE-DUCT, VARIABLE-VOLUME AND CONSTANT-VOLUME UNITS

A. Acoustic Performance Requirements:
   1. Use attenuation values found in appendix E of AHRI 885.

B. General:
   1. Factory-assembled, AHRI 880 (I-P) rated and bearing the AHRI seal, air volume control terminal with damper assembly, flow sensor, externally mounted volume controller, duct collars, and all required features.
   2. Control box bearing identification, including but not necessarily limited to nominal cfm, maximum and minimum factory-set airflow limits, coil type and coil (right or left hand) connection, where applicable.

C. Unit Casing:
   1. Minimum 22 gage, 0.0299 inch galvanized steel.
      a. Assembled with longitudinal lock seam construction.
      b. Casing leakage to meet ASHRAE Std 130.
   2. Air Inlet Collar: Provide round, suitable for standard flexible duct sizes.
   3. Unit Discharge: Rectangular, with slip-and-drive connections.
   4. Acceptable Liners:
      a. 1/2 inch thick, coated, fibrous-glass complying with ASTM C1071.
         1) Secure with adhesive.
         2) Coat edges exposed to airstream with NFPA 90A approved sealant.
         3) Cover liner with non-porous foil.
      b. 3/4 inch (19 mm) thick polyurethane foam adhesive complying with UL 181 erosion requirements in accordance with ASHRAE Std 62.1, and having a maximum smoke developed index of 50 for both insulation and adhesive, when tested in accordance with ASTM E84.
      c. Liner not to contain pentabrominated diphenyl ether (CAS #32534-81-9) or octabrominated diphenyl ether.

D. Sound Attenuator:
   1. Provide if required to meet scheduled acoustical performance requirements.
   2. Construction to consist of a continuous extension of the casing and liner as required to achieve required attenuation.
   3. At 2000 fpm inlet velocity, the minimum operating pressure with attenuator added not to exceed 0.14 inch wg.

E. Damper Assembly:
   1. Heavy-gage, galvanized steel or extruded aluminum construction with solid steel, nickel-plated shaft pivoting on HDPE, self-lubricating bearings.
   2. Provide integral position indicator or alternative method for indicating damper position over full range of 90 degrees.
   3. Incorporate low leak damper blades for tight airflow shutoff.

a. Air Leakage Past Closed Damper: Maximum two percent of unit maximum airflow at 3 inch wg inlet static pressure, tested in accordance with ASHRAE Std 130.

F. Hot Water Heating Coil:
1. Coil Casing: Minimum 22 gage, 0.0299 inch galvanized steel, factory-installed on terminal discharge with rectangular outlet, duct connection type.
a. Access Door: Gasketed and insulated located on bottom, on top, and downstream of coils.
b. Right or left coil inlets.
2. Coil Fins: Aluminum or aluminum plated fins, mechanically-bonded to seamless copper tubes.
3. Coil leak tested to minimum 350 psig.
a. Minimum Burst Pressure: 1800 psi.
4. Base performance data on tests run in accordance with AHRI 410 and units to bear AHRI 410 label.

G. Electrical Requirements:
1. Single-point power connection.
2. Equipment wiring to comply with requirements of NFPA 70.

H. Control Transformers: Factory supplied and mounted for electric and electronic control applications.

I. Controls:
1. DDC (Direct-Digital Controls):
a. Basis of Design: Price Industries, Inc.; Price Intelligent Controller.
b. Include a factory-installed, unit-mounted, direct-digital controller that includes the following:
1) 24 VAC power terminal or RJ-12 Power connection.
2) T-Stat Port for thermostat connection.
3) Service Port for Price Linker diagnostic equipment.
4) Damper actuator.
5) Fan output connection.
6) LED indication for troubleshooting.
7) Three binary staged heating outputs.
8) Binary cooling output.
9) S.A.T. sensor input.
10) Contact closure input.
11) Four analog outputs.
12) BACNET expansion module.
13) VAV expansion module.
c. Bi-directional Damper Actuator: 24 volt, powered closed, spring return open.
d. Microprocessor-Based Controller: Air volume controller, pressure-independent with electronic airflow transducers, factory-calibrated maximum and minimum airflow.
1) Occupied and unoccupied operating mode.
2) Remote reset of temperature or CFM set points.

3) Proportional, plus integral control of room temperature.
4) Monitoring and adjusting with portable terminal.
5) Time-proportional reheat coil control.

e. Room Sensor:
1) Compatible with temperature controls specified.
2) Wall-mounted, system powered, with temperature set-point adjustment including connection access for portable operator terminal.

2. Airflow Sensor: Differential pressure airflow device measuring total, static, and wake pressures.
a. Plastic parts shall be fire-resistant, complying with UL 94.
b. Signal accuracy: within 5 percent throughout operating range with a 90 degree sheet metal elbow directly at the inlet of the assembly.
c. Control tubing shall be protected by grommets at the wall of the air flow sensor's housing.
d. Provide sensor with a pressure transducer to interface with a DDC system.
e. Provide velocity pressure sensor with a removable access section for maintenance.
f. Suitable for operation with duct pressures between 0.25 and 3.0 inch wg inlet static pressure.
g. Include factory-mounted and piped, 5-micron filter; and adjustable, velocity-resetting, high-limit control with amplifying relay.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that conditions are suitable for installation.

B. Verify that field measurements are as shown on the drawings.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install the inlets of air terminal units and air flow sensors a minimum of four duct diameters from elbows, transitions, and duct takeoffs.

C. See drawings for the size(s) and duct location(s) of the air terminal units.

D. Provide ceiling access doors or locate units above easily removable ceiling components.

E. Support units individually from structure with wire rope complying with ASTM A492 and ASTM A603 in accordance with SMACNA (SRM). See Section 23 0548.
1. See Section 23 0548.

F. Embed anchors in concrete in accordance with ASTM E488.

G. Do not support from ductwork.

H. Connect to ductwork in accordance with Section 23 3100.

I. Provide minimum of 5 ft of 1 inch thick lined ductwork downstream of units.

J. Install heating coils in accordance with Section 23 8200.

K. Verify that electric power is available and of the correct characteristics.

3.3 ADJUSTING

A. Reset volume with damper operator attached to assembly allowing flow range modulation from 100 percent of design flow to zero percent full flow. Set units with heating coils for minimum 50 percent full flow.

3.4 FIELD QUALITY CONTROL

A. Provide manufacturer's field representative to test, inspect, instruct, observe, and verify field-assembled components and equipment installation, including connections and to assist in field testing. Report results in writing.
   1. Leak Test:
      a. After installation, fill water coils and test for leaks.
      b. Repair leaks and retest until no leaks exist.
   2. Operational Test:
      a. After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
      b. Test and adjust controls and safeties.
      c. Replace damaged and malfunctioning controls and other equipment.
      d. Remove and replace malfunctioning units and retest as specified above.

3.5 CLEANING

A. Vacuum clean coils and inside of units.

B. Install new filters.

END OF SECTION

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SECTION 23 3700 - AIR OUTLETS AND INLETS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Diffusers.

B. Registers/grilles.

C. Louvers.

D. Goosenecks.

1.2 RELATED REQUIREMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

B. Division 09: Painting

C. Section 23 04 00 – General Conditions for Mechanical Trades

D. Section 23 33 00 - Air Duct Accessories.

1.3 REFERENCE STANDARDS (follow the most currently adopted amended version)

A. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating

B. AMCA 511 - Certified Ratings Program for Air Control Devices.

C. AMCA 540 – Debris Impact Resistance

D. AMCA 550 - Test Method for High Velocity Wind Driven Rain Resistant Louvers.

E. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Inlets.

F. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

G. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).

H. SMACNA (ASMM) - Architectural Sheet Metal Manual.

I. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible.

1.4 SUBMITTALS

A. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

B. Project Record Documents: Record actual locations of all air outlets and inlets.

C. Project Record Documents: Once the final Testing, Adjusting & Balancing Report is approved, record all typed airflow values on the as-built drawings.

D. Test Reports: Rating of air outlet and inlet performance.

E. Manufacturer's Certificate: Certify products meet or exceed specified requirements

1.5 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of air outlets and inlets.

1.6 QUALITY ASSURANCE

A. Test and rate air outlet and inlet performance in accordance with ASHRAE Std 70.

B. Test and rate louver performance in accordance with AMCA 500-L.

C. AMCA 540 – Debris Impact Resistance

D. AMCA 550 - Test Method for High Velocity Wind Driven Rain Resistant Louvers; 2015.

E. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

F. Maintain two copies of each document on site.

1.7 PRE-INSTALLATION MEETINGS

A. Convene minimum one week prior to commencing work of this section.

1.8 WARRANTY

A. Furnish one year manufacturer warranty for air outlets and inlets.

1.9 EXTRA MATERIALS

A. Furnish one of each type and size extra air outlets and inlets.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. The following list of manufacturers applies to all air terminal units unless otherwise noted in sections below.
   1. Price Industries
   2. Titus
   3. Krueger
   4. Nailor Industries
   5. Anemostat

2.2 RECTANGULAR CEILING DIFFUSERS

A. Type: Provide square, stamped, multi-core, square, adjustable pattern, stamped, multi-core, square and rectangular, multi-louvered, square and rectangular, adjustable pattern, multi-louvered, and diffuser to discharge air in 360 degree, one way, two way, three way, four way, and pattern with directional baffles where indicated.

B. Connections: Round.

C. Frame: Provide surface mount, snap-in, inverted T-bar, spline type. In plaster ceilings, provide plaster frame and ceiling frame.

D. Fabrication: Steel with baked enamel finish.

E. Color: As selected by Architect from manufacturer's standard range.

F. Accessories: Refer to schedule.

2.3 PERFORATED FACE CEILING DIFFUSERS

A. Type: Perforated face with fully adjustable pattern and removable face.

B. Frame: Surface mount type. In plaster ceilings, provide plaster frame and ceiling frame.

C. Fabrication: Steel with steel frame and baked enamel finish.

D. Color: As selected by Architect from manufacturer's standard range.

E. Accessories: Radial opposed blade damper and multi-louvered equalizing grid with damper adjustable from diffuser face.

2.4 CEILING SLOT DIFFUSERS

A. Type: Continuous wide slot, , with adjustable vanes for left, right, or vertical discharge, , refer to schedule

B. Fabrication: Aluminum extrusions with factory clear lacquer finish.

C. Color: To be selected by Architect from manufacturer's standard range.

D. Frame: Refer to schedule.

E. Plenum: Integral, galvanized steel, insulated.

2.5 CEILING SUPPLY REGISTERS/GRILLES

A. Type: Streamlined and individually adjustable curved blades to discharge air along face of grille, one-way deflection.

B. Frame: Refer to schedule.

C. Construction: Made of aluminum extrusions with factory enamel finish.

D. Color: As selected by Architect from manufacturer's standard range.

E. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face.

2.6 CEILING EXHAUST AND RETURN REGISTERS/GRILLES

A. Type: Frame: Refer to schedule.

B. Fabrication: Steel with 20 gage, 0.0359 inch minimum frames and 22 gage, 0.0299 inch minimum blades, steel and aluminum with 20 gage, 0.0359 inch minimum frame, or aluminum extrusions, with factory baked enamel finish.

C. Color: To be selected by Architect from manufacturer's standard range.

D. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face where not individually connected to exhaust fans.

E. Gymnasiums: Provide front pivoted or welded in place blades, securely fastened to be immobile.

2.7 CEILING LINEAR EXHAUST AND RETURN GRILLES

A. Type: Refer to schedule.

B. Frame: Refer to schedule.

C. Fabrication: Steel with 20 gage, 0.0359 inch minimum frames and 22 gage, 0.0299 inch minimum blades, steel and aluminum with 20 gage, 0.0359 inch minimum frame, or aluminum extrusions, with factory baked enamel finish.

D. Color: To be selected by Architect from manufacturer's standard range.

E. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face.

2.8 CEILING EGG CRATE EXHAUST AND RETURN GRILLES

A. Type: Refer to schedule.

B. Fabrication: Refer to schedule.

C. Color: To be selected by Architect from manufacturer's standard range.

D. Frame: Refer to schedule.

E. Frame: Channel lay-in frame for suspended grid ceilings.

F. Accessories: Refer to schedule.

2.9 WALL SUPPLY REGISTERS/GRILLES

A. Type: Refer to schedule.

B. Frame: Refer to schedule.

C. Color: To be selected by Architect from manufacturer's standard range.

D. Damper: Integral, gang-operated opposed blade type with removable key operator, operable from face.

E. Gymnasiums: Provide front pivoted or welded in place blades, securely fastened to be immobile.

2.10 WALL SUPPLY REGISTERS/GRILLES

A. Type: Refer to schedule.

B. Frame: Refer to schedule.

C. Fabrication: Aluminum extrusions with factory clear lacquer finish.

D. Color: To be selected by Architect from manufacturer's standard range.

E. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face.

2.11 WALL EXHAUST AND RETURN REGISTERS/GRILLES

A. Type: Streamlined blades, 3/4 inch minimum depth, 3/4 inch maximum spacing, with spring or other device to set blades, vertical face.

B. Frame: 1-1/4 inch margin with countersunk screw mounting.

C. Fabrication: Steel frames and blades, with factory baked enamel finish.

D. Color: As shown on the drawings.

E. Color: To be selected by Architect from manufacturer's standard range.

F. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face.

G. Gymnasiums: Provide front pivoted or welded in place blades, securely fastened to be immobile.

2.12 LINEAR WALL REGISTERS/GRILLES

A. Type: Streamlined blades with 0 degree deflection, 1/8 by 3/4 inch (3.2 by 19 mm) on 1/4 inch (6 mm) centers.

B. Frame: 1-1/4 inch (32 mm) margin with countersunk screw mounting and gasket.

C. Fabrication: Aluminum extrusions, with factory baked enamel finish.

D. Color: As shown on the drawings.

E. Color: To be selected by Architect from manufacturer's standard range.

F. Damper: Integral gang-operated opposed blade damper with removable key operator, operable from face.

2.13 LOUVERS

A. Type: 4 inch deep with blades on 45 degree slope with center baffle and return bend, heavy channel frame, 1/2 inch square mesh screen over exhaust and 1/2 inch square mesh screen over intake.

B. Fabrication: 16 gage, 0.0598 inch thick galvanized steel welded assembly, with factory prime coat finish.

C. Color: As shown on the drawings.

D. Color: To be selected by Architect from manufacturer's standard range.

E. Fabrication: 12 gage, 0.1046 inch thick extruded aluminum, welded assembly, with factory prime coat finish.

F. Color: To be selected by Architect.

G. Mounting: Furnish with interior flat flange for installation.

2.14 GOOSENECKS

A. Fabricate in accordance with SMACNA (DCS) of minimum 18 gage, 0.0598 inch galvanized steel.

B. Mount on minimum 12 inch high curb base where size exceeds 9 by 9 inch .

PART 3 EXECUTION

3.1 EXAMINATION

A. Division 1 - Administrative Requirements: Coordination and project conditions.

B. Verify inlet and outlet locations.

C. Verify ceiling, wall systems are ready for installation.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Comply with SMACNA (ASMM) for flashing/counter-flashing of roof penetrations and supports for roof curbs and roof mounted equipment.

C. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.

D. Install diffusers to ductwork with air tight connection.

E. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly. Refer to Section 23 33 00.

F. Paint ductwork visible behind air outlets and inlets matte black. Refer to Division 09.

3.3 AIR OUTLET AND INLET SCHEDULE

A. Refer to contract drawings/plans.

3.4 INTERFACE WITH OTHER PRODUCTS

A. Check location of outlets and inlets and make necessary adjustments in position to conform to architectural features, symmetry, and lighting arrangement.

END OF SECTION

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SECTION 23 5100 - BREECHINGS, CHIMNEYS, AND STACKS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Manufactured breechings.

B. Type B double wall gas vents.

C. Special Gas Vents

1.2 RELATED REQUIREMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

B. Division 07 – Thermal and Moisture Protection.

C. Section 22 0700 - Plumbing Insulation.

D. Section 23 0700 - HVAC Insulation.

E. Section 26 0503 - Equipment Wiring Connections.

F. Section 26 3213 - Engine Generators: Exhaust silencer.

1.3 REFERENCE STANDARDS (follow the most currently adopted amended version)

A. ANSI Z21.66 - American National Standard for Automatic Damper Devices for Use with Gas-Fired Appliances.

B. ASME B16.5 - Pipe Flanges and Flanged Fittings NPS 1/2 Through NPS 24 Metric/Inch Standard.

C. ASME B16.21 - Nonmetallic Flat Gaskets for Pipe Flanges.

D. ASME B31.9 - Building Services Piping.

E. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

F. ASTM A181 - Standard Specification for Carbon Steel Forgings, for General - Purpose Piping.

G. ASTM A193 - Standard Specification for Alloy - Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications.

H. ASTM A194 - Standard Specification for Carbon Steel, Alloy Steel, and Stainless Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.

I. ASTM A234 - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.

J. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

K. ASTM A1011 - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.

L. ASTM C401 - Standard Classification of Alumina and Alumina-Silicate Castable Refractories.

M. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation.

N. NEMA MG 1 - Motors and Generators.

O. NFPA 31 - Standard for the Installation of Oil Burning Equipment.

P. NFPA 54 - National Fuel Gas Code.

Q. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction.

R. NFPA 82 - Standard on Incinerators and Waste and Linen Handling Systems and Equipment.

S. NFPA 211 - Guide for Smoke and Heat Venting.

T. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible.

U. UL 103 - Factory-Built Chimneys for Residential Type and Building Heating Appliances.

V. UL 127 - Standard for Factory-Built Fireplaces; Current Edition.

W. UL 378 - Standard for Draft Equipment.

X. UL 441 - Standard for Gas Vents.

Y. UL 641 - Type L Low Temperature Venting Systems.

Z. UL 959 - Medium Heat Appliance Factory Built Chimneys.

1.4 DEFINITIONS

A. Breeching: Vent Connector.

B. Chimney: Primarily vertical shaft enclosing at least one vent for conducting flue gases outdoors.

C. Smoke Pipe: Round, single wall vent connector.

D. Vent: That portion of a venting system designed to convey flue gases directly outdoors from a vent connector or from an appliance when a vent connector is not used.

E. Vent Connector: That part of a venting system that conducts the flue gases from the flue collar of an appliance to a chimney or vent, and may include a draft control device.

1.5 DESIGN REQUIREMENTS

A. Factory built vents and chimneys used for venting natural draft appliances shall comply with NFPA 211 and be UL listed and labeled.

B. Design refractory lined metal stacks for wind loading of 110 mph and seismic loads for Zone _____.

1.6 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

B. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.7 SUBMITTALS

A. Product Data: Provide data indicating factory built chimneys, including dimensional details of components and flue caps, dimensions and weights, electrical characteristics and connection requirements.

B. Shop Drawings: Indicate general construction, dimensions, weights, support and layout of breechings. Submit layout drawings indicating plan view and elevations where factory built units are used.

C. Manufacturer's Instructions: Include installation instructions, and indicate assembly, support details, and connection requirements.

D. Manufacturer's Certificate: Certify that refractory lined metal stacks meet or exceed specified requirements.

E. Manufacturer Seismic Qualification Certification (where applicable): Submit certification that factory-fabricated breeching, chimneys, and stacks; accessories; and components will withstand seismic forces defined in Section 230548 "Vibration and Seismic Controls for HVAC Piping and Equipment." Include the following:
   1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
      a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
   2. Dimensioned Outline Drawings of Breeching, Chimneys, and Stacks: Identify center of gravity and locate and describe mounting and anchorage provisions.
   3. Detailed description of anchorage devices on which the certification is based and their installation requirements.

1.8 QUALITY ASSURANCE

A. Designer Qualifications: Design stacks under direct supervision of a Professional Structural Engineer experienced in design of the type of work specified and licensed in the State in which the Project is located.

B. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

C. Installer Qualifications: Company specializing in performing the type of work specified in this section with minimum [10] years documented experience, and approved by manufacturer.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. AMPCO by Hart & Cooley, Inc; Model VSI

B. DuraVent; DuraStack Pro (DIS2)

C. Metal-Fab, Inc.

D. Security Chimneys International.

E. Selkirk Corporation; Model PS.

2.2 BREECHINGS, CHIMNEYS, AND STACKS - GENERAL REQUIREMENTS

A. Regulatory Requirements:
   1. Conform to applicable code for installation of natural gas burning appliances and equipment.

2. Conform to NFPA 31 for installation of oil burning appliances and equipment.
3. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

2.3 MANUFACTURED BREECHINGS

A. Provide factory-built, modular connector and manifold system, tested to UL 103 with positive pressure rating.

B. Assembly to be UL listed for use with building equipment in compliance with NFPA 211.

C. Fabricate with 1 inch minimum air space between walls and construct inner liner of 304 stainless steel and outer jacket of 304 stainless steel.
1. Protect aluminized steel surfaces exposed to the elements with a minimum of one base coat of primer and one finish coat of corrosion resistant paint suitable for outer jacket skin temperatures of the application.

Design, fabricate, and install gas-tight preventing products of combustion leaking into the building.
1. Securely connect inner joints and seal with factory supplied overlapping V-bands and appropriate sealant in accordance with manufacturer's instructions.
2. System design to compensate for all flue gas induced thermal expansion.

2.4 TYPE B DOUBLE WALL GAS VENTS (for certified gas appliances)

A. Description: Double-wall metal vents tested according to UL 441 and rated for 480 deg F continuously for Type B; with neutral or negative flue pressure complying with NFPA 211.

B. Construction: Inner shell and outer jacket separated by at least a 1/4-inch airspace.

C. Inner Shell: 0.012 inch aluminum alloy for sizes 3 inch to 8 inch diameter. 0.018 thick for sizes 10 inch to 30 inch diameter.

D. Outer Jacket: 0.018 inch G-90 galvanized steel for sizes 3 inch to 14 inch diameter. 0.024 inch thick G-90 galvanized steel for sizes 16 inch to 30 inch diameter.

E. Accessories: Tees, elbows, increasers, draft-hood connectors, terminations, adjustable roof flashings, storm collars, support assemblies, thimbles, firestop spacers, and fasteners; fabricated from similar materials and designs as vent-pipe straight sections; all listed for same assembly.

F. Electrically Actuated Vent Dampers: Same size as draft hood collar, constructed of stainless steel or galvanized steel, with corrosion-resistant components, in compliance with ANSI Z21.66.

2.5 SPECIAL GAS VENTS (for condensing gas appliances)

A. Description: Double-wall metal vents tested according to UL 1738 and rated for 480 deg F continuously, with positive or negative flue pressure complying with NFPA 211.

B. Construction: Inner shell and outer jacket separated by at least a 1-inchairspace.

C. Inner liner: ASTM A 959, Type 29-4C stainless steel 0.015 inch thickness for 3 inch - 12 inch diameters, 0.024 thickness for 14 inch to 24 inch diameters, and 0.035 thickness for 26 inch to 36 inch diameters

D. Outer Jacket: type 304 stainless steel 0.018 inch thickness for 3 inch to 12 inch diameters, 0.024 inch thickness for 14 inch to 24 inch diameters, and 0.035 thickness for 26 inch to 36 inch diameters.

E. Accessories: Tees, elbows, increasers, draft-hood connectors, terminations, adjustable roof flashings, storm collars, support assemblies, thimbles, firestop spacers, and fasteners; fabricated from similar materials and designs as vent-pipe straight sections; all listed for same assembly.

F. Termination: Stack cap designed to exclude minimum 90 percent of rainfall.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with NFPA 54.

C. Install breechings with minimum of joints. Align accurately at connections, with internal surfaces smooth.

D. Support breechings from building structure, rigidly with suitable ties, braces, hangers and anchors to hold to shape and prevent buckling. Support vertical breechings, chimneys, and stacks at 12 foot spacing, to adjacent structural surfaces, or at floor penetrations. Refer to SMACNA (DCS) for equivalent duct support configuration and size.

E. Install concrete inserts for support of breechings, chimneys, and stacks in coordination with formwork.

F. Pitch breechings with positive slope up from fuel-fired equipment to chimney or stack.

G. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.

H. Coordinate installation of dampers, and induced draft fans. Refer to Section 26 2717.

I. Insulate breechings in accordance with Section 23 0700.

J. For Type B double wall gas vents, maintain UL listed minimum clearances from combustibles. Assemble pipe and accessories as required for complete installation.

K. Install vent dampers, locating close to draft hood collar, and secured to breeching.

L. Assemble and install stack sections in accordance with NFPA 82, industry practices, and in compliance with UL listing. Join sections with acid-resistant joint cement. Connect base section to foundation using anchor lugs.

M. Level and plumb chimney and stacks.

N. Clean breechings, chimneys, and stacks during installation, removing dust and debris.

O. At appliances, provide slip joints permitting removal of appliances without removal or dismantling of breechings, breeching insulation, chimneys, or stacks.

P. Provide maximum 2 feet of breeching to connect appliance to chimney. Provide Type B chimney continuously from appliances.

Q. Engine Exhaust:
1. Install engine exhaust piping in accordance with MSS SP-58 and ASME B31.9.
2. Install exhaust silencer provided in accordance with Section 26 3213.
3. Provide sleeves with sufficient length to pass through entire thickness of walls, floors, roofs, partitions, or slabs.
4. Extend sleeves in floor slabs 2 inches above finished floor.
5. Firmly pack insulation between pipe and sleeve and caulk both ends with plastic waterproof cement.
6. Space Between Pipe Insulation and Sleeve: Not less than 0.25 inch thick.

3.2 SCHEDULES

A. Breechings, Chimneys and Stacks.
1. Unit Heater: Galvanized breeching, Type B chimney.
2. Water Heater: Galvanized breeching, Type B chimney.
3. Condensing Gas Boiler: Special Gas Vent

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SECTION 23 5239 - FIRE-TUBE BOILERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Condensing, gas-fired, firetube boilers, trim and accessories for generating hot water.

1.2 RELATED REQUIREMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

B. Division 03 - Concrete.

C. Division 08 - Openings.

D. Section 23 0548 - Vibration and Seismic Controls for HVAC Piping and Equipment.

E. Section 23 0913 - Instrumentation and Control Devices for HVAC.

F. Section 23 2114 - Hydronic Specialties.

G. Section 23 2123 - Hydronic Pumps.

H. Section 23 2500 - HVAC Water Treatment.

I. Section 23 5100 - Breechings, Chimneys, and Stacks.

J. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables.

K. Section 26 0526 - Grounding and Bonding for Electrical Systems

1.3 ABBREVIATIONS AND ACRONYMS

A. AGA: American Gas Association.

B. FMG: Factory Mutual Global.

C. IRI: Industrial Risk Insurers.

D. UL: Underwriters Laboratories Inc.

1.4 REFERENCE STANDARDS (follow the most currently adopted amended version)

A. AHRI, BTS-2000

B. ASHRAE Std. 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings.

C. ASME B1.20.1 - Pipe Threads, General Purpose (Inch).

D. ASME B16.5 - Pipe Flanges and Flanged Fittings NPS 1/2 Through NPS 24 Metric/Inch Standard.

E. ASME B16.24 - Cast Copper Alloy Pipe Flanges and Flanged Fittings Classes 150, 300, 600, 900, 1500, and 2500.

F. ASME B31.1 - Power Piping.

G. ASME B31.9 - Building Services Piping.

H. ASME BPVC - Boiler and Pressure Vessel Code.

I. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1 - Rules for Construction of Pressure Vessels.

J. ASME CSD-1 - Controls and Safety Devices for Automatically Fired Boilers.

K. ASTM A959 - Standard Guide for Specifying Harmonized Standard Grade Compositions for Wrought Stainless Steels.

L. CSA 4.9, ANSI Z2.1.13

M. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

N. NFPA 31 - Standard for the Installation of Oil Burning Equipment.

O. NFPA 54 - National Fuel Gas Code.

P. NFPA 70 - National Electrical Code.

Q. UL 726 - Oil-Fired Boiler Assemblies.

R. UL 795 - Commercial-Industrial Gas Heating Equipment.

1.5 SUBMITTALS

A. Product Data: Include performance data, operating characteristics, technical product data, rated capacities of selected model, weights (shipping, installed and operating), installation and start-up instructions, and furnished accessory information. Provide data indicating general assembly, components, controls, safety controls, and wiring diagrams with electrical characteristics and connection requirements, and service connections.

B. Shop Drawings: Vibration isolation and seismic restraint requirements; approved by Architect. For boiler, standard boiler trim and accessories.
   1. End Assembly Drawing: Detail overall dimensions, connection sizes, connection locations, and clearance requirements.
   2. Wiring Diagrams: Detail electrical requirements for the boiler including ladder type wiring diagrams for power, interlock and control wiring. Clearly

differentiate between portions of wiring that are factory installed and portions to be field installed.

C. Certificate of Product Rating: Submit AHRI Certificate indicating Thermal Efficiency, Combustion Efficiency, Materials of Construction, Input, and Gross Output conform to the design basis.

D. Thermal efficiency curves: Submit thermal efficiency curves between and including minimum and maximum rated capacities, for return water temperatures ranging from 80°F to 180°F.

E. Water side pressure drop curve.

F. Flue gas temperature curves: Submit flue gas temperature curves for minimum and maximum boiler capacity, for return water temperatures ranging from 80°F to 160°F.
1. If submitted flue gas temperatures or excess O2% levels, minimum or maximum inputs are different from that of the basis of design manufacturer and model, the manufacturer shall be responsible for draft calculations and potential costs associated with reselection of the flue gas exhaust vent system.

G. ASME "H" Stamp Certification and Report: Submit "H" stamp certificate of authorization as required by authorities having jurisdiction, and document hydrostatic testing of piping external to boiler.

H. Manufacturer's Inspection Report: Submit authorized boiler inspection prior to shipment.

I. Field quality-control test reports: Start-up by a factory authorized personnel.

J. Manufacturer's Field Start-up Reports: Burner manifold gas pressure, percent carbon monoxide (CO), percent oxygen (O), percent excess air, flue gas temperature at outlet, ambient temperature, net stack temperature, percent stack loss, percent combustion efficiency, and heat output.
1. Indicate compliance with specified performance and efficiency.
2. Provide results of the following combustion tests:
    a. Boiler firing rate.
    b. Over fire draft.
    c. Gas flow rate.
    d. Heat input.
    e. Burner manifold gas pressure.
    f. Percent carbon monoxide.
    g. Percent oxides of nitrogen.
    h. Percent oxygen.
    i. Percent excess air.
    j. Flue gas temperature at outlet.
    k. Ambient temperature.
    l. Net stack temperature.
    m. Percent stack loss.
    n. Percent combustion efficiency.
    o. Heat output.

K. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, cleaning procedures, replacement parts list, and maintenance and repair data.

L. Manufacturer's Instructions: Indicate assembly, support details, connection requirements,

M. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Firms regularly engaged in the manufacture of condensing hydronic boilers with welded steel pressure vessels. The manufacturer must manufacture pressure vessels in an ASME-certified facility wholly owned by the manufacturer. The specifying engineer, contractor and end customer must have the option to visit the factory to witness test fire and other relevant procedures.

B. Electrical Components, Devices and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. ASME Compliance: Fabricate and label boilers to comply with ASME Boiler and Pressure Vessel Code, Section IV “Heating Boilers”, for a maximum allowable working pressure of 160 PSIG.

D. CSD-1 Compliance: The boiler shall comply with ASME Controls and Safety Devices for Automatically Fired Boilers (CSD-1).

E. ASHRAE/IESNA 90.1 Compliance: Boilers shall have minimum efficiency according to “Gas and Oil Fired Boilers - Minimum Efficiency Requirements.”

F. UL Compliance: Boilers must be tested for compliance with UL 795, “Standard for Commercial-Industrial Gas Heating Equipment.” Boilers shall be listed and labeled by a testing agency acceptable to the authorities having jurisdiction.

G. AHRI Compliance: Boilers shall be tested and rated according to the BTS-2000 test standard and verified by AHRI.

H. The equipment shall fit within the allocated space, leaving ample allowance for maintenance and inspection.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect boilers from damage by leaving factory inspection openings and shipping packaging in place until final installation.

1.8 WARRANTY

A. Standard Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of boilers that fail in materials or workmanship within specified warranty period.
   1. Warranty Period for the Pressure Vessel and Heat Exchanger: The boiler manufacturer shall warranty against failure due to:
      a. Flue gas condensate corrosion, and/or defective material or workmanship for a period of ten (10) years, non-prorated, from the date of shipment from the factory.
      b. Thermal shock for the lifetime of the boiler.
   2. Warranty Period for the Burner: The boiler manufacturer shall warranty the burner against defective material or workmanship for a period of five (5) years, non-prorated, from the date of shipment from the factory.
   3. Warranty Period for all other components: The boiler manufacturer will repair or replace any part of the boiler that is found to be defective in workmanship or material within eighteen (18) months of shipment from the factory or twelve (12) months from start-up, whichever comes first.
   4. Warranties are only valid provided the boiler is installed, controlled, operated and maintained in accordance with the Installation, Operation and Maintenance Manual.

PART 2 PRODUCTS

2.1 CONDENSING GAS BOILER – 10:1 TURNDOWN

A. Manufacturers
   1. Lochinvar – Crest
   2. Patterson-Kelley - Solis
   3. Aerco – Benchmark Series
   4. Fulton – Endura +
   5. Viessmann - Vittocrossal
   6. Bosch/Buderus – SB Series

2.2 CONSTRUCTION

A. Description: Factory-fabricated, -assembled, and -pressure tested, stainless steel firetube condensing boiler with heat exchanger sealed pressure tight, built on a steel base; including flue gas vent; combustion air intake connections, water supply, water return, condensate drain, and controls. The boiler, burner and controls shall be completely factory assembled as a self-contained unit. Each boiler shall be neatly finished, thoroughly tested, and properly packaged for shipping. Closed-loop water heating service only.

B. Heat Exchanger: The heat exchanger is defined as the surfaces of the pressure vessel where combustion gases transfer heat to the hydronic fluid.
   1. The boiler shall be a firetube design, such that all combustion chamber components are within water-backed areas. Watertube boilers will not be accepted.
   2. Heat transfer capability shall be maximized via the use of corrugated firetubes. The corrugation process shall not remove any material from the tubes. Finned, twisted tape, or coil type tube inserts negatively impact ease of maintenance and will not be accepted.
   3. Material: The heat exchanger furnace, tubesheets, and firetubes shall be constructed of stainless steel.
      a. Heat exchangers constructed of cast aluminum, mild steel, cast iron or copper finned tube materials are not accepted.

C. Exhaust manifold shall be minimum 0.5" thick stainless steel, ASME designation SA-351 CF3M, and shall be a water-backed design to enhance heat transfer. Dry-back style flue gas condensate collection pan exhaust manifolds are not accepted.

D. Pressure Vessel: Design and construction shall be in accordance with Section IV of the ASME Code for heating boilers.
   1. The shell shall be minimum 0.3125" thick steel, SA-53B ERW.
   2. The top head shall be a minimum 0.50" thick steel, SA-790 or SA-516 Grade 70.
   3. The pressure vessel shall be a counter-flow design with internal water-baffling plates.
   4. The boiler return and supply water connections shall be 150# ANSI flanged. The water connections shall not be designed to support an external structural load from the piping system.
   5. The water volume of the boiler shall not be less than the value shown on the boiler schedule.
   6. The maximum water pressure drop across the boiler inlet and outlet connections shall not exceed values included on the boiler schedule.

E. Fuel/Air Mixture Combustion System: Air and gas pre-mix on the suction side of the fan.
   1. Fuel/Air mixture will be controlled by combustion air fan speed and gas valve. Fuel flow shall be controlled by either a servo-motor actuated butterfly valve or zero governor negative regulator system.

F. Burner: Standard natural gas, forced draft, woven fiber mesh design.
   1. Turndown: Shall be no less than ten to one.
   2. Excess Air: The burner shall operate at no greater than 8.0% excess O2 over the entire modulation range to maximize seasonal combustion and thermal efficiencies.
   3. NOx Emissions: When operating on natural gas, the burner shall maintain a level of <20 ppm over the complete combustion range at a 3% O2 correction.

G. Blower: The boiler shall include a variable-speed, centrifugal fan to operate during the burner firing sequence, pre-purge, and post purge sequence for the combustion chamber.

H. Main Fuel Train:
1. A factory mounted fuel train shall be supplied. The fuel train shall be fully assembled and enclosed within the boiler cabinet, complete with factory mounted and wired high and low gas pressure switches in compliance with CSD-1.

I. Ignition: Direct spark ignition with transformer. A UV scanner shall be utilized to ensure precise communication of flame status back to the flame programmer. Flame rods are not accepted.

J. Boiler Enclosure:
1. Cabinet: Jacketed steel enclosure with left hinged full height front access door, fully removable latching access panels, mounted on a steel skid with steel plate decking.
2. Control Enclosure: NEMA 250, Type 1.
3. Finish: Cabinet shall be powder coated, pressure vessel assembly shall be painted.
4. Combustion Air: Factory mounted air filter directly coupled to the blower inlet.

K. Rigging and Placement: The boiler shall include lifting eyes and fork hole accessibility for rigging.

2.3 TRIM

A. Safety Relief Valve: ASME rated 125 psig.

B. Pressure and Temperature Gauge: Minimum 3-1/2” diameter, combination pressure and temperature gauge.

C. Flue Gas Condensate Drain Trap: A flue gas condensate drain trap shall be provided to prevent positive pressure exhaust gases from entering the boiler room.

D. Flue Gas Condensate Neutralization: pH neutralization shall be provided.

2.4 CONTROLS: AS SPECIFIED IN SECTION 23 0913.

2.5 ELECTRICAL POWER

A. Single-Point Field Power Connection: Factory installed switches, controllers, transformers, and other devices will have a single-point field connection.
1. Enclosure: NEMA 250, Type 1.
2. Wiring: Numbered and color-coded matching wiring diagram.
3. Factory wiring exterior of an enclosure to be in a metal raceway.
4. Field power interface shall be to lugs.
5. Branch power circuit to each motor and controls with disconnect switch or circuit breaker.
6. Overcurrent Protection: Each motor.

2.6 VENTING

A. Refer to Section 23 5100.

B. The boiler shall be capable of operating with a stack effect not exceeding -0.10" W.C. and a combined air intake and exhaust venting pressure drop not exceeding 100 equivalent feet intake and exhaust.

C. Combustion Air Intake: It shall be acceptable to either direct vent the boiler using sealed combustion by drawing combustion air in from the outdoors

D. Equivalent piping length for direct vent and flue connections shall equate to no less than 100 ft each.

E. Condensate drain piping must be Schedule 40 CPVC.

2.7 SOURCE QUALITY CONTROL

A. Test and inspect factory-assembled boilers, before shipping, according to ASME Boiler and Pressure Vessel Code.

B. Each boiler shall be installed and operated in a functioning hydronic system, inclusive of venting, as part of the manufacturing process. A factory test fire report corresponding to the boiler configuration shall be included with each boiler.

PART 3 EXECUTION

3.1 EXAMINATION

A. Before boiler installation, examine roughing-in for concrete equipment bases, anchor-bolt sizes and locations, and piping and electrical connections to verify actual locations, sizes, and other conditions affecting boiler performance, maintenance, and operations.
   1. Final boiler locations indicated on Drawings are approximate. Determine exact locations before roughing-in for piping and electrical connections.

B. Examine mechanical spaces for suitable conditions where boilers will be installed.

C. Proceed with installation only after satisfactory conditions have been verified.

3.2 INSTALLATION

A. Install boilers level on concrete base, minimum 3.5 inches high. Concrete base is specified in Division 23 Section "Common Work Results for HVAC," and concrete materials and installation requirements are specified in Division 03.

B. Install gas-fired boilers according to NFPA 54. Equipment and materials shall be installed in an approved manner and in accordance with the boiler manufacturer's installation requirements.

C. Assemble and install boiler trim.

D. Install electrical devices furnished with the boiler but not specified to be factory mounted.

E. Install control wiring to field-mounted electrical devices.

3.3 CONNECTIONS

A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping from equipment drain connection to nearest floor drain. Piping shall be at least full size of connection. Provide an isolation valve if required.

C. Connect gas piping to boiler gas train inlet with isolation valve and union. Piping shall be at least full size of gas train connection. Provide a reducer if required.

D. Connect hot water supply and return water connections with shutoff valve and union or flange at each connection.

E. Install piping from safety relief valves to the nearest floor drain or local equivalent approved by local code.

F. Install piping from flue gas condensate drain connection to the condensate drain trap and to the nearest floor drain.

G. Boiler Venting:
   1. Install flue venting and combustion air-intake.
   2. Connect to boiler connections, flue size and type as recommended by the manufacturer.

H. Ground equipment according to Division 26 Section “Grounding and Bonding for Electrical Systems.”

I. Connect wiring according to Division 26 Section “Low-Voltage Electrical Power Conductors and Cables.”

3.4 FIELD QUALITY CONTROL

A. See Division 01 - General Requirements.

B. Perform tests and inspections and prepare test reports.
   1. After boiler installation is completed, the manufacturer shall provide the services of a field representative to inspect components, assemblies, and equipment installations, including connections and provide startup of the boiler and training to the operator.
   2. Arrange with National Board of Boiler and Pressure Vessel Inspectors for inspection of boilers and piping. Obtain certification for completed boiler units, deliver to Owner, and obtain receipt.

C. Tests and inspections:
   1. Perform installation and startup checks according to manufacturer's written instructions.
   2. Leak Test: Hydrostatic test. Repair leaks and retest until no leaks exist.
   3. Operational Test: Start units to confirm proper motor rotation and unit operation. Adjust air-fuel ratio and combustion.
   4. Check and adjust initial operating set points and high- and low-limit safety set points of fuel supply, water level and water temperature.

D. Remove and replace malfunctioning units and retest as specified above.

3.5 CLOSEOUT ACTIVITIES

A. See Division 01 - General Conditions.

B. Train operating personnel in operation and maintenance of units.

C. Provide the services of manufacturer's field representative to conduct training.
   1. Demonstrate operation of all safety controls.
   2. Demonstrate operation of the boilers over the entire firing range of the burners.

3.6 MAINTENANCE

A. See Division 01 - General Requirements.

END OF SECTION

FOR REFERNCE: THIS SECTION WAS ISSUED FOR PHASE 1 AND PHASE 2

SECTION 23 5700 - HEAT EXCHANGERS FOR HVAC

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Gasketed plate type heat exchangers

1.2 RELATED REQUIREMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

B. Division 03 - Cast-in-Place Concrete related sections.

C. Section 23 04 00 – General Conditions for Mechanical Trades

D. Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment: Execution requirements for heat exchanger supports specified by this section.

E. Section 23 07 00 - HVAC Insulation: Field applied insulation for heat exchangers.

F. Section 23 21 13 - Hydronic Piping: Product requirements for hydronic piping connected to heat exchangers.

G. Section 23 21 16 - Hydronic Piping Specialties: Product requirements for heat exchanger trim for placement by this section.

H. Section 23 22 13 - Steam and Condensate Heating Piping: Product requirements for steam supply and steam condensate return piping connected to heat exchangers.

1.3 REFERENCE STANDARDS (follow the most currently adopted amended version)

A. American Society of Mechanical Engineers:
   1. ASME Section VIII - Boiler and Pressure Vessel Code - Pressure Vessels.

1.4 SUBMITTALS

A. Shop Drawings: Indicate dimensions, locations, size of taps, tube-removal space and support frame.

B. Product Data: Submit performance data.

C. Test Reports: Indicate shop test reports of tube bundle shop pressure tests.

D. Manufacturer's Certificate: Certify Products to meet or exceed specified requirements.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Submit start-up and shut down instructions, assembly drawings, and spare parts lists.

1.6 QUALITY ASSURANCE

A. Maintain one copy of each document on site.

B. ASME Compliance: Fabricate and label heat exchangers to comply with ASME Boiler and Pressure Vessel Code: Section VIII, "Pressure Vessels," Division 01.

1.7 QUALIFICATIONS

A. Manufacturer: Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Accept heat exchangers on site in factory protective packaging. Inspect for damage.

B. Protect openings with temporary caps to prevent entry of foreign material.

1.9 WARRANTY

A. Furnish one year manufacturer’s warranty for heat exchangers

1.10 EXTRA MATERIALS

A. Furnish two sets of replacement gaskets.

B. Furnish one set of wrenches for disassembly of plate type heat exchangers.

PART 2 PRODUCTS

2.1 GASKETED PLATE TYPE HEAT EXCHANGERS

A. Manufacturers:
1. Alfa Laval
2. Armstrong
3. ITT Bell & Gossett
4. Taco
5. Sondex

B. Configuration: Freestanding assembly consisting of frame support, top and bottom carrying and guide bars, fixed and movable end plates, tie rods, individually removable plates, and one-piece gaskets.

C. Frames: Carbon steel with baked epoxy enamel paint, stainless steel side bolts and shroud. Provide capacity to accommodate 20 percent additional plates.

D. Plates: Stainless steel Type 316. Enclose plates in a solid aluminum or stainless-steel removable shroud.

E. Gaskets: Ethylene propylene diene monomer (EPDM).

F. Nozzles: 150 psig ASA rubber rated flange type.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install with clearance to permit removal of tube bundle or plates with minimum disturbance to installed equipment and piping.

B. Install gasketed plate type heat exchangers on concrete base.
1. Concrete Bases: Anchor heat exchanger to concrete base.
2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around full perimeter of base.
3. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Cast-in-place concrete materials and placement requirements are specified in Division 3.

C. Make connections to heat exchangers with unions or flanges.

D. Install piping from relief valve to nearest floor drain.

E. Install water to water heat exchanger with the following piping accessories on hot water piping connections, and in accordance with details as indicated on Drawings.
1. On supply:
   a. Thermometer well and thermometer.
   b. Well for control system temperature sensor.
   c. Shutoff valve.
   d. Strainer.
   e. Control valve.
   f. Pressure gage.
2. On return:
   a. Thermometer well and thermometer.
   b. Well for control system temperature sensor.
   c. Pressure gage.

d. Shutoff valve.
e. Balancing valve.

3.2 CLEANING

A. After completing system installation, including outlet fitting and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finishes.

END OF SECTION

SECTION 23 6411 - PACKAGED WATER CHILLERS – SCROLL

PART 1 GENERAL

1.1 SUMMARY

A. Section includes chiller package, charge of refrigerant and oil, controls and control connections, chilled water connections, condenser water connections, refrigerant connections, auxiliary water connections, starters.

B. Related Sections:
1. Division 03.
2. Section 23 04 00 – General Conditions for Mechanical Trades
3. Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment: Product requirements for vibration isolators for placement by this section.
4. Section 23 09 00 - Sequence of Operations for HVAC Controls: Sequences of operation for chillers specified in this section.
5. Section 23 21 13 - Hydronic Piping: Product requirements for chilled water and condenser water piping for placement by this section.
6. Section 23 21 14 - Hydronic Specialties: Product requirements for piping specialties for placement by this section.
7. Division 26

1.2 REFERENCES

A. Air-Conditioning and Refrigeration Institute:
1. ARI 550/590 - Water Chilling Packages Using the Vapor Compression Cycle.

B. American Society of Heating, Refrigerating and Air-Conditioning Engineers:
1. ASHRAE 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings.

C. American Society of Mechanical Engineers:
1. ASME Section VIII - Boiler and Pressure Vessel Code - Pressure Vessels.

D. National Electrical Manufacturers Association:
1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

1.3 DEFINITIONS

A. Coefficient of Performance (COP) - cooling: The ratio of the rate of heat removal to the rate of energy input, in consistent units, for a complete refrigerating system or some specific portion of that system under designated operating conditions.

B. Integrated Part-Load Value (IPLV): A single-number figure of merit based on part-load EER, COP, or kW/ton expressing part-load efficiency for air-conditioning and heat pump

equipment on the basis of weighted operation at various load capacities for the equipment.

1.4 SUBMITTALS

A. Section 01 - Submittal Procedures.

B. Shop Drawings: Indicate components, assembly, dimensions, weights and loads, required clearances, and location and size of field connections. Indicate valves, strainers, and thermostatic valves required for complete system.

C. Product Data: Submit rated capacities, weights, specialties and accessories, electrical requirements, wiring diagrams, and control diagrams.

D. Manufacturer's Installation Instructions: Submit assembly, support details, connection requirements, and include startup instructions.

E. Manufacturer's Certificate: Certify products meet or exceed specified requirements including those furnished but not produced by manufacturer.

F. Manufacturer’s Field Reports: Submit start-up report for each unit. Indicate results of leak test and refrigerant pressure test.

1.5 CLOSEOUT SUBMITTALS

A. Section 01 - Closeout procedures.

B. Operation and Maintenance Data: Submit start-up instructions, maintenance data, parts lists, controls, and accessories. Include trouble-shooting guide.

1.6 QUALITY ASSURANCE

A. Conform to ARI 550/590 code for testing and rating of screw water chillers.

B. Performance Ratings: Coefficient of Performance (COP) and Integrated Part-Load Value (IPLV) not less than prescribed by ASHRAE 90.1.

C. Perform Work in accordance with State of Connecticut standard.

D. Maintain two copies of each document on site.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience and with service facilities within 100 miles of Project.

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience approved by manufacturer.

1.8 PRE-INSTALLATION MEETINGS

A. Section 01 – Project Management.

B. Convene minimum one week prior to commencing work of this section.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Section 01 - Product Requirements.

B. Accept chillers on site in factory packaging. Inspect for damage.

C. Protect indoor chillers from weather by storing under roof.

1.10 WARRANTY

A. Section 01- Closeout Procedures.

B. Furnish five year manufacturer warranty to for compressors, all other pieces and parts shall be warranted by manufacturer for 18 months including but not limited to evaporator, condenser, complete assembly including materials and labor.

1.11 MAINTENANCE SERVICE

A. Section 01- Closeout Procedures.

B. Furnish service and maintenance of chiller for 18 months from Date of Substantial Completion.

C. Examine unit components monthly. Clean, adjust, and lubricate equipment.

D. Include systematic examination, adjustment, and lubrication of unit, and controls checkout and adjustments. Repair or replace parts in accordance with manufacturer's operating and maintenance data. Use parts produced by manufacturer of original equipment.

E. Perform work without removing units from service during building normal occupied hours.

F. Provide emergency call back service at all hours for this maintenance period.

G. Maintain locally, near Place of the Work, adequate stock of parts for replacement or emergency purposes. Have personnel available to ensure fulfillment of this maintenance service, without unreasonable loss of time.

H. Perform maintenance work using competent and qualified personnel under supervision and in direct employ of manufacturer or original installer.

I. Do not assign or transfer maintenance service to agent or subcontractor without prior written consent of Owner.

1.12 MAINTENANCE MATERIALS

A. Section 01- Closeout Procedures.

B. Furnish two containers of lubricating oil.

PART 2 PRODUCTS

2.1 PACKAGED WATER CHILLERS

A. Manufacturers:
1. Trane
2. Daikin Applied
3. Carrier
4. York
5. Quantech

B. Product Description: Factory assembled, single-piece chassis, air-cooled liquid chiller. Contained within the package shall be all factory wiring, piping, controls, and refrigerant charge (R513A).

C. High efficiency/performance: This provides oversized heat exchangers for two purposes: It allows the unit to be more energy efficient, and the unit will have enhanced operation in high ambient conditions.

D. Factory Functional Test: The chiller shall be pressure tested, evacuated and fully charged with refrigerant and oil. In addition, a factory functional test shall be conducted to verify correct operation by cycling condenser fans and compressors and confirming operation of temperature and pressure sensors.

2.2 COMPRESSORS

A. Screw Compressors
1. Provide compressor with automatic capacity reduction equipment consisting of capacity control via variable speed drive and slide valve. Compressor must start unloaded for soft start on motors.

2.3 EVAPORATOR

A. The evaporator shall be designed, tested, and stamped in accordance with ASME code for a refrigerant side working pressure of 200 psig. Waterside working pressure shall be 150 psig.

B. Insulate the evaporator and water boxes with a minimum of 0.75 inch (K=0.28) UV rated insulation. If the insulation is field installed, the additional money to cover material and installation costs in the field should be included in the bid.

~~C. Evaporator heaters shall be factory installed and shall protect unit down to -20F (-29C). Contractor shall wire separate power to energize heat tape and protect cooler while chiller is disconnected from the main power.~~

D. Provide shell and tube type evaporator, seamless or welded steel construction with cast iron or fabricated steel heads, seamless internally and externally finned copper tubes, roller expanded into tube sheets.

E. Provide ability to remove evaporator tubes from either end of the heat exchanger.

F. Provide water drain connection, vent and fittings for factory installed leaving water temperature control and low temperature cutout sensors.

G. Water connections shall be grooved pipe. Evaporator shall have only one entering and one leaving connection. If manufacturer provides 2 separate evaporators, contractor shall provide manifold and pressure gauges to ensure equal flow is provided to each evaporator.

H. Proof of flow shall be provided by the equipment manufacturer, mechanically installed and electrically wired, at the factory of origin.

2.4 CONDENSER COILS, FANS AND MOTORS

A. Fans shall be dynamically balanced and direct driven.

B. All condenser fans shall have integrated drives to provide variable speed for optimized efficiency.

C. Chiller shall be able to start and operate in ambient conditions down to 14ºF and up to 115ºF.

D. Construct condenser coils of microchannel all aluminum brazed fin construction. The condenser coils shall have an integral sub-cooling circuit and shall be designed for at least 350 psig working pressure. Leak tested at 1.5 times working pressure. Coils can be cleaned with high pressure water.

2.5 ENCLOSURES/STARTER

A. House components in a galvanized steel frame and mounted on a formed steel base. Hot-dip galvanized steel frame coating shall be Underwriters Laboratories Inc. (UL) recognized as G90-U, UL guide number DTHW2.

B. Unit panels, base rails and control panels shall be finished with a baked on powder paint. Control panel doors shall have door stays. Paint system shall meet the requirements for outdoor equipment of Federal Government Agencies.

C. Mount starters and Terminal Blocks in a UL 2014 rated weatherproof panel provided with full opening access doors. If a circuit breaker is chosen, it should be a lockable,

through-the-door type with an operating handle and clearly visible from outside of unit indicating if power is on or off.

D. Casings fabricated from steel that do not have a Zinc coating conforming to ASTM A 123 or ASTM A525 shall be treated for the prevention of corrosion with a factory coating or paint system. The coating or paint system shall withstand 1000 hours in a salt-spray fog test in accordance with ASTM B 117. Each specimen shall have a standard scribe mark as defined in ASTM D 1654. Upon completion of exposure, the coating or paint system shall be evaluated and rated in accordance with procedures A and B of ASTM D 1654. The rating of failure at the scribe mark shall be not less than six (average creepage not greater than 1/8 inch). The rating of the unscribed area shall not be less than ten (no failure). Thickness of coating or paint system on the actual equipment shall be identical to that on the test specimens with respect to materials, conditions of application, and dry-film thickness.

E. A control power transformer shall be factory-installed and factory-wired to provide unit control power.

2.6 LOW VOLTAGE VARIABLE SPEED DRIVE (VSD), UNIT MOUNTED

A. The water chiller shall be furnished with an air cooled variable speed drive (VSD) as shown on the drawings.

B. The VSD will be specifically designed to interface with the water chiller controls and allow for the operating ranges and specific characteristics of the chiller.

C. The VSD efficiency shall be 97% or better at full speed and full load. Fundamental displacement power factor shall be a minimum of 0.96 at all loads.

D. The VSD shall be solid state, microprocessor based pulse-width modulated (PWM) design. The VSD shall be voltage and current regulated. Output power devices shall be IGBTs.

E. Power semi-conductor and capacitor cooling shall be from a liquid or air cooled heatsink.

F. Warranties
1. The variable speed drive shall be warranted by the manufacturer for a period of twelve months from the date of installation. The warranty shall include parts, labor, travel costs, and living expenses incurred by the manufacturer to provide factory-authorized on-site service.

2.7 REFRIGERANT CIRCUIT

A. All units shall have 2 refrigeration circuits to provide redundancy, each with one or two (manifolded) compressor(s) on each circuit.

B. Provide for refrigerant circuit:
1. Liquid line shutoff valve.
2. Suction service valve

3. Discharge service valve
4. Filter (replaceable core type).
5. Liquid line sight glass.
6. Electronic expansion valve sized for maximum operating pressure.
7. Charging valve.
8. Discharge and oil line check valves.
9. High side pressure relief valve.
10. Full operating charge of R134a and oil.

C. Capacity Modulation: Provide capacity modulation by a variable speed drive. Unit shall be capable of operation down to 15%.

2.8 CONTROLS

A. On chiller, mount weatherproof control panel, containing starters, power and control wiring, factory wired with terminal block power connection. Provide primary and secondary fused control power transformer and a single 115 volt 60 Hz single phase connection for evaporator freeze protection heaters.

B. The unit controller shall utilize the following components to automatically take action to prevent unit shutdown due to abnormal operating conditions which will perform as follows:
1. High pressure switch that is set 20 PSIG lower that factory pressure switch that will automatically unload the compressor to help prevent a high pressure condenser control trip. One switch is required for each compressor and indicating light shall also be provided.
2. Motor surge protector that is set at 95% of compressor RLA that will automatically unload the compressor to help prevent an over current trip. One protector is required for each compressor and indicating light shall also be provided.
3. Low pressure switch that is set at 5 PSIG above the factory low pressure switch that will automatically unload the compressor to help prevent a low evaporator temperature trip. One switch is required for each compressor and indicating light shall also be provided.

C. In the above case, the chiller will continue to run in an unloaded state, and will continue to produce some chilled water in an attempt to meet the cooling load. However, if the chiller reaches the trip-out limits, the chiller controls will take the chiller off line for protection, and a manual reset will be required. Once the "near-trip" condition is corrected, the chiller will return to normal operation and can then produce full load cooling.

D. Provide the following safety controls with indicating lights or diagnostic readouts.
1. Low chilled water temperature protection.
2. High refrigerant pressure.
3. Low oil flow protection.
4. Loss of chilled water flow.
5. Contact for remote emergency shutdown.
6. Motor current overload.

7. Phase reversal/unbalance/single phasing.
8. Over/under voltage.
9. Failure of water temperature sensor used by controller.
10. Compressor status (on or off).

E. Provide the following operating controls:
1. A variable method to control capacity in order to maintain leaving chilled water temperature based on PI algorithms. Five minute solid state anti-recycle timer to prevent compressor from short cycling. Compressor minimum stop-to-start time limit shall be 2 minutes. If a greater than 5 minute start-to-start, or greater than 2 minute stop-to-start timer is included, hot gas bypass shall be provided to insure accurate chilled water temperature control in light load applications.
2. Chilled water pump output relay that closes when the chiller is given a signal to start.
3. Load limit thermostat to limit compressor loading on high return water temperature to prevent nuisance trip outs.
4. High ambient unloader pressure controller that unloads compressors to keep head pressure under control and help prevent high pressure nuisance trip outs on days when outside ambient is above design.
5. Compressor current sensing unloader unit that unloads compressors to help prevent current overload nuisance trip outs.
6. Auto lead-lag functions that constantly even out run hours and compressor starts automatically. If contractor cannot provide this function then cycle counter and hour meter shall be provided for each compressor so owner can be instructed by the contractor on how to manually change lead-lag on compressors and even out compressor starts and running hours.
7. Low ambient lockout control with adjustable setpoint.
8. Condenser fan sequencing which adjusts the speed of all fans automatically in response to ambient, condensing pressure and expansion valve pressure differential thereby optimizing unit efficiency.

F. Provide user interface on the front of the panel. If display is on the inside of the panel, then a control display access door shall be provided to allow access to the display without removal of panels. Provide user interface with a minimum of the following features:
1. Leaving chilled water setpoint adjustment from LCD input
2. Entering and leaving chilled water temperature output
3. Percent RLA output for each compressor
4. Pressure output of condenser
5. Pressure output of evaporator
6. Ambient temperature output
7. Voltage output
8. Current limit setpoint adjustment from LCD input.

G. Digital Communications to BAS system shall consist of a BACnet MS/TP interface via a single twisted pair wiring.

H. The chiller control panel shall provide leaving chilled water temperature reset based upon return water temperature.

2.9 CHILLER PERFORMANCE

A. Air Cooled Water Chillers
   1. See Schedules

2.10 ELECTRICAL CHARACTERISTICS AND COMPONENTS

A. Electrical Characteristics: In accordance with Section 26.

B. Disconnect Switch: Factory mount in control panel.

2.11 SOURCE QUALITY CONTROL (AND TESTS)

A. Section 01 - Quality Requirements: Testing, inspection and analysis requirements.

B. Furnish testing and analysis of package chillers.

C. Furnish shop inspection and testing for package chillers.

D. Make completed chillers available for inspection at manufacturer's factory prior to packaging for shipment. Furnish at least seven days notice before packaging is scheduled.

E. Allow witnessing of factory inspections and tests at manufacturers test facility. Furnish at least seven days notice before inspections and tests are scheduled.

2.12 SOUND

A. At full load chiller sound power shall not exceed 97 (dBA) A-weighted. Submitted sound data shall be in accordance with AHRI 370.
   1. If manufacturer cannot meet this sound specification then sound attenuation devices and/or barrier walls must be field installed at the contractor expense to meet the specified level.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install packaged outdoor chiller on concrete foundation minimum 6 inches thick and 6 inches wider than equipment base on each side. Refer to Section 03.

B. Install units on vibration isolation. Refer to Section 23 05 48.

C. Install the following piping accessories on evaporator chilled water piping connections. Refer to Section 23 21 16 and Section 23 21 13.
   1. On inlet:
      a. Thermometer well for temperature controller.
      b. Thermometer.
      c. Strainer.
      d. Flow switch.

e. Flexible pipe connection.
f. Pressure gage.
g. Shut-off valve.

2. On outlet:
a. Thermometer.
b. Flexible pipe connection.
c. Pressure gage.
d. Shut-off valve.

D. Install auxiliary water piping for oil cooling units and purge condensers.

E. Install the following piping accessories on condenser water piping connections. Refer to Section 23 21 16 and Section 23 21 13.

1. On inlet:
a. Thermometer well for temperature limit controller.
b. Thermometer well and thermometer.
c. Strainer.
d. Flow switch.
e. Flexible pipe connection.
f. Pressure gage.
g. Shut-off valve.

2. On outlet:
a. Thermometer well and thermometer.
b. Flexible pipe connection.
c. Pressure gage.
d. Shut-off valve.

F. Arrange piping for easy dismantling to permit tube cleaning.

G. Install refrigerant piping connections to air-cooled condensing units. Refer to Section 23 23 00.

H. Install piping from chiller safety relief valve to outdoors. Size as recommended by manufacturer.

I. Install chiller accessories furnished loose for field mounting.

J. Install electrical devices furnished loose for field mounting.

K. Install control wiring between chiller control panel and field mounted control devices.

L. Provide connection to electrical service. Refer to Section 26.

3.2 FIELD QUALITY CONTROL

A. Section 01 - Quality Requirements, 01 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.

B. Furnish cooling season start-up, winter season shutdown service, for first year of operation. When initial start-up and testing takes place in winter and machines are to remain inoperative, repeat start-up and testing operation at beginning of first cooling season.

3.3 MANUFACTURER'S FIELD SERVICES

A. Section 01 - Quality Requirements: Manufacturers' field services.

B. Furnish services of factory trained representative for minimum of two days to leak test, refrigerant pressure test, evacuate, dehydrate, charge, start-up, calibrate controls, and instruct Owner on operation and maintenance.

C. Furnish initial charge of refrigerant and oil.

3.4 ADJUSTING

A. Section 01- Closeout Procedures.

B. Provide cooling season start-up, winter season shutdown service, for first year of operation.

3.5 DEMONSTRATION AND TRAINING

A. Section 01- Closeout Procedures.

B. Demonstrate system operations and verify specified performance..

C. Furnish services of manufacturer's technical representative for one 8 hour day to instruct Owner's personnel in operation and maintenance of unit. Schedule training with Owner, provide at least 7 days notice to Architect/Engineer of training date.

3.6 COMMISSIONING

A. Engage a factory-authorized service representative, to perform startup service as per functional test sheets and requirements of Section 23 Commissioning Requirements.

B. Verify that equipment is installed and commissioned as per requirements of Section 23 Commissioning Requirements and manufacturer's written instructions.

C. Complete installation and startup checks and functional tests according to Section 23 Commissioning Requirements and manufacturer's written instructions.

D. Operational Test: After electrical and control systems have been energized, start units to confirm proper unit operation. Rectify malfunctions, replace defective parts with new one and repeat the start up procedure.

E. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.

F. Verify that equipment is installed and commissioned as per requirements of Section 01 19 13 and manufacturer's written instructions.

G. Complete installation and startup checks and functional tests according to Section 01 91 13 and manufacturer's written instructions.

END OF SECTION

FOR REFERNCE: THIS SECTION WAS ISSUED FOR PHASE 1 AND PHASE 2

SECTION 23 7413 - MODULAR CENTRAL-STATION AIR-HANDLING UNITS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Modular Outdoor Central-Station Air-Handling Units
   1. RTU -1,2,3
   2. DOA-5

B. Modular Indoor Central-Station Air-Handling Units
   1. DOA-1,2,3,4

C. Heat Recovery Ventilator Unit (HRV-1)

1.2 RELATED REQUIREMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

1.3 REFERENCES (follow the most currently adopted amended version)

A. American Bearing Manufacturers Association:
   1. ABMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
   2. ABMA 11 - Load Ratings and Fatigue Life for Roller Bearings.

B. Air Movement and Control Association International, Inc.:
   1. AMCA 99 - Standards Handbook.
   2. AMCA 210 - Laboratory Methods of Testing Fans for Aerodynamic Performance Rating.
   3. AMCA 300 - Reverberant Room Method for Sound Testing of Fans.
   4. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data.
   5. AMCA 500 - Test Methods for Louvers, Dampers, and Shutters.

C. Air-Conditioning and Refrigeration Institute:
   1. ARI 410 - Forced-Circulation Air-Cooling and Air-Heating Coils.
   2. ARI 430 - Central-Station Air-Handling Units.
   3. ARI Guideline D - Application and Installation of Central Station Air-Handling Units.

D. National Electrical Manufacturers Association:
   1. NEMA MG 1 - Motors and Generators.

E. Sheet Metal and Air Conditioning Contractors:
   1. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.

F. Underwriters Laboratories Inc.:
   1. UL 900 - Air Filter Units.
   2. UL - Fire Resistance Directory.

1.4 SUBMITTALS

A. Product Drawings: Indicate assembly, unit dimensions, weight loading, required clearances, construction details, field connection details, and electrical characteristics and connection requirements.

B. Product Data: Submit data indicating:
   1. Published Literature: Indicate capacities, ratings, gages and finishes of materials, and electrical characteristics and connection requirements.
   2. Filters: Data for filter media, filter performance data, filter assembly, and filter frames.
   3. Fans: Performance and fan curves with specified operating point plotted, power, RPM.
   4. Sound data shall be provided using ARI 260 test methods. Unit discharge, inlet, and radiated sound power levels in dB shall be provided for 63, 125, 250, 500, 1000, 2000, 4000, and 8000 Hz.
   5. Dampers: Include leakage, pressure drop, and sample calibration curves. Indicate materials, construction, dimensions, and installation details.
   6. Electrical Requirements: Power supply wiring including wiring diagrams for interlock and control wiring. Indicate factory installed and field installed wiring.
   7. Dimensions.
   8. Weights.

C. Test Reports: Submit results of factory test at time of unit shipment.

D. Manufacturer's Installation Instructions: Submit assembly, support details, connection requirements, and include start-up instructions.

E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

F. Manufacturer’s Field Reports: Submit start-up report for each unit.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Submit instructions for lubrication, filter replacement, motor and drive replacement, spare parts lists, and wiring diagrams.

1.6 QUALITY ASSURANCE

A. Damper Leakage: Test in accordance with AMCA 500.

B. Air handling units with fan sections utilizing single fans shall be rated and certified in accordance with AHRI Standard.

C. Air handling units with fan sections utilizing multiple fans shall be rated in accordance with AHRI Standard 430 for airflow, static pressure, and fan speed performance.

D. Airflow monitoring station: Certify airflow measurement station performance in accordance with AMCA 611.

E. Air Coils: Certify capacities, pressure drops and selection procedures in accordance with current AHRI Standard 410.

F. Energy Wheels: Certify energy wheels in accordance with AHRI Standard 1060 & ASHRAE 170.

G. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified and indicated.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Accept products on site in factory-fabricated protective containers, with factory-installed shipping skids and lifting lugs. Inspect for damage.

B. Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.

C. Units shall ship fully assembled up to practical shipping and rigging limitations. Units not shipped fully assembled shall have tags and airflow arrows on each section to indicate location and orientation in direction of airflow.

D. Do not operate units until ductwork is clean, filters are in place, bearings lubricated, and fan has been test run under observation.

1.9 WARRANTY

A. Provide minimum one year manufacturer warranty covering repair or replacement due to defective materials or workmanship.

1.10 EXTRA MATERIALS

A. Furnish one set of fan belts for each belt driven fan.

B. Energy wheel belt

C. Furnish one extra set of filters for each unit.

PART 2 PRODUCTS

2.1 OUTDOOR AIR HANDLING UNITS (RTU-1,2,3 & DOA-5)

A. Manufacturers:
1. Trane- CSAA
2. Carrier - AiroVision
3. Daikin – Vision
4. Semco

B. Coordinate specific components included for each air handling unit with schedule.

C. Casing:
1. Walls, floor and roof panels: constructed of insulated, double wall panels. Provide mid-span, no through metal, internal thermal break.
2. Base: Channel base and drain pan of welded, galvanized steel. Assemble sections with gaskets and bolts.
3. Outside Casing: 22 gauge Galvanized Steel
4. Inside Casing: 22 gauge Galvanized Steel, perforated upstream of cooling coil
Floor Plate: 22 gauge Galvanized Steel
5. Outdoor Unit Roof: Factory install single layer outer roof above inner roof. Slope from one side of unit to the other side, or from center to sides of unit. Roof assembly to overhang each unit wall or base rail to overhang curb to facilitate water runoff and prevent water intrusion into roof curb to base connection.
6. Panel and Door Deflection Performance: Less than L/240 at +/- 8 inches w.g.
7. Air Leakage Performance: Less than 1 percent air leakage at +/- 8 inches w.g.
8. Penetrations: Seal all penetrations airtight. Cover with escutcheons, gaskets, or fill with suitable compound so there is no exposed insulation. Provide shaft seals where fan shafts penetrate casing.
9. Insulation: Minimum insulation thickness of 2” and a thermal resistance (R-value) of 13 $ft^2 \cdot h \cdot {}^oF/Btu$. Comply with NFPA 90A.
10. Finish: Manufacturers standard paint on exterior.
11. Access Doors: Double wall construction with same materials and finishes as cabinet, insulated sandwich construction matching casing insulation requirements, for flush mounting, with hinges, gasket, latch, and handle assemblies.

D. Direct-Drive Plenum Fan(s):
1. Single-width, single-inlet plenum fan consisting of housing, wheel, fan shaft, grease lubricated ball bearings, motor and disconnect switch, drive assembly, and support structure and equipped with formed steel channel base for integral mounting of fan, motor, and casing panels. Fan blades shall be aluminum backward-inclined airfoil.
2. Fans shall be statically and dynamically balanced throughout the operating range and designed for continuous operation at maximum rated fan speed and motor horsepower.
3. Fan and motor shall be internally isolated with spring isolators and provided with flexible connection between fan and unit casing.
4. Fan sections containing multiple fans shall be controlled using a common control signal, such as the duct static control signal, to modulate the fan speed.

5. Provide Extended grease lines.

E. Motors and Drives:
1. Fan Motors: factory-installed and run tested, meet or exceed all NEMA Standards Publication MG 1 - 2006 requirements and comply with NEMA Premium efficiency levels. Motors shall comply with NEC and shall be UL Listed.
2. Fan Modulation: Variable Frequency/ Speed Drive.
3. Shafts: Solid, hot rolled steel, ground and polished, with key-way, and protectively coated with lubricating oil. Provide shaft grounding rings for motors with VFDs.

F. Airflow Measuring: Provide airflow measurement system to measure fan airflow directly or to measure differential pressure that can be used to calculate fan airflow. The system shall measure airflow within +/-5 percent total accuracy (device and transmitter) when operating within the stable operating region of the fan curve.

G. Coil Casing:
1. Casing with access to both sides of coils. Slide coils into casing through removable end panel with blank off sheets and sealing collars at connection penetrations.
2. When two or more cooling coils are stacked in the unit, an intermediate drain pan shall be installed between each coil. The intermediate drain pan shall be designed being of sufficient size to collect all condensation produced from the coil and sloped to promote positive drainage to eliminate stagnant water conditions. The intermediate drain pan shall be constructed of the same material as the sections primary drain pan. Intermediate drain pan shall include downspouts to direct condensate to the primary drain pan. The intermediate drain pan outlet shall be located at the lowest point of the pan and shall be sufficient diameter to preclude drain pan overflow under any normally expected operating condition.

H. Water Heating Coils:
1. Headers: Cast iron, seamless copper tube, or prime coated steel pipe with brazed joints.
2. Coil: Constructed of copper tubes expanded into aluminum fins. Factory leak tested under water.
3. Configuration: Drainable, with threaded plugs for drain and vent; serpentine type with return bends on smaller sizes and return headers on larger sizes.

I. Water Cooling Coils:
1. Headers: Cast iron, seamless copper tube, or prime coated steel pipe with brazed joints.
2. Coil: Constructed of copper tubes expanded into aluminum fins. Factory leak tested under water.
3. Configuration: Drainable, with threaded plugs for drain and vent; threaded plugs in return bends and in headers opposite each tube.

J. Drain Pans: Double thickness stainless steel cooling coil drain pan and galvanized steel heating coil drain pan with insulation between layers with welded corners. The drain pan shall be designed in accordance with ASHRAE 62.1 being of sufficient size to collect all condensation produced from the coil and sloped in two planes, pitched toward drain connections at lowest point of the pan.

K. Enthalpy Wheel:

1. Exchanger rotor shall be a minimum of 10" deep and shall be constructed of alternate layers of corrugated and flat aluminum. Enthalpy wheels shall have a permanently bonded desiccant adsorbent specifically developed for the selective transfer of moisture for equal transfer of sensible and latent energy.
2. The air channels shall be formed smooth to ensure laminar airflow for low-pressure drops and allow free passage of particles up to 900 microns. Rotor structure shall be internally reinforced and mounted on pillow block type bearings.
3. The rotor shall be removable from the frame.
4. Brush seals shall be provided around the periphery of the rotor and between the inlet and outlet air passages to effectively prevent air leakage and cross contamination between airflows. An adjustable purging sector shall be installed to prevent carryover of contaminated exhaust air into the supply air stream.
5. Performance and cross contamination shall be documented through an independent laboratory conducted in accordance with ASHRAE 84-1991 and ARI standards. Provide with speed controls and frost controls.
6. Total energy recovery wheels shall be provided as indicated on the schedule and drawings. Wheels shall be integral parts of the AHUs and shall be sized per the ventilation requirement of the units. Additional outside air units, or other field assembled and ducted energy recovery devices, are not acceptable. Mixed air units with economizing shall be constructed with internal bypass dampers such that the pressure drop across the wheel does not increase during economizing. External bypass and multiple duct connections are not acceptable.
7. The air handling unit shall be certified by AHRI to contain a rotary energy recovery wheel certified to ANSI/AHRI Standard 1060 and bears the AHRI 1060 label. The air handling unit and wheel must be AHRI 1060-certified as a package. Proof of compliance shall be that the air handling unit brand name and specific wheel being used be listed on the AHRI website within the Directory of Certified Product Performance for Commercial Air-to-Air Energy Recovery Ventilators under the Packaged Program Type. Verification of performance for non-AHRI 1060 certified AHU packages shall be completed by witness test for the owner/owner's representative and specifying engineer at the jobsite. Installing contractor shall be responsible for all expenses of verification testing, including test set-up, room/board for owner/owner's representative and engineer, travel to and from the jobsite, as well as modification costs associated to achieving specified performance.
8. Performance characteristics of the energy wheel shall be provided as defined by AHRI 1060 definitions. The energy wheel shall be a total energy wheel, with the sensible and latent effectiveness reported and within 5% of each other. The calculated total net effectiveness of the recovery wheel shall not be less than 70% when the specified ventilation flow rate equals the exhaust flow rate. The energy wheel's EATR shall be less than the value indicated in the schedule and

drawings. Wheel face velocity and pressure drop shall not exceed performance as defined on schedule. The energy recovery cassette shall be an Underwriters Laboratories (UL) Recognized Component certified for mechanical, electrical, and fire safety in accordance with UL Standard 1812.

9. The energy recovery component shall incorporate a rotary wheel in an insulated cassette frame complete with seals, drive motor and drive belts. The total energy recovery wheel shall incorporate a desiccant without the use of binders or adhesives, which may plug the desiccant aperture. The adsorbent shall not be applied as a glued on surface coating and not susceptible to erosion, abrasion, or delamination. Coated segments shall be washable using standard detergent or alkaline-based coil cleaners. The adsorbent shall be selected for its high affinity for water vapor and shall not dissolve or deliquesce in the presence of water or high humidity. The rim shall be continuous rolled stainless steel to form an even concentric circle to prevent leakage around the rim and to minimize wear of components. All diameter and perimeter seals shall be provided as part of the cassette assembly. Perimeter seals shall be self-adjusting; diameter seals shall be adjustable. Seals shall be factory set.
10. Wheel drive motor shall be provided mounted in the cassette frame. Wheel drive motor shall be thermally protected and UL Component Recognized. Drive belts shall not require belt tensioners. On units that require drive belt tensioners for the wheel belt/motor assembly, the unit manufacturer shall provide at no additional charge to the customer a visual inspection every four months, and adjustment if necessary, of the recommended belt tension during the unit warranty period. Wheel motors shall be of the voltage, phase, frequency, and Hp indicated on the schedule and drawings.
11. Wheel bearings shall be permanently sealed and lubricated and have a minimum L-10 life of 400,000 hours.
12. Access doors shall be provided for the removal of wheel segments. Doors shall be located on all air entering and air leaving sides of wheel to allow access to the entire upstream and downstream face of each wheel. Adequate space and access shall be provided for energy wheel motor, bearing and belt removal. Access doors shall be constructed per Section 2.04.
13. Energy recovery wheels shall be designed with variable effectiveness control, to vary the wheel's recovery capacity. Variable effective control shall be done by an internal bypass damper provided by the AHU Manufacturer. The wheel's variable effectiveness control shall have the ability to modulate the total energy recovery ability down to at least 40% of the initial recovery capacity. Variable frequency speed control is not an acceptable method for controlling variable effectiveness.
14. Frost prevention shall be achieved by outside air bypass, return air preheat, or outside air preheat, depending upon design conditions. Frost set point temperatures based on the scheduled design air conditions shall be provided by the AHU Manufacturer. Variable frequency speed control is not an acceptable method of frost control. Winter design supply and exhaust air conditions leaving the energy wheel shall be provided by the AHU Manufacturer and shall include any de-rate in performance due to frost prevention measures.
15. Control of energy wheels shall be incorporated and an integral part of the AHU control systems and shall be as described under the AHU control specifications. Secondary independent wheel controllers are not acceptable.

L. Passive Dehumidification Cassette (Applies to DOA-5):

1. The dehumidification wheel shall be placed in the air handler as shown in the air handler unit drawings. The dehumidification wheel shall not require an additional regeneration airflow stream or the use of a high heat source. If any preheat is required it shall not exceed the scheduled capacity.
2. The dehumidification wheel shall not utilize exhaust air. The wheel shall have no exhaust air transfer.
3. Cassettes can be designed with either a vertical (side by side) or a horizontal (over/under) airflow arrangement as per requirements. The cassette shall be mounted upright.
4. Cassette casing shall be constructed of heavy duty G90 galvanized steel. Cassettes up to 7000 cfm shall be single face panel construction for easy service access to the wheel drive motor and belt. Larger cassettes shall be double face panel with removable side panel for access to belt and drive motor. Small amounts of casing deflection shall have no significant impact on wheel performance or life. Casings shall have a 1”-1 1/2" perimeter flange to facilitate mounting inside AHU cabinet with self-tapping sheet metal screws. Alternatively, cassettes may be mounted using “safeoff” blanking to the side, top, and bottom of the cassette.
5. The dehumidification wheels shall be constructed of synthetic matrix with an adsorbent integrally bound into the matrix. The adsorbent shall be selected for its high affinity for water vapor at the operating conditions. The adsorbent shall be a type III desiccant. Construction of the wheel shall be corrugated, fluted design, which provides distinct air passageways and prevents internal wheel bypass. The desiccant is intimately, permanently bound and uniformly dispersed throughout the wheel matrix. Because the desiccant is not applied as a glued on surface coating, it is not susceptible to erosion, abrasion, or delamination of the desiccant. The wheel matrix shall be rigid and glued layer-to-layer, and not susceptible to sagging or separation of the layers. The wheel shall be structurally reinforced with a spoking system to minimize wheel deflection. Because the product is nonmetallic, it offers complete resistance to corrosion. The media shall meet the flammability requirements governing this class of products and be UL recognized components in accordance to UL 1812 and UL1995
6. All cassettes shall include both a circumferential seal as an air block-off around the perimeter, and an inner diametric seal separating regeneration and supply sides. Seals shall be full contact nylon brush seals, which minimizes leakage. Seals are factory set and field adjustable and make intimate contact with the wheel on all surfaces. Cassette, wheel and seal configuration allows for operation at high differential pressures. Seal replacement should not be necessary during the life of the product.
7. The drive system shall consist of a heavy-duty fractional horsepower A/C gear motor mounted in the cassette and cooled by the AHU air stream. Motor location shall be as required. All motors have permanently lubricated bearings. Minimal amp draw will be required and all motors shall be 115V/1PH/60Hz or 230V/1PH/60Hz. Drive belts shall be high performance v-belt multilink belts. The multilink belt allows for replacement of individual links(1” each) if a section of belt becomes worn or breaks. Belts are installed under tension, require no mechanical tensioner, and do not require adjustment after startup. The rotation speed of the wheel shall not exceed the scheduled value.

8. The wheel matrix shall be cleanable by vacuuming or pressurized air blowing, or alternatively with low temperature steam, hot water, light detergent.
9. Cassettes shall be provided with bearings which support rotation of the wheel around a center shaft driven by a perimeter belt. The bearings shall be internal ball bearings press fitted into the bored wheel hub for all wheels up to and including 72" diameter. Internal bearings are permanently lubricated, no maintenance bearings which support fixed shaft operation of the wheel assembly. Flanged or pillow block bearings which support rotating shaft operation of the wheel assembly are used for all units larger than 72" diameter. Outboard bearings are provided with grease fittings for periodic lubrication. L10 bearing life is greater than 400,000 at design conditions.
10. The wheel cassette shall be capable of continuous operation over ambient temperatures ranging from -40F to 200F at any relative humidity without adversely affecting wheel performance or life.
11. Performance shall be as predicted by selection software as scheduled. The performance shall be based on testing conducted on the wheel cassette installed in the air handler configuration as shown in the AHU drawings. Performance based on stand-alone desiccant wheel cassette or tests with two independent air streams are unacceptable. Performance data shall be from tests of a complete unit per-formed by an ISO 9000 certified laboratory. Temperature measurements shall be taken using instrumentation whose calibration is traceable to NIST standards. Dry bulb and wet bulb temperature measurements shall be accurate to +/- 0.1 Deg F. Performance prediction for the air handler shall be available for multiple conditions as required.

M. Filter Section:
1. Provide factory-fabricated filter section of the same construction and finish as unit casings. Filter section shall have side access filter guides and access door(s) extending the full height of the casing to facilitate filter removal. Provide fixed filter block offs as required to prevent air bypass around filters.
2. Filter type, MERV rating, and arrangement shall be provided as defined in project plans and schedule.
3. Filter Gauges: 2 inch diameter diaphragm actuated dial in metal case with static pressure tips.

N. Economizer: Provide economizer components and controls in accordance with ICC IECC.

O. Mixing Boxes: Parallel blade galvanized steel dampers mechanically fastened to steel operating rod in reinforced, stainless steel cabinet. Connect operating rods with common linkage and interconnect linkages so dampers operate simultaneously.

P. Dampers:
1. Description: galvanized steel frame and blade, Non-insulated, Single-thickness metal reinforced with multiple V-grooves or hollow-shaped airfoil. AMCA Class 1A rated dampers.
2. Blade Seals: Replaceable, continuous perimeter vinyl seals and jambs with stainless-steel compression-type seals.
3. Outside Air Damper Leakage: Maximum 3.0 cfm per square foot at 1.0 inches wg pressure differential.

4. Damper Leakage: Maximum 2 percent at 4 inch wg differential pressure when sized for 2000 fpm face velocity.

Q. Damper Actuators:
1. Factory-installed electric actuator for each damper assembly with one actuator for each damper assembly mounted to the damper frame.
2. Actuator capable of shutoff against fan pressure and able to operate the damper with sufficient reserve power to achieve smooth modulating action and proper speed of response at the velocity and pressure conditions to which the damper is subjected.

R. Accessories:
1. Lights: Weather-resistant (enclosed and gasketed to prevent water and dust intrusion), light emitting diode (LED) fixture located in accessible sections with housing, factory wired to weatherproof switch mounted on casing exterior. In humidifier sections, furnish lights suitable for wet locations.
2. Convenience Receptacle: Provide factory installed service module including GFCI receptacle independent from load side; designed to receive power from field supplied 120 volt source.
3. Piping Vestibule: Same materials and finishes as cabinet, insulated sandwich construction, to enclose hot and chilled water piping.
4. Roof Curb: 18 inches high galvanized steel, vibration isolation, channel frame with gaskets and nailer strips, sloped as required for level installation. Roof curb shall also be provided for piping vestibule section, if applicable.
5. Outside Air and Exhaust Air Weather Hood: Same material and finish as casing outer panel. Extend hood past perimeter of unit casing opening so as not to instruct airflow path. Weather hood shall provide full protection from wind driven rain and terminate 90 degree to inlet of unit. Protect each hood with bird screen.

S. Power and Controls
1. Multi-Point Power Connection: Refer to schedule on drawings.
2. A combination VFD/disconnect shall be provided for each fan motor, factory mounted and wired. Mount VFD-disconnect on fan section externally in a NEMA 1 enclosure within a dedicated controls section or housed fan section.
3. Power Interface: Field power interface shall be UL 508 listed, non-fused disconnect switch.
4. Unit shall ship without controllers and end devices as all will be supplied and field mounted by the Automatic Temperature Controls Contractor. Comply with 230900.
5. Disconnect Switch: Factory mount in control panel.

2.2 INDOOR AIR HANDLING UNITS (DOA-1,2,3 & 4)

A. Manufacturers:
1. Trane- CSAA
2. Carrier - AiroVision
3. Daikin – Vision
4. Semco

B. Coordinate specific components included for each air handling unit with schedule.

C. Casing:
1. Walls, floor and roof panels: constructed of insulated, double wall panels. Provide mid-span, no through metal, internal thermal break.
2. Base: Channel base and drain pan of welded, galvanized steel. Assemble sections with gaskets and bolts.
3. Outside Casing: 22 gauge Galvanized Steel
4. Inside Casing: 22 gauge Galvanized Steel, perforated upstream of cooling coil
Floor Plate: 22 gauge Galvanized Steel
5. Panel and Door Deflection Performance: Less than L/240 at +/- 8 inches w.g.
6. Air Leakage Performance: Less than 1 percent air leakage at +/- 8 inches w.g.
7. Penetrations: Seal all penetrations airtight. Cover with escutcheons, gaskets, or fill with suitable compound so there is no exposed insulation. Provide shaft seals where fan shafts penetrate casing.
8. Insulation: Minimum insulation thickness of 2" and a thermal resistance (R-value) of 13 $ft^2 \cdot h \cdot {}^oF/Btu$. Comply with NFPA 90A.
9. Finish: Manufacturers standard paint on exterior.
10. Access Doors: Double wall construction with same materials and finishes as cabinet, insulated sandwich construction matching casing insulation requirements, for flush mounting, with hinges, gasket, latch, and handle assemblies.

D. Direct-Drive Plenum Fan(s):
1. Single-width, single-inlet plenum fan consisting of housing, wheel, fan shaft, grease lubricated ball bearings, motor and disconnect switch, drive assembly, and support structure and equipped with formed steel channel base for integral mounting of fan, motor, and casing panels. Fan blades shall be aluminum backward-inclined airfoil.
2. Fans shall be statically and dynamically balanced throughout the operating range and designed for continuous operation at maximum rated fan speed and motor horsepower.
3. Fan and motor shall be internally isolated with spring isolators and provided with flexible connection between fan and unit casing.
4. Fan sections containing multiple fans shall be controlled using a common control signal, such as the duct static control signal, to modulate the fan speed.
5. Provide Extended grease lines.

E. Motors and Drives:
1. Fan Motors: factory-installed and run tested, meet or exceed all NEMA Standards Publication MG 1 - 2006 requirements and comply with NEMA Premium efficiency levels. Motors shall comply with NEC and shall be UL Listed.
2. Fan Modulation: Variable Frequency/ Speed Drive.
3. Shafts: Solid, hot rolled steel, ground and polished, with key-way, and protectively coated with lubricating oil. Provide shaft grounding rings for motors with VFDs.

F. Airflow Measuring: Provide airflow measurement system to measure fan airflow directly or to measure differential pressure that can be used to calculate fan airflow. The system shall measure airflow within +/-5 percent total accuracy (device and transmitter) when operating within the stable operating region of the fan curve.

G. Coil Casing:
1. Casing with access to both sides of coils. Slide coils into casing through removable end panel with blank off sheets and sealing collars at connection penetrations.
2. When two or more cooling coils are stacked in the unit, an intermediate drain pan shall be installed between each coil. The intermediate drain pan shall be designed being of sufficient size to collect all condensation produced from the coil and sloped to promote positive drainage to eliminate stagnant water conditions. The intermediate drain pan shall be constructed of the same material as the sections primary drain pan. Intermediate drain pan shall include downspouts to direct condensate to the primary drain pan. The intermediate drain pan outlet shall be located at the lowest point of the pan and shall be sufficient diameter to preclude drain pan overflow under any normally expected operating condition.

H. Water Heating Coils:
1. Headers: Cast iron, seamless copper tube, or prime coated steel pipe with brazed joints.
2. Coil: Constructed of copper tubes expanded into aluminum fins. Factory leak tested under water.
3. Configuration: Drainable, with threaded plugs for drain and vent; serpentine type with return bends on smaller sizes and return headers on larger sizes.

I. Water Cooling Coils:
1. Headers: Cast iron, seamless copper tube, or prime coated steel pipe with brazed joints.
2. Coil: Constructed of copper tubes expanded into aluminum fins. Factory leak tested under water.
3. Configuration: Drainable, with threaded plugs for drain and vent; threaded plugs in return bends and in headers opposite each tube.

J. Drain Pans: Double thickness stainless steel cooling coil drain pan and galvanized steel heating coil drain pan with insulation between layers with welded corners. The drain pan shall be designed in accordance with ASHRAE 62.1 being of sufficient size to collect all condensation produced from the coil and sloped in two planes, pitched toward drain connections at lowest point of the pan.

K. Enthalpy Wheel:
1. Exchanger rotor shall be a minimum of 10" deep and shall be constructed of alternate layers of corrugated and flat aluminum. Enthalpy wheels shall have a permanently bonded desiccant adsorbent specifically developed for the selective transfer of moisture for equal transfer of sensible and latent energy.
2. The air channels shall be formed smooth to ensure laminar airflow for low-pressure drops and allow free passage of particles up to 900 microns. Rotor

structure shall be internally reinforced and mounted on pillow block type bearings.

3. The rotor shall be removable from the frame.
4. Brush seals shall be provided around the periphery of the rotor and between the inlet and outlet air passages to effectively prevent air leakage and cross contamination between airflows. An adjustable purging sector shall be installed to prevent carryover of contaminated exhaust air into the supply air stream.
5. Performance and cross contamination shall be documented through an independent laboratory conducted in accordance with ASHRAE 84-1991 and ARI standards. Provide with speed controls and frost controls.
6. Total energy recovery wheels shall be provided as indicated on the schedule and drawings. Wheels shall be integral parts of the AHUs and shall be sized per the ventilation requirement of the units. Additional outside air units, or other field assembled and ducted energy recovery devices, are not acceptable. Mixed air units with economizing shall be constructed with internal bypass dampers such that the pressure drop across the wheel does not increase during economizing. External bypass and multiple duct connections are not acceptable.
7. The air handling unit shall be certified by AHRI to contain a rotary energy recovery wheel certified to ANSI/AHRI Standard 1060 and bears the AHRI 1060 label. The air handling unit and wheel must be AHRI 1060-certified as a package. Proof of compliance shall be that the air handling unit brand name and specific wheel being used be listed on the AHRI website within the Directory of Certified Product Performance for Commercial Air-to-Air Energy Recovery Ventilators under the Packaged Program Type. Verification of performance for non-AHRI 1060 certified AHU packages shall be completed by witness test for the owner/owner's representative and specifying engineer at the jobsite. Installing contractor shall be responsible for all expenses of verification testing, including test set-up, room/board for owner/owner's representative and engineer, travel to and from the jobsite, as well as modification costs associated to achieving specified performance.
8. Performance characteristics of the energy wheel shall be provided as defined by AHRI 1060 definitions. The energy wheel shall be a total energy wheel, with the sensible and latent effectiveness reported and within 5% of each other. The calculated total net effectiveness of the recovery wheel shall not be less than 70% when the specified ventilation flow rate equals the exhaust flow rate. The energy wheel's EATR shall be less than the value indicated in the schedule and drawings. Wheel face velocity and pressure drop shall not exceed performance as defined on schedule. The energy recovery cassette shall be an Underwriters Laboratories (UL) Recognized Component certified for mechanical, electrical, and fire safety in accordance with UL Standard 1812.
9. The energy recovery component shall incorporate a rotary wheel in an insulated cassette frame complete with seals, drive motor and drive belts. The total energy recovery wheel shall incorporate a desiccant without the use of binders or adhesives, which may plug the desiccant aperture. The adsorbent shall not be applied as a glued on surface coating and not susceptible to erosion, abrasion, or delamination. Coated segments shall be washable using standard detergent or alkaline-based coil cleaners. The adsorbent shall be selected for its high affinity for water vapor and shall not dissolve or deliquesce in the presence of water or high humidity. The rim shall be continuous rolled stainless steel to form an even

concentric circle to prevent leakage around the rim and to minimize wear of components. All diameter and perimeter seals shall be provided as part of the cassette assembly. Perimeter seals shall be self-adjusting; diameter seals shall be adjustable. Seals shall be factory set.

10. Wheel drive motor shall be provided mounted in the cassette frame. Wheel drive motor shall be thermally protected and UL Component Recognized. Drive belts shall not require belt tensioners. On units that require drive belt tensioners for the wheel belt/motor assembly, the unit manufacturer shall provide at no additional charge to the customer a visual inspection every four months, and adjustment if necessary, of the recommended belt tension during the unit warranty period. Wheel motors shall be of the voltage, phase, frequency, and Hp indicated on the schedule and drawings.
11. Wheel bearings shall be permanently sealed and lubricated and have a minimum L-10 life of 400,000 hours.
12. Access doors shall be provided for the removal of wheel segments. Doors shall be located on all air entering and air leaving sides of wheel to allow access to the entire upstream and downstream face of each wheel. Adequate space and access shall be provided for energy wheel motor, bearing and belt removal. Access doors shall be constructed per Section 2.04.
13. Energy recovery wheels shall be designed with variable effectiveness control, to vary the wheel's recovery capacity. Variable effective control shall be done by an internal bypass damper provided by the AHU Manufacturer. The wheel's variable effectiveness control shall have the ability to modulate the total energy recovery ability down to at least 40% of the initial recovery capacity. Variable frequency speed control is not an acceptable method for controlling variable effectiveness.
14. Frost prevention shall be achieved by outside air bypass, return air preheat, or outside air preheat, depending upon design conditions. Frost set point temperatures based on the scheduled design air conditions shall be provided by the AHU Manufacturer. Variable frequency speed control is not an acceptable method of frost control. Winter design supply and exhaust air conditions leaving the energy wheel shall be provided by the AHU Manufacturer and shall include any de-rate in performance due to frost prevention measures.
15. Control of energy wheels shall be incorporated and an integral part of the AHU control systems and shall be as described under the AHU control specifications. Secondary independent wheel controllers are not acceptable.

L. Passive Dehumidification Cassette:
1. The dehumidification wheel shall be placed in the air handler as shown in the air handler unit drawings. The dehumidification wheel shall not require an additional regeneration airflow stream or the use of a high heat source. If any preheat is required it shall not exceed the scheduled capacity.
2. The dehumidification wheel shall not utilize exhaust air. The wheel shall have no exhaust air transfer.
3. Cassettes can be designed with either a vertical (side by side) or a horizontal (over/under) airflow arrangement as per requirements. The cassette shall be mounted upright.
4. Cassette casing shall be constructed of heavy duty G90 galvanized steel. Cassettes up to 7000 cfm shall be single face panel construction for easy service

access to the wheel drive motor and belt. Larger cassettes shall be double face panel with removable side panel for access to belt and drive motor. Small amounts of casing deflection shall have no significant impact on wheel performance or life. Casings shall have a 1”-1 1/2" perimeter flange to facilitate mounting inside AHU cabinet with self-tapping sheet metal screws. Alternatively, cassettes may be mounted using “safeoff” blanking to the side, top, and bottom of the cassette.

5. The dehumidification wheels shall be constructed of synthetic matrix with an adsorbent integrally bound into the matrix. The adsorbent shall be selected for its high affinity for water vapor at the operating conditions. The adsorbent shall be a type III desiccant. Construction of the wheel shall be corrugated, fluted design, which provides distinct air passageways and prevents internal wheel bypass. The desiccant is intimately, permanently bound and uniformly dispersed throughout the wheel matrix. Because the desiccant is not applied as a glued on surface coating, it is not susceptible to erosion, abrasion, or delamination of the desiccant. The wheel matrix shall be rigid and glued layer-to-layer, and not susceptible to sagging or separation of the layers. The wheel shall be structurally reinforced with a spoking system to minimize wheel deflection. Because the product is nonmetallic, it offers complete resistance to corrosion. The media shall meet the flammability requirements governing this class of products and be UL recognized components in accordance to UL 1812 and UL1995
6. All cassettes shall include both a circumferential seal as an air block-off around the perimeter, and an inner diametric seal separating regeneration and supply sides. Seals shall be full contact nylon brush seals, which minimizes leakage. Seals are factory set and field adjustable and make intimate contact with the wheel on all surfaces. Cassette, wheel and seal configuration allows for operation at high differential pressures. Seal replacement should not be necessary during the life of the product.
7. The drive system shall consist of a heavy-duty fractional horsepower A/C gear motor mounted in the cassette and cooled by the AHU air stream. Motor location shall be as required. All motors have permanently lubricated bearings. Minimal amp draw will be required and all motors shall be 115V/1PH/60Hz or 230V/1PH/60Hz. Drive belts shall be high performance v-belt multilink belts. The multilink belt allows for replacement of individual links(1” each) if a section of belt becomes worn or breaks. Belts are installed under tension, require no mechanical tensioner, and do not require adjustment after startup. The rotation speed of the wheel shall not exceed the scheduled value.
8. The wheel matrix shall be cleanable by vacuuming or pressurized air blowing, or alternatively with low temperature steam, hot water, light detergent.
9. Cassettes shall be provided with bearings which support rotation of the wheel around a center shaft driven by a perimeter belt. The bearings shall be internal ball bearings press fitted into the bored wheel hub for all wheels up to and including 72” diameter. Internal bearings are permanently lubricated, no maintenance bearings which support fixed shaft operation of the wheel assembly. Flanged or pillow block bearings which support rotating shaft operation of the wheel assembly are used for all units larger than 72” diameter. Outboard bearings are provided with grease fittings for periodic lubrication. L10 bearing life is greater than 400,000 at design conditions.

10. The wheel cassette shall be capable of continuous operation over ambient temperatures ranging from -40F to 200F at any relative humidity without adversely affecting wheel performance or life.
11. Performance shall be as predicted by selection software as scheduled. The performance shall be based on testing conducted on the wheel cassette installed in the air handler configuration as shown in the AHU drawings. Performance based on stand-alone desiccant wheel cassette or tests with two independent air streams are unacceptable. Performance data shall be from tests of a complete unit per-formed by an ISO 9000 certified laboratory. Temperature measurements shall be taken using instrumentation whose calibration is traceable to NIST standards. Dry bulb and wet bulb temperature measurements shall be accurate to +/- 0.1 Deg F. Performance prediction for the air handler shall be available for multiple conditions as required.

M. Filter Section:
1. Provide factory-fabricated filter section of the same construction and finish as unit casings. Filter section shall have side access filter guides and access door(s) extending the full height of the casing to facilitate filter removal. Provide fixed filter block offs as required to prevent air bypass around filters.
2. Filter type, MERV rating, and arrangement shall be provided as defined in project plans and schedule.
3. Filter Gauges: 2 inch diameter diaphragm actuated dial in metal case with static pressure tips.

N. Economizer: Provide economizer components and controls in accordance with ICC IECC.

O. Mixing Boxes: Parallel blade galvanized steel dampers mechanically fastened to steel operating rod in reinforced, stainless steel cabinet. Connect operating rods with common linkage and interconnect linkages so dampers operate simultaneously.

P. Dampers:
1. Description: galvanized steel frame and blade, Non-insulated, Single-thickness metal reinforced with multiple V-grooves or hollow-shaped airfoil. AMCA Class 1A rated dampers.
2. Blade Seals: Replaceable, continuous perimeter vinyl seals and jambs with stainless-steel compression-type seals.
3. Outside Air Damper Leakage: Maximum 3.0 cfm per square foot at 1.0 inches wg pressure differential.
4. Damper Leakage: Maximum 2 percent at 4 inch wg differential pressure when sized for 2000 fpm face velocity.

Q. Damper Actuators:
1. Factory-installed electric actuator for each damper assembly with one actuator for each damper assembly mounted to the damper frame.
2. Actuator capable of shutoff against fan pressure and able to operate the damper with sufficient reserve power to achieve smooth modulating action and proper speed of response at the velocity and pressure conditions to which the damper is subjected.

R. Accessories:
1. Lights: Weather-resistant (enclosed and gasketed to prevent water and dust intrusion), light emitting diode (LED) fixture located in accessible sections with housing, factory wired to weatherproof switch mounted on casing exterior. In humidifier sections, furnish lights suitable for wet locations.
2. Convenience Receptacle: Provide factory installed service module including GFCI receptacle independent from load side; designed to receive power from field supplied 120 volt source.

S. Power and Controls
1. Multi-Point Power Connection: Refer to schedule on drawings.
2. A combination VFD/disconnect shall be provided for each fan motor, factory mounted and wired. Mount VFD-disconnect on fan section externally in a NEMA 1 enclosure within a dedicated controls section or housed fan section.
3. Power Interface: Field power interface shall be UL 508 listed, non-fused disconnect switch.
4. Unit shall ship without controllers and end devices as all will be supplied and field mounted by the Automatic Temperature Controls Contractor. Comply with 230900.
5. Disconnect Switch: Factory mount in control panel.

2.3 HEAT RECOVERY VENTILATORS (HRV-1)

A. Manufacturers:
1. Trane
2. Daikin Applied
3. Xetex

B. General:
1. Furnish and install exterior grade double wall air handler. All internal components specified in the air handling unit schedule will be factory furnished and installed. Unit will be completely factory assembled. The units cooling, heating, ventilating capacity and performance will meet or exceed that shown on the schedule.
2. Unit layout and configuration shall be as defined in project plans and schedule.
3. Provide an integral base frame to support all sections of unit and raise unit for proper trapping. Contractor will be responsible for providing a housekeeping pad when unit base frame is not of sufficient height to properly trap unit. Unit base frames not constructed of galvanized steel shall be chemically cleaned and coated with both a rust-inhibiting primer and finished coat of rust-inhibiting enamel.

C. Construction
1. Unit panels shall be solid double-wall construction with a perforated liner can be added to sections as specified on the schedule. Exterior wall panels shall be made of galvanized steel. The casing shall be able to withstand up to 1.5 times design static pressure, or 8" WC, whichever is less, with no more than 0.005 inch deflection per inch of panel span.
2. Casing performance – Casing air leakage shall not exceed leak class 9 (CL = 9) per ASHRAE 111 at specified casing pressure, where maximum casing leakage (cfm/100 ft2 of casing surface area) = CL X P0.65.

3. The unit base design shall allow unit to rest on top of concrete housekeeping pad or raised steel structure when field installed. It should also allow for ceiling suspension or external isolation.
4. Electrical wiring diagrams shall be attached to the control panel access door. Installation and maintenance manuals shall be supplied with each unit.
5. Units shall ship in one piece where possible. Shipping splits to be provided as required for installation. Lifting lugs shall be supplied on each side of the split to facilitate rigging and joining of segments.
6. Under 55°F supply air temperature and design conditions on the exterior of the unit of 81°F dry bulb and 73°F wet bulb, condensation shall not form on the casing exterior. The AHU manufacturer shall provide tested casing thermal performance for the scheduled supply air temperature plotted on a psychrometric chart. The design condition on the exterior of the unit shall also be plotted on the chart. If tested casing thermal data is not available, AHU manufacturer shall provide, in writing to the Engineer and Owner, a guarantee against condensation forming on the unit exterior at the stated design conditions above. The guarantee shall note that the AHU manufacturer will cover all expenses associated with modifying units in the field should external condensate form on them. In lieu of AHU manufacturer providing a written guarantee, the installing contractor must provide additional external insulation on AHU to prevent condensation.

D. Access Doors:
1. Access doors shall be 2” double-wall construction. Interior and exterior shall be of the same construction as the interior and exterior wall panels.
2. All doors downstream of cooling coils shall be provided with a thermal break construction of door panel and door frame.
3. Gasketing shall be provided around the full perimeter of the doors to prevent air leakage.
4. Handle hardware shall be designed to prevent unintended closure.
5. Access doors shall be hinged and removable without the use of specialized tools.
6. Hinges shall be interchangeable with the door handle hardware to allow for alternating door swing in the field to minimize access interference due to unforeseen job site obstructions.

E. Primary Drain Pans:
1. All cooling coil sections shall be provided with an insulated, double-wall, stainless steel drain pan.
2. The drain pan shall be designed in accordance with ASHRAE 62.1 being of sufficient size to collect all condensation produced from the coil and sloped in two planes, pitched toward drain connections, promoting positive drainage to eliminate stagnant water conditions when unit is installed level and trapped per manufacturer's requirements.
3. The outlet shall be located at the lowest point of the pan and shall be sufficient diameter to preclude drain pan overflow under any normally expected operating condition.
4. All drain pan threaded connections shall be visible external to the unit. Threaded connections under the unit floor shall not be accepted.
5. Drain connections shall be of the same material as the primary drain pan and shall extend a minimum 2-1/2” beyond the base to ensure adequate room for field piping of condensate traps.

6. Coil support members inside the drain pan shall be of the same material as the drain pan and coil casing.
7. Drain pans shall be provided for heating coils, access sections, and mixing sections as indicated in the plans.

F. Fans:
1. Provide fans of type and class as specified on the schedule. Fan shafts shall be solid steel, coated with a rust-inhibiting coating, and properly designed so that fan shaft does not pass through first critical speed as unit comes up to rated RPM. All fans shall be statically and dynamically tested by the manufacturer for vibration and alignment as an assembly at the operating RPM to meet design specifications. Fans controlled by variable frequency drives shall be statically and dynamically tested for vibration and alignment at speeds between 25% and 100% of design RPM. If fans are not factory-tested for vibration and alignment, the contractor shall be responsible for cost and labor associated with field balancing and certified vibration performance. Fan wheels shall be keyed to fan shafts to prevent slipping.
2. Belt-driven fans shall be provided with grease lubricated, self-aligning, anti-friction bearings selected for L-50 200,000-hour average life per ANSI/AFBMA Standard 9. Lubrication lines for both bearings shall be extended to the drive side of the AHU and rigidly attached to support bracket with zerk fittings. Lubrication lines shall be a clear, high-pressure, polymer to aid in visual inspection. If extended lubrication lines are not provided, manufacturer shall provide permanently lubricated bearing with engineering calculations for proof of bearing life.
3. Fans shall be mounted on isolation bases. Internally-mounted motor shall be on the same isolation base. Fan and motor shall be internally isolated with 2-inch isolators. A flexible connection (e.g. canvas duct) shall be installed between fan and unit casing to ensure complete isolation. Flexible connection shall comply with NFPA 90A and UL 181 requirements. If fans and motors are not internally isolated, then the entire unit shall be externally isolated from the building, including supply and return duct work, piping, and electrical connections. External isolation shall be furnished by the installing contractor in order to avoid transmission of noise and vibration through the ductwork and building structure.
4. Belts shall be enclosed as required by OSHA standard 29 CFR 1910 to protect worker from accidental contact with the belts and sheaves.

G. Motor and Drives:
1. All motors and drives shall be factory-installed and run tested. All motors shall be installed on a slide base to permit adjustment of belt tension. Slide base shall be designed to accept all motor sizes offered by the air-handler manufacturer for that fan size to allow a motor change in the future, should airflow requirements change. Fan sections without factory-installed motors shall have motors field installed by the contractor. The contractor shall be responsible for all costs associated with installation of motor and drive, alignment of sheaves and belts, run testing of the motor, and balancing of the assembly.
2. Motors shall meet or exceed all NEMA Standards Publication MG 1 – 2006 requirements and comply with NEMA Premium efficiency levels when applicable. Motors shall comply with applicable requirements of NEC and shall be UL Listed.

3. Fan Motors shall be heavy duty, NEMA Premium efficient operable at 480/60/3, exceeding the EPAct efficiency requirements.
4. Motors shall be 1800 rpm, except where noted, and shall NEMA Design B, with Class B insulation to operate continuously at 104°F (40°C) ambient without tripping of overloads.
5. Motors shall have a +/- 10 percent voltage utilization range to protect against voltage variation.
6. V-Belt Drive shall be variable pitch rated at 1.5 times the motor nameplate. Drives 20 hp and larger or any drives on units equipped with VFDs shall be fixed pitch.
7. Drives shall have minimum horsepower ratings of 150% of motor horsepower and shall be of sufficient size to start and bring equipment up to speed without slipping or squealing. Drives for motors 1-1/2 HP and larger shall have minimum of two belts.
8. Sheaves shall be cast iron and dynamically balanced. Motor sheaves shall be adjustable pitch type, with wide range of adjustment, selected so that design fan speed is at midpoint of adjustment range. Sheaves for motor and fan shafts on drives of 3 HP and larger shall have bronze shaft bushings.
9. Multi-belt drives shall have matched sets of belts to ensure equal tension and equal wear on all belts.
10. Drives not enclosed within equipment cabinets or casings shall have belt guards, easily removable, supported to prevent rattling or other noise. Guard shall be fully enclosed type, with holes opposite all shafts, for checking speeds without removing guard.
11. For each belt drive, furnish spare set of belts, tagged with fan number.
12. Manufacturer shall provide for each fan a nameplate with the following information to assist air balance contractor in start up and service personnel in maintenance:
    a. Fan and motor sheave part number
    b. Fan and motor bushing part number
    c. Number of belts and belt part numbers
    d. Fan design RPM and motor HP
    e. Belt tension and deflection
    f. Center distance between shafts

H. Coils:
1. Coils section side panels shall be removable to allow for removal and replacement of coils without impacting the structural integrity of the unit.
2. Install coils such that headers and return bends are enclosed by unit casing to ensure that if condensate forms on the header or return bends, it is captured by the drain pan under the coil.
3. Coils shall be manufactured with plate fins to minimize water carryover and maximize airside thermal efficiency. Fin tube holes shall have drawn and belled collars to maintain consistent fin spacing to ensure performance and air pressure drop across the coil as scheduled. Tubes shall be mechanically expanded and bonded to fin collars for maximum thermal conductivity. Use of soldering or tinning during the fin-to-tube bonding process is not acceptable due to the inherent thermal stress and possible loss of bonding at that joint.

4. Construct coil casings of galvanized steel. End supports and tube sheets shall have belled tube holes to minimize wear of the tube wall during thermal expansion and contraction of the tube.
5. All coils shall be completely cleaned prior to installation into the air handling unit. Complete fin bundle in direction of airflow shall be degreased and steam cleaned to remove any lubricants used in the manufacturing of the fins, or dirt that may have accumulated, in order to minimize the chance for water carryover.
6. When two or more cooling coils are stacked in the unit, an intermediate drain pan shall be installed between each coil. The intermediate drain pan shall be designed being of sufficient size to collect all condensation produced from the coil and sloped to promote positive drainage to eliminate stagnant water conditions.
7. The intermediate drain pan shall begin at the leading face of the water-producing device and be of sufficient length extending downstream to prevent condensate from passing through the air stream of the lower coil.
8. Intermediate drain pan shall include downspouts to direct condensate to the primary drain pan. The intermediate drain pan outlet shall be located at the lowest point of the pan and shall be sufficient diameter to preclude drain pan overflow under any normally expected operating condition.
9. Supply and return header connections shall be clearly labeled on unit exterior such that direction of coil water-flow is counter to direction of unit air-flow.
10. Coils shall be proof-tested to 300 psig and leak-tested to 200 psig air pressure under water.
11. Headers shall be constructed of round copper pipe or cast iron.
12. Tubes shall be 1/2 inch O.D., minimum 0.025 inch thick copper. Fins shall be aluminum.

I. Filters:
1. Provide factory-fabricated filter section of the same construction and finish as unit casings. Filter section shall have filter guides and access door(s) extending the full height of the casing to facilitate filter removal. Provide fixed filter blockoffs as required to prevent air bypass around filters. Blockoffs shall not need to be removed during filter replacement.
2. Filter type, MERV rating shall be provided as defined in project plans and schedule.
3. Manufacturer shall provide one set of startup filters.

J. Dampers:
1. All dampers shall be internally mounted. Dampers shall be premium ultra low leak and located as indicated on the schedule and plans. Blade arrangement (parallel or opposed) shall be provided as indicated on the schedule and drawings. Dampers shall be Ruskin CD60 double-skin airfoil design or equivalent for minimal air leakage and pressure drop. Leakage rate shall not exceed 4 CFM/square foot at one inch water gauge complying with ASHRAE 90.1 maximum damper leakage and shall be AMCA licensed for Class 1A. All leakage testing and pressure ratings shall be based on AMCA Standard 500-D. Manufacturer shall submit brand and model of damper(s) being furnished, if not Ruskin CD60.

K. Variable Frequency Drives (VFD's)
1. Variable frequency drives with bypasses shall be provided, mounted and wired by the AHU manufacturer as indicated on the schedule, sequence of operations or drawings. All standard and optional features shall be included within the VFD enclosure, unless otherwise specified. The VFDs shall be UL listed. The listing shall allow mounting in plenum or other air handling compartments.

L. Marine Lights
1. Marine lights shall be provided throughout AHUs as indicated on the schedule and plans. Lights shall be instant-on, light-emitting diode (LED) type to minimize amperage draw and shall produce lumens equivalent to a minimum 75W incandescent bulb (1200 lumens). LED lighting shall provide instant-on, white light and have a minimum 50,000 hr life.
2. Light fixture shall be weather-resistant, enclosed and gasketed to prevent water and dust intrusion.
3. Fixtures shall be designed for flexible positioning during maintenance and service activities for best possible location providing full light on work surface of interest and not being blocked by technician.
4. All lights on a unit shall be wired in the factory to a single on-off switch.
5. Installing contractor shall be responsible for providing 115V supply to the factory-mounted marine light circuit (unless single-point power is specified to be provided by AHU manufacturer).

M. Convenience Outlets
1. A 15-amp, 115V GFCI convenience outlet shall be provided by the AHU manufacturer. The outlet shall be separate from the load side of the equipment per NEC requirements. Installing contractor shall be responsible for providing 115V supply to the factory-mounted GFCI outlet circuit per NEC (even when single-point power is specified to be provided by AHU manufacturer).

N. Controls
1. Unit shall ship without controllers and end devices as all will be supplied and field mounted by Automatic Temperature Controls Contractor.

O. Sensible Plate Heat Exchanger
1. Core: constructed of alternate layers of corrugated aluminum. The sensible plate energy exchanger shall transfer both sensible energy between outgoing and incoming air streams in a cross flow arrangement.
2. Frame: core shall be assembled into a self-supporting frame made of aluminum corner extrusions and 16 gauge aluminum end plates.
3. Capabilities: Operation at temperatures between -40 °F and 140 °F (-40 °C and 60 °C). Withstand, without more than 10 % increase of pressure drop, pressure differentials of at least 5" w.g. Withstand pressure differential of 10" w.g. without permanent deformation.
4. The plate exchanger shall bear the AHRI 1060 Certified Product Seal. Sensible, latent and total effectiveness along with pressure drop, EATR and OACF rating shall be clearly documented with performance tests conducted in accordance with ASHRAE Standard 84-91 and per the official AHRI laboratory.
5. Fire resistance: Following UL1995 (Heating and Cooling Equipment), the enthalpy plate exchanger shall be a UL Recognized Component and bear the UL

Certification Mark (tested under UL723 with success by the UL laboratory). Exchangers only tested in accordance to UL723 shall be unacceptable.

6. Frost control shall be accomplished by face & bypass damper where temperatures fall below freezing.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with ARI 430.

B. Roof Curb:
1. Assemble roof curb.
2. Install roof curb level.
3. Coordinate curb installation and flashing with Division 07.
4. Install units on roof curb providing watertight enclosure to protect ductwork and utility services.
5. Install gasket material between unit base and roof curb.

C. Install flexible connections between unit and inlet and discharge ductwork. Install metal bands of connectors parallel with minimum 1 inch flex between ductwork and fan while running.

D. Install assembled units with vibration isolators. Install isolated fans with resilient mountings and flexible electrical leads. Install restraining snubbers as required. Adjust snubbers to prevent tension in flexible connectors when fan is operating.

E. Install floor mounted units on concrete housekeeping pads at least 3-1/2 inches high and 6 inches wider than unit.

F. Provide fixed sheaves required for final air balance.

G. Insulate coil headers located outside airflow as specified for piping.

H. Install condensate piping with trap

3.2 INSTALLATION CHILLED WATER COOLING COIL

A. Make connections to coils with unions or flanges.

B. Connect water supply to leaving airside of coil (counter flow arrangement).

C. Locate water supply at bottom of supply header and return water connection at top.

D. Install water coils to allow draining and install drain connection at low points.

E. Install valves and piping specialties in accordance with details as indicated on Drawings.

F. Install manual air vents at high points complete with shutoff valve.

3.3 INSTALLATION HOT WATER HEATING COIL

A. Make connections to coils with unions or flanges.

B. Connect water supply to leaving airside of coil (counter flow arrangement).

C. Locate water supply at bottom of supply header and return water connection at top.

D. Install water coils to allow draining and install drain connection at low points.

E. Install valves and piping specialties in accordance with details as indicated on Drawings.

F. Install manual air vents at high points complete with shutoff valve.

3.4 MANUFACTURER'S FIELD SERVICES

A. Furnish services of factory trained representative for minimum of one days to leak test, refrigerant pressure test, evacuate, dehydrate, charge, start-up, calibrate controls, and instruct Owner on operation and maintenance.

3.5 CLEANING

A. Vacuum clean coils and inside of unit cabinet.

B. Install new throwaway filters in units at Substantial Completion.

C. Install temporary filters during construction period. Replace with permanent filters at Substantial Completion.

3.6 DEMONSTRATION

A. Demonstrate unit operation and maintenance.

3.7 PROTECTION OF FINISHED WORK

A. Do not operate units until ductwork is clean, filters are in place, bearings lubricated, and fan has been test run under observation.

END OF SECTION

FOR REFERNCE: THIS SECTION WAS ISSUED FOR PHASE 1 AND PHASE 2

SECTION 23 8126 - SPLIT-SYSTEM AIR-CONDITIONERS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Air handling unit.
2. Condensing unit.
3. Refrigerant Piping

B. Related Sections:
1. Section 03 30 00 - Cast-In-Place Concrete: Execution requirements for concrete foundations specified by this section.
2. Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment: Vibration isolators.
3. Section 23 09 93 - Sequence of Operations for HVAC Controls: Sequences of operation applying to units in this section.
4. Section 23 21 13 - Hydronic Piping: Execution requirements for connection to hot water and drain piping specified by this section.
5. Section 23 23 00 - Refrigerant Piping: Execution requirements for connection to refrigerant piping specified by this section.
6. Section 23 33 00 - Air Duct Accessories: Flexible connections.
7. Section 25 50 00 - Integrated Automation Facility Controls: Control systems remote from unit.
8. Section 26 05 03 - Equipment Wiring Connections: Electrical connection to units.

1.2 REFERENCES

A. Air-Conditioning and Refrigeration Institute:
1. ARI 210/240 - Unitary Air-Conditioning and Air-Source Heat Pump Equipment.
2. ARI 270 - Sound Rating of Outdoor Unitary Equipment.
3. ARI 340/360 - Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment.
4. ARI 365 - Commercial and Industrial Unitary Air-Conditioning Condensing Units.

B. American Society of Heating, Refrigerating and Air-Conditioning Engineers:
1. ASHRAE 52.1 - Gravimetric and Dust-Spot Procedures for Testing Air-Cleaning Devices Used in General Ventilation for Removing Particulate Matter.
2. ASHRAE 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings.

C. ASTM International:
1. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus.

D. National Electrical Manufacturers Association:

1. NEMA MG 1 - Motors and Generators.

E. National Fire Protection Association:
1. NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems.

F. ASHRAE Standard 15
1. ASHRAE Std 15 - Safety Standard for Refrigeration Systems

G. ASHRAE Standard 34
1. ASHRAE Std 34 - Designation and Safety Classification of Refrigerants

H. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1 - Rules for Construction of Pressure Vessels

I. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Welding, Brazing, and Fusing Qualifications

J. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings

K. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes

L. ASME B31.5 - Refrigeration Piping and Heat Transfer Components

M. ASME B31.9 - Building Services Piping

N. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

O. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

P. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit data indicating:
1. Cooling and heating capacities.
2. Dimensions.
3. Weights.
4. Rough-in connections and connection requirements.
5. Duct connections.
6. Electrical requirements with electrical characteristics and connection requirements.
7. Controls.
8. Accessories.

C. Manufacturer's Installation Instructions: Submit assembly, support details, connection requirements, and include start-up instructions.

D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

E. Manufacturer's Field Reports: Submit start-up report for each unit.

F. Sustainable Design Documentation: Submit manufacturer's product data on refrigerant used, showing compliance with specified requirements.

G. Shop Drawings: Indicate schematic layout of system, including equipment, critical dimensions, equivalent piping lengths and sizes.

H. Design Data: Submit design data indicating pipe sizing. Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers.

I. Project Record Documents: Record exact locations of equipment and refrigeration accessories on record drawings.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of controls installed remotely from units.

C. Operation and Maintenance Data: Submit manufacturer's descriptive literature, operating instructions, installation instructions, and maintenance and repair data.

1.5 QUALITY ASSURANCE

A. Performance Requirements: Energy Efficiency Rating (EER) not less than prescribed by ASHRAE 90.1 when used in combination with compressors and evaporator coils when tested in accordance with ARI 210/240.

B. Cooling Capacity: Rate in accordance with ARI 210/240.

C. Sound Rating: Measure in accordance with ARI 270.

D. Insulation and adhesives: Meet requirements of NFPA 90A.

E. Maintain one copy of each document on site.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience approved by manufacturer.

1.7 PRE-INSTALLATION MEETINGS

A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Accept units and components on site in factory protective containers, with factory shipping skids and lifting lugs. Inspect for damage.

C. Comply with manufacturer's installation instruction for rigging, unloading and transporting units.

D. Protect units from weather and construction traffic by storing in dry, roofed location.

E. Deliver and store piping and specialties in shipping containers with labeling in place.

F. Protect piping and specialties from entry of contaminating material by leaving end caps and plugs in place until installation.

G. Dehydrate and charge components such as piping and receivers, seal prior to shipment, until connected into system.

1.9 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.

B. Coordinate installation of condensing units with roof structure.

C. Coordinate installation of air handling units with building structure.

1.10 WARRANTY

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for warranties.

B. Furnish one year manufacturers warranty for compressors.

1.11 MAINTENANCE SERVICE

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for maintenance service.

B. Furnish service and maintenance of equipment for one year from Date of Substantial Completion. Include maintenance items as shown in manufacturer's operating and maintenance data, including filter replacements, fan belt replacement, and controls checkout and adjustments.

C. Furnish 24-hour emergency service on breakdowns and malfunctions for this maintenance period. Furnish capability of response time within 24 hours.

1.12 MAINTENANCE MATERIALS

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for maintenance materials.

B. Furnish one set for each unit.

PART 2 PRODUCTS

2.1 SPLIT SYSTEM AIR CONDITIONING UNITS

A. Manufacturers:
1. Daikin
2. The Trane Company
3. Mitsubishi Enviromaster
4. Substitutions: Not Permitted.

B. Product Description: Split system consisting of air handling unit and condensing unit including cabinet, evaporator fan, refrigerant cooling coil, compressor, refrigeration circuit, condenser, air filters, controls, air handling unit accessories, condensing unit accessories, and refrigeration specialties.

2.2 AIR HANDLING UNIT

A. Configuration: As indicated on Drawings.

B. Cabinet:
1. Panels: Constructed of galvanized steel with baked enamel finish. Access Panels: Located on both sides of unit. Furnish with duct collars on inlets and outlets.
2. Insulation: Factory applied to each surface to insulate entire cabinet. one inch thick aluminum foil faced glass fiber with edges protected from erosion.

C. Evaporator Fan: Forward curved centrifugal type, resiliently mounted with adjustable belt drive and high efficiency motor complying with NEMA MG1, Type 1. Motor permanently lubricated with built-in thermal overload protection.

D. Evaporator Coil: Constructed of copper tubes expanded onto aluminum fins. Factory leak tested under water. Removable, PVC construction, double-sloped drain pan with piping connections on both sides.

E. Refrigeration System: Single refrigeration circuits controlled by factory installed thermal expansion valve.

F. Air Filters: 25 to 30 percent efficiency based on ASHRAE 52.1.

G. Air Handling Unit Accessories:
1. Discharge Plenum: with construction and finish matching unit casing. Integral grille of aluminum construction and adjustable louvers.
2. Return Air Grille: mounted in return air opening of aluminum construction and fixed louvers.
3. Mounting Subbase with construction and finish matching unit casing.
4. Vibration Isolators: As specified in Section 23 05 48.

2.3 CONDENSING UNIT

A. General: Factory assembled and tested air cooled condensing units, consisting of casing, compressors, condensers, coils, condenser fans and motors, and unit controls.

B. Unit Casings: Exposed casing surfaces constructed of galvanized steel with manufacturer's standard baked enamel finish. Designed for outdoor installation and complete with weather protection for components and controls, and complete with removable panels for required access to compressors, controls, condenser fans, motors, and drives.

C. Compressor: Single refrigeration circuit with rotary or hermetic reciprocating type compressors, resiliently mounted, with positive lubrication, and internal motor overload protection.

D. Condenser Coil: Constructed of copper tubing mechanically bonded to aluminum fins, factory leak and pressure tested.

E. Controls: Furnish operating and safety controls including high and low pressure cutouts. Control transformer. Furnish magnetic contactors for compressor and condenser fan motors.

F. Condenser Fans and Drives: Direct drive propeller fans statically and dynamically balanced. Wired to operate with compressor. Permanently lubricated ball bearing type motors with built-in thermal overload protection. Furnish high efficiency fan motors.

G. Condensing Unit Accessories: Furnish the following accessories:
1. Controls to provide low ambient cooling to -20 degrees F.
2. Time delay relay.
3. Anti-short cycle timer.
4. Disconnect switch.
5. Vibration isolators.
6. Hot gas bypass kit.
7. Coil with corrosion resistant coating capable of withstanding salt spray test of 1000 hours in accordance with ASTM B117.
8. Condenser Coil Guard: Condenser fan openings furnished with PVC coated steel wire safety guards.
9. Suction and discharge pressure gauges.

H. Refrigeration specialties: Furnish the following for each circuit:
1. Charge of compressor oil.

2. Holding charge of refrigerant.
3. Replaceable core type filter drier.
4. Liquid line sight glass and moisture indicator.
5. Shut-off valves on suction and liquid piping.
6. Liquid line solenoid valve.
7. Charging valve.
8. Oil level sight glass.
9. Crankcase heater.
10. Hot gas muffler.
11. Pressure relief device.

I. Refrigerant: Furnish charge of refrigerant.

2.4 CONTROLS

A. Furnish interface to Building Automation and Control System.

2.5 ELECTRICAL CHARACTERISTICS AND COMPONENTS

A. Electrical Characteristics: Refer to mechanical schedules

B. Disconnect Switch: Factory mounted, non-fused type, interlocked with access door, accessible from outside unit, with power lockout capability.

2.6 REFRIGERANT PIPING

A. Piping
1. Copper Tube: ASTM B280, Type ACR hard drawn or annealed.
   a. Fittings: ASME B16.22 wrought copper.
   b. Joints: Braze, AWS A5.8 BCuP silver/phosphorus/copper alloy with melting range 1190 to 1480 degrees F.

B. Valves
1. Service Valves:
   a. Forged brass body with copper stubs, brass caps, removable valve core, integral ball check valve, flared or solder ends, for maximum pressure of 500 psi.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

B. Verify concrete pad for condensing unit is ready for unit installation.

3.2 INSTALLATION - AIR HANDLING UNIT

A. Install air handling units on vibration isolators. Refer to Section 23 05 48.

B. Install floor mounted units on concrete housekeeping pads at least 3-1/2 inches high and 6 inches wider than unit. Refer to Section 03 30 00.

C. Install condensate piping with trap and route from drain pan to condensate drainage system.

D. Install components furnished loose for field mounting.

E. Install connection to electrical power wiring in accordance with Section.

3.3 INSTALLATION - CONDENSING UNIT

A. Install condensing units on vibration isolators.

B. Install refrigerant piping from unit to condensing unit. Install refrigerant specialties furnished with unit.

C. Evacuate refrigerant piping and install initial charge of refrigerant.

D. Install electrical devices furnished loose for field mounting.

E. Install control wiring between air handling unit, condensing unit, and field installed accessories.

F. Install connection to electrical power wiring in accordance with Section 26 05 03.

3.4 INSTALLATION – REFRIGERANT PIPING

A. Install refrigeration specialties in accordance with manufacturer's instructions.

B. Route piping in orderly manner, with piping parallel to building structure, and maintain gradient.

C. Install piping to conserve building space and avoid interference with use of space.

D. Group piping whenever practical at common elevations and locations.

E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

F. Arrange piping to return oil to compressor. Provide traps and loops in piping, and provide double risers as required.

G. Provide clearance for installation of insulation and access to valves and fittings.

H. Flood piping system with nitrogen when brazing.

I. Where pipe support members are welded to structural building frame, brush clean, and apply one coat of zinc rich primer to welding.

J. Insulate piping and equipment; refer to Section 23 0700.

K. Follow ASHRAE Std 15 procedures for charging and purging of systems and for disposal of refrigerant.

3.5 MANUFACTURER'S FIELD SERVICES

A. Section 01 40 00 - Quality Requirements: Requirements for manufacturer's field services.

B. Furnish initial start-up and shutdown during first year of operation, including routine servicing and checkout.

C. Test refrigeration system in accordance with ASME B31.5.

D. Pressure test system with dry nitrogen to maximum allowable working pressure. Pressure shall hold for a minimum of 24 hours with no leakage allowed.

3.6 CLEANING

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for cleaning.

B. Install temporary filters during construction period. Replace with permanent filters at Substantial Completion.

3.7 DEMONSTRATION

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for demonstration and training.

B. Demonstrate air handling unit operation and maintenance.

C. Demonstrate starting, maintenance, and operation of condensing unit including low ambient temperature operation.

D. Furnish services of manufacturer's technical representative for 8 hour day to instruct Owner's personnel in operation and maintenance of units. Schedule training with Owner, provide at least 7 days notice to Architect/Engineer of training date.

3.8 PROTECTION OF FINISHED WORK

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.

B. Do not operate air handling units until ductwork is clean, filters are in place, bearings lubricated, and fan has been test run under observation.

END OF SECTION

SECTION 23 8200 - CONVECTION HEATING AND COOLING UNITS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Active Chilled Beams

B. Air coils.

C. Convectors.

D. Cabinet unit heaters.

E. Fan coil units.

F. ~~Unit ventilators.~~

G. Hydronic radiant heaters.

H. Unit Heaters

I. Hydronic radiant ceiling panel radiators

J. Hydronic panel radiators

1.2 RELATED REQUIREMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

B. Division 23 specifications

1.3 REFERENCE STANDARDS (follow the most currently adopted amended version)

A. Air-Conditioning and Refrigeration Institute:
1. ARI 410 - Forced-Circulation Air-Cooling and Air-Heating Coils.

B. Sheet Metal and Air Conditioning Contractors:
1. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.

C. ASHRAE Std 138 - Method of Testing for Rated Ceiling Panels for Sensible Heating and Cooling.

D. ASTM B75 - Standard Specification for Seamless Copper Tube.

E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

F. ASTM F876 - Standard Specification for Crosslinked Polyethylene (PEX) Tubing.

G. ASTM F1281 - Standard Specification for Crosslinked Polyethylene/Aluminum/Crosslinked Polyethylene (PEX-AL-PEX) Pressure Pipe.

H. ASTM F1807 - Standard Specification for Metal Insert Fittings Utilizing a Copper Crimp Ring for SDR9 Cross-Linked (PEX) Tubing and SDR9 Polyethylene of Raised Temperature (PE-RT) Tubing.

I. ASTM F1974 - Standard Specification for Metal Insert Fittings for Polyethylene/Aluminum/ Polyethylene and Crosslinked Polyethylene/Aluminum/ Crosslinked Polyethylene Composite Pressure Pipe.

J. DIN EN 4726 - Warm Water Surface Heating Systems and Radiator Connecting Systems - Plastics Piping Systems and Multilayer Piping Systems.

K. DIN 14037-2 - Ceiling Mounted Radiant Panels Supplied with Water at a Temperature Below 120 Degrees C; Part 2: Test Method for Thermal Output.

L. DIN 14037-3 - Ceiling Mounted Radiant Panels Supplied with Water at a Temperature Below 120 Degrees C; Part 3: Rating Method and Evaluation of Radiant Thermal Output.

M. NFPA 70 - National Electrical Code.

1.4 SUBMITTALS

A. Shop Drawings: Indicate cross sections of cabinets, grilles, bracing and reinforcing, and typical elevations. Indicate schedules of equipment and enclosures typically indicating length and number of pieces of element and enclosure, corner pieces, end caps, cap strips, access doors, pilaster covers.

B. Product Data: Submit coil and frame configurations, dimensions, materials, rows, connections, and rough-in dimensions. Submit mechanical and electrical service locations, capacities and accessories or optional items.

C. Manufacturer's Installation Instructions: Submit assembly, support details, and connection requirements.

D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.5 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of components and locations of access doors in radiation cabinets required for access to valves.

B. Operation and Maintenance Data: Submit manufacturer’s descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listings.

1.6 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Accept units on site in factory packing. Inspect for damage. Store under roof.

B. Protect coil fins from crushing and bending by leaving in shipping cases until installation, and by storing indoors. Protect coils from entry of dirt and debris with pipe caps or plugs.

1.9 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.10 EXTRA MATERIALS

A. Furnish two sets of filters

PART 2 PRODUCTS

2.1 ACTIVE CHILLED BEAMS

A. Manufacturers:
1. Dadanco
2. Price
3. Titus
4. Swegon
5. Substitutions: Section 01 60 00 - Product Requirements

B. The Active Chilled Beams shall be ceiling-mounted cassette (1-way, 2-way and 4-way discharge) models as scheduled or approved equal in configurations as detailed on the drawings with performance per the unit schedule.

C. All units shall be selected and sized for a Noise Criteria rating below 25.

D. Casing

1. Construct the Active Chilled Beam from minimum 24 GA galvanized steel with a primary air plenum, secondary water coil frame, mixing chamber, grille assembly and mounting bracket support provisions.
2. All sheet metal joints in the primary air plenum are sealed airtight.

E. Primary Air Connection
1. Provide a round or oval primary air inlet connection at the side of the unit in the sizes and quantity as shown on the drawings.

F. Nozzles
1. Primary air shall be discharged into the mixing chamber through induction nozzles. Nozzles shall be of a fixed size, selected based on cooling and heating requirement. The nozzle plate shall be painted with a flat black finish

G. Cooling / Heating Water Coil
1. Provide a single water coil with capacities as shown on the unit schedule constructed of galvanized steel frame with ½" copper tubes mechanically expanded into aluminum fins. Coils shall be leak tested by manufacturer to 450 PSI and have a working pressure of 250 psi and shall be AHRI 410 certified. Provide ½" stubbed coil connections suitable for solder compression fittings, push-on fittings or threaded connections. Fin spacing shall be no greater than 10 fins per inch to prevent dust bridging. The coil shall be removable from the room side without requiring the removal of the beam casing from the ceiling. The coil shall include a vent and drain to facilitate maintenance on the unit. The coil pipe shall be upturned 90 degrees.

H. Grill Assembly
1. The secondary air is to be induced directly from the room.
2. Provide a powder coat baked-on enamel finish on the grille assembly integral to the unit. Paint color shall be selected by the owner. The supply air discharge shall be a linear slot(s) constructed of extruded aluminum along the longitudinal side(s) of the unit and the return air grille is constructed of perforated steel.
3. The return air grille is designed to allow the return air grille to swing-down or slide-out providing access to the coil by one person without removal of the grille.
4. The supply/return grille assemblies shall be of the lengths shown on the drawings and unit schedule.
5. Room side accessible controls enclosure shall be furnished where indicated.
6. Integrated return section shall be furnished where indicated.

I. Ceiling
1. The border of the grille assembly shall be compatible for mounting in standard T-bar lay-in ceilings as shown on the plans and unit schedule. Prior to ordering chilled beams coordinate with exact ceiling grid to be supplied for project.

J. Options
1. The units shall be compatible for mounting in a (specify) ceiling design. Or accommodate exposed mounting by the addition of wing extensions to exposed casing.

2. Grille assembly shall be special color (specify). At rooms with no ceiling provide custom color finish as per architects approved color/finish.

K. Accessories
1. ½ inch diameter 12 or 18 inch long flexible hose coil connectors constructed of EPDM hose with stainless steel braiding rated for a maximum operating pressure of not less than 125 psi (with sweat or NPT threaded or push fit) connections as shown on the drawings.
2. Trim kit for installation in dry wall or plaster ceilings as required by ceiling subcontractor.

L. Installation
1. To properly install the Active Chilled Beams, ensure that the unit is level and properly supported from above.
2. Connection to the main primary air duct with straight or a gentle radius flexible duct in accordance with local codes. Provide any and all necessary duct transitions for connection per manufacturer recommendations.
3. Make all joints airtight.
4. Connect the water inlet and outlet piping to the water coil, including installation of isolating, balancing and control valves as specified.
5. Refer and conform to the recommendations in the manufacturer's Installation, Operation and Maintenance manual.
6. Verify any controls and control enclosures are accessible.
7. Verify control connections are complete to control valves as needed.
8. Verify controls respond to inputs as specified.

M. Commissioning
1. The unit shall incorporate a commissioning port to measure the static pressure in the primary air plenum for adjustment of the primary airflow in accordance with the commissioning chart provided with each unit. The port is to be sealed airtight to the unit's primary air plenum.

2.2 AIR COILS

A. Manufacturers:
1. Vulcan
2. Trane
3. Carrier
4. York
5. USA Coil
6. Temtrol

B. Fabrication:
1. Tubes: Minimum 1/2 inch OD seamless copper arranged in parallel or staggered pattern, expanded into fins, brazed joints.
2. Fins: Aluminum or copper continuous plate type with full fin collars or individual helical spiral finned tube type wound under tension.
3. Casing: Die formed channel frame of minimum 16 gage galvanized steel. Provide stainless steel casing for cooling applications. Furnish intermediate tube supports

for spiral fin coils at manufacturer's recommended intervals to eliminate sagging during operation.

C. Water and Glycol Coils:
1. Headers: Seamless copper tube with silver brazed joints.
2. Leak Testing: Air test under water to a minimum of 400 psig for working pressure of 200 psig and 200 degrees F.
3. Configuration: Self draining circuitry, with threaded plugs for drain and vent; serpentine type with return bends on smaller sizes and return headers on larger sizes.

D. Refrigerant Cooling Coils:
1. Headers: Seamless copper tubes with silver brazed joints.
2. Liquid Distributors: Brass or copper venturi or orifice type or removable nozzle type distributor with seamless copper distributor tubes.
3. Leak testing: Air test under water at 450 psig for working pressure of 300 psig; dehydrate, and seal with dry air or nitrogen charge.
4. Configuration: Self-draining, down feed with bottom non-oil trapping connection.

2.3 CONVECTORS

A. Manufacturers:
1. Trane
2. Vulcan
3. McQuay
4. Modine

B. Heating Elements: Seamless copper tubing mechanically expanded into evenly spaced aluminum fins and cast iron headers, steel side plates and supports, factory air pressure tested at 100 psi under water, with means of adjusting pitch of element.

C. Cabinet 0.0598 inch thick steel front and top, 0.0478 inch steel back and ends; exposed corners rounded; easily secured removable front panels, adequately braced and reinforced for stiffness.

D. Finish: Factory applied baked enamel of color as selected.

E. Damper: Where heating media is not thermostatically controlled, furnish knob-operated internal damper at enclosure air outlet.

F. Access Doors: For otherwise inaccessible valves, furnish factory-made permanently hinged access doors, 6 x 7 inch minimum size, integral with cabinet.

2.4 CABINET UNIT HEATERS

A. Manufacturers:
1. Trane
2. Rittling

3. Vulcan
4. Sterling
5. Modine

B. Coils: Evenly spaced aluminum fins mechanically bonded to copper tubes, designed for 100 psi and 220 degrees F.

C. Cabinet: 0.0598 inch thick steel with exposed corners and edges rounded, easily removed panels, glass fiber insulation and integral air outlet and inlet grilles.

D. Finish: Factory applied baked enamel of color as selected on visible surfaces of enclosure or cabinet.

E. Fans: Centrifugal forward-curved double-width wheels, statically and dynamically balanced, direct driven.

F. Motor: Tap wound multiple speed ECM with sleeve bearings, resiliently mounted.

G. Control: Multiple speed switch, factory wired, located in cabinet.

H. Filter: Easily removed 1 inch thick glass fiber throw-away type, located to filter air before coil.

I. Mixing Dampers: Where indicated, mixing sections with dampers.

2.5 FAN COIL UNITS

A. Manufacturers:
1. Trane
2. Carrier
3. International Environmental Corporation (IEC)
4. JCI/Enviro-Tec
5. Daikin/McQuay
6. Williams

B. Coils: Evenly spaced aluminum fins mechanically bonded to copper tubes, designed for 200 psi and 220 degrees F. [Furnish drain pan under cooling coil, easily removable for cleaning, with drain connection.

C. Cabinet: 0.0598 inch thick steel with exposed corners and edges rounded, easily removed panels, glass fiber insulated, and integral air outlet and inlet grilles where exposed cabinet is specified.

D. Finish: Factory apply baked enamel of color as selected on visible surfaces of enclosure or cabinet.

E. Fans: Centrifugal forward-curved double-width wheels, statically and dynamically balanced, direct driven.

F. Motor: Tap wound multiple speed ~~[PSC]~~ [ECM] with sleeve bearings, resiliently mounted.

G. Control: Multiple speed switch, factory wired, located in cabinet.

H. Filter: Easily removed 1 inch thick glass fiber throw-away type, located to filter air before coil.

I. Mixing Dampers: As indicated on Drawings, provide mixing sections with dampers.

2.6 ~~UNIT VENTILATORS~~

A. ~~Manufacturers:~~
   1. ~~Trane~~
   2. ~~Carrier~~
   3. ~~McQuay~~

B. ~~Coils:~~
   1. ~~Type: [Chilled water cooling] [DX cooling] [Hot water heating] [Steam heating].~~
   2. ~~Copper tubes mechanically expanded into evenly spaced aluminum fins tested to operate at 150 psig. [Furnish drain pan under cooling coil, easily removable for cleaning, with drain connection.]~~

~~C. Electric Heating Coil: [Enclosed copper tube, aluminum finned element of coiled nickel-chrome resistance wire centered in tubes and embedded in refractory material.] [Exposed helical coil of nickel-chrome resistance wire with refractory ceramic support bushings.]~~

~~D. Cabinet: 0.0747 inch thick steel on solid base pan with exposed edges rounded. Furnish removable front panels with quick acting, key operated cam locks. Furnish removable die cast or fabricated steel discharge grilles. [For units having cooling coils, insulate internal parts and surfaces exposed to conditioned air stream with moisture resistant insulation.]~~

~~E. Cabinet Accessories: Matching steel construction, reinforced, for use with unit ventilators or finned radiation, with steel alignment pins, adjustable kick plates with leveling bolts, shelves and sliding doors [with locks] as indicated on Drawings, [sinks,] [bubbler faucets and bowls,] corner, end, and wall filler sections [as indicated on Drawings].~~

~~F. Finish: Factory apply baked enamel of color as selected on visible surfaces of enclosure or cabinet.~~

~~G. Fans: Centrifugal forward-curved double-width wheels, statically and dynamically balanced, direct driven, arranged to draw air through coil.~~

~~H. Wall Louvers: [Anodized aluminum] [Galvanized steel] wall intake box and louvers removable from frame with 1/2 inch square mesh galvanized screen in back of louver.~~

~~I. Motor: Tap wound multiple speed [permanent split capacitor] [ECM] with sleeve bearings, resiliently mounted.~~

~~J. Air Cooled Condensing Unit: Corrosion resistant cabinet, with hermetically sealed~~

~~compressor with internal spring isolation, external isolation, permanent split capacitor motor and overload protection, copper tube aluminum fin condenser coil, direct drive propeller fan with [permanently lubricated ball bearing] single phase motor with internal overload protection.~~

~~K. Control: Multiple speed switch, factory wired, located in cabinet.~~

~~L. Filter: Easily removed 1 inch [thick glass fiber throw-away] [permanent washable] type, located to filter air before coil.~~

~~M. Mixing Dampers: Multi-blade with compressible seal, capable of varying proportion of mixed air from 100 percent room air to 100 percent outside air.~~

2.7 HYDRONIC RADIANT HEATERS

A. Manufacturers:
1. Sun-El
2. Aero Tech
3. Shelley
4. Air Tech
5. Sterling

B. Ceiling Panels: Constructed of modular aluminum extrusions with interlocking edges, manufactured and assembled to sizes and configurations indicated.

C. Pipe Coil: incorporate continuous 1/2 inch copper pipe into extruded void. Furnish return bends for two water connections to each panel.

D. Cross brace entire assembly with structural members and insulate with 1 inch thick fiberglass insulation. Configure panels within T-bar ceiling module and run wall to wall.

2.8 UNIT HEATERS

A. Manufacturers:
1. Vulcan
2. Rittling
3. Sterling
4. Modine
5. Trane

B. Coils: Seamless copper tubing, 0.025 inch minimum wall thickness, silver brazed to steel headers, and with evenly spaced aluminum fins mechanically bonded to tubing.

C. Casing: 0.0478-inch thick steel with threaded pipe connections for hanger rods.

D. Finish: Factory applied baked enamel of color as selected.

E. Fan: Direct drive propeller type, statically and dynamically balanced, with fan guard; horizontal models with permanently lubricated sleeve bearings; vertical models with grease lubricated ball bearings.

F. Air Outlet: Adjustable pattern diffuser on projection models and four-way louvers on horizontal throw models.

G. Motor: Permanently lubricated sleeve bearings on horizontal models, grease lubricated ball bearings on vertical models.

H. Control: Local disconnect switch.

2.9 HYDRONIC RADIANT CEILING PANEL HEATERS

A. Manufacturers:
1. Barcol-Air USA Ltd.
2. Price Industries.
3. Armstrong Airtite
4. TWA Panel Systems, inc.
5. Substitutions: See Division 01 - General Requirements and 23 04 00 General Conditions for Mechanical Trades.

B. Modular Radiant Ceiling Panels: Heat sinks located behind panel, transfer heat between copper tubes and panel face, and radiate heat to zone.
1. Water Tubes:
   a. ASTM B75/B75M copper tubing, 1/2 inch minimum nominal diameter.
   b. Water Connections:
      1) Same end only.
      2) Suitable for solder, compression fittings, push-on fittings, or threaded connection.
      3) Protect with removable seals. Prevent introduction of dirt and dust during shipping.
2. Heat Sink Construction:
   a. Mechanically fasten extruded aluminum and copper pipe to heat sink.
   b. Provide non-hardening heat transfer paste between tubing, heat sink, and panel.
3. Panel Face: Construct of minimum 18 gage (0.0403 inches) thick aluminum.
4. Finish:
   a. Apply polyester paint, manufacture's standard finish.
   b. Color: As shown on drawings.
   c. Color: As selected by Architect from manufacturer's standard range.
   d. Maintain optimal radiative properties, durability, and cleanability.
5. Water Pressure Drop and Heating Output Data: Derive from factory testing in accordance with ASHRAE Std 138 or DIN 14037, Parts 2 and 3.
6. Accessories:
   a. 12 inch stainless steel braided hose with isolation ball valves for supply and return connections.

C. Heating Capacity: As scheduled, based on 180 degrees F average water temperature, 70 degrees F space temperature.

2.10 HYDRONIC PANEL RADIATORS

A. Manufacturers:
1. Runtal R2F
2. Substitutions: See Division 01 - General Requirements and 23 04 00 General Conditions for Mechanical Trades.

B. General: Provide steel double panel radiators of the lengths and in locations as indicated, and of capacities, style and having accessories as scheduled. The double heating panel radiation shall be of one-piece all-welded steel construction, consisting of a pair of flattened water tube panels welded to headers at each end. Welded to the inside of each panel shall be steel corrugated fins to increase the convective output of the radiator. The fins shall start at no less than 3" from the end of the radiator, and shall have no less than 32 fins per foot. The radiators shall include an integral heavy gauge (0.09" minimum) all-welded perforated top grille, which will cover the top of all of the finned areas (for curved radiators the grille is omitted).

C. The headers shall include all necessary inlet, outlet and vent connections as required. Standard connection sizes are ½" NPT tapered thread for supply and return piping, and 1/8" for the vent connection. Internal baffling is provided where required for proper water flow. The radiant heating panels shall be available in lengths from 2'-0" to 29'-6" in two inch even increments without the need for splicing. The panel radiation shall be capable of being mounted to typical stud wall construction without additional blocking or strapping. Appropriate wall mounting brackets shall be provided with the radiation. The panel radiation shall be manufactured in the USA.

D. The double panel radiators (up to four tubes tall) are to be provided with floor-mounted pedestals in lieu of the wall mounting brackets where installed in front of metal storefront windows.

E. Pressure Ratings: Pressure ratings for the radiation shall be as follows:
1. Working pressure - 128 PSI maximum
2. Test Pressure - 184 PSI maximum

F. Panel radiation expansion shall not exceed 1/64" per foot of radiation at 215ºF. The installer shall provide adequate expansion compensation for each radiator.

G. Finishes: The panel radiation shall be cleaned and phosphatized in preparation for the powder coat finish. The radiation is then finish painted with a gloss powder coat finish, for a total paint thickness of 2-3 mils (0.002" - 0.003"). The color shall be selected by the Architect form the manufacturer's standard colors

PART 3 EXECUTION

2.1 EXAMINATION

A. For recessed units, verify recess dimensions are correct size.

B. Verify wall construction is ready for installation.

C. Verify ductwork is ready for installation.

D. Verify concealed blocking and supports are in place and connections are correctly located.

E. Hydronic Radiant Ceiling Panel Heaters:
1. Examine areas to receive radiant heating units for compliance with requirements for installation tolerances and other conditions affecting performance.
2. Examine roughing-in for hydronic piping connections to verify actual locations prior to installation.
3. Ensure surfaces in contact with radiant heating panels are free of burrs and sharp protrusions.
4. Ensure surfaces are level and plumb.
5. Proceed with installation only after unsatisfactory conditions have been corrected.

2.2 INSTALLATION

A. Install air coils in ducts and casings in accordance with SMACNA HVAC Duct Construction Standards, Metal and Flexible.

B. Support air coil sections independent of piping on steel channel or double angle frames and secure to casings. Furnish frames for maximum three coil sections. Arrange supports to avoid piercing drain pans. Install with airtight seal between coil and duct or casing.

C. Protect coils to prevent damage to fins and flanges. Comb out bent fins.

D. Install coils level.

E. Make connections to coils with unions and flanges.

F. On water coils, install shut-off valve on supply piping and balancing valve on return piping. Locate water supply at bottom of supply header and return water connection at top. Install manual air vents at high points. Install water coils to be drainable and install drain connection at low points.

G. On water and glycol heating coils, and chilled water cooling coils, connect water supply piping to leaving airside of coil (counter flow arrangement).

~~H. In steam coils, install vacuum breaker in steam piping at or in header. Install steam traps with outlet minimum 12 inches below coil return connection.~~

I. Insulate headers located outside airflow, insulate as specified for piping.

J. Wire electric duct coils.

K. Install equipment exposed to finished areas after walls and ceilings are finished and painted. Avoid damage.

L. Protection: Install finished cabinet units with protective covers during remainder of construction.

M. Convectors: Coordinate to assure correct recess size for recessed convectors.

N. Cabinet Unit Heaters: Coordinate to assure correct recess size for recessed units.

O. Fan-Coil Units: Coordinate to ensure correct recess size for recessed units.

P. Hydronic Units: Install with shut-off valve on supply piping and balancing valve on return piping. Where not accessible, extend vent to exterior surface of cabinet for servicing.

Q. Units with Cooling Coils: Install drain piping to drain.

R. Hydronic Radiant Ceiling Panel Heaters:
1. Install level and plumb.
2. Suspend from structure.
3. Support in grid-type suspended ceiling using grid as support element as follows:
   a. Install a minimum of four ceiling support system rods or wires for each panel, located not more than 6 inches from panel corners.
   b. Fasten support clips to panel and to ceiling grid members at or near each panel corner with clips designed for the application.
   c. For panels of sizes less than ceiling grid, install as indicated on reflected ceiling plan(s) or center of acoustical panel, and support panels independently with at least two 3/4 inch metal channels spanning and secured to ceiling tees.
   d. Install at least one independent support rod or wire from structure to tab on panel with breaking strength of the weight of panel at a safety factor of 3.
4. Unless otherwise indicated, install shutoff valve and union or flange at each connection.
5. Provide tamper-proof, balancing valve with memory stop on return piping.
6. Provide float operated automatic air vents with stop valve.
7. Refer to Section 23 2113 and Section 23 2114 for additional requirements.

S. Hydronic Radiant Panel Heaters: Consult manufacturer's installation manual for panels not installed in ceiling systems.

2.3 CLEANING

A. After construction is completed, including painting, clean exposed surfaces of units. Vacuum clean coils and inside of cabinets.

B. Touch-up marred or scratched surfaces of factory-finished cabinets, using finish materials

furnished by manufacturer.

C. Install new filters after commissioning.

D. Clean all surfaces prior to installation.

2.4 CLOSEOUT ACTIVITIES

A. See Division 01 - General Requirements.

B. Demonstrate Operation of Controls for the following Equipment:
1. Active Chilled Beams
2. Air Coils
3. Convectors
4. Fan Coil Units
5. Hydronic Radiant heaters
6. Unit Heaters
7. Hydronic Radiant Ceiling Panel Heaters.
8. Hydronic Panel Radiators

2.5 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

B. Outdoor Equipment: Touch-up, repair, or replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 26 0400 - GENERAL CONDITIONS FOR ELECTRICAL TRADES

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. This section applies to certain sections of Division 08 “Openings”, Division 11 “Equipment”, Division 12 “Furnishings”, Division 21“Fire Protection, Division 22 “Plumbing”, Division 23 "Mechanical," Division 27 “Communications”, Division 28 “Electronic safety and Security”, Division 33 “Utilities” and this section applies to all sections of Division 26, "Electrical" of this project specification unless specified otherwise in the individual sections.

C. The Drawings of other trades Architectural, Structural, Landscape, Civil, Mechanical, Fire Protection and Plumbing, Food Service, Communications, and Electronic Safety and Security shall be examined for coordination and familiarity of work with other Contractors. Any duplication or omission of provisions in this project should be brought to the attention of the Owners prior to Bidding.

D. The drawings of equipment suppliers shall be examined for coordination and familiarity of work with Owner’s equipment suppliers.

1.2 DESCRIPTION

A. The General Conditions and Supplementary General Conditions are a part of this Division and are to be considered a part of this Contract.

B. Where items of the General Conditions and Supplementary General Conditions are repeated in other Sections of the Specifications, it is merely intended to qualify or to call particular attention to them. It is not intended that any other parts of the General Conditions and Supplementary General Conditions shall be assumed to be omitted if not repeated therein. This Section applies equally and specifically to all Contractors supplying labor and/or equipment and/or materials as required under each Section of this Division, (Division 27 and Division 28). Where conflicts exist between the drawings and the specifications or between this section of the specifications and other sections, the more stringent or higher cost option shall apply.

C. It is the intent of this Section of the Specifications to establish a standard of quality and performance characteristics for basic materials and installation methods used in building electrical (communications and electronic safety and security) systems.

1.3 HIGH PERFORMANCE BUILDINGS GENERAL REQUIREMENTS

A. Implement practices and procedures to meet the project's environmental goals, which include compliance with Connecticut Standard Guidelines Compliance Manual for High Performance Buildings, September 2011 with additional mandatory building project requirements for schools. Specific project goals which may impact this and the other sections of this specification include: use of recycled-content materials; use of locally-manufactured materials; use of low-emitting materials; use of certified wood products; construction waste recycling; and the implementation of a construction indoor air quality management plan. Ensure that the requirements related to these goals, as defined in this Section and other Sections of the contract documents, are implemented to the fullest extent. Substitutions or other changes to the work shall not be allowed if such changes substantially compromise the stated High Performance Building criteria.

B. Comply with Connecticut Standard Guidelines Compliance Manual for High Performance Buildings, September 2011 with additional mandatory building project requirements for schools and the Department of Administrative Services / Office of School Construction Grants High Performance School Construction Bulletin, September 2015.

1.4 INTENT

A. This contract is for all labor, materials and equipment required for installation. The system shall be complete and finished in all respects, tested and ready for operation. Work shall include calibration of equipment with factory settings. All materials, equipment and apparatus shall be new and of first class quality.

B. Any apparatus, appliance, material or work not shown on drawings but mentioned in the specifications, or vice versa, or any incidental accessories necessary to make the work complete and perfect in all respects and ready for operation as determined by good trade practice even if not particularly specified, shall be furnished, delivered and installed under their respective Divisions without any additional expense to the Owner.

C. Minor details not usually shown or specified but necessary for proper installation and operation shall be included in the work as though they were hereinafter shown or specified.

D. Work under each Section shall include giving written notice to the Owner and Engineer of any materials or apparatus believed inadequate or unsuitable; in violation of laws, ordinances, rules or regulations of authorities having jurisdiction; and any necessary items of work omitted. In the absence of such written notice, it is mutually agreed that work under each Section has included the cost of all required items for the accepted, satisfactory functioning of the entire system without extra compensation.

E. Location of all existing systems and equipment shown on floor plans is based on the best available information. The Contractor shall verify all dimensions and locations of existing systems and equipment in the field and adjust as necessary.

F. Certain items of existing equipment may be indicated for removal or relocation. Items noted for removal shall be disconnected and turned over to the Owner or disposed of by the Contractor if the Owner so requests. If instructed to dispose of items, the Contractor shall remove the items from the premises and dispose of them in a safe, legal and responsible manner and location. Items noted for relocation are intended for reuse in another location as designated on the Drawings. It shall be the responsibility of the Contractor to remove the material from its present location, store the material in a safe place and reinstall the material in its new location. Questions regarding the suitability of the material or equipment shall be brought to the attention of the Owner and Engineer in writing.

G. Wherever a particular piece of equipment, device or material is specifically indicated on the Drawings by model number, type, series or other means, that specification shall take precedence over equipment or materials specified herein. For example: If a particular switch is specified on the Drawings, its specification takes precedence over switch specified herein.

1.5 DEFINITIONS

A. Word “Subcontractor” means specifically the subcontractor working under this Division. Other Contractors are specifically designated “Plumbing Subcontractor”, “General Contractor” and so on. Note: Take care to ascertain limits of responsibility for connecting equipment which requires connections by two or more trades.

B. Word “install” shall mean set in place complete with all mounting facilities and connections as necessary ready for normal use or service.

C. Words “furnish” or “supply” shall mean purchase, deliver to, and off-load at the job site, all ready to be installed including where appropriate all necessary interim storage and protection.

D. Word “provide” shall mean furnish (or supply) and install as necessary.

E. Word “finished” refers to all rooms and areas scheduled to be painted in Room Finish Schedule on the drawings. All rooms and areas not covered in Schedule, including underground tunnels and areas above ceilings shall be considered not finished, unless otherwise noted.

F. No Exceptions Taken – reviewed and determined to be in general conformance with contract documents.

G. Words “approved equal” mean any product which in the opinion of the Engineer is equal in quality, arrangement, appearance, and performance to the product specified.

H. Word “wiring” shall mean cable assembly, raceway, conductors, fittings and any other necessary accessories to make a complete wiring system.

I. Word “product” shall mean any item of equipment, material, fixture, apparatus, appliance or accessory installed under this Division.

J. Substitutions: Requests for changes in products, materials, equipment, and methods of construction required by Contract Documents proposed by the Contractor after award of the Contract are considered requests for "substitutions."

K. Indicated: The term "indicated" refers to graphic representations, notes, or schedules on the Drawings, other paragraphs or schedules in the Specifications, and similar requirements in the Contract Documents. Where terms such as "shown," "noted," "scheduled," and "specified" are used, it is to help the reader locate the reference; no limitation on location is intended.

L. Directed: Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean "directed by the Engineer," "requested by the Engineer," and similar phrases.

M. Approve: The term "approved," where used in conjunction with the Engineer's action on the Contractor's submittals, applications, and requests, is limited to the Engineer's duties and responsibilities as stated in General and Supplementary Conditions.

N. Regulation: The term "Regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

O. Remove: The term “remove” means “to disconnect from its present position, remove from the premises and to dispose of in a legal manner.”

P. Standard Product Warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

Q. Special Warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

1.6 DRAWINGS

A. Drawings are diagrammatic and indicate the general arrangement of systems and work included in the Contract. Consult the Architectural Drawings and Details for exact

location of fixtures and equipment; where same are not definitely located, obtain this information from the Architect. (Do not scale the drawings)

B. Work under each Section shall closely follow Drawings in layout of work; check Drawings of other Divisions to verify spaces in which work will be installed. Maintain maximum headroom; where space conditions appear inadequate, Owner and Engineer shall be notified before proceeding with installations.

C. The Owner may, without extra charge, make reasonable modifications in the layout as needed to prevent conflict with work of other trades and/or for proper execution of the work.

D. Where variances occur between the Drawings and Specifications or within either of the Documents, the item or arrangement of better quality, higher rating, or higher value shall be included in the Contract price. The Owner and Engineer shall decide on the item and the manner in which the work shall be installed.

1.7 SURVEYS AND MEASUREMENTS

A. Before submitting his Bid, the Contractors shall visit the site and become thoroughly familiar with all existing conditions under which his work will be installed. This Contract includes all modifications of existing systems required for the installation of new equipment. This Contract includes all necessary offsets, transitions and modifications required to install all new equipment in existing spaces. All new and existing equipment and systems shall be fully operational under this Contract before the job is considered complete. The Contractors shall be held responsible for any assumptions he makes, any omissions or errors he makes as a result of his failure to become fully familiar with the existing conditions at the site and the Contract Documents.

B. The Contractor shall base all measurements, both horizontal and vertical, from established bench marks. All work shall agree with these established lines and levels. Verify all measurements at the site and check the correctness of same as related to the work.

C. Should the Contractor discover any discrepancies between actual measurements and those indicated which prevent following good practice or which interfere with the intent of the Drawings and Specifications, the Engineer will be notified and work will not proceed until instructions from the Engineer are received.

1.8 CODES AND STANDARDS

A. Reference Standard Compliance

1. Where equipment or materials are specified to conform to industry and technical society reference standards of the organizations such as American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM),

National Electrical Manufacturers Association (NEMA), and Underwriters Laboratories Inc. (UL), submit proof of such compliance. The label or listing by the specified organization will be acceptable evidence of compliance.

2. Independent Testing Organization Certificate: In lieu of the label or listing, indicated above submit a certificate from an independent testing organization, competent to perform testing, and approved by the engineer. The certificate shall state that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard.

B. The Following Codes and Standards for the state and local jurisdiction where the project is located as listed below apply to all electrical work. Wherever Codes and/or Standards are mentioned in these Specifications, the latest applicable edition or revision shall be followed:

Connecticut State Building Code Including all Supplements

Connecticut State Fire Safety Code Including all Supplements

School Construction Standards and Guidelines

Building Standards Guidelines – Compliance for High Performance Buildings

The International Building Code

The International Mechanical Code

The International Plumbing Code

NFPA 70, the National Electrical Code

Model Energy Code

NECA - 1 Standard for Good Workmanship in Electrical Construction

ASHRAE 90.1 and International Energy Conservation Code

C. The following Standards shall be used where referenced by the following abbreviations:

AIA	American Institute of Architects
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing and Materials
EPA	Environmental Protection Agency
FM	Factory Mutual
FSSC	Federal Specification

IEEE	Institute of Electrical and Electronics Engineers
NBS	National Bureau of Standards
NECA	National Electrical Contractors Association
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NSC	National Safety Council
OSHA	Occupational Safety and Health Administration
UL	Underwriters' Laboratories

D. All materials furnished and all work installed shall comply with the rules and recommendations of the NFPA, the requirements of the local utility companies, the recommendations of the fire insurance rating organization having jurisdiction and the requirements of all Governmental departments having jurisdiction.

E. The Contractor shall include in the work, without extra cost to the Owner, any labor, materials, services, apparatus and Drawings in order to comply with all applicable laws, ordinances, rules and regulations, whether shown on Drawings and/or specified or not.

1.9 PERMITS AND FEES

A. The Contractor shall give all necessary notices, obtain all permits; and pay all Government and State sales taxes and fees where applicable, and other costs, including utility connections or extensions in connection with the work, file all necessary Drawings, prepare all documents and obtain all necessary approvals of all Governmental and State departments having jurisdiction, obtain all required certificates of inspection for his work, and deliver a copy to the Owner and Engineer before request for acceptance and final payment for the work.

1.10 EQUIPMENT EQUIVALENTS AND SUBSTITUTIONS

A. Certain manufacturers of material, apparatus or appliances are indicated in the drawings and specifications for this project. These items have been used as the basis of design, and as a convenience in fixing the minimum standard of workmanship, finish and design that is required. If the Contractors uses an "approved equal" alternative to the basis of design, and if the features of that alternative have an impact on other components of the Project, the Contractor shall include the necessary adjustments in those components, whether for architectural, structural, mechanical, electrical, fire protection, or any other elements, plus any adjustments for difference in performance.

B. Where one name only is used and is followed by the words “or approved equal”, the Contractor must use the item named or he is required to apply for a substitution. Where one name only is used, the Contractor must use that item named.

C. Where no specific make of material, apparatus or appliance is mentioned, any first-class product made by a reputable manufacturer may be submitted for Architect and Engineer review.

D. Where the Contractor proposes to use an item that is different from the basis of design in the Drawings and specifications, and that will require the redesign of the structure, partitions, foundations, piping, wiring or any other component of the mechanical, electrical, or architectural layout, the Contractor shall provide the necessary redesign of those components.

E. Where the Contractor proposes to deviate (provide an equivalent or request for substitution) from the basis of design scheduled equipment or materials as hereinafter specified or shown on the drawings, they are required to submit a requested for substitution in writing. The Contractor shall state in their request whether it is a substitution, equivalent or a non approved equivalent to that specified and the amount of credit or extra cost involved. A copy of said request shall be included in the Base Bid with manufacturer’s equipment cuts. The Base Bid shall be based on using the materials and equipment as specified with no exceptions.

F. If an alternative or substitute item results in a difference in quantity and arrangement of piping, ductwork, valves, pumps, insulation, wiring, conduit, and equipment from that specified or indicated on the Drawings, the Contractor shall furnish and install any such additional equipment required by the system, at no additional cost to the Owner including any costs added to other trades due to the equivalent change from the basis of design detailed in the drawings or included within the specifications.

G. Equipment, material or devices submitted for review as an “equivalent” shall meet the following requirements:

1. The equivalent shall have the same construction features such as, but not limited to:
    a. Material thickness, gauge, weight, density, etc.
    b. Welded, riveted, bolted, etc., construction
    c. Finish, undercoating, corrosion protection
2. The equivalent shall perform with the same or better operating efficiency.
3. The equivalent shall be locally represented by the manufacturer for service, parts and technical information.

4. The equivalent shall bear the same labels of performance certification as is applicable to the specified item, such as UL or NEMA labels.

H. Equipment, material or devices submitted for review as a "substitution" shall meet the following requirements:

1. Substitution Request Submittal: Requests for substitution will be considered if received in writing 14 days before the bid date. Requests received later than 14 days before the bid date may be considered or rejected at the discretion of the Engineer/Owner. Once the Contractor submits a complete request for substitution as determined by the engineer, the engineer reserves the right to request the time necessary to evaluate the request for substitution and review it with the Owner.

2. Submit three (3) copies of each request for substitution for consideration.

3. Identify the product, or the fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:

a. Product Data, including Drawings and descriptions of products, fabrication and installation procedures.

b. Samples, where applicable or requested.

c. A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements such as size, weight, durability, performance and visual effect.

d. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Owner and separate Contractors that will become necessary to accommodate the proposed substitution.

e. A statement indicating the substitution's effect on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.

f. Cost information, including a proposal of the net change, if any in the Contract Sum.

g. Certification by the Contractor that the substitution proposed is equal-to or better in every significant respect to that required by the Contract Documents, and that it will perform adequately in the application indicated. Include the Contractor's waiver of rights to additional payment

or time that may subsequently become necessary because of the failure of the substitution to perform adequately.

h. Engineer's Action: Within one week of receipt of the request for substitution, the Engineer will notify the Contractor of acceptance or rejection of the proposed substitution. If a decision on use of a proposed substitute cannot be made or obtained within the time allocated, use the product specified by name. Acceptance of a product substitution will be in the form of an Addendum.

i. Other Conditions: The Contractor's substitution request will be received and considered by the Engineer when one or more of the following conditions are satisfied, as determined by the Engineer; otherwise requests will be returned without action except to record noncompliance with these requirements.

1) The request is directly related to an "or equal" clause or similar language in the Contract Documents.

2) The specified product or method of construction cannot be provided within the Contract Time. The request will not be considered if the product or method cannot be provided as a result of failure to pursue the Work promptly or coordinate activities properly.

3) A substantial advantage is offered the Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear. Additional responsibilities for the Owner may include additional compensation to the Engineer for redesign and evaluation services, increased cost of other construction by the Owner or separate Contractors, and similar considerations.

1.11 SUBMITTAL PROCEDURES

A. Provide Submittals in accordance with the requirements of Division 1 and as indicated in the following.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that require sequential activity.

2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals

concurrently for coordination. The Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing: Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for resubmittals.

1. Allow two weeks for initial review. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. The Engineer will promptly advise the Contractor when a submittal being processed must be delayed for coordination.

2. If an intermediate submittal is necessary, process the same as the initial submittal.

3. Allow two weeks for reprocessing each submittal.

4. No extension of Contract Time will be authorized because of failure to transmit submittals to the Engineer sufficiently in advance of the Work to permit processing.

D. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.

1. Include the following information on the label for processing and recording action taken.

a. Project name.

b. Date.

c. Name and address of Engineer.

d. Name and address of Contractor.

e. Name and address of subcontractor.

f. Name and address of supplier.

g. Name of manufacturer.

h. Number and title of appropriate Specification Section.

i. Drawing number and detail references, as appropriate.

E. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to Engineer using a transmittal form. Submittals received from sources other than the Contractor will be returned without action. On the transmittal, record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements,

including minor variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.

F. Except for submittals for record, information or similar purposes, where action and return is required or requested, the Engineer will review each submittal, mark to indicate action taken, and return promptly. Compliance with specified characteristics is the Contractor's responsibility.

G. Action Stamp: The Engineer will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, to indicate the action taken.

1.12 SHOP DRAWINGS

A. Submit newly prepared information, drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered Shop Drawings.

B. The Contractor shall submit for review detailed shop drawings of all equipment and material specified in each section and coordinated ductwork layouts. No material or equipment may be delivered to the job site or installed until the Contractor has received shop drawings for the particular material or equipment which have been properly reviewed. Shop drawings shall be submitted within 60 days after award of Contract before any material or equipment is purchased. The Contractor shall submit for review copies of all shop drawings to be incorporated in the Electrical Contract. Refer to the General Conditions and Supplementary General Conditions for the quantity of copies required for submission. Where quantities are not specified, provide seven (7) copies for review.

C. Provide shop drawings for all devices specified under equipment specifications for all systems including fire alarm, switchgear, clock, lighting, etc., or where called for elsewhere in the Specifications, or where scheduled on the drawings, or where called out on the drawings. Shop drawings shall include manufacturers' names, catalog numbers, cuts, diagrams, dimensions, identification of products and materials included, compliance with specified standards, notation of coordination requirements, notation of dimensions established by field measurement and other such descriptive data as may be required to identify and accept the equipment. A complete list in each category (example: all fixtures) of all shop drawings, performance cuts, material lists, etc., shall be submitted to the Engineer at one time. No consideration will be given to a partial shop drawing submittal.

D. Submittals shall be marked with the trade involved, i.e., Electrical, HVAC, Plumbing, Fire Protection, etc. when the submittal could involve more than one trade.

E. Where multiple quantities or types of equipment are being submitted, provide a cover sheet (with a list of contents) on the submittal identifying the equipment or material being submitted.

F. Failure to submit shop drawings in ample time for review shall not entitle the Contractor to an extension of Contract time. No claim for extension by reason of such default will be allowed, nor shall the Contractor be entitled to purchase, furnish and/or install equipment which has not been reviewed by the Engineer.

G. The Contractor shall furnish all necessary templates, patterns, etc., for installation work and for the purpose of making adjoining work conform; furnish setting plans and shop details to other trades as required.

H. Acceptance rendered on shop drawings shall not be considered as a guarantee of measurements or building conditions. Where drawings are reviewed, review does not mean that drawings have been checked in detail; said approval does not in any way relieve the Contractor from his responsibility or necessity of furnishing material or performing work as required by the Contract Drawings and Specifications. Verify available space prior to submitting shop drawings.

I. Acceptance of shop drawings shall not apply to quantity nor relieve Contractor of his responsibility to comply with intent of Drawings and Specifications.

J. Acceptance of shop drawings is final and no further changes will be allowed without the written consent of the Engineer.

K. Acceptance of shop drawings does not relieve the Contractor from submitting, coordinating and implementing schedules, forms, worksheets and similar as required for owner/operator input and approval as specified herein and required for proper system operation.

L. Shop drawing submittal sheets which may show items that are not being furnished shall have those items crossed off to clearly indicate which items will be furnished.

M. Bidders shall not rely on any verbal clarification of the Drawings and/or Specifications. Any questions shall be referred to the Engineer in writing at least five (5) working days prior to Bidding to allow for issuance of an Addendum.

N. Do not use Shop Drawings without an appropriate final stamp indicating action taken in connection with construction.

1.13 COORDINATION DRAWINGS

A. Prepare coordination drawings in accordance with Division 01 Section "PROJECT COORDINATION," to a scale of 1/4"=1'-0" or larger; detailing major elements, components, and systems of electrical equipment and materials in relationship with other

systems, installations, and building components. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:

1. Indicate the proposed locations of light fixtures, panelboards, conduits, cabinets, etc. Include the following:
2. Clearances for installing and maintaining insulation.
3. Clearances for servicing and maintaining equipment, including NEC requirements and space for equipment disassembly required for periodic maintenance.
4. Equipment connections and support details.
5. Exterior wall and foundation penetrations.
6. Fire-rated wall and floor penetrations.
7. Sizes and locations of required concrete pads and bases.

B. Indicate scheduling, sequencing, movement, and positioning of large equipment into the building during construction.

C. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.

D. Prepare reflected ceiling plans to coordinate and integrate installations, air outlets and inlets, light fixtures, communication systems components, sprinklers, and other ceiling-mounted items.

E. Electronic copies of the MEP floor plans are available to use as a basis for preparing coordination drawings and can be provided by the Engineer. If the Contractor elects to obtain the Engineers electronic files an Electronic File Release Form must be submitted with payment. This form must be signed by the Contractor, Owner, and Architect. Upon receipt of a signed copy of the Electronic File Release Form, and payment, the Engineer will provide copies of the electronic files for the Contractor's use. A copy of the Electronic File Release Form is appended to the end of this specification section

1.14 COORDINATION WITH OTHER DIVISIONS

A. All work shall be carried out in conjunction with other trades and full cooperation shall be given in order that all work may proceed with a minimum of delay and interference. Particular emphasis is placed on timely installation of major apparatus and furnishing other Contractors, especially the Contractor or Construction Manager, with information as to openings, chases, sleeves, bases, inserts, equipment locations, panels, etc., required by other trades.

B. The Contractors are required to examine all of the Project Drawings and mutually arrange work so as to avoid interference with the work of other trades. In general, ductwork, heating, condenser, chilled water piping, sprinkler piping and drainage lines take precedence over water, gas and electrical conduits. The Engineer shall make final decisions regarding the arrangement of work which cannot be agreed upon by the Contractors.

C. Where the work of the Contractor will be installed in close proximity to or will interfere with work of other trades, the Contractors will cooperate in working out space conditions to make a satisfactory adjustment.

D. If the work under a Section is installed before coordinating with other Divisions or Sections or so as to cause interference with work of other Sections, the necessary changes to correct the condition shall be made by the Contractor causing the interference without extra charge to the Owner.

E. Where work is installed prior to preparation and approval of the Coordination Drawings or in conflict with the approved Coordination drawings and if so directed in other Sections, the Contractor indicated shall prepare composite working drawings and sections clearly showing how the work is to be installed in relation to the work of other trades, at no extra charge to the Owner.

1.15 WORKMANSHIP

A. Service Support: The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

B. Modification of References: In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears.

C. The Contractor shall furnish the services of an experienced superintendent who shall be constantly in charge of the installation of the work together with all skilled workmen,

journeymen, electricians, helpers and laborers required to unload, transfer, erect, connect, adjust, start, operate and test each system.

D. Unless otherwise specifically indicated on the Drawings or Specifications, all equipment and materials shall be installed with the acceptance of the Engineer and in accordance with the recommendations of the manufacturer. This includes the performance of such tests as the manufacturer recommends.

E. All labor for installation of electrical systems shall be performed by experienced, skilled tradesmen under the supervision of a licensed journeyman foreman. All work shall be of a quality consistent with good trade practice and shall be installed in a neat, workmanlike manner. The Engineer reserves the right to reject any work which, in his opinion, has been installed in a substandard, dangerous or unserviceable manner. The Contractor shall replace said work in a satisfactory manner at no extra cost to the Owner.

1.16 SHUTDOWNS

A. When installation of a new system requires the temporary shutdown of an existing operating system, the connection of the new system shall be performed at such time as designated by the Owner.

B. The Engineer and the Owner shall be notified in writing of the estimated duration of the shutdown period at least ten (10) days in advance of the date the work is to be performed.

C. Work shall be arranged for continuous performance whenever possible. The Contractor shall provide all necessary labor, including overtime if required, to assure that existing operating services will be shut down only during the time actually required to make necessary connections.

1.17 TEMPORARY UTILITIES

A. General: Provide new materials and equipment; if acceptable to the Engineer, undamaged previously used materials in serviceable condition may be used. Provide materials suitable for the use intended.

B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities, or permit them to interfere with progress. Do not allow hazardous dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.

C. First Aid Supplies: Comply with governing regulations.

D. Fire Extinguishers: Provide hand-carried, portable UL-rated, class "A" fire extinguishers for temporary offices and similar spaces. In other locations provide hand-carried, portable, UL-rated, class "ABC" dry chemical extinguishers, or a combination of extinguishers of NFPA recommended classes for the exposures.

E. Provide temporary lighting in all areas, throughout construction activities.

1. Use Charges: Cost or use charges for temporary facilities are not chargeable to the Owner or Engineer, and will not be accepted as a basis of claims for a Change Order.

2. Temporary Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload protected disconnects, automatic ground-fault interrupters, and main distribution switch gear.

a. Except where overhead service must be used, install electric power service underground.

b. Power Distribution System: Install wiring overhead, and rise vertically where least exposed to damage. Where permitted, wiring circuits not exceeding 125 Volts, AC 20 ampere rating, and lighting circuits may be nonmetallic sheathed cable where overhead and exposed for surveillance.

3. Temporary Telephones: Provide temporary telephone service for all personnel engaged in construction activities, throughout the construction period.

F. Environmental Protection: Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result. Avoid use of tools and equipment which produce harmful noise. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near the site.

G. Termination and Removal: Unless the Engineer requires that it be maintained longer, remove each temporary facility when the need has ended, or when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces and replace construction that cannot be satisfactorily repaired. Materials and facilities that constitute temporary facilities are property of the Contractor. The Owner reserves the right to take possession of Project identification signs.

1.18 PROJECT PHASING

A. Work under each Section shall include all necessary temporary connections, equipment, conduit, wiring, fire alarm equipment and testing, lighting and emergency lighting, fire stopping, connection of necessary mechanical equipment, labor, and material as necessary to accommodate the phasing of Construction as developed by the General Contractor or Construction Manager and approved by the Owner. All existing systems that pass-thru an area of the building or are required to be maintained in a phased fashion

during construction shall remain operational during all phases of construction. No extra compensation shall be granted the Contractor for work required to maintain existing systems operational or to accommodate the construction phasing of the project.

1.19 PROTECTION OF MATERIALS AND EQUIPMENT

A. Work under each Section shall include protecting the work and material of all other Sections from damage by work or workmen and shall include making good all damage thus caused.

B. The Contractor shall be responsible for work and equipment until the facility has been accepted by the Owner. Protect work against theft, injury or damage and carefully store material and equipment received on site which is not immediately installed. Close open ends of work with temporary covers or plugs during construction to prevent entry of foreign material.

C. Work under each Section includes receiving, unloading, uncrating, storing, protecting, setting in place and completely connecting equipment supplied under each Section. Work under each Section shall also include exercising special care in handling and protecting equipment and fixtures, and shall include the cost of replacing any of the equipment and fixtures which are missing or damaged.

D. Equipment and material stored on the job site shall be protected from the weather, vehicles, dirt and/or damage by workmen or machinery. Insure that all electrical or absorbent equipment or material is protected from moisture during storage.

1.20 ADJUSTING AND TESTING

A. After all the equipment and accessories to be furnished are in place, they shall be put in final adjustment and subjected to such operating tests so as to assure the Engineer that they are in proper adjustment and in satisfactory, permanent operating condition.

B. Where requested by the Engineer or specified in the contract documents, a factory-trained service representative shall inspect the installation and assist in the initial startup and adjustment to the equipment. The period of these services shall be for such time as necessary to secure proper installation and adjustments. After the equipment is placed in permanent operation, the service representative shall supervise the initial operation of the equipment and instruct the personnel responsible for operation and maintenance of the equipment. The service representative shall notify the Contractor in writing that the equipment was installed according to manufacturer's recommendations and is operating as intended by the manufacturer. Factory start-up reports shall be included in the operation and maintenance manuals under the appropriate equipment section.

1.21 CLEANING

A. The Contractor shall thoroughly clean all equipment of all foreign substances, oils, dust, dirt, etc., inside and out before final acceptance by the Engineer.

B. If any part of a system should be stopped or damaged by any foreign matter after being placed in operation, the system shall be disconnected, cleaned and reconnected wherever necessary to locate and/or remove obstructions. Any work damaged in the course of removing obstructions shall be repaired or replaced when the system is reconnected at no additional cost to the Owner.

C. During the course of construction, all conduits shall be capped in an acceptable manner to insure adequate protection against the entrance of foreign matter.

D. Upon completion of all work under the Contract, the Contractor shall remove from the premises all rubbish, debris and excess materials left over from his work.

E. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.

1. Remove labels that are not permanent labels.

2. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compound and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.

3. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films and similar foreign substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors broom clean. Vacuum carpeted surfaces and panelboard interiors.

4. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean light fixtures and lamps.

F. Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove and dispose of ALL waste materials, packaging material, skids etc. from the site and dispose of in a lawful manner in accordance with municipal, state and federal regulations.

G. Where extra materials of value remaining after completion of associated Work have become the Owner's property, arrange for disposition of these materials as directed.

1.22 OPERATING AND MAINTENANCE

A. Upon completion of all work and tests, the Contractor shall furnish the necessary skilled labor and helpers for operating his system and equipment for a period specified under each applicable Section of this Division. During this period, he shall fully instruct the Owner or the Owner's representative in the operation, adjustment and maintenance of all equipment furnished. The Contractor shall give at least seven (7) day notice to the Owner and the Engineer in advance of this period.

B. The Contractor shall include the maintenance schedule for the principal items of equipment furnished under this Division.

C. The Contractor shall physically demonstrate procedures for all routine maintenance of all equipment furnished under each respective Section to assure accessibility to all devices.

D. An authorized manufacturer's representative shall attest in writing that the equipment has been properly installed prior to startup of any major equipment. At a minimum, the following equipment will require this inspection: emergency generator, fire alarm system, nurse call system, paging systems, etc. These letters will be bound into the operating and maintenance books.

E. Refer to individual trade Sections for any other particular requirements related to operating instructions.

F. Demonstration shall be recorded on CD Rom with two (2) discs turned over to the Owner.

1.23 OPERATING AND MAINTENANCE MANUALS

A. Prepare operating and maintenance manuals in accordance with the requirements of Division 1 and as follows. The Contractor shall prepare six (6) copies of a complete maintenance and operating instructions manual, bound in booklet form. Organize operating and maintenance data into suitable sets of manageable size. Bind properly indexed data in individual heavy-duty, 3-ring, vinyl-covered binders, with pocket folders for folded sheet information. Mark appropriate identification on front and spine of each binder.

B. Manual shall include the following:

1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.

2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping,

shutdown, and emergency instructions; and summer and winter operating instructions.

3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.

4. Servicing instructions and lubrication charts and schedules.

5. Emergency instructions.

6. Spare parts list.

7. Copies of warranties.

8. Wiring diagrams.

9. Recommended "turn around" cycles.

10. Inspection procedures.

11. Shop Drawings and Product Data.

12. Equipment start-up reports.

C. Include in the manual, a tabulated equipment schedule for all equipment. Schedule shall include pertinent data such as: make, model number, serial number, voltage, normal operating current, belt size, filter quantities and sizes, bearing number, etc. Schedule shall include maintenance to be done and frequency.

D. Maintenance and instruction manuals shall be submitted to the Owner at the same time as the seven (7) day notice is given prior to the instruction period.

1.24 ACCEPTANCES

A. The equipment, materials, workmanship, design and arrangement of all work installed under the Electrical Sections shall be subject to the review of the Engineer.

B. Within 30 days after the awarding of a Contract, the Electrical Contractor shall submit to the Engineer, for review, a list of manufacturers of equipment proposed for the work under the Electrical Sections. The intent to use the exact makes specified does not relieve the Contractor of the responsibility of submitting such a list.

C. If extensive or unacceptable delivery time is expected on a particular item of equipment specified, the Contractor shall notify the Owner and Engineer, in writing, within 30 days of the awarding of the Contract. In such instances, deviations may be made pending acceptance by the Engineer or the Owner’s representative.

D. Where any specific material, process or method of construction or manufactured article is specified by reference to the catalog number of a manufacturer, the Specifications are to be used as a guide and are not intended to take precedence over the basic duty and performance specified or noted on the Drawings. In all cases, the Electrical Contractor shall verify the duty specified with the specific characteristics of the equipment offered for review. Equipment characteristics are to be used as mandatory requirements where the Contractor proposes to use an acceptable equivalent.

E. If material or equipment is installed before it is reviewed and/or approved, the Contractor shall be liable for its removal and replacement at no extra charge to the Owner if, in the opinion of the Engineer, the material or equipment does not meet the intent of, or standard of quality implied by, the Drawings and Specifications.

F. Failure on the part of the Engineer to reject shop drawings or to reject work in progress shall not be interpreted as acceptance of work not in conformance with the Drawings and/or Specifications. Work not in conformance with the Drawings and/or Specifications shall be corrected whenever it is discovered.

1.25 RECORD DRAWINGS

A. General: Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the Engineer's reference during normal working hours.

B. Record Drawings: Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark whichever drawing is most capable of showing conditions fully and accurately; where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.

1. Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the Work.

2. Mark new information that is important to the Owner, but was not shown on Contract Drawings or Shop Drawings.

3. Note related Change Order numbers where applicable.

4. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each set.

5. Final record documents shall be prepared in the latest AutoCad version and digital media for all drawings and a clean set of reproducible paper copies shall be turned over to the Owner at the completion of the work.

1.26 WARRANTIES AND BONDS

A. The following general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturers standard warranties on products and special warranties are to be included:

1. General close-out requirements included in Section "Project Close-out."

2. Specific requirements for warranties for the Work and products and installation that are specified to be warranted, are included in the individual Sections of Divisions 02 through 28.

3. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.

B. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

C. Separate Prime Contracts: Each prime Contractor is responsible for warranties related to its own Contract.

1.27 WARRANTY REQUIREMENTS

A. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.

B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

D. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, right and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.

E. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.

F. The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

G. Submit written warranties to the Engineer prior to the date certified for Substantial Completion. If the Engineer's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Engineer.

H. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Engineer within fifteen days of completion of that designated portion of the Work.

I. When a special warranty is required to be executed by the Contractor, or the Contractor and a subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner through the Engineer for approval prior to final execution.

1. Refer to individual Sections of Divisions 26 through 28 for specific content requirements, and particular requirements for submittal of special warranties.

J. Form of Submittal: At Final Completion compile two copies of each required warranty and bond properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.

K. Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2" by 11" paper.

1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address and telephone number of the installer.

2. Identify each binder on the front and the spine with the typed or printed title "WARRANTIES AND BONDS," the Project title or name, and the name of the Contractor.

3. When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

1.28 GUARANTEES

A. The Contractor shall guarantee all material and workmanship under these Specifications and the Contract for a period of one (1) year from the date of final acceptance by Owner. During this guarantee period, all defects developing through faulty equipment, materials or workmanship shall be corrected or replaced immediately by this Contractor without expense to the Owner. Such repairs or replacements shall be made to the Engineers satisfaction.

B. Contractor shall provide name, address, and phone number of all contractors and subcontractors and associated equipment they provided

1.29 PROJECT CLOSE-OUT

A. Contractor shall submit annual maintenance proposal to the Architect/Engineer for review and approval as part of the close out documents.

B. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents.

C. Deliver tools, spare parts, extra stock, and similar items.

D. Complete start-up testing of systems, and instruction of the Owner's operating and maintenance personnel. Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.

E. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.

F. Inspection Procedures: On receipt of a request for inspection, the Engineer will either proceed with inspection or advise the Contractor of unfilled requirements. The Engineer will prepare the Certificate of Substantial Completion following inspection or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.

1. The Engineer will repeat inspection when requested and assured that the Work has been substantially completed.

2. Results of the completed inspection will form the basis of requirements for final acceptance.

END OF SECTION

Electronic File Release Form

DELIVERY OF ELECTRONIC FILES FOR: _____
Project Name

In accepting and utilizing any drawings or other data on any form of electronic media generated and provided by the Design Professional, the Client covenants and agrees that all such drawings and data are instruments of service of the Design Professional, who shall be deemed the author of the drawings and data, and shall retain all common law, statutory law and other rights, including copyrights.

The Client further agrees not to use these drawings and data, in whole or in part, for any purpose or project other than the project which is the subject of this Agreement. The Client agrees to waive all claims against the Design Professional resulting in any way from any unauthorized changes or reuse of the drawings and data for any other project by anyone other than the Design Professional.

In addition, the Client agrees, to the fullest extent permitted by law, to indemnify and hold the Design Professional harmless from any damage, liability or cost, including reasonable attorneys' fees and costs of defense, arising from any changes made by anyone other than the Design Professional or from any reuse of the drawings and data without the prior written consent of the Design Professional.

Under no circumstances shall transfer of the drawings and other instruments of service on electronic media for use by the Client be deemed a sale by the Design Professional, and the Design Professional makes no warranties, either express or implied, of merchantability and fitness for any particular purpose.

_____ _____
Client's Signature Date

_____
Company - Title

_____ _____
Architects' Signature Date

_____
Firm - Title

_____ _____
Owner's Signature Date

_____
Company - Title

SECTION 26 0503 - EQUIPMENT WIRING CONNECTIONS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes electrical connections to equipment.

1.2 RELATED SECTIONS

A. Division 01 – General Requirements

B. Section 260400 – General Conditions for Electrical Trades.

C. All of Division 26 Sections.

1.3 REFERENCE STANDARDS

A. National Electrical Manufacturers Association:
   1. NEMA WD 1 - General Requirements for Wiring Devices.
   2. NEMA WD 6 - Wiring Devices-Dimensional Requirements.

1.4 SUBMITTALS

A. See Division 01 - General Requirements

B. Product Data: Submit device manufacturer’s catalog information showing dimensions, configurations, and construction.

C. Provide manufacturer's installation instructions.

1.5 QUALITY ASSURANCE

A. Comply with NFPA 70.

B. Comply with latest adopted version of applicable building code, including any addendum or supplements.

1.6 CLOSEOUT SUBMITTALS

A. See Division 01- General Requirements

B. Project Record Documents: Record actual locations, sizes, and configurations of equipment connections.

1.7 COORDINATION

A. See Division 01 - General Requirements

B. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.

C. Determine connection locations and requirements.

D. Sequence rough-in of electrical connections to coordinate with installation of equipment.

E. Sequence electrical connections to coordinate with start-up of equipment.

PART 2 PRODUCTS

2.1 ATTACHMENT PLUGS

A. Manufacturers:
1. Hubbell.
2. Leviton.
3. Legrand / Pass & Seymour
4. Substitutions: Division 01 - General Requirements.

B. Attachment Plug Construction: Conform to NEMA WD 1.

C. Configuration: NEMA WD 6; match receptacle configuration to outlet furnished for equipment.

D. Rating: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.

2.2 FLEXIBLE CORD

A. Manufacturers:
1. General Cable.
2. Southwire Company.
3. Hubbell Incorporated.
4. Substitutions: Division 01 - General Requirements.

B. Cord Construction:
1. Type SJO multi-conductor flexible cord with identified neutral and equipment grounding conductor suitable for use in damp locations.
2. Rating: 600V, amperage to match full load or MCA rating of equipment being served, sized per NFPA 70, Article 400.5.
3. Conductor Identification:
   a. Neutral:
      1) White or gray colored braid.

2) Colored tracer in the braid.
3) White, gray, or light blue insulation.
4) Ridges, grooves, or white stripes on the exterior of the cord.

b. Equipment Grounding Conductor:
1) Continuous green color.
2) Continuous identifying marker distinguishing it from the other conductors.

C. Connectors:
1. Type: All steel fitting with gland nut, seal, and bushing for securing cable.
2. Suitable for use for passing cord thru enclosure or bulkhead.
3. Provide with suitable NEMA rating for application.

D. Strain Relief:
1. Type: Aluminum fitting with galvanized steel mesh, duct-tight
2. Suitable for size and type of flexible cord being used.

PART 3 EXECUTION

3.1 EXAMINATION

A. Division 01 - Administrative Requirements: Coordination and project conditions.

B. Verify equipment is ready for electrical connection, for wiring, and to be energized.

3.2 INSTALLATION

A. Make conduit connections to equipment using flexible metal conduit. Use liquidtight flexible metal conduit with watertight connectors in damp or wet locations.

B. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.

C. Provide receptacle outlet and plate to accommodate connection to attachment plug.

D. Provide flexible cord and cord-cap for field-supplied attachment plug. Coordinate exact requirements with equipment supplier.

E. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.

F. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.

G. Install terminal block jumpers to complete equipment wiring requirements.

H. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

I. Coolers and Freezers: Coordinate the location of openings in freezer and cooler walls, floor, and ceilings with equipment supplier. Seal openings.

J. Install conduit and wiring for interconnection of motorized door operator and motorized fire door control stations, safety devices and accessories to complete equipment wiring requirements.

K. Install conduit and wiring for interconnection of specialty equipment (motorized divider partitions, scoreboards, motorized backboards, shot clocks, motorized shades…etc.) control stations, safety devices and accessories to complete equipment wiring requirements.

L. Install conduit and wiring for interconnection of receptacles, lighting and switches furnished with equipment (fume hoods, food service equipment, furnishings…etc.).

M. Install conduit and wiring for interconnection of alarm initiating devices, control panels and annunciators furnished with equipment.

N. Install conduit and wiring for interconnection of power supplies furnished by other divisions.

O. Install conduit and wiring for interconnection of fire alarm initiating devices, control panels, motors, disconnect switches, and card access equipment and furnished with elevator equipment.

3.3 ADJUSTING

A. See Division 01 – General Requirements.

B. Cooperate with utilization equipment installers and field service personnel during checkout and starting of equipment to allow testing and balancing and other startup operations. Provide personnel to operate electrical system and checkout wiring connection components and configurations.

3.4 EQUIPMENT CONNECTION SCHEDULE

A. Refer to drawings.

END OF SECTION

SECTION 26 0519 - ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.1 APPLICABLE PRODUCTS

A. Single conductor building wire.

B. Underground feeder and branch-circuit cable.

C. Metal-clad cable.

D. Mineral Insulated Cable (Type M.I.)

E. Wiring connectors.

F. Electrical tape.

G. Heat shrink tubing.

H. Wire pulling lubricant.

I. Cable ties.

1.2 RELATED REQUIREMENTS

A. Division 01 – General Requirements.

B. Division 07 – Thermal and Moisture Protection.

C. Section 26 0505 – Electrical Demolition : Disconnection, removal, and/or extension of existing electrical conductors and cables.

D. Section 26 0526 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.

E. Section 26 0536 - Cable Trays for Electrical Systems: Additional installation requirements for cables installed in cable tray systems.

F. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

G. Section 28 3100 - Fire Detection and Alarm: Fire alarm system conductors and cables.

H. Section 31 2316 - Excavation.

I. Section 31 2316.13 - Trenching: Excavating, bedding, and backfilling.

J. Section 31 2323 - Fill: Bedding and backfilling.

1.3 REFERENCE STANDARDS

A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013.

B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011.

C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010 (Reapproved 2014).

D. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape; 2010.

E. ASTM D4388 - Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes; 2013.

F. FS A-A-59544 - Cable and Wire, Electrical (Power, Fixed Installation); Federal Specification; Revision A, 2008.

G. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

H. NECA 120 - Standard for Installing Armored Cable (AC) and Metal-Clad Cable (MC); 2012.

I. NECA 121 - Standard for Installing Nonmetallic-Sheathed Cable (Type NM-B) and Underground Feeder and Branch-Circuit Cable (Type UF); 2007.

J. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; 2009.

K. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.

L. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

M. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.

N. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.

O. UL 183 - Manufactured Wiring Systems; Current Edition, Including All Revisions.

P. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.

Q. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.

R. UL 486D - Sealed Wire Connector Systems; Current Edition, Including All Revisions.

S. UL 493 - Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables; Current Edition, Including All Revisions.

T. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.

U. UL 719 – Nonmetallic-Sheathed Cables; Current Edition, Including All Revisions.

V. UL 854 – Service-Entrance Cables; Current edition, Including All Revisions.

W. UL 1277 - Electrical Power and Control Tray Cables with Optional Optical-Fiber Members; Current Edition, Including All Revisions.

X. UL 1569 - Metal-Clad Cables; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
2. Coordinate the installation of direct burial cable with other trades to avoid conflicts with piping or other potential conflicts.
3. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
4. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.5 SUBMITTALS

A. See Division 01 – General Requirements.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.

C. Sustainable Design Documentation: Submit manufacturer's product data on conductor and cable showing compliance with specified lead content requirements.

D. Manufactured Wiring System Shop Drawings: Provide plan views indicating proposed system layout with components identified; indicate branch circuit connections.

E. Field Quality Control Test Reports.

F. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

G. Project Record Documents: Record actual installed circuiting arrangements. Record actual routing for underground circuits.

H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Division 01 – General Requirements.
2. Extra Manufactured Wiring System Cable Assemblies: One of each configuration, 6 foot lengths.

1.6 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

1.8 FIELD CONDITIONS

A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F, unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Architect and obtain direction before proceeding with work.

PART 2 PRODUCTS

2.1 CONDUCTOR AND CABLE APPLICATIONS

A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.

B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.

C. Nonmetallic-sheathed cable is not permitted, unless noted otherwise.

D. Service entrance cable is not permitted, unless noted otherwise.

E. Armored cable is not permitted.

F. Metal-clad cable is permitted as follows:
1. Where not otherwise restricted, may be used:
a. Where concealed above accessible ceilings for final connections from junction boxes to luminaires.
1) Maximum Length: 6 feet.
b. Where concealed in hollow stud walls, above accessible ceilings, and under raised floors for branch circuits up to 20 A.
1) Exception: Provide single conductor building wire in raceway for circuit homerun from first outlet to panelboard.
2. In addition to other applicable restrictions, may not be used:
a. Life Safety or Critical Power.
b. Homeruns from first device, such as lighting fixture, MEP equipment, wiring device to panelboards.
c. Where not approved for use by the authority having jurisdiction.
d. Where exposed to view.
e. Where exposed to damage.
f. For damp, wet, or corrosive locations.
g. For isolated ground circuits, unless provided with an additional isolated/insulated grounding conductor.
h. For patient care areas requiring redundant grounding, unless using HCFC Type cable.

G. Manufactured wiring systems are permitted only as follows:
1. Where not otherwise restricted, may be used:
a. For branch circuits where concealed under raised floors, where concealed above accessible ceilings for lighting.
1) Exception: Provide single conductor building wire in raceway for circuit homerun from distribution box to panelboard.
b. For general purpose, non-essential electrical systems in non-hazardous patient care areas of health care facilities, when provided with additional insulated grounding conductor for redundant grounding.

H. Mineral Insulated Cable permitted as follows:
1. Rated Feeders requiring a 2-hour protective rating.
2. Fire Alarm and Control Circuits requiring survivability rating.

2.2 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

A. Provide products that comply with requirements of NFPA 70.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Provide conductors and cables with lead content less than 300 parts per million.

D. Provide new conductors and cables manufactured not more than one year prior to installation.

E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.

F. Comply with NEMA WC 70.

G. Comply with FS A-A-59544 where applicable.

H. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.

I. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.

J. Conductors for Grounding and Bonding: Also comply with Section 26 0526.

K. Conductors and Cables Installed in Cable Tray: Listed and labeled as suitable for cable tray use.

L. Conductors and Cables Installed Where Exposed to Direct Rays of Sun: Listed and labeled as sunlight resistant.

M. Conductors and Cables Installed Exposed in Spaces Used for Environmental Air (only where specifically permitted): Plenum rated, listed and labeled as suitable for use in return air plenums.

N. Conductor Material:
1. Provide copper conductors specifically indicated. Conductor sizes indicated are based on copper 75 degree C ratings.
2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, or ASTM B8 unless otherwise indicated.
3. Tinned Copper Conductors: Comply with ASTM B33.

O. Minimum Conductor Size:
1. Branch Circuits: 12 AWG.
   a. Exceptions:
      1) 20 A, 120 V circuits longer than 75 feet 10 AWG minimum, and sized for voltage drop.
      2) 20 A, 120 V circuits longer than 150 feet 8 AWG minimum, and sized for voltage drop.
      3) 20 A, 277 V circuits longer than 150 feet: 10 AWG minimum, and sized for voltage drop.
2. Control Circuits: 14 AWG.

P. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

Q. Conductor Color Coding:
1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
2. Color Coding Method: Integrally colored insulation.

a. Conductors size 4 AWG and larger may have black insulation color coded using vinyl color coding electrical tape.

3. Color Code:
   a. 480Y/277 V, 3 Phase, 4 Wire System:
      1) Phase A: Brown.
      2) Phase B: Orange.
      3) Phase C: Yellow.
      4) Neutral/Grounded: Gray.
   b. 208Y/120 V, 3 Phase, 4 Wire System:
      1) Phase A: Black.
      2) Phase B: Red.
      3) Phase C: Blue.
      4) Neutral/Grounded: White.
   c. 240/120 V, 1 Phase, 3 Wire System:
      1) Phase A: Black.
      2) Phase B: Red.
      3) Neutral/Grounded: White.
   d. Equipment Ground, All Systems: Green.
   e. Isolated Ground, All Systems: Green with yellow stripe.
   f. Travelers for 3-Way and 4-Way Switching: Pink.
   g. For modifications or additions to existing wiring systems, comply with existing color code when existing code complies with NFPA 70 and is approved by the authority having jurisdiction.
   h. For control circuits, comply with manufacturer's recommended color code.

2.3 SINGLE CONDUCTOR BUILDING WIRE

A. Manufacturers:
   1. Copper Building Wire:
      a. Cerro Wire LLC.
      b. Southwire Company
      c. General Cable Technologies
      d. Substitutions: See Section 01 - Product Requirements.

B. Description: Single conductor insulated wire.

C. Conductor Stranding:
   1. Feeders and Branch Circuits:
      a. Size 10 AWG and Smaller: Solid.
      b. Size 8 AWG and Larger: Stranded.
   2. Control Circuits: Stranded.

D. Insulation Voltage Rating: 600 V.

E. Insulation:
   1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.
      a. Installed Underground: Type XHHW-2.

2.4 METAL-CLAD CABLE

A. Manufacturers:
   1. AFC Cable Systems Inc.
   2. Encore Wire Corporation
   3. Southwire Company
   4. General Cable Technologies
   5. Substitutions: See Section 01 - Product Requirements.

B. Description: NFPA 70, Type MC cable listed and labeled as complying with UL 1569, and listed for use in classified firestop systems to be used.

C. Conductor Stranding:
   1. Size 10 AWG and Smaller: Solid.
   2. Size 8 AWG and Larger: Stranded.

D. Insulation Voltage Rating: 600 V.

E. Insulation: Type THHN, THHN/THWN, or THHN/THWN-2.

F. Provide oversized neutral conductors where indicated or required.

G. Provide dedicated neutral conductor for each phase conductor where indicated or required.

H. Grounding: Full-size integral equipment grounding conductor.
   1. Provide additional isolated/insulated grounding conductor where indicated or required.

I. Armor: Steel, interlocked tape.

J. Provide PVC jacket applied over cable armor where indicated or required for environment of installed location.

2.5 MINERAL INSULATED CABLE (TYPE M.I.)

A. Rating: M.I. cables shall be U.L. Listed and rated for 2 hours fire resistivity.

B. Handling: Cables shall be installed, stored, prepared, and terminated per manufacturer's requirements.

C. Splices: Splices shall be performed by manufacturer's representative or certified personnel trained in proper termination techniques.

D. Supports: Provide cable supports at 3'-0" max. horizontally, 6'-0" max. vertically. Anchors shall be steel.

E. Configuration: Single conductors run together to form multi-phase feeders shall be installed in a tri-foil configuration. All sheaths shall maintain contact with each other

until entering into termination enclosure. Provide stainless steel straps to form bundles. Straps shall be installed at 3'-0" max. horizontal and vertical runs.

F. Sheath material: Seamless soft-drawn copper.

G. Lugs: Cables shall terminate on approved lugs.

H. Manufacturers: Pyrotenax/Pentair.

2.6 WIRING CONNECTORS

A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.

B. Connectors for Grounding and Bonding: Comply with Section 26 0526.

C. Wiring Connectors for Splices and Taps:
1. Copper conductors 10 AWG and smaller: Install insulated spring wire connectors with plastic caps
2. Copper Conductors Size 8 AWG: Install solderless pressure connectors with insulating covers
3. Copper Conductors Size 6 AWG and larger: Install pressure connectors or split bolt connectors.

D. Wiring Connectors for Terminations:
1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
2. Provide compression adapters for connecting conductors to equipment furnished with mechanical lugs when only compression connectors are specified.
3. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.
4. Provide motor pigtail connectors for connecting motor leads in order to facilitate disconnection.
5. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.
6. Stranded Conductors Size 10 AWG and Smaller: Use crimped terminals for connections to terminal screws.
7. Conductors for Control Circuits: Use crimped terminals for all connections.

E. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.

F. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.

G. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.
   1. Manufacturers:
      a. 3M
      b. Ideal Industries, Inc.
      c. NSI Industries LLC.
      d. Ilsco
      e. Erico
      f. Substitutions: See Division 01 – General Requirements.

H. Mechanical Connectors: Provide bolted type or set-screw type.
   1. Manufacturers:
      a. Burndy LLC.
      b. Ilsco
      c. Thomas & Betts Corporation
      d. Substitutions: See Division 01 – General Requirements.

I. Compression Connectors: Provide circumferential type or hex type crimp configuration.
   1. Manufacturers:
      a. Burndy LLC.
      b. Ilsco
      c. Thomas & Betts Corporation
      d. Erico
      e. Substitutions: See Division 01 – General Requirements.

J. Crimped Terminals: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.
   1. Manufacturers:
      a. Burndy LLC.
      b. Ilsco
      c. Thomas & Betts Corporation
      d. Substitutions: See Division 01 – General Requirements.

2.7 WIRING ACCESSORIES

A. Electrical Tape:
   1. Manufacturers:
      a. 3M
      b. Plymouth Rubber Europa
      c. Substitutions: See Division 01 – General Requirements.
   2. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F .
   3. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.

4. Rubber Splicing Electrical Tape: Ethylene Propylene Rubber (EPR) tape, complying with ASTM D4388; minimum thickness of 30 mil; suitable for continuous temperature environment up to 194 degrees F and short-term 266 degrees F overload service.

B. Heat Shrink Tubing: Heavy-wall, split-resistant, with factory-applied adhesive; rated 600 V; suitable for direct burial applications; listed as complying with UL 486D.
1. Manufacturers:
   a. 3M
   b. Burndy LLC.
   c. Thomas & Betts Corporation
   d. Substitutions: See Division 01 – General Requirements.

C. Oxide Inhibiting Compound: Listed; suitable for use with the conductors or cables to be installed.
1. Manufacturers:
   a. Burndy LLC.
   b. Ideal Industries, Inc.
   c. Ilsco
   d. Substitutions: See Division 01 – General Requirements.

D. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.
1. Manufacturers:
   a. 3M
   b. American Polywater Corporation
   c. Ideal Industries, Inc.
   d. Substitutions: See Division 01 – General Requirements.

E. Cable Ties: Material and tensile strength rating suitable for application.
1. Manufacturers:
   a. Burndy LLC.
   b. Substitutions: See Section 01 - Product Requirements.
2. Provide plenum rated cable ties.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that interior of building has been protected from weather.

B. Verify that work likely to damage wire and cable has been completed.

C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.

D. Verify that field measurements are as shown on the drawings.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.2 PREPARATION

A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.3 INSTALLATION

A. Circuiting Requirements:
   1. Unless dimensioned, circuit routing indicated is diagrammatic.
   2. When circuit destination is indicated and routing is not shown, determine exact routing required.
   3. Arrange circuiting to minimize splices.
   4. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
   5. Maintain separation of wiring for emergency systems in accordance with NFPA 70.
   6. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are shown as separate, combining them together in a single raceway is not permitted. Where combining branch circuit in a single raceway is indicated:
      a. Dedicated neutral conductors are considered current-carrying conductors.
      b. Increase size of conductors as required accounting for ampacity derating.
      c. Size raceways, boxes, etc. to accommodate conductors.
   7. Common Neutrals: Not allowed.

B. Install products in accordance with manufacturer's instructions.

C. Perform work in accordance with NECA 1 (general workmanship).

D. Install nonmetallic-sheathed cable (Type NM-B) in accordance with NECA 121.

E. Install metal-clad cable (Type MC) in accordance with NECA 120.

F. Installation in Raceway:
   1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
   2. Pull all conductors and cables together into raceway at same time.
   3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
   4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.

G. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.

H. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent su

pport from building structure. Do not provide support from raceways, piping, ductwork, or other systems.

1. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conductors and cables to lay on ceiling tiles.
2. Installation in Vertical Raceways: Provide supports where vertical rise exceeds permissible limits.

I. Terminate cables using suitable fittings.

1. Metal-Clad Cable (Type MC):
   a. Use listed fittings.
   b. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.
   c. Do not use direct-bearing set-screw type fittings for cables with aluminum armor.
   d. Secure at maximum interval of 5 ft.
   e. Install parallel and perpendicular to building lines.
   f. Bundle cables in common routes back to panelboards.
   g. Secure from structure using suitable J-hooks or plenum rated cable ties.

J. Install conductors with a minimum of 12 inches of slack at each outlet.

K. Where conductors are installed in enclosures for future termination by others, provide a minimum of 5 feet of slack.

L. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.

M. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.

N. Make wiring connections using specified wiring connectors.

1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
2. Do not remove conductor strands to facilitate insertion into connector.
3. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

O. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.

1. Dry Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.

a. For taped connections, first apply adequate amount of rubber splicing electrical tape or electrical filler tape, followed by outer covering of vinyl insulating electrical tape.
b. For taped connections likely to require re-entering, including motor leads, first apply varnished cambric electrical tape, followed by adequate amount of rubber splicing electrical tape, followed by outer covering of vinyl insulating electrical tape.

2. Damp Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
   a. For connections with insulating covers, apply outer covering of moisture sealing electrical tape.
   b. For taped connections, follow same procedure as for dry locations but apply outer covering of moisture sealing electrical tape.
3. Wet Locations: Use heat shrink tubing.

P. Insulate ends of spare conductors using vinyl insulating electrical tape.

Q. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.

R. Identify conductors and cables in accordance with Section 26 0553.

S. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07.

T. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

U. Mineral Insulated Cable Installation:
1. The wiring and cable shall be installed according to the manufacturers' recommendations, the instructions in the installation and specifications manual and the requirements of the UL Fire Resistance Directory listing.
2. Provide brass glands, termination kits and fittings from the same manufacturer as the cable. Provide brass plates for entrance fittings to ferrous enclosures per the manufacturer's recommendations.

3.4 FIELD QUALITY CONTROL

A. See Division 01 – General Requirements.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.3.2. The insulation resistance test is required for all conductors. The resistance test for parallel conductors listed as optional is not required.
   1. Disconnect surge protective devices (SPDs) prior to performing any high potential testing. Replace SPDs damaged by performing high potential testing with SPDs connected.

D. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION

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SECTION 26 0526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Grounding and bonding requirements.

B. Conductors for grounding and bonding.

C. Connectors for grounding and bonding.

D. Ground bars.

E. Ground rod electrodes.

F. Ground plate electrodes.

G. Ground enhancement material.

1.2 RELATED REQUIREMENTS

A. Division 01 – General Requirements

B. Division 03– Concrete.

C. Division 09 - Finishes.

D. Section 26 0400 – General Conditions for Electrical Trades

E. Section 26 0519 - Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.
   1. Includes oxide inhibiting compound.

F. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

G. Section 26 5100 - Lighting: Additional grounding and bonding requirements for pole-mounted luminaires.

H. Section 33 7900 - Site Grounding.

1.3 REFERENCE STANDARDS

A. IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction.

C. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings.

D. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems.

E. NFPA 70 - National Electrical Code.

F. UL 467 - Grounding and Bonding Equipment.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
1. Verify exact locations of underground metal water service pipe entrances to building.
2. Coordinate the work with other trades to provide steel reinforcement complying with specified requirements for concrete-encased electrode.
3. For signal reference grids, coordinate the work with access flooring furnished in accordance with Division 09- Finishes.
4. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Sequencing:
1. Do not install ground rod electrodes until final backfill and compaction is complete.

1.5 SUBMITTALS

A. See Division 01 – General Requirements.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.

C. Shop Drawings:
1. Indicate proposed arrangement for signal reference grids. Include locations of items to be bonded and methods of connection.

D. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

E. Field quality control test reports.

F. Project Record Documents: Record actual locations of grounding electrode system components and connections.

1.6 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

D. Installer Qualifications for Signal Reference Grids: Company with minimum five years documented experience with high frequency grounding systems.

E. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 GROUNDING AND BONDING REQUIREMENTS

A. Do not use products for applications other than as permitted by NFPA 70 and product listing.

B. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.

C. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

D. Grounding System Resistance:
   1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Architect. Precipitation within the previous 48 hours does not constitute normally dry conditions.
   2. Grounding Electrode System: Not greater than 5 ohms to ground, when tested according to IEEE 81 using "fall-of-potential" method.
   3. Between Grounding Electrode System and Major Electrical Equipment Frames, System Neutral, and Derived Neutral Points: Not greater than 0.5 ohms, when tested using "point-to-point" methods.

E. Grounding Electrode System:
   1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
      a. Provide continuous grounding electrode conductors without splice or joint.
      b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
   2. Metal Underground Water Pipe(s):
      a. Provide connection to underground metal domestic and fire protection (where present) water service pipe(s) that are in direct contact with earth for at least 10 feet at an accessible location not more than 5 feet from the point of entrance to the building.
      b. Provide bonding jumper(s) around insulating joints/pipes as required to make pipe electrically continuous.
      c. Provide bonding jumper around water meter of sufficient length to permit removal of meter without disconnecting jumper.
   3. Other Metal Piping:
      a. Provide connection to all metallic gas piping and miscellaneous metal piping of continuous lengths.
      b. Bond in accordance with NFPA 70.
      c. Size bonding conductor in accordance with NFPA 70.
   4. Concrete-Encased Electrode:
      a. Provide connection to concrete-encased electrode consisting of not less than 20 feet of either steel reinforcing bars or bare copper conductor not smaller than 4 AWG embedded within concrete foundation or footing that is in direct contact with earth in accordance with NFPA 70.
   5. Ground Rod Electrode(s):
      a. Provide three electrodes in an equilateral triangle configuration unless otherwise indicated or required.
      b. Space electrodes not less than 22 feet from each other and any other ground electrode.
      c. Where location is not indicated, locate electrode(s) at least 5 feet outside building perimeter foundation as near as possible to electrical service entrance; where possible, locate in softscape (uncovered) area.
      d. Provide ground enhancement material around electrode where indicated.
      e. Provide ground access well for each electrode.
   6. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.
   7. Ground Bar: Provide ground bar, separate from service equipment enclosure, for common connection point of grounding electrode system bonding jumpers as permitted in NFPA 70. Connect grounding electrode conductor provided for service-supplied system grounding to this ground bar.
      a. Ground Bar Size: 1/4 by 2 by 12 inches unless otherwise indicated or required.
      b. Where ground bar location is not indicated, locate in accessible location as near as possible to service disconnect enclosure.
      c. Ground Bar Mounting Height: 18 inches above finished floor unless otherwise indicated.

8. Ground Riser: Provide common grounding electrode conductor not less than 3/0 AWG for tap connections to multiple separately derived systems as permitted in NFPA 70.

F. Service-Supplied System Grounding:
   1. For each service disconnect, provide grounding electrode conductor to connect neutral (grounded) service conductor to grounding electrode system. Unless otherwise indicated, make connection at neutral (grounded) bus in service disconnect enclosure.
   2. For each service disconnect, provide main bonding jumper to connect neutral (grounded) bus to equipment ground bus where not factory-installed. Do not make any other connections between neutral (grounded) conductors and ground on load side of service disconnect.

G. Separately Derived System Grounding:
   1. Separately derived systems include, but are not limited to:
      a. Transformers (except autotransformers such as buck-boost transformers).
      b. Uninterruptible power supplies (UPS), when configured as separately derived systems.
      c. Generators, when neutral is switched in the transfer switch.
   2. Provide grounding electrode conductor to connect derived system grounded conductor to nearest effectively grounded metal building frame. Unless otherwise indicated, make connection at neutral (grounded) bus in source enclosure.
   3. Provide bonding jumper to connect derived system grounded conductor to nearest metal building frame and nearest metal water piping in the area served by the derived system, where not already used as a grounding electrode for the derived system. Make connection at same location as grounding electrode conductor connection.
   4. Where common grounding electrode conductor ground riser is used for tap connections to multiple separately derived systems, provide bonding jumper to connect the metal building frame and metal water piping in the area served by the derived system to the common grounding electrode conductor.
   5. Outdoor Source: Where the source of the separately derived system is located outside the building or structure supplied, provide connection to grounding electrode at source in accordance with NFPA 70.
   6. Provide system bonding jumper to connect system grounded conductor to equipment ground bus. Make connection at same location as grounding electrode conductor connection. Do not make any other connections between neutral (grounded) conductors and ground on load side of separately derived system disconnect.
   7. Where the source and first disconnecting means are in separate enclosures, provide supply-side bonding jumper between source and first disconnecting means.

H. Bonding and Equipment Grounding:
   1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials

enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.

2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
3. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
4. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
5. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.
6. Provide bonding for interior metal piping systems in accordance with NFPA 70. This includes, but is not limited to:
   a. Metal water piping where not already effectively bonded to metal underground water pipe used as grounding electrode.
   b. Metal gas piping.
   c. Metal process piping.
7. Provide bonding for interior metal air ducts.
8. Provide bonding for metal building frame.
9. Provide bonding for metal siding not effectively bonded through attachment to metal building frame.
10. Provide bonding and equipment grounding for pools and fountains and associated equipment in accordance with NFPA 70.
11. Provide redundant grounding and bonding for patient care areas of health care facilities in accordance with NFPA 70 and NFPA 99.

I. Isolated Ground System:
1. Where isolated ground receptacles or other isolated ground connections are indicated, provide separate isolated/insulated equipment grounding conductors.
2. Connect isolated/insulated equipment grounding conductors only to separate isolated/insulated equipment ground busses.
3. Connect the isolated/insulated equipment grounding conductors to the solidly bonded equipment ground bus only at the service disconnect or separately derived system disconnect. Do not make any other connections between isolated ground system and normal equipment ground system on the load side of this connection.

J. Cable Tray Systems: Also comply with Section 26 0536.

K. Photovoltaic Systems: Also comply with Section 26 4500.

L. Pole-Mounted Luminaires: Also comply with Section 26 5100.

2.2 GROUNDING AND BONDING COMPONENTS

A. General Requirements:
1. Provide products listed, classified, and labeled as suitable for the purpose intended.
2. Provide products listed and labeled as complying with UL 467 where applicable.

B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 0519:
   1. Use insulated copper conductors unless otherwise indicated.
      a. Exceptions:
         1) Use bare copper conductors where installed underground in direct contact with earth.
         2) Use bare copper conductors where directly encased in concrete (not in raceway).
   2. Factory Pre-fabricated Bonding Jumpers: Furnished with factory-installed ferrules; size braided cables to provide equivalent gage of specified conductors.

C. Connectors for Grounding and Bonding:
   1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
   2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
      a. Exceptions:
         1) Use mechanical connectors for connections to electrodes at ground access wells.
   3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.
      a. Exceptions:
         1) Use exothermic welded connections for connections to metal building frame.
   4. Manufacturers - Mechanical and Compression Connectors:
      a. Advanced Lightning Technology (ALT)
      b. Burndy LLC.
      c. Harger Lightning & Grounding
      d. Thomas & Betts Corporation
      e. Substitutions: See Division 01 - General Requirements.
   5. Manufacturers - Exothermic Welded Connections:
      a. Burndy LLC.
      b. Cadweld, a brand of Erico International Corporation
      c. ThermOweld, a brand of Continental Industries, Inc.Substitutions: See Division 01 - General Requirements.

D. Ground Bars:
   1. Description: Copper rectangular ground bars with mounting brackets and insulators.
   2. Size: As indicated.
   3. Holes for Connections: As indicated or as required for connections to be made.
   4. Manufacturers:
      a. Advanced Lightning Technology (ALT)
      b. Erico International Corporation
      c. Harger Lightning & Grounding
      d. ThermOweld, a brand of Continental Industries, Inc.
      e. Substitutions: See Division 01 - General Requirements.

E. Ground Rod Electrodes:
   1. Comply with NEMA GR 1.
   2. Material: Copper-bonded (copper-clad) steel.
   3. Size: 3/4 inch diameter by 10 feet length, unless otherwise indicated.
   4. Where rod lengths of greater than 10 feet are indicated or otherwise required, sectionalized ground rods may be used.
   5. Manufacturers:
      a. Advanced Lightning Technology (ALT)
      b. Erico International Corporation
      c. Galvan Industries, Inc.
      d. Harger Lightning & Grounding
      e. Substitutions: See Division 01 - General Requirements.

F. Chemically-Enhanced Ground Electrodes:
   1. Description: Copper tube factory-filled with electrolytic salts designed to provide a low-impedance ground in locations with high soil resistivity; straight (for vertical installations) or L-shaped (for horizontal installations) as indicated or as required.
   2. Length: 10 feet.
   3. Integral Pigtail: Factory-attached, sized not less than grounding electrode conductor to be attached.
   4. Backfill Material: Grounding enhancement material recommended by electrode manufacturer.
   5. Manufacturers:
      a. Advanced Lightning Technology (ALT)
      b. Erico International Corporation
      c. Harger Lightning & Grounding
      d. ThermOweld, subsidiary of Continental Industries
      e. Substitutions: See Division 01 - General Requirements.

G. Ground Plate Electrodes:
   1. Material: Copper.
   2. Size: 24 by 24 by 1/4 inches, unless otherwise indicated.
   3. Manufacturers:
      a. Advanced Lightning Technology (ALT)
      b. Erico International Corporation
      c. Harger Lightning & Grounding
      d. ThermOweld, subsidiary of Continental Industries
      e. Substitutions: See Division 01 - General Requirements.

H. Ground Enhancement Material:
   1. Description: Factory-mixed conductive material designed for permanent and maintenance-free improvement of grounding effectiveness by lowering resistivity.
   2. Resistivity: Not more than 20 ohm-cm in final installed form.
   3. Manufacturers:
      a. Erico International Corporation
      b. Harger Lightning & Grounding
      c. ThermOweld, subsidiary of Continental Industries

d. Substitutions: See Division 01 - General Requirements.

I. Ground Access Wells:
1. Description: Open bottom round or rectangular well with access cover for testing and inspection; suitable for the expected load at the installed location.
a. Areas Exposed to Light Vehicular Traffic: Rated for not less than 22,500 pounds vertical design load.
2. Size: As required to provide adequate access for testing and inspection, but not less than minimum size requirements specified.
a. Round Wells: Not less than 8 inches in diameter.
b. Rectangular Wells: Not less than 12 by 12 inches.
3. Depth: As required to extend below frost line to prevent frost upheaval, but not less than 10 inches.
4. Cover: Factory-identified by permanent means with word "GROUND".
5. Manufacturers:
a. Advanced Lightning Technology (ALT)
b. Erico International Corporation
c. Harger Lightning & Grounding
d. ThermOweld, subsidiary of Continental Industries
e. Substitutions: See Division 01 - General Requirements.

J. Pre-Fabricated Signal Reference Grids:
1. Description: Factory pre-fabricated grid manufactured from 2 inch wide (50 mm wide), 26 gage, flat copper strips spaced on 24 inch centers, factory-welded at each crossover.
2. Low Impedance Risers: Factory fabricated 2 inch wide, 26 gage, flat copper strips designed for connecting equipment enclosures to pre-fabricated signal reference grid.
3. Manufacturers:
a. Advanced Lightning Technology (ALT)
b. Erico International Corporation
c. Harger Lightning & Grounding
d. ThermOweld, subsidiary of Continental Industries
e. Substitutions: See Division 01 - General Requirements.

K. Oxide Inhibiting Compound: Comply with Section 26 0519.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that work likely to damage grounding and bonding system components has been completed.

B. Verify that field measurements are as shown on the drawings.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.2 PREPARATION

A. Remove paint, rust, mill oils, surface contaminants at connection points.

3.3 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches deep in accordance with NFPA 70 or provide ground plates.
   1. Outdoor Installations: Unless otherwise indicated, install with top of rod 6 inches below finished grade.
   2. Indoor Installations: Unless otherwise indicated, install with 4 inches of top of rod exposed.

D. Ground Plate Electrodes: Unless otherwise indicated, install ground plate electrodes at a depth of not less than 30 inches.

E. Make grounding and bonding connections using specified connectors.
   1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
   2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
   3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
   4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
   5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

F. Install in accordance with IEEE 142.

G. Install rod electrodes at locations as indicated on Drawings. Install additional rod electrodes to achieve specified resistance to ground.

H. Install grounding and bonding conductors concealed from view.

I. Equipment Grounding Conductor: Install separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.

J. Install continuous grounding using underground cold water system, driven rods and building steel as grounding electrode. Where water piping is not available, install artificial station ground by means of driven rods or buried electrodes.

K. Permanently ground entire light and power system in accordance with NEC, including service equipment, distribution panels, lighting panelboards, switch and starter enclosures, motor frames, grounding type receptacles, and other exposed non-current carrying metal parts of electrical equipment.

L. Accomplish grounding of electrical system by using insulated grounding conductor installed with feeders and branch circuit conductors in conduits. Size grounding conductors in accordance with NEC. Install from grounding bus of serving panel to ground bus of served panel, grounding screw of receptacles, lighting fixture housing, light switch outlet boxes or metal enclosures of service equipment. Ground conduits by means of grounding bushings on terminations at panelboards with installed number 12 conductor to grounding bus.

M. Permanently attach equipment and grounding conductors prior to energizing equipment.

N. Identify grounding and bonding system components in accordance with Section 26 0553.

3.4 FIELD QUALITY CONTROL

A. See Division 01 - General Requirements.

B. Inspect and test in accordance with NETA ATS except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.13.

D. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.

E. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

F. Submit detailed reports indicating inspection and testing results and corrective actions taken.

END OF SECTION

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SECTION 26 0529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Support and attachment components for electrical equipment, conduit, cable, boxes, and other electrical work.

1.2 RELATED REQUIREMENTS

A. Division 01 – General Requirements

B. Division 03 - Cast-in-Place Concrete: Concrete equipment pads.

C. Section 260400 – General Conditions for Electrical Trades

D. Section 260533 – Raceway and Boxes for Electrical Systems: Additional support and attachment requirements for conduits.

E. Section 260536 - Cable Trays for Electrical Systems: Additional support and attachment requirements for cable tray.

F. Section 262500 – Enclosed Bus Assemblies: Additional support and attachment requirements for busway.

G. Section 264500 - Photovoltaic Systems: Photovoltaic module mounting systems.

H. Section 265100 - Lighting: Additional support and attachment requirements for interior luminaires.

1.3 REFERENCE STANDARDS

A. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.

B. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.

C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2015.

D. MFMA-4 - Metal Framing Standards Publication; 2004.

E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. UL 5B - Strut-Type Channel Raceways and Fittings; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. See Division 01: General Requirements.

B. Coordination:
1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components being installed.
2. Coordinate the work with other trades and provide additional framing and materials required for installation.
3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
5. Notify Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

C. Sequencing:
1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Division 03.

1.5 SUBMITTALS

A. See Division 01 – General Requirements.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for metal channel (strut) framing systems, non-penetrating rooftop supports, and post-installed concrete and masonry anchors.

C. Shop Drawings: Include details for fabricated hangers and supports where materials or methods other than those indicated are proposed for substitution.

D. Installer's Qualifications: Include evidence of compliance with specified requirements.

E. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.6 QUALITY ASSURANCE

A. Comply with NFPA 70.

B. Comply with latest adopted version of applicable building code, including any addendum or supplements.

C. Installer Qualifications for Powder-Actuated Fasteners (when specified): Certified by fastener system manufacturer with current operator's license.

D. Installer Qualifications for Field-Welding: As specified in Section 260400 General Requirements for Electrical Trades.

E. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:
   1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
   2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
   3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
   4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
   5. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
   6. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
      a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
      b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, fiberglass or approved equivalent unless otherwise indicated.
      c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
      d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
   1. Conduit Straps: One-hole or two-hole type; zinc plated steel.
   2. Conduit Clamps: Bolted type unless otherwise indicated.
   3. Manufacturers:
      a. Cooper Crouse-Hinds, a division of Eaton Corporation
      b. Erico International Corporation
      c. O-Z/Gedney, a brand of Emerson Industrial Automation

d. Thomas & Betts Corporation
e. Substitutions: See Division 01 - General Requirements.

C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.
1. Manufacturers:
a. Cooper Crouse-Hinds, a division of Eaton Corporation
b. Erico International Corporation
c. O-Z/Gedney, a brand of Emerson IndustrialAutomation
d. Thomas & Betts Corporation
e. Substitutions: See Division 01 - General Requirements.

D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
1. Comply with MFMA-4.
2. Channel Material:
a. Indoor Dry Locations: Use galvanized steel.
b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
3. Minimum Channel Thickness: Steel sheet, 12 gage, 0.1046 inch.
4. Minimum Channel Dimensions: 1-5/8 inch width by 13/16 inch height.
5. Manufacturers:
a. Cooper B-Line, a division of Eaton Corporation
b. Thomas & Betts Corporation
c. Unistrut, a brand of Atkore International Inc.
d. Substitutions: See Division 01- General Requirements.
e. Source Limitations: Furnish channels (struts) and associated fittings, accessories, and hardware produced by a single manufacturer.

E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
1. Minimum Size, Unless Otherwise Indicated or Required:
a. Equipment Supports: 1/2 inch diameter.
b. Busway Supports: 1/2 inch diameter.
c. Single Conduit up to 1 inch trade size: 1/4 inch diameter.
d. Single Conduit larger than 1 inch trade size: 3/8 inch diameter.
e. Trapeze Support for Multiple Conduits: 3/8 inch diameter.
f. Outlet Boxes: 1/4 inch diameter.
g. Luminaires: 1/4 inch diameter.

F. Non-Penetrating Rooftop Supports for Low-Slope Roofs: Steel pedestals with thermoplastic or rubber bases that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified.
1. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
2. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports.
3. Mounting Height: Provide minimum clearance of 6 inches under supported component to top of roofing.

4. Manufacturers:
   a. Cooper B-Line, a division of Eaton Corporation
   b. Erico International Corporation
   c. PHP Systems/Design
   d. Unistrut, a brand of Atkore International Inc.
   e. Substitutions: See Division 01 - General Requirements.

G. Anchors and Fasteners:
1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
4. Hollow Masonry: Use toggle bolts.
5. Hollow Stud Walls: Use toggle bolts.
6. Steel: Use beam clamps, machine bolts, or welded threaded studs.
7. Sheet Metal: Use sheet metal screws.
8. Wood: Use wood screws.
9. Plastic and lead anchors are not permitted.
10. Powder-actuated fasteners may be used with:
    a. Permission by Architect.
    b. Permission by Structural Engineer.
    c. Use only threaded studs; do not use pins.
11. Hammer-driven anchors and fasteners are permitted as follows:
    a. Nails are permitted for attachment of nonmetallic boxes to wood frame construction (when specified).
    b. Staples are permitted for attachment of nonmetallic-sheathed cable to wood frame construction (when specified).
12. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
    a. Comply with MFMA-4.
    b. Channel Material: Use galvanized steel.
    c. Minimum Channel Thickness: Steel sheet, 12 gage, 0.1046 inch minimum base metal thickness.
    d. Manufacturer: Same as manufacturer of metal channel (strut) framing system.
13. Manufacturers - Mechanical Anchors:
    a. Hilti, Inc.
    b. ITW Red Head, a division of Illinois Tool Works, Inc.
    c. Powers Fasteners, Inc.
    d. Simpson Strong-Tie Company Inc.
    e. Substitutions: See Division 01 - General Requirements.
14. Manufacturers - Powder-Actuated Fastening Systems:
    a. Hilti, Inc.
    b. ITW Ramset, a division of Illinois Tool Works, Inc. Powers Fasteners, Inc.
    c. Simpson Strong-Tie Company Inc.
    d. Substitutions: See Division 01 - General Requirements.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that mounting surfaces are ready to receive support and attachment components.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

D. Unless specifically indicated, do not provide support from suspended ceiling support system or ceiling grid.

E. Unless specifically indicated, do not provide support from roof deck.

F. Do not penetrate, notch, or cut structural members without approval of Structural Engineer.

G. Equipment Support and Attachment:
   1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
   2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
   3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
   4. Unless otherwise indicated, mount floor-mounted equipment on properly sized 4 inch high concrete pad constructed in accordance with Division 03.
   5. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

H. Conduit Support and Attachment: Also comply with Section 26 05 33.

I. Cable Tray Support and Attachment: Also comply with Section 26 05 36.

J. Box Support and Attachment: Also comply with Section 26 05 33.

K. Transformer Supports: Also comply with Section 26 22 00.

L. Busway Support and Attachment: Also comply with Section 26 25 00.

M. Luminaire Support and Attachment: Also comply with Section 26 51 00.

N. Preset Concrete Inserts: Use manufacturer provided closure strips to inhibit concrete seepage during concrete pour.

O. Secure fasteners according to manufacturer's recommended torque settings.

P. Remove temporary supports.

3.3 FIELD QUALITY CONTROL

A. Division 01 - Quality Requirements, for additional requirements.

B. Inspect support and attachment components for damage and defects.

C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

D. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION

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SECTION 26 0533 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Conduit Applications
2. General Requirements
3. Galvanized steel rigid metal conduit (RMC).
4. Intermediate metal conduit (IMC)
5. Flexible metal conduit (FMC).
6. Liquidtight flexible metal conduit (LFMC).
7. Electrical metallic tubing (EMT).
8. Rigid polyvinyl chloride (PVC) conduit.
9. Surface metal raceway
10. Wireway
11. Boxes
12. Accessories.

B. Related Sections:
1. Section 260503 - Equipment Wiring Connections.
2. Section 260519 – Electrical Power Conductors and Cables.
3. Section 260526 - Grounding and Bonding for Electrical Systems.
4. Section 260529 - Hangers and Supports for Electrical Systems.
5. Section 260534 - Floor Boxes for Electrical Systems.
6. Section 260539 - Underfloor Raceways for Electrical Systems.
7. Section 260553 - Identification for Electrical Systems.
8. Section 262726 - Wiring Devices.
9. Section 270533 - Raceway and Boxes for Communications Systems.
10. Section 280533 - Raceway and Boxes for Electronic Safety and Security.

1.2 REFERENCES

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC);

B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S);

C. ANSI C80.5 - American National Standard for Electrical Rigid Metal Conduit -- Aluminum (ERMC-A);

D. NECA 1 - Standard for Good Workmanship in Electrical Construction;

E. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT);

F. NECA 102 - Standard for Installing Aluminum Rigid Metal Conduit;

G. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable;

H. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit;

I. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit;

J. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing;

K. NEMA TC 13 - Electrical Nonmetallic Tubing (ENT);

L. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

M. NEMA OS 1 - Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.

N. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers, and Box Supports.

O. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

P. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.

Q. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.

R. UL 360 - Liquid-Tight Flexible Steel Conduit; Current Edition, Including All Revisions.

S. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.

T. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.

U. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.

V. UL 1203 - Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations; Current Edition, Including All Revisions.

W. UL 1653 - Electrical Nonmetallic Tubing; Current Edition, Including All Revisions.

X. UL 1660 - Liquid-Tight Flexible Nonmetallic Conduit; Current Edition, Including All Revisions.

Y. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.

Z. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.

AA. UL 514C - Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers; Current Edition, Including All Revisions.

BB. UL 1203 - Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations; Current Edition, Including All Revisions.

1.3 DESIGN REQUIREMENTS

A. Minimum Raceway Size: 3/4 inch unless otherwise specified.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
2. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
4. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.
5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Sequencing:
1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

1.5 SUBMITTALS

A. See Division 01 – General Requirements.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for all conduits and fittings outlined in Part 2.

C. Manufacturer's Installation Instructions: Submit application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

D. Shop Drawings:
1. Indicate proposed arrangement for conduits to be installed within or under structural concrete slabs, where permitted.
2. Include proposed locations of roof penetrations and proposed methods for sealing.

E. Project Record Documents: Record actual routing for conduits installed underground, conduits embedded within concrete slabs (where permitted), and conduits 2 inch trade size and larger.

F. Project Record Documents: Record actual locations for outlet and device boxes, pull boxes, cabinets and enclosures, floor boxes, and underground boxes/enclosures.

G. Product Data: Provide manufacturer's standard catalog pages and data sheets for cabinets and enclosures, boxes for hazardous (classified) locations, floor boxes, and underground boxes/enclosures.

H. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Division 01 – General Requirements.
2. Keys for Lockable Enclosures: Two of each different key.

1.6 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.7 DELIVERY, STORAGE, AND HANDLING

A. See Division 01 – General Requirements

B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

C. Protect PVC conduit from sunlight.

D. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

1.8 COORDINATION

A. See Division 01 – General Requirements

B. Coordinate installation of outlet boxes for equipment connected under Section 260503.

C. Coordinate mounting heights, orientation and locations of outlets mounted above counters, benches, and backsplashes.

D. Electrical contractor is responsible to fully coordinate with the site and concrete contractors and all other trades when routing conduit underslab. Routing of conduit

underslab may be acceptable, provided spacing of conduits is adequate for proper backfilling of area surrounding conduits. Adequate spacing shall mean using factory made conduit spacers that allow for a minimum of 3-inches for backfilling with sand or 3 times the pipe diameter for backfilling with a structural fill. Proposed conduit routing, installation and methods and backfilling procedures shall be submitted to the Engineer for review prior to installation.

PART 2 PRODUCTS

2.1 CONDUIT APPLICATIONS

A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.

B. Raceway and boxes located as indicated on Drawings, and at other locations required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements. Raceway and boxes are shown in approximate locations unless dimensioned. Provide raceway to complete wiring system.

C. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications listed below. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.

1. Underground:
    a. Under Slab on Grade: Use schedule 40 rigid PVC conduit with galvanized steel rigid metal conduit sweeps. Provide cast metal boxes or nonmetallic handhole. Applications limited to:
        1) Panelboard feeders
        2) Floor boxes
        3) Free-standing equipment
    b. Exterior, Within Trench: Use schedule 40 or schedule 80 rigid PVC conduit with galvanized steel rigid metal conduit sweeps. Provide cast metal boxes or nonmetallic handhole. Schedule 80 shall be used under all paved areas with vehicular traffic.
    c. Exterior, Concrete Encased: Use Type EB rigid PVC conduit. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit where emerging from underground.
2. Embedded Within Concrete:
    a. Within Slab on Grade: Floor box applications only.
    b. Within Slab Above Ground: Not permitted.
    c. Within Concrete Walls Above Ground: Use Type EB rigid PVC conduit. Provide flush mounted box rated for masonry applications.
3. Concealed Within Masonry Walls: Use electrical metallic tubing (EMT). Provide flush mounted boxes rated for masonry applications.
4. Concealed Within Hollow Stud Walls: Use electrical metallic tubing (EMT) or MC cable (where allowed).Provide flush mounted sheet-metal boxes.
5. Concealed Above Accessible Ceilings: Use electrical metallic tubing (EMT) or MC cable (where allowed).

6. Interior, Damp or Wet Locations Provide:
   a. Rigid steel conduit
   b. Intermediate metal conduit
   c. Electrical metallic tubing (EMT) with compression fittings
   d. Schedule 40 PVC conduit
   e. Provide cast metal or nonmetallic outlet, junction, and pull boxes. Provide flush mounting outlet box in finished areas.
7. Exposed, Interior dry locations: Use electrical metallic tubing (EMT)
8. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit.
   a. Locations subject to physical damage include, but are not limited to:
      1) Where exposed below 8 feet, except within electrical and communication rooms or closets.
9. Exposed, Exterior: Use galvanized steel rigid metal conduit.
10. Hazardous (Classified) Locations: Use galvanized steel rigid metal conduit. Use sealing fittings appropriate for classification where installed.
11. Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit.
    a. Maximum Length: 6 feet.
12. Connections to Vibrating Equipment:
    a. Dry Locations: Use flexible metal conduit or MC Cable.
    b. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit.
    c. Maximum Length: 6 feet unless otherwise indicated.
    d. Vibrating equipment includes, but is not limited to:
       1) Transformers.
       2) Motors.
       3) Pumps.
       4) Fans.
13. Exposed Dry Finished Locations: Provide surface metal raceway and fittings. Unless specified on drawings, requires design team approval for use of surface metal raceway in finished locations. Coordinate all vertical runs of surface raceway with the architect prior to installation.

2.2 GENERAL REQUIREMENTS

A. Fittings for Grounding and Bonding: Also comply with Section 260526.

B. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.

C. Provide products listed, classified, and labeled as suitable for the purpose intended.

D. Minimum Conduit Size, Unless Otherwise Indicated:
1. Branch Circuits: 3/4 inch trade size.
2. Branch Circuit Homeruns: 3/4 inch trade size.
3. Control Circuits: 1/2 inch trade size.
4. Flexible Connections to Luminaires: 3/4 inch trade size.
5. Underground, Interior: 1 inch trade size.

6. Underground, Exterior: 1 inch trade size.

2.3 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Manufacturers:
1. Allied Tube and Conduit.
2. Western Tube and Conduit.
3. Wheatland Tube Company.
4. Substitutions: See Division 01 – General Requirements.

B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.

C. Fittings:
1. Manufacturers:
   a. Bridgeport Fittings Inc.
   b. O-Z/Gedney.
   c. Thomas & Betts Corporation.
   d. Substitutions: See Division 01 – General Requirements
2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
3. Hazardous (Classified) Locations: Use fittings listed and labeled as complying with UL 1203 for the classification of the installed location.
4. Material: Use steel or malleable iron.
5. Do not use die cast zinc fittings.
6. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.4 INTERMEDIATE METAL CONDUIT (IMC)

A. Manufacturers:
1. Allied Tube and Conduit.
2. Western Tube and Conduit.
3. Wheatland Tube Company.
4. Substitutions: See Division 01 – General Requirements.

B. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.

C. Fittings:
1. Manufacturers:
   a. Bridgeport Fittings Inc
   b. O-Z/Gedney, a brand of Emerson Industrial Automation
   c. Thomas & Betts Corporation
   d. Substitutions: See Division 01 – General Requirements
2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
3. Material: Use steel.
   a. Do not use die cast zinc fittings.

4. Connectors and Couplings: Use threaded type or compression fittings only.

2.5 FLEXIBLE METAL CONDUIT (FMC)

A. Manufacturers:
1. Carlon Electrical Products.
2. Allied Tube and Conduit.
3. AFC Cable Systems, Inc
4. Substitutions: See Division 01 – General Requirements.

B. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.

C. Fittings:
1. Manufacturers:
   a. Bridgeport Fittings Inc
   b. O-Z/Gedney, a brand of Emerson Industrial Automation
   c. Thomas & Betts Corporation
   d. Substitutions: See Division 01 – General Requirements
2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
3. Material: Use steel.
   a. Do not use die cast zinc fittings.

2.6 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

A. Manufacturers:
1. Carlon Electrical Products.
2. Allied Tube and Conduit.
3. AFC Cable Systems, Inc
4. Substitutions: See Division 01 – General Requirements

B. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.

C. Fittings:
1. Manufacturers:
   a. Bridgeport Fittings Inc
   b. O-Z/Gedney, a brand of Emerson Industrial Automation
   c. Thomas & Betts Corporation
   d. Substitutions: See Division 01 – General Requirements.
2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
3. Material: Use steel
   a. Do not use die cast zinc fittings.

2.7 ELECTRICAL METALLIC TUBING (EMT)

A. Manufacturers:
1. Allied Tube and Conduit.
2. Western Tube and Conduit.
3. Wheatland Tube Company.
4. Substitutions: See Division 01 – General Requirements

B. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.

C. Fittings:
1. Manufacturers:
   a. Bridgeport Fittings Inc
   b. O-Z/Gedney, a brand of Emerson Industrial Automation
   c. Thomas & Betts Corporation
   d. Substitutions: See Division 01 – General Requirements
2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
3. Material: Use steel.
4. Connectors and Couplings: Use compression (damp or wet location) or set-screw type elsewhere

2.8 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

A. Manufacturers:
1. Cantex Inc
2. Carlon, a brand of Thomas & Betts Corporation
3. JM Eagle
4. Substitutions: See Division 01 – General Requirements

B. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.

C. Fittings:
1. Manufacturer: Same as manufacturer of conduit to be connected.
2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

2.9 WIREWAY

A. Manufacturers:
1. Carlon Electrical Products.
2. Thomas & Betts Corp.
3. Hoffman.
4. Substitutions: See Division 01 – General Requirements

B. Product Description: General purpose.

C. Knockouts: Manufacturer's standard.

D. Cover: Screw cover.

E. Connector: Flanged.

F. Fittings: Lay-in type with removable top, bottom, and side; captive screws.

G. Finish: Rust inhibiting primer coating with gray enamel finish.

2.10 BOXES

A. General Requirements:
1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
3. Provide products listed, classified, and labeled as suitable for the purpose intended.
4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
1. Manufacturers:
   a. Cooper Crouse-Hinds, a division of Eaton Corporation
   b. Hubbell Incorporated; Bell Products
   c. Hubbell Incorporated; RACO Products
   d. Leviton
   e. O-Z/Gedney, a brand of Emerson Industrial Automation
   f. Thomas & Betts Corporation
   g. Substitutions: See Division 01 – General Requirements
2. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
3. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
4. Use cast iron boxes or cast aluminum boxes with threaded hubs where exposed galvanized steel rigid metal conduit is used.
5. Use cast aluminum boxes with threaded hubs where aluminum rigid metal conduit is used.
6. Use nonmetallic boxes where exposed rigid PVC conduit is used.
7. Use suitable concrete type boxes where flush-mounted in concrete.
8. Use suitable masonry type boxes where flush-mounted in masonry walls.
9. Use raised covers suitable for the type of wall construction and device configuration where required.

10. Use shallow boxes where required by the type of wall construction.
11. Do not use "through-wall" boxes designed for access from both sides of wall.
12. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
13. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
14. Nonmetallic Boxes: Comply with NEMA OS 2, and list and label as complying with UL 514C.
15. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
16. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes.
17. Minimum Box Size, Unless Otherwise Indicated:
    a. Wiring Devices (Other Than Communications Systems Outlets): 4 inch square by 1-1/2 inch deep trade size.
    b. Communications Systems Outlets:
        1) Minimum 4 inch square by 2-1/8 inch trade size.
        2) Provide with single-gang drywall ring.
        3) Comply with Section 27 0533.
    c. Ceiling Outlets: 4 inch octagonal or square by 1-1/2 inch deep trade size.
18. Wall Plates: Comply with Section 26 2726.

C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches :
1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
2. NEMA 250 Environment Type, Unless Otherwise Indicated:
    a. Indoor Clean, Dry Locations: Type 1, painted steel.
    b. Outdoor Locations: Type 3R, painted steel.
3. Junction and Pull Boxes Larger Than 100 cubic inches :
    a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
    b. Boxes 6 square feet and Larger: Provide sectionalized screw-cover or hinged-cover enclosures.
4. Cabinets and Hinged-Cover Enclosures, Other Than Junction and Pull Boxes:
    a. Provide lockable hinged covers, all locks keyed alike unless otherwise indicated.
    b. Back Panels: Painted steel, removable.
    c. Terminal Blocks: Provide voltage/current ratings and terminal quantity suitable for purpose indicated, with 25 percent spare terminal capacity.
    d. Provide with grounding stud.
    e. Provide with document pocket in cover.
5. Finish for Painted Steel Enclosures: Manufacturer's standard grey unless otherwise indicated.
6. Manufacturers:
    a. Cooper B-Line, a division of Eaton Corporation
    b. Hoffman, a brand of Pentair Technical Products
    c. Hubbell Incorporated; Wiegmann Products

d. Substitutions: See Division 01 – General Requirements

D. Boxes for Hazardous (Classified) Locations: Listed and labeled as complying with UL 1203 for the classification of the installed location.
1. Manufacturers:
   a. Appleton, a brand of Emerson Industrial Automation
   b. Cooper Crouse-Hinds, a division of Eaton Corporation
   c. Hubbell Incorporated; Killark Products
   d. Substitutions: See Division 01 – General Requirements
2. Provide outlet boxes and sealing fittings that comply with Article 501 of the NEC based on the classification of the area.

E. Underground Boxes/Enclosures:
1. Description: In-ground, open bottom boxes furnished with flush, non-skid covers with legend indicating type of service and stainless steel tamper resistant cover bolts.
2. Size: As indicated on drawings.
3. Depth: As required to extend below frost line to prevent frost upheaval, but not less than 12 inches.
4. Provide logo on cover to indicate type of service.
5. Applications:
   a. Sidewalks and Landscaped Areas Subject Only to Occasional Nondeliberate Vehicular Traffic: Use polymer concrete enclosures, with minimum SCTE 77, Tier 15 load rating.
   b. Parking Lots, in Areas Subject Only To Occasional Nondeliberate Vehicular Traffic: Use polymer concrete enclosures, with minimum SCTE 77, Tier 22 load rating.
   c. Do not use polymer concrete enclosures in areas subject to deliberate vehicular traffic.
6. Polymer Concrete Underground Boxes/Enclosures: Comply with SCTE 77.
   a. Manufacturers:
      1) Hubbell Incorporated; Quazite Products
      2) NewBasis
      3) MacLean Highline
      4) Substitutions: See Division 01 – General Requirements
   b. Combination fiberglass/polymer concrete boxes/enclosures are acceptable.

2.11 ACCESSORIES

A. Conduit Joint Compound: Corrosion-resistant, electrically conductive; suitable for use with the conduit to be installed.

B. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.

C. Pull Strings: Use nylon cord with average breaking strength of not less than 200 pound-force (890 N).

D. Sealing Compound for Sealing Fittings: Listed for use with the particular fittings to be installed.

E. Mechanical Sleeve Seals
   1. Manufacturers:
      a. Thunderline Link-Seal, Inc.
      b. NMP Corporation.
      c. PSI Link-Seal.
   2. Substitutions: See Division 01 – General Requirements
   3. Product Description: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.
   4. Use: Provide for all penetrations through foundation walls.

PART 3 EXECUTION

3.1 EXAMINATION

A. See Division 01 – General Requirements.

B. Verify outlet locations and routing and termination locations of raceway prior to rough-in.

C. Verify that field measurements are as shown on drawings.

D. Verify that mounting surfaces are ready to receive conduits.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.2 EXISTING WORK

A. Remove exposed abandoned raceway including abandoned raceway above accessible ceiling finishes. Cut raceway flush with walls and floors, and patch surfaces.

B. Remove concealed abandoned raceway to its source.

C. Disconnect abandoned outlets and remove devices. Remove abandoned outlets when raceway is abandoned and removed. Install blank cover for abandoned outlets not removed.

D. Maintain access to existing boxes and other installations remaining active and requiring access. Modify installation or provide access panel.

E. Extend existing raceway and box installations using materials and methods compatible with existing electrical installations or as specified.

F. Clean and repair existing raceway and boxes to remain or to be reinstalled.

3.3 INSTALLATION

A. Ground and bond raceway and boxes in accordance with Section 260526.

B. Fasten raceway and box supports to structure and finishes in accordance with Section 260529.

C. Identify raceway and boxes in accordance with Section 260553.

D. Arrange raceway and boxes to maintain headroom and present neat appearance.

E. Install products in accordance with manufacturer's instructions.

F. Perform work in accordance with NECA 1 (general workmanship).

G. Conduit Routing:
1. Unless dimensioned, conduit routing indicated is diagrammatic.
2. When conduit destination is indicated and routing is not shown, determine exact routing required.
3. Conceal all conduits unless specifically indicated to be exposed.
4. Unless otherwise approved, do not route conduits exposed:
   a. Across floors.
   b. Across roofs.
   c. Across top of parapet walls.
   d. Across building exterior surfaces.
   e. Interior finished spaces.
5. Conduits installed underslab or embedded in concrete (see section 2.1 where applicable) may be routed in the shortest possible manner unless otherwise indicated. Route all other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.
6. Arrange conduit to maintain adequate headroom, clearances, and access.
7. Arrange conduit to provide no more than the equivalent of four 90 degree bends between pull points.
8. Arrange conduit to provide no more than 150 feet between pull points.
9. Route conduits above water and drain piping where possible.
10. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
11. Maintain minimum clearance of 6 inches between conduits and piping for other systems.
12. Maintain minimum clearance of 12 inches between conduits and surfaces exceeding 104 degrees F. This includes, but is not limited to:
    a. Heaters.
    b. Hot water piping.
    c. Flues.
13. Group parallel conduits in the same area together on a common rack.

H. Conduit Support:
1. Secure and support conduits in accordance with NFPA 70 and Section 260529 using suitable supports and methods approved by the authority having jurisdiction.
2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
4. Use conduit strap to support single surface-mounted conduit.
5. Use clamp back spacer with conduit strap for damp and wet locations to provide space between conduit and mounting surface.
6. Use metal channel (strut) with accessory conduit clamps to support multiple parallel surface-mounted conduits.
7. Use conduit clamp to support single conduit from beam clamp or threaded rod.
8. Use trapeze hangers assembled from threaded rods and metal channel (strut) with accessory conduit clamps to support multiple parallel suspended conduits.
9. Use non-penetrating rooftop supports to support conduits routed across rooftops (only where approved).
10. Use of spring steel conduit clips for support of conduits is not permitted.
11. Use of wire for support of conduits is not permitted.

I. Connections and Terminations:
1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
3. Use suitable adapters where required to transition from one type of conduit to another.
4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
6. Where spare conduits stub up through concrete floors and are not terminated in a box or enclosure, provide threaded couplings equipped with threaded plugs 6” above finished floor.
7. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.

J. Penetrations:
1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
2. Make penetrations perpendicular to surfaces unless otherwise indicated.
3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
4. Conceal bends for conduit risers emerging above ground.

5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
6. Provide suitable mechanical sleeve seals where conduits penetrate exterior wall below grade.
7. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
8. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty. Include proposed locations of penetrations and methods for sealing with submittals.
9. Provide metal escutcheon plates for conduit penetrations exposed to public view.
10. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Division 07 Section 07 8400.

K. Underground Installation:
1. Provide trenching and backfilling in accordance with Division 31.
2. Provide trenching and backfilling in accordance with Division 31.
3. Minimum Cover, Unless Otherwise Indicated or Required:
   a. Underground, Exterior: 24 inches.
   b. Under Slab on Grade:
      1) Minimum 12 inches to bottom of slab.
      2) Depth as required to allow conduit to penetrate perpendicular to slab
4. Provide underground warning tape (exterior below grade) in accordance with Section 260553 along entire conduit length except where concrete-encased.

L. Concrete Encasement: Where conduits not otherwise embedded within concrete are indicated to be concrete-encased, provide concrete in accordance with Division 03 with minimum concrete cover of 3 inches on all sides unless otherwise indicated.

M. Hazardous (Classified) Locations: Where conduits cross boundaries of hazardous (classified) locations, provide sealing fittings located as indicated or in accordance with NFPA 70.

N. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
2. Where calculated in accordance with NFPA 70 for rigid polyvinyl chloride (PVC) conduit installed above ground to compensate for thermal expansion and contraction.
3. Where conduits are subject to earth movement by settlement or frost.

O. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:

1. Where conduits pass from outdoors into conditioned interior spaces.
2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.
3. Where conduits penetrate coolers or freezers.

P. Provide pull string in all empty conduits and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches at each end.

Q. Provide grounding and bonding in accordance with Section 260526.

R. Identify conduits in accordance with Section 260553.

S. Install no more than equivalent of three 90 degree bends between boxes. Install conduit bodies to make sharp changes in direction, as around beams. Install factory elbows for bends in metal conduit larger than 2 inch size.

T. Surface Raceway: Install flat-head screws, clips, and straps to fasten raceway channel to surfaces; mount plumb and level. Install insulating bushings and inserts at connections to outlets and corner fittings.

3.4 INSTALLATION – BOXES

A. Install products in accordance with manufacturer's instructions.

B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Provide separate boxes for emergency power and normal power systems.

E. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.

F. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.

G. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.

H. Install gang box with plaster ring for single device outlets.

I. Box Locations:
1. Locate boxes to be accessible. Provide access panels in accordance with Division 08 as required where approved by the Architect.
2. Unless dimensioned, box locations indicated are approximate.
3. Locate boxes as required for devices installed under other sections or by others.

a. Switches, Receptacles, and Other Wiring Devices: Comply with Section 262726.

4. Locate boxes so that wall plates do not span different building finishes.
5. Locate boxes so that wall plates do not cross masonry joints.
6. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.
7. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches horizontal separation unless otherwise indicated.
8. Acoustic-Rated Walls: Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches horizontal separation.
9. Fire Resistance Rated Walls: Install flush-mounted boxes such that the required fire resistance will not be reduced.
   a. Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches separation where wall is constructed with individual noncommunicating stud cavities or protect both boxes with listed putty pads.
   b. Do not install flush-mounted boxes with area larger than 16 square inches or such that the total aggregate area of openings exceeds 100 square inches for any 100 square feet of wall area.
10. Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 260534.

J. Box Supports:
1. Secure and support boxes in accordance with NFPA 70 and Section 260529.
2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
3. Installation Above Suspended Ceilings: Do not provide support from ceiling grid or ceiling support system.
4. Install stamped steel bridges to fasten flush mounting outlet box between studs.
5. Install adjustable steel channel fasteners for hung ceiling outlet box.

K. Install boxes plumb and level.

L. Flush-Mounted Boxes:
1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.

M. Floor-Mounted Cabinets: Mount on properly sized 3 inch high concrete pad constructed in accordance with Division 03.

N. Install boxes as required to preserve insulation integrity.

O. Metallic Floor Boxes: Install box level at the proper elevation to be flush with finished floor.

P. Nonmetallic Floor Boxes: Cut box flush with finished floor after concrete pour.

Q. Underground Boxes/Enclosures:
1. Install enclosure on gravel base, minimum 6 inches deep.
2. Flush-mount enclosures located in concrete or paved areas.
3. Mount enclosures located in landscaped areas with top at 1 inch above finished grade.
4. Provide cast-in-place concrete collar constructed in accordance with Division 03, minimum 10 inches wide by 12 inches deep, around enclosures that are not located in concrete areas.
5. Install additional bracing inside enclosures in accordance with manufacturer's instructions to minimize box sidewall deflections during backfilling. Backfill with cover bolted in place.

R. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

S. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Division 07.

T. Close unused box openings.

U. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.

V. Provide grounding and bonding in accordance with Section 260526.

W. Identify boxes in accordance with Section 260553.

3.5 INTERFACE WITH OTHER PRODUCTS

A. Locate outlet boxes to allow luminaires positioned as indicated on reflected ceiling plan.

B. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.

3.6 ADJUSTING

A. See Division 01 – General Requirements Adjust flush-mounting outlets to make front flush with finished wall material.

B. Install knockout closures in unused openings in boxes.

3.7 CLEANING

A. See Division 01 – General Requirements

B. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

C. Clean exposed surfaces and restore finish.

3.8 PROTECTION

A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

END OF SECTION

SECTION 26 0534 - FLOOR BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes floor boxes; floor box service fittings; poke-through fittings; and access floor boxes.

B. Related Sections:
1. Section 07 84 00 - Firestopping: Firestopping for electrical work.
2. Section 26 05 29 - Hangers and Supports for Electrical Systems: Firestopping for electrical work.
3. Section 26 05 33 - Raceway and Boxes for Electrical Systems.
4. Section 26 27 26 - Wiring Devices: Receptacles for installation in floor boxes.

1.2 REFERENCES

A. National Electrical Manufacturers Association:
1. NEMA OS 1 - Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit catalog data for floor boxes service fittings.

C. Samples: Submit two of each service fitting illustrating size, material, configuration, and finish.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of each floor box and poke-through fitting.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years [documented] experience.

1.6 EXTRA MATERIALS

A. Section 01 70 00 - Execution and Closeout Requirements: Spare parts and maintenance products.

B. Furnish two protective rings.

C. Furnish two carpet rings.

PART 2 PRODUCTS

2.1 FLOOR BOXES

A. Manufacturers:
1. Legrand/Wiremold Evolution Series (Basis of Design)
2. Leviton.
3. Bryant.
4. Hubbell.
5. Substitutions: Division 01 - Product Requirements.

B. Basis of design models:
1. Refer to floor box schedule on drawings.

C. Floor Boxes: NEMA OS 1.

D. For high capacity devices, power, data and AV outlets (as specified on drawings) shall be completely concealed and mounted on the side wall of floor box interior. Floor box shall utilize integral cable management with NO jacks being located on the top of the cover plate.

E. Floor boxes shall use sliding covers, flip-up covers are not acceptable.

F. Floor box shall be furnished with die cast aluminum cover assembly, with finish to be determined by architect.

G. Conduits: Provide device capable of accepting the following conduit terminations:
1. 3/4" for power.
2. 1-1/4” for data/telecommunications.
3. 2” for audiovisual.

H. Furnish with necessary furniture feed accessories when connecting to modular furniture.

I. Provide empty cover plates for sections without power/communication devices installed.

J. Installation: Contractor is responsible of trenching from floor mounted fitting location to nearest wall.

K. Provide final connections to furniture from furniture-feed devices as required by manufacturer.

2.2 POKE-THROUGH'S

A. Manufacturers:
1. Legrand/Wiremold Evolution Series (Basis of Design)
2. Leviton.
3. Bryant.
4. Hubbell.
5. Substitutions: Division 01 - Product Requirements.

B. Basis of design models:
1. Refer to floor box schedule on drawings.

C. Product Description: Assembly comprising of service fitting, poke-through component, fire stops and smoke barriers, and junction box for conduit termination.

D. Provide connectors with sliding covers, flip-up covers are not acceptable.

E. Fire rating to match that of floor.

F. Service fitting type: Flushed.

G. Conduits: Provide device capable of accepting the following conduit terminations:
1. 3/4" for power.
2. 1-1/4" for data/telecommunications.
3. 2" for audiovisual.

H. Provide empty cover plates for sections without power/communication devices installed.

I. Core Drills: Contractor is responsible of providing 4" core drill for the installation of the assemblies described herein.

J. Provide final connections to furniture from furniture-feed devices as required by manufacturer.

2.3 PEDESTAL-TYPE CONVENIENCE OUTLET SERVICE FITTING

A. Manufacturers:
1. Legrand/Wiremold
2. Leviton.
3. Bryant.
4. Hubbell.
5. Substitutions: Division 01 - Product Requirements.

B. Basis of design models:
1. Refer to floor box schedule on drawings.

C. Floor Boxes: NEMA OS 1.

D. For high capacity devices, power, data and AV outlets (as specified on drawings) shall be completely concealed and mounted on the side wall of floor box interior. Floor box shall utilize integral cable management with NO jacks being located on the top of the cover plate.

E. Floor boxes shall use sliding covers, flip-up covers are not acceptable.

F. Floor box shall be furnished with die cast aluminum cover assembly, with finish to be determined by architect.

G. Conduits: Provide device capable of accepting the following conduit terminations:
1. 3/4" for power.
2. 1-1/4” for data/telecommunications.
3. 2” for audiovisual.

H. Furnish with necessary furniture feed accessories when connecting to modular furniture.

I. Provide empty cover plates for sections without power/communication devices installed.

J. Installation: Contractor is responsible of trenching from floor mounted fitting location to nearest wall.

K. Provide final connections to furniture from furniture-feed devices as required by manufacturer.

2.4 FLUSH-COVER-TYPE CONVENIENCE RECEPTACLE SERVICE FITTING

A. Manufacturers:
1. Legrand/Wiremold
2. Leviton.
3. Bryant.
4. Hubbell.
5. Substitutions: Division 01 - Product Requirements.

B. Basis of design models:
1. Refer to floor box schedule on drawings.

C. Floor Boxes: NEMA OS 1.

D. For high capacity devices, power, data and AV outlets (as specified on drawings) shall be completely concealed and mounted on the side wall of floor box interior. Floor box shall utilize integral cable management with NO jacks being located on the top of the cover plate.

E. Floor boxes shall use sliding covers, flip-up covers are not acceptable.

F. Floor box shall be furnished with die cast aluminum cover assembly, with finish to be determined by architect.

G. Conduits: Provide device capable of accepting the following conduit terminations:
1. 3/4" for power.
2. 1-1/4” for data/telecommunications.
3. 2” for audiovisual.

H. Furnish with necessary furniture feed accessories when connecting to modular furniture.

I. Provide empty cover plates for sections without power/communication devices installed.

J. Installation: Contractor is responsible of trenching from floor mounted fitting location to nearest wall.

K. Provide final connections to furniture from furniture-feed devices as required by manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify locations of floor boxes and outlets in offices prior to rough-in.

C. Verify openings in access floor are in proper locations.

3.2 EXISTING WORK

A. Disconnect abandoned service fitting devices and remove service fittings. Install blank cover for abandoned floor boxes not removed.

B. Maintain access to existing floor boxes remaining active and requiring access. Modify installation or provide access panel.

C. Extend existing service fitting installations using materials and methods [compatible with existing electrical installations, or] as specified.

D. Clean and repair existing service fittings to remain or to be reinstalled.

3.3 INSTALLATION

A. Boxes and fittings are indicated on Drawings in approximate locations unless dimensioned. Adjust box location up to 10 feet to accommodate intended purpose.

B. Floor Box Requirements: Use cast floor boxes for installations in slab on grade; formed steel boxes are acceptable for other installations.

C. Set floor boxes level.

D. Install boxes and fittings to preserve fire resistance rating of slabs and other elements, using materials and methods specified in Section 26 05 29.

E. Install protective rings on active flush cover service fittings.

3.4 ADJUSTING

A. Section 01 70 00 - Execution and Closeout Requirements: Testing, adjusting, and balancing.

B. Adjust floor box flush with finish flooring material.

3.5 CLEANING

A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.

B. Clean interior of boxes to remove dust, debris, and other material.

END OF SECTION

SECTION 26 0536 - CABLE TRAYS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes cable tray.

B. Related Sections:
1. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
2. Section 26 05 29 - Hangers and Supports for Electrical Systems

1.2 REFERENCES

A. ASTM International:
1. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
2. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

B. National Electrical Manufacturers Association:
1. NEMA FG 1 - Nonmetallic Cable Tray Systems.
2. NEMA VE 1 - Metal Cable Tray Systems.
3. NEMA VE 2 - Metal Cable Tray Installation Guidelines.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate tray type, dimensions, support points, and finishes.

C. Product Data: Submit fittings and accessories.

D. Manufacturer's Installation Instructions: Submit application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual routing of cable tray and locations of supports.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience and with service facilities within 100 miles of Project.

1.6 PRE-INSTALLATION MEETINGS

A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.

PART 2 PRODUCTS

2.1 METAL LADDER-TYPE CABLE TRAY

A. Manufacturers:
   1. B-Line Redi-Rail (Basis of Design)
   2. McMaster-Carr
   3. Cablofil
   4. Substitutions: Section 01 60 00 - Product Requirements.

B. Product Description: NEMA VE 1, Class 20C ladder type tray.

C. Material: Aluminum.

D. Finish: Galvanized to ASTM A123/A123M; galvanized after fabrication.

E. Inside Width: As indicated on Drawings.

F. Inside Depth: 4 inches.

G. Straight Section Rung Spacing: 12 inches on center.

H. Inside Radius of Fittings: 12 inches.

I. Furnish manufacturer's standard clamps, hangers, brackets, splice plates, reducer plates, blind ends, barrier strips, connectors, and grounding straps.

J. Covers: ventilated cover.

2.2 WARNING SIGNS

A. Engraved Nameplates: 1/2 inch black letters on yellow laminated plastic nameplate, engraved with: WARNING! DO NOT USE CABLE TRAY AS WALKWAY, LADDER, OR SUPPORT. USE ONLY AS MECHANICAL SUPPORT FOR CABLES AND TUBING!

PART 3 EXECUTION

3.1 INSTALLATION

A. Install metal cable tray in accordance with NEMA VE 2.

B. Support trays and fasten to structure and finishes in accordance with Section 26 05 29. Install supports at each connection point, at end of each run, and at other points to maintain spacing between supports of 6 ft maximum.

C. Install expansion connectors where recommended by manufacturer.

D. Install firestopping in accordance with Section 26 05 29 to sustain ratings when passing cable tray through fire-rated elements.

E. Ground and bond metal cable tray in accordance with Section 26 05 26.
   1. Provide continuity between tray components.
   2. Use anti-oxidant compound to prepare aluminum contact surfaces before assembly.
   3. Install 2 AWG bare copper equipment grounding conductor through entire length of tray; bond to each component.
   4. Make connections to tray using mechanical, compression or exothermic connectors.

F. Install warning signs at 25 feet centers along cable tray, located to be visible.

END OF SECTION

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SECTION 26 05 48

VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL

PART 1 GENERAL

1.1 SECTIONS INCLUDES

A. Seismic restraints for electrical systems.

B. Certification of seismic restraint designs and installation supervision.

C. Certification of seismic attachment of housekeeping pads.

1.2 RELATED REQUIREMENTS

A. Division 03 - Cast-In-Place Concrete.

B. Section 26 04 00 – General Conditions for Electrical Trades.

C. Section 26 05 29 – Hangers and Supports for Electrical Systems.

D. Section 26 05 33 – Raceway and Boxes for Electrical Systems.

E. Section 26 05 36 – Cable Trays for Electrical Systems.

F. Section 26 22 00 – Low-Voltage Transformers.

G. Section 26 24 13 – Switchboards.

H. Section 26 24 16 – Panelboards.

I. Section 26 28 19 – Enclosed Switches.

J. Section 26 28 26 – Enclosed Transfer Switches.

K. Section 26 32 13 – Engine Generators.

1.3 SUBMITTALS

A. Division 01 - Submittal Procedures: Submittal procedures.

B. Shop Drawings:
   A. Submit fabrication details for equipment bases including dimensions, structural member sizes and support point locations.
   B. Provide all details of suspension and support for ceiling suspended equipment.
   C. Where walls, floors, slabs or supplementary steel work are used for seismic restraint locations, details of acceptable attachment methods for raceways must be included and approved before the condition is accepted for installation.

Restraint manufacturers' submittals must include spacing, static loads and seismic loads at all attachment and support points.

D. Provide specific details of seismic restraints and anchors; include number, size and locations for each piece of equipment.

C. Product Data:
   A. Catalog cuts or data sheets on specific restraints detailing compliance with the specification.
   B. Detailed schedules of flexible and rigidly mounted equipment, showing seismic restraints by referencing numbered descriptive drawings.

D. Seismic Certification and Analysis:
   A. Seismic restraint calculations must be provided for all connections of equipment to the structure. Calculations must be stamped by a registered professional engineer with at least five years of seismic design experience, licensed in the state of the job location.
   B. All restraining devices shall have a preapproval number from California OSHPD or some other recognized government agency showing maximum restraint ratings. Preapprovals based on independent testing are preferred to preapprovals based on calculations. Where preapproved devices are not available, submittals based on independent testing are preferred. Calculations (including the combining of tensile and shear loadings) to support seismic restraint designs must be stamped by a registered professional engineer with at least five years of seismic design experience and licensed in the state of the job location. Testing and calculations must include both shear and tensile loads as well as one test or analysis at 45° to the weakest mode.
   C. Analysis must indicate calculated dead loads, static seismic loads and capacity of materials utilized for connections to equipment and structure. Analysis must detail anchoring methods, bolt diameter, embedment and/or welded length.

E. Manufacturer's Responsibilities:
   A. Provide installation instructions, drawings and field inspections to ensure proper installation and performance.
   B. Provide written certification that isolators meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS

A. Division 01 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of seismic restraints.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

C. Design application of seismic restraints under direct supervision of Professional Engineer experienced in design of this Work and licensed in the State where the Project is located.

1.6 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

PART 2 PRODUCTS

2.1 VIBRATION AND SEISMIC CONTROL FOR ELECTRICAL SYSTEMS

A. Provide a "Vibration isolation And Seismic Restraints For Electrical Systems Report" for vibration isolation analysis, seismic restraint, design plans/details and specifications report for all electrical systems to resist seismic forces as determined in accordance to State of CT Building Code for the "Seismic Hazard Exposure Group " and the "Seismic Performance Category " as identified in the architectural and structural contract documents for design classifications. Restraint systems are intended to be designed to withstand the stipulated seismic accelerations applied through the component's center of gravity. The Report shall include all necessary equipment information, including but not limited to, weights, dimensions, center of gravity, mounting locations, wall material, from the submittal approved manufacturers, the appropriate calculations and installation recommendations that are stamped and certified by a licensed Professional Engineer registered in the state where the project is constructed, and with the expertise of vibration and seismic restraints for electrical systems. (Note that vibration control manufacturers usually can assist in recommendations for such services above). This Report shall be submitted and reviewed prior to installation of equipment.

B. Seismic restraint for all electrical systems used on this project shall be provided, except where specifically allowed for exclusion in the Code.

C. Vibration Isolation and Seismic Restraint Devices

1. All vibration isolation and seismic restraint devices described in this section shall be the product of a single manufacturer. Mason Industries is the base manufacturer of these specifications; products of other manufacturers are acceptable provided their systems strictly comply with intent, structural design, performance and deflections of the Base Manufacturer. The devices shall be identified by the manufacturer to be suitable for the particular seismic application(s) and also be listed with California OSHPD to ensure product seismic capability.

2. The manufacturer of the seismic restraint devices shall certify that the devices are capable of accepting, without failure, the seismic forces. The manufacturer shall select the appropriate seismic restraint device type, quantities, locations, installation instructions, drawings and field supervision to insure proper installation and performance of systems.

3. Corrosion protection for outdoor application shall be as follows:

   a. Springs cadmium plated, zinc electroplated, or powder coat.
   b. Hardware cadmium plated.
   c. All other metal parts hot spray or hot dipped galvanized.

4. All seismic restraint devices:

   a. shall maintain the equipment in a captive position and not short circuit isolation devices during normal operating conditions.

b. shall have provisions for bolting and/or welding to the structure.

5. Welding of springs to isolator housing, base plates, etc., is strictly prohibited.

6. Provide restraint attachment plates cast into housekeeping pads, concrete inserts, double sided beam clamps, etc.

7. The same manufacturer shall provide vibration isolation devices for transformers suitable to maintain minimum deflection.

8. Under the transformer and similar electrical equipment with vibration, there should be a stack of two ¾-inch neoprene pads with a 10 ga. metal shim between the pads and on top of the pads. These pads should be similar to Mason Industries type Super W. The spacing of these pads should be based on achieving a static deflection of 0.20 inches. To achieve this deflection, detailed weight information about the transformer will need to be provided by the manufacturer, along with a detail of the bottom supports of the transformer. The isolation pad vendor will need to work with these details and the manufacturer to determine how many pads and how closely spaced they are to properly support the transformer. To restrain the transformer to the housekeeping pad, a resilient bolt connection, similar to the one attached to this document, should be implemented at each isolation pad.

9. The suspended conduits should be suspended from the slab using neoprene isolation hangers similar to Mason HD, sized to achieve at least 0.2 inches of deflection.

D. Seismic Restraint Types

1. TYPE I: Same as TYPE B. Cast or aluminum housing, (except ductile iron) are not acceptable.

   a. Mason Industries TYPE SLR
   b. Avnec
   c. Vibration Eliminator Company

2. TYPE II: Where required, each corner or side of equipment base shall incorporate a seismic restraint snubber having an all directional resilient pad limit stop. Restraints shall be fabricated of plate, structural members or square metal tubing. Angle bumpers are not acceptable.

   a. Mason Industries Type Z-1225 / Z-1011
   b. Avnec
   c. Vibration Eliminator Company

3. TYPE III: Restraints for suspended systems

   a. Vibration isolated systems shall be braced with multiple 7 x 19 strand galvanized cable rope.

1) Mason Industries Type SCB
2) Avnec
3) Vibration Eliminator Company

b. Non-isolated systems shall be braced with structural steel strut type with approved fastening devices to equipment and structure.
1) Mason Industries Type SSB
2) Avnec
3) Vibration Eliminator Company

c. Steel angles (by contractor) shall be provided to prevent rod bending of hung equipment where indicated by the Seismic Restraint vendor's submittals. Steel angles shall be attached to the rods with a minimum of three ductile iron clamps at each restraint location. Welding of support rods to angles is not acceptable. Rod clamp assemblies shall have Anchorage Pre-approval "R" number from California OSHPD.
1) Mason Ind. Model "SRC".
2) Avnec
3) Vibration Eliminator Company

d. Pipe clevis cross braces are required at all restraint locations. They shall be special purpose preformed channels deep enough to be held in place by bolts passing over the clevis cross bolt. Clevis cross braces shall have Anchorage Pre-approval "R" number from California OSHPD.
1) Mason Ind. Model "CCB".
2) Avnec
3) Vibration Eliminator Company

4. TYPE IV: Double deflection neoprene isolator encased in ductile iron or steel casing.

a. Mountings shall have Anchorage Pre-approval "R" number from California OSHPD, certifying the horizontal and vertical seismic load ratings.
1) Mason Industries Type RC or BR
2) Avnec
3) Vibration Eliminator Company

5. TYPE V: Rigid attachment to structure utilizing wedge type expansion anchors for bolting and steel plates, either cast-in or anchored with wedge type expansion bolts, for welding. Powder shots are not acceptable. Concrete anchor bolt spacing shall be in accordance with manufacturer's published standards.

E. Vibration Isolator Types

1. TYPE A: Spring Isolator - Free Standing

a. Spring shall have a minimum outer diameter to overall height ratio of 0.8 : 1 at rated deflection.
b. Reserve deflection (from published load ratings to solid height) of 50% of the rated deflection.
c. Ductile top cup with adjusting bolt tapped for equipment attachment locking cap screw.

d. Minimum 1/4" thick neoprene acoustical base pad or cup on underside, unless designated otherwise.
   1) Mason Industries Type SLF

2. TYPE B: Spring Isolator - Restrained

   a. Shall be the same as TYPE A with the following additional features.

      1) Integral restraining bolts with elastomeric cushions preventing metal-to-metal contact.
      2) Internal spring adjusting nut or bolt with leveling capability.
      3) Built-in all-directional limit stops with minimum 1/4" clearance under normal operation.
      4) Mountings shall have Anchorage Pre-approval “R” number from California OSHPD, certifying the horizontal and vertical seismic load ratings.
         a) Mason Industries Type SLR, SSLFH

3. TYPE D: Double deflection neoprene isolator encased in ductile iron or steel casing.

   a. Mountings shall have Anchorage Pre-approval “R” number from California OSHPD, certifying the horizontal and vertical seismic load ratings.
      1) Mason Industries Type RC or BR

4. TYPE E: Elastomer Hanger Isolator

   a. Molded neoprene element with an integral bushing to insulate lower support rod from the hanger box.
   b. Steel hanger box shall withstand three times the rated load without failure.
      1) Mason Industries Type HD

F. Submittal Requirements

1. Catalog cuts or data sheets on specific seismic restraint devices restraints to be utilized detailing compliance with the specification. Reference seismic restraint types per section of this specification. An itemized list of all isolated and non-isolated equipment. Detailed schedules showing seismic restraints proposed for each piece of equipment, referencing material and seismic calculation drawing numbers. Provide specific details of seismic restraints and anchors; include number, size and locations for each piece of equipment.

2. When walls and slabs are used as seismic restraint locations, details of acceptable methods must be included.

3. Coordinated drawings shall be marked-up with the specific locations and types of restraints shown for all electrical systems including but not limited to, conduit, cable tray. Rod bracing at various installation angles and assigned load at each restraint location shall be clearly delineated. Any and all tributary loads shall be considered for proper restraint sizing.

4. For ceiling suspended equipment provide minimum/maximum installation angle allowed for restraint system as well as braced and unbraced rod lengths at each allowable installation condition.

G. Related Work

1. The Electrical Subcontractor shall coordinate with the General Contractor for all concrete pads and all attachments. Coordinate with the seismic restraint manufacturer for edge distance of pads, but shall be as minimum 10 bolt diameters of clearance all around the outermost anchor bolt to allow for the use of full anchor ratings.

2. Coordinate to ensure that the concrete pad is restrained itself to the structure to resist the seismic forces.

H. Supplementary Support Steel

1. Contractor shall supply supplementary support steel and connections for all equipment and piping as required.

I. Definitions

1. The term EQUIPMENT used throughout this specification section above includes ALL non-structural components within the facility and/or serving this facility, such as equipment located in outbuildings or outside of the main structure on grade within five feet of the foundation wall. Equipment buried underground is excluded but entry of services through the foundation walls is included. Equipment referred to below is a partial list of equipment for reference. (Equipment not listed is still included in this specification).

2. Life safety systems are defined.

   a. All systems involved with fire alarm system.
   b. All systems involved emergency lighting systems.

3. Positive Attachment is defined as a support location with a cast-in or wedge type expansion anchor, a double sided beam clamp, and a welded or through bolted connection to the structure.

4. Transverse Bracing is defined as restraint(s) applied to limit motion perpendicular or angular to the centerline of the conduit, cable tray or bus duct.

A. Longitudinal Bracing is defined as restraint(s) applied to limit motion along the centerline of the conduit, cable tray or bus duct.

PART 3 EXECUTION

3.1 INSTALLATION

A. General

A. Unless specifically noted or indicated otherwise, all equipment and material specified in Part 2 of this specification or indicated on the drawings shall be installed under this Contract whether or not specifically itemized herein. This Section covers particular installation methods and requirements peculiar to certain items and classes or material and equipment.

B. The Electrical Subcontractor shall obtain detailed information from manufacturers of equipment provided under Part 2 of this specification as to proper methods of installation.

C. The Electrical Subcontractor shall obtain final roughing dimensions and other information as needed for complete installation of items furnished under other Sections or furnished by the Owner.

D. The Electrical Subcontractor shall keep fully informed of size, shape and position of openings required for material and equipment provided under this and other Sections. Ensure that openings required for work of this Section are coordinated with work of other Sections. Provide cutting and patching as necessary.

E. All miscellaneous hardware and support accessories, including support rods, nuts, bolts, screws and other such items, shall be of a galvanized or cadmium plated finish or of another approved rust-inhibiting coating.

B. Vibration Isolation and Seismic Restraints for Electrical System

A. Refer to the Part 2 Vibration and Seismic Restraints for Electrical Systems Report for installation requirements.

B. All floor mounted equipment shall be snubbed, anchored, bolted or welded to the structure to comply with the required seismic forces. Calculations that determine that isolated equipment movement may be less than the operating clearance of snubbers (restraints) do not preclude the need for snubbers. All equipment must be positively restrained to the structure.

C. All suspended equipment shall be two or four point independently braced with TYPE III restraints, installed taught for non-isolated equipment and slack with ½" cable deflection for isolated equipment. Rod bracing shall be installed as per approved submittals and shop drawings.

D. All horizontally suspended conduits shall use RESTRAINT TYPE III unless otherwise noted in the Report.

E. For all trapeze supported conduit, the individual conduits must be transversely and vertically restrained to the trapeze support at the designated restraint locations.

F. The installation shall not overstress the building structure. Bracing locations and methods shall be reviewed by the Structural Engineer and Architect prior to installation.

G. Conduit Risers and Busduct Risers

a. Where conduits and busduct risers pass through cored holes, core diameters to be a maximum of 2" larger than pipe O.D. Cored holes must be packed with suitable resilient fire stop material as specified in other sections of this specification and/or state and local codes.

b. Conduit risers and busduct risers through cored holes require a riser clamp at each floor level on top of the slab attached in a seismically approved manner for vertical restraint. Allow space for thermal expansion per manufacturer and all applicable standards. The electrical code requires vertical support for cables within conduits, in addition to the required supports include conduit thermal expansion at each cable support location. Such thermal expansion method shall also allow space for any building settlement.

c. Conduit risers and busduct risers in pipe shafts require structural steel attached in a seismically approved manner at each floor level and a riser clamp at each floor level on top of, and fastened to the structural steel. The riser clamp and structural steel must be capable of withstanding all static and seismic loads.

d. Refer to manufacturer's seismic restraint methods for busduct. In addition to the seismic methods also coordinate for any thermal expansion (Vertical and Horizontal) and include proper installation method per manufacturer recommendations. Include any required future adjustment to the busducts or busduct fittings for building movement (settlement), such adjustment shall be perform within ten (10) to twelve (12) months of the busducts installation.

H. Ceiling mounted lighting fixtures shall be attached to lay-in ceilings with earthquake clips or other approved means of positive attachment to T- bar structure, in addition to direct attachments to the structure.

I. All non-isolated floor or wall mounted equipment shall use RESTRAINT TYPE III or V, unless noted otherwise in the Report.

J. Where base anchoring of equipment is insufficient to resist seismic forces, provide restraint TYPE III shall be located above the units center of gravity to suitably resist "G" forces specified, unless noted otherwise in the Report.

K. A rigid conduit or cable tray system shall not be braced to dissimilar parts of a building or two dissimilar building systems that may respond in a different mode during an earthquake (e.g Wall and roof; solid concrete wall and a metal deck

with lightweight concrete fill, bus duct, conduit, etc. crossing a building expansion joint).

3.2 MATERIALS AND WORKMANSHIP

A. All materials and equipment shall be new and unused and shall meet requirements of the latest Standards of NEMA, UL, IPCEA, ANSI and IEEE. Equipment shall have components required or recommended by OSHA, applicable NFPA documents and shall be UL listed and labeled.

B. Despite references in the specifications or on the drawings to materials or pieces of equipment by name, make or catalog number, such references shall be interpreted as establishing standards of quality for materials and performance.

C. Finish of materials, components and equipment shall not be less than Industry good practice. When material or equipment is visible or subject to corrosive or atmospheric conditions, the finish shall be as approved by the Architect.

D. Provide proper access to material or equipment that requires inspection, replacement, repair or service. If proper access cannot be provided, confer with the Architect as to the best method of approach to minimize effects of reduced access.

E. All work shall be installed in a neat and workmanlike manner and shall be done in accordance with all Local and State Codes.

F. The Owner will not be responsible for material, equipment or the installation of same before testing and acceptance.

END OF SECTION

SECTION 26 0553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Electrical identification requirements.

B. Identification nameplates and labels.

C. Wire and cable markers.

D. Voltage markers.

E. Underground warning tape.

F. Floor marking tape.

G. Warning signs and labels.

1.2 RELATED REQUIREMENTS

A. See Division 01 – General Requirements

B. Division 09 - Finishes.

C. Section 260400 – General Conditions for Electrical Trades.

D. All of Division 26.

1.3 REFERENCE STANDARDS

A. ANSI Z535.2 - American National Standard for Environmental and Facility Safety Signs.

B. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels.

C. NFPA 70 - National Electrical Code.

D. NFPA 70E - Standard for Electrical Safety in the Workplace

E. UL 969 - Marking and Labeling Systems.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.

B. Sequencing:
   1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.
   2. Do not install identification products until final surface finishes and painting are complete.

1.5 SUBMITTALS

A. See Division 01- General Requirements

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.

C. Shop Drawings: Provide schedule of items to be identified indicating proposed designations, materials, legends, and formats.

D. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation and installation of product.

1.6 DELIVERY, STORAGE, AND HANDLING

A. See Division 01 – General Requirements

B. Accept identification products on site in original containers. Inspect for damage.

C. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.

D. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.7 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

1.8 FIELD CONDITIONS

A. Do not install adhesive products when ambient temperature and humidity is lower than recommended by manufacturer.

PART 2 PRODUCTS

2.1 IDENTIFICATION REQUIREMENTS

A. Existing Work: Unless specifically excluded, identify existing elements to remain that are not already identified in accordance with specified requirements.

B. Identification for Equipment:
1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
a. Panelboards:
1) Identify panel name.
2) Identify ampere rating.
3) Identify voltage and phase.
4) Identify power source and circuit number. Include location when not within sight of equipment.
5) Identify main overcurrent protective device. Use identification label for panelboards with a door. For power distribution panelboards without a door, use identification nameplate.
6) Use typewritten circuit directory to identify load(s) served for panelboards with a door, including spares and spaces.
b. Transformers:
1) Identify kVA rating.
2) Identify voltage and phase for primary and secondary.
3) Identify power source and circuit number. Include location when not within sight of equipment.
4) Identify load(s) served. Include location when not within sight of equipment.
c. Enclosed switches, circuit breakers, and motor controllers:
1) Identify voltage and phase.
2) Identify power source and circuit number. Include location when not within sight of equipment.
3) Identify load(s) served. Include location when not within sight of equipment.
d. Time Switches:
1) Identify load(s) served and associated circuits controlled. Include location.
e. Enclosed Contactors:
1) Identify ampere rating.
2) Identify voltage and phase.
3) Identify configuration, e.g., E.O.E.H. (electrically operated, electrically held) or E.O.M.H. (electrically operated, mechanically held).
4) Identify coil voltage.
5) Identify load(s) and associated circuits controlled. Include location.
f. Transfer Switches:
1) Identify voltage and phase.
2) Identify power source and circuit number for both normal power source and standby power source. Include location when not within sight of equipment.
3) Identify load(s) served. Include location when not within sight of equipment.

4) Identify short circuit current rating based on the specific overcurrent protective device type and settings protecting the transfer switch.

g. Electricity Meters:

1) Identify load(s) metered.

2. Service Equipment:
   a. Use identification nameplate to identify each service disconnecting means.
   b. For buildings or structures supplied by more than one service, or any combination of branch circuits, feeders, and services, use identification nameplate or means of identification acceptable to authority having jurisdiction at each service disconnecting means to identify all other services, feeders, and branch circuits supplying that building or structure. Verify format and descriptions with authority having jurisdiction.
3. Emergency System Equipment:
   a. Use identification nameplate or voltage marker to identify emergency system equipment in accordance with NFPA 70.
   b. Use identification nameplate at each piece of service equipment to identify type and location of on-site emergency power sources.
   c. Use identification nameplate to identify emergency operating instructions for emergency system equipment.
4. Use voltage marker to identify highest voltage present for each piece of electrical equipment.
5. Use identification nameplate to identify equipment utilizing series ratings, where permitted, in accordance with NFPA 70.
6. Use identification nameplate to identify switchboards and panelboards utilizing a high leg delta system in accordance with NFPA 70.
7. Use identification nameplate to identify disconnect location for equipment with remote disconnecting means.
8. Use identification label or handwritten text using indelible marker on inside of door at each fused switch to identify required NEMA fuse class and size.
9. Use identification label or handwritten text using indelible marker on inside of door at each motor controller to identify nameplate horsepower, full load amperes, code letter, service factor, voltage, and phase of motor(s) controlled.
10. Use identification label to identify overcurrent protective devices for branch circuits serving fire alarm circuits. Identify with text "FIRE ALARM CIRCUIT".
11. Use field-painted floor markings, floor marking tape, or warning labels to identify required equipment working clearances where indicated or where required by the authority having jurisdiction.
    a. Field-Painted Floor Markings: Alternating black and white stripes, 3 inches wide, painted in accordance with Division 09.
12. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70, including but not limited to the following.
    a. Service equipment.
    b. Industrial control panels.
    c. Motor control centers.
    d. Elevator control panels.
    e. Industrial machinery.

13. Arc Flash Hazard Warning Labels: Comply with Section 260573.
14. Use warning signs to identify electrical hazards for entrances to all rooms and other guarded locations that contain exposed live parts operating at 600 V nominal or less with the word message "DANGER; Electrical hazard; Authorized personnel only" or approved equivalent.
15. Use warning signs to identify electrical hazards for entrances to all buildings, vaults, rooms, or enclosures containing exposed live parts or exposed conductors operating at over 600 V nominal with the word message "DANGER; HIGH VOLTAGE; KEEP OUT".
16. Use warning labels to identify electrical hazards for equipment, compartments, and enclosures containing exposed live parts or exposed conductors operating at over 600 V nominal with the word message "DANGER; HIGH VOLTAGE; KEEP OUT".
17. Use warning labels, identification nameplates, or identification labels to identify electrical hazards for equipment where multiple power sources are present with the word message "DANGER; Hazardous voltage; Multiple power sources may be present; Disconnect all electric power including remote disconnects before servicing" or approved equivalent.

C. Identification for Conductors and Cables:
1. Color Coding for Power Conductors 600 V and Less: Comply with Section 260519.
2. Identification for Communications Conductors and Cables: Comply with Section 270553.
3. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.
4. Use wire and cable markers to identify circuit number or other designation indicated for power, control, and instrumentation conductors and cables at the following locations:
    a. At each source and load connection.
    b. Within boxes when more than one circuit is present.
    c. Within equipment enclosures when conductors and cables enter or leave the enclosure.
    d. In cable tray, at maximum intervals of 20 feet.
5. Use wire and cable markers to identify connected grounding electrode system components for grounding electrode conductors.
6. Use underground warning tape to identify direct buried cables.

D. Identification for Raceways:
1. Use voltage markers to identify highest voltage present for accessible conduits at maximum intervals of 20 feet.
2. Use voltage markers or color-coded bands to identify systems other than normal power system for accessible conduits at maximum intervals of 20 feet.
    a. Color-Coded Bands: Use field-painting or vinyl color coding electrical tape to mark bands 3 inches wide.
        1) Color Code:
            a) Emergency Power System: Red.

(1) Life Safety Branch: YELLOW.
(2) Critical Branch: RED.
(3) Equipment Branch: GREEN.

b) Fire Alarm System: Red.

2) Field-Painting: Comply with Division 09.
3) Vinyl Color Coding Electrical Tape: Comply with Section 260519.

3. Use identification labels, handwritten text using indelible marker, or plastic marker tags to identify circuits enclosed for accessible conduits at wall penetrations, at floor penetrations, at roof penetrations, and at equipment terminations when source is not within sight.
4. Use identification labels, handwritten text using indelible marker, or plastic marker tags to identify spare conduits at each end. Identify purpose and termination location.
5. Use underground warning tape to identify underground raceways.
6. Use voltage markers to identify highest voltage present for wireways at maximum intervals of 20 feet.

E. Identification for Cable Tray: Comply with Section 260536.

F. Identification for Boxes:
1. Use voltage markers to identify highest voltage present.
2. Use voltage markers or color coded boxes to identify systems other than normal power system.
a. Color-Coded Boxes: Field-painted in accordance with Division 09 per the same color code used for raceways.
1) Emergency Power System: Red.
(1) Life Safety Branch: YELLOW.
(2) Critical Branch: RED.
(3) Equipment Branch: GREEN.
2) Fire Alarm System: Red.
b. For exposed boxes in public areas, do not color code.
3. Use identification labels or handwritten text using indelible marker to identify circuits enclosed.
a. For exposed boxes in public areas, use only identification labels.
4. Use warning labels to identify electrical hazards for boxes containing exposed live parts or exposed conductors operating at over 600 V nominal with the word message "DANGER; HIGH VOLTAGE; KEEP OUT".

G. Identification for Devices:
1. Identification for Communications Devices: Comply with Section 270553.
2. Wiring Device and Wallplate Finishes: Comply with Section 262726.
3. Factory Pre-Marked Wallplates: Comply with Section 262726.
4. Use identification label to identify fire alarm system devices.
a. For devices concealed above suspended ceilings, provide additional identification on ceiling tile below device location.
5. Use identification label or engraved wallplate to identify serving branch circuit for all receptacles.

a. For receptacles in public areas or in areas as directed by Architect, provide identification on inside surface of wallplate.

6. Use identification label or engraved wallplate to identify load controlled for wall-mounted control devices controlling loads that are not visible from the control location and for multiple wall-mounted control devices installed at one location.

7. Use identification label to identify receptacles protected by upstream GFI protection, where permitted.

H. Identification for Luminaires:

1. Use permanent red dot on luminaire frame to identify luminaires connected to emergency power system.

I. Identification for Photovoltaic Systems: Comply with Section 264500.

2.2 IDENTIFICATION NAMEPLATES AND LABELS

A. Identification Nameplates:

1. Manufacturers:
   a. Brimar Industries, Inc.
   b. Kolbi Pipe Marker Co.
   c. Seton Identification Products
   d. Substitutions: Division 01 - General Requirements.
2. Materials:
   a. Indoor Clean, Dry Locations: Use plastic nameplates.
   b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
3. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.
   a. Exception: Provide minimum thickness of 1/8 inch when any dimension is greater than 4 inches.
4. Stainless Steel Nameplates: Minimum thickness of 1/32 inch; engraved or laser-etched text.
5. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch; engraved or laser-etched text.
6. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.

B. Identification Labels:

1. Manufacturers:
   a. Brady Corporation
   b. Brother International Corporation
   c. Panduit Corp.
   d. Substitutions: Division 01 - General Requirements.
2. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
   a. Use only for indoor locations.
3. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

C. Format for Equipment Identification:
   1. Minimum Size: 1 inch by 2.5 inches.
   2. Legend:
      a. System designation where applicable:
         1) Emergency Power System: Identify with text "EMERGENCY".
         2) Life Safety Branch: Identify with text "LIFE SAFETY"
         3) Critical Branch: Identify with text "CRITICAL"
         4) Equipment Branch: Identify with text "EQUIPMENT"
         5) Fire Alarm System: Identify with text "FIRE ALARM".
      b. Equipment designation or other approved description.
      c. Other information as indicated.
   3. Text: All capitalized unless otherwise indicated.
   4. Minimum Text Height:
      a. System Designation: 1 inch.
      b. Equipment Designation: 1/2 inch.
      c. Other Information: 1/4 inch.
      d. Exception: Provide minimum text height of 1 inch for equipment located more than 10 feet above floor or working platform.
   5. Color:
      a. Normal Power System: White text on black background.
      b. Emergency Power System: White text on red background.
         1) Life Safety Branch: White text on YELLOW background.
         2) Critical Branch: White text on RED background.
         3) Equipment Branch: White text on GREEN background.
      c. Fire Alarm System: White text on red background.

D. Format for General Information and Operating Instructions:
   1. Minimum Size: 1 inch by 2.5 inches.
   2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.
   3. Text: All capitalized unless otherwise indicated.
   4. Minimum Text Height: 1/4 inch.
   5. Color: Black text on white background unless otherwise indicated.
      a. Exceptions:
         1) Provide white text on red background for general information or operational instructions for emergency systems.
         2) Provide white text on red background for general information or operational instructions for fire alarm systems.

E. Format for Caution and Warning Messages:
   1. Minimum Size: 2 inches by 4 inches.
   2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.
   3. Text: All capitalized unless otherwise indicated.
   4. Minimum Text Height: 1/2 inch.
   5. Color: Black text on yellow background unless otherwise indicated.

F. Format for Receptacle Identification:
1. Minimum Size: 3/8 inch by 1.5 inches.
2. Legend: Power source and circuit number or other designation indicated.
a. Include voltage and phase for other than 120 V, single phase circuits.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 3/16 inch.
5. Color: Black text on clear background.

G. Format for Control Device Identification:
1. Minimum Size: 3/8 inch by 1.5 inches.
2. Legend: Load controlled or other designation indicated.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 3/16 inch.
5. Color: Black text on clear background.

H. Format for Fire Alarm Device Identification:
1. Minimum Size: 3/8 inch by 1.5 inches.
2. Legend: Designation indicated and device zone or address.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 3/16 inch.
5. Color: Red text on white background.

2.3 WIRE AND CABLE MARKERS

A. Manufacturers:
1. Brady Corporation
2. HellermannTyton
3. Panduit Corp.
4. Substitutions: Division 01 - General Requirements.

B. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.
1. Do not use self-adhesive type markers.

C. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.

D. Legend: Power source and circuit number or other designation indicated.

E. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.
1. Do not use handwritten text.

F. Minimum Text Height: 1/8 inch.

G. Color: Black text on white background unless otherwise indicated.

2.4 VOLTAGE MARKERS

A. Manufacturers:
   1. Brady Corporation
   2. Brimar Industries, Inc.
   3. Seton Identification Products
   4. Substitutions: Division 01 - General Requirements.

B. Markers for Conduits: Use factory pre-printed self-adhesive vinyl, self-adhesive vinyl cloth, or vinyl snap-around type markers.

C. Markers for Boxes and Equipment Enclosures: Use factory pre-printed self-adhesive vinyl or self-adhesive vinyl cloth type markers.

D. Minimum Size:
   1. Markers for Equipment: 1 1/8 by 4 1/2 inches.
   2. Markers for Conduits: As recommended by manufacturer for conduit size to be identified.
   3. Markers for Pull Boxes: 1 1/8 by 4 1/2 inches.
   4. Markers for Junction Boxes: 1/2 by 2 1/4 inches.

E. Legend:
   1. Markers for Voltage Identification: Highest voltage present.
   2. Markers for System Identification:
      a. Emergency Power System: Text "EMERGENCY".
      b. Other Systems: Type of service.

F. Color: Black text on orange background unless otherwise indicated.

2.5 UNDERGROUND WARNING TAPE

A. Manufacturers:
   1. Brady Corporation
   2. Brimar Industries, Inc.
   3. Seton Identification Products
   4. Substitutions: Division 01 - General Requirements.

B. Foil-backed Detectable Type Tape: 3 inches wide, with minimum thickness of 5 mil (0.1 mm), unless otherwise required for proper detection.

C. Legend: Type of service, continuously repeated over full length of tape.

D. Color:
   1. Tape for Buried Power Lines: Black text on red background.
   2. Tape for Buried Communication, Alarm, and Signal Lines: Black text on orange background.

2.6 WARNING SIGNS AND LABELS

A. Manufacturers:
   1. Brimar Industries, Inc.
   2. Clarion Safety Systems, LLC.
   3. Seton Identification Products
   4. Substitutions: Division 01 - General Requirements.

B. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.

C. Warning Signs:
   1. Materials:
      a. Indoor Dry, Clean Locations: Use factory pre-printed rigid plastic or self-adhesive vinyl signs.
      b. Outdoor Locations: Use factory pre-printed rigid aluminum signs.
   2. Rigid Signs: Provide four mounting holes at corners for mechanical fasteners.
   3. Minimum Size: 7 by 10 inches unless otherwise indicated.

D. Warning Labels:
   1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
      a. Do not use labels designed to be completed using handwritten text.
      b. Provide polyester overlaminate to protect handwritten text.
   2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
   3. Minimum Size: 2 by 4 inches unless otherwise indicated.

PART 3 EXECUTION

3.1 PREPARATION

A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

3.2 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
   1. Surface-Mounted Equipment: Enclosure front.
   2. Flush-Mounted Equipment: Inside of equipment door.
   3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
   4. Elevated Equipment: Legible from the floor or working platform.
   5. Branch Devices: Adjacent to device.
   6. Interior Components: Legible from the point of access.
   7. Conduits: Legible from the floor.

8. Boxes: Outside face of cover.
9. Conductors and Cables: Legible from the point of access.
10. Devices: Outside face of cover.

C. Install identification products centered, level, and parallel with lines of item being identified.

D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.
1. Do not use adhesives on exterior surfaces except where substrate cannot be penetrated.

E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.

F. Install underground warning tape above buried lines with one tape per trench at 12 inches below finished grade.

G. Secure rigid signs using stainless steel screws.

H. Mark all handwritten text, where permitted, to be neat and legible.

3.3 FIELD QUALITY CONTROL

A. See Division 01 - General Requirements.

B. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

END OF SECTION

SECTION 260573 - OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY

PART 1 GENERAL

1.1 SUMMARY

A. Section includes short circuit and protective device coordination study for the following portions of electrical distribution system from normal power source or sources to and including:
1. Breakers in service entrance switchboard.
2. Main breaker in sub-distribution panels.
3. Main breaker in each panelboard.
4. Branch circuit breakers or fuses in Life Safety Power Systems.

B. Related Sections:
1. Section 260519 – Building Wire and Cable.
2. 262413 – Switchboards.
3. Section 262416 – Panelboards.
4. Section 262913 – Enclosed Controllers.

1.2 SECTION INCLUDES

A. Performance requirements for overcurrent protective devices.

B. Short circuit study.

C. Coordination study and analysis.

~~3.~~D. Arc flash hazard analysis.

~~1.2~~1.3 DESIGN REQUIREMENTS

A. Report Preparation:
1. Perform study with aid of computer software program.
2. Obtain actual settings for packaged chiller and motor characteristics.
3. Calculate short circuit interrupting and, when applicable, momentary duties for assumed 3-phase bolted fault short circuit current and phase to ground fault short circuit current at each of the following locations:
   a. Utility supply bus.
   b. Medium voltage air interrupter switchgear.
   c. Medium voltage circuit breaker switchgear.
   d. Secondary unit substations.
   ~~e. Medium voltage motor controllers.~~
   ~~f. Medium voltage oil switchgear.~~
   ~~g.~~e. Low-voltage switchgear.
   ~~h.~~f. Switchboards.
   ~~i.~~g. Motor control centers.
   ~~j.~~h. Distribution panelboards.

~~k.~~i. Branch circuit panelboards.
~~l.~~j. Busway.
~~m.~~k. Each other significant equipment location throughout system.

B. Prepare time-current curves graphically indicating coordination proposed for system, centered on conventional, full-size, log-log forms.

C. Prepare with each time-curve sheet complete title and one-line diagram with legend identifying specific portion of system covered by that particular curve sheet.

D. Prepare detailed description of each protective device identifying its type, function, manufacturer, and time-current characteristics. Tabulate recommended device tap, time dial, pickup, instantaneous, and time delay settings.

~~D.~~E. Refer to paragraph 1.08, E. for Arc Flash Hazard analysis requirements.

1.4 RELATED REQUIREMENTS

A. Section 262413 - Switchboards: Overcurrent protective devices in switchboards.

B. Section 262416 - Panelboards: Overcurrent protective devices in panelboards.

1.5 REFERENCE STANDARDS

A. IEEE 242 - IEEE Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems; 2001.

B. IEEE 399 - IEEE Recommended Practice for Industrial and Commercial Power Systems Analysis; 1997.

C. NFPA 70 - National Electrical Code; current revision.

~~1.3~~1.6 SUBMITTALS

A. See Division 01 – General Requirements: for submittal procedures.

B. Study Preparer's Qualifications.

C. Study Report: Submit protective device studies as specified, prior to submission of product data submittals or ordering or fabrication of protective devices.
1. Evaluation of product data submittals by Engineer will not commence until acceptable preliminary studies in sufficient detail to ensure that device selection will be adequate have been submitted.
2. Include stamp or seal and signature of preparing engineer.

D. Product Data: In addition to submittals specified elsewhere, submit manufacturer's time-current curves for all protective devices.

E. Field Engineer Qualifications.

F. Field Inspection Report: Show final adjusted settings of protective devices.

G. Certificates: Prior to final inspection, certify that field adjustable protective devices have been set in accordance with requirements of protective device analysis.

H. Project Record Documents: Revise protective device study as required to show as-built conditions.
1. Submit not less than 60 days prior to final inspection of electrical system.
2. Include hard copies in operation and maintenance data submittals.
3. Include all files prepared using software packages, on electronic media, with file name cross-references to specific pieces of equipment and systems.

~~A. Qualifications Data: Required.~~

~~B. Completed Report: Required.~~

1.7 PROTECTIVE DEVICE STUDY

A. Analyze the specific electrical and utilization equipment (according to NEC definition), the actual protective devices to be used, and the actual feeder lengths to be installed.
   1. Scope of Studies: Refer to Summary.
   2. Primary Source, for Purposes of Studies: Utility company primary protective devices.
   3. Study Methodology: Comply with requirements and recommendations of NFPA 70, IEEE 399, and IEEE 242.
   4. Report: State the methodology and rationale employed in making each type of calculation; identify computer software package(s) used.

B. One-Line Diagrams: Prepare schematic drawing of the emergency electrical distribution system, with all electrical equipment and wiring to be protected by the protective devices; identify nodes on the diagrams for reference on report that includes:
   1. Calculated fault impedance, X/R ratios, utility contribution, and short circuit values (asymmetric and symmetric) at the main switchboard bus and all downstream devices containing protective devices.
   2. Breaker and fuse ratings.
   3. Transformer kVA and voltage ratings, percent impedance, X/R ratios, and wiring connections.
   4. Identification of each bus, with voltage.
   5. Conduit materials, feeder sizes, actual lengths, and X/R ratios.

C. Short Circuit Study: Calculate the fault impedance to determine available 3-phase short circuit and ground fault currents at each bus and piece of equipment during normal conditions, alternate operations, emergency power conditions, and other operations that could result in maximum fault conditions.
   1. Show fault currents available at key points in the system down to a fault current of 7,000 A at 480 V and 208 V.
   2. Include motor contributions in determining the momentary and interrupting ratings of the protective devices.
   3. Primary Fault Level Assumptions: Obtain data from utility company.
   4. Report: Include all pertinent data used in calculations and for each device include:
      a. Device identification.
      b. Operating voltage.
      c. Protective device.
      d. Device rating.
      e. Calculated short circuit current, asymmetrical and symmetrical, and ground fault current.

D. Coordination Study: Perform an organized time-current analysis of each protective device in series from the individual device back to the primary source, under normal conditions, alternate operations, and emergency (alternate source) power conditions.
   1. Graphically illustrate that adequate time separation exists between series devices, including upstream primary device.
   2. Plot the specific time-current characteristics of each protective device on log-log paper.

3. Organize plots so that all upstream devices are clearly depicted on one sheet.
4. Also show the following on curve plot sheets:
   a. Device identification.
   b. Voltage and current transformer ratios for curves.
   c. 3-phase and 1-phase ANSI damage curves for each transformer.
   d. No-damage, melting, and clearing curves for fuses.
   e. Cable damage curves.
   f. Transformer inrush points.
   g. Maximum short circuit cutoff point.
   h. Simple one-line diagram for the portion of the system that each curve plot illustrates.
   i. Software report for each curve plot, labeled for identification.

E. Arc Flash Hazard Study: Perform an arc flash hazard study after short circuit and coordination study is complete based on IEEE Std. 1584 "IEEE Guide for Performing Arc Flash Hazard Calculations."
1. Pertinent data, rationale employed, and assumptions in developing calculations shall be incorporated in the introductory remarks of the study.
2. The study shall be in accordance with applicable NFPA 70E, OSHA 29-CFR, Part 1910 Sub Part S and IEEE 1584 Standards.
3. Determine the following:
   a. Flash Hazard Protection Boundary.
   b. Limited Approach Boundary.
   c. Restricted Boundary.
   d. Prohibited Boundary.
   e. Incident energy Level.
   f. Minimum Arc Rating.
   g. Shock Risk.
   h. Glove Class.
   i. Required Personal Protective Equipment class.
   j. Type of Fire Rated Clothing required.
4. Provide Arc Flash Evaluation summary sheet listing the following additional items:
   a. Bus Name.
   b. Upstream protective device Name, Type, and Settings.
   c. Bus Line to Line Voltage.
   d. Bus Bolted Fault.
   e. Protective Device Bolted fault current.
   f. Arcing Fault current.
   g. Protective Device Trip/Delay time.
   h. Breaker Opening Time.
   i. Equipment type.
   j. Gap.
   k. Arc Flash Boundary.
   l. Working distance.
   m. Incident energy.
   n. Required Protective Fire-Rated Clothing Type and Class.

F. Analysis: Determine ratings and settings of protective devices to minimize damage caused by a fault and so that the protective device closest to the fault will open first.
1. Required Ratings and Settings: Derive required ratings and settings of protective devices in consideration of upstream protective device settings and optimize system to ensure selective coordination.
2. Identify any equipment that is underrated.
3. Identify specified protective devices will not achieve required protection or coordination but with minor changes can be made to do so; provide such modified devices at no additional cost and identify them on submittals as "revised in accordance with Protective Device Coordination Study"; minor changes include different trip sizes in the same frame, time curve characteristics of induction relays, CT ranges, etc.
4. Identify specified protective devices that will not achieve required protection or coordination and cannot be field adjusted to do so, and for which adequate devices would involve a change to the contract sum.
5. In all cases where adequate protection or coordination cannot be achieved at no extra cost, provide a discussion of alternatives and logical compromises for best achievable coordination.

G. Protective Device Rating and Setting Chart: Summarize in tabular format the required characteristics for each protective device based on the analysis; include:
1. Device identification.
2. Relay CT ratios, tap, time dial, and instantaneous pickup.
3. Circuit breaker sensor rating, long-time, short-time, and instantaneous settings, and time bands.
4. Fuse rating and type.
5. Ground fault pickup and time delay.
6. Input level and expected response time at two test points that are compatible with commonly available test equipment and the ratings of the protective device.
7. Highlight all devices that as furnished by Contractor will not achieve required protection.

~~1.4~~1.8 QUALITY ASSURANCE

A. Study Preparer Qualifications: Electrical testing agency regularly engaged in short circuit and coordination studies, with at least 5 years experience in work of this type, and employing professional electrical engineer licensed in the State of Connecticut to perform the studies.

B. Computer Software for Study Preparation: Use the latest edition of commercially available software utilizing specified methodologies.

C. Contractor Responsibility: Provide all project-related data needed by study preparer, including equipment, wire sizes, insulation types, conduit types, and actual circuit lengths.

~~A. Use commercially available software, designed specifically for short circuit and protective device coordination studies with minimum of 5 years documented availability approved by Engineer.~~

~~B. Perform study in accordance with IEEE 242.~~

~~C. Coordinate work with local power company.~~

PART 2 PRODUCTS

2.1 COMPUTER SOFTWARE DEVELOPERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide a comparable product by one of the following:
1. CGI CYME.
2. EDSA Micro Corporation.
3. ESA Inc.
4. Operation Technology, Inc.
5. SKM Systems Analysis, Inc.

2.2 COMPUTER SOFTWARE PROGRAM REQUIREMENTS

A. Comply with IEEE 399.

B. Analytical features of fault-current-study computer software program shall include "mandatory," "very desirable," and "desirable" features as listed in IEEE 399.

C. Computer software program shall be capable of plotting and diagramming time-current characteristic curves as part of its output. Computer software program shall report device settings and ratings of all overcurrent protective devices and shall demonstrate selective coordination by computer-generated, time-current coordination plots.

2.3 PROTECTIVE DEVICES

A. Provide protective devices of ratings and settings as required so that the protective device closest to the fault will open first.

B. In addition to requirements specified elsewhere, provide overcurrent protective devices having ratings and settings in accordance with results of this analysis.
~~Not used.~~

PART 3 EXECUTION

3.1 FIELD QUALITY CONTROL

A. Provide the services of a qualified field engineer and necessary tools and equipment to test, calibrate, and adjust the installed protective devices to conform to requirements determined by the coordination analysis.

B. Adjust installed protective devices having adjustable settings to conform to requirements determined by the coordination analysis.

C. Produce Arc Flash Warning Labels with pre-printed header incorporating items a through j above. Also, include bus name, system operating voltage, and date of issue. Labels shall be printed in color on self-adhesive backed labels. Labels shall comply with NEC and NFPA 70E.
   1. Provide arc flash warning labels on the following equipment:
      a. Switchboards.
      b. Panelboards.
      c. Disconnect switches.
      d. Motor controllers.
      e. Standalone overcurrent protective devices.
      f. Other electrical equipment that is inspected, maintained and adjusted while energized.

D. Submit report showing final adjusted settings of all protective devices.

E. Results of the above shall be documented in writing and provided within the O&M manuals and to the CX agent as part of the closeout.

~~A. Provide assistance to electrical distribution system equipment manufacturer during start up of electrical system and equipment.~~

END OF SECTION

FOR REFERENCE: THIS SECTION WAS ISSUED FOR PHASE 1 AND PHASE 2

SECTION 26 0923 - LIGHTING CONTROL DEVICES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. General Requirements
2. Lighting Contactors
3. Line Voltage Switches
4. Line Voltage Dimmer Switches
5. Switch Plates.
6. Line Voltage Occupancy/Vacancy Sensor Switches
7. Low Voltage Occupancy/Vacancy Sensors
8. Photocells
9. Room Controllers / Power Packs
10. Low Voltage Keypads / Switches.
11. UL 924 Bypass Relays
12. UL1008 Transfer Relays
13. Lighting Control Relay Panels
14. Class 2 Conductors and Cables

B. Related Sections:
1. Section 26 05 03 - Equipment Wiring Connections: Execution requirements for electric connections specified by this section.
2. Section 26 05 19– Electrical Power Conductors and Cables.
3. Section 26 05 33 - Raceway and Boxes for Electrical Systems: Product requirements for raceway and boxes for placement by this section.
4. Section 26 05 53 - Identification for Electrical Systems: Product requirements for electrical identification items for placement by this section.
5. Section 26 24 16 - Panelboards.
6. Section 26 27 26 - Wiring Devices: Product requirements for wiring devices for placement by this section.
7. Section 26 55 61 – Theatrical Lighting: Controls for stage lighting units.

1.2 REFERENCES

A. National Electrical Manufacturers Association:
1. NEMA AB 1 - Molded Case Circuit Breakers and Molded Case Switches.
2. NEMA FU 1 - Low Voltage Cartridge Fuses.
3. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contractors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.
4. NEMA ICS 4 - Industrial Control and Systems: Terminal Blocks.
5. NEMA ICS 5 - Industrial Control and Systems: Control Circuit and Pilot Devices.
6. NEMA ICS 6 - Industrial Control and Systems: Enclosures.
7. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).

8. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
9. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts; 2015.

B. 47 CFR 15 - Radio Frequency Devices; current edition.

C. ANSI C136.10 - American National Standard for Roadway and Area Lighting Equipment - Locking-Type Photocontrol Devices and Mating Receptacles - Physical and Electrical Interchangeability and Testing; 2010.

D. ANSI C136.24 - American National Standard for Roadway and Area Lighting Equipment - Nonlocking (Button) Type Photocontrols; 2004 (R2010).

E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

F. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.

G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. UL 773 - Plug-in, Locking Type Photocontrols for Use with Area Lighting; Current Edition, Including All Revisions.

I. UL 773A - Nonindustrial Photoelectric Switches for Lighting Control; Current Edition, Including All Revisions.

J. UL 916 - Energy Management Equipment; Current Edition, Including All Revisions.

K. UL 917 - Clock-Operated Switches; Current Edition, Including All Revisions.

L. UL 1472 - Solid-State Dimming Controls; Current Edition, Including All Revisions.

M. IECC – International Energy Conservation Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.3 SYSTEM DESCRIPTION

A. IECC compliant lighting controls to control all interior and exterior lighting:
1. Standalone lighting controls in individual spaces consisting of some combination of occupancy sensors, vacancy sensors, photocells, power packs, low voltage switches and low voltage switches with dimming capability.
2. Standalone microprocessor based controllers with distributed switching control using self-contained individually mounted lighting relays. Provides multiple modes of operation incorporating vacancy sensors, photocells and low voltage control stations.
3. Lighting control relay panels to control lighting in corridors, large open areas, stairwells, exterior building mounted and pole mounted site lighting. Incorporates microprocessor local and centralized control, communications modules, bus connected sensors and control stations and power supplies.

B. Refer to lighting control details and riser diagrams on the drawings for additional information.

C. Provide automatic shutoff for lighting inside building, where required. Control shutoff by method conforming to IECC.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
1. Coordinate the placement of lighting control devices with millwork, furniture, equipment, etc. installed under other sections or by others.
2. Coordinate the placement of wall switches with actual installed door swings and sidelights.
3. Coordinate the placement of wall switch occupancy/vacancy sensors with actual installed door swings and sidelights.
4. Coordinate the placement of occupancy/vacancy sensors with millwork, furniture, equipment or other potential obstructions to motion detection coverage installed under other sections or by others.
5. Coordinate the placement of photo sensors for daylighting controls with windows, skylights, and luminaires to achieve optimum operation. Coordinate placement with ductwork, piping, equipment, or other potential obstructions to light level measurement installed under other sections or by others.
6. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

B. Sequencing:
1. Protect lighting control devices during construction.
2. Clean lighting control devices once final surface finishes and painting are complete.

1.5 SUBMITTALS

A. See Division 01 - General Requirements.

B. Shop Drawings: Indicate dimensioned drawings of lighting control system components and accessories.
1. One Line Diagram: Indicating system configuration, panels, number and type of switches or devices.
2. Include typical wiring diagrams for each component.
3. Floor Plan Layout Drawings: Manufacturers symbols are acceptable, provided that symbology between engineer’s device legend and manufacturers symbols are cross-referenced.

C. Product Data: Submit manufacturer’s standard product data for each system component. This shall include, but not be limited to: ratings, configurations, dimensions, sensor coverage ranges, colors, service condition requirements, and installation features.

D. Manufacturer's Installation Instructions: Submit for each system component.

E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

F. Coordination Drawings: Submit evidence that lighting controls are compatible with connected monitoring and control devices and systems specified in other Sections and evidence that the control schemes identified herein and shown on the typical lighting control details are configured and operational as specified.
   1. Show interconnecting signal and control wiring and interfacing devices that prove compatibility of inputs and outputs.
   2. Provide documentation addressing each room/area control scheme specified with a description of how the submitted system complies.

1.6 CLOSEOUT SUBMITTALS

A. See Division 01 - General Requirements

B. Project Record Documents: Record the following information:
   1. Actual installed locations of components and settings for lighting control devices. Record circuiting and switching arrangements.
   2. Wiring diagrams reflecting field-installed conditions with identified and numbered system components and devices.

C. Operation and Maintenance Data:
   1. Submit replacement parts numbers.
   2. Submit manufacturer’s published installation instructions and operating instructions.
   3. Recommended renewal parts list.
   4. Detailed information on device programming and setup.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience. Company shall provide 24/7 telephone support by qualified technicians.

B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

C. Installer Qualifications: Installer shall be one who is experienced in performing the work of this section, and who has specialized in installation of work similar to that required for this project.

D. Contractor shall ensure that lighting system control devices and assemblies are fully compatible and can be integrated into a system that operates as described in the lighting control notes on drawings and as described within this specification. Any incompatibilities between devices, assemblies, and system controllers shall be resolved between the contractor and the system provider, as required to ensure proper system operation and maintainability.

E. Performance Requirements: Shall provide all system components that have been manufactured, assembled, and installed to maintain performance criteria stated by manufacturer without defects, damage, or failure.

F. Performance Testing Requirements
1. Manufacturer shall 100% test all equipment prior to shipment. Sample testing is not acceptable.

G. Code Requirements
1. System Control Unit and System Field Devices shall be UL listed and certified.
2. All system components shall be FCC / IC compliant.
3. All system components shall be installed in compliance with National Electrical Codes.
4. Building Codes: All units shall be installed in compliance with applicable, local building codes.

1.8 PRE-INSTALLATION MEETINGS

A. See Division 01 - General Requirements.

B. Convene minimum one week prior to commencing work of this section.

1.9 DELIVERY, STORAGE, AND HANDLING

A. See Division 01 - General Requirements.

B. Accept components on site in manufacturer's packaging. Inspect for damage.

C. Protect components by storing in manufacturer's containers indoor protected from weather.

1.10 WARRANTY

A. See Division 01 - General Requirements.

B. For products noted in this section, provide manufacturer's standard warranty, minimum of one year.

1.11 EXTRA MATERIALS

A. See Division 01 - General Requirements furnish six of each switch type.

B. Furnish six of each occupancy/vacancy sensor type.

C. Furnish six of each photocell type.

D. Furnish six of each power pack type.

E. Furnish six room controllers.

PART 2 PRODUCTS

2.1 LIGHTING CONTROL DEVICES – GENERAL REQUIREMENTS

A. Manufacturers:
   1. Hubbell NX
   2. nLight
   3. Crestron
   4. Greengate
   5. Substitutions: See Division 01 – General Requirements.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Unless specifically indicated to be excluded, provide all required conduit, wiring, connectors, hardware, components, accessories, etc. as required for a complete operating system.

D. Products for Switching of Electronic Ballasts/Drivers: Tested and rated to be suitable for peak inrush currents specified in NEMA 410.

E. Source Limitations: Furnish products produced by a single manufacturer and obtained from a single supplier.

F. Refer to lighting control details on drawings for additional requirements and product specifications.

2.2 LIGHTING CONTACTORS

A. Manufacturers:
   1. General Electric
   2. Cutler-Hammer
   3. Square D
   4. Substitutions: See Division 01 – General Requirements

B. Product Description: NEMA ICS 2, magnetic lighting contactor.

C. Configuration: [Electrically held] [Mechanically held, [2] [3] wire control].

D. Coil Operating Voltage: [24] [120] volts, 60 Hertz.

E. Poles: To match circuit configuration and control function.

F. Contact Rating: Conductor overcurrent protection, considering derating for continuous loads.

G. Accessories:
   1. Cover Mounted Pilot Devices: NEMA ICS 5, standard-duty Selector Switch: ON/OFF/AUTOMATIC function, with rotary action.
   2. Indicating Light: Red Off Green On lens, with LED lamp.

3. Auxiliary Contacts: One field convertible in addition to seal-in contact.
4. Relays: NEMA ICS 2.
5. Control Power Transformers: Provide in each enclosed contactor. Furnish fused secondary.

H. Enclosure: NEMA ICS 6, to meet conditions. Fabricate enclosure from [steel finished with manufacturer's standard gray enamel.
1. Interior Dry Locations: Type 1.
2. Exterior Locations: Type 3R.

2.3 LINE VOLTAGE SWITCHES

A. Manufacturers:
1. Hubbell Incorporated
2. Leviton Manufacturing Co., Inc.
3. Pass and Seymour/Legrand
4. Substitutions: Not Permitted, shall match receptacles manufacturer.

B. Line Voltage Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.
1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.
2. Body and Handle finish: Color selection by Architect.

C. Standard Wall Switches: Industrial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

D. Lighted Wall Switches: Industrial specification grade, 20 A, 120/277 V with illuminated standard toggle type switch actuator and maintained contacts; illuminated with load off; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

E. Pilot Light Wall Switches: Industrial specification grade, 20 A, 120/277 V with red illuminated standard toggle type switch actuator and maintained contacts; illuminated with load on; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

F. Locking Wall Switches: Industrial specification grade, 20 A, 120/277 V with lever type keyed switch actuator and maintained contacts; switches keyed alike; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

G. Momentary Contact Wall Switches: Industrial specification grade, 20 A, 120/277 V with toggle type three position switch actuator and momentary contacts; single pole double throw, off with switch actuator in center position.

H. Locking Momentary Contact Wall Switches: Industrial specification grade, 20 A, 120/277 V with lever type keyed three position switch actuator and momentary contacts; switches keyed alike; single pole double throw, off with switch actuator in center position.

2.4 SWITCH PLATES

A. Manufacturers:
1. Hubbell Incorporated
2. Leviton Manufacturing Co., Inc.
3. Pass and Seymour/Legrand
4. Substitutions: Division 01 - General Requirements.
   a. Where low voltage keypads / switches or line voltage sensor switches are shown, provide switch plate by same manufacturer.

B. Product Description: Specification Grade.
1. Material: Plastic.
2. Color and finish: By Architect.

2.5 LINE VOLTAGE OCCUPANCY/VACANCY SENSOR SWITCHES

A. Manufacturers: See Paragraph 2.1(A)

B. Product Description: Provide wall switch style occupancy/vacancy sensor capable of turning lights OFF when the space becomes unoccupied and ON when the space becomes re-occupied. Provide with 0-10V dimming capabilities and/or integral daylight control, where indicated on the drawings. Refer to drawings for occupancy or vacancy mode setting.
1. Material: Plastic.
2. Color: By Architect.

C. Sensor Switch Requirements:
1. Sensor switch shall be line voltage @ 120/277 VAC, rated for 20A.
2. Sensor technology shall be dual technology: PIR and ultrasonic.
3. Sensor shall have field of view of 180 degrees.
4. Sensor switch shall be capable of operating with LED.
5. Sensor switch shall be set to:
   a. Auto-ON, Auto-OFF mode (Occupancy Sensor)
   b. Manual-ON, Auto-OFF mode (Vacancy Sensor)
   c. Dipswitch selectable to toggle between occupancy and vacancy mode.
6. Sensor shall be capable of turning lights OFF after 20 minutes of inactivity. Switch shall also have 10 and 20 minute overrides.
7. Provide device capable of accepting a 2-wire (hot and neutral) input plus ground.
8. Sensor switch shall be capable of operating in conjunction with a 3-way switch per manufacturers requirements, where indicated on drawings.
9. Provide with 0-10V dimming control.
10. Provide with integral daylight harvesting control: 10-500 foot-candle override range.

2.6 LOW VOLTAGE OCCUPANCY/VACANCY SENSORS

A. Manufacturers: See Paragraph 2.1(A)

B. Product Description: Factory-assembled commercial grade devices for indoor use capable of sensing both major motion, such as walking, and minor motion, such as small desktop level movements, according to published coverage areas, for automatic control of load indicated. Mounting as indicated on floor plans.

C. Sensor Requirements:
   1. Sensor Technology:
      a. Sensor shall be Dual Technology, unless otherwise noted on drawings. Available sensor technologies:
         1) Passive Infrared/Ultrasonic Dual Technology Sensors: Designed to detect occupancy using a combination of both passive infrared and ultrasonic technologies.
         2) Passive Infrared/Acoustic Dual Technology Sensors: Designed to detect occupancy using a combination of both passive infrared and audible sound sensing technologies.
   2. Sensor shall be set to:
      a. Auto-ON, Auto-OFF mode (Occupancy Sensor)
      b. Manual-ON, Auto-OFF mode (Vacancy Sensor)
      c. Dipswitch selectable to toggle between occupancy and vacancy mode.
   3. Provide LED to visually indicate motion detection with separate color LEDs for each sensor type in dual technology units.
   4. Field configurable turn-on and hold-on activation with settings for activation by either or both sensing technologies.
   5. Passive Infrared Lens Field of View: Field customizable to block motion detection in selected areas.
   6. Sensor shall be capable of turning lights OFF after 20 minutes of inactivity. Switch shall also adjustable overrides.
   7. Sensitivity: Field adjustable.
   8. Adaptive Technology: Field selectable; capable of self-adjusting sensitivity and time delay according to conditions.
   9. Isolated Relay for Low Voltage Occupancy Sensors: SPDT dry contacts, ratings as required for interface with system indicated.
   10. Coverage:
      a. Small Space (< 500 Sq Ft): 500 square feet minimum
      b. Medium Space (500-1000 Sq Ft): 1,000 square feet minimum
      c. Large Space (>1000 Sq Ft): 2,000 square feet minimum. Multiple sensors where shown on the plans.
   11. Furnish with power pack or room controller by same manufacturer.
      a. Provide for zone control and maximum number of sensors connected to power pack per manufacturer's requirements.
      b. Provide room controller with functions and quantity of zones as indicated on drawings and as required per manufacturer. Refer to Paragraph 2.9 for additional information.
   12. Operation: Silent.

D. Room Sensor Type: As indicated on Drawings.

E. Corridor and Hallway Sensors:
1. Capable of detecting major motion with a long, narrow pattern designed for corridor and aisle sensing. Refer to lighting control details for product specification.

F. High Bay areas: For areas with ceilings more than 15 feet above finished floor, provide high-bay ceiling mounted occupancy sensor. Refer to lighting control details for product specification.

2.7 PHOTOCELLS

A. Manufacturers: See Paragraph 2.1(A)

B. Product Description: Control system consisting of photo sensors and compatible control modules and power packs, contactors, or relays as required for automatic control of load indicated according to available natural light; capable of integrating with occupancy sensors and manual override controls. Sensor mounted as indicated on Drawings with separate control-calibration module. Control unit powered by 24 VAC.

C. Control-Calibration Module: Furnish with the following:
1. Capable of being switched between multiple measurement ranges.
2. Separate trip points for high and low response settings.
3. Three-minute time delay between switching outputs to avoid nuisance tripping.

D. Daylighting Control Photo Sensors: Low voltage class 2 photo sensor units with output signal proportional to the measured light level and provision for zero or offset based signal.
1. Sensor Type: Photodiode with diffusing lens
2. Sensor Range:
   a. Indoor Photo Sensors: 5 to 100 footcandles (53.8 to 1,080 lx).
   b. Outdoor Photo Sensors: 5 to 250 footcandles (53.8 to 2690 lx).
   c. Atrium Photo Sensors: 200 to 2,500 footcandles (2150 to 2,6910 lx).
   d. Skylight Photo Sensors: 1,000 to 6,000 footcandles (10,760 to 64,580 lx).
   e. Open Loop Photo Sensors: 3 to 6,000 footcandles (32.3 to 64,580 lx).
3. Finish: White unless otherwise indicated.

E. Standalone Dimming Photo Sensors: Photo sensor units with integral 0-10V controller compatible with specified dimming drivers/ballasts, for direct continuous dimming of up to 50 drivers/ballasts.

F. Daylighting Control Switching Modules for Low Voltage Sensors: Low voltage class 2 control unit compatible with specified photo sensors, for switching of compatible power packs, contactors, or relays in response to changes in measured light levels according to selected settings.

2.8 ROOM CONTROLLERS / POWER PACKS

A. Manufacturers: See Paragraph 2.1(A)

B. Refer to lighting control details on drawings for types, configurations, performance requirements, and additional information.

C. Description: Integrated lighting, dimming, and equipment switching control system for mounting in a concealed space, enclosure shall be plenum rated. Provide pre-configured lighting controller(s), with capabilities for manual setup, and software setup through programming port, configured as a standalone controller.
1. Room Controllers.
2. Power Packs.

D. Dimmable Load Types: 16A per channel at 100 to 277VAC, 50/60 Hz:

E. Magnetic low voltage.
1. Electronic low voltage.
2. LED

F. Receptacle/Plug Loads.
1. 120 VAC, 20A general purpose rating.

G. General Requirements:
1. Power Packs:
   a. Main Power: 100 – 277 VAC, 50/60 Hz.
   b. Input/Output (Refer to Drawings and Details for Input/Output Applicable to Project):
      1) Line Power Inputs: 1.
      2) Switch Channel Outputs: 1 or 2.
      3) 0 – 10V Dimmer Outputs: 1 - Class 1 or Class 2.
      4) Auxiliary Relay for Interface with Other Systems.
      5) Auxiliary Inputs: Hold On/Hold Off as specified.
   c. Enclosure: Plenum rated, surface-mounted industrial control enclosure mounts directly to electrical junction box.
2. Room Controllers:
   a. Main Power: 100 – 277 VAC, 50/60 Hz.
   b. Input/Output (Refer to Drawings and Details for Input/Output Applicable to Project):
      1) Line Power Inputs: 1.
      2) Switch Channel Outputs: As Indicated on Drawings.
      3) 0 – 10V Dimmer Outputs: As Indicated on Drawings. Class 1 or Class 2.
      4) Device Bussing, Provide control bussing for the following:
         a) Low Voltage Keypads / Switches
         b) Photocells / Daylight Sensors
         c) Occupancy / Vacancy Sensors
         d) Wiring: CAT X, Digital, or per manufacturers requirements.

5) Auxiliary Relay for Interface with Other Systems.
6) Auxiliary Inputs: Hold On/Hold Off as specified.

c. Enclosure: Plenum rated surface-mounted industrial control enclosure.
d. Control Processor:
1) Integrates sensors and other low voltage controls, devices, and subsystems through multiple control interfaces with control network. Refer to drawings for functions and operation required by project.

2.9 LOW VOLTAGE KEYPADS / SWITCHES

A. Provide low voltage keypads / switches with configuration, functionality and operation as indicated on drawings.

B. General Requirements:
1. Custom engravable buttons/switches, refer to drawings for labeling. Refer to Paragraph C below for additional requirements.
2. Quantity and function as indicated on drawings.
3. LED indicators, as shown on drawings.
4. Configured to fit in standard gang boxes.
5. Color: By Architect

C. Labeling:
1. Provide factory engraved labels for all low voltage keypads / switches buttons.
2. Refer to lighting control details on drawings for suggested labeling of lighting control equipment. Coordinate naming of scenes/control zones with the Owner. Provide a worksheet listing remote keypad controls, labeling requests and locations to the Owner for their labeling requests.
3. Do not order labels until Owner coordination is complete.

D. Lighting keypad shall be provided by the same manufacturer as the lighting control system.

2.10 UL 924 BYPASS AND UL1008 TRANSFER RELAYS

A. General Requirements:
1. Refer to drawings and details for required functions.
2. The UL 924 Bypass and UL 1008 Transfer Relays shall automatically illuminate connected emergency loads upon utility power interruption, regardless of room switch position. (NEC Article 700)
3. The UL 924 Bypass and UL 1008 Transfer Relays shall include an automatic diagnostic, which is initiated when the room switch is turned off. This test procedure will turn the emergency luminaires on for at least 2 seconds, indicating that an emergency power source is available & that the device, ballast, & lamp are all functioning correctly.
4. Automatic diagnostic shall be approved to meet periodic testing requirements (NEC Article 700 NFPA 101 Chapter 7)

5. Local room switch, dimmer or lighting keypad shall turn both regular & emergency luminaires on at the same time (no dedicated emergency room switch required).
6. The UL 924 Bypass and UL 1008 Transfer Relays shall include a dry contact for 0-10V override during utility power interruption, where indicated on drawings and details.
7. The UL 924 Bypass and UL 1008 Transfer Relays shall have a minimum load rating of 20 Amps at 120V or 277V, general use 20 Amps.
8. The UL 924 Bypass and UL 1008 Transfer Relays shall accept 120V & 277V 60 Hz Input & Output (voltage tolerance +/- 15%).
9. The UL 924 Bypass and UL 1008 Transfer Relays shall include emergency power and regular power indicator LED's and a manual test switch which are visible to room occupants when installed flush. (UL924 Section 29)
10. Load contacts shall be able to withstand 10 direct shorts while connected to 20 Amp breaker without permanent damage.
11. The UL 924 Bypass and UL 1008 Transfer Relays shall not generate any objectionable electrical or mechanical noise.
12. The UL 924 Bypass and UL 1008 Transfer Relays shall mount inside a 4-11/16" junction box with an extension & single gang plaster ring.
13. The UL 924 Bypass and UL 1008 Transfer Relays shall be installed flush to the ceiling or above ceiling adjacent to load controlled, such that test switch & LED's are in plain view of room occupants as required by some local electrical codes.
14. The UL 924 Bypass and UL 1008 Transfer Relays shall have UL94-V0 or UL94-5VA flame rating & be approved for installation above the suspended ceiling

2.11 LIGHTING RELAY CONTROL PANELS

A. Manufacturers: See Paragraph 2.1(A)

B. Product Description: Standalone relay panel with quantity of relays as indicated on drawings. Standalone panel shall utilize a digital controller with LCD screen and numerical keypad.

C. All components are to be supplied by the same manufacturer. The manufacturer shall be a supplier of this type of equipment for over 5 years.

D. Relay Panel shall come pre-assembled complete with Relays, Transformer & Timeclock.

E. Relays mounted in the lighting control panels shall be full load relays suitable for all types of lamp loads up to 20 Amperes. Relays shall be mechanically latching and must have a physical ON/OFF override built into the relay.

F. Time Controls shall be a 365 Day Astronomical Timer for switching, 2-Wire Relays. Programming shall be accomplished by entering data on a membrane key pad with an LCD graphic display. Any output shall be time, astro, photo-controlled or combination photo/time or astro/time controlled. There shall be available up to 500 events per week and 32 holiday programs. The controllers memory and time are not lost when power fails. Programs are held indefinitely and time is held for 72 hours.

G. Provide with inputs for each relay for manual override and programmable control of associated relays or groups of relays.

H. Provide with "BLINK" warning to blink the lights prior to expiration (off control) of a relay or groups of relays via time schedule.
   1. When manual override control is activated relay or relay group shall remain on for up to two hours (programmable).
   2. Relay or groups of relays shall sweep off every two hours until next time scheduled event.

I. Provide manual override low-voltage switches by same manufacturer in locations indicated on drawings.

J. Panel shall be capable of connecting to the building management system via BACNET interface.

K. Panel shall be capable of connecting to the fire alarm system to force all lighting fed through relay panel to 100% brightness.

L. Panels shall be able to be barriered and UL924 listed for wiring and control of emergency lighting systems.

2.12 CLASS 2 CONDUCTORS AND CABLES

A. General Requirements:
   1. Line Voltage Wiring: Comply with requirements of Division 26 Section "Electrical Power Conductors and Cables".
   2. Class 2 Low-Voltage Cable:
      a. Provide plenum-rated cable.
      b. UTP Cable: CAT 5, CAT 6, or as required by manufacturer:
         1) Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:
         2) All cabling shall meet or exceed Commercial Building Telecommunications Cabling Standard ANSI/TIA/EIA 568-C.2
         3) Cabling shall use 23AWG minimum conductors.
         4) Pulling tension: The cable pulling tension shall not exceed 25 ft/lbs as indicated in TIA/EIA-568-A.
      c. Control Cable:
         1) Stranded copper cable, Type CMP.
            a) Multiple-Conductor.
            b) Twisted Pair.
            c) Shielded Twisted Pair
            d) Minimum AWG: Per manufacturer requirements, as shown on drawings and details.

PART 3 EXECUTION

3.1 EXAMINATION

A. Site Verification:
   1. Verify that wiring conditions, which have been previously installed under other sections or at a previous time, are acceptable for product installation in accordance with manufacturer's instruction.
   2. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
   3. Verify that openings for outlet boxes are neatly cut and will be completely covered by devices or wall plates.
   4. Verify that final surface finishes are complete, including painting.
   5. Verify that branch circuit wiring installation is completed, tested, and ready for connection to lighting control devices.
   6. Verify that the service voltage and ratings of lighting control devices are appropriate for the service voltage and load requirements at the location to be installed.
   7. Verify that conditions are satisfactory for installation prior to starting work.

B. Inspection: Inspect all material included in this contract prior to installation. Manufacturer shall be notified of unacceptable material prior to installation.

3.2 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.3 INSTALLATION

A. The Electrical Contractor, as part of the work of this section, shall coordinate, receive, mount, connect, and place into operation all equipment. The Electrical Contractor shall furnish all conduit, wire, connectors, hardware, and other incidental items necessary for properly functioning lighting control as described herein and shown on the plans (including but not limited to System Field Devices, 0-10V dimming ballasts, fixed output ballasts, 0-10V LED drivers and communication wire). The Electrical Contractor shall maintain performance criteria stated by manufacturer without defects, damage, or failure.

B. Install lighting control devices in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards, unless otherwise indicated. Install per manufacturer's instructions.

C. Power: The contractor shall test that all branch load circuits are operational before connecting loads to sensor system load terminals, and then de-energize all circuits before installation.

D. Provide equipment at locations and in quantities indicated on Drawings. Provide any additional equipment required to provide control intent.

E. Install wiring in accordance with Section 260519 and paragraph 2.13.

F. Use only properly color coded, stranded wire. Install wire sizes as indicated on Drawings. Install wire in conduit in accordance with Section 260533 and paragraph 2.13.

G. Mount relay panel as indicated on Drawings. Wire numbered relays in panel to control power to each load.

H. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

I. Identify power wiring with circuit breaker number controlling load. When multiple circuit breaker panels are feeding into relay panel, label wires to indicate originating panel designation.

J. Label each low voltage wire with relay number at each switch or sensor. Refer to Section 26 05 53.

K. Coordinate locations of outlet boxes provided under Section 260533 as required for installation of lighting control devices provided under this section.

L. Orient outlet boxes for vertical installation of lighting control devices unless otherwise indicated.

M. Ensure that daylight sensor placement minimizes sensors view of electric light sources; ceiling mounted and fixture-mounted daylight sensors shall not have direct view of luminaries.

N. Prior to setting scenes or zones dependent on furniture placement, whiteboard locations, projection screen locations, lectern locations or similar, coordinate with the Owner, Architect and red-lined furniture plans. Make all required adjustments during construction.

O. Systems Integration:
   1. Equipment Integration Meeting:
      a. Facility Representative to coordinate meeting between Facility Representative, Lighting Control System Manufacturer and other related equipment manufacturers to discuss equipment and integration procedures prior to system startup

P. Unless otherwise indicated, connect lighting control device grounding terminal or conductor to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

Q. Install lighting control devices plumb and level, and held securely in place.

R. Where applicable, install lighting control devices and associated wall plates to fit completely flush to mounting surface with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

S. Identify lighting control devices in accordance with Section 260553.

T. Unless otherwise indicated, install power packs/room controllers for lighting control devices within the same space above accessible ceiling or above access panel in inaccessible ceiling.

U. Where indicated, install separate compatible wall switches for manual control interface with lighting control devices or associated power packs.

3.4 SENSOR INSTALLATION:

A. Adjust sensitivity to cover area installed

B. Set time delay on sensors that are connect to the lighting control system to the minimum. Time delay to off shall be set to no longer than 20 minutes.

C. Provide vacancy sensor configurations as indicated on drawings.

D. Install sensors on vibration free stable surface.

E. Install atrium and skylight light sensor facing toward window or skylight.

F. Install interior light sensor in ceiling facing the floor.

G. Within the design intent, reasonably minor adjustments to locations may be made in order to optimize coverage and avoid conflicts or problems affecting coverage.

H. Locations indicated are diagrammatic and only intended to indicate which rooms or areas require devices. Provide quantity and locations as required for complete coverage of respective room or area based on manufacturer's recommendations for installed devices.

I. Locate ultrasonic and dual technology passive infrared/ultrasonic occupancy sensors away from air supply ducts or other sources of heavy air flow and as per manufacturer's recommendations, in order to minimize false triggers.

J. Where indicated or as directed by Architect, install factory masking material or adjust integral blinders on sensor lenses to block undesired motion detection.

K. Outdoor Photo Sensor Control Locations:
   1. Where possible, locate outdoor photo controls with photo sensor facing north. If north facing photo sensor is not possible, install with photo sensor facing east, west, or down.

2. Locate outdoor photo controls so that photo sensors do not face artificial light sources, including light sources controlled by the photo control itself.
3. Install outdoor photo controls so that connections are weatherproof. Do not install photo controls with conduit stem facing up in order to prevent infiltration of water into the photo control.
4. Unless otherwise indicated, set outdoor photo sensor for dusk-to-dawn operation. Lighting shall turn on at dusk / off at dawn.

L. Daylighting Control Photo Sensor Locations:
1. Within the design intent, reasonably minor adjustments to locations may be made in order to optimize control and avoid conflicts or problems affecting proper detection of light levels.
2. Unless otherwise indicated, locate photo sensors for closed loop systems to accurately measure the light level controlled at the designated task location, while minimizing the measured amount of direct light from natural or artificial sources such as windows or pendant luminaires.
3. Unless otherwise indicated, locate photo sensors for open loop systems to accurately measure the level of daylight coming into the space, while minimizing the measured amount of lighting from artificial sources.
4. Refer to drawings and details for maintained light level settings.

3.5 MANUFACTURER'S FIELD SERVICES

A. Division 01 - General Requirements.

B. Manufacturer’s Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform the following field tests and inspections with the assistance of a factory-authorized service representative:
1. Operational Test: After installing wall stations and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
3. Test occupancy sensors to verify proper operation, including time delays and ambient light thresholds where applicable. Verify optimal coverage for entire room or area. Record test results in written report to be included with submittals.
4. Test outdoor photo controls to verify proper operation, including time delays where applicable. Record test results in written report to be included with submittals.
5. Test daylighting controls to verify proper operation, including light level measurements and time delays where applicable. Record test results in written report to be included with submittals.
6. Adjust relay panel settings to achieve desired operation schedule as indicated or as directed by Architect. Record settings and as-built relay panel schedules in written report, to be included with submittals.

D. Lighting control devices will be considered defective if they do not pass tests and inspections.

3.6 FIELD QUALITY CONTROL

A. Division 01 - General Requirements.

B. Inspect each lighting control device for damage and defects.

C. Correct wiring deficiencies and replace damaged or defective lighting control devices.

3.7 ADJUSTING

A. Division 01 - General Requirements.

B. Test contactors and switches after installation to confirm proper operation.

C. Confirm correct loads are recorded on directory card in each panel.

D. Adjust daylighting controls under optimum lighting conditions after all room finishes, furniture, and window treatments have been installed to achieve desired operation as indicated or as directed by Architect. Record settings in written report to be included with submittals. Readjust controls calibrated prior to installation of final room finishes, furniture, and window treatments that do not function properly as determined by Architect.

3.8 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.9 COMMISSIONING

A. Division 01 - General Requirements.

3.10 DEMONSTRATION

A. Division 01 - General Requirements.

B. Demonstrate proper operation of lighting control devices to Architect and Owner, and correct deficiencies or make adjustments as directed.

C. Training: Train Owner's personnel on operation, adjustment, programming, and maintenance of lighting control devices.
   1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
   2. Provide minimum of four hours of training.
   3. Schedule training with Owner, provide at least 7 days notice to Architect/Engineer of training date.
   4. Instructor: Qualified manufacturer’s representative familiar with the project and with sufficient knowledge of the installed lighting control devices.

D. Training shall include, but not be limited to, the following procedures:
   1. Programming and adjusting time schedules associated with timeclocks and relay panels, where such products exist in the project.
   2. Programming and adjusting time delay, default light levels and other functions of standalone wall sensors and low voltage room controller systems.
   3. Modifying scenes and zone control of room controllers and power packs, including programming, adjusting and pairing of low voltage keypads/switch buttons associated with zones or scenes.
   4. Programming and adjusting internal luminaire-level occupancy sensors and photocells, where such products exist in the project.

END OF SECTION

SECTION 262200 - LOW-VOLTAGE DRY TYPE TRANSFORMERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. General purpose transformers.

B. K-factor transformers rated for nonlinear loads.

C. Buck-boost transformers.

D. Shielded transformers.

E. Small power centers.

1.2 RELATED REQUIREMENTS

A. Division 01 - Cast-in-Place Concrete: Concrete equipment pads.

B. Section 260526 - Grounding and Bonding for Electrical Systems.

C. Section 260534 - Conduit: Flexible conduit connections.

D. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

E. Section 262416 - Panelboards.

1.3 REFERENCE STANDARDS

A. CFR 431, Subpart K - Energy Efficiency Program for Certain Commercial and Industrial Equipment - Distribution Transformers; Current Edition.

B. IEEE C57.94 - IEEE Recommended Practice for Installation, Application, Operation, and Maintenance of Dry-Type Distribution and Power Transformers; 2015.

C. IEEE C57.96 - Guide for Loading Dry-Type Distribution and Power Transformers; 2013.

D. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

E. NECA 409 - Standard for Installing and Maintaining Dry-Type Transformers; 2015.

F. NEMA ST 20 - Dry-Type Transformers for General Applications; 2014.

G. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

H. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems.

I. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

J. UL 506 - Standard for Specialty Transformers; Current Edition, Including All Revisions.

K. UL 1561 - Standard for Dry-Type General Purpose and Power Transformers; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
1. Coordinate the work with placement of support framing and anchors required for mounting of transformers.

2. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances required by NFPA 70.

3. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.

4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.

5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.5 SUBMITTALS

A. See Section 01 – General Requirements.

B. Product Data: Include voltage, kVA, impedance, tap configurations, insulation system class and rated temperature rise, efficiency, sound level, enclosure ratings, outline and support point dimensions, weight, required clearances, service condition requirements, and installed features.
1. Vibration Isolators: Include attachment method and rated load and deflection.
2. K-factor Rated Transformers: Include K-factor ratings.
3. Buck-boost Transformers: Include voltage selection tables and wiring diagrams for autotransformer configurations.
4. Shielded Transformers: Include shielding method and noise attenuation performance.
5. Small Power Centers: Include panelboard bus ampacity, integrated short circuit ampere rating, and circuit breaker sizes and ampere ratings.

C. Shop Drawings: Provide dimensioned plan and elevation views of transformers and adjacent equipment with all required clearances indicated.
1. Small Power Centers: Include panel arrangements.

D. Source Quality Control Test Reports: Include reports for tests designated in NEMA ST 20 as design and routine tests.

E. Field Quality Control Test Reports.

F. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

G. Maintenance Data: Include recommended maintenance procedures and intervals.

H. Project Record Documents: Record actual locations of transformers.

1.6 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to transformer internal components, enclosure, and finish.

1.8 FIELD CONDITIONS

A. Ambient Temperature: Do not exceed the following maximum temperatures during and after installation of transformers.
   1. Greater than 10 kVA: 104 degrees F (40 degrees C) maximum.
   2. Less than 10 kVA: 77 degrees F (25 degrees C) maximum.

1.9 WARRANTY

A. See Division 01 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Schneider Electric; Square D Products.

B. ABB General Electric Company.

C. Eaton Corporation.

D. Siemens Industry, Inc.

E. Substitutions: See Division 01 - Product Requirements.

F. Source Limitations: Furnish transformers produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.2 TRANSFORMERS - GENERAL REQUIREMENTS

A. Description: Factory-assembled, dry type transformers for 60 Hz operation designed and manufactured in accordance with NEMA ST 20 and listed, classified, and labeled as suitable for the purpose intended.

B. Unless noted otherwise, transformer ratings indicated are for continuous loading according to IEEE C57.96 under the following service conditions:
   1. Altitude: Less than 3,300 feet (1,000 m).
   2. Ambient Temperature:
      a. Greater than 10 kVA: Not exceeding 104 degrees F (40 degrees C).
      b. Less than 10 kVA: Not exceeding 77 degrees F (25 degrees C).

C. Core: High grade, non-aging silicon steel with high magnetic permeability and low hysteresis and eddy current losses. Keep magnetic flux densities substantially below saturation point, even at 10 percent primary overvoltage. Tightly clamp core laminations to prevent plate movement and maintain consistent pressure throughout core length.

D. Impregnate core and coil assembly with non-hydroscopic thermo-setting varnish to effectively seal out moisture and other contaminants.

E. Basic Impulse Level: 10 kV.

F. Ground core and coil assembly to enclosure by means of a visible flexible copper grounding strap.

G. Isolate core and coil from enclosure using vibration-absorbing mounts.

H. Nameplate: Include transformer connection data, ratings, wiring diagrams, and overload capacity based on rated winding temperature rise.

2.3 GENERAL PURPOSE TRANSFORMERS

A. Description: Self-cooled, two winding transformers listed and labeled as complying with UL 506 or UL 1561; ratings as indicated on the drawings.

B. Primary Voltage: 480 volts delta, 3 phase.

C. Secondary Voltage: 208Y/120 volts, 3 phase.

D. Insulation System and Allowable Average Winding Temperature Rise:
1. Less than 15 kVA: Class 180 degrees C insulation system with 115 degrees C average winding temperature rise.
2. 15 kVA and Larger: Class 220 degrees C insulation system with 150 degrees C average winding temperature rise.

E. Coil Conductors: Continuous copper windings with terminations brazed or welded.

F. Winding Taps:
1. Less than 3 kVA: None.
2. 3 kVA through 15 kVA: Two 5 percent full capacity primary taps below rated voltage.
3. 15 kVA through 300 kVA: Two 2.5 percent full capacity primary taps above and two 2.5 percent full capacity primary taps below rated voltage.
4. 500 kVA and Larger: Two 2.5 percent full capacity primary taps above and two 2.5 percent full capacity primary taps below rated voltage.

G. Energy Efficiency:
1. Comply with CFR 431, Subpart K.
2. Comply with the Department of Energy 2016 Efficiency Standards.

H. Sound Levels: Standard sound levels complying with NEMA ST 20.
1. 0-9 kVA: 40 dB.
2. 10-50 kVA: 45 dB.
3. 51-150 kVA: 50 dB.
4. 151-300 kVA: 55 dB.
5. 301-500 kVA: 60 dB.
6. 501-700 kVA: 62 dB.
7. 701-1000 kVA: 64 dB.

I. Mounting Provisions:
1. Less than 15 kVA: Suitable for wall mounting.
2. 15 kVA through 75 kVA: Suitable for wall, floor, or trapeze mounting.
3. Larger than 75 kVA: Suitable for floor mounting.

J. Transformer Enclosure: Comply with NEMA ST 20.
1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
   a. Indoor clean, dry locations: Type 1.
   b. Outdoor locations: Type 3R.

2. Construction: Steel.
   a. Less than 15 kVA: Totally enclosed, non-ventilated.
   b. 15 kVA and Larger: Ventilated.
3. Finish: Manufacturer's standard grey, suitable for outdoor installations.
4. Provide lifting eyes or brackets.

K. Accessories:
1. Mounting Brackets: Provide manufacturer's standard brackets.
2. Weathershield Kits: Provide for ventilated transformers installed outdoors to provide a listed NEMA 250, type 3R assembly.
3. Lug Kits: Sized as required for termination of conductors as indicated on the drawings.

2.4 K-FACTOR TRANSFORMERS RATED FOR NONLINEAR LOADS

A. Description: Self-cooled, two winding transformers listed and labeled as complying with UL 1561, and designed to supply nonlinear loads to the degree designated by the UL defined K-factor; ratings as indicated on the drawings.

B. Primary Voltage: 480 volts delta, 3 phase.

C. Secondary Voltage: 208Y/120 volts, 3 phase.

D. K-factor Rating: K-4, or higher.

E. Insulation System and Allowable Average Winding Temperature Rise: Class 220 degrees C insulation system with 150 degrees C average winding temperature rise.

F. Coil Conductors: Continuous copper windings with terminations brazed or welded. Individually insulate secondary conductors and arrange to minimize hysteresis and eddy current losses at harmonic frequencies. Size secondary neutral conductor at twice the secondary phase conductor ampacity.

G. Winding Taps: Two 2.5 percent full capacity primary taps above and two 2.5 percent full capacity primary taps below rated voltage.

H. Neutral Bus: Sized to accommodate twice the rated secondary current.

I. Energy Efficiency:
1. Comply with CFR 431, Subpart K.
2. Comply with the Department of Energy 2016 Efficiency Standards.

J. Sound Levels: Standard sound levels complying with NEMA ST 20.
1. 0-9 kVA: 40 dB.
2. 10-50 kVA: 45 dB.
3. 51-150 kVA: 50 dB.
4. 151-300 kVA: 55 dB.

5. 301-500 kVA: 60 dB.
6. 501-700 kVA: 62 dB.
7. 701-1000 kVA: 64 dB.

K. Mounting Provisions:
1. Less than 15 kVA: Suitable for wall mounting.
2. 15 kVA through 75 kVA: Suitable for wall, floor, or trapeze mounting.
3. Larger than 75 kVA: Suitable for floor mounting.

L. Electrostatic Shield: Provide grounded copper electrostatic shield between primary and secondary windings to attenuate electrical noise.

M. Transformer Enclosure: Comply with NEMA ST 20.
1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
a. Indoor clean, dry locations: Type 1.
b. Outdoor locations: Type 3R.
2. Construction: Steel, ventilated.
3. Finish: Manufacturer's standard grey, suitable for outdoor installations.
4. Provide lifting eyes or brackets.

N. Accessories:
1. Mounting Brackets: Provide manufacturer's standard brackets.
2. Weathershield Kits: Provide for ventilated transformers installed outdoors to provide a listed NEMA 250, type 3R assembly.
3. Lug Kits: Sized as required for termination of conductors as indicated on the drawings.

2.5 SHIELDED TRANSFORMERS

A. Description: Self-cooled, two winding, shielded isolation transformers listed and labeled as complying with UL 506 or UL 1561; ratings as indicated on the drawings.

B. Primary Voltage: 480 volts delta, 3 phase.

C. Secondary Voltage: 208Y/120 volts, 3 phase.

D. Insulation System and Allowable Average Winding Temperature Rise:
1. Less than 15 kVA: Class 180 degrees C insulation system with 115 degrees C average winding temperature rise.
2. 15 kVA and Larger: Class 220 degrees C insulation system with 150 degrees C average winding temperature rise.

E. Coil Conductors: Continuous copper windings with terminations brazed or welded.

F. Winding Taps:
1. Less than 3 kVA: None.
2. 3 kVA through 15 kVA: Two 5 percent full capacity primary taps below rated voltage.

3. 15 kVA through 300 kVA: Two 2.5 percent full capacity primary taps above and two 2.5 percent full capacity primary taps below rated voltage.
4. 500 kVA and Larger: Two 2.5 percent full capacity primary taps above and two 2.5 percent full capacity primary taps below rated voltage.

G. Energy Efficiency:
1. Comply with CFR 431, Subpart K.
2. Comply with the Department of Energy 2016 Efficiency Standards.

H. Sound Levels: Standard sound levels complying with NEMA ST 20.
1. 0-9 kVA: 40 dB.
2. 10-50 kVA: 45 dB.
3. 51-150 kVA: 50 dB.
4. 151-300 kVA: 55 dB.
5. 301-500 kVA: 60 dB.
6. 501-700 kVA: 62 dB.
7. 701-1000 kVA: 64 dB.

I. Winding Shield: Electrostatic, with separate insulated grounding connection.

J. Mounting Provisions:
1. Less than 15 kVA: Suitable for wall mounting.
2. 15 kVA through 75 kVA: Suitable for wall, floor, or trapeze mounting.
3. Larger than 75 kVA: Suitable for floor mounting.

K. Transformer Enclosure: Comply with NEMA ST 20.
1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
   a. Indoor clean, dry locations: Type 1.
   b. Outdoor locations: Type 3R.
2. Construction: Steel.
   a. Less than 15 kVA: Totally enclosed, non-ventilated.
   b. 15 kVA and Larger: Ventilated.
3. Finish: Manufacturer's standard grey, suitable for outdoor installations.
4. Provide lifting eyes or brackets.

L. Accessories:
1. Mounting Brackets: Provide manufacturer's standard brackets.
2. Weathershield Kits: Provide for ventilated transformers installed outdoors to provide a listed NEMA 250, type 3R assembly.
3. Lug Kits: Sized as required for termination of conductors as indicated on the drawings.

2.6 SMALL POWER CENTERS

A. Description: Factory assembled unit with integral primary circuit breaker, transformer, and distribution section with secondary main and branch circuit breakers; ratings and panel arrangements as indicated on the drawings.

B. Primary Voltage: 480 volts delta, 3 phase.

C. Secondary Voltage: 208Y/120 volts, 3 phase.

D. Insulation System and Allowable Average Winding Temperature Rise:
1. Less than 15 kVA: Class 180 degrees C insulation system with 115 degrees C average winding temperature rise.
2. 15 kVA and Larger: Class 220 degrees C insulation system with 150 degrees C average winding temperature rise.

E. Coil Conductors: Continuous copper windings.

F. Winding Taps: Two 5 percent full capacity primary taps below rated voltage.

G. Energy Efficiency: Comply with CFR 431, Subpart K.

H. Sound Levels: Standard sound levels complying with NEMA ST 20.

I. Mounting Provisions: Suitable for wall mounting.

J. Unit Enclosure:
1. Environment Type per NEMA 250: Type 3R.
2. Construction: Steel.
3. Finish: Manufacturer's standard grey, suitable for outdoor installations.
4. Provide lifting eyes or brackets.
5. Provide lockable hinged door for compartment housing circuit breakers.

K. Provide unit listed as suitable for use as service entrance.

L. Secondary Distribution Panel:
1. Comply with applicable requirements of Section 26 2416.
2. Bus: Copper.
3. Branch Circuit Breakers: Bolt-on.

2.7 SOURCE QUALITY CONTROL

A. Factory test transformers according to NEMA ST 20.

B. Sound Level Tests: Perform factory test designated in NEMA ST 20 as "design" test on each production unit.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that suitable concrete pads, support frames and anchors are installed where required and that mounting surfaces are ready to receive transformers.

C. Perform pre-installation tests and inspections on transformers per manufacturer's instructions and as specified in NECA 409. Correct deficiencies prior to installation.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship).

B. Install products in accordance with manufacturer's instructions.

C. Install transformers in accordance with NECA 409 and IEEE C57.94.

D. Use flexible conduit, under the provisions of Section 260534, 2 feet (600 mm) minimum length, for connections to transformer case. Make conduit connections to side panel of enclosure.

E. Arrange equipment to provide minimum clearances as specified on transformer nameplate and in accordance with manufacturer's instructions and NFPA 70.

F. Mount wall-mounted transformers using integral flanges or accessory brackets furnished by the manufacturer.

G. Mount floor-mounted transformers on properly sized 3 inch (80 mm) high concrete pad constructed in accordance with Division 03.

H. Mount floor-mounted transformers using vibration isolators suitable for isolating the transformer noise from the building structure.

I. Mount trapeze-mounted transformers using suitable metal framing as recommended by the manufacturer. See Section 260529 for material requirements.

J. Provide seismic restraints where required by local codes.

K. Provide grounding and bonding in accordance with Section 260526.

L. Remove shipping braces and adjust bolts that attach the core and coil mounting bracket to the enclosure according to manufacturer's recommendations in order to reduce audible noise transmission.

M. Where not factory-installed, install lugs sized as required for termination of conductors as shown on the drawings.

N. Where furnished as a separate accessory, install transformer weathershield per manufacturer's instructions.

O. Identify transformers in accordance with Section 260553.

3.3 FIELD QUALITY CONTROL

A. See Division 01 – General Requirements

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Perform inspections and tests listed in NETA ATS Sections 7.2.1.1 and 7.2.1.2. Tests and inspections listed as optional are not required.
   1. 167 kVA single phase, 500 kVA three phase and smaller:
      a. Perform turns ratio tests at all tap positions.
   2. Larger than 167 kVA single phase and 500 kVA three phase:
      a. Verify that control and alarm settings on temperature indicators are as specified.
      b. Perform excitation-current tests on each phase.
      c. Measure the resistance of each winding at each tap connection.
      d. Perform an applied voltage test on all high- and low-voltage windings-to-ground.

3.4 ADJUSTING

A. See Division 01 – General Requirements.

B. Measure primary and secondary voltages and make appropriate tap adjustments.

C. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

3.5 CLEANING

A. See Division 01 – General Requirements.

B. Clean dirt and debris from transformer components according to manufacturer's instructions.

C. Repair scratched or marred exterior surfaces to match original factory finish.

3.6 PROTECTION

A. Protect installed transformers from subsequent construction operations.

END OF SECTION

FOR REFERENCE: THIS SECTION WAS ISSUED FOR PHASE 1 AND PHASE 2

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SECTION 262413 - SWITCHBOARDS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Low-voltage (600 V and less) switchboards and associated accessories for service and distribution applications.

B. Overcurrent protective devices for switchboards.

1.2 RELATED REQUIREMENTS

A. Division 01 - General Requirements

B. Division 03 - Concrete

C. Section 260400 – General Conditions for Electrical Trades

D. Section 260526 - Grounding and Bonding for Electrical Systems

E. Section 260553 - Identification for Electrical Systems

F. Section 260573 – Overcurrent Protective Device Coordination Study

G. Section 262500 - Enclosed Bus Assemblies.

H. Section 262813 - Fuses

1.3 REFERENCE STANDARDS

A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service; Current Edition, Including All Revisions.

B. IEEE C57.13 - IEEE Standard Requirements for Instrument Transformers; Current Edition, Including All Revisions.

C. NECA 1 - Standard for Good Workmanship in Electrical Construction; Current Edition, Including All Revisions.

D. NECA 400 - Standard for Installing and Maintaining Switchboards; Current Edition, Including All Revisions.

E. NEMA KS 1 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum); Current Edition, Including All Revisions.

F. NEMA PB 2 - Deadfront Distribution Switchboards; Current Edition, Including All Revisions.

G. NEMA PB 2.1 - General Instructions for Proper Handling, Installation, Operation, and Maintenance of Deadfront Distribution Switchboards Rated 600 Volts or Less; Current Edition, Including All Revisions.

H. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; Current Edition, Including All Revisions.

I. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

J. UL 98 - Enclosed and Dead-Front Switches; Current Edition, Including All Revisions.

K. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.

L. UL 869A - Reference Standard for Service Equipment; Current Edition, Including All Revisions.

M. UL 891 - Switchboards; Current Edition, Including All Revisions.

N. UL 977 - Fused Power-Circuit Devices; Current Edition, Including All Revisions.

O. UL 1053 - Ground-Fault Sensing and Relaying Equipment; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances required by NFPA 70.
2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
3. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
4. Coordinate with manufacturer to provide shipping splits suitable for the dimensional constraints of the installation.
5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Service Entrance Switchboards:
1. Coordinate with Electric Utility Company and provide switchboards in compliance with Utility Company requirements and with suitable provisions for electrical service and utility metering, where applicable.
2. Coordinate with Owner to arrange for Utility Company required access to equipment for installation and maintenance.
3. Obtain Utility Company approval of switchboard prior to fabrication.

4. Pre-installation Meeting: Convene with Utility Company representative a minimum of two weeks prior to commencing work of this section to review requirements.
5. Arrange for inspections necessary to obtain Utility Company approval of installation.

1.5 SUBMITTALS

A. See Division 01 - General Requirements.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for switchboards, enclosures, overcurrent protective devices, and other installed components and accessories.
1. Submit electrical characteristics including voltage, frame size and trip ratings, fault current withstand ratings, and time-current curves of equipment and components.

C. Shop Drawings: Indicate dimensions, voltage, bus ampacities, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
1. Include dimensioned plan and front & side elevation views of switchboards and adjacent equipment with overall dimensions shown and all required clearances indicated.
2. Include wiring diagrams showing all factory and field connections.
3. Clearly indicate whether proposed short circuit current ratings are fully rated or, where acceptable, series rated systems.
4. Include documentation of listed series ratings upon request.
5. Include documentation demonstrating selective coordination upon request.

D. Service Entrance Switchboards: Include documentation of Utility Company approval of switchboard.

E. Source Quality Control Test Reports: Include reports for tests designated in NEMA PB 2 as production tests.

F. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

G. Field Quality Control Test Reports.

H. Project Record Documents: Record actual installed locations of switchboards and final equipment settings.

I. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.

J. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Division 01 - General Requirements.
2. Enclosure Keys: Two of each different key.
3. Electronic Trip Circuit Breakers: Provide one portable test set.
4. See Section 26 2813 for requirements for spare fuses and spare fuse cabinets.

1.6 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store switchboards in accordance with manufacturer's instructions, NECA 400, and NEMA PB 2.1.

B. Store in a clean, dry space having a uniform temperature to prevent condensation (including outdoor switchboards, which are not weatherproof until completely and properly installed). Where necessary, provide temporary enclosure space heaters or temporary power for permanent factory-installed space heaters.

C. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

D. Handle in accordance with NEMA PB 2.1. Lift only with lugs provided. Handle carefully to avoid damage to switchboard internal components, enclosure, and finish.

1.8 FIELD CONDITIONS

A. Maintain field conditions within required service conditions during and after installation.

B. Verify field measurements prior to fabrication.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Switchboards
   2. Schneider Electric; Square D Products (Basis of Design)
   3. General Electric - ABB
   4. Eaton Corporation
   5. Siemens Industry, Inc.
   6. Substitutions: See Division 01 - General Requirements.

B. Products other than basis of design are subject to compliance with specified requirements and prior approval of Engineer. By using products other than basis of design, Contractor accepts responsibility for costs associated with any necessary modifications to related work, including any design fees.

C. Source Limitations: Furnish switchboards and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.2 SWITCHBOARDS

A. Provide switchboards consisting of all required components, control power transformers, instrumentation and control wiring, accessories, etc. as necessary for a complete operating system.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Description: Dead-front switchboard assemblies complying with NEMA PB 2, and listed and labeled as complying with UL 891; ratings, configurations and features as indicated on the drawings.

D. Front-Connected Switchboards:
   1. Main Device(s): Individually-mounted.
   2. Feeder Devices: Panel/group-mounted.
   3. Arrangement: Front accessible only (not rear accessible), rear aligned.
   4. Gutter Access: Bolted covers.
   5. Energy Reduction Maintenance Setting (ERMS) system.
   6. Pull Section: 24 inch width, depth and height to match switchboard. Arrange with pull section on right with sections arranged right to left.
   7. Pull Box: Removable top and sides, same construction as switchboard.
   8. Align sections at rear only.

E. Service Entrance Switchboards Requirements:
   1. Listed and labeled as suitable for use as service equipment according to UL 869A.
   2. For solidly-grounded wye systems, provide factory-installed main bonding jumper between neutral and ground busses, and removable neutral disconnecting link for testing purposes.

3. Comply with Utility Company requirements for electrical service.
4. Utility Metering Provisions: Provide separate barriered compartment complying with Utility Company requirements where indicated or where required by Utility Company. Include hinged sealable door and provisions for Utility Company current transformers (CTs), potential transformers (PTs), or potential taps as required.

F. Service Conditions:
1. Provide switchboards and associated components suitable for operation under the following service conditions without derating:
   a. Altitude: Less than 6,600 feet.
   b. Ambient Temperature:
      1) Switchboards Containing Molded Case or Insulated Case Circuit Breakers: Between 23 degrees F and 104 degrees F.
      2) Switchboards Containing Fusible Switches: Between -22 degrees F and 104 degrees F.
2. Provide switchboards and associated components suitable for operation at indicated ratings under the service conditions at the installed location.
   a. Altitude: Less than 2000 feet.
   b. Ambient Temperature: Between 50 degrees F and 95 degrees F.

G. Short Circuit Current Rating:
1. Provide switchboards with listed short circuit current rating not less than the available fault current at the installed location as determined by short circuit study performed in accordance with Section 260573.

H. Selectivity: Where the requirement for selectivity is indicated, furnish products as required to achieve selective coordination.

I. Main Devices: Configure for top or bottom incoming feed as indicated or as required for the installation. Provide separate pull section and/or top-mounted pullbox as indicated or as required to facilitate installation of incoming feed.

J. Bussing: Sized in accordance with UL 891 temperature rise requirements.
1. Through bus (horizontal cross bus) to be fully rated through full length of switchboard (non-tapered). Tapered bus is not permitted.
2. Provide fully rated neutral bus unless otherwise indicated, with a suitable lug for each feeder or branch circuit requiring a neutral connection.
3. Provide solidly bonded equipment ground bus through full length of switchboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
4. Phase and Neutral Bus Material: Silver Plated Copper.
5. Ground Bus Material: Silver Plated Copper.

K. Conductor Terminations: Suitable for use with the conductors to be installed.
1. Line Conductor Terminations:
   a. Main and Neutral Lug Material: Silver Plated Copper, suitable for terminating aluminum or copper conductors.
   b. Main and Neutral Lug Type: Mechanical.

2. Load Conductor Terminations:
   a. Lug Material: Silver Plated Copper, suitable for terminating aluminum or copper conductors.
   b. Lug Type:
      1) Provide mechanical lugs unless otherwise indicated.
      2) Provide compression lugs where indicated.

L. Enclosures:
1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
   a. Indoor Clean, Dry Locations: Type 1.
   b. Outdoor Locations: Type 3R.
2. Finish: Manufacturer's standard unless otherwise indicated.
3. Enclosure Space Heaters:
   a. Provide in each switchboard section installed outdoors and in unconditioned indoor spaces.
   b. Size according to manufacturer's recommendations for worst case ambient temperature to prevent condensation.
   c. Heater Control: Thermostat.
   d. Heater Power Source: Provide connection to transformer factory-installed in switchboard or suitable external branch circuit as indicated or as required.
4. Outdoor Enclosures:
   a. Enclosure Type: Non-walk-in type unless otherwise indicated.
   b. Color: Manufacturer's standard.
   c. Access Doors: Lockable, with all locks keyed alike.

M. Future Provisions:
1. Prepare designated spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.
2. Equip distribution sections with full height vertical bussing to accommodate maximum utilization of space for devices.
3. Where designated spaces for future device provisions are not indicated, include provisions for minimum of six device(s) rated at ten percent of rating of switchboard main or incoming feed.
4. Arrange and equip through bus and ground bus to accommodate future installation of additional switchboard sections.

N. Surge Protective Device:
1. Product Description: IEEE C62.41, factory-mounted surge protective device, selected to meet requirements for high exposure (200,000A) and to coordinate with system circuit voltage. integral type 1 surge protection at [480v]Y 3 phase with L-N=1200 L-G=1200 N-G=1200 and L-L 2000
2. Minimum surge current rating per phase: 320 kA.
3. Surge Protective device module shall be integral to switchboard and shall be fused.

O. Ground Fault Protection: Where ground-fault protection is indicated, provide system listed and labeled as complying with UL 1053.
   1. Where overcurrent protective devices equipped with integral ground fault protection are used, provide separate neutral current sensor where applicable.
   2. Where accessory ground fault sensing and relaying equipment is used, equip companion overcurrent protective devices with ground-fault shunt trips.
      a. Use zero sequence or residual ground fault detection method unless otherwise indicated.
      b. Provide test panel and field-adjustable ground fault pick-up and delay settings.
      c. Provide zone selective interlocking capability where indicated, capable of communicating with other electronic trip circuit breakers and external ground fault sensing systems to control ground fault delay functions for system coordination purposes.
   3. Furnish monitor panel with lamp to indicate relay operation, TEST and RESET control switches.

P. All circuit breakers rated 1200 amps and above shall have energy reduction maintenance setting (ERMS) system. Provide the following:
   1. Energy Reduction Maintenance Setting Switch (ERMS).
      a. Provide a maintenance OFF ON selector switch on the compartment door to switch the circuit breaker instantaneous tripping characteristics to an alternate setting temporarily during maintenance activity.
      b. Provide a lock feature for the ERMS switch so that it may be locked in either the OFF or ON maintenance mode position.
      c. Provide a blue LED indicating light to indicate trip unit is in the ERMS mode.

Q. Phase Failure Relay:
   1. Provide integral phase failure relays within switchboard.

R. Customer Meter - Instrumentation:
   1. Provide power metering equal to a Square D Class 3020 PM8244 PowerLogic Power Meter with display. Device shall be panel mounted in the switchboard. Devices by others will be considered providing all the following specifications are met.
   2. The Power Meter shall be equipped with a two (2)-line by sixteen (16)-character LCD display for electrical circuit information.
   3. The information displayed by the Power Meter shall include the following quantities:
      a. Current, per-phase
      b. Volts, phase-to-phase & phase-neutral
      c. Real Power (kW), three-phase total
      d. Reactive Power (kVAR), three phase total
      e. Apparent Power (kVA), three phase total
      f. Power Factor, true, per-phase & three-phase total
      g. Frequency
      h. Current Demand, per phase and neutral, present and peak
      i. Real Power Demand (kWd), three phase total, present and peak

j. Reactive Power Demand (kVARd), three phase total, present and peak
k. Apparent Power Demand (kVAd), three phase total, present and peak
l. Real Energy (kWh), three phase total
m. Reactive Energy (kVARh), three phase total
n. Apparent Energy (kVAh), three phase total
o. Energy Accumulation Modes, signed, absolute, energy in, energy out
p. Watt-hour KYZ Pulse Initiator Output
q. Total Harmonic Distortion, Voltage
r. Total Harmonic Distortion, Current
s. Date/Time Stamping.

4. Communications port for Power Monitoring Systems communications and Modbus RTU communications.
5. The Power Meter shall be accurate to .25% for voltage and current sensing, .50% for power, energy, & demand sensing, and 1% for power factor sensing.
6. All information stored in the Power Meter shall be remotely accessible through data communications.
7. The Power Meter shall be UL Listed, rated for an operating temperature range of 0C to 55C and have an overcurrent withstand rating of 500 amps for 1 second.
8. The Power Meter metering inputs shall utilize industry standard current transformers (5A secondary CT's), have VT inputs for direct connection of VT leads to up to 600V, and adhere to UL standard 508 for dielectric voltage-withstand.
9. Each Circuit Monitor shall have built-in data communications to allow multipoint communication to multiple computer workstations, programmable controllers, and other host devices, at a minimum data rate of 9600 baud.
10. The data communications shall be optically isolated to provide reliable operation.
11. Power meter shall include a communications interconnection interface with the Building Management System (BMS). Coordinate interconnection requirements with the BMS provider. Available protocols:
    a. Modbus.
    b. Ion.
    c. DNP3.
    d. IEC 61850.
    e. HTTP.
    f. FTP.
    g. SNMP.
    h. DPWS.
    i. RSTP.
    j. NTP.
    k. SNTP.
    l. GPS.

S. Instrument Transformers:
1. Comply with IEEE C57.13.
2. Select suitable ratio, burden, and accuracy as required for connected devices.
3. Current Transformers: Connect secondaries to shorting terminal blocks.
4. Potential Transformers: Include primary and secondary fuses with disconnecting means.

2.3 OVERCURRENT PROTECTIVE DEVICES

A. Circuit Breakers:
1. Interrupting Capacity:
a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than specified minimum requirements.
b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated. Series rating not allowed.
2. Main circuit breakers in all switchboards shall have Long time, Short time, Instantaneous and ground fault protection (LSIG) functions. These functions shall similar to those functions found on a Square D PowerPact circuit breaker. Circuit breaker shall have energy reduction maintenance setting (ERMS) system. Provide the following;
a. Energy Reduction Maintenance Setting Switch (ERMS)
1) For the Main circuit breaker above 1200 amps, provide a maintenance OFF ON selector switch on the compartment door to switch the circuit breaker instantaneous tripping characteristics to an alternate setting temporarily during maintenance activity.
2) Provide a lock feature for the ERMS switch so that it may be locked in either the OFF or ON maintenance mode position.
3) Provide a blue LED indicating light to indicate trip unit is in the ERMS mode.
3. Molded Case Circuit Breakers:
a. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers; listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
1) Provide thermal magnetic circuit breakers unless otherwise indicated.
2) Provide electronic trip circuit breakers where indicated.
b. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
1) Provide field-adjustable magnetic instantaneous trip setting for circuit breaker frame sizes 225 amperes and larger.
2) Provide interchangeable trip units for circuit breaker frame sizes 125A and above.

2.4 EXTERNAL ENERGY METERING

A. Manufacturer:
1. Satec BFM 136 (Basis of Design)
2. Schneider Electric
3. E-Mon D-Mon
4. Eaton
5. Substitutions: Refer to Division 01 – Product Requirements

B. Product Description: Provide multi-metering units capable of connecting to up to 18 three-phase circuits) using high-accuracy current sensors (HACS), for the purpose of monitoring specific loads and for energy reporting purposes. Quantity of multi-metering units and feeders being metered are indicated on the drawings.

C. Mounting: Multi-metering unit shall be mounted in an enclosure located in the same room as the electrical equipment being metered.

D. Multi-metering unit shall meet or exceed the following specifications:
1. Four line LED display
2. Monitoring/Display capabilities for KWH, power factor per phase, amps per phase, KW demand, real time load (KW), volts per phase, date & time and identification codes for communication.
3. Built-in RS485 communications capability.

E. Provide split core HACS current sensors for each feeder being metered. Provide one current sensor per phase. Provide final connections between current sensors and multi-metering units.

F. Provide BACNET-over-IP converter for each multi-metering unit. Provide quantity of converters such that each feeder being metered can have data independently reported through BACNET to the building management system. Connections to the building management system shall be made by Division 23/ ATC contractor.

2.5 SOURCE QUALITY CONTROL

A. See Division 01 – General Requirements.

B. Factory test switchboards according to NEMA PB 2, including the following production tests on each switchboard assembly or component:
1. Dielectric tests.
2. Mechanical operation tests.
3. Grounding of instrument transformer cases test.
4. Electrical operation and control wiring tests, including polarity and sequence tests.
5. Ground-fault sensing equipment test.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that the ratings and configurations of the switchboards and associated components are consistent with the indicated requirements.

C. Verify that mounting surfaces are ready to receive switchboards.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install switchboards in accordance with NECA 1 (general workmanship), NECA 400, and NEMA PB 2.1.

C. Arrange equipment to provide required clearances and maintenance access, including accommodations for any drawout devices.

D. Where switchboard is indicated to be mounted with inaccessible side against wall, provide minimum clearance of 6 inches between switchboard and wall.

E. Provide required support and attachment components in accordance with Section 260529.

F. Install switchboards plumb and level.

G. Unless otherwise indicated, mount switchboards on properly sized 4 inch high concrete pad constructed in accordance with Division 03 - Concrete.

H. Provide grounding and bonding in accordance with Section 260526.

I. Install all field-installed devices, components, and accessories.

J. Provide fuses complying with Section 262813 for fusible switches as indicated.

K. Install identification in accordance with Section 260553.
   1. Labeling & Identification:
      a. Indicate the maximum available fault current at the equipment, including the date the fault current calculation was performed. Label shall include warning for “Arc Flash Hazard” and requirement for “PPE Protection”.
      b. Indicate locations of sources and feeders for all services to the building (generator and fire pump).

L. Installation of ERMS maintenance lockable selector switch and blue indicating light onto compartment door of the main circuit breaker. Installation of the IO module and the IFE module in accordance with manufactures recommendations.
   1. Set point for the ERMS instantaneous is based on manufactures recommendations. For Square D Power Pact circuit breaker (Basis of design) the default programmed setting to the instantaneous (li) set point is 2xIn.

M. Install breaker circuit directory.

N. Where accessories are not self-powered, provide control power source as indicated or as required to complete installation.

O. Set field-adjustable circuit breaker tripping function settings as determined by overcurrent protective device coordination study performed in accordance with Section 260573.

P. Provide filler plates to cover unused spaces in switchboards.

3.3 FIELD QUALITY CONTROL

A. See Division 01 - General Requirements.

B. Provide services of a manufacturer's authorized representative to observe installation and assist in inspection and testing. Include manufacturer's reports with submittals.

C. Disconnect surge protective devices (SPDs) prior to performing any high potential testing. Replace SPDs damaged by performing high potential testing with SPDs connected.

D. Before energizing switchboard, perform insulation resistance testing in accordance with NECA 400 and NEMA PB 2.1.

E. Inspect and test in accordance with NETA ATS, except Section 4.

F. Perform inspections and tests listed in NETA ATS, Section 7.1.

G. Fusible Switches: Perform inspections and tests listed in NETA ATS, Section 7.5.1.1.

H. Molded Case and Insulated Case Circuit Breakers: Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for all main circuit breakers and circuit breakers larger than 225 amperes. Tests listed as optional are not required.
1. Perform insulation-resistance tests on all control wiring with respect to ground.
2. Test functions of the trip unit by means of secondary injection.

I. Ground Fault Protection Systems: Test in accordance with manufacturer's instructions as required by NFPA 70.
1. Perform inspections and tests listed in NETA ATS, Section 7.14. The insulation-resistance test on control wiring listed as optional is not required.

J. Meters: Perform inspections and tests listed in NETA ATS, Section 7.11.2.

K. Instrument Transformers: Perform inspections and tests listed in NETA ATS, Section 7.10.

L. Test shunt trips to verify proper operation.

M. Correct deficiencies and replace damaged or defective switchboards or associated components.

N. Submit detailed reports indicating inspection and testing results and corrective actions taken.

3.4 ADJUSTING

A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

B. Adjust alignment of switchboard covers and doors.

3.5 CLEANING

A. See Division 01 – General Requirements.

B. Clean dirt and debris from switchboard enclosures and components according to manufacturer's instructions.

C. Repair scratched or marred surfaces to match original factory finish.

3.6 CLOSEOUT ACTIVITIES

A. See Division 01 – General Requirements.

B. Training: Train Owner's personnel on operation, adjustment, and maintenance of switchboard and associated devices.
   1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
   2. Provide minimum of two hours of training.
   3. Instructor: Manufacturer's authorized representative.
   4. Location: At project site.

3.7 PROTECTION

A. Protect installed switchboards from subsequent construction operations.

END OF SECTION

FOR REFERENCE: THIS SECTION WAS ISSUED FOR PHASE 1 AND PHASE 2

SECTION 262416 - PANELBOARDS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Power distribution panelboards.

B. Lighting and appliance panelboards.

C. Fusible Coordination Panelboards for Life Safety.

D. Overcurrent protective devices for panelboards.

1.2 RELATED REQUIREMENTS

A. Division 01 – General Requirements.

B. Division 03 - Cast-in-Place Concrete: Concrete equipment pads.

C. Section 260526 - Grounding and Bonding for Electrical Systems.

D. Section 260529 - Hangers and Supports for Electrical Systems.

E. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

F. Section 260573 - Overcurrent Protective Device Coordination Study: Additional criteria for the selection and adjustment of equipment and associated protective devices specified in this section.

G. Section 262200 - Low-Voltage Transformers: Small power centers with integral primary breaker, transformer, and panelboard.

H. Section 262813 - Fuses: Fuses for fusible switches and spare fuse cabinets.

1.3 REFERENCE STANDARDS

A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service..

B. IEEE C62.41 - Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.

C. NECA 1 - Standard for Good Workmanship in Electrical Construction.

D. NEMA FU 1 – Low Voltage Cartridge Fuses.

E. NECA 407 - Standard for Installing and Maintaining Panelboards.

F. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

G. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts.

H. NEMA KS 1 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum).

I. NEMA PB 1 - Panelboards.

J. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.

K. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems

L. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

M. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

N. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

O. UL 67 - Panelboards; Current Edition, Including All Revisions.

P. UL 98 - Enclosed and Dead-Front Switches; Current Edition, Including All Revisions.

Q. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.

R. UL 869A - Reference Standard for Service Equipment; Current Edition, Including All Revisions.

S. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

T. UL 1053 - Ground-Fault Sensing and Relaying Equipment; Current Edition, Including All Revisions.

U. UL 1699 - Arc-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.

3. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted panelboards where indicated.
4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.5 SUBMITTALS

A. See Division 01 – General Requirements.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.
1. Include characteristic trip curves for each type and rating of overcurrent protective device upon request.

C. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
1. Include dimensioned plan and elevation views of panelboards and adjacent equipment with all required clearances indicated.
2. Include wiring diagrams showing all factory and field connections.
3. Clearly indicate whether proposed short circuit current ratings are fully rated or, where acceptable, series rated systems.
4. Include documentation of listed series ratings upon request.

D. Source Quality Control Test Reports: Include reports for tests designated in NEMA PB 1 as routine tests.

E. Field Quality Control Test Reports.

F. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

G. Project Record Documents: Record actual installed locations of panelboards and actual installed circuiting arrangements.

H. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.

I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Division 01 - Product Requirements, for additional provisions.
2. Panelboard Keys: Two of each different key.
3. See Section 262813 for requirements for spare fuses and spare fuse cabinets.

1.6 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store panelboards in accordance with manufacturer's instructions and NECA 407.

B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

C. Handle carefully in accordance with manufacturer's written instructions to avoid damage to panelboard internal components, enclosure, and finish.

1.8 FIELD CONDITIONS

A. Maintain ambient temperature within the following limits during and after installation of panelboards:
   1. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.
   2. Panelboards Containing Fusible Switches: Between -22 degrees F and 104 degrees F.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Schneider Electric; Square D Products.

B. ABB/GE.

C. Eaton Corporation.

D. Siemens Industry, Inc.

E. Substitutions: See Division 01 - Product Requirements.

F. Source Limitations: Furnish panelboards and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.2 PANELBOARDS - GENERAL REQUIREMENTS

A. Provide products listed, classified, and labeled as suitable for the purpose intended.

B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
   1. Altitude: Less than 6,600 feet.
   2. Ambient Temperature:
      a. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.
      b. Panelboards Containing Fusible Switches: Between -22 degrees F and 104 degrees F

C. Short Circuit Current Rating:
   1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
   2. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as determined by short circuit study performed in accordance with Section 260573.
   3. ccontribution according to NFPA 70.
   4. Label equipment utilizing series ratings as required by NFPA 70.

D. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.

E. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.

F. Bussing: Sized in accordance with UL 67 temperature rise requirements.
   1. Provide fully rated neutral bus unless otherwise indicated, with a suitable lug for each feeder or branch circuit requiring a neutral connection.
   2. Provide 200 percent rated neutral bus and lugs where indicated, where oversized neutral conductors are provided, or where panelboards are fed from K-rated transformers.
   3. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
   4. Provide separate isolated/insulated ground bus where indicated or where isolated grounding conductors are provided.

G. Conductor Terminations: Suitable for use with the conductors to be installed.

H. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
   1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
      a. Indoor Clean, Dry Locations: Type 1.
   2. Outdoor Locations: Type 3R.
      a. Furnish thermostatically controlled electric heaters sized to prevent condensation under expected weather conditions at Project site. Furnish

control power transformer and terminals for separate connection of heater power circuit.

3. Boxes: Galvanized steel unless otherwise indicated.
   a. Provide wiring gutters sized to accommodate the conductors to be installed.
   b. Increase gutter space as required where sub-feed lugs, feed-through lugs, gutter taps, or oversized lugs are provided.
   c. Provide removable end walls for NEMA Type 1 enclosures.
   d. Provide painted steel boxes for surface-mounted panelboards where indicated, finish to match fronts.
4. Fronts:
   a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
   b. Fronts for Flush-Mounted Enclosures: Overlap boxes on all sides to conceal rough opening.
   c. Finish for Painted Steel Fronts: Manufacturer's standard grey unless otherwise indicated.
5. Lockable Doors: All locks keyed alike unless otherwise indicated.

I. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.

J. Surge Protective Devices: Where factory-installed, internally mounted surge protective devices are provided, list and label panelboards as a complete assembly including surge protective device.

K. Panelboard Contactors: Where panelboard contactors are indicated, provide electrically operated, mechanically held magnetic contactor complying with NEMA ICS 2.
1. Ampere Rating: Not less than ampere rating of panelboard bus.
2. Short Circuit Current Rating: Not less than the panelboard short circuit current rating.
3. Coil Voltage: As required for connection to control system indicated.

L. Ground Fault Protection: Where ground-fault protection is indicated, provide system listed and labeled as complying with UL 1053.
1. Where electronic circuit breakers equipped with integral ground fault protection are used, provide separate neutral current sensor where applicable.
2. Where accessory ground fault sensing and relaying equipment is used, equip companion overcurrent protective devices with ground-fault shunt trips.
   a. Use zero sequence ground fault detection method unless otherwise indicated.
   b. Provide test panel and field-adjustable ground fault pick-up and delay settings.
   c. Provide zone selective interlocking capability where indicated, capable of communicating with other electronic trip circuit breakers and external ground fault sensing systems to control ground fault delay functions for system coordination purposes.

M. Selectivity: Where the requirement for selectivity is indicated, furnish products as required to achieve selective coordination.

N. Selective Coordination:
1. Fusible branch circuit panelboards overcurrent protective devices shall be selectively coordinated with all supply side (fed from both the normal and emergency source) overcurrent protective devices. Provide recommended fuses from a single manufacturer to maintain published minimum ampere coordination ratios.

O. Multi-Section Panelboards: Provide enclosures of the same height, with feed-through lugs or sub-feed lugs and feeders as indicated or as required to interconnect sections.

P. Load centers are not acceptable.

Q. Provide the following features and accessories where indicated or where required to complete installation:
1. Feed-through lugs.
2. Sub-feed lugs.

2.3 POWER DISTRIBUTION PANELBOARDS

A. Description: Panelboards complying with NEMA PB 1, power and feeder distribution type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.

B. Conductor Terminations:
1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
2. Main and Neutral Lug Type: Mechanical.

C. Bussing:
1. Phase and Neutral Bus Material: Tin plated copper.
2. Ground Bus Material: Copper.

D. Circuit Breakers:
1. Provide bolt-on type. .
2. Provide thermal magnetic circuit breakers unless otherwise indicated.
3. Provide electronic trip circuit breakers where indicated.

E. Circuit breakers rated 1000 amps or more on solidly grounded 480V systems shall include ground fault protection.

F. Circuit breakers rated 1200 amps and above shall have Long time, Short time, Instantaneous and Ground fault protection (LSI) functions. These functions shall similar to those functions found on a Square D PowerPact circuit breaker. Circuit breaker shall have energy reduction maintenance setting (ERMS) system. Provide the following;
1. Energy Reduction Maintenance Setting Switch (ERMS)
a. For the circuit breakers above 1200 amps, provide a maintenance OFF ON selector switch on the compartment door to switch the circuit breaker instantaneous tripping characteristics to an alternate setting temporarily during maintenance activity.

b. Provide a lock feature for the ERMS switch so that it may be locked in either the OFF or ON maintenance mode position.
c. Provide a blue LED indicating light to indicate trip unit is in the ERMS mode.

G. Enclosures:
1. Provide surface-mounted enclosures unless otherwise indicated.
2. Fronts: Provide trims to cover access to load terminals, wiring gutters, and other live parts, with exposed access to overcurrent protective device handles.
3. Fronts: Provide lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
4. Fronts: Provide door-in-door trim with hinged cover for access to load terminals and wiring gutters, and separate lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
5. Provide clear plastic circuit directory holder mounted on inside of door.

2.4 LIGHTING AND APPLIANCE PANELBOARDS

A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.

B. Conductor Terminations:
1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
2. Main and Neutral Lug Type: Mechanical.

C. Bussing:
1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
2. Phase and Neutral Bus Material: Tin plated copper.
3. Ground Bus Material: Copper.

D. Circuit Breakers: Thermal magnetic bolt-on type unless otherwise indicated.

E. Enclosures:
1. Provide surface-mounted or flush-mounted enclosures as indicated.
2. Fronts: Provide lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
3. Fronts: Provide door-in-door trim with hinged cover for access to load terminals and wiring gutters, and separate lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
4. Provide clear plastic circuit directory holder mounted on inside of door.

F. Provide column-width panelboards with accessory column-width cable trough and pullbox where indicated.

2.5 FUSIBLE BRANCH CIRCUIT PANELBOARDS

A. Manufacturers:
1. Fusible Panelboards shall be Cooper Bussmann™ Quik-Spec™ Coordination Panelboards type QSCP.
2. Substitutions will be accepted only if the below requirements are met and written approval is provided from the engineer:
   a. The electrical contractor supplies a written request to the engineer three weeks prior to the project bid date
   b. The electrical contractor provides product documentation to prove complete compliance with specification and all pertinent codes and standards requirements as specified in this section.

B. Panelboard overcurrent protective device interrupting ratings shall be fully rated for the maximum available fault current and have a UL Listed interrupting rating of 300kA and CSA Certified interrupting rating of 200kA with SPD. SPD protection for 480V, 3-phase shall have L-N=600, L-G=600, N-G=600, L-L =1000 and for 480Y L-N=1200, L-G=1200, N-G=1200, L-L=2000.

C. Construction:
1. Panelboard circuits 100A and less shall incorporate overcurrent protection and branch-circuit rated disconnecting means into a single integrated component.
2. Interiors shall be factory assembled.
3. Panelboard shall be equipped with a six-space spare fuse compartment for storing replacement branch circuit fuses. Spare fuse compartment shall be located behind locking panel door.
4. Bus bars shall be tin-plated copper with sufficient cross sectional area to meet UL 67 temperature rise requirements.
5. 200A/400A rated neutrals shall be standard.
6. Main lug conductor terminations:
   a. MLO terminations shall be rated for 60/75°C, Cu-Al
   b. Main disconnect terminations shall be rated for 75°C, Cu Only
7. NEMA 1 panelboards shall be field convertible for top or bottom incoming feed.

D. Main Disconnect:
1. Permanently installed lockout means shall be provided on the main disconnect for lockout tagout procedures.
2. Main disconnect shall be quick-make, quick-break type.

E. Branch Fused Disconnects:
1. Device shall have visible circuit ON/OFF indication with colored and international symbol markings.
2. Device shall provide open fuse indication via permanently installed neon indicating light.
3. Device shall be UL and cUL Listed 600Vac/200kA or 125Vdc/100kA voltage/short-circuit current rating, load-break disconnect with amp ratings and number of poles as indicated on the panelboard schedule.
4. Fuse and disconnect assembly shall be a finger-safe component with trim installed.

5. Fuse and disconnect shall be mechanically interlocked so as not to allow fuse removal while fuse terminals are energized.
6. No special tools shall be required for fuse removal.
7. Devices shall have bolt-on style bus connectors.
8. Device housing shall be clearly marked with device amperage.
9. Permanently installed lockout means shall be provided on the device for lockout tagout procedures. Permanently installed means for locking device in the ON position shall also be provided.
10. Device shall provide fuse amp rating rejection at the following ampacities to ensure continued circuit protection at the specified circuit rating: 15A, 20A, 30A, 40A, 50A, 60A, 70A, 90A & 100A.

F. Main and Branch Circuit Overcurrent Protection
1. All overcurrent protective devices shall have a minimum UL Listed interrupting rating of 300kA and CSA Certified interrupting rating of 200kA.
2. Branch circuit overcurrent protection shall be 600Vac UL Listed minimum 300kA IR and CSA Certified minimum 200kA IR finger-safe fuse with Class J* performance characteristics.
3. Main overcurrent protective devices shall be 600Vac UL Listed minimum 300kA IR and CSA Certified minimum 200kA IR Class J time-delay fuses or Class J performance fuses.
4. Where panelboard main fuses are installed, fuses in panelboard branch circuits shall selectively coordinate with main fuses for all overcurrent ratings up to 200kA.

G. Panelboard Bus: Copper current carrying components, ratings as indicated on Drawings. Furnish copper ground bus in each panelboard.

H. Minimum Integrated Short Circuit Rating: Calculated based on primary transformer available SCR and as indicated on plans.

I. Enclosure:
1. NEMA 1 enclosures shall be surface or flush mount as indicated in associated schedules or drawings.
2. Boxes shall be a nominal 20 inches wide and 5-¾ inches deep with wire bending space per the National Electrical Code.
3. Panelboard trim shall be supplied with lockable door covering all disconnect handles.
4. Panelboard trim shall be dead-front construction covering all energized parts.
5. Door-in-door type trim shall be provided for NEMA 1 enclosures where it is specified in the associated schedules or drawings.
6. Front trim shall be lockable. All lock assemblies shall be keyed alike with like NEMA rated enclosures.

2.6 OVERCURRENT PROTECTIVE DEVICES

A. Fusible Switches:
1. Description: Quick-make, quick-break, dead-front fusible switch units complying with NEMA KS 1, and listed and labeled as complying with UL 98; ratings, configurations, and features as indicated on the drawings.
2. Fuse Clips: As required to accept indicated fuses.
   a. Where NEMA Class R fuses are installed, provide rejection feature to prevent installation of fuses other than Class R.
3. Provide externally operable handle with means for locking in the OFF position. Provide means for locking switch cover in the closed position. Provide safety interlock to prevent opening the cover with the switch in the ON position with capability of overriding interlock for testing purposes.
4. Conductor Terminations:
   a. Provide mechanical lugs unless otherwise indicated.
   b. Provide compression lugs where indicated.
   c. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.

B. Molded Case Circuit Breakers:
1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
2. Interrupting Capacity:
   a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
      1) 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
      2) 14,000 rms symmetrical amperes at 480 VAC.
   b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
   c. Series Rated Systems: Provide circuit breakers listed in combination with upstream devices to provide interrupting rating not less than the short circuit current rating indicated.
3. Conductor Terminations:
   a. Provide mechanical lugs unless otherwise indicated.
   b. Provide compression lugs where indicated.
   c. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
   a. Provide field-adjustable magnetic instantaneous trip setting for circuit breaker frame sizes 225 amperes and larger.
   b. Provide interchangeable trip units where indicated.
5. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.

6. Provide the following circuit breaker types where indicated:
   a. Ground Fault Circuit Interrupter (GFCI) Circuit Breakers: Listed as complying with UL 943, class A for protection of personnel.
   b. Ground Fault Equipment Protection Circuit Breakers: Designed to trip at 30 mA for protection of equipment.
   c. Arc-Fault Circuit Interrupter (AFCI) Circuit Breakers: Combination type listed as complying with UL 1699.
   d. 100 Percent Rated Circuit Breakers: Listed for application within the panelboard where installed at 100 percent of the continuous current rating.
   e. Current Limiting Circuit Breakers: Without using fusible elements, designed to limit the let-through energy to a value less than the energy of a one-half cycle wave of the symmetrical prospective current when operating within its current limiting range.
7. Provide listed switching duty rated circuit breakers with SWD marking for all branch circuits serving fluorescent lighting.
8. Provide listed high intensity discharge lighting rated circuit breakers with HID marking for all branch circuits serving HID lighting.
9. Do not use tandem circuit breakers.
10. Do not use handle ties in lieu of multi-pole circuit breakers.
11. Provide multi-pole circuit breakers for multi-wire branch circuits as required by NFPA 70.
12. Provide the following features and accessories where indicated or where required to complete installation:
   a. Shunt Trip: Provide coil voltage as required for connection to indicated trip actuator.
   b. Handle Pad-Lock Provision: For locking circuit breaker handle in OFF position.
   c. Auxiliary Switch: SPDT switch suitable for connection to system indicated for indicating when circuit breaker has tripped or been turned off.
   d. Under-voltage Release: For tripping circuit breaker upon predetermined drop in coil voltage with field-adjustable time delay to prevent nuisance tripping.
   e. Alarm Switch: SPDT switch suitable for connection to system indicated for indicating when circuit breaker has tripped.

2.7 SOURCE QUALITY CONTROL

A. See Division 01 – General Requirements.

B. Factory test panelboards according to NEMA PB 1.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that the ratings and configurations of the panelboards and associated components are consistent with the indicated requirements.

C. Verify that mounting surfaces are ready to receive panelboards.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship).

B. Install products in accordance with manufacturer's instructions.

C. Install panelboards in accordance with NECA 407 and NEMA PB 1.1.

D. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

E. Provide required supports in accordance with Section 260529.

F. Install panelboards plumb.

G. Install flush-mounted panelboards so that trims fit completely flush to wall with no gaps and rough opening completely covered.

H. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches above the floor or working platform.

I. Mount floor-mounted power distribution panelboards on properly sized 3 inch high concrete pad constructed in accordance with Division 03.

J. Provide minimum of six spare 1 inch trade size conduits out of each flush-mounted panelboard stubbed into accessible space above ceiling and below floor.

K. Provide grounding and bonding in accordance with Section 260526.
   1. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on isolated/insulated ground bus.
   2. Terminate branch circuit isolated grounding conductors on isolated/insulated ground bus only. Do not terminate on solidly bonded equipment ground bus.

L. Install all field-installed branch devices, components, and accessories.

M. Provide fuses complying with Section 262813 for fusible switches as indicated.

N. Energy Reduction Maintenance Switch:
1. Installation of ERMS maintenance lockable selector switch and blue indicating light onto compartment door of the circuit breaker. Installation of the IO module and the IFE module in accordance with manufactures recommendations.
   a. Set point for the ERMS instantaneous is based on manufactures recommendations. For Square D Power Pact circuit breaker (Basis of design) the default programmed setting to the instantaneous (li) set point is 2xIn.

O. Install a permanent label indicating the panelboard or transformer where the power supply to the panel originates.

P. Where accessories are not self-powered, provide control power source as indicated or as required to complete installation.

Q. Multi-Wire Branch Circuits: Group grounded and ungrounded conductors together in the panelboard as required by NFPA 70.

R. Set field-adjustable circuit breaker tripping function settings as indicated.

S. Set field-adjustable circuit breaker tripping function settings as determined by overcurrent protective device coordination study performed according to Section 260573.

T. Set field-adjustable ground fault protection pickup and time delay settings as indicated.

U. Provide filler plates to cover unused spaces in panelboards.

V. Provide circuit breaker lock-on devices to prevent unauthorized personnel from de-energizing essential loads where indicated. Also provide for the following:
1. Emergency and night lighting circuits.
2. Fire detection and alarm circuits.
3. Communications equipment circuits.
4. Intrusion detection and access control system circuits.
5. Video surveillance system circuits.

W. Identify panelboards in accordance with Section 260553.

3.3 FIELD QUALITY CONTROL

A. See Division 01 - General Requirements.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Fusible Switches: Perform inspections and tests listed in NETA ATS, Section 7.5.1.1.

D. Molded Case Circuit Breakers: Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for all main circuit breakers and circuit breakers larger than 800 amperes. Tests listed as optional are not required.
   1. Perform insulation-resistance tests on all control wiring with respect to ground.
   2. Test functions of the trip unit by means of secondary injection.

E. Ground Fault Protection Systems: Test in accordance with manufacturer's instructions as required by NFPA 70.
   1. Perform inspections and tests listed in NETA ATS, Section 7.14. The insulation-resistance test on control wiring listed as optional is not required.

F. Test GFCI circuit breakers to verify proper operation.

G. Test AFCI circuit breakers to verify proper operation.

H. Test shunt trips to verify proper operation.

I. Procure services of a qualified manufacturer's representative to observe installation and assist in inspection, testing, and adjusting. Include manufacturer's reports with field quality control submittals.

J. Correct deficiencies and replace damaged or defective panelboards or associated components.

3.4 ADJUSTING

A. See Division 01 – General Requirements.

B. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

C. Adjust alignment of panelboard fronts.

D. Load Balancing: For each panelboard, rearrange circuits such that the difference between each measured steady state phase load does not exceed 20 percent and adjust circuit directories accordingly. Maintain proper phasing for multi-wire branch circuits.

3.5 CLEANING

A. See Division 01 – General Requirements.

B. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.

C. Repair scratched or marred exterior surfaces to match original factory finish.

3.6 PROTECTION

A. Protect installed panelboards from subsequent construction operations.

END OF SECTION

FOR REFERENCE: THIS SECTION WAS ISSUED FOR PHASE 1 AND PHASE 2

SECTION 26 2653 - ELECTRIC VEHICLE CHARGING EQUIPMENT

PART 1 GENERAL

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections with DIVISION 1 - GENERAL REQUIREMENTS, which are hereby made a part of this Section of the Specifications.

B. Attention is directed Section 260400 – GENERAL CONDITIONS FOR ELECTRICAL TRADES, which is hereby made a part of this Section of the Specifications.

1.2 SUMMARY

A. Section includes EV charging equipment that provides Level 2 EV charging.

1.3 REFERENCES

A. National Fire Protection Association:
   1. NFPA 70 - National Electrical Code.

B. Definitions
   1. EV: Electric vehicle.
   2. EV Cable: The off-board cable containing the conductor(s) to connect the EV power controller to the EV that provides both power and communications during energy transfer.
   3. EV Capable: Parking spaces that include nearby termination of raceway (conduit) to a power source with sufficient electrical panel capacity designed for simultaneous charging of electric vehicles in all planned EV parking spaces. Electrical wiring need not be pulled through raceway (conduit) until charging station is installed.
   4. EV Charger or EV Charging Equipment: See "EVSE".
   5. EV Connector: A conductive device that, when electrically coupled to an EV inlet, establishes an electrical connection to the EV for the purpose of power transfer and information exchange. This device is part of the EV coupler.
   6. EV Coupler: A mating EV inlet and connector set.
   7. EV Inlet: The device in the vehicle into which the EV connector is inserted, and a conductive connection is made for the transfer of power and communication. This device is part of the EV coupler.
   8. EV Make Ready: Parking spaces that include nearby termination of raceway (conduit) and electrical wiring pulled to a power source with sufficient electrical panel capacity for simultaneous charging of electric vehicles in all EV parking spaces.
   9. EVSE: Electric Vehicle Supply Equipment. It includes the EV charging equipment and conductors, including the ungrounded, grounded, and equipment grounding conductors and EV cables, attachment plugs, and all other fittings,

devices, power outlets, or apparatus installed specifically for transferring energy between the premise wiring and the EV.

1.4 SYSTEM DESCRIPTION

A. Furnish and install electric vehicle charging equipment capable of supporting the following functions:
   1. Level 2 EV charging
   2. Be networked or internet addressable and capable of participating in a demand response program or time-of-use pricing to encourage off-peak charging.

B. Ensure that all locations of EV charging equipment is capable of receiving a CDMA or GSM cellular signal. The electrical contractor is responsible for this verification prior to purchasing or installing equipment. This does not apply if the installation uses Ethernet connectivity rather than cellular.

C. Provide the services of a manufacturer's technician to start and verify proper installation of all equipment.

1.5 SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for EV charging equipment.
   2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: For EV charging equipment.
   1. Include plans, elevations, sections, and mounting details.
   2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
   3. Detail fabrication and assembly of mounting assemblies for EV charging equipment.
   4. Include diagrams for power, signal, and control wiring.

C. Coordination Drawings: Area plans and details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
   1. Structural members to which equipment will be attached.
   2. Electrical service.
   3. Communications service, including wireless communications equipment.

D. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. See Division 01 – General requirements.

B. Operation and Maintenance Data: For EV charging equipment to include in operation and maintenance manuals.
   1. Programming data on installed system set-up.
   2. Third party payment system contracts.

C. Software and Firmware Operational Documentation:
   1. Online training and help documentation.
   2. Station activation sticker where required for network activation.

1.7 QUALIFICATIONS

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

C. Comply with UL 2231-1. UL 2231-2, UL 2594, and NEC Article 625.

D. Comply with SAE J1772.

E. Comply with FCC Part 15 Class A.

1.8 PRE-INSTALLATION MEETINGS

A. See Division 01 – General requirements.

B. Convene minimum one week prior to commencing work of this section.

1.9 DELIVERY, STORAGE, AND HANDLING

A. See Division 01 – General requirements.

B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

C. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.

D. Do not deliver items to project before time of installation. Limit shipment of bulk and multiple-use materials to quantities needed for immediate installation.

1.10 COORDINATION

A. See Division 01 – General requirements.

B. Coordinate exact location of charging equipment on site with concrete bases provided by Division 03.

C. Coordinate bolt pattern of bollard/pole mounted charging stations with supports provided by Division 03.

D. Wireless Survey: Complete wireless survey to determine if wireless provider signals meet or exceed manufacturer's recommended minimum values.

1.11 WARRANTY

A. See Division 01 warranty requirements.

B. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace components of EV charging units that fail(s) in materials or workmanship within specified warranty period.
   1. Standard Warranty Period: One year from date of Substantial Completion for the installer and three years from the date of shipment for the manufacturer.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: EVSE LLC

B. Acceptable Alternates: Chargepoint, Eaton.

C. Substitutions – See Division 01 – General Requirements.

D. Source Limitations: Obtain EV charging equipment from single manufacturer.

2.2 EV CHARGING EQUIPMENT DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

B. Comply with NFPA 70.

C. ADA compliant.

D. Metering: +/- 2 percent from 2 percent to full scale of output.

E. EV Charging Equipment Mounting: Bollard, pole or wall mount – see drawings for mounting type.

F. Enclosures:
   1. Rated for environmental conditions at installed location.
      a. Outdoor Locations: NEMA 250, Type 3R.
      b. Aluminum and UV-resistant plastic.
      c. Paint and Anodized or powder coated aluminum.
      d. Charging components protected by security screws.
      e. Charging connectors in locking holsters or using motorized, retractable cable system which does not require holsters.
      f. Meter, modem, and CPU, tamper resistant.

G. EV Cable and Connectors:
   1. SAE J1772 connector.
   2. Locking holster or using a motorized, retractable cable system which does not require holsters.
   3. 18-foot cable with cable management system (mechanical or motorized retractable).

H. Status Indicators:
   1. LEDs to indicate power, vehicle charging, charging complete, system status, faults, and service, as well as authorization.

I. Display Screen/LEDs:
   1. Daylight-viewable LCD screen with UV protection. Daylight readable and fingerprint resistant. The screen may be integral or detached in a separate kiosk-like module.
   2. Displays/indicates power, charging, charging complete, remote control, system status, faults, payment and pricing details, and service.

J. Networking:
   1. WAN Communications: Cellular GSM/GPRS and CDMA or Ethernet.
   2. LAN Communications: 2.4 GHz Wi-Fi 802.11b/g/n, ZigBee wireless or Ethernet Bridge.
   3. Capable of remote configuration, diagnostics and reporting.
   4. Capable of remote software updates.

K. Payment System:
   1. RFID (ISO 15693, ISO 14443), NFC, Contactless or insertion style credit card reader.
   2. PCI (Payment Card Industry) compliant.
   3. Capable of remote control and authorization including mobile phone application or toll free phone number.
   4. Capable of allowing free charging.
   5. Include all required network and port license fees.

L. Charging Network: Compatible with the Open Charge Point Protocol (OCPP) charging network.
   1. Multiple units shall independently connect to charging network.

2. Multiple units shall have one unit designated as a master unit that is configured as a gateway unit between the EV charging equipment (or a kiosk-like module serving the same function) and the charging network.
3. Individual units shall be capable of indicating station status and availability providing or connecting user to customer support and remote control, if networked, and via QR code or smartphone app.

2.3 PERFORMANCE REQUIREMENTS

A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

B. Surge Withstand: 6 kV at 3000A.

C. Integral GFCI.

D. Auto-GFCI fault retry.

E. Input Power:
1. As specified on drawings.
2. Dual circuits do not need to be interlocked.

F. EV Charging Levels:
1. Single vehicle: AC Level 2 maximum charging rate between 7.2 kW and 9.6 kW.
2. Dual vehicles, AC Level 2 maximum charging rate between 7.2 kW and 9.6 kW.

G. Multiple vehicles simultaneously charging at a site using Automatic Power Load Management may be charged up to 9.6 kW. Using Power Sharing of dual chargers, two vehicles charging simultaneously will allow each 4.8 kW per hour of charge, reverting to 9.6 kW per hour if one of two vehicles is no longer charging. Multiple pairs of vehicles can follow this pattern.

2.4 GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping or otherwise protecting exposed finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 EXECUTION

3.1 EXAMINATION

A. See Division 01 – General requirements.

B. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

C. Examine roughing-in for EV charging equipment electrical conduit to verify actual locations of conduit connections before equipment installation.

D. Examine walls, floors, and pavement for suitable conditions where EV charging equipment will be installed.

E. Notify the Architect or Engineer of any unsuitable conditions. Do not proceed with installation until unsuitable conditions have been corrected.

3.2 INSTALLATION

A. Comply with NECA 1 and NECA 413.

B. Concrete Base Mounting:
   1. Install EV charging equipment on a concrete base per manufacturers installation requirements or as indicated on drawings. Comply with requirements for concrete base specified in Division 03.
      a. Install dowel rods to connect concrete base to concrete floor or sidewalk where applicable. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
      b. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
      c. Install anchor bolts to elevations required for proper attachment to supported equipment.
      d. Secure EV charging equipment to concrete base according to manufacturer's written instructions.

C. Wiring Method: Install cables in raceways and cable trays. Conceal raceway and cables except in unfinished spaces.
   1. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."

D. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors.

E. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

F. Circuit Breakers: Comply with Section 262816 "Enclosed Switches and Circuit Breakers."

G. Secure covers to enclosure.

3.3 CONNECTIONS

A. Connect wiring according to Section 260519 “Electrical Power Conductors and Cable.”

B. Comply with grounding requirements in Section 260526 "Grounding and Bonding for Electrical Systems."

C. Comply with requirements for installation of conduit in Section 260533 "Raceways and Boxes for Electrical Systems." Drawings indicate general arrangement of conduit, fittings, and specialties.

D. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

3.4 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections with the assistance of a factory-authorized service representative.

C. Tests and Inspections:
   1. For each unit of EV charging equipment, perform the following tests and inspections:
      a. Unit self-test.
      b. Operation test with load bank.
      c. Operation test with EV.
      d. Network communications test.

D. EV charging equipment will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.6 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

3.7 SOFTWARE SERVICE AGREEMENT

A. Technical Support: Beginning at Substantial Completion, service agreement shall include software support for the duration of an active Network Service Plan.

B. Upgrade Service: At Substantial Completion, remotely update software to latest version. Install and program software upgrades that become available while an active Network Service Plan is maintained. Upgrading software shall include operating system and new or revised licenses for using software.

3.8 TRAINING:

A. The Owner may assign personnel to participate with the contractor during installation. Without delaying the work, familiarize the Owner's personnel with the installation, equipment, and maintenance.

B. Provide training to personnel selected by the Owner on operation and basic maintenance of all systems and equipment.

C. Include 4 hours of training Owner’s staff.

END OF SECTION

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SECTION 26 2716 - ELECTRICAL CABINETS AND ENCLOSURES

PART 1 GENERAL

1.1 SUMMARY

A. Section includes hinged cover enclosures, cabinets, terminal blocks, and accessories.

B. Related Sections:
1. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
2. Section 26 05 33 - Raceway and Boxes for Electrical Systems.
3. Section 27 05 33 - Conduits and Backboxes for Communications Systems.
4. Section 28 05 33 - Conduits and Backboxes for Electronic Safety and Security.

1.2 REFERENCES

A. National Electrical Manufacturers Association:

1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

2. NEMA ICS 4 - Industrial Control and Systems: Terminal Blocks.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit manufacturer's standard data for enclosures, cabinets, and terminal blocks.

C. Manufacturer's Installation Instructions: Submit application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum 3 years experience.

1.5 EXTRA MATERIALS

A. Section 01 70 00 - Execution and Closeout Requirements: Spare parts and maintenance products.

B. Furnish two of each key.

PART 2 PRODUCTS

2.1 HINGED COVER ENCLOSURES

A. Manufacturers:

1. Hoffman
2. Carlon Electrical Products.
3. Hubbell Wiring Devices.
4. Substitutions: Section 01 60 00 - Product Requirements

B. Construction: NEMA 250, Type 1 steel enclosure with gray enamel finish.

C. Covers: Continuous hinge, held closed by screwdriver with flat steel cover.

D. Furnish interior metal panel for mounting terminal blocks and electrical components; finish with white enamel.

E. Enclosure Finish: Manufacturer's standard enamel.

2.2 CABINETS

A. Manufacturers:

1. Hoffman
2. Carlon Electrical Products.
3. Hubbell Wiring Devices.
4. Substitutions: Section 01 60 00 - Product Requirements

B. Boxes: Galvanized steel with removable end walls.

C. Box Size: 24 inches wide x 6 inches x 4 inches deep.

D. Backboard: Furnish 3/4 inch thick plywood backboard for mounting terminal blocks. Paint matte white.

E. Fronts: Steel, type with screw cover front door with concealed hinge and flush lock keyed to match branch circuit panelboard. Finish with gray baked enamel.

F. Furnish metal barriers to form separate compartments wiring of different systems and voltages.

G. Furnish accessory feet for free-standing equipment.

2.3 TERMINAL BLOCKS

A. Manufacturers:
1. Carlon Electrical Products
2. Hubbell Wiring Devices
3. Reliance Electric

4. Substitutions: [Section 01 60 00 - Product Requirements] [Not Permitted.]

B. Terminal Blocks: NEMA ICS 4.

C. Power Terminals: Unit construction type with closed back and tubular pressure screw connectors, rated 600 volts.

D. Signal and Control Terminals: Modular construction type, suitable for channel mounting, with tubular pressure screw connectors, rated 300 volts.

E. Furnish ground bus terminal block, with each connector bonded to enclosure.

2.4 PLASTIC RACEWAY

A. Manufacturers:

1. Panduit.

2. Hubbell Wiring Devices.

3. Carlon Electrical Products.

4. Substitutions: Section 01 60 00 - Product Requirements

B. Product Description: Plastic channel with hinged or snap-on cover.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install enclosures and boxes plumb. Anchor securely to wall and structural supports at each corner in accordance with Section 26 05 29.

B. Install cabinet fronts plumb.

3.2 CLEANING

A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.

B. Clean electrical parts to remove conductive and harmful materials.

C. Remove dirt and debris from enclosure.

D. Clean finishes and touch up damage.

END OF SECTION

SECTION 26 2726 - WIRING DEVICES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Wall switches.

B. Receptacles.

C. Wall plates.

1.2 RELATED REQUIREMENTS

A. Division 01 – General Requirements

B. Division 09 - Finishes

C. Section 260400 – General Conditions for Electrical Trades

D. Section 260519 - Electrical Power Conductors and Cables.

E. Section 260526 - Grounding and Bonding for Electrical Systems.

F. Section 260503 – Equipment Wiring Connections.

G. Section 260533 – Raceways and Boxes for Electrical Systems.

H. Section 260553 - Identification for Electrical Systems.

I. Section 260943 - Networked Lighting Controls.

J. Section 262913 - Enclosed Controllers.

1.3 REFERENCE STANDARDS

A. FS W-C-596 - Connector, Electrical, Power, General Specification for; Revision H.

B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush-mounted (General Specification); Revision G.

C. NECA 1 - Standard for Good Workmanship in Electrical Construction.

D. NECA 130 - Standard for Installing and Maintaining Wiring Devices.

E. NEMA WD 1 - General Color Requirements for Wiring Devices.

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.

H. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.

I. UL 514D - Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.

J. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

K. UL 1310 - Class 2 Power Units; Current Edition, Including All Revisions.

L. UL 1449 - Standard for Surge Protective Devices; Current Edition, Including All Revisions.

M. UL 1472 - Solid-State Dimming Controls; Current Edition, Including All Revisions.

N. UL 1917 - Solid-State Fan Speed Controls; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.
2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.
3. Coordinate the placement of outlet boxes for wall switches with actual installed door swings.
4. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
5. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

B. Sequencing:
1. Do not install wiring devices until final surface finishes and painting are complete.

1.5 SUBMITTALS

A. See Division 01 - General Requirements.

B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.
1. Wall Dimmers: Include derating information for ganged multiple devices.
2. Surge Protection Receptacles: Include surge current rating, voltage protection rating (VPR) for each protection mode, and diagnostics information.

C. Samples: One for each type and color of device and wall plate specified.

D. Certificates for Surge Protection Receptacles: Manufacturer's documentation of listing for compliance with UL 1449.

E. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

F. Operation and Maintenance Data:
1. Wall Dimmers: Include information on operation and setting of presets.
2. GFCI Receptacles: Include information on status indicators.
3. Surge Protection Receptacles: Include information on status indicators.

G. Project Record Documents: Record actual installed locations of wiring devices.

H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Division 01 - General Requirements, for additional provisions.
2. Screwdrivers for Tamper-Resistant Screws: Two for each type of screw.
3. Extra Keys for Locking Switches: Two of each type.
4. Extra Surge Protection Receptacles: Two of each type.
5. Extra Wall Plates: One of each style, size, and finish.

1.6 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

D. Products: Listed, classified, and labeled as suitable for the purpose intended.

E. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.7 DELIVERY, STORAGE, AND PROTECTION

A. Store in a clean, dry space in original manufacturer's packaging until ready for installation.

PART 2 PRODUCTS

2.1 WIRING DEVICE APPLICATIONS

A. Provide wiring devices suitable for intended use and with ratings adequate for load served.

B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.

C. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.

D. Provide tamper resistant receptacles for receptacles where indicated on the drawings.

E. Provide GFCI protection for receptacles installed within 6 feet of water source.

F. Provide GFCI protection for receptacles installed in dwelling unit kitchens.

G. Provide GFCI protection in other than dwelling units for all single-phase receptacles rated 150 volts to ground or less and all three-phase receptacles rated 150 volts to ground or less, 100 amperes of less in: Bathrooms, Kitchens and on Rooftops

H. Provide GFCI protection for receptacles serving electric drinking fountains.

I. Unless noted otherwise, do not use combination switch/receptacle devices.

2.2 WALL SWITCHES:

A. See Section 260943 – Networked Lighting Controls for specifications.

2.3 RECEPTACLES

A. Manufacturers:
   1. Hubbell Incorporated
   2. Leviton Manufacturing Company, Inc.
   3. Pass & Seymour, a brand of Legrand North America, Inc.
   4. Substitutions: See Division 01 - General Requirements.
   5. Source Limitations: Where wall controls are furnished as part of lighting control system, provide accessory matching receptacles and wallplates by the same manufacturer in locations indicated.

B. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
   1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
   2. NEMA configurations specified are according to NEMA WD 6.

3. Hospital Grade Receptacles: Listed as complying with UL 498 Supplement SD, with green dot hospital grade mark on device face.
4. Body color:
   a. General Purpose Receptacles: color by Architect.
   b. Emergency, [Critical Branch], [Equipment Branch] receptacles: Red.

C. Convenience Receptacles:
1. Standard Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
2. Automatically Controlled Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R; controlled receptacle marking on device face per NFPA 70; single or duplex as indicated on the drawings.
3. Isolated Ground Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, with ground contacts isolated from mounting strap; isolated ground triangle mark on device face; single or duplex as indicated on the drawings.
4. Weather Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.
5. Tamper Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type; single or duplex as indicated on the drawings.
6. Tamper Resistant and Weather Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type and as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.
7. Illuminated Convenience Receptacles: Hospital grade, 20A, 125V, NEMA 5-20R; illuminated face or indicator light to indicate power is being supplied to receptacle; single or duplex as indicated on the drawings.

D. GFCI Receptacles:
1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
   a. Provide test and reset buttons of same color as device.
2. Standard GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.
3. Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.
4. Tamper Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as tamper resistant type.
5. Tamper Resistant and Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as tamper resistant type and as weather resistant type

complying with UL 498 Supplement SE suitable for installation in damp or wet locations.

E. USB Charging Devices:
1. USB Charging Devices - General Requirements: Listed as complying with UL 1310.
a. Charging Capacity - Two-Port Devices: 2.1 A, minimum.
b. Charging Capacity - Four-Port Devices: 4.2 A, minimum.
2. USB Charging/Tamper Resistant Receptacle Combination Devices: Two-port USB charging device and receptacle, commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type; rectangular decorator style.
3. USB Charging Noncombination Devices: Four-port; rectangular decorator style.

F. Surge Protection Receptacles:
1. Surge Protection Receptacles - General Requirements: Listed and labeled as complying with UL 1449, Type 2 or 3.
a. Energy Dissipation: Not less than 240 J per mode.
b. Protected Modes: L-N, L-G, N-G.
c. UL 1449 Voltage Protection Rating (VPR): Not more than 700 V for L-N, L-G modes and 1200 V for N-G mode.
d. Diagnostics:
1) Visual Notification: Provide indicator light to report functional status of surge protection.
2) Audible Notification: Provide switchable audible alarm to report that surge protection is not functional.
2. Standard Surge Protection Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.

G. Locking Receptacles: Industrial specification grade, configuration as indicated on the drawings.
1. Standard Locking Convenience Receptacles: Single, 20A, 125V, NEMA L5-20R.
2. Special Purpose Locking Receptacles: refer to drawings and schedules for NEMA locking configuration.

H. Special Purpose Receptacles: Industrial specification grade, straight blade grounding devices.
1. Refer to drawings and schedules for NEMA configuration.

I. Clock Hanger Receptacles: Single, 15A, 125V, NEMA 5-15R.

2.4 WALL PLATES

A. Manufacturers:
1. Hubbell Incorporated
2. Leviton Manufacturing Company, Inc.
3. Pass & Seymour, a brand of Legrand North America, Inc.
4. Substitutions: See Division 01 - General Requirements.

5. Source Limitations: Where wall controls are furnished as part of lighting control system, provide accessory matching receptacles and wallplates by the same manufacturer in locations indicated.

B. Wall Plates: Comply with UL 514D.
   1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
   2. Screws: Metal with slotted heads finished to match wall plate finish.
   3. Provide screwless wallplates with concealed mounting hardware where indicated.

C. Nylon Wall Plates: Smooth finish, high-impact thermoplastic.

D. Stainless Steel Wall Plates: Brushed satin finish, Type 302 stainless steel.

E. Brass Wall Plates: Brushed satin finish, factory-coated to inhibit oxidation.

F. Aluminum Wall Plates: Smooth satin finish, clear anodized, factory-coated to inhibit oxidation.

G. Chrome Wall Plates: Smooth finish, chrome plated steel.

H. Galvanized Steel Wall Plates: Rounded corners and edges, with corrosion resistant screws.

I. Premarked Wall Plates: Factory labeled as indicated; hot stamped for nylon wall plates and engraved for metal wall plates.

J. Weatherproof Covers for Damp Locations: Gasketed, cast aluminum, with self-closing hinged cover and corrosion-resistant screws; listed as suitable for use in wet locations with cover closed.

K. Weatherproof Covers for Wet Locations: Gasketed, cast aluminum, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected and identified as extra-duty type.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.

C. Verify that wall openings are neatly cut and will be completely covered by wall plates.

D. Verify that final surface finishes are complete, including painting.

E. Verify that floor boxes are adjusted properly.

F. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

G. Verify that conditions are satisfactory for installation prior to starting work.

3.2 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.3 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.

B. Coordinate locations of outlet boxes provided under Section 260533 as required for installation of wiring devices provided under this section.
   1. Mounting Heights: Unless otherwise indicated, as follows:
      a. Wall Switches: 48 inches above finished floor.
      b. Wall Dimmers: 48 inches above finished floor.
      c. Fan Speed Controllers: 48 inches above finished floor.
      d. Receptacles: 18 inches above finished floor or 6 inches above counter.
         1) Install convenience GFCI type receptacles 36 to 48 inches above roof deck. Or at designated heights as indicated on drawings.
   2. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
   3. Where multiple receptacles, wall switches, or wall dimmers are installed at the same location and at the same mounting height, gang devices together under a common wall plate.
   4. Locate wall switches on strike side of door with edge of wall plate 3 inches from edge of door frame. Where locations are indicated otherwise, notify Architect to obtain direction prior to proceeding with work.
   5. Locate receptacles for electric drinking fountains concealed behind drinking fountain according to manufacturer's instructions.

C. Install wiring devices in special application enclosures per manufacturer’s instructions, provide stainless steel cover plates.

D. Install wiring devices in accordance with manufacturer's instructions.

E. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

F. Where required, connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.

G. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.

H. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper. When stranded conductors are used in lieu of solid, use insulated crimp on fork terminals for device terminations. Do not place bare stranded conductors directly under screw terminals.

I. For isolated ground receptacles, connect wiring device grounding terminal only to identified branch circuit isolated equipment grounding conductor. Do not connect grounding terminal to outlet box or normal branch circuit equipment grounding conductor.

J. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.

K. Where split-wired duplex receptacles are indicated, remove tabs connecting top and bottom receptacles.

L. Install wiring devices plumb and level with mounting yoke held rigidly in place.

M. Install wall switches with OFF position down.

N. Install wall dimmers to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer.

O. Do not share neutral conductor on branch circuits utilizing wall dimmers.

P. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.

Q. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

R. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

S. Identify wiring devices in accordance with Section 260553.

3.4 FIELD QUALITY CONTROL

A. See Division 01 - General Requirements.

B. Inspect each wiring device for damage and defects.

C. Operate each wall switch, wall dimmer, and fan speed controller with circuit energized to verify proper operation.

D. Test each receptacle to verify operation and proper polarity.

E. Test each GFCI protected receptacle for proper tripping operation according to manufacturer's instructions.

F. Inspect each surge protection receptacle to verify surge protection is active.

G. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.5 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

B. Adjust presets for wall dimmers according to manufacturer's instructions as directed by Architect.

3.6 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION

SECTION 26 2813 - FUSES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fuses.

B. Spare fuse cabinet.

1.2 RELATED REQUIREMENTS

A. See Division 01 – General Requirements

B. Section 260400 – General Conditions for Electrical Trades

C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

D. Section 260573 – Overcurrent Protective Device Coordination Study: Additional criteria for the selection of protective devices specified in this section.

E. Section 262413 - Switchboards: Fusible switches.

F. Section 262416 - Panelboards: Fusible switches.

G. Section 262500 – Enclosed Bus Assemblies: Fusible switches.

H. Section 262819 - Enclosed Switches: Fusible switches.

I. Section 262913 - Enclosed Controllers: Fusible switches.

J. Section 264500 - Photovoltaic System: Additional requirements for photovoltaic fuses.

1.3 REFERENCE STANDARDS

A. NEMA FU 1 - Low Voltage Cartridge Fuses; 2012.

B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

C. UL 248-1 - Low-Voltage Fuses - Part 1: General Requirements; Current Edition, Including All Revisions.

D. UL 248-4 - Low-Voltage Fuses - Part 4: Class CC Fuses; Current Edition, Including All Revisions.

E. UL 248-8 - Low-Voltage Fuses - Part 8: Class J Fuses; Current Edition, Including All Revisions.

F. UL 248-10 - Low-Voltage Fuses - Part 10: Class L Fuses; Current Edition, Including All Revisions.

G. UL 248-12 - Low-Voltage Fuses - Part 12: Class R Fuses; Current Edition, Including All Revisions.

H. UL 248-15 - Low-Voltage Fuses - Part 15: Class T Fuses; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. See Division 01: General Requirements

B. Coordination:
1. Coordinate fuse clips furnished in equipment provided under other sections for compatibility with indicated fuses.
   a. Fusible Switches for Switchboards: See Section 262413.
   b. Fusible Switches for Panelboards: See Section 262416.
   c. Fusible Switches for Busway: See Section 262500.
   d. Fusible Enclosed Switches: See Section 262819.
   e. Fusible Switches for Enclosed Motor Controllers: See Section 262913.
2. Coordinate fuse requirements according to manufacturer's recommendations and nameplate data for actual equipment to be installed.
3. Notify Engineer of any conflicts with or deviations from the contract documents. Obtain written direction before proceeding with work.

1.5 SUBMITTALS

A. See Division 01 – General Requirements.

B. Product Data: Provide manufacturer's standard data sheets including voltage and current ratings, interrupting ratings, time-current curves, and current limitation curves.
1. Spare Fuse Cabinet: Include dimensions.

C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Division 01 - Product Requirements, for additional provisions.
2. Extra Fuses: One set(s) of three for each type and size installed.
3. Fuse Pullers: One set(s) compatible with each type and size installed.
4. Spare Fuse Cabinet Keys: Two.

1.6 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Bussmann

B. Littelfuse, Inc.

C. Ferraz Shawmut

D. Substitutions: See Division 01- General Requirements.

2.2 APPLICATIONS

A. Service Entrance:
1. Fusible Switches up to 600 Amperes: Class RK1, time-delay.
2. Fusible Switches Larger than 600 Amperes: Class L, time-delay.

B. Feeders:
1. Fusible Switches up to 600 Amperes: Class RK1, time-delay.
2. Fusible Switches Larger than 600 Amperes: Class L, time-delay.

C. General Purpose Branch Circuits: Class RK1, time-delay.

D. Individual Motor Branch Circuits: Class RK1, time-delay.

E. In-Line Protection for Pole-Mounted Luminaires: Class CC, time-delay.

F. Primary Protection for Control Transformers: Class CC, time-delay.

2.3 FUSES

A. Provide products listed, classified, and labeled as suitable for the purpose intended.

B. Unless specifically indicated to be excluded, provide fuses for all fusible equipment as required for a complete operating system.

C. Provide fuses of the same type, rating, and manufacturer within the same switch.

D. Comply with UL 248-1.

E. Unless otherwise indicated, provide cartridge type fuses complying with NEMA FU 1, Class and ratings as indicated.

F. Voltage Rating: Suitable for circuit voltage.

G. Class R Fuses: Comply with UL 248-12.

H. Class J Fuses: Comply with UL 248-8.

I. Class L Fuses: Comply with UL 248-10.

J. Class T Fuses: Comply with UL 248-15.

K. Selectivity: Where the requirement for selectivity is indicated, furnish products as required to achieve selective coordination.

L. Provide the following accessories where indicated or where required to complete installation:
1. Fuseholders: Compatible with indicated fuses.
2. Fuse Reducers: For adapting indicated fuses to permit installation in switch designed for fuses with larger ampere ratings.

2.4 SPARE FUSE CABINET

A. Description: Wall-mounted sheet metal cabinet with shelves and hinged door with cylinder lock, suitably sized to store spare fuses and fuse pullers specified.

B. Finish: Manufacturer's standard, factory applied grey finish unless otherwise indicated.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that fuse ratings are consistent with circuit voltage and manufacturer's recommendations and nameplate data for equipment.

B. Verify that mounting surfaces are ready to receive spare fuse cabinet.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

A. Do not install fuses until circuits are ready to be energized.

B. Install fuses with label oriented such that manufacturer, type, and size are easily read.

C. Install spare fuse cabinet where indicated.

D. Identify spare fuse cabinet in accordance with Section 260553.

END OF SECTION

SECTION 262819 - ENCLOSED SWITCHES

PART 1 GENERAL

1.1 SUMMARY

A. Section includes fusible and nonfusible switches.

B. Related Sections:
1. Section 26 28 13 - Fuses.

1.2 REFERENCES

A. National Electrical Manufacturers Association:

1. NEMA FU 1 - Low Voltage Cartridge Fuses.

2. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).

B. International Electrical Testing Association:

1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit switch ratings and enclosure dimensions.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of enclosed switches and ratings of installed fuses.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years [documented] experience.

PART 2 PRODUCTS

2.1 FUSIBLE SWITCH ASSEMBLIES

A. Manufacturers:
1. General Electric.
2. Square D.
3. Siemens.
4. Eaton/Cutler Hammer.
5. Substitutions: Section 01 60 00 - Product Requirements.

B. Product Description: NEMA KS 1, with externally operable handle interlocked to prevent opening front cover with switch in ON position, enclosed load interrupter knife switch. Handle lockable in OFF position. Provide lockable in the closed position for elevator cab light disconnect or similar applications.

C. Fuse clips: Designed to accommodate NEMA FU 1, Class R fuses.

D. Enclosure: NEMA KS 1, to meet conditions. Fabricate enclosure with manufacturer's standard gray painted steel.
1. Interior Dry Locations: Type 1.
2. Exterior Locations: Type 3R.
3. Kitchen Locations: Type 4X Stainless Steel.

E. Furnish switches with entirely copper current carrying parts.

2.2 NONFUSIBLE SWITCH ASSEMBLIES

A. Manufacturers:
1. General Electric.
2. Square D.
3. Siemens.
4. Eaton/Cutler Hammer.
5. Substitutions: Section 01 60 00 - Product Requirements.

B. Product Description: NEMA KS 1, Type with externally operable handle interlocked to prevent opening front cover with switch in ON position enclosed load interrupter knife switch. Handle lockable in OFF position.

C. Product Description: NEMA KS 1, with externally operable handle interlocked to prevent opening front cover with switch in ON position, enclosed load interrupter knife switch. Handle lockable in OFF position. Provide lockable in the closed position for elevator cab light disconnect or similar applications.

D. Enclosure: NEMA KS 1, to meet conditions. Fabricate enclosure with manufacturer's standard gray painted steel.
   1. Interior Dry Locations: Type 1.
   2. Exterior Locations: Type 3R.

E. Furnish switches with entirely copper current carrying parts.

2.3 SWITCH RATINGS

A. Switch Rating: Horsepower rated for AC or DC as indicated on Drawings.

B. Short Circuit Current Rating: UL listed for 200,000 rms symmetrical amperes when used with or protected by Class R or Class J fuses (30-600 ampere switches employing appropriate fuse rejection schemes and when used with or protected by Class L fuses (800-1200 ampere).

PART 3 EXECUTION

3.1 EXISTING WORK

A. Disconnect and remove abandoned enclosed switches.

B. Maintain access to existing enclosed switches and other installations remaining active and requiring access. Modify installation or provide access panel.

C. Clean and repair existing enclosed switches to remain or to be reinstalled.

3.2 INSTALLATION

A. Install enclosed switches plumb. Provide supports in accordance with Section 26 05 29.

B. Height:5 feet to operating handle.

C. Install fuses for fusible disconnect switches. Refer to Section 26 28 13 for product requirements.

D. Install engraved plastic nameplates in accordance with Section 26 05 53.

E. Apply adhesive tag on inside door of each fused switch indicating NEMA fuse class and size installed.

3.3 FIELD QUALITY CONTROL

A. Section [01 40 00 - Quality Requirements] [01 70 00 - Execution and Closeout Requirements]: Field inspecting, testing, adjusting, and balancing.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.5.

END OF SECTION

FOR REFERENCE: THIS SECTION WAS ISSUED FOR PHASE 1 AND PHASE 2

SECTION 262823 - ENCLOSED CIRCUIT BREAKERS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes molded-case circuit breakers in individual enclosures.

1.2 REFERENCES

A. National Electrical Manufacturers Association:
   1. NEMA AB 1 - Molded Case Circuit Breakers and Molded Case Switches.

B. International Electrical Testing Association:
   1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit catalog sheets showing ratings, trip units, time current curves, dimensions, and enclosure details.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations and continuous current ratings of enclosed circuit breakers.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

PART 2 PRODUCTS

2.1 MOLDED CASE CIRCUIT BREAKER

A. Manufacturers:
   1. ABB / GE
   2. Schneider Electric / Square D Co.
   3. Siemens
   4. Eaton
   5. Substitutions: Section 01 60 00 - Product Requirements.

B. Product Description: Enclosed, molded-case circuit breaker conforming to NEMA AB 1.

C. Field-Adjustable Trip Circuit Breaker: Circuit breakers with frame sizes 200 amperes and larger have mechanism for adjusting long time, short time, continuous current, short time, long time pickup current.

D. Field-Changeable Ampere Rating Circuit Breaker: Circuit breakers with frame sizes 200 amperes and larger have changeable trip units.

E. Accessories: As indicated on Drawings. Conform to NEMA AB 1.

F. Enclosure: NEMA AB 1, to meet conditions. Fabricate enclosure from steel finished with manufacturer's standard gray enamel or stainless steeel as identified below.
1. Interior Dry Locations: Type 1.
2. Exterior Locations: Type 3R.
3. Kitchen Locations: Type 4X Stainless Steel.

PART 3 EXECUTION

3.1 EXISTING WORK

A. Disconnect and remove abandoned enclosed circuit breakers.

B. Maintain access to existing enclosed circuit breakers and other installations remaining active and requiring access. Modify installation or provide access panel.

C. Clean and repair existing enclosed circuit breakers to remain or to be reinstalled.

3.2 INSTALLATION

A. Install enclosed circuit breakers plumb. Provide supports in accordance with Section 26 05 29.

B. Height: 5 feet to operating handle.

C. Locate and install engraved plastic nameplates in accordance with Section 26 05 53.

3.3 FIELD QUALITY CONTROL

A. Section [01 40 00 - Quality Requirements] [01 70 00 - Execution and Closeout Requirements]:Field inspecting, testing, adjusting, and balancing.

B. Perform inspections and tests listed in NETA ATS, Section 7.6.1.1.

3.4 ADJUSTING

A. Section 01 70 00 - Execution and Closeout Requirements: Testing, adjusting, and balancing.

B. Adjust trip settings to coordinate circuit breakers with other overcurrent protective devices in circuit.

C. Adjust trip settings to provide adequate protection from overcurrent and fault currents.

END OF SECTION

FOR REFERENCE: THIS SECTION WAS ISSUED FOR PHASE 1 AND PHASE 2

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SECTION 262826 - ENCLOSED TRANSFER SWITCHES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Transfer switches for low-voltage (600 V and less) applications and associated accessories:
   1. Automatic transfer switches.

1.2 RELATED REQUIREMENTS

A. Division 01 – General Requirements

B. Division 03 - Cast-in-Place Concrete: Concrete equipment pads.

C. Division 14 – Elevators: For interface with transfer switch.

D. Section 260400 - General Conditions for Electrical Trades.

E. Section 260526 - Grounding and Bonding for Electrical Systems.

F. Section 260529 - Hangers and Supports for Electrical Systems.

G. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

H. Section 260573 – Overcurrent Protective Device Coordination Study: Additional criteria for the selection of equipment specified in this section.

I. Section 262819 - Enclosed Switches: Safety switches not listed for use as transfer switch equipment.

J. Section 263213 - Engine Generators: For interface with transfer switches.
   1. Includes code requirements applicable to work of this section.
   2. Includes additional testing requirements.
   3. Includes related demonstration and training requirements.

1.3 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction.

B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

C. NEMA ICS 10 Part 1 - Industrial Control and Systems Part 1: Electromechanical AC Transfer Switch Equipment.

D. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems.

E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

F. NFPA 99 - Health Care Facilities Code.

G. NFPA 110 - Standard for Emergency and Standby Power Systems.

H. UL 869A - Reference Standard for Service Equipment; Current Edition, Including All Revisions.

I. UL 1008 - Transfer Switch Equipment; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate compatibility of transfer switches to be installed with work provided under other sections or by others.
      a. Engine Generators: See Section 263213.
      b. Elevators.
   2. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances required by NFPA 70.
   3. Coordinate arrangement of equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   4. Coordinate the work with placement of supports, anchors, etc. required for mounting.

1.5 SUBMITTALS

A. See Division 01 - General Requirements.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product, including ratings, configurations, dimensions, finishes, weights, service condition requirements, and installed features.
   1. Where applicable, include characteristic trip curves for overcurrent protective devices upon request.

C. Shop Drawings: Include dimensioned plan views and sections indicating locations of system components, required clearances, and field connection locations. Include system interconnection schematic diagrams showing all factory and field connections.

D. Warranty: Submit sample of manufacturer's warranty.

E. Evidence of qualifications for installer.

F. Evidence of qualifications for maintenance contractor (if different entity from installer).

G. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and operation of product.

H. Manufacturer's certification that products meet or exceed specified requirements.

I. Source quality control test reports.

J. Manufacturer's detailed field-testing procedures.

K. Field quality control test reports.

L. Operation and Maintenance Data: Include detailed information on system operation, equipment programming and setup, replacement parts, and recommended maintenance procedures and intervals.
   1. Include contact information for entity that will be providing contract maintenance and trouble call-back service.

M. Executed Warranty: Submit documentation of final executed warranty completed in Owner's name and registered with manufacturer.

N. Maintenance contracts.

O. Project Record Documents: Record actual locations of system components, installed circuiting arrangements and routing, and final equipment settings.

P. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Division 01 - General Requirements.
   2. Bypass/Isolation Transfer Switches: Provide accessories (ramps, dollies, etc.) necessary for removal of draw-out components.

1.6 QUALITY ASSURANCE

A. Comply with the following:
   1. NFPA 70 (National Electrical Code).
   2. NFPA 110 (Standard for Emergency and Standby Power Systems); meet requirements for system Level specified in Section 263213.
   3. NFPA 110 (Standard for Emergency and Standby Power Systems); meet requirements for Level 2 system.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
   1. Authorized service facilities located within 50 miles of project site.

D. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience with power transfer systems of similar size, type, and complexity; manufacturer's authorized installer.

E. Maintenance Contractor Qualifications: Same entity as installer or different entity with specified qualifications.
1. Contract maintenance office located within 100 miles of project site.

F. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store transfer switches in accordance with manufacturer's instructions.

B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

C. Handle carefully in accordance with manufacturer's instructions to avoid damage to transfer switch components, enclosure, and finish.

1.8 FIELD CONDITIONS

A. Maintain field conditions within manufacturers required service conditions during and after installation.

1.9 WARRANTY

A. See Division 01 – General Requirements.

B. Provide minimum one-year manufacturer warranty covering repair or replacement due to defective materials or workmanship commencing from the Date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Transfer Switches - Basis of Design: ASCO Power Technologies as described below.

B. Transfer Switches - Other Acceptable Manufacturers:
1. ABB.
2. ESL Power Systems (Manual Transfer Switches only)
3. Russelectric.
4. Same as manufacturer of engine generator(s) used for this project.

C. Substitutions: See Division 01 - General Requirements.

D. Products other than basis of design are subject to compliance with specified requirements and prior approval of Engineer. By using products other than basis of design, Contractor accepts responsibility for costs associated with any necessary modifications to related work, including any design fees.

E. Source Limitations: Furnish transfer switches and accessories produced by a single manufacturer and obtained from a single supplier.

2.2 TRANSFER SWITCHES

A. Provide complete power transfer system consisting of all required equipment, conduit, boxes, wiring, supports, accessories, system programming, etc. as necessary for a complete operating system that provides the functional intent indicated.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Applications:
1. Utilize open transition transfer unless otherwise indicated or required.
2. For transfer of highly inductive loads (e.g. large motors and transformers), utilize open transition transfer with in-phase monitor or delayed transition transfer.
3. Neutral Switching (Single Phase, Three Wire and Three Phase, Four Wire Systems):
    a. Unless otherwise indicated or required, provide neutral switching:
        1) For systems with ground fault protection.
        2) Where the alternate/emergency source is a separately derived system.
4. Provide signal before transfer contacts for transfer switches serving elevators.

D. Construction Type: Either "contactor type" (open contact) or "breaker type" (enclosed contact) transfer switches complying with specified requirements are acceptable.

E. Automatic Transfer Switch:
1. Transfer Switch Type NEMA ICS 10, automatic transfer switch.
2. Transition Configuration: Open Transition. Electrically operated, mechanically held.
3. Voltage: As indicated on the drawings.
4. Ampere Rating: As indicated on the drawings.
5. Neutral Configuration4 pole switched neutral.
6. Load Served: As indicated on the drawings.
7. Primary Source: As indicated on the drawings.
8. Alternate Source: As indicated on the drawings.

F. Switching Methods:
1. Open Transition:
a. Provide break-before-make transfer without a neutral position that is not connected to either source, and with interlocks to prevent simultaneous connection of the load to both sources.
b. Where in-phase transfer is indicated, utilize in-phase monitor to initiate transfer when phase angle difference between sources is near zero to limit in-rush currents.

G. Service Conditions: Provide transfer switches suitable for continuous operation at indicated ratings under the service conditions at the installed location.

H. Enclosures:
1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
a. Indoor Clean, Dry Locations: Type 1 or Type 12.
b. Outdoor Locations: Type 3R or Type 4.
2. Provide lockable door(s) for outdoor locations.
3. Finish: Manufacturer's standard unless otherwise indicated.

Short Circuit Current Rating:
4. Withstand and Closing Rating: Provide transfer switches, when protected by the supply side overcurrent protective devices to be installed, with listed withstand and closing rating not less than the available fault current at the installed location as determined by short circuit study performed in accordance with Section 26 0573.
5. Short Time Rating: Where the requirement for selectivity is indicated, provide transfer switches with short time ratings suitable for the maximum short time delay setting of the supply side overcurrent protective device.

I. Automatic Transfer Switches:
1. Description: Transfer switches with automatically initiated transfer between sources; electrically operated and mechanically held.
2. Control Functions:
a. Automatic mode.
b. Test Mode: Simulates failure of primary/normal source.
1) Mount control in cover of enclosure to simulate failure of normal source.
c. Voltage and Frequency Sensing:
1) Undervoltage sensing for each phase of primary/normal source; adjustable dropout/pickup settings.
2) Undervoltage sensing for alternate/emergency source; adjustable dropout/pickup settings.
3) Underfrequency sensing for alternate/emergency source; adjustable dropout/pickup settings.

d. Outputs:
   1) Contacts for engine start/shutdown.
   2) Auxiliary contacts; one set of normally open/normally closed contacts) for each switch position.
   3) Signal before transfer (load disconnect) contacts; for selective load disconnection prior to transfer.

e. Adjustable Time Delays:
   1) Engine generator start time delay; delays engine start signal to override momentary primary/normal source failures.
   2) Transfer to alternate/emergency source time delay.
   3) Retransfer to primary/normal source time delay.
   4) Signal before transfer (load disconnect) contact time delay.
   5) Engine generator cooldown time delay; delays engine shutdown following retransfer to primary/normal source to permit generator to run unloaded for cooldown period.

f. In-Phase Monitor (Open Transition Transfer Switches): Monitors phase angle difference between sources for initiating in-phase transfer.

g. Synchronization/In-Phase Monitor (Closed Transition Transfer Switches): Monitors voltage and phase angle difference between sources for initiating synchronized transfer.

h. Engine Exerciser: Provides programmable scheduled exercising of engine generator selectable with or without transfer to load; provides memory retention during power outage.

i. Retransfer to Normal Switch: Bypasses time delays for retransfer to primary/normal source.

3. Status Indications – Enclosure cover mounted:
   a. Connected to alternate/emergency source.
   b. Connected to primary/normal source.
   c. Alternate/emergency source available.
   d. Primary/normal source available.

4. Alarm Indications for Closed Transition Transfer Switches:
   a. Failure to synchronize.
   b. Extended source interconnection/transfer switch locked out.

5. Other Features:
   a. Event log.
   b. Communications Capability: Compatible with system indicated. Provide all accessories necessary for proper interface.
   c. Remote monitoring capability via PC.

6. Automatic Sequence of Operations:
   a. Upon failure of primary/normal source for a programmable time period (engine generator start time delay), initiate starting of engine generator.
   b. Where applicable, initiate signal before transfer (load disconnect) contacts at programmable time before transfer.
   c. When alternate/emergency source is available, transfer load to alternate/emergency source after programmable time delay.
   d. When primary/normal source has been restored, retransfer to primary/normal source after a programmable time delay. Bypass time delay if alternate/emergency source fails and primary/normal source is available.

e. Where applicable, initiate shutdown of engine generator after programmable engine cooldown time delay.
f. Required emergency systems transfer switch and generator shall be configured in accordance with NFPA 70 to ensure emergency power is available within 10 seconds of failure of the normal supply. The Contractor shall coordinate starting and stabilization time with the generator supplier and set all time delays to ensure the required 10 second maximum time period is met.

J. Interface with Other Work:
1. Interface with engine generators as specified in Section 263213.
2. Interface with elevators as specified in Division 14.
a. Utilize signal before transfer contacts to disconnect elevator(s) served prior to transfer.
3. Interface with building automation system as specified in Section 230923.

2.3 ENGINE START MONITORING SYSTEM

A. Provide an engine start monitoring system to monitor the engine start circuits from the transfer switches; start the generator; and signal an alarm condition to the building fire alarm system and generator remote annunciator.

B. Basis of design: ASCO 5101 engine start circuit monitor.

C. The system shall include the following:
1. ATS Engine start modules (one for each transfer switch). Din rail mounted, coordinate mounting in transfer switches with transfer switch manufacturers.
2. Generator start module, locate at generator.
3. 24 VDC power supply for generator start module (battery backed up or from generator batteries).
4. UL listed DPDT relay at generator start module for separate dry contact signaling of generator remote annunciator and fire alarm system.

D. Specifications:
1. DDC Power: Generator Module - 9-27V; ATS module (power from circuit).
2. Internal ride through: 3 seconds maximum.
3. Operating Temperature: -4 to 158º F.
4. Maximum wiring distance: 1,000 ft. one way.
5. Maximum wire loop resistance: <100 ohms.
6. Generator start contacts: 1A @ 30 VDC (Form C).
7. Generator alarm contacts: 1A @ 30 VDC (Form C).

2.4 SOURCE QUALITY CONTROL

A. See Division 01 - General Requirements.

B. Perform production tests on transfer switches at factory to verify operation and performance characteristics prior to shipment. Include certified test report with submittals.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that the ratings and configurations of transfer switches are consistent with the indicated requirements.

C. Verify that rough-ins for field connections are in the proper locations.

D. Verify that mounting surfaces are ready to receive transfer switches.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship).

B. Install products in accordance with manufacturer's instructions.

C. Arrange equipment to provide minimum clearances and required maintenance access.

D. Provide required support and attachment in accordance with Section 260529.

E. Install transfer switches plumb and level.

F. Unless otherwise indicated, mount floor-mounted transfer switches on properly sized 3 inch high concrete pad constructed in accordance with Division 03.

G. Provide grounding and bonding in accordance with Section 260526.

H. Install engraved plastic nameplates in accordance with Section 260553 and the following:
   1. For Emergency Sources: A sign shall be placed at the service-entrance equipment, at the meter location, and on any equipment up to the service entrance-equipment indicating type and location of on-site emergency power sources.
   2. For Mandated Standby Sources: A sign shall be placed at the service entrance, at the meter location, and on any equipment up to the service entrance-equipment indicating type and location of on-site legally required standby power sources.
   3. For Standby Sources: A sign shall be placed at the service-entrance equipment, at the meter location, and on any equipment up to the service-entrance equipment, that indicates the type and location of on-site optional standby power sources.

3.3 FIELD QUALITY CONTROL

A. See Division 01 – General Requirements.

B. Provide services of a manufacturer's authorized representative to observe installation and assist in inspection and testing. Include manufacturer's detailed testing procedures and field reports with submittals.

C. Prepare and start system in accordance with manufacturer's instructions.

D. Automatic Transfer Switches:
   1. Inspect and test in accordance with NETA ATS, except Section 4.
   2. Perform inspections and tests listed in NETA ATS, Section 7.22.3. The control wiring insulation-resistance tests listed as optional are not required.
      a. Disconnect surge protective devices (SPDs) prior to performing any high potential testing. Replace SPDs damaged by performing high potential testing with SPDs connected.

E. Provide additional inspection and testing as required for completion of associated engine generator testing as specified in Section 263213.

F. Test the following for the Engine Start Monitoring System:
   1. Generator module receiving 24 VDC power.
   2. Signals from all ATS modules to the Generator module.
   3. Alarm signals to external devices.
   4. Engine start signal to generator.
   5. DIP switch settings.
   6. LED status signals.

G. Adjust control and sensing devices to achieve specified sequence of operation.

H. Correct defective work, adjust for proper operation, and retest until entire system complies with contract documents.

I. Submit detailed reports indicating inspection and testing results and corrective actions taken.

3.4 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.5 CLOSEOUT ACTIVITIES

A. See Division 01 – General Requirements.

B. Demonstration: Demonstrate proper operation of transfer switches to Owner, and correct deficiencies or make adjustments as directed.

C. Training: Train Owner's personnel on operation, adjustment, and maintenance of transfer switches.
   1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
   2. Provide minimum of four hours of training.
   3. Instructor: Manufacturer's authorized representative.
   4. Location: At project site.

D. Coordinate with related generator demonstration and training as specified in Section 263213.

3.6 PROTECTION

A. Protect installed transfer switches from subsequent construction operations.

3.7 MAINTENANCE

A. See Division 01 – General Requirements.

B. Provide to Owner a proposal as an alternate to the base bid, a separate maintenance contract for the service and maintenance of transfer switches for two years from date of Substantial Completion; Include a complete description of preventive maintenance, systematic examination, adjustment, inspection, and testing, with a detailed schedule.

C. Conduct site visit at least once every three months to perform inspection, testing, and preventive maintenance. Submit report to Owner indicating maintenance performed along with evaluations and recommendations.

D. Provide trouble call-back service upon notification by Owner:
   1. Provide on-site response within 4 hours of notification.
   2. Include allowance for call-back service during normal working hours at no extra cost to Owner.
   3. Owner will pay for call-back service outside of normal working hours on an hourly basis, based on actual time spent at site and not including travel time; include hourly rate and definition of normal working hours in maintenance contract.

E. Maintain an on-site log listing the date and time of each inspection and call-back visit, the condition of the system, nature of the trouble, correction performed, and parts replaced.

END OF SECTION

FOR REFERENCE: THIS SECTION WAS ISSUED FOR PHASE 1 AND PHASE 2

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SECTION 263213 - ENGINE GENERATORS

PART 1 GENERAL

1.1 SUMMARY

A. Packaged engine generator system and associated components and accessories:
   1. Engine and engine accessory equipment.
   2. Alternator (generator).
   3. Generator set control system.
   4. Generator set enclosure.
   5. The generator system shall be natural gas fired.

B. Required emergency systems transfer switch and generator shall be configured in accordance with NFPA 70 to ensure emergency power is available within 10 seconds of failure of the normal supply. The contractor shall coordinate transfer switch time delays with the enclosed transfer switch supplier based on generator starting and stabilization time to ensure the required 10 second maximum time period is met.

C. Related Sections:
   1. Division 03 – Concrete
   2. Section 220548 - Vibration and Seismic Controls for Plumbing Piping and Equipment.
   3. Section 221123 - Fuel Gas Piping: Product and execution requirements for gas piping, regulator and meter service to the generator.
   4. Section 230700 - HVAC Insulation.
   5. Section 232123 - Hydronic Pumps.
   6. Section 232416 - Internal-Combustion Engine Exhaust Piping.
   7. Section 233100 - HVAC Ducts and Casings.
   8. Section 260526 - Grounding and Bonding for Electrical Systems.
   9. Section 260529 – Hangers and Supports for Electrical Systems.
   10. Section 260553 - Identification for Electrical Systems.
   11. Section 262826 - Enclosed Transfer Switches.
   12. Division 33 - Utilities

1.2 REFERENCES

A. NECA 1 - Standard for Good Workmanship in Electrical Construction.

B. NECA/EGSA 404 - Standard for Installing Generator Sets.

C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

D. NEMA AB 1 - Molded Case Circuit Breakers and Molded Case Switches.

E. NEMA ICS 10 - Industrial Control and Systems: AC Transfer Switch Equipment.

F. NEMA MG 1 - Motors and Generators.

G. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

H. NFPA 30 - Flammable and Combustible Liquids Code.

I. NFPA 37 - Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines

J. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements

K. NFPA 99 - Standard for Health Care Facilities.

L. NFPA 110 - Standard for Emergency and Standby Power Systems.

M. UL 142 - Steel Aboveground Tanks for Flammable and Combustible Liquids; Current Edition, Including All Revisions.

N. UL 1236 - Battery Chargers for Charging Engine-Starter Batteries; Current Edition, Including All Revisions.

O. UL 2085 - Protected Aboveground Tanks for Flammable and Combustible Liquids; Current Edition, Including All Revisions.

P. UL 2200 - Stationary Engine Generator Assemblies; Current Edition, Including All Revisions.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
1. Coordinate compatibility of generator sets to be installed with work provided under other sections or by others.
   a. Transfer Switches: See Section 262826.
   b. Switchboards: See Section 262413.
2. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment or other potential obstructions within the spaces dedicated for engine generator system.
3. Coordinate arrangement of equipment with the dimensions and clearance requirements of the actual equipment to be installed.
4. Coordinate the work to provide electrical circuits suitable for the power requirements of the actual auxiliary equipment and accessories to be installed.
5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Pre-installation Meeting: Convene two weeks before starting work of this section; require attendance of all affected installers.

1.4 SUBMITTALS

A. Division 01 – General Requirements.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product, including ratings, configurations, dimensions, finishes, weights, service condition requirements, and installed features. Include alternator starting capabilities, engine fuel consumption rates, and cooling, combustion air, and exhaust requirements.
1. Include generator set sound level test data.
2. Include characteristic trip curves for overcurrent protective devices.
3. Include alternator thermal damage curve.

C. Shop Drawings: Include dimensioned plan views and sections indicating locations of system components, required clearances, and field connection locations. Include system interconnection schematic diagrams showing all factory and field connections.

D. Derating Calculations: Indicate ratings adjusted for applicable service conditions.

E. Specimen Warranty: Submit sample of manufacturer's warranty.

F. Evidence of qualifications for installer.

G. Evidence of qualifications for maintenance contractor (if different entity from installer).

H. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and operation of product.

I. Manufacturer's factory emissions certification.

J. Manufacturer's certification that products meet or exceed specified requirements.

K. Source quality control test reports.

L. Provide NFPA 110 required documentation from manufacturer where requested by authorities having jurisdiction, including but not limited to:
1. Certified prototype tests.
2. Torsional vibration compatibility certification.
3. NFPA 110 compliance certification.
4. Certified rated load test at rated power factor.

M. Manufacturer’s detailed field testing procedures.

N. Field quality control test reports.

O. Operation and Maintenance Data: Include detailed information on system operation, equipment programming and setup, replacement parts, and recommended maintenance procedures and intervals.

1. Include contact information for entity that will be providing contract maintenance and trouble call-back service.

P. Executed Warranty: Submit documentation of final executed warranty completed in Owner's name and registered with manufacturer.

Q. Sample maintenance contract, submitted to owner for review and approval.

R. Project Record Documents: Record actual locations of system components, installed circuiting arrangements and routing, and final equipment settings.

S. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. Division 01 – General Requirements.
2. Extra Fuses: One of each type and size.
3. Extra Filter Elements: One of each type, including oil and air.
4. Furnish one set of tools required for preventative maintenance of engine generator system. Package tools in adequately sized metal tool box.

1.5 QUALITY ASSURANCE

A. Comply with the following:
1. NFPA 70 (National Electrical Code).
2. NFPA 110 (Standard for Emergency and Standby Power Systems); meet requirements for Level 1 system.
3. NFPA 99 (Health Care Facilities Code).
4. NFPA 37 (Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines).
5. NFPA 30 (Flammable and Combustible Liquids Code).

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
1. Authorized service facilities located within 100 miles of project site.

D. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience with engine generator systems of similar size, type, and complexity; manufacturer's authorized installer.

E. Maintenance Contractor Qualifications: Same entity as installer or different entity with specified qualifications.
1. Contract maintenance office located within 100 miles of project site.

F. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.6 DELIVERY, STORAGE AND HANDLING

A. Receive, inspect, handle, and store generator sets in accordance with manufacturer's instructions and NECA/EGSA 404.

B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

C. Handle carefully in accordance with manufacturer's instructions to avoid damage to generator set components, enclosure, and finish.

1.7 WARRANTY

A. Division 01 – General Requirements

B. Furnish service and maintenance of engine generator and transfer switch for one year from Date of Substantial Completion.

C. For products noted in this section, provide manufacturer’s standard warranty, minimum of one year.

1.8 MAINTENANCE SERVICE

A. Division 01 – General Requirements

B. Provide to Owner a proposal for a separate maintenance contract for the service and maintenance of engine generator system for one year from date of Substantial Completion; Include a complete description of preventive maintenance, systematic examination, adjustment, inspection, and testing, with a detailed schedule.

C. Conduct site visit at least once every three months to perform inspection, testing, and preventive maintenance. Submit report to Owner indicating maintenance performed along with evaluations and recommendations.

D. Provide trouble call-back service upon notification by Owner:
   1. Provide on-site response within 4 hours of notification.
   2. Include allowance for call-back service during normal working hours at no extra cost to Owner.
   3. Owner will pay for call-back service outside of normal working hours on an hourly basis, based on actual time spent at site and not including travel time; include hourly rate and definition of normal working hours in maintenance contract.

E. Maintain an on-site log listing the date and time of each inspection and call-back visit, the condition of the system, nature of the trouble, correction performed, and parts replaced.

PART 2 PRODUCTS

2.1 SERVICE CONDITIONS

A. Provide engine generator system and associated components suitable for operation under the service conditions at the installed location, including but not limited to:
   1. Altitude
   2. Ambient Temperature
   3. Available Natural Gas Pressure

2.2 MANUFACTURERS

A. Packaged Engine Generator Set:
   1. Kohler Co
   2. Cummins Power Generation Inc
   3. Generac Power Systems
   4. Substitutions: Division 01 – General Requirements

B. Products other than basis of design are subject to compliance with specified requirements and prior approval of Engineer. By using products other than basis of design, Contractor accepts responsibility for costs associated with any necessary modifications to related work, including any design fees.

C. Source Limitations: Furnish engine generator sets and associated components and accessories produced by a single manufacturer and obtained from a single supplier.

2.3 PACKAGED ENGINE GENERATOR SYSTEM

A. Provide new engine generator system consisting of all required equipment, sensors, conduit, boxes, wiring, piping, supports, accessories, system programming, etc. as necessary for a complete operating system that provides the functional intent indicated.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. System Description:
   1. Application: Emergency, Legally Required Standby (Fire Pump) and Optional Standby.
   2. Configuration: Single packaged engine generator set operated independently.

D. Packaged Engine Generator Set:
   1. Type: Natural Gas Fired
   2. Power Rating: 250 kW / 312.50 kVA.
   3. Voltage: 480/277 volt 3 phase 4 wire configured as a separately derived system.
   4. Line Side Circuit Breaker(s):
      a. Type: Solid State.
      b. Trip Rating: As indicated on drawings for Life Safety, Fire Pump and Optional Standby branches.
         1) For 480/277V, 3PH System, circuit breakers rated 1000A or greater:

a) Provide LSI type circuit breaker fir Life Safety and Fire Pump branches.
b) Provide LSIG for the Optional Standby branch.

c. Features:
1) All circuit breakers shall incorporate shunt trip.
2) Auxiliary contacts.
3) 100% Rated

d. Refer to sizes indicated on drawings.

E. Generator Set General Requirements:
1. Prototype tested in accordance with NFPA 110 for Level 1 systems.
2. Factory-assembled, with components mounted on suitable base.
3. List and label engine generator assembly as complying with UL 2200.
4. Power Factor: Unless otherwise indicated, specified power ratings are at 0.8 power factor for three phase voltages and 1.0 power factor for single phase voltages.
5. Provide suitable guards to protect personnel from accidental contact with rotating parts, hot piping, and other potential sources of injury.
6. Main Line Circuit Breakers: Provide factory-installed line side connections with suitable lugs for load side connections.

F. Starting and Load Acceptance Requirements:
1. Cranking Method: Cycle cranking complying with NFPA 110 (15 second crank period, followed by 15 second rest period, with cranking limiter time-out after 3 cycles), unless otherwise required.
2. Cranking Limiter Time-Out: If generator set fails to start after specified cranking period, indicate overcrank alarm condition and lock-out generator set from further cranking until manually reset.
3. Start Time: Capable of starting and achieving conditions necessary for load acceptance within 10 seconds (NFPA 110, Type 10).
4. Maximum Load Step: Supports 100 percent of rated load in one step.
a. Maximum Voltage Deviation with Load Step: 15% percent.
b. Maximum Frequency Deviation with Load Step: 15% percent.
5. Motor Starting Capability: Supports starting of motor load indicated with a maximum voltage dip of 15% percent.

G. Exhaust Emissions Requirements:
1. Comply with federal (EPA), state, and local regulations applicable at the time of commissioning; include factory emissions certification with submittals.
2. Do not make modifications affecting generator set factory emissions certification without approval of manufacturer and Engineer. Where such modifications are made, provide field emissions testing as necessary for certification.

H. Sound Level Requirements:
1. Comply with applicable noise level regulations.
2. Do not exceed 75 dBA at a distance of 3 Meters from the unit.
3. Sound attenuation shall strive to limit sound levels at the property line to satisfy zoning regulations of 55 dbA for a residential abutter.

I. Interface with building automation system as specified in Section 230993.

J. Mounting: Furnish unit with suitable spring-type vibration isolators and mount on structural steel base.

2.4 ENGINE AND ENGINE ACCESSORY EQUIPMENT

A. Provide engine with adequate horsepower to achieve specified power output at rated speed, accounting for alternator efficiency and parasitic loads.

B. Engine Fuel System - Gaseous (Spark Ignition):
   1. Fuel Source: Natural gas.
      a. Provide with self- adjusting fuel regulator based on manufacturer's full load operating pressure of 7" to 11" H2O.
   2. Engine Fuel Connections: Provide suitable, approved flexible fuel lines for coupling engine to fuel source.
   3. Provide components/features indicated and as necessary for operation and/or required by applicable codes, including but not limited to:
      a. Carburetor.
      b. Gas pressure regulators.
      c. Fuel shutoff control valves.
      d. Low gas pressure switches.

C. Engine Starting System:
   1. System Type: Electric, with DC solenoid-activated starting motor(s).
   2. Battery(s):
      a. Battery Type: Lead-acid.
      b. Battery Capacity: Size according to manufacturer's recommendations for achieving starting and load acceptance requirements under worst case ambient temperature; capable of providing cranking through two complete periods of cranking limiter time-outs without recharging.
      c. Provide battery rack, cables, and connectors suitable for the supplied battery(s); size battery cables according to manufacturer's recommendations for cable length to be installed.
   3. Battery-Charging Alternator: Engine-driven, with integral solid-state voltage regulation.
   4. Battery Charger:
      a. Provide dual rate battery charger with automatic float and equalize charging modes and minimum rating of 10 amps; suitable for maintaining the supplied battery(s) at full charge without manual intervention.
      b. Capable of returning supplied battery(s) from fully discharged to fully charged condition within 24 hours, as required by NFPA 110 for Level 1 applications while carrying normal loads.
      c. Recognized as complying with UL 1236.
      d. Furnished with integral overcurrent protection; current limited to protect charger during engine cranking; reverse polarity protection.
      e. Provide integral DC output ammeter and voltmeter with five percent accuracy.

f. Provide alarm output contacts as necessary for alarm indications.

5. Battery Heater: Provide thermostatically controlled battery heater to improve starting under cold ambient conditions.

D. Engine Speed Control System (Governor):
1. Single Engine Generator Sets (Not Operated in Parallel): Provide electronic isochronous governor for controlling engine speed/alternator frequency.
2. Multiple Engine Generator Sets Operated in Parallel: Provide electronic isochronous governors with automatic load sharing controls.
3. Generator Sets Used with Closed Transition Transfer Switches: Provide electronic isochronous governor with frequency regulation suitable for transfer.
4. Frequency Regulation, Electronic Isochronous Governors: No change in frequency from no load to full load; plus/minus 0.25 percent at steady state.

E. Engine Lubrication System:
1. System Type: Full pressure, with engine-driven, positive displacement lubrication oil pump, replaceable full-flow oil filter(s), and dip-stick for oil level indication. Provide oil cooler where recommended by manufacturer.
2. Oil Heater: Provide thermostatically controlled oil heater to improve starting under cold ambient conditions.

F. Engine Cooling System:
1. System Type: Closed-loop, liquid-cooled, with unit-mounted radiator/fan and engine-driven coolant pump; suitable for providing adequate cooling while operating at full load under worst case ambient temperature.
2. Fan Guard: Provide suitable guard to protect personnel from accidental contact with fan.
3. Ducted Radiators: Where ducted radiator air discharge is to be field-installed, provide suitable radiator duct flange/adapter.
4. Coolant Heater: Provide thermostatically controlled coolant heater to improve starting under cold ambient conditions; size according to manufacturer's recommendations for achieving starting and load acceptance requirements under worst case ambient temperature.

G. Engine Air Intake and Exhaust System:
1. Air Intake Filtration: Provide engine-mounted, replaceable, dry element filter.
2. Engine Exhaust Connection: Provide suitable, approved flexible connector for coupling engine to exhaust system.
3. Exhaust Silencer: Provide critical grade or better exhaust silencer with sound attenuation not less than basis of design; select according to manufacturer's recommendations to meet sound performance requirements.

H. Exhaust Silencer: Critical type silencer, with muffler companion flanges and flexible stainless steel exhaust fitting, sized in accordance with engine manufacturer's instructions.

I. Batteries: Heavy duty starting type lead-acid storage batteries. Match battery voltage to starting system. Furnish cables and clamps.

J. Battery Tray: Treated for electrolyte resistance, constructed to contain spillage.

K. Battery Charger: Current limiting type designed to float at 2.17 volts for each cell and equalize at 2.33 volts for each cell. Furnish overload protection, full wave rectifier, DC voltmeter and ammeter, and 120 volts AC fused input. Furnish wall mounted enclosure to meet NEMA 250, Type 1 requirements.

L. Load Bank: Complete load bank for placing resistive load on generator. 480 volts 3 phase 100 KW Complete with transfer switches, disconnect, ventilation fans and enclosure.

M. Generator mounted single point power feed load center for providing power to unit mounted loads for supporting battery charging, block heater, enclosure heater, alternator heater as specified within this section.

2.5 ALTERNATOR (GENERATOR)

A. Alternator: 4-pole, 1800 rpm (60 Hz output) revolving field, synchronous generator complying with NEMA MG 1; connected to engine with flexible coupling; voltage output configuration as indicated, with re-connectable leads for 3 phase alternators.

B. Exciter:
1. Exciter Type: Brushless; provide permanent magnet generator (PMG) excitation system; self-excited (shunt) systems are not permitted.
2. PMG Excitation Short-Circuit Current Support: Capable of sustaining 300% of rated output current for 10 seconds.
3. Voltage Regulation (with PMG excitation): Plus/minus 0.5 percent for any constant load from no load to full load.
4. Voltage Regulation (with shunt or PMG excitation): Plus/minus two percent for any constant load from no load to full load.
5. Alternator must be suitably rated for starting a 25 horsepower fire pump across the line while maintaining less than a 15% voltage dip. Manufacturer shall supply an alternator selection that can meet the above performance criteria.

C. Temperature Rise: Comply with UL 2200.

D. Insulation System: NEMA MG 1, Class H; suitable for alternator temperature rise.

E. Enclosure: NEMA MG 1, drip-proof.

F. Total Harmonic Distortion: Not greater than five percent.

G. Alternator Heater: Provide strip heater to prevent moisture condensation on alternator windings.

H. Voltage Regulation: Furnish generator mounted volts per hertz exciter-regulator to match engine and generator characteristics, with voltage regulation plus or minus 1 percent from no load to full load. Furnish manual controls to adjust voltage droop, voltage level (plus or minus 5 percent) and voltage gain.

I. Product Description: NEMA MG1, reconnectable brushless synchronous generator with brushless exciter.

J. Insulation Class: F.

K. Temperature Rise: 130 degrees C Standby.

L. Enclosure: NEMA MG1, open drip proof.

2.6 GENERATOR SET CONTROL SYSTEM

A. Provide microprocessor-based control system for automatic control, monitoring, and protection of generator set. Include sensors, wiring, and connections necessary for functions/indications specified.

B. Control Panel:
1. Control Panel Mounting: Unit-mounted unless otherwise indicated; vibration isolated.
2. Generator Set Control Functions:
   a. Automatic Mode: Initiates generator set start/shutdown upon receiving corresponding signal from remote device (e.g. automatic transfer switch).
   b. Manual Mode: Initiates generator set start/shutdown upon direction from operator.
   c. Reset Mode: Clears all faults, allowing generator set restart after a shutdown.
   d. Emergency Stop: Immediately shuts down generator set (without time delay) and prevents automatic restarting until manually reset.
   e. Cycle Cranking: Programmable crank time, rest time, and number of cycles.
   f. Time Delay: Programmable for shutdown (engine cooldown) and start (engine warmup).
   g. Voltage Adjustment: Adjustable through range of plus/minus 5 percent.
3. Generator Set Status Indications:
   a. Voltage (Volts AC): Line-to-line, line-to-neutral for each phase.
   b. Current (Amps): For each phase.
   c. Frequency (Hz).
   d. Real power (W/kW).
   e. Reactive power (VAR/kVAR).
   f. Apparent power (VA/kVA).
   g. Power factor.
   h. Duty Level: Actual load as percentage of rated power.
   i. Engine speed (RPM).
   j. Battery voltage (Volts DC).
   k. Engine oil pressure.
   l. Engine coolant temperature.
   m. Engine run time.
   n. Generator powering load (position signal from transfer switch).
4. Generator alarm indicators and gauges:
   a. Frequency Meter: 45-65 Hz. range, 3.5 inch dial.

b. AC Output Voltmeter: 3.5 inch dial, 2 percent accuracy, with phase selector switch.
c. AC Output Ammeter: 3.5 inch dial, 2 percent accuracy, with phase selector switch.
d. Engine running time meter.
e. Oil pressure gauge.
f. Water temperature gauge.
g. Push-to-test indicator lamps, one each for:
1) Low oil pressure.
2) Low water temperature.
3) Overspeed.
4) Overcrank.
5) High engine temperature.
6) High engine temperature pre-alarm.
7) Low coolant level.
8) EPS supplying load.
9) Control switch not in automatic position.
10) High battery voltage.
11) Low battery voltage.
12) Low cranking voltage.
13) Battery charger AC failure.
14) Lamp test.
15) Low starting air pressure.
16) Low starting hydraulic pressure.
17) Air shut-down damper (when used).

5. Additional features:
a. Engine start/stop selector switch.
b. Auxiliary Relay: 3PDT, operates when engine runs, with contact terminals prewired to terminal strip.
c. Additional visual indicators and alarms in accordance with by NFPA 110.
d. Remote Alarm Contacts: Factory wire DPDT contacts to terminal strip for remote alarm functions in accordance with NFPA 110.

C. Remote Annunciator Panel: Flush mounted panel with brushed stainless steel. Furnish alarm horn, and indicators and alarms as follows:
1. Low oil pressure.
2. Low water temperature.
3. Overspeed.
4. Overcrank.
5. High engine temperature.
6. High engine temperature pre-alarm.
7. Low coolant level.
8. Control switch not in automatic position.
9. Low cranking voltage.
10. Air shut-down damper (when used).
11. System ready.
12. Line power available.
13. Generator power available.

14. Lamp test and horn silence switch.

D. Remote Emergency Stop: Provide approved red, mushroom style remote emergency stop button where indicated or required by authorities having jurisdiction.

2.7 GENERATOR SET ENCLOSURE

A. Enclosure Type: Sound attenuating Level 2 and weather protective.

B. Enclosure Material: Steel or aluminum.

C. Hardware Material: Stainless steel.

D. Color: Manufacturer's standard.

E. Access Doors: Lockable, with all locks keyed alike.

F. Openings: Designed to prevent bird/rodent entry.

G. External Drains: Extend oil and coolant drain lines to exterior of enclosure for maintenance service.

H. Sound Attenuating Enclosures: Line enclosure with non-hydroscopic, self-extinguishing sound-attenuating material.

I. Utilize an upward discharging radiator hood to enhance sound attenuation.

J. Exhaust Silencers: Where exhaust silencers are mounted within enclosure in main engine compartment, insulate silencer to minimize heat dissipation as necessary for operation at rated load under worst case ambient temperature.

K. Enclosure Space Heater: Provide thermostatically controlled enclosure space heater to prevent condensation and improve starting under cold ambient conditions; size according to manufacturer's recommendations for achieving starting and load acceptance requirements under worst case ambient temperature.

L. Extreme Duty Sound Attenuating Protective Enclosure: Reinforced steel housing allowing access to control panel and service points, with lockable doors and panels. Furnish with fixed louvers, battery rack, silencer, stainless steel hardware, and emergency power off button. The enclosure shall be Level II, extreme duty. The generator enclosure shall attenuate sound to 68 to 70 d(B)A at a distance of 27 feet from the assembly.

M. Enclosure shall be wind rated to 120 mph.

2.8 SOURCE QUALITY CONTROL

A. Division 01 – General Requirements.

B. Perform production tests on generator sets at factory to verify operation and performance characteristics prior to shipment. Include certified test report with submittals.

C. Generator Set production testing to include, at a minimum:
   1. Operation at rated load and rated power factor.
   2. Single step load pick-up.
   3. Transient and steady state voltage and frequency performance.
   4. Operation of safety shutdowns.

D. Provide shop inspection and testing of completed assembly.

E. Make completed engine-generator assembly available for inspection at manufacturer's factory prior to packaging for shipment. Notify Architect/Engineer at least seven days before inspection is allowed.

F. Allow witnessing of factory inspections and tests at manufacturer's test facility. Notify Architect/Engineer at least seven days before inspections and tests are scheduled.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that the ratings and configurations of generator sets and auxiliary equipment are consistent with the indicated requirements.

B. Verify that rough-ins for field connections are in the proper locations.

C. Verify that mounting surfaces are ready to receive equipment.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship).

B. Install products in accordance with manufacturer's instructions.

C. Install generator sets and associated accessories in accordance with NECA/EGSA 404.

D. Arrange equipment to provide minimum clearances and required maintenance access.

E. Unless otherwise indicated, mount generator set on properly sized concrete pad, minimum of 6 inches above grade, constructed in accordance with Division 03. Provide suitable vibration isolators, where not factory installed.

F. Provide required support and attachment in accordance with Section 260529.

G. Use manufacturer's recommended oil and coolant, suitable for the worst case ambient temperatures.

H. Provide grounding and bonding in accordance with Section 260526.

I. Provide natural gas piping in accordance with Division 23.

J. Identify system wiring and components in accordance with Section 260553.

K. Install engraved plastic nameplates in accordance with Section 260553
   1. For Emergency Sources: A sign shall be placed at the service-entrance equipment, at the meter location, and on any equipment up to the service entrance-equipment indicating type and location of on-site emergency power sources.
   2. For Mandated Standby Sources: A sign shall be placed at the service entrance, at the meter location, and on any equipment up to the service entrance-equipment indicating type and location of on-site legally required standby power sources.
   3. For Standby Sources: A sign shall be placed at the service-entrance equipment, at the meter location, and on any equipment up to the service-entrance equipment that indicates the type and location of on-site optional standby power sources.

L. Ground and bond generator and other electrical system components in accordance with Section 260526.

3.3 FIELD QUALITY CONTROL

A. Division 01 – General Requirements.

B. Provide services of a manufacturer's authorized representative to prepare and start systems and perform inspection and testing. Include manufacturer's detailed testing procedures and field reports with submittals.

C. Notify Owner and Architect at least two weeks prior to scheduled inspections and tests.

D. Notify authorities having jurisdiction and comply with their requirements for scheduling inspections and tests and for observation by their personnel.

E. Provide all equipment, tools, and supplies required to accomplish inspection and testing.

F. Preliminary inspection and testing to include, at a minimum:
   1. Inspect each system component for damage and defects.
   2. Verify tightness of mechanical and electrical connections are according to manufacturer's recommended torque settings.
   3. Check for proper oil and coolant levels.

G. Prepare and start system in accordance with manufacturer's instructions.

H. Perform acceptance test in accordance with NFPA 110, Paragraph 7.13: Installation Acceptance.
   1. Inspection and testing to include, at a minimum:
      a. Verify compliance with starting and load acceptance requirements.
      b. Verify voltage and frequency; make required adjustments as necessary.
      c. Verify phase sequence.
      d. Verify control system operation, including safety shutdowns.
      e. Verify operation of auxiliary equipment and accessories (e.g. battery charger, heaters, etc.).

f. Perform load tests in accordance with NFPA 110 (1.5 hour building load test followed by 2 hour full load test). Contractor shall provide load bank to simulate building load as required.

I. Provide field emissions testing where necessary for certification.

J. Sound Level Tests: Measure sound levels for compliance with specified requirements. Identify and report ambient noise conditions.

K. Correct defective work, adjust for proper operation, and retest until entire system complies with contract documents.

L. Submit detailed reports indicating inspection and testing results and corrective actions taken.

M. Perform inspections and tests listed in NETA ATS, Section 7.22.

N. Above testing shall be documented in writing and furnished as a part of the O&M manuals, and provided to engineer prior to closeout.

3.4 ADJUSTING

A. Division 01 – General Requirements.

B. Adjust generator output voltage and engine speed to meet specified ratings.

3.5 CLEANING

A. Division 01 – General Requirements.

B. Clean engine and generator surfaces. Replace oil and air filters with new.

C. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.6 CLOSEOUT ACTIVITIES

A. Division 01 – General Requirements

B. Demonstration: Demonstrate proper operation of system to Owner, and correct deficiencies or make adjustments as directed.

C. Training: Train Owner's personnel on operation, adjustment, and maintenance of system.
1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
2. Provide minimum of four hours of training.
3. Instructor: Manufacturer's authorized representative.
4. Location: At project site.
5. Describe loads connected to emergency and standby system and restrictions for future load additions.

6. Simulate power outage by interrupting normal source, and demonstrate system operates to provide emergency and standby power.

D. After successful acceptance test and just prior to Substantial Completion, replace air and oil filters prior to turnover.

3.7 PROTECTION

A. Protect installed engine generator system from subsequent construction operations.

END OF SECTION

FOR REFERENCE: THIS SECTION WAS ISSUED FOR PHASE 1 AND PHASE 2

SECTION 26 4113 - LIGHTNING PROTECTION FOR STRUCTURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Strike (air) terminals and interconnecting conductors.

B. Grounding and bonding for lightning protection.

C. Description: Conductor system protecting the entire building and having a UL Master Label.

1.2 RELATED REQUIREMENTS

A. Division 01 – General Requirements

B. Section 260400 – General Conditions for Electrical Trades

C. Section 260526 - Grounding and Bonding for Electrical Systems: Electrical system grounds.

D. Surge Protection for Wiring Systems: Specified in individual system requirements.

1.3 REFERENCE STANDARDS

A. NFPA 780 - Standard for the Installation of Lightning Protection Systems;

B. UL 96 - Lightning Protection Components; Current Edition, Including All Revisions.

C. UL 96A - Installation Requirements for Lightning Protection Systems.

D. Perform Work in accordance with UL 96A and furnish Master Label.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination with Concrete Work: Coordinate the embedding of lightning protection components in concrete.

B. Coordination with Roofing Installation:
   1. Ensure adequate attachment of strike terminals and conductors without damage to roofing.
   2. Sealing and flashing of all lightning protection roof penetrations with roofing contractor.

C. Coordinate with all trades to ensure a correct, neat and unobtrusive installation.

D. Pre-installation Meeting: Convene a meeting at least two weeks prior to commencement of any work affected by lightning protection system requirements to discuss prerequisites

and coordination required by other installers; require attendance by representatives of installers whose work will be affected.

1.5 SUBMITTALS

A. See Division 01 – General Requirements.

B. Shop Drawings: Indicate location and layout of air terminals, grounding electrodes, and bonding connections to structure and other metal objects. Include terminal, electrode, and conductor sizes, and connection and termination details.
1. Where conductors or grounds are to be embedded or concealed in other construction, submit shop drawings at least 30 days prior to start of construction.
2. If concrete-encased grounds are to be used and are not shown in the contract documents, provide sufficient data to determine concrete encasement dimensions and location.
3. Include data on actual ground resistance determined by field measurement in accordance with NFPA 780.
4. Include engineering analysis of equalization of potential to metal bodies within the structure.
5. Include access panels, test holes, and disconnecting means for maintenance.

C. Product Data: Provide dimensions and materials of each component, indication of testing agency listing, and installation instructions.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Installation Certification: Submit copy of the UL Master Label.

F. Operation and Maintenance Data: Provide recommended inspection and testing plan, including recommended intervals, to achieve periodic maintenance as recommended in NFPA 780; provide customized plan reflecting actual installation configuration with specific installed components identified.

G. Project Record Documents: Record actual locations of air terminals, grounding electrodes, bonding connections, and routing of system conductors in project record documents.

1.6 QUALITY ASSURANCE

A. Maintain one copy of each referenced system design standard on site.

B. Manufacturer Qualifications: Company specializing in lightning protection equipment with minimum three years documented experience.

C. Designer Qualifications: Person or entity, employed by installer, who specializes in lightning protection system design with minimum three years documented experience.

D. Installer Qualifications: Capable of providing the specified certification of the installed system.

E. Installer Qualifications: Company specializing in lightning protection system design with minimum three years documented experience.

F. Field Quality Control Testing Agency Qualifications: Firm capable of and experienced in grounding and bonding testing with documented experience and minimum of three project references.

G. Products: Listed, classified, and labeled as suitable for the purpose intended.

H. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

I. Design lightning protection system under direct supervision of NFPA 780 Certified Designer or Professional Engineer experienced in design of this Work and licensed in State where work is performed.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Lightning Protection Components:
1. Advanced Lightning Technology (ALT)
2. Harger Lightning and Grounding
3. thermOweld Grounding, a subsidiary of Continental Industries; division of Burndy LLC;
4. Substitutions: See Division 01- General Requirements.

2.2 LIGHTNING PROTECTION SYSTEM

A. Lightning Protection System: Provide complete system complying with NFPA 780, including air terminals, bonding, interconnecting conductors and grounding electrodes.
1. Provide system that protects:
   a. The entire structure.
   b. Open air areas within 100 feet of exterior walls at grade level.
   c. Open air areas within building footprint.
   d. Metal fences identified on site plan.
   e. Aboveground metal water tank (grounding only).
   f. Aboveground concrete water tank.
   g. Metal communications towers (grounding only).
2. Coordinate with other grounding and bonding systems specified.
3. Treat isolated non-grounded protruding metal items as specified by NFPA 780 for heavy-duty stacks.
4. Determine ground resistance by field measurement.
5. Provide copper components, as specified in following sections..
6. Provide disconnecting means and access panels or similar devices to allow complete periodic inspection and testing as described by NFPA 780 Annex D.

7. Provide materials that are galvanically compatible with the structure and system components.
8. Provide system certified by Underwriters Laboratories or the Lightning Protection Institute.
9. Conceal all downleads within structure.

B. Strike Terminals: Provide strike (air) terminals where indicated on the drawings, or as required by the delegated design.

C. Strike Terminals: Provide strike (air) terminals on the following:
1. Roofs.
2. Penthouse roofs.
3. Parapets.
4. Roof mounted equipment.
5. Stacks.
6. Chimneys.

2.3 COMPONENTS

A. All Components: Complying with applicable requirements of UL 96.

B. Strike (Air) Terminals: Copper, solid, with adhesive bases for single-ply roof installations.

C. Strike Terminal for Chimney: Lead-coated copper.

D. Grounding Rods: Solid copper.

E. Ground Plate: Copper.

F. Conductors: Copper cable.

G. Connectors and Splicers: Bronze.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated on shop drawings.

B. Coordinate work with installation of roofing and exterior and interior finishes.

3.2 INSTALLATION

A. Install in accordance with referenced system standards and as required for specified certification.

B. Connect conductors using mechanical connectors or exothermic welding process; protect adjacent construction elements and finishes from damage.

C. Connect conductors using mechanical connectors.

D. Connect conductors using exothermic welding process; protect adjacent construction elements and finishes from damage.

E. Downleads from roof to grade shall be routed within the building envelope. Exposed downleads are not acceptable.
   1. Route downleads concealed within wall cavities.
   2. Coordinate roof penetrations with roofing installation to ensure a watertight seal.
   3. It is acceptable to use building columns as downleads providing all design criteria is coordinated with this application within the delegated design.
   4. Confirm with the project structural engineer that building vertical steel can be used as a down-conductor prior to incorporating that element into any delegated design.

3.3 FIELD QUALITY CONTROL

A. See Division 01, for additional requirements.

B. Perform visual inspection as specified in NFPA 780 as if this were a periodic follow-up inspection.

C. Perform continuity testing as specified in NFPA 780 as if this were testing for periodic maintenance.

D. Obtain the services of the specified certification agency to provide inspection and certification of the lightning protection system, including performance of any other testing required by that agency.

E. Perform inspection and testing in accordance with UL 96A.

END OF SECTION

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SECTION 26 5100 - LIGHTING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Interior luminaires.

B. Exterior luminaires.

C. Exit signs.

D. Ballasts and drivers.

E. LED Driver emergency power supply units.

F. Luminaire accessories.

1.2 RELATED REQUIREMENTS

A. Section 26 0533 – Raceways and Boxes for Electrical Systems.

B. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

C. Section 26 0923 – Lighting Control Devices: Automatic controls for lighting including occupancy sensors, time switches, outdoor photo controls, and daylight harvesting controls.

D. Section 26 2726 - Wiring Devices: Manual wall switches and wall dimmers.

E. Section 26 0961 - Theatrical Lighting: Stage lighting units and associated controls.

1.3 REFERENCE STANDARDS

A. 47 CFR 15 - Radio Frequency Devices; current edition.

B. ANSI C82.4 - American National Standard for Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type); 2002.

C. IESNA LM-63 - ANSI Approved Standard File Format for Electronic Transfer of Photometric Data and Related Information; 2002 (Reaffirmed 2008).

D. IES LM-79 - Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products; 2008.

E. IES LM-80 - Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays, and Modules; 2015.

F. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

G. NECA/IESNA 500 - Standard for Installing Indoor Commercial Lighting Systems; 2006.

H. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; 2006.

I. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts; 2015.

J. NEMA LE 4 - Recessed Luminaires, Ceiling Compatibility; 2012.

K. UL 844 - Luminaires for Use in Hazardous (Classified) Locations; Current Edition, Including All Revisions.

L. UL 924 Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.

M. UL 1029 - High-Intensity-Discharge Lamp Ballasts; Current Edition, Including All Revisions.

N. UL 1598 - Luminaires; Current Edition, Including All Revisions.

O. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.
2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
3. Coordinate placement of exit signs with furniture, equipment, signage or other potential obstructions to visibility, installed by other sections or others.
4. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

1.5 SUBMITTALS

A. See Division 01 – General Requirements.

B. Shop Drawings:
1. Indicate dimensions and components for each luminaire of the manufacturer.
2. Provide photometric calculations where luminaires are proposed for substitution upon request.

C. Shop Drawings: For nonstandard or custom luminaires.
   1. Include plans, elevations, sections, and mounting and attachment details.
   2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
   3. Include diagrams for power, signal, and control wiring.

D. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.
   1. Arrange in order of luminaire designation.
   2. Include data on features, accessories, and finishes.
   3. Include physical description and dimensions of luminaires.
   4. Include life, output (lumens, CCT, and CRI), and energy efficiency data.
   5. Photometric data and adjustment factors based on laboratory tests, complying with IESNA LM-79 and IESNA LM-80.
      a. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.
      b. Testing Agency Certified Data: Photometric data certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.
      c. TM-21 report for L70 rating at color temperature specified.
   6. Ballasts/drivers: Include wiring diagrams and list of compatible lamp configurations.
   7. Lamps/LED arrays: Include rated life, color temperature, color rendering index (CRI), and initial and mean lumen output.

E. Samples:
   1. Provide one sample(s) of each specified luminaire upon request.
   2. Provide one sample(s) of each custom luminaire.
   3. Provide one sample(s) of each luminaire proposed for substitution upon request.
   4. Provide one sample(s) of each product finish illustrating color and texture upon request.
   5. Provide a mockup of selected luminaires upon request.
   6. Submit two color chips 3 x 3 inch in size illustrating luminaire finish color where indicated in luminaire schedule.

F. Certificates for Dimming Ballasts/Drivers: Manufacturer's documentation of compatibility with dimming controls to be installed.

G. Field quality control reports.

H. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

I. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

1.6 EXTRA PRODUCTS

A. Provide 6 universal exit signs complete with all labor and materials required for installation and 100 feet of installed wiring as directed by the Local Authority Having Jurisdiction.

B. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Division 01 – General Requirements.
2. Extra Lenses and Louvers: Two percent of total quantity installed for each type, but not less than one of each type.
3. Extra LED circuit board modules: Ten percent of total quantity installed for each type, but not less than two of each type.
4. LED Drivers: Furnish two of each driver type
5. Furnish one replacement battery for each battery type and size.

C. Project Record Documents: Record actual connections and locations of luminaires and any associated remote components.

1.7 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.8 QUALIFICATION DATA:

A. Seismic Qualification Certificates: For luminaires, accessories, and components, from manufacturer.
1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.

B. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Product Test Reports: For each luminaire, for tests performed by a qualified testing agency.

1.9 DELIVERY, STORAGE, AND PROTECTION

A. Receive, handle, and store products according to NECA/IESNA 500 (commercial lighting), NECA/IESNA 502 (industrial lighting), and manufacturer's written instructions.

B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

1.10 FIELD CONDITIONS

A. Maintain field conditions within the manufacturers required service conditions during and after installation.

1.11 WARRANTY

A. See Division 01 – General Requirements.

B. Section 26 0400 – General Requirements for Electrical Trades.

C. For lighting fixture products noted in this section provide a manufacturer’s standard warranty, minimum of one year.

D. Provide manufacturer’s standard warranty, minimum of one year.for batteries for emergency lighting units.

E. Provide manufacturer’s standard warranty, minimum of one year.for batteries for self-powered exit signs.

F. Provide manufacturer’s standard warranty, minimum of one year.for LED Driver emergency power supply units.

PART 2 PRODUCTS

2.1 LUMINAIRE TYPES

A. Furnish products as indicated in Lighting Fixture Schedule included on the drawings.

B. Substitutions: See Division 01- General Requirements, except where individual luminaire types are designated with substitutions not permitted and the following:
   1. Section 26 04 00 – Product Requirements and as follows:
      a. Approved equals to the basis of design fixture as listed in the Lighting Fixture Schedule shall be accepted for review with the proposed substitute fixture meeting the following minimum requirements:
         1) Be of the same general size, style and shape, including but not limited to lens construction and shading.
         2) Be of equal or better quality and construction.

3) Be supplied with all required accessories to match the specified fixture.
4) Be supplied with all remote drivers, power supplies and cabling lengths to meet specified performance and control.
5) Provide the same or better distribution, efficiency, source lumen output, and L70 lumen depreciation metric.

b. Provide point by point photometric calculations at the request of the Engineer for evaluation.

c. The basis of design fixture listed in the Lighting Fixture Schedule lists part numbers, specifications, options, accessories and source output available at the time of design. Substitutions shall meet these requirements as scheduled.

d. The evaluation of an approved equal shall be at the sole discretion of the Architect and Engineer.

2.2 INTERIOR LUMINAIRES

A. Manufacturers:
1. Manufacturers represented by Apex Lighting.
2. Manufacturers represented by Lighting Affiliates.
3. Manufacturers represented by Illuminate Lighting.
4. Manufacturers represented by Reflex Lighting.
5. Substitutions: See paragraph 2.1, B.

B. Provide products that comply with requirements of NFPA 70.

C. Provide products that are listed and labeled as complying with UL 1598, where applicable.

D. Provide products listed, classified, and labeled as suitable for the purpose intended.

E. Provide products complying with Federal Energy Management Program (FEMP) requirements.

F. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, drivers, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.

G. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.

H. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

I. Recessed Luminaires:
1. Ceiling Compatibility: Comply with NEMA LE 4.
2. Luminaires Recessed in Insulated Ceilings: Listed and labeled as IC-rated, suitable for direct contact with insulation and combustible materials.

3. Luminaires Recessed in Sloped Ceilings: Provide suitable sloped ceiling adapters.

J. LED Luminaires:
1. Components: UL 8750 recognized or listed as applicable.
2. Tested in accordance with IES LM-79 and IES LM-80.
3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.

K. Track Lighting Systems: Provide track compatible with specified track heads, with all connectors, power feed fittings, dead ends, hangers and canopies as necessary to complete installation.

L. Luminaires Mounted in Continuous Rows: Provide quantity of units required for length indicated, with all accessories required for joining and aligning.

M. Luminaires in Special Environments:
1. Showers: Provide with non-conductive trim.
2. Wet Locations: Provide with sealed and gasketed lens.
3. Infectious Environments: Provide with sealed and gasketed lens and anti-microbial finish.
4. Clean Rooms: Provide with sealed and gasketed lens, IP65 Rating and clean room rating as indicated.
5. MRI/Imaging Suites: Provide with non-ferrous construction; DC power supply; wiring through RF-filter.

2.3 EMERGENCY LIGHTING UNITS

A. Manufacturers:
1. Manufacturers represented by Apex Lighting.
2. Manufacturers represented by Lighting Affiliates.
3. Manufacturers represented by Illuminate/Vanguard Lighting.
4. Manufacturers represented by Reflex Lighting.
5. Substitutions: See paragraph 2.1, B.

B. Emergency lighting units complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.

C. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps/LED arrays to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.

D. Battery:
1. Sealed maintenance free lead calcium unless otherwise indicated.
2. Size battery to supply all connected lamps/LED arrays, including emergency remote heads where indicated.

E. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.

F. Provide low voltage disconnect to prevent battery damage from deep discharge.

G. Self-Diagnostics: Provide units that self-monitor functionality and automatically perform testing required by NFPA 101 where indicated; provide indicator light(s) to report test and diagnostic status.

2.4 EXIT SIGNS

A. Manufacturers:
1. Manufacturers represented by Apex Lighting.
2. Manufacturers represented by Lighting Affiliates.
3. Manufacturers represented by Illuminate Lighting.
4. Manufacturers represented by Reflex Lighting.
5. Substitutions: See paragraph 2.1, B.

B. Description: Internally illuminated exit signs with LEDs unless otherwise indicated; complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
1. Number of Faces: Single or double as indicated or as required for the installed location.
2. Directional Arrows: Universal type for field adjustment sized so that they are clearly visible at a distance of 40 feet as required by local codes.
3. Mounting: Wall, ceiling or pendant as indicated. Provide universal mount exit signs where indicated.
4. Housing: Varies, refer to Lighting Fixture Schedule.
5. Face: Varies, refer to Lighting Fixture Schedule.

C. Self-Powered Exit Signs:
1. Product Description: UL 924 self-contained emergency lighting unit.
2. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
3. Battery: Sealed maintenance-free nickel cadmium unless otherwise indicated.
4. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
5. Provide low-voltage disconnect to prevent battery damage from deep discharge.
6. Self-Diagnostics: Provide units that self-monitor functionality and automatically perform testing required by NFPA 101 where indicated; provide indicator light(s) to report test and diagnostic status.

D. Self-Luminous Exit Signs: Internally illuminated by tritium gas sealed inside phosphor lined gas tubes, requiring no electrical power to operate, with a service life of 20 years unless otherwise indicated.

E. Photoluminescent Exit Signs: Powder-coated sheet aluminum with photoluminescent pigmented material.

F. Special Wording Signs: Provide with special wording as indicated.
   1. Where indicated, provide with international symbol of accessibility complying with state and local codes.
   2. Provide combination exit/special wording signs where indicated.

G. Accessories:
   1. Provide compatible accessory high impact polycarbonate vandal shields where indicated.
   2. Provide compatible accessory wire guards where indicated.

2.5 EXTERIOR LUMINAIRES (Building Mounted)

A. Manufacturers:
   1. Manufacturers represented by Apex Lighting.
   2. Manufacturers represented by Lighting Affiliates.
   3. Manufacturers represented by Illuminate/Vanguard Lighting.
   4. Manufacturers represented by Reflex Lighting.
   5. Substitutions: See paragraph 2.1, B.

B. Provide products that comply with requirements of NFPA 70.

C. Provide products that are listed and labeled as complying with UL 1598, where applicable.

D. Provide products listed, classified, and labeled as suitable for the purpose intended.

E. Provide products complying with Federal Energy Management Program (FEMP) requirements.

F. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, drivers, reflectors, lenses, housings, poles, brackets, bases, vibration dampers, isolation pads and other components required to position, energize and protect the lamp and distribute the light.

G. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.

H. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

I. Provide IESNA full cut-off classified products unless otherwise indicated or provide products with backlight, uplight and glare (BUG) ratings as indicated.

J. Provide products with IESNA light distribution as indicated.

K. Provide products with internal/external house-side shields as indicated.

L. LED Luminaires:
1. Components: UL 8750 recognized or listed as applicable.
2. Tested in accordance with IES LM-79 and IES LM-80.
3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data or as indicated.

2.6 MATERIALS

A. Parts:
1. Free of burrs and sharp corners and edges.
2. Sheet metal components shall be steel unless otherwise indicated.
3. Form and support to prevent warping and sagging.
4. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
5. Diffusers and Globes:
   a. Refer to Interior Lighting Fixture Schedule for types.
   b. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
   c. Glass: Annealed crystal glass unless otherwise indicated.
   d. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.
6. Housings:
   a. Extruded-aluminum housing and heat sink unless otherwise indicated.
   b. Powder-coat finish unless otherwise indicated, color selection by Architect.
7. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
   a. Label shall include the following lamp characteristics:
      1) “USE ONLY” and include specific lamp type.
      2) Lamp diameter, shape, size, wattage, and coating.
      3) CCT and CRI for all luminaires.

B. METAL FINISHES
1. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.

2.7 BALLASTS AND DRIVERS

A. Manufacturers:
1. eldoLED.
2. General Electric Company.
3. Lutron Electronics Company.

4. Osram Sylvania.
5. Philips Lighting Electronics/Advance.
6. Substitutions: See Division 01- General Requirements, Product Requirements.
7. Manufacturer Limitations: Where possible, for each type of luminaire provide ballasts produced by a single manufacturer.
8. Where a specific manufacturer or model is indicated elsewhere in the luminaire schedule or on the drawings, substitutions are not permitted unless explicitly indicated.
9. Provide ballasts/drivers compatible with the approved lighting control systems.

B. Ballasts/Drivers - General Requirements:
1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.
3. Electronic Ballasts/Drivers: Inrush currents not exceeding peak currents specified in NEMA 410.

C. LED Drivers:
1. Product Description: LED dimming driver.
   a. 4-Wire (0-10V DC Voltage Controlled) Dimming Drivers
   b. Digital (DALI Low Voltage Controlled) Dimming Drivers
   c. Digital Multiplex (DMX Low Voltage Controlled) Dimming Drivers
2. General:
   a. LED dimming shall be equal in range and quality to a commercial grade incandescent dimmer. Quality of dimming to be defined by dimming range, freedom from perceived flicker or visible stroboscopic flicker, smooth and continuous change in level (no visible steps in transitions), natural square law response to control input, and stable when input voltage conditions fluctuate over what is typically experience in a commercial environment. Demonstration of this compliance to dimming performance will be necessary for substitutions or prior approval.
   b. Ten-year expected life while operating at maximum case temperature and 90 percent non-condensing relative humidity.
   c. Driver must limit inrush current.
      1) Base specification: Meet or exceed NEMA 410 driver inrush standard of 430 Amps per 10 Amps load with a maximum of 370 Amps (^2) – seconds.
      2) Preferred Specification: Meet or exceed 30mA(^2)s at 277VAC for up to 50 watts of load and 75A at 240us at 277VAC for 100 watts of load.
   d. Withstand up to a 1,000 volt surge without impairment of performance as defined by ANSI C62.41 Category A.
   e. No visible change in light output with a variation of plus/minus 10 percent line voltage input.
   f. Total Harmonic Distortion less than 20% percent and meet ANSI C82.11 maximum allowable THD requirements at full output. THD shall at no point in the dimming curve allow imbalance current to exceed full output THD.

g. Driver must support automatic adaptation, allowing for future luminaire upgrades and enhancements and deliver improved performance:
   1) Adjustment of forward LED voltage, supporting 3V through 55V.
   2) Adjustment of LED current from 200mA to 1.05A at the 100 percent control input point in increments of 1mA
   3) Adjustment for operating hours to maintain constant lumens (within 5 percent) over the 50,000 hour design life of the system, and deliver up to 20 percent energy savings early in the life cycle.

h. Driver must be able to operate for a (+/- 10%) supply voltage of 120V through 277VAC at 60Hz.

i. Driver should be UL Recognized under the component program and shall be modular for simple field replacement. Drivers that are not UL Recognized or not suited for field replacement will not be considered.

j. Driver shall include ability to provide no light output when the analog control signal drops below 0.5 V, or the DALI/DMX digital signal calls for light to be extinguished and shall consume 0.5 watts or less in this standby. Control deadband between 0.5V and 0.65V shall be included to allow for voltage variation of incoming signal without causing noticeable variation in fixture to fixture output.

3. Light Quality
   a. Over the entire range of available drive currents, driver shall provide step-free, continuous dimming to black from 100 percent to 1 percent and 10% relative light output where indicated, or 100 – 10% light standard. Driver shall respond similarly when raising from 1% to 100%
   b. 1) Driver must be capable of configuring a linear or logarithmic dimming curve, allowing fine grained resolution at low light levels
   c. Drivers to track evenly across multiple fixtures at all light levels, and shall have an input signal to output light level that allows smooth adjustment over the entire dimming range.
   d. Driver and luminaire electronics shall deliver illumination that is free from objectionable flicker as measured by flicker index (ANSI/IES RP-16-10). At all points within the dimming range from 100-1 percent luminaire shall have:
      1) LED dimming driver shall provide continuous step-free, flicker free dimming similar to incandescent source.
      2) Base specification: Flicker index shall less that 5% at all frequencies below
      3) 1000 Hz.
      4) Preferred specification: Flicker index shall be equal to incandescent, less that 1% at all frequencies below 1000 Hz.

4. Control Input
   a. 4-Wire (0-10V DC Voltage Controlled) Dimming Drivers
      1) Must meet IEC 60929 Annex E for General White Lighting LED drivers
      2) Connect to devices compatible with 0 to 10V Analog Control Protocol, Class 2, capable of sinking 0.6 ma per driver at a low

end of 0.3V. Limit the number of drivers on each 0-10V control output based on voltage drop and control capacity.

3) Must meet ESTA E1.3 for RGBW LED drivers

b. Digital (DALI Low Voltage Controlled) Dimming Drivers

1) Must meet IEC 62386

c. Digital Multiplex (DMX Low Voltage Controlled) Dimming Drivers

1) Must meet DMX / RDM: USITT DMX512A and ANSI E1.20 (Explore & Address)

2) Capable of signal interpolation and smoothing of color and intensity transitions

5. Driver: Approved by dimming system manufacturer as suitable for operation with control unit and suitable for LED source type and quantity specified for luminaire.

2.8 LUMINAIRE FIXTURE SUPPORT COMPONENTS

A. Comply with requirements in Section 260529 “Hangers and Supports for Electrical Systems” for channel and angle iron supports and nonmetallic channel and angle supports.

B. Single-Stem Hangers: 1/2-inch steel tubing with heavy duty swivel ball fittings and ceiling canopy. Finish same as luminaire.

C. Wires: ASTM A 641/A 641 M, Class 3, soft temper, zinc-coated steel, 12 gage minimum.

D. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.

E. Hook Hangers: Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.

F. Provide accessory plaster frames for luminaires recessed in plaster ceilings.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.

C. Verify that suitable support frames are installed where required.

D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.2 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.3 INSTALLATION

A. Coordinate locations of outlet boxes provided under Section 26 0533 as required for installation of luminaires, emergency lighting units and exit signs provided under this section.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Install products in accordance with manufacturer's instructions.

D. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting) and NECA 502 (industrial lighting).

E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.

F. Suspended Ceiling Mounted Luminaires:
1. Do not use ceiling tiles to bear weight of luminaires.
2. Do not use ceiling support system to bear weight of luminaires unless ceiling support system is certified as suitable to do so.
3. Secure surface-mounted and recessed luminaires to ceiling support channels or framing members or to building structure.
4. Secure pendant-mounted luminaires to building structure.
   a. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
5. Stem-Mounted, Single-Unit Luminaires: Suspend with twin-stem hangers. Support with approved outlet box, heavy-duty swivel hangers and accessories that hold stem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.
6. Continuous Rows of Luminaires: Use tubing or stem for wiring at one point and wire support for suspension for each unit length of luminaire chassis, including one at each end.
7. In addition to ceiling support wires, provide two galvanized steel safety wire(s), minimum 12 gage, connected from opposing corners of each recessed luminaire to building structure.
8. See Division 09 - Finishes where suspended grid ceiling is specified for additional requirements.

G. Recessed Luminaires:
1. Install trims tight to mounting surface with no visible light leakage.
2. Secure lay-in luminaires to ceiling support channels using listed safety clips at four corners.

3. Non-IC Rated Luminaires: Maintain required separation from insulation and combustible materials according to listing.
4. Luminaires Recessed in Fire-Rated Ceilings: Install using accessories and firestopping materials to meet regulatory requirements for fire rating.
5. Install recessed luminaires to permit removal from below.

H. Suspended Luminaires:
1. Unless otherwise indicated, specified mounting heights are to bottom of luminaire.
2. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.
3. Provide minimum of two supports for each luminaire equal to or exceeding 4 feet nominal length, with no more than 4 feet (1.2 m) between supports.
4. Install canopies tight to mounting surface.
5. Secure pendant-mounted luminaires to building structure.
   a. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
6. Stem-Mounted, Single-Unit Luminaires: Suspend with twin-stem hangers. Support with approved outlet box, heavy-duty swivel hangers and accessories that hold stem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.
7. Continuous Rows of Luminaires: Use tubing or stem for wiring at one point and wire support for suspension for each unit length of luminaire chassis, including one at each end.
8. Unless otherwise indicated, support pendants from swivel hangers.
9. .

I. Wall-Mounted Luminaires:
1. Unless otherwise indicated, specified mounting heights are to center of luminaire.
2. Install accessories furnished with each luminaire.
3. Bond products and metal accessories to branch circuit equipment grounding conductor.
4. Air Handling Luminaires: Interface with air handling accessories furnished and installed under Section 23 3600.

J. Emergency Lighting Units:
1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.
2. Install lock-on device on branch circuit breaker serving units.
3. Install plumb and adjust to align with building lines and with each other. Secure to prevent movement.

K. Exit Signs:
1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.
2. Install lock-on device on branch circuit breaker serving units.

3. Install plumb and adjust to align with building lines and with each other. Secure to prevent movement.
4. Install suspended exit signs using pendants from swivel hangers. Install pendant lengths required to suspend sign at height indicated or as instructed by the Authority Having Jurisdiction.

L. Remote drivers: Install in accessible location as indicated or as required to complete installation, using conductors per manufacturer's recommendations not exceeding manufacturer's recommended maximum conductor length to luminaire.

M. Identify luminaires connected to emergency power system in accordance with Section 26 0553.

N. Install specified lamps in each luminaire.

O. Install accessories furnished with each luminaire.

P. Connect luminaires to branch circuit using flexible conduit, except for emergency lighting which shall be in conduit completely.

Q. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.

R. Ground and bond interior luminaires in accordance with Section 26 05 26.

3.4 FIELD QUALITY CONTROL

A. See Division 01 – General Requirements.

B. Inspect each product for damage and defects.

C. Operate each luminaire after installation and connection to verify proper operation.

D. Test self-powered exit signs, emergency lighting units, and emergency power supply units to verify proper operation upon loss of normal power supply.

E. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

3.5 ADJUSTING

A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.

B. Aim and position adjustable emergency lighting unit lamps to achieve optimum illumination of egress path as required or as directed by Architect or authority having jurisdiction.

C. Air-Handling Luminaires with Air Control Blades or Heat Removal Dampers: Adjust as indicated or as required for proper airflow as directed by Architect.

D. Exit Signs with Field-Selectable Directional Arrows: Set as indicated or as required to properly designate egress path as directed by Architect or authority having jurisdiction.

3.6 CLEANING

A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

B. Clean photometric surfaces as recommended by the manufacturer.

3.7 CLOSEOUT ACTIVITIES

A. See Division 01- General Requirements

B. Demonstration: Demonstrate proper operation of luminaires to Architect, and correct deficiencies or make adjustments as directed.

C. Just prior to Substantial Completion, replace all lamps that have failed.

3.8 PROTECTION

A. Protect installed luminaires from subsequent construction operations.

END OF SECTION

SECTION 26 5561 - THEATRICAL LIGHTING

PART 1 GENERAL

1.1 SUMMARY

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2 GOVERNING CLAUSE

A. For the sake of brevity, these specifications shall omit phrases such as "Contractor shall furnish and install", "unless otherwise indicated or specified", etc., but these phrases are nevertheless implied. Mention of materials and operations requires the Contractor to furnish and install such materials and perform such operations completely to the satisfaction of the owner's representative.

1.3 SCOPE OF WORK

A. Work under this Section shall include furnishing all labor, materials, tools, and transportation services; removal of waste, packaging and demolished materials; supervision and coordination with other trades, as necessary to complete installation of the stage lighting control equipment as well as any other items as herein listed, all as described in these specifications, as illustrated on the accompanying drawings, or as directed by the Owner's Representative. Any building structural material required to be modified or added to permit the proper and safe installation of the products of this section is included in the work of this section and the full cost of such work and the supervision of any subcontracted labor shall be incorporated in the base bid

1.4 SYSTEM DESCRIPTION

A. The intent of this specification is to define parameters for furnishing and installing a complete working system to the Owner. The System Integrator, Electrical Contractor and Stage Control Equipment Supplier shall provide coordination with all associated trades to insure a proper and correct installation. The system is designed to meet specific operational requirements. Performance deviations will not be accepted.

B. This specification makes reference to the products of ETC Inc to establish a level of quality and product support. Supply the specified product or approved equal. The project electrical engineer shall be the final authority for purposes of establishing product and service equivalence. Proposed substitutions should be submitted for approval in advance of bid. If not pre-submitted and approved, proposed substitutions are subject to rejection at time of submittal. If proposed substitutions are rejected, the contractor shall submit drawings and supply the specified product without further delay.

1.5 SUBMITTALS

A. Full system submittals in the format specified by the general conditions of the specifications shall be furnished for approval within 60 days of award of Contract. Prior to fabrication of equipment, submittals shall be returned in the same format appropriately marked as the approval document.

B. Manufacturer shall provide any additional information, including equipment demonstration, as required by the engineer or specifier to verify compliance with specifications.

1.6 QUALITY ASSURANCE

A. Manufacturer shall be one who has been continuously engaged in the manufacturer of theatrical lighting and control equipment for a minimum of ten years. All control equipment and cabinet fabrication must take place in a U.S. manufacturing plant.

B. The manufacturer shall have a factory authorized stocking service center with at least one full-time service technician on staff located within 100 miles of the job site. In addition, the manufacturer shall have a toll free 24-hour hotline with a maximum response time of 20 minutes, 24 hours a day and 365 days a year. This level of support is integral to this specification and to the owner's needs and shall not be waived.

C. All equipment, where applicable standards have been established, shall be built to the standards of Underwriters Laboratories, Inc., the National Electric Code and the United States Institute for Theater Technology. Approved equipment shall be so labeled on delivery to the job site.

1.7 SYSTEM INTEGRATION

A. To ensure proper system installation, coordination of trades, and initial setup and programming, the equipment shall be furnished by an approved stage Systems Integrator.

B. An approved Systems Integrator shall meet the following requirements:
   1. Be a factory authorized service center for the manufacturer of the stage lighting control equipment
   2. Have a full-time factory-trained technician who is currently certified for all products in this specification and in particular for DMX and Network configuration.
   3. Have a factory-trained project manager who will coordinate all project documentation and scheduling of deliveries and system energization.

C. At the time of bid submission, the Electrical Contractor of this section shall indicate:
   1. The company name of the Systems Integration firm
   2. Three installations of comparable scope installed by the systems integration firm within the past 5 years.

PART 2 PRODUCT

2.1 MANUFACTURERS

A. The following manufactured systems for theatrical lighting and controls are allowed:
   1. Electronic Theatre Controls (ETC)
   2. Strand Lighting
   3. Substitutions: Division 01 – General Requirements.

2.2 INTELLIGENT CONTROLLABLE BREAKER POWER CONTROL SYSTEM

A. General
   1. Intelligent breaker system shall be Sensor IQ as manufactured by ETC, Inc., or approved equal.
   2. Breaker Panels shall be UL508, UL67, and UL924 Listed.
   3. Breakers shall be UL489 listed.
   4. Breaker Panels shall consist of a main enclosure with 12, 24, or 48 pole breaker subpanels, integral control electronics for low voltage terminations and provision for accessory cards.

B. Mechanical
   1. The panel shall be constructed of 16-gauge steel. All panel components shall be properly treated and finished in fine-textured, scratch resistant paint.
   2. 120/208V breaker panels shall be capable of being surface or recessed mounted.
   3. Choice of panel covers shall be available for surface or recess mount applications. This outer panel shall ship complete with a locking door to limit access to electronics and breakers.
   4. The unit shall provide interior cover over breaker panel to allow access only to class 2 wiring and prevent direct access to class 1 line-voltage components.
      a. Branch circuits shall range from 15A to 30A capable of holding full rated load for minimum of three hours continuously.
      b. Two and three-pole circuits shall be supported at decreased density where each pole constitutes one of the available single-pole circuits. Mixing of circuits in any combination shall be supported.
   5. Breakers shall provide manual switching control such that critical lighting can be set to an on state without the need for power to the panel.
   6. Breaker output lugs shall accept 10-14 AWG dual conductor.
   7. Breaker output lug shall support solid or stranded 6-14 AWG class B, C, or K copper wire.
   8. Control wiring for DMX, station bus, and Emergency input terminations shall land on removable headers for contractor installation.

C. User Interface
   1. The user interface shall contain a graphical display with button pad to include 0-9 number entry, up, down back arrow navigation and enter.
   2. Test shortcut button shall be available for local activation of preset, sequence and set level overrides.

3. The user interface shall have a power status LED indicator (Blue), a DMX status LED indicator (Green), a network status LED indicator (Green) and an LED indicator (red) for errors.
4. Interface shall allow the backlight to timeout and shall provide user editable options to shut off backlight completely as well as adjust screen contrast.
5. Ethernet interface (when installed) shall default to automatic IP through link local and DHCP. Upon receiving IP address, the address of the Network Interface Card (NIC) shall display in the about menu. Static address and settings shall also be possible.
6. The control interface shall support a USB memory stick interface for uploads of configurations and software updates.

D. Functional
1. Panel setup shall be user programmable.
2. Breaker panels shall support discrete addressing of each breaker. Panels that are restricted to use of start address with sequential addressing, and cannot assign each 0-10V output control to any internal circuit shall not be acceptable.
3. The panel shall be capable of switching 6 poles on or off at once, or in a user-selectable delay per breaker using a period of 0.1 to 60 seconds, in 0.1 second increments.
4. Control electronics shall report the following information per branch circuit:
   a. Breaker state (On/ Off)
   b. Breaker state (Open/ Closed)
   c. Current draw (Amps)
   d. Voltage
   e. Energy usage
5. Built in Control shall include:
   a. Ability to record up to 16 presets in each space from the control panel, connected control stations, or timed events.
   b. Presets shall be programmable by recording current levels (as set by DMX or connected control stations), by entering levels on the control panel directly, manually selecting breaker state on each breaker, or a combination of these methods. From the control panel, stations, or timed events it shall be possible to record values for up to 16 zones per space.
   c. Indication of an active preset shall be visible on the control panel display.
   d. One 16-step sequence per space for power up and power down routines
   e. The panel shall have a UL924-listed contact input for use in Emergency Lighting systems. The panel shall respond to the contact input by setting included breakers to "on", while setting non-emergency breakers "off". Each breaker can be selected for activation upon contact input.
   f. Upon Data loss the system shall provide options to hold last look infinitely or hold for a configured time period set by the installing technician then fade/switch to the input of the next available priority.
   g. After power loss, electronics shall be capable of holding the system in its previous state until new level data (DMX, architectural presets, sequences and zones, or local overrides) is received to make each breaker change state.
6. The control of lighting via timed and Astronomical clock controls.

E. Electrical
1. Conduit Entry:
a. Feeders:
1) Top or top-side (upper 6" of either side)
2) Bottom or bottom-side 6" of either side
3) Feeder entry shall be nearest to the location of the feeder lugs or main breaker.
b. Load:
1) Load wiring shall enter through the top or bottom of the enclosure.
2) Load wiring shall enter through the surface nearest to the breaker sub panel.
3) Load wiring may also enter through left and/or right side provided a low voltage chase is not required through the same area. If class 2 chase is required, a field installable barrier panel shall be provided upon request. When installed, the left or right side of the panel, where the barrier has been installed, shall not permit load wiring.
c. Low Voltage:
1) Top or top-side (upper 6" of either side)
2) Bottom or bottom-side 6" of either side
3) For low voltage conduit entry at the breaker end of the cabinet, conduits shall be located at the outer 3" of the top/bottom panel.
2. Breaker
a. Bus connection type: Stab on
b. 1, 2, or three poles
c. UL489 listed
d. 15 amp, 20 amp, or 30 amp
e. 22,000 SCCR; 65,000A series rated w main breaker
f. High inrush trip curve (matches all Sensor breakers)
g. Maintains trip curve through entire thermal range
h. Guaranteed not to trip at full load
i. Load lugs accept 6-18awg load wiring
j. Multi-conductor rated output terminal
k. Integral mechanically held air gap relay
l. Manual control of relay state using breaker handle w/o power
m. Integral current sensing
n. Integral position and trip sensing
o. Control and status provided by contact pads directly at bottom of the breaker case. No external wires or connections required for control or feedback.
3. The breaker panel shall support a maximum feed size 100 Amps at 12 circuits.
4. Breaker panels shall support main circuit breaker options.

2.3 TOUCHSCREEN CONTROL STATIONS

A. The Touchscreen Control Stations shall be the Unison Echo EchoTouch Controller as manufactured by ETC, Inc., or equal.

B. General
1. The Touchscreen protocols station shall provide control of up to 512 networked addresses or up to 512 local DMX addresses on a maximum of forty (40) control zones. Addresses may be distributed using DMX512-A or via sACN or Art-Net Ethernet-based lighting.
2. The Touchscreen station shall operate using graphic buttons, faders and other images on at least 7 user programmable control pages.
3. Touchscreen stations shall support default and fully graphical control pages.
4. The Touchscreen shall integrate with ETC Unison Echo Controls.

C. Mechanical
1. Touchscreen stations shall consist of a seven inch, backlit liquid crystal display (LCD) with a minimum resolution of 800 by 400 pixels with a capacitive multi-touch interface.
2. Touchscreen bezels shall be constructed of cast zinc finished in a fine texture powder coat.
3. Touchscreen shall be available in four standard colors.
   a. Cream (RAL 9001)
   b. Gray (RAL 7001)
   c. Black (RAL 9004)
   d. Signal White (RAL 9003)
4. The bezel shall have no visible means of attachment.
5. Touchscreen stations shall support surface, flush and rack mounting options.
   a. Flush-mount to industry standard 3-gang back box
   b. Surface back box dimensions shall be 7.3” wide x 4.8” high x 3.5” deep and available from the manufacturer.
   c. Rack mounting options shall fit in standard 19” racks an shall be no taller than 3 EIA rack units

D. Electrical
1. The Touchscreen shall have an RJ45 Ethernet port for connection to a lighting system and for Power over Ethernet (PoE).
2. The Touchscreen shall have EchoConnect connection terminals.
3. Control wiring utilizing low-voltage, Class II unshielded twisted pair, type Belden 8471 or equivalent, and one #14 ESD drain wire
4. Control wiring shall be topology free. It may be point-to-point, bus, loop, home run or any combination of these.
5. The Touchscreen shall use (2) #16 AWG stranded wires for 24vDC operating power when not utilizing Power over Ethernet (PoE).
6. The Touchscreen shall have typical power draw of 400mA.
7. The Touchscreen shall have a USB type A connector for firmware maintenance.
8. The Touchscreen shall be UL/ cUL LISTED and CE marked.
9. The Touchscreen shall be FCC Compliant.

E. Network
1. Communications physical layer shall comply with IEEE 802.3i for 10BASE-T, 802.3u for 100BASE-TX and 802.3af for Power over Ethernet specifications.
2. All network cabling shall be Category 5 (or better), conforming to TIA-568A/B, and shall be installed by a qualified network installer.
3. Switches shall comply with power-over-Ethernet IEEE802.3af, unless a separate in-line power supply is provided.

F. Functional
1. A maximum of 64 presets shall be contained in non-volatile electronic memory.
2. A maximum of 4 internal sequences. Sequences shall record user-selected zone levels.
3. The Touchscreen shall be equipped with an on-board help system.
4. The Touchscreen software upgrades shall be made by the user via USB drive. Changing internal components shall not be required.
5. The Touchscreen shall provide a USB port allowing show data to be saved for archival or transfer to other consoles or a personal computer.
6. Systems that do not provide the above capabilities shall not be acceptable.

G. Patching
1. The Touchscreen shall provide patching facilities for dimmers and multi-parameter devices via a built in library of fixture definitions. The fixture library shall be updated via software based updates. It shall be possible to create custom fixture definitions using an offline application.
2. The Touchscreen shall support patching, address setting, and mode changes using Remote Device Management (RDM) on the local DMX/RDM port.
3. Customizable zone display using Zone Map. It shall be possible to rearrange the graphical representations for control channels to closely mimic the positions of fixtures in the installation.
4. Seven user customizable interactive pages.
5. Forty (40) programmable color chips and color or white pickers.
6. Touch-based parameter controls.
7. Virtual level wheel.

2.4 DATA PLUG-IN STATIONS

A. The Plug-in Stations shall consist of the appropriate connectors required for functional intent of the system as shown on the project drawings including DMX and RJ-45 Network. Custom combinations and control connectors shall be available.

B. Station faceplates shall be .80” aluminum, finished in fine texture, scratch-resistant black powder coat. Silk-screened graphics shall be white. The station panel shall mount into an industry standard back box, depending on size and quantity of connectors. A terminal block shall be supplied for contractor terminations.

2.5 PERFORMANCE LIGHTING CONTROL CONSOLE

A. General
1. The lighting control console shall be a microprocessor-based system specifically designed to provide complete control of stage, studio, and entertainment lighting systems. The console shall be the ION-XE-20 as manufactured by ETC, Inc.
2. The system shall provide control of up to 2,560 networked addresses or up to 1024 local DMX addresses. Addresses may be distributed using DMX512-A (two ports) or via sACN or Art-Net Ethernet-based lighting protocols.
3. A maximum of 999 cues may be contained in non-volatile electronic memory.
4. Twenty (20) faders shall provide access to individual intensity channels, intensity for devices as well as playbacks.

2.6 MOUNTING HARDWARE

A. All supporting pipe battens that are independent of motorized rigging shall be connected to the building structure in a secure and approved manner using rated beam clamps. The suspensions shall be connected to the roof structural beams or suitable rated material bridging structure such as UniStrut, B-Line, or Kindorf. The Systems Integrator shall coordinate between the work of this section and of the steel section.

B. All pipes and suspension materials are to be new. Do not use cable clip/Crosby fittings on any wire ropes. Only Nicopress/swaged terminations are allowed.

C. Install pipes plumb, straight and level. Suspend empty pipes as noted above. Mount connector strips under pipe using double brackets supplied with connector strip. Mount a second pipe below the connector strip. Mount fixtures under the pipe using supplied C-clamps.

D. All receptacles and lighting fixtures shown on project drawings shall be supported from 1.5” ID (nominal) schedule 40 black iron pipe using sleeve splices and bolts for lengths longer than 21ft. Screw coupling is not acceptable. All connector strips and pipe battens that are dead-hung shall be suspended using one of three approved methods:
1. All-Thread rod drilled-through the pipe and securely bolted with locking nuts top and bottom.
2. Rated welded-link chain fully wrapped around pipe and secured with locking bolts or rated shackles or attached to pipe with suitable rated sandwich pipe clamp.
3. Rated aircraft cable with thimble and swaged eye secured by rated forged shackle to sandwich pipe clamps.

2.7 POWER DISTRIBUTION – CONNECTOR STRIPS

A. The connector strips shall be the ColorSource Raceway by ETC, Inc., or approved equal.

B. General
1. Connector strips shall provide distributed power form incoming circuits to plugs along a raceway

2. Internal wiring shall be sized to circuit ampacity and shall be rated at 125°C
3. Connector strips shall support a combination of line voltage power and low voltage data distribution within a single raceway.
4. Connector strips shall be listed by a nationally recognized test lab (NRTL). Connector strips that are not listed shall not be acceptable.

C. Physical
1. Connector strips shall be 127mm H x 45mm D and fabricated from 1.6mm aluminum finished in black, white, or silver fine-texture powder coat paint.
2. Connector strips shall be available in any length up to 72ft / 2195cm in specified increments of 1ft / 30.5cm and shipped fully wired with all splicing hardware.
3. Connector strips shall weigh no more than 2.5lbs/ft. Connector Strips that weigh more than 2.5lbs/ft shall not be acceptable.
4. Two connector panels supporting power and data outlets shall be supported for each 1ft / 30.5cm section of strip and shall be mounted on individual 125mm panels.
5. Frames and connector panels shall be fabricated from 3mm die cast aluminum finished in black, white, or silver fine-textured powder coat paint.
6. Circuits shall be labeled above each connector on the front of the strip using 15mm reverse silk screened Lexan labels. All labels match connector strip finish with contrasting color circuit designations. Optional write-on labels shall be available upon request, connector strips that do not support write-on labels shall not be acceptable.
7. Connector strips shall be supplied with appropriate brackets and hardware for mounting.
8. Connector strips shall utilize junction brackets on 6ft / 152cm centers and support spans up to 12ft / 305cm between hanger brackets.
9. Mounting brackets shall be 45mm x 3mm and 45mm x 1.9mm ASTM A5008 steel. All mounting hardware shall conform to ISO 898-1 class 8.8.

D. Electrical
1. Connector strip shall support 120V/60Hz power input per branch circuit with support for multiple outlets wired to each circuit.
2. The connector strip wiring terminal box shall support a maximum of eight 20A inputs utilized for:
    a. Up to six circuits for power distribution along the length of the connector strip
    b. One circuit dedicated for work lights.
    c. One circuit for DMX Active Pass-thru connectors when required.
3. The connector strip terminal box shall support hardwired or pluggable connector power and data input.
4. Pluggable power and data inputs shall be fed by a single multi-conductor cable or flexible conduit (as determined by site conditions) and a single DMX or Ethernet cable. The LKS data connector by Link USA, Inc shall be supported, connector strips that do not support the LKS data connector shall not be accepted.
5. Power output connectors shall be available as 20A grounded stage pin, 20A Twist-Lock, 20A “U” ground (dual rated “T-slot”), and 20A Neutrik powerCON TRUE1. Connector strips that utilize connectors that are not rated for plugging hot loads shall not be accepted.

6. Terminations shall be consolidated at one end and utilize feed-through terminals individually labeled with corresponding circuit numbers.
   a. Performance lighting circuits shall utilize tension clamp terminals listed for AWG 20 – 8 / 0.5mm^2 – 6mm^2 gauge wire.
   b. Work light and DMX Active Pass-thru circuits shall use tension clamp terminals listed for AWG 20 – 12 / 0.5mm^2 – 4mm^2 gauge wire.
   c. Terminals that place a screw directly on the wire are not acceptable.
7. A low voltage data distribution system shall be supported to incorporate DMX/ RDM (ANSI E1.11-2008 USITT DMX512-A and ANSI E1.20 Remote Device Management) or Ethernet (IEEE 802.3).
   a. Ethernet connections shall utilize standard RJ-45 connection.
   b. DMX output ports shall utilize 5-pin XLR style connectors.
   c. Connector strips shall utilize a voltage barrier to accommodate class 2 wiring in the same strip as class one circuits.
   d. Low voltage signals shall enter the connector strip via a strain relief or connector mounted at the specified end of the connector strip. One low voltage cable shall be supported for each connector strip.
   e. Connector strips with multiple DMX outputs shall use active DMX/RDM pass through assemblies. Each strip shall support up to 24 active DMX/RDM pass through assemblies.
   f. DMX outputs without active splitting of the DMX/ RDM signal or that do not support RDM shall not be acceptable.

E. Theatrical Lighting Fixtures

Refer to the Theatrical Lighting Fixture Schedule indicated on the drawings.

PART 3 EXECUTION

3.1 INSTALLATION

A. It shall be the responsibility of the Electrical Contractor to receive and store the necessary materials and equipment for installation of the control system. It is the intent of these specifications and plans to include everything required for proper and complete installation and operation of the system, even though every item may not be specifically mentioned. The Electrical Contractor shall deliver on a timely basis to other trades any equipment that must be installed during construction.

B. The Systems Integrator shall be responsible for field measurements and coordinating physical size of all equipment with the architectural requirements of the spaces into which it is to be installed.

C. The Electrical Contractor shall install all lighting control and dimming equipment in accordance with manufacturer's approved shop drawings.

D. All branch load circuits shall be live tested before connecting the loads to the system load terminals.

E. If installation of fixtures before dirty work is completed is necessary due to coordination of trades, all fixtures shall be bagged in plastic and securely sealed to prevent particulate intrusion.

F. Any fixtures found to be damaged at the time of final review by the owner's representative shall be immediately repaired or replaced at no cost to the owner.

G. At time of system energization, or immediately following, all fixtures shall be tested and aimed under the supervision of the Systems Integrator as directed by the owner or their designated representative. The Electrical Contractor shall ensure the provision of safe means of access to the fixtures in their operational positions such as a certified personnel lift including personal fall-protection equipment.

3.2 MANUFACTURER'S SERVICES

A. Upon completion of the installation, including testing of load circuits, the Systems Integrator shall notify the system manufacturer that the system is available for formal checkout.

B. Notification shall be provided in writing, two weeks prior to the time factory-trained personnel are needed on the job site.

C. The Systems Integrator shall be liable for any return visits by the factory engineer as a result of incomplete or incorrect wiring.

D. Upon completion of the formal check-out, the factory engineer shall demonstrate operation and maintenance of the system to the owner's representatives. Training shall not exceed four working hours.

E. The Systems Integrator shall provide an additional 4-hour session of end-user training on specific programming and operation of the control system. This training shall be provided at a date after final completion of the site work and after the factory commissioning at a time to be arranged with the owner within the first six months of occupancy.

3.3 WARRANTY

A. The Electrical Contractor shall guarantee all of the work that is performed under this contract, including all materials, and workmanship, for a period of two (2) years from the date of full acceptance of the work in accordance with the following conditions.

B. Warranty by the manufacturer shall be in effect on materials and equipment for two years from the date of system commissioning under the following conditions:

1. The System Integrator shall INCLUDE the cost of providing a thorough inspection at the end of the first year of service in the base bid. The System Integrator shall be responsible for making arrangements for the inspection with the facility management. Inspection shall be scheduled during normal weekday business hours. Inspection shall include recommended routine cleaning of any equipment air filters and enclosures.

2. The inspection report shall be sent to the factory by the inspecting contractor within 10 days of completing the inspection.
3. Nothing in this guarantee shall cause repair or replacement by the Electrical Contractor or the Systems Integrator where negligence, neglect or improper operation by the Owner has caused the failure of any equipment installed under this contract.

END OF SECTION



Project Manual For

Volume 4 of 4

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TOWN OF GREENWICH
GREENWICH CENTRAL MIDDLE SCHOOL

Phase 2 of 3 – Building Construction, Demolition, and Sitework

9 Indian Rock Lane
Greenwich, Connecticut 06830

SLAM

The S/L/A/M Collaborative

State Project No.: 057-0114 N
Project No.: 22367.00
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Bidding/Permit – Sept. 30, 2024

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01 2300 – Alternates

01 2500 - Substitution Procedures
- Attachment – CSI Form 1.5C
- Attachment – CSI Form 13.1A

01 3000 - Administrative Requirements
- Attachment – CADD EFT Form
- Attachment – BIM Access License Agreement

01 3566.42 – Sustainability Compliance Procedures
- CTHPB Working Compliance Checklist w/ LEED cross-reference
- 01 3566.43: CTHPB Submittal Cover
- 01 3566.44: CTHPB Material Calculator

01 3566.45: CTHPB VOC Form
01 3566.46 – IAQ Field Report Form

01 3573 – Delegated Design Procedures

01 4000 – Quality Requirements

01 4219 - Reference Standards

01 4339 – Mock-ups.

01 4533 - Code-Required Special Inspections

01 5000 – Temporary Facilities and Controls
.Attachment: Project Sign SCG-3021

01 5639 – Temporary Tree and Plant Protection

01 5719 – Temporary Environmental Controls

01 6000 - Product Requirements

01 6116 – Volatile Organic Compound (VOC) Content Restrictions

01 7000 - Execution and Closeout Requirements

01 7419 – Construction Waste and Management Disposal
.Attachment: CW&MD Tracking Form

01 7800 - Closeout Submittals

01 7900 - Demonstration and Training

01 9113 – General Commissioning Requirements
.Attachment: Commissioning Plan

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02 4100 – Demolition

02 4113 – Site Utility Abandonment

02 8200 - Selective Hazardous Building Materials Abatement Demolition

02 8213 – Asbestos Abatement
Attachment: Form SCG-3011 – Asbestos Checklist – Central Middle School

02 8313 – Lead-Based Paint Awareness

02 8416 – Universal Waste Removal and Recycling

02 8432 - PCBs Greater than 50ppm Remediation
.Attachment: Form SCG-3012 PCB Checklist – Central Middle School
.Attachment: Form SCG-9008 PCB I Caulk - Central Middle School

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03 1000 - Concrete Forming and Accessories

03 2000 – Concrete Reinforcing

03 3000 – Cast-in-Place Concrete

03 3250 - Concrete Post-Installed Anchors

03 3511 – Concrete Floor Finishes

03 6213 - Non-Metallic Non-Shrink Grouting

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04 2000 - Unit Masonry

04 7323– Manufactured Building Stone Masonry

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05 1200 – Structural Steel Framing

05 2100 – Steel Joist Framing

05 3100 – Steel Decking

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05 5100 - Metal Stairs

05 7000 - Decorative Metal Railings

05 7100 – Monumental Metal Stairs

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06 4200 – Wood Paneling

06 6116 – Solid Surfacing Fabrications

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07 1400 – Fluid-Applied Waterproofing

07 2100 - Thermal Insulation

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07 2163 – Fluid-Applied Insulative Coating

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07 2726 – Fluid-Applied Membrane Air Barriers

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07 4646 - Fiber-Cement Wall Panels

07 5423 - Thermoplastic Membrane Roofing

07 6200 - Sheet Metal Flashing and Trim

07 7100 – Roof Specialties

07 7200 – Roof Accessories

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07 8400 - Firestopping

07 9200 - Joint Sealants

07 9513 – Expansion Joint Cover Assemblies

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08 1416 - Flush Wood Doors

08 3323 – Overhead Coiling Doors

08 3326 - Overhead Coiling Grilles

08 4313 - Aluminum-Framed Storefronts

08 4413 - Glazed Aluminum Curtain Walls

08 6300 - Metal-Framed Skylights

08 7100 – Door Hardware

08 7101 – Door Hardware Schedule

08 8000 – Glazing

08 8300 – Mirrors

08 9100 – Louvers

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09 2116 - Gypsum Board Assemblies

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09 3000 - Tiling

09 5100 - Acoustical Ceilings

09 6429 – Wood Strip and Plank Flooring

09 6466 - Wood Athletic Flooring

09 6500 - Resilient Flooring

09 6566 - Resilient Athletic Flooring

09 6700 - Fluid-Applied Flooring

09 6813 - Tile Carpeting

09 7200 – Wall Coverings

09 7800 – Interior Wall Paneling

09 8300 – Acoustic Finishes

09 8416 – Fixed Sound Reflective Panels

09 8430 – Sound-Absorbing Wall and Ceiling Units

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10 2800 - Toilet Accessories

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23 3400 – HVAC Fans

23 3600 – Air Terminal Units

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END OF SECTION 00 0110

SECTION 27 0536 CABLE TRAYS FOR COMMUNICATION SYSTEMS

PART 1 - GENERAL

1.01 Related Documents

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Related Drawings
   1. "T" Drawings – Technology Plans

1.02 SUMMARY

A. Section Includes:
   1. Ladder cable trays.
   2. Wire-basket cable trays.
   3. Single-rail cable trays.

1.03 Related Requirements:

A. Section 271100 "Communication Equipment Room Fittings" for cable trays and accessories serving electrical systems.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of cable tray.
   1. Include data indicating dimensions and finishes for each type of cable tray indicated.

B. Shop Drawings: For each type of cable tray.
   1. Show fabrication and installation details of cable trays, including plans, elevations, and sections of components and attachments to other construction elements. Designate components and accessories, including clamps, brackets, hanger rods, splice-plate connectors, expansion-joint assemblies, straight lengths, and fittings.

C. Delegated-Design Submittal: For seismic restraints.
   1. Seismic-Restraint Details: Signed and sealed by a qualified professional engineer, licensed in the state where Project is located, who is responsible for their preparation.
   2. Design Calculations: Calculate requirements for selecting seismic restraints.
   3. Detail fabrication, including anchorages and attachments to structure and to supported cable trays.

1.05 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Floor plans and sections, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
   1. Include scaled cable tray layout and relationships between components and adjacent structural, electrical, and mechanical elements.
   2. Vertical and horizontal offsets and transitions.
   3. Clearances for access above and to side of cable trays.
   4. Vertical elevation of cable trays above the floor or below bottom of ceiling structure.

B. Seismic Qualification Certificates: For cable trays, accessories, and components, from manufacturer.
   1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
   2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
   3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Field quality-control reports.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design cable tray supports and seismic bracing.

B. Seismic Performance: Cable trays and supports shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
   1. The term "withstand" means "the cable trays will remain in place without separation of any parts when subjected to the seismic forces specified."
   2. Component Importance Factor: 1.5.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes in cable tray installed outdoors.
   1. Temperature Change: 120 deg F

2.02 GENERAL REQUIREMENTS FOR CABLE TRAYS

A. Cable Trays and Accessories: Identified as defined in NFPA 70 and marked for intended location, application, and grounding.
   1. Source Limitations: Obtain cable trays and components from single manufacturer.

B. Sizes and Configurations: See the Cable Tray Schedule on Drawings for specific requirements for types, materials, sizes, and configurations.

C. Structural Performance: See articles for individual cable tray types for specific values for the following parameters:

1. Uniform Load Distribution: Capable of supporting a uniformly distributed load on the indicated support span when supported as a simple span and tested according to NEMA VE 1.
2. Concentrated Load: A load applied at midpoint of span and centerline of tray.
3. Load and Safety Factors: Applicable to both side rails and rung capacities.

2.03 LADDER CABLE TRAYS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide [product indicated on Drawings] or comparable product by one of the following:
1. Cooper B-Line, Inc.
2. Chatsworth
3. Wiremaid Products Division; Vutec Corporation.

C. Description:
1. Configuration: Two I-beam side rails with transverse rungs welded to side rails.
2. Rung Spacing: 12 inches o.c.
3. Radius-Fitting Rung Spacing: 9 inches at center of tray's width.
4. Minimum Cable-Bearing Surface for Rungs: 7/8-inch width with radius edges.
5. No portion of the rungs shall protrude below the bottom plane of side rails.
6. Structural Performance of Each Rung: Capable of supporting a maximum cable load, with a safety factor of 1.5, plus a 200-lb concentrated load, when tested according to NEMA VE 1.
7. Minimum Usable Load Depth: 6 inches.
8. Straight Section Lengths: 10 feet except where shorter lengths are required to facilitate tray assembly.
9. Width: 12 inches unless otherwise indicated on Drawings.
10. Fitting Minimum Radius: 12 inches.
11. Class Designation: Comply with NEMA VE 1.
12. Splicing Assemblies: Bolted type using serrated flange locknuts.
13. Hardware and Fasteners: Steel, zinc plated according to ASTM B 633.
14. Splice Plate Capacity: Splices located within support span shall not diminish rated loading capacity of cable tray.

2.04 WIRE-BASKET CABLE TRAYS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide comparable product of one of the following:
1. Cooper B-Line, Inc.
2. Chatsworth
3. Snaketray.

4. Wiremaid Products Division; Vutec Corporation.

C. Description:
1. Configuration: Wires are formed into a standard 2-by-4-inch wire mesh pattern with intersecting wires welded together. Mesh sections must have at least one bottom longitudinal wire along entire length of section.
2. Materials: High-strength-steel longitudinal wires with no bends.
3. Safety Provisions: Wire ends along wire-basket sides (flanges) rounded during manufacturing to maintain integrity of cables and installer safety.
4. Sizes:
   a. Straight sections shall be furnished in standard 118-inch lengths.
   b. Wire-Basket Depth: 12 inches wide.
   c. Wire-Basket Depth: 4 wide or as required.
5. Connector Assemblies: Bolt welded to plate shaped to fit around adjoining tray wires and mating plate. Mechanically joins adjacent tray wires to splice sections together or to create horizontal fittings.
6. Connector Assembly Capacity: Splices located within support span shall not diminish rated loading capacity of cable tray.

D. Hardware and Fasteners: Steel, zinc plated according to ASTM B 633.

2.05 SINGLE-RAIL CABLE TRAYS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following

B. Basis-of-Design Product: Subject to compliance with requirements, provide product by one of the following:
1. Cooper B-Line, Inc.
2. Chatsworth
3. Wiremaid Products Division; Vutec Corporation.

C. Description:
1. Configuration: Center rail with extruded-aluminum rungs arranged symmetrically about the center rail.
2. Construction: Aluminum rungs mechanically connected to aluminum center rail in at least two places, with ends finished to protect installers and cables.
3. Rung Spacing: 12 inches o.c.
4. Radius-Fitting Rung Spacing: 9 inches at center of tray's width.
5. Straight Section Lengths: 10 feet except where shorter lengths are required to facilitate tray assembly.
6. Width: 12 inches unless otherwise indicated on Drawings.
7. Support Point: Splice fittings shall be hanger support point.
8. Support Spacing: Support each section at midpoint. Support wall-mounted sections a maximum of one-sixth of the section length from each end.
9. Loading Depth: 4 inches
10. Maximum Loads: 50 lb/ft.

11. Unbalanced Loads: Maintain cable tray rungs within six degrees of horizontal under all loading conditions.
12. Splicing Assemblies: Bolted type using serrated flange locknuts.
13. Splicing Assembly Capacity: Splices located within support span shall not diminish rated loading capacity of cable tray.
14. Hardware and Fasteners: Steel, zinc plated according to ASTM B 633.
15. Splices and Connectors: Protect cables from edges of center rail and do not intrude into cable fill area.

2.06 MATERIALS AND FINISHES

A. Steel:
1. Straight Section and Fitting Side Rails and Rungs: Steel complies with the minimum mechanical properties of ASTM A 1008/A 1008M, Grade 33, Type 2.
2. Steel Tray Splice Plates: ASTM A 1011/A 1011M, HSLAS, Grade 50, Class 1.
3. Fasteners: Steel complies with the minimum mechanical properties of ASTM A 510/A 510M, Grade 1008.
4. Finish: Electrogalvanized before fabrication.
   a. Standard: Comply with ASTM B 633.
   b. Hardware: Galvanized, ASTM B 633.
5. Finish: [poxy-resin or Powder-coat enamel paint.
   a. Powder-Coat Enamel: Cable tray manufacturer's recommended primer and corrosion-inhibiting treatment, with factory-applied powder-coat paint.
   b. Epoxy-Resin Prime Coat: Cold-curing epoxy primer, MPI# 101.
   c. Epoxy-Resin Topcoat: Epoxy, cold-cured, gloss, MPI# 77.
   d. Hardware: Chromium-zinc plated, ASTM F 1136.
6. Finish: Black oxide finish for support accessories and miscellaneous hardware according to ASTM D 769.

B. Aluminum:
1. Materials: Alloy 6063-T6 according to ANSI H 35.1/H 35.1M for extruded components and Alloy 5052-H32] or Alloy 6061-T6 according to ANSI H 35.1/H 35.1M for fabricated parts.
2. Hardware: Chromium-zinc-plated steel, ASTM F 1136.
3. Hardware for Aluminum Cable Tray Used Outdoors: Stainless steel, Type 316, ASTM F 593 and ASTM F 594.

C. Stainless Steel:
1. Materials: Low-carbon, passivated, stainless steel, Type 304L or Type 316L, ASTM F 593 and ASTM F 594.
2. Hardware for Stainless-Steel Cable Tray Used Outdoors: Stainless steel, Type 316, ASTM F 593 and ASTM F 594.

2.07 CABLE TRAY ACCESSORIES

A. Fittings: Tees, crosses, risers, elbows, and other fittings as indicated, of same materials and finishes as cable tray.

B. Covers: Ventilated-hat type made of same materials and with same finishes as cable tray.

C. Barrier Strips: Same materials and finishes as for cable tray.

D. Cable tray supports and connectors, including bonding jumpers, as recommended by cable tray manufacturer.

2.08 WARNING SIGNS

A. Lettering: 1-1/2-inch high, black letters on yellow background with legend "Warning! Not To Be Used as Walkway, Ladder, or Support for Ladders or Personnel."

B. Comply with requirements for fasteners in Section 260553 "Identification for Electrical Systems."

2.09 SOURCE QUALITY CONTROL

A. Testing: Test and inspect cable trays according to NEMA FG 1.

PART 3 EXECUTION

3.01 CABLE TRAY INSTALLATION

A. Install cable trays according to NEMA FG 1.

B. Install cable trays as a complete system, including fasteners, hold-down clips, support systems, barrier strips, adjustable horizontal and vertical splice plates, elbows, reducers, tees, crosses, cable dropouts, adapters, covers, and bonding.

C. Install cable trays so that the tray is accessible for cable installation and all splices are accessible for inspection and adjustment.

D. Remove burrs and sharp edges from cable trays.

E. Join aluminum cable tray with splice plates; use four square neck-carriage bolts and locknuts.

F. Fasten cable tray supports to building structure.

G. Design fasteners and supports to carry cable tray, the cables, and a concentrated load of 200 lb. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems."

H. Place supports so that spans do not exceed maximum spans on schedules and provide clearances shown on Drawings. Install intermediate supports when cable weight exceeds the load-carrying capacity of the tray rungs.

I. Construct supports from channel members, threaded rods, and other appurtenances furnished by cable tray manufacturer. Arrange supports in trapeze or wall-bracket form as required by application.

J. Support bus assembly to prevent twisting from eccentric loading.

K. Install center-hung supports for single-rail trays designed for 60 versus 40 percent eccentric loading condition, with a safety factor of 3.

L. Locate and install supports according to NEMA FG 1. Do not install more than one cable tray splice between supports.

M. Support wire-basket cable trays with center support hangers or trapeze hangers or wall brackets.

N. Support center support hangers or trapeze hangers for wire-basket trays with 1/4-inch diameter rods.

O. Make connections to equipment with flanged fittings fastened to cable trays and to equipment. Support cable trays independent of fittings. Do not carry weight of cable trays on equipment enclosure.

P. Install expansion connectors where cable trays cross building expansion joints and in cable tray runs that exceed dimensions recommended in NEMA FG 1. Space connectors and set gaps according to applicable standard.

Q. Make changes in direction and elevation using manufacturer's recommended fittings.

R. Make cable tray connections using manufacturer's recommended fittings.

S. Seal penetrations through fire and smoke barriers. Comply with requirements in Section 078413 "Penetration Firestopping."

T. Install capped metal sleeves for future cables through firestop-sealed cable tray penetrations of fire and smoke barriers.

U. Install cable trays with enough workspace to permit access for installing cables.

V. Install barriers to separate cables of different systems, such as power, communications, and data processing; or of different insulation levels, such as 600, 5000, and 15 000 V.

W. Install permanent covers, if used, after installing cable. Install cover clamps according to NEMA VE 2.

X. Clamp covers on cable trays installed outdoors with heavy-duty clamps.

Y. Install warning signs in visible locations on or near cable trays after cable tray installation.

3.02 CABLE TRAY GROUNDING

A. Ground cable trays according to NFPA 70 unless additional grounding is specified. Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."

B. Cable trays with communications cable shall be bonded together with splice plates listed for grounding purposes or with listed bonding jumpers.

3.03 Cable trays with control conductors shall be bonded together with splice plates listed for grounding purposes or with listed bonding jumpers.

A. When using epoxy- or powder-coat painted cable trays as a grounding conductor, completely remove coating at all splice contact points or ground connector attachment. After completing splice-to-grounding bolt attachment, repair the coated surfaces with coating materials recommended by cable tray manufacturer.

B. Bond cable trays to power source for cables contained within with bonding conductors sized according to NFPA 70, Article 250.122, "Size of Equipment Grounding Conductors."

3.04 CABLE INSTALLATION

A. Install cables only when each cable tray run has been completed and inspected.

B. Fasten cables on horizontal runs with cable clamps or cable ties according to NEMA VE 2. Tighten clamps only enough to secure the cable, without indenting the cable jacket. Install cable ties with a tool that includes an automatic pressure-limiting device.

C. Fasten cables on vertical runs to cable trays every 18 inches.

D. Fasten and support cables that pass from one cable tray to another or drop from cable trays to equipment enclosures. Fasten cables to the cable tray at the point of exit and support cables independent of the enclosure. The cable length between cable trays or between cable tray and enclosure shall be no more than 72 inches.

E. Tie MI cables down every 36 inches where required to provide a 2-hour fire rating and every 72 inches elsewhere.

F. In existing construction, remove inactive or dead cables from cable trays.

3.05 CONNECTIONS

A. Remove paint from all connection points before making connections. Repair paint after the connections are completed.

B. Connect pathways to cable trays according to requirements in NEMA VE 2 and NEMA FG 1.

3.06 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:
   1. After installing cable trays and after electrical circuitry has been energized, survey for compliance with requirements.
   2. Visually inspect cable insulation for damage. Correct sharp corners, protuberances in cable trays, vibrations, and thermal expansion and contraction conditions, which may cause or have caused damage.
   3. Verify that the number, size, and voltage of cables in cable trays do not exceed that permitted by NFPA 70. Verify that communications or data-processing circuits are separated from power circuits by barriers or are installed in separate cable trays.
   4. Verify that there are no intruding items such as pipes, hangers, or other equipment in the cable tray.

5. Remove dust deposits, industrial process materials, trash of any description, and any blockage of tray ventilation.
6. Visually inspect each cable tray joint and each ground connection for mechanical continuity. Check bolted connections between sections for corrosion. Clean and retorque in suspect areas.
7. Check for improperly sized or installed bonding jumpers.
8. Check for missing, incorrect, or damaged bolts, bolt heads, or nuts. When found, replace with specified hardware.
9. Perform visual and mechanical checks for adequacy of cable tray grounding; verify that all takeoff raceways are bonded to cable trays. Test entire cable tray system for continuity. Maximum allowable resistance is 1 ohm.

B. Prepare test and inspection reports.

3.07 PROTECTION

A. Protect installed cable trays and cables.
1. Install temporary protection for cables in open trays to safeguard exposed cables against falling objects or debris during construction. Temporary protection for cables and cable tray can be constructed of wood or metal materials and shall remain in place until the risk of damage is over.
2. Repair damage to galvanized finishes with zinc-rich paint recommended by cable tray manufacturer.
3. Repair damage to paint finishes with matching touchup coating recommended by cable tray manufacturer.

END OF SECTION

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SECTION 27 1000 - STRUCTURED CABLING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Communications system design requirements.

B. Communications pathways.

C. Copper cable and terminations.

D. Fiber optic cable, terminations, and interconnecting devices.

E. Communications equipment room fittings.

F. Communications outlets.

G. Communications grounding and bonding.

H. Communications identification.

I. Cabling testing procedures.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Division 07 - Firestopping.

C. Division 26 - Grounding and Bonding for Electrical Systems.
   1. Includes intersystem bonding termination.
   2. Includes bonding jumpers for bonding of communications systems and electrical system grounding.

D. Division 26 - Conduit for Electrical Systems.

E. Division 26 - Cable Trays for Electrical Systems.

F. Division 26 - Boxes for Electrical Systems.

G. Division 26 - Underfloor Raceways for Electrical Systems.

H. Division 26 - Identification for Electrical Systems: Identification products.

I. Division 26 - Wiring Devices.

J. Division 33 - Electrical Underground Ducts, Ductbanks, and Manholes.

1.03 Definitions

A. BICSI: Building Industry Consulting Services International

B. EIA: Electronic Industries Association

C. TIA: Telecommunications Industries Association

D. UL: Underwriters Laboratory

E. NFPA: National Fire Protection Association

1.04 REFERENCE STANDARDS

A. ANSI/TIA-1152-A - Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling.

B. ANSI/TIA-568-0.D - Generic Telecommunications Cabling for Customer Premises.

C. BICSI N1 - Installation Practices for Telecommunications and ICT Cabling and Related Cabling Infrastructure, 1st Edition 2019.

D. EIA/ECA-310 - Cabinets, Racks, Panels, and Associated Equipment Revision E, 2005.

E. FM (AG) - FM Approval Guide current edition.

F. ICEA S-83-596 - Indoor Optical Fiber Cables 2016.

G. ICEA S-90-661 - Category 3, 5, & 5e Individually Unshielded Twisted Pair Indoor Cables (With or Without An Overall Shield) For Use in General Purpose and LAN Communications Wiring Systems Technical Requirements 2012.

H. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

I. TIA-455-21 - FOTP-21 - Mating Durability of Fiber Optic Interconnecting Devices 1988a (Reaffirmed 2012).

J. TIA-492AAAA - Detail Specification for 62.5-um Core Diameter/125-um Cladding Diameter Class Ia Graded-Index Multimode Optical Fibers 2009b.

K. TIA-492AAAB - Detail Specification for 50-um Core Diameter/125-um Cladding Diameter Class Ia Graded-Index Multimode Optical Fibers 2009a.

L. TIA-492AAAC - Detail Specification for 850-nm Laser-Optimized, 50-um Core Diameter/125-um Cladding Diameter Class Ia Graded-Index Multimode Optical Fibers 2009b.

M. TIA-492AAAD - Detail Specification for 850-nm Laser-Optimized, 50-um Core Diameter/125-um Cladding Diameter Class Ia Graded-Index Multimode Optical Fibers 2009.

N. TIA-492CAAA - Detail Specification for Class IVa Dispersion-Unshifted Single-Mode Optical Fibers 1998 (Reaffirmed 2002).

O. TIA-492CAAB - Detail Specification for Class IVa Dispersion-Unshifted Single-Mode Optical Fibers with Low Water Peak 2000 (Reaffirmed 2005).

P. TIA-526-7 - Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant 2015a.

Q. TIA-526-14 - Optical Power Loss Measurement of Installed Multimode Fiber Cable Plant 2015c.

R. TIA-568 (SET) - Commercial Building Telecommunications Cabling Standard Set 2019.

S. TIA-568.2 - Balanced Twisted-Pair Telecommunications Cabling and Components Standard 2018d.

T. TIA-568.3 - Optical Fiber Cabling and Components Standard 2016d.

U. TIA-569 - Telecommunications Pathways and Spaces 2019e.

V. TIA-598 - Optical Fiber Cable Color Coding 2014d.

W. TIA-606 - Administration Standard for Telecommunications Infrastructure 2017c.

X. TIA-607 - Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises 2019d.

Y. UL (DIR) - Online Certifications Directory Current Edition.

Z. UL 444 - Communications Cables Current Edition, Including All Revisions, and Edition 5, 2017.

AA. UL 514C - Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers Current Edition, Including All Revisions.

BB. UL 1651 - Fiber Optic Cable Current Edition, Including All Revisions.

CC. UL 1863 - Communications-Circuit Accessories Current Edition, Including All Revisions.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate requirements for service entrance and entrance facilities with Communications Service Provider.
   2. Coordinate the work with other trades to avoid placement of other utilities or obstructions within the spaces dedicated for communications equipment.
   3. Coordinate arrangement of communications equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Arrange for Communications Service Provider to provide service.

C. Preinstallation Meeting: Convene prior to commencing work of this section, as requested of the GC or Owner, to review service requirements and details with Communications Service Provider representative.

1.06 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.

C. Sustainable Design Documentation: Submit manufacturer's product data on cable and cable insulation showing compliance with specified lead content requirements.

D. Shop Drawings: Show compliance with requirements on isometric schematic diagram of network layout, showing cable routings, telecommunication closets, rack and enclosure layouts and locations, service entrance, and grounding, prepared and approved by BICSI Registered Communications Distribution Designer (RCDD).

E. Evidence of qualifications for installer.

F. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and operation of product.

G. Test Plan: Complete and detailed plan, with list of test equipment, procedures for inspection and testing, and intended test date; submit at least 60 days prior to intended test date.

H. Field Test Reports.

I. Copper and Fiber Test reports. Document data for each measurement. Data for submittals shall be printed in a summary report that is formatted similar to Table 10.1 in BICSI TDMM, or transferred from the instrument to the computer, saved as text files, and printed and submitted.

J. Installation contractor shall register all copper and fiber test results with the manufacturer(s) to attain the manufacturers extended warranty on labor an material. The manufacturer's approved documentation shall be delivered to the Owner.

K. Project Record Documents: Prepared and approved by BICSI Registered Communications Distribution Designer (RCDD).
   1. Record actual locations of outlet boxes and Data Rooms.
   2. Show as-installed color coding, pair assignment, polarization, and cross-connect layout.
   3. Identify Data Rooms and equipment rooms by room number on drawings.

L. Operation and Maintenance Data: List of all components with part numbers, sources of supply, and operation and maintenance instructions; include copy of project record documents

1.07 QUALITY ASSURANCE

A. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

B. Manufacturer Qualifications: At least 3 years experience manufacturing products of the type specified. experience in the installation and testing of the type of system specified, and:

C. Installer Qualifications: A company having at least 3 years experience in the installation and testing of the type of system specified, and:
   1. Employing a BICSI Registered Communications Distribution Designer (RCDD).
   2. Supervisors and installers factory certified by manufacturers of products to be installed.
   3. Employing BICSI Registered Cabling Installation Technicians (RCIT) for supervision of all work.

D. Products: Listed, classified, and labeled as suitable for the purpose intended.

E. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

F. Telecommunications Pathways and Spaces: Comply with TIA/EIA-569-A.

G. Grounding: Comply with ANSI-J-STD-607-A.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Keep stored products clean, dry and in a temperature permitted by the manufacturer.

C. Test cables upon receipt at Project site.
   1. Test optical fiber cable to determine the continuity of the strand end to end. Use optical loss test set.
   2. Test optical fiber cable while on reels. Use an optical time domain reflectometer to verify the cable length and locate cable defects, splices, and connector, including the loss value of each. Retain test data and include the record in maintenance data.
   3. Test each pair of UTP cable for open and short circuits.

1.09 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a 2 year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 SYSTEM DESIGN

A. Provide a complete permanent system of cabling and pathways for voice, data, audio visual, and security communications, including cables, conduits and wireways, pull wires, support structures, enclosures and cabinets, and outlets.
   1. Comply with TIA-568 (SET) (cabling) and TIA-569 (pathways) (commercial standards).
   2. Comply with Communications Service Provider requirements.

3. Provide fixed cables and pathways that comply with NFPA 70 and TIA-607 and are UL listed or third party independent testing laboratory certified.
4. Provide connection devices that are rated for operation under conditions of 32 to 140 degrees F (0 to 60 degrees C) at relative humidity of 0 to 95 percent, noncondensing.
5. In this project, the term plenum is defined as return air spaces above ceilings, inside ducts, under raised floors, and other air-handling spaces.

B. System Description:
1. Building Entrance / Service Provider Cable: By others.
2. Backbones - Within Buildings: Copper, Category 3, 25 Pair
3. Backbones - Within Building: OM4 Multimode Fiber, 12 Strand
4. Horizontal - Provide Category 6A plenum voice and data cabling, termination devices, and outlets per drawings.
5. Provide additional outlets where indicated on drawings.

C. Equipment Room (ER)/ Main Distribution Frame (MDF): Centrally located support structure for terminating horizontal cables that extend to telecommunications outlets, functioning as point of presence to external service provider.

D. Telecommunication Rooms (TRs)/ Intermediate Distribution Frame (IDF): Support structures for terminating horizontal cables that extend to telecommunications outlets.

E. Backbone Cabling: Cabling, pathways, and terminal hardware connecting Telecommunication Rooms (TRs/IDFs) with Equipment Room (ER/MDF), wired in star topology with Equipment Room (ER) at center hub of star.

F. Cabling to Outlets: Specified horizontal cabling, wired in star topology to Equipment Room or Telecommunication Room located at center hub of star; also referred to as "links".

2.02 PATHWAYS

A. General Requirements: Comply with TIA/EIA-569-C.

B. Cable Support: NRTL labeled for support of Category 5E and above cabling, designed to prevent degradation of cable performance and pinch points that could damage cable.
1. Support brackets with cable tie slots for fastening cable ties to brackets.
2. Lacing bars, spools, J-hooks, and D-rings.
3. Straps and other devices.

C. Conduit: As specified in Division 260533.13; provide pull cords in all conduit.

D. Cable Trays: As specified in Division 260536.

E. Underfloor Ducts: As specified in Division 260539.

F. Overhead Service Entrance: Weatherhead or service entrance fitting located on outside of building with galvanized rigid steel or intermediate metallic conduit running to entrance facility.

G. Underground Service Entrance: Rigid polyvinyl chloride (PVC) conduit, Schedule 40.

H. Firestop Sleeves: Listed; provide as required to preserve fire resistance rating of building elements.
   1. Products:
      a. Hilti Fire Stopping Products; www.hilti.com
      b. STI Fire Stopping Products; www.stifirestop.com
      c. HoldRite, a brand of Reliance Worldwide Corporation; HydroFlame Pro Series/HydroFlame Custom Built: www.holdrite.com/#sle.
      d. Approved Equivalents
      e. Substitutions: See Section 016000 - Product Requirements.

2.03 Firestopping

A. Comply with requirements in Division 07 Section "Penetration Firestopping."

B. Comply with TIA/EIA-569-C.

C. Comply with BICSI TDMM, "Firestopping System" Article.

2.04 Copper Cable and terminations

A. Manufacturers:
   1. Berk-Tek
   2. Superior Essex
   3. Belden
   4. Leviton
   5. Hubbell Premise Wiring
   6. Panduit
   7. Siemon
   8. Substitutions: See Section 016000 - Product Requirements.

B. Copper Horizontal Cable:
   1. Description: 100 ohm, balanced twisted pair cable complying with TIA-568.2 and listed and labeled as complying with UL 444.
   2. Cable Type: Voice and Data: TIA-568.2 Category 6A UTP; 23 AWG.
   3. Cable Type - Voice: TIA-568.2 Category 5e UTP (unshielded twisted pair); 24 AWG.
   4. Cable Capacity: 4-pair.

C. Cable Applications: Use listed NFPA 70 Type CMP plenum cable unless otherwise indicated.
   1. Cable Applications:
      a. Plenum Applications: Use listed NFPA 70 Type CMP plenum cable.
      b. Cable Jacket Color - Voice and Data Cable: Blue.

D. Copper Cable Terminations: Insulation displacement connection (IDC) type using appropriate tool; use screw connections only where specifically indicated.

E. Jacks and Connectors: Modular 8P8C (RJ-45), non-keyed, terminated with 110-style insulation displacement connectors (IDC); high impact thermoplastic housing; suitable for and complying with same standard as specified horizontal cable; UL 1863 listed.
   1. Performance: 500 mating cycles.

2. Voice and Data Jacks: 8-position modular jack, color-coded for both T568A and T568B wiring configurations.

F. Copper Patch Cords:
1. Description: Factory-fabricated 4-pair cable assemblies with 8-position modular connectors terminated at each end.

2.05 FIBER OPTIC CABLE AND INTERCONNECTING DEVICES

A. Manufacturers:
1. Berk-Tek
2. Superior Essex
3. Belden
4. Panduit
5. Hubbell Premise Wiring
6. Corning
7. Substitutions: See Section 016000 - Product Requirements.

B. Fiber Optic Backbone Cable:
1. Description: Tight buffered, non-conductive fiber optic cable complying with TIA-568.3, TIA-598, ICEA S-83-596 and listed as complying with UL 444 and UL 1651.
2. Cable Type: Multimode, laser-optimized 50/125 um (OM4) complying with TIA-492AAAD.
3. Cable Capacity: Quantity of fibers as indicated on drawings; 24-fiber.
4. Cable Applications:
   a. Plenum Applications: Use listed NFPA 70 Type OFNP plenum cable.
5. Cable Jacket Color:
   a. Laser-Optimized Multimode Fiber (OM3/OM4): Aqua.
   b. Multimode Fiber (OM1/OM2): Orange.
   c. Single-Mode Fiber (OS1/OS2): Yellow.

C. Fiber Optic Horizontal Cable:
1. Description: Tight buffered, non-conductive fiber optic cable complying with TIA-568.3, ICEA S-83-596 and listed as complying with UL 444 and UL 1651.
2. Cable Type: Multimode, laser-optimized 50/125 um (OM4) complying with TIA-492AAAD
3. Cable Capacity: 2-fiber; Quantity of fibers as indicated on drawings.
4. Cable Applications: Use listed NFPA 70 Type OFNP plenum cable unless otherwise indicated.
5. Cable Jacket Color:
   a. Laser-Optimized Multimode Fiber (OM3/OM4): Aqua.
   b. Multimode Fiber (OM1/OM2): Orange.
   c. Single-Mode Fiber (OS1/OS2): Yellow.

D. Fiber Optic Interconnecting Devices:
1. Connector Type: Type LC.
2. Connector Performance: 500 mating cycles, when tested in accordance with TIA-455-21.
3. Maximum Attenuation/Insertion Loss: 0.3dB.

2.06 COMMUNICATIONS EQUIPMENT ROOM FITTINGS

A. Copper Cross-Connection Equipment:
   1. Manufacturers:
      a. Belden
      b. Leviton
      c. Hubbell Premise Wiring
      d. Panduit
      e. Siemon
      f. Substitutions: See Section 016000 - Product Requirements.
   2. Connector Blocks for Category 3 Cabling: Type 66 insulation displacement connectors; capacity sufficient for cables to be terminated plus 25 percent spare.
   3. Patch Panels for Copper Cabling: Sized to fit EIA/ECA-310 standard 19 inch (482.6 mm) wide equipment racks; 0.09 inch (2.2 mm) thick aluminum; cabling terminated on Type 110 insulation displacement connectors; printed circuit board interface.
      a. Jacks: Non-keyed 8P8C (RJ-45), suitable for and complying with same standard as cable to be terminated; maximum 48 ports per standard width panel.
      b. Capacity: Provide ports sufficient for cables to be terminated plus 25 percent spare.
      c. Labels: Factory installed laminated plastic nameplates above each port, numbered consecutively; comply with TIA-606.
      d. Provide incoming cable strain relief and routing guides on back of panel.

B. Fiber Optic Cross-Connection Equipment:
   1. Manufacturers:
      a. Belden
      b. Leviton
      c. Hubbell Premise Wiring
      d. Panduit
      e. Siemon
      f. Substitutions: See Section 016000 - Product Requirements.
   2. Patch Panels for Fiber Optic Cabling: Sized to fit EIA/ECA-310 standard 19 inch (482.6 mm) wide equipment racks; 0.09 inch (2.2 mm) thick aluminum.
      a. Adapters: As specified above under FIBER OPTIC CABLE AND INTERCONNECTING DEVICES; maximum of 24 duplex adaptors per standard panel width.
      b. Labels: Factory installed laminated plastic nameplates above each port, numbered consecutively; comply with TIA-606.
      c. Provide incoming cable strain relief and routing guides on back of panel.
      d. Provide rear cable management tray at least 8 inches (203 mm) deep with removable cover.
      e. Provide dust covers for unused adapters.

C. Backboards: Interior grade plywood without voids, 3/4 inch (19 mm) thick; UL-labeled fire-retardant.
   1. Size: As indicated on drawings.
   2. Do not paint over UL label.

D. Equipment Frames, Racks and Cabinets:

1. Manufacturers:
   a. Chatsworth
   b. Great Lakes
   c. Hubbell Premise Wiring
   d. Panduit
   e. Siemon
   f. Substitutions: See Section 016000 - Product Requirements.
2. Component Racks: EIA/ECA-310 standard 19 inch (482.6 mm) wide.
3. Wall Mounted Racks: Steel construction, hinged to allow access to back of installed components.
   a. Load Rating: 300 pounds.
4. Floor Mounted Racks: Aluminum or steel construction with corrosion resistant finish; vertical and horizontal cable management channels, top and bottom cable troughs, and grounding lug.
   a. Load rating: pounds (kg).
5. Freestanding Cabinets: Front and rear doors with locks; removable side panels with locks; vented top and rear door; adjustable leveling feet; cable access in roof and base; grounding bar.
   a. Load rating: 1,500 pounds.
   b. Roof mounted fan, capacity: 4.
6. Wall Mounted Cabinets: Front doors with locks, louvered side panels, top and bottom cable access, and ground lug.
   a. Cover inside of cabinet back with plywood backboard as specified.
   b. Load rating: 300 pounds.
   c. Roof mounted fan, capacity: 2.
   d. Duplex AC power outlet inside cabinet.
7. Cabinets: Steel construction with corrosion resistant finish.
8. Locks: Keyed alike.

E. Cable Management:
1. Manufacturers:
   a. Chatsworth
   b. Great Lakes
   c. Hubbell Premise Wiring
   d. Panduit
   e. Siemon
   f. Substitutions: See Section 016000 - Product Requirements.

2.07 COMMUNICATIONS OUTLETS

A. Manufacturers:
1. Belden
2. Leviton
3. Hubbell Premise Wiring
4. Panduit
5. Siemon
6. Substitutions: See Section 016000 - Product Requirements.

B. Outlet Boxes: Comply with Section 26 0533.16.
   1. Provide depth as required to accommodate cable manufacturer's recommended minimum conductor bend radius.
   2. Minimum Size, Unless Otherwise Indicated:
      a. Wall Phone Only Outlets: 4 inch by 2 inch by 2-1/8 inch deep (100 by 50 by 54 mm) trade size.
      b. Data or Combination Voice/Data Outlets: 4 inch square by 2-1/8 inch deep (100 by 54 mm) trade size.
      c. Fiber Optic Outlets: 4-11/16 inch square by 2-1/8 inch deep (119 by 54 mm) trade size.

C. Wall Plates:
   1. Comply with system design standards and UL 514C.
   2. Accepts modular jacks/inserts.
   3. Capacity:
      a. Wall Phone Only Outlets: 1 port.
      b. Data or Combination Voice/Data Outlets: 4 ports.

D. Wall Plate Material/Finish - Flush-Mounted Outlets: High impact thermoplastic, color to be selected by Architect during product submissions.

E. GROUNDING AND BONDING COMPONENTS
   1. Comply with TIA-607.
   2. Comply with Section 260526.

F. IDENTIFICATION PRODUCTS
   1. Comply with TIA-606.
   2. Comply with Section 260553.

G. SOURCE QUALITY CONTROL
   1. See Section 014000 - Quality Requirements, for additional requirements.
   2. Factory test cables according to TIA-568 (SET).

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

A. Comply with latest editions and addenda of TIA-568 (SET) (cabling), TIA-569 (pathways), TIA-607 (grounding and bonding), BICSI N1, NFPA 70, and SYSTEM DESIGN as specified in PART 2.

B. Coordinate backbone cabling with required protectors and demarcation point provided by the communications service provider.

C. Comply with Communication Service Provider requirements.

D. Grounding and Bonding: Perform in accordance with TIA-607 and NFPA 70.

E. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.

3.02 INSTALLATION OF PATHWAYS

A. Install pathways with the following minimum clearances:
   1. 48 inches (1220 mm) from motors, generators, frequency converters, transformers, x-ray equipment, and uninterruptible power systems.
   2. 12 inches (300 mm) from power conduits and cables and panelboards.
   3. 5 inches (125 mm) from fluorescent and high frequency lighting fixtures.
   4. 6 inches (150mm) from flues, hot water pipes, and steam pipes.

B. Conduit, in Addition to Requirements of Section 26 0533.13:
   1. Arrange conduit to provide no more than the equivalent of two 90 degree bend(s) between pull points.
   2. Conduit Bends: Inside radius not less than 10 times conduit internal diameter.
   3. Arrange conduit to provide no more than 100 feet (30 m) between pull points.
   4. Do not use conduit bodies.
   5. Minimum Cover - Underground Service Entrance: Comply with NFPA 70 and Communications Service Provider requirements.

C. Pathway Installation in Communications Equipment Rooms:
   1. Position conduit ends adjacent to a corner on backboard where a single piece of plywood is installed, or in the corner of room where multiple sheets of plywood are installed around perimeter walls of room.
   2. Install cable trays to route cables if conduits cannot be located in these positions.
   3. Secure conduits to backboard when entering room from overhead.
   4. Extend conduits 3 inches above finished floor.
   5. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.

D. Outlet Boxes:
   1. Coordinate locations of outlet boxes provided under Section 26 0533.16 as required for installation of telecommunications outlets provided under this section.
      a. Mounting Heights: Unless otherwise indicated, as follows:
         1) Telephone and Data Outlets: 18 inches (450 mm) above finished floor.
         2) Wall mounted Telephone Outlets: 48 inches (1.2 m) above finished floor to top of telephone.
      b. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
      c. Provide minimum of 24 inches (600 mm) horizontal separation between flush mounted outlet boxes installed on opposite sides of fire rated walls.
      d. Unless otherwise indicated, provide separate outlet boxes for line voltage and low voltage devices.
      e. Locate outlet boxes so that wall plate does not span different building finishes.
      f. Locate outlet boxes so that wall plate does not cross masonry joints.

3.03 INSTALLATION OF EQUIPMENT AND CABLING

A. Cabling:

1. Do not bend cable at radius less than manufacturer's recommended bend radius; for unshielded twisted pair use bend radius of not less than 4 times cable diameter.
2. Do not over-cinch or crush cables.
3. Do not exceed manufacturer's recommended cable pull tension.
4. When installing in conduit, use only lubricants approved by cable manufacturer and do not chafe or damage outer jacket.

B. Wiring Method: Install cables in raceways and J-hooks except where cable trays are required in Drawings. Conceal raceway and cables except in unfinished spaces.
   1. 1. Install plenum cable in environmental air spaces, including plenum and non-plenum ceilings.

C. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.

D. All exposed cabling shall be installed within conduit. Conduit in exposed areas shall match the color of the wall or ceiling it is attached to. Only exceptions are in data rooms, mechanical spaces, and above concealed ceilings.
   1. Exposes Areas include but are not limited to:
      a. Gymnasiums.
      b. All open ceiling spaces.
      c. Cabling that is visible above specially designed ceilings.

E. Pre-terminated fiber optic cabling will be accepted. All devices mandated within this specification shall be used to make up this pre-terminated cable.

F. Cabling Installation:
   1. Install 110-style IDC termination hardware unless otherwise indicated.
   2. MUTOA shall not be used as a cross-connect point.
   3. Consolidation points may be used only for making a direct connection to telecommunications outlet/connectors.
   4. Do not use consolidation point as a cross-connect point, as a patch connection, or for direct connection to workstation equipment.
   5. Locate consolidation points for UTP at least 49 feet from communications equipment room.
   6. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
   7. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
   8. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
   9. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.
   10. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.

11. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.

G. Service Loops (Slack or Excess Length): Provide the following minimum extra length of cable, looped neatly:
1. At Distribution Frames: 120 inches (3000 mm).
2. At Outlets - Copper: 12 inches (305 mm).
3. At Outlets - Optical Fiber: 39 inches (1000 mm).

H. Copper Cabling:
1. Category 5e and Above: Maintain cable geometry; do not untwist more than 1/2 inch (12 mm) from point of termination.
2. For 4-pair cables in conduit, do not exceed 25 pounds (110 N) pull tension.
3. Use T568B wiring configuration.

I. Fiber Optic Cabling:
1. Prepare for pulling by cutting outer jacket for 10 inches (250 mm) from end, leaving strength members exposed. Twist strength members together and attach to pulling eye.
2. Support vertical cable at intervals as recommended by manufacturer.

J. Wall-Mounted Racks and Enclosures:
1. Install to plywood backboards only, unless otherwise indicated.
2. Mount so height of topmost panel does not exceed 78 inches (1980 mm) above floor.

K. Floor-Mounted Racks and Enclosures: Permanently anchor to floor in accordance with manufacturer's recommendations.

L. Floor-Mounted Enclosures: Connect adjacent cabinets together and remove interior side panels.

M. Identification:
1. Use wire and cable markers to identify cables at each end.
2. Use manufacturer-furnished label inserts, identification labels, or engraved wallplate to identify each jack at communications outlets with unique identifier.
3. Use identification nameplate to identify cross-connection equipment, equipment racks, and cabinets.
4. Labels shall meet the legibility, defacement, exposure, and adhesion requirements of UL 969.
5. Labels shall be preprinted using a mechanical means of printing (e.g. laser printer)
6. Where used for cable marking, provide vinyl substrate with a white printing area and a clear "tail" that self laminates the printed area when wrapped around the cable. If cable jacket is white, provide cable label with printing area that is any other color than white, preferable orange or yellow - so that labels are easily distinguishable.
7. Where insert type labels are used provide clear plastic cover over label.
8. Provide plastic warning tape 6 inches wide continuously printed and bright colored 18" above all direct buried services, underground conduits, and duct-banks.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Comply with inspection and testing requirements of specified installation standards.

C. Provide all labor, materials, tools, field-test instruments and equipment required for the complete testing, identification, and administration of the work called for in the Contract Documents.

D. Only test results with a PASS will be accepted. Field-test results with a *PASS will be rejected.

E. Testing shall be performed on each cabling link. (100% Testing)

F. All Tests shall be documented.

G. Trained technicians who have successfully attended an appropriate training program and have obtained a certificate as proof thereof shall execute the tests. These certificates may have been issued by any of the following organizations or an equivalent organization:
   1. Manufacturer of the connectors or cable.
   2. Manufacturer of the test equipment used for the field certification.
   3. Training Organizations (BICSI, Equivalent)

H. The Owner or the Owner's representative may select a random sample of five percent of the installed service links. The Owner or the Owner's representative shall test these randomly selected links. The results obtained shall be compared to the data provided by the installation contractor. If more than two percent of the sample results differ in terms of the pass/fail determination, the installation contractor under supervision of the representative shall repeat 100 percent testing at no cost to the Owner.

I. Engage a qualified testing agency to evaluate cables.

J. Cable will be considered defective if it does not pass tests and inspections.

K. Visual Inspection:
   1. Inspect cable jackets for certification markings.
   2. Inspect cable terminations for color coded labels of proper type.
   3. Inspect outlet plates and patch panels for complete labels.
   4. Inspect patch cords for complete labels.
   5. Inspect cable placement, cable termination, grounding and bonding, equipment, and patch cords, and labeling of all components.

L. Category 6A Modular Plug Termination Link Testing Requirements:
   1. Each cabling link shall be tested for:
      a. Wire Map
      b. Length
      c. Propagation Delay
      d. Delay Skew
      e. DC Loop Resistance
      f. Insertion Loss
      g. NEXT (Near-End Cross Talk)
      h. PS NEXT (Power Sum Near-End Cross Talk)
      i. ACR-N (Power Sum Attenuation to Crosstalk Ratio Near-End)
      j. ACR-F (Attenuation to Crosstalk Ratio Far-End)

k. PS ACR-F (Power Sum Attenuation to Crosstalk Ratio Far-End)
l. Return Loss

2. All installed cabling Modular Plug Terminated Links shall be field-tested and pass the test requirements and analysis as dictated by the Manufacturer to achieve the extended warranty. Any Modular Plug Terminated Link that fails these requirements shall be diagnosed and corrected until the Modular Plug Terminated Links meets the performance requirements. The final and passing results of the tests for all Modular Plug Terminated Links shall be provided in the test results documentation.
3. Modular Plug Terminated Links shall comply with the Permanent Link transmission requirements of the ANSI/TIA-568-2.D standard.
   a. The MPTL shall be tested with a Permanent Link Adapter on the Main Unit and a Patch Cord Adapter suitable for Category 6A testing on the Far End or Remote Test Equipment
4. Acceptance of the test results shall be given in writing after the project is fully completed and tested in accordance with the Contract Documents and to the satisfaction of the Owner.

M. Category 5e and Above Permanent Link Testing Requirements:
1. Each Cabling Link shall be tested for:
   a. Wire Map
   b. Length
   c. Propagation Delay
   d. Delay Skew
   e. DC Loop Resistance
   f. DC Resistance Unbalance within a pair
   g. DC Resistance Unbalance between pairs
   h. Insertion Loss
   i. NEXT (Near-End Cross Talk)
   j. PS NEXT (Power Sum Near-End Crosstalk)
   k. ACR-N (Attenuation to Crosstalk Ratio Near-End)
   l. PS ACR-N (Power Sum Attenuation to Crosstalk Ratio Near-End)
   m. ACR-F (Attenuation to Crosstalk Ratio Far-End)
   n. Return Loss
   o. TCL (Transverse Conversion Loss)
   p. ELTCTL (Equal Level Transverse Conversion Transfer Loss)
2. All installed cabling Permanent Links shall be field-tested and pass the test requirements and analysis as dictated by the Manufacturer for the extended warranty. Any Permanent Link that fails these requirements shall be diagnosed and corrected. Any corrective action that must take place shall be documented and followed with a new test to prove that the corrected Permanent Link meets performance requirements. The final and passing result of the tests for all Permanent Links shall be provided in the test results documentation.
3. Acceptance of the test results shall be given in writing after the project is fully completed and tested in accordance with the Contract Documents and to the satisfaction of the Owner.

N. Fiber Optic Cabling Test Requirements:
1. All tests performed on optical fiber cabling that uses a laser or LED in a test set shall be carried out with safety precautions in accordance with ANSI Z136.2.

2. The tests must be carried out by trained technicians who have successfully attended an appropriate training program, which includes testing with an OLTS and an OTDR and have obtained a certificate as proof thereof. These certificates may have been issued by any of the following organizations or an equivalent organization:
   a. Manufacturer of the fiber optic cable and/or fiber optic connectors.
   b. Manufacturer of the test equipment used for the field certification.
   c. Training Organizations (e.g. BICSI).
3. Link and channel test results from the OLTS and OTDR shall be recorded in the test instrument upon completion of each test for subsequent uploading to a PC in which the administrative documentation (reports) may be generated.
4. Fiber end faces shall be inspected at 200X and 400X magnification. 200X magnification is suitable for inspecting multimode and singlemode fibers. 400X magnification may be used for detailed examination of singlemode fibers. Scratched, pitted, or dirty connectors shall be diagnosed and corrected.
5. Testing shall be performed on each cabling segment (connector to connector)Testing shall be performed on each cabling channel (equipment to equipment) that is planned for use per the owner's instructions.
6. Testing of the cabling shall be performed using high-quality test cords of the same fiber type as the cabling under test. The test cords for OLTS testing shall be between 1m and 4m in length. The test cords for OTDR testing shall be approximately 100 m for the launch cable and at least 25 m for the receive cable.
7. Optical Loss Testing:
   a. Horizontal/Backbone Link:
      1) Multimode links shall be tested at 850 nm and 1300 nm in accordance with ANSI/TIA-526-14-B, one-cord reference method.
      2) Singlemode backbone links shall be tested at 1310 nm and 1550 nm in accordance with ANSI/TIA/EIA-526-7, Method A.1, One Reference Jumper equivalent method.
      3) Link attenuation does not include any active devices or passive devices other than cable, connectors, and splices, i.e. link attenuation does not include such devices as optical bypass switches, couplers, repeaters, or optical amplifiers.
   b. ODTR Testing:
      1) Fiber links shall be tested at the appropriate operating wavelengths for anomalies and to ensure uniformity of cable attenuation and connector insertion loss.
         a) Multimode: 850 nm and 1300 nm
         b) Singlemode: 1310 and 1550 nm
      2) Each fiber link and channel shall be tested in both directions.
      3) A launch cable shall be installed between the OTDR and the first link connection.
      4) A receive cable shall be installed after the last link connection
   c. Magnified End Face Inspection:
      1) Fibers shall be inspected at 250X or 400X magnification.
   d. Length Measurement:
      1) The length of each fiber shall be recorded.
      2) The optical length shall be measured using an OLTS or OTDR.

e. Polarity Testing
   1) Paired duplex fibers in multi-fiber cables shall be tested to verify polarity in accordance with Clause E.5.3 of ANSI/TIA-568-C.0. The polarity of the paired duplex fibers shall be verified using an OLTS.

8. Each cabling link shall be tested in compliance with the following Test Limits
9. Multimode Backbone: Perform tests in accordance with TIA-526-14.
10. Single Mode Backbone: Perform tests in accordance with TIA-526-7.
11. Links: Perform optical fiber end-to-end attenuation tests and field reel tests.

O. Cable Testers:
1. The field-test instrument shall be within the calibration period recommended by the manufacturer. Minimum calibration is 12 months prior to testing.
2. The tester shall have Level IIIe accuracy in accordance with ANSI/TIA-1152-A
3. The tester must be capable of storing > 10,000 results for all measurements listed above.
4. Acceptable Manufacturers:
   a. Fluke Networks
   b. Prior approved manufacturer.

P. Final Verification Tests: Perform verification tests for UTP systems after the complete communications cabling and workstation outlet/connectors are installed.
1. Voice Tests: These tests assume that dial tone service has been installed. Connect to the network interface device at the demarcation point. Go off-hook and listen and receive a dial tone. If a test number is available, make and receive a local, long distance, and digital subscription line telephone call.
2. Data Tests: These tests assume the Information Technology Staff has a network installed and is available to assist with testing. Connect to the network interface device at the demarcation point. Log onto the network to ensure proper connection to the network.

END OF SECTION

SECTION 27 4100 - AUDIO VIDEO SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Related Drawings:
1. Audio Video (AV) Drawings
2. Theatrical Drawings
3. Electrical Drawings
4. Architectural Drawings
5. Technology Drawings
6. Theatrical Rigging Drawings

C. Coordinate work with other trades to properly execute the work within this specification.

D. System features mentioned in this specification, or shown on the AV drawings, are required, whether they are listed in both places. Where there is conflict between this specification or the AV drawings, the more stringent requirement shall apply.

1.02 BIDDER RESPONSIBILITY

A. This specification and the AV drawings are detailed only to the extent necessary to show design intent and signal flow. The bidder shall examine and be thoroughly familiar with all contract drawings, design intent, systems specified, their installation, configuration, and industry best practices. The contractor is responsible for all devices and configuration required to produce a fully functional system, including devices that may not be documented on either this specification or the AV drawings. Equipment required to meet this stipulation shall be provided without claim for additional payment. Specific products to meet the required functionality are listed within this specification and notated within the AV drawing package.

1.03 SUMMAY

A. furnish and install sound, video, and communication systems as shown on drawings and as specified herein, complete with all apparatus, equipment, power supplies, wiring, labor, and services necessary to ensure a complete working system. Verify completeness of equipment listed and correctness of type numbers. Furnish and install supplementary equipment needed to meet system requirements, without claim for added payment. Labor furnished shall be specialized and experienced in systems installation.

B. Furnish any engineering services to provide a complete and professionally installed systems.

C. All areas shall receive new cabling as specified.

D. This work includes, but is not limited to the following:
   1. Furnish all back boxes and enclosures.
   2. Deliver to the job site all back boxes which are to be installed by others.
   3. Furnish and install all wire and cable.
   4. Furnish any additional items, not specifically mentioned herein, to meet system requirements as specified, without claim for additional payment. Such items may include hardware, transformers, line/distribution amplifiers, and other devices for proper installation, interface, isolation or gain structure.
   5. Programming and documenting of all software-controlled devices. Provide DSP and control system programming prior to final testing, if requested by the Consultant.
   6. Refer to Submittals section of this specification for all submittal requirements.
   7. Provide frequency scanning and coordination for all AV system wireless transmitters and receivers. Account for local frequencies used by others within the surrounding area.
   8. Setup and adjustment of signal processing, system tests and adjustments, written report, demonstration for approval, participation in acceptance tests and final adjustments where required.
   9. Submission of shop drawings prior to fabrication.
   10. Verification of dimensions and conditions at the job site.
   11. Installation in accordance with these specifications, manufacturer's recommendations, and all applicable code requirements.
   12. Setup and adjustment of signal processing, system tests and adjustments, written report, demonstration for approval, participation in acceptance tests, and final adjustments as required.
   13. Coordination with the Electrical Contractor is required to assure correct Systems conduit routing, Systems backbox locations, and clean power circuit locations as specified in Division 26 – Electrical.
   14. Coordination with the Lighting Contractor
   15. Coordination with the Fire Alarm Systems Contractor
   16. Coordination with the Tel/Data Contractor and other Low Voltage Contractors
   17. Coordination with the Owner's IT department and installers
   18. Performance standards, without claim for additional payment
   19. System Documentation
   20. Instruction of owner's operating personnel
   21. Maintenance and services for one year
   22. Guarantee all equipment and components for the specified period from the date of acceptance.

E. All work described within this section must be coordinated with other trades to ensure a successful installation.

1.04 SUBMITTALS

A. Provide Submittals in accordance with requirements of Division 01 – General Requirements and as described within this specification.

B. Bidder Qualifications (Pre-Bid Submittal):

1. Perspective bidders must be thoroughly experienced in installing, engineering, configuring and testing systems of the scope and size specified. Bidders must be a system integrator, normally engaged in the business of audiovisual and sound reinforcement system installation. Bidder shall provide a list of systems their company has furnished and installed of similar size and scope within the last (5) years. Indicate project name, address, and reference.
2. Bidder shall have qualified CTS, CTS-D, and CTS-I engineers, technicians, and project managers who will be assigned to this project. A CTS-D and CTS-I shall be employed on this project for the entirety of the installation and close-out.
3. The bidder shall have a qualified and certified system programmer who will program the system. Submit any and all manufacturer certifications related to system programming, DSP programming, and control programming.

C. Bid Submittals:
1. In conjunction with the bidding requirements set forth in the Division 01 documents, the bidder shall submit itemized unit prices for all devices, or their equivalents, listed within this specification or documented on the AV drawings.
2. The bid price shall include any Add-Alternates described.

D. Product Data: Submit manufacturer's technical data, product specifications, installation instructions, and other pertinent information as applicable for each product or material specified or required. Do not procure material or begin work until product data and shop drawing submittals have been approved. All product data shall be submitted in one submission, in PDF format, with manufacturer provided specifications and cutsheets.

E. Shop Drawings: Shop drawings shall be created in ACAD or equivalent and submitted electronically in DWG and PDF.
1. Include plan view locations, elevations, installation details, and accessories.
2. Functional Block Diagram: Show single-line interconnections between components for signal transmission and control. Show cable types and sizes. Show all transformers, switches, relays, and control circuits.
3. Drawings of loudspeaker mounting arrangements, equipment rack layouts, and receptacle and control plates and boxes.
4. Plate and panel schedule listing all plates individually with size, mounting condition, backbox size, and plate finish color.
5. Drawings of projector mounting arrangement and line of sight studies showing proper alignment and dimensions with the projection screen and projection equipment.
6. Complete list of wire run numbers and termination locations of each end.
7. Schematic diagrams of patch bays.
8. Drawings of final assemblies of loudspeaker, screen, and projector suspension equipment stamped by a certified structural engineer. Each system solution must be separately engineered, verified, and stamped.
9. Provide IP address table and addressing protocol in coordination with Owner's IT department.
10. Provide mockup of all system graphical user interface screens. Supply narrative and demonstration of all touch panel programming. Supply panel layouts and button functions listed.

11. Submit equipment rack layouts.
12. Submit samples of lettering/label size and typeface for custom plates, panels, or other equipment where required.
13. Provide EDID and HDCP management plan for all video signals.
14. Consultant and Architect shall approve all panel and furniture finishes. The Consultant and Architect may request samples of finishes which the Contractor shall provide at no additional cost to the project.
15. Provide conduit riser documented in plan and elevation view.

F. Closeout Submittals:
1. Create user manuals for all devices within the system, including instructions for how to use the device.
2. Create and mount a simplified line diagram protected in a plastic sheath and mount behind each AV cabinet.
3. Create floor plans showing locations of all faceplates, interconnections, speakers, projectors, and their cable paths, including cable identification on 11x17 drawings. Deliver to owner upon completion of the installation.
4. Create record drawings on 30x42 drawings of as-built conditions in ACAD or equivalent and deliver electronically and in PDF format.
5. Operating and Maintenance instructions for each product. O&Ms shall be complete for each device.
6. Contractor's written warranty for all parts and labor for a period of one year from project acceptance.
7. Manufacturer's standard product warranty. Extend all special warranties to project where available.
8. Equipment List: Include every piece of equipment by model number, manufacturer, serial number, location, and date of original installation.
9. List of spare and replacement parts recommended to be stored at the site for ready access.

1.05 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain all materials from one source from a single approved manufacturer for each different product required.

B. All materials shall be new and shall conform to applicable provisions of Underwriters Laboratories and the American Standards Association.

C. The contractor awarded this project is responsible for all permits, licenses, and inspections unless otherwise noted.

D. Follow latest federal, state, and local electrical and safety codes. Where conflicts exist, apply the most stringent requirement.

E. Certification: CE, FCC Class A

F. Contributing Organizations – The Organizations listed below have published standards used to establish the technical references to be followed under this scope of work.
1. Acoustical Society of America (ASA) (ASC S1)

2. Alliance for Telecommunications Industry (ATIS) (ASC T1)
3. American Society of Safety Engineers (ASSE) (ASC A1264)
4. Audio Engineering Society (AES) (ASC S4)
5. Electronics Industry Alliance (EIA) (CEMA)
6. Entertainment Services and Technology Association (ESTA) (ASC E1)
7. Institute of Electrical and Electronics Engineers (IEEE) (ASC C136) (802.1)
8. International Cable Engineers Association (ICEA) Formerly IPCEA
9. International Standards Organization (ISO)
10. National Electrical Manufacturer's Association (NEMA) (ASC C119)
11. National Fire Protection Associations (NFPA)
12. National Safety Council (NSC) (ASC A10)
13. Photographic and Imaging Manufacturer's Association (PIMA)
14. Society of Motion Picture and Television Engineers (SMPTE)
15. Telecommunications Industry Association (TIA)
16. Underwriters Laboratories (UL) (ASC C101) (CE)
17. NTSC
18. National Association of Broadcasters (NAB) – System technical standards for video and RF compliance are listed in the most recent edition of the NAB Handbook

G. Applicable Performance Standards – Execute all Division work in accordance with the following standards:
1. ANSI S4.48-1992 (R1998): Recommended Practice for the Application of Connectors, Part 1, XLR-Type polarity, and gender
2. ANSI S4.55-1997: Recommended Practice for conservation of the Polarity of Audio Signals
3. ANSI S4.56-1997: Recommended Practice for the subjective evaluation of Loudspeakers
4. ANSI S12.2-1995 (R1999): Criteria for Evaluating Room Noise
5. ANSI T1.217-1991 (R1998): Integrated Services Digital Network (ISDN) Management – Primary Rate Physical Layer
6. ANSI T1.522-2000: Quality of Service (QOS) for Business Multimedia Conferencing. Specifies classes of Service for conferencing on IP Networks
7. AES15: ANSI S4.49: AES Recommended practice for Sound Reinforcement Systems – Communications Interface PA-422.
8. AES-R1-1997 AES project report for professional audio: Specifications for audio on high capacity media
9. AES14-1992 (r1998) AES standard for professional audio equipment --Application of connectors, part 1, XLR-type polarity and gender
10. AES24-1-1999, (Revision of AES24-1-1995) AES standard for sound system control - Application protocol for controlling and monitoring audio devices via digital data networks
11. AES26-2001 (Revision of AES26-1995) AES recommended practice for professional audio -- Conservation of the polarity of audio signals
12. ANSI/TIA/EIA 606-1993: Standard for the Telecommunications Infrastructure of Commercial Buildings
13. ANSI/TIA/EIA 607-1994: Commercial Building Grounding and Bonding Requirements for Telecommunications

14. IEEE 149-1979 (R1990): Test Procedure for Antennas
15. IEEE 1100-1999: Powering and Grounding Sensitive Electronic Equipment
16. NEMA 250-2001: Enclosures for Electrical Equipment
17. SMPTE 292M: SMPTE 292M defines the base 1.485Gbps HD-SDI. Note: This standard can handle all HD formats except 1920*1080 @ 50P and 60P.
18. SMPTE 372M: Uncompressed Dual-Link HD-SDI for 50P & 60P
19. SMPTE 424M: 2.97 Gbps HD-SDI for 50P & 60P
20. TIA/EIA-568-B: Digital audio over Cat5 audio cable
21. UL 1047-1999: Isolated Power Systems Equipment
22. UL 1581-1998: Reference Standard for Electrical Wires, Cables, and Flexible Cords
23. UL 1682-1998: Standard for Safety for Plugs, Receptacles, and Cable Connectors, of the Pin and Sleeve Type up to 800 Amperes and up to 600 volts ac or dc.
24. UL 467-1998: Grounding and Bonding Equipment
25. UL 813-1999: Commercial Audio Equipment and accessories for use in commercial enterprises… this standard was originally listed for public review in the October 13, 1995 issue of Standards Action. It is being resubmitted owing to substantive changes in the text.
26. ANSI/TIA/EIA-568-A: Commercial Building Telecommunications Cabling
27. ANSI/TIA/EIA-569-A: Commercial Building Standard for Telecommunications Pathways and Spaces
28. ANSI/TIA/EIA-607: Commercial Building Grounding and Bonding Requirements for Telecommunications
29. ANSI/TIA/EIA TSB-72: Centralized Optical Fiber Cabling Guidelines
30. ANSI/TIA/EIA-526-14A: Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant
31. ANSI/TIA/EIA-526-7 Measurement of Optical Power Loss of Installed Single mode Fiber Cable Plant
32. ANSI/IEEE C-2 National Electrical Safety Code how to install cabling in accordance with the most recent edition of BICSI® publications:
33. BICSI Telecommunications Distribution Methods Manual
34. BICSI Cabling Installation Manual

1.06 DELIVERY, STORAGE AND HANDLING

A. Take care in handling products in accordance with manufacturer's instructions.

B. Store indoors in original undamaged packaging, in a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity. Store products upright in secure, protected area. Do not stack! Verify with manufacturer that site conditions are acceptable before receiving material.

C. Environmental Conditions: Capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:
   1. Interior, Controlled Environment: System components installed in temperature-controlled interior environments shall be rated for continuous operation in ambient temperatures of 36 to 122 deg F (2 to 50 deg C) dry bulb and 20 to 90 percent relative humidity.
   2. Drop shipping of equipment to the Owner's site is not allowed.

1.07 WARRANTY and Guarantee

A. All systems and components shall be guaranteed free of defects in materials and workmanship for a period of one (1) year (or to the length of the Manufacturer's warranty if longer) from the date of acceptance and shall be repaired or replaced within forty-eight (48) hours following report of such defects by the owner.

B. The Contractor shall be available on call and on eight (8) hour notice during the first month following acceptance of the system, to assist the Owner's representatives in any problems which may arise during the initial period of operation. If corrective measures on-site are required, they will be performed within 12 hours of the determination of a need for a site visit.

C. If, during the Guarantee period, any component is out of service for more than seven (7) days due to unavailability of parts or service, Contractor shall supply and install an identical new component. If an identical component is not available, Contractor will substitute equivalent equipment, with the approval of the Owner.

D. During the course of the Guarantee period, the Systems Contractor will provide the Owner with a 24 hour service phone number for emergency calls. A service engineer will respond to all emergency calls within one (1) hour. The personnel answering this call must be fully qualified to troubleshoot problems and propose solutions. A qualifying emergency event is defined as an event that may cause severe hardship or cause the systems to be inoperable or unusable for a scheduled class or event.

E. During the course of the Guarantee period, the Contractor shall provide a minimum of three (3) service visits to the site for inspection and adjustment of equipment. Contractor shall submit proposed schedule for these visits and shall notify Owner and Systems Designer in writing at least one month in advance of each visit.

F. During the course of the guarantee period, the Systems Contractor will supply the Owner with any published updates of manufacturer provided operating programs for any and all software-controlled equipment that are issued to correct "bugs". During the Guarantee period, the Owner will rely on the Systems Contractor to determine when to update the software, unless it is needed to correct a situation that renders the systems unstable, non-functional, or otherwise affects operations.

G. Repeated device failures, defined as the failure of a device or a single type of device three or more times over three contiguous months, will be considered as a failure of a manufactured system and all items of this type shall be replaced at no charge to the Owner.

H. At least one representative of the Systems Contractor, well versed in the installation and the operation of the systems, shall be on site in support of the Owner for the first significant public event in each space (as determined by the Owner) where the system will be used. The Contractor representative(s) for this event shall also be competent in show operations.

I. Contractor is to coordinate ongoing remote access to AV Systems Networks for support and troubleshooting. Owner to provide the access at their discretion.

PART 2 - PRODUCTS

2.01 SUBSTITUTIONS

A. Certain items of equipment specified by the manufacturer's type numbers to indicate an acceptable standard of quality and performance. Substitutions of equal equipment beyond the alternatives listed will be permitted only if such equipment is listed in an addendum to this specification. Address requests for listing substitutions to the Architect. With any request for substitution, include measured data providing the equivalence of the proposed substitution in quality and performance. The consultant shall be the final judge of the validity of the data submitted.

B. The submitted request shall include the following:
   1. List of advantages to the system
   2. Cost savings
   3. Printed specifications
   4. Previous field experience using the substitution.

C. Major Equipment approved manufacturer equivalents:
   1. AVoIP Video Distribution:
      a. AVPro Edge
      b. Crestron
   2. Digital Signal Processing and Control:
      a. Symmetrix
      b. Biamp
   3. Loudspeakers:
      a. Community
      b. D&B Audio
   4. Wireless Microphone Systems:
      a. Sennheiser
   5. Digital Mixing and Digital Snake:
      a. Yamaha
   6. Electric Screen:
      a. DA-LITE
   7. Large Format Projector:
      a. Panasonic
      b. Christie
   8. AV Cabinets & Racks:
      a. Hubbell
      b. Equivalent
   9. Assisted Listening Systems:
      a. Williams AV
   10. Digital Audio Distribution:
      a. Biamp
      b. RDL

2.02 MAJOR EQUIPMENT

GREENWICH CENTRAL MIDDLE SCHOOL MAJOR EQUIPMENT - SPECIALTY AV

1. Contractor shall confirm all quantities against drawings and specifications.
2. Where discrepancies between drawings and specifications are present, the stronger and more stringent requirement shall be furnished.
3. This list shall not be considered a complete list of required material. Contractor shall furnish all required material for a fully functional system.
4. Finish color of all facilities panels and equipment in public view (touch panels, loudspeakers, custom panels, faceplates, etc. must be confirmed with the architect.

AUDITORIUM 1127

SPEAKERS & AMPLIFIERS

Device	Description	Manufacturer	Model	QTY
12" Subcardioid Line Array Module	LCR Auditorium Speaker	Fulcrum Acoustic	CX1226	3
6.5" Coaxial Loudspeaker	Delay Fill	Fulcrum Acoustic	RX6	4
15" Coaxial Cardioid Stage Monitor	Stage Monitor	Fulcrum Acoustic	FW15	2
Loudspeaker Custom Factory Painted Color	Custom	By Contractor	By Contractor	A/R
Loudspeaker Rigging / Signed & Stamped Dwg	Custom	By Contractor	By Contractor	A/R
Eight-Channel Network Amplifier	Auditorium Amplifier	QSYS	CX-Q 8K8	1
Four-Channel Network Amplifier	Auditorium Amplifier	QSYS	CX-Q 2K4	1

WIRELESS MICROPHONE SYSTEM

Device	Description	Manufacturer	Model	QTY
Antenna Distribution System	Ant Distro	SHURE	UA844+	1
Cable	Ant Cable	SHURE	UA8100 or equiv.	A/R
Active Antenna Amplifier	Ant. Amp	SHURE	UA834WB	A/R
2" Antenna Cable	Ant. Cable	SHURE	UA802 or equiv.	2
Mounting Flange	Mounting Flange	SHURE	A13HDB	2
1/2-wave Antenna	Antenna	SHURE	UA860WB	2
Quad-Channel Digital Wireless Receiver	Wirless Mic Reciever	SHURE	ULXD4Q	3
Digital Bodypack Transmitter	Bodypack	SHURE	ULXD1	12
Earset Headworn Microphone	Headworn Mic	SHURE	MX153	12
Cardioil Lavalier Microphone	Lapel Mic	SHURE	WL185	12
Wireless Handheld Microphone w/ Capsule	Wireless Handheld	SHURE	ULXD2/B87A	12
Wireless Gooseneck Base Transmitter	Wireless Gooseneck Base	SHURE	ULXD8	12
Microflex 15" Modular Gooseneck Mic	Gooseneck Mic	SHURE	MX415	12
Lithium-Ion Rechargeable Battery	Rechargeable Battery	SHURE	SB900B	12
8-Bay Shure Battery Charger	8-Bay Charger	SHURE	SBC800	4

AUDIO DISTRIBUTION SYSTEM

Device	Description	Manufacturer	Model	QTY
Dante/AES67 Network Audio Wallplate	Digital XLR	QSYS	unDX4I	3
16x4 96kHz Expander	Audio Interface	Allen & Heath	DX164-W	1
48 Channel 96 kHz Digital Mixer	Digital Mixer	Allen & Heath	SQ7	1

64 x 64 Dante Card for SQ Series	Dante Card	Allen & Heath	AH-M-SQ-SDANTE64-A	1
Dust Cover for SQ7	Dust Cover	Allen & Heath	AH-AP11334	1
FLOOR BOX				
Device	**Description**	**Manufacturer**	**Model**	**QTY**
4" Deep Floor Box	Floor Box	FSR	FL-500P-4-B	1
VIDEO DISTRIBUTION SYSTEM				
Device	**Description**	**Manufacturer**	**Model**	**QTY**
4K UHD AVoIP Encoder, Bluetooth, HDMI, DANTE	Encoder	Visionary Solutions	DuetE-WP-BT	5
4K UHD AVoIP Encoder, Bluetooth, HDMI, DANTE	Surface Encoder	Visionary Solutions	DuetE-2 Encoder	1
4K UHD AVoIP Decoder	Decoder	Visionary Solutions	D4200	1
CONTROL SYSTEM				
Device	**Description**	**Manufacturer**	**Model**	**QTY**
10" High Definition Touch Screen Controller	10" Control Panel	QSYS	TSC-101-G3	1
7" High Definition Touch Screen Controller	7" Control Panel	QSYS	TSC-70-G3	4
Desk Mount For Touch Screen Controller	Desk Mount	QSYS	By Contractor	2
7" Control Panel Rack-Mount	Rack Mount	By Contractor	By Contractor	1
ELECTRIC SCREEN & PROJECTOR				
Device	**Description**	**Manufacturer**	**Model**	**QTY**
16:9, 298" Diagonal, 110V, Matt White	298" Electric Screen	Draper	114614	1
20K Lumen, 3LCD Laser Projector	Projector	Epson	EB-PU2220B	1
Appropriate Lens (Field Verify)	Projector Lens	Epson	By Contractor	1
Projector Rigging / Signed & Stamped Dwg	Custom	By Contractor	By Contractor	A/R
DIGITAL SIGNAL PROCESSOR & NETWORK ELECTRONICS				
Device	**Description**	**Manufacturer**	**Model**	**QTY**
Integrated Core Processor	DSP	QSYS	Core 510i	1
Line Output Card	Line Out	QSYS	COL4	1
High Performance Mic/Line Input Card	Line In	QSYS	CIML4-HP	1
Software Based Dante 128x128 Channel Lic.	Dante License	QSYS	SLDAN-128-P	1
Software Based UCI Deployment Software	Deployment License	QSYS	SLQUD-510-P	1
Scripting Engine Software License	Scripting License	QSYS	SLQSE-510-P	1
40x1G PoE+ 960W and 8xSFP+ Managed Switch	Network Switch	Netgear	GSM4248PX	1
AV CABINET & ASSOCIATED DEVICES				
Device	**Description**	**Manufacturer**	**Model**	**QTY**
40RU Large Pivoting Rack	AV Rack	Middle Atlantic	SR-40-28	2
Mix Position AV Rack	Rolling Rack	Middle Atlantic	PTRK-14	1
2kVa Uninterruptible Power Supply	UPS	Middle Atlantic	UPS-2200R	1
Veritcal Power Distribution	Power Strip	Middle Atlantic	By Contractor	A/R
2RU Rack Drawer	Rack Drawer	Middle Atlantic	UD2	Per Dwg

4RU Rack Drawer	Rack Drawer	Middle Atlantic	UD4	Per Dwg
ADA COMPLIANT ASSISTED LISTENING SYSTEM				
Device	**Description**	**Manufacturer**	**Model**	**QTY**
Assisted Listening Transmitter 72MHz	ALS Transmitter	Listen Technologies	LT-800-072-01	1
Assisted Listening Reciever	ALS Receiver	Listen Technologies	LR-4200-072	22
Assisted Lisetning Headphones	ALS Headphones	Listen Technologies	LA-402	22
Assisted Listening Neckloop Induction Coil	ALS Coil	Listen Technologies	LA-430	22
Assisted Lisetning 12-Unit Charging Case	ALS Charging Case	Listen Technologies	LA-381	2
Assisted Listening Battery Pack Rechargeable	ALS Battery	Listen Technologies	LA-365	22
Assisted Listening Replacement Cushions	ALS Cushion	Listen Technologies	LA-167	100
LOOSE EQUIPMENT				
Device	**Description**	**Manufacturer**	**Model**	**QTY**
Headphones	Headphone	SONY	MDR-506	5
Dynamic Cardioid Microphone	Mic	SHURE	SM57-LC	12
Dynamic Cardioid Vocal Microphone	Mic	SHURE	SM58-LC	12
Condenser Cardioid Microphone	Mic	SHURE	SM81-LC	6
Condenser Sid Cardioid Microphone	Mic	SHURE	SM27-LC	6
Microphone Road Case	Mic Road Case	Gator	G-Tour M15	4
Choir Microphone Boom Stand	Mic Stand	K&M	21021	4
Round Base Microphone Stand	Mic Stand	K&M	KM26010	4
Tabletop Microphone Stand	Mic Stand	K&M	23325	6
Supercardioid Microphone	Kick Mic	AKG	D112	1
Dynamic Cardioid Microphone	Drum Kit Mic	Sennheiser	e604	5
Condenser Shotgun Microphone	Shotgun Mic	Sennheiser	MKH8060	2
Active Instrument DI Box	DI Box	Radial Labs	J48	4
Microphone Cable - 20'	20' Cable	Whirlwind	MK420	20
Microphone Cable - 50'	50' Cable	Whirlwind	MK450	20
Drum Microphone Clip	Mic Clip	SHURE	A75M	5
MISC. EQUIPMENT & LABOR				
Description		**Manufacturer**	**Model**	**QTY**
Termination, faceplates, cabling, backboxes, and conduit		By Contractor	By Contractor	A/R
Installation, mounting of all devices, commissioning, configuration		By Contractor	By Contractor	A/R
Software Licenses for a fully functional system		By Contractor	By Contractor	A/R
CAFETERIA 1086				
SPEAKERS & AMPLIFIERS				
Device	**Description**	**Manufacturer**	**Model**	**QTY**
Full Range Ceiling Mount Loudspeaker	Flush Mount Speaker	QSYS	AC-C6T	8

Four-Channel Network Amplifier	Cafeteria Amplifier	QSYS	CX-Q 2K4	1
WIRELESS MICROPHONE SYSTEM				
Device	**Description**	**Manufacturer**	**Model**	**QTY**
Antenna Distribution System	Ant Distro	SHURE	UA844+	1
Cable	Ant Cable	SHURE	UA8100 or equiv.	A/R
Active Antenna Amplifier	Ant. Amp	SHURE	UA834WB	A/R
2" Antenna Cable	Ant. Cable	SHURE	UA802 or equiv.	2
Mounting Flange	Mounting Flange	SHURE	A13HDB	2
1/2-wave Antenna	Antenna	SHURE	UA860WB	2
Quad-Channel Digital Wireless Receiver	Wirless Mic Reciever	SHURE	ULXD4Q	1
Digital Bodypack Transmitter	Bodypack	SHURE	ULXD1	4
Cardioil Lavalier Microphone	Lapel Mic	SHURE	WL185	4
Wireless Handheld Microphone w/ Capsule	Wireless Handheld	SHURE	ULXD2/B87A	4
Lithium-Ion Rechargeable Battery	Rechargeable Battery	SHURE	SB900B	4
8-Bay Shure Battery Charger	8-Bay Charger	SHURE	SBC800	1
AUDIO DISTRIBUTION SYSTEM				
Device	**Description**	**Manufacturer**	**Model**	**QTY**
Dante/AES67 Network Audio Wallplate	Digital XLR	QSYS	unDX4I	1
CONTROL SYSTEM				
Device	**Description**	**Manufacturer**	**Model**	**QTY**
7" High Definition Touch Screen Controller	7" Control Panel	QSYS	TSC-70-G3	1
VIDEO DISTRIBUTION SYSTEM				
Device	**Description**	**Manufacturer**	**Model**	**QTY**
AVoIP Encoder	Encoder	Visionary Solutions	DuetE-WP-BT	1
AVoIP Decoder	Decoder	Visionary Solutions	D4200	2
DIGITAL DISPLAYS				
Device	**Description**	**Manufacturer**	**Model**	**QTY**
65" Digital Display	Display	Samsung	QM65R	2
Digital Display Mount	Mount	Chief	LTM1U	2
DIGITAL SIGNAL PROCESSOR & NETWORK ELECTRONICS				
Device	**Description**	**Manufacturer**	**Model**	**QTY**
40x1G PoE+ 960W and 8xSFP+ Managed Switch	Network Switch	QSYS	NS26-300+	1
Digial Signal Processor	DSP	QSYS	Core 8 Flex	1
Dante 64x64 License	License	QSYS	SLDAN-64-P	1
Deployment Software	License	QSYS	SLQUD-8N-P	1
Scripting Engine Software License	License	QSYS	SLQSE-8N-P	1
AV CABINET & ASSOCIATED DEVICES				
Device	**Description**	**Manufacturer**	**Model**	**QTY**
Pivoting Rack	Wall Mounted Pivot Cabinet	Middle Atlantic	CWR-18-22PD	1
2kVa Uninterruptible Power Supply	UPS	Middle Atlantic	UPS-2200R	1
Veritcal Power Distribution	Power Strip	Middle Atlantic	By Contractor	A/R
ADA COMPLIANT ASSISTED LISTENING SYSTEM				
Device	**Description**	**Manufacturer**	**Model**	**QTY**
Assisted Listening Transmitter 72MHz	ALS Transmitter	Listen Technologies	LT-800-072-01	1
Assisted Listening Reciever	ALS Receiver	Listen	LR-4200-072	12

		Technologies		
Assisted Lisetning Headphones	ALS Headphones	Listen Technologies	LA-402	12
Assisted Listening Neckloop Induction Coil	ALS Coil	Listen Technologies	LA-430	12
Assisted Lisetning 12-Unit Charging Case	ALS Charging Case	Listen Technologies	LA-381	1
Assisted Listening Battery Pack Rechargeable	ALS Battery	Listen Technologies	LA-365	12
Assisted Listening Replacement Cushions	ALS Cushion	Listen Technologies	LA-167	100
LOOSE EQUIPMENT				
Device	**Description**	**Manufacturer**	**Model**	**QTY**
Dynamic Cardioid Vocal Microphone	Mic	SHURE	SM58-LC	4
Round Base Microphone Stand	Mic Stand	K&M	KM26010	4
Active Instrument DI Box	DI Box	Radial Labs	J48	4
Microphone Cable - 20'	20' Cable	Whirlwind	MK420	4
6' HDMI Patch Cables	6' HDMI	By Contractor	By Contractor	4
MISC. EQUIPMENT & LABOR				
Description		**Manufacturer**	**Model**	**QTY**
Termination, faceplates, cabling, backboxes, and conduit		By Contractor	By Contractor	A/R
Installation, mounting of all devices, commissioning, configuration		By Contractor	By Contractor	A/R
Software Licenses for a fully functional system		By Contractor	By Contractor	A/R
GYMNASIUM 1100				
SPEAKERS & AMPLIFIERS				
Device	**Description**	**Manufacturer**	**Model**	**QTY**
12" Passive Loudspeaker	Loudspeaker	EV	Sx100+	6
Eight-Channel Network Amplifier	Cafeteria Amplifier	QSYS	CX-Q 8K8	1
Loudspeaker Rigging / Signed & Stamped Dwg	Custom	By Contractor	By Contractor	A/R
WIRELESS MICROPHONE SYSTEM				
Device	**Description**	**Manufacturer**	**Model**	**QTY**
Antenna Distribution System	Ant Distro	SHURE	UA844+	1
Cable	Ant Cable	SHURE	UA8100 or equiv.	A/R
Active Antenna Amplifier	Ant. Amp	SHURE	UA834WB	A/R
2" Antenna Cable	Ant. Cable	SHURE	UA802 or equiv.	2
Mounting Flange	Mounting Flange	SHURE	A13HDB	2
1/2-wave Antenna	Antenna	SHURE	UA860WB	2
Quad-Channel Digital Wireless Receiver	Wirless Mic Reciever	SHURE	ULXD4Q	1
Digital Bodypack Transmitter	Bodypack	SHURE	ULXD1	4
Cardioil Lavalier Microphone	Lapel Mic	SHURE	WL185	4
Wireless Handheld Microphone w/ Capsule	Wireless Handheld	SHURE	ULXD2/B87A	4
Lithium-Ion Rechargeable Battery	Rechargeable Battery	SHURE	SB900B	4
8-Bay Shure Battery Charger	8-Bay Charger	SHURE	SBC800	1
AUDIO DISTRIBUTION SYSTEM				
Device	**Description**	**Manufacturer**	**Model**	**QTY**
Dante/AES67 Network Audio Wallplate	Digital XLR	QSYS	unDX4I	2
CONTROL SYSTEM				

Device	Description	Manufacturer	Model	QTY
7" High Definition Touch Screen Controller	7" Control Panel	QSYS	TSC-70-G3	2
DIGITAL SIGNAL PROCESSOR & NETWORK ELECTRONICS				
Device	**Description**	**Manufacturer**	**Model**	**QTY**
40x1G PoE+ 960W and 8xSFP+ Managed Switch	Network Switch	QSYS	NS26-300+	1
Digial Signal Processor	DSP	QSYS	Core 8 Flex	1
Dante 64x64 License	License	QSYS	SLDAN-64-P	1
Deployment Software	License	QSYS	SLQUD-8N-P	1
Scripting Engine Software License	License	QSYS	SLQSE-8N-P	1
AV CABINET & ASSOCIATED DEVICES				
Device	**Description**	**Manufacturer**	**Model**	**QTY**
Pivoting Rack	Wall Mounted Pivot Cabinet	Middle Atlantic	CWR-18-22PD	1
2kVa Uninterruptible Power Supply	UPS	Middle Atlantic	UPS-2200R	1
Veritcal Power Distribution	Power Strip	Middle Atlantic	By Contractor	A/R
ADA COMPLIANT ASSISTED LISTENING SYSTEM				
Device	**Description**	**Manufacturer**	**Model**	**QTY**
Assisted Listening Transmitter 72MHz	ALS Transmitter	Listen Technologies	LT-800-072-01	1
Assisted Listening Reciever	ALS Receiver	Listen Technologies	LR-4200-072	34
Assisted Lisetning Headphones	ALS Headphones	Listen Technologies	LA-402	34
Assisted Listening Neckloop Induction Coil	ALS Coil	Listen Technologies	LA-430	34
Assisted Lisetning 12-Unit Charging Case	ALS Charging Case	Listen Technologies	LA-381	3
Assisted Listening Battery Pack Rechargeable	ALS Battery	Listen Technologies	LA-365	34
Assisted Listening Replacement Cushions	ALS Cushion	Listen Technologies	LA-167	100
LOOSE EQUIPMENT				
Device	**Description**	**Manufacturer**	**Model**	**QTY**
Dynamic Cardioid Vocal Microphone	Mic	SHURE	SM58-LC	4
Round Base Microphone Stand	Mic Stand	K&M	KM26010	4
Active Instrument DI Box	DI Box	Radial Labs	J48	4
Microphone Cable - 20'	20' Cable	Whirlwind	MK420	4
MISC. EQUIPMENT & LABOR				
Description		**Manufacturer**	**Model**	**QTY**
Termination, faceplates, cabling, backboxes, and conduit		By Contractor	By Contractor	A/R
Installation, mounting of all devices, commissioning, configuration		By Contractor	By Contractor	A/R
Software Licenses for a fully functional system		By Contractor	By Contractor	A/R

2.03 GENERAL EQUIPMENT

A. Whenever any equipment is specified by manufacturer and model number, it is for purposes of establishing a standard of quality, performance, construction and function.

B. All materials and equipment shall be new and of the latest design or model offered for sale by the manufacturer.

C. Equipment models provided shall operate at the required AC line voltage and frequency.

D. Contractor shall provide quantities as indicated in the equipment list, detail drawings, location drawings, schedule of terminations, and as required for a complete installation.

2.04 AUDIO & VIDEO WIRE AND CABLE

A. All wire numbers listed in the drawings are Belden unless otherwise noted.

B. THHN wire is not an allowable substitute for twisted pair stranded loudspeaker wiring.

C. Approved manufacturers: Belden, Canare, Gepco, West Penn, Whirlwind

D. Where conflict exists with any codes or ordinances, such codes and ordinances shall take precedence.

E. Where conflict exists with electrical specifications, the higher standard or more stringent requirement shall apply.

2.05 SPECIFICATIONS – RACK MOUNT PANELS

A. Material: 11 gauge steel or 1/8" Aluminum, minimum thickness Finish: Black or to match adjacent equipment

B. Size: 19" wide, standard EIA mounting hole spacing, height as specified

2.06 SPECIFICATIONS – BACK BOX ENCLOSURES

A. Material: Code grade steel

B. Finish: Black or galvanized Size: As specified

2.07 SPECIFICATIONS – PLUG BOX AND TERMINATION PANELS

A. Material: 11 gauge steel or 1/8" Aluminum, minimum thickness Finish: Black (unless instructed otherwise by Architect)

B. Size: As specified

C. Approved Manufacturers: Steel City, Raco, Hoffman, Whirlwind, Pro Co, Wireworks

2.08 AUDIO TRANSFORMERS

A. All transformers shall be selected for proper interface and loading in the circuits as required by as-built conditions and per manufacturer's recommendations.

2.09 LOUDSPEAKER RIGGING EQUIPMENT:

A. Provide rigging for loudspeakers and suspended loudspeakers. Provide with sufficient number of suspension points for field adjustment of loudspeaker aiming. Color to determine color. Verify that adequate clearance from all other hanging components and adequate clearance from structural steel is provided. Provide all required hardware necessary for the safe and proper installation of loudspeakers.

B. Available manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work, include but are not limited to:
   1. APE Rigging
   2. Polar Focus

2.10 DETAIL DRAWINGS

A. Furnish all materials and labor to provide complete and finished work even though not specifically shown on the drawings.

B. Detail drawings are located in large format AV drawings.

PART 3 EXECUTION

3.01 AUDIO SYSTEM REQUIREMENTS

A. Requirements herein refer to materials and work which are related to or part of the Systems. Where conflict exists with other specifications concerning such work or materials, this specification takes precedence unless otherwise approved in writing by the Owner.

3.02 INSTALLATION OF SYSTEMS

A. Locate all apparatus requiring adjustments, cleaning or similar attention so that it will be accessible for such attention. Equipment racks shall be positioned to permit full access for operation and service.

B. Furnish and install brackets, braces and supports. All mounting hardware shall be included.

C. All bolts and fasteners must be Grade 5 or better.

D. All bolted attachments to have lock washers or other self-locking fasteners.

E. Provide all required mounting brackets and framing, hardware and components, safety systems and rigging systems using the following minimum design factors (given as ratio of working load limit (WWL) : rated breaking load):
   1. 5:1 – Minimum design factor for all mounting components regardless of mounting condition.

2. 5:1-8:1 – Minimum design factor for manufacturer provided mounts & assemblies where engineered stamped documentation and destructive testing data is provided by manufacturer.
3. 10:1 – For all hardware and connecting assemblies between manufacturer rated assemblies when equipment is hung above the general public. This includes but is not limited to wire rope, bolts, shackles, turnbuckles, beam clamps, supplemental steel provided by Systems contractor and other connecting hardware.
4. Design factor calculations to be provided with all equipment mounting details.
5. Systems Contractor shall coordinate required additional blocking, supplemental steel or channel strut supports with Main Contractor & specific trade contractors.
6. All mounting systems not provided as a complete package from a single manufacturer must be engineered, approved, and have drawings stamped by a professional rigging engineer or licensed structural engineer, as approved by the Main Contractor. The engineer shall verify that the design meets or exceeds design criteria for this particular use case. Each mounting system solution must be separately engineered, verified, and stamped.

F. All supporting structures and enclosures supplied by the Contractor not having a standard factory paint finish shall be painted. Paint specifications will be supplied by the Architect or indicated herein.

G. Provide custom color or finish for any equipment or materials supplied which are exposed to public view. Color and finish of all such equipment or materials shall be approved in writing by the Architect. This does not exclude equipment or materials where standard colors and finishes may be specified herein.

H. Finish of blank panels and custom assembly panels shall match adjacent equipment panels. Verify all panel colors with Architect. All color choices should be clearly indicated on panel drawing submittals, and on the panel schedule.

I. Switches, connectors, jacks, receptacles, outlets, cables and cable terminations shall be logically and permanently marked. Custom panel nomenclature shall be engraved, etched or screened. Markings for these items are detailed in the drawings to ensure consistency and clarity. Verify any changes in working type size and/or placement with the Systems Designer prior to marking.

J. Protect equipment and related wiring where construction conditions may cause damage or environmental conditions exceed manufacturer’s specifications.

K. The standard reference for the layout and construction of the system shall be:
   1. Giddings, Philip. Audio Systems Design and Installation.

L. All cables, connectors and peripheral equipment’s required to attain a fully functional system shall be furnished, installed and performed by the contractor awarded this project.

M. Locate all apparatus requiring adjustments, cleaning or similar attention so that it will be accessible for such attention.

N. Provide custom color or finish for any equipment or materials supplied which are exposed to public view. Color and finish of all such equipment or materials shall be approved in writing by

the Architect. This does not exclude equipment or materials where standard colors and finishes may be specified herein.

O. Switches, connectors, jacks, receptacles, outlets, cables and cable terminations shall be logically and permanently marked. Custom panel nomenclature shall be engraved, etched or screened. Markings for these items are detailed in the drawings to ensure consistency and clarity. Verify any changes in working type size and/or placement with the Systems Designer prior to marking.

P. The equipment specified herein is designed to operate in environments of normal humidity, dust and temperature. Protect equipment and related wiring where extreme environmental conditions can occur.

Q. Secure equipment firmly in place, including control panels, loudspeakers, conduit, amplifiers, racks, and cables. Make fasteners and supports to support their loads with a safety factor of at least three.

R. Take precautions to prevent electromagnetic and electrostatic hum. Install equipment to provide safe operation.

S. Clearly, consistently, logically, and permanently mark connectors, jacks, relays, receptacles, cables, and cable terminations.

T. All wall mounted devices shall be mounted, secured and installed in accordance with SEI/ASCE 7 and shall additionally withstand the effects of any motions within the building as determined by SEI/ASCE 7.

U. The term “WITHSTAND” means “THE UNITS WILL REMAIN IN PLACE WITHOUT SEPARATION OF ANY PARTS FROM THE DEVICE WHEN SUBJECTED TO THE SEISMIC FORCES SPECIFIED AND THE UNIT WILL BE FULLY OPERATIONAL AFTER THE SEISMIC EVENT.”

V. SECURE ATTACHMENT OF AUDIO VISUAL ITEMS

1. To ensure proper attachment of Fixtures, Furnishings & Equipment items, including and Technology items, where “items” are attached to wall, ceiling, overhead structure, and/or floor, Contractor shall provide information adequate for architect to verify items, attached to wall, ceiling, and/or floor are attached securely and per manufacturer’s recommendations. Architect’s review may be implemented during submittal process.
2. Contractor shall provide struts, hangers, fasteners, safety harnesses, channels, bolts, screws, rods, etc. to securely attach items to existing structure as required to meet field conditions and meet applicable codes.

W. CONDUIT

X. Review and coordinate Systems conduit installation with the electrical contractor to ensure proper operation of the Systems.

Y. All wiring shall be in conduit unless authorized by the Architect, approved by the Systems Designer, and permitted by code. Exceptions are short runs at rack terminations where there is no means of connecting conduit to the equipment.

Z. Where installed exposed, conduits shall be parallel with or at right angles to walls or ceilings and shall be supported from walls or ceilings by means of approved galvanized iron clamps or hangers. Conduit connections to equipment racks shall be insulated.

AA. Minimum size conduit shall be 3/4 inch. All conduit shall be sized for maximum 40% fill or less if required by code.

BB. No conduit run between pull boxes/termination boxes may exceed 100 feet in length.

CC. No conduit run shall have more than 180 degrees of combined turns between pull boxes/termination boxes, and no single turn may exceed 90 degrees.

DD. Conduit containing STP, UTP, and COAX wire types must be installed so that the final length of the cable runs does not exceed maximum allowable cable lengths.

3.03 CONDUIT SEPARATION

A. Systems wiring is divided into wiring groups according to their nominal voltage levels (refer to Schedule of Terminations):

	Wiring Type
Group A	Microphones and other sensitive wiring (0 mV to 100 mV)
Group B	Line level wiring (100 mV to 10 V)
Group C	Loudspeaker and control wiring (10 V to 70 V)
Group D	Telephone, video, control and digital circuits
Group E	Fiber optic cable
Group F	Spare Conduit

1. Note: These wiring groups must never be intermixed within a given conduit run or junction box.

B. Minimum conduit separation between conduits carrying wiring of different groups is:

	Group A	Group B	Group C	Group D	Group E
Group A	adjacent	6"	12"	12"	adjacent
Group B	-	adjacent	12"	6"	adjacent
Group C	-	-	adjacent	6"	adjacent
Group D	-	-	-	adjacent	adjacent
Group E	-	-	-	-	adjacent
Group F	12”	12”	12”	12”	adjacent

1. Note: Ninety degree crossings in close proximity are acceptable. Separations must be maintained until within six feet of box or gutter entry.

C. Minimum conduit separation between conduits carrying Systems wiring and other electrical service conduit is:

	Group A	Group B	Group C	Group D	Group E	Group F
Dimmer controlled	24"	12"	6"	12"	adjacent	24”

lighting						
SCR controlled services	24"	12"	6"	12"	adjacent	24”
220/440V circuits	6"	6"	adjacent	adjacent	adjacent	24”
All other services	6"	6"	adjacent	adjacent	adjacent	24”

1. Note: Heavy current demands in or long parallel runs with the above services may dictate greater separations to avoid interference in the Systems. Separations must be maintained until within six feet of box or gutter entry.

D. Contractor must have written authorization from the Systems Designer for any conduit installation which does not conform to these requirements. The conduit separations above are based on the use of EMT conduit for all AV and other signals. Separations where Rigid conduit is utilized for AV systems and/or other adjacent systems may be halved. Separations where PVC conduit is utilized for AV systems and/or other adjacent systems must be doubled. The Contractor must request information on separation adjustments for each instance where a different type of conduit than what is listed above is used.
1. ELECTRICAL POWER

E. Review and coordinate electrical power system installation including grounding with the electrical contractor to ensure proper operation of the Systems.

F. Verify that all AC power circuits designated for Systems equipment are wired with correct polarity and isolated ground. Report in writing any discrepancies found to the Architect for corrective action.

G. Provide distribution of electrical power within the equipment racks with a minimum of one spare AC receptacle for each four in use per branch circuit.

3.04 STEEL SUPPORTS

A. Fabricate and install any supports so that the installation does not weaken or overload the building structure. Do not impose the weight of equipment or fixtures on supports provided for other trades or systems. No drilling or cutting of concrete beams, joists, or structural steel, nor welding to structural steel, will be permitted except as authorized, in writing, by the Architect.

3.05 BOXES

A. With the exception of portable equipment, all boxes, conduits, cabinets, equipment and related wiring shall be held in place and the mounting shall be plumb and square.

B. All boxes shall be securely mounted to building structure. All boxes shall be installed so that wiring contained in them is accessible. Install blanking devices or threaded plugs in all unused holes.

C. Wiring groups and circuits shall be isolated as indicated herein. Common pull or junction boxes are not permitted except as authorized, in writing, by the Systems Designer.

D. Clean all box interiors before installing plates, panels or covers.

E. Using permanent marker on the box or on wire tags, indicate the lengths of installed cable for all COAX and Category wiring inside the box.

F. Using permanent marker, inside the box, indicate the box name, for example “AA”.

3.06 WIRING METHODS AND PRACTICES

A. Provide installation of all Systems wire and cable, ensuring proper:

B. Pulling Tensions

C. Quantities

D. Types

E. Lengths
   1. Routing

F. Wire Group Separation
   1. Identification

G. The interconnection of equipment in a rack shall use the same wire by type as specified for runs external to racks unless otherwise indicated on AV single line drawings. All wiring within racks shall be direct between devices without splices.

H. Connector polarity shall be maintained except for terminations at equipment manufactured to other standards. In the event that manufactured equipment can be ordered with, or internally set to, various standards, the equipment shall be configured as follows:
   1. Polarity for XLR style connector shall be: pin 2-high, pin 3-low, and pin 1-shield.

I. Polarity for TRS style connector shall be: tip-high, ring-low, and sleeve-shield.

J. Spare wire runs of each group and type shall be pulled to each termination location. The number of spares shall be ten percent of those in actual use or one, whichever is greater.

K. Splicing of cables is not permitted between terminations of specified equipment.

L. Do not pull wire or cable through any box fitting or enclosure where change of raceway alignment or direction occurs without written approval from the Systems Designer; do not bend conductors to less than recommended radius. Employ temporary guides, sheaves, and rollers to protect cables from excess tension, abrasion or damaging bending during installation.

M. Provide wire pulling lubricants and pulling tensions in accordance with the wire and cable manufacturer's recommendations.

N. All wires shall be permanently identified at each wire end by marking with self-laminating adhesive labels fully covered with clear heat shrink tubing, and a chart kept of each wire's function. This applies to wire within a rack assembly as well as wire running in conduit.

O. Wire ends should be wrapped with heat shrink tubing. Each shield or drain wire should be covered with heat shrink to avoid unintentional connections.

P. Use Wago or Entrelec DIN rail mounted terminal blocks for all terminal block wiring connections. Do not exceed one wire per terminal connection point. Do not cut strands from conductors to fit lugs or terminals. Spare terminal blocks, equivalent to 10% of those in actual use, shall be provided.

Q. Form, in an orderly manner, all conductors in enclosures and boxes, wire ways and wiring troughs, providing circuit and conductor identification. Tie using wraps of appropriate size and type. Limit spacing between ties to six (6) inches and provide circuit and conductor identification at least once in each enclosure.

R. Provide service loops, minimum 6', at each termination so that plates, panels, patch bays, and equipment can be dismounted and placed on an adjacent horizontal work surface allowing for safe service and inspection without disconnection.

S. Maximum installed length of Category cables is 200'

T. Maximum installed length of Coaxial cable for HD-SDI, 3G-SDI, 6G-SDI, and 12G-SDI is 200'

U. Provide lengths of installed cables marked inside each termination back box using legible and permanent markings.

3.07 GROUNDING

A. Audio system wiring shall conform to the following procedures:
1. Audio equipment AC ground pins shall connect to AC isolated ground.
2. Audio equipment chassis shall connect to AC isolated ground or rack frames.
3. Audio rack frames shall connect to AC isolated ground bus in panelboard by means of #2 gauge (minimum) conductor.
4. Audio shields between AC powered pieces of equipment, where signal shield is tied to chassis ground, shall be directly connected to ground at the initiating end only. Capacitively terminate the receiving end with a 0.1µF capacitor.
5. Audio signal paths between AC powered pieces of equipment shall be connected using balanced lines and/or transformer isolation as required. No unbalanced signal paths may be connected to the patch bay.
6. Isolate all Systems wiring from racks, back boxes and conduit.
7. Isolate all Systems racks from conduit and other conductive surfaces. Use insulated bushings for conduit connections and a dielectric plinth between racks and conductive flooring materials.
8. AC isolated ground system shall be isolated from all other facility grounds except at the single point of connection at the AV isolation Transformer.
9. All metallic conduit, boxes and enclosures shall be grounded in accordance with the current National Electrical Code.

B. Metallic enclosures containing active equipment shall be grounded with due regard for the minimization of electrical noise. This may include the provision of grounding conductors separate from the AC ground.

3.08 EQUIPMENT RACKS

A. The equipment racks shall be considered as custom assemblies and shall be assembled, wired and tested in the Contractor's shop. Assembly of racks on-site will not be permitted, without written approval from the Systems Designer (except for system wiring which must terminate directly to the patch bays via soldering, punch-down or other non-connectorized termination process).

B. Placement of equipment in equipment racks, as shown in the drawings, is for maximum operator convenience. Verify any changes in placement of the equipment with the Systems Designer before assembly.

C. Racks shall be installed plumb and square without twists in the frames or variations in level between adjacent racks.

D. All wire, cable, terminal blocks, rack mounted equipment, and active slots of card frame systems shall be clearly and logically labeled as to their function, circuit, or system. Labeling on manufactured equipment shall be by engraved plastic laminate or by thermal printer on adhesive tape, with white lettering on black background or dark background that is similar to panel finish.

E. Provide stiffeners to custom panels to prevent panel deformation during normal plugging or switching operations.

F. All wires and cables used in assembling custom panels and equipment racks shall be formed into harnesses which are tied and supported in accordance with accepted engineering practice.

G. Harnessed cables shall be combed straight, wrapped every six (6) to ten (10) inches, and attached to the structure as necessary. Each cable that breaks out from a harness for termination shall be provided with an ample service loop so that panels, patch bays, and equipment can be dismounted and placed on an adjacent horizontal work surface allowing for safe service and inspection without disconnecting.

H. Harnessed cables shall be formed in either a vertical or a horizontal relationship to equipment, controls, components or terminations.

I. Cable shields shall be connected to the isolated ground system with due regard for ground loops. (See Giddings reference book, Chapter 10)

J. All system components and related wiring shall be located with due regard for the minimization of induced electro-magnetic and electrostatic noise, for the minimization of wiring length, for proper ventilation, and to provide reasonable safety and convenience for the operator.

K. All rack mounted equipment, with front panel controls, shall be provided with security covers to avoid tampering with preset levels. If specific security covers are not included in the equipment

list, the Contractor will provide the manufacturer's security cover for each specified device or a suitable alternate.

L. Every device shall be installed with regard for proper polarity. Absolute polarity shall be maintained through the entire Systems signal chain.

M. Any permanently mounted electronic device must be balanced. Contractor will provide balancing transformers for unbalanced equipment connections where necessary.

N. System Power Control
1. Provide a relay-controlled power switching system with a master power switch and power-on indicator for the system. Connect the master power switch to control each receptacle in the rack except for one of the spare receptacles. Label unswitched receptacles "UNSWITCHED".
2. Middle Atlantic USC-6R
3. Atlas Sound SACR-191
4. Juice Goose CQ1520
    1) Quantity: A/R

O. Remote Power ON/OFF Switch:

P. Provide a single-Rackspace mounted remote power key switch with LED status indicators.
    a. Middle Atlantic K-DEC in rack panel
    b. Juice Goose Equal
    c. Equal
        1) Quantity: A/R
2. VERIFICATION TESTS

Q. Test each point to point wire segment individually, and test any linkage of multiple point to point cables that form an end to end link.

R. Contractor must document all verification test requirements and results for submission (see 3.13.A below).

S. Confirm that each individual wire and cable run (whether in a rack or in conduit) is identified with a unique number. These numbers are affixed to both ends of each cable and are clearly visible. Provide a complete list of these numbers along with the termination location of each end of the wire run.

T. Verify all circuits and extensions for correct connection, continuity and polarity. Absolute polarity must be maintained between all points in the system.

U. Identify installed length of all copper and fiber cabling.

V. Confirm that all system outputs are free of spurious signals including oscillations and radio frequency signals. A wide band oscilloscope shall be used to verify this condition.
1. Confirm that the system is free of audible clicks, pops, and other noises when any operating control is activated, with or without input signal.

W. For all microphone lines, tie lines, return lines and effect loudspeaker lines, confirm:

1. Proper circuits appearing at each termination location
2. Proper circuits appearing at each jack bay position
3. Continuity of all conductors
4. Proper polarity is maintained
5. Absence of shorts between conductors within each circuit
6. Absence of shorts between circuit conductors and conduit

X. Perform a sweep test to 0.5MHz

Y. For RF Coaxial cabling confirm:
1. Receptacles output does not exceed +15dBmv (50-400MHz - +6 dBmv minimum, above 400MHz - +3dBmv minimum)
2. For each modulated video output, tap to meet +9dBmv (+/- 3dBmv)
3. Verify that all TV channels are visible and free of any interference or signal distortion
4. Frequency sweep test from 5MHz to 1000MHz.

Z. For all other Coaxial cabling confirm:
1. Verify that the installed cable meets, at a minimum, the requirements set forth in SMPTE ST 2081 for 6G-SDI single-link and 12G-SDI dual-link.
2. Verify that TDR impedance is 75 +/-3 ohms
3. Frequency sweep test from 5MHz to 6GHz.

AA. For Category Cabling:
1. Use Category 6A cable pair tester to verify compliance with TIA/EIA standards referenced above (including all current addendums)
2. Test each cable using the permanent link procedure for opens, shorts, reversals, cross twists and mis-wiring. Check NEXT, ELFEXT, Delay Skew, Return Loss, and Alien Crosstalk.

BB. Report all mis-wiring or failures found and report retests as needed.

CC. If any conductors report open or short, replace the entire wire and re-test.

DD. For Fiber cabling:
1. Using appropriate test devices and proper factory terminated jumpers, measure all fiber optic line attenuations, end to end, as required by TIA/EIA-526-14A.
2. Optical budget may not exceed the cable performance by length plus splice and connector losses (0.03 dB for each fusion splice, 0.3dB for each mechanical splice, and/or 0.4 dB for each connector).
3. Overall attenuation must meet TIA/EIA-568B standards. Perform attenuation tests at 850nm and 1300nm.

EE. Confirm that loudspeakers and mountings are free of buzzes and rattles when the loudspeaker is swept with sine wave tones over its rated bandwidth at one-half (1/2) its maximum rated power.

FF. For all permanently mounted loudspeaker terminations, provide impedance measurement of each pair of loudspeaker lines with all loudspeakers connected and all amplifiers disconnected. These measurements shall be documented as editable tabular data listing impedance for each 1/3 octave band from 20 Hz to 20 kHz and shall be accurate to the nearest tenth of an Ohm.

GG. For all intercom terminations, confirm proper operation by initiating and receiving audio communication and call light. For single lines connected to a matrix, test each line with each channel in the matrix. Verify that all channels are quiet and without spurious noise.

HH. For all electronic devices mounted in racks and connected to patch bays, confirm:
1. Every input and output is balanced.
2. Proper polarity is maintained throughout the entire audio path.
3. Tip connection of each TRS jack is connected to the positive terminal of each corresponding input or output.

II. For all devices requiring IP addressing:
1. IP addressing scheme must make use of subnets such that all devices, regardless on which network (Audio, Video, Control, or House) they reside, have a unique IP address to eliminate the possibility of duplicate IP addresses if networks are inadvertently cross-patched.
2. All devices must have static IP addresses.
3. Create a spreadsheet of all devices and their IP addresses, Subnet Masks, MAC Addresses, and other pertinent IP configuration information.
4. Coordinate all IP addressing schemes with the Owner.

JJ. If the Audio, Video, and Control network switches are dedicated to these systems and the systems do not rely on Owner furnished and configured network switches:
1. Configure network switches to operate properly and provide the proper network configurations to support the network devices and protocols used by those devices.
2. Configure, as needed, VLANS, IGMP, QOS, and other protocols requiring configuration to provide a fully functioning and robust network system.
3. With all networks configured and operating, and all network devices configured and operating, confirm that the networks are behaving as expected and as required.

KK. Electrical Contractor, coordinating with the Systems Contractor must confirm that there are no shorts between the Neutral and Isolated Ground conductors, and between the isolated ground conductor and building ground for each AV Technical Power circuit. Electrical Contractor, coordinating with the Systems Contractor must confirm there are no Bootleg Grounds or Neutral-Ground Reversals on each AV Technical Power circuit.

LL. The Contractor is responsible for the programming and configuration of all DSP systems and control systems necessary as specified in this project specification and AV large format drawings.
1. Programming and configuration must be complete and ready prior to System Designer's arrival for verification of functionality and acceptance testing.
2. Programming for the DSP systems must contain control pages to support normal operations, and to support Acceptance Testing and System Tuning operations, as described in this specification and the large format AV drawings.
3. Programming for the Control Systems must include all master controller code and touch panel code and graphics, working together to provide the function as described in this specification and the large format AV drawings.

MM. Test all Audio, Video, and Control system controls, including but not limited to mixing consoles, switchers, routers, touch panels, paging stations, volume controls, and source selectors for proper operation.

NN. Test proper operation of any portable controls at each designated control location (Stage Manager's rack, for example).

3.09 INITIAL ADJUSTMENT

A. All initial adjustments must be documented and submitted as part of the Verification Test Reports (see 3.13).

B. Make all adjustments and modifications so that the system is operational and fully functional including but not limited to:

C. Update all device software and firmware to the latest manufacturer's recommended release that allows for proper operation with ALL OTHER DEVICES in the systems.

1. Make all adjustments and modifications for system gain structure per recommendations of major component manufacturers.
2. Properly configure all EDID and HDCP settings to allow for proper function of all video systems.
3. Install all programming for digital mixing consoles, DSP, Control and any other software based devices in the systems, and verify that audio and video signal passes as designed through these systems. Verify that control systems function as specified. Contractor to provide initial DSP and control system programming prior to acceptance testing, one full set of programming changes and adjustments, prior to handover to the Owner, and one additional set of changes and adjustments during the initial warranty period, as part of the base scope of work.
4. Properly balance all 70 Volt loudspeaker zones to be consistent from zone to zone using amplifier settings and loudspeaker taps to adjust for differing loudspeakers or installation height. All 70 Volt loudspeakers within a given zone must not have a broadband SPL variation of greater than +/- 2dB.
5. Properly adjust delay and equalization for all loudspeaker systems using SIM, SMAART or other similar dual FFT type measurement devices. All testing and adjustment shall be in accordance with all manufacturer recommendations and industry standard practice. Contact the Systems Designer for further system delay and equalization requirements.
6. Capture traces showing magnitude and phase response for each loudspeaker or loudspeaker cluster before and after equalization and delay adjustments.
7. Capture traces showing magnitude and phase response for the systems operating as a whole from 3 locations in each major seating area. One of these areas should be the House Mix Position, if applicable.
8. Equalization and timing of the loudspeaker systems shall be further adjusted as required by the Systems Designer and Owner during Acceptance Testing.

3.10 VERIFICATION TEST REPORT

A. Submit written report detailing the results of Initial Adjustments and Verification Tests. Report to include, at minimum, the following:

1. Copies of all relevant drawings, charts, test instrument data, and photographs.
   a. PDF copies of all available manufacturers' operation and service literature for each major system component.
   b. Copy of all programming files including, but not limited to, Audio DSP programming and Graphic User Interface (GUI) files, Control system Touch Panel GUI files and control system control programming files including un-compiled source codes.
   c. All other documentation and results of testing and initial settings as referenced in 3.11, and 3.12 above.
   d. Written certification that the installation conforms to the requirements stated herein, is complete in all respects, and is ready for inspection, Acceptance Testing, and tuning.
2. Prepare and submit an InfoComm standard Commissioning Checklist for each system in this specification.
3. Prepare and submit a training syllabus for Owner training (see section 3.15).

B. This report shall be completed and submitted to the Systems Designer for review a minimum of five (5) days prior to Acceptance Testing and final tuning.

3.11 ACCEPTANCE TESTING

A. Acceptance Testing shall be performed by the Systems Designer and Contractor during a period designated by the Architect. Contractor shall furnish a minimum of two (2) technicians or one technician per Systems Designer commissioning team, for the acceptance testing period, and one or more engineers fully capable of programming DSP and Control systems and making any other engineering adjustments to equipment in the systems. Contact Systems Designer for number of commissioning teams that will be deployed. For Bid purposes assume there will be 1 commissioning team.

B. The minimum time required for Acceptance Testing is 2 working days, including 1 days of dedicated quiet time. Coordinate this time so that free access, work lighting, and electrical power are available on the site.

C. Ensure that Systems areas are in a clean and orderly condition ready for acceptance testing.

D. Be prepared to verify the performance of any portion of the system by demonstration, listening tests and instrumented measurements.

E. Be prepared to facilitate the visual inspection of system components and wiring, including removal of termination panels for inspection of wiring termination and wire management practices.

F. Be prepared to demonstrate all software and control systems.

G. Be prepared to go through the commissioning checklist and verify all items as complete.

H. Make additional mechanical and electrical adjustments within the scope of the work and which are deemed necessary by the Systems Designer as a result of the Acceptance Tests. This may

include realigning of loudspeaker systems, changes in system gain structures, grounding, filtering or interfaces.

I. Final acceptance will be contingent upon issuance by the Systems Designer of a letter of acceptance stating that the work has been completed and is in accordance with the contract documents.

J. Contractor will bear any costs incurred for additional Systems Designer's time and expenses due to failure to have the system functioning in accordance with specification requirements at the times scheduled for Systems Designer's Acceptance Testing.

K. Confirm that each individual wire and cable run is identified with a unique number. These numbers are affixed to both ends of each cable and are clearly visible. Provide a complete list of these numbers along with the termination location of each end of the wire run.

L. Confirm that all system outputs are free of spurious signals including oscillations and radio frequency signals. A wide band oscilloscope shall be used to verify this condition.

M. Confirm that the system is free of audible clicks, pops, and other noises when any operating control is activated, with or without input signal.

N. For all microphone lines, tie lines, return lines and effect loudspeaker lines, confirm:
1. Proper circuits appearing at each termination location.
2. Proper circuits appearing at each jack bay position.
3. Continuity of all conductors.
4. Proper polarity is maintained.
5. Absence of shorts between conductors within each circuit.
6. Absence of shorts between circuit conductors and conduit.

O. Confirm that speakers and mountings are free of buzzes and rattles when the speaker is swept with sine wave tones over its rated bandwidth at one-half its maximum rated power.

P. For each installed data network cable or fiber optic cable confirm conformance to the specified TIA/EIA performance standards

3.12 USER TRAINING

A. Contractor will provide in-depth training in operation and regular maintenance of all systems and on all equipment included in the scope of work contained in this specification and the AV large format drawings.

B. Training to include (but is not limited to):
1. Detailed operation of mixing consoles, video switchers and routers, computer control systems and other essential system elements as relevant to their installation in this project.
2. Maintenance and repair of system equipment, including replacement procedures for user-replaceable parts.
3. Review of Operation and Maintenance Manual (See 3.16)

C. Contractor will provide a minimum of (2) training sessions of four hours each with times and dates to be approved by the Owner.

D. The first session shall take place in the presence of the Systems Designer and shall occur directly after the completion of Acceptance Testing. If the Systems Designer, Owner, and/or Architect judge any work to be deficient and/or not substantially complete at the time scheduled for training, the training will be postponed until the Systems Designer, Owner, and Architect judge the entire AV system conforms to this specification and the AV large format drawings.

E. Contractor will bear any costs incurred for additional Systems Designer's time and expenses due to failure to have the system functioning in accordance with specification requirements at the times scheduled for User Training.

3.13 SYSTEM DOCUMENTATION

A. Within thirty (30) days of the Acceptance Testing, prepare and submit a CD-ROM of the preliminary Operation and Maintenance manual for approval by the Systems Designer. Manual to include, at minimum, the following documents in PDF format:
   1. Table of contents
   2. Written Guarantee and service policy
   3. Basic power on/off and operational procedure
   4. Copies of all shop drawings which have been updated to include any changes made during the installation process
   5. All available manufacturers' operation and service literature for each major system component
   6. One line signal flow diagram with all cable runs and patch points identified by alpha-numeric character
   7. Copy of the Verification Test report
   8. Copy of conduit riser diagram
   9. Copy of the final tuning settings as provided by the Systems Designer
   10. Copy of the IP Addressing table
   11. Copy of all uncompiled source codes and configuration files which have been updated to include any changes made during the installation process.

B. Systems Designer will review the above system documentation. Upon approval, Contractor shall prepare and submit to the Owner:
   1. Five (5) copies of the final Operation and Maintenance manual on CD-ROM or DVD.
   2. Two (2) hard copies of the final Operation and Maintenance manual printed and neatly bound

C. Provide framed or laminated copy of the as-built signal flow diagram for each theater to be mounted in each control room. This diagram shall have all cable runs and patch points identified by alpha-numeric character.

END OF SECTION

SECTION 27 5116 - PUBLIC ADDRESS SYSTEM

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Central Control sound system

B. Volume limiter/compressors

C. Speakers

D. Preamplifiers

E. Power amplifiers

F. Equipment cabinet

G. Equipment rack

H. Telephone paging adapters

I. Noise-operated gain controllers

J. Battery backup power unit

K. Conductors and cables

1.02 RELATED DOCUMENTS

A. The Contractor, Subcontractors and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section "Summary", Paragraph 1.1A, entitled "Related Documents."

B. Related Drawings

C. "T" Drawings – Technology Plans

D. Related Sections:

E. Section 271000 – "Structured Cabling"

F. Section 275313 – "Clock Systems"

G. Section 274100 – "Audio Visual Systems"

1.03 GENERAL REQUIREMENTS

A. The conditions of the General Contract (General, Supplementary, and other Conditions) and the General Requirements are hereby made a part of this Section.

B. All bids shall be based on the equipment as specified herein. The catalog numbers and model designations are that of the basis-of-design: Bogen Nyquist E7000 Series IP-Based Communications System.
   1. Approved Alternates:
   2. Telecor Equivalent
   3. Valcom Equivalent

C. Contractors who wish to submit alternative equipment shall provide the specifying authority with the appropriate documentation at least 10 business days prior to bid opening. The submitted documentation must provide a feature-by-feature comparison identifying how the proposed equipment meets the operation and functionality of the system described in this specification. Prior to bid date, the contractor shall provide adequate and complete submittal information, which shall include but not be limited to specification sheets, working drawings, shop drawings, and system demonstration. The alternative supplier-contractor must also provide a list to include six installations identical to the proposed system.

D. The contractor shall provide the FCC registration number of the proposed system, where applicable.

E. Final approval of the alternative system shall be determined at the time of job completion. Failure to provide the "precise functional equivalent" shall result in the removal of the alternative system at the contractor’s expense.

F. The contractor for this work shall have read all the bidding requirements, the general requirements of division xx, and the contract proposal forms, and shall be held to the execution of this work. The contractor shall be bound by all the conditions and requirements therein.

G. The contractor shall be responsible for providing a complete functional system, including all necessary components whether included in this specification or not.

H. In preparing the bid, the contractor should consider that no claim will be made against the owner for any costs incurred by the contractor for any equipment demonstrations requested by the owner.

1.04 REFERENCE STANDARDS

A. NFPA 70 – National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.05 SCOPE OF WORK

A. The contractor shall supply and install all equipment, accessories, and materials in accordance with these specifications and drawings to provide a complete and operating IP-Based Communications System including but not limited to:

1. The platform shall provide complete Nyquist E7000 intercom and employ state of the art IP Technology including the minimum functions listed.
    a. Intercom call between staff locations and classrooms with Unlimited Station capacity
    b. Interactive Facility Maps
    c. User customizable Announcements with priority
    d. Text-to-Speech Announcements
    e. Emergency Classroom Check-In can be used to enhances campus security
    f. Emergency or Normal Announcements are capable of being recorded and activated by a speed dial on an administrative console, DTMF, wireless panic button, mobile app, web browser or external IP networked system using HTTPS URL-based Application Programming Interface (API)
    g. Internal clock is synchronized with NTP network time server whether on the LAN, WAN or Internet keeping the Scheduled events (Bells) and Announcements accurate within milliseconds.
    h. Audio distribution allow for scheduled or manually activated audio to be activated from the Admin Web UI, contact closure, Admin phone and/or by use of Routines
    i. Unlimited Schedules
    j. Unlimited Time, Paging, and Audio Zones
    k. Unlimited Page Stacking/Queueing
    l. Unlimited Scheduled events
    m. Unlimited Scheduled Audio events
    n. Integrated Internet Radio Source
    o. Email Notifications and Alerts the system can send an email with a system event, contact closure, or when a Routine has been activated to name a few
    p. Supervised Station Status system can be setup to send an email when a Nyquist device goes offline.
    q. Clock / Messaging Display capability improves school communications
    r. Alert Filters – Allow facilities to monitor for such as weather events, earthquakes, tornados, tsunami, volcanoes, public health, power outages, and many other National Weather Alerts emergencies and warnings.
    s. Multi-Site All Call paging allows authorized users to make normal district wide pages
    t. Multi-Facility Emergency All-Call paging allows authorized users to make emergency district wide pages
    u. Administrative Graphical User Interface or GUI that can be used by technicians or Administrative: CoS and Roles define who has access to what parts of the GUI
    v. Push-to-Talk Microphone
    w. Ambient Noise Sensing

B. The system shall have a Routines feature that allows staff to activate via Admin Web UI, dial string, panic button, mobile app, API or with an Admin phone touch interface. Routines can automatically launch a procedure, or sequence of actions, that the E7000 system executes as a result of an input trigger. Routines are designed with school security plans and can support crisis plans for situations such as school lockdown, weather events, or emergency evacuation.

1. Direct Inward Station Access or DISA allows administrator or first responder or emergency personnel with proper login codes to call into the system from outside the school into any classroom, zone, or entire facility with customer supplied SIP enabled Telephone Network. DISA is designed to allow remote monitoring, Facility All-Call or Zone Paging, and two-way conversation from outside the facility.
2. Authorized staff can use the Admin Web UI to configure the Clock/Messaging Display function. They can use it to create messages that will display on monitors connected to the 10-Watt plenum-rated Intercom Modules with HDMI 1.3 (max. 1920 x 1080 @ 24/30 Hz) output or the NQ-GA10PV devices in a selected zone, multiple zones, or to specific stations. When creating the message, you can set several options, including when and how long the messages are displayed, priority of messages, and the appearance of the messages. The schedule programming allows the event names to be displayed analog or digital clock along with day and date on an NQ-GA10PV Display. You can also remove messages from the message queue either manually or via a Routine.
3. The ADA requires that title II entities (State and local governments) and title III entities (businesses and nonprofit organizations that serve the public) communicate effectively with people who have communication disabilities. The goal is to ensure that communication with people with these disabilities is equally effective as communication with people without disabilities. With this in mind the Bogen Nyquist E7000 helps people who have vision disabilities with clear audio paging, messaging and hearing disabilities with visual messaging to any display to assist in communicating.
4. Interactive Facility Maps that are intuitive to use. Simply click on a classroom or area of the GUI and it can initiate an intercom, page or drill to another map level. I addition when the system is in Check-In mode the classroom has a pop up of a room's video feed via the Maps view if equipped. The system shall allow authorized staff to use the Map-based Audio/Video room monitoring during emergency check-in. Systems that don't have provisions for this are not considered equal.
5. In the event of wide area network or WAN outage every facility must be capable of operating standalone and allow for all features listed within this specification to work. Systems that rely on the WAN to operate shall not be considered for comparison in this bid.
6. Manage Check-In functionality that allows staff to quickly verify that they are aware that a check-in event is underway and are reporting classroom status for their assigned classrooms or areas. For staff to check-in all they have to do is press their Call Switch after they have completed their required check-in procedure. Examples of check-in events include but are not limited to weather related shelter-in-place, safety related lockdown, fire evacuation, room occupancy.
7. The E7000 has a Disable Audio feature that can be activated via contact closure from fire alarm or security system, Admin Web UI, dial string, panic button, mobile app., API or with an Admin phone touch interface. When the E7000 has its Audio Disabled the follow features are disabled: programmed or manually activated audio distribution, Zone Paging, normal announcement files, All-Call Paging, manual normal tones and scheduled event tones.
8. Optional password protection for multi-site emergency all-Call, multi-site all-call, facility page. Emergency all-call page, all-call page, emergency announcement, announcement, zone page, alarm, and tone are used to prevent unauthorized use of the system.

9. Text-to-Speech option allows Admin Web UI users to add custom announcements into the system by simply typing the text that you want converted to speech for this announcement. The system will then generate a .wav file that can be used by the E7000 system. Systems that don't offer Text-to-Speech options shall not be equivalent.
10. Installation Wizards are available for installers to reduce the setup time on major components in the system programming. Included wizards are as follows: Customer Information, Dialing Length, Station, User, Time Zone, Network Time Server, and Zones as a minimum.
11. The public address system shall integrate with the PBX/VoIP within the school for complete access to this system from any handset part of the PBX/VoIP.
12. The public address system shall integrate with the access control system. Upon activation of threat levels in the access control system, the public address system shall broadcast emergency announcements pre-recorded by the Owner. The contractor shall coordinate the pre-recorded messages, testing with the access control system, and configuration of what threat level activates what announcement. Configure these messages with the security consultant, public address designer, and Owner.
13. The public address system shall integrate with the Fire Alarm annunciation system to announce emergencies from the fire-alarm system through the public address system.

1.06 SUBMITTALS

A. Product Data: Provide data showing electrical characteristics and connection requirements. Indicate layout of equipment mounted in racks and cabinets, component interconnecting wiring, and wiring diagrams of field wiring to speakers and remote input devices.

B. Test Results: Indicate satisfactory completion of each recommended by the manufacturer.

C. Manufacturer's installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.

D. Manufacturer's Certificate: Certify that products meet or exceed the specified requirements.

E. Manufacturer's Field Reports: Indicate that installation is complete and system performs according to specified requirements.

F. Project Record Documents: Record actual locations of speakers, control equipment, and outlets for input/outlet connectors.

G. Operation Data: Include instructions for adjusting, operating, and extending the system.

H. Maintenance Data: Include repair procedures and spare parts documentation.

I. Specification sheets on all items including cable types

J. Outline drawing of system control cabinet showing relative position of all major components

K. Shop drawings, detailing integrated electronic communications network system including, but not limited to, the following:

1. Station wiring arrangement
2. Equipment cabinet detail drawing

L. Wiring diagrams showing typical connections for all equipment

M. Numbered Certificate of Completion for installation, programming, and service training, which identifies the installing technician(s) as having successfully completed the Nyquist E7000 technical training course provided by the Bogen Communications, Inc.

1.07 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70 and Federal Communications Commission.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience with field service facilities within 100 miles of the project.

C. Supplier Qualifications: Authorized distributor of specified manufacturer with minimum three years documented experience.

D. Installer Qualifications: Authorized installer of specified manufacturer with service facilities within 100 miles of the project.

E. Products: Listed, classified, and labeled as suitable for the purpose intended.

F. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

G. All items of equipment shall be designed by the manufacturer to function as a complete system and shall be accompanied by the manufacturer's complete service notes and drawings detailing all interconnections.

H. The contractor shall be an established communications and electronics contractor that maintains a locally run and operated business and has done so for at least 10 years. The contractor shall be a duly authorized distributor of the equipment supplied with full manufacturer's warranty privileges.

I. The contractor shall show satisfactory evidence, upon request, that he or she maintains a fully equipped service organization capable of furnishing adequate inspection and service to the system. The contractor shall maintain at his or her facility the necessary spare parts in the proper proportion as recommended by the manufacturer to maintain and service the equipment being supplied.

1.08 SINGLE SOURCE RESPONSIBILITY

A. Except where specifically noted otherwise, all equipment supplied shall be the standard product of a single manufacturer of known reputation and a minimum of 30 years of experience in the industry. The supplying contractor shall have attended the manufacturer's installation and

service training classes. A certificate of this training shall be provided with the contractor's submittal.

1.09 SAFETY / COMPLIANCE TESTING

A. The communications system and its components shall, where applicable, bear the label of a Nationally Recognized Testing Laboratory (NRTL), such as Environmental Technology Laboratory (ETL), and shall be listed by their re-examination service. All work must be completed in strict accordance with all applicable electrical codes, under direction of a qualified and factory-approved contractor, and to the approval of the owner.

B. Bogen's Nyquist E7000 solution is consistent with those NEMA SB 40-2015 requirements that specifically apply to school paging and intercom systems only as outlined within the ANSI/NEMA SB 40-2015 standards publication.

1.10 IN-SERVICE TRAINING

A. The contractor shall provide a minimum of eight hours of in-service training with this system. These sessions shall be broken into segments, which will facilitate the training of individuals in the operation of this system including Admin Web UI Dashboard operation, Scheduling, and Audio Distribution as a minimum. Operation manuals shall be provided at the time of this training.

1.11 WIRING

A. System wiring and equipment installation shall be in accordance with generally accepted engineering best practices as established by the EIA and the NEC. Wiring shall meet all state and local electrical codes. All wiring shall be tested to be free from grounds and shorts.

B. All system wiring shall be labeled at both ends of the cable. All labeling shall be based on the room 1numbers as indicated in the architectural graphics package.

C. Wiring shall be done per manufacturer's recommendation (Cat 5 or West Penn #357) depending on speaker type. All terminal connections are to be on barrier strips.

1.12 PROTECTION

A. The contractor shall provide all necessary transient protection on the AC power feed and on all station lines leaving or entering the building.

B. The contractor shall note on their system drawings, the type and location of these protection devices and all wiring information. Such devices are not to be installed above the ceiling.

1.13 SERVICE AND MAINTENANCE

A. The contractor shall, at the owner's request, make available a service contract offering continuing factory authorized service of this system after the initial hardware and software warranty periods.

B. System shall include software maintenance that includes bug fixes and new feature releases for a period of five years. In addition, the contractor shall provide at the owner's request additional maintenance contracts that are available as one-year, three-year, and five-year extensions. The contractor shall provide a 24-hour response time from call by customer.

C. The system manufacturer shall maintain engineering and service departments capable of rendering advice regarding installation and final adjustment of the system.

PART 2 - SYSTEM SPECIFICATION

2.01 MANUFACTURERS

A. The Equipment specified herein shall be considered basis of design. Public address system headend equipment shall be from one manufacturer.
   1. Approved Public Address System Manufacturers:
      a. Bogen Nyquist E7000 IP-based paging and intercom solution manufactured by Bogen Communications, Inc. – Basis of Design
      b. Telecor IP/Analog Hybrid System
      c. Valcom IP/Analog Hybrid System

B. The intent is to establish a standard of quality, function, and features. It is the responsibility of the contractor to ensure that the proposed product meets or exceeds every standard set forth in these specifications.

C. The functions and features specified are vital to the operation of this facility; therefore, inclusion in the list of acceptable manufacturers does not release the contractor from strict compliance with the requirements of this specification.

2.02 EQUIPMENT

A. Install and configure the equipment below as required by the Contract Drawings and functionality of the system in order to furnish a complete, fully-functional Public Address system.
   1. Nyquist NQ-SYSCTRL System Controller
      a. Configuration and management via a Web-based Graphical User Interface (GUI)
      b. Wizard based setup for quick installation
      c. Remote access from virtually any PC/MAC, tablet, or mobile device
      d. Continuous monitoring of stations and appliances to ensure system operation
      e. Dual network adapters to allow the System Controller to operate on two separate networks
      f. Music automatically added to music library and playlist from USB port

g. Network-based audio that can be sourced (input) from any number of Nyquist appliances (NQ-P0100, NQ-A2xxx, NQ-A4xxx, etc.)
h. Ample storage for music files, recorded announcements, and call recordings
i. G722 and OPUS audio codec support to deliver superior HD audio quality
j. Convection air cooled; fan-less design for quiet, maintenance-free operation
k. Wall, rack, or shelf mountable

2. Nyquist NQ-E7030 Analog Station Bridge (ASB)
   a. 24 station interface supporting analog speakers and call switches
   b. 120-Watts of available power at 25-Volts
   c. Two dynamic talk paths/amplification channels
   d. Support Category G wiring or better
   e. 25/70-volt speaker(s), ceiling-mounted, wall-mounted, and paging horns
   f. CAN Bus 2.0 interface designed for support of Nyquist Digital Call Switch (DCS) NQ-E7020 that can initiate Normal, Urgent, or Emergency priority calls, all with options for Privacy Mode
   g. Analog/Mechanical Call Switches capable of placing Normal, Urgent, or Emergency priority calls, Bogen CA15C rocker style momentary call button
   h. Wall, rack, or shelf mountable
3. Nyquist NQ-P0100 Matrix Mixer Pre-Amplifier (MMPA)
   a. No less than four Mic/Line inputs used for analog audio input like AM/FM Tuner or CD Player
   b. Channel 4 configurable for Push-to-Talk MIC application
   c. Line Level output to drive external amplifier
   d. Software programmable configuration and operation
      1) Push-to-Talk Channel
      2) Push-to-Talk Type
      3) Push-to-Talk Zone
      4) Mixer Channels
   e. Configurable built-in DSP
      1) Noise Gate
      2) Compressor/Limiter functions, etc.
      3) Tone Controls: Low Shelving, Mid Bandpass and Hi Shelving
      4) Multi-band Parametric EQ
      5) Variable Low-Cut/High-Pass filters
      6) CH1 can be configured as a digital AES/EBU (AES3) input
   f. USB 2.0 host port, Type-A connector (future use)
   g. Powered by 100V – 240V Universal AC Mains
   h. Wall, rack, or shelf mountable
4. The Nyquist two and four channel amplifiers available in the following number of channels and watts
   a. NQ-A2060 two channel with 60 watts per channel
   b. NQ-A2120 two channel with 120 watts per channel
   c. NQ-A2300 two channel with 300 watts per channel
   d. NQ-A4060 four channel with 60 watts per channel
   e. NQ-A4120 four channel with 120 watts per channel

f. NQ-A4300 four channel with 300 watts per channel
g. These amplifiers shall include GUI based DSP controls; 16-band Graphic Equalizer; Signal Present and Clip Monitor; Adjustable High Pass, Low Pass, and Bandpass Filters; Noise Gate; Compressor/Limiter; and 7-band Parametric Equalizer. Outputs shall be provided for 4-, 8-ohm, 25V, and 70V distributed systems.
h. Bridged or Mono Mode
i. Integrated Digital Signal Processor
    1) Noise Gate
    2) Compressor/Limiter functions, etc.
    3) Tone Controls: Low Shelving, Mid Bandpass and Hi Shelving
    4) Multi-band Parametric EQ
    5) Variable Low-Cut/High-Pass filters
j. One Line-Level Input on two channel amplifiers
k. Two Line-Level Inputs on the four channel amplifiers
l. 100/1000 GB ethernet connection
m. USB 2.0 host port, Type-A connector (future use)
n. 100V – 240V Universal AC Mains
o. Wall, rack, or shelf mountable
p. The amplifiers shall carry the necessary safety agency listings for both the US and Canada. The amplifier shall employ convection air cooling. Amplifiers that require fans for cooling shall not be considered equal.

5. Nyquist NQ-E7010 Input/Output Controller
    a. Power over Ethernet 802.3af compliant
    b. 8 x Dry Contact Closure Inputs
    c. 8 x Relay Driver Outputs (Open-Collector)
    d. USB 2.0 host port, Type-A connector (future use)
    e. Software programmable configuration and operation including; Contact Type, Extension, Name, Close Interval, Actions (911, Audio, Alarm, Announcement, All-Call, Multi-Site-Emergency-All-Call, Emergency-Call, Emergency-All-Call, Hourly, Audio-Disabled, No Action, Page, Tone, Enable-Audio and Manual), Action ID, Zones, Close Extension, Dashboard Type, Dashboard Title, Dashboard Scope, Dashboard Text, Dashboard Style, Email and Routines
    f. Wall, rack, or shelf mountable
6. Nyquist NQ-GA10P 10-Watt Intercom Module
    a. Power over Ethernet 802.3af compliant
    b. Low-impedance (8-ohm) speaker output. Designed for use with Drop-In Ceiling Speaker CSD2X2L/U
    c. Network-based audio output (paging, intercom, audio distribution)
    d. Talkback support
    e. Push-to-Talk Microphone that can be routed anywhere over Bogen's Nyquist network
    f. Ambient Noise Sensor connection for Amplifier volume output control
    g. DSP-based noise rejection and voice bandwidth optimization
    h. Web-based configuration

i. Analog Call Switch support (Bogen CA15C, or equivalent)
j. Digital Call Switch support (Bogen NQ-E7020)
k. Audio Active Control SPDT Relay Output Rated at 2A
l. In-wall, in-ceiling, shelf, or device mountable UL 2043 plenum-rated package
m. Integrated slotted mounting flanges
n. Available PS4815W 48VDC External Power Supply when PoE isn't available

7. Nyquist NQ-GA10PV 10-Watt Intercom Module with HDMI Clock/Messaging Display.
   a. HDMI 1.3 (max. 1920 x 1080 @ 24/30 Hz) output that can be configured many ways:
      1) Analog Clock with Messaging
      2) Digital Clock with Messaging
      3) Single Column Messaging
      4) Two Column Messaging
      5) Three Column Messaging
      6) Priority Fullscreen Messaging
   b. Power over Ethernet 802.3af compliant
   c. Low-impedance (8-ohm) speaker output. Designed for use with Drop-In Ceiling Speaker CSD2X2L/U
   d. Network-based audio output (paging, intercom, audio distribution)
   e. Talkback support
   f. Push-to-Talk Microphone that can be routed anywhere over Bogen's Nyquist network
   g. Ambient Noise Sensor connection for Amplifier volume output control
   h. DSP-based noise rejection and voice bandwidth optimization
   i. Web-based configuration
   j. Analog Call Switch support (Bogen CA15C, or equivalent)
   k. Digital Call Switch support (Bogen NQ-E7020)
   l. Audio Active Control SPDT Relay Output Rated at 2A
   m. In-wall, in-ceiling, shelf, or device mountable UL 2043 plenum-rated package
   n. Integrated slotted mounting flanges
   o. Available PS4815W 48VDC External Power Supply when PoE isn't available
8. Nyquist NQ-GA20P2 Plenum-Rated 20-Watt Integrated Amplifier
   a. Single 20-watt, 8-ohm speaker output
   b. Single Balanced Line Output
   c. Power over Ethernet Plus (PoE+) 802.3at compliant
   d. Nyquist network-based audio output (paging, intercom, audio distribution)
   e. Web-based configuration
   f. Front panel Power and Status LEDs
   g. In-wall, in-ceiling, shelf, or device mountable UL 2043 plenum-rated package
   h. Integrated slotted mounting flanges
   i. Available PS4830W 48VDC External Power Supply when PoE+ isn't available
   j. NQ-T1100 VoIP Admin Phone Color Touch Display (aka Admin Station)
   k. 7" 800 x 480-pixel color display with backlight
   l. Touch screen display for one touch operation
   m. Full-duplex hands-free speakerphone with AEC

n. Call hold
o. Mute
p. Redial, call return, auto answer
q. PoE (802.3af) Class-3 support
r. Headset with EHS support
s. Dual Gigabit Ethernet ports
t. Desk Mountable
u. Optional Wall mount available

9. NQ-T1000 VoIP Staff Phone LCD Display (aka Staff Station)
   a. 132 x 64-pixel graphical LCD with backlight
   b. Two-port 10/100M Ethernet Switch
   c. Full-duplex hands-free speakerphone with AEC
   d. Call hold
   e. Mute
   f. Redial, call return, auto answer
   g. PoE (802.3af) Class-3 support
   h. Dual-color (red or green) illuminated LEDs for line status information
   i. Two 10/100M Ethernet ports
   j. Wall or desk mountable
10. Optional third-party equipment support
   a. Telephony interface device(s) for FXO/FXS analog port connectivity
   b. Third-party hardware FXS gateway support includes:
      1) Two port FXS gateway Cisco SPA-112 typically used for analog interface to existing PBX CO port support
      2) 24 port FXS gateway Yeastar TA-2400 typically used for analog staff phone support

2.03 COMPONENTS AND DESCRIPTIONS

A. The Nyquist E7000 Series Educational System is a software-based VoIP paging and intercom system.

B. The System must be capable of supporting existing Bogen Multicom 2000 and Bogen Quantum Multicom IP wiring, 25-Volt speakers and analog call-switches, and equivalent competitive systems utilizing the existing architectural numbering scheme. The VoIP capabilities of the Nyquist system will enable the support of the features across the Nyquist appliances within the facility. The following sections define how the system handles each of the features in the system. Systems that do not allow the reuse of existing wiring or numbering scheme shall not be deemed acceptable. Systems that do not allow appliances to be seamlessly integrated via the existing customers LAN are not considered equal.

C. Nyquist E7000 Software
   1. The Nyquist E7000 software is pre-installed on a Nyquist NQ-SYSCTRL System Controller or can be optionally installed on a dedicated dealer or customer supplied server. An unlimited number of facilities can be networked into a Nyquist-based District.

2. Audio shall be transmitted between the System Controller and the Nyquist appliances using the customer supplied LAN/WAN using both G.722 and Opus 48k audio encoding and streaming technology to deliver High Definition DVD quality audio. Systems that do not use G.722 and Opus for audio encoding and streaming shall not be deemed equivalent.
3. Installers have the ability to verify that the Nyquist System Controller can access Internet-based URLs required for the system to run properly by clicking on the "Check Internet Site Access" on the license activation wizard. If the installer made mistakes in configuring the network the install has the ability to go back and make changes to the network by clicking on the “Network Wizard” button.
4. The Nyquist software and Nyquist appliances firmware shall be upgradeable via the Nyquist Web UI System Update page that contains a list of available Nyquist software updates. When automatic software check and download are enabled, new software updates will automatically be downloaded and appear in the System Update list, and a dashboard message will be displayed to announce newly available software. Release notes can be viewed for each available update. System updates can be started via the System Update list. The System Update page includes a "Check for System Updates" button that can be used to manually check for and download available Nyquist software updates.
5. Prior to preforming Nyquist updates the technician shall have the ability to verify if the default gateway, Network Time Protocol, and Domain Name Servers are configured and available, to obtain network interface and routing tables status, and to display the Nyquist E7000’s public IP address. See "Check Internet Site Access" under "System Parameters”. The E7000 system can be setup to automatic check for new Nyquist System software and automatic download of new Nyquist System Software
6. It shall be possible for a Nyquist facility to make “station-to-station” calls and “remote facility” All-Call pages to a single facility or to all Nyquist facilities in a district via the Nyquist Web UI or an Admin Station. Systems that require remote viewing software or other application software to be installed/loaded on to additional servers or PCs to make station-to-station calls and remote facility All-Call or district paging shall not be considered equivalent.
7. The Nyquist software is designed to handle all facility and district-wide communications, including but not limited to, inter-facility intercom calling and paging, district-wide Emergency All-Call and local facility point-to-point calls. Via the Nyquist Web UI, every facility shall be configured with the IP addresses of all the other remote facilities within the district. To ensure that these communications are operating correctly at all times the Nyquist appliances are supervised and remote facilities are monitored, if a device or facility has a fault the system can send and/or email and also display a message if a device changes state. System that don’t provide Station Supervision and remote Facility Monitoring shall not be considered.
8. Nyquist can support an unlimited number of facilities; however, the maximum number of simultaneous remote facility intercom calls supported is based on the actual performance of the WAN and the Nyquist System Controller CPU load.
9. The voice quality of the facility calls may vary based on the WAN conditions. The maximum network bandwidth that All-Call and Zone Paging uses is average of 0.086 Mbps (Multicast G.722), and intercom calls average of 0.171 Mbps (unicast, G.722).

10. The system shall facilitate the repetitive playing of Normal or Emergency audio tones or announcements directed to an All-Call or a Paging Zone until stopped by the Nyquist user via the Web UI, an Admin Station, or a dry contact closure connected to the Nyquist I/O Controller NQ-E7010.
11. Through the use of Routines, a trained individual can create a routine that can perform a sequence of events that can include the repetitive playing of normal or emergency audio files, make or break contact closure(s), display different messages in different areas, send email(s), and place a phone call (if equipped) offsite and play a pre-recorded message. Routines can be triggered/started by Application Programming Interface (API) or the playing of normal or emergency audio files, make or break contact closure(s) or almost any feature or function in the E7000 system. The system must also be capable of executing multi-site Routines (e.g., supports District-wide lockdown). Systems that don't provide Routines are not equal.
12. A built-in Master Clock shall be included to automatically control class change bells or other time-based events. The Master Clock shall have an unlimited number of Events that may be programmed into any of the unlimited number of Facilities, unlimited number of Schedules, and unlimited number of Holiday events. The schedules shall be nameable for easy selection when assigning schedules to days or overriding a schedule. Schedules can be overridden via the Admin Web UI or Admin phone.
13. Network Time Synchronization. The system shall be capable of periodically updating/synchronizing the processor's time with a Network Time Server running Network Time Protocol (NTP) via the school's LAN network. Systems that do not provide Network Time Synchronization will not be deemed equivalent. The Nyquist server can be the NTP server for other devices on the LAN such as IP clocks and other IP devices.

D. Nyquist E7000 System Software Application
1. The Nyquist software is pre-installed on the Nyquist System Controller, and upon boot-up, users can log in to the Nyquist application via a web browser that supports WebRTC. Systems that require Com Port redirect software, client PC application, software or serial-to-Ethernet adapters for user access are not deemed equal. Communications between the System Controller and the Web UI(s) shall be via secure Hyper Text Transfer Protocol (HTTPS) connections (i.e., https://).
2. The Nyquist Web UI shall be configured with four different default user access levels, based on four unique user roles. Systems that do not provide unlimited access levels and unlimited number of user roles are not considered equal.
3. The four default roles shall be: admin, optech, operator, and user. These roles provide a starting point/example for administrators to create additional roles
4. Only a user assigned the admin role shall be able to provide access to users, giving them the ability to create, delete, edit, and view system parameters.
5. Only an Administrator shall have the ability to adjust roles and Class of Service (CoS) of users. The roles determine if users can view the definable data objects that can include configuration, alarms, and performance data and if users can perform certain operations based on the user's role and station's CoS. All changes to roles and CoS are effective immediately, without the need to restart the browser or reboot the System controller or server.

6. The Nyquist Web UI Dashboard shall provide full administrative capabilities to manage/operate the following system features:
   a. Calling/Paging – Used to access directory, dial pad, Page Exclusion, Call Forwarding, Zone Page, Record Page, Prepending Page, All-Call, Emergency All-Call, Manage Check-in and operate Routines.
   b. Multi-Site Calling/Paging – Used for Facility Page, Multi-Site All Call, and Multi-Site Emergency All Call.
   c. Tones/Announcements – Used for Tones, Announcements, Alarms, Stop Announcement, Display Message, and Remove Message.
   d. View Weekly Schedule – Used to show the current active Bell Schedules.
   e. Audio Distribution – Used to distribute audio sources to Stations, Audio Zones or entire facility. Operators can create an unlimited number Audio Distributions as needed by the facility
   f. Enable or Disable Audio – Used to place the Nyquist system into Page Exclusion mode (i.e., "mute" the system) when a contact closure is supplied from the fire alarm panel. Systems that do not provide this capability are deemed not equal.
7. Systems that require application software to be installed on a PC to manage the above features shall not be considered.
8. To facilitate installation and configuration of the system, additional Web UI menus are required. The menus shall only be visible to users with the correct roles and CoS. The navigation menus found on the Web UI shall be as follows:
   a. System Parameters – Allow installers to adjust core system parameters including Product License, Restart Server, Station Supervision, Email Configuration, System Update, Shut Down Server, Check Internet Site Access, Check Server Status, Edit system tools and adjust all the System Parameters.
   b. Zones and Queues – Allow installers to create and modify Paging, Time, and Audio Zones. Installers can also setup Queues that can be used to eliminate feedback.
   c. Schedules – Allow installers and administrators to create bell schedules for multiple Schools, predefine alternative schedules to run, prevent the bells from ringing on a holiday, and schedule an announcement to play. The system shall allow an unlimited number of schedules to operate simultaneously within a facility.
   d. CoS Configuration – Allow the installer to create, modify, and delete CoS groups that control station access to the following features: Call-in Level, Zone Paging, All-Call Paging, Emergency All-Call, Inter-Facility Call/Page, Audio Distribution, Remote Pickup, Join Conversation, Call Forwarding, Walking Class of Service, External Call Routing, Call Transfer/3-way Calling, Manually Activate Tone Signals, Call Any Station, Manage Recording, Monitor Calls, Monitor Locations, Conference Admin, Conference User, Voicemail, Record Calls, Activate Alarm Signals, Disable Audio, Enable Audio, Allow Callee Auto-answer, District Paging, Inter-Facility Features, Manage Output Contacts, and Execute Routines.
   e. Admin Groups – Allow the installer to create, modify, and delete software groupings of admin phones, staff phones, and Admin Web UIs that can ring when a station calls in with a call switch.
   f. Stations – Allow the installer to set up, modify, and delete stations; set up Page Exclusion; view Station Status; and add New Stations.

g. Bridge Devices – Allow the installer to configure the Nyquist ASBs.
h. Amplifier Devices – Allow the installer to configure Nyquist Two and Four and PA Amplifiers
i. Audio – Allow the installer to upload and manage Announcements, Playlists, Recordings, Songs, Tones, and Internet Radio Services. The system must support the uploading of both MP3 and WAV files and make Audio file management simple for users. Systems that limit the size of Audio files shall not be considered equal.
j. Users – Allow the installer to manage users by giving them the proper roles and assign extensions if needed.
k. Roles – Allow the installer to grant users rights to Create, Delete, Edit, Restart System, Sort Menu, Systems Update, Manage, Import/Export, Restore, Settings, or View.
l. Facilities – Allow the installer to set up the district wide facilities for remote paging and calling.
m. Outside Lines – Allow the installer to set up FXS and FXO ports for inbound and outbound system calling.
n. SIP Trunks – Allow the installer to set up SIP trunks into the facility for inbound or outbound calling.
o. Call Details – Allow the installer to review the historical system activities that can be used for incident investigation or system troubleshooting.
p. System Backup/Restore – Allow the installer to preform system backups or restores and allow the backups to be scheduled to run automatically.
q. System Logs – Allow the installer to view and export log files, Nyquist-Intercom, and Web Server logs that can be used for troubleshooting and technical assistance.
r. Paging Exclusions – Allow the installer to view and edit stations that are excluded from paging.
s. Firmware – Update firmware for Nyquist speakers and appliances.
t. Routines – Allow installers to create routines that are a sequence of actions, that the Nyquist system executes as a result of an input trigger. Routines can support crisis plans for situations such as school lockdowns, weather events, or emergency evacuations.
u. Alert Filters – Allow installers to select the National Weather Alerts that the facility needs to monitor for such as weather events, earthquakes, tsunami, volcanoes, public health, power outages, and many other emergencies.
v. Systems that do not provide these options as a minimum shall not be considered equal.

E. Nyquist NQ-E7030 Analog Station Bridge
1. The Nyquist NQ-E7030 ASB allows facilities with existing Multicom or Quantum or compatible intercom systems to upgrade to Nyquist. Each ASB supports up to 24 speakers and call switches with 120-Watts of embedded 25 Volt power. The ASB is designed to drive almost any combination of 25 Volt speakers and horns.
2. The Nyquist ASB contains two 120-Watt amplifiers that are used dynamically by the system and allows two simultaneous amplified audio paths through the ASB. Either

amplifier can be used for an intercom call and/or program (Paging, Time Tones and Audio) distribution.

3. Each of the 24 station interface ports - Support connections to as many as 24 individual 25 Volt speakers with one 25 Volt speaker connection per interface used for direct communication between the admin area and the classroom via Half-duplex talkback using the speaker as pickup and the 24 dry contact closure-type analog Call Switch connections allow for support of legacy Call-Switches like the CA15C.
4. On the back of the ASB is a CAN Bus 2.0 Interface designed to support the connection of 24 or more Nyquist NQ-E7020 Digital Call Switches DCS that can be associated with the programmed stations. Systems that don't support Digital Call Switches shall not be considered equal.
5. On the front of the ASB are two (2) x RGB full spectrum LED's. The POWER LED appears as solid red during initial power up, flashes green during a boot sequence, and appears solid green when fully booted. The STATUS LED uses the following indicators to provide information about the appliance:
    1) Flashing red – No network connection found
    2) Solid blue – The ASB is in an uninitialized state and is not associated to a server. (The server may be in a discovery mode.)
    3) Solid green – The ASB is registered to a Nyquist server and is in normal operation
    4) Flashing green – The ASB has an IP address but is not registered with the Nyquist server
    5) Solid red – The ASB needs to be rebooted or reset so that the Nyquist application can resume
    6) Flashing Blue – The ASB is updating.
6. USB 2.0 host port, type A connector designed for future applications.
7. On the front of the ASB you will also find the 10/100 Ethernet network connection. The ASB can be configured with a static IP address or use DHCP for connection to the customers network as required by the Network Administrator
8. The ASB gets its power from a universal mains power supply (100VAC – 240VAC)
9. The Nyquist NQ-E7030 ASB shall be rack, wall, or shelf mountable and shall include the required mounting bracket hardware.

F. Nyquist NQ-P0100 Matrix Mixer Pre-Amplifier (MMPA)
1. The Nyquist NQ-P0100 MMPA is designed to bring external audio into the Nyquist system. The MMPA interfaces with a local sound system by accepting one or more analog audio sources, mixing them, and outputting them to either, a) the network for Audio Distribution, or b) the MMPA's line level output that can then be inserted into an external amplifier to drive local sound system in gyms, cafeterias, auditoriums, etc. The MMPA supports the following:
    a. Four software selectable Line/MIC Input channels via three XLR connectors and four sets of screw-terminals. Input channel four (4) shall be capable of being configured to support a Push-to-Talk microphone Bogen model DDU-250. Channel-1 can be configured as a digital AES/EBU (AES3) input. Line/Monitor output – The MMPA becomes a station on the Nyquist system, allowing users to

call it directly or to include it in any of the Page, Time, or Audio Zones and can be direct one-way page by calling it extension.

b. The MMPA shall support the following features: Line-Level output to drive input on a local amplifier or self-amplified speaker; One USB 2.0 host port (Type-A connector) for future use; two (2) x RGB full spectrum LED status indicators.

c. Configurable built-in Digital Signal Processing for Noise Gate, Compressor/Limiter functions, etc., Tone Controls: Low Shelving, Mid Bandpass and Hi Shelving, Multi-band Parametric EQ, and Variable Low-Cut/High-Pass filters.

d. The MMPA is powered by Universal mains supply (100VAC – 240VAC).

e. The MMPA shall be wall or shelf mountable and shall include the required mounting bracket hardware.

2. The system shall be equipped a minimum of one (1) Nyquist MMPA that allows for up to four user-configurable audio inputs. The MMPA shall support Line, MIC, and digital AES/EBU (AES3) input sources. The system supports an unlimited number of MMPAs.

G. Nyquist NQ-E7010 Input/Output Controller

1. The Nyquist NQ-E7010 I/O Controller is designed to accept contact closure inputs and activate open-collector outputs to drive relay coils. These inputs and outputs are used to trigger events or to be triggered by an event or Routine within the Nyquist system.

a. PoE Class-1; IEEE 802.3af compliant with Optional 48VDC 15W power supply

b. Eight Dry Contact Closure Inputs that can be used with Fire Alarm Override Relays, external event triggers (for example, Lockdown Buttons, etc.)

c. Eight Relay Driver Outputs (Open-Collector) for use with Clock Correction (Sync Pulse), response to contact closure inputs, etc.

d. USB 2.0 host port, Type-A connector (future use)

e. Two (2) x RGB full spectrum LED Power and Status indicators

2. The Nyquist NQ-E7010 I/O Controller shall support wall or shelf-mounting options and shall include the required mounting bracket hardware.

3. The Nyquist NQ-E7010 I/O Controller shall be designed for wall or shelf mounting.

H. Bogen Analog Call Switch CA-15C for use with the Nyquist ASB or NQ-GA10P(V)

1. The momentary Call Switch shall be capable of placing a combination of Normal/Urgent/Emergency Calls based on the software configuration of the Call Switch.

2. Normal/Emergency call configuration: Making a Normal call in this mode involves pressing the button on the Call Switch once. A call is then placed to the designated Admin Station. An Emergency call involves pressing the call switch at least four times. The Emergency call is then routed to the designated Admin Station. In both scenarios, the calling station number and call-in level (Normal or Emergency) are displayed on the Admin Station or on a group of Admin Stations. Additionally, Emergency calls can be routed to an alternative Admin Station or Emergency Link.

3. Urgent/Emergency call configuration: Making an Urgent call in this mode involves pressing the button on the Call Switch once. A call is then placed to the designated Admin Station. An Emergency call involves pressing the button on the Call Switch at least four times. The Emergency call is then routed to the designated Admin Station. In both scenarios, the calling station number and call-in level (Urgent or Emergency) are

displayed on the Admin Station or on a group of Admin Stations. Additionally, Emergency calls can be routed to an alternative Admin Station or Emergency Link.

4. Emergency Only call configuration: Making an Emergency call in this mode involves pressing the Emergency call switch with Call Level Emergency one time. The call is then switched to the Admin Station. This requires the display of the station number and call-in level on the Admin Station or on a group of Admin Stations. Additionally, Emergency calls can be routed to any Admin Station, including Emergency Link.
5. Emergency Link Transfer - If an Emergency call goes unanswered by the Admin Station and the Emergency link transfer is active, the Emergency call will be forwarded to the loudspeaker associated with the Emergency Link Station. Any station equipped with a loudspeaker can be programmed as the Emergency Link Transfer. Systems that do not provide Emergency Link Transfer shall not be considered equal.
6. In addition to the mechanical click of a Call Switch button press, a call confirmation audio file shall be played on the associated loudspeaker when a call is placed. The three call-in levels shall have distinct audio confirmation messages:
    a. Call Placed
    b. Urgent Call Placed
    c. Emergency Call Placed

I. The Nyquist plenum-rated amplifier shall be a model NQ-GA20P2 20-watt integrated amplifier and shall utilize UL 2043 plenum-rated packaging.
1. One 20 watt 8-ohm speaker output (with PoE+)
2. One Balanced Line Output
3. RJ-45 for Nyquist network connection
4. Power-over-Ethernet Plus (PoE+) 802.3at compliant
5. Nyquist network-based audio output Web-based configuration
6. Power and Status LEDs
7. In-wall, in-ceiling, shelf, or device mountable UL 2043 plenum-rated package
8. Optional 48VDC External Power Supply (PS4830W; sold separately)

J. The Nyquist plenum-rated amplifier shall be a model NQ-GA20P2 20-watt integrated amplifier and shall utilize UL 2043 plenum-rated packaging. The amplifier shall be capable of being powered with an 802.3at compliant Power-over-Ethernet Plus (PoE+) switch, PoE+ power injector, or 48VDC external power supply PS4830W. The amplifier shall provide a frequency response from 20-20 kHz +/- 0.25 dB at rated power. Distortion shall be less than 0.05% THD+N. The amplifier shall include GUI based configuration. Output shall be provided for both line level or 8-ohm speaker connections. Audio line level output shall be 2.2V RMS @10kΩ (+27 dB) electronically balanced.

K. The Nyquist based two channel amplifier shall be a model (A/R) rated at (A/R) watts RMS per channel (NQ-A2060/2x60 watts, NQ-A2120/2x120 watts, and NQ-A2300/2x300 watts) with switch selectable 2-Channel or 1-Channel bridged operation. The amplifier shall have one dedicated Balanced Line Input. The amplifier shall provide a frequency response from 20-20 kHz +/- 0.25 dB at rated power. Distortion shall be less than 0.03%. The amplifier shall include GUI based DSP controls; 16-band Graphic Equalize; Signal Present and Clip Monitor; Adjustable High Pass, Low Pass, and Bandpass Filters; Noise Gate; Compressor/Limiter; and 7-band Parametric Equalizer. Outputs shall be provided for 4-, 8-ohm, 25V, and 70V distributed

systems. The amplifier shall be rack mountable 1/2 Rack Width - Wall, Rack, or Shelf mountable 1RU and 2RU packages or by using a 19" Rack Mount Kit (NQ-RMK03; sold separately). It shall carry the necessary safety agency listings for both the US and Canada. The amplifier shall employ convection air cooling. Amplifiers that require fans for cooling shall not be considered equal.

L. The Nyquist based four channel amplifier shall be a model (A/R) , rated at (A/R) watts RMS per channel (NQ-A4060/4x60 watts, NQ-A4120/4x120 watts, and NQ-A4300/4x300 watts) with switch selectable 4-Channel or 2-Channel bridged operation. The amplifier shall have two dedicated Balanced Line Inputs with both Phoenix plug and XLR connections for each input. The amplifier shall provide a frequency response from 20-20 kHz +/- 0.25 dB at rated power. Distortion shall be less than 0.03%. The amplifier shall include GUI based DSP controls; 16-band Graphic Equalizer; Signal Present and Clip Monitor; Adjustable High Pass, Low Pass, and Bandpass Filters; Noise Gate; Compressor/Limiter; and 7-band

M. Nyquist NQ-T1100 VoIP Admin Phone – Color Touch Display (Admin Station)
1. The Nyquist Admin Station shall have the following features:
   a. 7" 800 x 480-pixel color display with backlight
   b. Touch screen display for one touch operation
   c. Full-duplex hands-free speakerphone with AEC
   d. Call hold
   e. Mute
   f. Redial, call return, auto answer
   g. PoE (802.3af) Class-3 support
   h. Headset with EHS support
   i. Dual Gigabit Ethernet ports
   j. Desk Mountable
   k. Optional Wall mount capable
2. The Nyquist Admin Station display panel shall show the time of day and day of week, the current bell schedule(s), and the station numbers and call-in priority of staff stations that are calling in. Depending upon the system programming, an Admin Station shall display menus to activate Zone Paging, All-Call Paging, Emergency All-Call Paging, District All-Call paging, alarm signals, and external functions.
3. The Admin Station shall be capable of calling either the loudspeaker or Staff Station at each classroom location.
4. The Admin Station shall display the classroom number of any station that calls 911. This allows front-office administrators to direct emergency personnel to the correct physical location in the building when they arrive. If a system is not connected to outside phone lines, then 911 calls can be routed to a designated station within the facility. The system shall automatically record all 911 calls made from any station. The 911 call recording shall begin as soon as 911 is dialed and continue unit the call is terminated. Recorded calls shall be maintained on the system for later playback review and/or retrieval by authorized personnel and/or authorities. Systems that do not provide this feature will not be deemed equal.

N. Nyquist NQ-T1000 Staff VoIP Phone – LCD Display (Staff Station)
1. Nyquist Staff Station shall have the following features:

a. 132 x 64-pixel graphical LCD with backlight
b. Two-port 10/100M Ethernet Switch
c. Full-duplex hands-free speakerphone with AEC
d. Call hold
e. Mute
f. Redial, call return, auto answer
g. PoE (802.3af) Class-3 support
h. Dual-color (red or green) illuminated LEDs for line status information
i. Two 10/100M Ethernet ports
j. Wall or desk mountable

2. The classroom Staff Station shall be capable of the following features depending on how the station CoS is configured:
   a. Emergency intercom call – Staff Stations shall be capable of making an Emergency intercom call, which is then routed to the assigned Admin Station. This requires the display of the architectural number and call in level on the Admin Station. Systems that do not provide this feature are not equivalent.
   b. Speed dial
   c. Toggle audio distribution on and off
   d. Call Forward activation and deactivation for All-Calls/Busy/No Answer/Busy or No Answer
   e. Conference Calling
   f. Transfer Call
   g. Dial Administrative station– Staff Stations can allow the user to dial the station number to call to the Admin phone or its associated speaker. The call shall be routed to the Admin Station showing the architectural number that is calling.
   h. Emergency All-Call – An emergency page shall be broadcasted to all the stations in the facility.
   i. Place Outside Call
   j. Remote Answer
   k. Single-Zone/All-Station Page
   l. Call Waiting Tone for Outside Calls – It shall be possible to feed the call waiting tone to the Administrative Phone during a conversation.
   m. Transfer call from VoIP speaker in classroom down to an associated Staff Station
   n. Transfer call from analog speaker in classroom down to an associated Staff Station
   o. Transfer call from VoIP Staff Station in classroom up to an associated VoIP speaker
   p. Transfer call from Staff Station in classroom up to an associated analog speaker

O. Additional Loudspeakers for use with the Nyquist ASB
   1. 25-Volt Classroom Speakers shall be Bogen:
      a. Ceiling Mounted Speakers: CSD2X2U Drop-In Ceiling Speaker
      b. Wall Baffle Speakers: MB8TSQ/SL Metal Box Speaker
   2. 25-Volt Hallway Speakers shall be Bogen:
      a. Ceiling Mounted Speakers: S810T725PG8U Ceiling Speaker
      b. Wall Baffle Speakers: MB8TSQ/SL Metal Box Speaker

3. 25-Volt Outdoor/Gym/Locker Room Speakers shall be Bogen:
   a. FMH15T mounted in BBSM6 surface-mounted vandal-resistant enclosure/BBFM6 flush-mounted vandal-resistant enclosure with FMHAR8 adapter ring and SGHD8 heavy duty grille
   b. KFLDS30T Wide Dispersion Re-entrant Horn Loudspeakers
4. 25-Volt Pendant Speakers shall be Bogen:
   a. OCS1 Orbit Ceiling Speakers
   b. OPS1 Orbit Pendant Speakers

P. Wire guards shall be provided and installed for each speaker where indicated on the drawings.

Q. Public Address Strobe:
1. Each public address strobe location shall include the following:
2. QTY (1) RDL ACR-1 Audio Relay
3. QTY (1) Altronix RB5 Relay
4. QTY (1) Edwards 53X-G1 Rotating Beacon, 24V, CONFIRM COLOR PRIOR TO PROCUREMENT
5. QTY (1) Edwards WBR Wall Mounting Bracket
6. QTY (1) Altronix SMP-5 Power Supply
7. QTY (1) TA238175 Transformer
8. QTY (1) STI EM121204 Utility Box
9. All required cabling
10. The power supply for the public address strobes shall be located in the data closet / telecommunication room.
11. The strobe shall activate during an all call or direct room call to the room the strobe is located in.

R. Cabling:
1. All cabling shall be plenum rated.
2. The contractor shall provide wiring in raceway for the proper operation of the sound systems as called for in this specification, or as shown on the drawings. The types of cable required are as follows:
   a. Loudspeaker Cable: It shall contain three (3) 22 AWG stranded tinned copper conductors (two (2) aluminum-polyester shielded and one (1) unshielded), plus a #22 AWG copper drain wire in a chrome PVC jacket. Conductors shall be polyethylene insulated with 0.014 inch thickness. Jacket thickness shall be 0.028 inch and overall outer diameter 0.21 inch. Loudspeaker cable shall be Belden or approved equal.
   b. Microphone Cable: Cable shall consist of one (1) pair of 20 AWG stranded, tinned copper conductors, plus a #20 stranded drain wire in a chrome PVC jacket. Conductors shall be polyethylene insulated and aluminum-polyester shielded. Microphone cable shall be Belden or approved equal.
3. Raceways:
4. Conduit and Boxes: Comply with Section 260533 "Raceway and Boxes for Electrical Systems." Flexible metal conduit shall not be used.
5. Outlet boxes shall be not less than 2 inches wide, 3 inches high, and 2½ inches deep.

2.04 SYSTEM CAPABILITIES

A. The communication system shall be a Bogen Nyquist E7000 Series Educational System and shall provide a comprehensive communications network between administrative areas and staff locations throughout the facility.

B. The system shall provide no less than the following features and functions:
   1. Software-based, state-of-the-art, Voice over IP (VoIP) paging and intercom solution.
   2. The system shall provide a Web User Interface (Web UI) shall allow users to configure and control the system, in accordance with their assigned User Role, from any Web browser enabled PC, Mac, Android or iOS tablet or mobile device.
   3. Amplified-voice communication with analog loudspeakers shall use a shielded audio pair when connected to an ASB.
   4. The system shall support any combination of the following VoIP phone station types: NQ-T1100 Administrative VoIP Phone – Color Touch Display (Admin Station) or NQ-T1000 Staff VoIP Phone – LCD Display (Staff Station).
      a. All VoIP phone station types shall utilize the same type of field wiring.
      b. There shall be no limit to the number of Admin Stations that can be connected to a facility. Systems that require different head-end equipment to make Admin Stations function, or systems that limit the number of Admin or Staff Stations shall not be deemed acceptable.
   5. Future station alterations shall only require the Station Type to be changed in system programming. Alterations shall not require field wiring or system head-end alterations, unless an analog station device is being replaced by a VoIP station device or vice-versa.
   6. The system shall be a global non-blocking system. The system shall be capable of unlimited amplified intercom paths per facility. Two amplified intercom paths shall be provided with each ASB for its complement of 24 stations. All hardware, etc., required to achieve the necessary number of amplified-voice intercom channels for this system shall be included in this submittal. ASB amplified-voice intercom channels shall provide voice-activated switching. Systems requiring the use of a push-to-talk switch on administrative telephones shall not be acceptable. There shall be an automatic level control for return speech during amplified-voice communications. The intercom amplifier shall also provide control over the voice switching sensitivity and delay times of the VOX circuitry on the ASB.
   7. The system shall provide 911 Dial-Through via outside FXO/FXS lines or SIP trunks to ensure that one or more lines are always available for 911 calls. The 911 Dial-Through is available to any properly configured station (via CoS). When a station dials 911, the 911 call is processed as follows:
      a. Call routes to an Emergency Group where the call can be answered.
      b. The 911 CO lines can be pre-configured and reserved. If the 911 reserved lines are busy, the normal CO lines will be connected to route the 911 calls. If all the normal CO lines are busy, then one of the ongoing calls shall be disconnected and the 911 call shall be placed.
      c. When 911 is dialed from any station, its designated Admin Station or Admin Group will receive a message that the station has dialed 911.
      d. The system shall automatically record all 911 calls made from any station. The 911 call recording shall begin as soon as 911 is dialed and shall continue until the call

is terminated. Recorded calls shall be maintained on the system for later playback review and/or retrieval by authorized personnel and/or authorities.

8. It is of highest importance that Emergency calls from stations receive prompt attention. Therefore, it is important that there be an alternative destination in case the Emergency call does not get answered at the primary location. Details are as follows:
   a. Staff-generated Emergency calls shall be treated as the second highest system priority. Therefore, all Emergency calls shall annunciate at the top of the call queue of their respective Admin Station or Admin Group. Should that Emergency call go unanswered for 15 seconds, the call shall be re-routed to an alternative speaker station. Then, a tone will prompt the caller to make a verbal call for help and annunciates to the Emergency link station "Emergency." During the transfer, the original administrative telephone shall continue to ring the distinctive Emergency Ring. Should the Emergency Transfer-to-Station have an associated Admin Station, it will also ring for the Emergency call.
   b. The Emergency Transfer-to-Station shall be software configurable.
   c. Systems failing to transfer unanswered Emergency calls or failing to immediately connect to the designated Admin Station shall not be deemed as equal.
9. There shall be a Facility Wide Emergency All-Call feature. The Emergency All-Call shall be accessed from designated Admin Stations or the Nyquist Dashboard or by the activation of an external contact closure that shall give a microphone input Emergency status. The Emergency All-Call function shall have the highest system priority and shall override all other loudspeaker-related functions including Time Tones, Normal All-Call or Zone Pages, or Audio Distribution.
   a. Considering that Emergency calls are to be treated with the highest level of concern, systems that do not regard Emergency All-Call with the highest priority shall not be deemed as equal.
   b. Upon touching the Directory icon, a menu shall appear on the Admin Station display prompting the user to select the desired menu.
   c. The Emergency All-Call shall capture the highest-level system priority and shall be transmitted over all speakers in the facility. It shall also be capable of activating an external control output, which can be used to activate external relays to automatically override volume controls, local sound systems, or strobe circuits.
   d. This Emergency All-Call feature can have a four-digit pin number associated with it that would be required to use the feature or override someone that is already using this feature.
   e. Systems without Emergency All-Call or systems with All-Call that cannot be activated by external means or that do not capture complete system priority or activate an external relay, shall not be acceptable.
10. There shall be unlimited Alarm Tones (four by default). Each may be accessed by dialing *91 and the two-digit tone number from any Admin Station, SIP Trunk, or FXO/FXS system interface. These Alarm Tones are separate from the Time Tones. Users shall be able to add an unlimited number of Alarm Tones to the system by uploading MP3 or WAV files. Systems that do not allow the user to upload MP3 and WAV files to customize the Alarm Tones or need to use external alarm/tone generators or special software or have less than four Emergency Alarm Tones shall not be acceptable.

11. Upon touching the Directory icon on an Admin Station, a menu shall appear on the display prompting the user to select from the sub-menus. The Alarms sub-menu is the first available. This precludes the user from having to memorize complicated key sequences to access Alarm Tones.
12. There shall be unlimited I/O Controller relay driver outputs accessible and controllable by properly authorized users via an Administrative Web UI. These outputs remain set until accessed and reset. Users shall have the ability to review the status of each relay driver output. Users shall be prompted through fields via a plain English menu, precluding users from having to remember any dialing sequences to control this feature. The system shall support an unlimited number of I/O Controllers, and each I/O Controller shall be able to interact with any and all other I/O Controllers on the system (i.e., an input on one I/O Controller can trigger an output on one or more different I/O Controllers). Systems that require the user to remember complicated dialing schemes or prompt the user via cryptic commands shall not be acceptable.
13. The I/O Controller can create a contact closure when the following operations are performed in the system:
    a. 911 call placed
    b. Audio Distributed
    c. Alarm is played
    d. Announcement is played
    e. All-Call preformed
    f. Multi-Site All-Call performed
    g. Multi-Site Emergency-All-Call
    h. Emergency-Call
    i. Emergency-All-Call
    j. Audio-Disabled
    k. Page
14. The system shall provide software controlled and programmable control outputs for external relay activation for use with strobe lights, magnetic locks, card access systems, motion detectors, cameras, or any low-voltage, dry contact creating device. Systems using dedicated security stations for control of external functions shall not be acceptable.
15. The system shall be capable of interfacing to PSTN/PBX/iPBX via both FXO/FXS line and SIP trunk connectivity.
16. The system shall be capable of providing each facility (i.e., (i.e., Nyquist location) an unlimited number of incoming FXO/FXS or SIP trunk lines that can be designated by the user to ring the designated Day Admin or Night Admin. Where an Admin Station is designated to receive outside line calls, the incoming call's Caller ID information shall appear on the display. The system shall also provide the ability to make outside line calls from Admin Stations. This ability shall be programmable for each Admin Station and there shall be an unlimited number of CoS available to assign to any station.
17. The system shall be capable of supporting DID, DISA, and Security DISA functions.
    a. The system shall provide a password-protected Security DISA feature that shall only be accessible from authorized Police, Fire, Emergency personnel, or an off-premise security office that monitors the facility's security system. The Security DISA feature shall function as follows: Upon dialing the Security DISA phone number, the caller will receive a dial tone from the system, after which he or she

must enter the assigned Security DISA passcode on the dial pad. Upon confirmation, the system will present the dial tone again and will allow the authorized personnel to dial any station/classroom on the system and monitor the activity without any pre-announce tone or privacy beep. This will allow the authorized personnel to audibly assess the situation and determine what actions need to be taken.

b. All DISA and Security DISA calls shall be automatically recorded by the system for later playback review and/or retrieval by authorized personnel and/or authorities.

18. The system shall provide for field-programmable three-, four-, five-, or six-digit architectural station numbers.
19. There shall be an automatic level control for return speech during amplified-voice communications.
20. Each station loudspeaker shall be assignable to all or any combination of Paging, Time, and/or Audio Zones. Systems that do not provide unlimited Paging, Time, and/or Audio Zones shall not be acceptable.
21. There shall be unlimited schedules with unlimited programmable events per facility. Each event shall sound one user-selected tone or external audio source. It shall be possible to assign each schedule to a day of the week or to manually change schedules from an authorized user via a web-based UI. Systems that do not provide unlimited schedules, events, and tones, or that require software to be installed on a PC to perform these functions shall not be acceptable.
    a. The system shall provide multiple concurrent schedules per facility/location to accommodate split facilities (for example., combined Elementary and Middle School, combined Middle and High School, etc.).
    b. The system must be capable of providing Class Change Music to be played from an external audio source or audio files that are stored in playlists on the system during class change periods or whenever a facility wants music to be played in an area (i.e., (i.e., one or more Time Zones) on an automated schedule.
    c. Each event shall be able to be directed to any one or more of the unlimited Time Zones.
    d. Each of the unlimited Time Zones shall have a programmable, customizable Preannounce Tone and volume control that is unique unto itself.
    e. Each event shall play any of the Normal tones or external audio. Each event may utilize a different tone. For example, the system shall be capable of sending the gymnasium, shop classes, and pool a separate, unique time tone to indicate “clean up.” Minutes later, the entire facility can be sent a different time tone to indicate class change.
    f. Each of the unlimited Time Tones may be manually activated by selected VoIP Admin Phones or via an authorized user with access to the Web UI. These tones shall remain active as long as the telephone remains off-hook or until canceled from the keypad or the Nyquist Web UI.
    g. Systems that do not provide an unlimited number of schedules or do not provide automatic activation of schedules shall not be acceptable.

22. Internal Master Clock shall be included, allowing an unlimited number of events per facility. Systems that do not provide an internal master clock or that must supply an external master clock to meet these specifications shall not be acceptable.
23. The Nyquist E7000 is capable of synchronizing with an NTP server and automatically adjusting the Daylight Savings Time for any time zone in the world. The server that the Nyquist E7000 application is running on can also be used as an NTP server for other systems on the LAN (for example, IP Clocks and control systems).
24. There shall be a Zone Page/All-Call Page feature that is accessible by selected Admin Phones and FXO/FXS or SIP connection to the PSTN or PBX/iPBX.
25. There shall be an option to play a pre-announce tone at any loudspeaker selected for voice paging.
26. There shall be a voice-intercom feature that is accessible by CoS authorized staff phones, all Admin VoIP phones, and Admin Web UIs.
    a. There shall be a privacy beep played every 15 seconds at any selected loudspeaker to indicate that an intercom call is in progress.
    b. There shall be a pre-announce tone played at any selected loudspeaker for intercom call communication.
    c. For special applications, the privacy and pre-announce tone signals shall be capable of being disabled during system initialization.
    d. There shall be a switch over to private telephone communications should the person at the classroom loudspeaker pick up his or her Staff Station and dial *3 to transfer the call down to the associated classroom Staff Station.
27. There shall be various levels of telephonic communication accessible by all Admin Stations and Staff Stations.
    a. Staff Stations must be capable of being programmed to ring one Admin Station during day hours and a different Admin Station during night hours. Day and Night start hours shall be configurable. Staff Stations shall be capable of being assigned to any Admin station. Systems that limit the number and assignment of staff call-ins to an Admin Station shall not be acceptable.
28. Each VoIP speaker or ASB speaker equipped with a call switch (analog or digital) shall be configurable as one of three call-in types, as follows:
    a. Normal/Emergency
    b. Urgent/Emergency
    c. Emergency
29. Call buttons programmed for access Normal / Emergency or Urgent / Emergency shall be able to initiate an Emergency call by repeated flashing of the phone's hook switch, or repeated pressing of the DCS or the Call Switch. Systems that require additional switches and/or conductors to initiate an Emergency call, shall not be acceptable.
30. Normal and Urgent calls shall be placed into the queue for the designated Admin Station or Admin Web UI.
31. Each Admin Station call queue shall first be sorted per call priority (for example, Emergency, then Urgent, and then Normal). Calls are sorted within each priority level on a first-in, first-out basis. When a call is answered, it shall automatically be removed from the queue. Systems that do not sort calls per priority and order received shall not be acceptable.

a. The display shall simultaneously display a minimum of three intercom calls pending.
b. Additional calls beyond three shall be indicated by a scrolling option on the right-hand side of the screen thus prompting the user that additional calls are waiting.

32. It shall be possible to answer any incoming call by picking up the handset while it is ringing. It shall not be necessary to press any buttons to answer a call unless the call has dropped into the queue.
33. Staff Stations shall receive a dial tone upon going off-hook. Outgoing calls are made by dialing the desired station. Incoming calls can be directed to the telephone or to the associated loudspeaker for a hands-free reply. There shall be a switchover from loudspeaker to private telephone communication when a person picks up the handset, dials *3, and presses Enter/OK.
34. Staff Stations shall be programmable for any type of system access, provided by or restricted by the following CoS options:
    a. CoS Name
    b. Call-in Level
    c. Zone Paging
    d. All-Call Paging
    e. Emergency All-Call
    f. Inter-Facility Call/Page
    g. Audio Distribution
    h. Remote Pickup
    i. Join Conversation
    j. Call Forwarding
    k. Walking Class of Service
    l. External Call Routing
    m. Call Transfer/3-way Calling
    n. Manually Activate Tone Signals
    o. Call Any Station
    p. Manage Recordings
    q. Monitor Calls
    r. Monitor Locations
    s. Conference Admin
    t. Conference User
    u. Voicemail
    v. Record Calls
    w. Activate Alarm Signals
    x. Disable Audio
    y. Enable Audio
    z. Allow Callee Auto-answer
    aa. District Paging
    bb. Inter-Facility Features
    cc. Manage Output Contacts
    dd. Execute Routines

35. Each Station in a facility can have a unique CoS programmed with an unlimited number of CoS combinations.
36. Staff Stations shall be able to make a Normal call to any Admin Station by dialing the Admin Station's extension number. Staff Stations shall also be able to initiate an Emergency Intercom Call by dialing ****. Emergency Calls shall ring the Designated Day/Night Admin Station. The system shall provide for each station to have a Personal Identification Number (PIN). By dialing the PIN at any system telephone, the administrator shall have access to Emergency paging regardless of the restrictions on the phone being used.
37. Admin Stations shall receive a dial tone upon going off-hook. Outgoing calls are made by dialing the desired stations. Incoming calls can be directed to the telephone or to the associated loudspeaker for a hands-free reply. There shall be an automatic switchover from loudspeaker to private telephone communication should the person pick up his or her handset.
38. The display shall normally show the time of day and day of week, bell schedule name, and the numbers of a minimum of three stations calling-in, along with the call-in status of each station (Normal, Urgent, Emergency). The Admin Station's display shall indicate the station number being dialed from the Admin Station.
39. The display shall also provide user-friendly menu selections to assist the operator when using the Nyquist system. Displays shall be in English for maximum ease-of-use. Systems that require the operator to memorize long lists of operating symbols or control codes shall not be acceptable.
40. Admin Stations shall be programmable for any type of system access, providing or restricting the following CoS options:
    a. Call-in Level
    b. Zone Paging
    c. All-Call Paging
    d. Emergency All-Call
    e. Inter-Facility Call/Page
    f. Audio Distribution
    g. Remote Pickup
    h. Join Conversation
    i. Call Forwarding
    j. Walking Class of Service
    k. External Call Routing
    l. Call Transfer/3-way Calling
    m. Manually Activate Tone Signals
    n. Call Any Station
    o. Manage Recordings
    p. Monitor Calls
    q. Monitor Locations
    r. Conference Admin
    s. Conference User
    t. Voicemail
    u. Record Calls

v. Activate Alarm Signals
w. Disable Audio
x. Enable Audio
y. Allow Callee Auto-answer
z. District Paging
aa. Inter-Facility Features
bb. Manage Output Contacts
cc. Execute Routines

41. Program selection and its distribution or cancellation shall be accomplished from a designated Admin Station with the assistance of the menu display system. Distribution and cancellation shall be to any one or combination of speakers, any Audio Zone or Audio Zones, or All Zones. It shall be possible to provide an unlimited number of program channels for the user to pick from.
    a. It shall be possible via an Admin Station to manually initiate any of the unlimited Normal Tones or Emergency Tones. The Tones shall be separate and distinctly different from the Alarm Tones. The Tone selected shall be capable of being played one time, continuously until it is canceled, or until the administrative display phone is placed back on-hook.
    b. Each Admin Station shall maintain a unique queue of all stations calling that Admin VoIP phone.
42. VoIP Wall Baffle and VoIP Ceiling Speakers shall be configurable as either a VoIP Speaker Only or as a VoIP Speaker with DCS.
    a. The Bogen Nyquist VoIP speakers are powered via PoE. Use an 802.3af compliant PoE network switch port or PoE Injector to power these speakers. One PoE network switch port or PoE Injector is required per VoIP speaker.
    b. VoIP speakers can be equipped with a DCS that can be programmed as a Normal/Emergency, Urgent/Emergency, or Emergency Only and shall be able to initiate an Emergency call by touching the DCS one, two, or three times depending on the CoS and current call state of the DCS. If the station is authorized for Privacy Mode, the users can touch and hold for 4 seconds to enable Privacy Mode or hold for four seconds to disable Privacy Mode. Systems that require mechanical, membrane, or an additional number of switches to initiate an Emergency call, shall not be acceptable.
    c. Emergency Calls from VoIP Speaker with DCS shall have priority over the Normal and Urgent calls in the queue on the Admin Stations and will show up at the top of the list. Systems that do not provide priority for Emergency Call shall not be acceptable.
    d. Normal and Urgent calls shall be logged into queue for the designated Admin Stations.
        1) Admin Stations shall ring for when they receive a call, and then the call will be removed from the queue when the call is answered or when the Admin Queue times out (default is 30 minutes).
    e. Each queue call shall first be sorted by call priority (Emergency, then Urgent, and then Normal). Calls are sorted within each priority level on a first-in, first-out basis. When a call is answered, it shall automatically be removed from the queue. Systems that do not sort calls by priority and order received, shall not be

acceptable. The display shall simultaneously show a minimum of three staff calls pending. Additional staff calls beyond three shall be indicated by an arrow pointing down thus prompting the Admin user that additional calls are waiting.

f. It shall be possible to answer any incoming call simply by picking up the handset while it is ringing. It shall not be necessary to hit any buttons to answer a call unless the call has dropped into the queue.

43. System programming shall be from an authorized Nyquist Admin User via any web browser. A valid username and password shall be required to gain access to the following programmable functions:
    a. System Parameters – Allow installers to adjust core system parameters.
    b. Zones – Allow installers to create and modify Paging, Time, and Audio Zones.
    c. Schedules – Allow installers and administrators to create Bell Schedules for the facility, predefine alternative schedules to run. Holiday Events prevent the bells from ringing on a school holiday. The system shall allow an unlimited number of schedules to operate simultaneous within a facility.
    d. Admin Groups – Allow the installer to create, modify, and delete software groupings of admin phones that can ring when a station calls in with a call switch.
    e. CoS Configuration – Allow the installer to create, modify, and delete CoS groups that can have the following features defined: Call in Level, Zone Paging, All-Call Paging, Emergency All-Call, Inter-Facility Call/Page, Audio Distribution, Remote Pickup, Join Conversation, Call Forwarding, Walking Class of Service, External Call Routing, Call Transfer/3-way Calling, Manually Activate Tone Signals, Call any Station, Manage Recording, Monitor Calls, Monitor Locations, Conference Admin, Conference User, Voicemail, Record Calls, Activate Alarm Signals, Disable Audio, Enable Audio, Allow Callee Auto-answer, District Paging, Inter-Facility Features, and Execute Routines.
    f. Stations – Allow the installer to set up, modify, delete stations, set up Page Exclusion, view stations' status, and add a station.
    g. Bridge Devices – Allow the installer to install the Nyquist ASBs.
    h. Audio – Allow the installer to upload and manage Announcements, Playlists, Announcements, Songs, and Tones. The must support the uploading of both MP3 and WAV files making Audio file management simple for users. Systems that limit the size of Audio files shall not be considered equal.
    i. Users – Allow the installer to manage users by giving them the proper Role and assign an Extension if needed.
    j. Roles – Allow the installer to limit user to the following: create, delete, edit, restart server, sort menu, systems update, manage, import/export, restore, settings, or view.
    k. Facilities – Allow the installer to set up the district wide facilities for remote paging and calling.
    l. Outside Line – allow the installer to set up FXS and FXO ports for inbound and outbound system calling.
    m. SIP Trunks – allow the installer to set up SIP trunks into the facility for inbound or outbound calling.
    n. Call Details – allow the installer to review the historical system activities that can be used for incident investigation or system troubleshooting.

o. System Backup/Restore – allow the installer to preform system backup or restores and allow the backups to be scheduled to run automatically.
p. System Logs – allow the installer to view and export Server, Nyquist-Intercom, and Web Server logs that can be used for trouble shooting and technical assistance.
q. Paging Exclusions – allow the installer to view and edit station that are excluded from paging.
r. Firmware – is used to update Nyquist appliances.
s. Routines – Allow installers to create routines that are a sequence of actions, that the Nyquist system executes as a result of an input trigger. Routines can support crisis plans for situations such as school lockdowns, weather events, or emergency evacuations
t. Alert Filters – Allow installers to select the National Weather Alerts that the facility needs to monitor for such as weather events, earthquakes, tsunami, volcanoes, public health, power outages, and many other emergencies.
u. Help –Provides information about the system, online help topics, and System Administrator Manual.
v. Systems not capable of supporting web-based configuration and control, or require plugins or dedicated application software, shall not be deemed as equal.
w. Systems that require a Serial-to-Ethernet converter, or require additional application software on a PC for configuration and/or control shall not be deemed as equal.

44. Admin Groups
45. Admin Stations can be placed into Admin Groups, which are used if incoming calls are not answered by the assigned Admin Station or the Day or Night Admin associated with the Admin Station. Admin Groups act as an always answer feature by providing an alternate list of Admin Stations. If an incoming call is not answered by the assigned Admin Station within 30 seconds for normal calls or 15 seconds for emergency calls, all Admin Stations in the Admin Group will ring.
46. If Call Forwarding is enabled at the Admin Station, Nyquist tries the forwarded extension. If that station does not answer or is busy, the call timeout is reduced to 15 seconds. After 15 seconds, the call rolls over to the Admin Group.
47. If an Emergency level call receives no answer, the Admin Group will ring if the Day Admin or Night Admin does not answer.
48. Admin Stations can be assigned to multiple Admin Groups. A Day or Night Admin can also be assigned to one or more Admin Groups.
49. Call Detail Reporting
    a. The Call Details feature allows the viewing and/or printing of detail records of every call in a facility in a call log format. Calls include scheduled announcements, paging, and internally and externally made or received telephone calls.
50. System Backup/Restore
    a. The system backup feature allows users with access to back up the system database, voicemail, and recordings.
    b. The system restore allows users with access to perform a system restore of previously backed up database, voicemail, and/or recordings.
    c. The installer also can set up an automatic backup that can be performed daily, weekly, or monthly.

51. System Log Files
    a. A log file records either events or messages that occur when software runs and is used when troubleshooting the system. The following parts of the Nyquist system generate log files:
        1) Server (This provides access to the Debian Linux OS server log files.)
        2) Intercom (This provides access to the Intercom application server log files
        3) Web Server (This provides access to the web server log files.)
    b. From the web-based UI, system logs can be viewed directly or exported via download to a PC, Mac, or Android device and then copied to removable media or attached to an email to technical support.
52. Paging Exclusions
    a. For school testing and exams, the administrators shall be able to put stations into Page Exclusion mode. During this time, the stations will only receive Emergency All-Call pages – not music, tones, or All-Calls. Emergency pages will still be heard at the station even if that station is set to exclude paging.
53. Firmware
    a. Installers can manage the available firmware. Because the Nyquist E7000 is constantly evolving and changing new versions of firmware will become available and the Firmware section allow installers or authorized users the ability to upload, check for updates, or configure the system to automatically download new firmware for later installation. Systems that can't automatically check for new software are not considered equivalent.
54. Routines are designed to automatically launch a procedure, or sequence of actions, that the Nyquist system executes as a result of an input trigger.
55. Some of the events (triggered by dashboard, IP Phone, I/O Controller contact, or Routines API) that can be created are as follows:
    a. Lockdown Routines
    b. Emergency Evacuation Routines
    c. Fire Alarm Routines
    d. Weather Alert Routines
56. As you can see the power of Routines can support your facilities crisis plans for situations such as lockdown, lockout, weather events, or emergency evacuations.
57. Alert Filters Configuration - The Common Alerting Protocol (CAP) is an international standard format for emergency alerting and public warning. It is designed for all hazards related to weather events, earthquakes, tornado, tsunami, volcanoes, public health, power outages, and many other emergencies.
58. CAP elements and values are used when configuring alert filters for your Nyquist system. This part of the configuration allows installers to select or "Enable" or disable the filters needed for each facility. This filtered information can then be displayed on the NQ-GA10PV through the campus.
59. The growing list of information that can currently be displayed are as follows: 911 Telephone Outage, Administrative Message, Air Quality Alert, Air Stagnation Advisory, Arroyo And Small Stream Flood Advisory, Ashfall Advisory, Ashfall Warning, Avalanche Advisory, Avalanche Warning, Avalanche Watch, Beach Hazards Statement, Blizzard Warning, Blizzard Watch, Blowing Dust Advisory, Blowing Dust Warning, Brisk Wind Advisory, Child Abduction Emergency, Civil Danger Warning, Civil

Emergency Message, Coastal Flood Advisory, Coastal Flood Statement, Coastal Flood Warning, Coastal Flood Watch, Dense Fog Advisory, Dense Smoke Advisory, Dust Advisory, Dust Storm Warning, Earthquake Warning, Evacuation - Immediate, Excessive Heat Warning, Excessive Heat Watch, Extreme Cold Warning, Extreme Cold Watch, Extreme Fire Danger, Extreme Wind Warning, Fire Warning, Fire Weather Watch, Flash Flood Statement, Flash Flood Warning, Flash Flood Watch, Flood Advisory, Flood Statement, Flood Warning, Flood Watch, Freeze Warning, Freeze Watch, Freezing Fog Advisory, Freezing Rain Advisory, Freezing Spray Advisory, Frost Advisory, Gale Warning, Gale Watch, Hard Freeze Warning, Hard Freeze Watch, Hazardous Materials Warning, Hazardous Seas Warning, Hazardous Seas Watch, Hazardous Weather Outlook, Heat Advisory, Heavy Freezing Spray Warning, Heavy Freezing Spray Watch, High Surf Advisory, High Surf Warning, High Wind Warning, High Wind Watch, Hurricane Force Wind Warning, Hurricane Force Wind Watch, Hurricane Local Statement, Hurricane Warning, Hurricane Watch, Hydrologic Advisory, Hydrologic Outlook, Ice Storm Warning, Lake Effect Snow Advisory, Lake Effect Snow Warning, Lake Effect Snow Watch, Lake Wind Advisory, Lakeshore Flood Advisory, Lakeshore Flood Statement, Lakeshore Flood Warning, Lakeshore Flood Watch, Law Enforcement Warning, Local Area Emergency, Low Water Advisory, Marine Weather Statement, Nuclear Power Plant Warning, Radiological Hazard Warning, Red Flag Warning, Rip Current Statement, Severe Thunderstorm Warning, Severe Thunderstorm Watch, Severe Weather Statement, Shelter In Place Warning, Short Term Forecast, Small Craft Advisory, Small Craft Advisory For Hazardous Seas, Small Craft Advisory For Rough Bar, Small Craft Advisory For Winds, Small Stream Flood Advisory, Snow Squall Warning, Special Marine Warning, Special Weather Statement, Storm Surge Warning, Storm Surge Watch, Storm Warning, Storm Watch, Test, Tornado Warning, Tornado Watch, Tropical Depression Local Statement, Tropical Storm Local Statement, Tropical Storm Warning, Tropical Storm Watch, Tsunami Advisory, Tsunami Warning, Tsunami Watch, Typhoon Local Statement, Typhoon Warning, Typhoon Watch, Urban And Small Stream Flood Advisory, Volcano Warning, Wind Advisory, Wind Chill Advisory, Wind Chill Warning, Wind Chill Watch, Winter Storm Warning, Winter Storm Watch, and Winter Weather Advisory.

60. Systems that are not capable of displaying National Weather Service CAP information to give advanced warning to facilities shall not be considered equal.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine conditions, with the installer present, for compliance with requirements and other conditions affecting the performance of the Nyquist E7000 Series Educational System.

B. Do not proceed until unsatisfactory conditions have been corrected.

3.02 EQUIPMENT MANUFACTURER'S REPRESENTATIVE

A. All work described herein to be done by the manufacturer's authorized representative shall be provided by a documented factory authorized representative of the basic line of equipment to be utilized.

B. As further qualification for bidding and participating in the work under this specification, the manufacturer's representative shall hold a valid C-10 Contractor's License issued by the Contractor's State License Board of [your state]. The manufacturer's representative shall have completed at least 10 projects of equal scope, giving satisfactory performance, and shall have been in the business of furnishing and installing sound systems of this type for at least five years. The manufacturer's representative shall be capable of being bonded to ensure the owner of performance and satisfactory service during the guarantee period.

C. The manufacturer's representative shall provide a letter with submittals from the manufacturer of all major equipment stating that the manufacturer's representative is an authorized distributor. This letter shall also state that the manufacturer guarantees service performance for the life of the equipment and that there will always be an authorized distributor assigned to service the area in which the system has been installed.

D. The contractor shall furnish a letter from the manufacturer of the equipment. This letter shall certify that the equipment has been installed according to factory intended practices, that all the components used in the system are compatible, and that all new portions of the systems are operating satisfactorily. Further, the contractor shall furnish a written unconditional guarantee, guaranteeing all parts and all labor for a period of five years after final acceptance of the project by the owner.

3.03 INSTALLATION

A. The installation, adjustment, testing, and final connection of all conduit, wiring, boxes, cabinets, etc., shall conform to local electrical requirements and shall be sized and installed in accordance with the manufacturer’s approved shop drawings.

B. Low-voltage wiring may be run exposed above ceiling areas where they are easily accessible.

C. The contractor shall install the new system at the location shown on the plans.

D. All Staff Stations and Call Switches shall be wall-mounted:
   1. Mount at 54" AFF.
   2. All wiring should be concealed.
   3. Verify exact location with architect.
   4. Avoid mounting near doors to prevent students from activating and running out of the rooms.

E. Admin Stations can be desk or wall mounted.

F. Speaker and telephone lines run above ceiling and not in conduit shall be tie-wrapped to a ceiling joist with a maximum spacing of 8' between supports. No wires shall be laid on top of ceiling tile.

G. Connect field cable to each Analog Speaker transformer using UL butt splices for #22 AWG wire.

H. Contractor shall provide a minimum of eight hours of configuration and operational instruction to school personnel.

I. On the first school day following installation of the Nyquist System, the contractor shall provide a technician to stand by and assist in system operation.

J. Mark and label all demarcs IDF and MDF points with destination point numbers. Rooms with more than one outlet shall be marked XXX-1, XXX-2, XXX-3, etc. where XXX is the room number.

K. No graphic room number shall exceed the sequence from 000001 through 899999.
1. All outside speakers shall be on a separate Page Zone and Time Zone.
2. All zones shall be laid out not to exceed 40 Watts (@25V) maximum per zone.
3. All hallway speakers shall be tapped at 1 Watt (@25V) maximum.
4. All outside horns shall be tapped at 3.75 Watts (@25V) maximum.
5. All classroom speakers shall be tapped at ½ Watt (@25V) maximum.
6. Large rooms, such as cafeterias, shall be tapped at 2 Watts (@25V) maximum.

L. Plug disconnect: All major equipment components shall be fully pluggable by means of multi-pin receptacles and matching plugs to provide for ease of maintenance and service.

M. Protection of cables: Cables within terminal cabinets, equipment racks, etc., shall be grouped and bundled (harnessed) as to type and laced with No. 12 cord waxed linen lacing twine or T and B wire-ties, or hook and loop cable management. Edge protection material shall be installed on edges of holes, lips of ducts, or any other point where cables or harnesses cross a metallic edge.

N. Cable identification: Cable conductors shall be color-coded and individual cables shall be individually identified. Each cable identification shall have a unique number located approximately 1-1/2" from cable connection at both ends of cable. Numbers shall be approximately 1/4" in height. These unique numbers shall appear on the As-Built Drawings.

O. Shielding: Cable shielding shall be capable of being connected to common ground at point of lowest audio level and shall be free from ground at any other point. Cable shields shall be terminated in the same manner as conductors.

P. Provide complete “in service" instructions of system operation to school personnel. Assist in programming of telephone system.

3.04 GROUNDING

A. The contractor shall provide equipment grounding connections for Integrated Telecommunications/Time/Audio/Media System as indicated. Tighten connections to comply with tightening torques specified in UL Standard 486A to ensure permanent and effective grounds.

B. The contractor shall provide ground equipment, conductor, and cable shields to eliminate shock hazard and to minimize the greatest extent possible, ground loops, common mode returns, noise pickup, cross talk, and other impairments.

C. The contractor shall provide all necessary transient protection on the AC power feed and on all station lines leaving or entering the building.

D. The contractor shall note on their drawings the type and locations of these protection devices and all wiring information.

E. The contractor shall furnish and install a dedicated, isolated earth ground from the central equipment rack and bond to the incoming electrical service ground buss bar.

3.05 INSTALLATION OF SOUND SYSTEM WIRING

A. All installations shall comply with NECA 1.

B. Provide all conduits, conductors, boxes, receptacles, etc. indicated on the Drawings, herein specified, or required for the proper operation of the sound systems.

C. Installation of all sound system wiring and all equipment shall be performed under the direct supervision of a C-EST certified Field Engineer.

D. All Sound System conductors to and between the speakers and the Category 5E consolidation block shall be free from splices or other breaks.
   1. Interconnecting terminals as specified may be used only at terminals of loudspeakers, privacy switches, amplifiers, microphone receptacles, or where directed.

E. All loudspeaker cables shall be terminated in the following manner:
   1. The end connected to the loudspeaker transformer leads shall be neatly soldered and taped where such loudspeakers are not equipped with terminal strips. Where loudspeakers are equipped with terminal strips, the ends shall be equipped with U-type solderless lugs described above.
   2. Where two (2) or more loudspeakers are on the same circuit, shall be soldered neatly to terminals of the loudspeaker transformers to form a "loop" circuit.
   3. Unused leads or taps of loudspeaker matching transformers shall each be separately taped to insulate the conductors from each other and from grounded parts of the equipment.

F. All connections between/among components within the Central Control Rack shall be performed under the direct supervision of personnel authorized by the manufacturer of the Central Control Rack.

G. All connections of conductors entering the Central Control Rack and terminated at the terminal blocks shall be performed by the Contractor.

H. All connections shall be made under the direct supervision of the Manufacturer's Representative. Connections shall not be made until the Contractor and the Manufacturer's Representative have explained to the Owner's Representative the procedure to be followed.

I. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.

J. Wiring within Enclosures: Bundle, lace, and train cables to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

K. All cabling shall be plenum rated and properly gauged per the distances of the devices from the central control station.

L. Install 18" excess cable at each termination at microphone, attenuator, volume control, speaker, and other system outlet.

M. Install 6' excess cable at each termination at system cabinet.

N. Grounding
1. A dedicated #10 ground wire shall be installed in conduit from the main ground bus of the electrical service and/or adequate building ground and attached to the frame of all the sound racks/cabinets and all required devices. Conduit bonds shall be used only for rack to rack continuities.

3.06 PROTECTION

A. The Contractor shall provide all necessary transient protection on the AC power feed and on all station lines leaving or entering the building.

B. The Contractor shall note in his system drawings, the type and location of these protection devices as well as all wiring information. Such devices are not to be installed above the ceiling.

3.07 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Tests and Inspections:
1. Upon completion of the installation, contractor shall engage a factory-authorized service representative to perform overall performance test in the presence of the Owner's representative. Provide testing reports and certificate of completion of testing. The test shall include, but not be limited to the following:
   a. Loudspeaker Circuits Test
      1) Transmit audio signals at normal levels over each loudspeaker circuit for determination of proper loudspeaker volume and clarity.
      2) Adjust transformer taps for proper output, as necessary.
   b. Input Circuits Test
      1) Transmit audio signals at normal levels over each input circuit to determine proper operation of each input circuit. The test shall be performed using each of the two (2) input selector switches over each of the two (2) program channels. Each input source (tuner, CD/MP3 player, Mic., etc.) on the selector switch shall be tested.

c. Load Test
   1) Check for proper system operation when the entire system load (all speakers) is applied to either channel.

d. Communications Tests
   1) Initiate, by means of the central controls, two-way communications between classroom speaker and PA system.
   2) ALL-CALL via Central Controls: Check all speakers in the entire new building
   3) Zone paging via central controls.

e. Signal-to-Noise Ratio Test:
   1) Measure signal-to-noise ratio of complete system at normal gain settings as follows:
      a) Disconnect microphone at connector or jack closest to it and replace it in the circuit with a signal generator using a 1000-Hz signal. Replace all other microphones at corresponding connectors with dummy loads, each equal in impedance to microphone it replaces. Measure signal-to-noise ratio.
      b) Repeat test for each separately controlled zone of loudspeakers.
      c) Minimum acceptance ratio is 50 dB.

f. Distortion Test:
   1) Measure distortion at normal gain settings and rated power. Feed signals at frequencies of 50, 200, 400, 1000, 3000, 8000, and 12,000 Hz into each preamplifier channel. For each frequency, measure distortion in the paging and all-call amplifier outputs. Maximum acceptable distortion at any frequency is three percent (3%) total harmonics.

g. Acoustic Coverage Test:
   1) Feed pink noise into system using octaves centered at 500 and 4000 Hz. Use sound-level meter with octave-band filters to measure level at five (5) locations in each zone. For spaces with seated audiences, maximum permissible variation in level is plus or minus 2 dB. In addition, the levels between locations in same zone and between locations in adjacent zones must not vary more than plus or minus 3 dB.

h. Power Output Test:
   1) Measure electrical power output of each power amplifier at normal gain settings of 50, 1000, and 12,000 Hz. Maximum variation in power output at these frequencies must not exceed plus or minus 1 dB.

i. Signal Ground Test:
   1) Measure and report ground resistance at pubic address equipment signal ground. Comply with testing requirements specified in Section 260526 "Grounding and Bonding for Electrical Systems."

j. Inspection:
   1) Verify that units and controls are properly labeled and interconnecting wires and terminals are identified. Prepare a list of final tap settings of paging speaker-line matching transformers.

k. Public address and mass notification systems will be considered defective if they do not pass tests and inspections.

l. Prepare test and inspection reports.
m. Include a record of final speaker-line matching transformer-tap settings, and signal ground-resistance measurement certified by Installer.

3.08 SERVICE/MAINTENANCE/WARRANTY

A. The Contractor shall provide a one year warranty, or the manufacturers standard warranty, whichever is greater, of the installed system against defects in material and workmanship. All materials shall be provided at no expense to the Owner during normal working hours. The warranty period shall begin on the date of acceptance by the Owner/Engineer.

B. The Contractor shall, at the Owner's request, make available a service contract offering continuing factory authorized service of this system after the initial warranty period.

C. The system manufacturer shall maintain engineering and service departments capable of rendering advice regarding installation and final adjustment of the system.

D. The Contractor shall submit a written warranty from an authorized distributor of the sound system that the system installed is free from defects in materials and workmanship, for the period of one (1) year, or standard manufacturer's training, whichever is greater, from the date of acceptance by the Owner. This warranty shall include all parts and labor.

3.09 DEMONSTRATION – TRAINING

A. Bidding contractor shall engage a factory-authorized service representative to train the Owner's maintenance personnel to adjust, operate, and maintain the public address system.

B. The vendor shall provide various levels of training including Manufacturer provided training as mandated by the Owner.

C. Sixteen (16) hours of training shall be included as part of this specification. These training hours shall be partitioned as the Owner mandates and as required.

D. Train Owner's personnel on operation and maintenance of each component of system.
1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
2. Instructor shall be manufacturer's training personnel

3.10 GENERAL FIELD POLICY

A. When inspecting or supervising the installation of equipment, manufacturers' representative shall be accompanied at all times by the technology consultant. In order to make the necessary arrangements, the Owner shall be notified at least forty-eight (48) hours in advance of the manufacturer's representative visit to the School.

B. Any changes of equipment shall be made only with the written permission of the technology consultant.

C. Changes in location of equipment may be made only with the written permission of the technology consultant.

D. All changes of location of equipment (including pull boxes, conduit runs, wire sizes, etc.) shall be incorporated in the As-built Sound/System Intercom Riser Diagram installed in the School.

3.11 DOCUMENTATION

A. Provide the following directly to the Supervisor of Technology Services.
   1. One printed copy of all field programming for all components in system
   2. One copy of all diagnostic software with a copy of field programming data for each unit

B. One copy of all field wiring runs, location, and end designation of system

END OF SECTION

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SECTION 27 5313 - CLOCK SYSTEM

GENERAL

1.01 SUMMARY OF WORK

A. This Section specifies materials and accessories for a wireless clock system.

B. Section Includes:
   1. Transmission Systems
      a. System Controller with Ethernet Connection
      b. Primary Internal Transmitter
      c. Primary External Transmitter
      d. Magnetic mount or Campus transmitting antenna
   2. Wireless Synchronized Devices
      a. Analog Clock
      b. Master Clock Synchronizer Module
      c. Wireless Relay Module
      d. Signal Indicator

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections apply to this Section.

B. Section [27 05 00 - Common Work Results for Communications: conductors and cables].

C. Section [27 15 00 - Communications Horizontal Cabling].

D. Section [27 10 53 - Clock System Commissioning].

E. Section [27 51 16 – Public Address System].

F. Related Drawings: “T” Drawings – Technology Plans

1.03 REFERENCE STANDARDS

A. Federal Communications Division (FCC)
   1. Part 15 - Code of Federal Regulations.

B. National Fire Protection Association (NFPA).
   1. NFPA 70E-[2012], Standard for Electrical safety in the Workplace.

C. US Green Building Council (USGBC).

1. LEED® NC Version 2.2-[2009], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations.

D. Underwriter's Laboratories (UL)

E. Institute of Electrical and Electronics Engineers (IEEE)
1. IEEE 802.3af-[1998], Standard for Information Technology – Telecommunications and Information Exchange Between Systems.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Co-ordination: Co-ordinate work of this Section with communications and electronics work and with work of other trades for proper time and sequence to avoid construction delays.

B. High Performance Building Submittal Requirements: The contractor or subcontractor must submit the following High Performance Building certification items:
1. A Connecticut High Performance Building Compliance letter shall be provided verifying agreement with relevant High Performance requirements. Information to be supplied includes, but is not limited to:
   a. The percentage by weight of recycled content in the product(s). Identify post-consumer and/or pre-consumer recycled content.
   b. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the product(s).
   c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
3. Product Cut Sheets for all materials that meet the High Building Performance Requirements this Section.
4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC content, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC content).

C. Pre-installation Meeting: Convene pre-installation meeting after Award of Contract and [one week] before starting work of this Section to verify project requirements, substrate conditions and coordination with other building sub-trades, and to review manufacturer's written installation instructions.
1. Comply with Section 01 31 19 - Project Meetings and co-ordinate with other similar pre-installation meetings.
2. Notify attendees 2 weeks prior to meeting and ensure meeting attendees include as minimum:
   a. Owner;

b. Consultant;
c. Communications and Electronics Subcontractor;
d. Architect;
e. Manufacturer's Technical Representative

3. Ensure meeting agenda includes review of methods and procedures related to insulation installation including co-ordination with related work.
4. Record meeting proceedings including corrective measures and other actions required to ensure successful completion of work and distribute to each attendee within 1 week of meeting.

1.05 ACTION AND INFORMATIONAL SUBMITTALS

A. Make submittals in accordance with Contract Conditions and Section 01 33 00 - Submittal Procedures.

B. Product Data: Submit product data including manufacturer's literature for clock system materials and accessories, indicating compliance with specified requirements and material characteristics.
1. Submit list on clock system manufacturer's letterhead of materials and accessories to be incorporated into Work.
2. Include product name.
3. Include preparation instructions and recommendations, installation methods, and storage and handling requirements.
4. Include contact information for manufacturer and their representative for this Project.

C. Shop Drawings: Submit shop drawings with information as follows:
1. Diagram of proposed system showing system platform appliance, communication pathway, and schedule of individual device locations.
2. Indicate integration with the Owner's network and servers. Include line diagram of network relationships.
3. Show system power requirements.

D. Samples:
1. Submit one sample of each type of device used on project. Samples will be returned Contractor for incorporation into the Work after Consultant's review.

E. Test Reports:
1. Submit evaluation and test reports or other independent testing agency reports showing compliance with specified performance characteristics and physical properties.

F. Subcontractor Experience: Submit verification of communication and electronics subcontractor's experience.

G. Manufacturer's Authorization: Submit verification that of communication and electronics subcontractor's authorization from clock system manufacturer to perform Work of this section.

H. Sustainable Design (LEED).
1. LEED Submittals: In accordance with Section [01 35 21 – LEED Requirements]

1.06 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Supply maintenance data for clock system for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

B. Sustainable Design Closeout Documentation (LEED).
   1. Provide calculations on end-of-project recycling rates, salvage rates, and landfill rates for work of this Section demonstrating percentage of construction wastes which were recycled.
   2. Submit verification from recycling facility showing receipt of materials.

C. Record Documentation: In accordance with Section 01 78 00 - Closeout Submittals.
   1. List materials used in clock system work.
   2. Warranty: Submit warranty documents specified.

1.07 QUALITY ASSURANCE

A. Communications and Electronics Subcontractor Quality Assurance:
   1. Work experience of [3] years minimum with work similar to work of this Section.
   2. Manufacturer's authorization to perform work of this section.

B. Supplier's Accreditation: Use only suppliers accredited by clock system manufacturer.

C. Supplier's Maintenance Requirements:
   1. Ensure local supplier has adequate facility for storage of spare parts for clock system.

D. Sustainability Standards Certification (LEED).
   1. LEED submittals: In accordance with Section [01 35 21 - LEED Requirements].

1.08 DELIVERY STORAGE AND HANDLING

A. Delivery and Acceptance Requirements:
   1. Deliver material in accordance with Section 01 61 00 - Common Product Requirements.
   2. Deliver materials and accessories in clock system manufacture's original packaging with identification labels intact and to suit project.
   3. Ensure clock system materials are not exposed to moisture during delivery.
   4. Replace damaged clock system materials.

B. Storage and Handling Requirements: Store materials off ground in dry location and protected from exposure to fumes and harmful weather conditions and at temperature conditions recommended by manufacturer.
   1. Store in original packaging until installed.

C. Packaging Waste Management:
   1. Separate and recycle waste packaging materials in accordance with Section [01 74 19 - Construction Waste Management and Disposal].
   2. Remove waste packaging materials from site and dispose of packaging materials at appropriate recycling facilities.

3. Collect and separate for disposal, paper, and plastic material in appropriate on-site storage containers for recycling [in accordance with Waste Management Plan].

1.09 WARRANTY

A. Project Warranty: Refer to Contract Conditions for project warranty provisions.

B. Manufacturer's warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to and not intended to limit other rights Owner may have under Contract Conditions.

C. Warranty period: Shall commence for One (1) Year from substantial completion OR shall match the manufacturer's Standard Warranty. Provide whichever is greater.

1.10 SYSTEM DESCRIPTION

5 watt magnetic	10 watt magnetic	10 watt campus	30 watt campus
1-2 stories	3-5 stories	3-6 stories	6-8 stories
200k sq ft per floor	100k sq ft per floor	small campus	1 city block
5-10 acres	10-30 acres	30-100 acres	125 acre campus

A. SiteSync IQ Wireless timekeeping system shall be capable of synchronizing clocks, intercom, server, computers and other equipment throughout a facility.

B. The system shall synchronize all clocks to each other. The system shall utilize Ethernet technology to provide atomic time to all its components. The system shall not require any hard wiring for operation (besides AC power for specified components) except for an Ethernet patch cable for Ethernet connection. Analog clocks shall be battery operated for full portability. Clocks shall automatically adjust for Daylight Saving Time per the settings in the SiteSync IQ System Controller.

C. Clocks shall synchronize to ±1 second of the time displayed on the system controller.

D. The system shall include an internal real time clock reference so that failure of the GPS or Ethernet signal does not cause the clocks to fail to indicate the correct time.

E. The system shall incorporate a "fail-proof " design so that a temporary power interruption shall not cause failure of the system. Upon restoration of power, the system shall resume normal operation.

F. The system shall include a signal indicator to notify local supervisor or maintenance personnel when the SiteSync IQ System Controller transmits to verify signal reception.

G. Analog clocks to be battery operated for complete portability and relocation freedom, or AC powered for many years of maintenance free operation. Batteries included.

H. Site survey instruction manual and equipment to be available for building site transmitter signal reception diagnosis.

I. System Controller with 6 integrated signal relay circuits available for operating bells, tone generators, lighting circuits, intercom and other electrical equipment. This can be done via a direct wired connection or wirelessly via one or more wireless relay modules. System controller is capable of programming and storing 99 schedules with 9999 events. Events may be programmed for momentary 1-9 second activation or toggled on and off.

J. System Controller (with Ethernet option) capable of Remote Connect Web Interface which allows for event and circuit programming as well as manual circuit activation from a remote location via a web browser. No software required.

K. Wireless Relay Module: A remote relay that receives a wireless signal and supplies a contact closure based on the schedule in the system controller that is assigned to that circuit.

L. Optional: Wireless Controller – Part# SSQWCA-2C4T (Clock relays and 4 tones)
   1. The Wireless Controller receives the time and activation instructions via a wireless signal from the SiteSync IQ System Controller. The Wireless Controller is capable of running and correcting a wired clock system that is directly attached to the appropriate terminal strip inside it. The wired clock system attached to the Wireless Controller must use the eight second hour correction and 14 second 12-hour correction protocol.

1.11 REGULATORY REQUIREMENTS

A. Equipment and components furnished shall be of manufacturer's latest model.

B. System Controller, Transmitter and Receiver shall comply with Part 90 of FCC rules, as follows:
   1. This device may not cause harmful interference.
   2. Transmitter frequency shall be governed by FCC Part 90.35.
   3. Transmitter output power shall be governed by FCC Parts 90 and 74.

C. System shall be installed in compliance with local and state authorities having jurisdiction.

PRODUCTS

2.01 MANUFACTURER

A. SiteSync IQ timekeeoing system and its components shall be manufacturerd by:
   1. American Time, 140 3rd Street South, Dassel, MN, 55235 www.american-time.com

2.02 SYSTEM OPERATION AND STARTUP SEQUENCE

A. The SiteSync IQ system receives atomic time information from the Ethernet. The system controller is a powerful multitasking device that is capable of sending precise time information to synchronize all the system wireless clocks and accessories. The system can be monitored and programmed from the SiteSync IQ system controller keypad or via your PC web browser if you have the Remote Connect capability. It's important to follow steps in this order: Install system controller, confirm signal reception and then install clocks.

B. Wireless System Controller Operation:
   1. When power is first applied to the SiteSync IQ system controller, the user shall complete the Startup Wizard to initiate system operation and signal transmission. The SiteSync IQ system controller looks for the time signal every hour from the time source your system is designed to synchronize with. Once the system controller has received the time synchronization it sets its internal clock to that time. The system controller then starts to transmit the internal time. The system controller features an on-demand GPS or Ethernet sync capability which is initiated by the user/installer to sync the time.

C. Analog Clock Operation:
   1. For battery clocks, connect the barrel jack plug of the battery pack to the wireless receiver. For AC powered clocks, connect to AC power with cord kit or Molex kit and confirm green LED is lit. There is no need for any additional adjustment (the clock movement adjustment is fully automatic). The LED on the back of the clock will turn red for one second then briefly flash orange (1-15 flashes) indicating the receive frequency on power up. Within 30 seconds of power up the LED will flash red or green. Red indicates the receiver is looking for the signal and green indicates the signal has been received. On battery clocks, when the movement starts to correct, the LED will turn off. On electric clocks the LED will turn green. Correction will begin within 3-5 minutes after activation/power up. The clock will automatically look for valid time signals 4 times each day, and will adjust to the correct time if needed.

2.03 EQUIPMENT

A. General: A basic clock system shall include a system controller, internal or external transmitter, GPS time signal receiving antenna or Ethernet connection, analog and/or digital clocks. An expanded system can also include all accessories and options, (such as tone generator, anti-theft brackets, wireless sync relays, remote connect, wired synchronous clocks, bells, signal reception indicator, tone generators, etc.) as needed.

B. Wireless Master: The SiteSync IQ system controller shall incorporate a display and a keypad to provide the following features:
   1. Time zone selection via the keypad and display for all USA time zones as well as custom time zones. Includes all U.S. time zones: Eastern, Central, Mountain, Pacific, Alaska and Hawaii
   2. Automatic Daylight Saving Time: adjustment can be enabled or disabled from keypad
   3. Ethernet interface and real time status display mode
   4. Password protected Programming Menu to set the date, local time zone, DST and other system parameters as needed

5. The system controller shall contain an internal clock such that failure of reception from Ethernet will not disable the operation of the clocks
6. Time Synchronization Mode:
    a. Ethernet: Plug Cat 5 or higher patch cable into the appropriate receptacle on the back of the system controller. The controller must be linked with a TCP/IP Network with Internet access or connection to a Network Time Server.

C. Transmitter: American Time wireless transmitters may be internal at 5 or 10 watts, or external at 25 and 40 watts. The transmitter parameters shall be:
1. Frequency Range: 450-470 MHz
2. Transmitter output power: Internal 5 or 10 watts (built into the SiteSync IQ system controller) or External 30 watts in external metal case
3. Transmission Range: Up to 50 miles radius (transmitter dependent)
    a. Radio technology: Narrowband FM, 12.5 KHz bandwidth
    b. Transmission format: POCSAG, digital one-way communication
    c. Digital Data rate: 512 baud
    d. Operating range: 0 to 60˚ C / 32 to 140˚ F

D. Transmitting Antenna**:** Shall be American Time Part # H001263 or H002978 for indoor or outdoor applications. Antenna polarization shall be vertical.

E. Power supply: (included with system controller)
1. Input: 120vac 50/60 Hz
2. Output: 12vdc, 3 Amps

F. Surge Protector/Battery Backup: American Time Part # H006238.
1. Input: 120vac 60 Hz +/- 1 Hz.
2. Output: 120vac, 550VA, 300 watts
3. Surge Energy Rating: 700 joules with 10x1000uS pulse

G. Analog Clocks: American Time molded plastic analog clocks are round 13.375" or 17.25" outside diameter as noted. Analog clocks, whether round or square, shall be wall mounted and surface mount. Plastic clocks shall have polystyrene frame and polycarbonate lens. Face (dials) shall be white. Hour and minute hands shall be black and sweep (second) hand is red. Analog clocks are available as wall or ceiling mount double dial assemblies.

H. Other wireless clock features shall be:
1. Analog clocks with no user mechanical adjustments. Run time of a half hour after power loss without losing time for AC versions.
2. Time shall be automatically updated from the transmitter 4 times per day.
3. Use the battery booster pack with 6 AA lithium batteries or AC power adapter without battery.
4. The clock shall have an ultra-sensitive UHF receiver (better than -110dBm) and integrated internal antenna.
5. The clock will keep operating using its internal quartz clock in case of signal reception loss due to malfunction of the wireless system controller or transmitter.

I. Wire guards: Provide one for each analog clock in the gymnasium as follows:

1. Part # 1200, 15 by 15 inch size, for nominal 12" diameter analog clocks.
2. Part # 1500, 19 by 19-inch size, for nominal 15" diameter analog clocks.

J. Anti-theft Bracket:
1. 12" plastic - Part # H001141
2. 15" plastic - Part # H004734

K. Wireless Relay: (Part # H004296 = .5amps, Part #H004609 = 8amps): A remote relay receives a wireless signal and supplies a contact closure based on the schedule in the system controller that is assigned to that circuit. Multiple modules are available that operate specifically with 1 of 6 corresponding dry contact circuits in the system controller for wireless communication with multiple products. The wireless relay module is programmable via the system controller scheduling capability for a 1-9 second momentary signal or toggled on and off.

L. Remote Connect: The Remote Connect Web interface allows for SiteSync IQ System Controller event and circuit schedule programming, manual circuit activation, time/date settings and other system configuration from your PC.

M. Remote Connect capabilities include triggering wired and wireless events, assigning custom durations to signals, managing programming of up to six circuits, backing up and restoring schedules to and from PC's and activating circuits manually.

N. Ensure that you have the most current web browser (ie. Firefox, Internet Explorer, Chrome, Edge, Safari).

O. SiteSync IQ Signal Indicator: w/ 9v Battery Option (P/N H004292): American Time hand held signal indicator runs off one 9v battery or may be powered with an AC power adaptor. The signal indicator receives data transmission from the system controller and indicates signal reception via LED lights. The signal indicator LED shows red each time the unit receives signal if it is within range of the transmitter. Blinking green indicates unit has received signal within the past 5 minutes and blinking red indicates the unit has not received signal.

P. Include all required FCC licensing.

EXECUTION

3.01 INSTALLERS

A. Use only installers with [3] years minimum experience with work similar to work of this Section.

B. Ensure all clock system components are installed by single communications and electronics subcontractor.

3.02 EXAMINATION

A. Verification of Conditions: Verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for clock system installation in accordance with manufacturer's written recommendations.
   1. Visually inspect substrate in presence of Consultant.
   2. Ensure surfaces are free of snow, ice, frost, grease and other deleterious materials.
   3. Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

B. Start of clock system installation indicates installer's acceptance of substrate installation conditions.

3.03 SYSTEM INSTALLATION

A. Install clock system in accordance with manufacturer's written recommendations and in accordance with NFPA 70E.

B. Integrate clock system with Owner's electrical and communications network.

C. Install wiring in accordance with requirements of local Authority Having Jurisdiction.
   1. Do cabling in accordance with Section [27 15 00 - Communications Horizontal Cabling].

D. Conceal wiring except in unfinished spaces and as approved in writing by Consultant.

E. Install clocks only after painting and other finish work is completed in each room.

F. Install clocks and other devices square and plumb.

3.04 FIELD QUALITY CONTROL

A. Field Inspection: Coordinate field inspection in accordance with Section [01 45 00 - Quality Control].

3.05 SYSTEM STARTUP

A. At completion of installation and before final acceptance, turn on equipment and ensure equipment is operating properly, and clock system devices and components are functioning.

B. Evaluate and test each device in clock system on room-by-room basis using factory-trained technicians.
   1. Fix or replace devices which fail test or are functioning incorrectly.
   2. Submit evaluation and report showing results of room-by-room tests and overall system compliance within 3 days of testing being carried out.

3.06 CLEANING

A. Progress Cleaning: Perform cleanup as work progresses [in accordance with Section 01 74 00 - Cleaning and Waste Management].
   1. Leave work area clean at end of each day.

B. Final Cleaning: Upon completion, remove surplus materials, rubbish, tools, and equipment [in accordance with Section 01 74 00 – Cleaning and Waste Management].

C. Waste Management:
   1. Co-ordinate recycling of waste materials with [01 74 19 - Construction Waste Management and Disposal].
   2. Collect recyclable waste and dispose of or recycle field generated construction waste created during construction or final cleaning related to work of this Section.
   3. Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.07 DEMONSTRATION & TRAINING

A. Arrange system demonstration and training session for Owner's operation and maintenance personnel.
   1. Allow Owner and Consultant [7] days minimum advance notice before training session.

B. Break down system demonstration and training session into logical segments for Owner's operations and maintenance personnel.

C. Train Owner's maintenance personnel in procedures and schedules involved in operating, troubleshooting, servicing, and preventative maintenance of clock system.

D. Training shall consist of a minimum of two (2) 4-hour training sessions.

E. Deliver two (2) sets of operating instructions and programming manuals for the clock system to the Owner's Representative.

F. Deliver all programming codes and passwords for the system to the Owner's Representative.

3.08 SYSTEM COMMISSIONING

A. Do clock system commissioning in accordance with Manufacturer requirements.

3.09 PROTECTION

A. Protect installed products and accessories from damage during construction.

B. Repair damage to adjacent materials caused by clock system installation.

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SECTION 27 6010 - EMERGENCY RESPONDER RADIO COVERAGE SYSTEM

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections with DIVISION 1 - GENERAL REQUIREMENTS, which are hereby made a part of this Section of the Specifications.

B. Attention is directed Section 26 0400 – GENERAL CONDITIONS FOR ELECTRICAL TRADES, which is hereby made a part of this Section of the Specifications.

1.2 SECTION INCLUDES

A. This specification describes the technical and performance criteria for deploying a Neutral-Host Basic Distributed Antenna System (DAS) capable of supporting Public Safety Networks (PSN)

B. The DAS components specified in this document include: Donor Antennas, Coverage Antennas, Coax Cable, Coax Connectors, Splitters, Combiners, Couplers, Fiber-Optic Cable, Fiber-Optic Connectors, and Fiber-Optic Jumpers, Bi-Directional Amplifiers (BDA), Fiber-Optic Master Unit and Fiber-Optic Remote Units, backup batteries, annunciators, and interfacing/connection to the Fire Alarm system.

1.3 RELATED SECTIONS

A. Carefully examine all of the Contract Documents for requirements that affect the work of this section. Other specification sections that directly relate to the work of this section include, but are not limited to the following:
1. Section 27 0526 – Grounding and Bonding for Communication Systems
2. Section 27 0529 – Hangers and Supports for Communication Systems
3. Section 27 0533 – Conduits and Backboxes for Communication Systems

1.4 SYSTEM DESCRIPTION

A. Services: Upon commissioning, the DAS shall provide coverage for the PSNs frequencies provided and coordinated with the owner for the given market or location. Verification of frequencies to be monitored, extended, and covered shall take place prior to the ordering of any equipment.
1. (Example) 800 MHz PSN coverage, city of Grapevine, TX Ordinance No. 109.2

2. The frequencies to be handled by the DAS system shall be coordinated and provided by the owner and local public safety agencies. No equipment shall be purchased until frequencies have been verified by all parties involved.

B. Expansion: Without replacing the Passive DAS Infrastructure, the DAS shall have expansion capabilities to support the following PSN frequencies deployed in a SISO antenna environment. Any additional Components required for system expansion shall comply with all specifications of this Section.

SERVICE	UPLINK, MHZ	DOWNLINK, MHZ
PCS	1850 – 1915	1930 – 1995
Commercial 700 Band	698 – 716, 776 – 787	728 – 746
Narrow Band Public Safety 700 Band	799 – 805	769 – 775
800 Band	806 – 824	851 – 869
900 Band	896 – 902	935 – 941
BRS/EBS	2496 – 2690	

C. PSN Approval: The Contractor shall propose and deploy a DAS system capable of receiving approval of the PSN Authority Having Jurisdiction (AHJ).

D. Broadband Active Distribution: Single-mode fiber-optic cable will be used for Active distribution. In-line amplifiers are not allowed.

E. Network Management:
1. NMS: The DAS shall have a Network Management System (NMS) capable of alarm, monitor, configuration and control of all Active Components.
2. SNMP Integration: The DAS NMS shall be capable of integration with 3rd party SNMP based NMS products for alarm purposes and provide alarming information.

1.5 CODES, STANDARDS AND CERTIFICATIONS

A. All wire and components supplied and installed shall meet the requirements of the following and all sub-referenced documents:
1. American National Standard ANSI/TIA/EIA Telecommunications Building Wiring Standards.
2. Underwriters Laboratories (UL).

B. All work, including but not limited to: cabling, pathways, support structures, wiring, equipment, installation, workmanship, maintenance and testing shall comply with the latest editions of the National Electrical Code, National Electrical Safety Code, all applicable local rules and regulations, equipment manufacturer's instructions, and the National Electrical Contractors Association (NECA) Standard of Installation. In case of discrepancy or disagreement between the documents noted above, the contractor shall satisfy the most stringent requirements.

C. Requirements set forth by first-responder code, ordinance, or the PSN AHJ shall supersede the requirements described herein and shall be met in their entirety. It is the Contractor's responsibility to ensure that the DAS complies with local code, ordinances or requirements established by the PSN AHJ.

1.6 ABBREVIATIONS AND ACRONYMS

A. ACG: Automatic Gain Control

B. AHJ: Authority Having Jurisdiction

C. ATP: Acceptance Test Plan

D. BDA: Bi-Direction Amplifier

E. BOM: Bill-of-Material

F. BRS: Broadband Radio Service

G. BTS: Base Transceiver Station

H. CDMA: Code Division Multiple Access

I. C/N: Carrier-to-Noise Ratio

J. CWDM: Coarse Wave Division Multiplexing

K. DAS: Distributed Antenna System

L. DWDM: Dense Wave Division Multiplexing

M. EBS: Educational Broadband Service

N. ESMR: Enhanced Specialized Mobile Radio

O. FCC: Federal Communications Commission

P. GUI: Graphical User Interface

Q. iDEN: Integrated Enhanced Digital Network

R. LMR: Land Mobile Radio

S. LTE: Long Term Evolution

T. MTBF: Mean Time Between Failure

U. NFPA: National Fire Protection Association

V. NMS: Network Management System

W. PCS: Personal Communications System

X. PSN: Public Safety Network

Y. RoF: Radio-over-Fiber

Z. RoHS: Restriction of Hazardous Substances

AA. RSL: Received Signal Level

BB. SISO: Single-Input, Single-Output

CC. SMR: Specialized Mobile Radio

DD. SMS: Short Message Service

EE. SNIR: Signal-to-Noise Interference Ratio

FF. SNMP: Simple Network Management Protocol

GG. SOW: Statement of Work

HH. VSWR: Voltage Standing Wave Ratio

1.7 DEFINITIONS

A. Acceptance: Expressed approval by the customer

B. Active: DAS components that require AC/DC power for operation

C. Channel: A path for an RF transmission between two points

D. Component: A main system element of the DAS

E. Contractor: The prime contractor

F. Passive: DAS components that do not require AC/DC power for operation

1.8 PERFORMANCE REQUIREMENTS

A. PSN DAS:
1. The PSN DAS shall comply with NFPA-1 2009 Edition.
2. Where the in-building coverage requirements include 700 - 800 MHz public safety system and commercial wireless in-building coverage, the two systems shall operate over a unified Passive Cable and Coverage Antenna Infrastructure.
3. Contractors shall state the assumed channel count for the PSN Frequency Bands identified above in Section 1.04 A.. Prior to installation, contractors shall confirm the channel count and frequencies with the AHJ, and shall guarantee coverage for these channels per the criteria stated above.

4. The DAS shall be capable of upgrade, without additional hardware or software, to allow for changes to system frequencies within the deployed frequency band in order to maintain radio system coverage as originally designed.
5. The contractor shall explain the method used to avoid downlink and uplink interference.

1.9 ADDITIONAL REQUIREMENTS

A. PSN Approval: When approval of the DAS deployment is required by code or ordinance, the Contractor shall be responsible for facilitating the AHJ approval(s) per the requirements of the code or ordinance.

1.10 SUBMITTALS

A. Section 01 3300 – Submittal Procedures: Submittal procedures.

B. Submittal Requirements (GENERAL):
1. Product Data: Submit manufacturer datasheets for the following components:
   a. Donor and Coverage Antennas
   b. Coaxial Cable and Connectors
   c. Splitters, Combiners and Couplers
   d. Bi-Directional Amplifiers (BDA)
   e. Fiber-Optic Master Unit
   f. Fiber-Optic Remote Units

2. Shop Drawings: Submit the following items:
   a. RF link budget
   b. Overlay of system Components on floor plans
   c. Drawings for Donor Antenna and grounding
   d. Bill-of-Material (BOM)
3. Statement of Work (SOW): Submit sample SOW
4. Acceptance Test Plan (ATP): Submit sample ATP
5. Recommended Spares
6. Warranty Documents:
   a. Submit for all manufactured Components specified in this Section.
   b. Submit Contractor's System Warranty.
   c. Submit Manufacturer's Extended Warranty.

C. Submittal Requirements Prior to Start of Construction
1. Final RF link budget
2. Overlay of system Components on floor plans
3. Drawings for Donor Antenna and grounding
4. RF propagation modeling
5. Signal to Noise Interference Ratio (SNIR) Map
6. Bill-of-Material (BOM)
7. Maintenance Service Contract
8. Statement of Work (SOW): The contractor shall submit a SOW that has been accepted by the customer or customer's designated representative.

9. Acceptance Test Plan (ATP): The contractor shall submit an ATP that has been accepted by the customer or customer's designated representative.

D. Submittal Requirements at Close Out
   1. Drawings: Submit as-built drawings indicating:
      a. Donor antenna, grounding and lighting protection details
      b. Cable routing, splitters, couplers and coverage antenna locations
      c. Active component locations, layout and configuration
   2. Test Reports
      a. PSN: Submit Accepted ATP reports confirming the requirements of Section 1.07 B have been met.
   3. Field Reports: Submit sweep-testing results for all cable runs.
   4. Field Reports: Submit OTDR test results for all fiber runs.
   5. Operation and Maintenance Data: Submit hardware and software manuals for all Active Components.
   6. Warranty Documents:
      a. Submit for all manufactured components specified in this Section.
      b. Submit Contractor's System Warranty.
      c. Submit Manufacturer's Extended Warranty

1.11 QUALITY ASSURANCE

A. Qualifications: Contractor, and/or Sub-Contractors, shall have a minimum of 5-years full-time experience executing work of similar scope and complexity.

B. Certifications:
   1. Passive Components: Contractor or Sub-Contractor shall provide manufacturer certification that their personnel have been trained on the components being installed.
   2. Active Components: Contractor or Sub-Contractor shall provide manufacturer certification that their personnel have been trained on the components being installed.

1.12 WARRANTY

A. Manufacturer Warranty:
   1. Splitters, Couplers and Coverage Antennas: 5-year limited warranty from date of system acceptance.
   2. Coaxial Cable and Connectors: 10-year limited warranty from date of system acceptance.
   3. Fiber-Optic Cable: 20-year limited warranty from date of system acceptance.
   4. Active Components: The earliest of 1-year limited warranty from date of system installation or 15 months from date of shipment.

B. Contractor Warranty: Contractor shall warrant the system performance as specified in Section 1.10 for 1-year.

C. Manufacturers Extended Warranty:

1. The DAS shall be covered by a two-part certification program provided by a single manufacturer and that manufacturer's certified contractor. The certification program covers a certified system defined as a DAS installation performed by a certified contractor using components conforming to section 2.01 following all the manufactures recommendations, installation instructions and best practices. Manufacturer shall administer a follow-on program through the contractor to provide support and service to the purchaser. The first part is an assurance program, which provides that the certified system will support current and future modulation formats in the frequency bands for which it is designed, during the 20-year warranty of the certified system.
2. The second portion of the certification is a 20-year warranty provided by the manufacturer and the contractor on all cable products within the system (fiber-optic cable, coaxial riser cable, plenum coaxial cable and associated connectors, etc.). In conflict with 1.13 A 3 where we say the fiber has a 20 year warranty.
3. In the event that the certified system ceases to support the certified application(s), whether at the time of ATP, during normal use or when upgrading to additional frequency bands, the manufacturer and Contractor shall commit to promptly implement corrective action.
4. Manufacturer shall maintain ISO Quality Control registration for the facilities that manufacture the products used in the DAS.

1.13 MAINTENANCE

A. The Contractor shall provide an optional maintenance service contract, covering for a period of one-year: preventative maintenance, system monitoring, spares, fault mitigation, equipment repair, and response time.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Andrew Telecomm Solutions (basis of design).

B. Siemens

C. Honeywell

D. Radio Solutions Inc.

E. Substitutions: Section 01 60 00 - Product Requirements

2.2 COMPONENTS

A. Broadband Donor Antennas: Broadband Donor Antennas shall feature a multi-band design, accommodating PCS and LMR frequencies in a single small antenna.
   1. Electrical:
      a. Frequency bands, 806 - 960 MHz and 1710 - 2200 MHz
      b. VSWR ≤ 1.8
      c. Gain: 806-960 ≥ 10.5 dBi, 1710 - 2200 ≥ 12 dBi
      d. Maximum input power: 100 watts
      e. Polarization: Vertical
      f. Front-to-back ratio: 806 - 960 ≥ 18 dB, 1710 - 2200 ≥ 20 dB
      g. Impedance: 50 Ω
      h. Azimuth Pattern: As proposed by the manufacturer to meet the performance specifications in this Section.
   2. Mechanical:
      a. Radome material: UV-protected ABS
      b. Pigtail cable: RG58, plenum rated
      c. Connector: 50 Ω N Type Female
      d. Mounting: Pole
   3. Environmental
      a. Temperature: -40 °C to +60 °C
      b. Lighting protection: Direct ground
      c. Waterproof level: IP 66
      d. Wind Speed, maximum: 125 mph
   4. Approved Manufacturer: Andrew CELLMAX-EXT-CPU or equivalent, in accordance with Section 1.05.

B. 700 MHz LMR Yagi Donor Antennas:
   1. Electrical:
      a. Frequency band, 746 - 806 MHz
      b. VSWR ≤ 1.5:1
      c. Gain: ≥ 1 1.1 dBi
      d. Maximum input power: 100 watts
      e. Polarization: Vertical
      f. Front-to-back ratio: ≥ 15 dB
      g. Impedance: 50 Ω
      h. Beamwidth, Horizontal, degrees: 60
      i. Azimuth Pattern: As proposed by the manufacturer to meet the performance specifications in this Section.
   2. Mechanical:
      a. Connector: 50 Ω N Type Female
      b. Mounting: Pole
   3. 3. Environmental:
      a. Temperature: -40 °C to +60 °C
      b. Lighting protection: Direct ground
      c. Waterproof level: IP 66
      d. Wind Speed, maximum: 125 mph
   4. Approved Manufacturer: Andrew DB498-PS or equivalent in accordance with Section 1.05.

C. Omni-Directional Coverage: Omni-Directional Coverage antennas shall feature a multi-band design, accommodating multiple frequency bands in a single small antenna.
   1. Electrical Band 1:
      a. Frequency Band: 698 – 800 MHz
      b. VSWR: ≤ 1.8:1
      c. Gain: ≥ 1.5 dBi
      d. Maximum input power:
      e. Impedance: 50 Ω
      f. Beamwidth, Horizontal: 360° omnidirectional
      g. Beamwidth, Vertical: 80° nominal
      h. Return Loss: 10.9 dB
   2. Electrical Band 2:
      a. Frequency Band: 1710 – 2700 MHz and 800 – 960 MHz
      b. VSWR: ≤ 1.5:1
      c. Gain: ≥ 1.5 dBi @ 800–960 MHz and ≥ 5.0 dBi @ 1710 – 2700 MHz
      d. Maximum input power:
      e. Impedance: 50 Ω
      f. Beamwidth, Horizontal: 360° omnidirectional
      g. Beamwidth, Vertical: 65° nominal
      h. Return Loss: ≤ 13.9 dB
   3. Mechanical:
      a. Connector: 50 Ω N Type Female
      b. Mounting: Thru-hole ceiling mount
      c. Radome material: ABS, UV resistant
      d. Pigtail cable: KSR195, plenum rated
   4. Environmental:
      a. Application: Indoor
      b. Operating Temperature: 40 °C to +60 °C (40 °F to +140 °F)
      c. Relative Humidity: Up to 100%
   5. Regulatory Compliance/Certifications: RoHS 2002/95/EC
   6. Approved Manufacturer: Andrew CELLMAX-O-CPUSE or equivalent, in accordance with Section 1.05.

D. Directional Coverage Antennas: Directional coverage antennas shall feature a multi-band design, accommodating multiple frequency bands in a single small antenna.
   1. Electrical Band 1:
      a. Frequency Band: 698 – 800 MHz
      b. VSWR: ≤ 1.8:1
      c. Gain: ≥ 5.0 dBi @ 698 – 800 MHz
      d. Maximum input power: 50W
      e. Impedance: 50 Ω
      f. Beamwidth, Horizontal: 110° nominal
      g. Polarization: Vertical
      h. Return Loss: ≤ 10.9 dB
   2. Electrical Band 2:
      a. Frequency Band: 1710 – 2700 MHz and 800 – 960 MHz
      b. VSWR: ≤ 1.5:1
      c. Gain: ≥ 5.0 dBi @ 800 – 960 MHz and ≥ 6.0 dBi @ 2170 – 2700 MHz and ≥ 8.0 dBi @ 1710 – 2170 MHz

d. Maximum input power: 50W
e. Impedance: 50 Ω
f. Beamwidth, Horizontal: 90° nominal
g. Return Loss: ≤ 13.9 dB

3. Mechanical:
   a. Connector: 50 Ω N Type Female
   b. Mounting: 4-hole wall mounting plate
   c. Radome material: ABS, UV resistant
   d. Pigtail cable: RG58, plenum rated
4. 4. Environmental:
   a. Application: Indoor
   b. Operating Temperature: 40 °C to +60 °C (40 °F to +140 °F)
   c. Relative Humidity: Up to 100%
5. Regulatory Compliance/Certifications: RoHS 2002/95/EC
6. Approved Manufacturer: Andrew CELLMAX-D-CPUSE or equivalent, in accordance with Section 1.05.

E. Fiber-Optic Cable and Connectors:
1. General Specifications:
   a. Cables shall be six-strand or greater, designed for point-to-point applications as well as mid-span access, and shall provide a high-level of protection for optical fiber installed in interior building environments.
   b. Higher optical fiber count cables shall utilize a sub-unitized design with color-coded subunits for easy identification.
   c. Single-mode optical fibers shall be 8.3 µm and use standard colored tight-buffered construction.
   d. The single-mode optical fiber shall be dispersion-unshifted optical fiber that meets ITU-T G.652c standards.
   e. Cable shall provide optimum performance over entire wavelength range from 1260 to 1625 nanometers.
   f. Cable shall support new and emerging applications that utilize extended E band, 1360 to 1460 nanometers.
   g. Cable shall also support existing and legacy single-mode applications that traditionally operate in 1310 and 1550 nanometer regions.
   h. Cable shall deliver a cost-effective upgrade path by expanding available wavelengths by 50 percent supporting 16 Channels of coarse wave division multiplexing (CWDM) on a single optical fiber and up to 400 Channels of dense wave division multiplexing (DWDM) on a single cable.
   i. Fire ratings: Riser, plenum, and/or LSZH
   j. Approved Manufacture: CommScope Fiber Optic Cable containing TerraSpeed Single Mode Optical Fiber. As an example, P-006-BO-8W-F25YL, 6-strand breakout cable single-mode Fiber or equal in accordance with Section 1.05.

F. Fiber-Optic Pigtails:
1. General Specifications:
a. To maintain channel integrity, optical fiber patch cords and pigtails shall be fabricated to meet the performance parameters corresponding to the optical fiber cable approved product type specified below. Patch cord and pigtail plug connectors shall be equipped with boots, and shall have same colors as related optical fiber backbone cables, unless specified or indicated otherwise. Optical fiber patch cords and pigtails shall be available with the following options as specified or indicated:
1) Termination types: SC-APC
2) Connector/cable configuration: Simplex and duplex
3) Fire ratings: Riser, plenum and/or LSZH
4) Patch cord outside diameters: 1.6 millimeters (0.063 inches) and 3.0 millimeters (0.118 inches)
5) Pigtails: Ruggedized and tight-buffered optical fiber—0.9 millimeters (0.035 inches) outside diameter
6) Lengths: As specified or indicated
7) Approved Manufacturer: CommScope RFT-01RF09-8W-SCA-XX, single reinforced buffered 900 µm, LightScope ZWP single-mode fiber, angled polished connector or equivalent, in accordance with Section 1.05.

G. Air Dielectric, Plenum Rated Cable:
1. Material Characteristics:
a. Jacket: Halogenated, Fire-Retardant
b. Outer Conductor Material: Corrugated Aluminum or Corrugated Copper
c. Inner Conductor Material: Copper-Clad Aluminum Wire
2. Electrical Characteristics:
a. Impedance: 50 ± 2.0 Ω
b. Frequency Band: 1 - 8800 MHz
c. Peak Power Rating: ≥ 40.0 kW
3. Mechanical Characteristics:
a. Diameter Over Jacket: ≤ .627 in
b. Minimum Bending Radius: ≤ 5 in
c. One Time Minimum Bending Radius: ≤ 3 in

4. Attenuation Characteristics:

Frequency (MHz)	Attenuation (dB/100ft)
150	< 0.848
450	< 1.530
800	< 2.105
2000	< 3.564

a. Standard Conditions: VSWR 1.0, ambient temperature 20 °C (68 °F)
5. Approved Manufacturer: Andrew HL4RP-50A, AL4RPV-50A or equivalent, in accordance with Section 1.05.

H. Foam Dielectric Cable:
1. Material Characteristics:
   a. Jacket: Non-halogenated, Fire-Retardant Ployolefin
   b. Outer Conductor Material: Corrugated Copper
   c. Inner Conductor Material: Copper-Clad Aluminum Wire or Copper Tube
2. Electrical Characteristics:
   a. Impedance: 50 ± 1.0 Ω
   b. Frequency Band: 1/2" Nominal: 1 - 8800 MHz, 7/8" Nominal: 1 - 5000 MHz
   c. Peak Power Rating: ≥ 40.0 kW
3. Mechanical Characteristics:
   a. Diameter Over Jacket: 1/2" Nominal: ≤ .630 in, 7/8" Nominal: ≤ 1.1 in
   b. Minimum Bending Radius: 1/2" Nominal: ≤ 5 in, 7/8" Nominal: ≤ 10 in
   c. One Time Minimum Bending Radius: 1/2" Nominal: ≤ 2 in, 7/8" Nominal: ≤ 5 in
4. Attenuation Characteristics: 1/2" Nominal

Frequency (MHz)	Attenuation (dB/100ft)
150	< 0.815
450	< 1.447
800	< 1.968
2000	< 3.251

   a. Standard Conditions: VSWR 1.0, ambient temperature 20 °C (68 °F)

5. Attenuation Characteristics: 7/8" Nominal

Frequency (MHz)	Attenuation (dB/100ft)
150	< 0.417
450	< 0.744
800	< 1.014
2000	< 1.683

   a. Standard Conditions: VSWR 1.0, ambient temperature 20 °C (68 °F)
6. Approved Manufacturer: Andrew LDF4-50A, FXL-540-NHR, FXL-780-NHR or equivalent, in accordance with Section 1.05.

I. Splitters, Combiners, Couplers, Coax Jumpers and Connectors:
1. Approved Manufacturer: Andrew or equivalent, in accordance with Section 1.05.

J. BDA: When the AHJ dictates a BDA drive the DAS, the BDA shall be of modular design and use digital filtering to mitigate interference and accommodate multiple services for PSNs.
1. Characteristics
   a. Operating Temperature Range: -33 °C to +50 °C
   b. Chassis: Shall be of modular design with ≥ 4 frequency bands per 19" chassis. Chassis shall not exceed four Rack Units (RUs) in height.
   c. Filtering: Digital

d. Separate Control: Each RF amplifier shall be capable of adjusting and controlling power levels for each WSP when multiple WSPs share a single amplifier.
e. FCC Part 90.219 Type Classification: Class A narrowband for LMR/SMR/ESMR frequency bands
f. Alarming: Shall support both SNMP and SMS using wireless modem
g. Mounting Options: shall support rack, wall and pole mounting
h. Frequency Bands Supported: 380 - 512 MHz LMR, 769 - 806 MHz LMR, 806 - 869 MHz LMR/SMR/ESMR, 896 - 941MHz LMR/SMR/ESMR, 1900 - 1950 MHz PCS

2. Compliance:
   a. NFPA: The BDA shall comply with NFPA-1 2009 edition Annex O In-Building Public Safety Radio Enhancement Systems.
   b. FCC: Shall be FCC type certified.
3. Approved Manufacturer: Andrew Node A or equivalent, in accordance with Section 1.05.

K. Fiber-Optic Master Unit: When building size dictates an Active fiber DAS, the Fiber-Optic Master Unit shall convert radio over coax to Radio-Over-Fiber (RoF) for distribution to Fiber-Optic Remote Units.
1. Characteristics
   a. Transmission Media: Single-mode fiber at 1310 nm
   b. Operating Temperature Range: +5 °C to +40 °C
   c. Impendence: 50 Ω
   d. Chassis:
      1) Shall be of modular design capable of supporting ≥ 32 Remote Units per 19”, 4 RU chassis
      2) Shall support redundant power supplies
      3) Shall have the capability to remotely power the Remote Units via composite fiber-optic cable
   e. Automatic Gain Control (AGC): Shall provide AGC for optical loss compensation
   f. Optical Budget: Shall support ≤ 3 dB optical budget (~3 km or 2 miles)
   g. Auxiliary Channel: Shall provide an input to support 400 to 2700 MHz for future expandability
   h. Interlink: Shall support one fiber or two fibers bi-directional optical link for distances up to 20 km with a 10 dB optical budget
   i. Remote Supervision:
      1) Shall support the TCP/IP protocol, SNMPv2, FTP, HTTP, Telnet, and be fully compatible with general purpose SNMP managers
      2) Remote access shall be available via Point-to-Point Protocol (PPP), over circuit-switched/packet data and wired/wireless modems
      3) Each Active device shall be manageable via a Web GUI
      4) Auto Mapping: Each board position shall be automatically mapped during system turn-up

2. Frequency Bands Supported: 380 - 512 MHz LMR, 769 - 806 MHz LMR, 806 - 869 MHz LMR/SMR/ESMR, 896 - 941MHz LMR/SMR/ESMR, 1900 - 1950 MHz PCS and 2496 - 2690 MHz BRS/EBS.
3. Approved Manufacturer: Andrew ION-B, ION-M or equivalent, in accordance with Section 1.05.

L. Fiber-Optic Remote Units: The Fiber-Optic Remote Unit converts the RoF signal back to radio over coax, as well as provides filtering so that multiple frequency bands can reside over the same passive cable and antenna infrastructure.
1. Characteristics
   a. Operating Temperature Range: +5 °C to +40 °C
   b. Impendence: 50 Ω
   c. Power Consumption: ≤ 105 watts, maximum

M. Output Power per Carrier at Antenna Port:

Technology/Band (MHz)	Single carrier (dBm)
Analog 700	27
GSM 700	27
Analog 800 and 850	27
GSM 800 and 850	31
GSM 800 and 850 at band edges	29
iDEN 800 and 850	26
iDEN 800 and 850 at band edges	24
CDMA 800 and 850	29
CDMA 800 and 850 at band edges	27
Analog 900	29
iDEN 900	23
CDMA 1700	30
W-CDMA 1700	28
Analog 1900	31
GSM 1900	31
CDMA 1900	29
W-CDMA 1900	27

   a. MTBF (excluding external power supply): ≥ 160,000 hours
   b. Physical: The Remote Unit shall consist of the following:
      1) Ingress Protection: IP31 or equivalent
      2) Frequency Bands supported: 769 - 806 MHz LMR, 806 - 869 MHz LMR/SMR/ESMR, 896 - 941MHz LMR/SMR/ESMR, 1850 - 1995 MHz PCS
      3) Optical Port: 2xSC-APC connector (separated uplink/downlink)
      4) Antenna Port: Single 50 Ω N type female connector
      5) Auxiliary Ports: Two SMA female for future add-on modules
   c. Uplink Noise Figure:
      1) LMR 700, LMR 800, Cell850: ≤ 7.5 dB
      2) LMR 700, LMR 800, Cell850 at band edges: ≤ 9.5 dB
      3) LMR 900: ≤ 8.5 dB
      4) PCS 1900 extended: ≤ 7.5 dB

2. Approved Manufacturer: Andrew ION-B, ION-M Series or equivalent in accordance with Section 1.05.

PART 3 EXECUTION

3.1 INSTALLATION

A. The contractor shall design, install, commission and test the DAS in accordance with the manufacturer's instructions and recommendations.

B. The contractor shall install the DAS in accordance with the accepted SOW.

C. Wiring Method:
1. Install all required telecommunications conduits, sleeves, and back boxes. Conduits, sleeves and boxes shall be installed in accordance with Section 270533.
2. Install cables in raceways, conduits and interstitial spaces above suspended ceilings.
3. Conceal wiring except in unfinished spaces.
4. Wire shall not be subjected to pulling tensions greater the maximum specified by the manufacturer
5. Wire bend radius shall not be less than the manufacturer's minimum of one (1) inch.
6. Support cables that are not in raceway or conduit at intervals no greater than 60 inches with supports designed for high-speed twisted pair wire ("J " hooks)

3.2 ACCEPTANCE TESTING

A. Acceptance testing will be performed confirming the requirements of Section 1.09 have been met.

B. The contractor shall complete the acceptance testing as prescribed in the approved Acceptance Test Plan (ATP) submittal.

END OF SECTION

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SECTION 28 0500 - SECURITY CONDUCTOR CABLES

PART 1 - GENERAL

1.01 Section Includes

A. System Requirements

B. Cabling

1.02 RELATED REQUIREMENTS

A. The Contractor, Subcontractors and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section "Summary", Paragraph 1.1A, entitled "Related Documents." OR Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
   1. Division 07 - Firestopping.
   2. Division 08 - Door Hardware: Electrically operated door hardware, for interface with access control system. Includes door hardware with integral request to exit devices.
   3. Division 26 - Parking Control Equipment: Parking gates, for interface with access control system.
   4. Division 26 - Electric Traction Elevators: For interface with access control system.
   5. Division 26 - Hydraulic Elevators: For interface with access control system.
   6. Division 26 - Grounding and Bonding for Electrical Systems.
   7. Division 26 - Conduit for Electrical Systems.
   8. Division 26 - Identification for Electrical Systems: Identification products and requirements.
   9. Division 27 - Structured Cabling: Data cables for access control system IP network connections.
   10. Division 28 - Video Surveillance: For interface with access control system.
   11. Division 28 -Building Intrusion Detection: For interface with access control system.
   12. Division 28 - Fire Detection and Alarm: For interface with access control system.

B. Refer to the following construction documents for Data Room locations and device locations only.
   1. "TY" Drawings – Security Plans

C. Any apparatus, appliance, material, or work not shown on the Drawings but mentioned in the Specifications, or vice versa, and any incidental accessories necessary to make the work complete and perfect in all respects and ready for operation, even if not particularly specified, shall be provided without additional expense. Coordinate with each system manufacturer to ensure all hardware, firmware, relays, or other necessary components are provided prior to bid submission.

D. All work of this Section to comply with the requirements of the Conditions of Contract, with all Specification Sections of Division 01 – General Requirements, with the Security Drawings, and with all other Contract Documents.

E. Refer to Division 26 of the Contract Documents, Electrical, for all Specifications governing the installation of raceway (conduit, EMT, cable trays, wire trough, etc.), system junction and pull boxes, and device rough-in boxes, for all Security System work shown on the Security Drawings. Conduit, back box, and trough work to be provided by this Contractor.

F. Refer to Division 26 of the Contract Documents, Electrical, for all work related to the interconnection of Security System equipment to 120 VAC power sources.

G. Refer to Division 09 of the Contract Documents, Finishes, for details relating to acoustical ceilings and gypsum board systems, floor finishes, painting, etc., for information pertinent to device and back box selection and installation.

H. Refer to Division 08 of the Contract Documents, Openings, for details relating to doors, door frames, windows, and window frames, for information pertinent to the selection of magnetic contact devices and their associated placement and installation, including back box selection and installation.

I. Refer to Division 08 of the Contract Documents, Openings, for details relating to door and door frame hardware and preparation, electrified lock power supplies, required coordination to accommodate these components and/or systems, lock voltage and current draw coordination, coordination of fail-safe electrified locks, and any other related equipment or requirements

J. Refer to Division 06, Wood, Plastics, Composites, and coordinate all desk locations and installation details with the Millwork Contractor.

K. Review all other Specification Sections as required to achieve complete inter- trade coordination.

1.03 DEFINITIONS

A. “Project Manager” shall mean the Owner’s appointed representative.

B. “As Necessary” shall mean work which is required for completed construction, but is not necessarily shown or described in the Contract Documents.

C. “As Required” shall mean work which is required for completed construction and is shown on the drawings or described in the project specification.

D. “Install” shall mean to set in place complete with all mounting facilities and connections as required ready for normal use of service

E. “Substantial Completion” shall mean that the project is sufficiently complete to be utilized for its intended use as stated in the body of this written specification.

F. “Conduit” shall include all fittings, sleeves, connections, hangers and other accessories related to such conduit.

G. "Surface Metal Raceway" shall include all fittings, sleeves, connections, hangers and other accessories related to such raceway.

H. "Concealed" shall mean hidden from sight, as in chases, furred spaces, shafts, fixed ceiling or embedded in construction.

I. "Exposed", shall mean not "concealed" as defined above.

J. "Governmental" shall mean all municipal, state and federal government agencies.

K. The words "Furnish", "Supply" and "Provide" shall mean purchase, deliver to the job site, protect and provide interim storage and install in accordance with manufacturer's specifications.

L. Words "Approved Equal" shall mean any product which in the opinion of the Technology Consultant is equal in quality, arrangement, appearance, and performance to the product specified.

M. "Cabling" shall mean cable assembly, raceway, conductors, fittings and any other necessary accessories to make a complete wiring system.

N. "Product" shall mean any item of equipment, material, fixture, apparatus, appliance or accessory installed under this Division.

O. Words in the singular shall also mean and include the plural, wherever the context so indicates, and words in the plural shall mean the singular, wherever the context so indicates.

P. "Contractor" refers to the biding/installation Contractor responsible for furnishing and installation of all work indicated within this specification.

1.04 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

C. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. UL 294 - Access Control System Units; Current Edition, Including All Revisions.

E. UL 1076 - Proprietary Burglar Alarm Units and Systems; Current Edition, Including All Revisions.

F. System shall be RoHS (Restriction of Hazardous Substances) compliant and meet proposed amendments to the reduction of toxic substances in manufacturing in stated in the Environmental Design of Electrical Equipment Act (EDEE).

G. Installation shall comply with NECA 1-2010 "Standard Practice of Good Workmanship in Electrical Construction"

H. Installation shall comply with NEC/NFPA 70E "Standard for Electrical Safety in the Workplace"

I. Electronic data exchange between Video Surveillance System and the Access Control System shall comply with SIA TVAC

J. Installation shall comply with FCC CFR 47 Part 15 Class A "Telecommunications, Radio, Frequency, Digital Device Emission:

K. Installation shall comply with Federal, State, and Local Codes and Authority Having Jurisdiction (AHJ).

L. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the work with other installers to provide suitable security wiring for all security systems.

1.06 SUBMITTALS

A. See Division 01 – Administrative Requirements for submittal procedures.

B. Evidence of Qualifications for Installer:
   1. The Contractor shall be a bona fide security systems contractor, licensed by the State of Connecticut for the installation of the low voltage security and signal communication systems, and engaged in security system maintenance, service and contracting for at least the last five years.
   2. The Contractor shall employ technicians who have been trained by the Manufacturer specified within this section to install the systems of this Manufacturer.
   3. The contractor shall be a factory authorized stocking distributor of the manufacturer of the equipment included in the system so that immediate replacement parts can be made from inventory and service provided as needed on an emergency basis.
   4. The Contractor shall submit with the bid a manufacturer's certificate of acceptance of the qualifications of the Installing Contractor to install, test, maintain and repair the manufacturer's equipment.
   5. In order for the Security Consultant to verify that they meet the competency requirements of this specification, Contractors must submit the following information if so requested:
      a. Proof that the Contractor has installed, services and maintained similar security systems for a minimum of ten (10) years.
      b. Proof that the Contractor is a firm which currently and regularly installs, services and maintains security systems as a full time business.
      c. The names and qualifications of security system technicians that shall perform and supervise the work and perform tests or adjustments on the systems and equipment. Qualifications shall include all schooling, training, and history of work experience.

d. A list of four prior systems comparable to the one specified under this contract which were installed, serviced, and maintained satisfactorily by the Contractor for a minimum of one (1) year. Each system listed shall include the firm or owner, location, person to contact (with telephone number), date of installation and service period, and a brief description of the system and work performed on the system.

6. The Contractor shall submit any other information required by the Security Consultant to determine the competency of the Contractor. If this information is not submitted as requested, it shall be submitted within the time specified by the Architect after the bid opening. If the Contractor fails to submit the information in accordance with the Security Consultant's request, the Contractor shall be declared non-responsive, and may be rejected to perform the work specified within this section.

C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instruction for storage, handling, protection, examination, preparation, installation, and operation of product.

D. Manufacturer's detailed field-testing procedures.

E. Product Data: Provide details and technical specifications for each product indicated. Include physical dimensions, features, performance, electrical characteristics, ratings, software versions, and operating system details.

1. Equipment Submittals
   a. Provide a Title Page, with project name, Contractor's name and address, contact information, date of submission, and submission revision number.
   b. Provide a Parts List, for proposed equipment, materials, components and devices, listing the following information for each line item:
      1) The system type
      2) Model number
      3) Specification sheet page reference
   c. Provide Manufacturers Specification Sheet with descriptive information for equipment, materials, components and devices. Number each page, to correspond with the Parts List.
   d. Clearly delineate (with highlighter, arrow, or underline) on each specification sheet, specific model numbers, options and configurations being proposed for this project.
   e. Indicate kinds of materials and finishes for equipment where more than one option is presented.
2. Acceptance Testing Plan
   a. Submit a written document detailing the test procedures to be followed in evaluating and proving the installed system(s).
   b. Provide a sample of the test forms to be used for each system and for each component of each system.
   c. Include all tests required by the equipment manufacturer and by this Specification
3. Incomplete or unchecked submittals which do not contain complete data on the work and full information on related matters will be returned for correction.

F. CE and FCC Compliance Certificates:

G. Field quality-control reports

H. Current Specified Manufacturer Integrator Certification Letter

I. Current Specified Manufacturer Training Certificates (listing expiration dates) for Two technicians from the supporting office

J. Warranty: Software support and warranty information for all components, including Service Level Agreement (SLA) details, and duration of agreement from date of system acceptance by Owner. Submit sample of manufacturer's warranty and documentation of final executed warranty completed in Owner's name and registered with manufacturer.

K. Project Record Documents: Record actual locations of system components and installed wiring arrangements and routing.

1.07 QUALITY ASSURANCE

A. Comply with the following:
   1. NFPA 70.
   2. NFPA 101 (Life Safety Code).
   3. The requirements of the local authorities having jurisdiction.
   4. Applicable TIA/EIA standards.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

D. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience with access control systems of similar size, type, and complexity and providing contract maintenance service as a regular part of their business; authorized manufacturer's representative.
   1. Contract maintenance office located within 100 miles (160 km) of project site.

E. Maintenance Contractor Qualifications: Same entity as installer.

F. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

G. The requirements of the State Building Code and local regulations establish the minimum acceptable quality of workmanship and materials, and all work shall conform thereto unless more stringent requirements are indicated or specified herein.

H. All work shall comply with the latest editions of the codes as referenced herein.

I. Follow manufacturer's directions for articles furnished, in addition to directions shown on drawings or specified herein.

J. Protect all work, materials, and equipment from damage during process of work. Replace all damaged or defective work, materials and equipment without additional cost to DCAMM.

K. All equipment and materials for permanent installation shall be the products of recognized manufacturers and shall be new.

L. Equipment and materials shall:
1. Where normally subject to Underwriters Laboratory Inc. listing or labeling services, be so listed or labeled.
2. Be without blemish or defect.
3. Not be used for temporary purposes.
4. Be in accordance with the latest applicable NEMA standards.
5. Be products which will meet with the acceptance of all authorities having jurisdiction over the work. Where such acceptance is contingent upon having the products examined, tested and certified by Underwriters or another recognized testing laboratory, the product shall be so examined, tested and certified.

M. Except for conduit, conduit fittings, outlet boxes, wire and cable, all items of equipment or material of one generic type shall be the product of one manufacturer throughout.

N. For items which are to be installed but not purchased as part of the electrical work, the electrical work shall include:
1. The coordination of their delivery.
2. Their unloading from delivery trucks driven into any point on the property line at grade level.
3. Their safe handling and field storage up to the time of permanent placement in the project.
4. The correction of any damage, defacement or corrosion to which they may have been subjected. Replacement, if necessary, shall be coordinated with Contractor who originally purchased the item.
5. Their field make up and internal wiring as may be necessary for their proper operation.
6. Their mounting in place including the purchase and installation of all dunnage, supporting members, and fastenings necessary to adapt them to architectural and structural conditions.
7. Their connection to building wiring including the purchase and installation of all termination junction boxes necessary to adapt and connect them to this wiring. Included also shall be the purchase and installation of any substitute lugs or other wiring terminations as may be necessary to adapt their terminals to the building wiring as called for and to the connection methods set forth in these specifications.

O. Items which are to be installed but not purchased as part of the electric work shall be carefully examined upon delivery to the project. Claims that any of these items have been received in such condition that their installation will require procedures beyond the reasonable scope of the electric work will be considered only if presented in writing within one week of the date of delivery to the project of the items in question. The work includes all procedures, regardless of how extensive, necessary to put into satisfactory operation, all items for which no claims have been submitted as outlined above.

P. Seismic Performance: Provide equipment capable of withstanding the effects of earthquake motions determined according to ASCE/SEI 7 and current building codes for the state of CT.
   1. The term "withstand" means "the system(s) will remain in place without separation of any parts when subjected to the seismic forces specified and the system will be fully operational after the seismic event."

1.08 PROJECT CONDITIONS

A. Environmental Conditions: Capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:
   1. Interior, Controlled Environment: System components installed in temperature-controlled interior environments shall be rated for continuous operation in ambient temperatures of 36 to 122 deg F (2 to 50 deg C) dry bulb and twenty to ninety percent (20-90%) relative humidity, noncondensing. Use NEMA 250, Type 1 enclosures.
   2. Interior, Uncontrolled Environment: System components installed in non- temperature-controlled interior environments shall be rated for continuous operation in ambient temperatures of 0 to 122 deg F (minus 18 to plus 50 deg C) dry bulb and twenty to ninety percent (20-90%) relative humidity, noncondensing. Use NEMA 250, Type 3R enclosures.
   3. Exterior Environment: System components installed in locations exposed to weather shall be rated for continuous operation in ambient temperatures of minus 30 to plus 122 deg F (minus 34 to plus 50 deg C) dry bulb and twenty to ninety percent (20-90%) relative humidity, condensing. Rate for continuous operation when exposed to rain as specified in NEMA 250, winds up to 85 mph and snow cover up to 24 inches thick. Use sufficiently rated NEMA 250 enclosures.
   4. Hazardous Environment: System components located in areas where fire or explosion hazards may exist because of flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers shall be rated, listed, and installed according to NFPA 70.
   5. Corrosive Environment: System components subject to corrosive fumes, vapors, and wind-driven salt spray in coastal zones. Use sufficiently rated NEMA 250 enclosures.
   6. Security Environment: Camera housing for use in high-risk areas where surveillance equipment may be subject to physical violence.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

B. Store products in manufacturer's unopened packaging, keep dry and protect from damage until ready for installation.

1.10 FIELD CONDITIONS

A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.11 WARRANTY

A. See Division 01 – Closeout Submittals for additional warranty requirements.

B. The Integrator guarantees the Systems to be installed under this specification to be free from any defects in workmanship and materials for a period of one (1) year from the date of final completion/acceptance of the project by the Owner as evidenced by the date of final payment for the work. The Contractor shall promptly and at their own expense remedy any defects in the work and pay for any damage to other work resulting thereof, which shall appear during the period of time covered by this guarantee. Neither the final certificate of payment nor any provisions in this Agreement shall constitute an acceptance of work not done in accordance with this specification or relieve the Contractor of liability with respect to any expressed warranties or guarantees or responsibility for faulty materials or workmanship.

C. Submit manufacturer's standard warranties.

PART 2 PRODUCTS

2.01 SYSTEM REQUIREMENTS

A. Furnish and install Electronic Security System cabling consisting of required equipment, conduit, boxes, wiring, connectors, hardware, supports, accessories, software, system programming, etc. as necessary for a complete operating system that provides the functional intent indicated.

B. It is the responsibility of the contractor awarded this project to ensure the cable used is approved by the equipment manufacturer for its intended use and will meet environmental and distance requirements.

C. Shields and twisted wire are required unless PROHIBITED by the Access Control or Intrusion Detection Manufacturer.

D. 20 AWG is a minimum wire size unless PROHIBITED by the Access Control and Intrusion Detection Manufacturer.

2.02 CABLING:

A. All cabling shall be plenum rated.

B. Approved Manufacturer’s:
1. Belden
2. West Penn

C. System Cable: Provide cable as shown below or as recommended by the Manufacturer.
1. Low Voltage Security Alarm Signal Cable shall be twisted, single pair, shielded cable, with shield drain wire, with overall jacket, gauge calculated to compensate for length of run and current requirements. All conductors for security zone signal to be minimum #20 AWG, UL listed. All wires to be color coded. One pair #20 AWG per security device zone required.
2. Low Voltage Security Power, 12 VDC cable shall be minimum of #18 AWG for runs up to 150,’ and a minimum of #16 AWG for runs up to 300,’ twisted, shielded stranded, with

shield drain wire, UL listed, jacketed, pair, separate color code from any other power circuits.

3. Electric Lock Power Cable shall be minimum of #14 AWG for runs up to 200' serving a single lock. Twisted, shielded, stranded, jacketed pair, UL listed, separate color ode from any other power circuits.
4. Composite Cable (Reader, Lock, Monitor, REX): CAT6 jacketed Plenum cable with overall shield, including (6) Conductor Shielded 22AWG w/ripcord, 4-Conductor 22AWG w/ripcord, 4-Conductor 22AWG w/ripcord, and 4-Conductor 18 AWG w/ripcord; or equal with written approval by Security Consultant.
5. Lock Power, at Double Doors: Jacketed Plenum cable, unshielded, 4-conductor 18 AWG (7- strand), unshielded, or approved equal.
6. Request-to-Exit Cable, at Double Doors: Plenum rated jacket, 4-conductor 22 AWG (7-strand), unshielded, or approved equal.
7. Special Control Cable, at Double Emergency Exit Doors with Power Booster: Plenum rated cable, 4-conductor 12 AWG (19 strand), unshielded, or approved equal.
8. Card Reader Cable for second card reader at same portal: 3 Pair Shielded 22AWG or approved equal.
9. Alarm Monitoring: 1Pair Shielded 22AWG, or equal.
10. Area Motion Detector: 2 Pair Shielded 20AWG, or equal.
11. Push Buttons: 2 Conductor 18AWG.
12. Lockdown Buttons: 2 Pair Shielded 18AWG, or equal
13. Data: 2 Pair Shielded 20AWG, or equal.
14. Strobe: 2 Pair Shielded 18AWG, or equal.
15. Network Cable: CAT 6, or as required by Division 27, whichever is more stringent.

D. Cable installed below grade shall be rated for immersion in water.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that ratings and configurations of system components are consisted with the indicated requirements.

C. Verify that mounting surfaces are ready to receive the system components.

D. Verify that branch circuit wiring is installed, completed, tested, and ready for connection to system.

E. Verify that conditions are satisfactory prior to starting work.

F. Device Locations
1. All device locations are to be field verified with the Owner prior to start of project. Architectural drawings are for approximation purposes only. Additional charges will not be allowed for outlet installation in areas not reviewed or approved by the Owner.

G. Examine pathway elements intended for cables. Check raceways and other elements for compliance with space allocations, installation tolerance, hazards to camera installation, and other conditions affecting installation.

H. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install access control system in accordance with NECA 1 (general workmanship).

B. Install products in accordance with manufacturer's instructions.

C. Unless otherwise indicated, use wiring in conduit.
   1. Use suitable listed cables in we locations, including underground raceways.
   2. Use suitable listed cables for vertical wire applications.
   3. All cabling shall be plenum rated.
   4. Install wiring in conduit for the following:
      a. Where required for rough-in.
      b. Where required by the AHJ.
      c. Where exposed to damage.
      d. Where installed outside the building.
      e. For exposed connections from outlet boxes to devices.
   5. Conduit: comply with section Division 26.
   6. Conceal cables unless specifically indicated to be exposed.
   7. User power transfer hinges specified within Division 08 for concealed connections to door hardware.
   8. Cables in the following areas may be exposed:
      a. Equipment Closets
   9. Route exposed cables in parallel or perpendicular to building structural members and surfaces.
   10. Do not exceed manufacturer's recommended maximum cable length between components.

D. Provide grounding and bonding in accordance with Division 26.

E. Install firestopping to preserve the fire resistance rating of partitions and other elements, using materials and methods specified in Division 07.

F. Install power supplies and other auxiliary components at control stations unless otherwise indicated.

G. Identify system components, wiring, cabling, and terminals according to ANSI/EIA/TIA standards.

H. Wiring may be run in concealed spaces without conduit, in electrical trays (approved by owner), and where otherwise shown on drawings, provided conductors are reasonably protected from mechanical and environmental damage.

I. Conductors run without conduit shall be approved, UL Listed, rated and labeled for Plenum use.

J. Secure wire and cable with approved supports in accordance with the referenced standards and the Authority Having Jurisdiction.

K. Provide cable supports at a minimum of 4-foot intervals.

L. Equipment and devices shall be installed on approved electrical back-boxes. Do not install equipment and devices directly on walls, ceilings or structural components without back- boxes.

M. Secure cables to cabinets, junction boxes, pull boxes and outlet boxes with approved cable clamps.

N. Independently support cables. Do not use other supports i.e., (suspended ceilings, suspended ceiling supporting members, lighting fixtures, mechanical piping, or mechanical ducts).

O. Support cable independently of junction boxes, pull boxes, fixtures, suspended ceiling T- bars, angle supports, and similar items.

P. Support cable using cable trays, D-brackets, support straps, support wires or other approved cable supports.

Q. Fasten cable supports to building structure and surfaces.

R. In shared electrical trays, open ducts, and other cable runs without conduit, separate and strap Access Control cable so that it is clearly distinguishable from all other cables.

S. Clearly mark security system cables at minimum intervals of every 10-feet. Marking shall be with a permanent, printed label, color-coded tag, or other distinguishing marking. Felt tip pen marking on the cable is not acceptable.

T. After installation, and before termination, wiring shall be checked and tested to insure there are no grounds, opens, or shorts on any conductors or shields. In addition, wiring between buildings or underground and all coax cables shall have insulation tested with a megohmmeter and a reading of greater than 20 megohms shall be required to successfully complete the test.

U. Run wires continuously from termination to termination without splices. Splices at junction box locations are not allowed.

V. Water-resistant protection shall be continuous throughout the cable in outdoor surface conduit, poles, in-slab pull-boxes, in-slab conduit, and underground conduit and pull-boxes, and in any areas subject to moisture and/or water infiltration.
   1. Splices/Junctions: Provide water-proof protection of splices and junctions, in surface conduit and boxes, in-slab conduit and pull-boxes, underground conduit, and underground pull-boxes, to prevent the entry of moisture or water into cables, splices or connections.
   2. Cable Entries: Provide water-blocking sealants at all conduit entries into pull- boxes, junction boxes, back-boxes, cabinets, etc., to prevent the entry of moisture or water into the conduit and cable system.

W. Labeling: Identify wire and cable clearly with permanent labels wrapped around the full circumference within one inch of each connection. Correlate the number designated on the associated Shop or Field Drawings. Assign wire or able designations consistently throughout a

given system. Each wire or cable shall carry the same labeled designation over its entire run. Regardless of intermediate terminations.

X. Boxes: Provide a box loop for wire and cable routed through pull boxes or controller panels. Cable loops and bends shall not be at a radius less than that recommended by the manufacturer. Coordinate pull box size with the Division 26 Contractor as necessary to accommodate this requirement.

Y. Wire Lacing and Dressing: Dress, lace, tie or harness wire and cable vertically, horizontally and at right angles to the enclosure surfaces to prevent mechanical stress on electrical connections as required herein and in accordance with accepted professional practice. No wire or cable shall be supported by a connection point.

Z. Non-Coaxial Connections: Make non-coaxial connections and approved splices within terminal cabinets (except microphone or line level) to screw-type barrier blocks with insulated crimp-type spade lugs. Size all lugs properly to assure high electrical integrity. Connect only one (1) wire per spade lug and not more than two (2) lugs per screw terminal.

AA. Non-Coaxial splicing at device locations to equipment with wire leads shall be made with pre-approved wire Dolphin Connectors.

BB. Shielded Cables: Shielded cables shall be insulated. Do not permit shields to contact conduit, raceway, boxes, terminal cabinets or equipment enclosures. Tin terminated shield drain wires and insulate with heat shrinkable tubing.

CC. Coaxial Splices: Coaxial splices, if required and approved, shall be on plate mounted dual - barrel type insulated BNC connectors, secured in such a manner that no stress is placed upon the connector.

DD. Unacceptable Conditions: Correct any unacceptable wiring conditions immediately upon discovery, and upon receiving notice to correct.

EE. Wiring to provide all 120 VAC sources and points of connection to same shall be by the Electrical Contractor.

FF. All wiring, including low voltage power, voice, signal and data communication, shall be installed in approved metal raceway as required. All wiring, conduit and installation shall be in accordance with the latest edition of the National Electrical Code, especially article 725, with conduit fill requirements as though system wiring were 120VAC, (40% conduit fill) and the requirements of Division 26, Electrical Specifications. Up- size conduits from sizes shown on drawings, as necessary not to exceed 40% fill criteria. All conduit shall be ¾” minimum unless otherwise noted on the riser diagrams.

GG. Ensure cabling shield does not touch terminal connections. Provide “one-end” ground on all shields using drain wires at control panels, power supplies, or head end equipment, then to separate and dedicated RF ground via #8 AWG copper cable. Insulate shield at device end with shrink tubing to completely cover shield and drain wire.

HH. Where multiple devices are served by the same shielded cable, shield continuity shall be maintained and properly insulated to eliminate intermittent grounding. Do not bring shield grounds directly to a building electrical ground point of connection. Carefully follow

manufacturer's instructions and advise Engineer accordingly. Shield grounds shall be treated as specified herein unless prohibited by manufacturers.

II. Lay out conduit and cable runs with Electrical and General Contractor prior to installation, and maintain 1'-0" clearance from parallel runs with 120VAC or larger voltage conduit and wiring. Cross 120VAC or larger voltage conduit runs at 90° to reduce EMI and RF induction in security wiring.

JJ. All wires shall be color coded to provide separate identification of intrusion alarm signal, 12 VDC, 24 VAC, or ACS/IDS system data communication, lock power, video signal, VSS alarm input, zone expansion or relay board power and data bus or any other system function. Wires shall be similarly coded for each system serviced throughout the entire installation.

KK. All resistors shall be solder connected or double crimp connected to eliminate any additional circuit resistance. Wires connected to resistors shall be solder-tinned to insure positive solder connection or crimp connection. Resistors shall be insulated with shrink tubing extending a minimum of 1" either side of resistor. (Unless factory installed and potted as part of magnetic contact construction.)

LL. No intermediate cable splices are allowed without the specific written approval of the Security Consultant. Request clarification and approval prior to installation of any splices.

MM. All alarm circuits shall be tagged at the device end and field control panel end with alarm panel or zone addressing module hardware circuit terminal address numbers.

NN. Transformers and power supplies shall be identified, along with their cable, at both transformer and load fed end of cable.

OO. Each alarm device system cable shall be tagged at both the device and control panel end with the device type (i.e. door contact, motion detector, etc.).

PP. All 12VDC power circuits shall be tagged at each device and 12VDC power supply fused terminal strip with 12VDC panel and fused circuit number.

QQ. All power cables shall be tagged at the device end and power panel end with matching numbers.

RR. All wiring in panels shall be neatly dressed, run parallel wherever possible, and provided with adequate slack for future maintenance and service terminations.

SS. All "unused" wire conductors shall be insulated to eliminate shorts and grounds, tagged with their terminal points and identified as "spare" at each end with a unique spare cable tag identification system.

TT. Minor deviations (relocations) in wire runs to installed mounting locations may be required prior to final acceptance when site conditions affect the equipment's operation, performance, or purpose. Relocations which require only minimal work (plus or minus 15') and/or materials shall be made without additional cost or credit.

UU. The Contractor shall note that connection of alarm zone circuits to the ACS/IDS panels will require the installation of end-of-line resistors in each zone circuit. Locate as close to the device as possible to provide as much circuit supervision as possible. EOL resistors shall not be located

at the panel for active security circuits. All unused zones shall have the end-of-line resistor mounted in the panel if manufacturers' requirements so dictate. Where end-of-line resistors are to be mounted at devices that are factory sealed and have factory configured wire leads, the resistor shall be spliced in-line with the leads as close to the device as possible (splices shall be soldered and covered with heat shrink tubing as specified elsewhere in these specifications).

VV. The Contractor shall install panel cover-operated tamper switches in each equipment enclosure, cabinet, housing, to actuate an alarm signal before access to equipment wiring within the enclosure is gained. Tamper switch mounting hardware shall be concealed so that the location of the switch cannot be visually detected from the exterior of the enclosure. These circuits shall be supervised.

WW. All wiring or cable shall be tested for, and be free of, opens and shorts. All wiring shall test free of grounds with the exception of circuits that are intended to be connected to the ground side of protective circuits.

XX. All wire and cables entering equipment cabinets and enclosures shall be grouped and tied inside the enclosures on 6-inch centers with self-locking nylon cable ties. All wiring shall be grouped in an orderly fashion. Under no circumstances is the use of adhesive tapes (electrical or other) permitted for either permanent or temporary ties or wire management.

YY. All stranded wiring that is connected to equipment that has terminal strips or screw lugs shall be terminated with either nylon insulated crimp-on spade lugs, equal to Thomas & Betts STA-KON fork tongue locking type or equivalent, sized for correct wire and screw sizes or shall be solid bare wire attached to screw terminals. Where compression screws are used to cap wiring, wiring shall be tinned to eliminate destranding and consequent poor connection. Each spade lug or wire shall be marked with a self- sticking numbered wire marker and documented on the as-built wiring diagrams.

ZZ. All wiring that is connected to equipment with solder lug connectors shall terminate wire to lug in a solder joint. The solder joint, lug and any bare wire shall be covered with heat shrink tubing. Multi-conductor bare wire ends shall be soldered to prevent de-stranding.

AAA. Each wire and cable shall be clearly marked within each enclosure, junction box, or where termination is made. Wires and cables shall be marked with a clear, heat-shrink system such as "Shrink Mark" or equivalent, labeling system as manufactured by RayChem. Cable numbers shall be generated on a PC. Felt-tip "Sharpie" type pen markings are unacceptable. Marking documentation shall be included with the detailed wiring diagram to be provided to the Owner on completion of the installation as part of the As-Built documentation in the "Project Manuals".

BBB. Wiring and cables that are installed shall maintain color coding from origination point to termination point. Where paired cable is used, the pairs in the cable shall be maintained in the run. Pairs shall not be separated to form different pairs than those in the original cable. Color coding shall be maintained within the system. Maintaining color coding applies to all type circuits in the system.

CCC. Review wiring type, scheme and tagging for all systems prior to installation, with factory/technical representatives. Advise the engineer of any required modifications prior to wire procurement and installation and obtain approval accordingly. It is the contractor's

responsibility to review the system's wiring with the factory representatives and supply the cables which meet their requirements. Where heavier gauge cables are specified by the engineer and such provide enhanced performance reliability, durability or future capacity, they shall be used unless prohibited by the manufacturer.

DDD. Paralleling of multi-conductor cables to "create" a cable of larger wire gauge is prohibited, except at door frame power transfer hinges.

EEE. Wiring diagrams shall be provided in all signal and power panels along with cable schedules, in a clear plastic envelope, for future use in system maintenance and service.

FFF. Run electric lock power circuits so that each electrified locking door opening is wired on its own wire pair to a dedicated fused circuit in the lock power supply.

GGG. Connect no more than five (5) 12VDC security devices to a single pair of 12VDC power wires without the engineer's approval. Terminate these 12VDC power circuits on a dedicated fused outlet in the 12VDC power supply

3.03 FIELD QUALITY CONTROL

A. Testing Agency: The Contractor shall engage a qualified testing agency to perform tests and inspections with the Owner and appointed project manager.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections.
   1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

D. Tests and Inspections:
   1. Inspection: Verify that units and controls are properly installed, connected, and labeled, and that interconnecting wires and terminals are identified.
   2. Pretesting: Align and adjust system and pretest components, wiring, and functions to verify that they comply with specified requirements.
   3. Test Schedule: Schedule tests after pretesting has been successfully completed and system has been in normal functional operation for at least fourteen (14) days. Provide a minimum of ten (10) days notice of test schedule.
   4. Operational Tests: Perform operational system tests to verify that system complies with Specifications. Include all modes of system operation. Test equipment for proper operation in all functional modes.

E. Access Control System shall be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

3.04 CLEANING

A. Remove rubbish and debris: Installation contractor is not allowed you use the onsite dumpster and is responsible to discard their own debris off site.

B. Clean installed items using methods and materials recommended in writing by manufacturer.

C. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.05 CLOSEOUT ACTIVITIES

A. See Division 01 – Closeout Submittals for Closeout Submittals.

3.06 PROTECTION

A. Protect installed system components from subsequent construction operations.

3.07 MAINTENANCE

A. See Division 01 – Execution and Closeout Requirements for additional requirements relating to maintenance service.

B. Adjustments:
   1. Occupancy Adjustments: When requested within twelve (12) months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two (2) visits to Project during other-than-normal occupancy hours for this purpose. Tasks shall include, but are not limited to, the following:
      a. Check cable connections.
      b. Check proper operation of access control devices.
      c. Provide a written report of adjustments and recommendations.

C. Provide to Owner, at no extra cost, a separate maintenance contract for the service and maintenance of the Access Control System for One Year from date of Substantial Completion. Include a separate description of preventative maintenance, systematic examination, cleaning, inspection, and testing, with a detailed schedule.

D. Conduct site visit at least once every three months to perform inspection, testing, and preventative maintenance. Submit report to Owner indicating maintenance performed along with evaluations and recommendations.

E. Provide trouble call-back service upon notification by Owner:
   1. Include allowance for call-back service during normal working hours at no extra cost to Owner.
   2. Owner will pay for call-back service outside of normal working hours on an hourly basis, based on actual time spent at the site and not including travel time; include hourly rate and definition of normal working hours in maintenance contract.

END OF SECTION

SECTION 28 0528 - PATHWAYS FOR SECURITY SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Related Drawings
   1. "T" Drawings – Technology Plans

C. Related Sections:
   1. Section 271000 – Communication Horizontal
   2. Section 280500 – Security Conductor Cables
   3. Section 281300 – Access Controls
   4. Section 281600 – Intrusion Detection
   5. Section 282300 – Video Surveillance

1.02 SUMMARY

A. Section Includes:
   1. Metal conduits and fittings.
   2. Nonmetallic conduits and fittings.
   3. Optical-fiber-cable pathways and fittings.
   4. Metal wireways and auxiliary gutters.
   5. Nonmetallic wireways and auxiliary gutters.
   6. Surface pathways.
   7. Boxes, enclosures, and cabinets.
   8. Handholes and boxes for exterior underground cabling.

1.03 DEFINITIONS

A. ARC: Aluminum rigid conduit.

B. GRC: Galvanized rigid steel conduit.

C. IMC: Intermediate metal conduit.

1.04 ACTION SUBMITTALS

A. Product Data: For surface pathways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

1.05 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Pathway routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:
   1. Structural members in paths of pathway groups with common supports.
   2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

B. ~~Qualification Data: For professional engineer.~~

C. ~~Seismic Qualification Certificates: For pathway racks, enclosures, cabinets, equipment racks and their mounting provisions, including those for internal components, from manufacturer.~~
   1. ~~Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.~~
   2. ~~Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.~~
   3. ~~Detailed description of equipment anchorage devices on which certification is based and their installation requirements.~~
   4. ~~Detailed description of conduit support devices and interconnections on which certification is based and their installation requirements.~~

D. Source quality-control reports.

PART 2 PRODUCTS

2.01 METAL CONDUITS AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. AFC Cable Systems, Inc.
   2. Allied Tube & Conduit; a Tyco International Ltd. Co.
   3. Alpha Wire Company
   4. Anamet Electrical, Inc.
   5. Electri-Flex Company
   6. O-Z/Gedney; a brand of EGS Electrical Group
   7. Picoma Industries; Subsidiary of Mueller Water Products, Inc.
   8. Republic Conduit
   9. Robroy Industries
   10. Southwire Company
   11. Thomas & Betts Corporation
   12. Western Tube and Conduit Corporation
   13. Wheatland Tube Company; a division of John Maneely Company

B. General Requirements for Metal Conduits and Fittings:
   1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
   2. Comply with TIA-569-B.

C. GRC: Comply with ANSI C80.1 and UL 6.

D. ARC: Comply with ANSI C80.5 and UL 6A.

E. IMC: Comply with ANSI C80.6 and UL 1242.

F. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.
   1. Comply with NEMA RN 1.
   2. Coating Thickness: 0.040 inch minimum.

G. EMT: Comply with ANSI C80.3 and UL 797.

H. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
   1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
   2. Fittings for EMT:
      a. Material: Steel.
      b. Type: Setscrew.
   3. Expansion Fittings: PVC or steel to match conduit type, complying with UL-467, rated for environmental conditions where installed, and including flexible external bonding jumper.
   4. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.

I. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.02 NONMETALLIC CONDUITS AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. AFC Cable Systems, Inc.
   2. Allied Tube & Conduit; a Tyco International Ltd. Co.
   3. Anamet Electrical, Inc.
   4. Arnco Corporation
   5. CANTEX Inc.
   6. CertainTeed Corp.
   7. Condux International, Inc.
   8. Electri-Flex Company
   9. Kraloy
   10. Lamson & Sessions; Carlon Electrical Products

11. Niedax-Kleinhuis USA, Inc.
12. RACO; a Hubbell company
13. Thomas & Betts Corporation

B. General Requirements for Nonmetallic Conduits and Fittings:
1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Comply with TIA-569-B.

C. RNC: Type EPC-40-PVC complying with NEMA TC 2 and UL 651 unless otherwise indicated.

D. Rigid HDPE: Comply with UL 651A.

E. Continuous HDPE: Comply with UL 651B.

F. RTRC: Comply with UL 1684A and NEMA TC 14.

G. Fittings for RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.

H. Solvent cements and adhesive primers shall have a VOC content of 510 and 550 g/L or less, respectively, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.03 OPTICAL-FIBER-CABLE PATHWAYS AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Alpha Wire Company.
2. Arnco Corporation.
3. Endot Industries Inc.
4. IPEX.
5. Lamson & Sessions; Carlon Electrical Products.

B. Description: Comply with UL 2024; flexible-type pathway, approved for plenum installation unless otherwise indicated.
1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Comply with TIA-569-B.

2.04 METAL WIREWAYS AND AUXILIARY GUTTERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Cooper B-Line, Inc.
2. Hoffman; a Pentair company
3. Mono-Systems, Inc.
4. Square D; a brand of Schneider Electric

B. Description: Sheet metal, complying with UL 870 and NEMA 250 and sized according to NFPA 70.
   1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
   2. Comply with TIA-569-B.

C. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

D. Wireway Covers: Screw-cover type unless otherwise indicated.

E. Finish: Manufacturer's standard enamel finish.

2.05 NONMETALLIC WIREWAYS AND AUXILIARY GUTTERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Allied Moulded Products, Inc.
   2. Hoffman; a Pentair company
   3. Lamson & Sessions; Carlon Electrical Products
   4. Niedax-Kleinhuis USA, Inc.

B. General Requirements for Nonmetallic Wireways and Auxiliary Gutters:
   1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
   2. Comply with TIA-569-B.

C. Description: Fiberglass polyester, extruded and fabricated to required size and shape, without holes or knockouts. Cover shall be gasketed with oil-resistant gasket material and fastened with captive screws treated for corrosion resistance. Connections shall be flanged and have stainless-steel screws and oil-resistant gaskets.

D. Description: PVC, extruded and fabricated to required size and shape, and having snap-on cover, mechanically coupled connections, and plastic fasteners.

E. Fittings and Accessories: Couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings shall match and mate with wireways as required for complete system.

F. Solvent cements and adhesive primers shall have a VOC content of 510 and 550 g/L or less, respectively, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.06 SURFACE PATHWAYS

A. General Requirements for Surface Pathways:
   1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2. Comply with TIA-569-B.

B. Surface Metal Pathways: Galvanized steel with snap-on covers complying with UL 5. Manufacturer's standard enamel finish in color selected by Architect.
   1. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:
      a. Mono-Systems, Inc.
      b. Niedax-Kleinhuis USA, Inc.
      c. Panduit Corp
      d. Wiremold/Legrand

C. Surface Nonmetallic Pathways: Two- or three-piece construction, complying with UL 5A, and manufactured of rigid PVC with texture and color selected by Architect from manufacturer's standard colors. Product shall comply with UL-94 V-0 requirements for self-extinguishing characteristics.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Hubbell Incorporated; Wiring Device-Kellems Division
      b. Lamson & Sessions; Carlon Electrical Products
      c. Mono-Systems, Inc.
      d. Panduit Corp.
      e. Wiremold/Legrand

2.07 BOXES, ENCLOSURES, AND CABINETS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Adalet

B. Cooper Technologies Company; Cooper Crouse-Hinds
   1. EGS/Appleton Electric
   2. Erickson Electrical Equipment Company
   3. Hoffman; a Pentair company
   4. Hubbell Incorporated; Killark Division
   5. Lamson & Sessions; Carlon Electrical Products
   6. Milbank Manufacturing Co.
   7. Molex; Woodhead Brand
   8. Mono-Systems, Inc.
   9. O-Z/Gedney; a brand of EGS Electrical Group
   10. RACO; a Hubbell company
   11. Robroy Industries
   12. Spring City Electrical Manufacturing Company
   13. Stahlin Non-Metallic Enclosures; a division of Robroy Industries
   14. Thomas & Betts Corporation
   15. Wiremold/Legrand

C. General Requirements for Boxes, Enclosures, and Cabinets:
   1. Comply with TIA-569-B.
   2. Boxes, enclosures and cabinets installed in wet locations shall be listed for use in wet locations.

D. Sheet-Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

E. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, aluminum, Type FD, with gasketed cover.

F. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

G. Metal Floor Boxes:
   1. Material: Cast metal.
   2. Type: Fully adjustable.
   3. Shape: Rectangular.
   4. Listing and Labeling: Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

H. Nonmetallic Floor Boxes: Nonadjustable, rectangular.
   1. Listing and Labeling: Nonmetallic floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

I. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

J. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.

K. Device Box Dimensions: as specified within the Architectural drawings.

L. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.

M. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, with continuous-hinge cover with flush latch unless otherwise indicated.
   1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
   2. Nonmetallic Enclosures:
      a. Material: Plastic.
      b. Finished inside with radio-frequency-resistant paint.
   3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

PART 3 EXECUTION

3.01 PATHWAY APPLICATION

A. Indoors: Apply pathway products as specified below unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: EMT.
2. Exposed, Not Subject to Severe Physical Damage: EMT.
3. Exposed and Subject to Severe Physical Damage: GRC. Pathway locations include the following:
   a. Loading dock.
   b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
   c. Mechanical rooms.
   d. Gymnasiums.
4. Concealed in Ceilings and Interior Walls and Partitions: EMT. Allow plenum cable in j-hooks or cable tray.
5. Damp or Wet Locations: GRC.
6. Pathways for Optical-Fiber or Communications Cable in Spaces Used for Environmental Air: Plenum-type, optical-fiber-cable pathway.
7. Pathways for Concealed General-Purpose Distribution of Optical-Fiber or Communications Cable: Plenum-type, optical-fiber-cable pathway.
8. Boxes and Enclosures: NEMA 250 Type 1, except use NEMA 250 Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations.

B. Minimum Pathway Size: ¾-inch trade size. Minimum size for optical-fiber cables is 1 inch.

C. Pathway Fittings: Compatible with pathways and suitable for use and location.
1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
3. EMT: Use setscrew or compression, cast-metal fittings. Comply with NEMA FB 2.10.

D. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

E. Install surface pathways only where indicated on Drawings.

F. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg.

3.02 INSTALLATION

A. Comply with NECA 1, NECA 101, and TIA-569-B for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum pathways. Comply with NFPA 70 limitations for types of pathways allowed in specific occupancies and number of floors.

B. Keep pathways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal pathway runs above water and steam piping.

C. Complete pathway installation before starting conductor installation.

D. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.

E. Arrange stub-ups so curved portions of bends are not visible above finished slab.

F. Install no more than the equivalent of two (2) 90-degree bends in any pathway run. Support within 12 inches of changes in direction. Utilize long radius ells for all optical-fiber cables.

G. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

H. Support conduit within 12 inches of enclosures to which attached.

I. Pathways Embedded in Slabs:
   1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure pathways to reinforcement at maximum 10-foot intervals.
   2. Arrange pathways to cross building expansion joints at right angles with expansion fittings.
   3. Arrange pathways to keep a minimum of 2 inches of concrete cover in all directions.
   4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
   5. Change from ENT to RNC, Type EPC-40-PVC before rising above floor.

J. Stub-ups to Above Recessed Ceilings:
   1. Use EMT, IMC, or RMC for pathways.
   2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

K. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of pathway and fittings before making up joints. Follow compound manufacturer's written instructions.

L. Coat field-cut threads on PVC-coated pathway with a corrosion-preventing conductive compound prior to assembly.

M. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install insulated bushings on conduits terminated with locknuts.

N. Install pathways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus ¼ turn more.

O. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

P. Cut conduit perpendicular to the length. For conduits of 2-inch trade size and larger, use roll cutter or a guide to ensure cut is straight and perpendicular to the length.

Q. Install pull wires in empty pathways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground pathways designated as spare above grade alongside pathways in use.

R. Surface Pathways:
1. Install surface pathway for surface telecommunications outlet boxes only where indicated on Drawings.
2. Install surface pathway with a minimum 2-inch radius control at bend points.
3. Secure surface pathway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight pathway section. Support surface pathway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.

S. Pathways for Optical-Fiber and Communications Cable: Install pathways, metal and nonmetallic, rigid and flexible, as follows:
1. ¾-Inch Trade Size and Smaller: Install pathways in maximum lengths of 50 feet.
2. 1-Inch Trade Size and Larger: Install pathways in maximum lengths of 75 feet.
3. Install with a maximum of two (2) 90-degree bends or equivalent for each length of pathway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.

T. Install pathway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed pathways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install pathway sealing fittings according to NFPA 70.

U. Install devices to seal pathway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all pathways at the following points:
1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground service pathway enters a building or structure.
3. Where otherwise required by NFPA 70.

V. Comply with manufacturer's written instructions for solvent welding PVC conduit and fittings.

W. Expansion-Joint Fittings:
1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F, and that has straight-run length that exceeds 25 feet. Install in each run of aboveground RMC and EMT conduit that is located where environmental temperature change may exceed 100 deg F and that has straight-run length that exceeds 100 feet.
2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:
   a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
   b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.

c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.
d. Attics: 135 deg F temperature change.

3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.
4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

X. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

Y. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surface to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.

Z. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

AA. Support boxes of three (3) gangs or more from more than one (1) side by spanning two (2) framing members or mounting on brackets specifically designed for the purpose.

BB. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

CC. Set metal floor boxes level and flush with finished floor surface.

DD. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.03 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR COMMUNICATIONS PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 271000 "Structured Cabling."

3.04 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.05 PROTECTION

A. Protect coatings, finishes, and cabinets from damage or deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION

SECTION 28 1300 - ACCESS CONTROL SYSTEM

PART 1 GENERAL

1.01 Section Includes

A. System Requirements

B. Access Control Field Devices

C. Access Control System

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Division 07 - Firestopping.

C. Division 08 - Door Hardware: Electrically operated door hardware, for interface with access control system.
   1. Includes door hardware with integral request to exit devices.

D. Division 26 - Hydraulic Elevators: For interface with access control system.

E. Division 26 - Grounding and Bonding for Electrical Systems.

F. Division 26 - Conduit for Electrical Systems.

G. Division 26 - Identification for Electrical Systems: Identification products and requirements.

H. Division 27 - Structured Cabling: Data cables for access control system IP network connections.

I. Division 28 - Video Surveillance: For interface with access control system.

J. Division 28 - Building Intrusion Detection: For interface with access control system.

K. Division 28 - Fire Detection Alarm: For interface with access control system.

L. Refer to the following construction documents for Data Room locations and device locations only.
   1. “TY” Drawings – Security Plans

M. Any apparatus, appliance, material, or work not shown on the Drawings but mentioned in the Specifications, or vice versa, and any incidental accessories necessary to make the work complete and perfect in all respects and ready for operation, even if not particularly specified, shall be provided without additional expense. Coordinate with each system manufacturer to insure all hardware, firmware, relays, or other necessary components are provided prior to bid submission.

N. All work of this Section to comply with the requirements of the Conditions of Contract, with all Specification Sections of Division 01 – General Requirements, with the Security Drawings, and with all other Contract Documents.

O. Refer to Division 26 of the Contract Documents, Electrical, for all Specifications governing the installation of raceway (conduit, EMT, cable trays, wire trough, etc.), system junction and pull boxes, and device rough-in boxes, for all Security System work shown on the Security Drawings. Conduit, back box, and trough work to be provided by this Contractor.

P. Refer to Division 26 of the Contract Documents, Electrical, for all work related to the interconnection of Security System equipment to 120 VAC power sources.

Q. Refer to Division 09 of the Contract Documents, Finishes, for details relating to acoustical ceilings and gypsum board systems, floor finishes, painting, etc., for information pertinent to device and back box selection and installation.

R. Refer to Division 08 of the Contract Documents, Openings, for details relating to doors, door frames, windows, and window frames, for information pertinent to the selection of magnetic contact devices and their associated placement and installation, including back box selection and installation.

S. Refer to Division 08 of the Contract Documents, Openings, for details relating to door and door frame hardware and preparation, electrified lock power supplies, required coordination to accommodate these components and/or systems, lock voltage and current draw coordination, coordination of fail-safe electrified locks, and any other related equipment or requirements

T. Refer to Division 06, Wood, Plastics, Composites, and coordinate all desk locations and installation details with the Millwork Contractor.

U. Review all other Specification Sections as required to achieve complete inter- trade coordination.

1.03 DEFINITIONS

A. API: Application Programming Interface

B. AVI: Audio Video Interleave

C. CA: Certificate Authority

D. CAC: Common Access Card

E. CE: European Union Conformity

F. CPU: Central Processing Unit

G. CSV: Comma Separated Values

H. DNS: Domain Name Server

I. DSM: Door Status Monitor

J. DVR: Digital Video Recorder

K. EACS: Electronic Access Control System

L. FCC: Federal Communications Commission

M. FIPS: Federal Information Processing Standard

N. FIFO: First In – First Out

O. FTP: File Transfer Protocol

P. FRAC: First Responder Authentication Credential

Q. GB: Gigabyte

R. GSOC: Global Security Operations Center

S. GUI: Graphical User Interface

T. HA: High Availability

U. HTML: Hypertext Markup Language

V. 4, H.265: Video Compression Standards

W. I2C: Inter-Integrated Circuit

X. IEEE: Institute of Electrical and Electronics Engineers

Y. I/O: Input / Output

Z. IP: Internet Protocol

AA. IS: Integrated System

BB. JPEG: Joint Photographic Experts Group

CC. LAN: Local Area Network

DD. LDAP: Lightweight Directory Access Protocol

EE. MB: Megabyte

FF. MJPEG: Motion JPEG

GG. MSATA: Mini-Serial Advanced Technology Attachment

HH. MSP: Mobile Security Professional

II. MTBF: Mean-Time Between Failure

JJ. NAS: Network Attached Storage

KK. NAT: Network Address Translation

LL. NBAPI: NetBox Application Programming Interface

MM. NECA: National Electric Code Association

NN. NFPA: National Fire Protection Association

OO. NVR: Network Video Recorder

PP. ODBC: Open Database Connectivity

QQ. OS: Operating System

RR. OVID: Open Video Integration Driver

SS. PDF: Portable Document Format

TT. PIN: Personal Identification Number

UU. PIV: Personal Identity Verification

VV. PoE: Power over Ethernet

WW. PTZ: Pan-Tilt-Zoom

XX. RAID: Redundant Array of Independent Disks

YY. RAM: Random Access Memory

ZZ. REX: Request to Exit

AAA. RFID: Radio Frequency Identification

BBB. RoHS: Restriction of Hazardous Substances

CCC. ROM: Read Only Memory

DDD. RU: Rack Unit

EEE. SFTP: Secure File Transfer Protocol

FFF. SHA: Secure Hash Algorithm

GGG. SIO: Serial Input / Output

HHH. SLA: Sealed Lead-Acid

III. SMS: Security Management System or Short Message Service (text messaging)

JJJ. SSL: Secure Sockets Layer

KKK. SUSP: Software Upgrade and Support Plan

LLL. TCP: Transmission control protocol - connects hosts on the Internet

MMM. TIA: Telecommunications Industry Association

NNN. TLS: Transport Layer Security

OOO. TWIC: Transportation Worker Identification Credential

PPP. UI: User Interface

QQQ. UPS: Uninterruptible Power Supply

RRR. UTP: Unshielded Twisted Pair

SSS. VMS: Video Management System

TTT. WAN: Wide Area Network

UUU. Wi-Fi: Wireless Network

VVV. AS NECESSARY: Shall mean work which is required for completed construction, but is not necessarily shown or described in the Contract Documents.

WWW. AS REQUIRED: Shall mean work which is required for completed construction, but is not necessarily shown or described in the Contract Documents.

XXX. Substantial Completion: Shall mean that the project is sufficiently complete to be utilized for its intended use as stated in the body of this written specification.

YYY. Contractor/INTEGRATOR: Refers to the biding/installation Contractor responsible for furnishing and installation of all work indicated within this specification.

1.04 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

C. CSBC101.2 & CFSC 102.1 [in CT Projects] - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. UL 294 - Access Control System Units; Current Edition, Including All Revisions.

E. UL 1076 - Proprietary Burglar Alarm Units and Systems; Current Edition, Including All Revisions.

F. System shall be RoHS (Restriction of Hazardous Substances) compliant and meet proposed amendments to the reduction of toxic substances in manufacturing in stated in the Environmental Design of Electrical Equipment Act (EDEE).

G. Installation shall comply with NECA 1-2010 “Standard Practice of Good Workmanship in Electrical Construction”

H. Installation shall comply with NEC/NFPA 70E "Standard for Electrical Safety in the Workplace"

I. Electronic data exchange between Video Surveillance System and the Access Control System shall comply with SIA TVAC

J. Installation shall comply with FCC CFR 47 Part 15 Class A "Telecommunications, Radio, Frequency, Digital Device Emission:

K. Installation shall comply with Federal, State, and Local Codes and Authority Having Jurisdiction (AHJ).

L. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
1. Coordinate the work with other installers to provide suitable door hardware as required for both access control functionality and code compliance.
2. Coordinate the placement of readers with millwork, furniture, equipment, etc. installed under other sections or by others.
3. Coordinate the work with other installers to provide power for equipment at required locations.
4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Access Control Cloud Services:
1. Subscription fees to be paid by Owner.
2. Obtain Owner approval of subscription fees and terms of service prior to submittal.

C. Preinstallation Meetings:
1. Conduct meeting with facility representative to review reader and equipment locations.
2. Conduct meeting with facility representative and other related equipment manufacturers to discuss access control system interface requirements.

D. Confidentiality of Documents
1. The project documents, consisting of all technical proposals, drawings, specifications, shop drawings, as-built drawings, manufacturer's literature, etc., shall be considered proprietary information and are to be treated with complete confidentiality. Dissemination of any security system documentation to any party not considered "need-to-know" without a pre-defined and approved agreement will be considered a violation of the contract documents and all pursuant clauses regarding financial penalties, project termination, and/or legal prosecution will apply. The Contractor is to obtain a list of "need-to-know" parties from the Owner and/or Construction Manager.
2. Use of the Contract drawings and specifications is restricted to the original site for which they were prepared. Publication therefore is expressly limited to such use. Re-use, reproduction, storage by any medium or publication by any method in whole or in part is prohibited. Visual contact with the Contract drawings and specifications constitutes

prima facie evidence of the acceptance of these restrictions. Unlawful publication, dissemination, and use of these documents carry significant liability and the Owner maintains the right to legally pursue restitution and/or penalty for violation of these confidentiality conditions.

3. All documents marked "DO NOT DUPLICATE" are to be returned to the Construction Manager for proper disposal and handling upon completion of their relevant use.

1.06 SUBMITTALS

A. See Division 01 – Administrative Requirements for submittal procedures.

1.07 Evidence of Qualifications for Installer:

1. The Contractor shall be a bona fide security systems contractor, licensed by the State of Connecticut for the installation of the low voltage security and signal communication systems, and engaged in security system maintenance, service and contracting for at least the last five years.
2. The Contractor shall employ technicians who have been trained by the Manufacturer specified within this section to install the systems of this Manufacturer.
3. The contractor shall be a factory authorized stocking distributor of the manufacturer of the equipment included in the system so that immediate replacement parts can be made from inventory and service provided as needed on an emergency basis.
4. The Contractor shall submit with the bid a manufacturer's certificate of acceptance of the qualifications of the Installing Contractor to install, test, maintain and repair the manufacturer's equipment.
5. In order for the Security Consultant to verify that they meet the competency requirements of this specification, Contractors must submit the following information if so requested:
   a. Proof that the Contractor has installed, services and maintained similar security systems for a minimum of ten (10) years.
   b. Proof that the Contractor is a firm which currently and regularly installs, services and maintains security systems as a full time business.
   c. The names and qualifications of security system technicians that shall perform and supervise the work, and perform tests or adjustments on the systems and equipment. Qualifications shall include all schooling, training, and history of work experience.
   d. A list of four prior systems comparable to the one specified under this contract which were installed, serviced, and maintained satisfactorily by the Contractor for a minimum of one (1) year. Each system listed shall include the firm or owner, location, person to contact (with telephone number), date of installation and service period, and a brief description of the system and work performed on the system.
6. The Contractor shall submit any other information required by the Security Consultant to determine the competency of the Contractor. If this information is not submitted as requested, it shall be submitted within the time specified by the Architect after the bid opening. If the Contractor fails to submit the information in accordance with the Security

Consultant's request, the Contractor shall be declared non-responsive, and may be rejected to perform the work specified within this section.

B. Design Data: Standby battery/UPS Calculations

C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instruction for storage, handling, protection, examination, preparation, installation, and operation of product.

D. Manufacturer's detailed field-testing procedures.

E. Maintenance contracts.

F. Product Data: Provide details and technical specifications for each product indicated. Include physical dimensions, features, performance, electrical characteristics, ratings, software versions, and operating system details.

G. Shop Drawings:
1. General: General: Bid documents, including drawings, details and specifications are considered conceptual in nature, and provide direction on products and project requirements. Contractor is given a choice of methods that may be incorporated into the system. These choices may affect the overall design, configuration and installation of the proposed system.
2. Contractor Responsibility: Prepare and submit shop drawings, rendered in the latest AutoCAD DWG file format, which show details of all work to ensure proper installation of the work using those materials and equipment specified or allowed under the approved plans and specifications. A complete Shop Drawing submittal drawing package shall consist of Drawings, Equipment Data Sheet Submittals, and an Acceptance Testing Plan.
3. Completeness: The Equipment Submittals, Acceptance Testing Plan, and the Shop Drawings should be submitted as a complete and contiguous package. Partial or unmarked submittals will not be accepted for review.
4. Scheduling: A schedule of shop drawing submissions shall be submitted for the Architect and Owner's Representative review on a form acceptable to the Architect within ten (10) days after award of the Contract. The schedule of shop drawing submissions shall include as a minimum, but not limited to the requirements stated herein.
5. Requirements: Provide the following information complete, and in the manner described herein:
    a. Hardware, Application Software, and Network Requirements: A system description including analysis and calculations used in sizing equipment required by the security systems. The description shall show how the equipment will operate as a system to meet the performance requirements of the systems. The following information shall be supplied as a minimum:
        1) Server(s) processor(s), disk space and memory size
        2) Workstation(s) processor(s), disk space and memory size
        3) Description of facility (field) control equipment (Controllers/Field Panels, Models) and their configuration
        4) Operating System(s) Software, where software is provided or upgraded
        5) Application Software, with Optional and Custom Software Modules supplied in this project

6) Integration Schemes: Proposed connectivity, software, development requirements, and SDK information, for inter-system communication.
7) Network bandwidth and reliability requirements
8) Number and location of LAN ports required
9) Other specific network requirements, preferences, and constraints
10) Backup/archive system size and configuration
11) Start-up operations
12) System power requirements and Uninterruptible Power Supply (UPS) sizing
13) Device/Component environmental requirements (cooling and/or heating parameters)

b. Shop Drawings: Shop Drawings shall be numbered consecutively and shall accurately and distinctly present the following information:
1) Title Sheet
2) Floor Plans: Showing devices, pull boxes, cabinets, conduits and conductors in their proposed locations with device numbering scheme.
3) Riser Diagram: Showing all conduit relationships between devices shown on the Floor Plans. Show all power sources.
4) Single-Line/Block Diagrams: Show signal relationships of controls and devices within the system.
5) Custom Assembly Diagrams: For each custom assembly such as Access Control Terminal Cabinets, receptacle assemblies, or door control panels, provide an assembly drawing illustrating the appearance of the assembled device. Include dimensions, assembly components, and functional attributes (momentary or alternate action switch, lens color, panel finish)
6) Component Connection Diagrams
a) For each equipment component such as a computer, video switcher, camera or video recorder, show the rear elevation of the device and all connectors/terminations as a pictorial.
b) Show the wire designations on connectors. Typical wiring detail where multiple of same device is provided.
c) Show a schedule of the wire colors connected to the pins on each device connector.

c. Equipment Wiring Diagrams
1) Show a pictorial illustration of each equipment enclosure and/or terminal cabinet, including terminals, components and wiring devices.
2) Show the device nomenclature exactly as shown on the single line diagrams.
3) Terminations: Show every termination and terminating cable, with applicable cable and wire numbers matching the single line diagrams.
a) Every termination in the system must be documented.
b) Termination information may be rendered as a wiring list(s), if properly coordinated with, and referenced to, typical component and single-line diagrams. Otherwise, the Shop Drawings shall show a pictorial of every component in the system, with its terminations.
4) Show wire colors for each terminal.

5) For each wire exiting the enclosure, show the destination of the wire by floor, room number and the drawing number of the panel where the wire terminates.
6) Provide working dimensions and erection dimensions.
7) Arrangements and sectional views
8) Necessary details, including complete information for making connections between work under this Contract, existing work, and work under other Contracts.
9) Stock or standard drawings will not be accepted for review unless full identification and supplementary information is shown thereon in ink or typewritten form.
10) Duplicate of design drawings may be used where each sheet is modified to reflect contractor coordination, specific requirements of the project and multi discipline conditions.
11) Each Drawing or page shall include:
    a) Project name, Project Number and descriptions.
    b) Submittal date and space for revision dates.
    c) Identification of equipment, product or material.
    d) Name of Contractor and Subcontractor.
    e) Name of Supplier and Manufacturer.
    f) Relation to adjacent structure of material.
    g) Physical dimensions clearly identified.
    h) ASTM and Specifications references.
    i) Identification of deviations from the Contract Documents.
    j) Contractor's stamp, initialed or signed, dated and certifying to review of submittal, certification of field measurements and compliance with Contract.
    k) Location at which the equipment or materials are to be installed. Location shall mean both physical location and location relative to other connected or attached material.

d. Equipment Submittals
1) Provide a Title Page, with project name, Contractor’s name and address, contact information, date of submission, and submission revision number.
2) Provide a Parts List, for proposed equipment, materials, components and devices, listing the following information for each line item:
    a) The system type
    b) Model number
    c) Specification sheet page reference
3) Provide Manufacturers Specification Sheet with descriptive information for equipment, materials, components and devices. Number each page, to correspond with the Parts List.
4) Clearly delineate (with highlighter, arrow, or underline) on each specification sheet, specific model numbers, options and configurations being proposed for this project.
5) Indicate kinds of materials and finishes for equipment where more than one option is presented.

e. Acceptance Testing Plan
   1) Submit a written document detailing the test procedures to be followed in evaluating and proving the installed system(s).
   2) Provide a sample of the test forms to be used for each system and for each component of each system.
   3) Include all tests required by the equipment manufacturer and by this Specification

f. Spare Parts List: Submit a list of recommended spare parts for Owner's review & approval and/or amending. Spare parts shall comprise a minimum of 5% or minimum of 2 each of field devices, device termination boards and a minimum of 1 system controller boards.

g. Training Program
   1) Submit a training program 10 working days prior to scheduled training to be followed in training key employees in the operation and maintenance of the installed system at the project site. The proposed training program shall be designed to provide a level of basic competence with the system for selected personnel. These selected personnel shall then be expected to train other personnel as required, utilizing the training that they have been given and the body of training documentation provided by Contractor. This plan shall comply with the requirements stated in the "Training" section, of these Specifications, all stated hours of which shall be considered to be classroom hours.
   2) Submit a curriculum to account for, and relate, each subject to actual training time. All required hours shall be accounted for in this curriculum.
   3) The training plan shall cover the overall system, each individual system, each subsystem, and each component. The plan shall also cover procedures for database management, normal operations, and failure modes with response procedures for each failure. Each procedural item must be applied to each equipment level.

h. Incomplete or unchecked submittals which do not contain complete data on the work and full information on related matters will be returned for correction.

i. Verification: The contractor shall check and acknowledge all shop drawings and shall place his signature on all shop drawings submitted for approval. Contractor's signature shall constitute a representation that all quantities, dimensions, field construction criteria, materials, catalog numbers, performance criteria and similar data have been verified and that, in his opinion, the submittal fully meets the requirements of the Contract Documents.

j. Timeliness: The Contractor shall schedule, prepare and submit a complete shop drawing assembly in accordance with a time-table that will allow his suppliers and manufacturers sufficient time to fabricate, manufacture, inspect test and deliver their respective products to the project site in a timely manner so as to not delay the complete performance of the work.

k. Departure from Contract Requirements: If shop drawings show departures from the Contract requirements, the Contractor shall make specific mention thereof in his letter of transmittal, otherwise review of such submittals shall not constitute review of the departure. Review of the drawings shall constitute review of the specific

subject matter for which the drawings were submitted and not of any other structure, materials, equipment, or apparatus shown on the drawings.

l. Contractor Responsibility: The review of shop drawings will be general and shall not relieve the Contractor of responsibility for the accuracy of such drawings, nor for the proper fitting and construction of the work, nor for the furnishing of materials or work required by the Contract. No construction called for by shop drawings shall be initiated until such drawings have been reviewed and approved.

m. Shop Drawing Submittal Review: The procedure in seeking review of the shop drawings shall be as follows:

1) The Contractor shall submit four (4) complete sets and/or electronic PDFs of shop drawings with equipment submittals and other descriptive data with one copy of a letter of transmittal to the Architect for review thirty (30) working days after award of the contract. The letter of transmittal shall contain the project name, Architect's Project Number, the name of the Contractor, the list of drawings submitted including numbers and titles, requests for any review of departures from the contract requirements and any other pertinent information. Drawings submitted for review shall be full-sized and included with the equipment submittals.

2) Drawings or descriptive data will be stamped "Reviewed", "Furnish as Corrected", "Revise and Resubmit", "Rejected" or 'Submit Specific Item' and one copy with a Letter of Transmittal will be transmitted to the Contractor with the return of submitted documents.

3) If a shop drawing or data is stamped "Reviewed" or "Furnish as Corrected", no additional submittal is required for that shop drawing.

4) If a shop drawing or data is stamped "Revise and Resubmit" or "Rejected", the Contractor shall make the necessary corrections and resubmit the documents as required above. The letter transmitting corrected documents shall indicate that the documents are re-submittals.

5) The Contractor shall revise and resubmit the shop drawing as required, until they are stamped either "Reviewed" or "Furnish as Corrected."

H. Equipment and Software List: Include every piece of equipment and software by product/model name and/or number, manufacturer, serial number, revision number, location, and date of original installation. If factory and/or bench testing regimens are required by the project plan, add pretesting record of each piece of equipment and software, listing name of person testing, date of test, and adjustments made.

I. CE and FCC Compliance Certificates:

J. Field quality-control reports

K. Current Specified Manufacturer Integrator Certification Letter

L. Current Specified Manufacturer Training Certificates (listing expiration dates) for Two technicians from the supporting office

M. Warranty: Software support and warranty information for all components, including Service Level Agreement (SLA) details, and duration of agreement from date of system acceptance by

Owner. Submit sample of manufacturer's warranty and documentation of final executed warranty completed in Owner's name and registered with manufacturer.

N. Project Record Documents: Record actual locations of system components and installed wiring arrangements and routing.

O. Operation and Maintenance Data: Include detailed information on system operation, equipment programming and setup, replacement parts, and recommended maintenance procedures and intervals.
   1. Include contact information for entity that will be providing contract maintenance and trouble call-back service.
   2. General: The Contractor is responsible for providing accurate drawings and equipment manuals describing and depicting the systems as they are actually installed and operated.
   3. Phase One: Notwithstanding requirements specified elsewhere, submit the following labeled as the "Operating and Maintenance Manual" within thirty (30) days after Final Acceptance of the Installation:
      a. Record Drawings: Submit two (2) copies of revised versions of drawings as submitted in the "Shop and Field" and "Equipment Wiring Diagrams" Submittals showing actual device locations, conduit routing, wiring and relationships as they were constructed. Include nomenclature showing as-built wire designations and colors. Drawings shall include room numbers coinciding with Owner space planning numbering. Drawings shall be submitted in electronic editable AutoCAD files, in ".dwg" format, on CD or DVD disks.
      b. Manuals: Submit two (2) copies of each of the following materials in bound manuals, or electronic PDF copies on CD/DVD discs, with labeled dividers:
         1) A final Bill of Material for each system.
         2) Equipment Instruction Manuals: Complete, project specific comprehensive instructions for the operation of devices and equipment provided as part of this work.
         3) Manufacturers Instruction Manuals: Specification sheets, brochures, Operation Manuals and service sheets published by the manufacturers of the components, devices and equipment provided.
         4) Include information for testing, repair, troubleshooting, assembly, disassembly and recommended maintenance intervals.
         5) Provide a replacement parts list with current prices. Include list of recommended spare parts, tools, and instruments for testing and maintenance purpose.
         6) Performance, Test and Adjustment Data: Comprehensive documentation of performance verification according to parameters specified herein.
         7) Warranties: Provide an executed copy of the Warranty Agreement and copies of all manufacturers' Warranty Registration papers as described herein.

1.08 Quality Assurance

A. Comply with the following:
   1. NFPA 70.

2. NFPA 101 (Life Safety Code).
3. The requirement of the local authorities having jurisdiction.
4. Applicable TIA/EIA standards.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

D. Installer qualifications: company specializing in performing the work of this section with minimum three years documented experience with access control systems of similar size, type, and complexity and providing contract maintenance service as a regular part of their business; authorized manufacturer's representative.
1. Contract maintenance office located within 100 miles (160km) of project site.

E. Maintenance contractor qualifications: same entity as installer.

F. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities jurisdiction.

G. The requirements of the State Building Code and local regulations establish the minimum acceptable quality of workmanship and materials, and all work shall conform thereto unless more stringent requirements are indicated or specified herein.

H. All work shall comply with the latest editions of the codes as referenced herein.

I. Follow manufacturer's directions for articles furnished, in addition to directions shown on drawings or specified herein.

J. Protect all work, materials, and equipment from damage during process of work. Replace all damaged or defective work, materials and equipment without additional cost to the Project.

K. All equipment and materials for permanent installation shall be the products of recognized manufacturers and shall be new.

L. Equipment and materials shall:
1. Where normally subject to Underwriters Laboratory Inc. listing or labeling services, be so listed or labeled.
2. Be without blemish or defect.
3. Not be used for temporary purposes.
4. Be in accordance with the latest applicable NEMA standards.
5. Be products which will meet with the acceptance of all authorities having jurisdiction over the work. Where such acceptance is contingent upon having the products examined, tested and certified by Underwriters or another recognized testing laboratory, the product shall be so examined, tested and certified.

M. Except for conduit, conduit fittings, outlet boxes, wire and cable, all items of equipment or material of one generic type shall be the product of one manufacturer throughout.

N. For items which are to be installed but not purchased as part of the electrical work, the electrical work shall include:
   1. The coordination of their delivery.
   2. Their unloading from delivery trucks driven into any point on the property line at grade level.
   3. Their safe handling and field storage up to the time of permanent placement in the project.
   4. The correction of any damage, defacement or corrosion to which they may have been subjected. Replacement, if necessary, shall be coordinated with Contractor who originally purchased the item.
   5. Their field make up and internal wiring as may be necessary for their proper operation.
   6. Their mounting in place including the purchase and installation of all dunnage, supporting members, and fastenings necessary to adapt them to architectural and structural conditions.
   7. Their connection to building wiring including the purchase and installation of all termination junction boxes necessary to adapt and connect them to this wiring. Included also shall be the purchase and installation of any substitute lugs or other wiring terminations as may be necessary to adapt their terminals to the building wiring as called for and to the connection methods set forth in these specifications.

O. Items which are to be installed but not purchased as part of the electric work shall be carefully examined upon delivery to the project. Claims that any of these items have been received in such condition that their installation will require procedures beyond the reasonable scope of the electric work will be considered only if presented in writing within one week of the date of delivery to the project of the items in question. The work includes all procedures, regardless of how extensive, necessary to put into satisfactory operation, all items for which no claims have been submitted as outlined above.

P. Seismic Performance: Provide equipment capable of withstanding the effects of earthquake motions determined according to ASCE/SEI 7 and current building codes for the state of CT.

Q. The term “withstand” means “the system(s) will remain in place without separation of any parts when subjected to the seismic forces specified and the system will be fully operational after the seismic event.”

1.09 PROJECT CONDITIONS

A. Environmental Conditions: Capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:
   1. Interior, Controlled Environment: System components installed in temperature-controlled interior environments shall be rated for continuous operation in ambient temperatures of 36 to 122 deg F (2 to 50 deg C) dry bulb and twenty to ninety percent (20-90%) relative humidity, noncondensing. Use NEMA 250, Type 1 enclosures.
   2. Interior, Uncontrolled Environment: System components installed in non- temperature-controlled interior environments shall be rated for continuous operation in ambient temperatures of 0 to 122 deg F (minus 18 to plus 50 deg C) dry bulb and twenty to ninety percent (20-90%) relative humidity, noncondensing. Use NEMA 250, Type 3R enclosures.

3. Exterior Environment: System components installed in locations exposed to weather shall be rated for continuous operation in ambient temperatures of minus 30 to plus 122 deg F (minus 34 to plus 50 deg C) dry bulb and twenty to ninety percent (20-90%) relative humidity, condensing. Rate for continuous operation when exposed to rain as specified in NEMA 250, winds up to 85 mph and snow cover up to 24 inches thick. Use sufficiently rated NEMA 250 enclosures.
4. Hazardous Environment: System components located in areas where fire or explosion hazards may exist because of flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers shall be rated, listed, and installed according to NFPA 70.
5. Corrosive Environment: System components subject to corrosive fumes, vapors, and wind-driven salt spray in coastal zones. Use sufficiently rated NEMA 250 enclosures.
6. Security Environment: Camera housing for use in high-risk areas where surveillance equipment may be subject to physical violence.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

B. Store products in manufacturer's unopened packaging, keep dry and protect from damage until ready for installation.

1.11 FIELD CONDITIONS

A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.12 WARRANTY

A. See Division 01 – Closeout Submittals for additional warranty requirements.

B. The Integrator guarantees the Systems to be installed under this specification to be free from any defects in workmanship and materials for a period of one (1) year from the date of final completion/acceptance of the project by the Owner as evidenced by the date of final payment for the work. The Contractor shall promptly and at their own expense remedy any defects in the work and pay for any damage to other work resulting thereof, which shall appear during the period of time covered by this guarantee. Neither the final certificate of payment nor any provisions in this Agreement shall constitute an acceptance of work not done in accordance with this specification or relieve the Contractor of liability with respect to any expressed warranties or guarantees or responsibility for faulty materials or workmanship.

C. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of equipment related to the Access Control System, and control-station equipment that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: The standard manufacturer’s warranty shall apply or a minimum of a one (1) year warranty from the date of Substantial Completion.

D. The Integrator shall provide all services required to maintain the system in an operational state as specified by the manufacturer for a period of one (1) year after acceptance.

E. Service response shall be within twelve (12) hours of the initial request for service and shall be provided twenty-four (24) hours per day, seven (7) days per week and three hundred sixty-five (365) days per year.

F. Contractor shall include, as part of this warranty, a program for maintenance for each integrated system.
   1. Provide details of coverage, preventive maintenance schedules, exclusions and service rates for all billable time and travel charges.
   2. Maintenance shall include two (2) semi-annual inspections and tests to verify the intended operation of the security system(s). System testing shall include but not be limited to the testing of all devises, fault modes and batteries. A detailed test report indicating these results and any corrective measures shall be furnished to the owner.

G. The Contractor shall provide software and firmware upgrades as required and available to the Owner.

H. Submit manufacturer's standard warranties.

PART 2 PRODUCTS

2.01 SYSTEM REQUIREMENTS

A. Furnish and install Access Control System consisting of required equipment, conduit, boxes, wiring, connectors, hardware, supports, accessories, software, system programming, etc. as necessary for a complete operating system that provides the functional intent indicated.

B. The awarded contractor of this section shall furnish and install a network access controlled system into this facility using electronic security devices. This integrated access control system shall incorporate all devices necessary to achieve the specified system, all associated monitoring and recording software, hardware, configuration, testing and training.

C. The contractor awarded this project must include the following licenses and configuration:
   1. Access Control Manufacturer licenses for each camera on the Specified VMS system
   2. Input / Output panels, and network nodes for all access-controlled doors, all door position switches, all duress & lockdown buttons, and all security strobes.
   3. Access Control Manufacturer Licenses for integration with the Specified Intrusion Detection System.
   4. Threat Level, Lockdown button configuration, and Day alarm configuration.
   5. Alarm and notification configuration through the Specified Access Control User Interface GUI.

D. This Access Control System described within this specification shall be fully integrated with the Video Surveillance, Intrusion Detection, Public Address, and Fire Alarm System.

E. All installation, peripheral devices, required licensing and configurations are required as part of this specification to establish a coherent, functional system as described within this bid package.

F. Security control and network cabling to/from the equipment rooms to the controlled doors, as described within the documents shall be furnished and installed by the contractor awarded this project.

G. Any and all additional interconnection cabling required for a functional system shall be furnished and installed by the contractor awarded this portion of work.

H. Final terminations to all devices are required by the Contractor awarded this Section.

I. The Contractor awarded this Section shall furnish and install a complete integrated security system and all associated, terminations, supporting devices, configuration of system, testing and training in accordance with this Bid package.

J. This specification is used to identify the requirements for an integrated access control system. The operator workstation(s) shall be used for database programming and storage of historical events and as a User interface with the Video Surveillance System.

K. This system shall be integrated with the building's fire alarm system for proper activation of "fail-secure" locking mechanisms.

L. All interconnections required to the fire alarm system shall be terminated by the fire alarm installers and shall be coordinated with the contractor awarded this portion of work.

M. All system configuration(s) shall be included to attain a fully functional system and shall be within the Scope of work of the awarded contractor of this Bid package. This configuration shall include but not be limited to the following:
   1. Configuration of all controlled doors and devices.
   2. Configuration of all cameras shall be managed from the Access Control Platform
   3. Configuration of LAN switches – Active Electronics as required.
   4. Configuration of Access Control platform shall allow for Web access into the Access Control and Video Surveillance systems from all schools and via an internet connection which shall VPN into the owner's network.
   5. Configuration of the Lockdown / Duress / Emergency buttons, as directed by the Security Consultant, Police Department, and Owner.
   6. Configuration of the Access Control, Intrusion Detection, and Video Surveillance integration.
   7. Configuration of the Day Alarm system, which will notify users of a propped or opened door equipped with door position switches, as directed by the security consultant and Owner.

N. Environmental Conditions: System(s) shall withstand the environmental conditions without mechanical or electrical failure, damage or degradation of its operating capacity Capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:
   1. Interior, Controlled Environment: System components installed in temperature-controlled interior environments shall be rated for continuous operation in ambient temperatures of 36 to 122 deg F (2 to 50 deg C) dry bulb and twenty to ninety percent (20-90%) relative humidity, noncondensing. Use NEMA 250, Type 1 enclosures.

2. Interior, Uncontrolled Environment: System components installed in non- temperature-controlled interior environments shall be rated for continuous operation in ambient temperatures of 0 to 122 deg F (minus 18 to plus 50 deg C) dry bulb and twenty to ninety percent (20-90%) relative humidity, noncondensing. Use NEMA 250, Type 3R enclosures.
3. Exterior Environment: System components installed in locations exposed to weather shall be rated for continuous operation in ambient temperatures of minus 30 to plus 122 deg F (minus 34 to plus 50 deg C) dry bulb and twenty to ninety percent (20-90%) relative humidity, condensing. Rate for continuous operation when exposed to rain as specified in NEMA 250, winds up to 85 mph and snow cover up to 24 inches thick. Use sufficiently rated NEMA 250 enclosures.
4. Hazardous Environment: System components located in areas where fire or explosion hazards may exist because of flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers shall be rated, listed, and installed according to NFPA 70.
5. Corrosive Environment: System components subject to corrosive fumes, vapors, and wind-driven salt spray in coastal zones. Use sufficiently rated NEMA 250 enclosures.
6. Security Environment: Camera housing for use in high-risk areas where surveillance equipment may be subject to physical violence.

2.02 ACCESS CONTROL FIELD DEVICES

A. Proximity Readers:
1. The selected manufacturer shall be HID – USA in 15370 Barranca Pkwy, Irvine, CA. Other manufacturers will be considered, providing equipment meets or exceeds the quality and functionality specified.
2. The selected model shall be:
3. HID, RP40, Wall-mounted multiCLASS SE Reader
4. HID, RP15, Wall-Mounted Mullion Mount multiCLASS SE Reader
5. Features:
    a. Accepts 5 to 16 volts, meeting most voltage requirements.
    b. Available with Wiegand or Clock-and-Data interface.
    c. Allows easy upgrade from magstripe to a proximity reader; no rewiring or pulling of new cable required.
    d. Offers high reliability, consistent read-range and low power consumption in an easy-to-install package.
    e. Mounts directly onto metal with no change in read range performance.
    f. Provides multicolor LED, compatibility with all standard access control systems and internal or host control of LED and beeper.
    g. Includes multilingual installation manual.
6. Specifications:
    a. Typical Maximum* Read Range
        1) ProxCard® II card – up to 5.5 inches
        2) ISOProx® II card – up to 5 inches
    b. DuoProx® II card – up to 5 inches
        1) Smart ISOProx®/DuoProx® cards – up to 5 inches
        2) Proximity & MIFARE® card – up to 5 inches

3) ProxCard® Plus card – up to 2 inches
4) ProxKey® II keyfob – up to 2 inches
5) MicroProx® Tag – up to 2.5 inches
6) *Depending on local installation conditions.

c. Dimensions:
1) inches x 1.7 inches x 1.0 inch

d. Material:
1) Polycarbonate UL 94

e. Power Supply:
1) Standard MiniProx: 5-16 VDC
2) Loc. MiniProx: 5-16 VDC
3) Linear power supplies are recommended.

f. Current Requirements:
1) Max Average 30 mA
2) Typ Peak: 75 mA

g. Operating Temperature:
1) -22° to 150° F (-30° to 65° C)

h. Operating Humidity:
1) 0-95% relative humidity non-condensing

i. Weight:
1) With Terminal Strip: 3.5 oz.
2) With Pigtail: 3.8 oz.
3) Loc. MiniProx: 3.8 oz.

j. Transmit Frequency:
1) 125 kHz

k. Excite Frequency:
1) 125 kHz

l. Cable Distance:
1) Wiegand Interface: 500 feet
2) Clock-and-Data Interface: 50 feet
3) Recommended cable is ALPHA 1295 (22 AWG) 5 conductor
4) Minimum stranded with overall shield or equivalent. Additional conductors may be required for LED or beeper control.

m. Environmental:
1) IP55

n. Certifications:
1) UL294/cUL (US), FCC Certification (US), IC (Canada), CE (EU),
2) C-tick (Australia, New Zealand),
3) SRRC (China), MIC (Korea), NCC (Taiwan), MIC (Japan), iDA
4) (Singapore), RoHS

B. Request to Exit Sensor (REX / RTE):
1. Coordinate with the door hardware vendor and use the Provided Exit Request Touch Bar or Integral Lock Signal Switch, where specified in Division 08.
2. Where integral exit request touch bar is not specified, furnish an install the following:
a. Manufacturer:

1) BOSCH
   a) #DS160
   b) Approved Equivalent

C. Door Position Switches (Door Contacts):
   1. All Door Position Switches shall be Double Pole-Double Throw (DPDT).
   2. Door position switches shall be installed by the Contractor. The Contractor shall align, prepare, and fabricate doors and frames to accept specified door position switches. The Contractor shall be responsible for coordinating the installation, so systems and hardware operate as specified. Door Position Switches will be installed at the top of the door in the first instance. If unable to install on top, then side installation on the handle side is acceptable.
   3. Surface Mounted Door Switch: DPDT sensor. Interlogix or approved equal. Surface Mounted Magnetic Switch with armored cable. Route armored cable to junction box and permanently secure to box with clamp or set-screws. Use only where flush-mounted devices cannot be installed.
   4. Non-fire rated Doors, Flush Mount:
      a. Interlogix Model 1076C-W or approved equivalent Concealed Magnetic Door Switch.
   5. Fire Rated Doors:
      a. General: Contractor shall coordinate access control hardware equipment and installation so as to maintain the Fire Rating of each specific door to the satisfaction of the Local Authority Having Jurisdiction.

D. Lockdown Button:
   1. The selected model shall be: Alertus Lockdown Button or an Approved Equivalent
      a. The lock down button shall be green and labeled “LOCKDOWN”
      b. The lockdown button shall have a key-to-reset function
      c. Include plastic cover – STI #6518
   2. Lock-down buttons must be configured to Owner requirements. Minimally, these buttons will have to interface with the Access Control System, Intrusion Detection System, Public Address System, Fire Alarm System and Video Surveillance System.\
   3. Lock Down button shall connect to nearest alertus alert beacon to trigger text to speech announcement over interior fire alarm speakers and exterior public address speakers.
   4. Lock Down buttons shall automatically release fire-alarm hold-open doors.
   5. Lock Down buttons shall cause the security strobes to activate. Coordinate configuration and functionality with Security Consultant and Owner.
   6. Lockdown shall send emails and text messages to up to 50 users.
   7. Lockdown shall dial-out to the central monitoring company, through the intrusion detection panel.

E. Panic / Duress Button
   1. The selected model shall be: Sentrol UL Rated #3050 or an Approved DSX equivalent. Include bi-color latching LED and single pole, double throw contacts.
   2. Panic / Duress buttons must be configured to Owner requirements. Coordinate configuration and functionality with Security Consultant and Owner.

3. Panic / Duress button shall connect to nearest alertus Alert Beacon to trigger text to speech announcement over interior fire alarm speakers and exterior public address speakers.
4. Panic / Duress button shall dial-out to central monitoring.

F. Security Strobe Lights:
1. The selected model shall be:
   a. Talkaphone #ETP-EL12/24 or approved equal.
   b. Contractor shall demonstrate that lamps are visible in direct sunlight prior to final installation and approval.
   c. Include low voltage power supplies.
   d. Lights shall be controlled through outputs of the Access Control Panel. Coordinate configuration and functionality with Security Consultant and Owner.

G. Access Control Platform:
1. The access control platform shall be DSX. No others will be considered. The vendor awarded this project shall be fully factory trained and familiar with DSX access control systems.

H. Access Control Panel:
1. The selected model shall be:
   a. DSX-1048
   b. No others will be considered.
      1) QTY (A/R)

I. Access Control Intelligent Output Controller:
1. The selected model shall be:
   a. DSX-1042
   b. No others will be considered.
      1) QTY (A/R)

J. Access Control Intelligent Input Controller
1. The selected model shall be:
   a. DSX-1044
   b. No others will be considered.
      1) QTY (A/R)

K. Access Control Software:
1. The selected model shall be:
   a. WINDSX SQL
   b. No others will be considered.
      1) QTY of Licenses (A/R)

L. Door Release Buttons:
1. The selected model shall be:
   a. Dortronics #H276 series or an Approved DSX equivalent
   b. The door release button shall be engraved with the label “ASSOCIATED DOOR # Push to Release”

c. The door release button shall be mounted to FSR #DSKB Gang Table Box. Size table box to fit specified quantity of door release buttons.

M. Access Control Source Power:
1. Derive primary Access Control 120VAC power from a designated power source within the telecommunication room, as shown on the T & Y drawings.
2. Power cable shall be protected by conduit.
3. Transformer shall be installed in locked cabinets, protected by tamper switches. Plug-in transformers which are not protected by locked cabinets are not acceptable.
4. Serve all Low Voltage powered devices within the Access Control Cabinet from the Electronics Power Supply.
5. Provide barriers as necessary to separate Class 1 from Class II power.

N. Access Control System Source Power Supplies and Batteries:
1. Furnish and Install Altronix UL Listed Class II power supplies or approved equivalent.
2. Serve all low voltage powered devices within the Access Control Enclosure from the Electronics Power Supply.
3. Capacity: The power supply shall be capable of powering a minimum of 125 percent of the load required at the time of acceptance (25% spare capacity).
4. Power Monitoring: The system shall monitor the loss and restoration of power at the Access Control Panel of both primary and secondary loss of power. Loss and restoration of power shall be displayed at the console, but shall not require resetting the system.
5. Battery Back-up: Provide battery back-up to retain functions of all electronics for a period of four (4) hours upon loss of 120VAC power.

O. Lock Power Supply (LPS)
1. Provide Altronix, UL Listed Class II power supplies within a ventilated, locked, cabinet within the telecommunication rooms as noted on the T & Y drawings, or as otherwise required, to affect proper system performance. Cabinet shall be equipped with a tamper switch, which shall be connected to the Access Control System to provide a supervisory alarm. Power supply shall include separate terminals for each door lock. Power supply voltage shall be required by the hardware supplied locks.
2. Capacity: The power supply shall be capable of powering 200 percent of the load required at the time of acceptance (100% spare capacity).
3. Power Monitoring: The system shall monitor the loss and restoration of power at the Access Control Cabinet. Restoration of power shall be displayed at the console but shall not require resetting the system.
4. Battery Back-Up: Power supplies shall be equipped with integral battery recharging circuits and batteries. If a separate cabinet is used for batteries, the cabinet shall be locked and provided with a tamper switch connected to the Access Control System.
   a. Fail Safe Door Locks: Provide four (4) hours of battery backup for Low-Voltage electrified door hardware.
   b. Fail-Secure Door Locks: Provide battery backup enough to operate fail-secure door locks 100 times per hour, for four (4) hours.
5. Power supply output may be connected to remove UL-approved distribution board of the same manufacturer mounted within the Access Control Cabinet.
6. Provide a Fire Alarm Interface Relay to interface the LPS to the Access Control system and Fire Alarm System as shown on the contract drawings.

7. Transformers shall be installed in locked cabinets, protected by tamper switches. Plug-in transformers which are not protected by locked cabinets are not acceptable.

P. Auto Door Actuator Interface Relay: Furnish and install Dayton Model 5YR20N, or equal, with compatible relay base, at automated doors to ensure the Access Control System approved the Credential / Push Plate before actuator motor is engaged.

Q. Provide IDEC RTE series interval timer, or equal, for interface with motorized door Push Plates and the Automated Door Operator. This will be used to provide a functional time extension for the interaction of between the Access Control system and the Automated Door Hardware, to avoid damage and prevent unwanted alarms.
1. Unit shall be UL listed and operate on 24VDC.
2. Unit shall mount to UL listed relay socket.
3. Unit shall mount within the door operator housing.

R. Emergency Communication Device:
1. The Emergency Communication Device shall be Alertus #ALERTBEACON
2. Install Alert Beacons as shown on the TY Drawings.
3. The Alert Beacons shall sound and display custom text for lockdown, duress button, and software activated emergencies.
4. The Alert Beacons shall connect to the district Alertus server, coordinate configuration with Owner's IT & Security teams.
5. The Alert Beacons shall sound custom text over the facility Fire Alarm Emergency Communicators.
6. Include Alertus Text to Speech module or equivalent for custom text to speech announcements over the Fire Alarm Emergency Communicators. Coordinate with Fire Alarm System Vendor.
7. Coordinate custom text and configuration with Owner IT & Security team.
8. Alternatives shall not be accepted for Emergency Communication Devices.
9. Include all required licenses for a fully functional system.

S. Text To Speech Device:
1. The Emergency Text to Speech devices shall be Alertus #Text to Speech or equivalent (TTS).
2. Include QTY (2) so that one may send audio signal through the fire alarm control panel speakers and one may send audio signal to the exterior public address speakers.

T. Access Control Cabinet:
1. System controllers and field control boards serving a given area shall be installed inside Access Control Cabinets. No controller or control module shall be mounted independently of the cabinet and its power supplies. Refer to the drawings and the following descriptions for details on the Access Control Cabinet construction.

U. Provide Access Control Cabinets as described below, located in the telecommunication rooms where the access control cabling terminates, per the T & Y Drawings, to house all equipment. Each access control cabinet shall contain the following equipment to support the current and future alarm initiating and controlled devices to be connected to the Access Control System:
a. Access Control Cabinet:

1) Indoor: NEMA 2, hinged, locking cabinet by Access Control Manufacturer, Hoffman, or approved equal, sized to fit contents. Lock shall be coordinated with the Owner allowing replacement by the Owner.
2) Outdoor: Stainless steel, NEMA 4X, hinged locking handle cabinet by Access Control Manufacturer, Hoffman, or approved equal, sized to fit contents.
3) Provide door tamper switch and wire into alarm input for each Access Control Cabinet.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that ratings and configurations of system components are consisted with the indicated requirements.

C. Verify that mounting surfaces are ready to receive the system components.

D. Verify that branch circuit wiring is installed, completed, tested, and ready for connection to system.

E. Verify that conditions are satisfactory prior to starting work.

F. Device Locations
1. All device locations are to be field verified with the Owner prior to start of project. Architectural drawings are for approximation purposes only. Additional charges will not be allowed for outlet installation in areas not reviewed or approved by the Owner.

G. Examine pathway elements intended for cables. Check raceways and other elements for compliance with space allocations, installation tolerance, hazards to camera installation, and other conditions affecting installation.

H. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install access control system in accordance with NECA 1 (general workmanship).

B. Install products in accordance with manufacturer's instructions.

C. Unless otherwise indicated, use wiring in conduit.
1. Use suitable listed cables in we locations, including underground raceways.
2. Use suitable listed cables for vertical wire applications.
3. All cabling shall be plenum rated.

D. Install wiring in conduit for the following:
a. Where required for rough-in.

b. Where required by the AHJ.
c. Where exposed to damage.
d. Where installed outside the building.
e. For exposed connections from outlet boxes to devices.

2. Conduit: comply with section Division 26.
3. Conceal cables unless specifically indicated to be exposed.
4. User power transfer hinges specified within Division 08 for concealed connections to door hardware.
5. Cables in the following areas may be exposed:
   a. Equipment Closets
6. Route exposed cables in parallel or perpendicular to building structural members and surfaces.
7. Do not exceed manufacturer's recommended maximum cable length between components.

E. Provide grounding and bonding in accordance with Division 26.

F. Install firestopping to preserve the fire resistance rating of partitions and other elements, using materials and methods specified in Division 07.

G. Install all devices and infrared illuminators level and plumb.

H. Install power supplies and other auxiliary components at control stations unless otherwise indicated.

I. Identify system components, wiring, cabling, and terminals according to ANSI/EIA/TIA standards.

J. Door Hardware Coordination
1. Doors shall not be locked in path of legal egress unless integrated with the fire alarm for release upon the fire alarm system notification. All access controlled locked door within the path of legal egress must be brought to the attention of the Architect and Security Consultant prior to rough-in.
2. Refer to Section Division 08 for Door Hardware requirements and coordination. Contractor shall work directly with door hardware supplier to ensure the provision of specified mechanical and electronic functionality.
3. Request to Exit Activation: Contractor shall configure the system such that Request to Exit devices and System Controllers will react quickly enough to bypass alarms before a fast-moving individual can reach and open the door. This bypass shall be evaluated and verified by the Contractor on the fully configured and operation Access Control system prior to acceptance testing. When possible, use door hardware with REX devices built into the hardware.
4. Fire Alarm Interface: Electrified locks, strikes and turnstiles which are part of this work and which may be locked in the path of legal exiting, shall be connected to the building Fire Alarm System in accordance with the AHJ requirement such that they automatically unlock in the event of activation of the Fire Alarm System. This shall occur whether the activation is a result of a manual pull station, smoke detector, or sprinkler flow switch.
   a. A fire alarm "general / common alarm relay" shall be programmed at the fire alarm control panel to activate the Access Control System interface relays located in each

Lock Power Supply cabinet. The Access Control Contractor shall research and provide all necessary fire alarm system conduit, wire, hardware, and programming to perform required interface.

b. This interface shall not depend on the Access Control System host or Remove Controllers for its operation. Locate these interface relays electrically ahead of lock power distribution. The Contractor shall supply and install programmed alarm interface relay(s) with sufficient capacity to control the power supplied to all controlled locks.

5. Access Control Lock Configuration
   a. Secured Doors: Doors equipped with electric locks shall be individually programmed for locking and unlocking at specific times of the day. A valid credential presented at a reader will allow the portal to unlock for a programmed period of time.
   b. Stairwell Door Locks:
      1) Stairwell doors which are locked from the stairwell side shall have the capability to be simultaneously unlocked upon a signal from the Fire Command Center, Fire Alarm Panel, or the Access Control Command Center when applicable.
      2) Stairwell locking systems shall, in all respects, comply with the requirements of the Building Codes for “Means of Egress”.
      3) Contractor shall provide clearly labeled switches, in the required locations, to unlock all stairwell doors simultaneously for “non-fire” emergencies. Coordinate wall or desk mounted switch style, with the Owner and the AHJ.
      4) This interface shall not depend on the Access Control System Host or Remote Controllers for its operation. Locate interface relays for each stairwell door electrically ahead of the Access Control System lock control, to independently override the Access Control System Control.
   c. Upon authorization by card reader or manual means, “door force” and “door held open” alarms associated with the portals shall be automatically bypassed (prevented from reporting an alarm) for a duration of time that is programmable on an individual door and individual cardholder basis.
   d. The door shall re-lock immediately upon closing, after an authorized access, and the bypass duration shall be immediately truncated. A door position switch will be required at every door for this purpose. The same door position switch shall be used to sense the position of the door for “door forced” and “door held open” alarms.
   e. Free Egress Authorization
      1) Unless otherwise shown on the plans or described herein, the system shall detect the normal egress of a user at any individual portal and shall bypass any alarm associated with the portal for a duration of time that is programmable on an individual door and individual cardholder basis.
      2) Timing shall be independently programmed for each portal during the initial enrollment process. This function allows extended timing for disabled persons to pass through a portal.
      3) The timing function shall automatically truncate after an adjustable period (0-4 seconds) after a portal is closed. This feature allows a subsequent alarm

at the portal to be detected and prevents the portal from being re-opened without an authorized request.

4) "Request-to-Exit" devices shall be used to signal the system that an individual is ready to exit the secured door. Request-to-Exit devices may include but not be limited to:
   a) Integral Lock Handle Signal Switches
   b) Touch Bars (Electro-Mechanical or Electronic)
   c) Push Bars (Mechanical)
   d) Push Buttons
5) On doors with integral electro-mechanical locking mechanisms (strikes, electrical panic hardware, or electrical mortise locks) the mechanical action of the door hardware shall enable egress without requiring release of the electrical mechanism. The Request-to-Exit device shall not unlock the door.
6) On doors with integral electro-mechanical locking mechanisms (magnetic locks), a Request-to-Exit device may unlock the door, releasing the electrical mechanism for the programmed duration. Refer to the drawings for details and direction.
7) On doors with Intercom Systems or Door Release Buttons, the Contractor shall interconnect the intercom system or door release button to activate the Request to Exit function and unlock the door. The door release request contact shall be connected to an input on the Access Control System, such that an event shall be registered into the Access Control System indicating its operation.

f. Sequences: Verify each door type sequence at each door with the Owner.
   1) Doors with Door Position Switches (DPS) and Request-to-Exit (REX) Devices:
      a) DPS and REX contacts shall be wired to Access Control System auxiliary input. Configure the Access Control System to mask the associated DPS alarm for a minimum of 45 seconds. Coordinate the required masking duration with the Owner.
      b) Access Control System shall report a "door forced" alarm when any time the door is opened without a valid REX request. The subsequent operation of an associated REX shall not abort a "door forced" alarm already sensed by the system.
      c) Access Control System shall report a "door-held-open" alarm after the door has been opened and the masking duration has ended.
   2) Doors with Electronic Locking (EL), DPS and REX devices:
      a) DPS and REX contacts shall be wired to Access Control System auxiliary input. Configure the Access Control System to mask the associated DPS alarm for a minimum of 45 seconds. Coordinate the required masking duration with the Owner.
      b) Electronic lock shall be wired to Access Control System auxiliary output. Configure the Access Control System to mask the associated DPS alarm during timed or commanded unlock.
      c) Electric lock shall be locked and unlocked based on preprogrammed schedules and conditions, and by manual control from the Access Control System client workstations.

d) Access Control System shall not cause an alarm event when door is unlocked.
e) Access Control System shall report a "door forced" alarm when any time the door is opened without a valid REX request. The subsequent operation of an associated REX shall not abort a "door forced" alarm already sensed by the system.
f) Access Control System shall report a "door-held-open" alarm after the door has been opened and the masking duration has ended during locked mode.
g) REX device shall not unlock the door.

3) Doors with Card Access Control (CR), EL, DPS and REX devices:
a) CR, EL, DPS and REX devices shall be wired to a door controller board.
b) Electronic lock shall be locked on command from the system at any time.
c) Electronic lock shall unlock during a preset time zone or from the system.
d) Electronic lock shall be unlocked and shall not require use of card reader during timed unlock mode.
e) Access Control System shall not report activity when door is scheduled unlocked.
f) During locked mode Card Reader shall unlock the door, mask DPS preventing alarm.
g) Access Control System shall report a "door-held-open" alarm after the door has been opened and the masking duration has ended.
h) Access Control System shall report a "door forced" alarm when any time the door is opened without a valid REX request. The subsequent operation of an associated REX shall not abort a "door forced" alarm already sensed by the system.
i) REX device shall not unlock door.

4) Doors with Auto-Operators, Proximity CR, EL, DPS and REX devices:
a) Auto-Operator controls, CR, EL, DPS and REX devices shall be wired to a door controller board.

5) Electronic lock shall be locked on command from the system at any time.
a) Electronic lock shall unlock during a preset time zone.
b) EACS shall not report alarm activity when door is unlocked.
c) Auto-Operator door dwell times will meet all ADA/DDA requirements.
d) Day mode: proximity card reader shall activate the auto operator to open the door.
e) Secure mode: Card reader, auto operator function, shall activate the auto door operator at all times.
f) Card Reader shall unlock the door, mask the DPS device preventing alarm and allow use of door open pushbuttons. Electronic lock to be unlocked prior to door open mechanism is engaged. Where auto door equipment is not provided with door open pushbuttons, the door shall automatically open after unlocking. NOTE: The exterior door open

pushbutton should not function without first presenting a valid access card.

g) Access Control System shall report a "door-held-open" alarm after the door has been opened and the masking duration has ended during locked mode.

h) Access Control System shall report a "door forced" alarm when any time the door is opened without a valid REX request. The subsequent operation of an associated REX shall not abort a "door forced" alarm already sensed by the system.

i) Use of push plate shall activate the Access Control System REX, unlock the door and operate the auto door system only after a valid card read.

j) Door shall report a door held open time when REX (push plate or signal from the door operator) is activated, door is opened from the secured side and the system bypass time has expired during locked mode.

k) Verify interior push plate is operational in both lock and unlocked modes.

l) Verify exterior push plate is operational during unlocked mode.

m) Verify exterior push plate is non-operational until valid card read during locked mode.

n) Verify exterior push plate is operational after valid card read during locked mode.

o) Verify door can be manually opened during locked mode from secured side.

g. Doors with Auto-Operators, Dual CR (Mag Stripe and Proximity types), EL, DPS and REX devices:

1) Auto-Operator controls, CR, EL, DPS and REX devices shall be wired to a door controller board.

2) Electric lock shall be locked on command from the system at any time.

3) Electric lock shall unlock during a preset time zone.

4) Door shall not report alarm activity when door is unlocked.

5) Secure mode:

a) Proximity card reader, auto operator function, shall open the door at all times.

b) During secure mode the card reader shall operate as item e above.

6) Access Control System shall report a "door-held-open" alarm after the door has been opened and the masking duration has ended during locked mode

7) Access Control System shall report a "door forced" alarm when any time the door is opened without a valid REX request. The subsequent operation of an associated REX shall not abort a "door forced" alarm already sensed by the system.

8) Use of push plate shall activate the Access Control System REX, unlock the door and operate the auto door system from the inside; however, the push plate will not operate the door from the exterior (secure) side unless there is a valid access card presented.

9) Door shall report a door held open time when REX (push plate or signal from the door operator) is activated, door is opened from the secured side and the system bypass time has expired during locked mode.
10) Verify interior push plate is operational in both locked and unlocked modes.
11) Verify exterior push plate is operational only during unlocked mode.
12) Verify exterior push plate is non-operational until valid card read during locked mode.
13) Verify exterior push plate is operational after valid card read during locked mode.
14) Verify door can be manually opened during locked mode from secured side.

h. Auto Sliding Doors shall operate similar to Doors with Auto-Operators (as applicable).
1) Contractor to coordinate and confirm door hardware includes electronic remote door locking control capability.
2) Verify sliding door break away feature is not disabled when door is in legal path of egress.

i. Exterior Gates:
1) Insert as defined by hardware group. [Provide gate with electric strike] [Provide gate with electrified mortise handle] CR, EL, DPS, REX wired to input / output / door controller card as required by application.
2) Gate shall operate as described for door with similar access control devices including being tied to the Fire Alarm System via a relay so the gates will unlock on receipt of a fire alarm.

6. Electrical Connections to Door Hardware: Wire connections to door hardware pigtail leads shall be made using the manufacturer-provided quick-connect devices, or by Dolphin insulated dis- placement connectors. Wire nuts and splices are not acceptable.
7. Tamper Devices
a. Terminal cabinets, equipment cabinets, enclosures, power supply cabinets, exposed wireways, and pull and junction boxes with wire connections or splices shall be equipped with tamper switches programmed to report an alarm.
b. Junction boxes requiring tamper switches that are associated with an individual alarmed de- vice (such as a door position switch) may report to the respective device alarm point if end- of-line resistors and the system are configured to support 6-state alarm reporting. Other cabinet and box tamper switches shall report as independent alarm points.
c. Power Supply/Battery Chargers: Power supply/battery chargers shall be connected to alarm monitoring points to provide an "Event" indication of tamper, power failures and other system troubles.

K. Access Control System Connectivity
1. Access Control Network: Access Control Servers, Client Workstations and Controllers shall reside on the Owners' Local Area (LAN) and/or Wide Area Network (WAN) to allow global event activity and shared data interchange.
2. Provide and coordinate with Owner IT adequate network "firewalls" to maintain the security of Access Control System controls and information while connected to shared computer networks and transmission media. Contractor shall coordinate shared resource

usage with the Owner, and develop network security schemes acceptable to the Owner to ensure the integrity of the Access Control System.

3. LAN Communications & Connectivity, (Integrated CPU's and Controller's)
   a. Provide LAN communications interfaces for the applicable Access Control System Server, Clients and Controllers to support multiple workstation and integration schemes that are part of this work.
   b. LAN Communications: Contractor shall utilize the facility's Local Area Network for Access Control System connections and interfaces, as shown on the drawings and described herein.
   c. Coordinate with Access Control System equipment and software manufacturers to provide network inter- face devices compatible with the established LAN/WAN network.
   d. Coordinate with the Owner's IT Department to provide servers, Access Control System clients, network interface devices, bandwidth utilization, and appurtenances acceptable to the Owner.
4. Controller Communications
   a. Between controllers at an individual location, and between controllers located within the same building, the controller network may be implemented using standard, twisted, shielded copper conductors as approved by the system manufacturer. It is also acceptable for controllers to be LAN connected, regardless of location.

L. Duress / Lockdown Alarm System
1. Furnish and install duress / lockdown alarm devices as shown on the Drawings, and as coordinated with final architectural millwork details, millwork shop drawings and consoles.
2. Wire alarm signal circuit using two-conductor twisted, shielded cable per cable specifications. Specified device contains latching L.E.D. Run additional two- conductor cable, dedicated to intrusion detection system, 12VDC power, per cable specifications, to power supply via reset switch at power supply.
3. Each hardwired duress alarm system device shall be wired to an Access Control input panel and intrusion detection remote field input module panels as separate 24 hour security zones.
4. Duress devices associated alarm signal circuitry to be fully supervised for open, short, normal and alarm. Provide required end-of-line resistors to achieve this supervision per manufacturer's specifications. Locate as close to device as possible, preferably in device homerun junction box. Protect wires from button to junction box using miniature Greenfield/stainless steel sheathing.
5. Provide separate 12 VDC, power kill, LED reset switch in security device low voltage power supply cabinet enclosure, and wire duress device LED power through switch. Label switch accordingly.

M. Emergency Standby Power
1. Low-Voltage Equipment: Access Control System Remote Controllers, peripheral devices and Lock Power Sup- plies shall have their own 4-hour battery back-up systems.
   a. Power back-up may be in the form of direct DC battery power back-up or by 120VAC Uninterruptable Power Supplies (UPS), depending upon equipment requirements.

b. Lock Power Supplies shall allow fail-secure locks to be operated by the system a minimum of 100 times-per-hour, during this time period. Fail-safe locks shall be maintained for the full 4-hours.
c. Battery back-up systems may be distributed throughout the facility to provide the required emergency power to individual components.
d. Battery back-up systems shall include battery chargers to keep storage batteries at their peak charge.

N. Security System Integration
1. The Contractor shall be responsible for providing hardware and software interfaces to achieve the specified system performance described herein and, by reference, realize absolute and seamless compatibility with the related component systems.
2. The Contractor shall ensure system additions and modifications provided under this scope of work have no negative effect on the individual components and systems, and their core functionality, and no permanent effect beyond that specified or implied by the scope of work.
3. Purpose
a. Integration is the process of designing, deploying, and configuring independently operating systems with the ability to request, receive, extract, process, and act upon information from other systems.
b. Successful system integration must address three fundamental issues:
1) Functionality: What information is needed, how it is to be requested and processed, and what functions or activities need to occur upon receipt of the information.
2) Connectivity: How systems will be connected to support the communication of information and commands. (Special interfaces, wiring, networks, databases.)
3) Communication: How information will be communicated between systems. (Instruction sets, language, protocols, formats, priority.)
4. Environment
a. Integration components shall generally comprise special elements of independent subsystems, and shall be located within, or in close proximity to, the processing components of each independent subsystem. Where subsystems require special hardware or communications interfaces to support integration, the special hardware should be located near the independent subsystem processing components or network appliance, based on the manufacturers' recommendation. See the drawings for details on mounting locations.
5. Infrastructure and Connectivity:
a. Devices/Appliances: Appliances and devices shall be connected to their respective systems via the applicable communications network.
b. System LAN/WAN Connectivity: System Servers and microprocessor-based Control Panels, shall reside on the Local Area Network (LAN) or Wide Area Network (WAN) tier designated for integrated components.
c. Enterprise: LAN networks will be connected to the Wide Area Network, to establish connectivity between remote sites and both the Primary and Alternate Security Operations Center (SOC – room SB05-1).
6. Attributes

a. The attributes of the integrated environment are primarily defined by the subsystems that are to be integrated. Verify existing system components to be expanded by this project.
b. Integrated systems comprise the processors, software, electrical control panels, data gathering panels, special data interfaces, and converters required to allow systems to communicate with each other, process information, and allow users to program and perform operations.

7. Functions
   a. The system shall provide the following automated processing rules, at a minimum:
   b. The object of "Access Control system integration" is to automatically configure the system to display, record, and report appropriate system activity to various elements of the system. Automatic configuration can free operators from difficult control tasks, give the operator more time to respond to events, reduce operator error, and ensure critical system tasks occur consistently.
   c. Electronic Access Control system elements shall be electronically integrated in such a way as to enable detection, database records and/or event-initiated instructions to be communicated between system components, to initiate recording, display, communication, and control activities.
   d. Event-Initiated Interface, General:
      1) The system shall support the capability to send and receive alarm and control messages between the Access Control System and video systems via a LAN communications link, using API, XML, or other industry-standard communication languages and formats, and shall act upon those messages received.
      2) The system shall support the capability to send and receive alarm and control messages and alarm signal between the Access Control system and Intrusion Detection System for lockdown / duress / and panic button initiation.
      3) Where integration may require the implementation of data interfaces, Contractor shall propose such integration to the Owner for approval, before proceeding with the work.
      4) Software routines required to accomplish the required data-interface with external equipment and controls will be fully developed, installed, tested and supported by the Contractor.
      5) The manufacturer of each applicable system will also support the data interface and will be engaged by the Contractor to provide on-site technical assistance where required to prepare, repair, configure, and test the system to operational condition.
      6) Communication of event information between systems shall take place automatically and immediately when the event is sensed by the System.

3.03 FIELD QUALITY CONTROL

A. Testing Agency: The Contractor shall engage a qualified testing agency to perform tests and inspections with the Owner and appointed project manager.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections.
   1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

D. Tests and Inspections:
   1. Inspection: Verify that units and controls are properly installed, connected, and labeled, and that interconnecting wires and terminals are identified.
   2. Pretesting: Align and adjust system and pretest components, wiring, and functions to verify that they comply with specified requirements.
   3. Test Schedule: Schedule tests after pretesting has been successfully completed and system has been in normal functional operation for at least fourteen (14) days. Provide a minimum of ten (10) days notice of test schedule.
   4. Operational Tests: Perform operational system tests to verify that system complies with Specifications. Include all modes of system operation. Test equipment for proper operation in all functional modes.

E. Access Control System shall be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

3.04 CLEANING

A. Remove rubbish and debris: Installation contractor is not allowed you use the onsite dumpster and is responsible to discard their own debris off site.

B. Clean installed items using methods and materials recommended in writing by manufacturer.

C. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.05 CLOSEOUT ACTIVITIES

A. See Division 01 – Closeout Submittals for Closeout Submittals.

B. Demonstration: Demonstrate proper operations of system to Owner and correct deficiencies or make adjustments as directed.

C. Training:
   1. By means of training classes augmented by individual instruction as necessary, the Bidding contractor shall fully instruct the BOE’s designated staff and personnel in the operation, adjustment and maintenance of all products, equipment and systems.
   2. General Training Requirements:
      a. The security contractor shall submit proposal to conduct training courses for the security personnel in the operation and maintenance of the security systems within this security project.

b. The security contractor shall include training manuals and aids in the quantity as requested by the Owner. The training manuals shall include an agenda, defined objectives for each lesson, and a detailed description of the subject matter for each lesson. All personnel providing the instructions shall be certified by the equipment manufacturer for all applicable hardware and software.

c. Approval of the planned training content and training schedule shall be obtained by the Owner at least 45 days before the training is scheduled.

d. Training shall be provided by qualified, factory trained and certified engineers familiar with each system and its operations and shall be provided at the site for a period of no less than the hours stipulated below.

3. Training Topics:

a. System Administration Training

1) This training shall focus on determining and implementing system operational parameters.

2) The first training class shall be conducted so that it is completed approximately 30 days prior to acceptance of the system and final system reliability testing. 8 Hours of Administration training; (2) 4-hour classes.

3) The second training class shall be conducted so that it is completed approximately 7 days prior to acceptance of the system and final system testing. The system administrator shall be included as part of this final system acceptance and reliability testing. 6 Hours of training; (2) 3-hour classes.

4) This Administrations training shall include:

a) Overall architecture and configuration of each system.
b) Use of all system functions.
c) ID badging design and production.
d) Card-holder setup and configuration.
e) Card-holder access level assignment.
f) Access Door programming.
g) Alarm setup and implementation.
h) Data storage and retrieval through reports.
i) Creation of reports.
j) System database backup procedures.
k) Hardware specifications.
l) Fault diagnosis and corrections.

b. System User Monitoring Training

1) This training shall be for each designated personnel at this school.

2) This training shall focus on day-to-day system operations. Each user shall be capable to start the systems, operate them, recover the systems after a failure, and describe the specific hardware architecture and operation of the systems.

3) The first training class shall be conducted so that it is completed approximately 30 days prior to acceptance of the system and final system reliability testing. All System User Training shall be performed at each school within this specification. 8 Hours of User training; (2) 4-hour classes.

4) The second training class shall be conducted so that it is completed approximately 7 days prior to acceptance of the system and final system testing. The system administrator shall be included as part of this final system acceptance and reliability testing. 6 Hours of User training; (2) 3-hour classes.
5) Training shall include:
   a) Use of overall system monitoring functions as determined by the security administration staff.
   b) Monitoring alarm events.
   c) Monitoring personnel access into the facility.
   d) Assessing, responding to, and clearing alarms and messages.
   e) Monitoring access door status.
   f) Running routine reports.
   g) General hardware architecture.
   h) Functional operation of each system and interaction between these systems.
   i) All Operator commands.
   j) Database entry.
   k) Report generation.
   l) Alarm assessment.
   m) Simple diagnostics.

c. System Troubleshooting and Maintenance Training
1) Training shall be provided with the internal features and configuration of the security systems so the user can trouble shoot and repair most configuration and physical device problems.
2) The training class shall be conducted so that it is completed approximately 14 days prior to acceptance of the system and final reliability testing. The users shall be included as part of this reliability testing. 8 Hours of training; (2) 4-hour classes.
3) This training shall include:
   a) System networking communications and diagnostics.
   b) Device configuration and programming.
   c) Controller setup.
   d) Wiring and cabling overview.
   e) System Diagnostics.
   f) Software troubleshooting.
   g) Physical layout of each piece of hardware.
   h) Preventive maintenance procedures and schedules.
   i) Calibration procedures.

d. IT Training
1) Training shall be provided information of the security systems to the IT staff. This shall include information as to how each system functions within the LAN/WAN network infrastructures. 4 Hours of training.
2) Topics shall include:
   a) Network topologies.
   b) Maintenance of data security.

4. Training hours and sessions must be documented by the instructor and approved by the Owner before project closeout.
5. Should the training be deemed as inadequate by the Owner, the owner reserves the right to retain outside manufacturer training. If this outside manufacturer training has an associated cost, this cost shall be deducted from the final invoice of this project.
6. The Owner reserves the right to request the Contractor to videotape training sessions and turn over video records (DVD format) to Owner as part of the "Owner Project Manuals" and Deliverables.

3.06 PROTECTION

A. Protect installed system components from subsequent construction operations.

3.07 MAINTENANCE

A. See Division 01 – Execution and Closeout Requirements for additional requirements relating to maintenance service.

B. Adjustments:
   1. Occupancy Adjustments: When requested within twelve (12) months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two (2) visits to Project during other-than-normal occupancy hours for this purpose. Tasks shall include, but are not limited to, the following:
      a. Check cable connections.
      b. Check proper operation of access control devices.
      c. Provide a written report of adjustments and recommendations.

C. Provide to Owner, at no extra cost, a separate maintenance contract for the service and maintenance of the Access Control System for One Year from date of Substantial Completion. Include a separate description of preventative maintenance, systematic examination, cleaning, inspection, and testing, with a detailed schedule.

D. Conduct site visit at least once every three months to perform inspection, testing, and preventative maintenance. Submit report to Owner indicating maintenance performed along with evaluations and recommendations.

E. Provide trouble call-back service upon notification by Owner:
   1. Include allowance for call-back service during normal working hours at no extra cost to Owner.
   2. Owner will pay for call-back service outside of normal working hours on an hourly basis, based on actual time spent at the site and not including travel time; include hourly rate and definition of normal working hours in maintenance contract.

END OF SECTION

SECTION 28 1600 - INTRUSION DETECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Refer to the following construction documents for Data Room locations and device locations only.
   1. "TY" Drawings – Security Plans

1.02 SUMMARY

A. The scope of work required as part of this project shall include a new intrusion detection system installed into the school.

B. Section Includes:
   1. Control Panel
   2. Motion Sensors
   3. Door Contacts
   4. Intrusion detection devices

C. These specifications contain the functional and operational requirements for an integrated intrusion alarm system employing motion detection devices and door contacts as the primary means of intrusion detection for selected interior protection. This procurement shall include all the equipment required at various facilities as shown on the Drawings.

D. Responsibility for the integrated security systems and equipment is specified in the following sections and shall be coordinated with the finish door hardware and Fire Alarm sections.

E. The intrusion system is intended to provide protection of selected facilities against intrusion and for the detecting or discouraging of burglary or vandalism during the hours the facilities are unoccupied and report signal to the Central Station.

F. General: Provide and install an integrated security system and all devices, terminations, associated supporting devices, configuration of system, testing and training in accordance with this Bid package to provide a complete and functional system.

G. The cabling shall be provided and installed by the contractor awarded this project and as described within the construction bid document and referenced on the drawings associated with this bid package. All other cabling required to provide a complete and functional system shall be furnished and installed by the Contractor awarded this portion of work.

H. This specification is used to identify the requirements for integrated Burglar entry systems encompassing door contacts and motion detectors.

I. Responsibility for the integrated security systems and equipment is specified in the following sections and shall be coordinated with the Finish Hardware and Fire Alarm sections of the Phase I Construction.

J. It is the intent of these specifications to procure a fully acceptable, effective and reliable integrated security system. Refer to the Drawings for division of responsibility. These specifications recognize the importance of complete system operation and are not limited to specifying of equipment only. The following are also required from the selected bidder:
1. Proven experience in the security business.
2. Prompt delivery and professional installation including service of equipment as specified.
3. Bidder must provide, for objective evaluation, references, which clearly state and show the effectiveness of proposed equipment and services.
4. Used products will not be acceptable. Manufacturer must satisfactorily demonstrate that he has supplied and will continue to supply products to avoid the obsolescence of equipment installed in the building.
5. All equipment shall be fully guaranteed for twelve (12) months. This guarantee shall become effective from the day of installation completion. When in normal operation, if the equipment is found to be below the manufacturer's specification, repair and replacement of equipment shall be provided. Repairs shall be started within twenty-four (24) hours and completed without delay. Installation contractor shall either stock spares or be capable of obtaining all required replacement parts within twenty-four (24) hours.
6. Extended warranty terms shall be provided by the installing security system integrator at the time of bid.

1.03 APPLICABLE STANDARDS

A. All of the work within the scope of this bid shall be performed in accordance with the applicable state, county and city laws and ordinances. The bidder shall be able to obtain all permits and licenses as required in addition to being a licensed contractor. All materials, supplies and equipment being furnished shall be installed in accordance with the latest version of the applicable standards of:
1. OSHA
2. Uniform Building Code
3. Americans with Disabilities Act (ADA)
4. Components of the system shall be of the type approved by Safety and Regulatory Agencies including:
   a. Underwriters' Laboratories (UL), Inc.
   b. Federal Communications Commission (FCC).
   c. Agency approvals and UL Listing declare the system's design, components, and installation shall meet the highest standards.
   d. System installation shall comply with UL 681 and UL 611.
5. Alarm detection systems intended for UL certified fire alarm reporting shall meet the requirements of UL Standard 985, NFPA Standard 72 Chapter 2.
6. The equipment shall comply with Part 68 of the FCC Telephone Requirements Rules.

7. All circuits and equipment shall be installed and protected according to the National Electric Code and any applicable local requirements.

1.04 DEFINITIONS

A. LCD: Liquid-crystal display.

B. LED: Light-emitting diode.

C. PIR: Passive infrared.

D. RFI: Radio-frequency interference.

E. Protected or Protection Zone: A space or area for which an intrusion must be detected and uniquely identified, the sensor or group of sensors assigned to perform the detection, and any interface equipment between sensors and communication link to central-station control unit.

1.05 SUBMITTALS

A. Product Data: Components for sensing, detecting, systems integration, and control, including dimensions and data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: Detail assemblies of standard components that are custom assembled for specific application on this Project.
   1. Functional Block Diagram: Show single-line interconnections between components including interconnections between components specified in this Section and those furnished under other Sections. Indicate methods used to achieve systems integration. Indicate control, signal, and data communication paths and identify programmable logic controllers, networks, and control interface devices and media to be used. Describe characteristics of network and other data communication lines.
   2. Raceway Riser Diagrams: Detail raceway runs required for intrusion detection and for systems integration. Include designation of devices connected by raceway, raceway type, and size, and type and size of wire and cable fill for each raceway run.
   3. Device Address List: Coordinate with final system programming.
   4. System Wiring Diagrams: Include system diagrams unique to Project. Show connections for all devices, components, and auxiliary equipment. Include diagrams for equipment and for system with all terminals and interconnections identified.
   5. Sensor detection patterns and adjustment ranges.

C. Equipment and System Operation Description: Include method of operation and supervision of each component and each type of circuit. Show sequence of operations for manually and automatically initiated system or equipment inputs. Description must cover this specific Project; manufacturer's standard descriptions for generic systems are not acceptable.

D. Field quality-control test reports.

E. Operation and Maintenance Data: For intrusion detection system to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
   1. Data for each type of product, including features and operating sequences, both automatic and manual.
   2. Central-station control-unit hardware and software data.

F. Warranty: Special warranty specified in this Section.

G. In the event that the installation contractor does not furnish or does not supply sufficient documentation, the owner has the right to engage a separate contractor to attain any or all required documentation. All costs related with this event shall result in a back charge to the installation vendor via a change order.

1.06 QUALITY ASSURANCE

A. Installer Qualifications:
   1. An employer of workers, at least one of whom is a technician certified by the National Burglar & Fire Alarm Association.
   2. Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
   3. A copy of the Contractors Certified Installers Certificate shall be furnished with bid response.

B. Intrusion Detection Systems Integrator Qualifications: An experienced intrusion detection equipment supplier and/or Installer who has completed systems integration work for installations similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. FMG Compliance: FMG-approved and -labeled intrusion detection devices and equipment.

E. Comply with NFPA 70.

F. Electrical Power
   1. Normal System Power Supply: 120V, 60Hz, through a locked disconnect device and an isolation transformer in a central-station control unit. Central-station control unit shall supply power to all components connected to it unless otherwise indicated.
   2. Power Continuity for Central-Station Control Units: Batteries in power supplies of the central-station control unit and individual system components shall maintain continuous system operation during outages of both the normal and backup ac system supply.
      a. Batteries: Rechargeable, valve-regulated, recombinant, sealed, lead-acid type with nominal ten (10) year life expectancy. Capacity adequate to operate portion of system served, including audible trouble signal devices for up to four (4) hours and

audible and visual alarm devices under alarm condition for an additional ten (10) minutes.

b. Battery Charger: Solid-state fully automatic, variable-charging-rate type. Charger shall recharge fully discharged battery within twenty-four (24) hours.

G. Annunciation: Indicate a change in system condition and switching of system or component to backup power.

1.07 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer and Installer agree to repair or replace components of intrusion detection devices and equipment that fails in materials or workmanship within specified warranty period.
1. Warranty Period: The standard manufacturer's warranty shall apply or a minimum of a one (1) year warranty from the date of Substantial Completion.

PART 2 PRODUCTS

2.01 INTRUSION DETECTION SYSTEM

A. Basis of Design SHALL BE DIGITAL MONITORING PRODUCTS, INCORPORATED (DMP)
1. Series: XR550-DN Partitioned Commercial Burglary Alarm and Access Control Panel
2. Approved alternate manufacturers:
a. Bosch G series panels
3. The intrusion detection system shall be integrated with the access control system. Both systems shall utilize the same control panel.

B. Control Panel
1. DMP XR550-DN
2. The intrusion detection control panel shall have be furnished with the following functionality:
a. Onboard 10/100 Network Communication
b. Cellular Communication
c. Wi-Fi Communication
d. Access Control

C. Door Contacts
1. Refer to Door Hardware Schedule

D. MICROWAVE-PIR DUAL TECHNOLOGY MOTION SENSORS
1. DMP #CDX-DAM or approved equal.

E. 360° MOTION SENSORS
1. DMP#SX-360Z

F. Alarm Keypad Console
   1. DMP #7173

G. Glass Break Sensor
   1. DMP Model #5845LX

H. Panel Loop Expansions
   1. Hard-wired detection equipment shall communicate to the system by way of the control panel loop expansion bus. The equipment shall have a (3) year warranty as stated in the current DMP Product Catalog and meet or exceed features offered in the following products:
      a. Network Transient Suppressor – DMP Model 270
      b. Trouble Sounder – DMP Model 277
      c. Bus Splitter / Repeater Module – DMP Model 710
      d. Output Expansion Module DMP Model 716
      e. Dual Phone Line Module – DMP Model 893A
      f. Motion Detector – DMP Model 6155LX (wall mount with built-in zone expander)
      g. Motion Detector – DMP Model AP669 (ceiling mount 360' – requires DMP zone expander)
      h. Glass Break Detector – DMP Model 5845LX (includes built-in zone expander)
      i. Bus Splitter/Repeater Module – DMP Model 710
      j. Door Contact – DMP Model SM20WG (surface applications – requires DMP zone expander)
      k. Output Expansion Module - DMP Model 716
      l. Graphic Annunciator Module - DMP Model 717

2.02 ENCLOSURE

A. The Control Panel shall be enclosed in a metal cabinet, suitable for wall mounting. The dimensions shall not exceed 14.5 inches in height, 12.5 inches in width or 3 inches in depth.

2.03 ELECTRICAL POWER REQUIREMENTS

A. System Power – The Fire and Burglary Alarm System shall operate using standard 120 volts AC, 50/60 Hz power.
   1. Control Primary Power – Transformer power shall be 16.5 VAC, 40VA.
   2. Backup Battery – A rechargeable 12 VDC, gel type, lead acid backup battery shall be provided. The battery shall be rated between 7 and 34- ampere hours (AH).
   3. Alarm Power – Alarm power shall be 12 VDC, 1.7 amps for each bell output
   4. Auxiliary Standby Power – Standby power shall be 12 VDC, 750 mA maximum.
   5. Fusing – The battery input, auxiliary, and bell outputs shall be protected using PTC circuit breakers. All outputs shall be power limited.

2.04 SUBSTITUTIONS

A. Substitution of any item shall only be permitted when the Owner waives the specification(s) of a particular product(s) in writing, allowing a substitute item to be bid. It shall be the responsibility of the Contractor requesting the substitution that the proposed item is equivalent in each and every way to the originally specified product stated within this bid specification and drawing package and that it is in the best interest of the Owner to use the proposed substitute.

PART 3 EXECUTION

3.01 COMMISSIONING OF SYSTEMS AND EQUIPMENT

A. Engage a factory-authorized service representative or technician who is familiar with this project to participate and assist, if necessary, in the functional performance testing of the equipment include in this Division with the Commissioning Agent.

3.02 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of intrusion detection.
   1. Examine roughing-in for embedded and built-in anchors to verify actual locations of intrusion detection connections before intrusion detection installation.
   2. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of intrusion detection.

B. Inspect built-in and cast-in anchor installations, before installing intrusion detection, to verify that anchor installations comply with requirements. Prepare inspection reports.
   1. Remove and replace anchors where inspections indicate that they do not comply with requirements. Re-inspect after repairs or replacements are made.
   2. Perform additional inspections to determine compliance of replaced or additional anchor installations. Prepare inspection reports.

C. For material whose orientation is critical for its performance as a ballistic barrier, verify installation orientation.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.03 SYSTEM INSTALLATION

A. The System shall be installed and tested in accordance with the Manufacturer's Installation instructions. The following conditions are applicable:

B. In order to ensure a complete, functional System, for bidding purposes, where information is not available from the Owner upon request, the worst case condition shall be assumed.

C. Interfaces shall be coordinated with the Owner's representative, where appropriate.

D. All necessary backboxes, pullboxes, connectors, supports, conduit, cable, and wire shall be furnished and installed to provide a complete and reliable System installation.

E. All conduit, cable, and wire shall be installed parallel and square with building lines. Conduit fill shall not exceed forty percent (40%). All wires shall be gathered, labeled and tied to create an orderly installation.

F. Comply with UL 681.

3.04 WIRING INSTALLATION

A. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points. Use lacing bars and distribution spools. Separate power-limited and non-power-limited conductors as recommended in writing by manufacturer. Install conductors parallel with or at right angles to sides and back of enclosure. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with intrusion system to terminal blocks. Mark each terminal according to system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

B. Wires and Cables:
   1. Conductors: Size as recommended in writing by system manufacturer, unless otherwise indicated.

C. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

D. Install power supplies and other auxiliary components for detection devices at controllers, unless otherwise indicated or required by manufacturer. Do not install such items near devices they serve.

E. Identify components with engraved, laminated-plastic or metal nameplate for central-station control unit and each terminal cabinet, mounted with corrosion-resistant screws.

3.05 GROUNDING

A. Ground system components and conductor and cable shields to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.

B. Signal Ground Terminal: Locate at main equipment rack or cabinet. Isolate from power system and equipment grounding. Provide 5-ohm ground. Measure, record, and report ground resistance.

C. Install grounding electrodes of type, size, location, and quantity indicated.

3.06 FIELD QUALITY CONTROL

A. Pretesting: After installation, align, adjust, and balance system and perform complete pretesting to determine compliance of system with requirements in the Contract Documents. Correct deficiencies observed in pretesting. Replace malfunctioning or damaged items with new ones and retest until satisfactory performance and conditions are achieved. Prepare forms for systematic recording of acceptance test results.
   1. Report of Pretesting: After pretesting is complete, provide a letter certifying that installation is complete and fully operable; include names and titles of witnesses to preliminary tests.

B. Perform the following field tests and inspections and prepare reports:
   1. Inspection: Verify that units and controls are properly labeled and interconnecting wires and terminals are identified.
   2. Operational Tests: Schedule tests after pretesting has been successfully completed. Test all modes of system operation and intrusion detection at each detection device. Test for detection of intrusion and for false alarms in each protected zone. Test for false alarms by simulating activities outside indicated detection patterns.
   3. Electrical Tests: Comply with NFPA 72, Section A-7. Minimum required tests are as follows:
      a. Verify the absence of unwanted voltages between circuit conductors and ground.
      b. Test all conductors for short circuits using an insulation-testing device.
      c. With each circuit pair, short circuit at the far end of circuit and measure circuit resistance with an ohmmeter. Record circuit resistance of each circuit on Record Drawings.
      d. Verify that each controller is in normal condition as detailed in manufacturer's operation and maintenance manual.
      e. Verify that transient surge-protection devices are installed according to manufacturer's written instructions.
      f. Test each initiating and indicating device for alarm operation and proper response at central-station control unit.

C. Report of Tests and Inspections: Prepare a written record of tests, inspections, and detailed test results in the form of a test log.

D. Tag all equipment, stations, and other components for which tests have been satisfactorily completed.

3.07 ADJUSTING

A. Occupancy Adjustments: When requested within twelve (12) months of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to three (3) visits to Project during other than normal occupancy hours for this purpose. Visits for this purpose shall be in addition to any required by warranty.

3.08 CLEANING

A. Remove rubbish and debris: Installation contractor is not allowed you use the onsite dumpster and is responsible to discard their own debris off site.

B. Clean installed items using methods and materials recommended in writing by manufacturer.

3.09 DEMONSTRATION – TRAINING

A. By means of training classes augmented by individual instruction as necessary, the Bidding contractor shall fully instruct the BOE's designated staff and personnel in the operation, adjustment and maintenance of all products, equipment and systems.

B. The Contractor shall be required to provide all training aids, e.g., notebooks, manuals as required.

C. All training shall be completed a minimum of two (2) weeks prior to system cut over. Training schedule shall be subject to the Owner approval.

D. Training shall be conducted by experienced personnel and supported by training aids. An adequate number and amount of training material shall be provided by the Contractor. The following is considered a minimum.
   1. Functional flow-charts, overall block diagrams, and descriptive material for all software;
   2. Schematic drawings for each of the hardware components;
   3. All procedure manuals, specification manuals, and operating manuals;
   4. As-built drawings.

E. Bidding contractor shall engage a factory-authorized service representative to provide formal training the Owner's maintenance personnel to adjust, operate, and maintain this Intrusion Detection system.

F. Training shall include the following:
   1. User Training; Eight (8) hours of instruction to the users at EACH school within this project shall be included as part of this specification. Eight (8) hours of instruction per school is required.
   2. Administrator Training; Twenty four (24) hours of advanced system administration training to the administrator of this system shall be included as part of this specification.
   3. All training shall be divided up into four (4) hour sessions as mandated by the Owner.

G. Training hours and sessions must be documented by the instructor and approved by the Owner before project closeout.

H. Should the training be deemed as inadequate by the owner, the owner reserves the right to retain outside manufacturer training. If this outside manufacturer training has an associated cost, this cost shall be deducted from the final invoice of this project.

SECTION 28 2300 - VIDEO SURVEILLANCE SYSTEM

SECTION 1 - GENERAL

1.01 SECTION INCLUDES

A. System Requirements

B. Uninterruptible Power Supplies

C. Surge Protection

D. Client Workstations

E. Cameras

F. Video Surveillance Software

1.02 RELATED REQUIREMENTS

A. The Contractor, Subcontractors and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section "Summary", Paragraph 1.1A, entitled "Related Documents." OR Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Division 07 - Firestopping.

C. Division 08 - Door Hardware: Electrically operated door hardware, for interface with access control system. Includes door hardware with integral request to exit devices.

D. Division 26 - Hydraulic Elevators: For interface with access control system.

E. Division 26 - Grounding and Bonding for Electrical Systems.

F. Division 26 - Conduit for Electrical Systems.

G. Division 26 Identification for Electrical Systems: Identification products and requirements.

H. Division 27 - Structured Cabling: Data cables for access control system IP network connections.

I. Division 28 - Video Surveillance: For interface with access control system.

J. Division 28 -Building Intrusion Detection: For interface with access control system.

K. Division 28 - Fire Detection and Alarm: For interface with access control system.

L. Refer to the following construction documents for Data Room locations and device locations only.

1. "Y" Drawings – Security Plans
2. "T" Drawings – Technology Plans

M. Any apparatus, appliance, material, or work not shown on the Drawings but mentioned in the Specifications, or vice versa, and any incidental accessories necessary to make the work complete and perfect in all respects and ready for operation, even if not particularly specified, shall be provided without additional expense. Coordinate with each system manufacturer to insure all hardware, firmware, relays, or other necessary components are provided prior to bid submission.

N. All work of this Section to comply with the requirements of the Conditions of Contract, with all Specification Sections of Division 01 – General Requirements, with the Security Drawings, and with all other Contract Documents.

O. Refer to Division 26 of the Contract Documents, Electrical, for all Specifications governing the installation of raceway (conduit, EMT, cable trays, wire trough, etc.), system junction and pull boxes, and device rough-in boxes, for all Security System work shown on the Security Drawings. Conduit, back box, and trough work to be provided by this Contractor.

P. Refer to Division 26 of the Contract Documents, Electrical, for all work related to the interconnection of Security System equipment to 120 VAC power sources.

Q. Refer to Division 09 of the Contract Documents, Finishes, for details relating to acoustical ceilings and gypsum board systems, floor finishes, painting, etc., for information pertinent to device and back box selection and installation.

R. Refer to Division 08 of the Contract Documents, Openings, for details relating to doors, door frames, windows, and window frames, for information pertinent to the selection of magnetic contact devices and their associated placement and installation, including back box selection and installation.

S. Refer to Division 08 of the Contract Documents, Openings, for details relating to door and door frame hardware and preparation, electrified lock power supplies, required coordination to accommodate these components and/or systems, lock voltage and current draw coordination, coordination of fail-safe electrified locks, and any other related equipment or requirements

T. Refer to Division 27, Telecommunications for all Ethernet Cabling for the Cameras.

U. Review all other Specification Sections as required to achieve complete inter- trade coordination.

1.03 DEFINITIONS

A. API: Application Programming Interface

B. AVI: Audio Video Interleave

C. CA: Certificate Authority

D. CAC: Common Access Card

E. CE: European Union Conformity

F. CPU: Central Processing Unit

G. CSV: Comma Separated Values

H. DNS: Domain Name Server

I. DSM: Door Status Monitor

J. DVR: Digital Video Recorder

K. EACS: Electronic Access Control System

L. FCC: Federal Communications Commission

M. FIPS: Federal Information Processing Standard

N. FIFO: First In – First Out

O. FTP: File Transfer Protocol

P. FRAC: First Responder Authentication Credential

Q. GB: Gigabyte

R. GSOC: Global Security Operations Center

S. GUI: Graphical User Interface

T. HA: High Availability

U. HTML: Hypertext Markup Language

V. H.264, H.265: Video Compression Standards

W. I^2C: Inter-Integrated Circuit

X. IEEE: Institute of Electrical and Electronics Engineers

Y. I/O: Input / Output

Z. IP: Internet Protocol

AA. IS: Integrated System

BB. JPEG: Joint Photographic Experts Group

CC. LAN: Local Area Network

DD. LDAP: Lightweight Directory Access Protocol

EE. MB: Megabyte

FF. MJPEG: Motion JPEG

GG. MSATA: Mini-Serial Advanced Technology Attachment

HH. MSP: Mobile Security Professional

II. MTBF: Mean-Time Between Failure

JJ. NAS: Network Attached Storage

KK. NAT: Network Address Translation

LL. NBAPI: NetBox Application Programming Interface

MM. NECA: National Electric Code Association

NN. NFPA: National Fire Protection Association

OO. NVR: Network Video Recorder

PP. ODBC: Open Database Connectivity

QQ. OS: Operating System

RR. OVID: Open Video Integration Driver

SS. PDF: Portable Document Format

TT. PIN: Personal Identification Number

UU. PIV: Personal Identity Verification

VV. PoE: Power over Ethernet

WW. PTZ: Pan-Tilt-Zoom

XX. RAID: Redundant Array of Independent Disks

YY. RAM: Random Access Memory

ZZ. REX: Request to Exit

AAA. RFID: Radio Frequency Identification

BBB. RoHS: Restriction of Hazardous Substances

CCC. ROM: Read Only Memory

DDD. RU: Rack Unit

EEE. SFTP: Secure File Transfer Protocol

FFF. SHA: Secure Hash Algorithm

GGG. SIO: Serial Input / Output

HHH. SLA: Sealed Lead-Acid

III. SMS: Security Management System or Short Message Service (text messaging)

JJJ. SSL: Secure Sockets Layer

KKK. SUSP: Software Upgrade and Support Plan

LLL. TCP: Transmission control protocol - connects hosts on the Internet

MMM. TIA: Telecommunications Industry Association

NNN. TLS: Transport Layer Security

OOO. TWIC: Transportation Worker Identification Credential

PPP. UI: User Interface

QQQ. UPS: Uninterruptible Power Supply

RRR. UTP: Unshielded Twisted Pair

SSS. VMS: Video Management System

TTT. WAN: Wide Area Network

UUU. Wi-Fi: Wireless Network

VVV. AS NECESSARY: Shall mean work which is required for completed construction, but is not necessarily shown or described in the Contract Documents.

WWW. AS REQUIRED: Shall mean work which is required for completed construction, but is not necessarily shown or described in the Contract Documents.

XXX. Substantial Completion: Shall mean that the project is sufficiently complete to be utilized for its intended use as stated in the body of this written specification.

YYY. Contractor/INTEGRATOR: Refers to the biding/installation Contractor responsible for furnishing and installation of all work indicated within this specification.

1.04 REFERENCE STANDARDS

A. 47 CFR 15 - Radio Frequency Devices; current edition.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

C. NECA 303 - Standard for Installing Closed- Circuit Television (CCTV) Systems; 2005.

D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. System shall be RoHS (Restriction of Hazardous Substances) compliant and meet proposed amendments to the reduction of toxic substances in manufacturing in stated in the Environmental Design of Electrical Equipment Act (EDEE).

F. Installation shall comply with NECA 1-2010 "Standard Practice of Good Workmanship in Electrical Construction"

G. Installation shall comply with NEC/NFPA 70E "Standard for Electrical Safety in the Workplace"

H. Electronic data exchange between Video Surveillance System and the Access Control System shall comply with SIA TVAC

I. Installation shall comply with FCC CFR 47 Part 15 Class A "Telecommunications, Radio, Frequency, Digital Device Emission:

J. Installation shall comply with Federal, State, and Local Codes and Authority Having Jurisdiction (AHJ).

K. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
1. Coordinate the placement of cameras with structural members, ductwork, piping, equipment, luminaires, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
2. Coordinate the work with other installers to provide power for cameras and equipment at required locations.
3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Preinstallation Meetings:
1. Conduct meeting with facility representative to review camera and equipment locations and camera field of view objectives.
2. Conduct meeting with facility representative and other related equipment manufacturers to discuss video surveillance system interface requirements.

C. Confidentiality of Documents
1. The project documents, consisting of all technical proposals, drawings, specifications, shop drawings, as-built drawings, manufacturer's literature, etc., shall be considered proprietary information and are to be treated with complete confidentiality. Dissemination of any security system documentation to any party not considered "need-to-know" without a pre-defined and approved agreement will be considered a violation of the contract documents and all pursuant clauses regarding financial penalties, project termination, and/or legal prosecution will apply. The Contractor is to obtain a list of "need-to-know" parties from the Owner and/or Construction Manager.
2. Use of the Contract drawings and specifications is restricted to the original site for which they were prepared. Publication therefore is expressly limited to such use. Re-use, reproduction, storage by any medium or publication by any method in whole or in part is prohibited. Visual contact with the Contract drawings and specifications constitutes prima facie evidence of the acceptance of these restrictions. Unlawful publication,

dissemination, and use of these documents carry significant liability and the Owner maintains the right to legally pursue restitution and/or penalty for violation of these confidentiality conditions.

3. All documents marked "DO NOT DUPLICATE" are to be returned to the Construction Manager for proper disposal and handling upon completion of their relevant use.

1.06 SUBMITTALS

A. See Division 01 – Administrative Requirements for submittal procedures.

B. Evidence of Qualifications for Installer:

1. The Contractor shall be a bona fide security systems contractor, licensed by the State of Connecticut for the installation of the low voltage security and signal communication systems, and engaged in security system maintenance, service and contracting for at least the last five years.
2. The Contractor shall employ technicians who have been trained by the Manufacturer specified within this section to install the systems of this Manufacturer.
3. The contractor shall be a factory authorized stocking distributor of the manufacturer of the equipment included in the system so that immediate replacement parts can be made from inventory and service provided as needed on an emergency basis.
4. The Contractor shall submit with the bid a manufacturer's certificate of acceptance of the qualifications of the Installing Contractor to install, test, maintain and repair the manufacturer's equipment.
5. In order for the Security Consultant to verify that they meet the competency requirements of this specification, Contractors must submit the following information if so requested:
   a. Proof that the Contractor has installed, services and maintained similar security systems for a minimum of ten (10) years.
   b. Proof that the Contractor is a firm which currently and regularly installs, services and maintains security systems as a full time business.
   c. The names and qualifications of security system technicians that shall perform and supervise the work, and perform tests or adjustments on the systems and equipment. Qualifications shall include all schooling, training, and history of work experience.
   d. A list of four prior systems comparable to the one specified under this contract which were installed, serviced, and maintained satisfactorily by the Contractor for a minimum of one (1) year. Each system listed shall include the firm or owner, location, person to contact (with telephone number), date of installation and service period, and a brief description of the system and work performed on the system.
6. The Contractor shall submit any other information required by the Security Consultant to determine the competency of the Contractor. If this information is not submitted as requested, it shall be submitted within the time specified by the Architect after the bid opening. If the Contractor fails to submit the information in accordance with the Security Consultant's request, the Contractor shall be declared non-responsive, and may be rejected to perform the work specified within this section.

C. Design Data: Standby battery/UPS Calculations

D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instruction for storage, handling, protection, examination, preparation, installation, and operation of product.

E. Manufacturer's detailed field-testing procedures.

F. Maintenance contracts.

G. Product Data: Provide details and technical specifications for each product indicated. Include physical dimensions, features, performance, electrical characteristics, ratings, software versions, and operating system details.

H. Shop Drawings:
1. General: General: Bid documents, including drawings, details and specifications are considered conceptual in nature, and provide direction on products and project requirements. Contractor is given a choice of methods that may be incorporated into the system. These choices may affect the overall design, configuration and installation of the proposed system.
2. Contractor Responsibility: Prepare and submit shop drawings, rendered in the latest AutoCAD DWG file format, which show details of all work to ensure proper installation of the work using those materials and equipment specified or allowed under the approved plans and specifications. A complete Shop Drawing submittal drawing package shall consist of Drawings, Equipment Data Sheet Submittals, and an Acceptance Testing Plan.
3. Completeness: The Equipment Submittals, Acceptance Testing Plan, and the Shop Drawings should be submitted as a complete and contiguous package. Partial or unmarked submittals will not be accepted for review.
4. Scheduling: A schedule of shop drawing submissions shall be submitted for the Architect and Owner's Representative review on a form acceptable to the Architect within ten (10) days after award of the Contract. The schedule of shop drawing submissions shall include as a minimum, but not limited to the requirements stated herein.
5. Requirements: Provide the following information complete, and in the manner described herein:
    a. Hardware, Application Software, and Network Requirements: A system description including analysis and calculations used in sizing equipment required by the security systems. The description shall show how the equipment will operate as a system to meet the performance requirements of the systems. The following information shall be supplied as a minimum:
        1) Server(s) processor(s), disk space and memory size
        2) Workstation(s) processor(s), disk space and memory size
        3) Description of facility (field) control equipment (Controllers/Field Panels, Models) and their configuration
        4) Operating System(s) Software, where software is provided or upgraded
        5) Application Software, with Optional and Custom Software Modules supplied in this project
        6) Integration Schemes: Proposed connectivity, software, development requirements, and SDK information, for inter-system communication.
        7) Network bandwidth and reliability requirements
        8) Number and location of LAN ports required

9) Other specific network requirements, preferences, and constraints
10) Backup/archive system size and configuration
11) Start-up operations
12) System power requirements and Uninterruptible Power Supply (UPS) sizing
13) Device/component environmental requirements (cooling and/or heating parameters)

b. Shop Drawings: Shop Drawings shall be numbered consecutively and shall accurately and distinctly present the following information:
1) Title Sheet
2) Floor Plans: Showing devices, pull boxes, cabinets, conduits and conductors in their proposed locations with device numbering scheme.
3) Riser Diagram: Showing all conduit relationships between devices shown on the Floor Plans. Show all power sources.
4) Single-Line/Block Diagrams: Show signal relationships of controls and devices within the system.
5) Custom Assembly Diagrams: For each custom assembly such as Access Control Terminal Cabinets, receptacle assemblies, or door control panels, provide an assembly drawing illustrating the appearance of the assembled device. Include dimensions, assembly components, and functional attributes (momentary or alternate action switch, lens color, panel finish)
6) Component Connection Diagrams
a) For each equipment component such as a computer, video switcher, camera or video recorder, show the rear elevation of the device and all connectors/terminations as a pictorial.
b) Show the wire designations on connectors. Typical wiring detail where multiple of same device is provided.
c) Show a schedule of the wire colors connected to the pins on each device connector.

c. Equipment Wiring Diagrams
1) Show a pictorial illustration of each equipment enclosure and/or terminal cabinet, including terminals, components and wiring devices.
2) Show the device nomenclature exactly as shown on the single line diagrams.
3) Terminations: Show every termination and terminating cable, with applicable cable and wire numbers matching the single line diagrams.
a) Every termination in the system must be documented.
b) Termination information may be rendered as a wiring list(s), if properly coordinated with, and referenced to, typical component and single-line diagrams. Otherwise, the Shop Drawings shall show a pictorial of every component in the system, with its terminations.
4) Show wire colors for each terminal.
5) For each wire exiting the enclosure, show the destination of the wire by floor, room number and the drawing number of the panel where the wire terminates.
6) Provide working dimensions and erection dimensions.
7) Arrangements and sectional views

8) Necessary details, including complete information for making connections between work under this Contract, existing work, and work under other Contracts.
9) Stock or standard drawings will not be accepted for review unless full identification and supplementary information is shown thereon in ink or typewritten form.
10) Duplicate of design drawings may be used where each sheet is modified to reflect contractor coordination, specific requirements of the project and multidiscipline conditions.
11) Each Drawing or page shall include:
    a) Project name, Project Number and descriptions.
    b) Submittal date and space for revision dates.
    c) Identification of equipment, product or material.
    d) Name of Contractor and Subcontractor.
    e) Name of Supplier and Manufacturer.
    f) Relation to adjacent structure of material.
    g) Physical dimensions clearly identified.
    h) ASTM and Specifications references.
    i) Identification of deviations from the Contract Documents.
    j) Contractor's stamp, initialed or signed, dated and certifying to review of submittal, certification of field measurements and compliance with Contract.
    k) Location at which the equipment or materials are to be installed. Location shall mean both physical location and location relative to other connected or attached material.

d. Equipment Submittals
1) Provide a Title Page, with project name, Contractor’s name and address, contact information, date of submission, and submission revision number.
2) Provide a Parts List, for proposed equipment, materials, components and devices, listing the following information for each line item:
    a) The system type
    b) Model number
    c) Specification sheet page reference
3) Provide Manufacturers Specification Sheet with descriptive information for equipment, materials, components and devices. Number each page, to correspond with the Parts List.
4) Clearly delineate (with highlighter, arrow, or underline) on each specification sheet, specific model numbers, options and configurations being proposed for this project.
5) Indicate kinds of materials and finishes for equipment where more than one option is presented.

e. Acceptance Testing Plan
1) Submit a written document detailing the test procedures to be followed in evaluating and proving the installed system(s).
2) Provide a sample of the test forms to be used for each system and for each component of each system.

3) Include all tests required by the equipment manufacturer and by this Specification

f. Spare Parts List: Submit a list of recommended spare parts for Owner's review & approval and/or amending. Spare parts shall comprise a minimum of 5% or minimum of 2 each of field devices, device termination boards and a minimum of 1 system controller boards.

g. Incomplete or unchecked submittals which do not contain complete data on the work and full information on related matters will be returned for correction.

h. Verification: The contractor shall check and acknowledge all shop drawings and shall place his signature on all shop drawings submitted for approval. Contractor's signature shall constitute a representation that all quantities, dimensions, field construction criteria, materials, catalog numbers, performance criteria and similar data have been verified and that, in his opinion, the submittal fully meets the requirements of the Contract Documents.

i. Timeliness: The Contractor shall schedule, prepare and submit a complete shop drawing assembly in accordance with a time-table that will allow his suppliers and manufacturers sufficient time to fabricate, manufacture, inspect test and deliver their respective products to the project site in a timely manner so as to not delay the complete performance of the work.

j. Departure from Contract Requirements: If shop drawings show departures from the Contract requirements, the Contractor shall make specific mention thereof in his letter of transmittal, otherwise review of such submittals shall not constitute review of the departure. Review of the drawings shall constitute review of the specific subject matter for which the drawings were submitted and not of any other structure, materials, equipment, or apparatus shown on the drawings.

k. Contractor Responsibility: The review of shop drawings will be general and shall not relieve the Contractor of responsibility for the accuracy of such drawings, nor for the proper fitting and construction of the work, nor for the furnishing of materials or work required by the Contract. No construction called for by shop drawings shall be initiated until such drawings have been reviewed and approved.

l. Shop Drawing Submittal Review: The procedure in seeking review of the shop drawings shall be as follows:

1) The Contractor shall submit four (4) complete sets and/or electronic PDFs of shop drawings with equipment submittals and other descriptive data with one copy of a letter of transmittal to the Architect for review thirty (30) working days after award of the contract. The letter of transmittal shall contain the project name, Architects's Project Number, the name of the Contractor, the list of drawings submitted including numbers and titles, requests for any review of departures from the contract requirements and any other pertinent information. Drawings submitted for review shall be full-sized and included with the equipment submittals.

2) Drawings or descriptive data will be stamped "Reviewed", "Furnish as Corrected", "Revise and Resubmit", "Rejected" or 'Submit Specific Item' and one copy with a Letter of Transmittal will be transmitted to the Contractor with the return of submitted documents.

3) If a shop drawing or data is stamped "Reviewed" or "Furnish as Corrected", no additional submittal is required for that shop drawing.

4) If a shop drawing or data is stamped "Revise and Resubmit" or “Rejected”, the Contractor shall make the necessary corrections and resubmit the documents as required above. The letter transmitting corrected documents shall indicate that the documents are re-submittals.
5) The Contractor shall revise and resubmit the shop drawing as required, until they are stamped either "Reviewed" or "Furnish as Corrected."

I. Equipment and Software List: Include every piece of equipment and software by product/model name and/or number, manufacturer, serial number, revision number, location, and date of original installation. If factory and/or bench testing regimens are required by the project plan, add pretesting record of each piece of equipment and software, listing name of person testing, date of test, and adjustments made.

J. CE and FCC Compliance Certificates:

K. Field quality-control reports

L. Current Specified Manufacturer Integrator Certification Letter

M. Current Specified Manufacturer Training Certificates (listing expiration dates) for Two technicians from the supporting office

N. Warranty: Software support and warranty information for all components, including Service Level Agreement (SLA) details, and duration of agreement from date of system acceptance by Owner. Submit sample of manufacturer’s warranty and documentation of final executed warranty completed in Owner’s name and registered with manufacturer.

O. Project Record Documents: Record actual locations of system components and installed wiring arrangements and routing.

P. Operation and Maintenance Data: Include detailed information on system operation, equipment programming and setup, replacement parts, and recommended maintenance procedures and intervals.
1. Include contact information for entity that will be providing contract maintenance and trouble call-back service.
2. General: The Contractor is responsible for providing accurate drawings and equipment manuals describing and depicting the systems as they are actually installed and operated.
3. Phase One: Notwithstanding requirements specified elsewhere, submit the following labeled as the "Operating and Maintenance Manual" within thirty (30) days after Final Acceptance of the Installation:
    a. Record Drawings: Submit two (2) copies of revised versions of drawings as submitted in the "Shop and Field" and "Equipment Wiring Diagrams" Submittals showing actual device locations, conduit routing, wiring and relationships as they were constructed. Include nomenclature showing as-built wire designations and colors. Drawings shall include room numbers coinciding with Owner space planning numbering. Drawings shall be submitted in electronic editable AutoCAD files, in “.dwg” format, on CD or DVD disks.
    b. Manuals: Submit two (2) copies of each of the following materials in bound manuals, or electronic PDF copies on CD/DVD discs, with labeled dividers:

1) A final Bill of Material for each system.
2) Equipment Instruction Manuals: Complete, project specific comprehensive instructions for the operation of devices and equipment provided as part of this work.
3) Manufacturers Instruction Manuals: Specification sheets, brochures, Operation Manuals and service sheets published by the manufacturers of the components, devices and equipment provided.
4) Include information for testing, repair, troubleshooting, assembly, disassembly and recommended maintenance intervals.
5) Provide a replacement parts list with current prices. Include list of recommended spare parts, tools, and instruments for testing and maintenance purpose.
6) Performance, Test and Adjustment Data: Comprehensive documentation of performance verification according to parameters specified herein.
7) Warranties: Provide an executed copy of the Warranty Agreement and copies of all manufacturers' Warranty Registration papers as described herein.

1.07 QUALITY ASSURANCE

A. Comply with the following:
   1. NFPA 70.
   2. Applicable TIA/EIA standards.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

D. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience with video surveillance systems of similar size, type, and complexity and providing contract maintenance service as a regular part of their business; authorized manufacturer's representative.
   1. Contract maintenance office located within 100 miles (160 km) of project site.

E. Maintenance Contractor Qualifications: Same entity as installer.

F. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

G. The requirements of the State Building Code and local regulations establish the minimum acceptable quality of workmanship and materials, and all work shall conform thereto unless more stringent requirements are indicated or specified herein.

H. All work shall comply with the latest editions of the codes as referenced herein.

I. Follow manufacturer's directions for articles furnished, in addition to directions shown on drawings or specified herein.

J. Protect all work, materials, and equipment from damage during process of work. Replace all damaged or defective work, materials and equipment without additional cost to the Owner.

K. All equipment and materials for permanent installation shall be the products of recognized manufacturers and shall be new.

L. Equipment and materials shall:
1. Where normally subject to Underwriters Laboratory Inc. listing or labeling services, be so listed or labeled.
2. Be without blemish or defect.
3. Not be used for temporary purposes.
4. Be in accordance with the latest applicable NEMA standards.
5. Be products which will meet with the acceptance of all authorities having jurisdiction over the work. Where such acceptance is contingent upon having the products examined, tested and certified by Underwriters or another recognized testing laboratory, the product shall be so examined, tested and certified.

M. Except for conduit, conduit fittings, outlet boxes, wire and cable, all items of equipment or material of one generic type shall be the product of one manufacturer throughout.

N. For items which are to be installed but not purchased as part of the electrical work, the electrical work shall include:
1. The coordination of their delivery.
2. Their unloading from delivery trucks driven into any point on the property line at grade level.
3. Their safe handling and field storage up to the time of permanent placement in the project.
4. The correction of any damage, defacement or corrosion to which they may have been subjected. Replacement, if necessary, shall be coordinated with Contractor who originally purchased the item.
5. Their field make up and internal wiring as may be necessary for their proper operation.
6. Their mounting in place including the purchase and installation of all dunnage, supporting members, and fastenings necessary to adapt them to architectural and structural conditions.
7. Their connection to building wiring including the purchase and installation of all termination junction boxes necessary to adapt and connect them to this wiring. Included also shall be the purchase and installation of any substitute lugs or other wiring terminations as may be necessary to adapt their terminals to the building wiring as called for and to the connection methods set forth in these specifications.

O. Items which are to be installed but not purchased as part of the electric work shall be carefully examined upon delivery to the project. Claims that any of these items have been received in such condition that their installation will require procedures beyond the reasonable scope of the electric work will be considered only if presented in writing within one week of the date of delivery to the project of the items in question. The work includes all procedures, regardless of

how extensive, necessary to put into satisfactory operation, all items for which no claims have been submitted as outlined above.

P. Seismic Performance: Provide equipment capable of withstanding the effects of earthquake motions determined according to ASCE/SEI 7 and current building codes for the state of CT.
   1. The term “withstand” means “the system(s) will remain in place without separation of any parts when subjected to the seismic forces specified and the system will be fully operational after the seismic event.”

1.08 PROJECT CONDITIONS

A. Environmental Conditions: Capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:
   1. Interior, Controlled Environment: System components installed in temperature-controlled interior environments shall be rated for continuous operation in ambient temperatures of 36 to 122 deg F (2 to 50 deg C) dry bulb and twenty to ninety percent (20-90%) relative humidity, noncondensing. Use NEMA 250, Type 1 enclosures.
   2. Interior, Uncontrolled Environment: System components installed in non- temperature-controlled interior environments shall be rated for continuous operation in ambient temperatures of 0 to 122 deg F (minus 18 to plus 50 deg C) dry bulb and twenty to ninety percent (20-90%) relative humidity, noncondensing. Use NEMA 250, Type 3R enclosures.
   3. Exterior Environment: System components installed in locations exposed to weather shall be rated for continuous operation in ambient temperatures of minus 30 to plus 122 deg F (minus 34 to plus 50 deg C) dry bulb and twenty to ninety percent (20-90%) relative humidity, condensing. Rate for continuous operation when exposed to rain as specified in NEMA 250, winds up to 85 mph and snow cover up to 24 inches thick. Use sufficiently rated NEMA 250 enclosures.
   4. Hazardous Environment: System components located in areas where fire or explosion hazards may exist because of flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers shall be rated, listed, and installed according to NFPA 70.
   5. Corrosive Environment: System components subject to corrosive fumes, vapors, and wind-driven salt spray in coastal zones. Use sufficiently rated NEMA 250 enclosures.
   6. Security Environment: Camera housing for use in high-risk areas where surveillance equipment may be subject to physical violence.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions and NECA 303.

B. Store products in manufacturer's unopened packaging, keep dry and protect from damage until ready for installation.

1.10 FIELD CONDITIONS

A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.11 WARRANTY

A. See Section Division 01 – Closeout Submittals for additional warranty requirements.

B. The Integrator guarantees the Systems to be installed under this specification to be free from any defects in workmanship and materials for a period of one (1) year from the date of final completion/acceptance of the project by the Owner as evidenced by the date of final payment for the work. The Contractor shall promptly and at their own expense remedy any defects in the work and pay for any damage to other work resulting thereof, which shall appear during the period of time covered by this guarantee. Neither the final certificate of payment nor any provisions in this Agreement shall constitute an acceptance of work not done in accordance with this specification or relieve the Contractor of liability with respect to any expressed warranties or guarantees or responsibility for faulty materials or workmanship.

C. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of equipment related to the Access Control System, and control-station equipment that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: The standard manufacturer’s warranty shall apply or a minimum of a one (1) year warranty from the date of Substantial Completion.

D. The Integrator shall provide all services required to maintain the system in an operational state as specified by the manufacturer for a period of one (1) year after acceptance.

E. Service response shall be within twelve (12) hours of the initial request for service and shall be provided twenty-four (24) hours per day, seven (7) days per week and three hundred sixty-five (365) days per year.

F. Contractor shall include, as part of this warranty, a program for maintenance for each integrated system.
   1. Provide details of coverage, preventive maintenance schedules, exclusions and service rates for all billable time and travel charges.
   2. Maintenance shall include two (2) semi-annual inspections and tests to verify the intended operation of the security system(s). System testing shall include but not be limited to the testing of all devises, fault modes and batteries. A detailed test report indicating these results and any corrective measures shall be furnished to the owner.

G. The Contractor shall provide software and firmware upgrades as required and available to the Owner.

H. Submit manufacturer's standard warranties.

PART 2 PRODUCTS

2.01 SYSTEM REQUIREMENTS

A. Furnish and install Video Surveillance System consisting of required equipment, conduit, boxes, wiring, connectors, hardware, supports, accessories, software, system programming, etc. as necessary for a complete operating system that provides the functional intent indicated.

B. The awarded contractor of this section shall furnish and install a network Video Surveillance (VSS) system into this facility using electronic security devices. This integrated VSS shall incorporate all devices necessary to achieve the specified system, all associated monitoring and recording software, hardware, configuration, testing and training.

C. The contractor awarded this project must include the following licenses and configuration:
   1. VSS licenses for each camera on the Specified Access Control System

D. The contractor shall provide a rack mounted UPS for each equipment rack provided for powering all equipment located within the equipment rack. The UPS shall be supplied with an auto-shutdown feature to allow an automatic orderly shutdown of the connected server. The auto-shutdown feature shall be connected to and programmed to shut down any servers contained within the equipment rack being powered from the UPS.

E. Surge Protection: Protect components from voltage surges originating external to equipment housing and entering through power, communication, signal, control, or sensing leads. Include surge protection for external wiring of each conductor's entry connection to components.

F. This VSS described within this specification shall be fully integrated with the Access Control and Intrusion Detection System.

G. All installation, peripheral devices, required licensing and configurations are required as part of this specification to establish a coherent, functional system as described within this bid package.

H. Security Ethernet cabling from the indicated Telecommunication Rooms to the Specified Cameras as described within the documents shall be furnished and installed by the contractor awarded Division 27.

I. Any and all additional interconnection cabling required for a functional system shall be furnished and installed by the contractor awarded this portion of work.

J. Final terminations to all devices are required by the Contractor awarded this Section.

K. The Contractor awarded this Section shall furnish and install a complete integrated security system and all associated, terminations, supporting devices, configuration of system, testing and training in accordance with this Bid package.

L. This specification is used to identify the requirements for an integrated VSS. The operator workstation(s) shall be used for database programming and storage of historical events and as a User interface with the Access Control System.

M. Within the VMS, the Contractor shall create floor plan maps that include camera icons appropriately placed according to actual location. Upon clicking a camera icon, the video feed associated with that camera shall automatically be called up and displayed.

N. System Design Intent:

1. It is the intention of this system design to provide a fully functional Video Surveillance System for, minimally, the following features:
    a. The end user shall be able to access live or recorded video from within the VSS software and shall have the following capabilities:
        1) The end user shall have the ability to pause, stop, resume, fast forward, frame advance, rewind, and move to a different time window.
        2) The user shall be able to quickly switch between live and recorded video.
        3) The user shall be able to view multiple video feeds simultaneously.
        4) Upon alarm input to the IDS or ACS, a predetermined video feed or feeds that are associated with that alarm shall automatically display in the Access Control System Software window. This video window shall have the capability to display recorded (IE 10 seconds prior to alarm) video.
        5) Within the VSS software window, the end user shall have the ability to call up and display live video from any camera. This shall include the ability to display multiple live camera views simultaneously through a matrix view.
        6) Within the VMS, the end user shall have the ability to export recorded video to a local hard drive or to a removable media (such as CD or USB drive). The system shall automatically watermark this video file for future proof of authenticity.

O. System Functionality Overview:
1. System shall provide high-quality delivery and processing of IP-based video and control data using standard Ethernet-based networks.
2. System shall have seamless integration of all video surveillance and control functions.
3. Graphical user interface software shall manage all IP-based video matrix switching and camera control functions and recording and archive/retrieval management. IP system shall also be capable of integrating into larger system environments.
4. System design shall include all necessary compression software for high-performance, dual-stream, Motion JPEG and H.264 video.
5. All camera signals shall be compressed to H.264, encoded, and delivered onto the network for processing and control by the IP video-management software.
6. Camera system units shall be ruggedly built and designed for extreme adverse environments, complying with NEMA Type environmental standards.
7. The Camera's recorded images shall include masking of the unwanted areas within each camera view to minimize storage space. These recorded images shall be defined with the Owner and technology consultant.
8. Configuration of the Video Server to utilize two (2) Ethernet connections and Network Interface cards; one (1) for incoming video and recording and one (1) to send recorded video to the storage device.
9. Video management software shall be configured for the following.
    a. Recorded Video Compression Rate: H.264
    b. Frame Recorded Per Second: Fifteen (15).
    c. Resolution should be set at the highest obtainable from each camera specified.
    d. Stored data shall be saved for thirty (30) calendar days.
    e. Interior cameras shall record eighteen (18) hours per day.
    f. Exterior cameras shall record twenty-four (24) hours per day.
    g. Include 10% headroom storage.

h. Include subtotal for processing and management software.
i. Each camera "Field of View" shall be coordinated with the assistance of the Owner and/or the Security Consultant.

P. System Configuration Overview:
1. All system configuration(s) shall be included to attain a fully functional system and shall be within the Scope of work of the awarded Contractor of this section. This configuration shall include but not be limited to the following:
a. Configuration of all cameras to be managed via the Video Management software.
b. Configuration of Video Surveillance Server to view/record/access all cameras.
c. Configuration of the Video Surveillance Servers to monitor all connected cameras for video loss. Video loss detection shall create an alarm on the VMS, alert any connected workstation, and simultaneously send an email to the system administrator conveying the video loss condition.
d. Configuration of video storage devices with the server.
e. Configuration of Browser Based Client for up to (4) users groups.
f. Configuration of the Video Storage Server per the manufacturer's established best practices.
g. Configuration of the Video Management Server per the manufacturer's established best practices.
h. Configuration of the Video Mobile Server per the manufacturer's established best practices.
i. Integration with the Owner's Active Directory.
j. Configuration of LAN switches – Active Electronics, as related to the systems specified within this document. Including VLANS and IP addressing shall be as indicated by the Owner.
k. The Contractor shall coordinate any/all network connections with the Owner IT Department prior to making any physical connections to the Owner's network components. Failure to follow this directive may result in expenditures for repair and troubleshooting by the Owner's IT department or 3rd party IT contractor/vendor. Such expenditures to remedy any issues caused by incorrect coordination by the Contractor shall be borne by the Contractor.
l. The contractor will be responsible for establishing the security of all IP devices, servers, and VMS storage from adversary compromise (internal or external) in conjunction with the owner's IT Department.
m. The cost of investigation, repairs, and reprogramming resulting from any security breaches during the construction or operation of the systems (while under warranty or service agreement) attributable to the failure of the Contractor to implement approved IT security measures shall be borne by the contractor.
n. Configuration of the VMS and Access Control managed software to:
1) Allow complete interface between both platforms
2) Allow the Access Control System to access and view all video surveillance cameras.
3) Allow access and controlled network management system with Web and Internet access of the Video Surveillance system.
o. Programming camera names and recording parameters to optimize the camera for the environment for which it is operating in. Camera names shall be coordinated

with the Owner prior to configuration. Naming all cameras within the system is the responsibility of the Contractor.

Q. Environmental Conditions: System(s) shall withstand the environmental conditions without mechanical or electrical failure, damage or degradation of its operating capacity Capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:

1. Interior, Controlled Environment: System components installed in temperature-controlled interior environments shall be rated for continuous operation in ambient temperatures of 36 to 122 deg F (2 to 50 deg C) dry bulb and twenty to ninety percent (20-90%) relative humidity, noncondensing. Use NEMA 250, Type 1 enclosures.
2. Interior, Uncontrolled Environment: System components installed in non- temperature-controlled interior environments shall be rated for continuous operation in ambient temperatures of 0 to 122 deg F (minus 18 to plus 50 deg C) dry bulb and twenty to ninety percent (20-90%) relative humidity, noncondensing. Use NEMA 250, Type 3R enclosures.
3. Exterior Environment: System components installed in locations exposed to weather shall be rated for continuous operation in ambient temperatures of minus 30 to plus 122 deg F (minus 34 to plus 50 deg C) dry bulb and twenty to ninety percent (20-90%) relative humidity, condensing. Rate for continuous operation when exposed to rain as specified in NEMA 250, winds up to 85 mph and snow cover up to 24 inches thick. Use sufficiently rated NEMA 250 enclosures.
4. Hazardous Environment: System components located in areas where fire or explosion hazards may exist because of flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers shall be rated, listed, and installed according to NFPA 70.
5. Corrosive Environment: System components subject to corrosive fumes, vapors, and wind-driven salt spray in coastal zones. Use sufficiently rated NEMA 250 enclosures.
6. Security Environment: Camera housing for use in high-risk areas where surveillance equipment may be subject to physical violence.

2.02 VIDEO MANAGEMENT SYSTEM

A. The Video Management System shall be Avigilon Enterprise. No other manufacturer will be considered.

B. The Video Management Server shall be Avigilon.

C. Include an Avigilon Enterprise License per each device specified within this project.

2.03 CAMERAS

A. The camera manufacturer shall be Avigilon. No other manufacturer will be considered.

B. Refer to camera schedule for make and model.

C. Interior and Exterior cameras shall be Avigilon H5A, Dome, 6MP or better cameras.

D. The Exterior multi-sensor cameras shall be Avigilon H4A, Dome, 12MP or better cameras.

2.04 Uninterruptible Power Supply (UPS):

A. The Contractor shall supply individual UPS' each Telecommunication Room or Equipment Room where Active Electronics supplying data and signal to the Video Surveillance System is located. The UPS will be used to support Ethernet switch, servers, video recorders, and any other rack mount security equipment.

B. The Contractor shall supply individual UPS at security guard post. UPS will be used to support security workstation, monitors, printer, intercom master station, and any other security equipment in that location.

C. The UPS shall be as manufactured by APC or approved equal

D. The supplied UPS shall support the equipment at each location plus an additional 500 Watts at 120VAC for a minimum of fifteen (15) minutes under full load

E. The Contractor shall supply the appropriately sized UPS as dictated by the accepted submitted equipment as approved by the Engineer.

F. The UPS located in ER / TR locations shall be rack mountable and shall include all mounting hardware.

G. The UPS shall have the capability of sending SMTP email messages

H. The UPS shall be supplied with software to connect to the security system Ethernet network to allow for monitoring and alarm condition of the UPS including but not limited to the following;
   1. UPS on battery
   2. UPS load capacity exceeded
   3. UPS off line
   4. UPS overheat
   5. UPS experienced surge

2.05 Surge Protection:

A. Install Lightning / Surge protection for all exterior rated cameras. Ground all protectors to manufacturer recommendations and Code requirements.

B. The intent of the Lightning / Surge protector is to protect the connected electronics (switches, routers, servers) in the event a camera is struck by lightning.

C. Surge protectors shall be installed between camera and patch panel.

D. Acceptable manufacturers:
   1. Ditek
   2. Approved Equivalent

2.06 CLIENT WORKSTATIONS:

A. Client Viewing PC:
   1. Avigilon RM7-WKS-4MN

B. Wireless Mouse and Keyboard:
   1. IOGEAR #GKM552R
   2. Approved Equivalent

C. 55" Display and Mount:
   1. SAMSUNG #QM55R or approved equal
   2. The digital display shall meet the following requirements:
      a. 55" diagonal
      b. 3840 x 2160 minimal resolution
      c. 500 nit minimal brightness
      d. Approved for 24/7 operation
      e. Includes a standard manufacturer 3-year warranty
   3. CHIEF #MTM1U or approved equal
   4. Include Chief #FHB5147 Universal Flat Panel Mount Hardware Kit

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that ratings and configurations of system components are consisted with the indicated requirements.

C. Verify that mounting surfaces are ready to receive the system components.

D. Verify that branch circuit wiring is installed, completed, tested, and ready for connection to system.

E. Verify that conditions are satisfactory prior to starting work.

F. Device Locations
   1. All device locations are to be field verified with the Owner prior to start of project. Architectural drawings are for approximation purposes only. Additional charges will not be allowed for outlet installation in areas not reviewed or approved by the Owner.

G. Examine pathway elements intended for cables. Check raceways and other elements for compliance with space allocations, installation tolerance, hazards to camera installation, and other conditions affecting installation.

H. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install Video Surveillance system in accordance with NECA 1 (general workmanship).

B. Install products in accordance with manufacturer's instructions.

C. Install cameras level and plumb.

D. Install cameras with 84-inch minimum clear space below cameras and their mountings. Change type of mounting to achieve required clearance.

E. Set pan unit and pan-and-tilt unit stops to suit final camera position and to obtain the field of view required for camera. Connect all controls and alarms and adjust.

F. Install power supplies and other auxiliary components within the Telecommunication Room unless otherwise indicated.

G. Install tamper switches on components indicated to receive tamper switches, arranged to detect unauthorized entry into system-component enclosures and mounted in self-protected, inconspicuous positions.

H. Identify system components, wiring, cabling, and terminals according to industry standards.

I. Unless otherwise indicated, use wiring in conduit.
   1. Use suitable listed cables in we locations, including underground raceways.
   2. Use suitable listed cables for vertical wire applications.
   3. All cabling shall be plenum rated.
   4. Install wiring in conduit for the following:
      a. Where required for rough-in.
      b. Where required by the AHJ.
      c. Where exposed to damage.
      d. Where installed outside the building.
      e. For exposed connections from outlet boxes to devices.
   5. Conduit: comply with section Division 26.
   6. Conceal cables unless specifically indicated to be exposed.
   7. User power transfer hinges specified within Division 08 for concealed connections to door hardware.
   8. Cables in the following areas may be exposed:
      a. Equipment Closets
   9. Route exposed cables in parallel or perpendicular to building structural members and surfaces.
   10. Do not exceed manufacturer's recommended maximum cable length between components.

J. Provide grounding and bonding in accordance with Division 26.

K. Install firestopping to preserve the fire resistance rating of partitions and other elements, using materials and methods specified in Division 07.

L. Install power supplies and other auxiliary components at control stations unless otherwise indicated.

M. Identify system components, wiring, cabling, and terminals according to ANSI/EIA/TIA standards.

N. Security System Integration

1. The Contractor shall be responsible for providing hardware and software interfaces to achieve the specified system performance described herein and, by reference, realize absolute and seamless compatibility with the related component systems.
2. The Contractor shall ensure system additions and modifications provided under this scope of work have no negative effect on the individual components and systems, and their core functionality, and no permanent effect beyond that specified or implied by the scope of work.
3. Purpose
    a. Integration is the process of designing, deploying, and configuring independently operating systems with the ability to request, receive, extract, process, and act upon information from other systems.
    b. Successful system integration must address three fundamental issues:
        1) Functionality: What information is needed, how it is to be requested and processed, and what functions or activities need to occur upon receipt of the information.
        2) Connectivity: How systems will be connected to support the communication of information and commands. (Special interfaces, wiring, networks, databases.)
        3) Communication: How information will be communicated between systems. (Instruction sets, language, protocols, formats, priority.)
4. Environment
    a. Integration components shall generally comprise special elements of independent subsystems, and shall be located within, or in close proximity to, the processing components of each independent subsystem. Where subsystems require special hardware or communications interfaces to support integration, the special hardware should be located near the independent subsystem processing components or network appliance, based on the manufacturers' recommendation. See the drawings for details on mounting locations.
5. Infrastructure and Connectivity:
    a. Devices/Appliances: Appliances and devices shall be connected to their respective systems via the applicable communications network.
    b. System LAN/WAN Connectivity: System Servers and microprocessor-based Control Panels, shall reside on the Local Area Network (LAN) or Wide Area Network (WAN) tier designated for integrated components.
    c. Enterprise: LAN networks will be connected to the Wide Area Network, to establish connectivity between remote sites and both the Primary and Alternate Security Operations Center (SOC – room SB05-1).
6. Attributes
    a. The attributes of the integrated environment are primarily defined by the subsystems that are to be integrated. Verify existing system components to be expanded by this project.
    b. Integrated systems comprise the processors, software, electrical control panels, data gathering panels, special data interfaces, and converters required to allow systems to communicate with each other, process information, and allow users to program and perform operations.
7. Functions
    a. The system shall provide the following automated processing rules, at a minimum:

b. The object of "Access Control system integration" is to automatically configure the system to display, record, and report appropriate system activity to various elements of the system. Automatic configuration can free operators from difficult control tasks, give the operator more time to respond to events, reduce operator error, and ensure critical system tasks occur consistently.

c. Electronic Access Control system elements shall be electronically integrated in such a way as to enable detection, database records and/or event-initiated instructions to be communicated between system components, to initiate recording, display, communication, and control activities.

d. Event-Initiated Interface, General:

1) The system shall support the capability to send and receive alarm and control messages between the Access Control System and video systems via a LAN communications link, using API, XML, or other industry-standard communication languages and formats, and shall act upon those messages received.

2) The system shall support the capability to send and receive alarm and control messages and alarm signal between the Access Control system and Intrusion Detection System for lockdown / duress / and panic button initiation.

3) Where integration may require the implementation of data interfaces, Contractor shall propose such integration to the Owner for approval, before proceeding with the work.

4) Software routines required to accomplish the required data-interface with external equipment and controls will be fully developed, installed, tested and supported by the Contractor.

5) The manufacturer of each applicable system will also support the data interface and will be engaged by the Contractor to provide on-site technical assistance where required to prepare, repair, configure, and test the system to operational condition.

6) Communication of event information between systems shall take place automatically and immediately when the event is sensed by the System.

3.03 FIELD QUALITY CONTROL

A. Testing Agency: The Contractor shall engage a qualified testing agency to perform tests and inspections with the Owner and appointed project manager.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

C. Camera Field Verification:

1. All camera locations MUST to be field verified with the Owner prior to start of project. Architectural drawings are for approximation purposes only. Additional charges will not be allowed for installation in areas not reviewed or approved by the Owner.
2. Camera images will be reviewed with the Owner and the Security Consultant. The contractor shall plan for three adjustments of the camera's field of view as follows:
   a. Initial setup and testing

b. Owner and / or Security Consultant adjustments #1
c. Owner and / or Security Consultant adjustments #2

D. Perform tests and inspections.
1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

E. Tests and Inspections:
1. Inspection: Verify that units and controls are properly installed, connected, and labeled, and that interconnecting wires and terminals are identified.
2. Pretesting: Align and adjust system and pretest components, wiring, and functions to verify that they comply with specified requirements. Conduct tests at varying lighting levels, including day and night scenes as applicable. Prepare video-surveillance equipment for acceptance and operational testing as follows:
a. Prepare equipment list described in "Submittals" Article.
b. Verify operation of auto-iris lenses.
c. Set back-focus of fixed focal length lenses. At focus set to infinity, simulate nighttime lighting conditions by using a dark glass filter of a density that produces a clear image. Adjust until image is in focus with and without the filter.
d. Set back-focus of zoom lenses. At focus set to infinity, simulate nighttime lighting conditions by using a dark glass filter of a density that produces a clear image. Additionally, set zoom to full wide angle and aim camera at an object 50 to 75 feet away. Adjust until image is in focus from full wide angle to full telephoto, with the filter in place.
e. Set and name all preset positions; consult Owner's personnel.
f. Set sensitivity of motion detection.
g. Connect and verify responses to alarms.
h. Verify operation of control-station equipment.
3. Test Schedule: Schedule tests after pretesting has been successfully completed and system has been in normal functional operation for at least fourteen (14) days. Provide a minimum of ten (10) days notice of test schedule.
4. Operational Tests: Perform operational system tests to verify that system complies with Specifications. Include all modes of system operation. Test equipment for proper operation in all functional modes.

F. Video Surveillance System shall be considered defective if it does not pass tests and inspections.

G. Prepare test and inspection reports.

H. Occupancy Adjustments: When requested within twelve (12) months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two (2) visits to this Project location during other-than-normal occupancy hours for this purpose. Tasks shall include, but are not limited to, the following:
1. Check cable connections.
2. Check proper operation of cameras and lenses. Verify operation of auto-iris lenses and adjust back-focus as needed.

3. Adjust all preset positions; consult Owner's personnel.
4. Recommend changes to cameras, lenses, and associated equipment to improve Owner's use of video surveillance system.
5. Provide a written report of adjustments and recommendations

3.04 CLEANING

A. Clean installed items using methods and materials recommended in writing by manufacturer.

B. Clean video-surveillance-system components, including camera-housing windows, lenses, and monitor screens before installation and prior to final acceptance.

C. Remove rubbish and debris: Installation contractor is not allowed you use the onsite dumpster and is responsible to discard their own debris off site.

3.05 CLOSEOUT ACTIVITIES

A. See Division 01 – Closeout Submittals for Closeout Submittals.

B. Demonstration: Demonstrate proper operations of system to Owner and correct deficiencies or make adjustments as directed.

C. Training:
1. By means of training classes augmented by individual instruction as necessary, the Bidding contractor shall fully instruct the BOE's designated staff and personnel in the operation, adjustment and maintenance of all products, equipment and systems.
2. General Training Requirements:
    a. The security contractor shall submit proposal to conduct training courses for the security personnel in the operation and maintenance of the security systems within this security project.
    b. The security contractor shall include training manuals and aids in the quantity as requested by the Owner. The training manuals shall include an agenda, defined objectives for each lesson, and a detailed description of the subject matter for each lesson. All personnel providing the instructions shall be certified by the equipment manufacturer for all applicable hardware and software.
    c. Approval of the planned training content and training schedule shall be obtained by the Owner at least 45 days before the training is scheduled.
    d. Training shall be provided by qualified, factory trained and certified engineers familiar with each system and its operations and shall be provided at the site for a period of no less than the hours stipulated below.
3. Training Topics:
    a. System Administration Training
        1) This training shall focus on determining and implementing system operational parameters.
        2) The first training class shall be conducted so that it is completed approximately 30 days prior to acceptance of the system and final system reliability testing. 8 Hours of Administration training; (2) 4-hour classes.

3) The second training class shall be conducted so that it is completed approximately 7 days prior to acceptance of the system and final system testing. The system administrator shall be included as part of this final system acceptance and reliability testing. 6 Hours of training; (2) 3-hour classes.
4) This Administrations training shall include:
   a) Overall architecture and configuration of each system.
   b) Use of all system functions.
   c) ID badging design and production.
   d) Card-holder setup and configuration.
   e) Card-holder access level assignment.
   f) Access Door programming.
   g) Alarm setup and implementation.
   h) Data storage and retrieval through reports.
   i) Creation of reports.
   j) System database backup procedures.
   k) Hardware specifications.
   l) Fault diagnosis and corrections.

b. System User Monitoring Training
1) This training shall be for each designated personnel at this school.
2) This training shall focus on day-to-day system operations. Each user shall be capable to start the systems, operate them, recover the systems after a failure, and describe the specific hardware architecture and operation of the systems.
3) The first training class shall be conducted so that it is completed approximately 30 days prior to acceptance of the system and final system reliability testing. All System User Training shall be performed at each school within this specification. 8 Hours of User training; (2) 4-hour classes.
4) The second training class shall be conducted so that it is completed approximately 7 days prior to acceptance of the system and final system testing. The system administrator shall be included as part of this final system acceptance and reliability testing. 6 Hours of User training; (2) 3-hour classes.
5) Training shall include:
   a) Use of overall system monitoring functions as determined by the security administration staff.
   b) Monitoring alarm events.
   c) Monitoring personnel access into the facility.
   d) Assessing, responding to, and clearing alarms and messages.
   e) Monitoring access door status.
   f) Running routine reports.
   g) General hardware architecture.
   h) Functional operation of each system and interaction between these systems.
   i) All Operator commands.
   j) Database entry.

k) Report generation.
l) Alarm assessment.
m) Simple diagnostics.

c. System Troubleshooting and Maintenance Training
1) Training shall be provided with the internal features and configuration of the security systems so the user can trouble shoot and repair most configuration and physical device problems.
2) The training class shall be conducted so that it is completed approximately 14 days prior to acceptance of the system and final reliability testing. The users shall be included as part of this reliability testing. 8 Hours of training; (2) 4-hour classes.
3) This training shall include:
a) System networking communications and diagnostics.
b) Device configuration and programming.
c) Controller setup.
d) Wiring and cabling overview.
e) System Diagnostics.
f) Software troubleshooting.
g) Physical layout of each piece of hardware.
h) Preventive maintenance procedures and schedules.
i) Calibration procedures.

d. IT Training
1) Training shall be provided information of the security systems to the IT staff. This shall include information as to how each system functions within the LAN/WAN network infrastructures. 4 Hours of training.
2) Topics shall include:
a) Network topologies.
b) Maintenance of data security.

4. Training hours and sessions must be documented by the instructor and approved by the Owner before project closeout.
5. Should the training be deemed as inadequate by the Owner, the owner reserves the right to retain outside manufacturer training. If this outside manufacturer training has an associated cost, this cost shall be deducted from the final invoice of this project.
6. The Owner reserves the right to request the Contractor to videotape training sessions and turn over video records (DVD format) to Owner as part of the “Owner Project Manuals” and Deliverables.

3.06 PROTECTION

A. Protect installed system components from subsequent construction operations.

3.07 MAINTENANCE

A. See Division 01 – Execution and Closeout Requirements for additional requirements relating to maintenance service.

B. Adjustments:
   1. Occupancy Adjustments: When requested within twelve (12) months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two (2) visits to Project during other-than-normal occupancy hours for this purpose. Tasks shall include, but are not limited to, the following:
      a. Check cable connections.
      b. Check proper operation of video surveillance devices.
      c. Provide a written report of adjustments and recommendations.

C. Provide to Owner, at no extra cost, a separate maintenance contract for the service and maintenance of the Access Control System for One Year from date of Substantial Completion. Include a separate description of preventative maintenance, systematic examination, cleaning, inspection, and testing, with a detailed schedule.

D. Conduct site visit at least once every three months to perform inspection, testing, and preventative maintenance. Submit report to Owner indicating maintenance performed along with evaluations and recommendations.

E. Provide trouble call-back service upon notification by Owner:
   1. Include allowance for call-back service during normal working hours at no extra cost to Owner.
   2. Owner will pay for call-back service outside of normal working hours on an hourly basis, based on actual time spent at the site and not including travel time; include hourly rate and definition of normal working hours in maintenance contract.

END OF SECTION

SECTION 28 3100 - FIRE DETECTION AND ALARM

PART 1 GENERAL

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections with DIVISION 1 - GENERAL REQUIREMENTS, which are hereby made a part of this Section of the Specifications.

B. Attention is directed Section 26 0400 – GENERAL CONDITIONS FOR ELECTRICAL TRADES, which is hereby made a part of this Section of the Specifications.

1.2 SUMMARY

A. Section includes fire alarm control panels, manual fire alarm stations, automatic smoke and heat detectors, fire alarm signaling appliances, and auxiliary fire alarm equipment and power and signal wire and cable.

B. Related Sections:
1. Division 07 – Firestopping
2. Division 08 – Hardware (for magnetic door hold open devices)
3. Division 21 – Fire Protection (for flow detection devices)
4. Division 23 – HVAC (for smoke dampers and fire/smoke dampers)
5. Section 26 05 19 – Building Wire and Cable
6. Section 26 05 26 – Grounding and Bonding
7. Section 26 05 33 – Identification for Electrical Systems, for labeling and identification requirements.

C. Allowances: Refer to Division 01 Section “Allowances” for lump-sum allowance for additional fire alarm devices.

D. Alternates: Refer to Division 01 Section “Alternates” for description of Work of this Section affected by alternates.

E. Unit Prices: Administrative and procedural requirement for unit prices for fire alarm and carbon monoxide devices are specified in Division 1 Section “Unit Prices”.

1.3 REFERENCES

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; current edition.

B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

C. NFPA 72 - National Fire Alarm and Signaling Code

D. NFPA 101 - Life Safety Code

E. NFPA 601 - Standard for Security Services in Fire Loss Prevention

1.4 SYSTEM DESCRIPTION

A. This section of the specification includes the furnishing, installation, connection and testing of the microprocessor controlled, intelligent reporting fire alarm equipment required to form a complete, operative, coordinated system. It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, Fire Alarm Control Panel (FACP), auxiliary control devices, annunciators, and wiring as shown on the drawings and specified herein.

B. The fire alarm system shall comply with requirements of NFPA Standard No. 72 for Local Protected Premises Signaling Systems except as modified and supplemented by this specification. The system field wiring shall be supervised either electrically or by software-directed polling of field devices.
1. The Secondary Power Source of the fire alarm control panel will be capable of providing at least 24 hours of backup power with the ability to sustain 5 minutes in alarm at the end of the backup period.

C. Basic Performance:
1. Alarm, trouble and supervisory signals from all intelligent reporting devices shall be encoded on Class B circuits, unless otherwise indicated on drawings.
2. Notification Appliance Circuits (NAC) shall be wired Class B as part of an addressable device connected by the SLC Circuit, unless otherwise indicated on drawings.
3. All circuits shall be power-limited, per UL864 9th edition requirements.
4. A single ground fault or open circuit on the system Signaling Line Circuit shall not cause system malfunction, loss of operating power or the ability to report an alarm when wire NFPA Style 6/7.
5. Alarm signals arriving at the main FACP shall not be lost following a primary power failure or outage of any kind until the alarm signal is processed and recorded.

D. Alarm Sequence of Operation: Actuation of initiating device causes the following system operations:
1. Local fire alarm signaling devices sound and display with signal.
2. Zone-coded signal transmits to municipal connection (where applicable).
3. Location of alarm zone indicates on fire alarm control panel and on remote annunciator panel.
4. Signal transmits to building mechanical controls, shutting down fans and operating dampers.
5. Signal transmits to building elevator control panel, initiating return to main floor or alternate floor and lockout for fire service.
6. Signal releases magnetic door hold opens.
7. Refer to drawings for additional actions required to occur during alarm state.

E. Trouble Sequence of Operation: System or circuit trouble causes the following system operations:
   1. Visual and audible trouble alarm indicates by zone at fire alarm control panel.
   2. Visual and audible trouble alarm indicates at remote annunciator panel.
   3. Trouble signal transmits to municipal connection.

1.5 SUBMITTALS

A. Division 01: Submittal procedures.

B. Shop Drawings: Indicate system wiring diagram showing each device and wiring connection; indicate annunciator layout, and design calculations.

C. Product Data: Submit catalog data showing electrical characteristics and connection requirements.

D. Test Reports: Indicate procedures and results for specified field testing and inspection.

E. Manufacturer's Field Reports: Indicate activities on site, adverse findings, and recommendations.

F. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

G. Submit complete fire alarm battery calculations, taking all devices within building into account.

1.6 CLOSEOUT SUBMITTALS

A. Division 01: Closeout procedures.

B. Project Record Documents: Record actual locations of fire alarm equipment.

C. Operation and Maintenance Data: Submit manufacturer’s standard operating and maintenance instructions.

1.7 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70 and NFPA 101.

B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

C. Supplier Qualifications: Authorized distributor of specified manufacturer with minimum three years documented experience.

D. Installer Qualifications: Company specializing in installing the products specified in this section with minimum three years documented experience, and certified by the State as fire alarm installer.

E. Products: Listed and classified by Underwriters Laboratories, Inc as suitable for the purpose specified and indicated.

1.8 MAINTENANCE SERVICE

A. Division 01: Maintenance service.

B. Furnish service and maintenance of fire alarm equipment for one year from Date of Substantial Completion.

1.9 EXTRA MATERIALS

A. Division 01: Spare parts and maintenance products.

B. Provide (4) manual fire alarm pullstations, complete with all labor, material, and programming, to be located in the field as directed by the Local Authority having Jurisdiction.

C. Provide (6) fire alarm audio/visual appliances, complete with all labor, material, and programming, to be located in the field as directed by the Local Authority having Jurisdiction.

D. Provide (6) addressable ceiling type smoke detectors, complete with all labor, material, and programming, to be located in the field as directed by the Local Authority Having Jurisdiction.

E. Provide (4) addressable duct mounted smoked detectors, including all labor, material, and programming, to be located in the field as directed by the Local Authority having Jurisdiction.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials and products in unopened, factory labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from all possible damage. Sequence deliveries to avoid delays, but minimize on-site storage.

1.11 COORDINATION

A. Division 01: Pre-Installation conferencing.

B. Coordinate the installation of cable and equipment with other construction activities and the work of other sections.

C. Coordinate all connections to the building's HVAC system with the Division 23 contractor.

D. Coordinate all connections to the building's fire suppression system with the Division 21 contractor.

E. Coordinate all connections to door hardware with the Division 08 contractor.

1.12 WARRANTY

A. Contractor's Warranty: Warranty the installation to be free of defect for a period of one (1) year.

B. Equipment Warranty: For products noted in this section, provide manufacturer's standard warranty, minimum of one year.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Honeywell Silent Knight 6820 EVS.

B. No Substitutions: This is an owner sole source request.

2.2 CONTROL PANEL

A. Basis of design:
   1. Silent Knight 6820 EVS addressable control panel with voice-evac annunciation.

B. Product Description: Modular fire alarm control panel (FACP) with surface wall-mounted enclosure and shall contain a microprocessor-based Central Processing Unit (CPU). The CPU shall communicate with and control the following types of equipment used to make up the system: intelligent addressable smoke and thermal (heat) detectors, addressable modules, annunciators, and other system controlled devices.

C. In conjunction with intelligent Loop Control Modules and Loop Expander Modules, the main FACP shall perform the following functions:
   1. Supervise and monitor all intelligent addressable detectors and monitor modules connected to the system for normal, trouble and alarm conditions.
   2. Supervise all initiating signaling and notification circuits throughout the facility by way of connection to addressable monitor and control modules.
   3. Detect the activation of any initiating device and the location of the alarm condition. Operate all notification appliances and auxiliary devices as programmed. In the event of CPU failure, all SLC loop modules shall fallback to degrade mode. Such degrade mode shall treat the corresponding SLC loop control modules and associated detection devices as conventional two-wire operation. Any activation of a detector in this mode shall automatically activate associated Notification Appliance Circuits.

D. Power supply: Adequate to serve control panel modules, remote detectors, remote annunciators, relays, and alarm signaling devices. Include battery-operated emergency

power supply with capacity for operating system in standby mode for 24 hours followed by alarm mode for 5 minutes.

E. Batteries
1. The battery shall have sufficient capacity to power the fire alarm system for not less than twenty-four hours plus 5 minutes of alarm upon a normal AC power failure.
2. The batteries are to be completely maintenance free. No liquids are required. Fluid level checks for refilling, spills, and leakage shall not be required.
3. If necessary to meet standby requirements, external battery cabinet and charger systems may be used.

F. Remote Transmissions:
1. Provide local energy or polarity reversal or trip circuits as required.
2. The system shall be capable of operating a polarity reversal or local energy or fire alarm transmitter for automatically transmitting fire information to the fire department.
3. Provide capability and equipment for transmission of zone alarm and trouble signals to remote operator's terminals, system printers and annunciators.
4. Transmitters shall be compatible with the systems and equipment they are connected to such as timing, operation and other required features.

G. Field Programming
1. The system shall be programmable, configurable and expandable in the field without the need for special tools, laptop computers, or other electronic interface equipment. There shall be no firmware changes required to field modify the system time, point information, equations, or annunciator programming/information.
2. All field defined programs shall be stored in non-volatile memory.

H. Digital Voice Command Center (DVC)
1. The Digital Voice Command Center located with the FACP, shall contain all equipment required for all audio control, emergency telephone system control, signaling and supervisory functions. This shall include speaker zone indication and control, telephone circuit indication and control, digital voice units, microphone and main telephone handset.
2. Function: The Voice Command Center equipment shall perform the following functions:
    a. Operate as a supervised multi-channel emergency voice communication system.
    b. Operate as a two-way emergency telephone system control center.
    c. Audibly and visually annunciate the active or trouble condition of every speaker circuit and emergency telephone circuit.
    d. Audibly and visually annunciate any trouble condition for digital tone and voice units required for normal operation of the system.
    e. Provide all-call Emergency Paging activities through activation of a single control switch.
    f. As required, provide vectored paging control to specific audio zones via dedicated control switches.

g. Provide a factory recorded "library" of voice messages and tones in standard WAV. File format, which may be edited and saved on a PC running a current Windows® operating system.
h. Provide a software utility capable of off-line programming for the DVC operation and the audio message files. This utility shall support the creation of new programs as well as editing and saving existing program files. Uploading or downloading the DVC shall not inhibit the emergency operation of other nodes on the fire alarm network.
i. Support an optional mode of operation with four analog audio outputs capable of being used with UL 864 fire-listed analog audio amplifiers and SLC controlled switching.
j. The Digital Voice Command shall be modular in construction, and shall be capable of being field programmable without requiring the return of any components to the manufacturer and without requiring use of any external computers or other programming equipment.
k. The Digital Voice Command and associated equipment shall be protected against unusually high voltage surges or line transients.

3. Audio Amplifiers
   a. The Audio Amplifiers will provide audio power for distribution to speaker circuits.
   b. Multiple audio amplifiers may be mounted in a single enclosure, either to supply incremental audio power, or to function as an automatically switched backup amplifier(s).
4. Audio Message Generator (Prerecorded Voice)/Speaker Control:
   a. Each initiating zone or intelligent device shall interface with an emergency voice communication system capable of transmitting a prerecorded voice message to all speakers in the building.
   b. Actuation of any alarm initiating device shall cause a prerecorded message to sound over the speakers.
   c. A built-in microphone shall be provided to allow paging through speaker circuits.

I. Digital Alarm Communicator Transmitter (DACT, or UDACT). The DACT is an interface for communicating digital information between a fire alarm control panel and a UL-Listed central station.
   1. The DACT shall be an integral component of the fire alarm control panel requiring no interconnecting wiring or supervisory circuitry.
   2. Primary and secondary communication to central station monitoring shall be via cellular / GSM signal. Provide a separate external cellular communication panel per the following district sole source selection:
      a. Napco Starlink #SLE-MAXVI-CFB.
   3. The DACT shall be completely field programmable locally from the control panel keypad or remotely over a phone line using upload/download PC software.
   4. The DACT shall be capable of transmitting events in at least 15 different formats. This ensures compatibility with existing and future transmission formats.

5. Communication shall include vital system status such as:
   a. Independent Zone (Alarm, trouble, non-alarm, supervisory)
   b. Independent Addressable Device Status
   c. AC (Mains) Power Loss
   d. Low Battery and Earth Fault
   e. System Off Normal
   f. 12 and 24-Hour Test Signal
   g. Abnormal Test Signal (per UL requirements)
   h. EIA-485 Communications Failure
   i. Phone Line Failure
6. The DACT shall support independent zone/point reporting when used in the Contact ID format. In this format, the DACT shall support the transmission of up to 50 addressable points with the system. This enables the central station to have exact details concerning the location of the fire for emergency response.

2.3 REMOTE EMERGENCY VOICE EVACUATION MICROPHONES

A. Remote Microphones “EVAC”
   1. Provide a remote microphone with enclosure and annunciator selector switches. Remote microphone shall override digitized voice message and shall allow for manual page override for the area. Rooms indicated with remote microphones on drawings shall have the ability for all speakers in area to be overridden.
   2. Remote microphone shall be connected to main fire alarm control panel. Supervision and backup power shall be provided to all remote microphone locations.
   3. Provide flushed cabinet for mounting microphone, Dimensions: 6.0”W x 8.3”H, 3.6”D.

2.4 INITIATING DEVICES

A. Addressable Manual Pull Station
   1. Product Description: Manual addressable double-action station with break-glass rod.
   2. Mounting: Semi-Flush in finished spaces and Surface in unfinished spaces.
   3. Type: Non-coded.
   4. Backbox: Manufacturer's standard.
   5. Provide manual station guards on EACH manual station within the building. Station guards equal to "Stopper II" with audible horn.

B. Addressable Heat Detector
   1. Product Description: Addressable combination rate-of-rise and fixed temperature, spot heat detector.
   2. Temperature Rating: 135 degrees F (57 degrees C).
   3. Rate-of-Rise: 15 degrees F (8.3 degrees C).
   4. The choice of alarm reporting as a fixed temperature detector or a combination of fixed and rate of rise shall be made in system software and be changeable at any time without the necessity of hardware replacement.
   5. The detectors furnished shall have a listed spacing for coverage up to 2,500 square feet.

C. Addressable Photoelectric Ceiling Smoke Detector
   1. Product Description: NFPA 72, addressable photoelectric type ceiling smoke detector with the following features:
      a. Adjustable sensitivity.
      b. Plug-in base
      c. Visual indication of detector actuation.
   2. Mounting: 4 inch (102 mm) outlet box.
   3. Furnish two-wire detector with common power supply and signal circuits.
   4. The smoke detector shall be capable of providing three distinct outputs from the control panel. The outputs shall be from an input of smoke obscuration, a thermal condition or a combination of obscuration and thermal conditions.
   5. Low profile, white case shall not exceed 2.5 inches of extension below the finish ceiling.

D. Addressable Carbon Monoxide Detector
   1. Detectors shall meet UL2034 and UL2075.
   2. Detectors shall be ceiling mounted.
   3. Detectors shall be connected to the fire alarm system and shall have supervised circuits.
   4. Detectors shall be addressable and may be in combination with a smoke detector.
   5. Detectors shall be connected as a separate zone or programmed as a separate zone and shall only activate a supervisory signal at the main fire alarm control panel and at the remote annunciator panel.
   6. Detectors shall not activate the building evacuation system.

E. Addressable Duct Smoke Detector
   1. Product Description: NFPA 72, addressable photoelectric type with the following features:
      a. Auxiliary SPDT relay contact.
      b. Duct sampling tubes extending width of duct.
      c. Visual indication of detector actuation.
      d. Duct-mounted housing.
   2. Furnish two-wire detector with common power supply and signal circuits.
   3. Furnish and install a remote test switch for each duct smoke detector, flushed into nearest accessible ceiling.

F. Addressable Reflected Beam Smoke Detector
   1. The intelligent single-ended reflected beam smoke detector shall connect with two wires to the fire alarm control panel signaling line circuit (SLC). The detectors shall consist of a transmitter/receiver unit and a reflector and shall send data to the panel representing the analog level of smoke density. The detector shall be capable of being tested remotely via a keyswitch.
   2. Furnish and install a remote test switch for each beam smoke detector in locations indicated on drawings, or on wall nearest to beam detector mounted at 48” above finished floor.

G. Addressable Dry Contact Monitor Module

1. Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional alarm initiating devices (any N.O. dry contact device) to one of the fire alarm control panel SLCs.
2. The monitor module shall mount in a 4-inch square (101.6 mm square), 2-1/8 inch (54 mm) deep electrical box.
3. The IDC zone shall be suitable for Style D/Class A or Style B/Class B operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.
4. For difficult to reach areas, the monitor module shall be available in a miniature package and shall be no larger than 2-3/4 inch (70 mm) x 1-1/4 inch (31.7 mm) x 1/2 inch (12.7 mm). This version need not include Style D or an LED.

H. Addressable Control Module
1. Addressable control modules shall be provided to supervise and control the operation of one conventional circuit of compatible Notification Appliances, 24 VDC powered, polarized audio/visual notification appliances.
2. The control module shall mount in a standard 4-inch square, 2-1/8 inch deep electrical box, or to a surface mounted backbox.
3. The control module NAC may be wired for Style Z or Style Y (Class A/B) with a current rating of 2 Amps for Style Z and 3 Amps for Style Y;
4. Audio/visual power shall be provided by a separate supervised circuit from the main fire alarm control panel or from a supervised UL listed remote supply.

2.5 REMOTE ANNUNCIATOR PANEL

A. Serially Connected Annunciator Requirements
1. Product Description: Supervised remote annunciator including audible and visual indication of fire alarm by zone, and audible and visual indication of system trouble.
2. Mounting: Factory mounted in flush wall-mounted enclosure.
3. The annunciator shall communicate to the fire alarm control panel via an EIA 485 (multi-drop) two-wire communications loop.
4. An EIA-485 repeater shall be available to extend the EIA-485 wire distance in 3,000 ft. increments. The repeater shall be UL864 approved.

2.6 MAGNETIC DOOR HOLDERS

A. Description: Units shall be listed to UL 228. Units are equipped for wall or floor mounting as indicated and are complete with matching door plate. Unit shall operate from a 24VDC source, powered via the fire alarm system, and develop a minimum of 25 lbs. holding force.

B. Material and Finish: Match door hardware.

2.7 SIGNALING APPLIANCES

A. Speakers
1. The speaker shall be listed to UL 1480 for Fire Protective Signaling Systems. It shall be a dual-voltage transformer speaker capable of operation at 25.0 or 70.7 nominal Vrms. The speaker shall have a frequency range of 400 to 4,000 Hz and shall have an operating temperature between 32°F and 120°F. It shall mount to a 4 x 4 x 2 1/8-inch back box.
2. A universal mounting plate shall be used for mounting ceiling and wall speaker products. The notification appliance circuit and amplifier wiring shall terminate at the universal mounting plate.
3. Speakers shall be plug-in and shall have the ability to check wiring continuity via a shorting spring on the universal mounting plate. The shorting spring shall also provide tamper resistance via an open circuit if the device is removed. Speaker design shall isolate speaker components to reduce ground fault incidents.
4. The speaker shall have power taps (from ¼ watt to 2 watts) and voltage that are selected by rotary switches. All models shall have a maximum sound output of 86 dB at 10 feet and shall incorporate an open back construction.
5. All notification appliances shall be backward compatible.
6. Speakers shall receive a separate twisted pair from the fire alarm control panel for voice communications.
7. Combination speaker/strobe devices shall meet the requirements specified under “Strobes” in addition to these specifications.

B. Strobes
1. The strobe shall consist of a xenon flash tube with associated lens/reflector system and operate on either 12V or 24V. The strobe shall also feature selectable candela output, providing options for 15 or 15/75 candela when operating on 12V and 15, 15/75, 30, 75, 110, or 115 when operating on 24V. The strobe shall comply with NFPA 72 and the Americans with Disabilities Act requirement for visible signaling appliances, flashing at 1 Hz over the strobe’s entire operating voltage range.
2. Strobe lights shall meet the requirements of the ADA, UL Standard 1971and be fully synchronized.

2.8 CONDUIT AND WIRE

A. Fire alarm cabling shall be wire in conduit, unless metal clad (MC) cable is specifically permitted to be installed by the Authority Having Jurisdiction, and is specified as an acceptable means of installation on the drawings.

B. Metal Clad (MC) Cable:
1. Type FPLP cable with galvanized interlocking steel with continuous red stripe.
2. NEC Article 760 rating for fire alarm control cables.
3. Install multiconductor cabling in accordance with NEC article 730.
4. Use permitted above accessible ceilings and concealed within walls to devices. Provide conduit and wire for final homeruns to control panels , transponders and power supplies.
5. Conductors shall comply with “Wire” paragraph below.

C. Conduit:
1. Conduit shall be in accordance with the National Electrical Code (NEC), local and state requirements.
2. Where possible, all wiring shall be installed in conduit or raceway. Conduit fill shall not exceed 40 percent of interior cross sectional area where three or more cables are contained within a single conduit.
3. Cable must be separated from any open conductors of power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, per NEC Article 760-29.
4. Wiring for 24 volt DC control, alarm notification, emergency communication and similar power-limited auxiliary functions may be run in the same conduit as initiating and signaling line circuits. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals.
5. Conduit shall not enter the fire alarm control panel, or any other remotely mounted control panel equipment or backboxes, except where conduit entry is specified by the FACP manufacturer.
6. Conduit shall be 3/4 inch (19.1 mm) minimum.
7. All fire alarm junction boxes and raceways shall be identified and labeled in accordance with Section 26 05 33, “Identification for Electrical Systems”.

D. Wire:
1. All fire alarm system wiring shall be new.
2. Wiring shall be in accordance with local, state and national codes (e.g., NEC Article 760) and as recommended by the manufacturer of the fire alarm system. Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 18 AWG (1.02 mm) for initiating device circuits and signaling line circuits, and 14 AWG (1.63 mm) for notification appliance circuits.
3. All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system.
4. Wire and cable not installed in conduit shall have a fire resistance rating suitable for the installation as indicated in NFPA 70 (e.g., FPLR).
5. Wiring used for the SLC multiplex communication loop shall be twisted and shielded and support a minimum wiring distance of 10,000 feet. The system shall permit use of IDC and NAC wiring in the same conduit with the SLC communication loop.
6. All field wiring shall be completely supervised.
7. The fire alarm control panel shall be capable of t-tapping Class B (NFPA Style 4) Signaling Line Circuits (SLCs).

E. Terminal Boxes, Junction Boxes and Cabinets: All boxes and cabinets shall be UL listed for their use and purpose.

F. Initiating circuits shall be arranged to serve like categories (manual, smoke, waterflow). Mixed category circuitry shall not be permitted except on signaling line circuits connected to intelligent reporting devices.

G. The fire alarm control panel shall be connected to a separate dedicated branch circuit, maximum 20 amperes. This circuit shall be labeled at the main power distribution panel as FIRE ALARM. Fire alarm control panel primary power wiring shall be 12 AWG. The control panel cabinet shall be grounded securely to either a cold water pipe or grounding rod.

PART 3 EXECUTION

3.1 EXAMINATION

A. Division 01: Coordination and project conditions.

B. Verify products and systems receiving devices are ready for installation.

3.2 INSTALLATION

A. Division 1 - Quality Control: Manufacturer's instructions.

B. Install manual station with operating handle 4 feet above finished floor.

C. Install audible and visual signal devices 6 feet 8 inches above finished floor.

D. Install 16 AWG minimum size conductors for fire alarm detection and signal circuit conductors, or as indicated on drawings.

E. Connect conduit and wire to door release devices, sprinkler flow switches, sprinkler valve tamper switches, fire suppression system control panels, duct smoke detectors and fire protection storage tank level sensor.

F. Automatic Detector Installation: Conform to NFPA 72E and NFPA 720 (remotely located from heating appliances as possible).

G. Installation shall be in accordance with the NEC, NFPA 72, local and state codes, as shown on the drawings, and as recommended by the major equipment manufacturer.

H. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas. Smoke detectors shall not be installed prior to the system programming and test period. If construction is ongoing during this period, measures shall be taken to protect smoke detectors from contamination and physical damage.

I. All fire detection and alarm system devices, control panels and remote annunciators shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas, or on existing block constructed walls with no means to fish wiring.

J. Locate intelligent CO detectors as far away from CO source (fossil fuel burning appliance) as practical to minimize false alarms while maintaining manufacturer spacing criteria and NFPA required coverage.

K. Provide the services of a factory trained and authorized technician to perform all system software modifications, upgrades or changes. Field technicians shall be NICET Level 1 (minimum) certified.

L. The factory trained technician shall install initial data and artwork at each interactive firefighter's display.

M. The factory trained technician shall design the graphic layout based on area diagrams and floor plans.

3.3 MANUFACTURER'S FIELD SERVICES

A. Division 01: Manufacturer's field services.

B. Include services of factory certified technician to supervise installation, adjustments, final connections, and system testing.

3.4 TEST

A. The service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment shall be provided to technically supervise and participate during all of the adjustments and tests for the system. All testing shall be in accordance with NFPA 72 and the following:
   1. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.
   2. Close each sprinkler system flow valve and verify proper supervisory alarm at the FACP.
   3. Verify activation of all waterflow switches.
   4. Open initiating device circuits and verify that the trouble signal actuates.
   5. Open and short signaling line circuits and verify that the trouble signal actuates.
   6. Open and short notification appliance circuits and verify that trouble signal actuates.
   7. Ground all circuits and verify response of trouble signals.
   8. Check presence and audibility of tone at all alarm notification devices.
   9. Check installation, supervision, and operation of all intelligent smoke detectors using the walk test.
   10. Each of the alarm conditions that the system is required to detect should be introduced on the system. Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control points.
   11. When the system is equipped with optional features, the manufacturer's manual shall be consulted to determine the proper testing procedures. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality and similar.

B. Test carbon monoxide detectors and any associated alarms in accordance with NFPA 72H, NFPA 720, manufacturer's instructions and local fire department requirements.

3.5 FINAL INSPECTION/ ACCEPTANCE TESTING

A. Division 01 – Quality Control.

B. At the final inspection, a factory trained representative of the manufacturer of the major equipment shall demonstrate that the system functions properly in every respect.

C. Fire Alarm/Acceptance Testing Procedures:
   1. The fire alarm testing shall be as the authority having jurisdiction shall dictate. This will be as determined by the AHJ and shall include, but not be limited to, the requirements as set below:
      a. Protective Signaling Systems: All protective signaling systems shall meet with acceptance testing requirements of the applicable standards listed in NFPA 101 and NFPA 13.
      b. Prior Test Notification: At least five (5) working days prior to testing, the Electrical Contractor shall notify (in writing) the following people of the proposed date the acceptance tests are to be performed:
         1) Authority Having Jurisdiction
         2) General Contractor or Construction Manager
         3) Engineer of Record
         4) Equipment Supplier Representative
         5) Sprinkler Contractor (if applicable)
         6) HVAC Contractor (if applicable)
         7) Elevator Contractor (if applicable)

D. Certificates of Compliance:
   1. A Fire Alarm System Inspection and Testing Certification and Description form shall be prepared for each system per the requirements listed in NFPA 72, Chapter 7.
   2. After the completion of the operational acceptance tests and sign-off of test witness (with stipulations noted), final copies of the Certificates shall be forwarded to the AHJ.

E. Tests:
   1. All tests shall be conducted in accordance with the Manufacturer's Testing Recommendations.
   2. All testing equipment, apparatus (i.e. sound level decibel meter, 2-way radio communication, test devices, ladders, tools, lighting, etc.) and personnel shall be supplied by the Electrical Contractor.

3.6 INSTRUCTION

A. Instruction shall be provided as required for operating the system. Hands-on demonstrations of the operation of all system components and the entire system including program changes and functions shall be provided.

B. The contractor and/or the systems manufacturer's representatives shall provide a typewritten "Sequence of Operation" to the Owner.

C. Manufacturers representative shall provide Owner with a minimum of four (4) hours of onsite training on system. This training shall be followed up with an additional four (4) hours of onsite instruction at the discretion of the Owner, at any time during the warranty period.

END OF SECTION

SECTION 31 1000 - SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Removing above- and below-grade site improvements.
6. Salvaging of existing granite curb for reuse.

B. Related Sections:

1. Division 01 Section "Temporary Tree and Plant Protection" for installation of tree protection fencing and pruning of existing trees.
2. Division 01 Section(s) "Construction Waste Management and Disposal" and "Sustainability Compliance Procedures" for sustainability requirements
3. Division 31 Section "Soil Erosion and Sediment Controls" for installation of soil erosion control measures.
4. Division 32 Section "Soil Preparation" for testing of topsoil for reuse.

C. Alternates: Refer to Division 01 Section "Alternates" for description of Work of this Section affected by alternates.

1.3 DEFINITIONS

A. Subsoil: All soil beneath the topsoil layer of the soil profile and typified by a reduced or low level/the lack of organic matter and soil organisms.

B. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches (50 mm) in diameter; and free of subsoil and weeds, roots, toxic materials, or other non soil materials.

D. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and defined by a circle concentric with each tree with a radius 1.5 times the diameter of the drip line unless otherwise indicated.

E. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 MATERIAL OWNERSHIP

A. Except for stripped topsoil and other materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.5 INFORMATIONAL SUBMITTALS

A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.

1. Use sufficiently detailed photographs or videotape.
2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.6 QUALITY ASSURANCE

A. Preinstallation Conference: Conduct conference at Project site.

1.7 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

B. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where directed.

C. Utility Locator Service: Notify Call Before You Dig for area where Project is located before site clearing and provide evidence of compliance.

D. Do not commence site clearing operations until temporary erosion- and sedimentation-control and tree-protection measures are in place.

E. The following practices are prohibited within protection zones (non-construction zones):

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

F. Do not direct vehicle or equipment exhaust towards protection zones.

G. Do not allow vehicles to idle more than 3 minutes.

H. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

I. Soil Stripping, Handling, and Stockpiling: Perform only when the topsoil is dry or slightly moist.

J. Do not commence work prior to 8 am and all work must cease by 5 pm.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Division 31 Section "Earthwork".

1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Locate and clearly identify trees, shrubs, and other vegetation to remain. Wrap a 1-inch (25-mm) blue vinyl tie tape flag around each tree trunk at 54 inches (1372 mm) above the ground.

1. Obtain approval from Landscape Architect and Tree Warden prior to removal of existing trees.

C. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. General: Provide temporary erosion and sedimentation control on-site according to requirements in Division 31Section "Sedimentation and Erosion Controls".

B. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.

C. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

D. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

E. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 TREE AND PLANT PROTECTION

A. General: Protect trees and plants remaining on-site according to requirements in Division 01 Section "Temporary Tree and Plant Protection".

B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect.

3.4 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.

1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
2. Grind down stumps and remove roots, obstructions, and debris to a depth of 18 inches (450 mm) below exposed subgrade.

3. In the athletic field areas, all stumps and roots must be removed grinding is not acceptable.
4. Use only hand methods for grubbing within protection zones.
5. Chip removed tree branches and stockpile in areas approved by Landscape Architect for reuse in tree protection zones.

6. Invasive species such as Japanese knotweed or other noxious weeds and brush must not be chipped or mulched. Pull roots and remove intact to prevent the spread of seeds and cuttings that may root or contaminate the area.

3.5 TOPSOIL STRIPPING

A. Identify and confirm through sampling the depth of topsoil to be removed

B. Remove sod and grass before stripping topsoil.

C. Strip topsoil down to the sub=base material. in a manner to prevent intermingling with underlying subsoil or other waste materials. Identify the depth of the subbase material through inspection.

1. Remove subsoil and non soil materials from topsoil, including clay lumps, gravel, and other objects more than 2 inches (50 mm) in diameter; trash, debris, weeds, roots, and other waste materials.

D. Stockpile topsoil away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.

1. Limit height of topsoil stockpiles to 72 inches (1800 mm).
2. Do not stockpile topsoil within protection zones.
3. Stockpile surplus topsoil to allow for respreading deeper topsoil.
4. Document the volume and mass of the materials that are being stockpiled for reuse/recycling.
5. Limit the organic material within stockpiles.
6. If the stockpiled material is to be held for more than 30 days , rotate the materials from the bottom to the top to prevent the development of anerobic conditions.

3.6 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.

B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.

1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.

3.7 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

B. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION 31 1000

SECTION 311000 – SITE CLEARING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

All materials and construction methods shall conform to the Connecticut Department of Transportation Standard Specifications for Roads, Bridges, Facilities, and Incidental Construction Form 818 with modifications for the following item as stated in this specification:

- SELECTIVE CLEARING AND THINNING

1.2 SUMMARY – NOT USED

1.3 REFERENCES

State of Connecticut Department of Transportation Standard Specifications for Roads, Bridges, Facilities, and Incidental Construction Form 818, 2020 (Merged with Supplemental Specifications Dated July 2023)

Section 9.52 is amended as follows:

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

Article 9.52.03 – Construction Methods is supplemented as follows:

Traffic Signal Equipment:

Prior to scheduling support structure installation and at least 14 days in advance of clearing operations, stake out the limits of vegetation and tree clearing to facilitate installation of traffic signal equipment as described below.

Visibly mark or flag trees scheduled to be removed.

The Engineer will review the identified trees and verify the limits of clearing and thinning prior to the Contractor proceeding with the cutting operation.

For the following intersections, cut, trim, and/or remove trees/tree limbs/vegetation as indicated below and to account for future vegetation growth when applicable. This work shall be completed prior to turning on the new signal equipment.

Int. No.	Location	Additional Information
XXX-XXX	Orchard Street At Coachlamp Lane	Trim tree branches at proposed RRFB sign locations.
XXX-XXX	Indian Rock Lane at Ponderosa Drive	Trim tree branches at proposed RRFB sign locations.
XXX-XXX	Orchard Street	Trim tree branches at proposed speed feedback sign locations.

Extruded and Sheet Aluminum Signs:

Prior to scheduling sign installation and at least 14 days in advance of clearing operations, stake out the limits of vegetation and tree clearing to provide visibility to signs as described below.

Visibly mark or flag trees proposed to be removed. Contact the Engineer if an adjustment to sign location can prevent tree removal.

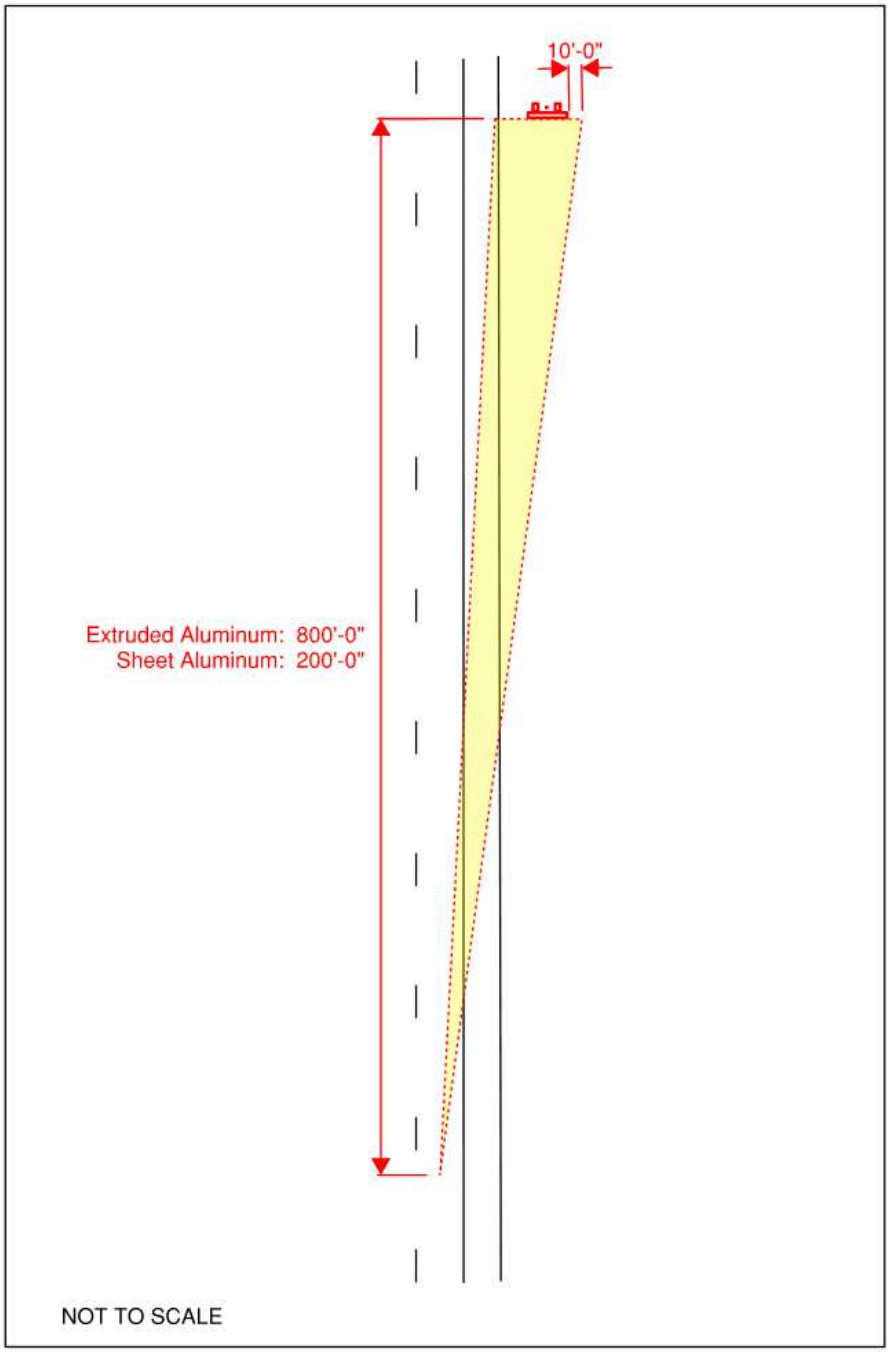
The Engineer will review the identified trees and verify the limits of clearing and thinning prior to the Contractor proceeding with the cutting operation.

At all extruded aluminum sign and sign support locations, cut, trim and/or remove vegetation/tree limbs needed for installation and to provide visibility to the sign(s) and to account for future vegetation growth. The entire sign plus a 10’ buffer shall be visible for 800-ft measured from the center of the right-travel lane approaching the sign, as viewed from a 3.5-ft height above the roadway.

At all sheet aluminum sign locations, cut, trim and/or remove vegetation/tree limbs needed for installation and to provide visibility to the sign(s) and to account for future vegetation growth. The entire sign plus a 10’ buffer shall be visible for 200-ft measured from the center of the right-travel lane approaching the sign, as viewed from a 3.5-ft height above the roadway.

This work shall be completed prior to installing the sign panel onto the vertical supports.

Clearing and Thinning for Extruded Aluminum Signs & Sheet Aluminum Signs



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SECTION 31 1005 - ATHLETIC FIELD SITE PREPARATION PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

Sequence of Operations

1. Mobilization of Equipment
2. Land Survey
3. Strip turf from all existing athletic field turf areas.
4. Remove and stockpile existing root zone medium to a depth of 8 inches or when subbase is encountered.
5. Placement and Installation of Perimeter Drain
6. Placement and Installation of any required Irrigation System.
7. Provisional grading of the subbase material and consolidated to provide a 1 or 1.2 percent slope longitudinally from the center line of the field to the perimeter.
8. Placement of a shim layer of sand on top of the subbase layer to aid in accurate grading and to promote drainage
9. Upon re-grading of existing surfaces and installation of any required additional material, install, roll and consolidate subbase material to the final grades according to the Drawings. The final grading will be completed using three-axis computer-controlled laser grading implement to within ¼ inch.
10. Place engineered root zone mix in 1 to 2 inch lifts, to a minimum depth of six (6)", and grade

B. Related Requirements:

1. Division 01 Section(s) "Construction Waste Management and Disposal" and "Sustainability Compliance Procedures" for sustainability requirements.

2. Section 32 9113.29 - Athletic Field Root Zone: Preparation and blending of root zone mix.

3. Section 32 9219.22 - Athletic Field Seeding and Sodding: Seeding and sodding of athletic fields.

1.2 SUBMITTALS

A. CTHPB Documentation Submittals: Comply with Section 01 3566.42 – Sustainability Compliance Procedures and provide the following in addition to other submittals:

1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material.

Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Shim Layer Sand shall consist of a screened drainage sand, the purpose of which is to assist with accurate grading of sub-base and to provide limited drainage and water holding capacity.

B. Shim Layer Sand shall be a washed screened drainage sand.

C. The Shim Layer Sand shall contain 93 to 97 percent sand with no less than 60 percent of the total sand falling into the medium through very coarse sand fractions, no more than 15 percent fine sand, and no more than 5 percent very fine sand, as determined by ASTM F1632 or D422.

D. The Shim Layer shall be free of sub-soil, large stones, earth clods, sticks, stumps, clay lumps, roots or other objectionable, extraneous matter or debris larger than one eighth (1/8) inches in diameter.

E. The Shim Layer Sand shall also be free of Quack grass rhizomes, Agropyron repens, and the nut-like tubers of Nutgrass, Cyperus esculentus, and all other primary noxious weeds.

F. The shim layer sand should be free of any organic matter.

G. The Shim Layer Sand shall not be delivered or used for planting while in a frozen or muddy condition.

H. The shim layer must be stockpiled in such a manner as to prevent contamination from soils, stones, debris, or organic materials.

I. The Drainage Pipe shall be of eight (8)" N-12 dual wall – HDPE pipe and shall be laid on a bed of four (4)" of specified three-eights (3/8) washed drainage stone.

J. The Drainage Stone shall be three-eighths (3/8)" washed drainage stone fitting the physical specifications outlined in Section 3.3 (K) (11)

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

1. Protect grade stakes set by others until directed to remove them.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-

bearing water runoff or airborne dust to adjacent properties and walkways.

C. The Contractor shall flag the limits of clearing shown on the drawings by accurate field survey with marked stakes or other means acceptable to the Landscape Architect. The Landscape Architect shall be notified a minimum of five (5) working days prior to scheduled commencement of clearing operations to review the flagged limits. Adjust the clearing limits as directed by the Landscape Architect.

D. Protection of all stockpiled materials from erosion and contamination by stone, organic matter, construction debris, or other inappropriate materials. Any contaminated stockpiled materials will need to be screened to remove contaminating debris. Cleaned materials can only be used with the approval of the Landscape Architect.

3.2 EXAMINATION

A. Examine areas to be worked for compliance with requirements and other conditions affecting performance.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within athletic field renovation area.
2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
4. Uniformly moisten excessively dry soil that is not workable, and which is too dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within athletic field renovation area, remove the soil and contamination as directed by Landscape Architect replace with new material to meet the existing specified material. The replacement material must be approved by the Landscape Architect or designee.

D. Alert the Landscape Architect so that the new material and installation technique may be inspected and approved.

E. The Landscape Architect must approve any changes to the means and methods of the athletic field construction, and/or materials.

F. Completion of work is subject to adverse climatic and ground conditions, which could affect the date of substantial completion. Any/all delays must be communicated with the Construction Manager as soon as possible

G. No work can progress unless testing results are approved by the Landscape Architect.

3.3 EXCAVATION AND SUB-BASE PREPARATION WORK

A. The Contractor is solely responsible for the discovery, presence, handling, means and methods of excavation, and responsible disposal of all material, hazardous or not, removed from the site.

B. The Landscape Architect is not responsible for pollution investigations, abatement procedures, or the means and methods of material removal and transport, nor do they direct or control the activity of any retained environmental consultant.

C. It is the contractor's responsibility to gain any and all permits that may be required for environmentally safe disposal at a recognized disposal center for the entire depth of excavation.

D. All work must be performed in the approximate sequence as listed below:

E. Mobilize Equipment:

1. Delivery and removal of all required equipment to site. Mobilization will require forty-eight (48) hour notice of intent prior to delivery of any construction equipment to be left on site. Notify the Construction Manager and Landscape Architect for authorization of mobilization.

2. Any proposed equipment substitutions must be approved by the landscape Architect prior to mobilization.

3. All equipment on site must be Low Ground Pressure (L.G.P.) which is defined as having a low ground pressure by flotation tire or track that is six (6) psi or less. Equipment which is not LGP is not allowed on the athletic field area.

F. Land Survey:

1. Prior to the use of any construction equipment, the Contractor's proposed field layout and elevation control strategies must be determined and marked.

2. Prior to work commencing, the Contractor is responsible for examining the site, and its existing contours. The field must meet final elevations according to the Drawings.
3. The Contractor must make sure the field reconstruction meets the final elevations provided in new grading plans (provided in this specification)

G. Topsoil Excavation and Stockpile:

1. The Contractor shall provide all labor, materials, and equipment (including LGP equipment) required to provide earth moving and sub-base elevations.

2. All contaminated Topsoil is to be removed from site and properly disposed. It is the responsibility of the contractor to make all and any necessary arrangement, secure licenses and permits and provides the Landscape Architect with proof for approval. All vehicles leaving the site must comply with the relevant elements of the Site Protection Guidance as shown on plans, utilizing a stone run out strip, trailer brush down, and covering the

trailers.

3. Remove any existing stone, remaining surface stabilization materials, and other debris to the depth of the existing sub-base.

4. The Contractor shall take all necessary precautions to prevent other excavated material or other objectionable material from becoming intermixed with the topsoil, either before or after the stripping and stockpiling operation. Stripping operations shall be completed prior to the start of excavation, trenching, or grading operations.

5. Transport all stone and debris material to stockpile holding area utilizing LGP hydraulic dump box trailers or equal attached to LGP tractors.

6. Remove existing topsoil material to specified depth and/or down to existing sub-base.

H. Sub-Base Preparation:

1. The sub-base material will require decompaction to enable accurate regrading to take place. This would take place following consultation with the Contractor the Construction Manager and Landscape Architect.

2. The sub-base materials shall be power raked to a depth of six (6)" and any stone or debris larger than four ()" in diameter shall be removed.

3. Laser grade sub-base to 0.25 inch of finish subbase elevation according to the Site Grading Drawing utilizing a LGP compact motorized cross slope dual laser grader or equal. The sub-base shall mirror the final grading plan of the field.

4. The sub-base should be compacted to no more than approximately ninety-five (95)% compaction level.

K. Installation of Perimeter Drainage

1. Drainage elements shall be installed in the quantities and locations identified on the Contract Drawings. Contact the Athletic Field Consultant if obstructions or conflicts are encountered.

2 Perimeter drain shall be placed in a minimum 24"x24" trench, with three sides lined (bottom, and two sides) with Mirafi 140N filter fabric or equivalent. No geotextile material shall be placed atop the perimeter drain trench.

3. Placement of 8" N-12 Dual Wall - HDPE no wrapped pipe, shall be on a bed of at least four (4)" of specified 3/8" drainage stone.

4. The top of pipe shall be at a minimum of twelve (12)" below all final field elevations.

5. Contractor shall install perimeter drainage pipe to allow for a minimum of 0.25% fall to provide positive drainage as indicated on the Grading and Drainage Plan (##).6.

6. An eight (8)" Round Grate surface drains, as manufactured by NDS (part no. 20), or equal

shall beinstalled on an eight (8)" N-12 Dual Wall – HDPE pipe riser which connects to the eight (8)" main drainage perimeter pipe, connected with 8" to 8" T joint manufactured by Advanced Drainage Systems, Inc. or approved equivalent. The 8" surface drain shall be placed in10" Round Carson TrussT Valve boxes or equivalent at the corners of the field as indicated on the Grading and Drainage Plan .

7. A four (4)" Round Grate surface drains, as manufactured by NDS (part no. 13), or equal shall be installed on a 4" N-12 Dual Wall – HDPE pipe riser which connects to the eight (8)" main drainage perimeter pipe, connected with four (4)" "Inserta TEE" or approved equivalent.

   The four (4)" surface drain shall be placed in six (6)" Round Carson TrussT Valve boxes or equivalent on seventy (70)' centers along the north and south limitsthe field as indicated on the Grading and Drainage Plan.

8. The joint tightness shall conform to ASTM D3212 for joints or drain and sewer plasticpipe using flexible elastomeric seals.

9. The gravel shall be clean, free of hazardous or regulated substances and free of organic material. Gravel shall have a minimum laboratory saturated hydraulic conductivity (Ksat rate) of twenty (20) inches per hour at a defined percentage of its maximum dry density, to be determined by an accredited laboratory

10. A sample of the athletic field gravel will be collected at its source for each seven hundred (700) tons to bedelivered to the site and a sieve analysis run on the sample to check its particle size using ASTM D-422 Standard Method (Section IV–Soil tests 2). The results of the tests are to be submitted to the Owner for approval.
11. The gravel shall meet the following gradation

(particle size)Sieve Size Percent Passing by

Weight

2"	100
1"	85-100
¾"	20-40
½"	10-20
5/64"	0-10

Note: Upon completion of the installation of the drainage elements the site shall be inspected by the Owner or Athletic Field Consultant, or a designee for approval and acceptance of the drainage installation.

L. installation of the Shim Layer

1. All specified sand shim layer material must be transported onto the subgrade through the use of LGP equipment.

2. Whenever possible, stockpiles shall be placed around the sand placement area for distribution by LGP equipment as listed in Appendix A or equal.

3. Haul, laser grade and compact a three (3)" uniform layer of specified sand shim layer over the established sub grade to meet the required slopes and elevations of finish grade. Utilize hauling, backfilling, grading, finish grading and compaction equipment as listed in Appendix A or equal.

4. The shim layer shall extend over the perimeter drain trenches.

5. The entire sand shim layer to be laser graded with a three-axis laser grader and compacted to meet the required slopes and elevations of finish grade elevations utilizing power raking, blending and ground preparation equipment as listed in Appendix A or equal. Box graders are not acceptable.

6. Upon completion of the installation of the sand shim layer the site shall be inspected by the Owner, Landscape Architect, or a designee for approval and acceptance of a uniform subbase profile and grade.

7. All grades of the sub-base and shim layer and all depths of the shim layer sand shall be verified by the Landscape Architect or designee prior to the work proceeding.

3.4 SAND SHIM LAYER PHYSICAL GRADATION

PERCENTAGE OF MAIN FRACTIONS		
DESCRIPTION	SIZE (MM)	PERCENT
SAND	0.05 - 2.0	93 - 97
SILT	0.002 - 0.05	1 - 3
CLAY	<0.002	1-3
PERCENTAGE OF SAND FRACTIONS		
DESCRIPTION	SIZE (MM)	PERCENT
NO. 5 GRAVEL	4.0	0
NO. 10 GRAVEL	2.0	0.5 - 1.5
VERY COARSE	1.0 - 2.0	8 - 11
COARSE	0.5 - 1.0	25 - 35
MEDIUM	0.25 - 0.5	35 - 45
FINE	0.10 - 0.25	10 - 15
VERY FINE	0.05 - 0.10	2.5 - 4.5

END OF SECTION 31 1005

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SECTION 31 1006 – SOIL STRIPPING AND STOCKPILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Stripping the existing soil.
2. Stockpiling the soil for later reuse.

B. Related Requirements:

1. Division 01 Section "Temporary Facilities and Controls" for temporary utility services, construction and support facilities, security and protection facilities.

2. Division 01 Section "Execution Requirements" for field engineering and surveying.

3. Division 01 Section(s) "Construction Waste Management and Disposal" and "Sustainability Compliance Procedures" for sustainability requirements.

4. Division 01 Section "Temporary Tree and Plant Protection" for installation of tree protection fencing and pruning of existing trees.

5. Division 31 Section "Erosion and Sedimentation Controls" for installation of soil erosion control measures.

6. Division 32 Section "Soil Preparation" for testing of topsoil for reuse.

7. Section 32 9113.29 – "Athletic Field Rootzone"

C. Alternates: Refer to Division 01 Section "Alternates" for description of Work of this Section affected by alternates.

1.3 DEFINITIONS

A. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

B. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

C. Topsoil: Top layer of the soil profile consists of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches (50 mm) in diameter; and free of subsoil and weeds, roots, toxic materials, or other nonsoil materials.

D. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by a circle concentric with each tree with a radius 1.5 times the diameter of the drip line unless otherwise indicated.

E. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 MATERIAL OWNERSHIP

A. Except for stripped topsoil and other materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become the Contractor's property and shall be removed from the Project site.

1.5 INFORMATIONAL SUBMITTALS

A. Existing Conditions: Documentation of any discovered contaminants or subsurface debris that may impact the ability of the soil to nurture plant growth or may impact the site construction.

1. Use sufficiently detailed photographs or videotape.

2. Include Global Positioning System (GPS) coordinates indicating the location of debris or contaminant

3. Notify the Landscape Architect and do not disturb the area further.

1.6 QUALITY ASSURANCE

A. Preinstallation Conference: Conduct a conference at the Project site.

1.7 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from the Owner and authorities having jurisdiction.

2. Provide alternate routes around closed or obstructed traffic ways if required by the Owner or authorities having jurisdiction.

B. Utility Locator Service: Notify Call Before You Dig for the area where the Project is located before site clearing.

C. Do not commence site clearing operations until temporary erosion- and sedimentation-control and tree-protection measures are in place.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Erosion Control Material: Requirements for erosion control materials are specified in Division 31 Section "Sedimentation and Erosion Controls

B. Obtain approved borrow soil material off-site when a sufficient volume of satisfactory soil material is not available on-site.

C. If required to satisfy agronomic or sports turf performance requirements, obtain a proper sand amendment as specified in Section 32 9113.29 – Athletic Field Rootzone

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Locate and clearly identify trees, shrubs, and other vegetation to remain. Wrap a 1-inch (25-mm) blue vinyl tie tape flag around each tree trunk at 54 inches (1372 mm) above the ground.

C. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. General: Provide temporary erosion and sedimentation control on-site according to requirements in Division 31 Section "Sedimentation and Erosion Controls".

B. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.

C. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross-protection zones.

D. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

E. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 TREE AND PLANT PROTECTION

A. General: Protect trees and plants remaining on-site according to requirements in Division 01 Section "Temporary Tree and Plant Protection".

B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect.

3.4 TOPSOIL EXCAVATION:

1. The Contractor shall provide all labor, materials, and equipment (including LGP equipment) required to provide earth moving and sub-base elevations.

2. All contaminated Topsoil is to be removed from the site and properly disposed of. It is the responsibility of the contractor to make all and any necessary arrangement, secure licenses and permits and provide the Landscape Architect with proof for approval. All vehicles leaving the site must comply with the relevant elements of the Site Protection Guidance as shown on plans, utilizing a stone run-out strip, trailer brush down, and covering the trailers.

3. Remove any existing stone, remaining surface stabilization materials, and other debris to the depth of the existing sub-base.

4. The Contractor shall take all necessary precautions to prevent other excavated material or other objectionable material from becoming intermixed with the topsoil, either before or after the stripping and stockpiling operation. Stripping operations shall be completed prior to the start of excavation, trenching, or grading operations.

5. Transport all stone and debris material to stockpile holding area utilizing LGP hydraulic dump box trailers or equal attached to LGP tractors.

3.5 TURF REMOVAL, TOPSOIL EXCAVATION, AND STOCKPILING WORK

A. The Contractor is solely responsible for the discovery, presence, handling, means and methods of excavation, and responsible disposal of all material, hazardous or not, removed from the site.

B. The Landscape Architect is not responsible for pollution investigations, abatement procedures, or the means and methods of material removal and transport, nor do they direct or control the activity of any retained environmental consultant.

C. It is the contractor's responsibility to gain any and all permits that may be required for environmentally safe disposal at a recognized disposal center for the entire depth of excavation.

D. All work must be performed in the approximate sequence as listed below:

1. Site Inspection and Protection
2. Mobilize Equipment
3. Land Survey
4. Turf Removal and Disposal
5. Top Soil Excavation
6. Stockpile of Materials

E. Mobilize Equipment:

1. Delivery and removal of all required equipment to site. Mobilization will require forty- eight (48) hour notice of intent prior to delivery of any construction equipment to be left on site. Notify the Construction Manager and Landscape Architect for authorization of mobilization.

2. Any proposed equipment substitutions must be approved by the landscape Architect prior to mobilization.

3. All equipment on site must be Low Ground Pressure (L.G.P.) which is defined as having a low ground pressure by flotation tire or track that is 6 psi or less. No equipment that is not LGP is allowed on the athletic field area.

F. Land Survey:

1. Prior to the use of any construction equipment, the Contractor's proposed field layout and elevation control strategies must be determined and marked.

2. Prior to work commencing, the Contractor is responsible for examining the site, and its existing contours. The field must meet final elevations according to the Drawings.

3. The Contractor must make sure the field reconstruction meets the final elevations provided in new grading plans (provided in this specification)

G. Turf Removal:

1. Utilizing Global Positioning System or equivalent, locate and mark all site fixtures including, but not limited to, irrigation heads, quick couplers, goal post sleeves, and valve boxes.

2. Inspect area for debris and stone. "Koro Field Topmaker" cannot be run over temporary surface stabilizing material (stone, gravel sand).

3. Remove existing turf utilizing LGP turf tractor mounted "Koro Field Topmaker" or

equivalent at one (1) inch plus/minus one-eight (1/8) inch pass.

4. Transport pulverized turf and organic material to the designated stockpile holding area for removal from the site, utilizing LGP dump trailers or equivalent attached to LGP turf tractors or equivalent.

5. The Contractor is to provide equipment to load and haul all debris material away from the designated stockpile area and dispose of it off-site.

6. The contractor is responsible for off-site disposal costs and haulage fees.

7. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.

8. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.

9. Grind down stumps and remove roots, obstructions, and debris to a depth of 18 inches (450 mm) below the exposed subgrade.

10. In the athletic field areas, all stumps and roots must be removed grinding is not acceptable.

11. Use only hand methods for grubbing within protection zones.

12. Chip removed tree branches and stockpile in areas approved by Landscape Architect for reuse in tree protection zones.

13. Invasive species such as Japanese knotweed or other noxious weeds and brush must not be chipped or mulched. Pull roots and remove them intact to prevent the spread of seeds and cuttings that may root or contaminate the area.

H. Topsoil Excavation:

1. The Contractor shall provide all labor, materials, and equipment (including LGP equipment) required to provide earth moving and sub-base elevations.

2. All contaminated Topsoil is to be removed from the site and properly disposed of. Promptly notify the Landscape Architect, and document and photograph the location. if any contamination or debris is discovered and cease work in the area until the site is inspected.

3. It is the responsibility of the contractor to make all and any necessary arrangement, secure licenses and permits and provides the Landscape Architect with proof for approval. All vehicles leaving the site must comply with the relevant elements of the Site Protection Guidance as shown on plans, utilizing a stone run-out strip, trailer brush down, and covering the trailers.

4. Remove any existing stone, remaining surface stabilization materials, and other debris to the

depth of the existing topsoil.

5. The Contractor shall take all necessary precautions to prevent other excavated material or other objectionable material from becoming intermixed with the topsoil, either before or after the stripping and stockpiling operation. Stripping operations shall be completed prior to the start of excavation, trenching, or grading operations.

6. Transport all stone and debris material to the stockpile holding area utilizing LGP hydraulic dump box trailers or equal attached to LGP tractors.

7. Remove existing topsoil material to a specified depth and/or down to the existing sub-base.

8. Strip topsoil down to the subbase material in a manner to prevent intermingling with underlying subsoil or other waste materials. Identify the depth of the subbase material through inspection

9. Remove subsoil and non-soil materials from topsoil, including clay lumps, gravel, and other objects more than 2 inches (50 mm) in diameter; trash, debris, weeds, roots, and other waste materials.

I. Stockpile Location: The location must be chosen in consultation with the owner or their designee. Care must be taken to provide adequate footprint area for the stockpile to be located.

J. An estimation of the total volume of the stockpile should be agreed, this will be crucial in allowing the stockpile material to be protected from contamination, weather and environmental conditions.

K. Stockpile topsoil away from the edge of excavations without intermixing with subsoil.

L. Grade and shape stockpiles to drain surface water.

M. Cover to prevent windblown dust and erosion by water.

1. Limit the height of topsoil stockpiles to 72 inches (1800 mm) where applicable. This is to prevent anaerobic conditions within the stockpile and preserve microbial health.

2. The material may be windrowed.

3. Do not stockpile topsoil within protection zones.

4. Stockpile surplus topsoil to allow for respreading deeper topsoil.

5. Document the volume and mass of the materials that are being stockpiled for reuse/recycling.

6. Limit the organic material within stockpiles.

7. If the stockpiled material is to be held for more than 30 days, rotate the materials from the bottom to the top to prevent the development of anaerobic conditions.

8. Protect all stockpiled materials from erosion and contamination by stone, organic matter,

construction debris, or other inappropriate materials. Any contaminated stockpiled materials will need to be screened to remove contaminating debris. Cleaned materials can only be used with the approval of the Landscape Architect.

9. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects more than 2 inches (50 mm) in diameter; trash, debris, weeds, roots, and other waste materials.

10. Only stockpile materials in the area designated on the site plan. Do not stockpile materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.

11. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.

12. Stockpiled soils must be prevented from erosion which may alter particle size distributions.

13. Do not move or handle materials when they are wet or frozen.

14. Stockpiled soils must be stored in such a manner to prevent contamination by stone or other deleterious materials.

15. Differing materials, topsoil, sand, and debris for disposal must be stored in distinct areas where they will not cross-contaminate.

16. Soil stockpiles must not impede the other work on-site or present a risk of installed work.

17. Before stockpiling coordinate the location with other on-site trades.

END OF SECTION 31 1006

SECTION 311200 - SITE UTILITY PREPARATION

PART 1 GENERAL

1.1 RELATED DOCUEMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and other Division I Specifications apply to this section.

1.2 SUMMARY

A. General: Perform site utility preparation in accordance with the Contract Documents.

B. Related Sections

1. Appendix F - Report entitled "Greenwich Central Middle School Construction-Vibration and Controls During Construction" by Gap Mountain Consulting Engineers, PLLC dated November 1, 2024. The Construction-Vibration and Controls report is provided to outline the requirements for monitoring and protection the existing school building from structural damage while it is occupied.

1.3 COORDINATION

A. Coordinate and schedule the work of this Section with all trades involved to prevent interference, and to allow adequate time at the proper stage of construction to properly perform all work of this Section.

1.4 PROJECT CONDITIONS

A. Coordinate all street closings and/or obstructions, including pavement and curbing removals with all governing authorities and utility companies.

B. The existing property lines and topographic contours noted on the drawings are given for the convenience purposes only. The Engineer and the Owner will not be responsible for interpretations or conclusions drawn from this information. Notify the Architect immediately of any discrepancies in the existing property lines or existing topographic elevations.

C. Do not rely upon the location of existing structures, utilities, storm drainage structures, and piping shown on the drawings. Check and verify the location of all existing structures, utilities, and piping prior to commencing work.

D. Call 1-800-922-4455 (Call Before You Dig) and register before beginning any excavation at least 72 hours prior to the start of construction.

E. Locate and identify existing underground and overhead services and utilities within the Contract Limits. Provide adequate means of protection of utilities and services designated to remain. Repair utilities damaged during site work operations.

F. When uncharted or incorrectly charted underground piping or other utilities and services are encountered during site work operations, notify the applicable utility company immediately to obtain procedural directions. Cooperate with the applicable utility companies in maintaining active services in operation.

G. Perform site work operations and the removal of debris and waste materials to assure minimum interference with the streets and day-to-day operations of the Owner.

H. Obtain written permission from governing authorities when required to obstruct the street. Provide alternate routes around obstructed traffic ways when required by governing authorities. Provide traffic control when and as required by the Town of Greenwich or the Connecticut Department of Transportation as applicable.

I. Remove all encumbrances which interfere with the proper fulfillment of all work without additional cost to the Owner.

J. Control dust caused by work operations. Dampen surfaces with water, as required to control all dust. Comply with air pollution control regulations of governing authorities. Exercise every reasonable precaution throughout the life of the contract to minimize dust arising from construction operations, hauling, storage, or demolition.

K. Protect existing and adjacent buildings, structures, pavement, light fixtures, and utilities to remain from damage caused by work operations. Repair and/or restore of damage caused by construction operations at no additional expense to the Owner. Protect all benchmarks, control points, and engineering reference points; re-establish, if damaged or disturbed.

PART 2 PRODUCTS

2.1 MATERIALS

A. None.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine the areas and conditions where site preparation is to be provided. Notify the Owner, in writing, of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.

3.2 SITE UTILITY LAYOUT, LINES, AND LEVELS

A. Before removals, topsoil stripping, excavation, filling, or rough grading operations are started, stake out site areas for the work of this Contract. Provide layout for all site utility related items, including, but not limited to, access road limits crossing berm limits, and all miscellaneous site features.

Site utility layout is to be performed by a surveyor licensed by the State of Connecticut.

B. Site utility layout, lines and levels may be subject to possible modifications, whether by inaccuracies in existing grades, or by other site conditions. Except in the case of substantial increases in material quantities, authorized in writing by the Owner, such modifications will not entitle General Contractor(s) to additional compensation.

B. The drawings indicate existing grade elevations and contours. The existing elevations are given for the convenience purposes in arriving at the quantities of excavation, grading and backfilling. The Engineer and the Owner do not assume any responsibility for the correctness of the existing grade elevations.

3.4 SITE UTILITY DEMOLITION AND REMOVALS

A. The work includes all other existing materials or work necessary to install new work as shown and/or specified and to connect same to existing structures or pavements in an approved manner. Completely remove all foundations, abandoned utilities, and all other items that interfere with new construction.

B. Remove existing construction features as required for the execution of the contract work. Perform such work in a manner to avoid any damages to the construction and finishes scheduled to remain. Where new work is required to be built adjacent to or connected with existing construction, cut or remove the existing construction and replace with new construction to the extent required to solidly build and anchor the new work in place.

C. Completely remove existing paving, including all base material, as required to accommodate new construction. Saw cut and remove existing roadway paving a sufficient distance to permit installation of new work, as required.

3.5 DISPOSALS

A. Properly dispose of all materials and debris resulting from the demolition and removal operations; legally dispose of all materials as required by the project environmental consultant and at a location approved by the Owner.

B. Maintain all disposal routes clear, clean, and free of debris. Keep all streets clean along the disposal routes.

C. On-site burning of combustible materials is not permitted.

D. Accumulation of materials for disposal is not permitted. Disposal is to be made as fast as materials accumulate.

E. Obtain all required and necessary permits or approvals for off-site disposals.

3.6 EXISTING UTILITY AND STORM DRAINAGE ABANDONMENT

A. Completely remove all existing utilities, underground tanks and storm drainage structures and piping that interfere with new construction or as noted on the drawings. Properly cut, cap, and abandon all other utilities or storm drainage structures or piping that does not interfere with construction. Maintain all utilities to the existing buildings until the time of demolition.

C. Contact appropriate utility companies prior to abandonment and properly coordinate all work with the utility companies.

D. At all times, maintain a positive outlet for storm drainage and sanitary sewers on site were encountered.

E. Backfill removed buried utilities in accordance with project specifications, Town requirements or State requirements as applicable.

END OF SECTION

SECTION 31 2200 - GRADING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes:

1. Removal and storage of topsoil.
2. Rough grading the site for site structures.

B. Related Requirements:

1. 01 Section(s) "Construction Waste Management and Disposal" and "Sustainability Compliance Procedures" for sustainability requirements

2. Section 01 5639 - Temporary Tree and Plant Protection.

3. Section 31 1000 - Site Clearing.

4. Section 31 2300 – Excavation, Backfill, Compaction and Dewatering.

5. Section 31 2316.26 – Rock Removal.

6. Section 31 2323 – Borrow Material: Filling and compaction.

7. Section 32 9119 – Soil Preparation: Topsoil testing, planting soil placement and finish grading.

8. Section 32 9113.29 – Athletic Field Root Zone

9. Section 32 9219.22 – Athletic Field Seeding and Sodding

10. Section 32 9219 - Seeding: Finish ground cover.

11. Section 32 9300 - Plants: Finish plant materials.

1.3 SUBMITTALS

A. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

B. CTHPB Documentation Submittals: Comply with Section 01 3566.42 – Sustainability Compliance Procedures and provide the following in addition to other submittals:

1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

PART 2 PRODUCTS

2.1 MATERIALS

A. Topsoil and Planting Mix: See Section 32 9115 - Topsoil and Planting Mix

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that survey bench mark and intended elevations for the Work are as indicated.

B. Verify the absence of standing or ponding water.

3.2 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Stake and flag locations of known utilities.

C. Locate, identify, and protect from damage above- and below-grade utilities to remain.

D. Notify utility company to remove and relocate utilities.

E. Provide temporary means and methods to remove all standing or ponding water from areas prior to grading.

F. Protect site features to remain, including but not limited to bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs, from damage by grading equipment and vehicular traffic.

G. Protect trees and other plantings to remain according to Section 01 5639 - Temporary Tree and Plant Protection.

3.3 ROUGH GRADING

A. Remove topsoil from areas to be further excavated, re-landscaped, or re-graded, without mixing with foreign materials.

B. Do not remove topsoil when wet.

C. Remove subsoil from areas to be further excavated, re-landscaped, or re-graded.

D. Do not remove wet subsoil, unless it is subsequently processed to obtain optimum moisture content.

E. When excavating through roots, perform work by hand and cut roots according to Section 01 5639 - Temporary Tree and Plant Protection. F. See Section 31 2323 for filling procedures.

G. Benching Slopes: Horizontally bench existing slopes greater than 1:4 to key fill material to slope for firm bearing.

H. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.

I. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack surface water control.

3.4 SOIL REMOVAL AND STOCKPILING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil to depth of 6 inches (150 mm) in a manner to prevent intermingling with underlying subsoil or other waste materials.

1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects more than 2 inches (50 mm) in diameter; trash, debris, weeds, roots, and other waste materials.

C. Stockpile excavated topsoil on site.
1. Stockpile topsoil away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.
2. Limit height of topsoil stockpiles to 72 inches (1800 mm).
3. Do not stockpile topsoil within protection zones.
4. Stockpile surplus topsoil to allow for respreading deeper topsoil. D. Stockpile subsoil to be re-used on site; remove remainder from site.

D. Stockpiles: Use areas designated on site; subsoil pile depth not to exceed 8 feet (2.5 m); topsoil stockpiles depth not to exceed 4 feet (1.25 m). Protect from erosion.

3.5 TOLERANCES

A. Top Surface of Subgrade: Plus or minus 0.10 foot (1-3/16 inches) (30 mm) from required elevation.

3.6 REPAIR AND RESTORATION

A. Existing Facilities, Utilities, and Site Features to Remain: If damaged due to this work, repair or replace to original condition.

B. Trees to Remain: If damaged due to this work, repair or replace according to Section 01 5639 - Temporary Tree and Plant Protection.

C. Other Existing Vegetation to Remain: If damaged due to this work, replace with vegetation according to Section 01 5639 - Temporary Tree and Plant Protection.

3.7 FIELD QUALITY CONTROL

A. See Section 31 2323 for compaction density testing.

END OF SECTION 31 2200

SECTION 312300 - EXCAVATION, BACKFILL, COMPACTION AND DEWATERING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Excavation, backfill and compaction for buildings, retaining walls and other structures
2. Excavation, backfill and compaction for subsurface utilities
3. Removal, handling and disposal of rock not covered under Section 312316.26
4. Earth retention systems
5. Excavation, backfill and compaction for the abandonment of existing pipe
6. Temporary dewatering systems

B. Related Sections

1. Section 003132 – Geotechnical data
2. Section 023000 – Subsurface Investigations
3. Section 312500 – Soil Erosion and Sediment Controls
4. Section 312323 – Borrow Materials
5. Section 312316.26 – Rock Removal
6. Section 316616 – Aggregate Piers
7. Appendix F - Report entitled "Greenwich Central Middle School Construction-Vibration and Controls During Construction" by Gap Mountain Consulting Engineers, PLLC dated November 1, 2024. The Construction-Vibration and Controls report is provided to outline the requirements for monitoring and protection the existing school building from structural damage while it is occupied.

1.2 REFERENCES

A. ASTM D1557-07 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3))

B. Federal Register 40 CFR Part 122, United State Environmental Protection Agency (USEPA) Administered Permit Programs (National Pollution Discharge Elimination System or NPDES), Storm Water Discharge

C. ASTM D1556-07 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method

D. ASTM D2487-06e1 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)

E. ASTM D6938-08a - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

F. 29 CFR Part 1926 Subpart P - OSHA Excavation Regulations 1926.650 through 1926.652 including Appendices A through F

1.3 DEFINITIONS

A. Benching - A method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.

B. Earth Retention Systems - Any structural system, such as sheeting and bracing or cofferdams, designed to retain in-situ soils in place and prevent the collapse of the sides of an excavation in order to protect employees and adjacent structures.

C. Excavation - Any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal.

D. Protective System - A method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into an excavation, or from the collapse of adjacent structures. Protective systems include earth retention systems, sloping and benching systems, shield systems, and other systems that provide the necessary protection.

E. Registered Professional Engineer - A person who is registered as a professional engineer in the state where the work is to be performed. However, a professional engineer, registered in any state is deemed to be a "registered professional engineer" within the meaning of this standard when approving designs for "manufactured protective systems" or "tabulated data" to be used in interstate commerce.

F. Licensed Environmental Professional - A person who is registered by the State of Connecticut to render Hazardous Waste Site Cleanup Activity Opinions.

G. Shield System - A structure that is designed to withstand the forces imposed on it by a cave-in and thereby protects employees within the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. Additionally, shields can be either pre-manufactured or job-built in accordance with 29 CFR 1926.652(c)(3) or (c)(4). Shields used in trenches are usually referred to as "trench boxes" or "trench shields."

H. Sloping - A method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation so as to prevent cave-ins. The angle of incline required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads.

I. Temporary Dewatering System – A system to lower and control water to maintain stable, undisturbed subgrades at the lowest excavation levels. Dewatering shall be provided for all pipelines, structures and for all other miscellaneous excavations.

J. Trench - A narrow excavation (in relation to its length) made below the surface of the ground, of at least three feet in depth. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet (4.6 m).

1.4 SUBMITTALS

A. Drawings and calculations for each Earth Retention System required in the Work. The submittal shall be in sufficient detail to disclose the method of operation for each of the various stages of construction required for the completion of the Earth Retention Systems.

1. Submit calculations and drawings for Earth Retention Systems prepared, signed and stamped by a Professional Engineer registered in the state where the work is performed.

B. Performance data for the compaction equipment to be utilized

C. Construction methods that will be utilized for the removal of rock

D. Dewatering plan for the excavation locations. Design shall include calculations and drawings stamped and signed by a Professional Engineer registered in the state where the work is performed.

1.5 QUALITY ASSURANCE

A. All Excavation, Trenching, and related Earth Retention Systems shall comply with the requirements of OSHA excavation safety standards (29 CFR Part 1926 Subpart P), and other State and local requirements. Where conflict between OSHA and State regulations exists, the more stringent requirements shall apply.

B. The following test procedures will be performed by the Owner's inspection agency. Results will be submitted to the Engineer for review.

1. Modified Proctor Test (ASTM D1557) results and soil classification (ASTM D2487) for all proposed backfill materials at the frequency specified below:

a. For suitable soil materials removed during excavation, perform one test for every 1,000 cubic yards of similar soil type. Similarity of soil types will be as determined by the Engineer.

b. For borrow materials; perform tests at frequency specified in Section 312323 - Borrow Materials.

2. Compaction test results (i.e. ASTM D6938 or ASTM D1556) at a frequency of one test for every 100 cubic yards of material backfilled. The Engineer will determine the locations and lifts to be tested.

a. The Engineer may specify additional compaction testing when there is evidence of a change in the quality of moisture control or the effectiveness of compaction.

b. If all compaction test results within the initial 25% of the total anticipated number of tests indicate compacted field densities equal to or greater than 95% of maximum dry density at optimum moisture content, the Engineer may reduce frequency of compaction testing. In no case will the frequency be reduced to less than one test for every 500 cubic yards of material backfilled.

c. The Contractor is cautioned that compaction testing by nuclear methods may not be effective where excavation sidewalls impact the attenuation of the gamma radiation or where oversize particles (i.e. large cobbles or coarse gravels) are present. In these cases, other field density testing methods may be required.

C. Employ the services of a dewatering specialist or firm when well points, deep wells, recharge systems, or equal systems are required. Specialist shall have completed at least 5 successful dewatering projects of equal size and complexity and with equal systems.

1.6 PROJECT CONDITIONS

A. Notify Call Before You Dig and obtain Call Before You Dig identification numbers.

B. Notify utility owners in reasonable advance of the work and request the utility owner to stake out on the ground surface the underground facilities and structures. Notify the Engineer in writing of any refusal or failure to stake out such underground utilities after reasonable notice.

C. Make explorations and Excavations to determine the location of existing underground structures, pipes, house connection services, and other underground facilities in accordance with Paragraph 3.2.D of this Section.

PART 2 PRODUCTS

2.1 SOIL MATERIALS

A. Fill material is subject to the approval of the Engineer and may be either material removed from excavations or borrow from off site. Fill material, whether from the excavations or from borrow, shall be of such nature that after it has been placed and properly compacted, it will make a dense, stable fill.

B. Satisfactory fill materials shall include materials classified by ASTM D 2487 as GW, GP, GM, GP-GM, GW-GM, GC, GP-GC, SW, and SP. Additional requirements are included in Section 02320.

C. Fill type shall be as indicated below and/or as shown on the drawings:

Location	Acceptable Materials
Areas Beneath Footings, Floor Slabs, or Structures	Granular Fill, Gravel Borrow, Crushed Stone
Footing, Foundation and Structure Backfill	Granular Fill, Gravel Borrow, Crushed Stone
Areas within 10' of Existing or Proposed Building or Structure Footing or Slab	Granular Fill, Gravel Borrow, Crushed Stone
Landscaped Areas	Ordinary Fill, Granular Fill, Gravel Borrow, Crushed Stone

D. Blast rock fill is suitable for use beyond 12 inches from building foundations, slabs and utilities, unless other materials are specified on the Drawings. A minimum of 12 inches of choke stone shall be placed over the blast rock fill. The blast rock fill and choke stone shall be placed in loose lift thickness not exceeding 18 inches. The blast rock fill and choke stone shall be thoroughly compacted with heavy compaction equipment to achieve a firm, stable and unyielding condition.

E. Satisfactory fill materials shall not contain trash, refuse, vegetation, masses of roots, individual roots more than 18 inches long or more than 1/2 inch in diameter, or stones over 6 inches in diameter. Unless otherwise stated in the Contract Documents, organic matter shall not exceed minor quantities and shall be well distributed.

F. Satisfactory fill materials shall not contain frozen materials nor shall backfill be placed on frozen material.

G. Excavated surface and/or pavement materials such as gravel or trap rock that are salvaged may be used as a sub-grade material, if processed to the required gradation and compacted to the required degree of compaction. In no case shall salvaged materials be substituted for the required gravel base.

2.2 DEWATERING MATERIALS

A. Provide haybales and silt fence in accordance with Section 312500.

B. Provide silt filter bags (Dandy Dewatering Bag, Dirtbag, JMP Environ-Protection Filter Bag, or equal) of adequate size to match flow rate.

C. Provide dewatering equipment and materials for engineered dewatering systems.

PART 3 EXECUTION

3.1 PREPARATION

A. Public Safety and Convenience

1. Adhere to the requirements of the latest revision of the CTDOT Standard Specifications for Roads, Bridges, and Incidental Construction, 'Form 818', for all excavation work.

2. Take precautions for preventing injuries to persons or damage to property in or about the Work.

3. Provide safe access for the Owner and Engineer at site during construction.

4. Do not obstruct site drainage, natural watercourses or other provisions made for drainage.

3.2 CONSTRUCTION

A. Earth Retention Systems

1. Provide Earth Retention Systems necessary for safety of personnel and protection of the Work, adjacent work, utilities and structures.

2. Maintain Earth Retention Systems for the duration of the Work.

3. Sheeting

a. Systems shall be constructed using interlocking corner pieces at the four corners. Running sheet piles by at the corners, in lieu of fabricated corner pieces, will not be allowed.

b. Drive sheeting ahead of and below the advancing excavation to avoid loss of materials from below and from in front of the sheeting.

c. Sheeting is to be driven to at least the depth specified by the designer of the earth retention system, but no less than 2 feet below the bottom of the Excavation.

4. Soldier piles with lagging

a. Provide soldier piles or H-piles of sizes required to contain lagging, sheeting, or planking in accordance with the approved Earth Retention System Submittal.

b. Provide heavy timber boards or planking of sizes indicated on approved Earth Retention System Submittal. Lagging boards or planking shall be secured and contained in place by H- piles (soldier piles), with boards inserted in the recesses between the H-flanges.

c. Soldier piles are to be driven to at least the depth specified by the designer of the Rarth Retention System, but no less than 2 feet below the bottom of the Excavation.

d. Install lagging members as indicated and in a manner which will prevent loss of soil. Wedge lagging members against undisturbed earth or place compacted fill or slurry fill into voids behind lagging.

5. Remove earth retention system, unless designated to be left in place, in a manner that will not endanger the construction or other structures. Backfill and properly compact all voids left or caused by the withdrawal of sheeting.

a. Remove earth retention systems, which have been designated by the Engineer to be left in place, to a depth of 3 feet below the established grade.

B. Excavation

1. Perform excavation to the lines and grades indicated on the Drawings. Backfill unauthorized over-excavation in accordance with the provisions of this Section, at no additional cost to the Owner.

2. Excavate with equipment selected to prevent damage to existing utilities or other facilities. Hand excavate as necessary to locate utilities or avoid damage.

3. Sawcut the existing pavement in the vicinity of the excavation prior to the start of excavation in paved areas, so as to prevent damage to the paving outside the requirements of construction. The sawcut shall be neat in appearance with no ragged lines; trim pavement as necessary.

4. Perform excavation in such a manner as to prevent disturbance of the final subgrade. The Engineer or Owner may require the final six inches of excavation be performed by hand, with the use of a smooth-faced bucket, or other means acceptable to the Engineer or Owner, at no additional cost if subgrade disturbance is considered excessive as judged by the Engineer or Owner.

5. During excavation, material satisfactory for backfill shall be stockpiled in an orderly manner at a distance from the sides of the excavation equal to at least one half the depth of the excavation, but in no case closer than 2 feet.

   a. Excavated material not required or not suitable for backfill shall be removed from the site and disposed of in accordance with local, State and Federal laws and regulations.

   b. Perform grading to prevent surface water from flowing into the excavation.

   c. Pile excavated material in a manner that will endanger neither the safety of personnel in the excavation nor the Work itself. Avoid obstructing sidewalks and driveways.

   d. Hydrants under pressure, valve pit covers, valve boxes, manholes, curb stop boxes, fire and police call boxes, or other utility controls shall be left unobstructed and accessible until the Work is completed.

6. Grade or create berms or swales to direct surface water from excavations to appropriate structures designed to accommodate storm water. If no structures exist, direct water to areas that minimize impacts to adjacent structures and properties.

7. Make pipe trenches as narrow as practicable and keep the sides of the trenches undisturbed until backfilling has been completed. Provide a clear distance of 12 inches on each side of the pipe.

8. Perform the excavation in such a manner as to prevent disturbance of the final subgrade. If excessive subgrade disturbance is occurring, as judged by the Owner or Engineer, then the final 6 inches of the excavation shall be performed by hand, with the use of a smooth-faced bucket, or other means acceptable to the Engineer or Owner, at no additional cost to the Owner.

    a. Grade the excavation bottom to provide uniform bearing and support for the bottom quadrant of each section of pipe.

    b. Excavate bell holes at each joint to prevent point bearing.

    c. Remove stones greater than 6 inches in any dimension from the bottom of the trench to prevent point bearing.

9. If satisfactory materials are not encountered at the design subgrade level, excavate unsatisfactory materials to the depth directed by the Engineer and properly dispose of the material. Backfill the resulting depth of excavation with satisfactory fill materials and compact in accordance with the provisions of this Section.

10. Satisfactory materials below building structures (foundations or slabs) consist of undisturbed native inorganic soils (native granular soil or native sandy clay) or bedrock, or compacted borrow placed above these materials. Existing fill or buried organic-containing materials are not suitable to remain in place below building structures and shall be completely removed from within the building footprint and footing bearing zones (defined as the 1 horizontal to 1 vertical plane extending downward and outward from one foot beyond the edge of footings) and replaced with suitable compacted backfill.

    a. An aggregate pier ground improvement alternate to complete removal and replacement of existing fill or buried organic-containing materials from below building structures shall be provided in accordance with Section 316616 – Aggregate Piers. The Owner will elect either removal and replacement or the aggregate pier alternate.

C. Backfill and Compaction

1. Unless otherwise specified or indicated on the Drawings, use satisfactory material removed during excavation for backfilling trenches. The Engineer may require stockpiling, drying, blending and reuse of materials from sources on the Project.

2. Spread and compact the material promptly after it has been deposited. When, in the Engineer's judgment, equipment is inadequate to spread and compact the material properly, reduce the rate of placing of the fill or employ additional equipment.

3. Prior to backfilling or placement of structures, excavated subgrades shall be proof compacted with either 10 passes of a 10-ton vibratory drum roller for open excavations or 6 passes of a large, reversible, walk behind vibratory compactor capable of exerting a minimum force of 2,000 pounds in trench or pit excavations. Soft or weak spots shall be over-excavated and replaced with compacted Granular Fill or compacted Crushed Stone wrapped in a non-woven geotextile, as directed by the Owner or their representative. If proof compaction will prove detrimental to the subgrade due to the presence of groundwater, static rolling may be allowed at the discretion of the Engineer or Owner.

    a. Where aggregate piers are installed in accordance with Section 316616 – Aggregate Piers, prepare subgrades in accordance with requirements of that section and those of the aggregate pier designer.

4. Soil bearing surfaces shall be protected against freezing and the elements before and after concrete placement. If construction is performed during freezing weather, structures shall be backfilled as soon as possible after they are constructed. Insulating blankets or other means shall be used for protection against freezing at the discretion of the Engineer or Owner.

5. When excavated material is specified for backfill and there is an insufficient amount of this material at a particular location on the Project due to rejection of a portion thereof, consideration will be given to the use of excess material from one portion of the Project to make up the deficiency existing on other portions of the Project.

    a. Use borrow material if there is no excess of excavated material available at other portions of the Project.

6. Backfilling and compaction methods shall attain at least 95% of maximum dry density at optimum moisture content as determined in accordance with ASTM D1557. All backfill shall be firm and stable after compaction.

    a. In areas outside the building footprint where structures are not supported (landscaped areas), backfilling and compaction methods shall attain at least 90% of maximum dry density at optimum moisture content as determined in accordance with ASTM D1557.

    b. In areas outside the building footprint where pavements or sidewalks are to be supported, backfilling and compaction methods shall attain at least 90% of maximum dry density at optimum moisture content as determined in accordance with ASTM D1557, except the final 2 feet below pavement or sidewalk section subgrades shall attain at least 95% of maximum dry density at optimum moisture content as determined in accordance with ASTM D1557. The section subgrade shall be defined as the elevation of the bottom of the aggregate base/subbase, whichever is lower.

7. Do not place stone or rock fragments larger than six inches in greatest dimension in the backfill.

8. Maximum loose lift height for backfilling existing or borrow material shall be 12 inches, unless satisfactory compaction is demonstrated otherwise to the Engineer through field-testing. In no case shall loose lift height for backfilling exceed 2 feet.

9. Do not drop large masses of backfill material into the trench endangering the pipe or adjacent utilities.

10. Install pipe in rock excavated trenches on a 3/4" crushed stone bedding with a minimum depth of 6 inches. Shape the stone bedding at the pipe bells to provide uniform support. Encase the pipe in the 3/4" crushed stone bedding to a grade 6 inches over the top of the pipe and the full width of the trench.

11. Backfill from the bottom of the trench to the centerline of the pipe with the specified material. This initial backfill is to be placed in layers of no more than 6 inches and thoroughly tamped under and around the pipe. This initial backfilling shall be deposited in the trench for its full width on both sides of the pipe, fittings and appurtenances simultaneously.

12. Electrical conduit not encased in concrete, shall be backfilled with sand borrow conforming to the requirements of Section 312323. The backfill shall be placed in the trench for its full width and shall extend to 12 inches over the conduit.

13. Where excavation is made through permanent pavements, curbs, paved driveways, or paved sidewalks, or where such structures are undercut by the excavation, place the entire backfill to sub-grade with granular materials and compact in 6 inch layers, unless satisfactory compaction is demonstrated otherwise to the Engineer through field-testing. Use approved mechanical tampers for the full depth of the trench. If required, sprinkle the backfill material with water before tamping so as to improve compaction. Any trenches improperly backfilled, or where settlement occurs, shall be reopened to the depth required to correct the problem, and shall then be refilled and properly compacted with the surface restored to required grade at no additional expense.

14. The Contractor shall not place backfill against or on structures until they have attained sufficient strengths to support the loads to which they will be subjected, without distortion, cracking, or other damage. As soon as possible after the structures are adequate, they shall be backfilled with suitable backfill material.

15. Place and compact backfill around manholes, vaults, pumping stations, gate boxes or other structures in six inch layers unless satisfactory compaction is demonstrated otherwise to the Engineer through field-testing, from a point one foot over the pipe. Exercise care to protect and prevent damage to the structures.

D. Test Pit Excavation

1. General requirements of test pits are specified in Section 023000 Subsurface Investigations and Section 316616 Aggregate Piers.

E. Dewatering

1. Obtain the following construction dewatering permits, as required:

   a. US EPA Dewatering General Permit

   b. CT DEEP permit titled "General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities" (DEEP-WPED-GP-015)

2. Provide, operate and maintain adequate pumping, diversion and drainage facilities in accordance with the approved dewatering plan to maintain the excavated area sufficiently dry from groundwater and/or surface runoff so as not to adversely affect construction procedures nor cause excessive disturbance of underlying natural ground. Locate dewatering system components so that they do not interfere with construction under this or other contracts.

3. Conduct operations so as to prevent at all times the accumulation of water, ice and snow in excavations or in the vicinity of excavated areas so as to prevent water from interfering with the progress or quality of the work.

4. Take actions necessary to ensure that dewatering discharges comply with permits applicable to the Project. Dispose of water from the trenches and excavations in such a manner as to avoid public nuisance, injury to public health or the environment, damage to public or private property, or damage to the work completed or in progress.

5. Repair any damage resulting from the failure of the dewatering operations and any damage resulting from the failure to maintain all the areas of work in a suitable dry condition, at no additional cost to the Owner.

6. Exercise care to ensure that water does not collect in the bell or collar holes to sufficient depth to wet the bell or collar of pipes waiting to be jointed.

7. Take precautions to protect new work from flooding during storms or from other causes. Control the grading in the areas surrounding all excavations so that the surface of the ground will be properly sloped to prevent water from running into the excavated area. Where required, provide temporary ditches for drainage. Upon completion of the work, all areas shall be restored to original condition.

8. Brace or otherwise protect pipelines and structures not stable against uplift during construction.

9. Do not excavate until the dewatering system is operational and the excavation may proceed without disturbance to the final subgrade.

10. Unless otherwise specified, continue dewatering uninterrupted until the structures, pipes, and appurtenances to be installed have been completed such that they will not float or be otherwise damaged by an increase in groundwater elevation.

11. Temporarily lower the groundwater level at least two feet below excavations to limit potential "boils", loss of fines, or softening of the ground. If any of these conditions are observed, submit a modified dewatering plan to the Engineer within 48 hours. Implement the approved modified plan and repair any damage incurred at no additional cost to the Owner.

12. When subgrades are soft, weak, or unstable due to improper dewatering techniques, remove and replace the materials in accordance with Section 312323 at no additional cost to the Owner.

13. Notify the Engineer immediately if any settlement or movement is detected of survey points adjacent to excavations being dewatered. If settlement is deemed by the Engineer to be related to the dewatering, submit a modified dewatering plan to the Engineer within 24 hours. Implement the approved modified plan and repair any damage incurred to the adjacent structure at no additional cost to the Owner.

14. Dewatering discharge:

    a. Install sand and gravel, or crushed stone, filters in conjunction with sumps, well points, and/or deep wells to prevent the migration of fines from the existing soil during the dewatering operation.

    b. Transport pumped or drained water without interference to other work, damage to pavement, other surfaces, or property. Pump water through a silt filter bag or other approved sedimentation device prior to discharge to grade of drainage system.

    c. Do not discharge water into any sanitary sewer system.

    d. Provide separately controllable pumping lines.

    e. The Engineer reserves the right to sample discharge water at any time.

15. Install erosion/sedimentation controls for velocity dissipation at point discharges onto non-paved surfaces.

16. Removal

    a. Do not remove dewatering system without written approval from the Engineer.

    b. Backfill and compact sumps or ditches with screened gravel or crushed stone in accordance with Section 312323.

c. Remove well points and deep wells. Backfill abandoned well holes with cement grout having a water cement ratio of 1 to 1 by volume.

3.3 PROTECTION

A. Protection of Existing Structures

1. All existing foundations, conduits, wall, pipes, wires, poles, fences, property line markers and other items which the Engineer decides must be preserved in place without being temporarily or permanently relocated, shall be carefully supported and protected from damage by the Contractor. Should such items be damaged, they shall be restored by the Contractor to at least as good condition as that in which they were found immediately before the Work began.

B. Accommodation of Traffic

1. Streets and drives shall not be unnecessarily obstructed. The Contractor shall take such measures at his own expense to keep the street or road open and safe for two-way traffic unless otherwise indicated.

2. Construct and maintain such adequate and proper bridges over excavations as may be necessary or as directed for the safe accommodation of pedestrians and vehicles. Provide substantial barricades at crossings of trenches, or along the trench to protect the traveling public.

3. Where deemed necessary, such additional passageways as may be directed shall be maintained free of such obstructions. All material piles, open excavations, equipment, and pipe which may serve as obstructions to traffic shall be protected by proper lights, signage, or guards as necessary.

4. All traffic controls shall be in accordance with the Manual on Uniform Traffic Control Devices for Streets and Highways, latest edition.

C. Erosion and Sedimentation Control

1. Take all necessary steps to prevent soil erosion.

2. Plan the sequence of construction so that only the smallest practical area of land is exposed at any one time during construction.

3. Temporary vegetation and/or mulching shall be used to protect critical areas exposed during construction as judged by the Engineer.

END OF SECTION

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SECTION 312316.26 – ROCK REMOVAL

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Rock excavation for trenches and structures.

B. Related Sections

1. Section 312300 – Excavation, Backfill, Compaction and Dewatering

2. Appendix F - Report entitled "Greenwich Central Middle School Construction-Vibration and Controls During Construction" by Gap Mountain Consulting Engineers, PLLC dated November 1, 2024. The Construction-Vibration and Controls report is provided to outline the requirements for monitoring and protection the existing school building from structural damage while it is occupied.

1.2 DESCRIPTION

A. Removal of boulders greater than 1 cubic yard in volume is included under this Section of work. Removal of boulders under 1 cubic yard in volume is not considered part of this work and is considered a part of the work specified under Section 312300.

B. Rock excavation shall mean solid ledge rock or solid concrete which in the opinion of the Engineer requires for its removal, drilling and blasting, wedging, sledging, firing, or breaking up with power operated hand tools.

C. Material removed solely with a power-operated excavator or loose, previously blasted ledge, broken stone, weathered rock, cemented gravel, hardpan, or glacial till which may be encountered during excavation operations is not considered rock excavation.

1.3 SUBMITTALS

A. Construction methods that will be utilized for the removal of rock on the project.

B. Qualifications of professional blasting Consultant and a pre-blast survey.

C. A description of the proposed method for blasting, prior to beginning any blasting operations, detailing the proposed methods of blasting including the type of information to be included in the blasting monitoring seismograph reports.

1. Seismograph reports shall include plan of drilling, amount and type of loadings, kind and distribution of blasting caps, delays used and amount of explosive per day, order of firing, distance and direction of recording station from blast area, type of ground at recording station, time of readings displacements and frequency, copy or record, and brief discussion on vibratory effects.

D. Conduct pre-blast structure survey prior to start of blasting.

1. Conduct pre-blast structure survey on structures within areas affected by work that may be damaged by blasting. Include aboveground structures within at least 500 feet of areas to be blasted.

2. The purpose of the survey is to document existing conditions of structures prior to blasting. The survey is intended to be used as evidence in ascertaining whether and to what extent damage may have occurred as a result of blasting.

3. Record information for each structure surveyed:

   a. Age and type of construction

   b. Location and character of cracks

   c. Evidence of settlement and leakage

   d. Other pertinent information

4. Record pre-blast survey information on forms prepared specifically for pre-blast surveys.

5. Supplement written records with photographs or videotape recording.

6. Submit copies of written records and photographs or videotapes to respective property owner, as well as to the Engineer with the property owner's permission, prior to the start of blasting.

E. Blasting records - For each blast, document the following:

1. Location of blast in relation to Project Stationing or coordinate systems and elevation.

2. Date and times of loading and detonation of blast.

3. Name of person in responsible charge of loading and firing.

4. Details of blast design, as previously specified.

5. Vibration records including location and distance of seismograph geophones to blast and to nearest structure and measured peak particle velocity. Report peak particle velocity in units of inches per second.

6. Air-blast records. Report peak air blast values in units of pounds per square inch overpressure above atmospheric or in decibels at linear response.

7. Comments by blaster in charge regarding damage to existing facilities, adjacent property, or completed work, misfires, fly rock occurrences, unusual results, or unusual effects.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 BLASTING

A. Comply with OSHA, State and Local regulations when blasting and handling explosives.

1. The Town of Greenwich Fire Department approval is required for all blasting operations. A pre-blast survey must be completed. The Fire Chief or his designated representative must witness the survey.

B. Assume full responsibility for the safety of the blasting operations and perform the work in a manner that will ensure the safety of personnel and that of existing structures, adjacent buildings, and completed new construction. The Contractor will be held responsible for claims for damage to property and underground structures. Repair in kind utilities, pipelines or house services damaged while conducting pre-drilling and blasting activities. Repair and maintain roadway and paved surfaces that are cracked or damaged during the course of pre-drilling and blasting.

C. Comply with current OSHA regulations as well as engage the services of a qualified, professional blasting Consultant who will design, review, evaluate and modify the blasting operations. Design the initial blasts and conduct test blasts (minimum four tests) until regular production-controlled blast patterns are developed that produce the desired rate of excavation while meeting the requirements for vibration and air blast control specified. Periodically, or when requested by the Engineer, review the blasting operations and make such changes in the blasting operations as are required to produce a controlled blasting operation meeting the requirements of these specifications. Review by the Engineer of the Contractor's blast design shall not relieve the responsibility for obtaining adequate rock breakage.

D. Provide adequate notice to residents that may be affected by the use of explosives. In residential areas, provide the following:

1. Certificate of Insurance to cover a blasting operation.

2. Evidence that residential homes have been reviewed to satisfy all parties that pre-construction conditions are well documented.

E. Blasting Design Criteria

1. Exercise care in the drilling and blasting operations so that the remaining rock remains stable and to reduce overbreak to a minimum.

2. Control blasting by limiting the charge per delay to that which produces limited levels of ground vibrations as herein specified. Hire a qualified testing agency to measure the radial particle velocities using a seismograph. Peak radial particle velocity shall be the measure of the level of vibration.

3. The charge weight per delay used in blasting, measured on the foundation material, rock, or overburden at the nearest residential structure, shall be such the peak radial particle velocity and frequency relationship criteria shown below on Figure 1 – "New U.S. Bureau of Mines Criteria from Report RI-8501, dated November 1980" is not exceeded. The Contractor shall modify the size and type of explosives used to meet this criteria or other limiting criteria.

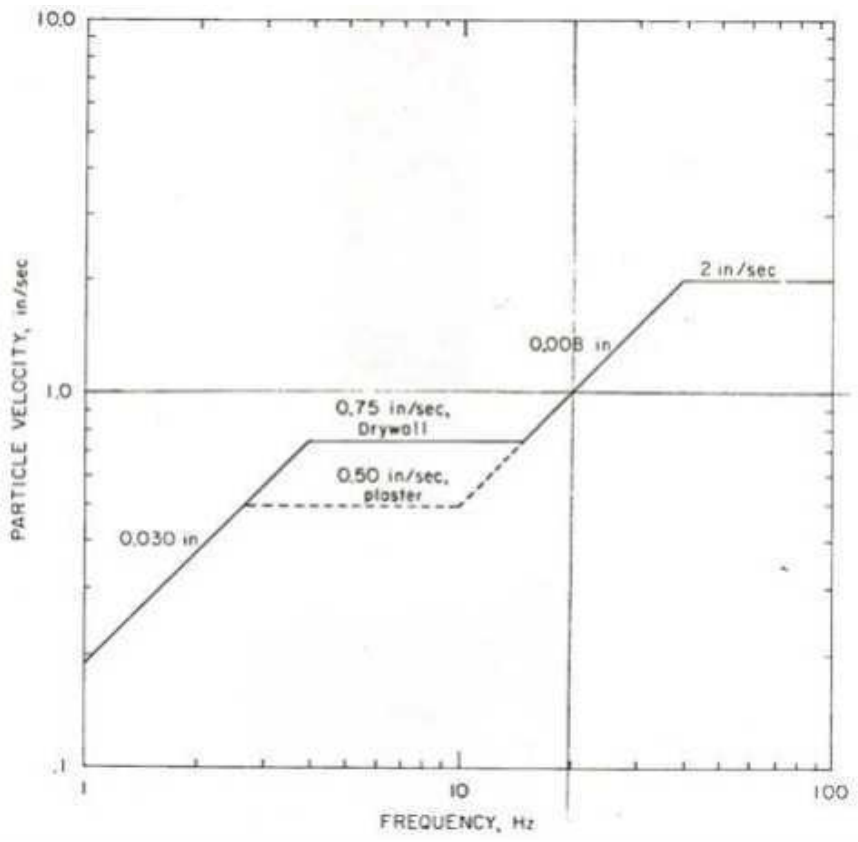

Figure 1

4. The charge weight per delay used in blasting, measured at the foundation of the existing middle school building, shall be such shall be such that the peak particle velocity and frequency relationship criteria detailed in the CVC report is not exceeded.

5. Air blast overpressures from blasting operations shall not exceed 0.02 psi.

6. The maximum depth of lift to be removed at any one time shall not exceed 6 feet.

7. Use blasting mats, chained logs, warning signs, guards, etc., in accordance with the best practice.

8. All blasting operations shall be done by electronic or non-electric detonation.

9. Restrict blasting to daylight hours. In no case will blasting operations be permitted before 8:00 AM or after 5:00 PM.

10. These criteria may be adjusted by the Owner, if the blasting procedures based on monitoring results or in the opinion of the Owner are likely to be disruptive to nearby businesses, people, or to cause damage to structures. These changes may require the Contractor to revise blast design and reduce the size of charges.

~~F. In areas where the Contractor is allowed to pre-drill and blast ledge or rock formations without first removing the over-burden, the Contractor shall be required to firmly establish a profile of the solid ledge or rock that cannot be ripped free by the excavating machine. The actual pay quantities will be based on the inspector's determination of the actual profile and extent of the rock formations drilled and blasted by the Contractor and his verification of the rock formations once the excavation has been opened.~~

G. Minimum excavation and clearance within rock trenches shall be per Section 312300.

H. The use of perchlorate containing explosives is prohibited.

3.2 BACKFILL

A. Backfill must be with material from the excavation or where the excavated material is considered unsuitable for backfill, with material wasted from other area of the job or, when directed by the Engineer in writing, with ordinary borrow. No stones, rocks, or boulders shall be used as backfill.

B. Minimum pipe bedding requirements shall be per Section 312300.

END OF SECTION

SECTION 312323 - BORROW MATERIALS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Gravel Borrow
2. Processed Aggregate Base
3. Granular Fill
4. Sand Borrow
5. Stone Borrow
6. Ordinary Borrow
7. Blast Rock Fill & Choke Stone

B. Related Sections

1. Section 312300 – Excavation, Backfill, Compaction and Dewatering
2. Appendix F - Report entitled "Greenwich Central Middle School Construction-Vibration and Controls During Construction" by Gap Mountain Consulting Engineers, PLLC dated November 1, 2024. The Construction-Vibration and Controls report is provided to outline the requirements for monitoring and protection the existing school building from structural damage while it is occupied.

1.2 REFERENCES

A. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates

B. ASTM C117 - Standard Test Method for Materials Finer than 75 μm (No. 200) Sieve in Mineral Aggregates by Washing

C. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method

D. ASTM D1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lb./ft3)

E. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)

F. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

G. AASHTO – Standard Specification for Transportation Materials and Methods of Sampling and Testing, 1986 Edition as amended

H. Connecticut Department of Transportation, Form 818, Specifications for Roads, Bridges, Facilities and Incidental Construction, latest edition

1.3 SUBMITTALS

A. Representative Samples of borrow materials taken from the source. Tag, label, and package the Samples as requested by Engineer. Provide access to the borrow site for field evaluation and inspection.

B. Provide sieve analysis (ASTM C136) from certified soils testing laboratory for all borrow materials. Take and test a sample, at no additional cost to the Owner for each 1,500 c.y. of borrow material placed.

C. Provide modified proctor analysis (ASTM D1557) from certified soils testing laboratory for all borrow materials.

1. Take and test a sample of borrow material once unless more frequent testing is deemed necessary by the Engineer or Owner due to material variation, or as directed by the Engineer.

D. The Engineer reserves the right to require more frequent testing than that which is specified above should the borrow characteristics change.

1.4 QUALITY ASSURANCE

A. No borrow shall be placed prior to the approval of Samples by the Engineer.

1.5 PROJECT/SITE CONDITIONS

A. Existing Conditions

1. Comply with any environmental requirements and restrictions.

2. Keep all public and private roadway surfaces clean during hauling operations and promptly and thoroughly remove any borrow or other debris that may be brought upon the surface before it becomes compacted by traffic. Frequently clean and keep clean the wheels of all vehicles used for hauling to avoid bringing any dirt upon the paved surfaces.

PART 2 PRODUCTS

2.1 GRAVEL BORROW

A. Gravel Borrow shall consist of inert material that is hard, durable stone and coarse sand, free from loam and clay, surface coatings, and deleterious materials. The coarse aggregate shall have a percentage of wear, by the Los Angeles Abrasion Test, of not more than 50.

Gradation requirements for Gravel Borrow shall be determined by AASHTO-T11 and T27 and shall conform to the following:

Sieve	Percent by Weight Passing
½ inch	50 – 85
No. 4	40 – 75
No. 50	8 – 28
No. 200	0 - 10

Maximum size of stone in Gravel Borrow shall be 2 inches.

2.2 PROCESSED AGGREGATE BASE

A. The compacted Processed Aggregate Base to be used for gravel access roads and pavement base, or other area where a firm, free-draining subgrade is needed shall consist of inert material that is hard, durable stone and coarse sand, free from loam and clay, surface coatings and deleterious materials. The coarse aggregate shall have a percentage of wear, by the Los Angeles Abrasion Test, of not more than 50.

B. Gradation requirements shall conform to the following:

Sieve	Percent by Weight Passing
2 ½"	100
2"	95 – 100
¾"	50 – 75
¼"	25 – 45
No. 40	5 – 20
No. 200	2 - 12

C. Stockpile the processed materials in such a manner to minimize segregation of particle sizes. All processed gravel shall come from approved stockpiles.

2.3 GRANULAR FILL

A. Granular Fill to be used as fill material to achieve gravel base grade beneath structures, pavement, or other area requiring structural fill shall consist of inert material that is hard, durable stone and sand, free from loam and clay, surface coatings and deleterious materials. The coarse aggregate shall have a percentage of wear, by the Los Angeles Abrasion Test, of not more than 50.

B. Gradation requirements for Granular Fill shall conform to the following:

Sieve Size	Percent by Weight Passing	
	Minimum	Maximum
2/3rds loose lift thickness	100	--
No. 10	30	95
No. 40	10	70
No. 200	0	15

C. Existing subsurface materials may be re-used as Granular Fill, regardless of its gradation, provided it is environmentally appropriate, free of organics, debris, stones greater than two thirds the lift thickness in diameter, or other unsuitable material, and they are placed to the required degree of compaction and to a stable condition. Brick or concrete shall be crushed to smaller than 2 inches in its longest dimension, mixed thoroughly with the soil to create a homogeneous backfill material, and shall not compose more than 20 percent of the backfill volume. Existing cobbles and boulders, if present, shall be removed from the material prior to reuse.

However, site soils which contain greater than 15% fines (material passing the No. 200 sieve) shall not be used in locations that require free draining materials such as immediately beneath slabs or pavement, or behind retaining walls. It should be noted that some of the existing site soils have a relatively high fine-grained content, which will likely make them difficult to place and compact to the required degree of compaction and to a stable condition when excessively wet, and therefore would not be suitable for use.

2.4 SAND BORROW

A. Sand Borrow material shall be supplied from an off-site borrow area approved by the Engineer. Testing of the off-site Sand Borrow shall be at the Contractor's expense.

B. Sand Borrow shall consist of clean, inert, hard, durable grains of quartz or other hard, durable, rock, free from loam or clay, surface coatings and deleterious materials. The allowable amount of material passing a No. 200 sieve as determined by ASTM-C117 shall not exceed 10% by weight.

C. Material shall consist of a clean, non-plastic, granular material conforming to the requirements of a SW, SP or SM under the Unified Soil Classification System (USCS) (ASTM D2487).

D. The material shall have the characteristics that when placed and compacted, the soil particles will bind together so as to form a solid, stable surface capable of supporting rubber-tired vehicular traffic during wet weather periods as well as extended dry weather periods. The borrow material shall not contain fines to the extent that the surface layer becomes "greasy" when wet.

E. The material shall not contain stones larger than 3/8 inch in diameter.

F. Material consisting of frozen clogs, ice and snow will be rejected.

G. All sand borrow material to be used shall be subject to approval by Engineer, and Engineer reserves the right to reject any borrow material from the job that does not meet the above requirements.

2.5 STONE BORROW

A. Crushed Stone Borrow

1. Crushed stone borrow shall consist of one of the following materials:

   a. Durable crushed rock consisting of the angular fragments obtained by breaking and crushing solid or shattered natural rock, and free from a detrimental quantity of thin, flat, elongated or other objectionable pieces. A detrimental quantity will be considered as any amount in excess of 15% of the total weight. Thin stones shall be considered to be such stones whose average width exceeds 4 times their average thickness. Elongated stones shall be considered to be stones whose average length exceeds 4 times their average width.

   b. Durable crushed gravel stone obtained by artificial crushing of gravel boulders or fieldstone with a minimum diameter before crushing of 8 inches.

2. The crushed stone shall be free from clay, loam or deleterious material and not more than 1.0% of satisfactory material passing a No. 200 sieve will be allowed to adhere to the crushed stone.

3. The crushed stone shall have a maximum percentage of wear as determined by the Los Angeles Abrasion Test (AASHTO-T-96) as follows:

   a. For Class 1 Bit. Conc. 30%**

   b. For Cement Concrete Aggregate 45%***

   c. Crushed Stone for Subbase 45%

   **Crushed stone for this use shall consist of crushed or shattered natural rock only. Crushed gravel stone will not be permitted.

   ***Except for 5000 psi or greater cement concrete and prestressed concrete which shall be 30%.

4. Crushed stone placed in total thickness greater than 6 inches shall be wrapped in a non-woven geotextile filter fabric, such as Mirafi 140N or approved equal, with the exception of where placed in rock trenches, geotextile filter fabric is not required to separate the stone from rock.

5. The crushed stone shall conform to the grading requirements shown in the following grading Table.

Sieve Size	Percent by Weight Passing Minimum	Maximum
1 ½" Crushed Stone		
2"	100	--
1 ½"	95	100
1"	35	70
¾"	0	25
¾" Crushed Stone		
1"	100	--
¾"	90	100
½"	10	50
3/8"	0	20
No. 4	0	5
3/8" Crushed Stone		
3/8"	100	--
No. 4	85	100
No. 8	10	40
No. 16	0	10
No. 50	0	5

B. Dense Graded Stone Borrow

1. The crushed stone used for backfill shall be a dense graded mixture and conform to the following gradation requirements.

Sieve Size (Square Openings)	Percent by Weight Passing Minimum	Maximum
5/8″	100	--
½″	85	100

3/8″	15	45
#4	0	15
#8	0	5

2.6 ORDINARY BORROW

A. Ordinary borrow shall have the physical characteristics of soils designated as type GW, GP, GM, SW, SP or SM, under USCS and shall not be specified as gravel borrow, sand borrow, special borrow material or other particular kind of borrow. It shall have properties such that it may be readily spread and compacted for the formation of embankments. The borrow shall not include rocks with a major dimension greater than 8 inches.

2.7 BLAST ROCK FILL & CHOKE STONE

A. Blast rock fill and choke stone shall be free from litter and foreign materials.

B. Blast rock fill shall be material generated from on-site rock removal.

C. Choke stone shall be a well-grade mixture of blast rock fill less than 6 inches in major dimension and granular fill.

D. Blast rock fill shall conform to the following gradation requirements:

	Percent by Weight Passing	
Sieve Size	**Minimum**	**Maximum**
12″	100	-
4″	0	25
¾”	0	10

PART 3 EXECUTION

3.1 INSTALLATION

A. Prior to the placement of borrow material, site preparation shall be completed as required by the Contract Documents, and approved by the Engineer.

B. Ensure that all materials are properly stockpiled on site to prevent contamination by other materials.

C. Place borrow material over the entire area in uniform lifts and compact in accordance with Section 322300.

D. Utilize on-site soils prior to using off-site borrow provided on-site soils meet the requirements of the specifications.

E. Utilize gravel borrow in all locations where a surface treatment has not been specified but requires a firm finish surface.

F. Processed aggregate base is intended to provide a stable foundation for driveways, sidewalk and roadway repair where a gravel base has been specified.

G. Borrow shall be used as a replacement for unsuitable materials where poor soil conditions are encountered during the progress of the work, where approved by the Engineer. Borrow type will be determined by the Engineer. Borrow material used as a replacement for unsuitable soil is not intended to be an aid to dewatering.

H. Shape borrow used for pipe foundation material so that it supports the pipe properly and will not damage the pipe, bells, collars, or the pipe fittings.

I. Place all borrow to keep it free of other materials and to prevent segregation.

END OF SECTION

SECTION 312333 - TRENCHING AND BACKFILLING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and other Division 1 Specifications, apply to this section.

1.2 SUMMARY

A. General: Perform trench excavation and backfill in accordance with the Contract Documents. The Work includes but is not limited to trench excavation and backfill to within five (5) feet of proposed building for the following:

1. Storm drainage, stormwater management, sanitary sewers, water distribution and site utility services construction.

B. Stanwich Road, Orchard Street and Indian Rock Lane are Town Streets and trenching and backfill requirements shall comply with Town requirements. Contractor shall obtain all necessary permits prior to any excavation within Town streets.

C. Related Sections include the following:

1. Section 312500 – Soil Erosion and Sediment Controls

2. Section 333113 – Poly Vinyl Pipe (PVC) Pipe and Fittings

3. Section 334113 – High Density Polyethylene Pipe and Fittings

4. Section 334100 – Storm Drainage

5. Section 312300 - Excavation, Backfill, Compaction and Dewatering

6. Appendix F - Report entitled "Greenwich Central Middle School Construction-Vibration and Controls During Construction" by Gap Mountain Consulting Engineers, PLLC dated November 1, 2024. The Construction-Vibration and Controls report is provided to outline the requirements for monitoring and protection the existing school building from structural damage while it is occupied.

1.3 COORDINATION

A. Coordinate and schedule the work of this Section with all trades involved to prevent interference, and in order to allow adequate time at the proper stage of construction to properly perform all work of this Section.

PART 2 PRODUCTS

2.1 MATERIALS

A. Materials shall comply with CTDOT Form 818, "Standard Specifications for Road, Bridges, and Incidental Construction" latest revision.

B. Roadway materials installed within Town of Greenwich Roadway Right-of-Way shall conform with the Town of Greenwich Department of Public Works standards and requirements.

C. Drainage materials installed within the Town of Greenwich Roadway Right-of-Way shall conform with the Town of Greenwich Engineering Division standards, details, and requirements.

D. Sanitary Sewer installations shall conform with the Town of Greenwich Roadway Right-of-Way shall conform with the Town of Greenwich Sewer Division standards, details, and requirements.

PART 3 EXECUTION

3.1 EXCAVATION, TRENCHING AND BACKFILL

A. General: Perform excavation to the depths shown or specified.

B. During excavation, pile material suitable for backfilling in an orderly manner a sufficient distance from the banks of the trench to avoid overloading and to prevent slides or cave-ins.

C. Remove all excavated materials not required or suitable for backfill per the site environmental consultant's requirements and the Owner.

D. Grade as necessary to prevent surface water from flowing into trenches or other excavations. Remove any water accumulating therein by pumping or by other approved method.

E. Install sheeting and shoring as necessary for the protection of the Work and for the safety of personnel.

F. Unless otherwise indicated, excavation to be open cut.

G. Excavation is classified as earth excavation and includes excavation to subgrade elevations indicated, regardless of character of materials and obstructions encountered, pavements, and other obstructions visible on ground surface, underground structures, utilities, and other items indicated to be demolished and removed, together with earth and other materials, excluding rock.

H. Rock, for the purposes of classification shall consist of rock material in beds, ledges, unstratified masses, conglomerate deposits and boulders of rock material that exceed 1 cubic yard that cannot be removed by rock excavating equipment without systematic drilling, ram hammering, ripping, or blasting. Rock excavating equipment is defined as a late-model, track-mounted, hydraulic excavator equipped with a 42-inch wide, maximum, short-tip radius rock bucket, rated at not less

than 138-hp flywheel power with bucket-curling force of not less than 28,090 lbf and stick-crowd force of not less than 18,650 lbf; measured according to SAE J-1179.

I. Backfill and surface excavations for utilities occurring in or across streets or sidewalks with temporary paving or crushed stone as soon as possible after Work is completed.

J. Maintain temporary paving or surfacing in a condition acceptable to the Owner until permanent pavement can be installed.

3.2 SIZES OF TRENCHES

A. Ensure trenches are the necessary width for the proper laying of the pipe and ensure the banks areas nearly vertical as practicable.

B. Accurately grade the bottom of the trenches to provide uniform bearing and support for each section of the pipe on undisturbed soil at every point along its entire length.

C. Except where rock is encountered, take care not to excavate below the depths indicated or specified.

D. Where rock excavations are required, excavate the rock to a minimum overdepth of 6 inches below the trench depths indicated on the drawings or specified.

E. Backfill overdepths in the rock excavation and unauthorized overdepths with thoroughly compacted sand or gravel as specified.

F. Whenever wet or otherwise unstable soil that is incapable of properly supporting the pipe, as determined by the Owner's Geotechnical Consultant, is encountered in the bottom of the trench, remove such soil to the depth required and backfill the trench to the proper grade with coarse sand, fine gravel, or other suitable material.

G. Ensure trenches for utilities are of a depth that will provide the following minimum depths of cover from existing grade or from indicated finished grade, whichever is lower, unless otherwise specifically shown:

1. Four feet - six inches minimum cover for water and fire protection lines,

2. Thirty inches minimum cover for electrical and telephone conduit.

3. Three feet minimum cover over storm and sanitary sewer.

4. Three feet minimum cover of gas services per utility company standards.

H. For bedding of piping, ensure the width of the trench at and below the top of the pipe is such that the clear space between the barrel of the pipe and the trench wall is between 6 and 12 inches on either side of the pipe.

I. Ensure the width of the trench above the pipe crown is as wide as necessary for sheeting and bracing and the proper performance of the Work.

J. Round the bottom of the trench so that at least the bottom quadrant of the pipe rests firmly on undisturbed soil for as nearly as the full length of the barrel as proper joining operations will permit.

K. Ensure the part of the excavation described in subsection J above is performed manually only a few feet in advance of the pipe laying by men skilled in this type of Work.

3.3 EXISTING UTILITY LINES

A. Contact "Call Before You Dig" at 1-800-922-4455 72 hours in advance of any construction to verify the location of utilities.

B. Protect existing utility lines to be retained that are shown on the drawings or the locations of which are made known to the General Contractor prior to excavation operations from damage during excavation and backfilling. If such lines are damaged, the Contractor will repair at his expense.

3.4 BACKFILL RESTRICTIONS AND REQUIREMENTS

A. Do not backfill trenches until all required pressure and other tests have been performed and until the utilities systems as installed conform to the requirements of the drawings and specification.

B. Carefully backfill the trenches with the excavated materials approved for backfilling consisting of earth, loam, sand, sand and gravel, soft shale, or other approved materials, free from large clods of earth, stones over 2-1/2 inches maximum dimension, or other undesirable material as specified in Section 31 2300. Deposit backfill in 6 inch layers then thoroughly and carefully tamp until the pipe has a cover of not less than one (1) foot.

C. Carefully place the remainder of the backfill material in the trench in one-foot layers and tamp. Settling the backfill with water is not permitted.

D. Grade the surface to a reasonable uniformity and leave the mounding over trenches in a uniform and neat condition.

E. The Owner's Geotechnical Consultant may reject any on-site or borrow materials which he considers unsuitable for intended backfill or fill usage.

F. Under all paved areas, compact the fill and/or backfill to 95% of the maximum density at optimum moisture when tested in accordance with ASTM Designation D1557.

G. Perform field density tests by the approved Soil Testing Laboratory at locations and elevations as directed.

H. Backfill trenches excavated under footings and within 18 inches of bottom of footings with compacted select backfill; fill with concrete to elevation of bottom of footings.

3.5 TRAFFIC CONTROL

A. Maintain access for vehicular and pedestrian traffic required for other construction activities and for public when working in roadway right-of-way.

B. Provide public flagmen, barricades, warning signs and warning lights as required. Obtain required Town Street opening permits before start of work.

END OF SECTION

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SECTION 312500 - SOIL EROSION AND SEDIMENT CONTROLS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and other Division I Specifications, apply to this section.

1.2 SUMMARY

A. General: Perform site utility preparation in accordance with the contract documents.

B. This Section includes the following:
1. Dust control.
2. Drainage and erosion control.
3. Haybales and siltation fence.
4. Sediment trapping devices.
5. Construction Entrance.

C. Related Sections – Not Used

1.3 REFEREENCES

A. State of Connecticut Department of Transportation "Standard Specifications for Roads, Bridges, Facilities and Incidental Construction, Form 818," as amended.

1.4 SUBMITTALS – NOT USED

PART 2 PRODUCTS

2.1 HAYBALES

A. Haybales required for siltation control shall be wire tied bales of the type normally used for siltation or erosion control or construction projects.

2.2 FILTER FABRIC

A. Filter fabric siltation fencing shall be a woven filter fabric having a weight of at least 2.5 ounces per square yard, a thickness of at least 17 mils, a coefficient of permeability of not less than 0.0009 centimeters per second and allows a water flow rate of a minimum 40 gallons per minute per square yard. The material shall have a high sediment filtration capacity, high slurry flow and minimum clogging characteristics. The material shall be an approved equal to FW-300 as

manufactured by Mirafi, Inc., Charlotte, North Carolina; Amoco 2130 by Nilex, Inc., Centennial, CO; MISF 180 by Mutual Industries, PA; or approved equal.

2.3 SEDIMENT TRAPPING DEVICES

A. Sediment trapping devices shall be Siltsack®, Dandy Bag II®, or approved equal.

2.4 MULCH

A. Hay mulch shall consist of mowed cured grass, clover, alfalfa, timothy, oats, or wheat. No salt hay shall be used.

2.5 CONSTRUCTION ENTRANCE

A. Stone

1. Stone shall be crushed stone conforming to CTDOT Form 818, Article M.02.01-1, Gradation No. 3.

B. Geotextile

1. Geotextile shall be Mirafi 500X, or approved equal.

PART 3 EXECUTION

3.1 DUST CONTROL

A. Control dust during the Work. Use a mechanical street sweeper as needed or at the request of the Engineer.

B. Prevent dust from becoming a nuisance or hazard. During construction, excavated material and open or stripped areas are to be policed and controlled to prevent spreading of the material.

C. Control dust during the work on-site using calcium chloride and/or water.

D. During the Work on-site, all paved road and driveway surfaces shall be scraped and broomed free of excavated materials on a daily basis. The surfaces shall be hosed down or otherwise treated to eliminate active or potential dust conditions and the natural road or wearing surface shall be exposed.

E. Ensure that the existing equipment, facilities, and occupied space adjacent to or nearby areas of the work do not come in contact with dust or debris as a result of concrete demolition, excavation or surface preparation for coatings.

F. Control dust by the construction of temporary wooden frame/polyethylene sheeting walls and covering enclosures separating adjacent or nearby areas and equipment from the Work site.

3.2 DRAINAGE AND EROSION CONTROL

A. Control erosion and siltation during the construction through mulching, haybales, siltation fencing, diversion and control of storm water run-off, ponding areas, and similar methods.

B. Provide and maintain sediment trapping systems.

C. Discharge surface runoff from any disturbances to the site into silt containment basins. Utilize siltation prevention measures including haybale and geotextile fences before discharge to drainage systems.

D. Control surface waters within the construction area through the use of temporary culverts.

E. Install sediment trapping devices in catch basins located in existing paved areas with sediment trapping devices to minimize the transport of sediment through the subsurface stormwater collection system.

3.3 HAYBALES AND SILTATION FENCE

A. Place and maintain both haybales and a staked filter fabric siltation fence along the entire length of the proposed construction between the area of construction and where shown on the Drawings or required by permit.

B. Install haybales by anchoring bales butted together to existing ground with at least 2 stakes per bale. The stake shall be a minimum of 1-inch square cross section and shall be long enough to penetrate 12 inches into the ground. Replace deteriorated haybales. Remove and dispose of the haybales following the successful growth of vegetation in the areas disturbed by the construction. Haybales shall not be removed until their removal is approved by the Engineer.

C. Install a filter fabric siltation fence in addition to the staked haybales, prior to construction and remove after full surface restoration has been achieved. Install the siltation fence parallel and immediately adjacent to the haybales as shown on the Drawings. Install as follows:

1. Hand shovel excavate a small trench on the upstream side of the desired fence line location.

2. Unroll the siltation fence system, position the post in the back of the trench (downhill side), and hammer the post at least 1½ feet into the ground.

3. Lay the bottom 6 inches of the fabric into the trench to prevent undermining by storm water run-off.

4. Backfill the trench and compact.

3.4 CONSTRUCTION ENTRANCE

A. Install construction entrance at the locations shown on the plans.

B. Clear the area of the construction entrance of all vegetation, roots, and other objectionable material. Place the stone to the specified dimensions.

C. Maintain the pads in a condition that prevents tracking or flow of mud onto public rights-of-way. This may require periodic top dressing with CTDOT No. 3 stone, as conditions demand, and repair and/or cleanout of any structures used to trap sediment. Remove all material spilled, dropped, washed, or tracked from vehicles onto roadways or into storm drains immediately.

3.5 RESTORATION

A. Provide erosion control, seed and mulch and netting for surface restoration of areas disturbed during construction activities.

B. Provide temporary stabilization of disturbed areas that remain inactive greater than 14 consecutive days to minimize erosion. Methods to minimize erosion may include but are not limited to:

1. Spreading straw and/or providing temporary planting stabilization.

2. Installing jute netting.

3. Preparing surfaces to increase the runoff flow path, reduce the runoff flow velocity, or create small storage pockets to retain surface flows. Methods of accomplishing this include using mechanical devices such as track equipment or sheep's foot rollers.

C. Place mulch on seeded areas. Use jute netting on areas having a slope greater than 3 horizontal to 1 vertical, to anchor the mulch until a satisfactory growth is obtained. If seeding is not possible because of the time of the year, apply mulch and netting to stabilize the area until such time as seed can be sown.

D. Provide grading, refertilizing, reseeding, remulching and/or netting to maintain the restored areas until the Work is accepted by the Owner.

E. See Landscape Specifications for seed.

3.6 CLEANING

A. Remove any sediment that builds up around the haybales or catchbasins.

B. Clean sediment trapping devices periodically during the Work. Devices shall be cleaned on a weekly basis or more frequently if the devices become clogged.

C. Clean catchbasins that collect sediment as a result of the Work.

END OF SECTION

SECTION 316616 - AGGREGATE PIERS

PART 1 GENERAL

1.1 SUMMARY

A. This work shall consist of designing, furnishing, installing, and testing aggregate piers in accordance with these specifications and as shown on the Drawings. Refer to Drawing sheets C-206 and S-101A through S-101F.

B. Design and installation of the aggregate piers shall be in accordance with the criteria provided herein and good engineering practice.

C. Aggregate pier ground improvement shall be provided as an alternate to complete removal and replacement of existing fill or buried organic-containing materials from below building structures. The Owner will elect to accept or reject the aggregate pier alternate. Work associated with this specification shall not be initiated without written acceptance of the aggregate pier alternate by the Owner.

D. The Contractor shall provide the cost and associated units for the aggregate pier alternate in accordance with Section 01 2201 – Unit Prices.

E. Aggregate pier ground improvement is required for improving existing fill and buried organics for support of building foundations and the slab on grade ground floor within the unsuitable soil limits shown on the Drawings, and as verified by the Contractor.

F. Aggregate piers shall be designed and installed to account for presence of cobbles, boulders, or other obstructions within the subsurface and within pier installation depths at each pier location. The Contractor's base bid shall include installation of aggregate piers, including pre-augering each pier location prior to installation of the pier aggregate. Additionally, for 50% of the Contractor's designed piers, the Contractor's base bid shall include pre-drill of each pier using a down-hole hammer or pre-excavating each pier location and backfill of the pre-excavated pier location with excavated soil after removal of cobbles, boulders or other materials that would otherwise obstruct the installation of the pier using displacement installation methods. Unit costs for pre-drill using a down-hole hammer, and unit costs for pre-excavating each pier location and backfill of the pre-excavated pier location with excavated soil after removal of cobbles, boulders or other materials that would otherwise obstruct the installation of the pier using displacement installation methods, shall be provided. The Contractor will be paid for pre-augering each pier location and for the actual quantity of pre-drill or pre-excavate. The Contractor will be paid for only one of the pre-drill or pre-excavate installation methods employed, whichever is the method used to achieve the final installed pier tip elevation.

G. Related Sections

1. Section 003132 – Geotechnical Data
2. Section 312316 – Excavation, Backfill, Compaction and Dewatering
3. Section 312323 – Borrow Material
4. Appendix F - Report entitled "Greenwich Central Middle School Construction-Vibration and Controls During Construction" by Gap Mountain Consulting Engineers, PLLC dated November 1, 2024. The Construction-Vibration and Controls report is provided to outline the requirements for monitoring and

protection the existing school building from structural damage while it is occupied.

H. Where reference is made herein to the Owner, the Owner may delegate responsibilities to the Owner's Engineer or the Architect.

1.2 REFERENCES

A. Connecticut State Building Code, latest edition

B. ASTM D1143 – Standard Test Methods for Deep Foundations Under Static Axial Compressive Load

C. ASTM D6913 - Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

1.3 QUALIFICATIONS

A. The contractor performing the work described in the specification shall have installed aggregate piers of similar size and complexity for a minimum of five years, and shall include at last ten projects completed in New England on which the contractor has installed aggregate piers of similar size and complexity to this project, with at least two projects that included use of down-hole hammer techniques for installing aggregate piers.

B. The contractor shall engage their own engineer who shall have at least five years of experience in the design and construction of aggregate piers, and shall include at last ten projects completed in New England using aggregate piers of similar size and complexity to this project. Rig operators and on-site supervisors shall have a minimum of one year experience installing aggregate piers with the contractor's organization.

C. The Owner will approve or reject the contractor's qualifications and staff within 14 calendar days after receipt of the submission. Work shall not be started on any aggregate pier nor any materials ordered until approval of the contractor's qualifications is given. The Owner may suspend the aggregate pier work if the contractor substitutes unqualified personnel for approved personnel. The contractor shall be fully liable for additional costs resulting from the suspension of work and no adjustment in contract time resulting from the suspension of work will be allowed.

1.4 DESIGN REQUIREMENTS

A. The Contractor shall be responsible for the design and construction of the aggregate pier system. The aggregate pier system shall be properly designed by a Professional Engineer registered in the State of Connecticut, who practices in a discipline applicable to work and has more than five years of experience in the design of aggregate pier systems of similar size and complexity as this project.

B. The design of the aggregate pier system shall be based on the minimum required allowable bearing pressure shown on the Contract Drawings and herein, and the allowable total and differential settlement criteria indicated herein. The aggregate pier system shall be designed in accordance with generally accepted engineering practice.

C. The aggregate pier elements shall be constructed by compacting aggregate using special high-energy impact densification equipment. Aggregate piers shall be installed by pre-augering the pier cavity or use of down-hole hammer drilling techniques, unless existing fill at the pier location is pre-excavated to remove obstructions which may otherwise refuse the aggregate pier installation equipment. It specifically shall not be assumed that piers can be installed using displacement methods without the use of pre-augering, down-hole hammer pre-drilling, or pre-excavation of existing fill.

D. The aggregate piers shall be in a columnar-type configuration and shall be used to reinforce soils for the support of foundations and the first floor building slabs within the limits shown on the Drawings, and as verified by the Contractor. Refer to Drawing sheets C-206 and S-101A through S-101F.

E. The aggregate piers shall be laid out in a logical manner such that piers are generally evenly spaced, to the extent practical, and slab-support piers align with slab joints.

F. The aggregate pier layout shall consider the elevation of the working grade, elevations of bottom of footing or foundation element subgrades, and the corresponding excavation slope angles for excavation to footing or foundation subgrades such that piers are laid out to avoid the ground improvement designer's designated "no dig zone" around installed piers, to the extent practicable.

G. Ground improvement shall be designed for any loads imposed by proposed raises in grade, as applicable.

H. Aggregate piers shall fully penetrate existing fill and buried organics and shall terminate in the inorganic native soils. The actual depths / elevations of the bottom of the piers shall satisfy the minimum penetrations referenced above, and meet the performance criteria specified herein.

I. The ground improvement designer shall coordinate with the Contractor to determine the ground elevation that will exist at the time of aggregate pier installation. The ground improvement design shall include consideration of any fill placed over the aggregate piers to achieve final elevations.

J. All underground utility lines shall be identified, located, and protected from damage or displacement. Utility companies and other responsible authorities shall be contacted to locate and mark the locations and, if they so desire, direct or assist with protecting the underground installation.

K. The aggregate pier design shall meet the following criteria:

1. Footings:
    a. Minimum allowable bearing pressure: 4 kips per square foot
    b. Total settlement: ≤ 1.0 inch
    c. Differential settlement between footings: ≤ 0.5 inch (over 30 feet)
2. Slab on Grade: Maximum total settlement: ≤0.5 inch

L. The ground improvement design shall assume footings supported on non-aggregate pier improved soils, beyond the extent of the aggregate pier improvement area, have estimated settlement of 0.75 inch for the purposes of differential settlements. The ground improvement design shall be required to satisfy differential settlement performance requirements between the aggregate pier and non-aggregate pier supported areas.

M. The ground improvement system shall be designed to preclude plastic bulging deformations at the top-of-pier design stress. The results of the modulus tests shall be used to verify the design assumptions. The requirement for performance of a successful modulus test shall not be waived without authorization by the Owner.

N. The aggregate piers shall be designed using an aggregate pier stiffness modulus to be verified by the results of the modulus test described in Part 3 of these specifications.

O. In addition to improvement of unsuitable soils for support of foundations and slabs, the intent of the aggregate piers is to minimize import and export of soil from the site. Therefore, if pre-excavate is employed, the design and construction of aggregate piers shall be such that excavated soils can be used to backfill the pre-excavated locations after removal of obstructions within the excavated material.

1.5 SUBMITTALS

A. Qualifications

1. At time of the bid, submit a list containing at least ten projects completed in New England within the past five years on which the contractor and engineer have installed aggregate piers of similar size and complexity to this project. Include at least two projects for which the contractor –utilized down-hole hammer techniques for installing aggregate piers. A brief description of each project and a reference shall be included for each project listed. At a minimum, the reference shall include an individual's name, current email address, and current phone number.

2. Prior to the start of work, the Contractor shall submit a list identifying the engineer, equipment operators and on-site supervisors who will be assigned to the project. The list shall contain a summary of each individual's experience, and it shall be complete enough for the Owner's review. The list shall contain a summary of each individual's experience. Should the Contractor elect to change any of these intended personnel prior to or during construction of the aggregate piers, this same approval process is required for the new personnel prior to their starting work on the Project. The Contractor shall not be compensated for any delays resulting from such changes of personnel.

B. Submit a detailed narrative describing the construction method to be employed and encompassing all aspects of the site operation.

C. Submit a detailed narrative describing the means and methods to be employed for installation of aggregate piers through soils containing frequent occurrences of cobbles, boulders and/or obstructions.

D. Submit working drawings and a Design Submittal describing the ground improvement system intended for use. The working drawings and design submission, stamped/sealed by a Professional Engineer licensed in the State of Connecticut, shall be submitted at least 21 calendar days prior to the desired commencement of ground improvement work. The working drawings and Design Submittal shall include the following:

1. A written summary report which describes the overall ground improvement design.

2. Applicable code requirements and design references and methodology.

3. Design criteria including but not limited to soil strength properties, consolidation properties, unit weights, design groundwater elevation(s), and aggregate pier properties.

   a. Include references and basis for selection of matrix soil properties, including stiffness/compressibility and ratio of pier to matrix soil stiffness.

   b. Include at least five (5) modulus test results for similar aggregate piers installed in similar soil conditions to provide basis for selected ground improvement pier properties.

4. Design information including but not limited to bearing capacity analysis, settlement analysis, and details and design of load transfer pad (if required).

5. Installation means and methods, including general notes for constructing the aggregate piers and other special construction requirements.

6. Layout plan of aggregate piers, on the foundation drawing, with pier number/identification. The layout plan shall identify any piers that are expected to be located within the ground

improvement designer's designated "no dig zone" around installed piers with consideration to the working elevation and bottom of footing or foundation element subgrade elevations.

7. Table listing all aggregate piers by number/identification with corresponding design pier diameter, length, top of pier elevation, tip of pier elevation, and other relevant information.

8. Requirements for repair of aggregate piers that are impacted by adjacent excavations such as to not void the aggregate pier contractor's warrantee.

9. Requirements to ensure adequate confinement of the piers between completion of installation and completion of sitework and foundation construction, including identification of piers that are expected to be impacted by adjacent construction/excavations.

10. If pre-excavation is to be performed, provide details for required excavation slope angles to avoid loss of confining stress to nearby already-installed piers, as applicable.

11. Requirements or limitations for use of excavation support systems in proximity to aggregate piers.

E. Submit requirements for backfill of locations where pre-excavation is to be performed prior to aggregate pier installation, including material composition/gradation requirements, backfilling requirements, minimum installed density, requirements for density testing, etc., as applicable.

F. Submit modulus test load test reaction piles and frame design, including diameter, type, reinforcement, depth as well as the reaction frame and beams. All details and supporting calculations shall be submitted for review.

G. Submit calibration records load cells, hydraulic jacks, pumps and pressure gauges shall be submitted at least 7 calendar days prior to performing the modulus testing.

H. The Owner will acknowledge and respond to the Contractor's working drawings and design submission within 14 calendar days after receipt of the submission.

I. Modulus Test Data – The Contractor shall furnish a description of the installation equipment, installation records, complete test data, analysis of test data, and recommended design parameter values for the aggregate piers based on the modulus test results. The report shall be stamped/sealed by a Professional Engineer licensed in the State of Connecticut.

J. Daily Progress Reports – The Contractor shall furnish a complete and accurate record of aggregate pier installation. The record shall indicate the pier location, verticality, identification number, diameter, length, volume of aggregate, and final elevations or depths of the base and top of each pier. The record shall also indicate the type and size of the installation equipment used, and the use of pre-augering, pre-drilling, or pre-excavation for installation of the pier. The Contractor shall immediately report any unusual conditions encountered during installation to the Owner.

K. As-built plans for the installed aggregate piers based on actual locations and tip elevations. The surveyed locations shall be sealed and signed by a licensed surveyor and tip elevations shall be certified by the Contractor's Professional Engineer.

1.6 QUALITY CONTROL

A. Contractor's Quality Control Representative

1. The Contractor shall have a full-time Quality Control Representative to verify and document all installation procedures. The Quality Control Representative shall immediately report any unusual conditions encountered during installation to the Owner. The quality procedures

shall include the preparation of aggregate pier installation reports completed during each day of installation and containing the following information, as applicable:

a. Aggregate pier location.

b. Pre-auger or pre-drill diameter and depth, or pre-excavate depth, and description of soils encountered.

c. Volume of aggregate introduced.

d. Aggregate pier installation depth.

e. Number of lifts.

f. Procedure to construct each lift.

g. Base diameter and height of the remaining aggregate cone formed after constructing each pier and extracting the tooling out of the ground.

h. Volume of aggregate used for each pier construction.

i. Planned and actual aggregate pier elevations at the top and bottom of the element, and explanation of deviations.

j. Type and size of hammer equipment used.

k. Aggregate description.

l. Record of flow rates of water or compressed air pressure (if applicable).

m. Documentation of any unusual conditions encountered.

B. Allow the Owner to access the work, observe, and document pier installations as required.

1.7 QUALITY ASSURANCE

A. Perform work in accordance with the Connecticut State Building Code.

B. Field Monitoring and Testing

1. Install all aggregate piers in the presence of an authorized representative of the Owner, unless otherwise notified in writing that aggregate piers can be installed without presence of the Owner.

1.8 PROJECT/SITE CONDITIONS

A. Existing Conditions

1. A geotechnical report (Geotechnical Evaluation – Greenwich Central Middle School, Greenwich, CT, by Tighe & Bond and dated January 26, 2024) has been prepared for this Project and is available for information only. The opinions expressed in this report are those of the Owner's geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by Owner's geotechnical engineer. Owner will not be responsible for interpretations or conclusions drawn from this information by the Contractor.

2. Subsurface conditions at the site include frequent occurrence of cobbles, boulders, and/or other obstructions. The Contractor is notified that SPT blow counts shown on the boring logs are indicative of relatively high density soils as well as soils containing materials

that will obstruct penetration of direct-push displacement mandrel installation methods and possibly augers. The use of down-hole hammer or pre-excavation shall be expected in order to install the aggregate piers to the required depths.

3. The subsurface exploration information is considered to represent the conditions at the locations of the subsurface explorations at the time the subsurface explorations were made. Variations from the conditions disclosed by the subsurface explorations shall be anticipated in planning and estimating the Work.

4. Contractor shall perform test pits at the time of construction, prior to the Design Submittal, to verify the extents of unsuitable soils shown on the Drawings. Refer to Section 3.1 of this specification.

1.9 ALLOWABLE TOLERANCES

A. Centerline of aggregate piers shall not be more than 6 inches from indicated plan location.

B. Top elevation of aggregate pier shall be within +/- 1 inch of the design vertical elevation.

C. Pier tip elevation shall be within 6 inches of the design vertical elevation.

1.10 COORDINATION

A. Coordinate work with that of other trades affecting or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

B. The Contractor shall coordinate all excavations made subsequent to aggregate pier installations so that excavations do not encroach on the aggregate piers as shown in the approved shop drawings and design submission. Protection of completed aggregate piers is the responsibility of the Contractor. Piers that are impacted by excavations made subsequent to aggregate pier installations shall be repaired as detailed in the Design Submittal.

1.11 SEQUENCING AND SCHEDULING

A. Provide a fully equipped aggregate pier installation rig in full-time operation at the site during the Work and mobilize additional equipment, if necessary, to complete the Work on schedule.

B. Aggregate piers located in areas to be excavated or demolished, shall not be installed until the excavation has been completed.

C. Commence installing the initial aggregate piers for selection of the modulus test element immediately upon mobilizing to the site.

D. Once the test element has been installed, tested and approved, commence installation of production aggregate piers. Contractor may proceed with production aggregate pier installation prior to completion of the test at his own risk, with approval from the Owner.

1.12 DELIVERY, STORAGE AND HANDLING

A. Stockpile materials only in indicated staging areas within the property limits. Keep public ways and areas clean and clear of all spillages from construction operations and from trucks hauling materials to or from the project site.

B. Take special care in promptly and legally disposing of material from the work area, including all drill spoils. Disposal of drill spoils on-site or in the sewer system shall not be permitted. No temporary collecting ponds or lagoons shall be allowed.

PART 2 PRODUCTS

2.1 AGGREGATE

A. Aggregate used for aggregate pier construction shall be Type 1 Grade B in accordance with ASTM D1241-68, No. 57 stone. Aggregate shall demonstrate suitable performance during modulus testing.

B. Potable or other suitable water shall be used to increase aggregate moisture content where required. The Contractor shall provide all water needed for aggregate pier construction.

PART 3 EXECUTION

3.1 SUBUSRFACE INVESTIGATIONS

A. Contractor shall perform test pits at the perimeter of the limits of unsuitable soils shown on the Drawings to verify the extents (lateral and vertical) of unsuitable for aggregate pier design and installation. Test pits shall be performed at maximum 50-foot increments along the perimeter of the limits of unsuitable soils shown on the Drawings, where that perimeter is within the interior of the building footprint. Where unsuitable soils are observed to be present at the limits of unsuitable soils shown on the Drawings, excavate additional test pit(s) at 15-foot distances perpendicular to the limits of unsuitable soils shown on the Drawings to delineate the extents of unsuitable soils.

B. Coordinate with the Owner for performing test pits of this section. The Owner will record subsurface conditions at the test pits, including composition of soils encountered and determination of depth to top of inorganic native soils.

3.2 GENERAL REQUIREMENTS

A. The Contractor shall protect existing adjacent property, utilities and structures, and completed work from damage associated with the aggregate pier installation operation. Damage due to aggregate pier installation shall be repaired by the Contractor at their own expense.

B. The Contractor shall determine the aggregate pier locations in the field and establish all elevations required.

C. The Contractor shall employ a licensed Connecticut Professional Land Surveyor or a Connecticut Professional Civil Engineer, familiar with aggregate pier installation, who shall establish lines and levels. The Contractor shall be responsible for the correct location of aggregate piers, and establishing actual aggregate pier locations.

D. Install all aggregate piers at the proper locations shown in the Design Submittal, unless superseded by revised plan provided by the ground improvement designer and approved by the Owner. Aggregate pier locations shall be checked during installation and appropriate measures taken, as necessary to maintain the correct aggregate pier location.

E. Prior to installation of the aggregate pier elements, each pier location shall be prepared by pre-augering a cavity to the design pier depth.

F. If cobbles, boulders, or other obstructions are encountered that prevent pre-augering of the cavity to the design pier depth, the use of (an) additional method(s) below shall be employed to achieve the design pier depth:

1. Use of a down-hole hammer to pre-drill/pre-bore the aggregate pier cavity such that obstructions will not prevent installation of the aggregate pier to the design depth; or

a. The down-hole hammer shall be of sufficient diameter such that the aggregate pier tooling can be installed through the pre-bored cavity without being obstructed by buried obstructions.

2. Pre-excavating the existing fill, removing any obstructions that would otherwise refuse the pier installation equipment, and then backfilling the excavation with excavated materials after removal of obstructions from the soil matrix.

3.3 INSTALLATION

A. The following are general criteria for the construction of the aggregate piers. Unless otherwise approved by the Owner, the installation method used for ground improvement construction shall be that as used in the construction of the successful modulus test pier(s).

B. Use machines or combinations of machines and equipment that are in good working condition, are safe to operate and will produce the results specified herein.

C. Use equipment that is capable of advancing the aggregate piers through the subsurface materials efficiently and timely to meet the project schedule.

D. The equipment shall be of sufficient size and capacity, and be capable of installing aggregate piers to the minimum depths required by the design.

E. The equipment shall be capable of installing aggregate piers in the presence of very dense granular soils and obstructions, where encountered.

F. Aggregate Pier Systems

1. After pre-augering, pre-drilling or pre-excavation, aggregate pier systems shall be constructed by advancing a specially designed mandrel with a minimum 15-ton static force augmented by dynamic vertical ramming energy to the full design depth. The hollow-shaft mandrel, filled with aggregate, is incrementally raised, permitting the aggregate to be released into the cavity, and then lowered by vertically advancing and/or ramming to densify the aggregate and force it laterally into the adjacent soil. The cycle of raising and lowering the mandrel is repeated to the top of pier elevation. The cycle distance shall be determined by the aggregate pier designer.

2. A high-energy impact densification apparatus shall be employed to vertically densify the aggregate pier elements during installation of each constructed lift of aggregate.

3. Densification shall be performed using a mandrel/tamper. The mandrel/tamper foot is required to adequately increase the lateral earth pressure in the matrix soil during installation. Compaction equipment that induces horizontal vibratory energy shall not be permitted.

4. Downward crowd pressure shall be applied to the mandrel during installation.

G. Obstructions

1. Obstructions, such as rocks, cobbles, boulders, and/or gravel shall be anticipated within the fill and native soils. The Contractor shall have sufficient capacity, equipment, and tooling necessary to allow for aggregate piers to achieve the design tip elevations, including penetrating obstructions, unless obstructions are otherwise pre-excavated. Piers terminating in existing fill shall be rejected.

H. Modulus Test

1. A modulus test shall be performed to verify the parameter values selected for the design of the aggregate piers. The test pier shall be agreed upon by the ground improvement designer and the Owner. The modulus test shall include the following:
   a. The test element shall be tested to a load equal to the element area times at least 150 percent of the aggregate pier maximum design stress (not allowable bearing pressure for footings) to demonstrate that the element exhibits safe response during service loading.
   b. The top of the pier shall be exposed and a test plate/cap having the same diameter as the test aggregate pier shall be placed/constructed. The test plate/cap shall not extend beyond the edge of the aggregate pier.
   c. General test procedures, including load increments, load increment duration, and load decrements shall be in accordance with ASTM D1143 and ASTM D1194.
   d. A telltale shall be installed at the bottom of the test aggregate pier so that bottom-of-aggregate pier deflections can be determined.
   e. With the exception of the load increment representing approximately 117% of the design maximum stress at the top of the aggregate pier, all load increments shall be held for a minimum of 15 minutes, a maximum of 1 hour, and until the rate of deflections reduces to 0.01 inches per hour or less.
   f. The load increment that represents approximately 117% of the design maximum stress on the aggregate pier shall be held for a minimum of 15 minutes, a maximum of 4 hours, and until the rate of deflection reduces to 0.01 inches per hour or less.
   g. A seating load equal to 5% of the maximum load shall be applied to the test place/cap prior to application of load increments and prior to measurement of deflections to compensate for surficial disturbance.
   h. Modulus testing shall be performed in accordance with the requirements outlined in the Design Submittal.
   i. The location of the modulus test shall be approved by the Owner.
   j. The modulus test pier shall be installed in a manner that will be consistently used throughout aggregate pier installation. The details of the installation procedure shall be recorded by the Contractor's quality control representative.

3.4 SITE SUBGRADE PREPARATION

A. Subgrades shall be prepared in accordance with Section 312316 Excavation, Backfill, and Compaction and the following paragraphs.

B. Prior to placing fill on the aggregate pier subgrade, the exposed subgrade soils shall be thoroughly compacted with a hand-operator vibratory compactor or vibratory roller. Static compaction may be allowed if acceptable to the Owner. Compaction shall be performed on the same day that fill is to be placed and shall extend over the entire subgrade to compact any loose surficial soil.

C. Excavation and compaction of all subgrades shall be the responsibility of the Contractor.

D. Excavations to expose the tops of aggregate piers shall be made carefully to prevent disturbance of the piers. Excavations shall be protected until concrete placement to prevent softening of the matrix soil between and around the aggregate piers before placing concrete.

3.5 REJECTED AGGREGATE PIERS

A. Aggregate piers improperly located or installed beyond the maximum allowable tolerances shall be abandoned and replaced with new piers unless the Designer and Owner approve other remedial measures. Aggregate piers terminating above the inorganic native soils shall be rejected. All material and labor required to replace rejected piers shall be provided at no additional cost to the Owner.

END OF SECTION

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CENTRAL MIDDLE SCHOOL
GREENWICH, CONNECTICUT
STATE PROJECT NO. 057-0114 N
PHASE 2 OF 3 – BUILDING CONSTRUCTION,
DEMOLITION, AND SITEWORK

S/L/A/M PROJECT NO. 22367.00
AGGREGATE PIERS
316616 - 12

SECTION 32 0529 - GLACIAL BOULDERS FOR EXTERIOR IMPROVEMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Glacial Boulders.

2. **Stepping Stones.**

B. Related Requirements:

1. Section 017419 - Construction and Demolition Waste Management and Disposal.

2. Division 01 Section(s) "Construction Waste Management and Disposal" and "Sustainability Compliance Procedures" for sustainability requirements

3. Section 31 2200 - Grading: Preparation of site for boulder placement.

4. Section 31 2300 Excavation, Backfill, Compaction and Dewatering: Excavation for installing concrete footings.

1.3 SUBMITTALS

A. CTHPB Documentation Submittals: Comply with Section 01 3566.42 – Sustainability Compliance Procedures and provide the following in addition to other submittals:

1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

B. ~~Photographs for~~ **Initial Selection: Landscape Architect to walk the site with contractor to complete initial selection and tagging of boulders during demolition stage of project.**

1. **Notify Landscape Architect seven days prior to intended date for boulder selection site walk.**

~~For each source of glacial boulders, provide at least ten photographs of all sizes of boulders. Provide at least three sources from which the Landscape Architect is to select~~.

C. ~~Photographs for Verification:~~

1. ~~For each boulder indicated, include at least four photographs of three potential boulders considered for use. Photographs are to exhibiting extremes of the full range of color and other visual characteristics. If fewer than the required number of boulders are selected from the submitted photographs, additional photographs shall be submitted for selection.~~

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain boulders on site**.** ~~through one source from a single supplier.~~ **Obtain stepping stones from on site or from locally single source quarry.**

B. Boulder Review and Selection: Landscape Architect ~~may~~ **shall** observe review and select individual boulders at site before placement for compliance with requirements and may reject unsatisfactory boulders at any time during progress of work. Remove rejected boulders immediately from Project site.

1. ~~Notify Landscape Architect of sources of boulders seven days in advance of delivery to site.~~

C. **Stepping Stone Review and Selection: Landscape Architect shall observe review and select individual stepping stones at site before placement for compliance with requirements and may reject unsatisfactory stepping stones at any time during progress of work. Remove rejected stepping stones immediately from Project site. Offsite stepping stones shall be reviewed and selected at the source. Notify Landscape Architect of sources of stepping stones a minimum of seven days prior to intended selection date.**

D. Pre-installation conference: Conduct conference at project site to comply with requirements in Section 01 3000 - Administrative Requirements. The purpose of the conference is to meet with Landscape Architect on-site to select boulders to be used.

PART 2 PRODUCTS

2.1 LEED PERFORMANCE REQUIREMENTS

A. For all permanently installed products and materials related to the work of this Section, provide products and materials that meet the Project's LEED performance criteria as outlined in PART 2–PRODUCTS of Section 018113 – Sustainable Design Requirements.

2.2 STONE SOURCE

A. Varieties and Sources: Boulders to be sourced on site, as possible. ~~If insufficient quality or quantity can be extracted from the site, obtain materials of each type from same source for the entire project. Approval of stone supplier is required prior to purchase.~~

2.3 GLACIAL BOULDERS

A. Boulders: Shall be selected from on-Site boulders and shall be randomly sized. Boulder size shall vary from the maximum size to the minimum size. No boulders shall be obtained from off-site unless approved by the Landscape Architect.
   1. Boulders shall be naturally rounded glacial erratics as found in glacial till deposits on-site, and to be of solid basalt, sedimentary or granitic naturally occurring stone, free from flaking, decomposition or weathering.
   2. **If insufficient quantity of glacial erratics can be extracted, weathered boulders from sections of material harvested by blasting Indian Rock Outcropping and other on-site outcroppings may be submitted. Any sharp angles must be buried or ground down to eliminate safety rist of finished exposed surfaces of boulders.**
   3. ~~Boulders shall not be stone material from ledge excavations.~~
   4. Minimum Size: 4 feet by 3 feet by 3 feet.
   5. Maximum Size: No maximum however some of the largest should be at least be 8 feet by 6 feet by 6 feet.

B. **Stepping Stones: Shall be selected from on-site and shall be randomly sized. Stepping stones size shall vary from maximum size to minimum size. Stepping stones may be obtained off-site from single source local quarry such as Liberty Stone or approved equal.**
   1. **Stepping stones shall be 2-4 inches thick natural cleft material.**
   2. **Minimum size: 2 feet by 2 feet**
   3. **Maximus size: 4 feet by 3 feet**
   4. **Color: to match boulder gradation of color, as selected by Landscape Architect.**

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 GLACIAL BOULDERS

A. Install boulders at locations, elevations and height as indicated on the Drawings and as directed by Landscape Architect.

B. Set firmly in place with approximately half the boulder exposed as indicated on the Drawings.

3.3 CLEANUP AND PROTECTION

A. After completing installation of boulders, remove spots, dirt, and debris.

END OF SECTION

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SECTION 32 1216 - ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. The State of Connecticut Department of Transportation Standard Specifications for Roads, Bridges and Incidental Construction, Form 816, 2004, and latest Supplemental specifications (ConnDOT Form 816) apply to this work, with the exception of provisions for measurements and payments.

1.2 SUMMARY

A. This Section includes the following:

1. Hot-mix asphalt paving of parking lots and drives.
2. Hot-mix porous asphalt paving of parking lots and drives.
3. Hot-mix asphalt paving of walkways.
4. Pavement-marking paint of parking lots and driveway.

B. Related Requirements:

1. Division 01 Section(s) "Construction Waste Management and Disposal" and "Sustainability Compliance Procedures" for sustainability requirements

2. Division 31 Section "Excavation, Backfill, Compaction and Dewatering" for aggregate subbase and base courses and for aggregate pavement shoulders.

3. Division 32 Section "Concrete Paving Joint Sealants" for joint sealants and fillers at paving terminations.

C. Alternates: Refer to Division 01 Section "Alternates" for description of Work of this Section affected by alternates.

1.3 DEFINITIONS

A. Hot-Mix Asphalt Paving Terminology: Refer to ASTM D 8 for definitions of terms.

B. ConnDOT: Connecticut Department of Transportation.

1.4 SYSTEM DESCRIPTION

A. Provide hot-mix asphalt paving according to materials, workmanship, and other applicable requirements of standard specifications of State of Connecticut Department of Transportation (ConnDOT).

1.5 SUBMITTALS

A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.

B. CTHPB Documentation Submittals: Comply with Section 01 3566.42 – Sustainability Compliance Procedures and provide the following in addition to other submittals:

1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

C. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.

D. Job-Mix Designs: For each job mix proposed for the Work.

E. Shop Drawings: Indicate pavement markings, lane separations, and defined parking spaces. Indicate, with international graphics symbol, spaces dedicated to people with disabilities.

F. Samples: For each paving fabric, 12 by 12 inches (300 by 300 mm) minimum.

G. Qualification Data: For manufacturer and synthetic track base installer.

H. Material Test Reports: For each paving material.

I. Material Certificates: For each paving material, signed by manufacturers.

1.6 QUALITY ASSURANCE

A. Paving Installation Qualifications: Company shall have successful experience in the installation of the various standard and porous bituminous pavement and base installations required as part of this project. The Contractor shall provide competent workmen skilled in installations.

1. The installer's supervisor shall have a minimum of 5 years of experience as either a construction manager or a supervisor of synthetic track base installations.

2. The installer shall have a minimum of 5 track installations.

B. Manufacturer Qualifications: A qualified manufacturer.

1. Manufacturer shall be a paving-mix manufacturer registered with and approved by and registered with ConnDOT.

C. Testing Agency Qualifications: Qualified according to ASTM D 3666 for testing indicated, as documented according to ASTM E 548.

D. Asphalt-Paving Publication: Comply with AI MS-22, "Construction of Hot Mix Asphalt Pavements", unless more stringent requirements are indicated.

E. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to hot-mix asphalt paving including, but not limited to, the following:

a. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.
b. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.

F. Flood Testing: At the discretion of the Landscape Architect, the Contractor shall flood test all asphalt pavement for proper drainage by flooding with water in ample quantities to demonstrate the correct shaping of the pavement.

1. Flood testing of subbase for synthetic running track subbase is mandatory.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.

B. Store pavement-marking materials in a clean, dry, protected location within temperature range required by manufacturer. Protect stored materials from direct sunlight.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp or if the following conditions are not met:

1. Tack Coat: Minimum surface temperature of 60 deg F(15.5 deg C).
2. Slurry Coat: Comply with weather limitations of ASTM D 3910.

3. Asphalt Base Course: Minimum surface temperature of 40 deg F(4 deg C) and rising at time of placement.

4. Asphalt Surface Course: Minimum surface temperature of 60 deg F(15.5 deg C) at time of placement.

B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F(4 deg C) for oil-based materials, 50 deg F(10 deg C) for water-based materials, and not exceeding 95 deg F(35 deg C).
1. Provide manufacturer's standard warranty, minimum of one year.

PART 2 - PRODUCTS

2.1 AGGREGATES

A. General: Use materials and gradations that have performed satisfactorily in previous installations.

B. Base Coarse: Comply with Section "Earth Moving" for pavement base materials. Processed Aggregate base material for Asphalt Paving shall comply with the requirements of Section M.05.01 of ConnDOT 816.

C. Subbase Course: Comply with Section "Earth Moving" for pavement subbase material.

D. Mineral Filler: Comply with section M.04.01.1a of ConnDOT 816.

E. Reclaimed Asphalt Pavement: Comply with Section M.02.01.3 for use as subbase material under bituminous concrete pavement.

2.2 ASPHALT MATERIALS

A. Asphalt Cement: AASHTO M226.

B. Tack Coat: AASHTO M 140, emulsified asphalt, cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.

C. Water: Potable.

2.3 AUXILIARY MATERIALS

A. Herbicide: Commercial chemical for weed control, registered by the EPA. Provide in granular, liquid, or wettable powder form.

B. Joint Sealant: Comply with section M.04.02 of ConnDOT 816.

C. Pavement-Marking Paint: comply with section M.07.20 of ConnDOT 816, for 15 minute dry paint.

1. Color: White, blue, Yellow. (see plans and details for color use.)

2.4 MIXES

A. Recycled Content of Hot-Mix Asphalt: Postconsumer recycled content and preconsumer recycled content conforming with Section M.04.01.5 of ConnDOT Form 816.

B. Hot-Mix Asphalt:

1. Base Course: Class 1: Complying with Section M.04.01 of ConnDOT Form 816.
2. Surface Course: Class 2: Complying with Section M.04.01 of ConnDOT Form 816.
3. Subbase Course: Class 4: Complying with Section M.04.01 of ConnDOT Form 816.
4. Porous Bituminous Concrete Paving: Shall be equal to Porous Bituminous Concrete – Torrington Plant Mix as provided by O & G Industries, Inc (860.489.9261). Base and choker courses shall be as detailed and noted on the drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that subgrade is dry and in suitable condition to support paving and imposed loads.

B. Proof-roll subbase using heavy, pneumatic-tired rollers to locate areas that are unstable or that require further compaction.

C. Proceed with paving only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.

1. Sweep loose granular particles from surface of unbound-aggregate base course. Do not dislodge or disturb aggregate embedded in compacted surface of base course.

B. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.

1. Mix herbicide with prime coat if formulated by manufacturer for that purpose.

C. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd.(0.2 to 0.7 L/sq. m).

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.3 PROCESSED AGGREGATE BASE:

A. Box-out and place processed Aggregate Base in locations and to depths indicated on the drawings.

B. Compact Processed Aggregate Base to 95% ASHO compaction as in compliance with Form 816.

3.4 HOT-MIX ASPHALT PLACING

A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.

1. Place hot-mix asphalt subbase and base course in number of lifts and thicknesses indicated.
2. Place hot-mix asphalt surface course in single lift.
3. Spread mix at minimum temperature of 250 deg F (121 deg C).
4. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes, unless otherwise indicated.
5. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

B. Place paving in consecutive strips not less than 10 feet (3 m) wide unless infill edge strips of a lesser width are required.

1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete a section of asphalt base course before placing asphalt surface course.

C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.5 JOINTS

A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions with same texture and smoothness as other sections of hot-mix asphalt course.

1. Clean contact surfaces and apply tack coat to joints.
2. Offset longitudinal joints, in successive courses, a minimum of 6 inches (150 mm).
3. Offset transverse joints, in successive courses, a minimum of 24 inches (600 mm).
4. Construct transverse joints as described in AI MS-22, "Construction of Hot Mix Asphalt Pavements".
5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
6. Compact asphalt at joints to a density within 2 percent of specified course density.

3.6 COMPACTION

A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or vibratory-plate compactors in areas inaccessible to rollers.

1. Complete compaction before mix temperature cools to 185 deg F(85 deg C).

B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:

1. Average Density: 96 percent of reference laboratory density according to AASHTO T 245, but not less than 94 percent nor greater than 100 percent.
2. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent nor greater than 96 percent.

D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.

F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.

G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.7 INSTALLATION TOLERANCES FOR GENERAL PAVING

A. Thickness: Compact each course to produce the thickness indicated within the following tolerances:

1. Base Course: Plus or minus 1/2 inch (13 mm).
2. Surface Course: Plus 1/4 inch(6 mm), no minus.

B. Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot(3-m) straightedge applied transversely or longitudinally to paved areas:

1. Base Course: 1/4 inch (6 mm)
2. Surface Course: 1/8 inch (3 mm).
3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch (6 mm).

3.8 PAVEMENT MARKING

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Landscape Architect.

B. Allow paving to age for 30 days before starting pavement marking.

C. Sweep and clean surface to eliminate loose material and dust.

D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils(0.4 mm).

3.9 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports.

1. Testing agency will conduct and interpret tests and state in each report whether tested Work complies with or deviates from specified requirements.

B. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

C. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.

D. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.

E. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to ConnDOT 816.

F. Flood Testing: All asphalt pavements shall be flood tested for proper drainage by flooding with water in ample quantities to demonstrate the correct shaping of the pavement.

1. Landscape Architect must be present to witness the flood tests. The Contractor shall notify the Landscape Architect a minimum of 3 working days prior to the flood testing.
2. Flood test immediately after the asphalt is capable of handling traffic, but within 24 hours. If, after 20 minutes of drying time there are birdbaths evident, pavement with excessive ponding shall be repaired. Areas with ponding which have a water depth of 3/16 inch or more shall be corrected.

3. Repair: Any areas requiring correction by means of remedial overlay shall be prepared by grinding the pertinent areas and placement of fine asphalt concrete patch mix over a tack coat. No cold tar patching, skin patching or sand mix patching will be acceptable.
4. Repair of Subbase for Synthetic Running Track: Corrective action method and materials for ponding on subbase of synthetic running track shall be accepted in writing by the Synthetic Running Track Contractor.

G. Oils Spills on Subbase of Synthetic Running Track: Any oil spills (hydraulic, diesel, motor oil, etc.) must be completely removed, either by chipping out or removing and replacing with new, keyed in asphalt. The minimum depth of any asphalt replacement shall be one inch. The curing time for the asphalt base is 28 days. It shall be the responsibility of the Synthetic Running Track Contractor to determine if the asphalt substrate has cured sufficiently prior to the application of synthetic running track surfacing system.

H. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.10 DISPOSAL

A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Do not allow excavated materials to accumulate on-site.

END OF SECTION 32 1216

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SECTION 32 1313 - CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. State of Connecticut, Department of Transportation, Form 816 Standard Specification of Roads, Bridges and Incidental Construction, 1995, and as amended.

1.2 SUMMARY

A. This Section includes exterior cement concrete pavement for the following:

1. Concrete Sidewalk Pavement.
2. Concrete Footing for Bleachers.
3. Heavy Duty Concrete Pavement.
4. Concrete Utility Pads.
5. ~~Concrete Curbs.~~
6. ~~Concrete Edge at Synthetic Track Trench Drain.~~
7. ~~Concrete Edge at Synthetic Sports Field.~~
8. ADA detectable warning tiles.

B. Related Requirements:

1. Division 01 Section(s) "Construction Waste Management and Disposal" and "Sustainability Compliance Procedures" for sustainability requirements

2. Division 03 Section "Cast-in-Place Concrete" for footings of walls, stairs, signs, site furnishings, and other general building applications of concrete.

3. Division 11 Section "Track and Field Equipment" for formwork of track and field events.

4. Division 31 Section "Excavation, Backfill, Compaction and Dewatering" for subgrade preparation, grading, and subbase course.

C. Alternates: Refer to Division 01 Section "Alternates" for description of Work of this Section affected by alternates.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.

1.4 SUBMITTALS

A. Product Data: For each type of manufactured material and product indicated.

B. CTHPB Documentation Submittals: Comply with Section 01 3566.42 – Sustainability Compliance Procedures and provide the following in addition to other submittals:

1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

C. Design Mixtures: For each concrete pavement mixture. Include alternate mixture designs when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

D. Qualification Data: For manufacturer.

E. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:

1. Aggregates.

F. Material Certificates: Signed by manufacturers certifying that each of the following materials complies with requirements:

1. Cementitious materials.
2. Steel reinforcement and reinforcement accessories.
3. Admixtures.
4. Curing compounds.
5. Joint fillers.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products who complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities".

B. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete", unless modified by requirements in the Contract Documents.

C. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

D. Mockups of ADA Tactile Warning Tiles: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination".

1. Before submitting design mixtures, review concrete pavement mixture design and examine procedures for ensuring quality of concrete materials and concrete pavement construction practices. Require representatives, including the following, of each entity directly concerned with concrete pavement, to attend conference:

a. Contractor's superintendent.
b. Independent testing agency responsible for concrete design mixtures.
c. Ready-mix concrete producer.
d. Concrete pavement subcontractor.

1.6 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

1.7 WARRANTY

A. Special Warranty: Contractor agrees to repair or replace components of tactile warning surfaces that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Deterioration of finishes beyond normal weathering and wear.
b. Separation or delamination of materials and components.

2. Warranty Period: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.

1. Use flexible or curved forms for curves with a radius 100 feet (30.5 m) or less.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.2 STEEL REINFORCEMENT

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

C. Reinforcing Bars: ASTM A 615/A 615M, Grade 60(Grade 420); deformed.

D. Plain Steel Wire: ASTM A 82, as drawn.

E. Deformed-Steel Wire: ASTM A 496.

F. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420) plain-steel bars. Cut bars true to length with ends square and free of burrs.

G. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded-wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:

1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.

2.3 CONCRETE MATERIALS

A. Regional Materials: Provide concrete materials that have been manufactured within 500 miles (800 km) of Project site from aggregates and cement that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site.

B. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source throughout the Project:

1. Portland Cement: ASTM C 150, Type I and II. Supplement with the following:

a. Fly Ash: ASTM C 618, Class C or F.
b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

C. Aggregates: ASTM C 33, uniformly graded from a single source with coarse aggregate as follows:

1. Per governing jurisdictions as referenced in Section 1.2C.

D. Water: ASTM C 94/C 94M.

E. Air-Entraining Admixture: ASTM C 260.

F. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
3. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
4. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.

2.4 CURBING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd.(305 g/sq. m) dry.

B. Water: Potable.

C. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.

D. Clear Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

2.5 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: Concrete Sidewalk Pavement: ASTM D 1751, asphalt-saturated cellulosic fiber.

2.6 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.

1. Use a qualified independent testing agency for preparing and reporting proposed concrete mixture designs for the trial batch method.

B. Proportion mixtures to provide normal-weight concrete with the following properties:

1. Compressive Strength (28 Days): 4000 psi (27.6 MPa).
2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.45.
3. Slump Limit: 4 inches (100 mm), plus or minus 1 inch (25 mm).

C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:

1. Air Content: 5 percent plus or minus 1.5 percent for 3/4-inch (19-mm) nominal maximum aggregate size.

D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

E. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing admixture, high-range, water-reducing admixture, or high-range, water-reducing and retarding admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

F. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 requirements for concrete exposed to deicing chemicals as follows:

1. Fly Ash or Pozzolan: 25 percent.
2. Ground Granulated Blast-Furnace Slag: 50 percent.

2.7 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Furnish batch certificates for each batch discharged and used in the Work.

1. When air temperature is between 85 deg F(30 deg C) and 90 deg F(32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F(32 deg C), reduce mixing and delivery time to 60 minutes.

2.8 ADA TACTILE WARNING SURFACING, GENERAL

A. Accessibility Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for tactile warning surfaces.

1. For tactile warning surfaces composed of multiple units, provide units that when installed provide consistent side-to-side and end-to-end dome spacing that complies with requirements.
2. Source Limitations: Obtain each type of tactile warning surfacing, anchor, and fasteners from single source with resources to provide materials and products of consistent quality in appearance and physical properties.

2.9 DETECTABLE WARNING TILES

A. Cast-in-Place Detectable Warning Tiles: Accessible truncated-dome detectable warning tiles with replaceable surface configured for setting flush in new concrete walkway surfaces, with slip-resistant surface treatment on domes and field of tile.
   1. Material: Molded glass- and carbon-fiber-reinforced polyester.
   2. Color: Black
   3. Mounting:

      a. Replaceable detectable warning tile wet-set into freshly poured concrete and surface-fastened to permanently embedded anchors.

2.10 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of tactile warning surfaces, noncorrosive and compatible with each material joined, and complying with the following:

   1. Furnish Type 316 stainless-steel fasteners for exterior use.
   2. Fastener Heads: For nonstructural connections, use flathead or oval countersunk screws and bolts with tamper-resistant heads, colored to match tile.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.

B. Proof-roll prepared subbase surface below concrete pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding.

   1. Completely proof-roll subbase in one direction. Limit vehicle speed to 3 mph (5 km/h).
   2. Proof-roll with a loaded 10-wheel tandem-axle dump truck weighing not less than 15 tons (13.6 tonnes).
   3. Subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch (13 mm) require correction according to requirements in Division 2 Section "Earthwork".

C. Proceed with concrete pavement operations only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.

D. **ADA Tactile Warning Tiles:**

   1. Verify that pavement is in suitable condition to begin installation according to manufacturer's written instructions. Verify that installation of tactile warning surfacing will comply with accessibility requirements upon completion.
   2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

D. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.5 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour unless pavement terminates at isolation joints.

1. Continue steel reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.
2. Provide tie bars at sides of paving strips where indicated.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.

1. Locate expansion joints at intervals of 20 feet (15.25 m), unless otherwise indicated.
2. Extend joint fillers full width and depth of joint.

3. Terminate joint filler not less than 1/2 inch (13 mm) or more than 1 inch(25 mm) below finished surface if joint sealant is indicated.
4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
6. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:

1. Use grooving tool to form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch (6-mm) radius. Repeat grooving of contraction joints after applying surface finishes.

E. Edging: Tool edges of paving, curbs, and joints in concrete after initial floating with an edging tool to a 1/4-inch (6-mm) radius. Repeat tooling of edges after applying surface finishes.

1. All Contraction, Isolation and Construction joints to be edged.

3.6 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast in. Notify other trades to permit installation of their work.

B. Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.

E. Do not add water to fresh concrete after testing.

F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

G. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.

H. Screed pavement surfaces with a straightedge and strike off.

I. Commence initial floating using bull floats or darbies to impart an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

J. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When air temperature has fallen to or is expected to fall below 40 deg F(4.4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F(10 deg C) and not more than 80 deg F(27 deg C) at point of placement.
2. Do not use frozen materials or materials containing ice or snow.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mix designs.

K. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F(32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

L. Curbs: When automatic machine placement is used for curb placement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce curbs to required cross section, lines, grades, finish, and jointing as specified for formed concrete. If results are not approved, remove and replace with formed concrete.

3.7 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

1. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.

3.8 SPECIAL FINISHES

A. ADA Tactile Warning Tiles:

1. Concrete Paving Installation: Comply with installation requirements in Section 32 1313 "Concrete Paving". Mix, place, and finish concrete to conditions complying with detectable warning tile manufacturer's written requirements for satisfactory embedment of removable tile.
2. Set each detectable warning tile accurately and firmly in place with embedding anchors and fasteners attached, and firmly seat tile back in wet concrete by tamping or vibrating. If necessary, temporarily apply weight to tiles to ensure full contact with concrete.
3. Set surface of tile flush with surrounding concrete and adjacent tiles, with variations between tiles and between concrete and tiles not exceeding plus or minus 1/8 inch (3 mm) from flush.
4. Protect exposed surfaces of installed tiles from contact with wet concrete. Complete finishing of concrete paving surrounding tiles. Remove concrete from tile surfaces.
5. Clean tiles using methods recommended in writing by manufacturer.

3.9 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h(1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

E. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:

1. Moist Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

   a. Water.
   b. Continuous water-fog spray.

c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.

2. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.10 ADA TACTILE WARNING TILES: CLEANING AND PROTECTION

A. Remove and replace tactile warning surfacing that is broken or damaged or does not comply with requirements in this Section. Remove in complete sections from joint to joint unless otherwise approved by Architect. Replace using tactile warning surfacing installation methods acceptable to Architect.

B. Protect tactile warning surfacing from damage and maintain free of stains, discoloration, dirt, and other foreign material.

3.11 PAVEMENT TOLERANCES

A. Comply with tolerances of ACI 117 and as follows:

1. Elevation: 1/4 inch (6 mm).
2. Thickness: Plus 3/8 inch (10 mm), minus 1/4 inch (6 mm).
3. Surface: Gap below 10-foot- (3-m-) long, unleveled straightedge not to exceed 1/4 inch (6 mm).
4. Lateral Alignment and Spacing of Tie Bars and Dowels: 1 inch (25 mm).
5. Vertical Alignment of Tie Bars and Dowels: 1/4 inch (6 mm).
6. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: Length of dowel 1/4 inch per 12 inches (6 mm per 300 mm).
7. Joint Spacing: 3 inches (75 mm).
8. Contraction Joint Depth: Plus 1/4 inch (6 mm), no minus.
9. Joint Width: Plus 1/8 inch (3 mm), no minus.

3.12 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain at least 1 composite sample for each 100 cu. yd.(76 cu. m) or fraction thereof of each concrete mix placed each day.

a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F(4.4 deg C) and below and when 80 deg F(27 deg C) and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C 39/C 39M; test 1 specimen at 7 days and 2 specimens at 28 days.

a. A compressive-strength test shall be the average compressive strength from 2 specimens obtained from same composite sample and tested at 28 days.

C. Strength of each concrete mix will be satisfactory if average of any 3 consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).

D. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.

G. Remove and replace concrete pavement where test results indicate that it does not comply with specified requirements.

H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.13 REPAIRS AND PROTECTION

A. Remove and replace concrete pavement that is broken, damaged, or defective or that does not comply with requirements in this Section.

B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.

C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 32 1313

SECTION 32 1373 - CONCRETE PAVING JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Expansion and contraction joints within cement concrete pavement.
2. Joints between cement concrete and asphalt pavement.

B. Related Requirements:

1. Division 01 Section(s) "Construction Waste Management and Disposal" and "Sustainability Compliance Procedures" for sustainability requirements

2. Division 07 Section "Joint Sealants" for sealing nontraffic and traffic joints in locations not specified in this Section.

3. Division 32 Section "Asphalt Paving" for constructing joints between concrete and asphalt pavement.

4. Division 32 Section "Concrete Paving" for constructing joints in concrete pavement.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. CTHPB Documentation Submittals: Comply with Section 01 3566.42 – Sustainability Compliance Procedures and provide the following in addition to other submittals:

1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

C. Samples for Verification: For each type and color of joint sealant required. Install joint-sealant samples in 1/2-inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

D. Paving-Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of joint sealant and accessory.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. Product Testing: Test joint sealants using a qualified testing agency.

1.7 FIELD CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F (5 deg C).
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.

2.2 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.3 COLD-APPLIED JOINT SEALANTS

A. General: Pavement sealants shall be a polyurethane based complying with ASTM C-920, Type S (single componenent),or Type M (multicomponent), Use group T (traffic) or NT (non-traffic), Class 35 (minimium) and the following. Any sealants used shall be recommended for the specific use by the manufacturer. Sealant and backer-rod materials shall be compatible as noted by the manufacturers submitted.

1. Horizontal joints in areas of vehicular traffic shall comply with: ASTM C-920, Grade P (pourable or self-leveling) Use T. Color Grey.
2. Horizontal joints in areas of pedestrian, or light vehicular traffic shall comply with ASTM C-920, Grade NS (non-sag), use T or NT. Submitted product shall be available in a minimum of 7 standard colors.
3. Vertical Joints: Shall comply with ASTM C-920, Grade NS (non-sag), use T or NT. Submitted product shall be available in a minimum of 7 standard colors.

B. Typical Manufacturers (non exclusive):

1. BASF.
2. Bostik.
3. Pecora.
4. Sika.
5. Tremco.
6. W. R. Meadows.

2.4 JOINT-SEALANT BACKER MATERIALS

A. Joint-Sealant Backer Materials: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by joint-sealant manufacturer, based on field experience and laboratory testing.

B. Round Backer Rods for Cold-Applied Sealants: ASTM D 5249, Type 3, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

2.5 PRIMERS

A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Before installing joint sealants, clean out joints immediately to comply with joint-sealant manufacturer's written instructions.

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

3.3 INSTALLATION OF JOINT SEALANTS

A. Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions.

C. Install backer materials of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of backer materials.
2. Do not stretch, twist, puncture, or tear backer materials.
3. Remove absorbent backer materials that have become wet before sealant application and replace them with dry materials.

D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses provided for each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealants from surfaces adjacent to joint.

2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.

F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions, unless otherwise indicated.

G. Provide recessed joint configuration for sealants in areas of vehicular traffic per manufacturers recommended recess depth and at locations indicated.

3.4 CLEANING AND PROTECTION

A. Clean off excess joint sealant as the Work progresses, by methods and with cleaning materials approved in writing by joint-sealant manufacturers.

B. Protect joint sealants, during and after curing period, from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations in repaired areas are indistinguishable from the original work.

END OF SECTION 32 1373

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SECTION 32 1400 - UNIT PAVERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and Volume 1 Project Contract Manual apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Pedestrian Concrete Unit Pavers
2. Edge restraints for unit pavers.

B. Related Requirements:

1. Division 31 Section “Excavation, Backfill, Compaction and Dewatering”

2. Division 32 Section for compacted subgrade and subbase course, if any, under unit pavers.

3. Division 32 Section "Joint Sealants" for sealing control and expansion joints in unit pavers with elastomeric sealants.

1.3 SUBMITTALS

A. Product Data: For the following:

1. Concrete pavers.
2. Edge restraints.

B. CTHPB Documentation Submittals: Comply with Section 01 3566.42 – Sustainability Compliance Procedures and provide the following in addition to other submittals:

1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

C. Samples for Initial Selection: Manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available for each type of unit paver indicated.

D. Samples for Verification: Full-size units of each type of unit paver indicated; in sets for each color, texture, and pattern specified, showing the full range of variations expected in these characteristics.

E. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed unit paver installations similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Source Limitations: Obtain each type of unit paver, joint material, and setting material from one source with resources to provide materials and products of consistent quality in appearance and physical properties.

C. Mockups: Before installing unit pavers, build mockups for each form and pattern of unit pavers required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for the completed Work, including same base construction, special features for expansion joints, and contiguous work as indicated:

1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
2. Demonstrate the proposed range of aesthetic effects and workmanship.
3. Obtain Architect's written approval of mockups before starting unit paver installation.
4. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
5. Demolish and remove mockups when directed.
6. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect unit pavers and aggregate during storage and construction against soiling or contamination from earth and other materials.

1. Cover pavers with plastic or use other packaging materials that will prevent rust marks from steel strapping.

1.6 PROJECT CONDITIONS

A. Cold-Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit paver work damaged by frost or freezing.

1.7 WARRANTY

A. For products noted in this section, provide manufacturer's standard warranty, minimum of one year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.2 UNIT PAVERS

A. Concrete Pavers: Solid, interlocking paving units, ASTM C 936, made from normal-weight aggregates in sizes and shapes indicated. See drawings for locations.

1. Pedestrian Concrete Unit Pavers Basis of Design – Unilock Artline

a. Thickness: 2 ¾" vehicular, 2 ¼" pedestrian.

b. Size: Unit G – 7 ½" x 17 ¾"

c. Color: to be selected by Landscape Architect from full range of colors and finishes.

2.3 ACCESSORIES

A. Paver Edge Restraint Material: Paver edge restraints shall be Pave Edge Rigid, by Pave Tech, Inc. and provided by Ideal Concrete Block, Co., or an approved equal.

B. Geotextile Soil Separator: Shall be Propex 601 as manufactured by Propex, Inc. 6025 Lee Highway, Suite 425, PO Box 22788, Chattanooga, TN 37422 as distributed by Ferguson Water Works, Co., Newington, C T; 124 Costello Road Newington, CT (Connecticut) 06111-5156; Phone: (860) 666-5634 or 1-800-382-4581 or approved equal.

2.4 AGGREGATE SETTING-BED MATERIALS

A. Graded Aggregate for Base: Per manufacturer's specifications

B. Geotextile Fabric: TYPAR 3401-G Geotextile Fabric manufactured by Advanced Drainage Systems (1.800.821.6710) or approved equal.

C. Sand for Leveling Course: Sound, sharp, washed, natural sand or crushed stone complying with gradation requirements of ASTM C 33 for fine aggregate.

D. Sand for Joints: Techni-seal Polymeric Sand as manufactured by Techni-Seal, 1470 rue De Coulomb, Boucherville, Quebec, Canada J4B 7K2 (514) 523-2110 or approved equal.

PART 3 - EXECUTION

3.1 PREPARATION

A. Proof-roll prepared subgrade surface to check for unstable areas and areas requiring additional compaction. Proceed with unit paver installation only after deficient subgrades have been corrected and are ready to receive subbase for unit pavers.

3.2 INSTALLATION, GENERAL

A. Do not use unit pavers with chips, cracks, voids, discolorations, and other defects that might be visible or cause staining in finished work.

B. Mix pavers from several pallets or cubes, as they are placed, to produce uniform blend of colors and textures.

C. Cut unit pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.

1. For concrete pavers, a block splitter may be used.

D. Joint Pattern: As indicated.

E. Tolerances: Do not exceed 1/16-inch (1.6-mm) unit-to-unit offset from flush (lippage) nor 1/8 inch in 24 inches (3 mm in 600 mm) and 1/4 inch in 10 feet (6 mm in 3 m) from level, or indicated slope, for finished surface of paving.

F. Expansion and Control Joints: Provide for sealant-filled joints at locations and of widths indicated. Provide joint filler as backing for sealant-filled joints where indicated. Install joint filler before setting pavers. Sealant materials and installation are specified in Division 7 Section "Joint Sealants."

G. Provide edge restraints as indicated. Install edge restraints before placing unit pavers.

1. Install edge restraints to comply with manufacturer's written instructions. Install stakes at intervals required to hold edge restraints in place during and after unit paver installation.
2. For metal edge restraints with top edge exposed, drive stakes at least 1 inch (25 mm) below top edge.

3.3 AGGREGATE SETTING-BED PAVER APPLICATIONS

A. Compact soil subgrade uniformly to at least 95 percent of ASTM D 1557 laboratory density.

B. Place geotextile over prepared subgrade, overlapping ends and edges at least 12 inches (300 mm).

C. Place aggregate base over compacted subgrade. Provide compacted thickness indicated. Compact base to 100 percent of ASTM D 1557 maximum laboratory density and screed to depth required to allow setting of pavers.

D. Place geotextile over compacted base course, overlapping ends and edges at least 12 inches (300 mm).

E. Place leveling course and screed to a thickness of 1 to 1-1/2 inches (25 to 38 mm), taking care that moisture content remains constant and density is loose and constant until pavers are set and compacted.

F. Treat leveling base with soil sterilizer to inhibit growth of grass and weeds.

G. Set pavers with a minimum joint width of 1/16 inch (1.6 mm) and a maximum of 1/8 inch (3 mm), being careful not to disturb leveling base. If pavers have spacer bars, place pavers hand tight against spacer bars. Use string lines to keep straight lines. Fill gaps between units that exceed 3/8 inch (10 mm) with pieces cut to fit from full-size unit pavers.

1. When installation is performed with mechanical equipment, use only unit pavers with spacer bars on sides of each unit.

H. Vibrate pavers into leveling course with a low-amplitude plate vibrator capable of a 3500- to 5000-lbf (16- to 22-kN) compaction force at 80 to 90 Hz. Perform at least three passes across paving with vibrator. Vibrate under the following conditions:

1. After edge pavers are installed and there is a completed surface or before surface is exposed to rain.
2. Before ending each day's work, fully compact installed concrete pavers to within 36 inches (900 mm) of the laying face. Cover open layers with nonstaining plastic sheets overlapped 48 inches (1200 mm) on each side of the laying face to protect it from rain.

I. Spread dry sand and fill joints immediately after vibrating pavers into leveling course. Vibrate pavers and add sand until joints are completely filled, then remove excess sand. Leave a slight surplus of sand on the surface for joint filling.

J. Do not allow traffic on installed pavers until sand has been vibrated into joints.

K. Repeat joint-filling process 30 days later.

3.4 REPAIR, POINTING, CLEANING, AND PROTECTION

A. Remove and replace unit pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units as intended. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.

END OF SECTION 32 1400

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SECTION 32 1500 - AGGREGATE SURFACING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Stone Mulch Surfacing.

B. Related Requirements:

1. Division 01 Section(s) "Construction Waste Management and Disposal" and "Sustainability Compliance Procedures" for sustainability requirements

2. Section 31 2200 - Grading: Preparation of site paving.

3. Section 31 2323 – Borrow Material: Compacted subbase for paving.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. CTHPB Documentation Submittals: Comply with Section 01 3566.42 – Sustainability Compliance Procedures and provide the following in addition to other submittals:

1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

C. Samples for Verification:
1. For each stone type indicated. Include at least two samples in each set for each type of stone, exhibiting extremes of the full range of color and other visual characteristics expected in completed Work. Samples will establish the standard by which stone provided will be judged.
2. Weed Control Barrier: 12 by 12 inches (300 by 300 mm).
3. Edging Materials and Accessories: Manufacturer's standard size, to verify color selected.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of aggregate through one source from a single manufacturer.

B. Pre-installation conference: Conduct conference at project site to comply with requirements in Section 01 3000 - Administrative Requirements.

PART 2 PRODUCTS

2.1 STONE SOURCE

A. Varieties and Sources: Obtain materials of each type from same source for the entire project. Approval of stone supplier is required prior to purchase. Subject to compliance with requirements, provide stone of one of the following varieties from the following source or equivalent:

2.2 STONE MULCH SURFACING

A. River-washed Stone Mulch: Off-site, naturally occurring river-washed stone free of iron, fines, dust (less than 2 percent passing the No. 200 sieve), organic materials, snow, ice, and other unsuitable materials as approved by Landscape Architect. Mulch shall be washed free of all fines.
   1. Type: Rounded riverbed gravel or smooth-faced stone.
   2. Size Range: 1 ½ to 2-inch diameter.
   3. Color: Readily available natural gravel color range as approved by Landscape Architect.

B. Stone Mulch Edge Restraints: Standard commercial-aluminum angle edging, rolled edge, fabricated in sections of standard lengths.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide “PermaStrip” angled aluminum landscape edging as manufactured by Permaloc Corporation or comparable product by a licensee of one of the following:
      a) Brickstop Corporation.
      b) Curv-Rite, Inc.
      c) Sure-loc Edging Corporation.
   2. Edging Size: 3/16 inch (3.2 mm) thick by 6 inches (102 mm) tall by 1-1/2 inches wide.
   3. Stakes: 18 inches (300 mm) long, 3 minimum per 8-foot section.
   4. Accessories: Standard tapered ends, corners, and splicers.
   5. Finish: Electrostatically applied baked on paint.
   6. Color: Black.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 STONE MAINTENANCE STRIP INSTALLATIONS

A. Steel Edging: Install steel edging where indicated according to manufacturer's written instructions. Anchor with steel stakes spaced approximately 30 inches (760 mm) apart, driven below top elevation of edging.

B. Install weed-control barriers before mulching according to manufacturer's written instructions. Completely cover area to be mulched, overlapping edges a minimum of 6 inches (150 mm) and secure seams with galvanized pins.
   1. Mulch backfilled and compacted surfaces areas to receive stone mulch. Apply 4-inch (100-mm) average thickness of mineral mulch over whole surface, and finish level with adjacent finish grades.

3.3 CLEANUP AND PROTECTION

A. During installation, keep adjacent paving and construction clean and work area in an orderly condition.

B. After completing installation of stone materials, inspect components. Remove spots, dirt, and debris. Repair damaged finishes to match original finish or replace component.

3.4 DISPOSAL

A. Remove surplus stone materials and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.

END OF SECTION 32 1500

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SECTION 32 1640 - GRANITE CURBING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Form 816 - State of Connecticut Department of Transportation Standard Specifications for Roads, Ramps and Incidental Construction, 2004.

1.2 SUMMARY

A. Section Includes:

1. Granite curbs - vertical.

B. Related Requirements:

1. Division 01 Section(s) "Construction Waste Management and Disposal" and "Sustainability Compliance Procedures" for sustainability requirements

2. Division 31 Section "Excavation, Backfill, Compaction and Dewatering" for fill materials.

3. Division 31 Section "Borrow Materials"

4. Division 03 Section "Cast-in-Place Concrete".

1.3 ACTION SUBMITTALS

A. Product Data: For materials other than water and aggregates.

B. Product Data: For the following:

1. Stone curbs.

C. Documentation Submittals: Comply with Section 01 3566.42 – Sustainability Compliance Procedures and provide the following in addition to other submittals:

1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material.

Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Samples for Initial Selection: For the following:

1. Granite for stone curbs.

E. Samples for Verification:

1. Stone curbs.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of stone curb, joint material, and setting material from single source with resources to provide materials and products of consistent quality in appearance and physical properties.

B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

C. Preinstallation Conference: Conduct conference at Project site.

1.5 PROJECT CONDITIONS

A. Cold-Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit paver work damaged by frost or freezing.

PART 2 - PRODUCTS

2.1 GRANITE CURBS

A. Granite curbs shall conform to Section M.12.06-1 of Form 816 **and Town of Greenwich standard specifications.**

1. No drill marks will be accepted on any exposed surface.
2. Dimensions shall conform to the Drawings.
3. Granite shall comply with ASTM C 615.
4. Vertical Granite Curbs:

a. Granite Color and Grain: Light gray with medium grain.
b. Top Width: ~~6~~ **5** inches.
c. Face Height: Varies, as shown on drawings.
d. Total Height: ~~2~~' **1'**-6" inches.

e. Length: 4'-0", as shown on drawings.
f. Top Finish: Thermal.
g. Face Finish: ~~Split~~. **¼" buzzed edge**
h. End Finish: Saw cut.

2.2 MORTAR MIX

A. General: Comply with referenced standards and with manufacturers' written instructions for mix proportions, mixing equipment, mixer speeds, mixing containers, mixing times, and other procedures needed to produce joint materials of uniform quality and with optimum performance characteristics. Discard mortars if they have reached their initial set before being used.

B. Mortar Materials: Conform to Article M.11.04 of Form 816.

PART 3 - EXECUTION

3.1 PREPARATION

A. Sweep concrete substrates to remove dirt, dust, debris, and loose particles.

3.2 INSTALLATION, GENERAL

A. Granite curb installation shall conform to Section 8.13 of Form 816 and to the City of **Greenwich** ~~Fairfield's~~ specifications for construction.

B. Do not curb units with chips, cracks, voids, discolorations, or other defects that might be visible or cause staining in finished work.

C. Cut curb units with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.

3.3 GRANITE CURB

A. Set curb on edge. Settle into place with a heavy wooden hand rammer. Set level, true line, and plumb on compacted base as indicated on the Drawings.

B. Place concrete joint setting beds as shown on the Drawings. Ensure that top exposed edge of curb face is consistent and true to line and grade. Support curb as required until concrete cures and all backfill operations have been completed.

C. Backfill with approved material, compacted to 95 percent modified AASHTO Laboratory density (ASTM D-1557, Method C).

D. Point joints with mortar for the full depth and width of curbing. At approximately 50 foot intervals, a ½ inch joint shall not be filled with mortar but left free for expansion. Conform to the details on the Drawings.

E. Where cobblestone curb embedded in concrete is indicated as edge restraints for concrete pavement on an aggregate setting bed, install curb embedded in concrete and allow concrete to cure before placing aggregate setting bed and pavement. Hold top of concrete below aggregate setting bed.

3.4 REPAIRING, POINTING, AND CLEANING

A. Remove and replace unit pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.

B. Pointing: During tooling of joints, enlarge voids or holes and completely fill with grout. Point joints at sealant joints to provide a neat, uniform appearance, properly prepared for sealant application.

C. Cleaning: Remove excess grout from exposed paver surfaces; wash and scrub clean.

END OF SECTION 32 1640

SECTION 32 1726 - TACTILE WARNING SURFACING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Cast-in-place replaceable tactile pavers.

B. Related Requirements:

1. Division 01 Section(s) "Construction Waste Management and Disposal" and "Sustainability Compliance Procedures" for sustainability requirements

2. Section 32 1313 "Concrete Paving" for concrete walkways serving as substrates for tactile warning surfacing.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. CTHPB Documentation Submittals: Comply with Section 01 3566.42 – Sustainability Compliance Procedures and provide the following in addition to other submittals:

1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

C. Samples for Initial Selection: For each type of exposed finish requiring color selection.

D. Samples for Verification: For each type of tactile warning surface, in manufacturer's standard sizes unless otherwise indicated, showing edge condition, truncated-dome pattern, texture, color, and cross section; with fasteners and anchors.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For tactile warning surfacing, to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.7 PROJECT CONDITIONS

A. Cold-Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit paver work damaged by frost or freezing.

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of tactile warning surfaces that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Deterioration of finishes beyond normal weathering and wear.
b. Separation or delamination of materials and components.

2. Warranty Period: One year minimum from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 TACTILE WARNING SURFACING, GENERAL

A. Accessibility Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for tactile warning surfaces.

1. For tactile warning surfaces composed of multiple units, provide units that when installed provide consistent side-to-side and end-to-end dome spacing that complies with requirements.

B. Source Limitations: Obtain each type of tactile warning surfacing, anchor, and fasteners from single source with resources to provide materials and products of consistent quality in appearance and physical properties.

2.2 DETECTABLE WARNING TILES

A. Cast-in-Place Detectable Warning Tiles: Accessible truncated-dome detectable warning tiles with replaceable surface configured for setting flush in new concrete walkway surfaces, with slip-resistant surface treatment on domes and field of tile.

1. Detectable Warning Tiles: Subject to compliance with requirements, provide "Cast-in-Place Replaceable Tactile Warning Surface Tiles", as manufactured by ADA Solution, Inc., of Chelmsford, MA, (Phone: 800-372-0519, Fax: 978-262-9125, www.adatile.com.
2. Material: Molded glass- and carbon-fiber-reinforced polyester.
3. Color: Brick Red
4. Shapes and Sizes:

    a. Rectangular panel, 24 by 36 inches, 24 by 48 inches, and 24 by 60 inches.
    b. Radius panel, nominal 24 inches deep by 10-foot and 15-footoutside radius.

5. Dome Spacing and Configuration: 2.35-inch spacing in square pattern.
6. Mounting:

    a. Replaceable detectable warning tile wet-set into freshly poured concrete and surface-fastened to permanently embedded anchors.

2.3 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of tactile warning surfaces, noncorrosive and compatible with each material joined, and complying with the following:

1. Furnish Type 316 stainless-steel fasteners for exterior use.
2. Fastener Heads: For nonstructural connections, use flathead or oval countersunk screws and bolts with tamper-resistant heads, colored to match tile.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that pavement is in suitable condition to begin installation according to manufacturer's written instructions. Verify that installation of tactile warning surfacing will comply with accessibility requirements upon completion.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF TACTILE WARNING SURFACING

A. General: Prepare substrate and install tactile warning surfacing according to manufacturer's written instructions unless otherwise indicated.

B. Place tactile warning surfacing units in dimensions and orientation indicated. Comply with location requirements of AASHTO MP 12.

3.3 INSTALLATION OF DETECTABLE WARNING TILES

A. Removable Cast-in-Place Detectable Warning Tiles:

1. Concrete Paving Installation: Comply with installation requirements in Section 32 1313 "Concrete Paving". Mix, place, and finish concrete to conditions complying with detectable warning tile manufacturer's written requirements for satisfactory embedment of removable tile.
2. Set each detectable warning tile accurately and firmly in place with embedding anchors and fasteners attached, and firmly seat tile back in wet concrete by tamping or vibrating. If necessary, temporarily apply weight to tiles to ensure full contact with concrete.
3. Set surface of tile flush with surrounding concrete and adjacent tiles, with variations between tiles and between concrete and tiles not exceeding plus or minus 1/8 inch from flush.
4. Protect exposed surfaces of installed tiles from contact with wet concrete. Complete finishing of concrete paving surrounding tiles. Remove concrete from tile surfaces.
5. Clean tiles using methods recommended in writing by manufacturer.

3.4 CLEANING AND PROTECTION

A. Remove and replace tactile warning surfacing that is broken or damaged or does not comply with requirements in this Section. Remove in complete sections from joint to joint unless otherwise approved by Architect. Replace using tactile warning surfacing installation methods acceptable to Architect.

B. Protect tactile warning surfacing from damage and maintain free of stains, discoloration, dirt, and other foreign material.

END OF SECTION 32 1726

SECTION 32 1823.17 - NATURAL INFIELD AND WARNING TRACK SURFACING

PART 1 – GENERAL

1.0 SEQUENCE OF WORK

1. Consolidate the areas leaving a 4" depth for infield clay surfacing or warning track material.
2. Install the base anchors.
3. Place the infield clay or warning track material in 2" lifts.
4. Scarify between lifts.
5. Consolidate to 85-90%.
6. Apply calcium chloride.
7. Rake and roll the areas.
8. Apply inflow conditioner.
9. Install the mound.
10. Clean the turf areas.

1.1 SECTION INCLUDES

A. Baseball and softball skinned surfacing.

1. Using existing in-place materials and new materials as needed for grade adjustment, the Contractor shall furnish, and construct infield mix and warning track surfaces to the lines and grades shown on the plans as specified in this section, including the provision of all materials, labor, tools, equipment and transportation necessary to complete the work.
2. In advance of installing the additional infield mix and warning track surfacing, the Contractor shall be responsible for skimming and relocation or removal of existing materials if needed.

1.2 RELATED REQUIREMENTS

A. Division 01 Section(s) “Construction Waste Management and Disposal” and “Sustainability Compliance Procedures” for sustainability requirements.

B. Section 11 6833 – Athletic Field Equipment: Baseball and softball bases and pitching rubbers.

C. Section 31 2300 – Excavation, Backfill, Compaction and Dewatering: Subgrade Preparation.

D. Section 32 3113 – Chain Link Fences and Gates: Baseball and softball backstops.

1.3 REFERENCE STANDARDS

A. ASTM D689 – Standard Test Method for Internal Tearing Resistance of Paper; 2017.

1.4 SUBMITTALS

A. See Section 01 3000 – Administrative Requirements, for submittal procedures.

B. CTHPB Documentation Submittals: Comply with Section 01 3566.42 – Sustainability Compliance Procedures and provide the following in addition to other submittals:

1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

C. Product Data: For each type of product.

1. Include particle size analysis for infield mix.

D. Samples: For each bulk-supplied material, 1-quart (1-L) volume of each in sealed containers labeled with content, source, and date obtained. Each sample shall be typical of the lot of material to be furnished; provide an accurate representation of composition, color, and texture.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent operated laboratory; experienced in soil science, soil testing specific to baseball and softball fields with the experience and capability to conduct the testing indicated; and that specializes in types of tests to be performed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Remove contaminated and rejected material from project site immediately.

B. Handle and store so to keep dry and maintain workability of infield materials.

PART 2 – PRODUCTS

2.1 INFIELD MIX

A. Acceptable Manufacturers: Subject to compliance with requirements, provide products by one of the following as approved by the Landscape Architect:

1. DuraEdge Products, Inc. (866) 867-0052.
2. Partac Peat Corporation, (908) 637-8421.

B. Infield Mix: As available from local infield mix suppliers and complying with the following requirements:

1. Shall be clean, dry clay mixed with washed mason-type sand resulting in a weed-free mixture that is reddish brown in color, having a yield of 1.35 tons per cubic yard when placed loose or 1.5 tons per cubic yard when compacted to 85 to 90 percent on a Standard Proctor Test (ASTM D689). Infield mix shall possess the following particle size analysis:

a) Total Sand Content: 70 to 75 percent.
b) Combined amount of sand retained on medium, coarse and very coarse sieves shall be greater than or equal to 50 percent.
c) Combined amount of silt and clay shall be 25 to 30 percent.
d) The SCR ratio (silt clay ratio) shall be 0.5 to 1.0.
e) No particles shall be greater than 3 millimeters.
f) Equal to or less than 5 percent of particles shall be retained on the 2-millimeter sieve.

2.2 PITCHING MOUND MIX

A. Acceptable Manufacturers: Subject to compliance with requirements, provide products by one of the following as approved by the Landscape Architect:

1. DuraEdge Products, Inc. (866) 867-0052.
2. Partac Peat Corporation, (908) 637-8421.

B. Pitching Mound Mix: As available from local infield mix suppliers and complying with the following requirements:

C. Shall be clean, dry clay mixed with washed mason-type sand resulting in a weed-free mixture that is reddish brown in color, having a yield of 1.35 tons per cubic yard when placed loose or 1.75 tons per cubic yard when compacted to 85 to 90 percent on a Standard Proctor Test (ASTM D689). Pitching Mound mix shall possess the following particle size analysis:

1. Total Sand Content: 15 to 28 percent.
2. Total Clay Content: 30 percent.
3. The SCR ratio (silt clay ratio) shall be 0.75 to 1.25.

4. No particles shall be greater than 3 millimeters.

2.3 INFIELD TOPDRESSING

A. Amendments shall be installed in accordance with the Infield Mix manufacturer's recommendations to include, but not be limited, to the following:

1. Calcined Clay: "Turface Pro League Heritage Red Conditioner", as manufactured by Profile Products LLC, 750 Lake Cook Road, Suite 440, Buffalo Grove, IL (800) 207-6457.
2. Expanded Shale: "ProSlide Engineered Topdressing", a professional grade expanded shale topdressing.
3. Calcium Chloride
4. Inflow infield conditioner by precision laboratories.

2.4 WARNING TRACK MIX

A. Acceptable Manufacturers: Subject to compliance with requirements, provide products by one of the following as approved by the Landscape Architect:

1. DuraEdge Products, Inc., (866) 867-0052.
2. Partac Peat Corporation, (908) 637-8421.

B. Warning Track Mix: As available from local infield mix suppliers and complying with the following requirements:

1. Shall be clean, crushed brick mixed with #10 limestone resulting in a mix that is reddish brown in color, having a yield of 1.3 tons per cubic yard and possessing the following particle size analysis:

PART 3 – EXECUTION

3.1 SITE PREPARATION

A. Grade subgrade within 10 inches of finish grade and thoroughly compact.

B. Check that finished grade will match proposed grades shown on plan. Make corrections as required prior to placing Infield Mix materials.

3.2 BLECAVATE, INSTALL, ROLL AND COMPACT INFIELD MIX AREAS

A. All infield mix areas are to be tilled to a depth of 4 inches (101.6 mm) with a Blecavator. Conventional tilling is unacceptable.

B. The Contractor shall perform blending operations within the areas delineated on the plans. The

contractor shall prepare the soil using the Blecavator, which is a heavy duty contra-rotating rotor with blades that dig into the ground throwing soil, debris, and rocks against a sorting screen mounted behind the rotor for separating rocks and debris. The fine soil is deposited over the top and leveled off. The rear packer roll on the Blecavator firms up the finished areas ready for fine grading. Within the area delineated on plans, the contractor shall be directed by the Engineer, to perform blending for 4-inch (101.6-mm) depth of infield mix in order to achieve a homogeneous blend of soil composition over the entire infield within the limits of the full depth renovation areas.

C. Upon regrading of existing surfaces and installation of the required additional material, the Contractor shall install, roll and compact the infield mixes and warning track materials specified to a compacted finished depth as specified on the construction plans. Complete installation of clay surfaces in conformance with the manufacturer's recommendations or as otherwise required by the Engineer.

D. The edges of the infield mixes and warning track shall meet the grades of adjacent turf areas. No ridges or depressions will be permitted at edges.

E. Infield turf areas are to be seeded and maintained per Section 32 9219 - Seeding.

3.3 SKINNED INFIELD AND PITCHING MOUND INSTALLATION

A. Place mixes in lifts of 2 inches (50.8 mm) and compact with a 1-ton vibratory roller until an optimum compaction is achieved. Scarify the surface to facilitate bonding of the next lift and repeat until finish grade elevation is achieved.

1. Pitching Mound Compaction: 90 to 95 percent.
2. Skinned Infield Compaction: 85 to 90 percent.

B. Apply calcium chloride evenly at the rate of 3/4 pounds per square yard as recommended by mix manufacturer. Mix into top 2 inches (50.8 mm) by raking or dragging.

C. Rake to smooth grade; then compact with small roller leveling edges of existing grades. Remove all rocks and debris over 1/2- inch (12.7-mm) in size (in any dimension).

D. Remove from the field of play all infield material contaminated by installation. Remove all infield materials from adjacent lawns or sod. Trim all edges with lawn straight and true.

E. Finish Grading: Infield Mix shall be laser graded to a tolerance of 1/8-inch (3.175-mm). Slope infield towards outfield at 1 percent slope.

F. Topdressing: Following final approval of infield surfacing, topdressing shall be applied to the surface. Topdressing material shall be either expanded shale or calcined clay as recommended by manufacturer and applied at a rate of 1 pound per square foot.

3.4 WARNING TRACK INSTALLATION

A. Excavate material from the warning track area to a depth of 7 inches (177.8 mm) below the final finished grade.

B. Compact the subgrade until 90 to 95 percent compaction is achieved.

C. Install geotextile fabric to prevent weed migration through the warning track area.

D. Place 3 inches (76.2 mm) of processed aggregate base capped with 1 inch (25,4 mm) of stone dust for a total of 4 inches (101.6 mm).

E. Place the warning track material of the top of the stone dust. The depth of the warning track material shall be 3 inches (76.2 mm) at completion of compaction.

F. When placing the processed aggregate, stone dust and warning track materials, use lifts of 2 inches (50.8 mm) or less and compact with a minimum 1-ton vibratory roller until an optimum compaction between 90 and 95 percent is achieved. Scarify the surface to facilitate bonding of the next lift and repeat until finish grade elevation is achieved.

END OF SECTION 32 1823.17

SECTION 32 3113 - CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1.2 SUMMARY

A. Section Includes:

1. Chain Link Fence.

a. Chicanes.

b. Baseball/Softball backstop with hood.

c. Baseball/Softball sideline and dugout fences.

d. Field Perimeter fence

e. Synthetic Turf fence (Alternate No. S1).

f. Tennis court fence.

2. Posts, rails, and frames - polymer coated.

3. Wire fabric - polymer coated.

4. Concrete for footings.

5. Manual swing and / or slide gates with related hardware.

a. Swing gates.

b. Slide gates.

B. Related Requirements:

a. Division 01 Section(s) "Construction Waste Management and Disposal" and "Sustainability Compliance Procedures" for sustainability requirements

b. Section 03 3000 - Cast-in-Place Concrete: Concrete anchorage for posts.

1.3 REFERENCE STANDARDS

A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.

B. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength 2018a.

C. ASTM F567 - Standard Practice for Installation of Chain-Link Fence 2014a.

D. ASTM F668 - Standard Specification for Polyvinyl Chloride (PVC) and Other Organic Polymer-Coated Steel Chain-Link Fence Fabric 2017.

E. ASTM F1043 - Standard Specification for Strength and Protective Coatings on Steel Industrial Fence Framework 2018.

F. ASTM F1083 - Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures 2018.

G. CLFMI CLF-FIG0111 - Field Inspection Guide 2014.

H. CLFMI CLF-PM0610 - Product Manual 2017.

I. CLFMI WLG 2445 - Wind Load Guide for the Selection of Line Post and Line Post Spacing 2018.

J. FS RR-F-191/1D - Fencing, Wire and Post Metal (Chain-Link Fence Fabric) 1990.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on fabric, posts, accessories, fittings and hardware.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 – Sustainability Compliance Procedures and provide the following in addition to other submittals:

1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Design Calculations: For high wind load areas, provide calculations for fence fabric and accessory selection as well as line post spacing and foundation details. See CLFMI WLG 2445 for line post and spacing guidance.

E. Manufacturer's Installation Instructions: Indicate installation requirements and procedures.

F. Field Inspection Records: Provide installation inspection records that include post settings, framework, fabric, barbed wire, fittings and accessories, gates, and workmanship.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

B. Fence Installer: Company with demonstrated successful experience installing similar projects and products, with not less than five years of documented experience.

1.6 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a one year period after Date of Substantial Completion.

C. Provide manufacturer’s standard warranty for vinyl-coated chain link fence system, minimum of one year.

PART 2 - PRODUCTS

2.1 COMPONENTS

A. Line Posts: 1.9 inch (48 mm) diameter w/ cap.

B. Corner and Terminal Posts: 2.38 inch (60 mm) diameter w/ cap.

C. Gate Posts: 3-1/2 inch (89 mm) diameter w/ cap.

D. Top and Brace Rail: 1.66 inch (42 mm) diameter, plain end, sleeve coupled.

E. Bottom Rail: 1.66 inch (42 mm) diameter, plain end, sleeve coupled.

F. Gate Frame: 1.66 inch (42 mm) diameter for welded fabrication.

G. Fabric: diamond mesh interwoven wire, top selvage knuckle end closed, bottom selvage twisted tight.

a. Standard Fence Fabric:

1. Mesh Size: 2-inch (50mm).
2. Mesh Gauge: 9-gauge core wire with a dia. of 0.148 inch (3.76mm).

H. Tension Wire: 6 gauge, 0.1920 inch (4.9 mm) thick steel, single strand.

I. Tension and Brace Bands: Pressed steel.

J. Tension Bars: Steel, length not less than 2 inches (50 mm) shorter than full height of chain-link fabric.

K. Tie Wire: Hot-dip galvanized steel wire according to ASTM F626 for attaching chain-link fabric to posts, rails and frames.

2.2 MATERIALS

A. Posts, Rails, and Frames:

a. ASTM A1011/A1011M, Designation SS; hot-rolled steel strip, cold formed to pipe configuration, longitudinally welded construction, minimum yield strength of 50 ksi (345 MPa); zinc coating complying with ASTM F1043 and ASTM F1083.
b. Line Posts: Type I round in accordance with FS RR-F-191/1D.
c. Terminal, Corner, Rail, Brace, and Gate Posts: Type I round in accordance with FS RR-F-191/1D.
d. Comply with CLFMI CLF-PM0610.
e. ASTM F668 polymer-coated

B. Wire Fabric:

a. ASTM F668 polymer-coated steel chain link fabric.
b. Comply with CLFMI CLF-PM0610.
c. Standard Fence:

1. Mesh Size: 2-inch (50mm).
2. Mesh Gauge: 9-gauge core wire with a dia. of 0.148 inch (3.76mm).

C. Concrete for Bases:

a. Shall be as specified in Section 03 3005.

2.3 FENCE COMPONENTS

A. Line Posts: 1.9 inch (48 mm) diameter.

B. Corner and Terminal Posts: 2.38 inch (60 mm) diameter.

C. Fabric: 1-3/4 inch (44 mm) diamond mesh interwoven wire, 6 gage, 0.1920 inch (4.9 mm) thick, top selvage knuckle end closed, bottom selvage knuckle end closed.

2.4 MANUAL GATES AND RELATED HARDWARE

A. Hardware for Single Swinging Gates: 180 degree hinges, 2 for gates up to 60 inches (1,525 mm) high, 3 for taller gates; fork latch with gravity drop and padlock hasp; keeper to hold gate in fully open position.

B. Hardware for Double Swinging Gates: 180 degree hinges, 2 for gates up to 60 inches (1,525 mm) high, 3 for taller gates; drop bolt on inactive leaf engaging socket stop set in concrete, active leaf latched to inactive leaf preventing raising of drop bolt, padlock hasp; keepers to hold gate in fully open position.

C. Hardware for Cantilever Slide Gates, Class 1 with external roller assemblies:

   a. Hangers, Roller Assemblies, and Stops.
   b. Latch: Permitting operation from both sides of gate with provisions for padlocking accessible from both sides of gate.

D. Hinges: Finished to match fence components.

E. Latches: Finished to match fence components.

2.5 ACCESSORIES

A. Caps: Cast steel galvanized; sized to post diameter, set screw retainer and finished to match fence components.

B. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings; steel.

2.6 CHAIN LINK FENCE FINISHES

A. Posts, Components, and Fabric: Vinyl coated over coating of 1.8 ounces per square foot galvanizing (over coating of 550 g/sq m galvanizing).

B. Hardware: Hot-dip galvanized to weight required by ASTM A153/A153M.

C. Accessories: Same finish as fabric.

D. Color(s): Black.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Verify that areas are clear of obstructions or debris.

B. Preinstallation Testing: Test areas for ledge.

3.2 PREPARATION

A. Removal: Obstructions or debris.

B. Ground Preparation:

a. Grading shall be completed prior to beginning of installation.

3.3 INSTALLATION

A. Install framework, fabric, accessories and gates to heights indicated on drawings and in accordance with ASTM F567.

B. Set intermediate, terminal, and gate posts plumb, in concrete footings with top of footing 6 inches below finish grade. Slope top of concrete for water runoff.

C. Provide top rail through line post tops and splice with 6 inch (150 mm) long rail sleeves.

D. Install center brace rail on corner gate leaves.

E. Do not stretch fabric until concrete foundation has cured 28 days.

F. Stretch fabric between terminal posts or at intervals of 100 feet (30 m) maximum, whichever is less.

G. Position bottom of fabric 2 inches (50 mm) above finished grade.

H. Fasten fabric to top rail, line posts, braces, and bottom tension wire with tie wire at maximum 15 inches (380 mm) on centers.

I. Attach fabric to end, corner, and gate posts with tension bars and tension bar clips.

J. Install bottom tension wire stretched taut between terminal posts.

K. Do not attach the hinged side of gate to building wall; provide gate posts.

L. Install hardware and gate with fabric to match fence.

M. Provide concrete center drop to footing depth and drop rod retainers at center of double gate openings.

N. Peen all bolts upon installation.

O. Perform three random field inspections confirming proper installation.

3.4 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch (6 mm).

B. Maximum Offset From True Position: 1 inch (25 mm).

C. Do not infringe on adjacent property lines.

3.5 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Layout: Verify that fence installation markings are accurate to design, paying attention to gate locations, underground utilities, and property lines.

C. Post Settings: Randomly inspect three locations against design for:

a. Hole diameter.
b. Hole depth.
c. Hole spacing.

D. Fence Height: Randomly measure fence height at three locations or at areas that appear out of compliance with design.

E. Gates: Inspect for level, plumb, and alignment.

F. Workmanship: Verify neat installation free of defects. See CLFMI CLF-FIG0111 for field inspection guidance.

3.6 CLEANING

A. Leave immediate work area neat at end of each work day.

B. Clean jobsite of excess materials; scatter excess material from post hole excavations uniformly away from posts. Remove excess material if required.

C. Clean fence with mild household detergent and clean water rinse well.

D. Remove mortar from exposed posts and other fencing material using a 10 percent solution of muriatic acid followed immediately by several rinses with clean water.

E. Touch up scratched surfaces using materials recommended by manufacturer. Match touched-up paint color to factory-applied finish.

F. See Section 01 7419 - Construction Waste Management and Disposal, for additional requirements.

3.7 CLOSEOUT ACTIVITIES

A. See Section 01 7800 - Closeout Submittals, for closeout submittals.

END OF SECTION 32 3113

SECTION 32 3118 - METAL FENCES AND GATES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Security steel fence and gates

2. Steel fence.

B. Related Requirements:

1. Division 01 Section(s) "Construction Waste Management and Disposal" and "Sustainability Compliance Procedures" for sustainability requirements

2. Section 03 3000 – "Cast-in-Place Concrete"

3. Section 08 7100 – "Door Hardware": Panic hardware for emergency egress gates.

4. Section 31 2300 – "Excavation, Backfill, Compaction and Dewatering".

1.3 REFERENCE STANDARDS

A. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes 2017.

B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.

C. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus 2019.

D. ASTM D523 - Standard Test Method for Specular Gloss 2014 (Reapproved 2018).

E. ASTM D714 - Standard Test Method for Evaluating Degree of Blistering of Paints 2002 (Reapproved 2017).

F. ASTM D822/D822M - Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings 2013 (Reapproved 2018).

G. ASTM D1654 - Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments 2008, with Editorial Revision (2017).

H. ASTM D2244 - Standard Practice for Calculation of Color Tolerances and Color Differences

from Instrumentally Measured Color Coordinates 2021.

I. ASTM D2794 - Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact) 1993 (Reapproved 2019).

J. ASTM D3359 - Standard Test Methods for Rating Adhesion by Tape Test 2022.

K. ASTM F2408 - Standard Specification for Ornamental Fences Employing Galvanized Steel Tubular Pickets 2016.

L. ASTM F2656/F2656M - Standard Test Method for Crash Testing of Vehicle Security Barriers 2020.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to start of work of this section; require attendance by affected installers.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 – Sustainability Compliance Procedures and provide the following in addition to other submittals:

1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Shop Drawings:
1. Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, gates, and schedule of components.

E. Samples: Submit two samples of fence panels, slat infill, 24 inch (609 mm) by 24 inch (609 mm) in size illustrating construction and colored finish.

F. Manufacturer's Installation Instructions: Indicate installation requirements, post foundation anchor bolt templates, etc.

G. Manufacturer's Qualification Statement.

H. Installer's Qualification Statement.

I. Manufacturer's Warranty.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.

B. Installer Qualifications: Experienced with type of construction involved and materials and techniques specified and approved by fence manufacturer.

1.7 DELIVERY, STORAGE AND HANDLING

A. Store materials in a manner to ensure proper ventilation and drainage. Protect against damage, weather, vandalism and theft.

1.8 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements

B. Correct defective Work within a five year period after Date of Substantial Completion.

C. Provide five year manufacturer warranty for the electro-coated surface against cracking, peeling, chipping, blistering or corroding.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Metal Fences and Gates:
   1. Ameristar Perimeter Security, USA: www.ameristarfence.com/#sle.
   2. Substitutions: See Section 01 6000 - Product Requirements.

B. Specialty Hardware:
   1. DAC Industries, Inc; Detex Exit Bar: www.dacindustries.com/#sle.
   2. Substitutions: See Section 01 6000 - Product Requirements.

2.2 FENCES

A. Fences: Complete factory-fabricated system of posts and panels, accessories, fittings, and fasteners; finished with electrodeposition coating, and having the following performance characteristics:
   1. Capable of resisting vertical load, horizontal load and infill performance requirements for fence categories defined in ASTM F2408.

B. Electro-Deposition Coating: Multistage pretreatment/wash with zinc phosphate, followed by epoxy primer and acrylic topcoat.

1. Total Coating Thickness: 2 mils (0.058 mm), minimum.
2. Color: As shown on drawings.
3. Coating Performance: Comply with general requirements of ASTM F2408.
   a) Adhesion: ASTM D3359 (Method B); Class 3B with 90 percent or more of coating remaining in tested area.
   b) Corrosion Resistance: ASTM B117, ASTM D714 and ASTM D1654; 1/8 inch (15.8 mm) coating loss or medium No.8 blisters after 1,500 hours.
   c) Impact Resistance: ASTM D2794; 60 inch pounds (6.8 N m).
   d) Weathering Resistance: ASTM D523, ASTM D822/D822M and ASTM D2244; less than 60 percent loss of gloss.

C. Steel: ASTM A653/A653M; tensile strength 45,000 psi (310 MPa), minimum.
   1. Hot-dip galvanized; ASTM A653/A653M, G60.
   2. 62 percent recycled steel, minimum.

D. Fasteners: ASTM A276/A276M, Type 302 stainless steel; finished to match fence components.

E. Hinges: Finished to match fence components.
   1. Brackets: Round.
   2. Mounting: Center.
   3. Closing: Manual.

F. Latches: Finished to match fence components.
   1. Brackets: Round.
   2. Locking: Mechanical.

2.3 HIGH-SECURITY STEEL FENCE

A. Basis-of-Product Design: Subject to compliance with requirements, provide "Impasse II High Security Steel Fence System", Gauntlet Style as manufactured by Ameristar Perimeter Security USA Inc.or a comparible product by the following as approved by Landscape Architect:
   1. Ametco Manufacturing Corporation.
   2. Fortress Building Products

B. Provide fence meeting requirements for Industrial class as defined by ASTM F2408 and capable of resisting impact from specified vehicle weight and speed when tested according to ASTM F2656/F2656M.

C. Fence Panels: Mechanically fastened with internal reinforcement and tamperproof fasteners; 6 feet (1.8 m) high by 6 feet (1.8 m) long.
   1. Panel Style: Three rail.
   2. Panel Strength: Capable of supporting 400 pound (181 kg) load applied at midspan without deflection.
   3. Attach panels to posts with manufacturer's standard panel brackets.

D. Posts: Double-wall, I-beam shape; prepunched for rails and cables.
   1. Bending Strength: 93,700 psi (64,600 kPa) load applied at midspan without deflection.
   2. Size: 1-3/4 inch (44.5 mm) by 4 inches (102 mm).
   3. Post Cap: Manufacturer's standard cast aluminum.

E. Rails: Steel channels with lower leg designed to carry cables, sensor wiring and alarm system components.
   1. Size: 2 inches (51 mm) by 2 inches (51 mm) by 11 gauge nominal thickness.
   2. Pale Holes: 6 inches (152 mm) on center.

F. Pales: Corrugated steel strips; 3/4 inch (19 mm) thick.
   1. Spacing: 6 inches (152 mm) on center.
   2. Size: 2-3/4 inches (70 mm) by 3/4 inch (19 mm).
   3. Style: Pales with rounded tip extend above top rail.

G. Color: As indicated on Metal Finish Schedule.

H. Swing Gates:
   1. Swing gates shall be fabricated using 2 inch square by 12 gauage rail, 2 inches square by 12 gauage gate ends, and 2.75 inch by 0.75 inch by 0.075 pales. Gates that exceed 6 feet in width will have a 2 inch square by 11gauage. intermediate upright. All rail and upright intersections shall be joined by welding. All pale and rail intersections shall also be joined by welding.

   2. Pedestrian swing gates shall be self-closing, having a gate leaf no larger than 48 inch in width. Integrated hinge-closer set (2 qty) shall be ADA compliant that shall include a variable speed and final snap adjustment with compact design (no greater than 5” x 6” footprint). Hinge-closer set (2 qty) shall be tested to a minimum of 500,000 cycles and capable of self-closing gates up to a maximum gate weight of 260 lbs. and maximum weight load capacity of 1,500 lbs. Hinge-closer device shall be externally mounted with tamper-resistant security fasteners, with full range of adjustability, horizontal (.5” - 1.375”) and vertical (0 - .5”). Maintenance free hinge-closer set shall be tested to operate in temperatures of negative 20 F to 200 F degrees, and swings to negative 2 degrees to ensure reliable final lock engagement.

I. Sliding Cantilever Gates:
   1. Basis-of-Design Product: Provide "TransPort IS" as manufactured by Ameristar Perimeter Security USA Inc.with design matching style, height, and color of fence system. The dual enclosed track slide gate shall be an aluminum component design using tracks, uprights, pales, hardware, fittings, and fasteners. Gate installation shall comply with latest ASTM F2200 standards for automated gates, regardless if the gate is of manual operation.

2.4 BARRIER FENCE

A. Basis-of-Product Design: Subject to compliance with requirements.

B. Provide fence meeting requirements for Industrial class as defined by ASTM F2408 and capable of resisting impact from specified vehicle weight and speed when tested according to ASTM F2656/F2656M.
   1. Panel Style: Two rail.
   2. Panel Strength: Capable of supporting 400 pound (181 kg) load applied at midspan without deflection.
   3. Attach panels to posts with manufacturer's standard panel brackets.
   4. Bending Strength: 93,700 psi (64,600 kPa) load applied at midspan without deflection.
   5. Size: 1-1/4 inch (31.75 mm) x 15/16 inch (23.81 mm).

6. Size: 4 inch (101 mm) square by 11 gauge, 0.1196 inch (3.04 mm thick).
7. Size: 4 inch (101 mm) square by 11 gauge, 0.1196 inch (3.04 mm thick).

C. Rails: Steel channels with lower leg designed to carry cables, sensor wiring and alarm system components.
1. Size: 2 inches (51 mm) by 2 inches (51 mm) by 11 gauge nominal thickness.
2. Pale Holes: 6 inches (152 mm) on center.

D. Pales: Corrugated steel strips; 3/4 inch (19 mm) thick.
1. Spacing: 6 inches (152 mm) on center.
2. Size: 2-3/4 inches (70 mm) by 3/4 inch (19 mm).
3. Style: Pales with rounded tip extend above top rail.

E. Color: As indicated on Metal Finish Schedule.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Set fence posts in accordance with the manufacturer recommended spacing.

C. When cutting rails immediately seal the exposed surfaces by:
1. Removing metal shavings from cut area.
2. Apply zinc-rich primer to thoroughly cover cut edge and drilled hole; allow to dry.
3. Apply two coats of custom finish spray paint matching fence color.
4. Failure to seal exposed surfaces in accordance with manufacturer's instructions will negate manufacturer's warranty.

D. Space gate posts according to the manufacturers' drawings, dependent on standard out-to-out gate leaf dimensions and gate hardware selected.
1. Base type and quantity of gate hinges on the application, weight, height, and number of gate cycles.
2. Identify the necessary hardware required for the application on the manufacturer's gate drawings.
3. Provide gate hardware by the manufacturer of the gate and install in compliance with manufacturer's recommendations.

3.4 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch (6.3 mm).

B. Maximum Offset From Indicated Position: 1 inch (25.4 mm).

C. Minimum Distance from Property Line: 6 inches (152 mm).

3.5 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Layout: Verify that fence installation markings are accurate to design, paying attention to gate locations, underground utilities, and property lines.

C. Post Settings: Randomly inspect three locations against design for:
   1. Hole diameter.
   2. Hole depth.
   3. Hole spacing.

D. Fence Height: Randomly measure fence height at three locations or at areas that appear out of compliance with design.

E. Gates: Inspect for level, plumb, and alignment.

F. Workmanship: Verify neat installation free of defects.

3.6 CLEANING

A. Leave immediate work area neat at end of work day.

B. Clean jobsite of excess materials; scatter excess material from post hole excavations uniformly away from posts. Remove excess material if required.

C. Clean fence with mild household detergent and clean water rinse well.

D. Remove mortar from exposed posts and other fencing material using a 10 percent solution of muriatic acid followed immediately by several rinses with clean water.

E. Touch up scratched surfaces using materials recommended by manufacturer. Match touched-up paint color to factory-applied finish.

F. See Section 01 7429 - Construction Waste Management and Disposal, for additional requirements.

3.7 CLOSEOUT ACTIVITIES

A. See Section 01 7800 - Closeout Submittals, for closeout submittals.

B. See Section 01 7900 - Demonstration and Training, for additional requirements.

3.8 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair, or replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 32 3120 - VEHICLE BARRIER GATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Delegated design for:

a. Automatic vehicular barrier gate.
b. Manual vehicular barrier gate.
c. Motorized gate operator.
d. Communications and controls.
e. Miscellaneous appurtenances.

B. Related Requirements:

1. Division 01 Section(s) "Construction Waste Management and Disposal" and "Sustainability Compliance Procedures" for sustainability requirements.

2. Division 01 Section "Delegated Design Procedures"

3. Division 03 Section "Cast-in-Place Concrete" for concrete foundations.

4. Division 31 Section "Excavation, Backfill, Compaction and Dewatering" for site excavation, fill, and backfill where decorative metal gates are located.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. CTHPB Documentation Submittals: Comply with Section 01 3566.42 – Sustainability Compliance Procedures and provide the following in addition to other submittals:

1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

C. Shop Drawings: For gates, gate posts, operators, communications, electronics, and miscellaneous appurtenances required for full and proper operation of gate system. Include plans, elevations, sections, details, and attachments to other work.

D. Samples: For each fence material and for each color specified.

1. Provide Samples 12 inches (300 mm) in length for linear materials.

E. Welding certificates.

F. Concrete mix and related test data per Section 32 1313 "Concrete Paving".

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel".

C. Preinstallation Conference: Conduct conference at Project site.

PART 2 - PRODUCTS

2.1 AUTOMATIC VEHICLE BARRIER GATES

A. Electronic Gate (Daley Drive Entrance) - Basis of Design:

1. Provide equal to Transport Link | Chain Link Cantilever Gate – Item No. 04 x 827 as provided by Ameristar Fence (888.333.3422) www.Ameristarfence.com.
2. Provide 4' Height / Dual (27' Opening) with all posts, chain link fabric, lockable gate hardware, bracing, motor & electronic controls, electronic timer, and misc. appurtenances as required for full and proper operation.
3. Finish / Color: Black PVC Vinyl coating.

2.2 MANUAL VEHICULAR BARRIER GATE

A. Manual Lift Arm Barrier Gate – Basis of Design:
1. Provide equal to Avon Manual Barrier by Avon Barrier, www.avon-barrier.com, 149 South Liberty Lane, Bristol, UK BS3 2TL or approved equal.
2. Finish/Color: To be selected by Landscape Architect

3. Boom Mounted “STOP”.
4. Boom Mounted pogo stick and support.

2.3 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Concrete: Normal-weight, air-entrained, ready-mix concrete complying with requirements in Division 03 Section "Cast-in-Place Concrete" with a minimum 28-day compressive strength of 20 MPa (3000 psi), 75-mm (3-inch) slump, and 25-mm (1-inch) maximum aggregate size.

C. Non-shrink Grout: Factory-packaged, non-staining, noncorrosive, nongaseous grout complying with ASTM C 1107 and specifically recommended by manufacturer for exterior applications.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, construction layout, and other conditions affecting performance of the Work.

B. Do not begin installation before final grading is completed unless otherwise permitted by Architect.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Stake locations of gates and terminal posts. Indicate locations of utilities, underground structures, benchmarks, and property monuments. Meet w/ Architect / City to gain written confirmation of field layout.

1. Construction layout and field engineering are specified in Division 01 Section "Execution".

3.3 GATE INSTALLATION

A. Foundations / Post Setting: Mount components / Set posts in concrete footings at indicated spacing per manufacturer’s recommendations and per approved shop drawings into firm, undisturbed soil.

1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
2. Posts Set in Concrete: Extend post to within 6 inches (150 mm) of specified excavation depth, but not closer than 3 inches (75 mm) to bottom of concrete.

a. Concealed Concrete: Top 6 inches (152.4 mm) below grade as indicated on Drawings to allow covering with surface material. Slope top surface of concrete to drain water away from post.

3. Provide foundations / slabs as required per manufacturer's recommendations and as detailed for proper installation of the vehicular gate. All exposed concrete surfaces shall be hand-rubbed finish.

B. Gates / Hardware: Install all gates, hardware, motors, electronics, and appurtenances as detailed and noted on drawings and as per manufacturer's recommendations.

3.4 ADJUSTING

A. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

B. Lubricate hardware and other moving parts. Touch up any minor damages to finish that may have occurred during installation.

C. Conduct meeting with Architect / Engineer / City to review gate operation and demonstrate that all equipment and components are properly operating.

END OF SECTION 32 3120

SECTION 32 3223 - SEGMENTAL RETAINING WALLS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Segmental Retaining Wall

1.2 RELATED REQUIREMENTS

A. Division 01 Section(s) "Construction Waste Management and Disposal" and "Sustainability Compliance Procedures" for sustainability requirements

B. Section 00 3132 - Available Project Information: Geotechnical Report.

C. Section 04 7200 – "Cast Stone Masonry": Seat wall caps.

D. Section 31 2200 – "Grading": Rough and finish grading.

E. Section 31 2316 – "Excavation, Backfill, Compaction and Dewatering".

F. Section 33 4000 – "Storm Drainage System".

1.3 REFERENCE STANDARDS

A. AASHTO M 288 - Standard Specification for Geosynthetic Specification for Highway Applications 2017.

B. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.

C. ASTM C1262 - Standard Test Method for Evaluating the Freeze-Thaw Durability of Manufactured Concrete Masonry Units and Related Concrete Units 2010.

D. ASTM C140/C140M - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units 2020a.

E. ASTM C1372 - Standard Specification for Dry-Cast Segmental Retaining Wall Units 2017.

F. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)) 2012, with Editorial Revision (2015).

G. ASTM D1241 - Standard Specification for Materials for Soil-Aggregate Subbase, Base, and Surface Courses 2015.

H. ASTM D4491/D4491M - Standard Test Methods for Water Permeability of Geotextiles by Permittivity 2020.

I. ASTM D4632/D4632M - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles 2015a.

J. ASTM D4751 - Standard Test Methods for Determining Apparent Opening Size of a Geotextile 2020b.

K. ASTM D5321/D5321M - Standard Test Method for Determining the Shear Strength of Soil-Geosynthetic and Geosynthetic-Geosynthetic Interfaces by Direct Shear 2020.

L. ASTM D6638 - Standard Test Method for Determining Connection Strength Between Geosynthetic Reinforcement and Segmental Concrete Units (Modular Concrete Blocks) 2018.

M. ASTM D6916 - Standard Test Method for Determining the Shear Strength Between Segmental Concrete Units (Modular Concrete Blocks) 2018.

N. NCMA TR-127 - Design Manual for Segmental Retaining Walls 2010, Third Edition.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate the installation of soil reinforcement with segmental retaining wall size, location, and installation of service utilities.

B. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section with the material supplier, installer, and the Architect.

C. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. CTHPB Documentation Submittals: Comply with Section 01 3566.42 – Sustainability Compliance Procedures and provide the following in addition to other submittals:

1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

C. Segmental Retaining Wall Units:

1. Manufacturer's product data.
2. Test data on unit strength and shear resistance between units.
3. Test data on soil reinforcement connection.
4. Manufacturer's certification that units meet requirements of specification.
5. Storage and handling requirements and recommendations.
6. Installation methods.

D. Samples for Initial Selection: For concrete units and each type of product, ingredient, or admixture requiring color and texture selection.

E. Samples for Verification: For each color and texture of concrete unit required. Submit 12-inch by 24-inch piece of full-size unit.

F. Shop Drawings: Engineering drawings for installation, including elevations, large-scale details of elevations, typical sections, details, and connections, soil reinforcement, and drainage provisions.

1. Include marked up contract drawings showing exact dimensions for blocks, required coping, and other minor revisions.
2. Design Data: Submit detailed design calculations showing compliance with specified design criteria and material evaluations performed in accordance with specified design standard, signed and sealed by Design Engineer.

G. Design Engineer's Qualification Statement.

H. Concrete Unit Manufacturer Qualification Statement.

I. Installer Qualification Statement.

1.6 QUALITY ASSURANCE

A. Design Engineer Qualifications: Provide design by or under direct supervision of Professional Engineer experienced in the work of this section and licensed in the State in which the Project is located and:

1. Having a minimum of five years documented experience in design of reinforced soil structures.
2. Employed by firm that has designed a minimum of 500,000 square feet (46,450 sq m) of segmental retaining walls.
3. Having minimum of $2,000,000 aggregate liability insurance.

B. Installer Qualifications: Firm specializing in design and installation of segmental retaining walls and:

1. With not less than 2 years documented experience.
2. With a minimum of five previously constructed successful projects, similar in size and magnitude, using specified retaining wall system; provide contact names and numbers.

3. Having site supervisor with verifiable qualified experience suitable for this project.
4. Approved by retaining wall system manufacturer.

C. Preconstruction Soil Testing: Engage a qualified independent testing agency to test soil reinforcement and backfill materials for compliance with design criteria.

1. Testing Agency Qualifications: As specified in Section 01 4000.

D. Product Testing: Performed by qualified independent testing agency or by manufacturer and witnessed by qualified independent testing agency.

E. Copies of Documents at Project Site: Maintain at the project site a copy of each referenced document that prescribes execution requirements.

1.7 MOCK-UP

A. Prior to erection of retaining walls, provide mock-up for evaluation of installation workmanship.

B. Erect 4 by 4 feet (1200 by 1200 mm) sample of eacwall using materials specified.

C. Locate mock-up where directed by Architect.

D. Do not start masonry work until mock-up has been approved by Architect.

E. Retain mock-up during construction as standard for judging completed work. Do not alter or destroy mock-up until work is completed.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Confirm that the specified materials have been delivered. Provide a product certification with each shipment.

B. Store products above ground on wood pallets or blocking, in manufacturer's unopened packaging, until ready for installation.

C. Prevent excessive soil and mud from coming in contact with face of concrete units.

D. Protect material from damage. Do not use damaged material. Remove damaged material from the site.

E. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.9 FIELD CONDITIONS

A. Ambient Conditions: Do not install polymeric materials when temperatures are below minus 20 degrees F (minus 29 degrees C).

B. Existing Conditions: See subsurface investigation report; see Section 00 3100.

1.10 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a one year period after Date of Substantial Completion.

C. Provide manufacturer's standard warranty for Segmental Retaining Wall, minimum of one year.

PART 2 - PRODUCTS

2.1 RETAINING WALLS

A. Delegated Design: Contractor is responsible for design of the retaining walls.

B. Design Standard: Design retaining walls to be capable of withstanding the effects of gravity loads due to soil pressures resulting from grades indicated, determined in accordance with:

1. NCMA TR-127.
2. Include effects of sloped backfill as indicated on drawings.
3. Include effects of superimposed loads (surcharge) as indicated on drawings.
4. In addition, comply with applicable local, state, and federal codes and regulations.
5. This design method considers potential failure modes categorized by external, internal, local, compound, and global stability.
6. Architect has considered global stability and has indicated minimum design requirements in Contract Documents.
7. Seismic Stability: Perform analysis in accordance with ASCE 7.
8. Provide engineering services as required for analysis for all modes of stability.
9. Use of design software for calculations is permitted.
10. Submit complete shop drawings showing all features of the design.

C. Drainage: Design to prevent water accumulation in retained soil; use drainage fill and drainage pipe as specified in Section 33 4100; provide outlets at 50-foot (15 m) intervals along length of wall, minimum.

D. Minimum Factor of Safety: Design with the following stability requirements:

1. Sliding = 1.5.
2. Pullout = 1.5.
3. Tensile Overstress = 1.5.
4. Overturning = 2.0.
5. Bearing Capacity = 2.0.

2.2 SEGMENTAL RETAINING WALL

A. Retaining Wall Units: Machine-formed wet-cast concrete blocks of shapes and sizes suitable for the retaining wall configuration required and complying with ASTM C1776 and the following:

1. Basis-of-Design Product: Subject to compliance with requirements, provide "Daimond Pro PS" modular block units as produced by Belgard or one of the following acceptable products:

    1. Concord XL by Unilock
    2. Alta Pro by Nicolock

2. Finish/Color: Victorian Face/Color to be selected by Landscape Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify location of existing structures and utilities prior to excavation.

B. Protect adjacent structures from the effects of excavation.

C. Verify that layout dimensions are correct, and substrate is in proper condition for installation.

D. Notify Architect of unsatisfactory conditions.

E. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Sitework:

1. Remove unwanted trees, bushes, and debris as specified in Section 31 1000.

B. Excavation:

1. Excavate to lines and grades indicated on drawings.
2. Do not disturb embankment or foundation beyond lines. Minimize over-excavation; fill over-excavated areas with compacted reinforced backfill or leveling pad material at Contractor's expense.
3. After excavation, and prior to placement of leveling materials, Geotechnical Engineer will examine bearing soil surface to verify strength meets or exceeds design requirements and assumptions.
4. Replace unsuitable bearing soil as directed by Architect.
5. Provide means of controlling surface water away from excavation during construction.
6. Perform rough and finish grading as specified in Section 31 2200.

C. Leveling Pad:

1. Depth: As indicated by delegated design submittal.
2. Width: 6 inches (152 mm) minimum extension beyond front and back faces of units.
3. In lieu of pad made solely of aggregate or concrete, pad may be 3 inches (75 mm), minimum, of thick compacted sand or crushed rock, covered with 2 inches (50 mm) to 3 inches (75 mm) of unreinforced concrete.
4. Location: Top of pad at 1 inch (25 mm) below grade for each 8 inches (200 mm) that wall extends above grade.
5. Compact aggregate to lines and grades on drawings, in lifts 6 inches (152 mm) thick, maximum.
6. Use only hand-operated compaction equipment within 36 inches (1 m) of back of wall.

D. Verify level grade before proceeding.

E. Install drainage collection pipe with a continuous fall in the direction of flow. Cap open ends as necessary to prevent soil and debris from entering.

3.3 INSTALLATION

A. Install in accordance with drawings, manufacturer instructions, and applicable codes and regulations.

B. Segmental Retaining Wall Units:

1. Place first course of units on leveling pad; check alignment and level. Check for full contact with base and for stability.
2. Place units side by side for full length of wall, aligning back face of straight walls using string line or offset from base line and back face of curved walls using flexible pipe or other method recommended by manufacturer.
3. Do not leave gaps between units.
4. Lay out corners and curves in accordance with manufacturer's instructions. Do not leave gaps to produce wall batter or curvature.
5. Cut blocks with saw; do not split units.
6. Sweep excess material from tops of units before laying succeeding courses.
7. Place a maximum of 2 succeeding courses above level backfill. Check for proper alignment and batter.
8. Where top of wall changes elevation, step units to match grade or turn top course into embankment.
9. Where bottom of wall changes elevation, step base leveling pad and extend lowest course a minimum of two units into slope.
10. Install shear connectors per manufacturer recommendations.

C. Drainage Fill: Place drainage fill in, between, and behind units.

1. Compact to lines and grades on drawings, in lifts 6 inches (152 mm) thick, maximum; decrease lift thickness where necessary to achieve required density.
2. Extend drainage fill 6 inches (150 mm) beyond back face of units.

3. Base of drainage fill elevation shall not exceed two courses or 16 inches (400 mm) from base of wall units.

D. Backfill: Place, spread, and compact backfill from behind drainage fill to undisturbed soil while minimizing the development of slack in the soil reinforcement.

1. Use only lightweight hand-operated compaction equipment within 3 feet (900 mm) from back wall face, or one half of wall height, whichever is greater.
2. Place backfill in lifts of maximum 6 inches (150 mm) to 8 inches (200 mm) loose thickness where hand compaction is used and 8 inches (200 mm) to 10 inches (250 mm) where heavy compaction equipment is used.
3. Compact backfill to 95 percent maximum density and upper 2 feet (600 mm) of backfill to 98 percent maximum density, standard Proctor, as determined in accordance with ASTM D698, or as recommended by Geotechnical Engineer.
4. Moisture content of backfill prior to and during compaction to be within plus or minus 2 percentage points dry of optimum and uniform throughout each layer.
5. Do not operate tracked construction equipment directly upon soil reinforcement. Maintain a minimum fill thickness of 6 inches (150 mm) for operation of tracked vehicles over soil reinforcement. Minimize turning of tracked vehicles while over soil reinforcement.
6. Operate wheeled equipment at speeds less than 10 miles per hour (16 kph) over soil reinforcement.
7. Prevent contamination of the filter fabric, unit fill, blanket drains, chimney drains, and/or drainage composite from poor drainage materials such as fine grained silt and clay.

E. Cap Units: Install cast stone with masonry adhesive.

1. Verify in-place top of wall elevation prior to installation of cap units and adjust accordingly.
2. Clear cap units and top course of segmental retaining wall units of debris and standing water before applying adhesive.
3. Apply masonry adhesive to top surface of top unit and place cap into position over projecting pins. Protect wall face from masonry adhesive.

F. Site Drainage:

1. At end of each day:
    1. Grade backfill a minimum of 2 percent away from wall to prevent runoff from adjacent areas from entering wall site and to prevent ponding at the wall.
    2. Construct a berm at the crest of the wall to prevent surface water from overtopping.
2. At completion, if other work adjacent to wall is not to be done immediately (paving, landscaping, etc.), grade top of backfill and provide temporary drainage to prevent water runoff toward the wall.
3. Surface water control and groundwater seepage shall be the responsibility of the project Architect.

3.4 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Provide manufacturer's field representative to observe and inspect concrete units.

C. Observe and inspect:

1. Concrete units: For correct type, for quality installation with courses that are level and follow the designed batter ratio.
2. Soil backfill: For correct type, for specified compaction with level grading prior to reinforcement installation.
3. Soil reinforcement: For correct type, for solid connection to concrete units, and for smooth and taut installation.
4. Field location in plan and elevation.

D. Soil Tests: For every new soil type and/or for every 2,000 cubic yard per running foot (1,500 cm/m) perform Atterberg Limit, Sieve Analysis, and Proctor Compaction tests. Perform additional testing per project Architect.

E. Owner will engage inspection and testing services, including independent laboratories, to provide quality assurance and testing services during construction. Contractor will secure necessary construction control testing during construction.

F. Correct work found deficient and not in accordance with drawings and specifications.

3.5 CLEANING

A. Clean wall face to remove debris and stains.

B. Leave adjacent paved areas broom clean.

C. See Section 01 7419 - Construction Waste Management and Disposal, for additional requirements.

3.6 PROTECTION

A. Prevent damage to wall and earthwork by subsequent construction and uncontrolled runoff until substantial completion; repair damage due to failure to protect wall or earthwork.

B. Do not operate equipment with wheel loads in excess of 150 pounds per square foot (1000 kPa) live load within 10 feet (3 m) from the wall face.

C. Do not place temporary soil or fill stockpiles adjacent to wall.

END OF SECTION 32 3223

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SECTION 32 8415 - SITEWORK SLEEVES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Sleeves for Site Lighting.

B. Related Requirements:

1. Division 01 Section(s) "Construction Waste Management and Disposal" and "Sustainability Compliance Procedures" for sustainability requirements

2. Division 26 Electrical Sections for site electrical work requiring sleeves beneath pavement.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. CTHPB Documentation Submittals: Comply with Section 01 3566.42 – Sustainability Compliance Procedures and provide the following in addition to other submittals:

1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.

B. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

A. PVC Pipe: ASTM D 1785, PVC 1120 compound, Schedule 40 with solvent weld couplings.

2.2 SLEEVE BACKFILL

A. Drainage Backfill: Cleaned gravel or crushed stone, graded from 3/4 inch (19 mm) minimum to 3 inches (75 mm) maximum.

2.3 ACCESSORIES

A. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (750 mm) deep; colored as follows:

1. Red: Electric.
2. Blue: Water systems.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Division 31 Section "Earthwork".

B. Install warning tape directly above sleeves under pavement at 6 inches (150 mm) below subgrade under pavement and slabs.

C. Provide minimum cover over top of underground sleeves for piping and wiring according to the following:

1. Irrigation Main Piping Sleeves: Minimum depth of not less than 18 inches (450 mm) below average local frost depth.
2. Circuit Piping Sleeves: 12 inches (300 mm).
3. Drain Piping Sleeves: 12 inches (300 mm).
4. Irrigation System Wiring Sleeves: 24 inches (600 mm).
5. Site Lighting Wiring Sleeves: 24 inches (600 mm).

3.2 PREPARATION

A. Set stakes to identify locations of proposed site sleeves. Obtain Architect's approval before excavation.

3.3 SLEEVE INSTALLATION

A. Location and Arrangement: Drawings indicate location of sleeves. Install sleeves as indicated unless deviations are approved on Coordination Drawings.

B. Install sleeves free of sags and bends.

C. Install groups of sleeves parallel to each other.

D. Lay sleeves on solid subbase, uniformly sloped without humps or depressions.

E. Install PVC piping in dry weather when temperature is above 40 deg F (5 deg C).

F. Install sleeves for piping and wiring under parking lots, roadways, and sidewalks.

G. Install sleeves made of Schedule 40 PVC pipe.

3.4 SITE LIGHTING SLEEVE INSTALLATION

A. Install wiring for site lighting and signage lighting in separate sleeve, but in same trench as irrigation piping sleeve and at 12 inch separation from piping sleeve under paved areas.

3.5 IDENTIFICATION

A. Warning Tapes: Arrange for installation of continuous, underground, detectable warning tapes over sleeves during backfilling of trenches.

3.6 CLEANING

A. Flush dirt and debris from sleeves before sealing with duct tape and backfilling. Installation of irrigation system to follow in next phase of construction.

END OF SECTION 32 8415

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SECTION 32 8423 - SITE IRRIGATION SYSTEM

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.3 SUMMARY

A. Section Includes:

1. Pipe and tubing, wiring, fittings, valves, sprinkler heads, emitters, bubblers and accessories.
2. Control system.
3. Backflow Preventor.

B. RELATED REQUIREMENTS**:**

1. Section 01 – "Construction and Demolition Waste Management and Disposal" and Sustainability Compliance Procedures".
2. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables.
3. Section 26 0533.13 - Conduit for Electrical Systems.
4. Section 31 2316.13 - Trenching: Excavating and backfilling for irrigation piping.

1.4 REFERENCE STANDARDS

A. ASTM D2241 – Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series); 2020.

B. ASTM D2564 – Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems; 2020.

C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate the work with site backfilling, landscape grading and delivery of plant material.

B. Preinstallation Meeting: Convene meeting with Landscape Architect, Landscape Contractor, and Owner's Representative two weeks prior to commencing work of this Section to ensure proper coordination of scheduling and installation requirements.

1.5 PERFORMANCE REQUIREMENTS AND SYSTEM DESIGN

A. Delegated Design: Design 100 percent coverage irrigation system, including comprehensive coordination with a qualified professional engineer, using performance requirements and design criteria indicated.

B. For soil conditions of the site, see Geotechnical Report prepared for the project.

C. Design Requirements:
1. New Irrigation System: All portions of the site within the limits of construction to be irrigated as indicated on the Drawings. New system to include all portions of the existing system to remain outside of the limits of construction and new irrigation within limits of construction.
2. Water Coverage:
3. All areas shall have heat-to-head coverage with matched precipitation rates capable of delivering 2 inches of precipitation per week.
4. System shall be designed and installed so as to minimize over spray onto all paved areas, buildings, and other non-irrigated areas.
5. Irrigation zone control shall be automatic operation with controller (including rain sensor) and automatic control valves.
6. Minimum Working Pressures: The following are minimum pressure requirements for piping, valves, and specialties unless otherwise indicated:
7. Irrigation Main Piping: 200 psig (1380 kPa).
8. Circuit Piping: 150 psig (1035 kPa).
9. Location of Irrigation Lines: System shall be designed to avoid locating irrigation main and zone lines within drip line of existing trees to remain.
10. Location of Sprinklers and Specialties: Design location is approximate. Make minor adjustments necessary to avoid plantings and obstructions such as signs and light standards. Maintain 100 percent irrigation coverage of areas indicated.
11. Sleeves: Provide sleeves beneath all pavements for irrigation wiring and piping.

1.6 SUSTAINABLE DESIGN REQUIREMENTS

1.7 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. CTHPB Documentation Submittals: Comply with Section 01 3566.42 – Sustainability Compliance Procedures and provide the following in addition to other submittals:
1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional

C. Delegated-Design Submittal: For irrigation systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

D. Product Data: Provide component and control system and wiring diagrams.

E. Zoning Chart: Show each irrigation zone and its control valve.

F. Shop Drawings: Indicate piping layout to water source, location of sleeves under pavement, location and coverage of sprinkler heads, components, plant and landscaping features, site structures, schedule of fittings to be used.

G. Samples: Provide one outlet of each type, with housing. Accepted samples may be used in the Work.

H. Operation and Maintenance Data:

3. Provide instructions for operation and maintenance of system and controls, seasonal activation and shutdown, and manufacturer's parts catalog.
4. Provide schedule indicating length of time each valve is required to be open to provide a determined amount of water.

I. Record Documents: Record actual locations of all components; piping system; conduit; tubing; wiring; heads and emitters.

J. Maintenance Materials: Provide the following for Owner's use in maintenance of project.

5. See Section 01 6000 - Product Requirements, for additional provisions.
6. Extra Sprinkler Heads: One of each type and size.
7. Extra Valve Keys for Manual Valves: One
8. Extra Valve Box Keys: One
9. Extra Valve Marker Keys: One
10. Wrenches: One for each type head core and for removing and installing each type head.

1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years of experience of documented experience.

1.9 WARRANTY

A. For products noted in this section, provide manufacturer’s standard warranty, minimum of one year.

PART 2 PRODUCTS

2.1 IRRIGATION SYSTEM

A. Electric solenoid controlled underground irrigation system, with low point self drain.

B. Manufacturers:
   1. Rain Bird Sales, Inc**:** www.rainbird.com
   2. Toro Company**:** www.toro.com
   3. Hunter Industries: www.hunterindustries.com
   4. Alternate manufacturer if Approved Equal

2.2 PIPE MATERIALS

A. PVC Pipe: ASTM D2241; 200 psi (1.38 MPa); pressure rated upstream from controls, 160 psi (1.10 Mpa) downstream solvent welded sockets.

B. Fittings: Type and style of connection to match pipe.

C. Pipe Risers at Valves: 160 psi (1.10 Mpa) PVC pipe.

D. Solvent Cement: ASTM D2564 for PVC pipe and fittings

E. Sleeve Material: PVC

2.3 TUBING

A. Poly Tubing and Micro Tubing: Sizing, PSI, and length to meet delegated design requirements to properly irrigate the designated areas.

B. Fittings: Type and style of connection to match tubing. Spacing, type, and number of emitters / bubblers to meet delegated design requirements to properly irrigate the designated areas.

2.4 OUTLETS

A. Rotary Type Sprinkler Head: Pop-Up with screens; fully adjustable for flow and pressure; size as indicated; with letter or symbol designating degree of arc and arrow indicating center of spray pattern.

B. Spray Type Sprinkler Head: Pop-Up

C. Quick Coupler: Factory-fabricated bronze or brass, two-piece assembly. Include coupler water-seal valve; removable upper body with spring-loaded or weighted, rubber-covered cap; hose swivel with ASTM B1.20, 3/4-11NH threads for garden hose on outlet; and operating key.

2.5 VALVES

A. Ball Valves: Bronze; non-rising stem.

B. Automatic Control Valves: Molded-plastic body, normally closed, diaphragm type with manual-flow adjustment, and operated by 24-V ac solenoid.

C. Automatic Drain Valves: Spring-loaded-ball type of corrosion-resistant construction and designed to open for drainage if line pressure drops below 2-1/2 to 3 psig (17 to 20 kPa).

D. Backflow Preventers: Bronze body construction, double check valve type. Size and type as required to meet applicable Building Code and Delegated Design requirements and ensure proper functioning of the system.

E. Valve Box and Cover; open bottom and openings for piping designed for installation flush with grade.
   1. Size: As required for valves and service.
   2. Shape: Round, Square or Rectangular.
   3. Sidewall Material: PE, ABS, or FRP.
   4. Cover Material: PE, ABS, or FRP.
   5. Color: Green.

F. Drain Valve: Spring-loaded-ball type of corrosion-resistant construction and designed to open for drainage if line pressure drops below 2-1/2 to 3 psig (17 to 20kPa).

2.6 CONTROLS

A. Controller: Automatic controller, microprocessor solid state control with visible readout display; temporary override feature to bypass cycle for inclement weather; programmable for 7 days in quarter hour increments, with automatic start and shutdown.

B. Controller Housing: NEMA 250 Type 3; weatherproof, watertight, with lockable access door.

C. Valves: Hydraulic; normally open; hydraulic tubing; including required fittings and accessories.

D. Wire Conductors: Color coded.

2.7 GENERAL

A. All misc. appurtenances as required to meet Delegated Design requirements and ensure proper functioning of the system.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify location of existing utilities, vegetation, rock outcroppings, and/or misc site improvements to remain.

B. Verify that required utility connections are available, in proper location, and ready for use.

3.2 PREPARATION

A. Irrigation system layout indicated is diagrammatic only. Route piping to avoid plants, ground cover, and structures.

B. Layout and stake locations of system components to be reviewed by project Landscape Architect and/or Owner Representative in field prior to installation.

C. Review layout requirements with other affected work. Coordinate locations of sleeves under paving to accommodate system.

3.3 TRENCHING

A. Trench and backfill in accordance with Section 31 2300 Excavation, Backfill, Compaction, and Dewatering and Section 31 2333 Trenching and Backfilling.

B. Trench to accommodate grade changes and slope to drains.

C. Maintain trenches free of debris, material, or obstructions that may damage pipe.

3.4 GENERAL INSTALLATION

A. Install pipe, valves, controls, and outlets/spray heads/emitters in accordance with manufacturer's instructions.

B. The minimum depth of cover of the pipe and wire shall meet applicable code requirements and geotechnical report recommendations.

C. Connect to utilities.

D. Set outlets and box covers at finish grade elevations.

E. Provide for thermal movement of components in system.

F. Use threaded nipples for risers to each outlet.

G. After piping is installed, but before outlets are installed and backfilling commences, open valves and flush system with full head of water.

3.5 EXCAVATING, PIPE AND WIRE LAYING AND BACKFILLING

A. Pipe shall be installed strictly in accordance with the recommendations of the manufacturer, including bedding of pipe in the bottom trench and securely thrusting any fittings to change the direction of the pipe. Thrust blocks shall be poured so as not to interfere with any pipe joint or connection.

B. The minimum depth of cover of the pipe and wire shall be as follows:
   1. Main line piping: minimum twenty (20) inches;
   2. Zone piping (downstream of automatic control valves): twelve (12) inches;
   3. Wire in main line pipe trench shall be at the depth of the pipe;

4. Wire in separate trench from pipe: twenty-four (24) volt wire, twelve (12) inches;
5. Wire under roads and through culverts shall be installed in 1 1/2 inch conduit. Conduit shall extend five (5) feet beyond road or culvert and shall be plugged with duct seal or approved equal.

C. Wire shall be installed in the same trench as the pipe wherever possible. All wire shall be installed with at least one percent (1%) slack, thirty-six (36) inch expansion loop at each forty-five (45) degree or ninety (90) degree turn in the trench and have an eighteen (18) inch expansion loop at each automatic valve. Wire may be laid with a vibratory plow but never pulled.

D. When wire runs do not follow pipe trenches, they are to be laid in a straight line which shall be carefully located on the as-built plan. If a change of direction is required on these runs, they are to made at an angle between two (2) straight runs, and not as a sweeping curve. A splice box is to be installed at the angle point with sufficient wire slack to allow wires to be raised at least twenty-four (24) inches above grade.

E. Backfill material shall be free from rock, large stones, or other unsuitable substances to prevent damage to pipe and wire during backfilling operations. Backfill is to be approved by the Owner.

F. Excess material shall be removed to a readily accessible location on site, as designated by the Owner's representative, at the Contractor's expense. The Owner shall supply replacement backfill material at his expense, as and in quantities requested by the Contractor.

G. Deleterious material shall be dug and hauled to an accessible dumping site at a pre-determined contract price per cubic yard. Determination of deleterious material shall be made jointly by the Owner's representative and the Contractor's superintendent.

H. Backfilling shall be done by hand, so as to place it under, around, and above the pipe in stages so that it is hand tampered in layers to a point six (6) inches above the pipe. Special care shall be taken to ensure that this layer is completely free of stones and other deleterious matter. The remainder of the trench may be machine backfilled with available soil. Machine placed backfill shall be compacted to the original density by machine tamping, rolling, or puddling to prevent settlement in the trench.

I. Throughout the entire work period, it shall be the responsibility of the Contractor to refill any trenches that may have settled due to incomplete compaction. However, it shall not be the responsibility of the Contractor to refill any trenches that may have been washed out by natural rainfall or run-off.

J. Trenches shall be compacted and left flush with the present grade and hand raked clean of stone with a fine rake. Loam and reseeding shall be done as required.

K. Wherever conditions permit, pipe shall be installed with a vibratory plow to minimize damage to the existing turf.

3.6 AUTOMATIC IRRIGATION-CONTROL SYSTEM INSTALLATION

A. Equipment Mounting: Install interior controllers on wall.
   1. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
   2. Install anchor bolts to elevations required for proper attachment to supported equipment.

B. Install control cable in same trench as irrigation piping and at least 2 inches (51 mm) below or beside piping. Provide conductors of size not smaller than recommended by controller manufacturer. Install cable in separate sleeve under paved areas.

3.7 FIELD QUALITY CONTROL

A. Field inspection testing will be performed under provisions of Section 01 4000 – Quality Requirements.

B. Prior to backfilling, test system for leakage**.**

C. System is acceptable if no leakage or loss of pressure occurs during test period.

3.8 SYSTEM STARTUP

A. Prepare and start system in accordance with manufacturer's instructions.

B. Adjust control system to achieve time cycles required.

C. Change or Adjust head types for full water coverage as directed.

3.9 CLOSEOUT ACTIVITIES

A. Instruct Owner's personnel in operation and maintenance of system, including adjusting of sprinkler heads. Use operation and maintenance data as basis for demonstration.

3.10 MAINTENANCE

A. See Section 01 7000 – Execution and Closeout Requirements, for additional requirements relating to maintenance service.

B. Provide a separate maintenance contract for specified maintenance service.

C. Provide one complete spring start-up and a fall shutdown by installer, at no extra cost to Owner.

3.11 AS-BUILT DRAWINGS

A. After completion of the installation, the Contractor shall furnish an "as built" drawings of the system to the Owner.

B. The drawings shall include accurate measurements from two fixed permanent features to gate valves, valves boxes, splice boxes, pipe at road crossings, etc.

END OF SECTION 32 8423

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SECTION 32 9113 - SOIL PREPARATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Providing, testing, placing and finish grading all stockpiled and borrow topsoil and planting soil for planting beds and tree pits as shown on the Drawings and specified herein to properly complete all lawn and planting operations.

B. Related Requirements:

1. Division 01 Section(s) “Construction Waste Management and Disposal” and “Sustainability Compliance Procedures” for sustainability requirements.

2. Division 31 Section "Site Clearing" for stripping and stockpiling of topsoil.

3. Division 32 Section "Turf and Grasses" for reuse of amended topsoil.

4. Division 32 Section "Plants" for reuse of amended topsoil as ingredient in planting soil mix.

C. Alternates: Refer to Division 01 Section "Alternates" for description of Work of this Section affected by Alternates.

1.3 QUALITY ASSURANCE

A. Topsoil:

1. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of topsoil.

a. Report suitability of topsoil for plant growth. State recommended quantities of nitrogen, phosphorous, and potash nutrients and soil amendments to be added to produce a satisfactory topsoil.

2. Before delivery of any borrow topsoil, furnish the Architect with a 5 gallon sample of material and a written statement identifying source and origin from which topsoil is to be obtained, names and addresses of owners, depth to be stripped and vegetation type supported grown during the past two years.
3. Both borrow and stockpiled topsoil shall be tested.
4. Topsoil testing costs shall be borne by the Contractor.

5. Testing laboratory shall be:

   a. Soil and Plant Tissue Laboratory, West Experiment Station, 682 North Pleasant Street, Amherst, MA 01003, (413) 545-2311, website: www.umass.edu/plsoils/soiltest.
   b. Substitute laboratory may be used if approved by the Owner and Architect.

1.4 SUBMITTALS

A. Topsoil test results shall be submitted to the Landscape Architect for review to determine acceptability. The Architect will be the sole judge of acceptance.

B. Product data for each soil amendment to be added to topsoil or prepared planting soil mix.

C. CTHPB Documentation Submittals: Comply with Section 01 3566.42 – Sustainability Compliance Procedures and provide the following in addition to other submittals:

1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.5 PRODUCT HANDLING

A. Delivery of borrow topsoil to the site shall be coordinated such that it is placed as delivered and no stockpiling required.

PART 2 - PRODUCTS

2.1 BORROW TOPSOIL

A. Not to contain materials harmful to plant life, to be clean, fertile, friable, well-draining, natural sandy loam. All topsoil to be screened with a ¾" sieve and free of any subsoil earth clods, sods, stones over 3/4" in any dimension, sticks, roots, weeds, litter and other deleterious material.

Topsoil shall be uniform in quality and texture and contain organic matter and mineral elements necessary for sustaining healthy plant growth.

B. Topsoil shall have the following optimum ranges unless otherwise approved by the Architect.

1. Organic matter content: 6 to 15 percent (by loss of ignition at 375 C method of testing).

C. Nutrient levels shall be achieved by the Contractor's addition of amendments to the topsoil to meet the optimum nutrient levels specified in the testing laboratory report.

D. Proposed topsoil shall meet the USDA Soils Textural Classification percentages of sand, silt, and clay for "sandy loam" or "loam" classification.

E. Topsoil shall be completely free of any toxic chemical, hazardous waste and any material or condition that would prevent the establishment of a suitable lawn.

F. Topsoil shall be friable and with sufficient structure to give good tilth and aeration. Continuous, air-filled pore space content on a volume/volume basis shall be at least 15 percent when moisture is present at field capacity. Soil shall have a field capacity. Soil shall have a field capacity of at least 15 percent on a dry weight basis.

2.2 STOCKPILED TOPSOIL

A. Proposed for reuse shall conform to all requirements of paragraph 2.1 of this Section.

2.3 AMENDED TOPSOIL

A. Mix tested topsoil with soil amendments and fertilizers as recommended by the topsoil analysis to produce amended topsoil.

2.4 PLANTING SOIL MIX FOR PLANTING BEDS AND TREE PITS

A. Mix Amended Topsoil (topsoil as amended by Paragraph 2.3 of this Section) with one of the following soil amendments in the following quantities to produce planting soil:

1. Ratio of loose compost to amended topsoil by volume: 1:3.
2. Ratio of loose sphagnum or muck peat to amended topsoil by volume: 1:3.
3. Ratio of loose wood derivatives to amended topsoil by volume: 1:3.

2.5 INORGANIC SOIL AMENDMENTS

A. The following inorganic soil amendments shall be added to planting soil when recommended by topsoil analysis:

1. Lime: ASTM C 602, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent and as follows:

a. Class: Class T, with a minimum 99 percent passing through No. 8(2.36-mm) sieve and a minimum 75 percent passing through No. 60(0.25-mm) sieve.
b. Provide lime in form of dolomitic limestone if soil analysis requires the addition of magnesium.

2. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, with a minimum 99 percent passing through No. 6(3.35-mm) sieve and a maximum 10 percent passing through No. 40(0.425-mm) sieve.
3. Agricultural Gypsum: Finely ground, containing a minimum of 90 percent calcium sulfate.
4. Sand: Clean, washed, natural or manufactured, free of toxic materials.
5. Diatomaceous Earth: Calcined, diatomaceous earth, 90 percent silica, with approximately 140 percent water absorption capacity by weight.

2.6 ORGANIC SOIL AMENDMENTS

A. The following organic soil amendments shall be added to planting soil when recommended by topsoil analysis:

1. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch (25-mm) sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

a. Organic Matter Content: 50 to 60 percent of dry weight.
b. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

2. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture and free of chips, stones, sticks, soil, or toxic materials.

a. In lieu of decomposed wood derivatives, mix partially decomposed wood derivatives with ammonium nitrate at a minimum rate of 0.15 lb/cu. ft. (2.4 kg/cu. m) of loose sawdust or ground bark, or with ammonium sulfate at a minimum rate of 0.25 lb/cu. ft. (4 kg/cu. m) of loose sawdust or ground bark.

3. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, debris, and material harmful to plant growth.

2.7 FERTILIZERS

A. The following fertilizers may be added to planting soil as recommended by topsoil analysis:

1. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 1 and a maximum of 4 percent nitrogen and a minimum of 10 and a maximum of 20 percent phosphoric acid.

2. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

   a. Composition: 1 lb/1000 sq. ft. (0.45 kg/92.9 sq. m) of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
   b. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

3. Chelated Iron: Commercial-grade FeEDDHA for dicots and woody plants, and commercial-grade FeDTPA for ornamental grasses and monocots.

B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

C. Planting Tablets: Tightly compressed chip type, long-lasting, slow-release, commercial-grade planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting nutrients into a form that can be absorbed by plant roots.

1. Size: 5-gram tablets.
2. Nutrient Composition: 20 percent nitrogen, 10 percent phosphorous, and 5 percent potassium, by weight plus micronutrients.

2.8 MISCELLANEOUS PRODUCTS

A. Mycorrhizal Fungi: Dry, granular inoculant containing at least 5300 spores per lb (0.45 kg) of vesicular-arbuscular mycorrhizal fungi and 95 million spores per lb (0.45 kg) of ectomycorrhizal fungi, 33 percent hydrogel, and a maximum of 5.5 percent inert material.

PART 3 - EXECUTION

3.1 GENERAL

A. Place planting soil and fertilizers according to requirements in other Specification Sections.

B. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in planting soil.

C. Proceed with placement only after unsatisfactory conditions have been corrected.

3.2 PROTECTION

A. Protection Zone: Identify protection zones according to Section 01 5639 "Temporary Tree and Plant Protection".

B. Protect areas of in-place soil from additional compaction, disturbance, and contamination. Prohibit the following practices within these areas except as required to perform planting operations:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Vehicle traffic.
4. Foot traffic.
5. Erection of sheds or structures.
6. Impoundment of water.
7. Excavation or other digging unless otherwise indicated.

C. If planting soil or subgrade is overcompacted, disturbed, or contaminated by foreign or deleterious materials or liquids, remove the planting soil and contamination; restore the subgrade as directed by Architect and replace contaminated planting soil with new planting soil.

D. If compaction occurs with light tractors, scarify to a depth of 4-inches and regrade.

3.3 PREPERATION OF UNAMENDED, ON-SITE SOIL BEFORE AMENDING

A. Excavation: Excavate soil from designated area(s) to a depth of 6 inches (150 mm) and stockpile until amended.

B. Unacceptable Materials: Clean soil of concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.

C. Unsuitable Materials: Clean soil to contain a maximum of 8 percent by dry weight of stones, roots, plants, sod, clay lumps, and pockets of coarse sand.

D. Screening: Pass unamended soil through a 2-inch (50-mm) sieve to remove large materials.

3.4 PLACING MANUFACTURED PLANTING SOIL OVER EXPOSED SUBGRADE

A. General: Apply manufactured soil on-site in its final, blended condition. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.

B. Subgrade Preparation: Till subgrade to a minimum depth of 6 inches (150 mm). Remove stones larger than 2 inches (50 mm) in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. Apply approximately half the thickness of planting soil over prepared, loosened subgrade. Mix thoroughly into top 4 inches (100 mm) of subgrade. Spread remainder of planting soil.

C. Application: Spread planting soil to total depth as indicated on drawings, but not less than required to meet finish grades after natural settlement. Do not spread if soil or subgrade is frozen, muddy, or excessively wet.

1. Lifts: Apply planting soil in lifts not exceeding 8 inches (200 mm) in loose depth for material compacted by compaction equipment, and not more than 4 inches (100 mm) in loose depth for material compacted by hand-operated tampers.

D. Compaction: Compact each lift of planting soil to 75 to 82 percent of maximum Standard Proctor density according to ASTM D 698, except where a different compaction value is indicated on Drawings.

E. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.5 PREPARATION AND FINISHED GRADING FOR PLANTING BEDS

A. Shape subgrades and prepare planting beds according to Division 32 Section "Plants".

B. Planting soil will not be permitted to be spread until topsoil test reports and amendments have been submitted and approved.

C. Prepare planting soil off-site before spreading according to Division 32 Section "Plants".

D. Spread topsoil according to Division 32 Section "Plants".

3.6 EXCESS STOCKPILED TOPSOIL

A. Remains property of Owner and is to be deposited by the Contractor in an approved location unless approved otherwise.

END OF SECTION 32 9113

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SECTION 32 9113.29 - ATHLETIC FIELD ROOT ZONE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   A. The contractor is to confirm all materials and volumes and shall furnish all labor, materials, equipment (including low ground pressure at six (6) psi) and transportation required to furnish and place, r prepare rootzone for the field.
   B. Blending operations may be performed off site by a qualified soil blending company approved by the landscape architect or designee if materials are to be imported. All blending shall be by a blending, mixing and screening plant, such as a trommel or equivalent. Bucket mixing is not acceptable.
   C. The Contractor shall be responsible for removing any preexisting materials from the athletic field area per the procedure detailed in "Site Clearing-Turf Removal-Subgrade Preparation".
   D. This work shall consist of preparing a root zone mixture consisting of proposed new sand. The root zone mix will be evaluated by using ASTM F2396 test methods. A sand sample shall be submitted to the testing agent identified in these specifications for analysis and adherence to specifications prior to blending operations. Sand shall not be blended, nor shall the blended material be delivered to the site until approved by the Landscape Architect or designee. The contractor is solely responsible for gaining the approval before purchase and delivery of the material.
   E. A representative sample or samples, of blended soil may be submitted for Environmental Analysis prior to spreading at the direction of the Landscape Architect,. The blended soil shall not be spread without the express written permission of the Landscape Architect.
   F. No heavy-duty equipment and vehicular traffic shall be allowed on the prepared areas. Only low ground pressure (LGP) equipment is to be used.

B. Related Requirements:

   A. Division 01 Section(s) "Construction Waste Management and Disposal" and "Sustainability Compliance Procedures" for sustainability requirements
   B. Section 31 1005 – "Athletic Field Site Preparation": Turf removal and subgrade preparation.
   C. Section 32 1823.17 – "Natural Infield and Warning Track Surfacing": Installation of infield mixes and warning tracks.
   D. Section 32 8423 – "Irrigation Systems": Irrigation of athletic fields.
   E. Section 32 9219.22 – "Athletic Field Seeding and Sodding": Seeding of athletic fields.

1.3 REFERENCE STANDARDS

A. ASTM F2396 - Standard Guide for Construction of High-Performance Sand-Based Rootzones for Athletic Fields; 2011.

1.4 SAMPLES/TESTS

A. The Contractor shall furnish a methodology/project plan of their approach to the project no less than ten (10) days prior to the start of construction.

B. The Contractor shall furnish a Certified Laboratory Report from the laboratories identified in showing the soils classification physical characteristics including particle size distribution, soils performance characteristics including Ksat, and nutrient analysis (both chemical and paste extract) of representative samples of the sand that is proposed to be used, including the extent of lime and fertilizer required.

C. Samples submitted for approval must be representative of the total volume to be furnished, taken in the presence of the Engineer, and delivered to a certified laboratory by the Contractor; all costs for such shall be borne by the Contractor.

D. If the material does not conform to the above requirements and also the requirements as laid out in it shall be rejected, and additional sources shall be found. Sampling and testing shall be accomplished as specified herein until an approved material is found, all at the Contractor's expense.

E. To assure that materials fulfill specified requirements regarding textural analysis, organic matter content, pH, and fertility, depending on the approach, testing must be undertaken:
   1. Prior to blending using materials on site and supplied.
   2. At time of delivery; on-site.

F. For quality control, immediately following spreading on site, soil may be tested at the Landscape Architect's discretion.

1.5 SUBMITTALS

A. CTHPB Documentation Submittals: Comply with Section 01 3566.42 – Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional

1.6 NOTIFICATION

A. The Contractor shall notify the Landscape Architect in writing at least 10 days in advance of the time he intends furnishing root zone mix sand or amendments stating the location and amount of such deposit, the name and address of the supplier and also shall furnish such facilities, transportation and assistance as the Landscape Architect may require for collecting and forwarding samples.

B. Any changes to the means and methods of the athletic field construction, and/or materials, must be approved by the Landscape Architect.

C. Completion of work is subject to adverse climatic conditions, which could affect the date of substantial completion. Any/all delays must be communicated with the Construction Manager as soon as possible.

D. No work can progress unless the Landscape Architect approves testing results.

1.7 QUALITY CONTROL

A. Root Zone Mix Sand: A one-gallon sample for every 1000 cu yds (765 cu m) of root zone mix shall be tested by the Landscape Architect Testing Agent for approval coming per material source. All costs shall be borne by the Contractor.

B. Prior to seeding, contractor shall notify the Landscape Architect and provide the Landscape Architect with compaction tests with a digital cone penetrometer along the center line of the field as well as in off center areas to ensure that the root zone mix has not been heavily compacted. Compaction test shall fall within the industry standards for fields and must reach a minimum of one hundred and fifty (150) psi and not exceed a maximum of two hundred and fifty (250) psi and any areas of the field that exceed these standards shall be corrected at the contractor's expense prior to seeding.

1.8 QUALITY ASSURANCE

A. Contractor Qualifications: A qualified Contractor whose work has resulted in successful athletic field construction and performance turf establishment.

B. Contractor Experience: The Contractor must have completed at least five (5) projects per year of similar scope over the past three (3) consecutive years.

A. General Experience:

a) Five (5) years' experience of athletic fields construction, resurfacing and/or renovations similar to scope of project over the last three (3) consecutive years.

b) Provide reports of above said athletic fields projects as to the type of projects involved in, including but not limited to; start and end dates, adherence to target/ key performance indicators, scope of works completed along with contact persons and

contact details for said clients

c) Provide testimonies from previous clients, including but not limited to; quality of work, staff/employee interactions, tidiness of site, timekeeping and punctuality and overall client satisfaction levels. Include any measured field performance metrics (i.e. infiltration rate, hardness, rotational traction) and any standards to which the field was constructed.

B. Staff/Employees:

a) Provide resumes for all staff/employees who will be responsible for carrying out scope of works, including but not limited to, full time and seasonal/short term employees.

b) Resumes will be required for all employees/staff involved in the project.

c) Resumes to include:

1) Experience level relevant to the project needs/scope of work.
2) Qualifications level relevant to the project needs/scope of work.

d) Must provide evidence that all staff/employees have at least three (3) years' experience of similar scope of work for project over the last three (3) consecutive years.

e) Provide evidence of continued professional development of all/any employees involved in project for last three (3) consecutive years.

f) Shall have a supervisor on the site who is experienced in the construction of sports fields. Supervisor's name and experience shall be submitted to the Engineer for approval.

g) Shall have membership of one or more of the following Professional associations for a minimum of the last three (3) consecutive years.

1) New England Sports Field Management Association (NESFMA).
2) Sports Turf Managers Association (STMA).

C. Insurance / Certifications:

a) Must be in possession of a suitable level of public liability insurance and any other relevant insurances required by the state and/or client.

D. Equipment:

a) Must be in possession and provide a detailed list of a suitable level of tools/equipment/machinery and or equivalent required to carry out the scope of work for said project.

b) All equipment and or equivalent should be in a condition able to carry out scope of work. Any certificates proving this will be required as part of the submission.

c) All equipment must be verified by the Contractor as being leak free and fit for use.
d) The proposed equipment must be approved by the Landscape Architect prior to commencing work on the Athletic Fields.

e) Contractor must be able to prove that all equipment to be used on the athletic fields is Low Ground Pressure (6 PSI).

E. Additional:

a) Provide a project plan identifying all key indicator/target points, which clearly shows an integrated approach to quality control and quality assurance.

b) Provide a detailed methodology of how the required works will be carried out, this should be inclusive and synced to the project plan.

c) Is required to submit samples, test results and/or certification of all material prior to delivery to the site. All materials are to be approved by the Landscape Architect prior to their use. These certifications shall comply with specifications and scope of project and where applicable, with any standards that may be implied.

d) Approved Soil Testing Laboratories: Contractor shall submit a chemical, saturated paste extract, and physical soil test of the rootzone mix prior to seeding. Testing of the existing Rootzone Material and washed screened sand shall be performed by:

For particle size analysis and complete physical performance

Turf & Soil Diagnostics
Trumansburg, NY 14886
(607) 387-5694

For chemical and paste extracts

Logan Labs, LLC
620 North Main Street
Lakeview, OH 43331
(937) 842-2433

1.9 DELIVERY, STORAGE, AND HANDLING

A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.

B. Bulk Materials:

A. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.

B. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.

C. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.

D. Fertilizers, lime, and soil amendments must be stored in a secure, locked area, and must be protected from the elements and from temperature and humidity extremes.

E. Stockpiled materials must be stored in such a manner to prevent contamination from stones, organic matter, or other deleterious materials. In addition, precautions must be taken to prevent cross contamination between soils that are to be removed from the site and materials that are being imported. Cross contamination can occur through runoff, direct contact, equipment, or wind-blown dust, as well as other possibilities.

1.10 SITEWORK CONSTRUCTION EQUIPMENT BY USE

A. Excavation, Earth Moving, and Grading:

A. Utilize Model 550 J Crawler Dozer as manufactured by John Deere equipment or equivalent, which meets the following specifications:

a) Laser T Guided Capability.
b) Tier 3/Stage 3A emissions certified engine.
c) Net power – 85 hp. at 2200 rpm.
d) Maximum speed (forward and reverse) 5 mph.
e) Track gauge – 5 ft.
f) Length of track on ground – 7 ft. 2 in.
g) Ground contact area – 4128 sq. in.
h) Maximum ground pressure – 5.8 psi.
i) Number of track rollers – 6.
j) Track pitch – 6.29 in.
k) Track shoes, each side – 40.
l) Standard shoe type – single grouser.
m) Blade width – 9 ft. 7 in.
n) Blade height – 3 ft. 2 in.
o) SAE blade capacity – 2/57 cu. yd.
p) Lade lift height – 2 ft. 7 in.

q) Digging depth – 20.6 in.
r) Blade tilt – 1 ft. 3 in.
s) Ground clearance – 14 in.
t) SAE operating weight – 18,252 lbs.

B. Utilize Model Z Axis 50 U Series Mini Excavator as manufactured by Hitachi or equivalent, which meets the following specifications:

a) Net power – 40 hp. at 2,500 rpm.
b) Weight – 10,758 lbs.
c) Speed – 1.7 to 2.8 mph.
d) Track – rubberized 15 in.
e) Maximum ground pressure – 4.49 psi.
f) Ground clearance – 13 in.
g) Front grading blade width – 78 in.
h) Grade ability – 30".
i) Maximum digging reach – 236 in.
j) Maximum digging depth – 141 in.
k) Maximum cutting height – 222 in.
l) Maximum vertical wall – 111 in.

B.Stripping of Existing Grass Surface:

A. Utilize Model FTM 2000 Koro Field Top Maker as Manufactured by Pols International, Stationsweg 36, 3214 VK Zuidland, Netherlands or equivalent that meets the following specifications:

a) Working width – 78 in.
b) Working depth – 1.75 in.
c) Weight – 2448 lbs.
d) Horsepower requirements – 70 hp.
e) Number of cutting blades – 64.
f) Side conveyor extension.

B. Utilize Model 6425 Turf Tractor as manufactured by John Deere Equipment or equivalent, which meets the following specifications:

a) Engine power – 125 hp.
b) PTO power – 114 hp.
c) Wheelbase – 94.5 in.
d) Weight – 10,064 lbs.
e) Rear lift – 5,100 lbs.
f) Front tire – 10.00 – 16 low ground pressure high floatation turf tire.
g) Rear tire – 16.9 – 30 low ground pressure high floatation turf tire.

C.Hauling of Stripped Material off Field:

A. Utilize Dirtcub Hydraulic Dump-box as manufactured by TYCROP Manufacturing or equivalent that meets the following specifications:

a) Bed size – 60 13/16" x 70 1/8' L.
b) Unit Size – 68 1/8" W x 45 9/16" H.
c) Weight – 956 lbs.
d) Payload: 3000 lbs.
e) Suspension – Low ground pressure (maximum 5 psi) 4 wheel4-wheel walking beam evenly distributing.

B. Utilize Model 4720 Turf Tractor as Manufactured by John Deere Equipment or equivalent that meets the following requirements:

a) Engine power – 58 hp.
b) PTO power – 56 hp.
c) Wheelbase – 71.5 in.
d) Weight – 3,860 lbs.
e) Rear lift – 2,500 lbs.
f) Front tire – 8.00 – 16 low ground pressure high floatation turf tire.
g) Rear tire – 13.6 – 28 low ground pressure high floatation turf tire.

D. Loading, Backfilling, Power Raking Specifications:

A. Utilize Model 287 Compact Track and Multi Terrain Loader as manufactured by Caterpillar Inc, or equivalent that meets the following specifications:

a) Net Power – 82 HP.
b) Operating Weight – 10,275 lb.
c) Maximum speed (forward and reverse) – 7 mph.
d) Length of Track on Ground – 73 in.
e) Ground contact area – 2,610 sq. in.
f) Maximum ground pressure – 3.8 psi.
g) Ground clearance – 11 in.
h) Vehicle width – 77 in.
i) Clearance at maximum lift/dump – 94 in.
j) Quick connect accessory and implement capability.

B. Utilize Model MX7H Hydraulic Power Angle Mounted Grading and Blending Implement as manufactured by Harley Rake or equivalent and meets the following specifications:

a) Front attachment plate for track and multi terrain loader.
b) Working width to cover multi terrain loader trucks.
c) Aggressor pointed carbide teeth.
d) Dual independently adjustable gauge wheels.
e) Weight – 1050 lb.
f) Length – 64 in.
g) Width (overall) – 93 in.
h) Raking width – 84 in.
i) Raking width (full range) – 79 in.
j) Angle roll - 20°.
k) Removable/reversible end plates.

C. Utilize Model TD – 460 low ground pressure large area top dresser as manufactured by Tyco Manufacturing or equivalent, which meets the following specifications:

a) Weight – 3,400 lbs.
b) Length – 167 in.
c) Height – 63 in.
d) Width – 89 in.
e) Hopper load capacity – 75 cu. ft.
f) Capability to spread wet or dry materials including soil mixes, sand, stone, gravel, Inorganic material, composted products and wood chips.
g) Capability to perform as multifunctional trailer for material handling and relocation tasks with an unloading time of 30 seconds.
h) Low ground pressure four-wheel walking beam suspension.
i) Unlockable metering gate to float freely during bulk unloading operations.
j) Removable metering gate for hauling construction and landscape materials.
k) Independent control valves for adjusting the speed of floor conveyor belt and the finishing brush.
l) 72" wide spread and distribution of material.

D. Utilize Model BV150 Ground preparation machine as manufactured by BLEC USA or equivalent which meets the following specifications:

a) Working width – 60 in.
b) Working depth – 9 in.
c) Gear box – single speed 540 RPM.
d) No. of blades – 36.
e) Overload safety – friction multi-plate clutch.
f) Maximum working output/hr. 5300 sq. yd.
g) Maximum 1.5 mph working speed – 2.0 mph.
h) 3 point3-point hitch – cat 2.
i) Weight – 2,300 lbs.
j) Length – 71 in.
k) Height – 44 in.
l) Width – 82 in.

E. Utilize Model 5425 Turf Tractor as manufactured by John Deere Equipment or equivalent which meets the following specifications:

a) Engine power – 81 hp.
b) PTO power – 65 hp.
c) Wheelbase – 85.7 in.
d) Weight – 7,385 lbs.
e) Rear lift – 3,374 lbs.
f) Front tire – 7.50 – 16 low ground pressure high floatation turf tire.
g) Rear tire – 16.9 – 30 low ground pressure high floatation turf tire.

E. Finish Grading:

A. Utilize Model 106 P Compact Motorized Cross Slope Dual Laser Grader as manufactured by Laser-Grader Manufacturing or equivalent that meets the following specifications:

a) Weight – 3,200 lbs.
b) Length – 11 ft. 6 in.
c) Height – 7 ft. 2 in.
d) Width (excluding blades) – 4 ft.
e) Front pusher blade width – 5 ft.
f) Mold board width – 6 ft.
g) Mold board height – 12 in.
h) Variable speed: 0 – 10 mph.
i) Outside turning radius – 9 ft.
j) Inside turning radius – 5 ft.
k) Mold board functions.
l) Left and right manual raise and lower.
m) Side shift and blade rotation.
n) Grading tolerance - +/- 1/8 in. accuracy equipped with Trimble GCS 600 Grande Control System with two LR410 laser receivers monitored by dual LED grade displays as programmed through a CB420 control box providing the ability to calculate angle, slope and cross slope.
o) Trimble control package plumbed into hydraulics for "automatic" laser control.
p) 6 wheel6-wheel drive via hydraulic wheel motors.
q) Power steering.
r) ROPS certified roll bar.

2 Any proposed substitution of equipment as an equivalent must receive written approval by the Landscape architect or their designee prior to any operation on site..

PART 2 PRODUCTS

2.1 AMENDED ROOT ZONE MATERIAL

A. Amended Root Zone Material shall conform to the following:

1. Organic Matter Content: Minimum of 3 to 5 percent.
2. Infiltration rate shall be greater than inches per hour.
3. Soil shall not be compactable to more than 200 psi.
4. If additional sands are needed they must be mixed by a soil plant or trommel, bucket mixing is not acceptable.
5. The soils textural shall meet the following gradation:

IMPORTED ROOT ZONE

Description	Size (mm)	Percent
Sand	0.05 to 2.0	80 to 86
Silt	0.002 to 0.05	5 to 9.5
Clay	<0.002	1.5 to 3.5

Combined silt and clay (#140 and #270) shall not exceed 10 percent. No stone greater than 1/4-inch (6 mm).

a.

SAND FRACTIONS			
Conventional Name	Retained on U.S. Sieve No. (mm)	Diameter	Percent
Very Coarse Sand	#18	1.0 to 2.0	5 to 9
Coarse Sand	#35	0.5 to 1	20 to 24
Medium Sand	#60	0.25 to 0.5	30 to 34
Fine Sand	#140	0.10 to 0.25	10 to 25
Very Fine Sand	#270	0.05 to 0.10	5 to 10

B. Soil Testing

1. The rootzone blend shall be tested for nutrition through a chemical test and a saturated paste extract. The physical characteristics and performance shall be tested by a complete physical test with particle size distribution, infiltration, and porosity.

PART 3 EXECUTION

3.1 PLACEMENT

A. Amended Root Zone Mix:

1. After excavation and removal of the existing turf and organic material to no less than a depth of eight (8) inches and no more than a depth of eight and a half (8.5) inches.

2. The subbase condition and grade, presence of debris and compaction levels must be verified and approved by the landscape Architect or designee prior to proceeding with the installation of the shim layer or rootzone.

3. The irrigation system is to be installed before if the amended root zone mix is to be applied.

4. All amended rootzone mix placed around irrigation components shall be placed by hand and compacted utilizing hand tools.

5. Prior to spreading of amended rootzone material, the subbase grades, irrigation, and drainage must be approved in writing by the Landscape Architect or their designee.

6. Under no circumstances will rubber-tired vehicles more than one (1) ton be allowed on the gravel/existing base or root zone mix prior to, during or after the spreading of the root

zone mix without a LGP rating of six (6) PSI.

7. Finish grades shall be established per the grading plan, using a three-axis laser grader. Box graders are not acceptable.

8. Finish grades shall be verified by the Contractor using laser operation survey instruments with a tolerance of +/- 1/4-inch.

9. No compaction shall be required beyond that extent necessary to place amended rootzone.

10. Amended Root Zone Mix shall be graded in such a manner as to establish a loose, friable seedbed.

11. The entire site to be seeded shall be laser graded and compacted to predetermined finish grade elevations utilizing power raking and ground preparation equipment as listed in Appendix A or equal.

12. All edges, corners, and material transition areas shall be graded and compacted by manual labor, if necessary, to insure consistent elevation control with surface stabilization and firmness throughout the site. The site shall be inspected for acceptable finish grade and compaction by the Landscape Architect.

13. At the completion of finish grading to +/- one quarter inch and compaction, the irrigation system will be tested, and sprinkler heads installed.

14. The final grades, amended rootzone condition, compaction levels and amended rootzone depth shall all be inspected and approved by the Landscape Architect or designee prior to proceeding with seeding.

15. The seed surface shall be smooth and free of any debris larger than 3/8 inch. Any irregularities in the surface resulting from construction operations shall be corrected to prevent the formation of depressions or crowns. The seeding surface shall be able to provide seed to soil contact.

3.2 ADDITIVES

A. The Contractor shall apply any additives or nutrients as detailed in Section 32 9219.22 - Athletic Field Seeding and Sodding.

END OF SECTION 32 9113.29

SECTION 32 9200 - TURF AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Seeding.
2. Hydroseeding.
3. Sod (Alternate)
4. Erosion-control material(s).

B. Related Requirements:

1. Division 01 Section(s) "Construction Waste Management and Disposal" and "Sustainability Compliance Procedures" for sustainability requirements

2. Division 31 Section "Site Clearing" for topsoil stripping and stockpiling.

3. Division 31 Section "Excavation, Backfill, Compaction and Dewatering" for excavation, filling and backfilling, and rough grading.

4. Division 31 Section "Soil Erosion and Sedimentation Controls" for additional erosion control measures.

5. Division 32 Section "Soil Preparation" for planting medium.

6. Division 32 Section "Plants" for border edgings.

7. Division 33 Section “Storm Drainage” for subsurface drainage.

1.3 DEFINITIONS

A. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

B. Finish Grade: Elevation of finished surface of planting soil.

C. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

D. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

E. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

F. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

G. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or top surface of a fill or backfill before planting soil is placed.

H. Subsoil: All soil beneath the topsoil layer of the soil profile and typified by the lack of organic matter and soil organisms.

I. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 INFORMATIONAL SUBMITTALS

A. CTHPB Documentation Submittals: Comply with Section 01 3566.42 – Sustainability Compliance Procedures and provide the following in addition to other submittals:
   1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional

B. Qualification Data: For Landscape Installer.

C. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture, stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

D. Product Certificates: For soil fertilizers, from manufacturer.

E. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of turf and meadows during a calendar year. Submit before expiration of required maintenance periods.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful turf and meadow establishment.

1. Professional Membership: Installer should be a member in good standing, for at least the past three (3) consecutive years, of either the Professional Landcare Network, New England Sport Field Management Association, (NESFMA).
2. Experience: Five years' experience in turf installation in addition to requirements in Division 01 Section "Quality Requirements".
3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
4. Pesticide Applicator: State licensed, commercial.
5. Any substitutions of professional certifications or associations must be submitted in writing, with supporting documentation, and must be approved by the Landscape Architect.
6. The Installer must be able to prove that they have all LGP (low ground pressure – less than six (6) psi).
7. The Installer must own, or have fully executed lease contractors for, all of the required equipment necessary to complete the work. If the required equipment is being leased, the Installer must provide satisfactory evidence of operator experience and training qualifications with the identical equipment to the Landscape Architect.
8. Selected installer must install athletic fields using his/her own crews, subcontracting of installation work will not be allowed.

1.8 JOB CONDITIONS AND UTILITIES

A. Utilities: Contractor is responsible for contacting Call Before You Dig (CBYD) before commencement of work or arranging with the owner for this to be carried out and must be approved by Tom Irwin Advisors

B. Contractor is responsible for having all utilities clearly marked and having all appropriate protections of marked utilities and must be approved by Tom Irwin Advisors

C. Contactor is responsible for damage to any marked utilities.

D. Excavation: must not take place when conditions are detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify Tom Irwin Advisors before spreading Rootzone.

E. All work shall be performed between the hours of Seven (7) am and Five (5) pm unless otherwise agreed between the contractor and Tom Irwin Advisors

F. Before the project commences, If necessary, all personnel on site must present evidence of a successful CORI check suitable for work in a school zone if required.

G. Sod Restrictions: Apply sod during one of the following periods. Coordinate sod periods with initial maintenance periods to provide required maintenance from date of Substantial Completion.

1. Spring Planting: March 15th to June 15th.
2. Fall Planting: August 15th to November 15th. (Recommended)

H. Weather Limitations: Proceed with sod installation only when existing and forecasted weather conditions permit sodding to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

1.9 DELIVERY, STORAGE, AND HANDLING

B. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.

C. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.
4. All Seed, Fertilizers, Insecticides, and Soil amendments must be used immediately or stored in an access-controlled structure and not subject to excessive moisture, heat, or cold.
5. The location of storage facilities must be approved by the Landscape Architect.

D. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of Substantial Completion.

1. Spring Planting: March 15th to June 15th.
2. Fall Planting: August 15th to November 15th.

E. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 SEED

A. All products and material required for the successful completion of the project shall be as specified unless otherwise communicated by the contractor. All products and materials shall be authenticated by the supplier and Landscape Architect upon delivery and before use.

B. Grass Seed: Must be certified through the National Turfgrass Evaluation Program (NTEP).

C. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.

D. Seed Species: Seed of grass species as follows, with not less than 95 percent germination, not less than 85 percent pure seed, and not more than 0.5 percent weed seed:

1. Grass seed mixture shall be as indicated on the Drawings.

E. Certification of grass seed selected shall clearly state no less than 98 percent germination, no less than 98 percent pure seed, and no more than 0.2 percent weed seed.

2.2 SOD (ALTERNATE)

A. The sod shall be a crop of one year but not more than 2 years old from the date of seed seeding.

B. Sod shall be machine cut at a uniform thickness of three quarters (3/4) inch sod pad only) by thirty (30) inch width at the time of cutting.

C. Measurement of thickness will exclude top growth and thatch; damaged rolls will not be acceptable.

D. Sod shall be stored in rolls with grass topside inverted so that the topsoil is to the exterior.

E. Sod will be free from annual and perennial weeds and weed grasses

2.3 PLANTING SOILS

A. Topsoil: Amend topsoil for seed areas as outlined in topsoil test results as indicated in Division 32 Section "Topsoil and Planting Mix".

2.4 FERTILIZERS

A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

2.5 MULCHES

A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.

B. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch (25-mm) sieve; soluble salt content of 2 to 5 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 50 to 60 percent of dry weight.
2. Feedstock: Animal bedding and manure, pesticide or chemical free green waste, , and crop residues. Feedstock must comply with USDA Organic Regulations: § 205.203(c)(1),
3.

Description	Percent
Passing ½ inch screen	100%

Passing a 1" screen	>90%
Passing a 4 mm screen	>85%
Passing a 2 mm screen	. >65%

1. Derived from a well-decomposed source of organic matter.
2. Produced using an aerobic composting process, meeting Code of Federal Regulations (CFR) 503 for time, temperature, and heavy metal concentrations.
3. No visible admixture of refuse or other physical contaminants, nor any material toxic to plant growth.
4. Certified by the U.S. Composting Council's Seal of Testing Assurance (STA) program.
5. Conforms to chemical, physical, and biological parameters of AASHTO R 52, with the following additional requirements:

a. Follow U.S. Composting Council's TMECC guidelines for all testing.
b. Organic Matter Content: 30% minimum.
c. pH: between 6.0 and 8.0.
d. Maturity (growth screening): Minimum 90% emergence for all compost to be vegetated.
e. Carbon to Nitrogen ratio (C:N) less than 25:1 upon completion.
f. Ratio of Ammonium to Nitrate less than 3:1
g. Soluble salts less than 10 dS/m
h. Respirometry less than 8 mg CO2-C per g OM per day
i. Shall Comply with EPA 503 regulations for metals and all state regulations
j. No free water
k. No viable weed seeds
l. The compost must maintain a stable temperature between 155 F and 170 F for a minimum of 3 days.

4.

C. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic and free of plant-growth or germination inhibitors; with a maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.

D. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application; nontoxic and free of plant-growth or germination inhibitors.

E. Asphalt Emulsion: ASTM D 977, Grade SS-1; nontoxic and free of plant-growth or germination inhibitors.

2.6 PESTICIDES

A. General: Pesticide, registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

2.7 EROSION-CONTROL MATERIALS

A. Erosion-Control Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches (150 mm) long.

B. Erosion-Control Fiber Mesh: Biodegradable burlap or spun-coir mesh, a minimum of 0.92 lb/sq. yd. (0.5 kg/sq. m), with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, 6 inches (150 mm) long.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to be planted for compliance with requirements and other conditions affecting performance.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

1. Protect adjacent and adjoining areas from hydroseeding and hydro mulching overspray.
2. Protect grade stakes set by others until directed to remove them.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 TURF AREA PREPARATION

A. General: Prepare planting area for soil placement and mix planting soil according to Section 32 9115 "Topsoil and Planting Mix".

B. Placing Planting Soil: Place and mix planting soil in place over exposed subgrade according to Section 32 9115 "Topsoil and Planting Mix".

1. Reduce elevation of planting soil to allow for soil thickness of sod.

C. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

D. Ensure that the soil is not overly compact. If the soil compaction, as measured with a cone penetrometer is greater than one hundred and seventy five (175) PSI, loosen the soil to a depth of 4 inches with a rake or harrow. Re-level the soil to meet specified grades.

E. Before planting, obtain Landscape Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 PREPARATION FOR EROSION-CONTROL MATERIALS

A. Prepare area as specified in "Turf Area Preparation" Article.

B. For erosion-control mats, install planting soil in two lifts, with second lift equal to thickness of erosion-control mats. Install erosion-control mat and fasten as recommended by material manufacturer.

C. Fill cells of erosion-control mat with planting soil and compact before planting.

D. For erosion-control blanket or mesh, install from top of slope, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.

E. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

3.5 SEEDING

A. Sow seed with a dimple seeder and a slice seeder. Do not broadcast or drop seed. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.

1. Do not use wet seed or seed that is moldy or otherwise damaged.
2. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.

B. Sow seed at a total rate of 5 lb/1000 sq. ft. per direction for a total application of 10 lbs/1000 sq. ft.

C. Rake seed lightly into top 1/8 inch (3 mm) of soil, roll lightly, and water with fine spray.

D. Protect seeded areas with slopes exceeding 1:4 with erosion-control blankets and 1:6 with erosion-control fiber mesh installed and stapled according to manufacturer's written instructions.

E. Protect seeded areas with slopes not exceeding 1:6 by spreading straw mulch.

F. Spread uniformly at a minimum rate of two (2) tons/acre (42 kg/92.9 sq. m) to form a continuous blanket 1-1/2 inches (38 mm) in loose thickness over seeded areas. Spread by hand, blower, or other suitable equipment. Straw mulch to be maintained in place by one of the following methods:

1. Anchor straw mulch by crimping into soil with suitable mechanical equipment.
2. Bond straw mulch by spraying with asphalt emulsion at a rate of 10 to 13 gal./1000 sq. ft. (38 to 49 L/92.9 sq. m). Take precautions to prevent damage or staining of structures or other plantings adjacent to mulched areas. Immediately clean damaged or stained areas.

G. Protect seeded areas from hot, dry weather or drying winds by applying compost mulch, peat mulch, or planting soil within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of 3/16 inch (4.8 mm), and roll surface smooth.

3.6 HYDRO MULCHING

A. Hydro mulching: Mix specified fertilizer and fiber mulch in water, using equipment specifically designed for hydro mulch application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.

B. Mix slurry with fiber-mulch manufacturer's recommended tackifier.

C. Mulch for hydro mulch to cover mechanically seeded areas shall be fiber- processed from whole wood chips manufactured specifically for standard hydraulic mulching equipment. Fiber shall not be produced from recycled material such as sawdust, paper, or cardboard.

D. Moisture content shall not exceed 10%, plus or minus 3%, as defined by the pulp and paper industry standards. Fiber shall have a water holding capacity of not less than 900 grams of water per 100 grams fiber.

E. Apply slurry cover coat of fiber mulch (hydro mulching) at a rate of 1000 lb/acre (10.4 kg/92.9 sq. m).

F. Mulch shall disperse into a uniform slurry when mixed with water. Mulch shall be nontoxic to plant life or animal life.

G. Mulch shall contain a non-petroleum based tackifier and a green dye for visual monitoring during application, but non-injurious to plant growth.

3.7 SOD (ALTERNATE)

A. Sod will be installed from September 15th to November 30th, as long as ground is not frozen.

B. Sod shall be harvested, delivered and installed within a period of twenty-four (24) hours. The soil on the sod pads shall be kept moist at all times

C. Immediately prior to installation, the sod bed shall be lightly raked with a fine-toothed harrow of hand rake to provide a surface for the sod to root into.

D. The sod bed shall be reasonably moist and watered in necessary. The sod shall be installed smoothly edge to edge with a maximum joint tolerance of 1/16”

E. A big roll sod installer shall be the equivalent to a Werner KMWI tracked sod installer with a forty-eight (48)” minimum width roll capacity.

F. Sod shall be installed perpendicular to the direction of play.

G. Sod shall be installed with vertical joints being staggered by five (5)’ foot

H. Sod shall be irrigated during and immediately after installation to prevent drying out. Irrigation shall be continuous to allow moisture to penetrate and through the sod pad and into the topsoil immediately below the pad.

I. After sod has been installed the sod shall be rolled with an approved weighted roller, not to exceed sixty-five (65) pounds per foot of width.

3.8 TURF RENOVATION (AFTER INSTALLATION)

A. Renovate turf damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.

1. Reestablish turf where settlement or washouts occur or where minor regrading is required.
2. Install new planting soil as required.

B. Remove sod and vegetation from diseased or unsatisfactory turf areas using a sod cutter; do not bury in soil.

C. Maintain a consistent depth with the sod cupper and ensure that the edges of the removed area are parallel and uniform.

D. Remove topsoil containing foreign materials, such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from Contractor's operations, and replace with new planting soil.

E. Loosen the soil, add soil to replace the soil removed, regrade with iron rake such that the repaired area will match the finish grades.

F. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off Owner's property.

G. Till stripped, bare, and compacted areas thoroughly to a soil depth of six (6) inches.

H. Apply soil amendments and initial fertilizer required for establishing new turf and mix thoroughly into top 4 inches (100 mm) of existing soil. Install new planting soil to fill low spots and meet finish grades.

1. Soil Amendment(s): According to requirements of Division 32 Section "Topsoil and Planting Mix". Apply as recommended by topsoil analysis.
2. Initial Fertilizer: Commercial fertilizer or Slow-release fertilizer applied according to manufacturer's recommendations.

I. Apply seed or sod and protect with straw mulch as required for new turf.

J. Water newly planted areas and keep moist until new turf is established.

3.9 TURF MAINTENANCE

A. Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and re-mulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

B. Watering: Install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of four (4) inches.

1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
2. During the first two weeks after planting water turf with fine spray at a minimum rate of 1/8 inch at 4 am, 8 am, 11am, 2 pm, 5 pm, and 10 pm, unless rainfall precipitation is adequate.
3. After the grass has established Water turf with fine spray at a minimum rate of 1 inch (25 mm) per week unless rainfall precipitation is adequate.

C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:

1. Mow to a height of 1-1/2 to 2 inches (38 to 50 mm).

2. All clippings must be removed.

3. Mowing blades must be properly sharpened to prevent torn or ragged leaf tips of the grass blades

4. Do not delay mowing until the the grass blades bed over and become matted.

D. Turf Post fertilization: Apply fertilizer after initial mowing and when grass is dry.

1. Use fertilizer that will provide actual nitrogen of at least 1 lb/1000 sq. ft. (0.45 kg/92.9 sq. m) to turf area.

3.10 SATISFACTORY TURF

A. Turf installations shall meet the following criteria as determined by Architect:

1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 95 percent over any 10 sq. ft. (0.92 sq. m) and no bare spots.

2. The soil compaction will be between 150 and 200 pounds per in^2 (PSI) at a 3 inch depth.

3. The infiltration rate of the Project sites will not be below three (3) inches of water per hour as measured using a double ring infiltrometer with a falling head

B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

3.11 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents in accordance with requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

3.12 RESTORATION OF SETTLED GRADES

A. At the end, twelve months after the date of substantial completion of the soil installation work, inspect the site and restore any areas where the grades have settled beyond the elevations shown on the drawings.

1. Lawn areas: Remove the sod using mechanical sod cutter from the settled area and add the specified top soil or planting mix. Re sod the area using the sod cut from the lawn. In the event that the sod cannot be reused, install new sod that matches the seed mix on the lawn.

2. Planting Areas: Where the settlement is 3-inches or less, remove the mulch, top dress the area with the specified topsoil or planting mix and re mulch.
3. Planting Areas: Where the settlement is greater than 3-inches remove the mulch and plants, add the specified topsoil or planting mix and re mulch.

3.13 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout maintenance period and remove after plantings are established.

C. Remove erosion-control measures after grass establishment period.

3.14 MAINTENANCE SERVICE

A. Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in "Turf Maintenance" Article. Begin maintenance immediately after each area is planted and continue until acceptable turf is established but for not less than the following periods:

1. Seeded Turf: 90 days from date of Substantial Completion.

    a. When maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.

B. Meadow Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in "Meadow Maintenance" Article. Begin maintenance immediately after each area is planted and continue until acceptable meadow is established, but for not less than 40 days from maintenance period below:

1. Maintenance Period: 90 days from date of Substantial Completion.

END OF SECTION 32 9200

SECTION 32 9219.22 - ATHLETIC FIELD SEEDING AND SODDING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

1.2 SUMMARY

A. Section Includes:

1. Seeding.

B. Related Requirements: Division 01 Section(s) "Construction Waste Management and Disposal" and "Sustainability Compliance Procedures" for sustainability requirements

1. Division 01 Section(s) "Construction Waste Management and Disposal" and "Sustainability Compliance Procedures" for sustainability requirements.

2. Section 31 1005 – "Athletic Field Site Preparation": Turf removal and disposal.

3. Section 31 2323 – "Borrow Material"

4. Section 31 2300 – "Excavation, Backfill, Compaction and Dewatering" for Excavation, filling and backfilling, and rough grading.

5. Section 32 9113.29 – "Athletic Field Root Zone": Root zone mix.

1.3 DEFINITIONS

A. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

1. Finish Grade: Elevation of finished surface of planting soil.

2. Engineered Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

3. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

4. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

5. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

6. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or top surface of a fill or backfill before planting soil is placed.

7. Subsoil: All soil beneath the topsoil layer of the soil profile and typified by the lack of organic matter and soil organisms.

8. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 SUBMITTALS

A. CTHPB Documentation Submittals: Comply with Section 01 3566.42 – Sustainability Compliance Procedures and provide the following in addition to other submittals:

1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regionalQualification Data: For Athletic Field Contractor.

B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture, stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

C. Product Certificates: For soil fertilizers, from manufacturer.

D. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

E. Approved Soil Testing Laboratories: Contractor shall submit a chemical, saturated paste extract, and physical soil test of the rootzone mix prior to seeding and subsequently when called for in these specifications. Testing of the existing Rootzone Material and washed screened sand shall be performed by:

1. For particle size analysis and complete physical performance:

Turf & Soil Diagnostics
Trumansburg, NY 14886
(607) 387-5694

2. For chemical and paste extracts:

Logan Labs, LLC
620 North Main Street
Lakeview, OH 43331
(937) 842-2433

F. Any changes to the means and methods of the athletic field construction, and/or materials, must be approved in writing by the Landscape Architect.

G. Completion of work is subject to adverse climatic conditions which could affect the date of substantial completion. Any/all delays must be communicated in writing with the Construction Manager as soon as possible

H. No work can progress unless testing results are approved by the Landscape Architect.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of athletic field turf during a calendar year. Submit before expiration of required maintenance periods.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified Athletic Field Contractor whose work has resulted in successful turf establishment as follows:

1. General Experience:

a. Five (5) years' experience of athletic fields construction, resurfacing and/or renovations similar to scope of project over the last three (3) consecutive years.

b. Provide references and reports of above said athletic fields projects as to the type of projects involved in, including but not limited to; start and end dates, adherence to target/ key performance indicators, scope of works completed along with contact persons and contact details for said clients.
c. Provide testimonies from previous clients, including but not limited to; quality of work, staff/employee interactions, tidiness of site, timekeeping and punctuality and overall client satisfaction levels.

2. Staff/Employees:

a. Provide resumes for all staff/employees who will be responsible for carrying out scope of works, including but not limited to, full time and seasonal/short term employees.
b. Resumes will be required for all employees/staff involved in the project.
c. Resumes to include:

1). Experience level relevant to the project needs/scope of work.
2). Qualifications level relevant to the project needs/scope of work.

d. Must provide evidence that all staff/employees have at least three (3) years' experience of similar scope of work for project over the last three (3) consecutive years.
e. Provide evidence of continued professional development of all/any employees involved in project for last three (3) consecutive years.
f. Shall have a supervisor on the site who is experienced in the construction of sports fields. Supervisor's name and experience shall be submitted to the Landscape Architect for approval.
g. Shall have membership of one or more of the following Professional associations for a minimum of the last three (3) consecutive years:

1). New England Sports Field Management Association (NESFMA).
2). Sports Field Management Association (SFMA).

3. Insurances / Certifications:

a. Must be in possession of a suitable level of public liability insurance and any other relevant insurances required by the state and/or client.

4. Equipment:

a. Must be in possession and provide a detailed list of a suitable level of tools/equipment/machinery and or equivalent required to carry out the scope of work for said project.
b. All equipment and or equivalent must be in a condition able to carry out scope of work. Any certificates proving this will be required as part of the submission. All equipment must be verified as being free of any leaks or defects.
c. All proposed equipment to be used for seeding shall be approved by the Landscape Architect prior to commencing work.

d. The Contractor must be able to prove that they have all LGP (low ground pressure – less than six (6) psi construction and renovation equipment

5. Additional:

a. Provide a project plan identifying all key indicator/target points, which clearly shows an integrated approach to quality control and quality assurance.
b. Provide a detailed methodology of how the required works will be carried out., this should be inclusive and synced to the project plan.
c. Contractor is required to submit samples, test results and/or certification of all material prior to delivery to the site. All materials are to be approved by the Landscape Architect prior to their use. These certifications shall comply with specifications and scope of project and where applicable, with any standards that may be implied.
d. All chemical applications shall follow CT Law including applications on School Grounds and the Best Practices as detailed in NESFMA *"Best Management Practices for the Sports Field Manager: A Professional Guide for Environmental Sports Field Management in New England"*

6. Pesticide Applicator: State licensed, commercial.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.
4. Fertilizers, lime, and soil amendments must be stored in a secure, locked area, and must be protected from the elements and heat/cold extremes.
5. Immediately remove from the site all materials, which are not true to name, and all materials that do not comply with the specified requirements.
6. Use all means necessary to protect materials from theft, tampering, and weather before, during and after installation, and to protect the work and materials of all other trades.
7. All materials must be stored or stockpiled in such a manner so as not to present a threat to the environment. Erosion controls and run off protection must be implemented. All materials must be stored in accordance with relevant protection plans.
8. All materials must be inspected by the Athletic Field Consultant prior to acceptance and such inspection shall be documented with, at a minimum, the name of the inspector, the

material inspected, the person or company delivering the materials, the results of the inspection, and the date and time of acceptance

9. Contamination: Immediately remove from the site all materials that have been contaminated. In the case of contamination of stockpiled items, confer with the Athletic Field Consultant and if directed remove the entire stockpile from site immediately at no cost to the Owner.
10. Repair and Replacement: in the event of damage, immediately make all repairs and replacements necessary to the approval of the Athletic Field Consultant and at no additional cost to the Owner.

1.9 FIELD CONDITIONS

A. Seeding Restrictions: Seed during one of the following periods, if climatic and ground conditions are favorable. Coordinate seeding periods with initial maintenance periods to provide required maintenance from date of Substantial Completion.

1. Spring Seeding: April 15th to June 15th.
2. Fall Seeding: August 15th to November 15th.

B. Weather Limitations: Proceed with seeding and sodding only when existing and forecasted weather conditions permit seeding and sodding to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

PART 2 PRODUCTS

2.1 SEED

A. Grass Seed: Must be certified through National Turf Grass Evaluation Program.

B. Seed Mixtures:

1. Evenly apply 900 lbs. of "Hash Mark Sports Turf Mix" seed as specified in Appendix B or equal at the rate of 10 lbs./1,000 Sq. Ft. in two directions (5 lbs. in each direction) utilizing seed injection drum spike or slice seeding implement at 1" x 1" spacing towed behind a LGP turf tractor as in Appendix A or equal. See Appendix B for the Planting Plan.

a. Hash Mark Sports Turf Mix.
b. Sundial Tall Fescue 19.96%.
c. Falcon IV Tall Fescue 19.85%.
d. Dallas Tall Fescue 19.83%.
e. Ashland Kentucky Bluegrass 19.80%.
f. Double Time GLS Perennial Ryegrass 9.91%.
g. Palmer III Perennial Ryegrass 9.83%.

C. Seed of grass species as follows, with not less than 98 percent germination, not less than 98 percent pure seed, and not more than 0.2 percent weed seed:

2.2 PLANTING SOILS

A. Topsoil: Topsoil for athletic field seeded and sodded areas as indicated in Section 32 9113.29 - "Athletic Field Root Zone".

2.3 FERTILIZERS

A. Nutrient application - Evenly spread soil amendment "Renovate Plus" or equal at the rate of 25 lbs./1,000 Sq. Ft. Lightly scarify and incorporate into the top 1 to 2 inches of new rootzone profile utilizing a super rake surface preparation machine or equal prior to seeding or sodding.

B. Nutrient application – Evenly spread seedbed amendment "Myco-Replenish 3-3-3 SG" or equal at the rate of 10 lbs./1,000 Sq. Ft prior to seeding or sodding.

C. Evenly spread seedbed amendment and 4-way wetting agent "Vivax Plus Fertilizer 0-0-20 SG" or equal at the rate of 5 lbs./1,000 Sq. Ft within 3 days of seeding or sodding.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas to be seeded or sodding for compliance with requirements and other conditions affecting performance.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
4. Uniformly moisten excessively dry soil that is not workable, and which is too dusty.
5. Proceed with installation only after unsatisfactory conditions have been corrected.

B. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 TURF AREA PREPARATION

A. General: Prepare planting area for soil placement and mix root zone mix according to Section 32 9113.29 - "Athletic Field Amended Root Zone".

B. Placing Amended Root Zone Mix: Place and mix root zone mix in place over exposed subgrade according to Section 32 9113.29 - "Athletic Field Root Zone".

C. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create waterlogged soil conditions.

D. Before planting, obtain Landscape Architect's written acceptance of finish grading and rootzone material; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 SEEDING

A. Evenly apply seed as specified in two (2) directions, utilizing LGP turf tractor mounted unequal twin disc slitting system with a maximum 3-inch spacing between discs or equivalent as specified in Section 32 9113.29 - Athletic Field Root Zone.

1. Do not use wet seed or seed that is moldy or otherwise damaged.
2. Do not seed against existing trees. Limit extent of seed to outside edge of tree planting ring.
3. Do not seed during excessively windy conditions. (>15 mph wind gusts)

B. Sow seed at a total rate of 10 lb./1000 sq. ft. (4.5 kg/92.9 sq. m). 5 lbs of seed per direction.

C. The Contractor must utilize LGP turf tractor mounted with an oscillating arm broadcast applicator or equivalent to broadcast spread the following, within 24-48 hours of seeding:

1. Nutrient amendments - "Earthworks Micro Replenish 3-3-3 SG" or equivalent at 10 lbs./1,000 sq. ft. .
2. Evenly apply 2,200 lbs. of a compost and mineral soil amendment to aid rapid seed establishment "Renovate Plus" or equal at a rate of 25.25 lbs. per 1000 square feet to the soil surface.
3. Nutrient and hydration amendment - "Precision Labs Vivax 0-0-20" or equivalent at the rate of 5 lbs/1,000 sq. ft.

3.5 TURF MAINTENANCE (INCLUSIVE OF GROW-IN AND ESTABLISHMENT)

A. Maintain and establish turf seeded (and sodded areas if sod has been chosen) by utilizing proper irrigation, fertilizing, weeding, mowing, trimming, replanting, aeration, and performing other operations as required to establish healthy, viable turf. For seeded areas only; regrade, and replant bare or eroded areas to produce a uniformly smooth turf. The Contractor must provide materials and installation the same as those used in the original seeded and sodded areas.

1. Fill in as necessary any soil subsidence with a rootzone mix that is consistent with the existing materials, which may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
2. Apply treatments as required to keep turf and soil free of pests and pathogens or disease.
3. Use integrated pest management practices (IPM) whenever possible to minimize the use of pesticides and reduce hazards.

B. Irrigation:

1. Schedule irrigation to prevent wilting, puddling, erosion and displacement of seed.
2. Irrigate turf with computer-controlled irrigation system, if installed and operational, to maintain appropriate moisture levels which will sustain sod or seed health and promote root development. Irrigate regularly unless rainfall precipitation is adequate
3. If computer-controlled irrigation system is not operational the Contractor is required to furnish, install, and maintain a system of temporary pipe, sprinklers and service connections which are adequate to irrigate the turf areas daily to maintain appropriate moisture levels which will sustain turf health and vigor, and to promote root development.
4. Once per week, the Contractor must monitor Volumetric Moisture Content (VMC) with a moisture probe such as Pogo Pro+, TDR-300 or equivalent to assure that the rootzone has sufficient moisture content. As guidance the VMC should be no less than twenty five (25)% to thirty five (35)% in the areas tested. Fifteen (15) designated points on the field should be tested to create representative sampling.

C. Grow-In Agronomic Requirements:

1. Apply fertilizer to dry turf and water in post application.

2. All nutrient, plant health, amendments, and cultural practices must be followed as the Grow In And Establishment section. Any deviations from this plan must be approved by the Landscape Architect or their designee.

3.6 GROW-IN AND ESTABLISHMENT

A. Applications: All dates and timing to be approved by the Athletic Field Consultant, based on environmental and surface conditions. Products and rates may be adjusted with the

approval of the Athletic Field Consultant based on soil tests and specific growth requirements. Apply fertilizer to dry turf and water in post application. See Appendix B for recommended product labels.

1. Ten (10) days after seeding, evenly apply "Proscape 21-22-1 Mesotrione SGN 125" or equal at the rate of 4.5 lbs./1,000 Sq. Ft. to the surface.
2. Ten (10) days after seeding, evenly apply "Vivax Plus Fertilizer 0-0-20" at the rate of 5 lbs./1,000 Sq. Ft. to the surface.
3. Thirty (30) days after seeding, evenly apply "Nutrite 16-24-10 SGN 200" or equal at the rate of 4 lbs./1,000 Sq. Ft. to the surface.
4. Product solutions supplier requirements - Must make bi-weekly visits to assist Contractor on fertility, performance turf establishment and product effectiveness.

B. Spring/Summer Applications (Date to be determined based on athletic Field Completion):

1. All dates and timing to be approved by the Athletic Field Consultant, based on environmental and surface conditions. Products and rates may be adjusted with the approval of the Athletic Field Consultant based on soil tests and specific growth requirements. Apply fertilizer to dry turf and water in post application.

C. Spray Foliar Application:

1. Evenly apply "Vivax" or equal at the rate of 3.67 oz/1,000 Sq. Ft.;
2. "Fame SC" or equal at the rate of 0.36 oz/1,000 Sq. Ft.;
3. "Phos-Fight 0-0-26" or equal at the rate of 3.67 oz/1,000 Sq. Ft.;
4. "Sea-3" or equal at the rate of 3.67 oz/1,000 Sq. Ft.;
5. "TurfRx Green" or equal at the rate of 3.67 oz/1,000 Sq. Ft.; and
6. "TurfRx K+ Micro Crystal" or equal at the rate of 1.84 oz/1,000 Sq. Ft. to the surface.

D. Granular Application:

1. Evenly apply "28-0-10SGN 200" or equal at the rate of 4 lbs./1,000 Sq. Ft., to the surface. Apply as specified and water in with ¼" of irrigation.

E. Spray Foliar Application:

1. Evenly apply "Pylex" or equal at the rate of 0.03 oz/1,000 Sq. Ft., to the turf surface;
2. "Q4 Plus" Post emergent Herbicide or equal at a rate of 3.00 oz/1000 Sq. Ft.;
3. "Border 2.0" Drift Control Product efficacy or equal at a rate of 0.37 oz/1000 Sq. Ft.

F. Granular Application:

1. Evenly apply "Replenish 5-4-5" or equal at the rate of 6.8 lbs./1,000 Sq. Ft., to the surface. Apply as specified and water in with ¼" of irrigation.
2. "Sili-Cal SS SG" or equal at the rate of 20 lbs./1,000 Sq. Ft., to the surface. Apply as specified and water in with ¼" of irrigation.

G. Granular Application:

1. Evenly apply "Replenish 5-4-5" or equal at the rate of 6.8 lbs./1,000 Sq. Ft., to the surface. Apply as specified and water in with ¼" of irrigation.

3.7 AERATION (DEEP TINE)

A. Carry out deep tine aeration using a vertical action aerator equipment fitted with three quarter (¾) " diameter tines with a three (3)" x three (3)" spacing pattern to a depth of seven (7)" minimum. Forward speed should be three (3) MPH. Turning of equipment should happen at safe distance off the field footprint to reduce compaction and or surface damage.

3.8 AGRONOMIC TESTING SOIL ANALYSIS (IN FALL POST ESTABLISHMENT)

A. Carry out comprehensive soil core testing using the specified soil testing laboratories. This should consist of chemical extraction as well a paste extraction and also physical analysis covering at a minimum particle size distribution. Cores shall be harvested at a minimum of twenty (20) sample points spread evenly throughout the athletic field covering both high wear areas and non-high wear areas. A core shall be extracted from a depth of four (4)" using a three quarter (¾") diameter soil corer or probe or equal.

B. Product solutions supplier requirements - Must make bi-weekly visits to assist Contractor on fertility, performance turf establishment and product effectiveness.

3.9 PERFORMANCE QUALITY STANDARDS TESTING

A. Carry out a complete Performance Quality Standards Assessment. Inclusive of over three hundred and fifty (350) tests encompassing thirty-four (34) criteria including but not limited to GMax/Surface hardness, rotational traction, shear vane strength, infiltration, soil compaction, elevation, turf height of cut, planarity, ball roll and ball bounce, in ten (10) identified areas as per ASTM standards throughout the athletic field, covering Structural, Presentation and Playability.

3.10 MOWING

A. Mow turf once top growth reaches an average height of two and a half (2.5") inches. Mow to the height of two (2") inches.

B. All clippings MUST be removed.

C. Mow turf using a collection system, with properly sharpened rotary blades.

D. Repeat mowing to maintain specified height without cutting more than 1/3 of grass height.

E. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowing's.

F. Do not delay mowing until grass blades bend over and become matted.

G. Do not mow when grass is wet. Schedule initial and subsequent mowing's to maintain the following grass height.

H. Continue mowing practices at desired height of two and a half" (2.5 inches) until the end of the growing season.

3.11 SATISFACTORY TURF

A. Seed and sod installations shall meet the following criteria as determined by Architect:

1. Satisfactory Seeded Turf Areas: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 95 percent over any ten (10) sq. ft. and bare spots not exceeding three (3) by three (3) inches.

B. Use previously specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf complies with requirements.

C. Substantial Completion Field Testing:

1. Soil structural consolidation readings at the six (6) inch depth must be a minimum of one-hundred and fifty (150) psi and a maximum of one hundred and seventy-five (175) psi using a digital cone penetrometer or equivalent. The readings will be taken at fifteen (15) designated points on the field, of which a minimum of seven (7) of those readings must be taken along the center of the field.
2. Surface Impact Levels must be a minimum of fifty (50) Gravities to a maximum of seventy (70) Gravities using a Clegg Surface Impact Tester or equivalent. The readings will be taken at fifteen (15) points on the field of which a minimum of seven (7) of those readings must be taken along the center of the field..
3. Infiltration rate of water into the rootzone must achieve a minimum of two (2) inches per hour. The reading will be taken at five (5) designated points on the field, of which a minimum of three (3) of those readings must be taken along the center of the field.
4. If any of the above readings are outside of the agreed tolerances, then corrective action will need to be carried out. This would be following consultation between the Landscape Architect, Landscape Architect's Representative, and Contractor.

3.12 RESTORATION OF SETTLED GRADES

A. At the end, three (3) months after the date of substantial completion of the soil installation work, inspect the site and restore any areas where the grades have settled beyond the elevations shown on the Drawings.

3.13 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walkways, or other paved areas.

B. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout maintenance period and remove after plantings are established.

3.14 MAINTENANCE SERVICE

A. Turf Maintenance Service: Provide full maintenance by skilled employees of Athletic Field Contractor. Maintain as required in "Turf Maintenance" Article. 3.5, 3.6, 3.7, 3.8,3.9,3.10, 3.11 (above). Begin maintenance immediately after each area is planted and continue until acceptable turf is established but for not less than the following periods:

1. Seeded Turf: ninety (90) days from date of Substantial Completion.
2. When maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.

END OF SECTION 32 9219.22

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SECTION 32 9300 - PLANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Plants.

B. Related Requirements:

1. Division 01 Section(s) "Construction Waste Management and Disposal" and "Sustainability Compliance Procedures" for sustainability requirements

2. Division 01 Section "Temporary Tree and Plant Protection" for protecting, trimming, pruning, repairing, and replacing existing trees to remain that interfere with, or are affected by, execution of the Work.

3. Division 31 Section "Site Clearing" for protection of existing trees and plantings, topsoil stripping and stockpiling, and site clearing.

4. Division 31 Section "Excavation, Backfill, Compaction and Dewatering" for excavation, filling, and rough grading and for subsurface aggregate drainage and drainage backfill materials.

5. Division 32 Section "Soil Preparation" for planting medium.

6. Division 32 Section "Turf and Grasses" for turf (lawn), and hydroseeding.

1.3 DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation.

B. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with ball size not less than sizes indicated; wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.

C. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed

from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.

D. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

E. Finish Grade: Elevation of finished surface of planting soil.

F. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

G. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

H. Pests: Living organisms that occur where they are not desired, or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

I. Planting Area: Areas to be planted.

J. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

K. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.

L. Root Flare: Also called "trunk flare". The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.

M. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.

N. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

O. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

P. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 COORDINATION

A. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.

1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project Site with Landscape Architect, Owner's Rep, and Tree Warden to ensure that the project scope and expectations are to be met.

B. Conduct meeting a minimum of 4 weeks prior to beginning implementation of planting operations.

1.6 SPECIAL CONDITIONS:

A. Any excavation within the Critical Root Zone will be done carefully to expose tree roots to be cut. Tree roots with a diameter of one-half inch or larger wil I be severed cleanly with a sharp pair of lopping shears. Tree roots too large for lopping shears may be cut with a power cut-off saw. Back-fill adjacent to the severed roots will be good quality topsoil mixed with and equal amount of peat moss. Excavated roots will be back- filled the same day to prevent drying.

B. A commercial tree service equipped with supersonic air excavating equipment (i.e., "Air Spade") may be required to be used to carefully expose roots for pruning. With air excavation, a trench can be dug and the location on the root can be selected for cutting. This will allow a more sensitive selection of cut location. For example, if the root branches, it may be possible to locate the cut to save the branch of the root that does not travel toward the area to be excavated. It may also be possible to relocate small roots by excavating around them and replanting them inside the retained rooting area.

C. Tree Fertilization and Aeration: Immediately after construction all trees impacted by excavation operations should be backfilled with topsoil and not left open so that the tree's roots dry out. Trenches near trees should be backfilled within 2-4 hours after excavation and not left open over night. Trees should be fertilized by high pressure liquid injection method with a slow-release organic fertilizer mixed with an organic root growth enhancer. The following rates will apply: (formulated for I 00 gals. of water) 20 lbs. of Davey Arbor Green® (30-10-7) or equivalent. I lb. of MycorTree Injectable® containing beneficial spores of the endo- and ectomysorrizal Mycorrhizal fungi with PHC BioPak™ biostimulant. Apply I 00 gallons of this mixture per 2,000 square feet of available root area. Soil injection should be 8 - 12 inches deep using an injector probe at 150 - 200 lbs pressure. Injection shall begin four feet out from the trunk of the tree and be spaced two and a half feet apart, injecting on a 2 ½ foot grid extending beyond the dripline or out to area of root severance. It should be noted that tree root zones may extend onto private property and should also be treated there when permitted

1.7 ACTION SUBMITTALS

A. CTHPB Documentation Submittals: Comply with Section 01 3566.42 – Sustainability Compliance Procedures and provide the following in addition to other submittals:

1. Product Data for Credit d8: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
2. Product Data for Credit d10: For products and materials required to comply with requirements for regional materials, documentation indicating location and distance from Project of manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional

B. Product Data: For each type of product.

1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.
2. Plant Photographs: Include digital color photographs of each required species and size of plant material as it will be furnished to Project. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. For species where more than 20 plants are required, include a minimum of three photographs showing the average plant, the best quality plant, and the worst quality plant to be furnished. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery.

C. Samples for Verification: For each of the following:

1. Organic and Compost Mulch: 1-quart (1-L) volume of each organic mulch required; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.
2. Weed Control Barrier: 12 by 12 inches (300 by 300 mm).

1.8 INFORMATIONAL SUBMITTALS

A. Qualification Data: For landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.

B. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:

1. Manufacturer's certified analysis of standard products.
2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.

C. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

D. Sample Warranty: For special warranty.

1.9 CLOSEOUT SUBMITTALS

A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of plants during a calendar year. Submit before expiration of required maintenance periods.

1.10 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful establishment of plants.

1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
2. Experience: Five years' experience in landscape installation in addition to requirements in Division 01 Section "Quality Requirements".
3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
4. Pesticide Applicator: State licensed, commercial.

B. Soil-Testing Laboratory Qualifications: An independent or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

C. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of the soil.

1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.
2. The soil-testing laboratory shall oversee soil sampling; with depth, location, and number of samples to be taken per instructions from Architect. A minimum of three one gallon representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.
3. Report suitability of tested soil for plant growth.

    a. Based upon the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. (92.9 sq. m) or volume per cu. yd. (0.76 cu. m) for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
    b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.

D. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.

E. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.

1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches (150 mm) above the root flare for trees up to 4-inch (100-mm) caliper size, and 12 inches (300 mm) above the root flare for larger sizes.
2. Other Plants: Measure with stems, petioles, and foliage in their normal position.

F. Plant Material Observation: Landscape Architect shall be given the opportunity to observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Provide transportation and accompany Landscape Architect to this location. Landscape Architect retains right to observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.

1. Notify Architect of sources of planting materials seven days in advance of delivery to site.

G. Preinstallation Conference: Conduct conference at Project site.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws if applicable.

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.

C. Deliver bare-root stock plants freshly dug. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting.

D. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.

E. Handle planting stock by root ball.

F. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.

1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.

G. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.

H. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

1. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
2. Do not remove container-grown stock from containers before time of planting.
3. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly-wet condition.

1.12 FIELD CONDITIONS

A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.

B. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.

1. Spring Planting of Deciduous Plants: March 1st to May 15th
2. Spring Planting of Evergreen Plants: March 1st to June 1st.
3. Fall Planting of both Deciduous and Evergreen Plants: October 1st until soil becomes frozen.

Note: These planting dates may be modified based on written agreement by the Landscape Architect in coordination with the Tree Warden.

C. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

D. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.

1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

1.13 WARRANTY

A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

11 Months after acceptance to begin the Warrantee, the Contractor shall walk the site with the Landscape Architect, the Town Tree Warden, and Town Arborist to determine if there are any plants that require replacement.

1. Failures include, but are not limited to, the following:

   a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner, or incidents that are beyond Contractor's control.
   b. Structural failures including plantings falling or blowing over.
   c. Faulty performance of edgings.
   d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Periods from Date of Substantial Completion:

   a. Trees, Shrubs, Vines, and Ornamental Grasses: 12 months.
   b. Ground Covers, Biennials, Perennials, and Other Plants: 12 months.

3. Include the following remedial actions as a minimum:

   a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
   b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
   c. A limit of one replacement of each plant will be required except for losses or replacements due to failure to comply with requirements.
   d. Provide extended warranty for period equal to original warranty period, for replaced plant material. Note: All planting requirements noted in this specification section including Item 3.11 for maintenance shall apply to replaced plant material.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant Schedule or Plant Legend shown on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in

leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch (19 mm) in diameter; or with stem girdling roots will be rejected.
2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.

B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Architect, with a proportionate increase in size of roots or balls.

C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

D. Labeling: Label at least one plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant as shown on Drawings.

2.2 PLANTING SOILS

A. Planting Soil: Amend topsoil for planting beds as outlined in topsoil test results as indicated in Division 32 Section "Topsoil and Planting Mix".

2.3 MULCHES

A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of the following:

1. Type: 100 percent shredded bark.
2. Size Range: 3 inches (76 mm) maximum, 1/2 inch (13 mm) minimum.
3. Color: Natural.

B. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through a 1-inch (25-mm) sieve; soluble-salt content of 2 to 5 dS/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 50 to 60 percent of dry weight.
2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

2.4 WEED-CONTROL BARRIERS

A. Provide biodegradable coir weed mats made from the fibrous husks of coconuts.

B. The mats used shall not have a high salt content nor contained any embedded pathogens – Contractor shall provide manufacturer's product date to confirm prior to use on-site.

2.5 PESTICIDES

A. General: Pesticide registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

Note: All pesticides / herbicides used shall be organic and shall be a product which is allowed for use by the Town of Greenwich / Tree Warden.

B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

2.6 MISCELLANEOUS PRODUCTS

A. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.

B. Mycorrhizal Fungi: Dry, granular inoculant containing at least 5300 spores per lb (0.45 kg) of vesicular-arbuscular mycorrhizal fungi and 95 million spores per lb (0.45 kg) of ectomycorrhizal fungi, 33 percent hydrogel, and a maximum of 5.5 percent inert material.

Note: In all disturbed areas where topsoil is being placed and re-spread from existing topsoil stockpiles, the Contractor shall also inoculate those areas with naturally occurring, existing on-site topsoil to assist in re-establishment of the on-site mycorrhizal fungi. Rate 1 CF per 1,000 SF of soil area. Notify Landscape Architect / Tree Warden prior to spreading. Shall be spread at the same time as the product noted in Item 2.6.B above.

C. Filter Fabric: Nonwoven geotextile manufactured for separation applications and made of polypropylene, polyolefin, or polyester fibers or combination of them.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive plants for compliance with requirements and conditions affecting installation and performance.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

3.1 CARE OF PLANTS PRIOR TO PLANTING

A. When plants are taken from storage to the planting site, roots of plants shall be immersed in water immediately upon opening the bundle and kept in water until planted. The Contractor shall have sufficient tanks and pails to keep roots of plants from opened bundles in water until planted. Rootball and container plants shall be immersed for a minimum of 10 minutes prior to planting. Do not remove containers or wire baskets until plant is at planting pit.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Landscape Architect's acceptance of layout before excavating or planting. Make minor adjustments as required.

D. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.

1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.

3.3 PLANTING AREA ESTABLISHMENT

A. Loosen subgrade of planting areas to a minimum depth of 12 inches (300 mm). Remove stones larger than 1 inch (25 mm) in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. Apply approved fertilizer as required by Division 32 Section "Topsoil and Planting Mix" directly to subgrade before loosening.
2. Thoroughly blend planting soil off-site before spreading.

    a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
    b. Mix lime with dry soil before mixing fertilizer.

3. Spread planting soil to a minimum depth of 18 inches (450 mm) as indicated on the Drawings, but not less than required to meet finish grades after natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.

    a. Spread approximately one-half the thickness of planting soil over loosened subgrade. Mix thoroughly into top 4 inches (100 mm) of subgrade. Spread remainder of planting soil.

B. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

C. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

D. Application of Mycorrhizal Fungi: At time directed by Architect, broadcast dry product uniformly over prepared soil at rate recommended by the manufacturer.

3.4 EXCAVATION FOR TREES AND SHRUBS

A. Planting Pits and Trenches: Excavate circular planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are not acceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.

1. Excavate approximately three times as wide as ball diameter for balled and burlapped or container-grown stock.
2. Excavate at least 12 inches (300 mm) wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
3. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
4. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
5. Maintain required angles of repose of adjacent materials as shown on the Drawings. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.

6. Maintain supervision of excavations during working hours.
7. Keep excavations covered or otherwise protected when unattended by Installer's personnel.

B. Backfill Soil: Subsoil and topsoil removed from excavations may not be used as backfill soil unless otherwise indicated.

C. Obstructions: Notify Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.

1. Hardpan Layer: Drill 6-inch- (150-mm-) diameter holes, 24 inches (600 mm) apart, into free-draining strata or to a depth of 10 feet (3 m), whichever is less, and backfill with free-draining material.

D. Drainage: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.

E. Fill excavations with water and allow to percolate away before positioning trees and shrubs.

3.5 TREE, SHRUB, AND VINE PLANTING

A. Only plants which have had their roots immersed in water for at least 10 minutes immediately prior to planting shall be installed. The Contractor shall have sufficient tanks and pails for immersing rootball and container plants prior to planting. Containers and wire baskets are to be removed only after plant has been immersed at the planting pit.

B. Before planting, fill excavations with water and allow to percolate away before positioning trees and shrubs.

C. Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.

D. Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.

E. Set balled and burlapped stock plumb and in center of planting pit or trench with root flare 1 inch (25 mm) above adjacent finish grades.

1. Use planting soil conforming to Division 32 Section "Topsoil and Planting Mix" for backfill.
2. After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.

4. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch (25 mm) from root tips; do not place tablets in bottom of the hole.
5. Continue backfilling process. Water again after placing and tamping final layer of soil.

F. Set container-grown stock plumb and in center of planting pit or trench with root flare 1 inch (25 mm) above adjacent finish grades.

1. Use planting soil conforming to Division 32 Section "Topsoil and Planting Mix" for backfill.
2. Carefully remove root ball from container without damaging root ball or plant.
3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
4. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch (25 mm) from root tips; do not place tablets in bottom of the hole.
5. Continue backfilling process. Water again after placing and tamping final layer of soil.

G. When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

3.6 TREE, SHRUB, AND VINE PRUNING

A. Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by Architect, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.

B. Do not apply pruning paint to wounds.

3.7 GROUND COVER AND PLANT PLANTING

A. Set out and space ground cover and plants other than trees, shrubs, and vines as indicated in even rows with triangular spacing.

B. Use planting soil conforming to Division 32 Section "Topsoil and Planting Mix" for backfill.

C. Dig holes large enough to allow spreading of roots.

D. For rooted cutting plants supplied in flats, plant each in a manner that will minimally disturb the root system but to a depth not less than two nodes.

E. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.

F. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

G. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.8 APPLYING COMPOST TO SURFACE OF PLANTING SOIL

A. Application: Apply compost 3 inches (76 mm) of compost to surface of in-place planting soil in planting beds prior to installation of weed control fabric and mulch. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet. Rake compost into top 3 inches (76 mm) of planting soil.

3.9 PLANTING AREA MULCHING

A. Prior to installing weed-control barriers, incorporate a 3 to 4 inches depth of composted mulch into the top 6 inches of the planting bed.

B. Install weed-control barriers before mulching according to manufacturer's written instructions. Completely cover area to be mulched, overlapping edges a minimum of 6 inches (150 mm) and secure seams with galvanized pins.

C. Mulch backfilled surfaces of planting areas and other areas indicated.

1. Trees and Tree-like Shrubs in Turf Areas: Apply organic mulch ring of 3-inch (75-mm) average thickness, with radius around trunks or stems as indicated on the Drawings. Do not place mulch within 3 inches (75 mm) of trunks or stems.
2. Organic Mulch in Planting Areas: Apply 3-inch (75-mm) average thickness of organic mulch extending 12 inches (300 mm) beyond edge of individual planting pit or trench and over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 3 inches (75 mm) of trunks or stems.

3.10 BED EDGING

A. Shovel-Cut Edging: Separate mulched areas from turf areas with a 45-degree, 4- to 6-inch- (100- to 150-mm-) deep, shovel-cut edge as shown on Drawings.

3.11 PLANT MAINTENANCE

A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease.

Note: The contractor shall take special care to provide water for new plants throughout the growing season and through the warrantee period to ensure all plants remain robustly viable and that no plants dry out to a degree that would compromise their overall health. If products such as

"Gator Bags" are to be used, the Contractor is to notify the Landscape Architect of the regular monitoring and filling of those reservoirs to ensure that water is present, available, and reaching the plant material as intended.

B. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.

C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated past management practices whenever possible to minimize the use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

3.12 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents in accordance with authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Pre-Emergent Herbicides (Selective and Non-Selective): Apply to tree, shrub, and ground-cover areas in accordance with manufacturer's written recommendations. Do not apply to seeded areas.

C. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

3.13 REPAIR AND REPLACEMENT

A. General: Repair or replace existing or new trees and other plants that are damaged by construction operations, in a manner approved by Landscape Architect.

1. Submit details of proposed pruning and repairs.
2. Perform repairs of damaged trunks, branches, and roots within 24 hours, if approved.
3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Architect.

B. Remove and replace trees that are more than 25 percent dead or in an unhealthy condition before the end of the corrections period or are damaged during construction operations that Landscape Architect determines are incapable of restoring to normal growth pattern.

1. Provide new trees of same size as those being replaced for each tree of 6 inches (150 mm) or smaller in caliper size.
2. Species of Replacement Trees: Same species being replaced.

3.14 RESTORATION OF SETTLED GRADES

A. At the end, twelve months after the date of substantial completion of the soil installation work, inspect the site and restore any areas where the grades have settled beyond the elevations shown on the Drawings.

1. Lawn areas: Remove the sod using mechanical sod cutter from the settled area and add the specified top soil or planting mix. Re sod the area using the sod cut from the lawn. In the event that the sod cannot be reused, install new sod that matches the seed mix on the lawn.
2. Planting Areas: Where the settlement is 3-inches or less, remove the mulch, top dress the area with the specified topsoil or planting mix and re mulch.
3. Planting Areas: Where the settlement is greater than 3-inches remove the mulch and plants, add the specified topsoil or planting mix and re mulch.

3.15 CLEANUP AND PROTECTION

A. During planting, keep adjacent paving and construction clean and work area in an orderly condition. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.

C. After installation and before Substantial Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

3.16 DISPOSAL

A. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.

3.17 MAINTENANCE SERVICE

A. Maintenance Service for Trees and Shrubs: Provide maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.

1. Maintenance Period: 12 months from date of Substantial Completion.

B. Maintenance Service for Ground Cover and Other Plants: Provide maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.

1. Maintenance Period: Six months from date of Substantial Completion.

END OF SECTION 32 9300

SECTION 330513 - MANHOLES AND CATCH BASINS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and other Division I Specifications, apply to this section.

1.2 SUMMARY

A. This Section includes the following:

1. Precast concrete manholes.

2. Precast concrete catch basins and yard drains.

3. Cast iron manhole frames and covers.

4. Cast iron catch basin and yard drain frames and grates.

B. Related Sections

1. Section 33 3114 – Testing of Sanitary Sewer and Storm Drainage Systems.

1.3 REFERENCES

A. AASHTO – American Association of State Highway and Transportation Officials, Standard Specifications for Highways and Bridges, most recent edition.

B. ASTM C32 – Standard Specification for Sewer and Manhole Brick (made from clay or shale).

C. ASTM A48 – Standard Specification for Gray Iron Castings.

D. ASTM C150 – Standard Specification for Portland Cement.

E. ASTM C207 – Standard Specification for Hydrated Lime for Masonry Purposes.

F. ASTM C478 – Standard Specification for Precast Reinforced Concrete Manhole Sections.

G. ASTM C443 – Standard Specification for Joints for Circular Concrete Sewer and Culvert Piping Using Rubber Gaskets.

H. ASTM C923 – Standard Specification for Resilient Connectors between Reinforced Concrete Manhole Structures, Pipes and Laterals.

I. ASTM C990 – Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.

J. State of Connecticut Department of Transportation "Standard Specifications for Roads, Bridges, Facilities and Incidental Construction, Form 818," as amended.

1.4 SUBMITTALS

A. Submit Shop Drawings, showing details of construction, reinforcing, joints, pipe connections to structures, manhole rungs, manhole frames and covers, dampproofing coating, catch basin frames and grates.

B. Submit weights of manhole frames and covers and catch basin frames and grates.

C. Submit design calculations including verification of adequate anti-flotation features and lateral earth pressures. Calculations shall verify that the manhole structure has been designed to withstand the burial depth, submergence due to flooding, flotation, and dead and live loads.

1.5 QUALITY ASSURANCE

A. The quality of materials, the process of manufacture, and the finished sections shall be subject to inspection and approval by the Engineer, or other representative of the Owner. Such inspection may be made at the place of manufacture, or at the Site after delivery, or at both places, and the materials shall be subject to rejection at any time on account of failure to meet any of the Specification requirements, even though samples may have been accepted as satisfactory at the place of manufacture. Material rejected after delivery to the job shall be marked for identification and shall be removed from the job at once. Materials which have been damaged after delivery will be rejected, and if already installed, shall be acceptably repaired, if permitted, or removed and replaced, at no additional cost to the Owner.

B. At the time of inspection, the materials will be carefully examined for compliance with the latest ASTM designation specified and these Specifications, and with the approved manufacturer's drawings. Manhole sections will be inspected for general appearance, dimension, "scratch-strength," blisters, cracks, roughness, and soundness. The surface shall be dense and close-textured.

C. Imperfections in manhole sections may be repaired, subject to the approval of the Engineer, after demonstration by the manufacturer that strong and permanent repairs result. Repairs will be carefully inspected before final approval. Cement mortar used for repairs shall have a minimum compressive strength of 4,000 psi at 7 days and 5,000 psi at 28 days, when tested in 3 inch by 6

inch cylinders stored in the standard manner. Epoxy mortar may be utilized for repairs subject to the approval of the Engineer.

D. Personnel shall have confined space entry training as appropriate for the work to be performed.

E. Manholes and catch basins shall be designed for lateral earth pressures and to resist flotation.

F. Manholes, catch basins, drainage structures, connections, testing, and acceptances shall conform with the Town of Greenwich Department of Public Works Sewer & Engineering/ Highway Department for drain standards, materials, and requirements.

PART 2 PRODUCTS

2.1 PRECAST CONCRETE MANHOLE AND CATCH BASIN SECTIONS

A. Precast concrete barrel sections and transition top sections, shall conform to ASTM C478 and the following requirements:

1. The wall thickness shall not be less than 5 inches for 48 inch diameter reinforced barrel sections, 6 inches for 60 inch diameter reinforced barrel sections and 7 inches for 72 inch diameter reinforced barrel sections.

2. Top sections shall be eccentric except that flat top sections shall be used where shallow cover requires a top section less than 4 feet as shown on the Drawings.

3. Barrel sections shall have tongue and groove joints.

4. All sections shall be cured by an approved method and shall not be shipped nor subjected to loading until the concrete compressive strength has attained 3,000 psi and not before 5 days after fabrication and/or repair, whichever is longer.

5. Precast concrete barrel sections with precast top slabs and precast concrete transition sections shall be designed for a minimum of AASHTO HS20-44 loading plus the weight of the soil above at 120 pcf.

6. The date of manufacture and the name and trademark of the manufacturer shall be clearly marked on each precast section.

7. Precast concrete bases shall be monolithically constructed. The thickness of the bottom slab of the precast bases shall not be less than the barrel sections or top slab whichever is greater. Precast concrete bases shall be constructed with a 6 inch extended base, unless otherwise shown on the Drawings.

8. Knock out panels for Storm piping only shall be provided in precast sections at the locations shown on the Drawings. They shall be integrally cast with the section, 2½ inches thick and

shall be sized as shown on the Drawings. There shall be no steel reinforcing in knock out panels.

9. No knock out panels shall be allowed for sanitary sewer manholes.

10. The side wall height of the base section shall be a minimum of 12 inches above the top of the pipe coming into the manholes and catch basins.

11. A 2'-0" deep minimum sump shall be provided below catch basin outlet pipes.

2.2 BRICK MASONRY

A. Bricks shall be good, sound, hard and uniformly burned, regular and uniform in shape and size, of compact texture. Underburned or salmon brick will not be acceptable and only whole brick shall be used unless otherwise permitted. In case bricks are rejected by the Engineer, they shall be immediately removed from the site of the work and satisfactory bricks substituted, at no additional cost to the Owner.

1. Bricks for the channels and shelves shall comply with the latest specifications of ASTM C32 for Sewer Brick, Grade SM.

2. Bricks for building up and leveling manhole frames shall conform to ASTM C32 Grade MS.

3. Poured concrete inverts will not be allowed.

B. Mortar used in the brickwork shall be composed of one part Type II portland cement conforming to ASTM C150 to two parts sand to which a small amount of hydrated lime not to exceed 10 lbs. to each bag of cement shall be added.

C. Sand used shall be washed, cleaned, screened, sharp and well graded as to different sizes and with no grain larger than will pass a No. 4 sieve. Sand shall be free from vegetable matter, loam, organic or other materials of such nature or of such quantity as to render it unsatisfactory.

D. Hydrated lime shall conform to ASTM C207, Type S.

2.3 MANHOLE FRAMES AND COVERS

A. Manhole frames and covers shall be of good quality, strong, tough, even grained cast iron, smooth, free from scale, lumps, blisters, sand holes and defects of any kind. Manhole covers and frame seats shall be machined to a true surface. Castings shall be thoroughly cleaned and subject to hammer inspection. Cast iron shall conform to ASTM A48, Class 30B.

B. Sanitary sewer manhole covers shall meet the requirements of the Town Greenwich Department of Public Works standards, materials, and requirements.

C. Sanitary sewer manhole frames and covers shall comply with the detail shown on the Drawings and the Town of Greenwich Department of Public Works Sewer Division standards, requirements, and materials. Manhole frames and covers shall be EJ 2239Z82 8" high manhole frame and EJ2239A2S cover, no venting or Campbell foundry pattern 1200.

D. On-site storm sewer manholes shall be as specified on the Contract Drawings. Storm sewer manholes located within Town right of way shall conform to Town standards.

E. On-site catch basin frame and grates shall comply as specified on the contract drawings. Catch basins located within Town roadway right of way shall conform to Town standards. Catch basins located within State right of way shall conform to the Connecticut Department of Transportation standards.

2.4 CATCH BASIN FRAMES AND GRATES

A. Catch basin frames and grates shall be of good quality, strong, tough, even grained cast iron, smooth, free from scale, lumps, blisters, sand holes and defects of any kind which render them unfit for the service for which they are intended. Grate and frame seats shall be machined to a true surface. Castings shall be thoroughly cleaned and subject to hammer inspection. Cast iron shall conform to ASTM A48, Class 30B.

B. The catch basin frames and grates shall comply with the details shown on the Drawings.

2.5 JOINTING PRECAST MANHOLE SECTIONS

A. Tongue and groove joints of precast manhole sections shall be sealed with a preformed flexible joint sealant. The preformed flexible joint sealant shall conform to ASTM C990.

2.6 MANHOLE RUNGS

A. Manhole rungs shall be drop front design, 14 inches wide with an abrasive step surface, steel reinforced, copolymer, polypropylene, plastic. Manhole rungs shall conform to OSHA requirements.

2.7 FULLY SHEILDED PIPE-TO-PIPE CONNECTORS

A. Fully shielded pipe connector coupling shall be banded rubber (shield couplings) gasketed coupling type with type 316 s.s. hardware and outside sheet ring shall be strong back sewer coupling RC 5000 series by Fernco, or flex-seal adjustable repair coupling (arc) by Mission.

B. The external shielding and bands shall be made entirely of 316 series non-magnetic stainless steel.

2.8 FLEXIBLE PIPE-TO-STRUCTURE CONNECTORS

A. The flexible pipe-to-structure connectors shall be designed to provide a positive seal between the connector and the structure wall and between the connector and the pipe.

B. The flexible boot shall be manufactured of EPDM synthetic rubber in accordance with ASTM C443 and C923 and shall be 3/8 inch thick or greater.

C. The external bands shall be made entirely of 304 series non-magnetic stainless steel.

D. The flexible connectors shall be provided with a wedge-type or toggle-type expander to secure the pipe in the structure opening.

E. The flexible connectors shall meet the following criteria, in accordance with ASTM C923:

1. Shall not leak when subjected to a head pressure of 10 psi for 10 minutes.

2. Shall have the ability to deflect 7 degrees in any direction without leakage under the head pressure conditions described above.

3. Shall not leak when subject to a load of 150 lbs./in. pipe diameter and the head pressure conditions described above.

2.9 DAMPPROOFING

A. Provide two coats of bituminous dampproofing on outer surfaces of precast manholes at the rate of 20-25 square feet per gallon in accordance with manufacturer's instructions.

B. Dampproofing coating shall be a factory-applied asphalt compound specially made to adhere to below grade concrete structures.

C. The dampproofing shall be Sonoshield semi-mastic, as manufactured by BASF; Dehydratine 4 by Euclid Chemical; RIW Marine Liquid by Toch Brothers; or approved equal.

2.10 NON-SHRINK, WATER-PROOF GROUT

A. Non-shrink, water-proof grout shall be Hallemite; Waterplug; Embeco; or approved equal.

PART 3 EXECUTION

3.1 INSTALLATION

A. Installation

1. Construct manholes and catch basins to the dimensions shown on the Drawings and as specified. Protect all work against flooding and flotation.

2. Set precast concrete barrel sections so as to be plumb and with sections in true alignment with a ¼ inch maximum tolerance to be allowed.

3. Install the precast sections in a manner that will result in a watertight joint. Seal the joints of precast concrete barrel sections with the preformed flexible joint sealant used in sufficient quantity to fill 75% of the joint cavity. Fill the outside and inside precast section joints with non-shrink grout and finish flush with the adjoining surfaces. Plug holes in the concrete barrel sections required for handling or other purposes with a non-shrink, water-proof grout or concrete and rubber plugs, and finish flush on the inside.

4. Backfilling shall be done in a careful manner, bringing the fill up evenly on all sides.

5. All precast structures shall be set on a level bed of ¾" crushed stone meeting the requirements of CTDOT Form 818, Article M.01.01 No. 6 stone.

B. Pipe Connections

1. Stubs

   a. Connect pipe stubs for future extensions to the structures as shown on the Drawings and close the stub end by a suitable watertight plug.

2. For pipes with smooth exterior surfaces (PVC, ductile iron, HDPE pressure pipe, steel, etc), use flexible pipe-to-structure connectors.

3. Where flexible pipe-to-structure connectors cannot be used, such as pipes with rough, irregular or corrugated exterior surfaces (concrete, corrugated metal, HDPE drainage pipe, etc):

   a. After the new pipe has been set in place, completely fill the hole around the new pipe and structure with non-shrink, water-proof grout.

   b. Place a 6 inch thick concrete encasement a total of 12 inches in length around the pipe stub adjacent to the exterior wall of the structure. Concrete shall have a 28 day compressive strength of 3,000 psi.

C. Manhole Rung Installation

1. Steel reinforced copolymer polypropylene plastic steps shall be press fitted by hand driven hammer into preformed holes in cured precast sections, on 12 inch centers, by the precast concrete manufacturer.

D. Brickwork

1. Mix mortar only in such quantity as may be required for immediate use and use before the initial set has taken place. Do not retain mortar for more than one and one-half hours and constantly work over with a hoe or shovel until used. Anti-freeze mixtures will not be allowed in the mortar. No masonry shall be laid when the outside temperature is below 40°F

unless provisions are made to protect the mortar, bricks, and finished work from frost by heating and enclosing the work with tarpaulins or other suitable material. The Engineer's decision as to the adequacy of protection against freezing shall be final.

2. Construct channels and shelves of brick as shown on the Drawings. The brick channels shall correspond in shape with the lower half of the pipe. The top of the shelf shall be set at the elevation of the crown of the highest pipe and shall be sloped 1 inch per foot to drain toward the flow through channel. Construct brick surfaces exposed to sewage flow with the nominal 2 inch by 8 inch face exposed (i.e., bricks on edge).

3. Set manhole covers and frames and catch basin frames and grates in a full mortar bed and bricks, a maximum of 12 inches thick for conical tops and 6 inches thick for flat top sections, utilized to assure frame and cover are set to the existing grade. Reset the manhole frames and covers and catch basin frames and grates to final grade prior to placement of final paving.

3.2 LEAKAGE TEST

A. Leak test sewer manholes in conjunction with the pipeline in accordance with Section 33 3114.

3.3 CLEANING

A. Clean all new manholes and catch basins of silt, debris, and foreign matter of any kind, prior to final inspection.

END OF SECTION

SECTION 330514 - BREAKING INTO EXISTING MANHOLES AND CATCH BASINS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and other Division I Specifications, apply to this section.

1.2 SUMMARY

A. Related Section includes

1. Breaking through the walls and inverts of existing manholes and catch basins.

2. Connecting new pipes to existing structures.

3. Ancillary work associated with making the new connections to the existing structures.

1.3 REFERENCES

A. ASTM C443 – Standard Specification for Joints for Circular Concrete Sewer and Culvert Piping Using Rubber Gaskets.

B. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals.

1.4 SUBMITTALS

A. Submit shop drawings showing pipe connection details.

B. Bypass plans shall be submitted to the Town of Greenwich Department of Public Works Sewer Division for review and approval.

1.5 QUALITY ASSURANCE

A. Personnel shall have confined space entry training as appropriate for the work to be performed.

PART 2 PRODUCTS

2.1 MATERIALS

A. Flexible Pipe-to-Structure Connectors

1. The flexible connectors shall be designed to provide a positive seal between the connector and the structure wall and between the connector and the pipe.

2. The flexible boot shall be manufactured of EPDM synthetic rubber in accordance with ASTM C443 and C923 and shall be 3/8 inch thick or greater.

3. The external bands shall be made entirely of 304 series non-magnetic stainless steel.

4. The flexible connectors shall be provided with a wedge-type or toggle-type expander to secure the pipe in the structure opening.

5. The flexible connectors shall meet the following criteria, in accordance with ASTM C923:

   a. Shall not leak when subjected to a head pressure of 10 psi for 10 minutes.

   b. Shall have the ability to deflect 7 degrees in any direction without leakage under the head pressure conditions described above.

   c. Shall not leak when subject to a load of 150 lbs./in. pipe diameter and the head pressure conditions described above.

B. Non-shrink, water-proof grout

1. Non-shrink, water-proof grout shall be Hallemite; Waterplug; Embeco; or approved equal.

PART 3 EXECUTION

3.1 INSTALLATION

A. General

1. Core drill into existing structures in such a fashion as to make an opening of suitable size to accommodate the connecting pipe without excessive damage to the existing structure.

2. Core drilling and manhole connections shall conform to the Town of Greenwich Public Works requirements.

B. Manholes

1. For manholes, break out and rebuild existing inverts as required to provide an adequate base under the new channels being installed, and shaped to provide smooth continuous hydraulic flow through the manhole.

2. Control existing flows as required during the period of construction. No sewage or drainage will be permitted to flow directly against concrete or other masonry work until it is at least 48 hours old.

   a. Temporary handling of sewage or drainage flows may be accomplished by inserting pipes from the inlet to the outlet of the manhole and by using temporary plugs, where appropriate, provided that such pipes do not interfere with satisfactory completion of the work and shaping of the inverts, nor cause excessive backing-up in the existing system upstream of the diversion. In cases where this type of temporary handling of

flows is not possible, provide the necessary dams, plugs, etc., as required in upstream manholes, and pump the flow around the structure under construction.

b. When sewage is pumped or otherwise diverted around a particular structure, it shall be discharged back into the sewage system through existing downstream manholes. Under no circumstances shall sewage be permitted to run onto the surface of the ground.

c. Any sewer bypass operation shall be staffed by the contractor and field personnel must be present during the operation.

d. All manholes utilized in the bypass operation must remain closed by temporary means to prevent unauthorized access. Contractor shall include temporary closure methods in their bypass plan.

C. Catch Basins

1. All catch basin openings, created as a result of the removal and replacement of the existing drains connected to the catch basins with new drainpipes, shall be sealed. This work shall be performed using masonry to match existing construction, where applicable, and non-shrink grout to provide a neat patch.

D. Pipe Connections

1. Rebuild and tightly close existing manhole walls and inverts and catch basin walls to provide an integral, water-tight structure around the new pipes.

2. For pipes with smooth exterior surfaces (PVC, ductile iron, HDPE, steel, etc), use flexible pipe-to-structure connectors.

3. Where flexible pipe-to-structure connectors cannot be used, such as pipes with rough, irregular, or corrugated exterior surfaces (concrete, corrugated metal or HDPE, etc):

a. After the new pipe has been set in place, completely fill the hole around the new pipe and structure with non-shrink, water-proof grout.

b. Place a 6-inch-thick concrete encasement a total of 12 inches in length around the pipe stub adjacent to the exterior wall of the structure. Concrete shall have a 28-day compressive strength of 3,000 psi.

END OF SECTION

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SECTION 331113 - DUCTILE IRON PIPE AND FITTINGS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Ductile iron pipe and fittings, direct buried or in below grade vaults
2. Restrained joints and fittings
3. Cast-in-place concrete thrust blocks

B. Related Sections

1. Section 31 2333 – Trenching and Backfilling
2. Section 33 4114 – Underground Warning Tape
3. Appendix F - Report entitled "Greenwich Central Middle School Construction-Vibration and Controls During Construction" by Gap Mountain Consulting Engineers, PLLC dated November 1, 2024. The Construction-Vibration and Controls report is provided to outline the requirements for monitoring and protection the existing school building from structural damage while it is occupied.

1.2 REFERENCES

A. Pipe and fittings shall conform to the latest edition of the following standards unless otherwise specified:

1. ANSI/AWWA C104/A21.4, Cement Mortar Lining for Ductile Iron Pipe and Fittings for Water.
2. ANSI/AWWA C110/A21.10, Ductile Iron and Grey Iron Fittings 3″ through 48″ for Water and Other Liquids.
3. ANSI/AWWA C111/A21.11, Rubber-Gasket Joints for Ductile Iron Pressure Pipe and Fittings.
4. ANSI/AWWA C150/A21.50,Thickness Design of Ductile Iron Pipe.
5. ANSI/AWWA C151/A21.51, Ductile Iron Pipe, Centrifugally Cast, for Water.
6. ANSI/AWWA-C153/A21.53, Ductile Iron Compact Fittings Water Service.
7. ANSI/AWWA C600, Installation of Ductile Iron Water Mains and their Appurtenances.
8. ANSI/AWWA C800, Underground Service Line Valves and Fittings.
9. ANSI/AWWA C651, Disinfecting Water Mains.
10. ASTM A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.

11. Ductile Iron Pipe Research Association, "Thrust Restraint Design for Ductile Iron Pipe" (Third Edition).

1.3 SUBMITTALS

A. Administrative Submittals

1. Detailed description of proposed pipe handling and installation methods along with the manufacturer's approval.

2. Construction details and schedule of operation for each connection to existing piping at least 30 days prior to beginning the Work. Approval must be received before commencement of Work on-site.

B. Shop Drawings

1. Manufacturer's scale drawings, cuts or catalogs including descriptive literature and complete characteristics and specifications and code requirements. Submit shop drawings for ductile iron pipe, types of joint, fittings, couplings, filling rings, lining, and coating.

C. Quality Control Submittals

1. Certificates of compliance on pipe materials.

2. Prior to first shipment of pipe, submit certified test reports that the pipe for this Contract was manufactured and tested in accordance with the ASTM and ANSI/AWWA Standards specified herein.

3. Manufacturers of pipe on the project shall have an established, annually audited, and certified, quality control procedure for manufacturing of pipe. Each manufacturer shall be certified by an independent, third-party auditor for compliance with all requirements of the AWWA standards. The manufacturer shall submit a current certificate of compliance for the plant facility where the pipe is to be made. Certificate of compliance shall be submitted for each additional year of pipe manufacturing during the duration of the Project. The manufacturer shall not change the plant manufacturing the pipe during the duration of the Work.

1.4 QUALITY ASSURANCE

A. Ductile iron pipe shall be from a single manufacturer. Fittings shall be from a single manufacturer, not necessarily the pipe manufacturer.

B. Shop Inspection - Materials are subject to inspection and approval at the manufacturing plant by the Engineer.

C. The Engineer will inspect the pipe and fittings after delivery. The pipe shall be subject to rejection at any time on account of failure to meet any of the Specification requirements. Pipe rejected after delivery or at any point during the progress of the Work, shall be marked for identification and shall immediately be removed from the job site and replaced at no additional cost to the Owner.

D. Test pipe under pressure for defects and leakage in accordance with Section 33 1400 – Testing of Water Distribution Systems.

E. All pipe and fittings shall be manufactured in North America.

1.5 PROJECT CONDITIONS

A. Secure permits and pay fees required to carry out the piping work. Comply with laws, ordinances, codes, rules, and regulations of the local and state authorities having jurisdiction over the Work. Where provisions of the Contract Documents are in conflict with the codes, the code shall govern. The Contract Documents shall govern when in excess of the required or minimum regulations or codes.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. American Cast Iron Pipe Company

B. Griffin Pipe Products

C. U.S. Pipe

D. or approved equal

2.2 PIPE AND FITTINGS - GENERAL

A. Ductile iron pipe shall be designed in accordance with AWWA C150 and shall be manufactured in accordance with AWWA C151. Fittings and other materials referenced in this section shall conform to the latest edition of the references listed in Paragraph 1.2 of this section.

B. Unless otherwise indicated or specified in the Contract Documents, direct buried ductile iron pipe shall be Class 52 with push on joints and shall meet the Aquarion Water Company standards and requirements.

C. Unless otherwise indicated or specified in the Contract Documents, ductile iron flanged pipe for vault or above ground service, or for installation in buried vaults, shall be Class 53 with flanged joints

D. Unless otherwise indicated or specified in the Contract Documents, direct buried fittings shall be ductile iron or gray iron with mechanical joints.

E. Pipe and fittings for water, sewage, or sludge service, except where specified, shall have a bituminous outside coating in accordance with AWWA C110, C151 or C153, as applicable.

F. Obtain from the manufacturer sufficient gauged pipe sections in accordance with AWWA C151 to ensure the availability of each pipe diameter required on the Project.

G. Pipe and fittings shall be cement mortar lined and seal coated on the interior in accordance with AWWA C104. Cement mortar lining shall be twice the standard thickness; tolerance shall be minus 0 inches, plus 1/8 inch.

2.3 PIPE AND FITTING JOINTS

A. Push-on-joints and mechanical joints shall conform to ANSI/AWWA C111/A21.11.

B. Where indicated on the Drawings, provide restrained joints suitable for a 250-psi working pressure and fabricated of heavy section cast iron casting. Gaskets shall meet the material requirements of ANSI/AWWA A21.11/C111 for mechanical joint gaskets.

2.4 FITTINGS

A. Fittings shall be ductile iron.

B. Fittings less than or equal to 12 inches in size shall conform to ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53 and shall have a 350-psi pressure rating.

C. Fittings greater than 12 inches in size shall conform to ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53 and shall have the following pressure ratings:

1. Fittings greater than 12 inches and less than or equal to 24 inches - 350 psi

2. Fittings greater than 24 inches - 250 psi

D. Mechanical joint retainer glands shall be installed on all mechanical joints, except where rodding is used. Retainer glands shall be specifically designed to fit standard mechanical joint bells with corrosion resistant, high strength, low-alloy T-head bolts conforming to ANSI/AWWA A21.11/C-111 and ANSI/AWWA A21.53/C-153. Retainer glands shall be manufactured of ductile iron conforming to ASTM A536-80 grade 60-42-10. Wedges shall be of hardened ductile iron and require the same torque in all sizes. These devices shall have a minimum 250 psi pressure rating with a minimum safety factor of 2:1 and shall be EBAA IRON, Inc., series 1100 or approved equal. Glands shall be listed with Underwriters Laboratories and/or approved by Factory Mutual and shall meet the Aquarion Water Company standards and requirements.

E. Cast-in-place concrete thrust blocks are required at all fittings and will be used in conjunction with retainer glands, as specified in Paragraph 3.12 of this section. Thrust blocks, solid concrete blocks with oak wedges, are to be installed at all bends, tees, hydrants or A.O.B.E. against undisturbed earth.

F. Anchoring tees shall have main run ends as indicated on the Drawings or as required for the installation. The branch shall have a plain end with an integral gland and rotating mechanical joint gland to provide a restrained connection with the adjacent valve or fitting.

2.5 COUPLINGS

A. Couplings and transitional couplings for pipe less than or equal to 12 inches in diameter shall consist of a long body cast iron sleeve and shall have gaskets suitable for the pipe being joined. The bolts and nuts shall be corrosion resistant high strength, low alloy steel such as Cor-Ten steel or an approved equal. Couplings shall be Romac style 501, Dresser style 153, Rockwell type 441, or approved equal. Transition couplings for pipe less than or equal to 12 inches in diameter shall be Dresser Style 162, Rockwell Type 441, Smith Blair Omni Style 442, or approved equal.

B. Couplings and transitional couplings for pipe greater than 12 inches in diameter shall consist of a steel sleeve and with gaskets suitable for the pipe being joined. The bolts and nuts shall be corrosion resistant high strength, low alloy steel such as Cor-Ten steel or an approved equal. Couplings shall be Dresser style 38, Smith Blair Style 311, Romac Style 400, or approved equal. Transition couplings for pipe greater than 12 inches in diameter shall be Dresser Style 62, Smith Blair Style 413, Romac Style TC400, or approved equal.

C. Provide couplings with an exterior epoxy coating.

D. Solid sleeves shall have long body type (12 inches min.) and mechanical joints with retainer glands.

2.6 GASKETS, GLANDS, NUTS, AND BOLTS

A. Gaskets, glands, nuts, bolts and accessories shall conform to ANSI/AWWA C111/A21.11 or C153/A21.53, as appropriate.

B. Gaskets shall be of plain tipped rubber, suitable for exposure to the liquid within the pipe.

C. Lubricants must be suitable for the type of fluid to be carried by the pipeline, and shall be NSF approved for water service, where applicable.

D. Glands shall be ductile or cast iron.

E. Bolts shall be high strength, low alloy.

F. Requirements for flanged joints:

1. Gaskets for flanged joints shall be full faced red rubber, 1/8 inches thick. Gaskets shall conform to the dimensions of Table A.1 of ANSI/AWWA C115/A21.15. Ring gaskets shall be utilized for joints 14 inches in diameter and larger.

2. Assemble flanged joints with bolts and nuts, bolt studs with nut on each end, or studs with nuts in tapped flanges. Bolts and nuts shall be of low carbon steel conforming to the chemical and mechanical requirements of ASTM A307, 60,000 psi tensile strength, Grade B. Bolts, nuts and studs shall be cadmium plated.

2.7 TEST CONNECTIONS

A. Install air release, test connections, and blow offs in the piping for pressure testing and disinfection at locations to be determined by the Contractor and approved by the Engineer.

1. Corporation cocks shall be in accordance with ANSI/AWWA C800 and shall be ¾ inch diameter with CC thread on inlet by iron pipe thread flare on outlet as manufactured by Mueller, Ford, McDonald or approved equal.

2. Copper tubing shall be annealed Type K soft tubing and shall conform to the requirements of ASTM B88.

3. Upon completion of testing and disinfection, remove the corporation cock and replace with a brass plug and the copper tubing removed. Field swab the brass plug for disinfection in accordance with AWWA C651.

PART 3 EXECUTION

3.1 GENERAL

A. Deliver, handle, store and install ductile iron pipe in accordance with ANSI/AWWA C600.

3.2 DELIVERY, STORAGE AND HANDLING

A. Delivery of Pipe and Fittings

1. Coordinate delivery of pipe and fittings with installation and unload along the line of work outside the trench near as practicable to the point of final placement, facing in the specified direction and properly wedged secure. Give minimum 24 hour notice to the Engineer prior to pipe deliveries. Notice shall include the method of unloading.

2. Unload and handle pipe and fittings with a crane or backhoe of proper capacity outfitted with a steel cable sling, belt sling or other specially designed attachment to protect the pipe coating.

3. At the end of each work week, no more than the amount of pipe to be installed the following work week shall remain along the construction route. All pipes remaining at the construction route are to be properly wedged to prevent movement and not interfere with traffic or pedestrian movement. All excess pipes are to be stockpiled at an approved staging yard in accordance with AWWA C600.

B. Storage of Materials

1. Store pipe in a manner to keep pipe interior free from dirt and foreign matter. Store pipe on wood blocking, rails or other suitable materials. Pipe shall not be stored on stones.

2. Pipe may be stored on top of each other to the maximum stacking height specified by AWWA C600.

3. Protect materials subject to corrosion in accordance with manufacturer's recommendations.

4. If pipe or project materials are stored at the Contractor’s approved staging yard, the Engineer shall be permitted reasonable access to the staging yard for inspection of the pipe and materials.

5. Pipe ends shall be sealed tight using polyethylene bags and tape immediately after unloading, regardless of the storage time length, in order to keep foreign matter and wind blown debris out.

6. All vales, hydrant and fittings are to be stored off of the ground on wooden pallets.

C. Handling Materials

1. Handle materials in such a manner so as to prevent damage to the concrete or mortar coating or lining.

2. Materials are to be handled using methods approved by the pipe manufacturer.

3. Materials damaged during handling will be rejected and shall be replaced at the Contractor’s expense.

4. Ensure that no foreign materials enter the materials during handling.

3.3 COORDINATION

A. Existing mains may have to be shut down to complete the connections as shown on the Drawings and as specified herein.

1. Existing valves will only be operated by the Owner.

2. Submit requests for shutdown of existing piping to the Engineer at least 5 working days prior to the operations and reschedule operations to prevent conflicts with the Owner's operations.

3. The Owner reserves the right to cancel the shut-down at any time without penalty if system conditions exist in which it would be a matter of public health or safety to do so.

4. The Owner does not guarantee complete shut down of valves. Make necessary provisions to do work under existing conditions.

3.4 DEFECTIVE PIPE

A. Defective pipe or fittings will be rejected for use on this project. Defective pipe is classified as follows:

1. Damage to interior cement-mortar lining

2. Insufficient cement-mortar lining thickness

3. Pipe out of round

4. Damaged pipe barrel area

5. Damaged pipe bells or spigots

6. Missing, misplaced or illegible marking and identification

7. Outside pipe diameter shall not exceed allowable tolerance

B. If defective pipe is discovered after it has been installed, it shall be removed and replace with sound pipe, at no additional cost to the Owner.

3.5 JOB CONDITIONS

A. Environmental Requirements

1. Do not lay pipe when weather conditions are unsuitable, as determined by the Engineer, for pipe laying work.

2. Equipment for pipe laying shall be maintained in good operating order.

3. Job site shall be kept clean of debris and organized.

B. Protection

1. At all times when pipe laying is not in progress, the open ends of pipe shall be closed by a watertight plug. This provision shall apply at all times when pipe laying operations are suspended.

C. Work Affecting Existing Pipelines

1. Work on Existing Pipelines:

a. Prior to any work on existing pipelines, remove soils, rust, and other debris from the exterior wall of the pipe a minimum of 12 inches beyond the work area.

b. Cut pipes as shown or required with machines specifically designed for this work.

c. Install temporary plugs to keep out all mud, dirt, water, and debris.

d. Provide necessary adapters, fittings, pipe, and appurtenances required.

e. Cut or tap existing mains at the mid span of a pipe barrel. In no case shall a pipe be cut or tapped within 24 inches of a pipe joint.

3.6 CLEANING PIPE AND FITTINGS

A. Clean and remove foreign matter from the interior of each pipe and fitting before placing in the trench. Remove pipe and fittings whose interior has been contaminated with oil, gasoline or kerosene and replace at no additional cost to the Owner. Remove pipe and fittings whose interior has been contaminated with any material which is a regulated drinking water contaminate or which damages the cement and replace at no additional cost to the Owner. Should foreign material or contaminants be observed in previously installed pipe, cease work until foreign material or contaminated pipe is decontaminated or removed.

B. Remove all lumps, blisters, and excess coal-tar coating from the bell and spigot ends of each pipe or fitting. The outside of the spigot and the inside of the bell shall be wire-brushed and wiped clean and be dry and free from oil and grease before the pipe or fitting is laid.

C. On all ductile iron pipe or fittings, the bell of the pipe and the spigot of the adjacent pipe or fitting shall be wire-brushed and cleaned of rust and dirt. The bell of the pipe or fitting and the spigot of the adjacent pipe shall then be lubricated with the joint lubricant furnished with the pipe, and used in accordance with the manufacturer's directions.

3.7 ALIGNMENT AND GRADE

A. Lay and maintain the pipe at the required lines and grades as shown on the Drawings. Fittings shall be at the locations indicated on the Drawings and as required to construct the pipeline with joints centered, and spigots properly fitted. No deviation shall be made from the line and grade indicated on the drawings, except with the approval of the Engineer.

B. Joint Openings and Deflection:

1. The maximum allowable joint openings and deflection for push-on joint pipe and restrained joint pipe shall be one-half the manufacturer's maximum allowable opening and deflection.

C. Line or Grade Conflicts with Other Structures

1. Wherever obstructions not shown on the Drawings are encountered during the progress of the Work and interfere to such an extent that an alteration in the Drawing is required, the Engineer will order a deviation from the line and grade at locations where obstructions such as culverts, ducts, wire and/or pipes are encountered. The pipe shall be laid over or under such obstacles with a clearance of 6 inches. The choice of "over" or "under" is shown on the Drawings, but the Engineer reserves the right to make any alterations at the time of construction.

D. Where underground conditions indicate a change of alignment or grade, such change shall be made only with the written consent of the Engineer.

E. Except at locations indicated on the Drawings by the profile, do not establish high points where air can accumulate.

3.8 PIPE INSTALLATION

A. General Requirements

1. Prepare the pipe trench in accordance with Section 312333 Trenching and Backfilling.

2. Keep trenches dewatered while installing pipe until all required pipe joints have been made and the trench has been backfilled above the water table to a point where pipe uplift will not occur when the pipe is empty.

3. Carefully lower pipe and fittings into the trench piece by piece by means of a crane, ropes or other tools or equipment, in such a manner as to prevent damage to pipeline materials and protective coatings and linings. Under no circumstances shall pipeline materials be dropped or dumped into the trench.

4. Carefully inspect pipe and fittings for cleanliness and defects prior to placing them in the trench.

5. Install underground warning tape over the pipe in accordance with Section 334114 Underground Warning Tape.

B. Laying Pipe

1. Install pipe with a minimum of 4.5 feet of cover, unless indicated otherwise on the Drawings or directed by the Regional Water Authority.

2. Prevent foreign material from entering the pipe while it is being placed in the line. During laying operations, no debris, tools, clothing, or other materials shall be placed in the pipe.

3. When laying pipe, the spigot end shall be centered in the bell, the pipe forced home and the joint completely assembled. The pipe shall be adjusted to correct line and grade and secured in place with approved backfill material, properly tamped under and around the pipeline.

4. When laying the pipe, remove and replace fittings that do not allow a sufficient and uniform space for joints at no additional cost to the Owner.

C. Cutting Pipe

1. Furnish pipe in full lengths. Cut ductile iron pipe without damage to the pipe or cement lining. The cutting shall be done to leave a smooth end at right angles to the axis of the pipe.

2. Cut ductile iron pipe either by the use of compression-type chain cutters which exert an even continuous force on the wall of the pipe or by power driven abrasive wheels.

3. On ductile iron pipe using rubber joints, the outside edge of the cut end must be tapered back approximately ¼ inch at an angle of about 30 degrees so as to provide for the proper assembly of this joint.

D. Permissible Deflection at Joints

1. Wherever it is necessary to deflect pipe from a straight line, either in the vertical or horizontal plane, to avoid obstructions or where long-radius curves are permitted, the amount of deflection allowed shall not exceed one-half of the manufacturer's maximum allowable joint deflection and shall be approved by the Engineer.

2. Radius curves indicated on the Drawings or approved during Shop Drawing review shall be made using full lengths of pipe. The use of short lengths of pipe and extra joint in order to make a smaller radius turn will not be allowed without the written approval of the Engineer.

3.9 PUSH-ON JOINTS

A. Push-on joints shall be made in accordance with the manufacturer's instructions. Install gaskets in the pipe bell after lowering the pipe into the trench for installation. Thoroughly clean the bell and spigot of dirt and tar blisters in the trench utilizing a wire brush or bristle brush. Insert rubber gasket in the groove of the bell end of the pipe beginning at the bottom of the bell and working to the top of the bell. Apply lubricant per the manufacturer's recommendations utilizing a paint brush to the pipe gasket and the pipe spigot to be joined. Place a clean rag under the joint to protect the joint from dirt caused by unintentional grounding of the pipe during jointing. Upon completion, remove the rag. Align the plain end of the pipe to be laid and insert in the bell of the pipe to which it is to be joined and push home with a jack or by other means. After joining the pipe use a metal feeler to make certain that the rubber gasket is correctly located.

3.10 MECHANICAL JOINTS

A. Mechanical joints shall be made in accordance with Appendix A of ANSI A21.11/AWWA C111 and the manufacturer's instructions. Thoroughly clean and lubricate the joint surfaces and rubber gasket before assembly. Tighten bolts to the specified torques. Under no conditions shall extension wrenches or an extended handle ratchet wrench be used to secure greater leverage.

3.11 RESTRAINED JOINTS

A. Install restrained joints on all fittings, bends, tees and at a minimum of two pipe lengths either side of a fitting. Make the joint assemblies in accordance with the manufacturer's recommendations.

3.12 CONCRETE THRUST BLOCKS

A. Concrete thrust blocks shall be used in conjunction with retainer glands or other restraining methods at all tees, bends, offsets, hydrants, caps and plugs. Concrete shall be 3,000 psi.

B. Place cast-in-place concrete thrust blocks at all bends (regardless of the angle of deflection or direction), caps, offsets, hydrants, and tees, as well as in locations shown on the Drawings or directed by the Engineer. Cast-in-place thrust blocks shall be formed with wood forms; rough earth forms are not acceptable. Protect pipeline materials and fittings from direct adherence of the concrete thrust block by wrapping in plastic, roofing felt, reinforced manila paper or similar material. The thrust block shall not bear directly on the joint and shall not interfere with future adjustments, tightening, or removal of the joint. Thrust blocks shall bear against undisturbed soil at the side or end of the trench and this undisturbed surface shall be carefully cleaned off so as to be vertical. The thrust blocks shall have a minimum horizontal thickness of 2 feet and shall have the minimum bearing area listed on the Drawings, measured perpendicular to the direction of thrust.

3.13 DISINFECTION

A. Disinfect pipe, fittings, and valves in accordance with Section 33 1300 – Disinfection of Water Distribution Systems, before placing into service.

3.14 TESTING

A. Pipe, fittings, and valves installed under this contract shall be tested in accordance with Section 33 1400 – Testing of Water Distribution Systems, before being placed into service.

3.15 INFORMATION

A. Provide "as-built" survey made by a licensed surveyor registered in the State of Connecticut, paid for by the Site Contractor, showing all actual locations, inverts, grades of structures and piping. Furnish one set to the owner and one set to the Site Engineer. As-builts shall meet the Aquarion Water Company requirements

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SECTION 331300 - DISINFECTION OF WATER DISTRIBUTION SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Procedures for disinfecting new and repaired water distribution systems.

B. Related Sections

1. Section 33 1400 – Testing of Water Distribution Systems.
2. Section 33 1113 – Ductile Iron Pipe and Fittings.

1.2 REFERENCES

A. American Water Works Association, AWWA C651, *AWWA Standard for Disinfecting Water Mains.*

B. American Public Health Association, American Water Works Association and Water Pollution Control Federation, *Standard Methods For the Examination of Water and Wastewater.*

1.3 SUBMITTALS

A. A formal statement in writing to the Engineer that all crews responsible for installation and repairs within the operating distribution system have been properly trained and are aware of prescribed construction practices and disinfection procedures to avoid contamination to the operating distribution system.

B. The name of competent person(s) responsible for the disinfection processes and performing the required bacteriological sampling. The Engineer will approve the disinfection process to be used in advance of any disinfection efforts.

C. Certificate of compliance that the independent commercial laboratory performing the bacteriological sampling analyses is certified with the State Department of Environmental Protection and U.S. Environmental Protection Agency for analyzing public drinking water supplies.

D. Certified results for all bacteriological sampling prior to restoring or placing the distribution system into service.

E. For each section of pipe to be chlorinated, the Contractor shall inform the Engineer in writing of the locations for taps to be installed and utilized for the procedure.

1.4 QUALITY ASSURANCE

A. Qualifications & Certifications

1. The Contractor shall employ trained personnel aware of the need to carefully observe prescribed construction practices and disinfection procedures in order to prevent contamination to the distribution system.

2. The competent person(s) responsible for the disinfection processes and bacteriological sampling shall be familiar with AWWA C651- Standards for Disinfecting Water Mains and experienced with the Continuous Feed Method of disinfection. The Engineer shall approve disinfection procedures in advance.

3. Bacteriological sampling shall be made in full accordance with AWWA C651 and under the supervision of the Engineer.

4. An independent commercial laboratory certified for analyzing public drinking water supplies by the State Department of Environmental Protection and U.S. Environmental Protection Agency shall analyze all bacteriological samples and provide certified results to the Engineer and/or Owner for review prior to restoring or placing the system into service.

5. Contractor shall coordinate all testing, disinfection and acceptance of new water and fire protection services with the Aquarion Water Company.

1.5 PROJECT/SITE CONDITIONS

A. The general procedure for disinfection and analyses is described in Part 3, Execution, of this section. If project conditions warrant the need for special disinfection procedures, obtain prior written approval from the Engineer.

PART 2 PRODUCTS

2.1 MATERIALS

A. The forms of chlorine used in the disinfection operations shall conform to ANSI/AWWA B300. Materials Safety Data Sheets (MSDS) for the disinfectant shall be readily available for reference. The competent person responsible for the disinfection operation shall be fully trained and equipped to handle any emergency that may arise.

PART 3 EXECUTION

3.1 DISINFECTION

A. Before being placed into service, all new water pipelines shall be chlorinated using the Continuous Feed Method specified in AWWA C651 – Section 4.4.3. The Engineer shall approve the procedure in advance.

1. The Contractor will determine the location of the chlorination and sampling points in the field. The Contractor shall install taps for chlorinating, sampling and expulsion of air and shall uncover, backfill, and plug the taps as required.

2. Prior to disinfecting the water main, the main shall be completely filled to remove all air pockets and then flushed to remove particulate. The flushing velocity in the main shall not

be less than 2.5 ft/s unless the Engineer and/or Owner determine that the conditions do not permit the required flow to be discharged to waste.

TABLE 3.1-1
Required Flow to Flush Pipelines (40 psi residual pressure in water main)*

Pipe Diameter (in)	Flow Required to Produce 2.5 ft/s (Approximate) Velocity in Main	Number of 2 ½ inch Hydrant Outlets
4	100 gpm	1
6	200 gpm	1
8	400 gpm	1
10	600 gpm	1
12	900 gpm	2
16	1600 gpm	2

**AWWA C651, AWWA Standard for Disinfecting Water Mains*

3. At a point not more than 10 feet downstream from the beginning of the new main, water entering the new main shall receive a dose of chlorine fed at a constant rate such that the water will not have less than 25 mg/L (PPM) free chlorine throughout the entire section of pipe to be chlorinated.

TABLE 3.1-2
Chlorine Required to Produce 25-mg/L Concentration in 100 Feet of Pipe – By Diameter*

Pipe Diameter (in)	100 % Chlorine (Pounds)	1% Chlorine Solution (Gals.)
4	0.013	0.16
6	0.030	0.36
8	0.054	0.65
10	0.085	1.02

12	0.120	1.44
16	0.217	2.60

**AWWA C651, AWWA Standard for Disinfecting Water Mains*

4. The chlorinated water is to remain in the new pipeline for at least 24-hours. After a contact time of 24-hours there should be a free chlorine concentration of not less than 10 mg/L (PPM). During this period, proper precautions are to be taken to prevent this chlorinated water from flowing back into the existing system.

5. All valves and hydrants within the treated section shall be operated to ensure disinfection of the appurtenances.

B. The Tablet Method consisting of placing calcium hypochlorite granules or tablets in the water main as it is being installed and then filling the main with potable water and allowing it to set for a contact period is not acceptable.

C. The interior of all pipes, fittings and valves used in making a repair or tie-in shall be swabbed or sprayed with a one percent (1%) hypochlorite solution before they are installed.

3.2 FINAL FLUSHING

A. Following the chlorination period, all treated water shall be flushed from the lines at their extremities and replaced with water from the distribution system.

1. Flushing the main is to be accomplished at as high a velocity as possible consistent with the ability of the Contractor to collect the discharge water for proper disposal.

2. All treated water flushed from the lines shall be disposed of by discharging to the nearest sanitary sewer or by other approved means provided in AWWA C651.

3. Flushing shall be done in strict conformance with all applicable local, state and federal regulations. No discharge of chlorinated water to any storm sewer or natural watercourse will be allowed.

3.3 BACTERIOLOGICAL ANALYSES

A. After the 24-hour disinfection period and all chlorine solution has been thoroughly flushed, the bacteriological sampling and analysis of the replacement water may then be performed.

1. Bacteriological sampling shall be made by the Contractor's competent person(s) in full accordance with AWWA C651- Section 5, *Bacteriological Tests* and under the supervision of the Engineer.

2. Analysis shall be performed by an independent commercial laboratory certified by the State Department of Environmental Protection and U.S. Environmental Protection Agency for analyzing public drinking water supplies. All results shall be provided to the Engineer for review.

3. Two consecutive sets of acceptable samples, taken at least 24-Hours apart are required prior to placing the main into service. Failure of any one of the bacteriological test samples shall require rechlorination and retesting by the Contractor.

4. The line shall not be placed in service until the bacteriological requirements of AWWA C651 are met.

END OF SECTION

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SECTION 331400 - TESTING OF WATER DISTRIBUTION SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Testing of pipe, castings, fittings, valves, and accessories.

2. Contractor shall coordinate all water and fire protection services testing with the Aquarion Water Company.

1.2 REFERENCES

A. American Water Works Association, AWWA C600, AWWA Standard for Installation of Ductile-Iron Water Mains and Their Appurtenances.

1.3 SUBMITTALS

A. List of equipment and personnel to be used for the pressure test.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 TEST PARAMETERS

A. For water mains, the pressure test shall not be conducted until the new main has been flushed clean, disinfected in accordance with Section 33 1300 and the chlorinated water properly disposed of. After acceptable completion of the water system disinfection, the Contractor may commence pressure testing of the new water main.

B. Run pressure test and leakage test simultaneously in accordance with ANSI/AWWA C600.

C. Test pressure shall not be less than 1.25 times the working pressure at the highest point along the test section. Test pressure shall not exceed pipe or thrust-restraint design pressures.

D. The hydrostatic test shall be of at least 2-hour duration or until such time as the Engineer indicates acceptance of the pipeline.

E. Test pressure shall not vary by more than ±5 psi (35 MPa or 0.35 bar) for the duration of the test.

F. On pipelines where the elevation along the route of construction varies substantially, the Engineer reserves the right to valve off and test portions of the line.

G. Do not operate valves in either direction at differential pressure exceeding the rated valve working pressure. Use of a test pressure greater than the rated valve pressure can result in trapped test pressure between the gates of a double-disc gate valve. For tests at these pressures, the test setup should include a provision, independent of the valve, to reduce the line pressure to the rated valve

pressure on completion of the test. The valve can then be opened enough to equalize the trapped pressure with the line pressure, or fully opened if desired.

H. Test pressure shall not exceed the rated pressure of the valves when the pressure boundary of the test section includes closed, resilient-seated gate valves or butterfly valves.

3.2 TIME FOR MAKING TESTS

A. No pipeline is to be placed under pressure or subjected to hydrostatic pressure until at least 5 days have elapsed after the concrete thrust blocks have been installed. If high early strength concrete is used in the concrete thrust blocks, the hydrostatic pressure can be applied to the main after 2 days have elapsed from time of construction of the thrust blocks.

B. The Contractor will be allowed to complete backfilling as hereinbefore specified, prior to undertaking the leakage and pressure tests. Backfilling prior to conducting tests will be at the option of the Contractor with the exception of intersections, driveways, crosswalks and other such locations where holding open the trench may adversely affect the public.

C. Pipelines may be subjected to hydrostatic pressure and inspected for leakage at any convenient time after the trench has been partially backfilled. Partial backfilling shall consist of filling along the center of the pipe length and leaving the joint open for inspection.

3.3 OPERATION OF EXISTING WATER SYSTEM

A. Do not operate any valve or other control device on the existing water system for any purpose. Do not make any tap or cut-in to the existing water system without the approval of the Engineer and unless an authorized representative of the Owner is present.

B. When the Contractor's operations require the adjustment of any hydrant, valves, or other control device on the existing system, the Owner will provide authorized personnel for the purpose of supervising the operation of these control devices. Provide the personnel for the operation of these devices.

3.4 PREPARATION

A. Conduct connections to the existing system under the Engineer’s direction.

B. To allow for proper filling, venting, testing, etc., install any corporation stops and/or special fittings which may be required. All such installation will be subject to the Engineer’s approval.

C. Foreign materials left in pipelines during installation often results in valve or hydrant seat leakage during pressure tests. Thorough flushing is recommended prior to a pressure test by partially opening and closing valves and hydrants several times under expected line pressure, with flow velocities adequate to flush foreign material out of the main, valves and hydrants. Flushing requirements are specified in Specification 33 1300.

3.5 PROCEDURE

A. On completion of the pipeline or any valved section thereof, fill pipeline with water and test. Draw water from the existing water system under the direction of the Engineer and Aquarion Water Company.

B. Before applying the specified test pressure, expel air completely from the pipe, valves, and hydrants. If permanent air vents are not located at all high points, install corporation cocks at such points so that the air can be expelled as the line is filled with water. After all the air has been expelled, close the corporation cocks and apply the test pressure. At the conclusion of the pressure test, either remove and plug or leave in place the corporation cocks at the discretion of the Owner.

C. Slowly fill each valved section of pipe with water and apply the specified test pressure as described in Part 3.1 by means of a pump connected to the pipe in a manner satisfactory to the Engineer. Valves shall not be operated in either the opening or closing direction at differential pressures above the rated pressure. The system shall be stabilized at the test pressure before conducting the leakage test.

3.6 EXAMINATION UNDER PRESSURE

A. Examine exposed pipes, fittings, valves, hydrants, and joints carefully during the test.

B. Repair or replace any cracked or defective pipe, fittings, valves, hydrants, or joints that are discovered following the pressure tests with sound material and repeat the test until it is satisfactory to the Engineer.

3.7 LEAKAGE TEST

A. Leakage is defined as the quantity of water that must be supplied into the newly laid pipe, or any valved section thereof to maintain pressure after the pipe has been filled with water and the air has been expelled. Testing shall include all hydrants and hydrant branches. Leakage shall not be measured by a drop in pressure in a test section over a period of time.

B. No pipe installation will be accepted if the leakage is greater than that determined by the following formula:

$$L = \frac{SD\sqrt{P}}{148{,}000}$$

Where:

L	=	allowable leakage, in gallons per hour
S	=	length of pipe tested, in feet
D	=	nominal diameter of the pipe, in inches
P	=	average test pressure during the leakage test, in pounds per square inch (gauge)

This formula is based on an allowable leakage of 10.5 gpd/mi/in of nominal diameter at a pressure of 150 psi.

C. When testing against closed metal-seated valves, an additional leakage per closed valve of 0.0078 gph/in. of nominal valve size will be allowed.

D. When hydrants are in the test section, the test shall be made against the closed main valve in the hydrant.

E. Acceptance of Installation - acceptance will be determined on the basis of allowable leakage. If any test of laid pipe discloses leakage greater than that specified in this section, locate, and make approved repairs as necessary until the leakage is within the specified allowance at no additional cost to the Owner.

F. Visible leaks are to be repaired, regardless of the amount of leakage.

END OF SECTION

SECTION 333113 - POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and other Division I Specifications, apply to this section.

1.2 SUMMARY

A. Section Includes

1. PVC Gravity Pipe and Fittings

2. Perforated PVC Drain Pipe

B. Related Sections

1. Section 31 2300 - Excavation, Backfill, Compaction and Dewatering

2. Section 31 2333 – Trenching and Backfilling

3. Section 33 3114 – Testing of Sanitary Sewer and Storm Drainage Systems

4. Appendix F - Report entitled "Greenwich Central Middle School Construction-Vibration and Controls During Construction" by Gap Mountain Consulting Engineers, PLLC dated November 1, 2024. The Construction-Vibration and Controls report is provided to outline the requirements for monitoring and protection the existing school building from structural damage while it is occupied.

1.3 REFERENCES

A. ASTM D2412 - Standard Test Method for External Loading Properties of Plastic Pipe by Parallel-Plate Loading.

B. ASTM D2444 - Standard Test Method for Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight).

C. ASTM D3034 - Specification for Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings.

D. ASTM D3212 - Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.

E. ASTM F477 - Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

1.4 SUBMITTALS

A. Submit specifications and shop drawings for materials and equipment furnished under this Section.

B. Prior to first shipment of pipe, submit certified test reports that the pipe for this Contract was manufactured and tested in accordance with the ASTM Standards specified herein.

1.5 QUALITY ASSURANCE

A. Each type of PVC pipe and fittings shall be from a single manufacturer and shall conform with the Town of Greenwich Department of Public Works Sewer & Engineering Division standards, materials, and requirements.

B. Inspection of the pipe will also be made by the Owner after delivery. The pipe shall be subject to rejection at any time on account of failure to meet any of the Specification requirements. Pipe rejected after delivery shall be marked for identification and shall immediately be removed from the job site.

C. No recycled pipe will be accepted.

1.6 SPARE PARTS

A. Supply 4 tee handle wrench operators suitable to operate the curb stops installed under this section.

PART 2 PRODUCTS

2.1 MATERIALS

A. Gravity Pipe

1. Polyvinyl chloride (PVC) pipe shall be of the size indicated on the Drawings or as specified and shall conform to the latest revision of ASTM D3034, Type SDR 35 for diameters less than or equal to 15-inch diameter and ASTM F679 for pipe greater than 15-inch diameter. Standard laying lengths shall not exceed 14.0 feet.

2. Joints shall be elastomeric gasket joints and shall provide a watertight seal. Assembly of joints shall be in accordance with ASTM D3212.

3. The minimum "pipe stiffness" (load divided by change in inside diameter in direction of load application) at 5% deflection shall be at least 46 psi for pipe tested in accordance with ASTM D2412.

4. No shattering or splitting shall be evident when 150 ft.-lbs. and 210 ft.-lbs. is impacted on 4 inch and 6-inch diameter pipe, respectively, in accordance with ASTM Method of Test D2444.

5. Pipe lengths and fittings to be used on the project shall be clearly marked on the outside in bold type with the name of the manufacturer, pipe size, pipe material, pipe class, and ASTM designation.

6. Gravity Pipe Lateral Connections.

   a. Gravity pipe lateral connection wyes and tees are to be laid in the run of the main pipeline. The wyes and tees shall be the same material as the main line and shall conform in material, joints, and class with the line into which they are to be laid.

   b. Eighth and sixteenth bends and end plugs are to be of the same material and class or strength designation as the pipe for the house connection.

   c. Unless noted on the Drawings, house service piping shall use the same diameter tees, WYEs and lateral pipes as existing to connect existing laterals to new mainline sewer and shall be of the same material as the main line pipe.

7. Lateral Service Chimneys

   a. Pipe and fittings shall use the same diameter tees, WYEs and lateral pipes as existing to connect existing laterals to new mainline sewer and be of the same material as the main line pipe.

   b. Construct service chimneys with precast concrete sections. Cast-in-place chimneys will not be acceptable.

   c. Concrete chimneys shall be designed so that the weight of the chimney is not transferred onto the main line pipe or tee.

   d. Concrete used for construction of chimneys shall be 5,000 psi at 28 days.

B. Perforated Pipe

1. Perforated polyvinyl chloride pipe shall be Type PS-46 PVC and conform to ASTM F758. Perforated pipe shall be furnished in lengths of not more than 20 feet.

2. Alternately, perforated polyvinyl chloride pipe hall conform to ASTM D3034 in sizes 4 through 15 inch. Perforations shall be two rows of ½ inch diameter holes spread longitudinally, 6 inches (maximum) apart and shall be oriented 120 degrees apart (60

degrees either side of the pipe bottom). A maximum tolerance of ¼-inch on hole spacing and size will be allowed. The top of pipe shall be marked for ease of installation.

PART 3 EXECUTION

3.1 HANDLING PIPE AND FITTINGS

A. Take care in loading, transporting, and unloading to prevent injury to the pipe. Do not drop pipe or fittings. Examine pipe and fittings before installing, and no piece shall be installed that is found to be defective.

B. If any defective pipe is discovered after it has been installed, remove, and replace it with a sound pipe in a satisfactory manner. Thoroughly clean pipe and fittings before installing, keep clean until they are used in the work, and conform to the lines, grades and dimensions required when installed.

C. Pipe ends requiring cutting shall be cut square without damage to the remaining pipe. Bevel cut pipe ends 1/8 inch at approximately 30 degrees to provide proper assembly of the joint. Beveling can be done with a coarse file or portable grinder.

D. Support stored pipe from below at not more than 3-foot intervals to prevent deformation. Do not stack pipe higher than 6 feet. Store pipe and fittings in a manner which will keep them at ambient outdoor temperatures. Provide temporary shading as required to meet this requirement. Simply covering of the pipe and fittings which allows temperature buildup when exposed to direct sunlight will not be permitted.

3.2 INSTALLATION

A. No single piece of pipe shall be laid unless it is generally straight. The centerline of the pipe shall not deviate from a straight line drawn between the centers of the openings at the ends of the pipe by more than 1/16 inch per foot of length. If a piece of pipe fails to meet this required check for straightness, it shall be rejected and removed from the site. Laying instructions of the manufacturer shall be explicitly followed.

B. Install piping and fittings true to alignment and grade. If necessary, each length of pipe shall be cleaned out before installation.

C. Excavation, trenching and back filling procedures shall be in accordance with Section 31 2333.

D. All PVC gravity pipe shall be installed on a bed of 3/4-inch crushed stone borrow meeting the requirements of Section 31 2000 and have a minimum depth of 6 inches. The 3/4-inch crushed stone borrow shall also completely encase the pipe and cover the pipe to a grade 6 inches over the top of the pipe for the entire width of the trench. Bell holes shall be made in the 3/4-inch crushed stone borrow bedding such that the pipe shall be uniformly supported throughout the entire length of the barrel section.

E. All sections of gravity sewer pipe will be low pressure air tested in accordance with Section 33 3114.

F. All PVC force main pipe shall be installed with proper bedding using compacted native materials which provide uniform longitudinal support under the pipe. When an unstable subgrade material is encountered which will provide inadequate pipe support, additional trench depth should be excavated and refilled with suitable material. Initial backfill material should be placed to a minimum one foot over the top of the pipe. Pipe backfill material should be selected and placed carefully, avoiding stones, frozen lumps, and debris.

G. Deflections in Pipe Alignment.

1. Wherever it is necessary to deflect pipe from a straight line, either in the vertical or horizontal plane, to avoid obstructions or where long-radius curves are permitted, the amount of deflection allowed shall not exceed that required for satisfactory making of the joint and shall be approved by the Engineer.

2. Prior to deflecting the pipeline, the spigot of the pipeline should be marked flush with the bell end to assure that the spigot is not withdrawn excessively as the result of the deflection. After the pipe is deflected, an adequate depth of jointing material must remain on the side where the spigot is away from home and an adequate width of caulking space must remain on the opposite side of the pipe at the face of the bell.

3. The maximum deflection recommended by the manufacturer when using any pipe system must be observed when deflecting a pipeline.

4. In general, all radius curves called for on the Drawings or permitted at the time of construction are to be made using full lengths of pipe. The use of short lengths of pipe and extra joints in order to make a smaller radius turn will not be allowed without the written approval of Engineer.

H. Unsuitable Laying Conditions

1. No pipe shall be laid in water, in an unsuitable trench or during unsuitable weather conditions.

I. "As-Built" Information

1. Provide "as-built" survey made by a licensed surveyor registered in the State of Connecticut, paid for by the Site Contractor, showing all actual locations, inverts, grades of structures and piping. Furnish one set to the owner and one set to the Site Engineer. As-builts shall meet the Town of Greenwich Public Works Sewer & Engineering Division requirements.

END OF SECTION

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SECTION 333114 - TESTING OF STORM DRAINAGE AND SANITARY SEWER SYSTEMS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and other Division I Specifications, apply to this section.

1.2 SUMMARY

A. Section Includes

1. Testing of Storm Drainage Systems

2. Testing of Gravity Sanitary Sewer Systems

B. Related Sections

1. Section 33 3115 – Television Inspection of Pipelines

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 TESTING OF STORM DRAINAGE SYSTEMS

A. Storm drainage pipes shall be sighted to ensure that pipes are straight between structures, correctly sloped, clean of debris and sediment and generally free flowing. Alignment shall meet the requirements of Paragraph 3.2.G.

B. Storm drainage structures shall be sighted to ensure that all structures are clean of debris and sediment, have frames, covers, grates, inverts, sumps, and other specified appurtenances installed.

C. All PVC or HDPE drainage pipe shall be tested for deflection in accordance with Paragraph 3.2.E after forty-five (45) days from completion of backfill operations.

D. Conform with the Town of Greenwich Sewer Division standards, materials, and requirements.

3.2 TESTING OF GRAVITY SANITARY SEWER SYSTEMS

A. All gravity sewers shall be tested for allowable leakage by low pressure air test or by an infiltration/exfiltration water test as described herein.

B. Low Pressure Air Test

1. After completing backfill of a section of pipe including laterals, conduct a line acceptance test using low-pressure air. The test shall be performed according to the specified procedures and under the supervision of the Engineer. Follow the testing procedures outlined below.

2. Seal test pneumatic plugs before use in the actual test installation. Lay one length of pipe on the ground and seal at both ends with the pneumatic plugs to be checked. Introduce air into the plugs to 25 psig. Pressurize the sealed pipe to 5 psig. The plugs shall hold against this pressure without bracing and without movement of the plugs out of the pipe.

3. After a manhole reach of pipe has been backfilled and cleaned, and the pneumatic plugs have been checked, place the plugs in the line at each manhole and inflate to 25 psig. Introduce low pressure air into this sealed line until the internal air pressure reaches 4 psig greater than the average back pressure of any groundwater that may be over the pipe. Allow a minimum of two minutes for the air pressure to stabilize. After the stabilization period (3.5 psig minimum pressure in the pipe), disconnect the air hose from the control panel to the air supply. The portion of the line being tested has passed the test if the time required in minutes for the pressure to decrease from 3.5 to 2.5 psig (greater than the average back pressure of any groundwater that may be over the pipe) is not be less than the time shown for the given diameters and lengths in Table 1 at the end of this section.

4. Air tests shall cover a 1.0 psig pressure drop; 0.5 psig pressure drop tests are not acceptable.

5. In areas where groundwater is known to exist, install a one-half inch diameter capped pipe nipple, approximately 10 inches long, through the manhole wall on top of one of the sewer lines entering the manhole. The nipple shall be installed at the time the sewer line is installed. Immediately prior to the line acceptance test, determine the elevation of the groundwater by removing the pipe cap, blowing air through the pipe nipple to remove any obstructions, and then connecting clear plastic tube to the nipple. Hold the hose vertically and measure the height after the water has stopped rising in this plastic tube. Divide the height in feet by 2.3 to establish the pressure in pounds per square inch (psig) that will be added to all readings. (For example, if the height of water is 11-1/2 feet, then the added pressure will be 5 psig. This increases the 3.5 psig to 8.5 psig, and the 2.5 psig to 7.5 psig. The allowable drop of one pound per square inch and the timing remain the same.)

6. The maximum starting test pressure should not exceed 9 psig, regardless of groundwater level above the pipe. If the groundwater level is such that the added pressure would be greater than 5.5 psig (12.7 feet), the pipe section may be tested using a starting pressure of 9 psig.

7. Each pipe nipple installed to measure groundwater levels shall be recapped subsequent to the air testing procedure to prevent future infiltration. The plugs shall be removed and properly plugged with a watertight seal.

8. As an alternative to installing a pipe nipple in a manhole to measure the height of groundwater, excavate a test pit over the pipe to determine the height of groundwater.

C. Vacuum Test for Manholes - Gravity Sewer Line.

1. After a manhole has been constructed, conduct a manhole acceptance test using the following vacuum test procedure:

a. Plug all lift holes with an approved non-shrink grout.

b. Plug all pipes entering the manhole, taking care to securely brace the plug from being drawn into the manhole.

c. Place the test head at the inside of the top of the precast concrete cone section and inflate the seal in accordance with the manufacturers' recommendations.

d. Draw a vacuum of 10 inches of mercury and shut off the vacuum pump. With the valves closed, measure the time for the vacuum to drop to 9 inches. The manhole shall pass if the time is greater than:

1 min. 0 sec. for 0-ft. to 10-ft. deep manholes

1 min. 15 sec. for 10-ft. to 15-ft. deep manholes

1 min. 30 sec. for 15-ft. to 25-ft. deep manholes

e. If the manhole fails the initial test, make repairs with a non-shrink grout. Retest until a satisfactory test is obtained.

D. Infiltration/Exfiltration Test

1. All gravity type sewers shall be subjected to either an infiltration or an exfiltration test unless otherwise specified. The type of test required will be contingent upon groundwater conditions in the area where lines are to be tested. These tests shall include losses or gains through manholes as well as through pipe walls and joints, as well as through house connection fittings and pipe. No building shall be connected to a newly installed sewer until the sewer has been satisfactorily tested.

2. Where lines are installed in areas having a high groundwater level, conduct an infiltration test of a minimum four-hour duration under the supervision of the Engineer. Isolate various sections of the sewer using of watertight plugs and measure the quantity of water entering the pipe during a predetermined time. If the conditions are such that groundwater table varies depending on surrounding influence and time of the year or if the table elevation is unknown at the time of testing, excavate test holes as directed by the Engineer.

3. Where lines are installed in relatively dry areas, conduct an exfiltration test. Conduct this test by isolating various sections of the line using watertight plugs and filling the line with water to a predetermined level. Determine the loss of water in a predetermined time by measuring the quantity of water required to refill the line to the original level.

4. The Engineer will determine the length of line to be tested at one time, depending on the grade of the sewer.

5. Include losses through manholes in determining the loss in a line. For exfiltration test, fill manholes to the bottom of the cone or flat top section and allow to stabilize before beginning test. Refilling to reference line may be required before commencing test.

6. The maximum acceptable loss, through either infiltration or exfiltration, shall not exceed 100 gallons per mile per 24 hours per inch of diameter of the pipe tested. When two or more pipeline sections are tested at the same time, the allowable leakage for the shortest section shall be used as the acceptable loss for the entire length being tested.

E. Allowable Deflection Test for PVC or HDPE Pipe (Sewer or Drain Pipe) - Unless otherwise specified, all gravity and drain PVC or HDPE pipe shall be tested for allowable deflection in accordance with the procedure noted below.

1. Pipe deflection measured not less than 45 days after the backfill has been completed as specified shall not exceed 5 percent. Deflection shall be computed by multiplying the amount of deflection (average outside diameter less twice the average wall thickness diameter when measured) by 100 and dividing by the nominal diameter of the pipe.

2. Deflection shall be measured with a rigid mandrel (Go-No-Go) device cylindrical in shape and constructed with a minimum of nine or ten evenly spaced arms or prongs. Submit drawings of the mandrel with complete dimensions for each diameter of pipe to be tested. Hand pull the mandrel through all sewer and drain lines.

3. Uncover any section of pipe not passing the mandrel and replace the bedding and backfill to prevent excessive deflection. Retest repaired pipe immediately upon backfilling of trench until acceptable.

4. Retest the repaired section of pipeline from manhole to manhole again after the 45 day backfill period until acceptable.

F. Test Failures

1. In case leakage or deflection exceeds the above specified amount, locate the failure and repair them at no additional cost to the Owner.

2. Pipelines with shear-type breaks, fishmouths or damaged gaskets, cracked bells or couplings, hairline fractures, or structural damage shall be replaced in kind. Mechanical sleeve couplings, poured concrete collars or similar repairs are not permitted. The use of pressure grouting repair techniques will not be allowed without the written consent of the Engineer.

3. After repairs have been made, re-test the line and repeat the process of repairing and re-testing until results within the above specified limits are obtained.

G. Alignment of Gravity Sewers and Drains

1. Lay gravity sewers and drains accurately to line and grade.

2. After the pipe is laid and backfill complete, visually inspect the interior of the pipe from manhole to manhole. If it is not possible to sight from manhole to manhole through the pipe, the alignment is considered unacceptable.

3. CCTV inspections shall be performed per specification 33 3115 upon completion sanitary mains and laterals. Contractor shall clean and jet any construction debris encountered during the CCTV inspections.

4. If the alignment is unacceptable due to vertical displacement, remove and replace the pipe to the proper grade.

3.3 PAYMENT FOR TESTS

1. No separate payment will be made for preparing or carrying out tests of pipelines or structures. Furnish all materials, equipment, gauges, pumps, specials, temporary tappings in line, and water or other things required for making the tests. Test all manholes and pipe installed as part of the Work.

TABLE I

SPECIFICATION TIME REQUIRED FOR A 1.0 PSIG PRESSURE DROP

FOR SIZE AND LENGTH OF PIPE INDICATED FOR Q=0.0015

1	2	3	4	Specification Time for Length (L) Shown (min:sec)							
Pipe Diameter (in.)	Minimum Time (min:sec)	Length for Minimum Time (ft)	Time for Longer Length (sec)	100 ft.	150 ft.	200 ft.	250 ft.	300 ft.	350 ft.	400 ft.	450 ft.
4	3:46	597	.380 L	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	398	.854 L	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8	7:34	298	1.520 L	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24
10	9:26	239	2.374 L	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48
12	11:20	199	3.418 L	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38

Uni-Bell PVC Pipe
Association Publication
Uni-B-6-90

END OF SECTION

SECTION 334100 - STORM DRAINAGE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and other Division I Specifications, apply to this section.

1.2 SUMMARY

A. General: Provide storm drainage systems in accordance with the Contract Documents.

B. Related Sections include the following:

1. Section 31 2500 – Soil Erosion and Sediment Controls
2. Section 31 2300 - Excavation, Backfill, Compaction and Dewatering
3. Section 31 2333 – Trenching and Backfilling
4. Section 33 0514 – Breaking into Existing Manholes and Catch Basins
5. Section 33 4419 – Stormwater Treatment System
6. Appendix F - Report entitled "Greenwich Central Middle School Construction-Vibration and Controls During Construction" by Gap Mountain Consulting Engineers, PLLC dated November 1, 2024. The Construction-Vibration and Controls report is provided to outline the requirements for monitoring and protection the existing school building from structural damage while it is occupied.

1.3 COORDINATION

A. Coordinate and schedule the work of this Section with all trades involved to prevent interference, and in order to allow adequate time at the proper stage of construction to properly perform all work of this Section.

1.4 REQUIREMENTS AND RESTRICTIONS

A. Requirements given herein may be affected by other related requirements of the project specifications. Correlation of all contract requirements is the responsibility of the Contractor.

B. Connect to storm drain lines at a point five (5) feet outside the building lines. All drain lines within a point five (5) feet outside the building lines are specified in the Plumbing Division.

C. Work to comply with all applicable codes and regulations. Furnish all bonds necessary to get a permit for cuts and connections to sewer.

D. The term "Local Standards" as used herein, means the standards of design and construction of the Town of Greenwich, or State of Connecticut, whichever is applicable.

E. Maintain in operating condition all active utilities, sewers, gutters, and other drains encountered in the utility installation. Repair to the satisfaction of the Owner any surface or subsurface improvements damaged during the course of the Work (unless such improvement is shown to be abandoned or removed), whether or not such improvement is shown on the Drawings.

1.5 APPLICABLE STANDARDS

A. Town of Greenwich applicable standards for roadway standards.

B. Standard Specifications for Roads, Bridges and Incidental Construction Form 818 as issued by the State of Connecticut Department of Transportation, 2020 edition with all latest amendments thereto.

C. The Town of Greenwich Public Works standards, materials, and requirements.

1.6 SUBMITTALS

A. Structure details for manholes, catch basins, trench drains, oil interceptors, vortex swirl separators, rims, frames, grates, etc.

B. Certification of Specification Compliance for drainage structures including catch basins and manholes.

C. All piping certifications, casting data and the like as may be required by the Owner.

D. Product data for geotextile fabric for riprap aprons, if substitution is requested.

E. Product data for erosion control blanket, if substitution is requested.

PART 2 PRODUCTS

2.1 MATERIALS

A. Pipe:

1. Polyvinyl Chloride (PVC) Pipe: Pipe and fittings to conform to ASTM D 3034 "Type PSM Polyvinyl Chloride (PVC) Sewer pipe and fittings, Class SDR-35." The minimum modulus of elasticity shall be 400,000 psi.

2. Corrugated Exterior / Smooth Interior HDPE Pipe and Fittings: Pipe and fittings to conform to ASTM D3350 minimum cell classification 324420C (4”-10”) or

325420C (12”-60”). The polyethylene pipe and fittings shall comply with AASHTO M294, Type S (smooth wall interior)

B. Structures and Miscellaneous:

1. Concrete – Class “A” Concrete conforming to ConnDOT Form 818, Article M.03.01, 3,000 p.s.i. to comply with requirements and workmanship set forth in the referenced standards.

2. Ensure precast structures are yard manufactured of 5,000 p.s.i. material and are in accordance with standard details as shown on the drawings - ASTM C-478 and in compliance with Section M.08.02.4 of the reference standard.

3. Concrete block for drainage structures shall conform to the requirements of ASTM C 55, Grade S II.

4. Masonry concrete units for drainage structures shall conform to the requirements of ASTM C139.

5. Brick for adjustment – AASHTO M 91, Grade SM, except that the depth shall be 2-1/4 inches, the width 3-5/8 inches and the length 8 inches, and except that the maximum water-absorption by 5-hour boiling shall not exceed 15% for an average of five bricks, or 18% for an individual brick.

6. Ensure frames and covers or gratings are provided where indicated on the drawings of cast iron conforming to ASTM A-48, Class 30 and are similar and equal to Campbell Foundry Company as required by drawing details. Machine casting frame and grating seats to prevent rocking. Unit assemblies to comply with Section M.08.02-5 of the reference standard.

7. Catch basin bell traps are to be constructed of cast iron for pipe sizes up to 24 inches, and galvanized fabricated steel for pipe sizes 24 inches and over. Hanger plates to be constructed of same metal.

8. Aluminum Steps for Manholes: Aluminum conforming to AASHTO M199 (ASTM C478), with ends in concrete walls coated with zinc chromate paint conforming to Federal Specification TT-P645.

C. Backfill and Bedding Material:

1. The backfill envelope of select material, consisting of crushed stone and sand, for storm drain piping shall meet the following gradation:

a. 100% passing 1/4-inch sieve; not more than 35% passing the No. 50 sieve; not more than 10% passing the No. 100 sieve.

b. All percentages are by weight and shall be determined in accordance with ASTM D422.

2. Bedding Material shall be as follows:

a. For structures, crushed stone conforming to ConnDOT Form 818, Article M.02.06-1.

D. Riprap Aprons:

1. Riprap for riprap aprons shall be sound, tough, durable and angular rock, free from decomposed stones or other defects impairing its durability and shall conform to the gradation of Modified Riprap as specified in ConnDOT Form 818, Article M.12.02-3.

2. Granular fill beneath riprap aprons shall conform to ConnDOT Form 818, Article M.02.01-2.

3. Geotextile for riprap aprons shall be Mirafi 140N, or approved equal.

E. Drainage Swales:

1. Erosion Control Blanket for turf establishment in swales shall be North American Green S75, or approved equivalent.

2. Seeding for grass swales in wetland areas shall be "New England Wetmix", by New England Wetland Plants, Amherst, Massachusetts, or approved equal.

F. Biofiltration Swales:

1. Seeding for biofiltration swale slopes and bottoms shall be "New England Control/Restoration Mix", by New England Wetland Plants, Amherst, Massachusetts, or approved equal.

2. Permeable soil shall be a mixture of 60% sand conforming to ConnDOT Form 818, Article M.08.01-21, 20% Topsoil conforming to Section 02900, and 20% Leaf Compost.

3. Crushed Stone: ConnDOT Grading No. 6, conforming to ConnDOT Form 818, Article M.02.01-1.

4. Separation Geotextile: Mirafi 140N or approved equal.

F. Balance of materials shall be as indicated on the Drawings and/or specified elsewhere in this Section.

PART 3 EXECUTION

3.1 INSPECTION

A. Provide adequate survey controls to construct the utility lines and structures as shown on the Drawings. Deviations from the plans will be permitted only with the approval of the Owner. Provide an "as-built" record made by a licensed surveyor registered in the State of Connecticut, and paid for by the Site Contractor, showing all actual locations, inverts, grades, etc. Furnish one set furnished to the Owner and one set to the Site Engineer.

B. Examine the areas and conditions under which the site storm drainage system is to be installed. Notify the Owner and Site Contractor in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in an acceptable manner.

C. Dig test pits at the locations shown on the Drawings or ordered by the Owner before installation of storm drainage systems. Notify Engineer 48 hours before start of test pits. Test pit excavations shall have neat, clean cut and vertical sides. Provide Engineer with survey of utilities within the hole showing horizontal and vertical location of top and bottom of all pipes, ducts and structures and a description of size and type of material. Backfill, compaction and surfacing to be in accordance with Section 31 2333 – Trenching and Backfilling.

3.2 TRAFFIC CONTROL

A. Maintain access for vehicular and pedestrian traffic as required for other construction activities and for public when working in road rights-of-way.

B. Provide flagmen, barricades, warning signs and warning lights as required. Obtain required opening permits before start of Work.

3.3 INSTALLATION

A. Lay out all drainage systems, starting from the downstream end, true to line and grade to provide positive pitch, and place "in-the-dry".

B. Length of piping shown is approximate. Provide all piping required to complete system.

C. Lay pipe true to the lines and grades shown on the Drawings or ordered by the Engineer.

D. Before laying pipe, wipe the insides of sockets and outside of spigots clean of all dirt, grease, sand or water.

E. The pipe should not be dropped from the delivery truck into an open trench or onto uneven surface, it should not be dragged or struck against another pipe or object, the pipe should not be dragged across the ground.

F. Where soft foundation is encountered in the progress of the Work, Site Contractor to remove such soft foundations as unsuitable material and material as described in the excavation of unsuitable material or as ordered by the Owner's Geotechnical Consultant. Place crushed stone not less than six inches in depth in wet trenches as bedding to support pipe and structures, on the order of the Owner's Geotechnical Consultant. Ensure stone is of a quality acceptable to the Owner's Geotechnical Consultant and not larger than will pass through a one (1) inch ring.

G. Conduct backfilling so that no stone having a dimension larger than five (5) inches shall be placed within six (6) inches of completed sewer line and none larger than nine (9) inches in diameter shall be placed less than fifteen (15) inches above the pipe.

H. Install gaskets in accordance with manufacturer's recommendations for use of lubricants, cements, and other special installation requirements.

I. At the point where the proposed sewer construction meets a live or exiting sewer, the new sewer shall be securely plugged with brick and mortar until the entire new sewer construction is completed and ready for final inspection. No deviations from this provision will be allowed.

J. Plastic Pipe: Install plastic piping in accordance with pipe manufacturer's instructions. Use joint adhesives as recommended by manufacturer to suit basic pipe materials. Where standards herein conflict, the more stringent shall apply.

3.4 CLEANING CONDUIT

A. Clean interior of conduit of dirt and other superfluous material as Work progresses. Maintain swab or drag in line and pull past each joint as it is completed.

B. In large, accessible conduit, brushes and brooms may be used for cleaning.

C. Place plugs in ends of uncompleted conduit at end of day or whenever Work stops.

D. Flush lines between manholes if required to remove collected debris.

3.5 JOINT ADAPTERS

A. Make joints between cast iron pipe and other types of pipe with standard manufactured cast iron adapters and fitting.

3.6 ROOF DRAIN CONNECTIONS

A. Connect roof drains to storm drainage system with standard adapters. Grout joints between PVC pipe, cast iron pipe and concrete pipes thoroughly with cement mortar to make watertight joints.

3.7 CLOSING ABANDONED UTILITIES

A. Close open ends of abandoned underground utilities in accordance with Drawings. Provide sufficiently strong closures to withstand hydrostatic or earth pressure that may result after ends of abandoned utilities have been closed.

3.8 INTERIOR INSPECTION

A. Inspect conduit to determine whether line displacement or other damage has occurred.

B. Perform inspections after lines between manholes or catch basin locations have been installed and approximately two feet of backfill is in place and at completion of Project.

C. If inspection indicates poor alignment, debris displaced pipe, infiltration, or other defects, correct such defects to the satisfaction of the Engineer. Debris to be disposed off-site at Construction Manager's expense.

3.9 DRAINAGE STRUCTURES (REFER TO DETAILS)

A. Inspect conduit to determine whether line displacement or other damage has occurred.

B. Set brick and/or block in mortar with joints full and fill all joints.

C. In manholes form invert channel of concrete, fill, smooth and accurately shape to conform to outside of adjoining pipe. Change direction of channel with true curve of as large as radius as possible.

D. Where structures are constructed of solid concrete catch basin block, set block in cement mortar and fill all cross joints.

E. Set frames and grates to proper elevations and in bed of mortar.

3.10 EXISTING UTILITIES

A. Utility locations shown are approximate. Contractor shall determine exact locations before submitting bid.

B. When encountered in Work or as indicated, protect existing active sewer, water, gas, electric, other utility services, structures; where required for proper execution of Work, relocate them as directed by the Utility Company responsible for the service. If existing active services are not indicated but are encountered, requiring protection or relocation, determine with utility company providing said service the appropriate action required to provide protection or method of relocation; advise Owner of all changes and manner of same.

END OF SECTION

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SECTION 334113 - HIGH DENSITY POLYETHYLENE PIPE AND FITTINGS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and other Division I Specifications, apply to this section.

1.2 SUMMARY

A. Section Includes

1. High density polyethylene (HDPE) pipe for:

a. On-site storm drainage lines.

2. Types of HDPE piping specified in this section include:

a. Corrugated exterior, smooth interior, solid wall HDPE pipe.

b. Corrugated exterior, smooth interior, perforated HDPE pipe

B. Related Sections

1. Section 31 2300 – Excavation, Backfill, Compaction and Dewatering

2. Section 31 2333 – Trenching and Backfilling

3. Section 33 3114 – Testing of Sanitary Sewer and Storm Drainage Systems

4. Appendix F - Report entitled "Greenwich Central Middle School Construction-Vibration and Controls During Construction" by Gap Mountain Consulting Engineers, PLLC dated November 1, 2024. The Construction-Vibration and Controls report is provided to outline the requirements for monitoring and protection the existing school building from structural damage while it is occupied.

1.3 REFERENCES

A. AASHTO M252 –Corrugated Polyethylene Drainage Pipe

B. ASSHTO M294 – Corrugated Polyethylene Pipe, 300- to 1200-mm Diameter

C. AASHTO MP7 – Corrugated Polyethylene Pipe, 1300- to 1500-mm Diameter

D. ASTM D1248 – Standard Specification for Polyethylene Plastics Extrusion Materials For Wire and Cable

E. ASTM D2321 – Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications

F. ASTM D2412 – Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading

G. ASTM D2683 – Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing

H. ASTM D2737 – Standard Specification for Polyethylene (PE) Plastic Tubing

I. ASTM D2774 – Standard Practice for Underground Installation of Thermoplastic Pressure Piping

J. ASTM D2837 – Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials

K. ASTM D3212 – Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals

L. ASTM D3261 – Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing

M. ASTM D3350 – Standard Specification for Polyethylene Plastics Pipe and Fittings Materials

N. ASTM F405 – Standard Specification for Corrugated Polyethylene (PE) Tubing and Fittings

O. ASTM F667 – Standard Specification for Large Diameter Corrugated Polyethylene Pipe and Fittings

P. ASTM F1417 – Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air

1.4 SUBMITTALS

A. Submit product data on the pipe, fittings, and accessories.

B. Prior to first shipment of pipe, submit certified test reports that the pipe for this Contract was manufactured and tested in accordance with the appropriate ASTM standards specified herein.

C. All on-site storm sewers shall conform to Advance Drainage Systems ADS N12 WT IB pipe or approved equal.

1.5 DELIVERY, STORAGE AND HANDLING

A. When lifting with slings, only wide fabric choker slings capable of safely carrying the load shall be used. Wire rope or chain shall not be used to handle pipe.

PART 2 PRODUCTS

2.1 MANUFACTURER – GENERAL

A. The manufacturer shall have manufacturing and quality assurance facilities capable of producing and assuring the quality of the pipe and fittings required by these specifications.

B. Pipe and fittings from different manufacturers shall not be interchanged for the same type of pipe and application.

2.2 PIPE IDENTIFICATION

A. The following shall be continuously indent printed on the pipe or spaced at intervals not exceeding five-feet:

1. Name and/or trademark of the pipe manufacturer.

2. Nominal pipe size.

3. Dimension ratio.

4. The letters “PE” followed by the polyethylene grade in accordance with the ASTM designation, followed by the hydrostatic design basis in PSI.

5. A production code from which the date and place of manufacture can be determined.

2.3 CORRUGATED EXTERIOR / SMOOTH INTERIOR HDPE PIPE AND FITTINGS

A. General

1. The polyethylene pipe and fittings shall comply with AASHTO M294, Type S (smooth wall interior).

2. Piping shall be manufactured by Advanced Drainage Systems, Inc., or approved equal.

3. Pipe material and fittings shall be high density polyethylene meeting ASTM D3350 minimum cell classification 324420C (4”-10”) or 325420C (12”-60”).

4. Installation shall be in accordance with ASTM D2321.

5. Pipe shall be joined with the bell-and-spigot joint. Gaskets and joint lubricant shall be utilized. On-site storm sewer pipe shall be ADS N12 WT IB type pipe or approved equal.

6. Minimum parallel plate pipe stiffness shall be as recommended for each specified diameter pipe per ASTM Test Method D2412.

7. The pipe and fittings shall be free of foreign inclusions and visible defects. The ends of the pipe shall be cut squarely and cleanly so as not to adversely effect joining.

8. The nominal size of the pipe and fittings is based on the nominal inside diameter of the pipe. Corrugated fittings may be either molded or fabricated by the manufacturer. Fittings and gaskets supplied by manufacturers other than the supplier of the pipe shall not be permitted without the approval of the Engineer.

2.4 JOINTS FOR CORRUGATED PIPING

A. General

1. Joints of corrugated pipe sections and fittings other than smooth interior, shall be made with split couplings, corrugated to engage the pipe corrugations, and shall engage a minimum of 4 corrugations, 2 on each side of the pipe joint. Where required by the Engineer, a neoprene gasket shall be utilized with the coupling to provide a soil tight joint.

2. Joints of smooth interior, corrugated pipe sections shall be as per manufacturer's instructions utilizing gasketed PVC or HDPE joints meeting ASTM D-3212.

3. Installation shall be in accordance with ASTM Recommended Practice D-2321 or as specified by the Engineer or local approving agency.

B. Watertight Pipe

1. Provides superior watertight performance.

2. Meets ASTM D3212 requirements of 10.8 PSI for 10 minutes with no leakage.

3. Shall be ADS, N-12 IB WT (watertight joint type) piping or approved equal.

C. Manhole Boot Connection

1. Watertight seal made with rubber manhole boot as manufactured by Press Seal, or approved equal.

2. Alternatively, watertight seal made by Alok, or approved equal, in which case maximum insertion angle is 7 degrees.

D. Watertight Seals for Corrugated HDPE Pipe - Shall be NPC Corrugated Pipe Adapter compatible with Kor-N-Seal manhole connector.

2.5 CORRUGATED INTERIOR/SMOOTH EXTERIOR SLOTTED HDPE PIPE

A. Corrugated, slotted, HDPE tubing shall meet AASHTO M-252. Slotted tubing shall be supplied factory wrapped in a polyester geotextile filter sock. The filter sock shall have a minimum weight of 3.0 oz/square yard, a minimum burst strength of 100 psi, and an apparent opening size of 35.

B. A manufacturers' certification that the product was manufactured, tested, and supplied in accordance with this specification shall be furnished to the Engineer upon request.

C. There shall be a minimum soil cover of 12 inches, as measured from the top of the pipe, for H-20 loading conditions.

D. Filter Fabric Wraps

1. Extra strong synthetic materials are to be used with perforated drainage pipe to prevent infiltration of fine soil particles while allowing water to flow freely.

2. Material shall be ADS Sock, as manufactured by Advanced Drainage Systems or approved equal.

PART 3 EXECUTION

3.1 PREPARATION

A. The Contractor shall verify that the surface has been prepared to the proper line and grade by shooting invert elevation grades.

3.2 INSTALLATION

A. Open-Cut Installations

1. Polyethylene pipe and fittings shall be installed in accordance with ASTM Standards, and the manufacturers recommendations.

2. Pipe is to be lifted or rolled into position, not dragged over the prepared bedding.

3. The pipe is to be set at the slope and grades indicated on the plans. Ensure pipe remains at proper grades by shoring it.

4. All HDPE piping shall be bedded in 6" of crushed stone unless noted otherwise.

5. Crushed stone shall be used as backfill to a point of 6" above the top of the pipe unless noted otherwise.

6. Clay dams shall be installed in the stone backfill as directed by the Engineer to prevent groundwater migration. Spacing shall be 50 ft. maximum.

7. No single piece of pipe shall be laid unless it is generally straight. The centerline of the pipe shall not deviate from a straight line drawn between the centers of the openings at the ends of the pipe by more than 1/16 inch per foot of length. If a piece of pipe fails to meet this requirement check for straightness, it shall be rejected and removed from the site. Laying instructions of the manufacturer shall be explicitly followed.

8. Install piping and fittings true to alignment and grade. If necessary, each length of pipe shall be cleaned out before installation.

B. Joint Couplings

1. Joint couplings shall be installed in accordance with manufacturer's recommendations.

2. Remove the protective paper and wrap the collar around the pipe with the mastic side to the pipe. The overlap shall be at the top of the pipe.

3. Secure the steel straps. The closing flap shall cover the exposed straps.

4. Encase the entire joint with a minimum of 8 inches of concrete on all sides. The concrete encasement shall extend along the pipe 12 inches on each side of the joint.

3.3 TESTING

A. Pressure Testing

1. All sections of polyethylene drain and sewer pipe shall be tested in accordance with Section 33 3114.

3.4 "AS-BUILT" INFORMATION

1. Provide "as-built" survey made by a licensed surveyor registered in the State of Connecticut, paid for by the Site Contractor, showing all actual locations, inverts, grades of structures and piping. Furnish one set to the owner and one set to the Site Engineer. As-Built plans shall conform with the Town of Greenwich Public Works requirements.

END OF SECTION

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SECTION 334114 - UNDERGROUND WARNING TAPE

PART 1 GENERAL

1.1 RELATED SECTIONS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and other Division I Specifications, apply to this section.

1.2 SUMMARY

A. Section Includes

1. Underground Warning Tape for site water, electric, tel-com, gas, drainage and sanitary sewer.

1.3 SUBMITTALS

A. Shop Drawing Submittals

1. Product Data

PART 2 PRODUCTS

2.1 MATERIALS

A. Metallic warning tape for underground piping shall be polyethylene tape with metallic core for easy detection and location of piping with a metal detector.

B. Tape shall be 6 inches wide.

C. Tape shall be as manufactured by Seton Name Plate Corp., New Haven, CT; Presco Detectable Underground Warning tape, Sherman, Texas; Blackburn Manufacturing, Neligh, NE; Mercotape, Hachensach, NJ; or approved equal.

D. The warning tape shall be heavy gauge 0.004 inch polyethylene and shall be resistant to acids, alkalis and other soil components. It shall be highly visible in the following colors with the associated phrases stamped in black letters and repeated at a maximum interval of 40 inches.

Type of Utility	Color	Warning Message
Sanitary Sewer	Green	CAUTION – SANITARY SEWER BURIED BELOW
Storm Drain	Green	CAUTION - STORM DRAIN BURIED BELOW
Water	Blue	CAUTION – WATER LINE BURIED BELOW
Electric	Red	CAUTION – ELECTRIC LINE BURIED BELOW
Tel-Com	Orange	CAUTION – TELEPHONE LINE BURIED BELOW
Gas	Yellow	CAUTION – GAS LINE BURIED BELOW

E. The tape shall be of the type specifically manufactured for marking and locating utilities.

PART 3 EXECUTION

3.1 INSTALLATION

A. All buried pipe and fittings shall be installed with metallic-lined underground warning tape located approximately 18 inches below grade to allow detection by a metal detector.

END OF SECTION

SECTION 334419 - STORMWATER TREATMENT SYSTEM

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including General and Supplemental Conditions and other Division I Specifications, apply to this section.

1.2 SUMMARY

A. General: Provide precast concrete stormwater treatment systems and appurtenances and stormwater management systems in accordance with the Contract Documents.

B. Related Sections include the following:

1. Section 31 2500 – Soil Erosion and Sediment Controls

2. Section 31 2300 - Excavation, Backfill, Compaction and Dewatering

3. Section 31 2333 – Trenching and Backfilling

4. Section 33 4100 – Storm Drainage

5. Appendix F - Report entitled "Greenwich Central Middle School Construction-Vibration and Controls During Construction" by Gap Mountain Consulting Engineers, PLLC dated November 1, 2024. The Construction-Vibration and Controls report is provided to outline the requirements for monitoring and protection the existing school building from structural damage while it is occupied.

1.3 QUALITY CONTROL INSPECTION

A. The quality of materials, the process of manufacture, and the finished sections are subject to inspection by the Engineer. Such inspection may be made at the place of manufacture, or on the work site after delivery, or at both places, and the sections are subject to rejection at any time if material conditions fail to meet any of the specification requirements, even though sample sections may have been accepted as satisfactory at the place of manufacture. Mark sections rejected after delivery to the site and remove from the site at once. Reject all sections that have been damaged beyond repair during delivery and, if already installed, repair acceptably, if permitted, or remove and replace, at no additional expense to the Owner.

B. Inspect all sections for general appearance, dimensions, soundness, etc. Ensure the surface is dense, close textured and free of blisters, cracks, roughness, and exposure of reinforcement.

1.4 SUBMITTALS

A. Annotate shop drawings to indicate all materials to be used and all applicable standards for materials, required tests of materials and design assumptions for structural analysis. Design calculations and shop drawings to be certified by a Professional Engineer retained by the system manufacturer and licensed in the State of Connecticut.

PART 2 PRODUCTS AND MATERIALS

2.1 MATERIALS

A. Stormwater management infiltrators shall be StormTech MC-3500 manufactured by Advanced Drainage Systems or approved equal.

B. The stormwater treatment system manufacturer to furnish documentation which supports all product performance claims and details storage capacities and maintenance requirements.

1. Stormwater Treatment System shall be a CDS hydrodynamic separator by ConnTech Engineered Solutions, LLC. The model shall be as shown on the contract drawings or approved equal.

PART 3 EXECUTION

3.1 INSTALLATION

A. Stormwater Treatment System – CDS Hydrodynamic Separator

1. Construct each Stormwater Treatment System per the sizes shown on the Drawings and as specified herein. Install at elevations and locations shown on the Drawings or as otherwise directed by the Engineer. In general, install per manufacturer's recommendations.

2. Place the precast base unit on a ¾" crushed stone bed of minimum thickness of six inches after compaction or of greater thickness and compaction if specified elsewhere. Crushed stone bed shall be level prior to setting the structure base and check the precast base section of the trap for level at all four comers after it is set. If the slope from any corner to any other corner exceeds 0.5%, remove the base section and re-level the granular subbase material.

3. Prior to setting subsequent sections, place butyl mastic sealant equal to ASTM C990 along the construction joint in the section that is already in place.

4. Prior to setting the precast roof section, install the circular swirl chamber wall by bolting the swirl chamber to the side walls at the three (3) tangent points and at the 3-

inch-wide inlet tab using HILTI brand concrete anchors or equivalent 1/2-inch diameter by 3-inch minimum length at heights of approximately three inches (3 ") off the floor and at the mid-height of the completed trap (at locations of pre-drilled holes in 7aluminum components). Seal the bottom edge of the swirl chamber to the trap sidewalls to the outside of the swirl chamber from the floor to the same height as the inlet pipe invert using a butyl mastic or approved equal sealant.

5. Prior to setting the precast roof section, place butyl mastic sealant equal to ASTM C990 along the top of the baffle wall, using more than one layer of mastic if necessary, to a thickness at least one inch (1") greater than the nominal gap between the top of the baffle and the roof section.

   Determine the nominal gap either by field measurement or the shop drawings. After placement of the roof section has compressed the butyl mastic sealant in the gap, finish sealing the gap with an approved non-shrink grout on both sides of the gap using the butyl mastic as a backing material to which to apply the grout. Also apply non-shrink grout to the joints at the side edges of the baffle wall.

6. After setting the precast roof section of the stormwater treatment system, set precast concrete manhole riser sections, to the height required to bring the cast iron manhole covers to grade, so that the sections are vertical and in true alignment with a 1/4 inch maximum tolerance allowed. Fill the outside and inside joint with a comparatively dry mortar (one part cement and two parts sand) and finish flush with the adjoining surfaces. Backfill carefully, bringing the fill up evenly on all sides. If leaks appear, clean the inside joints and caulk with lead wool to the satisfaction of the Engineer. Precast sections shall be set in a manner that will result in a watertight joint.

7. Plug holes in the concrete sections made for handling or other purposes with a non-shrink grout or by grout in combination with concrete plugs.

8. Where holes must be cut in the precast sections to accommodate pipes, do all cutting before setting the sections are in place to prevent any subsequent jarring which may loosen the mortar joints. The Contractor shall make all pipe connections.

3.2 FIELD TESTING

A. Stormwater Treatment Systems

1. Fill all stormwater treatment systems with water up to the lowest pipe invert and test for ex-filtration. Any loss of water constitutes a system that is not watertight. Find the leak and correct.

2. Test all stormwater treatment systems for leakage around the grit chamber while leaving water in the rest of the trap up to the bottom of the lowest opening in the grit chamber. If water flows into the grit chamber, find the leak and correct.

3.3 CLEANING TREATMENT SYSTEM

A. At the end of the construction phase, once the storm drainage system has been accepted and approved by the Owner and Engineer, the Stormwater Treatment System and Stormwater Management Systems shall be pumped out and cleaned by a licensed hauler and the sediment and liquid disposed of off-site.

B. Once the system is cleaned and accepted by the Engineer, fill the Stormwater System with water up to the lowest pipe invert.

END OF SECTION

SECTION 340000 – TRANSPORTATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

All general requirements and covenants shall conform to the Connecticut Department of Transportation Standard Specifications for Roads, Bridges, Facilities, and Incidental Construction Form 818 with modifications for the following sections as stated in this specification:

- SECTION 1.05 – CONTROL OF THE WORK
- SECTION 1.06 – CONTROL OF MATERIALS
- SECTION 1.07 – LEGAL RELATIONS AND RESPONSIBILITIES
- SECTION 1.08 – PROSECUTION AND PROGRESS

1.2 SUMMARY

SECTION 1.05 - CONTROL OF THE WORK

Article 1.05.02 - Plans, Working Drawings and Shop Drawings are supplemented as follows:

Sub article 1.05.02 - (2) is supplemented by the following:

Traffic Signal Items:

When required by the contract documents or when ordered by the Engineer, The Contractor shall prepare and submit product data sheets, working drawings and/or shop drawings for all traffic signal items, except Steel Span Poles and Mast Arm Assemblies when applicable, to the Division of Traffic Engineering for review before fabrication. The packaged set of product data sheets, working drawings and/or shop drawings shall be submitted in an electronic portable document format (.pdf).

The packaged set submitted in an electronic portable document format (.pdf) shall be in an individual file with appropriate bookmarks for each item. The electronic files for product data sheets shall be created on ANSI A (8 ½" x 11"; 216 mm x 279mm; letter) sheets. Working drawings and shop drawings shall be created on ANSI B (11" x 17"; 279 mm x 432 mm; ledger/tabloid) sheets.

Please send the pdf documents via email to:

APWhite@tighebond.com

SECTION 1.06 - CONTROL OF MATERIALS

Article 1.06.01 - Source of Supply and Quality:

Add the following:

Traffic Signal Items:

For the following traffic signal items, the contractor shall submit a complete description of the item, shop drawings, product data sheets and other descriptive literature which completely illustrates such items presented for formal review. Such review shall not change the requirements for a certified test report and materials certificate as may be called for. All documents shall be grouped into one separate file for each group of items as indicated by the Roman numerals below (for example, one pdf file for all of the pedestal items). The documents for all of the traffic signal items shall be submitted at one time, unless otherwise allowed by the engineer.

I. 1117111A – Rectangular Rapid Flashing Beacon Assembly (Type B)
II. School Radar Speed Display Sign with Flashing Beacons (Solar Powered)

SECTION 1.07 - LEGAL RELATIONS AND RESPONSIBILITIES

Article 1.07.13 - Contractor's Responsibility for Adjacent Property, Facilities, and Services is supplemented as follows:

The following company and representative shall be contacted by the Contractor to coordinate the protection of their utilities on this project 30 days prior to the start of any work on this project involving their utilities:

Ms. Amy Siebert
Town of Greenwich
101 Field Point Road PO Box 2540-Town Hall
Greenwich, CT 06836
(203) 622-7740

Mr. Frank Gomes
Cablevision
28 Cross Street
Norwalk, CT 06851
(203) 750-5630

Mr. Eric Clark
Crown Castle Fiber, LLC
1781 Highland Avenue, Suite 102
Cheshire, CT 06410
(203) 649-3904

Mr. David Vega
CenturyLink Communications
71 Clinton Road
Garden City, NY 11530
(917) 207-4604

Mr. Eric Johnson
MCImetro Access Transmission Services
85 High Street
Pawtucket, RI 02860
(401) 727-9558

Ms. Lynne DeLucia
Frontier
1441 North Colony Road
Meriden, CT 06450
(203) 238-5000

Mr. John Sprague
Verizon New York
111 Main Street
White Plains, NY 10601
(914) 821-9610

Mr. Brandon Lawrence
Zayo Group
1401 Wynkoop Street
Denver, CO 80202
(502) 542-7772

Mr. Mark Bonjuklian
Eversource
9 Tindall Avenue
Norwalk, CT 06851
(203) 845-3456

Mr. Jonathan Gould
Connecticut Natural Gas Corporation
76 Meadow Street
Hartford, CT 06108
(860) 727-3044

Mr. David Wood
Kinder Morgan
8 Anngina Drive
Enfield, CT 06082
(860) 763-6005

Mr. Carlos Vizcarrondo
Aquarion
600 Lindley Street
Bridgeport, CT 06606
(203) 337-5950

When ready for inspection, the Contractor should be present for the release of the connection of electrical service. The local Building Department shall be contacted for electrical service inspections for controllers located on town roads located within the respective municipality.

SECTION 1.08 - PROSECUTION AND PROGRESS

Article 1.08.03 - Prosecution of Work:

Add the following:
The Contractor shall stake the limits of the concrete sidewalks and ramps in conjunction with staking the locations of foundations to ensure that pedestrian push buttons will be located appropriately and will be accessible from a landing area.

The Contractor shall notify the project engineer on construction projects, or the district permit agent on permit jobs, when all traffic signal work is completed. The project engineer or district permit agent will notify the Division of Traffic Engineering to coordinate a field inspection of all work. Refer to Section 10.00 – General Clauses For Highway Illumination And Traffic Signal Projects, Article 10.00.10, and corresponding special provision.

Article 1.08.04 - Limitation of Operations - Add the following:

In order to provide for traffic operations as outlined in the Special Provision "Maintenance and Protection of Traffic," the Contractor will not be permitted to perform any work which will interfere with the described traffic operations on all project roadways as follows:

Monday through Friday between 6:00 a.m. and 9:00 a.m. & between 2:00 p.m. and 6:00 p.m.
Saturday and Sunday between 10:00 a.m. and 6:00 p.m.

Additional Restrictions:

A. The Contractor shall not be allowed to close any roadways or detour traffic.

Additional Lane Closure Restrictions

It is anticipated that work on adjacent projects may be ongoing simultaneously with this project. The Contractor shall be aware of those projects and anticipate that coordination will be required to maintain proper traffic flow at all times on all project roadways, in a manner consistent with these specifications and acceptable to the Engineer.

The Contractor will not be allowed to perform any work that will interfere with traffic operations on a roadway when traffic operations are being restricted on that same roadway, unless there is at least a one-mile clear area length where the entire roadway is open to traffic, or the closures have been coordinated and are acceptable to the Engineer. The one-mile clear area length shall be measured from the end of the first work area to the beginning of the signing pattern for the next work area.

1.3 REFERENCES

State of Connecticut Department of Transportation Standard Specifications for Roads, Bridges, Facilities, and Incidental Construction Form 818, 2020 (Merged with Supplemental Specifications Dated July 2023)

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

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SECTION 344114 – RECTANGULAR RAPID FLASHING BEACON

PART 1 GENERAL

1.1 RELATED DOCUMENTS

All materials and construction methods shall conform to the Connecticut Department of Transportation Standard Specifications for Roads, Bridges, Facilities, and Incidental Construction Form 818 with modifications for the following item as stated in this specification:

- RECTANGULAR RAPID FLASHING BEACON (RRFB) – TYPE B

1.2 SUMMARY

Furnish and install a rectangular rapid flashing beacon (RRFB) at the locations indicated on the plans or where directed by the Engineer.

Each RRFB will be a complete assembly consisting of but not limited to the following:

- RRFB unit with two rapidly flashed rectangular-shaped yellow LED indications
- Controller cabinet (circuit breaker, timer or solid-state circuit boards etc.) or any electrical component hardware
- Pedestal
- Pedestal Foundation
- Pedestrian Pushbutton with accessible features
- Pushbutton Signs
- Mounting hardware
- If Solar, all solar equipment

Type B: Double sided RRFB will contain four rapidly flashed rectangular-shaped yellow LED indications (two indications on each side facing traffic)

1.3 REFERENCES

State of Connecticut Department of Transportation Standard Specifications for Roads, Bridges, Facilities, and Incidental Construction Form 818, 2020 (Merged with Supplemental Specifications Dated July 2023)

PART 2 PRODUCTS

The materials for the work shall be specified in the following:

Article M.16.03 - Pedestals
Article M.16.08 – Pedestrian Push Button – as revised by special provision M.16.08
Article M.16.10 – Cabinet

Equipment Required

Solar Powered RRFB Crosswalk System - Oversized 85/105 Solar w/ APS Buttons c/o:

2 each	PB-5100-14-P34	14' Aluminum Pedestal - Black
2 each	PB-5334-P34	Square Signal Base Aluminum - Black
2 each	85watt Solar - Nat	85watt Solar Panel w/ Top of Pole Mount - Natural Finish
2 each	Model 120652 - Nat	NEMA 3R Solar RRFB Control Cabinet Assembly - Natural Finish
2 each	Model IWS Controller	TAPCO Intelligent Warning System Controller
2 each	Model Blinker Beam	TAPCO Wireless Radio Unit
2 each	Model SS-6L-12V	MorningStar SunSaver Solar Controller
6 each	2180-35AHAGN-BAT	Battery, Solar 12v 35Ah, UB12350
4 each	Model RRFB-XL2	RRFB Light Bar w/ 2 Side Ped Indication Light - Black
2 each	Polara Model X	iNX APS Pushbutton w/ 9x12 R10-25 Sign - Yellow
4 each	S1-1	36" S1-1 School Crossing Sign - FYG
2 each	W16-7pL	24"x12" W16-7pL Down Left Arrow Sign - FYG
2 each	W16-7pR	24"x12" W16-7pR Down Right Arrow Sign - FYG

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RECTANGULAR RAPID FLASHING BEACON PEDESTRIAN CROSSWALK SYSTEMS

Rectangular Rapid Flashing Beacon (RRFB) Pedestrian Crosswalk Systems provide drivers real-time warning when pedestrians are in or about to enter an approaching crosswalk. This popular, MUTCD-compliant option heightens driver awareness in a variety of applications.

- School zone crossings
- Multilane uncontrolled crossings
- High-speed pedestrian crossings







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TAPCO RRFB-XL2™ CAPACITY RATINGS

RATED EQUIPMENT	
TAPCO RRFB CONTROLLER ASSEMBLY:	
Solid State Flash Controller	Back-to-Back RRFB-XL2™ Light Bars
Solar Charge Regulator	Polara Model X APS Button
900MHz BlinkerBeam® Wireless Radio	55W 12V Solar Panel
	50Ah 12V VRLA Battery

MAXIMUM DAILY ACTIVATIONS PER REGION
Northern Climates - Up to 1,000 Activations Per Day
Central Climates - Up to 1,700 Activations Per Day
Southern Climates - Up to 3,400 Activations Per Day

GENERAL LOCATION	DAILY ACTIVATIONS (20 SECONDS EACH)	RATED AUTONOMY (DAYS)	GENERAL LOCATION	DAILY ACTIVATIONS (20 SECONDS EACH)	RATED AUTONOMY (DAYS)
NORTHERN LATITUDES	100	38	SOUTHERN LATITUDES	1800	7
	200	31		1900	7
	300	25		2000	6
	400	22		2100	6
	500	19		2200	6
	600	17		2300	5
	700	15		2400	5
	800	14		2500	5
	900	13		2600	5
	1000	12		2700	5
CENTRAL LATITUDES	1100	11		2800	5
	1200	10		2900	4
	1300	9		3000	4
	1400	9		3100	4
	1500	8		3200	4
	1600	8		3300	4
	1700	7		3400	4

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TRAFFIC & PARKING CONTROL CO., INC.

Blinker LED Products

Rectangular Rapid Flash Beacon: RRFB-XL2

Extra-large beacons provide greater visibility, ideal for high-speed and multi-lane pedestrian & school crossings

- Driver yielding rates of 80-90%
- Large LEDs exceed FHWA standards
- Completely modular
- Various mounting options

RRFBs have produced 80% to 90% driver compliance in yielding to pedestrians at high-risk uncontrolled crossings. This is the highest yielding rate of all devices not featuring a red display, and up to 4 times greater than standard round beacons. RRFBs cost less than other devices with similar vehicular yield rates.

RRFB options include:

- Advance RRFB wirelessly linked to Crossing RRFB
- Self-powered remote bollard-mounted pushbutton
- Passively activated systems



PATENT NUMBERS 6,943,698 AND 6,693,556. OTHER PATENTS PENDING.

Rectangular Rapid-Flash Beacon (RRFB) LED Crosswalk Warning System



ocean state signal — Lighting the way

Ocean State Signal Co.
27 Thurber Blvd Smithfield, RI 02917
(401) 231-6780 Fax: (401) 231-4390

pelco PELCO PRODUCTS, INC.

SPECIFICATION SHEET

TITLE: Pedestal Pole, 4" - 8 NPT Spun Aluminum w/ Square Base Assy, Aluminum

PART NO.: SEE BELOW

Pedestal Pole, 4" NPT Spun Aluminum



Pole Length — Coating

PB-5100 - 14 - P34

PNC = Process No Color
P__ = Paint

P29 = Federal Yellow
P30 = Dark Hunter Green
P33 = Gloss Black
P34 = Flat Black Matte
P36 = Forest Green
P62 = MDC-DCR Grey
P76 = Moss Green

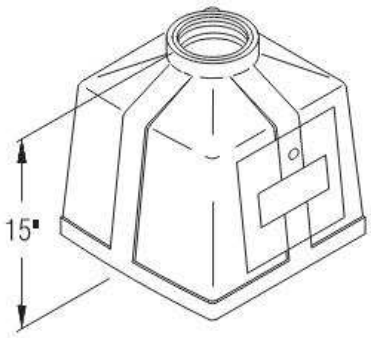
Coating

PB-5334 - P34

PNC = Process No Color
P__ = Paint

Square Base Assy, Aluminum





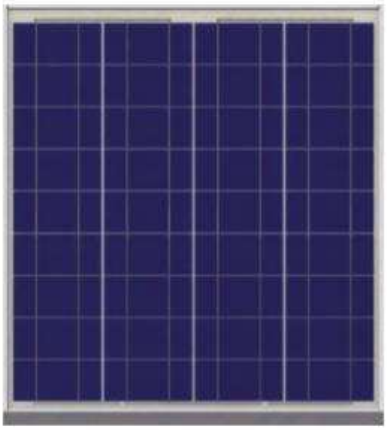


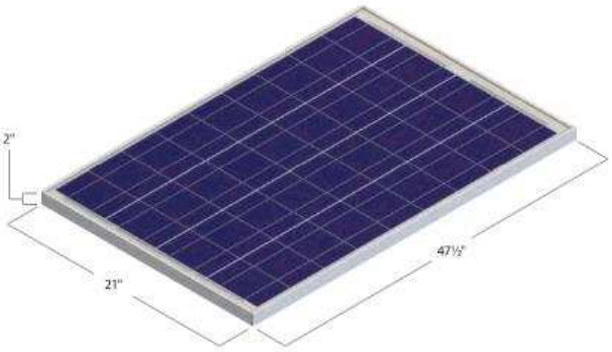
For more information, visit our website at www.oceanstatesignal.com

TAPCO
TRAFFIC & PARKING CONTROL COMPANY

85 Watt Solar Panel

Electrical specifications	
Max Power	85W
Nominal Voltage	12V
Open Circuit Voltage (Voc)	22.2V
Short Circuit Current (Isc)	5.35A
Maximum Power Voltage (Vpm)	17.8V
Maximum Power Current (Ipm)	4.78A
Physical dimensions (without brackets)	
Length	47½"
Width	21"
Depth (thickness)	2"
Weight	20 lbs.
Glass	Tempered





TOP-OF-POLE BRACKET

MATERIAL	Aluminum
POLE TYPE	4½" round(shown) or 3" round
MOUNTING HARDWARE	Set screws



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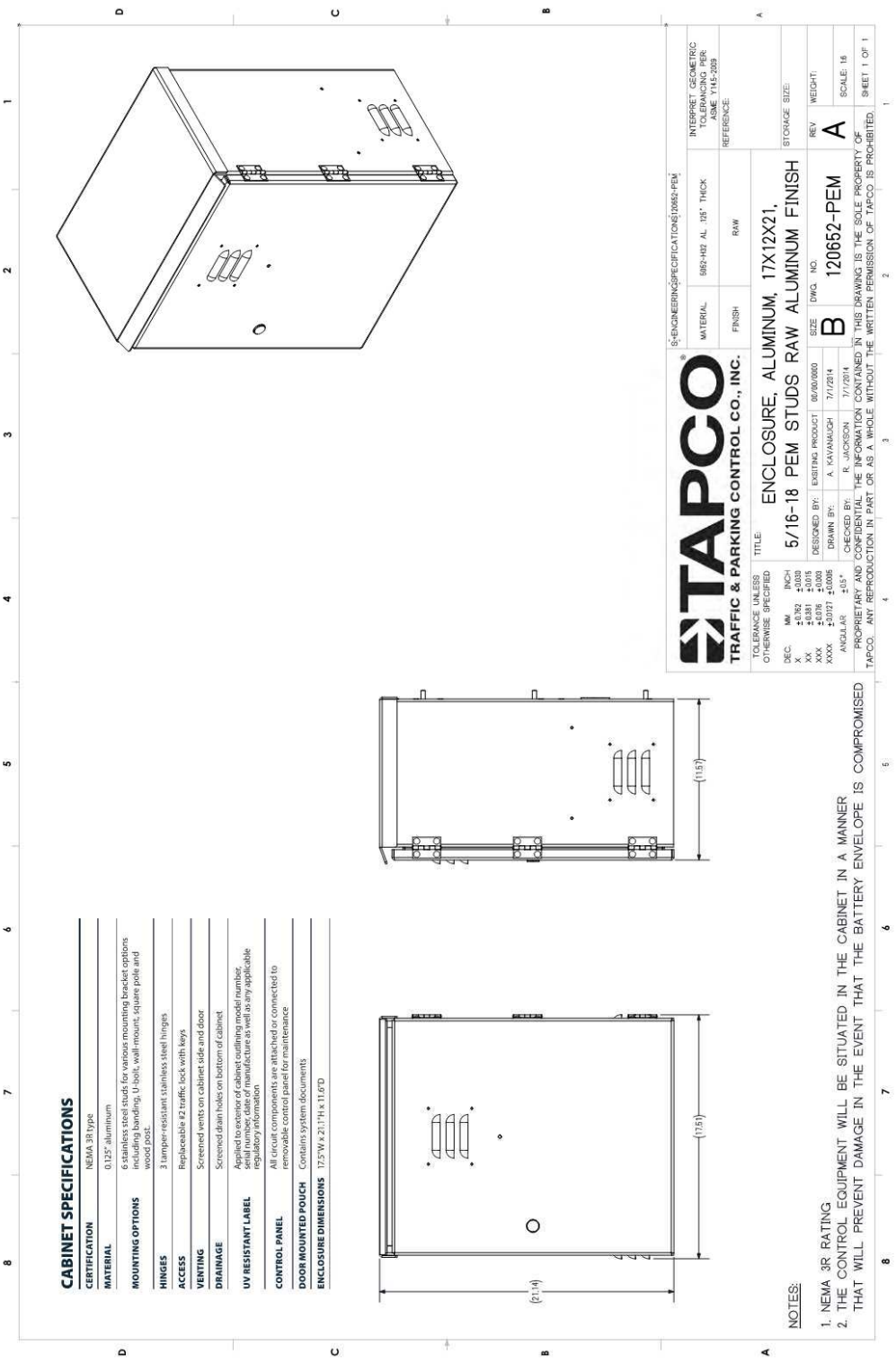
1005-XXXXXX (08/01/14)


CABINET SPECIFICATIONS
CERTIFICATION NEMA 3R type
MATERIAL 0.125" aluminum
MOUNTING OPTIONS 6 stainless steel studs for various mounting bracket options including banding, U-bolt, wall-mount, square pole and wood post.
HINGES 3 tamper-resistant stainless steel hinges
ACCESS Replaceable #2 traffic lock with keys
VENTING Screened vents on cabinet side and door
DRAINAGE Screened drain holes on bottom of cabinet
UV RESISTANT LABEL Applied to exterior of cabinet outlining model number, serial number, date of manufacture as well as any applicable regulatory information
CONTROL PANEL All circuit components are attached or connected to removable control panel for maintenance
DOOR MOUNTED POUCH Contains system documents
ENCLOSURE DIMENSIONS 17.5"W x 21.1"H x 11.6"D
(21.14)
(17.51)
(11.57)
NOTES:
1. NEMA 3R RATING
2. THE CONTROL EQUIPMENT WILL BE SITUATED IN THE CABINET IN A MANNER THAT WILL PREVENT DAMAGE IN THE EVENT THAT THE BATTERY ENVELOPE IS COMPROMISED
TAPCO
TRAFFIC & PARKING CONTROL CO., INC.
S:\ENGINEERING\SPECIFICATIONS\120652-PEM
TITLE:
ENCLOSURE, ALUMINUM, 17X12X21,
5/16-18 PEM STUDS RAW ALUMINUM FINISH
MATERIAL 5052-H32 AL .125" THICK
FINISH RAW
INTERPRET GEOMETRIC TOLERANCING PER ASME Y14.5-2009
REFERENCE:
TOLERANCE UNLESS OTHERWISE SPECIFIED
DEC. MM INCH
X ±0.762 ±.0030
XX ±0.381 ±.015
XXX ±0.076 ±.003
XXXX ±.00127 ±.0005
ANGULAR ±0.5°
DESIGNED BY: EXISTING PRODUCT 00/00/0000
DRAWN BY: A. KAYANAUGH 7/1/2014
CHECKED BY: R. JACKSON 7/1/2014
SIZE B
DWG. NO. 120652-PEM
REV A
STORAGE SIZE:
WEIGHT:
SCALE: 16
SHEET 1 OF 1
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IWS CONTROLLER

SPECIFICATIONS

POWER	6V and 12VDC with power indicator light
INPUTS	2 digital inputs
OUTPUTS	2x two-channel (able to drive two warnings per output)
PROGRAMMABILITY	Locally using serial input (RS232) or remotely using BlinkLink® via cell modem
PROGRAM ACTIVATION OPTIONS	24/7, Dusk 'til Dawn, BlinkLink® Scheduling, Time Clock, Custom Input
LED-WARNING CONTROL COMPATIBILITY	BlinkerSign®, BlinkerBeacon™, RRFB-XL2™
DIMMABILITY	Auto-adjustable via solar panel (6V systems) Auto-adjustable via photocell sensor (12V systems)
INTERNAL SYSTEM CLOCK	Integrated with on-board battery backup
SELF-DIAGNOSTIC CAPABILITY	Internal temperature monitor
DAYLIGHT SAVING TIME	User programmable
OPERATING TEMPERATURE RANGE	-40°F to 176°F (-40°C to 80°C)
ENCLOSURE	IP67 rated
ENCLOSURE DIMENSIONS	3.2"W x 3.7"H x 2.5"D



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1026-01000 08-07-2018

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BLINKERBEAM® WIRELESS RADIO

SPECIFICATIONS

POWER INPUT	5VDC
INPUT	1 digital input, micro USB
OUTPUTS	2 digital output lines, host serial lines for OTA serial
PROGRAMMABILITY	Locally using USB port or front-mounted joystick
LCD DISPLAY	4 lines at 21 characters per line
OPERATION POWER MODES	3 levels available, 0.25, 0.5 or 1 watt
CONNECTIVITY	Activates warning LEDs concurrently
FREQUENCY	License free 900 MHz Frequency Hopping Spread Spectrum with 10 different RF patterns to prevent interference between collocated radio systems
RANGE	900 feet or longer with optional antenna
SERIAL DATA RATE	19,200Baud
STATUS LEDS	Red, green, yellow, amber
FCC ID	2ANWN-02ANWN
AVAILABLE ANTENNAS	6dBi Omni - Fiberglass 3dBi Omni Whip - RPSMA 3dBI Omni Low Profile 10.64dBi Yagi
OPERATING TEMPERATURE	-40°F to 176°F (-40°C to 80°C); less than 90% RH
DIMENSIONS	3.2"W x 3.7"H x 2.5"D



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1026-01001 06-27-2018

MORNINGSTAR corporation



SUNSAVER™

SOLAR CONTROLLER

Morningstar is pleased to introduce our third generation ***SunSaver***. Since its first market introduction in 1996, over 1 million SunSaver controllers have been installed in over 73 countries for numerous solar power systems including oil/gas, telecom and instrumentation, marine and boating, and remote homes. We have retained much of our legacy design including the same ratings, footprint and simple user interface, and have added several new and advanced high value features:

- Full electronic protections
- 4 stage battery charging
- Self-diagnostics to detect critical faults
- Multi-color status LED
- 3 LED's for battery state of charge
- Dead battery recovery
- Telecom mode for sensitive loads
- Maximum charge limiting for sensitive loads
- Cover to protect wire terminals
- Additional certifications









Key Features and Benefits

Extremely High Reliability
- Failure rate of less than 1 per 1,000 shipped (<0.1%)
- 100% solid state. Power MOSFET design
- Manufactured in an ISO 9000 factory
- 100% pre-shipment functional testing

Longer Battery Life
- Advanced PWM charging
- Series design (not shunt) for cool operation
- 4-stage charging: bulk, absorption, float, equalize
- Optimized sealed or flooded battery set points
- Temperature compensated charging
- Low voltage load disconnect on several versions

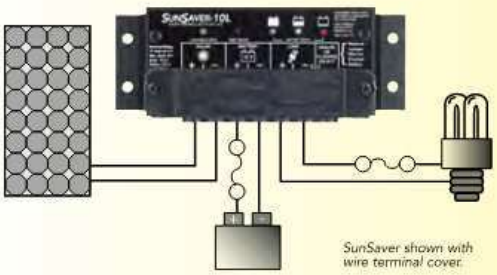
Designed for Harsh Environments
- Temperature rating of –40°C to +60°C
- Epoxy encapsulation for protection against humidity and dust ingress
- Corrosion protection: marine rated terminals and anodized aluminum case
- Certified for use in hazardous locations

Easy to Install and Use
- Factory pre-sets result in no required install settings
- Electronic protections prevent damage from wiring mistakes
- Fully automatic operation and fault recovery
- LED's display extensive information about status, faults and battery condition

SUNSAVER™ SOLAR CONTROLLER

SunSaver Versions

	Solar Current	Load Current	System Voltage	LVD
• SS-6-12V	6A	6A	12V	No
• SS-6L-12V	6A	6A	12V	Yes
• SS-10-12V	10A	10A	12V	No
• SS-10L-12V	10A	10A	12V	Yes
• SS-10L-24V	10A	10A	24V	Yes
• SS-20L-12V	20A	20A	12V	Yes
• SS-20L-24V	20A	20A	24V	Yes



SunSaver shown with wire terminal cover.

TECHNICAL SPECIFICATIONS

Electrical

• Max. PV and load ratings	Per above	
• System voltage	12 or 24 volts	
• Min. battery voltage	1 volt	
• Regulation voltage	**12 volt**	**24 volt**
Sealed battery	14.1 V	28.2 V
Flooded battery	14.4 V	28.8 V
• Load disconnect	11.5 V	23.0 V
• LVD reconnect	12.6 V	25.2 V
• Max. solar voltage		
12V battery	30 volts	
24V battery	60 volts	
• Load in-rush capability		
SunSaver-6	45 amps	
SunSaver-10	65 amps	
SunSaver-20	140 amps	
• Self-consumption	< 8 mA	
• Voltage accuracy	12V: +/– 25 mV (typical) 24V: +/– 48 mV (typical)	
• Transient surge protection	1500W per connection	

Mechanical

• Wire size	5 mm² / #10 AWG
• Weight (unpacked)	0.23kg / 8 oz.
• Dimensions	15.2 x 5.5 x 3.4 cm 6.0 x 2.2 x 1.3 inch

Environmental

• Ambient temperature	–40°C to +60°C
• Storage temperature	–55°C to +80°C
• Humidity	100% non-condensing
• Tropicalization	Epoxy encapsulation Marine rated terminals Anodized aluminum case

Electronic Protections

- **Solar:** Overload, short-circuit, high voltage
- **Load:** Overload, short-circuit, high voltage
- **Battery:** High voltage
- **All:** Reverse polarity, high temperature, lightning and transient surges
- **Reverse current at night**

Battery Charging

• Charging method	4 stage series PWM
• Charging stages	Bulk, absorption, float, equalize
• Temperature compensation	
Coefficient	12V: –30mV/°C 24V: –60mV/°C
Range	–30°C to +60°C
Set points	Absorption, float, equalize

LED Indications

• Status LED (1)	Charging or not charging Solar error conditions
• Battery LED's (3)	Battery level Charging stage

Certifications

• ETL Listed to UL 1741 and CSA C22.2 No. 107.1-01	
• Hazardous Locations	Class 1, Division 2, Groups A,B,C,D CSA C22.2#213
• EMC Directives	Immunity, emissions, safety
• FCC	Class B Part 15
• CE	
• RoHS	
• ISO 9000	

WARRANTY: ***Five year warranty period. Contact Morningstar or your authorized distributor for complete terms.***

AUTHORIZED MORNINGSTAR DISTRIBUTOR:

MORNINGSTAR corporation

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Newtown, PA 18940 USA
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E-mail: info@morningstarcorp.com
Website: www.morningstarcorp.com

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BATTERY 35Ah
Sealed Lead-Acid

SPECIFICATIONS

VOLTAGE	12V
CAPACITY AT C/100	35Ah
TERMINAL	Type: I2
CONSTRUCTION	Absorbant Glass Mat (AGM) technology, valve regulated and spill proof. Approved for transport by air - DOT, IATA, FAA and CAB certified.
WEIGHT	23.2 pounds
DIMENSIONS	7.70"L x 5.12"W x 6.26"H
OPERATING TEMPERATURE RANGE	-40°F to 176°F (-40°C to 80°C)



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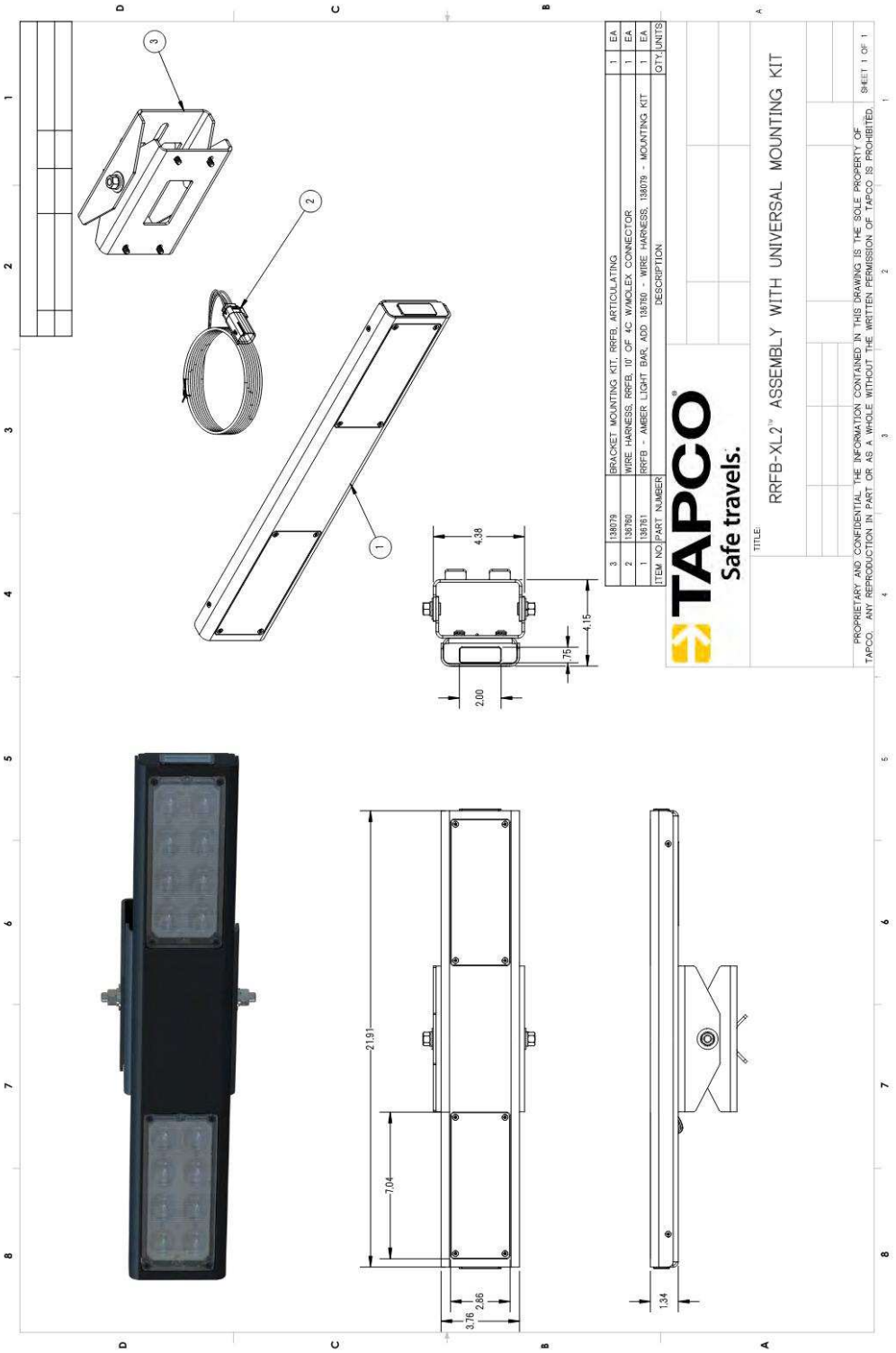
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RRFB-XL2™ ASSEMBLY WITH UNIVERSAL MOUNTING KIT
TITLE:
ITEM NO. PART NUMBER DESCRIPTION QTY. UNITS
3 138079 BRACKET MOUNTING KIT, RRFB, ARTICULATING 1 EA
2 136760 WIRE HARNESS, RRFB, 10' OF 4C W/MOLEX CONNECTOR 1 EA
1 136761 RRFB - AMBER LIGHT BAR, ADD 136760 - WIRE HARNESS, 138079 - MOUNTING KIT 1 EA
4.38
4.15
.75
2.00
21.91
7.04
3.76
2.66
1.34
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Polara iNX Push button

SPECIFICATIONS

POWER	10 to 24VDC
PUSH BUTTON	ADA compliant. Field adjustable directional arrow is standard; bidirectional and blank buttons available. Optional adjustable locator tone
ACTIVATION CONFIRMATION	Yellow LEDs and voice confirmation activated when push button is pressed; custom message available
PUSH BUTTON HOUSING	Yellow powder coat finish is standard; black and green available
SPEAKER	Field replaceable, weather resistant, 10-watt audio amplifier Maximum volume: 100 dB at 1 meter
INSTRUCTIONAL SIGN	9" x 12" is standard; larger signs available; braille available. Retroreflective sheeting with tamper-resistant mounting screws
OPERATING FORCE	Three adjustable settings: .5 to 3.5 pounds
IDLE CURRENT DRAW	~9mA @ 12 VDC
PEAK CURRENT DRAW	~500mA (@15VDC) with voice message at maximum
ENCLOSURE	NEMA 250 Type 4X Powdercoated cast aluminum cover and backplate
CONNECTIVITY	Bluetooth 5.0 Polara Field Service app for customization
WIRING	6 conductor
OPERATING TEMPERATURE RANGE	-30°F to 165°F (-34°C to 74°C)
DIMENSIONS	9"W x 18.2"L x 2.6"H



1026-01039 10/14/2020

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POLARA

Function

Push button station (PBS) for use on crosswalks with flashing yellow lights. Connects to RRFB to enable triggering of crosswalk lights and can provide a locate tone and a voice message. Voice message can be set to play 1/2/3 times, or for the entire time the lights are flashing. Factory Default Setting is to play 2 times per FHWA.

Features

- Instructional 9"x12" retro-reflective sign with tamper-resistant mounting screws
- One yellow LED that flashes when warning lights are flashing
- ADA-compliant push button with directional arrow, field adjustable to point left, right, up, or down
- 10-watt audio amplifier
- Weather resistant speaker
- Volume and other settings set using the free Polara service app, connected over Bluetooth
- Standard English Message: "Yellow lights are flashing" (Default 2X per FHWA)
- Standard Spanish Message: "Las luces amarillas estan relampaqueando"

Electrical Properties

Power Requirements	
DC In	10-24 VDC
Lights In	7-32 VDC
Idle Current Draw	~15mA @ 12 VDC (Locate Tone With Default Settings)
Peak Current Draw (15 VDC Input Power)	~500mA with Voice Message at maximum

Mechanical Properties

Physical	
Enclosure Type	Plastic sealed housing, powdercoated cast aluminum cover and backplate
Installation	3/4" or smaller banding or 2 tapped 1/4-20 holes on 6" centers; 1/2" or larger hole for wire access
Dimensions	
Width	9" (with 9x12" sign) / 5.1 (without sign)
Length	18.2" (with 9x12" sign) / 14" (without sign)
Maximum Height	2.6"

Operating Specifications	
Parameter	**Rating**
Operating Temp. Range	-34°C to +74°C (-30°F to +165°F)
Storage Temp. Range	-45°C to +85°C (-50°F to +185°F)
Operating Force	3.0 lbs max
Switch Operating Life	Greater than 20 million operations
Max. Volume	100 dB @ 1 meter

Design Compliance	
Test Type	**Compliance**
Functionality	MUTCD 2009-4E
Temperature and Humidity	NEMA TS2
Mechanical Shock and Vibration	NEMA TS2
iNX Enclosure	NEMA 250 Type 4X

Notes:
1. Designed to comply with applicable sections of referenced standards
2. All specifications are subject to change without notice
3. All specifications are typical unless otherwise specified

6 Wire System Termination View

2-Wire inputs for LIGHTS (+/-)*
2-Wire inputs for BUTTON (+/-)*
Power (PWR)
Ground (GND)
***Note: Both LIGHTS and BUTTON accept either polarity.**

Dimensions are in inches.

Doc. iNX-CutSheet Rev. C-25329 05/19/2020

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PART 3 EXECUTION

- Each RRFB indication will be mounted on a standard aluminum pedestal and in accordance with dimensions and details shown on the plan.

- Each Solar RRFB will require a location free of any vegetation or obstruction which will inhibit solar charging.

- Each RRFB shall initiate operation only upon pedestrian actuation and shall cease operation after a programed time as shown on the plan or determined by the Engineer (based on MUTCD procedures).

- All RRFBs associated with a given crosswalk (including those with an advance crossing sign, if used) shall, when activated, simultaneously commence operation of their rapid-flashing indications and shall cease operation simultaneously.

- Install the pedestrian pushbutton according to the manufacturer's instructions.

- Position the pedestrian pushbutton so the plane of the sign face is parallel to the crossing (sign is facing perpendicular) and the arrow is pointing in the same direction as the crossing, not necessarily at the ramp. Notify the Engineer if there is any discrepancy or ambiguity between the plans and field conditions that prevent placement of the pedestrian pushbutton as shown on the plan.

- Set the minimum sound levels of the locator tone and the speech message when there is little or no ambient noise as in nighttime operation. Set the volume of speech message and pushbutton locator tones to a maximum of 5dBA louder than ambient sound. The locator tone should be audible 6' to 12' from the pushbutton or to the building line, whichever is less. Confirm the volume of both speech message and the locator tone increases with an increase in ambient sound and subsequently decreases when the ambient noise decreases.

Mechanical and Electrical Requirements:

a) Dimensions:
- Each indication shall be at least 5" wide by 2" high.
- The indications shall be aligned horizontally, with the longer dimension horizontal and with a minimum space of 7" between the two indications
- The outside edges of the indications, including any housing, shall not project beyond the outside edges of the sign that it supplements.

b) Power:
- Hardwired:
  - AC input, 100-240 VAC, 50/60Hz
  - DC output, 12 VDC, +/- 1%
- Solar:
  - DC input, 12 VDC, 55W
  - DC output, 12 VDC, +/- 1%

c) Temperature & Humidity:
- All components will be capable of continuous operation in accordance with NEMA Standards

d) Indications:
- Flash Pattern:
  - When actuated, the two yellow indications in each RRFB unit shall flash in a rapidly flashing sequence and shall provide 75 flashing sequences per minute.
  - Shall comply with MUTCD https://mutcd.fhwa.dot.gov/resources/interim_approval/ia21/ia21.pdf
- Optics:
  - ITE LED
- Light Intensity:
  - During daytime conditions: shall meet the minimum specifications for Class 1 yellow peak luminous intensity in the Society of Automotive Engineers (SAE) Standard J595 (Directional Flashing Optical Warning Devices for Authorized Emergency, Maintenance, and Service Vehicles) dated January 2005.
  - During nighttime conditions: an automatic signal dimming device shall be used to reduce the brilliance of the indications.
- Housing Color:
  - Federal Yellow

e) Control Cabinet:
- Shall be NEMA 3R type

END OF SECTION

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SECTION 344115 – LED SCHOOL RADAR SPEED DISPLAY SIGN WITH FLASHING BEACONS ASSEMBLY (HARDWIRED)

PART 1 GENERAL

1.1 RELATED DOCUMENTS

All materials and construction methods shall conform to the Connecticut Department of Transportation Standard Specifications for Roads, Bridges, Facilities, and Incidental Construction Form 818 with modifications for the following item as stated in this specification:

- LED SCHOOL RADAR SPEED DISPLAY SIGN WITH FLASHING BEACONS ASSEMBLY (HARDWIRED)

1.2 SUMMARY

The work shall consist of furnishing and installing LED School Radar Speed Display Sign with Flashing Beacon Assemblies (Hardwired) and their associated power supplies in accordance with the contract documents or as directed by the Engineer.

1.3 REFERENCES

State of Connecticut Department of Transportation Standard Specifications for Roads, Bridges, Facilities, and Incidental Construction Form 818, 2020 (Merged with Supplemental Specifications Dated July 2023)

PART 2 PRODUCTS

The Contractor shall furnish LED Radar Speed Display Sign with Flashing Beacon Assemblies (Hardwired) in accordance with these requirements:

TRAFFICLOGIX

SafePace® Beacon System Specifications

The SafePace Beacon System provides a visual alert to drivers of changed driving conditions such as pedestrians crossing or construction ahead. Beacons have been proven to improve safety by making drivers more vigilant and are a low cost, low maintenance solution. They can be combined with any of the SafePace signs to create a complete school zone system.



Basic Technical Data	
LED Signal Head	ITE VTCSH LED circular signal
LED Color	Yellow (Amber)
LED Signal Housing	ITE compliant, UV stabilized polycarbonate (yellow)
Beacon Size	305 mm (12 inch), or 203 mm (8 inch) diameter
Power Requirements	12 V DC / 5 Watt
Power Source	Powered directly from radar sign
Operating Temperature	-40 °C (-40 °F) to 74 °C (165 °F)
Ambient Light Control	Controlled by the radar sign
Flash Pattern	MUTCD compliant alternating pattern
Programming	24/7 365 day scheduling including holidays and exception days
Warranty	2 year limited warranty

Features	
Flashing beacon lights notify motorists of changed driving conditions.	Proven to improve safety in school zones by decreasing vehicle speeds by up to 7 mph.
Easy to use management software allows you to turn systems on and off multiple times per day and set beacon schedules and exceptions.	Multiple configurations available including vertical or horizontal placement and single or double beacons.
Can be used as an accessory to any of the SafePace radar signs.	Draws power directly from the sign, so no additional power source is required.
Excellent visibility even in poor lighting conditions.	Two year limited warranty.

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TRAFFIC LOGIX

SafePace® 100
Driver Feedback Sign



Choice of faceplate colors available

The Traffic Logix® SafePace® 100 driver feedback sign is the solution that fits your budget.

This compact radar speed sign offers exceptional visibility and power efficiency in a lightweight and portable solution. Featuring the options you need at remarkably affordable pricing, the SafePace 100 driver feedback sign will help you keep your neighborhoods safe for years to come.

100 Specifications

Digit Size	11"
Height	29"
Weight	21 lbs
24/7, 365 Scheduling	✓
Data Collection	✓
Solar Compatibility	✓
Battery Operated	✓
Universal Mounting	✓
Cloud Compatibility	✓
Trailer Compatibility	✓
Dolly Compatibility	✓
Hitch Compatibility	✓
Warranty	2 Years

Features

Energy Efficient: The sign can function up to 3 weeks autonomously with optional battery power depending on volume.

Optimal Visibility: Unique light enhancing, anti-glare lens system as well as automatic ambient light adjustment provide brilliant visibility even in poor lighting conditions.

User Friendly: Software Interface: Easy-to-use management software lets you set sign parameters quickly and easily while optional data collection allows you to download traffic data, and generate statistical reports.

Stealth Mode: Collect baseline traffic data while speed display appears blank to motorists.

Speed Violator Strobe: Programmable flashing strobe to alert speeding drivers comes standard with every sign.

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Feature	Specifications
Dimensions	
Digits	11"(h) x 5.6"(w), 98 LEDs per digit
Unit with "YOUR SPEED" sign mounted	Full size sign: 29.0"(h) x 23.0"(w) x 3.5"(d)
Sign Weight (includes "YOUR SPEED" sign (2 lbs) mounted)	
AC Powered	21 lbs
3 cell battery powered model	23 lbs
4 cell battery powered model	25 lbs
Solar powered model	23 lbs (not including solar panel or bracket)
General Specifications	
Operating Temperatures F (C):	-40° (-40°) to 185° (85°)
Speed Units	Miles per hour (mph) or Kilometers per hour(km/h)
Faceplate	Yellow or white high-Intensity prismatic reflective sheeting on sign face with black colored text MUTCD approved colors and format

Feature	Specifications
Bashplate	Aluminum, 0.25"
Communications	Bluetooth (standard) GSM/GPRS (optional, for use with SafePace Cloud)
Programming	SafePace Pro sign management software SafePace Cloud remote sign management 24/7 365 day unlimited programming and scheduling
Power Options (Electrical Specifications)	
AC power input	100~240 V AC
DC power input	12 V DC
Solar panel options	20W, 50W
Radar	
Internal	SS300 Doppler (FCC approved)
Radar RF out	5 mW maximum
Radar f-center	24.125 GHz or 24.200 GHz
Pickup distance	Up to 300 feet
Beam	38° x 45°, Linear polarization
CE Mark	Yes
Display	
LEDs	208
Digits	196 Amber, 23°, 5 mm, luminous Intensity (5,000 – 12,000 mcd/LED)
Speed Violator Strobes	12 White, 15°, 5 mm , luminous intensity (18,000 – 28,000 mcd/LED)
Optical Lenses	208
Ambient light sensors	1 sensor and automatic brightness control
Enclosure	
Construction	12 gauge aluminum, flat black powder coated front for reduced glare and maximum contrast; light gray powder coated body to minimize heat absorption
Weatherproof Rating	Weatherproof, NEMA 4X-12, IP65 level compliant Non-sealed and ventilated
Warranty	
Sign	2 years
Batteries	1 year

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Traffic Logix®
SafePace® 100 Radar Speed Sign
Product Specifications Version 2.9



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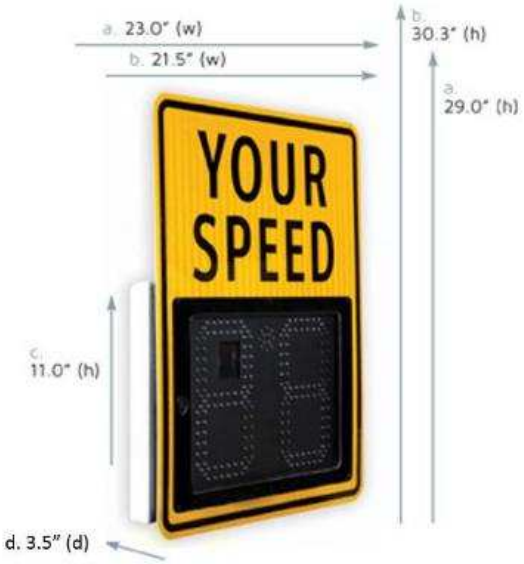
Dimensions

- Digit: 11"(h) x 5.6"(w), 98 LEDs per digit
- Unit alone: 15.8"(h) x 21.4"(w) x 3.5"(d)
- Unit with "YOUR SPEED" sign mounted:
  - Full size sign: 29.0"(h) x 23.0"(w) x 3.5"(d)
- Sign Weight (includes "YOUR SPEED" sign (2 lbs) mounted)
  - AC Powered Model: 21 lbs
  - 3 Cell Battery Powered Model: 23 lbs
  - 4 Cell Battery Powered Model: 25 lbs
  - Solar Powered Model: 23 lbs (does not include solar panel or bracket)
- Accessories
  - 3 Cell Lithium Ion Battery: 2 lbs
  - 4 Cell Lithium Ion Battery: 4 lbs
  - Universal Mounting Bracket System
    - Sign Bracket: 2 lbs
    - Pole Bracket: 5 lbs



SafePace® 100 Full-size sign dimensions

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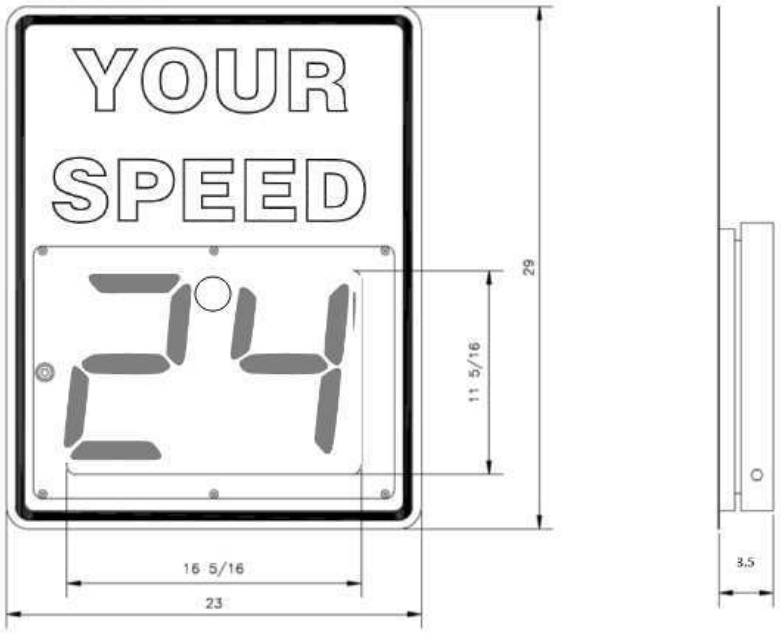
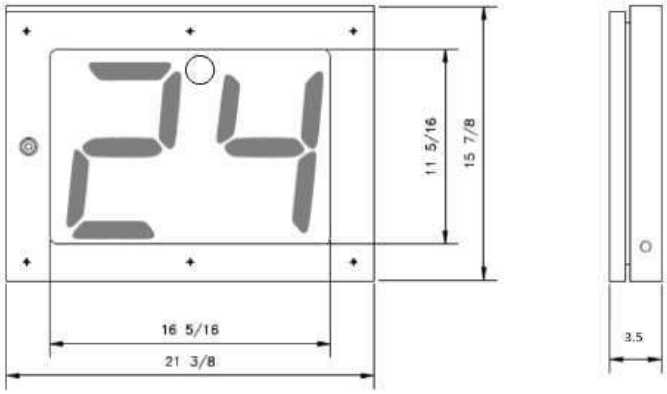
Dimensions of SafePace® 100 Radar Sign with Full "YOUR SPEED" Sign Face



Dimensions of SafePace® 100 Radar Sign unit alone



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Technical Specifications

- Miles Per Hour (mph) or Kilometers Per Hour (km/h)
- Aluminum protective cover: 0.25" (d)
- High-Intensity prismatic reflective sheeting on "YOUR SPEED" signs with black colored text
- MUTCD approved colors and format
- Operating Temperatures F (C): -40° (-40°) to 185° (85°)
- Conformal coating on all circuit boards
- Power
  - Power input:
    - AC 90~264 VAC
    - 12 VDC
  - Vcc: 5.5 VDC to 16 VDC (18V max)
  - Icc@12 VDC (radar always on): Display blank- 9.5 mA
  - Display at night: 21 mA
  - Display max bright: 415 mA
  - Radar RF out: 5 mW maximum
  - Power Efficiency:
    - Best in class power efficiency
    - Low power SS300 radar drives display eliminate extra CPU
    - Built in ambient light sensing and automatic brightness control
    - Ambient temperature compensation of LED drive voltage
    - High efficiency boost regulator for LED drive voltage
    - With no traffic present, radar automatically powers down display, reducing power consumption to 0.1W
  - Power Options
    - AC power input: 90~264 VAC
    - DC power input: 12 VDC
    - Battery power option offers extended life:
      - 3 Cell, 9.6V, 10Ah Lithium-Ion Phosphate battery with up to 2 weeks operation between charges (under normal operating conditions)
      - 4 Cell, 12.8V, 15Ah Lithium-Ion Phosphate battery with up to 4 weeks operation between charges (under normal operating conditions)
    - Solar power
      - Compact, 20W solar panel (15.4" x 9.8" x 0.71")
- Radar
  - Internal Radar: SS300 Doppler (FCC approved)
  - Radar RF out: 5 mW maximum

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- Radar f-center: 24.125 GHz or 24.200 GHz
- Pickup distance: Up to 300 feet
- Beam angle: 38 x 45
- Beam polarization: Linear
- CE Mark (Radar): Yes

- Display
  - LEDs 208:
    - Digits: 196 Amber, 15°, 5 mm, luminous Intensity (4180 - 8200)
    - Speed Violator Strobe: 12 White, 15°, 5 mm , luminous intensity (4180 - 8200)
  - Optical lenses: 208 lenses
  - Display Brightness:
    - 11,000 nits (cdm) maximum
    - 550 nits (cdm) at night
  - Ambient light sensor and automatic brightness adjustment
- Enclosure
  - 12 gauge aluminum, flat black powder coated front for reduced glare and maximum contrast; light gray powder coated body to minimize heat absorption
  - Weatherproof, NEMA 4X-12, IP65 level compliant
  - Non-sealed and ventilated

Communication

- **Bluetooth 4.0** → standard recommended configuration (**"BlueFin"** Bluetooth card installed on **"BackFin"** sign controller card by default)
- **Wi-Fi** → optional configuration upon request (**"Wi-Fin"** Wi-Fi card optionally installed on **"BackFin"** sign controller card – connect to radar sign configured as network access point)
- **GPRS** → optional configuration upon request (**"SimFin"** card optionally installed on **"BackFin"** sign controller card to insert SIM (Subscriber Identity Module) card

Programming



- SafePace® Pro Management Software application
- Display Settings:
  - Display On/Stealth Modes (In Stealth Mode, speed is not displayed but data is collected)
  - Display Minimum Speed, Display Maximum Speed
  - Digit Flashing Speed Threshold (digits flash above selected speed)
  - Speed Violator Strobe (pulsing strobe flashes with digits or alone above Display Maximum Speed)

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Data Collection and Statistical Analysis & Reporting (optional feature)

- Traffic data collected and stored by location
- Stealth Mode (capture baseline traffic data with speed display off)
- Download through Serial Port connection
- Statistical Reporting & Charts
  - Summary Reports
  - Weekly Reports
  - Period Comparison Reports
  - Reporting Parameters:
    - Average Vehicle Count
    - Total Vehicle Count
    - Average Speed
    - Average Number of Speed Violations
    - Total Number of Speed Violations
  - Other Features:
    - Minimum and Maximum Speed
    - 85% Speed
    - Counters by Speed Bins
    - 5 MPH Bin Resolution
    - Reports print directly or can be exported into CSV format, MS Excel, Adobe Acrobat PDF and HTML
    - Charts may be printed directly or converted into Adobe Acrobat PDF and picture formats



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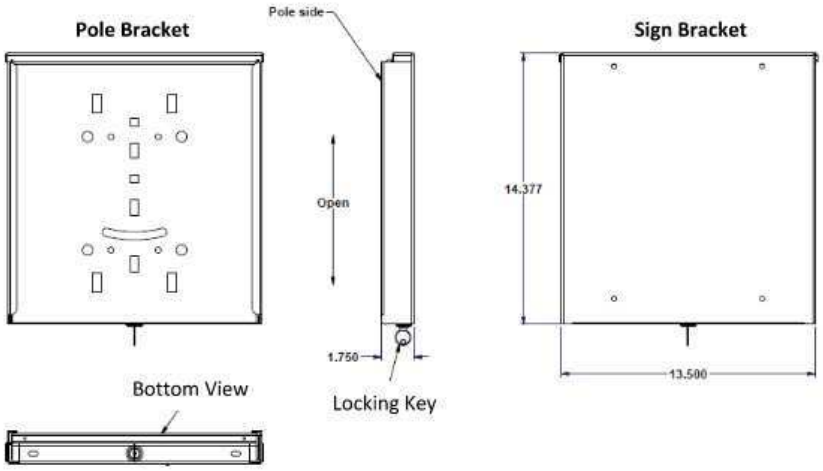
Mounting Options

- Standard mounting bracket system (use banding brackets to fasten sign to steel or wooden pole)
- Universal Mounting Bracket System
  - Universal mounting options: circular, square and telspar poles
  - Theft resistant
  - Promotes sign portability: sign locks into mounting bracket with a turn of a key
- Sign dolly mounting system
  - Battery-powered sign recommended
  - Speed limit face plate not included
- Sign mounted to/compatible with SafePace Cruiser LT Lightweight Trailer
  - Battery box storage not included with trailer
  - See web-site trailer specifications for more details

Universal Mounting Bracket System



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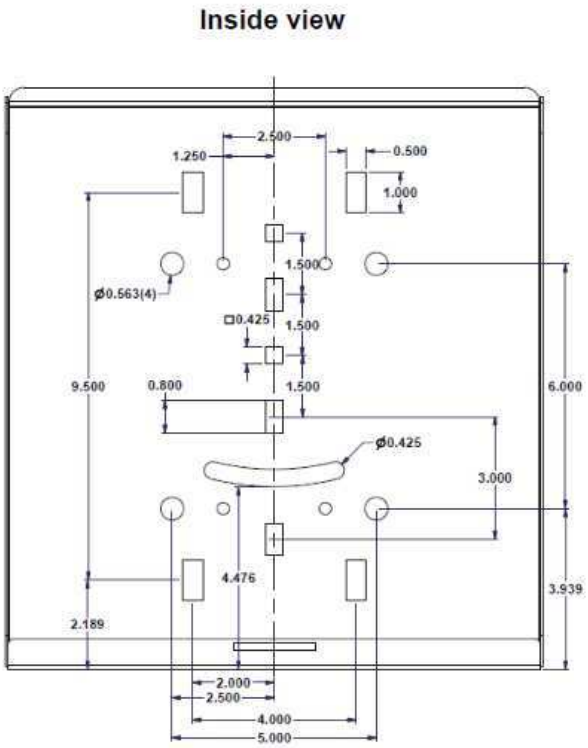
Inside View of Pole Bracket



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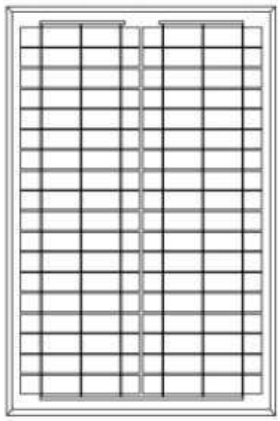
SafePace® 100 Solar Panel Specifications (p/n: SPS1500)

20 WATT Panel Specifications



Solar cells: Crystalline solar cells

Laminate: Glass /EVA / TPT (tedlar/pet/tedlar) or TPE

Front Side: High-transmission 3.2mm tempered glass

Back Side: TPT /TPE

Frame: Clear anodized aluminum frame

Output: Junction box

Module Type	Pm(Wp)±5%	Vmpp(V)	Impp(A)	Voc(V)	Isc(A)	Module size(mm)	NET(kg)
20 WATT PANEL	20	17.1	1.17	21.4	1.3	520*350*18mm 20.5"*13.8"*0.7"	2.0

Operation Temperature Range: - 40℃~85℃

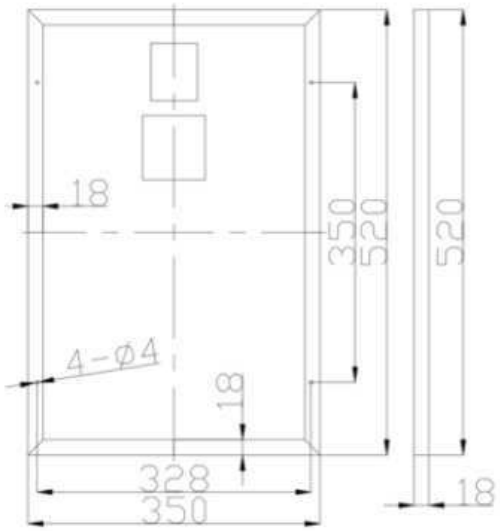
NOCT: 48℃±3℃

Temperature coefficients of Im: + 0.1 %/℃

Temperature coefficients of Vm: - 0.38 %/℃

Maximum System Voltage: DC600V

STC: 1000W/m², 25℃ AM1.5



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Warranty

Subject to the following conditions, Traffic Logix Corporation ("Traffic Logix") warrants that the SafePace® 100 Speed sign (the "Product") is free from defects in materials and workmanship. This limited warranty begins on the invoice date of your purchase of the Product and extends:

- For TWO (2) calendar years on the radar sign, and
- For ONE (1) calendar year on the batteries.

This limited warranty extends only to the original purchaser of the Product when purchased either directly through Traffic Logix® or through an authorized Traffic Logix® distributor and is not assignable or transferable to any subsequent purchaser or end-user. Traffic Logix's® obligation and liability under this warranty are expressly limited to repairing or replacing, at Traffic Logix's® option, defective products. In no circumstances shall Traffic Logix's® liability, whether in contract or tort, under any warranty, in negligence, or otherwise, exceed the amount of the purchase price of the product. Traffic Logix® shall not be liable for special, indirect, or consequential damages of any kind. This warranty does not cover damages resulting from normal wear and tear, incorrect installation or operation, use other than for the product's intended purposes, vandalism, and extraordinary environmental circumstances. Traffic Logix® reserves the right to charge for these damages to the product at rates normally charged for repairing such products not covered under this warranty. Damages resulting from any physical changes or alterations made to the product other than Traffic Logix® will render this warranty VOID. Using any parts or accessories not supplied or approved by Traffic Logix®, such as battery chargers, will further render the warranty VOID.

Traffic Logix® neither assumes, nor authorizes any person to assume for it, any other liability in connection with the sale of the Product, and there are no agreements or warranties collateral to or affecting this limited warranty.

THE LIMITED WARRANTY SET FORTH IN THIS AGREEMENT IS THE EXCLUSIVE AND SOLE WARRANTY APPLICABLE TO THIS PURCHASE. ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO THE IMPLIED WARRANTY OF MERCHANTABILITY AND THE IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY DISCLAIMED.

Traffic Logix® does not warrant that any of its products will meet or comply with the requirements of any applicable federal, state or local safety code, law, regulation or ordinance ("Applicable Safety Laws"). Buyer acknowledges that Traffic Logix's® products are to be used only in accordance with the attached Conditional Terms of Use and any Applicable Safety Laws. Buyer agrees that there shall be no coverage or benefits of any kind under this limited warranty if it is determined by Traffic Logix® that the Product was not installed or used in accordance with the Conditional Terms of Use or Applicable Safety Laws, or if the Product has been altered in any way by anyone other than Traffic Logix®, or if the Product has been subject to any misuse or accident. In addition, Buyer assumes and agrees to indemnify Traffic Logix® for all risk, liability or expense that results from any installation or use of the Product that is not in accordance with the Conditional Terms of Use or any Applicable Safety Laws.

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Warranty Replacement Procedure

In order to submit a claim for the repair or replacement of the Product under this limited warranty, you must do the following:

1) Obtain a Return Materials Authorization number by contacting Customer Support. Do not ship your defective product to Traffic Logix® prior to contacting Customer Support.

2) A Customer Support agent will evaluate the Product to determine if it is defective. If the product is defective, then you will need to submit your contact information, and proof of purchase (including the date or purchase), in order to obtain repair or replacement parts.

3) The Customer Service Agent will provide you with instructions on how to have defective parts repaired or replaced.

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PART 3 EXECUTION

The wiring of the assembly shall be completed by a Connecticut Licensed Electrician.

The Contractor shall submit to the Engineer for approval: complete shop drawings, detailed specifications, catalog cuts, parts lists, instruction sheets, and wiring diagrams for the equipment to be installed. The Contractor will be required to install wiring connecting all powered equipment to existing utility pole power (to be coordinated with utility company/companies) to complete the work.

The Contractor shall conduct approved stand-alone, system performance tests of the equipment installed. The tests shall, at a minimum, satisfactorily exercise all stand-alone functional requirements of the field equipment. Following successful completion of the system performance tests, a 90 calendar-day test shall be performed. The purpose of the operational test is to demonstrate reliability of the system equipment for a 90-day period. Final acceptance shall be based on the satisfactory completion of the 90-day test.

The setup and programming of the assembly shall be completed and coordinated by the Contractor. The display options and patterns shall be coordinated with the Greenwich Department of Public Works.

END OF SECTION

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SECTION 344117 – PEDESTRIAN PUSH BUTTON

PART 1 GENERAL

1.1 RELATED DOCUMENTS

All materials and construction methods shall conform to the Connecticut Department of Transportation Standard Specifications for Roads, Bridges, Facilities, and Incidental Construction Form 818 with modifications for the following item as stated in this specification:

- PEDESTRIAN PUSH BUTTON

1.2 SUMMARY – NOT USED

1.3 REFERENCES

State of Connecticut Department of Transportation Standard Specifications for Roads, Bridges, Facilities, and Incidental Construction Form 818, 2020 (Merged with Supplemental Specifications Dated July 2023)

PART 2 PRODUCTS

Article M.16.08 - Pedestrian Push Button:

For RRFB (Rectangular Rapid Flashing Beacon):

Delete the entire section and replace with the following:

A. General

- Size and force compliant with ADA, Section 14.2.5, Crossing Controls.
- Tamper-proof, and Vandal-proof, Weatherproof, Freeze-proof, Impact-resistant design and construction.
- Completely insulated to preclude electrical shock under any weather conditions.
- Wire entrance through the rear.
- Stainless steel mounting hardware.
- Any features in conflict with this spec and MUTCD shall be disabled.
- Accessible features shall:
  - conform to the MUTCD
  - provide the speech message “yellow lights are flashing” that shall be spoken twice
  - include tactile arrow on the button
  - include a locator tone
  - not use vibrotactile indications or percussive indications for the audible information
    - The vibrotactile feedback shall be disabled.

B. Audible Pushbutton Locator Tone

- Frequency: repeating tone at one (1) second intervals
- Tone duration: ≤ 0.15 seconds
- Volume:
  - Minimum setting of zero
  - Manually adjustable initial setting
  - Automatically adjusted after initial setting. Volume increased in response to a temporary increase in ambient noise and subsequently decreased with a decrease in ambient noise.

- Maximum volume: 100 dBA which is the approximate sound pressure of a gasoline powered lawn mower nearby.
- Automatic volume adjustment independent of other APS&Ds at the intersection.
- Should not be disabled but have the capability of being disabled without affecting operation of other features.

- Silent only when RRFB yellow lights are flashing. Active all other times.

C. Tactile Arrow Pushbutton:

- Pushbutton contained in a circular assembly which fits inside the housing and is attached to the housing with 4 screws.
- The confirmation light shall flash simultaneously with the RRFB indications.
- ADA compliant: Size: ≥ 2.0" diameter, Actuation force: ≤ 5 ft-lb
- Shape: Circular, raised slightly above housing so that it may be actuated with the back of a hand
- Tamper-proof, vandal-proof, weatherproof, freeze-proof, impact-resistant design and construction.
- Tactile Arrow:
  - Attached to surface of the button assembly by a tamperproof method.
  - Raised slightly above surface of pushbutton, minimum 0.125"
  - Size: Length ≥ 1.5", Height ≥ 1.0"
  - Color: Sharp contrast to background color of pushbutton and housing

D. Housing

- Die cast aluminum meeting requirements of ASTM B85.
- Designed to attach 9" x 12" four-hole advisory sign.
- Flat back to facilitate surface mount.
- Available hardware to either pedestal top-mount or pole side-mount on diameter range of 3½" to 15".
- Available extension bracket of a size indicated on the plan – 18" maximum.

E. Painting

- All Surfaces of the unit shall be finished with 3 coats of infrared oven-baked paint, before assembly.
  - **First coat:** Primer shall be epon-oxide baking primer and shall meet and exceed 1 performance specification of FS TT-P-664.
  - **Second coat:** Gray Enamel shall be lusterless and shall meet the requirements of FS TT-E-527.
  - **Third coat:** The housing, all brackets, and hardware shall be YELLOW exterior-baking enamel and shall meet the requirements of FS TT-E-489. The color shall be No. 13538, Federal Standard No. 595.

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 347001 – TRAFFICPERSON

PART 1 GENERAL

1.1 RELATED DOCUMENTS

All materials and construction methods shall conform to the Connecticut Department of Transportation Standard Specifications for Roads, Bridges, Facilities, and Incidental Construction Form 818 with modifications for the following items as stated in this specification:

- TRAFFICPERSON (MUNICIPAL POLICE OFFICER)
- TRAFFICPERSON (UNIFORMED FLAGGER)

1.2 SUMMARY

Under this item the Contractor shall provide the services of Trafficpersons of the type and number, and for such periods, as the Engineer approves for the control and direction of vehicular traffic and pedestrians. Traffic persons requested solely for the contractor's operational needs will not be approved for payment.

1.3 REFERENCES

State of Connecticut Department of Transportation Standard Specifications for Roads, Bridges, Facilities, and Incidental Construction Form 818, 2020 (Merged with Supplemental Specifications Dated July 2023)

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

Prior to the start of operations on the project requiring the use of Trafficpersons, a meeting will be held with the Contractor, Trafficperson agency or firm, and Engineer, if applicable, to review the Trafficperson operations, lines of responsibility, and operating guidelines which will be used on the project. A copy of the municipality's billing rates for Municipal Police Officers and vehicles, if applicable, will be provided to the Engineer prior to start of work.

On a weekly basis, the Contractor shall inform the Engineer of their scheduled operations for the following week and the number of Trafficpersons requested. The Engineer shall review this schedule and approve the type and number of Trafficpersons required. In the event of an unplanned, emergency, or short-term operation, the Engineer may approve the temporary use of properly clothed persons for traffic control until an authorized Trafficperson may be obtained. In no case shall this temporary use exceed 8 hours for any operation.

If the Contractor changes or cancels any scheduled operations without prior notice of same as required by the agency providing the Trafficpersons, and such that Trafficperson services are no longer required, the Contractor will be responsible for payment at no cost to the Department of any show-up cost for any Trafficperson not used because of the change. Exceptions, as approved by the Engineer, may be granted for adverse weather conditions and unforeseeable causes beyond the control and without the fault or negligence of the Contractor.

Trafficpersons assigned to a work site are to only take direction from the Engineer.

Trafficpersons shall wear a high visibility safety garment that complies with OSHA, MUTCD, ASTM Standards and the safety garment shall have the words "Traffic Control" clearly visible on the front and rear panels (minimum letter size 2 inches (50 millimeters)). Worn/faded safety garments that are no longer highly visible shall not be used. The Engineer shall direct the replacement of any worn/faded garment at no cost to the Town.

A Trafficperson shall assist in implementing the traffic control specified in the Maintenance and Protection of Traffic contained elsewhere in these specifications or as directed by the Engineer. Any situation requiring a Trafficperson to operate in a manner contrary to the Maintenance and Protection of Traffic specification shall be authorized in writing by the Engineer.

Trafficpersons shall consist of the following types:

1. Uniformed Law Enforcement Personnel: Law enforcement personnel shall wear the high visibility safety garment provided by their law enforcement agency. If no high visibility safety garment is provided, the Contractor shall provide the law enforcement personnel with a garment meeting the requirements stated for the Uniformed Flaggers' garment.

Law Enforcement Personnel may also be used to conduct motor vehicle enforcement operations in and around work areas as directed and approved by the Engineer.

Municipal Police Officers: Uniformed Municipal Police Officers shall be sworn Municipal Police Officers or Uniformed Constables who perform criminal law enforcement duties from the Municipality in which the project is located. Their services will also include an official Municipal Police vehicle when requested by the Engineer. Uniformed Municipal Police Officers will be used on non-limited access highways. If Uniformed Municipal Police Officers are unavailable, other Trafficpersons may be used when authorized in writing by the Engineer.

Uniformed Municipal Police Officers and requested Municipal Police vehicles will be used at such locations and for such periods as the Engineer deems necessary to control traffic operations and promote increased safety to motorists through the construction sites.

2. Uniformed Flagger: Uniformed Flaggers shall be persons who have successfully completed flagger training by the American Traffic Safety Services Association (ATSSA), National Safety Council (NSC) or other programs approved by the Engineer. A copy of the Flagger's training certificate shall be provided to the Engineer before the Flagger performs any work on the project. Uniformed Flaggers shall conform to Chapter 6E, Flagger Control, in the Manual of Uniformed Traffic Control Devices (MUTCD) and shall wear high-visibility safety apparel, use a STOP/SLOW paddle that is at least 18 inches (450 millimeters) in width with letters at least 6 inches (150 millimeters) high. The paddle shall be mounted on a pole of sufficient length to be 6 feet (1.8 meters) above the ground as measured from the bottom of the sign.

Uniformed Flaggers will only be used on non-limited access highways to control traffic operations when authorized in writing by the Engineer.

END OF SECTION

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SECTION 347002 – MAINTENANCE AND PROTECTION OF TRAFFIC

PART 1 GENERAL

1.1 RELATED DOCUMENTS

All materials and construction methods shall conform to the Connecticut Department of Transportation Standard Specifications for Roads, Bridges, Facilities, and Incidental Construction Form 818 with modifications for the following items as stated in this specification:

- MAINTENANCE AND PROTECTION OF TRAFFIC

1.2 SUMMARY

Article 9.71.01 – Description *is supplemented by the following:*

The Contractor shall maintain and protect traffic as described by the following and as limited in the special provision for Section 1.08 - Prosecution and Progress:

All Roads (Orchard St, Indian Rock Ln, Stanwich Rd, Coachlamp Ln, Ponderosa Dr)

The Contractor shall maintain and protect a minimum of 1 lane of traffic in each direction with each lane on a paved travel path not less than 11 feet in width, with the following exceptions:

1. During the allowable periods and when the Contractor is actively working, the Contractor will be permitted to maintain and protect at least an alternating one-way traffic operation on a paved travel path not less than 11 feet in width and no more than 300 feet in length, unless specified elsewhere in the Contract. There shall be no more than one alternating one-way traffic operation within the Project limits without prior approval of the Engineer.
2. The Contractor will not be permitted to close any roadways or detour traffic.

Commercial and Residential Driveways

The Contractor shall maintain access to and egress from all commercial and residential driveways throughout the Project limits. The Contractor will be permitted to temporarily close affected driveways while actively working with coordination and permission from the owner or proprietor.

Intermediate Term Sidewalk Closures

The Contractor shall maintain and protect existing pedestrian accommodations, or a minimum of 4 feet in width, on all existing sidewalks, sidewalk ramps, and access to pedestrian pushbuttons, with the following exception:

- During the allowable periods and when the Contractor is actively constructing pedestrian amenities or installing signal equipment, the Contractor will be allowed to close pedestrian sidewalks and sidewalk ramps and restrict access to pedestrian pushbuttons for no more than a continuous 48 hour period of time.

No more than two corners of an intersection may be closed for an intermediate term sidewalk closure at any time. Where all four corners of an intersection have sidewalks and sidewalk ramps, diagonal corners shall not be closed at the same time.

During the intermediate term sidewalk closure, all approaches to the sidewalk shall be blocked by Construction Barricade Detectable with Sidewalk Closed signs.

The Contractor shall ensure that traffic control signals with pedestrian phases where access to the pushbuttons cannot be provided are revised at the start of the closure to automatically activate the pedestrian phase every signal cycle.

Intermediate term sidewalk closures may be extended to 72 hours with prior approval of the Engineer.

1.3 REFERENCES

State of Connecticut Department of Transportation Standard Specifications for Roads, Bridges, Facilities, and Incidental Construction Form 818, 2020 (Merged with Supplemental Specifications Dated July 2023)

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

Article 9.71.03 - Construction Methods *is supplemented as follows:*

General

Unpaved travel paths will only be permitted for areas requiring full depth and full width reconstruction. The unpaved section shall be the full width of the road and shall be perpendicular to the travel lanes. The Contractor will be allowed to maintain traffic on processed aggregate for a duration not to exceed 10 calendar days and opposing traffic lane dividers shall be used as a centerline.

The Contractor is required to delineate any raised structures within the travel lanes, so that the structures are visible day and night, unless there are specific Contract plans and provisions to temporarily lower these structures prior to the completion of work.

The Contractor shall schedule operations so that pavement removal and roadway resurfacing shall be completed full width across a roadway or bridge section by the end of a work shift, or as directed by the Engineer.

When the installation of all intermediate courses of bituminous concrete pavement is completed for the entire roadway, the Contractor shall then install the final course of bituminous concrete pavement.

When the Contractor is excavating adjacent to the roadway, the Contractor shall provide a 3 foot shoulder between the work area and travel lanes, with traffic drums spaced every 50 feet. At the end of the work shift if the vertical drop-off exceeds 3 inches, the Contractor shall provide a temporary bituminous concrete traversable slope of 4:1 or flatter that is acceptable to the Engineer.

The Contractor, during the course of any active overhead construction work, shall close the lanes directly below the work area for the entire length of time overhead work is being undertaken.

At no time shall an overhead sign be left partially removed or installed.

When an existing sign is to be relocated or replaced, the work shall be completed during the same work shift.

The field installation of a signing pattern shall constitute interference with existing traffic operations and shall not be allowed, except during the allowable periods.

On limited-access highways, construction vehicles entering travel lanes shall not be allowed without a lane closure. The lane closure shall be of sufficient length to allow vehicles to enter or exit the work area at the posted speed limit, in order to merge with existing traffic.

Existing Signing

The Contractor shall maintain all existing overhead and side-mounted signs within the Project limits throughout the duration of the Project. The Contractor shall temporarily relocate signs and sign supports as many times as deemed necessary, and shall install temporary sign supports if necessary and as directed by the Engineer.

Requirements for Winter

The Contractor shall schedule a meeting with representatives of the Town/City to determine any interim traffic control measures the Contractor shall accomplish prior to winter to provide safety to motorists and permit adequate snow removal procedures. This meeting shall be held prior to October 31 of each year and will include, but not be limited to, discussion of the status and schedule of the following items: lane and shoulder widths, pavement restoration, traffic signal work, pavement markings, and signing.

Signing Patterns

The Contractor shall erect and maintain all signing patterns in accordance with the traffic control plans contained herein. Proper distances between advance warning signs and proper taper lengths are mandatory.

Pavement Markings - Non-Limited Access Roadways

During construction, the Contractor shall maintain all pavement markings on paved surfaces on all roadways throughout the limits of the Project.

Temporary pavement markings shall be installed on each intermediate course of bituminous concrete pavement and on any milled surface by the end of the work shift.

Permanent Epoxy Resin Pavement Markings shall be installed on the final course of bituminous concrete pavement within 10 calendar days of the final pavement installation if no Pavement Marking Grooves are proposed.

Temporary Pavement Markings

Temporary pavement markings that will be in place for less than 72 continuous hours may consist of temporary plastic pavement marking tape at the Contractor's expense. Additionally;

1. These temporary pavement markings shall include centerlines, lane lines (solid and broken), and stop bars.
2. Centerlines shall consist of two 4 inch wide yellow markings, 2 feet in length, side by side, 4 inches apart, at 40 foot intervals.
3. Lane lines shall consist of 4 inch wide white markings, 2 feet in length, at 40 foot intervals.
4. No passing zones shall be posted with signs in those areas where the final centerlines have not been established on two-way roadways.
5. Stop bars may consist of two 6 inch wide white markings or three 4 inch wide white markings placed side by side.
6. The temporary plastic pavement marking tape shall be installed in accordance with Section 12.12.
7. The Contractor shall remove and dispose of the temporary plastic pavement marking tape prior to another course of bituminous concrete pavement being installed.

Temporary pavement markings that will be in place for 72 continuous hours or more should consist of temporary painted pavement markings and shall be installed in accordance with Section 12.09. The markings shall include centerlines, edge lines, lane lines (solid and broken), lane-use arrows, and stop bars on each intermediate course of bituminous concrete pavement and on any milled surface by the end of the work shift Edge lines and lane-use arrows are not required if the next course of bituminous concrete pavement will be placed within 10 calendar days.

All temporary pavement markings exposed throughout the winter shall be Epoxy Resin Pavement Markings, unless directed otherwise by the Engineer.

Temporary pavement markings, as described above, shall be maintained until the permanent pavement markings are installed.

Final Pavement Markings

Refer to Pavement Marking Groove special provisions for pavement marking requirements. Permanent epoxy resin pavement markings shall be installed in accordance with Section 12.10 and the applicable Traffic Engineering Standard Drawings.

If Temporary Plastic Pavement Marking Tape is installed, then the Contractor shall remove and dispose of these markings during the same work shift that the permanent epoxy resin pavement markings are to be installed. The cost of furnishing, installing and removing the Temporary Plastic Pavement Marking Tape shall be at the Contractor's expense.

Traffic Control During Construction Operations

The following guidelines shall assist field personnel in determining when and what type of traffic control patterns to use for various situations. These guidelines shall provide for a safer and more efficient movement of traffic through work zones and enhance the safety of work forces in the work area.

Traffic Control Patterns

Traffic control patterns shall be used when a work operation requires that all or part of any vehicle or work area protrudes onto any part of a travel lane or shoulder or is within the clear zone. For each situation, the installation of traffic control devices shall be based on the following:

- Speed and volume of traffic.
- Duration of operation.
- Exposure to hazards.

Traffic control patterns shall be uniform, neat, and orderly in order to command respect from the motorist.

Lane reduction tapers should be placed so that the entire length of the taper is installed on a tangent section of roadway and the entire taper area can be seen by the motorist.

All existing conflicting signs shall be removed, covered with an opaque material, or turned so that they are not legible to oncoming traffic prior to implementing a traffic control pattern. The existing signs shall be uncovered or reinstalled once the pattern is removed.

A buffer area should be provided during installation of a traffic control pattern and maintained for the duration of the work. The buffer area shall be free of any equipment, workers, materials, and parked vehicles.

Construction Traffic Control Plans 19 through 25 should be used for moving operations such as line striping, rumble strips, pothole patching, mowing, or sweeping when it is necessary for equipment to occupy a travel lane.

Traffic control patterns are not required for vehicles on an emergency patrol type activity or for a short duration stop of up to one hour, as long as the equipment is contained within the shoulder. Flashing lights, arrow boards, truck-mounted or trailer-mounted impact attenuators, and appropriate Trafficperson(s) shall be used when required.

In a situation not adequately covered by the Construction Traffic Control Plans, the Contractor shall contact the Engineer for assistance prior to setting up a traffic control pattern.

Placement of Signs

Signs shall be placed in a position that allows motorists the opportunity to reduce their speed prior to the work area. Signs shall be installed on the same side of the roadway as the work area. On multi-lane divided highways, advance warning signs shall be installed on both sides of the highway. On directional roadways (on-ramps, off-ramps, one-way roads) where the sight distance to signs is restricted, these signs should be installed on both sides of the roadway.

Allowable Adjustment of Signs and Devices Shown on the Construction Traffic Control Plans

The Construction Traffic Control Plans contained herein show the location and spacing of signs and devices under ideal conditions. Signs and devices should be installed as shown on these plans.

The proper application of the Construction Traffic Control Plans and installation of traffic control devices is dependent upon actual field conditions.

In the case of a horizontal or vertical sight restriction in advance of the work area, the traffic control pattern shall be extended to provide adequate sight distance for approaching traffic.

Adjustments to the Construction Traffic Control Plans shall only be made at the direction of the Engineer.

Table 1 indicates the minimum taper lengths required for a lane closure based on the posted speed limit and lane width of the roadway. These taper lengths shall only be used when the recommended taper lengths shown on the Construction Traffic Control Plans cannot be achieved.

Table 1 – Minimum Taper Length

POSTED SPEED LIMIT (MPH)	MINIMUM TAPER LENGTH FOR A SINGLE LANE CLOSURE (FEET)	
	FREEWAYS	SECONDARY ROADS
30 OR LESS	180	165
35	245	225
40	320	295
45	540	495
50	600	550
55	660	605
65	780	715

1. Work Zone Safety Meetings

1.a) Prior to the commencement of work, a Work Zone Safety Meeting shall be conducted with representatives from DOT Construction, Connecticut State Police (Local Barracks), Municipal Police, the Contractor (Project Superintendent) and the Traffic Control Subcontractor (if different than the prime Contractor) to review the traffic operations, lines of responsibility, and operating guidelines which will be used on the Project. DOT Traffic Engineering shall be invited to the Work Zone Safety Meeting. Other Work Zone Safety Meetings during the course of the Project should be scheduled as needed.

1.b) A Work Zone Safety Meeting Agenda shall be developed and used at the Meeting to outline the anticipated traffic control issues during the construction of this Project. Any issues that can't be resolved at these Meetings will be brought to the attention of the District Engineer and the Office of Construction. The agenda shall include:

i. Review Project scope of work and time;
ii. Review Section 1.08, Prosecution and Progress;
iii. Review Section 9.70, Trafficpersons;
iv. Review Section 9.71, Maintenance and Protection of Traffic;
v. Review Contractor's schedule and method of operations;
vi. Review special concern areas: ramps, turning roadways, medians, lane drops, etc.;
vii. Open discussion of work zone questions and issues;
viii. Discussion of review and approval process for changes in Contract requirements as they relate to work zone areas.

2. General

2.a) Traffic control patterns shall only be installed if the required minimum number of signs, traffic cones, traffic drums, and other equipment (i.e. one Arrow Board for each lane closed, two Truck-Mounted or Trailer-Mounted Attenuators (TMAs), Changeable Message Sign, etc.) are on Site.

2.b) The Contractor shall have spare maintenance and protection of traffic equipment (TMAs, Arrow Board, Changeable Message Sign(s), construction signs, traffic cones, traffic drums, etc.) available at all times in case of mechanical failures, etc. Spare maintenance and protection of traffic equipment

installed as a result of a sudden equipment breakdown shall be replaced by the Contractor within 24 hours.

2.c) Failure of the Contractor to have the required minimum number of signs, personnel, and equipment, which results in the pattern not being installed, shall not be a reason for a time extension or claim for lost time.

2.d) In cases of differences of opinion between the Contractor and the Inspection staff, the Contractor shall follow the directions of the Engineer. The matter shall be brought to the District Office for resolution immediately or, in the case of work after regular business hours, on the next business day.

3. Installing and Removing Traffic Control Patterns

3.a) Lane closures shall be installed beginning with the advance warning signs and proceeding forward toward the work area.

3.b) Lane closures shall be removed in the reverse order, beginning at the end of the work area, or traffic control pattern, and proceeding back toward the advance warning signs.

3.c) Stopping traffic may be allowed within the allowable hours stated in Section 1.08.04:

i. For those activities stated within the Contract.
ii. During paving, milling operations, or similar activities where, in the middle of the operation, it is necessary to flip the pattern to complete the operation on the other half of the roadway so traffic does not travel across the longitudinal joint or difference in roadway elevation.
iii. To move slow moving equipment across live traffic lanes into the work area.

3.d) The Contractor shall adhere to using the proper signs, placing the signs correctly, and ensuring the proper spacing of signs.

3.e) Additional devices are required on entrance ramps, exit ramps, and intersecting roads to warn and/or move traffic into the proper travel path prior to merging with or exiting from the mainline traffic. This shall be completed before installing the mainline pattern past the ramp or intersecting roadway.

3.f) Workers are prohibited from crossing the travel lanes on limited access roadways to install and remove signs or other devices on the opposite side of the roadway. Any signs or devices on the opposite side of the roadway shall be installed and removed separately.

4. Use of Arrow Boards

4.a) On limited access roadways, one Arrow Board shall be used for each lane that is closed. The Arrow Board shall be installed concurrently with the installation of the traffic control pattern and its placement shall be as shown on the Construction Traffic Control Plans. Additional Arrow Boards shall be deployed if sight distances are limited.

4.b) On non-limited access roadways, the use of an Arrow Board for lane closures is optional. The roadway geometry, sight distance, and traffic volume shall be considered in the decision to use the Arrow Board.

4.c) A vehicle displaying an arrow board shall be equipped with high-intensity rotating, flashing, oscillating, or strobe lights.

4.d) The flashing arrow mode shall be used for lane closure (merge) tapers.

4.e) The flashing arrow mode shall not be used for temporary alternating one-way traffic operations or to laterally shift lanes of traffic.

4.f) The flashing double arrow mode shall only be used for closing a center lane on a multilane roadway where adjacent left and right lanes remain open.

4.g) For shoulder work or roadside work near the shoulder, the Arrow Board shall be positioned in the shoulder and the flashing alternating diamond mode should be used.

4.h) The flashing alternating diamond caution mode should also be used when supplemental Arrow Boards are positioned in an already closed lane.

5. Use of Truck-Mounted or Trailer-Mounted Impact Attenuators (TMAs)

5.a) On limited access roadways, lane closures shall use a minimum of two TMAs to install and remove traffic control patterns. If two TMAs are not available, then the pattern shall not be installed.

5.b) On non-limited access roadways, the use of TMAs to install and remove patterns closing a lane(s) is optional. The roadway geometry, sight line distance, and traffic volume shall be considered in the decision to utilize the TMAs.

5.c) On limited access roadways, one TMA shall be placed on the shoulder and the second TMA shall be approximately 1,000 feet ahead blocking the lane to establish the advance and transition signing. The Arrow Board mounted on the TMA shall be in the arrow mode when taking the lane. The sign truck and workers shall be at sufficient distance ahead of the second TMA. In no case shall the TMA be used as the sign truck or a work truck. Once the transition is in place, the TMAs shall travel in the closed lane until all Portable Changeable Message Signs, signs, Arrow Boards, and cones/drums are installed. The Arrow Board mounted on the TMA should be in the flashing alternating diamond caution mode when traveling in the closed lane.

5.d) A TMA shall be placed prior to the first work area in the pattern. If there are multiple work areas within the same pattern, then additional TMAs shall be positioned at each additional work area as needed. The Arrow Board mounted on the TMA should be in the flashing alternating diamond caution mode when in the closed lane.

5.e) TMAs shall be positioned a sufficient distance prior to the workers or equipment being protected to allow for appropriate vehicle roll-ahead in the event that the TMA is hit, but not so far that an errant vehicle could travel around the TMA and into the work area. For additional placement and use details, refer to Section 18.06. Some operations, such as paving and concrete repairs, do not allow for placement of the TMA(s) within the specified distances. In these situations, the TMA(s) shall be placed at the beginning of the work area and shall be advanced as the paving or concrete operations proceed.

5.f) TMAs will be paid for in accordance with how the unit is used. If it is used as a TMA and is in the proper location as specified, then it will be paid for at the specified hourly rate for Truck-Mounted or Trailer-Mounted Impact Attenuator. When the TMA is used as an Arrow Board, it will be paid for at the daily rate for Arrow Board. If a TMA is used to install and remove a pattern and is also used as an Arrow Board in the same day, then the unit will be paid for as a Truck-Mounted or Trailer-Mounted Impact Attenuator for the hours used to install and remove the pattern, typically 2 hours (1 hour to install and 1 hour to remove). If the TMA is also used as an Arrow Board during the same day, then the unit will only be paid for at the daily rate as an Arrow Board.

6. Use of Traffic Drums and Traffic Cones

6.a) On limited-access highways, ramps, and turning roadways:

i. Traffic drums shall be used for taper channelization.
ii. Traffic drums shall be used to delineate raised catch basins and other hazards.
iii. Traffic cones with a minimum height of 42 inches may be used in place of drums in the tangent section of a closed lane or shoulder.
iv. Traffic cones less than 42 inches in height shall not be used.

6.b) On all roadways:

i. Traffic drums shall be used in place of traffic cones in traffic control patterns that are in effect for more than a 36-hour duration.
ii. Traffic cones shall not be left unattended.
iii. Traffic cones with a minimum height of 42 inches shall be used when the posted speed limit is 45 MPH or above.

6.c) Typical spacing of traffic drums and/or cones shown on the Construction Traffic Control Plans in the Contract are maximum spacings and may be reduced to meet actual field conditions as required.

7. Use of Barricade Warning Lights

7.a) Barricade Warning Lights may be installed on channelizing devices when used in a merge taper. The Barricade Warning Lights shall flash in a sequential pattern when used in a merge taper. The successive flashing shall occur from the upstream end (beginning) of the merge taper to the downstream end (end) of the merge taper.

7.b) Type C Barricade Warning Lights may be used at night to delineate the edge of the travel way.
7.c) Type B Barricade Warning Lights shall be used on post-mounted advanced warning signs.

8. Use of Portable Changeable Message Signs (PCMS)

8.a) On limited access roadways, one PCMS shall be used in advance of the traffic control pattern for all lane closures. Prior to installing the pattern, the PCMS shall be installed and in operation, displaying the appropriate lane closure information. The PCMS shall be positioned ½ to 1 mile ahead of the start of the lane closure taper. If the distance to the nearest exit ramp is greater than the specified ½ to 1 mile distance, then an additional PCMS shall be positioned a sufficient distance ahead of the exit ramp (and before the previous on-ramp where practical) to alert motorists to the work and therefore offer them an opportunity to take the exit.

8.b) On non-limited access roadways, the use of PCMS for lane closures is optional. The roadway geometry, sight line distance, and traffic volume shall be considered in the decision to use the PCMS.

8.c) PCMS should be placed off the shoulder of the roadway and behind a traffic barrier, if practical. Where a traffic barrier is not available to shield the PCMS, it should be placed off the shoulder and outside of the clear zone. If a PCMS has to be placed on the shoulder of the roadway or within the clear zone, it should be placed on the paved shoulder with a minimum of five traffic drums placed in a taper in front of it to delineate its position. The taper shall meet minimum distance requirements for a shoulder closure. The PCMS shall be protected if it is used for a continuous duration of 36 hours or more.

8.d) The PCMS shall be removed from the clear zone and have the display screen cleared and turned 90 degrees away from the roadway when the PCMS is no longer required.

8.e) The PCMS should not be used within 1,000 feet of an existing PCMS or Variable Message Sign (VMS).

8.f) A PCMS message shall:

i. consist of no more than two phases;
ii. contain no more than three lines of text per phase;
iii. have no more than eight characters per line, including spaces.

8.g) The PCMS should be used for specific situations that need to command the motorist's attention which cannot be conveyed with standard construction signs. The PCMS should not be used for generic messages (ex.: Road Work Ahead, Bump Ahead, Gravel Road, etc.) or for messages that need to be displayed for long periods of time, such as during stage construction. These types of messages should be displayed with construction signs. Special signs shall be coordinated with the Office of Construction and the Division of Traffic Engineering for the proper layout/dimensions required.

8.h) Typical messages that are allowed on the PCMS are shown below. Approval must be received from the Office of Construction for any message(s) different than the typical messages shown in Figure 1.

8.i) All messages shall comply with the information provided in Tables 2 and 3.

Message No.	Phase 1	Phase 2	Message No.	Phase 1	Phase 2
1	LEFT LANE CLOSED	MERGE RIGHT	9	LANES CLOSED AHEAD	REDUCE SPEED
2	2 LEFT LANES CLOSED	MERGE RIGHT	10	LANES CLOSED AHEAD	USE CAUTION
3	LEFT LANE CLOSED	REDUCE SPEED	11	EXIT XX CLOSED	USE EXIT YY
4	2 LEFT LANES CLOSED	REDUCE SPEED	12	EXIT XX CLOSED USE YY	FOLLOW DETOUR
5	RIGHT LANE CLOSED	MERGE LEFT	13	2 LANES SHIFT AHEAD	USE CAUTION
6	2 RIGHT LANES CLOSED	MERGE LEFT	14	3 LANES SHIFT AHEAD	USE CAUTION
7	RIGHT LANE CLOSED	REDUCE SPEED			
8	2 RIGHT LANES CLOSED	REDUCE SPEED			

Figure 1: Typical PCMS Messages

Table 2: Acceptable Abbreviations

Word Message	Standard Abbreviation	Word Message	Standard Abbreviation
Access	ACCS	Minimum	MIN
Afternoon / Evening	PM	Minor	MNR
Ahead	AHD	Minute(s)	MIN
Alternate	ALT	Monday	MON
Avenue	AVE, AV	Morning / Late Night	AM
Bicycle	BIKE	Mount	MT
Blocked	BLKD	Mountain	MTN
Boulevard	BLVD	National	NATL
Bridge	BR	Normal	NORM
CB Radio	CB	North	N
Center	CTR	Northbound	NBND
Center	CNTR	Oversized	OVRSZ
Chemical	CHEM	Parking	PKING
Circle	CIR	Parkway	PKWY
Compressed Natural Gas	CNG	Pavement	PVMT
Condition	COND	Pedestrian	PED
Congested	CONG	Place	PL
Construction	CONST	Pounds	LBS
Court	CT	Prepare	PREP
Crossing	XING	Quality	QLTY
Crossing (other than highway-rail)	XING	Right	RT
Downtown	DWNTN	Road	RD
Drive	DR	Roadwork	RDWK
East	E	Route	RT, RTE
Eastbound	EBND	Saint	ST
Electric Vehicle	EV	Saturday	SAT
Emergency	EMER	Service	SERV
Entrance, Enter	ENT	Shoulder	SHLDR
Exit	EX	Slippery	SLIP
Express	EXP	South	S
Expressway	EXPWY	Southbound	SBND
Feet	FT	Speed	SPD
Freeway	FRWY, FWY	State, county, or other non-US or non-Interstate numbered route	[Route Abbreviation determined by highway agency]**
Friday	FRI	Street	ST
Frontage	FRNTG	Sunday	SUN
Hazardous	HAZ	Telephone	PHONE
Hazardous Material	HAZMAT	Temporary	TEMP
High Occupancy Vehicle	HOV	Terrace	TER

Highway	HWY	Thruway	THWY
Highway-Rail Grade Crossing	RR XING	Thursday	THURS
Hospital	HOSP	Tons of Weight	T
Hour(s)	HR, HRS	Traffic	TRAF
Information	INFO	Trail	TR
International	INTL	Travelers	TRVLRS
Interstate	I-	Tuesday	TUES
Junction / Intersection	JCT	Turnpike	TPK
Lane	LN	Two-Way Intersection	2-WAY
Left	LFT	Two-Wheeled Vehicles	CYCLES
Liquid Propane Gas	LP-GAS	Upper	UPR
Local	LOC	US Numbered Route	US
Lower	LWR	Vehicle(s)	VEH, VEHS
Maintenance	MAINT	Warning	WARN
Major	MAJ	Wednesday	WED
Maximum	MAX	West	W
Mile(s)	MI	Westbound	WBND
Miles Per Hour	MPH		

** A space and no dash shall be placed between the abbreviation and the number of the route.

Table 3: Unacceptable Abbreviations

Unacceptable Abbreviation	Intended Word	Common Misinterpretation
ACC	Accident	Access (Road)
CLRS	Clears	Colors
DLY	Delay	Daily
FDR	Feeder	Federal
L	Left	Lane (Merge)
LT	Light (Traffic)	Left
PARK	Parking	Park
POLL	Pollution (Index)	Poll
RED	Reduce	Red
STAD	Stadium	Standard
WRNG	Warning	Wrong

9. Use of State Police Officers

9.a) State Police may be used only on limited access highways and secondary roadways that are under their primary jurisdiction. A minimum of one Officer may be used per critical sign pattern; however, a State Police presence is not required. Shoulder closures and right lane closures can generally be implemented without the presence of a State Police Officer. Left lane closures may also be implemented without State Police presence in areas with only moderate traffic and wide, unobstructed medians. It may be desirable to have a State Police presence, when available, under specific situations, such as nighttime lane closures; left lane closures with minimal width for setting up advance signs and staging; lane and shoulder closures on turning roadways/ramps or mainline where sight distance is minimal; and closures where extensive turning movements or traffic congestion regularly occur; however, they are not required.

9.b) If a State Police presence is provided, once the pattern is in place, the State Police Officer should be positioned in a non- hazardous location in advance of the pattern to provide advance warning to the motorist. If traffic backs up beyond the beginning of the pattern, then the State Police Officer shall reposition so that they are located prior to the backup. The State Police Officer should not be located immediately behind or within the roll ahead area of any TMA or within the work zone buffer area. The State Police Officer shall not be positioned in such a way that the State Police Officer obstructs any construction warning signs or PCMS from view of the motorist.

9.c) Other functions of the State Police Officer(s) may include:

i. Assisting construction vehicles entering and exiting the work area.
ii. Enforcement of motor vehicle laws within the work area, if specifically requested by the Engineer.

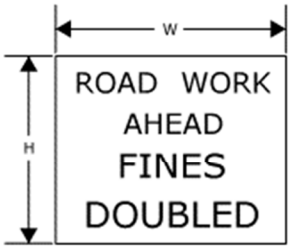
9.d) State Police Officers assigned to a work site shall take direction from the Engineer.

REGULATORY SIGN "ROAD WORK AHEAD, FINES DOUBLED"

THE REGULATORY SIGN "ROAD WORK AHEAD FINES DOUBLED" SHALL BE INSTALLED FOR ALL WORK ZONES THAT OCCUR ON ANY STATE HIGHWAY AND MUNICIPAL ROAD IN CONNECTICUT WHERE THERE ARE WORKERS PRESENT ON THE HIGHWAY.

THE "ROAD WORK AHEAD FINES DOUBLED" REGULATORY SIGN SHALL BE PLACED AFTER THE SERIES 16 SIGN AND IN ADVANCE OF THE "ROAD WORK AHEAD" SIGN.

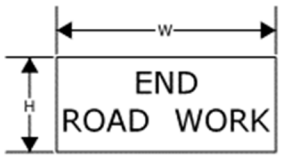
	W	H
31-1906	48"	42"
31-1907	60"	54"



"END ROAD WORK" SIGN

THE LAST SIGN IN THE PATTERN SHALL BE THE "END ROAD WORK" SIGN.

	W	H
80-9606	36"	18"
80-9612	48"	24"



CONSTRUCTION TRAFFIC CONTROL PLAN
ROAD WORK AHEAD SIGNS

SCALE: NONE

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED Tracy L. Fogarty, P.E. 2019.09.12 15:54:44 -04'00'
PRINCIPAL ENGINEER

NOTES FOR TRAFFIC CONTROL PLANS

1. IF A TRAFFIC STOPPAGE OCCURS IN ADVANCE OF SIGN (A), THEN AN ADDITIONAL SIGN (A) SHALL BE INSTALLED IN ADVANCE OF THE STOPPAGE.

2. SIGNS (AA), (A), AND (D) SHOULD BE OMITTED WHEN THESE SIGNS HAVE ALREADY BEEN INSTALLED IN ADVANCE TO DESIGNATE A LARGER WORK ZONE THAN THE WORK ZONE THAT IS ENCOMPASSED ON THIS PLAN.

3. SEE TABLE 1 FOR ADJUSTMENT OF TAPERS IF NECESSARY.

4. TRAFFIC CONES AND PORTABLE CONSTRUCTION SIGNS SHALL NOT BE LEFT UNATTENDED.

5. ALL CONFLICTING SIGNS WITHIN THE LIMITS OF A ROADWAY / LANE CLOSURE AREA SHALL BE COVERED WITH AN OPAQUE MATERIAL WHILE THE CLOSURE IS IN EFFECT, AND UNCOVERED WHEN THE ROADWAY / LANE CLOSURE IS RE-OPENED TO ALL LANES OF TRAFFIC.

6. IF THIS PLAN REMAINS IN CONTINUOUS OPERATION FOR MORE THAN 48 HOURS, THEN ANY EXISTING CONFLICTING PAVEMENT MARKINGS SHALL BE ERADICATED OR COVERED, AND TEMPORARY PAVEMENT MARKINGS THAT DELINEATE THE PROPER TRAVELPATHS SHALL BE INSTALLED.

7. DISTANCES BETWEEN SIGNS IN THE ADVANCE WARNING AREA MAY BE REDUCED TO 100' ON LOW-SPEED URBAN ROADS (SPEED LIMIT ⩽ 40 MPH).

8. IF THIS PLAN IS TO REMAIN IN OPERATION FROM SUNSET TO SUNRISE, INSTALL BARRICADE WARNING LIGHTS - HIGH INTENSITY ON ALL POST-MOUNTED DIAMOND SIGNS IN THE ADVANCE WARNING AREA.

9. A PORTABLE CHANGEABLE MESSAGE SIGN SHALL BE INSTALLED ONE HALF MILE TO ONE MILE IN ADVANCE OF THE LANE CLOSURE TAPER.

10 SIGN (P) SHALL BE MOUNTED A MINIMUM OF 7 FEET FROM THE PAVEMENT SURFACE TO THE BOTTOM OF THE SIGN.

TABLE 1 - MINIMUM TAPER LENGTHS

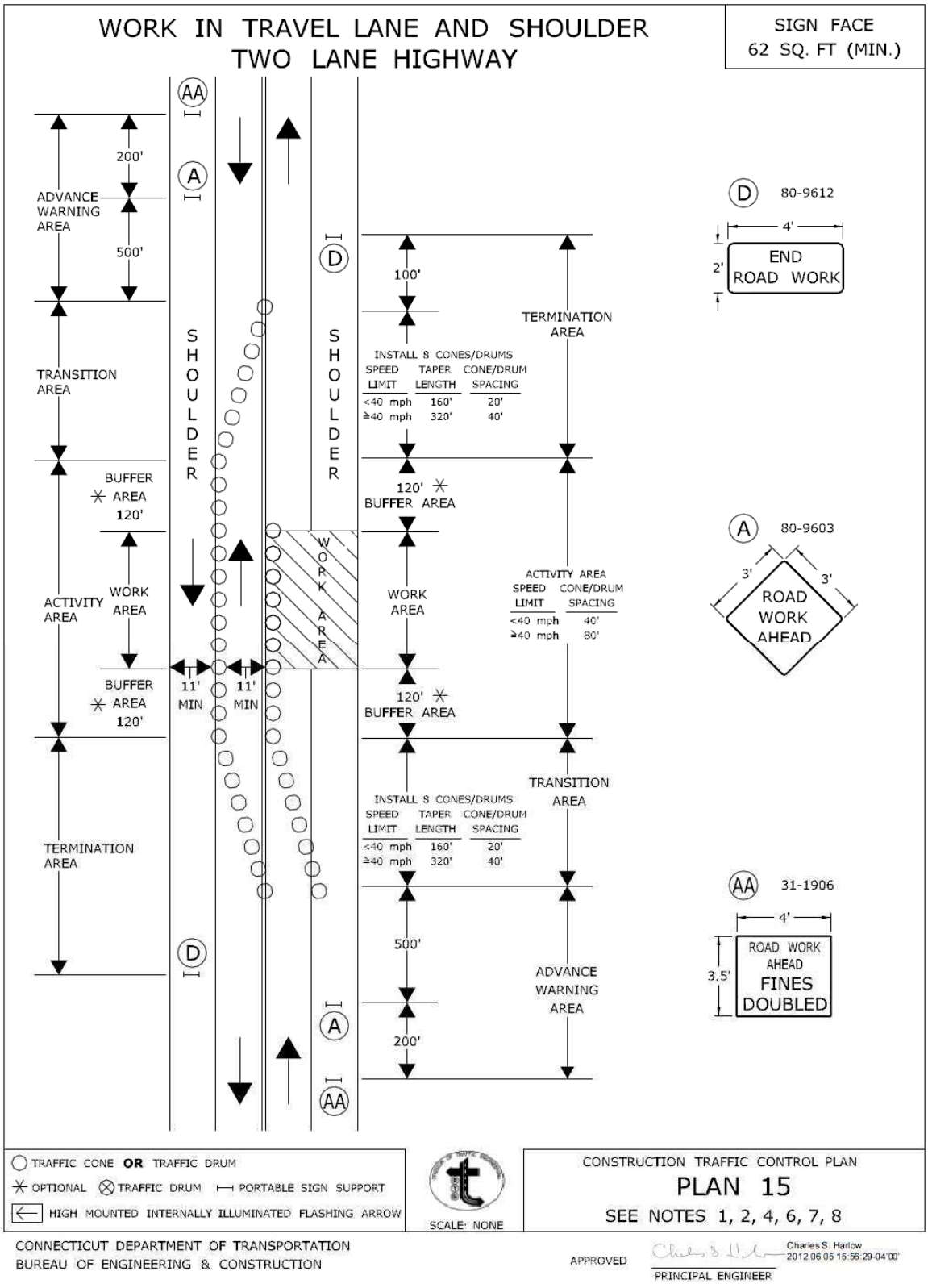
POSTED SPEED LIMIT (MILES PER HOUR)	MINIMUM TAPER LENGTH FOR A SINGLE LANE CLOSURE
30 OR LESS	180'
35	245'
40	320'
45	540'
50	600'
55	660'
65	780'

CONSTRUCTION TRAFFIC CONTROL PLAN
NOTES

SCALE: NONE

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED Tracy L Fogarty Tracy L. Fogarty, P.E. 2019.09.13 08:47:47-04'00'
PRINCIPAL ENGINEER

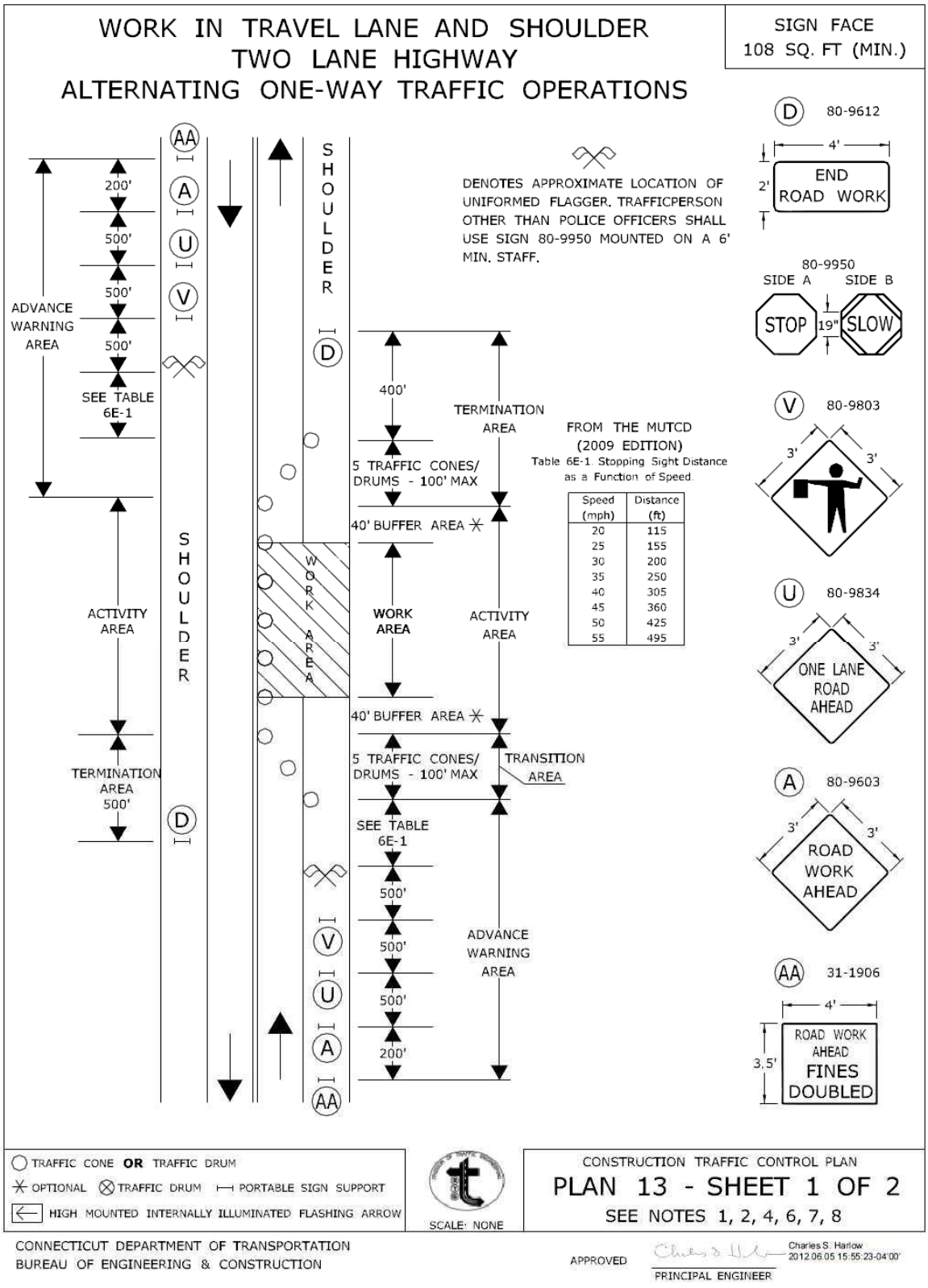


CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED Charles S. Harlow 2012.06.05 15:56:29-04'00'
PRINCIPAL ENGINEER

CENTRAL MIDDLE SCHOOL
GREENWICH, CONNECTICUT
STATE PROJECT NO. 057-0114 N
PHASE 2 OF 3 – BUILDING CONSTRUCTION, DEMOLITION, AND SITEWORK

S/L/A/M PROJECT NO. 22367.00
MAINTENANCE AND PROTECTION OF TRAFFIC
347002 - 17



CENTRAL MIDDLE SCHOOL
GREENWICH, CONNECTICUT
STATE PROJECT NO. 057-0114 N
PHASE 2 OF 3 – BUILDING CONSTRUCTION, DEMOLITION, AND SITEWORK

S/L/A/M PROJECT NO. 22367.00
MAINTENANCE AND PROTECTION OF TRAFFIC
347002 - 18

WORK IN TRAVEL LANE AND SHOULDER
TWO LANE HIGHWAY
ALTERNATING ONE-WAY TRAFFIC OPERATIONS

SIGN FACE
108 SQ. FT (MIN.)

HAND SIGNAL METHODS TO BE USED BY UNIFORMED FLAGGERS

THE FOLLOWING METHODS FROM SECTION 6E.07, FLAGGER PROCEDURES, IN THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES," SHALL BE USED BY UNIFORMED FLAGGERS WHEN DIRECTING TRAFFIC THROUGH A WORK AREA. THE STOP/SLOW SIGN PADDLE (SIGN NO. 80-9950) SHOWN ON THE TRAFFIC STANDARD SHEET TR-1220 01 ENTITLED, "SIGNS FOR CONSTRUCTION AND PERMIT OPERATIONS" SHALL BE USED.

A. TO STOP TRAFFIC

TO STOP ROAD USERS, THE FLAGGER SHALL FACE ROAD USERS AND AIM THE STOP PADDLE FACE TOWARD ROAD USERS IN A STATIONARY POSITION WITH THE ARM EXTENDED HORIZONTALLY AWAY FROM THE BODY. THE FREE ARM SHALL BE HELD WITH THE PALM OF THE HAND ABOVE SHOULDER LEVEL TOWARD APPROACHING TRAFFIC.



B. TO DIRECT TRAFFIC TO PROCEED

TO DIRECT STOPPED ROAD USERS TO PROCEED, THE FLAGGER SHALL FACE ROAD USERS WITH THE SLOW PADDLE FACE AIMED TOWARD ROAD USERS IN A STATIONARY POSITION WITH THE ARM EXTENDED HORIZONTALLY AWAY FROM THE BODY. THE FLAGGER SHALL MOTION WITH THE FREE HAND FOR ROAD USERS TO PROCEED.



C. TO ALERT OR SLOW TRAFFIC

TO ALERT OR SLOW TRAFFIC, THE FLAGGER SHALL FACE ROAD USERS WITH THE SLOW PADDLE FACE AIMED TOWARD ROAD USERS IN A STATIONARY POSITION WITH THE ARM EXTENDED HORIZONTALLY AWAY FROM THE BODY. TO FURTHER ALERT OR SLOW TRAFFIC, THE FLAGGER HOLDING THE SLOW PADDLE FACE TOWARD ROAD USERS MAY MOTION UP AND DOWN WITH THE FREE HAND, PALM DOWN.



◯ TRAFFIC CONE **OR** TRAFFIC DRUM
✳ OPTIONAL ⊗ TRAFFIC DRUM ⊢ PORTABLE SIGN SUPPORT
⟵ HIGH MOUNTED INTERNALLY ILLUMINATED FLASHING ARROW

SCALE: NONE

CONSTRUCTION TRAFFIC CONTROL PLAN
PLAN 13 - SHEET 2 OF 2
SEE NOTES 1, 2, 4, 6, 7, 8

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED Charles S. Harlow 2012.06.05 15:55:45-04'00'
PRINCIPAL ENGINEER

END OF SECTION

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APPENDIX E - GREENWICH TEST PIT FIELD LOG FORMS (TP101 – TP120) - NEW PER BQ RFI #223 REPORTS DATED 11/17/2023

Town of Greenwich
Department of Public Works - Engineering Division
Town Hall - 101 Field Point Road, Greenwich, CT 06830
Phone 203-622-7767 - Fax 203-622-7747

SOIL EVALUATION TEST RESULTS

Project Name: Greenwich Central Middle School

Engineering Firm's Nam Tighe & Bond

Project Address: Greenwich, CT

Engineer's Name: Andrew P. White, PE

Test Pit or Soil Boring #: 101 Ground Elevation: 45.97'

Elevation	Soil Texture (Percent Sand, Silt and Clay)	Depth Range in Inches
45.57'	Topsoil	0" - 5"
44.47'	F-C Sand and F-C Gravel Some Boulders, Little Silt, Little Wood	5" - 18"
42.97'	Light Brown F-C Sand, Some Boulders, Little F-C Gravel, Trace Roots at 2'	18" - 36"
40.97'	F-M Sand, Some Silt, Little Boulders, Trace Roots	36" - 60"
37.97'	Brown F-C Sand and F-C Gravel, Some Boulders, Little Silt	60" - 96"

Elevation		Depth in Inches
	Mottling (Seasonally High Groundwater)	
37.97'	Groundwater	96"
	Ledge	

* All test pits or soil borings shall be excavated to an elevation four feet below the proposed bottom elevation of the infiltration system.

Saturated Hydraulic Conductivity Test Location #:

Ground Elevation: _____

Top Elevation of Proposed Infiltration System: _____

Bottom Elevation of Proposed Infiltration System: _____

Elevation of Test*: _____

Test Method (check one of the following acceptable methods**):

_____ Borehole infiltration test (NHDES, 2008)
_____ Guelph permeameter - ASTM D5126-90 Method
_____ Falling head permeameter – ASTM D5126-90 Method
_____ Double ring permeameter or infiltrometer - ASTM D3385-03, D5093-02, D5126-90 Methods
_____ Amoozemeter or Amoozegar (constant head) permeameter – Amoozegar 1992

Attach field data forms for the respective infiltration test method.

Calculated Saturated Hydraulic Conductivity Rate: _____

**A percolation test, performed in accordance with the guidelines of the Connecticut State Health Code or otherwise, is not an acceptable test for saturated hydraulic conductivity. Percolation tests overestimate the saturated hydraulic conductivity rate.

* All field infiltration tests must be conducted in the actual location and soil layer where stormwater infiltration is proposed.

TEST CERTIFICATION

I HEREBY CERTIFY THAT THE INFORMATION CONTAINED IN THIS REPORT IS TRUE AND CORRECT.

Elysa Goldberg	Elysa Goldberg	11/17/2023
Name of Test Conductor	Signature of Test Conductor	Date

Town of Greenwich
Department of Public Works - Engineering Division
Town Hall - 101 Field Point Road, Greenwich, CT 06830
Phone 203-622-7767 - Fax 203-622-7747

SOIL EVALUATION TEST RESULTS

Project Name: Greenwich Central Middle School

Engineering Firm's Nam Tighe & Bond

Project Address: Greenwich, CT

Engineer's Name: Andrew P. White, PE

Test Pit or Soil Boring #: 102 Ground Elevation: 46.1'

Elevation	Soil Texture (Percent Sand, Silt and Clay)	Depth Range in Inches
45.6'	Topsoil	0" - 6"
45.1'	F-C Brown Sand, Some Silt, Little F-C Gravel	6" - 12"
44.1'	F-C Light Brown Sand and F Gravel, Little Boulders, Little C Gracel, Trace Silt	12" - 24"
40.1'	F-C Gray Sand and F Gravel, Some Boulders, Little Silt, Trace Roots	24" - 72"

Elevation		Depth in Inches
	Mottling (Seasonally High Groundwater)	
	Groundwater	
	Ledge	

* All test pits or soil borings shall be excavated to an elevation four feet below the proposed bottom elevation of the infiltration system.

Saturated Hydraulic Conductivity Test Location #:

Ground Elevation: _____

Top Elevation of Proposed Infiltration System: _____

Bottom Elevation of Proposed Infiltration System: _____

Elevation of Test*: _____

Test Method (check one of the following acceptable methods**):

_____ Borehole infiltration test (NHDES, 2008)
_____ Guelph permeameter - ASTM D5126-90 Method
_____ Falling head permeameter – ASTM D5126-90 Method
_____ Double ring permeameter or infiltrometer - ASTM D3385-03, D5093-02, D5126-90 Methods
_____ Amoozemeter or Amoozegar (constant head) permeameter – Amoozegar 1992

Attach field data forms for the respective infiltration test method.

Calculated Saturated Hydraulic Conductivity Rate: _____

**A percolation test, performed in accordance with the guidelines of the Connecticut State Health Code or otherwise, is not an acceptable test for saturated hydraulic conductivity. Percolation tests overestimate the saturated hydraulic conductivity rate.

* All field infiltration tests must be conducted in the actual location and soil layer where stormwater infiltration is proposed.

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Town of Greenwich
Department of Public Works - Engineering Division
Town Hall - 101 Field Point Road, Greenwich, CT 06830
Phone 203-622-7767 - Fax 203-622-7747

SOIL EVALUATION TEST RESULTS

Project Name: Greenwich Central Middle School

Engineering Firm's Nam Tighe & Bond

Project Address: Greenwich, CT

Engineer's Name: Andrew P. White, PE

Test Pit or Soil Boring #: 103 Ground Elevation: 45'

Elevation	Soil Texture (Percent Sand, Silt and Clay)	Depth Range in Inches
44.5'	Topsoil	0" - 6"
44.0'	Brown F-C Sand and F Gravel, Little Silt	6" - 12"
43.0'	Light Brown F-M Sand, Little Silt, Trace F Gravel	12" - 24"
42.0'	Brown F-C Sand and F-C Gravel, Little Boulders	24" - 36"
40.0'	Gray F-C Sand and F Gravel, Some Boulders, Little Silt	36" - 60"
37.5'	Black F-M Sand, Some Silt, Little Organics	60" - 90"

Elevation		Depth in Inches
	Mottling (Seasonally High Groundwater)	
	Groundwater	
	Ledge	

* All test pits or soil borings shall be excavated to an elevation four feet below the proposed bottom elevation of the infiltration system.

Saturated Hydraulic Conductivity Test Location #:

Ground Elevation: _____

Top Elevation of Proposed Infiltration System: _____

Bottom Elevation of Proposed Infiltration System: _____

Elevation of Test*: _____

Test Method (check one of the following acceptable methods**):

_____ Borehole infiltration test (NHDES, 2008)
_____ Guelph permeameter - ASTM D5126-90 Method
_____ Falling head permeameter – ASTM D5126-90 Method
_____ Double ring permeameter or infiltrometer - ASTM D3385-03, D5093-02, D5126-90 Methods
_____ Amoozemeter or Amoozegar (constant head) permeameter – Amoozegar 1992

Attach field data forms for the respective infiltration test method.

Calculated Saturated Hydraulic Conductivity Rate: _____

**A percolation test, performed in accordance with the guidelines of the Connecticut State Health Code or otherwise, is not an acceptable test for saturated hydraulic conductivity. Percolation tests overestimate the saturated hydraulic conductivity rate.

* All field infiltration tests must be conducted in the actual location and soil layer where stormwater infiltration is proposed.

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Name of Test Conductor	Signature of Test Conductor	Date

Town of Greenwich
Department of Public Works - Engineering Division
Town Hall - 101 Field Point Road, Greenwich, CT 06830
Phone 203-622-7767 - Fax 203-622-7747

SOIL EVALUATION TEST RESULTS

Project Name: Greenwich Central Middle School

Project Address: Greenwich, CT

Engineering Firm's Nam Tighe & Bond

Engineer's Name: Andrew P. White, PE

Test Pit or Soil Boring #: 104 Ground Elevation: 44.36'

Elevation	Soil Texture (Percent Sand, Silt and Clay)	Depth Range in Inches
43.86'	Topsoil	0" - 6"
43.36'	Brown F-C Sand, Some F-C Gravel, Trace Silt	6" - 12"
40.36'	Light Brown F-C Sand and F-C Gravel, Some Boulders, Little Silt	12" - 48"
39.36'	Gray F-C Sand, some Boulders, Little F-C Gravel, Trace Silt	48" - 60"
38.36'	Black F-M Sand, Some Silt, Little Organics, Seepage at 72"	60" - 72"
36.36'	Gray Clayey Silt, Some F-M Sand	72" - 96"

Elevation		Depth in Inches
	Mottling (Seasonally High Groundwater)	
	Groundwater	
	Ledge	

* All test pits or soil borings shall be excavated to an elevation four feet below the proposed bottom elevation of the infiltration system.

Saturated Hydraulic Conductivity Test Location #:

Ground Elevation: _____

Top Elevation of Proposed Infiltration System: _____

Bottom Elevation of Proposed Infiltration System: _____

Elevation of Test*: _____

Test Method (check one of the following acceptable methods**):

_____ Borehole infiltration test (NHDES, 2008)
_____ Guelph permeameter - ASTM D5126-90 Method
_____ Falling head permeameter – ASTM D5126-90 Method
_____ Double ring permeameter or infiltrometer - ASTM D3385-03, D5093-02, D5126-90 Methods
_____ Amoozemeter or Amoozegar (constant head) permeameter – Amoozegar 1992

Attach field data forms for the respective infiltration test method.

Calculated Saturated Hydraulic Conductivity Rate: _____

**A percolation test, performed in accordance with the guidelines of the Connecticut State Health Code or otherwise, is not an acceptable test for saturated hydraulic conductivity. Percolation tests overestimate the saturated hydraulic conductivity rate.

* All field infiltration tests must be conducted in the actual location and soil layer where stormwater infiltration is proposed.

TEST CERTIFICATION

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Elysa Goldberg	Elysa Goldberg	11/17/2023
Name of Test Conductor	Signature of Test Conductor	Date

Town of Greenwich
Department of Public Works - Engineering Division
Town Hall - 101 Field Point Road, Greenwich, CT 06830
Phone 203-622-7767 - Fax 203-622-7747

SOIL EVALUATION TEST RESULTS

Project Name: Greenwich Central Middle School

Engineering Firm's Nam Tighe & Bond

Project Address: Greenwich, CT

Engineer's Name: Andrew P. White, PE

Test Pit or Soil Boring #: 105 Ground Elevation: 43.75'

Elevation	Soil Texture (Percent Sand, Silt and Clay)	Depth Range in Inches
43.25'	Topsoil	0" - 6"
40.25'	Light Brown F-C Sand and F Gravel, Some Boulders, Little Silt	6" - 42"
38.75'	Gray F-C Sand , Some Boulders, Little F-C Gravel, Trace Silt. Seepage at 60"	42" - 60"

Elevation		Depth in Inches
	Mottling (Seasonally High Groundwater)	
	Groundwater	
	Ledge	

* All test pits or soil borings shall be excavated to an elevation four feet below the proposed bottom elevation of the infiltration system.

Saturated Hydraulic Conductivity Test Location #:

Ground Elevation: _____

Top Elevation of Proposed Infiltration System: _____

Bottom Elevation of Proposed Infiltration System: _____

Elevation of Test*: _____

Test Method (check one of the following acceptable methods**):

_____ Borehole infiltration test (NHDES, 2008)
_____ Guelph permeameter - ASTM D5126-90 Method
_____ Falling head permeameter – ASTM D5126-90 Method
_____ Double ring permeameter or infiltrometer - ASTM D3385-03, D5093-02, D5126-90 Methods
_____ Amoozemeter or Amoozegar (constant head) permeameter – Amoozegar 1992

Attach field data forms for the respective infiltration test method.

Calculated Saturated Hydraulic Conductivity Rate: _____

**A percolation test, performed in accordance with the guidelines of the Connecticut State Health Code or otherwise, is not an acceptable test for saturated hydraulic conductivity. Percolation tests overestimate the saturated hydraulic conductivity rate.

* All field infiltration tests must be conducted in the actual location and soil layer where stormwater infiltration is proposed.

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Name of Test Conductor	Signature of Test Conductor	Date

Town of Greenwich
Department of Public Works - Engineering Division
Town Hall - 101 Field Point Road, Greenwich, CT 06830
Phone 203-622-7767 - Fax 203-622-7747

SOIL EVALUATION TEST RESULTS

Project Name: Greenwich Central Middle School

Project Address: Greenwich, CT

Engineering Firm's Nam Tighe & Bond

Engineer's Name: Andrew P. White, PE

Test Pit or Soil Boring #: 106 Ground Elevation: 42.98'

Elevation	Soil Texture (Percent Sand, Silt and Clay)	Depth Range in Inches
42.48'	Topsoil	0" - 6"
38.98'	Brown F-C Sand and F-C Gravel, Some Boulders, Trace Silt	6" - 48"
37.98'	Gray F-C Sand and F-C Gravel, Little Boulders, Trace Silt	48" - 60"
34.98'	Brown F-C Sand and F Gravel, Little Boulders, Little Silt	60" - 96"

Elevation		Depth in Inches
	Mottling (Seasonally High Groundwater)	
	Groundwater	
	Ledge	

* All test pits or soil borings shall be excavated to an elevation four feet below the proposed bottom elevation of the infiltration system.

Saturated Hydraulic Conductivity Test Location #:

Ground Elevation: _____

Top Elevation of Proposed Infiltration System: _____

Bottom Elevation of Proposed Infiltration System: _____

Elevation of Test*: _____

Test Method (check one of the following acceptable methods**):

_____ Borehole infiltration test (NHDES, 2008)
_____ Guelph permeameter - ASTM D5126-90 Method
_____ Falling head permeameter – ASTM D5126-90 Method
_____ Double ring permeameter or infiltrometer - ASTM D3385-03, D5093-02, D5126-90 Methods
_____ Amoozemeter or Amoozegar (constant head) permeameter – Amoozegar 1992

Attach field data forms for the respective infiltration test method.

Calculated Saturated Hydraulic Conductivity Rate: _____

**A percolation test, performed in accordance with the guidelines of the Connecticut State Health Code or otherwise, is not an acceptable test for saturated hydraulic conductivity. Percolation tests overestimate the saturated hydraulic conductivity rate.

* All field infiltration tests must be conducted in the actual location and soil layer where stormwater infiltration is proposed.

TEST CERTIFICATION

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Elysa Goldberg	Elysa Goldberg	11/17/2023
Name of Test Conductor	Signature of Test Conductor	Date

Town of Greenwich
Department of Public Works - Engineering Division
Town Hall - 101 Field Point Road, Greenwich, CT 06830
Phone 203-622-7767 - Fax 203-622-7747

SOIL EVALUATION TEST RESULTS

Project Name: Greenwich Central Middle School

Engineering Firm's Nam Tighe & Bond

Project Address: Greenwich, CT

Engineer's Name: Andrew P. White, PE

Test Pit or Soil Boring #: 107 Ground Elevation: 43.19'

Elevation	Soil Texture (Percent Sand, Silt and Clay)	Depth Range in Inches
42.69'	Topsoil	0" - 6"
39.19'	Brown F-C Sand and F-C Gravel, Some Boulders, Trace Silt	6" - 48"
38.19'	Black F-M Sand, Some Silt, Little Roots. Bog Odor	48" - 60"
35.19'	Gray F-M Sand. Some Silt, Little Boulders, Little F-C Gravel. Seepage at 84"	60" - 96"

Elevation		Depth in Inches
	Mottling (Seasonally High Groundwater)	
	Groundwater	
	Ledge	

* All test pits or soil borings shall be excavated to an elevation four feet below the proposed bottom elevation of the infiltration system.

Saturated Hydraulic Conductivity Test Location #:

Ground Elevation: _____

Top Elevation of Proposed Infiltration System: _____

Bottom Elevation of Proposed Infiltration System: _____

Elevation of Test*: _____

Test Method (check one of the following acceptable methods**):

_____ Borehole infiltration test (NHDES, 2008)
_____ Guelph permeameter - ASTM D5126-90 Method
_____ Falling head permeameter – ASTM D5126-90 Method
_____ Double ring permeameter or infiltrometer - ASTM D3385-03, D5093-02, D5126-90 Methods
_____ Amoozemeter or Amoozegar (constant head) permeameter – Amoozegar 1992

Attach field data forms for the respective infiltration test method.

Calculated Saturated Hydraulic Conductivity Rate: _____

**A percolation test, performed in accordance with the guidelines of the Connecticut State Health Code or otherwise, is not an acceptable test for saturated hydraulic conductivity. Percolation tests overestimate the saturated hydraulic conductivity rate.

* All field infiltration tests must be conducted in the actual location and soil layer where stormwater infiltration is proposed.

TEST CERTIFICATION

I HEREBY CERTIFY THAT THE INFORMATION CONTAINED IN THIS REPORT IS TRUE AND CORRECT.

Elysa Goldberg	Elysa Goldberg	11/17/2023
Name of Test Conductor	Signature of Test Conductor	Date

Town of Greenwich
Department of Public Works - Engineering Division
Town Hall - 101 Field Point Road, Greenwich, CT 06830
Phone 203-622-7767 - Fax 203-622-7747

SOIL EVALUATION TEST RESULTS

Project Name: Greenwich Central Middle School

Engineering Firm's Nam Tighe & Bond

Project Address: Greenwich, CT

Engineer's Name: Andrew P. White, PE

Test Pit or Soil Boring #: 108 Ground Elevation: 42.65'

Elevation	Soil Texture (Percent Sand, Silt and Clay)	Depth Range in Inches
42.15'	Topsoil	0" - 6"
38.65'	Light Brown F-C Sand and F-C Gravel, Some Boulders, Little Silt	6" - 48"
37.65'	Black F-M Sand, Some Silt, Little Cobbles. Bog Odor	48" - 60"
36.65'	Gray F-C Sand and F-C Gravel, Some Boulders, Little Silt	60" - 72"
34.65'	Gray F-M Sand, Some Silt, Trace Roots, Trace Boulders. Seepage at 96"	72" - 96"

Elevation		Depth in Inches
	Mottling (Seasonally High Groundwater)	
	Groundwater	
	Ledge	

* All test pits or soil borings shall be excavated to an elevation four feet below the proposed bottom elevation of the infiltration system.

Saturated Hydraulic Conductivity Test Location #:

Ground Elevation: _____

Top Elevation of Proposed Infiltration System: _____

Bottom Elevation of Proposed Infiltration System: _____

Elevation of Test*: _____

Test Method (check one of the following acceptable methods**):

_____ Borehole infiltration test (NHDES, 2008)
_____ Guelph permeameter - ASTM D5126-90 Method
_____ Falling head permeameter – ASTM D5126-90 Method
_____ Double ring permeameter or infiltrometer - ASTM D3385-03, D5093-02, D5126-90 Methods
_____ Amoozemeter or Amoozegar (constant head) permeameter – Amoozegar 1992

Attach field data forms for the respective infiltration test method.

Calculated Saturated Hydraulic Conductivity Rate: _____

**A percolation test, performed in accordance with the guidelines of the Connecticut State Health Code or otherwise, is not an acceptable test for saturated hydraulic conductivity. Percolation tests overestimate the saturated hydraulic conductivity rate.

* All field infiltration tests must be conducted in the actual location and soil layer where stormwater infiltration is proposed.

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SOIL EVALUATION TEST RESULTS

Project Name: Greenwich Central Middle School

Engineering Firm's Nam Tighe & Bond

Project Address: Greenwich, CT

Engineer's Name: Andrew P. White, PE

Test Pit or Soil Boring #: 109 Ground Elevation: 42.03'

Elevation	Soil Texture (Percent Sand, Silt and Clay)	Depth Range in Inches
41.03'	Topsoil	0" - 12"
40.03'	Light Brown Silty Loam and Sand	12" - 24"
38.03'	M Brown Sandy Loam	24" - 48"

Elevation		Depth in Inches
	Mottling (Seasonally High Groundwater)	
	Groundwater	
	Ledge	

* All test pits or soil borings shall be excavated to an elevation four feet below the proposed bottom elevation of the infiltration system.

Saturated Hydraulic Conductivity Test Location #:

Ground Elevation: _____

Top Elevation of Proposed Infiltration System: _____

Bottom Elevation of Proposed Infiltration System: _____

Elevation of Test*: _____

Test Method (check one of the following acceptable methods**):

_____ Borehole infiltration test (NHDES, 2008)

_____ Guelph permeameter - ASTM D5126-90 Method

_____ Falling head permeameter – ASTM D5126-90 Method

_____ Double ring permeameter or infiltrometer - ASTM D3385-03, D5093-02, D5126-90 Methods

_____ Amoozemeter or Amoozegar (constant head) permeameter – Amoozegar 1992

Attach field data forms for the respective infiltration test method.

Calculated Saturated Hydraulic Conductivity Rate: _____

**A percolation test, performed in accordance with the guidelines of the Connecticut State Health Code or otherwise, is not an acceptable test for saturated hydraulic conductivity. Percolation tests overestimate the saturated hydraulic conductivity rate.

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SOIL EVALUATION TEST RESULTS

Project Name: Greenwich Central Middle School

Engineering Firm's Nam Tighe & Bond

Project Address: Greenwich, CT

Engineer's Name: Andrew P. White, PE

Test Pit or Soil Boring #: 110 Ground Elevation: 45.82'

Elevation	Soil Texture (Percent Sand, Silt and Clay)	Depth Range in Inches
45.32'	Topsoil	0" - 6"
43.32'	M Brown Sandy Loam with Some Cobbles	6" - 30"
41.82'	Grey Silty Organic Material	30" - 48"

Elevation		Depth in Inches
	Mottling (Seasonally High Groundwater)	
	Groundwater	
	Ledge	

* All test pits or soil borings shall be excavated to an elevation four feet below the proposed bottom elevation of the infiltration system.

Saturated Hydraulic Conductivity Test Location #:

Ground Elevation: _____

Top Elevation of Proposed Infiltration System: _____

Bottom Elevation of Proposed Infiltration System: _____

Elevation of Test*: _____

Test Method (check one of the following acceptable methods**):

_____ Borehole infiltration test (NHDES, 2008)

_____ Guelph permeameter - ASTM D5126-90 Method

_____ Falling head permeameter – ASTM D5126-90 Method

_____ Double ring permeameter or infiltrometer - ASTM D3385-03, D5093-02, D5126-90 Methods

_____ Amoozemeter or Amoozegar (constant head) permeameter – Amoozegar 1992

Attach field data forms for the respective infiltration test method.

Calculated Saturated Hydraulic Conductivity Rate: _____

**A percolation test, performed in accordance with the guidelines of the Connecticut State Health Code or otherwise, is not an acceptable test for saturated hydraulic conductivity. Percolation tests overestimate the saturated hydraulic conductivity rate.

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SOIL EVALUATION TEST RESULTS

Project Name: Greenwich Central Middle School

Engineering Firm's Nam Tighe & Bond

Project Address: Greenwich, CT

Engineer's Name: Andrew P. White, PE

Test Pit or Soil Boring #: 111 Ground Elevation: 44.16'

Elevation	Soil Texture (Percent Sand, Silt and Clay)	Depth Range in Inches
43.16'	Topsoil	0" - 12"
41.16'	M Brown Sandy Loam with Some Cobbles	12"- 36"

Elevation		Depth in Inches
	Mottling (Seasonally High Groundwater)	
	Groundwater	
	Ledge	

* All test pits or soil borings shall be excavated to an elevation four feet below the proposed bottom elevation of the infiltration system.

Saturated Hydraulic Conductivity Test Location #:

Ground Elevation: _____

Top Elevation of Proposed Infiltration System: _____

Bottom Elevation of Proposed Infiltration System: _____

Elevation of Test*: _____

Test Method (check one of the following acceptable methods**):

_____ Borehole infiltration test (NHDES, 2008)

_____ Guelph permeameter - ASTM D5126-90 Method

_____ Falling head permeameter – ASTM D5126-90 Method

_____ Double ring permeameter or infiltrometer - ASTM D3385-03, D5093-02, D5126-90 Methods

_____ Amoozemeter or Amoozegar (constant head) permeameter – Amoozegar 1992

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Calculated Saturated Hydraulic Conductivity Rate: _____

**A percolation test, performed in accordance with the guidelines of the Connecticut State Health Code or otherwise, is not an acceptable test for saturated hydraulic conductivity. Percolation tests overestimate the saturated hydraulic conductivity rate.

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SOIL EVALUATION TEST RESULTS

Project Name: Greenwich Central Middle School

Engineering Firm's Nam Tighe & Bond

Project Address: Greenwich, CT

Engineer's Name: Andrew P. White, PE

Test Pit or Soil Boring #: 112 Ground Elevation: 45.7'

Elevation	Soil Texture (Percent Sand, Silt and Clay)	Depth Range in Inches
45.2'	Topsoil	0" - 6"
43.2'	M Brown Sandy Loam and Silt, Some Gravel and Some Boulders	6" - 30"
38.7'	M Brown Sandy Loam and Silt with Some Cobbles, Some Boulders	30" - 84"

Elevation		Depth in Inches
	Mottling (Seasonally High Groundwater)	
	Groundwater	
	Ledge	

* All test pits or soil borings shall be excavated to an elevation four feet below the proposed bottom elevation of the infiltration system.

Saturated Hydraulic Conductivity Test Location #:

Ground Elevation: _____

Top Elevation of Proposed Infiltration System: _____

Bottom Elevation of Proposed Infiltration System: _____

Elevation of Test*: _____

Test Method (check one of the following acceptable methods**):

_____ Borehole infiltration test (NHDES, 2008)
_____ Guelph permeameter - ASTM D5126-90 Method
_____ Falling head permeameter – ASTM D5126-90 Method
_____ Double ring permeameter or infiltrometer - ASTM D3385-03, D5093-02, D5126-90 Methods
_____ Amoozemeter or Amoozegar (constant head) permeameter – Amoozegar 1992

Attach field data forms for the respective infiltration test method.

Calculated Saturated Hydraulic Conductivity Rate: _____

**A percolation test, performed in accordance with the guidelines of the Connecticut State Health Code or otherwise, is not an acceptable test for saturated hydraulic conductivity. Percolation tests overestimate the saturated hydraulic conductivity rate.

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SOIL EVALUATION TEST RESULTS

Project Name: Greenwich Central Middle School

Engineering Firm's Nam Tighe & Bond

Project Address: Greenwich, CT

Engineer's Name: Andrew P. White, PE

Test Pit or Soil Boring #: 113 Ground Elevation: 44.79'

Elevation	Soil Texture (Percent Sand, Silt and Clay)	Depth Range in Inches
44.29'	Topsoil	0" - 6"
43.29'	Light Brown Sandy Loam and Silt	6" - 18"
39.79'	Light Brown Silt and Sand with Some Cobbles	18" - 60"
37.79'	M Brown Sandy Loam and Silt with Some Cobbles	60" - 84"

Saturated Hydraulic Conductivity Test Location #:

Ground Elevation: _____

Top Elevation of Proposed Infiltration System: _____

Bottom Elevation of Proposed Infiltration System: _____

Elevation of Test*: _____

Test Method (check one of the following acceptable methods**):

_____ Borehole infiltration test (NHDES, 2008)
_____ Guelph permeameter - ASTM D5126-90 Method
_____ Falling head permeameter – ASTM D5126-90 Method
_____ Double ring permeameter or infiltrometer - ASTM D3385-03, D5093-02, D5126-90 Methods
_____ Amoozemeter or Amoozegar (constant head) permeameter – Amoozegar 1992

Attach field data forms for the respective infiltration test method.

Calculated Saturated Hydraulic Conductivity Rate: _____

Elevation		Depth in Inches
	Mottling (Seasonally High Groundwater)	
	Groundwater	
	Ledge	

**A percolation test, performed in accordance with the guidelines of the Connecticut State Health Code or otherwise, is not an acceptable test for saturated hydraulic conductivity. Percolation tests overestimate the saturated hydraulic conductivity rate.

* All test pits or soil borings shall be excavated to an elevation four feet below the proposed bottom elevation of the infiltration system.

* All field infiltration tests must be conducted in the actual location and soil layer where stormwater infiltration is proposed.

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Town of Greenwich
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Phone 203-622-7767 - Fax 203-622-7747

SOIL EVALUATION TEST RESULTS

Project Name: Greenwich Central Middle School

Engineering Firm's Nam Tighe & Bond

Project Address: Greenwich, CT

Engineer's Name: Andrew P. White, PE

Test Pit or Soil Boring #: 114 Ground Elevation: 44.28'

Elevation	Soil Texture (Percent Sand, Silt and Clay)	Depth Range in Inches
43.78'	Topsoil	0" - 6"
42.28'	Dark Brown Sandy Loam with Little Roots and Some Cobbles	6" - 24"
39.28'	Light Brown Sandy Loam with Some Cobbles	24" - 60"

Elevation		Depth in Inches
	Mottling (Seasonally High Groundwater)	
	Groundwater	
	Ledge	

* All test pits or soil borings shall be excavated to an elevation four feet below the proposed bottom elevation of the infiltration system.

Saturated Hydraulic Conductivity Test Location #:

Ground Elevation: _____

Top Elevation of Proposed Infiltration System: _____

Bottom Elevation of Proposed Infiltration System: _____

Elevation of Test*: _____

Test Method (check one of the following acceptable methods**):

_____ Borehole infiltration test (NHDES, 2008)
_____ Guelph permeameter - ASTM D5126-90 Method
_____ Falling head permeameter – ASTM D5126-90 Method
_____ Double ring permeameter or infiltrometer - ASTM D3385-03, D5093-02, D5126-90 Methods
_____ Amoozemeter or Amoozegar (constant head) permeameter – Amoozegar 1992

Attach field data forms for the respective infiltration test method.

Calculated Saturated Hydraulic Conductivity Rate: _____

**A percolation test, performed in accordance with the guidelines of the Connecticut State Health Code or otherwise, is not an acceptable test for saturated hydraulic conductivity. Percolation tests overestimate the saturated hydraulic conductivity rate.

* All field infiltration tests must be conducted in the actual location and soil layer where stormwater infiltration is proposed.

TEST CERTIFICATION

I HEREBY CERTIFY THAT THE INFORMATION CONTAINED IN THIS REPORT IS TRUE AND CORRECT.

Elysa Goldberg	Elysa Goldberg	11/17/2023
Name of Test Conductor	Signature of Test Conductor	Date

Town of Greenwich
Department of Public Works - Engineering Division
Town Hall - 101 Field Point Road, Greenwich, CT 06830
Phone 203-622-7767 - Fax 203-622-7747

SOIL EVALUATION TEST RESULTS

Project Name: Greenwich Central Middle School

Engineering Firm's Nam Tighe & Bond

Project Address: Greenwich, CT

Engineer's Name: Andrew P. White, PE

Test Pit or Soil Boring #: 115 Ground Elevation: 44.89'

Elevation	Soil Texture (Percent Sand, Silt and Clay)	Depth Range in Inches
44.39'	Topsoil	0" - 6"
42.39'	M Brown Sandy Loam with Some Gravel	6" - 30"
39.89'	M Brown Sandy Loam with Some Gravel, Some Silt, Some Boulders	30" - 60"
37.89'	M Brown Sandy Loam with Some Cobbles and Some Boulders	60" - 84"

Elevation		Depth in Inches
	Mottling (Seasonally High Groundwater)	
	Groundwater	
	Ledge	

* All test pits or soil borings shall be excavated to an elevation four feet below the proposed bottom elevation of the infiltration system.

Saturated Hydraulic Conductivity Test Location #:

Ground Elevation: _____

Top Elevation of Proposed Infiltration System: _____

Bottom Elevation of Proposed Infiltration System: _____

Elevation of Test*: _____

Test Method (check one of the following acceptable methods**):

_____ Borehole infiltration test (NHDES, 2008)
_____ Guelph permeameter - ASTM D5126-90 Method
_____ Falling head permeameter – ASTM D5126-90 Method
_____ Double ring permeameter or infiltrometer - ASTM D3385-03, D5093-02, D5126-90 Methods
_____ Amoozemeter or Amoozegar (constant head) permeameter – Amoozegar 1992

Attach field data forms for the respective infiltration test method.

Calculated Saturated Hydraulic Conductivity Rate: _____

**A percolation test, performed in accordance with the guidelines of the Connecticut State Health Code or otherwise, is not an acceptable test for saturated hydraulic conductivity. Percolation tests overestimate the saturated hydraulic conductivity rate.

* All field infiltration tests must be conducted in the actual location and soil layer where stormwater infiltration is proposed.

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Town of Greenwich
Department of Public Works - Engineering Division
Town Hall - 101 Field Point Road, Greenwich, CT 06830
Phone 203-622-7767 - Fax 203-622-7747

SOIL EVALUATION TEST RESULTS

Project Name: Greenwich Central Middle School

Engineering Firm's Nam Tighe & Bond

Project Address: Greenwich, CT

Engineer's Name: Andrew P. White, PE

Test Pit or Soil Boring #: 116 Ground Elevation: 48.05'

Elevation	Soil Texture (Percent Sand, Silt and Clay)	Depth Range in Inches
47.55'	Topsoil	0" - 6"
46.55'	M Brown Sandy Loam with Some Gravel and Some Cobbles	6" - 18"
44.55'	Red/Brown Sandy Loam with Some Gravel, Some Cobbles, Some Boulders	18" - 42"
41.05'	M Brown Sandy Loam with Some Gravel and Some Boulders	42" - 84"

Elevation		Depth in Inches
	Mottling (Seasonally High Groundwater)	
	Groundwater	
	Ledge	

* All test pits or soil borings shall be excavated to an elevation four feet below the proposed bottom elevation of the infiltration system.

Saturated Hydraulic Conductivity Test Location #:

Ground Elevation: _____

Top Elevation of Proposed Infiltration System: _____

Bottom Elevation of Proposed Infiltration System: _____

Elevation of Test*: _____

Test Method (check one of the following acceptable methods**):

_____ Borehole infiltration test (NHDES, 2008)
_____ Guelph permeameter - ASTM D5126-90 Method
_____ Falling head permeameter – ASTM D5126-90 Method
_____ Double ring permeameter or infiltrometer - ASTM D3385-03, D5093-02, D5126-90 Methods
_____ Amoozemeter or Amoozegar (constant head) permeameter – Amoozegar 1992

Attach field data forms for the respective infiltration test method.

Calculated Saturated Hydraulic Conductivity Rate: _____

**A percolation test, performed in accordance with the guidelines of the Connecticut State Health Code or otherwise, is not an acceptable test for saturated hydraulic conductivity. Percolation tests overestimate the saturated hydraulic conductivity rate.

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Name of Test Conductor	Signature of Test Conductor	Date

Town of Greenwich
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Phone 203-622-7767 - Fax 203-622-7747

SOIL EVALUATION TEST RESULTS

Project Name: Greenwich Central Middle School

Engineering Firm's Nam Tighe & Bond

Project Address: Greenwich, CT

Engineer's Name: Andrew P. White, PE

Test Pit or Soil Boring #: 117 Ground Elevation: 47.21'

Elevation	Soil Texture (Percent Sand, Silt and Clay)	Depth Range in Inches
46.71'	Topsoil	0" - 6"
43.71'	Light Brown Sandy Loam with Some gravel, Some Cobbles. Some Boulders, and Trace Roots	6" - 42"
41.71'	Red/ Brown Sandy Laom with Some Silt, Some Gravel, Trace Roots	42" - 66"
40.21'	Light Brown Sandy Loam with Some Gravel, and Some Cobbles	66" - 84"

Elevation		Depth in Inches
	Mottling (Seasonally High Groundwater)	
	Groundwater	
	Ledge	

* All test pits or soil borings shall be excavated to an elevation four feet below the proposed bottom elevation of the infiltration system.

Saturated Hydraulic Conductivity Test Location #:

Ground Elevation: _____

Top Elevation of Proposed Infiltration System: _____

Bottom Elevation of Proposed Infiltration System: _____

Elevation of Test*: _____

Test Method (check one of the following acceptable methods**):

_____ Borehole infiltration test (NHDES, 2008)
_____ Guelph permeameter - ASTM D5126-90 Method
_____ Falling head permeameter – ASTM D5126-90 Method
_____ Double ring permeameter or infiltrometer - ASTM D3385-03, D5093-02, D5126-90 Methods
_____ Amoozemeter or Amoozegar (constant head) permeameter – Amoozegar 1992

Attach field data forms for the respective infiltration test method.

Calculated Saturated Hydraulic Conductivity Rate: _____

**A percolation test, performed in accordance with the guidelines of the Connecticut State Health Code or otherwise, is not an acceptable test for saturated hydraulic conductivity. Percolation tests overestimate the saturated hydraulic conductivity rate.

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SOIL EVALUATION TEST RESULTS

Project Name: Greenwich Central Middle School

Engineering Firm's Nam Tighe & Bond

Project Address: Greenwich, CT

Engineer's Name: Andrew P. White, PE

Test Pit or Soil Boring #: 118 Ground Elevation: 42.83'

Elevation	Soil Texture (Percent Sand, Silt and Clay)	Depth Range in Inches
42.33'	Topsoil	0" - 6"
40.83'	Brown F-C Sand and F-C Gravel, Little Silt, Little Boulders, Trace Roots	6" - 24"
38.83'	Light Brown F-C Sand and F-C Gravel, Some Boulders, Trace Silt	24" - 48"
37.83'	Gray F-M Sand, Some Silt, Trace Roots	48" - 60"
36.83'	Brown F-C Sand and F-C Gravel, Some Boulders, Trace Silt. Seepage at 72"	60" - 72"

Elevation		Depth in Inches
	Mottling (Seasonally High Groundwater)	
	Groundwater	
	Ledge	

* All test pits or soil borings shall be excavated to an elevation four feet below the proposed bottom elevation of the infiltration system.

Saturated Hydraulic Conductivity Test Location #:

Ground Elevation: _____

Top Elevation of Proposed Infiltration System: _____

Bottom Elevation of Proposed Infiltration System: _____

Elevation of Test*: _____

Test Method (check one of the following acceptable methods**):

_____ Borehole infiltration test (NHDES, 2008)
_____ Guelph permeameter - ASTM D5126-90 Method
_____ Falling head permeameter – ASTM D5126-90 Method
_____ Double ring permeameter or infiltrometer - ASTM D3385-03, D5093-02, D5126-90 Methods
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Attach field data forms for the respective infiltration test method.

Calculated Saturated Hydraulic Conductivity Rate: _____

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SOIL EVALUATION TEST RESULTS

Project Name: Greenwich Central Middle School

Engineering Firm's Nam Tighe & Bond

Project Address: Greenwich, CT

Engineer's Name: Andrew P. White, PE

Test Pit or Soil Boring #: 119 Ground Elevation: 42'

Elevation	Soil Texture (Percent Sand, Silt and Clay)	Depth Range in Inches
41.5'	Topsoil	0" - 6"
40.5'	Dark Brown Sandy Loam with Some Gravel, Some Cobbles and Some Boulders	6" - 18"
39.5'	Red/ Brown Silty Loam and Sand with Some Gravel	18" - 30"
37'	Light Brown Sandy Loam with Some Gravel, Some Cobbles, and Some Boulders	30" - 60"
35'	Gray Clay with Some Boulders	60" - 84"

Elevation		Depth in Inches
37'	Mottling (Seasonally High Groundwater)	60"
	Groundwater	
	Ledge	

* All test pits or soil borings shall be excavated to an elevation four feet below the proposed bottom elevation of the infiltration system.

Saturated Hydraulic Conductivity Test Location #:

Ground Elevation: _____

Top Elevation of Proposed Infiltration System: _____

Bottom Elevation of Proposed Infiltration System: _____

Elevation of Test*: _____

Test Method (check one of the following acceptable methods**):

_____ Borehole infiltration test (NHDES, 2008)
_____ Guelph permeameter - ASTM D5126-90 Method
_____ Falling head permeameter – ASTM D5126-90 Method
_____ Double ring permeameter or infiltrometer - ASTM D3385-03, D5093-02, D5126-90 Methods
_____ Amoozemeter or Amoozegar (constant head) permeameter – Amoozegar 1992

Attach field data forms for the respective infiltration test method.

Calculated Saturated Hydraulic Conductivity Rate: _____

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Project Name: Greenwich Central Middle School

Engineering Firm's Nam Tighe & Bond

Project Address: Greenwich, CT

Engineer's Name: Andrew P. White, PE

Test Pit or Soil Boring #: 120 Ground Elevation: 42'

Elevation	Soil Texture (Percent Sand, Silt and Clay)	Depth Range in Inches
41.5'	Topsoil	0" - 6"
39'	Light Brown Sandy Loam and Silt and Some Gravel	6" - 36"

Elevation		Depth in Inches
	Mottling (Seasonally High Groundwater)	
	Groundwater	
	Ledge	

* All test pits or soil borings shall be excavated to an elevation four feet below the proposed bottom elevation of the infiltration system.

Saturated Hydraulic Conductivity Test Location #:

Ground Elevation: _____

Top Elevation of Proposed Infiltration System: _____

Bottom Elevation of Proposed Infiltration System: _____

Elevation of Test*: _____

Test Method (check one of the following acceptable methods**):

_____ Borehole infiltration test (NHDES, 2008)

_____ Guelph permeameter - ASTM D5126-90 Method

_____ Falling head permeameter – ASTM D5126-90 Method

_____ Double ring permeameter or infiltrometer - ASTM D3385-03, D5093-02, D5126-90 Methods

_____ Amoozemeter or Amoozegar (constant head) permeameter – Amoozegar 1992

Attach field data forms for the respective infiltration test method.

Calculated Saturated Hydraulic Conductivity Rate: _____

**A percolation test, performed in accordance with the guidelines of the Connecticut State Health Code or otherwise, is not an acceptable test for saturated hydraulic conductivity. Percolation tests overestimate the saturated hydraulic conductivity rate.

* All field infiltration tests must be conducted in the actual location and soil layer where stormwater infiltration is proposed.

TEST CERTIFICATION

I HEREBY CERTIFY THAT THE INFORMATION CONTAINED IN THIS REPORT IS TRUE AND CORRECT.

Elysa Goldberg	Elysa Goldberg	11/17/2023
Name of Test Conductor	Signature of Test Conductor	Date

APPENDIX F - GREENWICH CENTRAL MIDDLE SCHOOL CONSTRUCTION-VIBRATION AND CONTROLS DURRING CONSTRUCTION (CVC), BY GAP MOUNTAIN CONSULTING ENGINEERS, PLLC, DATED NOVEMBER 1, 2024.

Gap Mountain Consulting Engineers, PLLC

November 1, 2024

Greenwich Public Schools
c/o Building Committee
(attn. Mr. Joseph Rossetti)
9 Indian Rock Lane
Greenwich, CT 06830

Subject: **GREENWICH CENTRAL MIDDLE SCHOOL**
CONSTRUCTION-VIBRATION AND CONTROLS DURING CONSTRUCTION

Dear Mr. Rossetti,

This provides you with our analysis, findings, and recommendations for control of construction-vibration at the existing middle school.

EXECUTIVE SUMMARY

The Town of Greenwich is constructing a new central middle school adjacent to its existing school. Greenwich plans to keep the existing school operational throughout construction. The Building Committee is concerned with the impact construction-vibration has on the existing building and has engaged our firm to evaluate the risk of structural damage and provide our opinion on safety of occupants.

We were provided with a site logistics plan, geotechnical report, master schedule for the new construction project, and a Division 2 specification for vibration monitoring and proposed vibration limits. These documents provide sufficient information with which to assess the nature and location of construction-vibration. We also have detailed records from our previously conducted physical condition assessments of the existing building. Collectively, this body of this information is sufficient for our analysis and findings.

Our engagement focuses on physical damage to structural elements. It is within our competencies and expertise to evaluate construction-vibration and specify engineered limits and controls that protect existing structural elements from damage. We set limits based on the mechanical properties of materials that are exposed to construction-vibration and their existing physical condition.

The weakest structural element in the existing building exposed to significant construction-vibration is the interior wythe of concrete masonry unit (CMU) block walls located in the sallyport connector to the library including abutting classrooms and stairwells. These walls are near construction activity, some CMU block is fatigued and cracked due to how the walls were constructed, long-term differential settlement, and a recent earthquake. The condition of these CMU block is the most vulnerable to damage from vibration. Our analysis sets control limits to the highest level of vibration that should be permitted for construction to protect the existing building from resulting structural damage while it is occupied.

The fundamental purpose of professional civil / structural engineering is to design structures that protect life safety. Our Codes and practices focus on design of structures that are safe for the public when natural forces are at play. These forces include vibration.

> ***We are not designing a new building. We are analyzing and prescribing limits to construction-born vibration so that the existing building is not damaged while occupied. The limits that we specify are for other professionals, such as an explosives engineer, to design means / methods for heavy construction that do not exceed the vibration limits <u>at the existing building</u>. By keeping construction-vibration within these limits at the existing building, the existing building will not experience structural damage due to construction-vibration.***

Enclosed is our analysis and required limits for construction-vibration. Our findings are that an appropriate control limit for impact vibration (blasting) is 0.75 inches per second at frequency ranges of 10 to 60 Hz. This is the measurable limit at the building and not elsewhere on the property or where construction-vibration activity is taking place. Sustained vibration should not exceed 0.50 inches per second in the same

frequency range. We also provide the enclosed vibration monitoring specification which outlines the project's management team protocol for controlling construction-vibration within these limits. If incorporated in contract documents and enforced by the general contractor and Town, these specifications assure that the contractor exercises control over construction-vibration within these limits.

CONSTRUCTION-VIBRATION

Vibration is a mechanical phenomenon where an external source of energy causes a structure to oscillate or repeat a motion over time. Construction-vibration means the external source of energy is construction activity such as blasting and hammering of competent rock formations in the earth. The energy from construction-vibration is classified as: 1) steady state, such as sustained hammering of rock and equipment movements; and 2) impact or impulse from dynamic excavation activities, such as blasting.

The energy from construction-vibration travels through the earth and vibrates neighboring structures. The theory is physical law. Engineering is the application of theory. Applying the theory there are a vast number of variables involved with construction-vibration, particularly given the earth is not a homogeneous material and construction activity is not defined by physical laws. We use factors of safety and professional judgement to account for the many unknowns. There are empirically derived thresholds at which damage to certain materials is expected. Some of these materials are structural and there are empirical maximums.

Construction-vibration is measured in the field using seismic monitors that record velocity, frequency, and the axis of vibration in one of three dimensions including a composite. Modern seismic monitors continuously record and report readings and signal alarms. Some communicate through the internet. Construction-vibration's velocity is measured in inches per second (ips) and its frequency is measured in Hertz (Hz). Recordings are taken at the point of interest such as a neighboring building or structure.

Vibration retains more energy when traveling through certain soil conditions and dissipates more rapidly when traveling through others. The impact that construction-vibration has on neighboring buildings can be controlled using specialized techniques. For example, construction-vibration traveling along a horizontal axis (left and right) can be reduced or eliminated by creating physical buffers such as trenches. Construction-vibration traveling along a vertical axis (up and down) is more difficult to control.

ANALYSIS

The American Society of Engineers (ASCE) contains a body of knowledge from which we have developed engineering methods for estimating energy and, for practical application, equivalent lateral static forces. When studying construction-vibration we also look to a body of knowledge available from peer organizations that routinely deal with the topic. These include the U.S. Army Corps of Engineers (ERDC / CERL TR-08-19), Naval Facilities Engineering Command DM7-02, Federal Emergency Management Agency Seismic Safety Council, U.S. Department of Interior, U.S. Bureau of Mines, International Society of Soil Mechanics and Geotechnical Engineering, The Masonry Society, Concrete Masonry and Hardscapes Association, and scholarly studies from various accredited engineering colleges and universities.

State Building Codes focus on new construction and renovation. Associated engineering algorithms and engineering methods relate to vibration from earthquakes, harmonics from wind, vehicular traffic, ocean waves, machinery, etc. There are federal and State limits on construction-vibration but these are regulatory maximum limits applied generally to all cases.

Our analysis focuses on the weakest structural element in the existing building and exposed to significant construction-vibration. Our engineering philosophy is allowable stress design. The structure of the existing building is a composite of structural steel, CMU walls, and shallow concrete foundations. The weakest elements are the most prone to damage from construction-vibration. CMU walls of the sallyport connector are near where construction activity will generate significant vibration and they are CMU. Their structural

purpose is support against wind, seismic, and roof loads. These CMU walls are constructed in (2) wythes[1]. The exterior wythe is a free-standing CMU facade tied to the interior CMU wythe with structural steel mechanical fasteners called wall ties. The interior wythe is reinforced with steel and supports against wind, seismic, and roof loads. Some interior wythe CMU block is already cracked due to its construction, external forces, and their mechanical properties[2]. Cracks in CMU decrease a wall's strength and requires deferred maintenance / repair. Continued cracking from construction-vibration may lead to structural concerns. We believe the CMU walls of the sallyport connector are the weakest structural element in the existing building and are exposed to significant construction-vibration. We selected these walls as a case study to set control limits on construction-vibration in the existing building when it is occupied.

We apply fundamental Newtonian physical laws and ASCE allowable stress design philosophy to study mechanical properties of the CMU in the walls in the sallyport connector to the library.

Internal forces or stress from construction-vibration acting on the CMU block are directly proportional to the mass of the wall and acceleration. We define these forces as a "base" shear. Metrics are velocity and frequency because these are the vibration readings used in practice to control vibration. Base shear acts in three dimensions. The relationship between energy, velocity and frequency are directly proportional. Greater velocities and frequencies result in greater base shear acting on the CMU block wall. Higher values of internal base shear increase internal stress on the CMU block. Base shear in the vertical axis accelerates and oscillates the entire weight of the wall and portions of the roof where horizontal vibration accelerates and oscillates just the foundation that supports the wall. We focus our analysis on vertical oscillation because vibration in the vertical axis generates the highest internal stress on the CMU block.

We studied internal stress acting on cracked CMU wall at the sallyport in the vertical axis in increments of 0.25 ips and frequencies ranging from 30 to 60 Hz. This represents impact construction-vibration which is an instantaneous impulse. We converted peak particle velocity and frequency to acceleration and calculated the corresponding base shear loads acting vertically and at each increment.

The seismic weight of the wall is its self-supporting dead load plus contributing roof dead and live loads. We assumed no other load combinations, such as wind and snow, and apply base shear in the vertical axis to the wall for each increment. The results are tabulated. Highlighted in red are velocities and frequencies that exceed the block's strength.

We then analyzed the wall under a controlled vertical load scenario using IES masonry wall design software and allowable stress design philosophy. The wall passes design criteria in accordance with a historic Code criteria applicable to its existing condition, and results are included with this report.

CONCLUSION

Maximum permissible impact vibration (blasting) at the existing building 0.75 ips for frequencies ranging from 10 to 60 Hz. Maximum permissible sustained vibration (hammering and equipment movement) is 0.50 inches per second for the same range of frequency. Higher readings from monitors of construction-vibration in or at the existing building are expected to damage the existing CMU block walls. These walls are structural and therefore control vibration limits[3].

[1] A wythe is a horizontal row of block (1) block wide. A row of block is a coarse. The exterior and interior wythes of the central middle school form (2) wythes and they are tied together with retrofit structural steel mechanical fasteners called wall-ties.

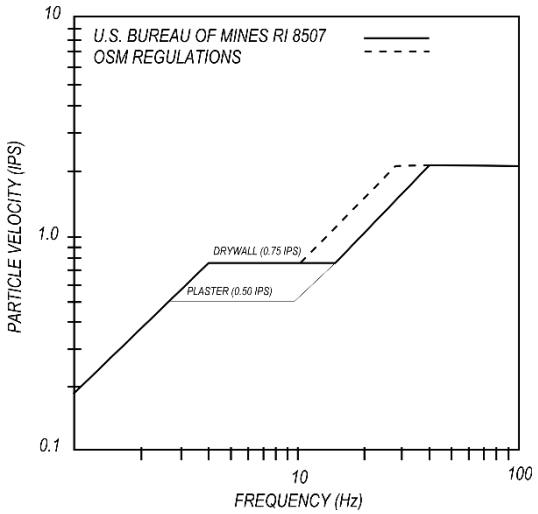
[2] Separately we studied and reported the condition of the CMU block in the sallyport connector and adjoining connector. Some of this CMU block is damaged due to long-term differential settlement and a recent earthquake. These conditions require deferred maintenance and do not pose a life safety concern. Construction-vibration that exceeds certain limits could cause damage would could result in a life safety concern.

[3] Structural steel, structural steel assemblies, structural slabs, slabs on metal decks, and cast-in-place concrete foundations. Non-structural elements such as glazing, tile, sheetrock, etc. may be damaged due to levels of vibration at or below 0.75 ips.

REQUIREMENTS FOR PROTECTING THE EXISTING SCHOOL BUILDING FROM STRUCTURAL DAMAGE WHILE IT IS OCCUPIED

Following are technical, managerial, and operational requirements necessary to protect the existing middle school building from structural damage during those periods of time that heavy construction is producing vibration and the existing school middle school is occupied.

1. Restrict maximum permissible steady-state peak particle velocity to 0.50 inches per second at maximum frequency of 60 HZ measured at the existing building.
2. Restrict maximum permissible impact peak particle velocity to 0.75 inches per second at maximum frequency of 60 HZ measured at the existing building.
3. The accompanying figure gives reference to U.S. Bureau of Mines RI 8507 and Office of Surface Mining vibration limits on peak particle velocity levels at or above which damage to materials is expected.
4. Engage an independent testing agency to continuously monitor and report construction vibration while the existing middle school remains in operation.



   a. Submit a vibration monitoring plan for review and approval. Coordinate the plan with the explosive engineer's blasting plan. Include equipment, technical specifications, calibration certificates, and operator qualifications. At least (1) monitor shall report readings over the internet, and at least (1) monitor shall be manned at the job site. Coordinate monitoring plan with blasting plan.

   b. Submit technical data on vibration monitors including calibration certificates.

   c. Provide baseline readings from test blast. Provide report to Contractor and Owner following completion of the test.

   d. Conduct a pre-construction inspection of the existing building and document prior to start of heavy construction operations such as excavation, hammering, blasting, etc.

   e. Routinely inspect and report movement in existing cracks in masonry units of the "sallyport" connector and abutting classrooms and library in the existing school building and as identified during the pre-construction conditions inspection. Provide readings to the DOR within (48) hours of an inspection.

   f. Establish elevation controls on the existing building foundations, and inspect and report dynamically driven settlement during construction. Principle areas of concern are the library and sallyport connector.

   g. Provide vibration alarms that are audible and visual to personnel responsible for controlling vibration at the site. Immediately report to the Owner, Contractor, and DOR when vibration that exceeds restrictions to Project Management Team.

5. Engage a qualified blasting contractor and prepare engineered blasting plan(s) for Owner and DOR review and approval.

    a. Submit a blasting plan signed and sealed by a CT professional engineer. Include engineering calculations, key assumptions, and a site plan that specifies the horizontal distance D from source of blast to existing building. Coordinate the blasting plan with the independent testing agencies preparation of its monitoring plan.

    b. Establish horizonal control limits for blasting prior to and following test blast. Include any vibration control measures such as trenches between blast areas and the existing building.

    c. Perform a test blast under controlled conditions to validate assumptions. Coordinate with Owner and testing agency to monitor and report vibration during the test.

    d. Submit management protocols and call back procedures in the event vibration generating activities trip alarms. Protocols should include temporary suspension of activities causing particle vibration to exceed alarm limits protocols for adjust energy levels so not to continue tripping alarms.

    e. Document the time and date of an alarm event(s), and coordinate with the Owner and Engineer to reduce energy levels prior to recommencing a definable feature of work tripping alarms

    f. During construction adjust calculations and blasting plan as may be necessary from blast test results and activation of alarms.

    g. Submit hammering plan and proposed equipment prior to hammering operations.

    h. Submit dynamic soil compaction plan and proposed equipment prior to dynamic compaction.

    i. Comply with Title 29, Section 29-349-206 of the Connecticut Regulations for protection of persons and property when storing, transporting, and using explosive and blasting agents. Other reference guidelines include but are not limited to the American Association of State Highway and Transportation Officials R 8-96, the American Society for Testing and Materials D5112, and U.S. Bureau of Mines RI 8507.

We would be pleased to meet with the Building Committee to discuss our analysis and findings, review our recommendations, and discuss case studies from our past work experience.

Please call me at 603-400-5455 if you have any questions or need more information.

Very truly yours,

GAP MOUNTAIN CONSULTING ENGINEERS, PLLC



B. Cory Attra, PE, MBA, SI, M.ASCE
Engineer in Responsible Charge

Encl: Calculations for Vibration Limits

CALCULATIONS FOR VIBRATION LIMITS

Given: F = Ma where lbs = lb

a = V x (2 x 3.14 x f)

fc =	1,800	psi
fb = fc x 0.25 =	450	psi
Block dimensions = 8x8x12		
M per hollow core block =	35	lbs
M per solid core block =	55	lbs
Height of wall	240	in
Width of wall	192	in
Total number of block	480	ea
- hollow core block	360	ea
- solid core block	120	ea
DL roof	15	psf
DL = wall + roof	22,080	lbs
LL	3,840	lbs
W = DL + LL = seismic load	25,920	lbs



Find: Control limits to construction generated vibration required to prevent damage to cracked CMU block walls in sallyport connector based on mechanical properties of CMU block.

Assumptions: 1) Strength of cracked CMU block controls.
2) Base excitation (impact) controls.
3) Condition of CMU walls in sallyport and its proximity to construction controls.

Analysis: Assume loads transfer to largest uncracked surface area where F is constant.

Net surface area of hollow core = 42.38 si

Calculate base shear in-plane, vertical axis (see IES finite anlaysis model for corresponding wall calcs):

Seismic Weight W =	25,920	lbs
Try Peak Ground Acceleration (PGA) =	1.00	in / s^2
	31.40	ft / s^2
Base Shear = W x PGA =	813,888	lbs
Seismic Vertical Load In-Plane =	50,868	lbs / ft

Check fb:

V (ips)	f (Hz)	a (fps^2)	fb (psi)	Alarm Setting (ips)
0.50	30.00	7.85	132.47	0.40
0.50	40.00	10.47	176.63	0.40
0.50	50.00	13.08	220.78	0.40
0.50	60.00	15.70	264.94	0.40
0.75	30.00	11.78	198.70	0.60
0.75	40.00	15.70	264.94	0.60
0.75	50.00	19.63	331.17	0.60
0.75	60.00	23.55	397.41	0.60
1.00	30.00	15.70	264.94	0.80
1.00	40.00	20.93	353.25	0.80
1.00	50.00	26.17	441.56	0.80
1.00	60.00	31.40	529.88	0.80
1.25	30.00	19.63	331.17	1.00
1.25	40.00	26.17	441.56	1.00
1.25	50.00	32.71	551.95	1.00
1.25	60.00	39.25	662.34	1.00
1.50	30.00	23.55	397.41	1.20
1.50	40.00	31.40	529.88	1.20
1.50	50.00	39.25	662.34	1.20
1.50	60.00	47.10	794.81	1.20
1.75	30.00	27.48	463.64	1.40
1.75	40.00	36.63	618.19	1.40
1.75	50.00	45.79	772.73	1.40
1.75	60.00	54.95	927.28	1.40
2.00	30.00	31.40	529.88	1.60
2.00	40.00	41.87	706.50	1.60
2.00	50.00	52.33	883.13	1.60
2.00	60.00	62.80	1,059.75	1.60

Conclusions: Control limit for base excitation (impact or blasting) is 0.75 ips @ 60 Hz for alarm set to 0.60 ips. Vibration caused by blasting should not exceed 0.75 ips at sensors located at base of CMU walls of sallyport. Maintain sustained vibration limit to 0.50 ips @ 60 Hz for alarm set to 0.40 ips.

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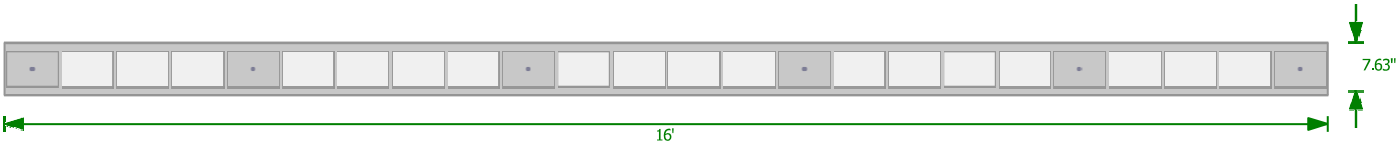
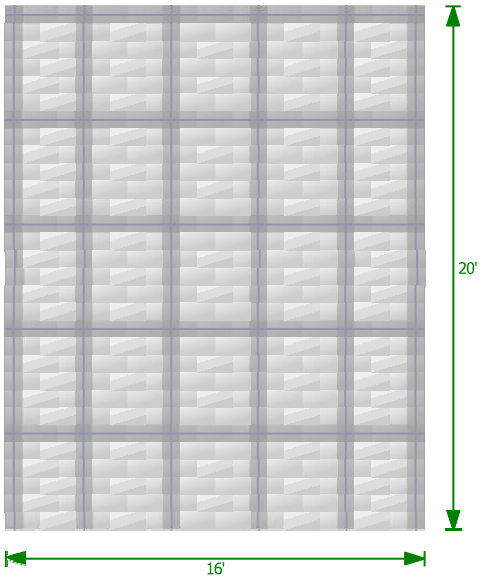
Sallyport

Masonry Wall Design Calculations





Masonry Unit: CMU - 8 in.
Bond: Running
Grouting: Partial

Vertical Distributed Rebar:
No. 5, spaced as shown (1 per cell)
Horizontal (Bond Beam) Rebar:
No. 4, spaced as shown (1 per course)



Design Criteria

Building Code: TMS 402-2016 (Allowable Stress Design)
Choose Load Combinations Manually: Yes
Strength Check Load Combinations: ASCE 7-16 ASD Combinations
Service Check Load Combinations: ASCE 7-16 ASD Combinations
Apply Sds to Seismic Combinations for Ev: No
f'm: 1800 psi
fy: 60000 psi
Mortar Type: Type M/S - PCL (Portland Cement/Lime)
Shear Wall Seismic Designation: Ordinary
Use R=1.5 for Shear Walls: No

Material (CMU/Clay): Taken from Unit
Specify Wall Weight Manually: Yes
Average Unit Weight: 117 lb/ft³
Block Weight: Normal Weight
Built on Concrete with Rough Surface: Yes

Secondary Moment Approach: Moment Magnifier
Include Wall Self-Weight: Yes
Neglect Lateral Load on Parapet: No
Include Wall Wt In Virtual Eccentricity: Yes
Always use I-cracked: Yes
Amplify Axial Stress For Slenderness: No
End Bars Only For Shear Wall Flexural/Axial Analysis: No
Multiply Seismic Shear By 1.5 (ASD only): Yes

Checks Summary

☐	Ratio	Check	Critical Combination
Out-Of-Plane Checks			
✔	0.031	Axial Force	1D
✔	0.000	Shear	1D
✔	0.000	Flexural+Axial Interaction	1D
✔	0.000	Deflection (IBC)	1D

☐	Ratio	Check	Critical Combination
In-Plane Checks			
✔	0.000	Flexural+Axial Interaction	1D
✔	0.000	Shear	1D
✔	0.000	Shear Friction	1D
✔	0.000	Maximum Reinforcement	1D
✔	0.000	Deflection (Drift)	1D
Prescriptive Checks			
✔	0.645	Vert Area	N/A
✔	0.400	Vert Spacing	N/A
✔	1.000	Horz Area	N/A
✔	0.400	Horz Spacing	N/A

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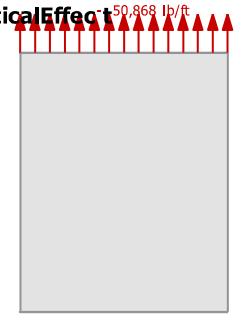
Sallyport

Loads on the Wall

Source: SeismicVerticalEffect



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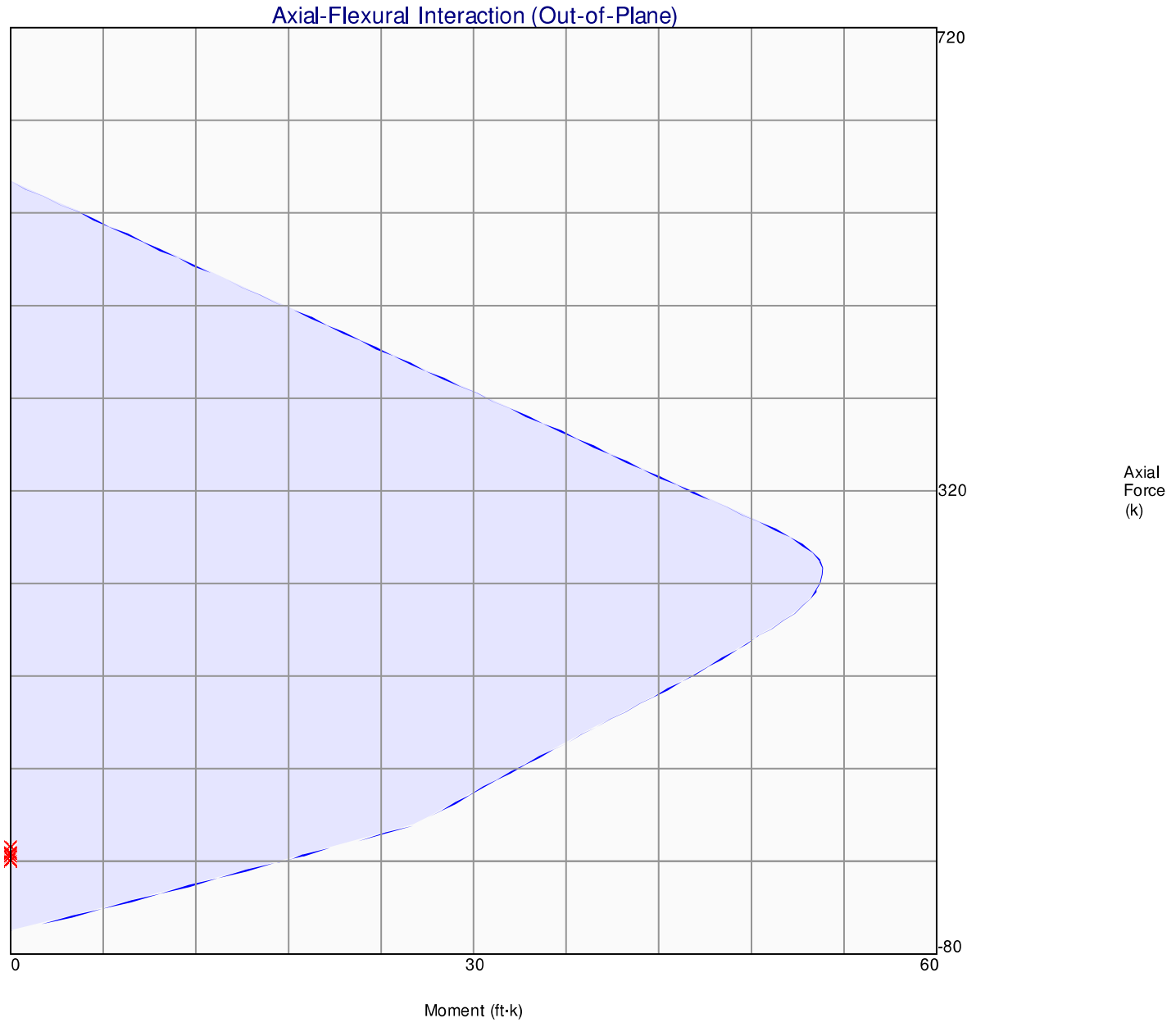

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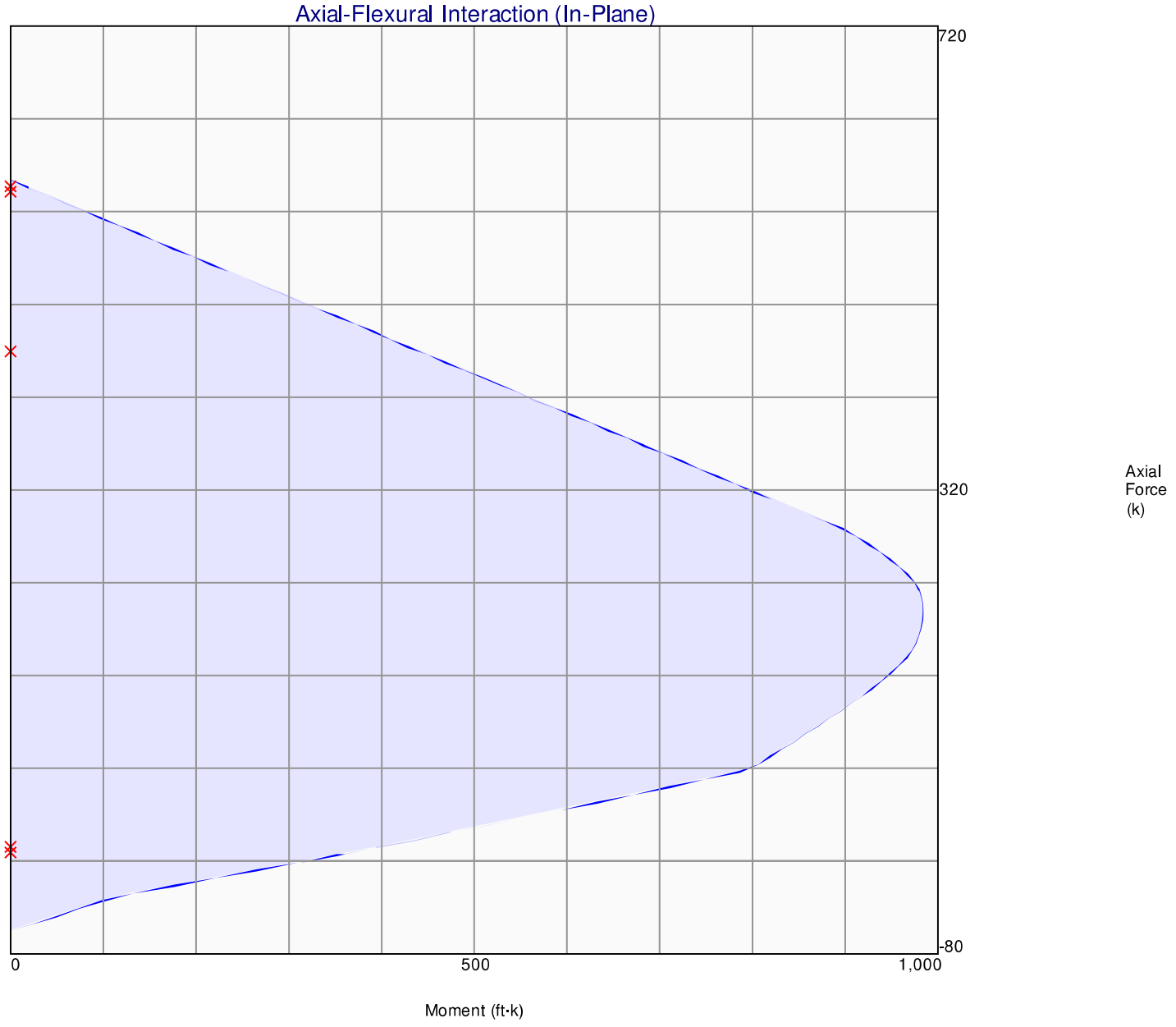

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Sallyport

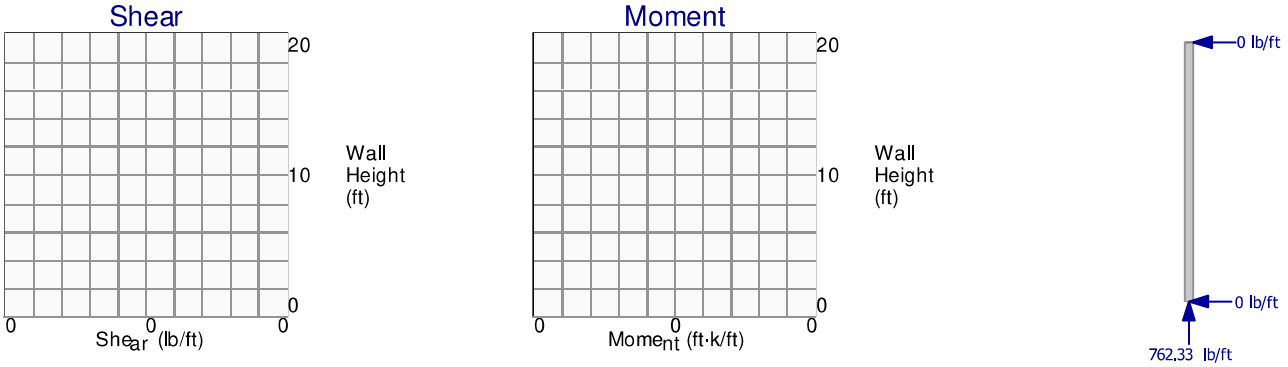
Out-of-Plane Design Calculations for Combination 1D

Load Combination: 1D

Wall weight: For this partially grouted wall, the average volume of masonry per cell is calculated as 250.2 in³ based on 40 in grout spacing. Given a masonry density of 117 lb/ft³, the average weight per face of wall is 38.12 psf and the weight per length for this wall is 762.33 lb/ft (all unfactored values).

Factored wall weight = 38.12 psf.

	Per-Length Axial Force (lb/ft)	Per-Length Out-of-Plane Shear (lb/ft)	Per-Length Out-of-Plane Moment (ft·k/ft)	Total Wall Axial Force (k)	Total Wall Out-of-Plane Shear (k)	Total Wall Out-of-Plane Moment (ft·k)	Total Wall Out-of-Plane P-δ Moment (ft·k)	Total Wall Out-of-Plane Mag. Moment (ft·k)
20 ft from base	0 lb/ft	0 lb/ft	0 ft·k/ft	0 k	0 k	0 ft·k	N/A	N/A
10 ft from base	381.16 lb/ft	0 lb/ft	0 ft·k/ft	6.1 k	0 k	0 ft·k	N/A	N/A
0 ft from base	762.33 lb/ft	0 lb/ft	0 ft·k/ft	12.2 k	0 k	0 ft·k	N/A	N/A



Note that secondary moments are not considered with Allowable Stress Design.

Out-of-Plane Strength Checks: Combination 1D

Design forces for this load combination:

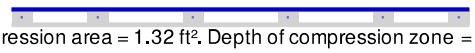
- P @ top = 0 k
- P @ mid-span = 6.1 k
- P @ base = 12.2 k
- V = 0 k
- M @ top = 0 ft·k
- M @ mid-span = 0 ft·k

Moment Check @ Axial Load Application Point

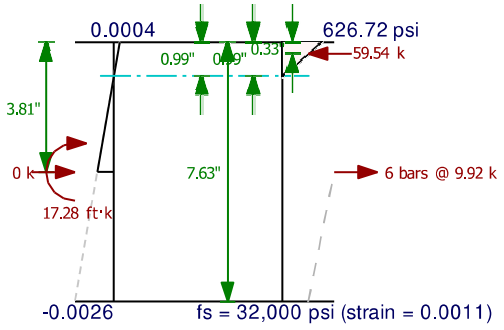
The moment capacity is determined by considering the point on the interaction diagram where P_n is equal to the axial load at this section (0 k) and thus $P_n \geq 0$ k. The associated M_n (17.28 ft·k) is multiplied by ϕ to obtain design moment capacity.

At an axial load of 0 k, the interaction diagram gives a moment capacity of 17.28 ft·k.

✔ $\phi M_n \geq M_u$ ...utilization ratio 0



Compression area = 1.32 ft². Depth of compression zone = 0.99 in.



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Sallyport

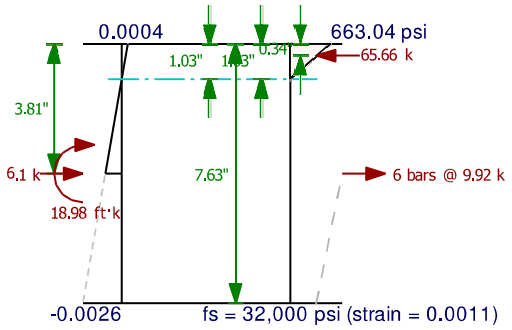
Moment Check @ Mid-span

The moment capacity is determined by considering the point on the interaction diagram where P_n is equal to the axial load at this section (6.1 k) and thus P_n = 6.1 k. The associated M_n (18.98 ft·k) is multiplied by $ to obtain design moment capacity.

At an axial load of 6.1 k, the interaction diagram gives a moment capacity of 18.96 ft·k.

✔ M_n Š M_u ...utilization ratio 0

Compression area = 1.38 ft². Depth of compression zone = 1.03 in.



Axial Force Check

$$\frac{h}{r} = \frac{(20\ \text{ft})}{(2.75\ \text{in})} = 87.37$$

$$P_a = 0.25 f'_m A_n + 0.65 A_{st} F_s \left(1 - \left(\frac{h}{140r}\right)^2\right) = 0.25\ 1{,}800\ \text{psi}\ \ 5.04\ \text{ft}^2 + 0.65\ \ 0\ \text{in}^2\ \ 32{,}000\ \text{psi}\ \ \left(1 - \left(\frac{(20\ \text{ft})}{(140(2.75\ \text{in}))}\right)^2\right) = 199.45\ \text{k}$$

[TMS 402-16 Section 8.3.4.2.1, Equation 8-18]

P= 6.1 k

✔ P_a Š P ...utilization ratio 0.031

Shear Check

There is no applied shear force in this load combination; check passes.

✔ V_n Š f_v ...utilization ratio 0

Out-of-Plane Service Checks for Combination 1D

Out-of-Plane Service Checks: Combination 1D

Design forces for this load combination:

- P @ mid-span = 6.1 k
- M @ mid-span = 0 ft·k

Deflection Check per IBC

Load combination does not include Components & Cladding wind loads, hence this check does not apply.

✔ $\delta_{max} \leq \delta_{>}$ ...utilization ratio 0

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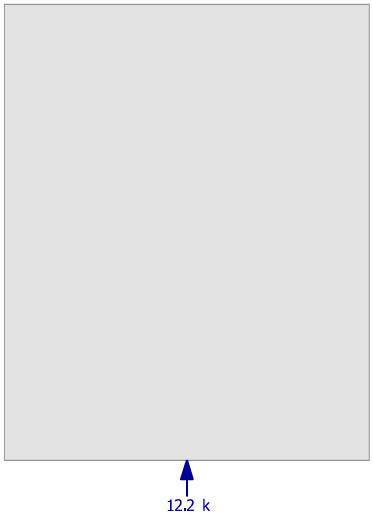
In-Plane Design Calculations for Combination 1D

Load Combination: 1D

Factored wall weight per height of wall = 609.86 lb/ft.Factored total wall weight = 12.2 k.



In-Plane Strength Checks: Combination 1D

Design forces for this load combination:

- P = 12.2 k
- V = 0 k
- M = 0 ft·k

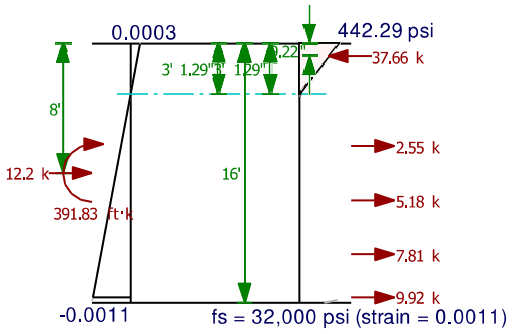
Moment Check

The moment capacity is determined by considering the point on the interaction diagram where P_n is equal to the axial load at this section (12.2 k) and thus P_n = 12.2 k. The associated M_n (391.83 ft·k) is multiplied by $ to obtain design moment capacity.

At an axial load of 12.2 k, the interaction diagram gives a moment capacity of 391.98 ft·k.

✔ M_n Š M_u ...utilization ratio 0

Compression area = 1.12 ft². Depth of compression zone = 37.29 in.



Shear Check

There is no applied shear force in this load combination; check passes.

✔ F_v Š f_v ...utilization ratio 0

Shear Friction Check

There is no applied shear force in this load combination; check passes.

✔ F_1 Š f_v ...utilization ratio 0

Maximum Reinforcement Check

Check is not required. Under Allowable Stress Design, only Special Reinforced Shear Walls are subject to the maximum reinforcement ratio check. See TMS 402-16 8.3.4.4

✔ $q_{max} \le q$ ...utilization ratio 0

Deflection (Drift) Check

Applying a factor to I_g to represent the effects of cracking:

$I_g = t_{sp} l_w^3 / 12 = 7.63\ in \quad 16\ ft^3 / 12 = 4{,}497{,}408\ in^4$

$I_{eff} = C_{cr} I_g = 0.4\ 4{,}497{,}408\ in^4 \quad = 1{,}798{,}963.2\ in^4$

$E_m = 900 f'_m = 900\ 1{,}800\ psi = 1{,}620{,}000\ psi$

Calculate elastic deflection:

$A_g = 2 t_{fs} l_w = 2\ 1.25\ in\ 16\ ft = 3.33\ ft^2$

$$\Delta_u = \frac{V_u h}{5/6.0\ A_g\ 0.4E_m} + \frac{V_u h^3}{3E_m I_{eff}} = \frac{0\ k \quad 20\ ft}{5/6.0\ 3.33\ ft^2\ 0.4\ 1{,}620{,}000\ psi} + \frac{\left((0\ k)(20\ ft)^3\right)}{\left(3\ 1{,}620{,}000\ psi)(1{,}798{,}963.2\ in^4\right)} = 0\ in$$

[Masonry Designers Guide 2013, Eqn 7.4-1 (modified form)]

Calculate inelastic deflection, taking C_d from ASCE 7 Table 12.2-1:

$\Delta_{inelastic} = C_d \Delta_u = 1.75\ 0\ in = 0\ in$

Maximum allowable deflection:

$\Delta_{max} = 0.01h = 0.01\ 20\ ft = 2.4\ in$

[ASCE 7-10 Table 12.12-1]

✔ $\Delta_{max} \le \Delta_{inelastic}$ ...utilization ratio 0

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Prescriptive Checks

Maximum Vertical Steel Spacing

For this Ordinary Reinforced Shear Wall, the maximum spacing of vertical reinforcement is:

s_{max}= 120 in

[TMS 402-16 7.3.2.3.1]

The spacing of provided distributed vertical reinforcing bars is:

s= 48 in

✔ s_{max} Š s ...utilization ratio 0.4

Minimum Distributed Vertical Steel Area

For this Ordinary Reinforced Shear Wall, the minimum area of vertical reinforcement is:

A_{s_min}= 0.2 in²

[TMS 402-16 7.3.2.3.1]

The area of provided distributed vertical reinforcing bars is:

A_s= 0.31 in²

✔ A_{s_min} Š A_s ...utilization ratio 0.645

Maximum Horizontal Steel Spacing

For this Ordinary Reinforced Shear Wall, the maximum spacing of horizontal reinforcement is:

s_{max}= 120 in

[TMS 402-16 7.3.2.3.1]

The spacing of provided distributed horizontal reinforcement is:

s= 48 in

✔ s_{max} Š s ...utilization ratio 0.4

Minimum Distributed Horizontal Steel Area

For this Ordinary Reinforced Shear Wall, the minimum area of horizontal reinforcement is bond beam reinforcement of minimum area:

A_{s_min}= 0.2 in²

[TMS 402-16 7.3.2.3.1]

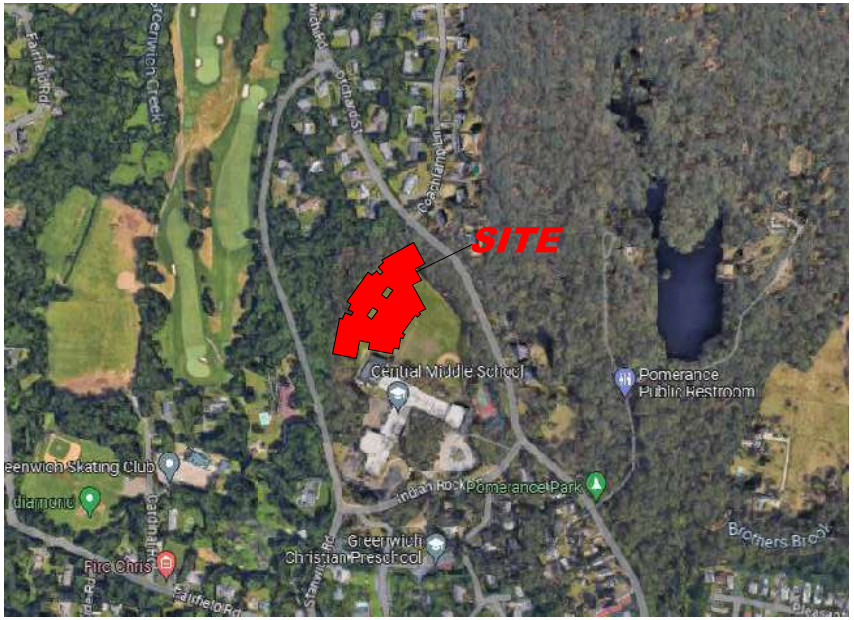
The area of provided bond beam bar size is:

A_s= 0.2 in²

✔ A_{s_min} Š A_s ...utilization ratio 1

SLAM





Greenwich Public Schools

GREENWICH CENTRAL MIDDLE SCHOOL

9 Indian Rock Lane, Greenwich, CT

State Project No: 057-0114 N

Owner:
Town Of Greenwich, CT
290 Greenwich Ave, Greenwich, CT

Architect, Structural Engineer:
The S/L/A/M Collaborative
80 Glastonbury Blvd, Glastonbury, CT 06033

Landscape Architect:
The S/L/A/M Collaborative
80 Glastonbury Blvd, Glastonbury, CT 06033

HazMat & Abatement Engineer:
Langan Engineering & Environmental Services, Inc.
555 Long Wharf Dr, #9b, New Haven, CT 06511

MEP Engineers:
Consulting Engineering Services, Inc.
811 Middle Street, Middletown, CT 06457

Geotechnical, Traffic and Civil Engineers:
Tighe and Bond
213 Court Street, Suite 1100, Middletown, CT 064557

Food Service Consultant:
Crabtree McGrath Assoc. Inc
161 West Main Street, Georgetown, MA 01833

Educational Planning Consultant:
MLP Integrated Design
5 Dawes Street, Newburyport, MA 01950

Acoustics/Theater Consultant:
Cavanaugh Tocci Assoc. Inc
327F Boston Post Road, Sudbury, MA 01776

Building, Code and Accessiblity Consultant:
Versteeg Assoc. LLC
86 University Dr. Torrigton, CT 06790

Energy Modeling Consultant:
Thorton Tomasetti
14 York Street, Portland, ME 04101

Tech./Comm./Security Consultant:
D'Agostino & Assoc. LLC
477 Main Street, Monroe, CT 06468

Binding: VOLUME 1
Issued for: BIDDING/ PERMIT
Date: 09/30/2024
Proj No. : 22367.00

CODE INFORMATION

1. OCCUPANCY CLASSIFICATION (CSBC 302):
   USE GROUP(S): E /A-1, A-2, A-3, A-4, B, S-1
   ACCESSORY USE AREAS (CSBC 508.2): A-3 - CONFERANCE ROOMS
   MIXED OCCUPANCIES (CSBC 508):
   NON-SEPARATED USES (CSBC 508.3): YES
   SEPARATED USES (CSBC 508.4): NO

2. CONSTRUCTION TYPE CLASSIFICATION (CSBC 602.2):
   MINIMUM TYPE OF CONSTRUCTION REQUIRED: IB
   ACTUAL TYPE OF CONSTRUCTION PROVIDED: IB

3. BUILDING HEIGHT & MODIFICATIONS (CSBC 503 & 504):
   ALLOWABLE HEIGHT IN STORIES/FEET: 6 / 160'
   TABULAR HEIGHT IN STORIES/FEET: 6 / 160'
   INCREASE FOR SPRINKLERS IN STORIES/FEET: 1 / 20'
   ACTUAL HEIGHT IN STORIES/FEET: 2 / 32'
   STORIES ABOVE GRADE: 2

4. ACTUAL BUILDING AREA (CSBC 502.1 & CHAPTER 2):
   GROSS BUILDING AREA PER FLOOR:
   FIRST FLOOR GROSS BUILDING AREA: 74,194 SF
   SECOND FLOOR GROSS BUILDING AREA: 53,104 SF
   TOTAL GROSS BUILDING AREA: 127,298 SF

5. BUILDING AREA & MODIFICATIONS (CSBC 503 & 506):
   CALCULATION NOT APPLICABLE - UNLIMITED AREA BUILDING

   ALLOWABLE AREA - At = CALCULATION BY OCCUPANCY CLASSIFICATION:
   At = TABULAR AREA (CSBC TABLE 506.2)
   If = INCREASE FOR FRONTAGE - SEE BELOW (CSBC 506.3): N/A

   ALLOWABLE AREA EQUATION 5-1 (CSBC 506.1):
   As = At + (At x Ia) + (At x Is)
   As (NS) = N/A + (N/A x N/A) + (N/A x N/A) = N/A SF
   As (S) = N/A + (N/A x N/A) + (N/A x N/A) = N/A SF

   FRONTAGE INCREASE (If) CALCULATION (CSBC 506.3):

	NORTH	EAST	SOUTH	WEST
TOTAL PERIMETER (P):	N/A FT	N/A FT	N/A FT	N/A FT
TOTAL FRONTAGE (F):	N/A FT	N/A FT	N/A FT	N/A FT

   TOTAL PERIMETER (P): N/A FT
   TOTAL FRONTAGE (F): N/A FT

   FRONTAGE INCREASE EQUATION 5-2 (CSBC 506.3):
   If = (P/F - 0.25) W/30
   If = (N/A / N/A - 0.25) N/A (30) = N/A

   FRONTAGE INCREASE - VALUE OF W - EQUATION 5-3 (CSBC 506.3.1):
   W = [(L1 x w1) + (L2 x w2) + (L3 x w3)...] / F
   W = [(N/A' x N/A') + (N/A' x N/A') + (N/A' x N/A')...] / F = N/A FT

7a. CASE 2a - MIXED OCCUPANCIES - NON-SEPARATED (CSBC 508.3):
   ALLOWABLE BUILDING AREA (CSBC 506.2.2):
   CALCULATION NOT APPLICABLE - UNLIMITED AREA BUILDING

   ALLOWABLE BUILDING AREA CALCULATION - "MOST RESTRICTIVE" (CSBC 508.3.2) FOR EACH FLOOR:

   OCC. CLASS - ?
   ACTUAL AREA / ALLOWABLE AREA (Aa) ≤ 1

   OCC. CLASS - ?
   N/A SF / N/A SF = N/A - OK

   MIXED OCCUPANCY TOTAL ALLOWABLE BUILDING AREA DETERMINATION CALCULATIONS (CSBC 508.3) FOR MULTI-STORY BUILDINGS (1 OR MORE STORIES):
   CALCULATION NOT APPLICABLE - UNLIMITED AREA BUILDING

   OCC. CLASS - ?
   ACTUAL AREA / ALLOWABLE AREA (Aa) = X

   FIRST FLOOR - MIXED OCCUPANCIES:
   OCC. CLASS - ?
   N/A SF / N/A SF = N/A

   SECOND FLOOR - MIXED OCCUPANCIES:
   OCC. CLASS - ?
   N/A SF / N/A SF = N/A

   THIRD FLOOR - SINGLE OCCUPANCY:
   OCC. CLASS - ?
   N/A SF / N/A SF = N/A

   TOTAL OF ALL FLOORS LESS THAN X: N/A - OK

8. FIRE RESISTANCE RATED REQUIREMENTS FOR BUILDING ELEMENTS (CBC TABLE 601):

BUILDING ELEMENT	FIRE SEP. DIST. (FEET)	RATING REQ'D	RATING PROVIDED
STRUCTURAL FRAME, INCLUDING COLUMNS, GIRDERS, TRUSSES		2 HR	2 HR
BEARING WALLS			
EXTERIOR			
NORTH	N/A	2 HR	2 HR @ GYM
EAST	N/A	2 HR	2 HR @ GYM
WEST	N/A	2 HR	2 HR @ GYM
SOUTH	N/A	2 HR	2 HR @ GYM
INTERIOR		2 HR	N/A
INT. CARRYING ROOF ONLY		N/A	N/A
NONBEARING WALLS AND PARTITIONS			
NORTH		NR	NR
EAST		NR	NR
WEST		NR	NR
SOUTH		NR	NR
INTERIOR		NR	NR
FLOOR CONSTRUCTION INCLUDING SUPPORTING BEAMS AND JOISTS		2 HR	2 HR
ROOF CONSTRUCTION INCLUDING SUPPORTING BEAMS AND JOISTS		1 HR	1 HR
SHAFTS - EXIT		2 HR	2 HR
SHAFTS - OTHER		2 HR	2 HR
CORRIDOR SEPARATION		NR	NR
OCCUPANCY SEPARATION		N/A	N/A
INCIDENTAL USE SEPARATION		NR	NR
PARTY/FIRE WALL SEPARATION		N/A	N/A
SMOKE BARRIER SEPARATION		N/A	N/A
TENANT SEPARATION		N/A	N/A
PEDESTRIAN WALKWAYS		N/A	N/A

NR = NO RATING
N/A = NOT APPLICABLE, CONDITION NOT PRESENT IN DESIGN
1 HR = 1 HOUR RATING
2 HR = 2 HOUR RATING
3 HR = 3 HOUR RATING
0 HR = UNRATED SMOKE PARTITION

9. OCCUPANCY LOAD - REFER TO FIRESAFETY PLANS FOR OCCUPANT LOADS OF INDIVIDUAL ROOMS (CSBC 1004.1):
   DESIGN TOTAL FOR EACH FLOOR:
   FIRST FLOOR: 2,702 OCC.
   SECOND FLOOR: 1,638 OCC.
   TOTAL EXIT CAPACITY FOR EACH FLOOR:
   FIRST FLOOR: 5,156 OCC.
   SECOND FLOOR: 1,900 OCC.
   DESIGN TOTAL FOR ENTIRE BUILDING: 4,340 OCC.
   TOTAL EXIT CAPACITY FOR ENTIRE BUILDING: 6,956 OCC.

10. MODIFICATIONS:
    APPROVED:
    A) CODE SECTION: 2902.1 NUMBER: M-24-0252
    FILED/PENDING (NOT YET APPROVED):
    A) CODE SECTION: NONE

11. ACCESSIBLE BUILDING:
    DESIGNATED: X NON-DESIGNATED:

12. MINIMUM PLUMBING FIXTURE COUNT (CSBC TABLE 2902.1):

GROUP A-1 OCCUPANCY — DESIGN LOAD: 297 — AUDITORIUM

	REQUIRED	PROVIDED	
W/C MALE	3	5*	* = NO DEDICATED FACILITIES - SHARED WITH "A-4" AND "E" USE
W/C FEMALE	6	6*	A-1 W/C 1 PER 125 MALE / 1 PER 65 FEMALE
LAVATORY	4	17*	A-1 LAVS 1 PER 200
D/F	2	6*	A-1 D/F 1 PER 500

GROUP A-2 OCCUPANCY — DESIGN LOAD: 297 — CAFE

	REQUIRED	PROVIDED	
W/C	4	11*	* = NO DEDICATED FACILITIES - SHARED WITH "A-4" AND "E" USE
LAVATORY	2	10*	A-2 W/C 1 PER 75
D/F	1	4*	A-2 LAVS 1 PER 200
			A-2 D/F 1 PER 500

GROUP A-3 OCCUPANCY — DESIGN LOAD: 214 — MEDIA CENTER

	REQUIRED	PROVIDED	
W/C MALE	1	3*	* = NO DEDICATED FACILITIES - SHARED WITH "E" USE
W/C FEMALE	3	3*	A-3 W/C 1 PER 125 MALE / 1 PER 65 FEMALE
LAVATORY	2	6*	A-3 LAVS 1 PER 200
D/F	1	4*	A-3 D/F 1 PER 500

GROUP A-4 OCCUPANCY — DESIGN LOAD: 670 — GYMNASIUM

	REQUIRED	PROVIDED	
W/C MALE	7	8	* = NO DEDICATED FACILITIES - SHARED WITH "A-1" AND "E" USE
W/C FEMALE	13	13*	A-1 W/C 1 PER 75 FOR FIRST 1,500 / 1 PER 120 REMAINDER MALE
LAVATORY	6	12*	A-1 W/C 1 PER 40 FOR FIRST 1,500 / 1 PER 60 REMAINDER FEMALE
D/F	1	4	A-1 LAVS 1 PER 200 MALE / 1 PER 150 FEMALE
			A-1 D/F 1 PER 1000

GROUP E OCCUPANCY — DESIGN LOAD: 1,182

	REQUIRED	PROVIDED	
W/C	40	68*	* SHARED WITH "A-1" AND "A-4" USE
LAVATORY	40	42*	E W/C 1 PER 50
D/F	20	20*	E LAVS 1 PER 50
			E D/F 1 PER 100

GROUP B OCCUPANCY — DESIGN LOAD: 231

	REQUIRED	PROVIDED	
W/C	4	4	* = NO DEDICATED FACILITIES - SHARED WITH "E" USE
LAVATORY	2	4	B W/C 1 PER 25 FOR FIRST 50 / 1 PER 50 REMAINDER
D/F	2	4*	B LAVS 1 PER 40 FOR FIRST 80 / 1 PER 80 REMAINDER
			B D/F 1 PER 100

13. ENTIRE BUILDING SPRINKLERED (CSBC 903.1):
    YES

14. THRESHOLD BUILDING CONDITIONS (CSBC 107.7):
    YES

15. CODES TO WHICH THIS PROJECT WAS DESIGNED:
    2022 STATE OF CONNECTICUT STATE BUILDING CODE - CSBC
    - 2021 INTERNATIONAL BUILDING CODE IBC
    - 2021 INTERNATIONAL MECHANICAL CODE - IMC
    - 2021 INTERNATIONAL PLUMBING CODE - IPC
    - 2021 INTERNATIONAL ENERGY CONSERVATION CODE - IECC
    - 2020 NFPA 70 NATIONAL ELECTRICAL CODE, of the NATIONAL FIRE PROTECTION ASSOC. INC.
    - 2017 ICC/ANSI A117.1 ACCESSIBLE and USABLE BUILDINGS and FACILITIES ANSI
    - 2018 AMENDMENTS TO THE CONNECTICUT STATE BUILDING CODE

    2008 CONNECTICUT PUBLIC HEALTH CODE - PHC
    2010 ADA STANDARDS FOR ACCESSIBLE DESIGN
    2017 ICC/ANSI A117.1 ACCESSIBLE and USABLE BUILDINGS and FACILITIES, AS AMENDED BY 2022 CONNECTICUT STAE BUILDING CODE

    2022 CONNECTICUT STATE FIRE SAFETY CODE - CSFSC
    - 2021 INTERNATIONAL FIRE CODE - IFC
    - 2021 AMENDMENTS TO THE CONNECTICUT FIRE SAFETY CODE
    - 2019 NFPA 10 - STANDARD FOR PORTABLE FIRE EXTINGUISHERS
    - 2019 NFPA 13 - STANDARD FOR THE INSTALLATION OF SPRINKLER SYSTEMS
    - 2019 NFPA 72 - NATIONAL FIRE ALARM AND SIGNALING CODE

    2022 CONNECTICUT STATE FIRE PREVENTION CODE - CFPC
    - 2021 NFPA 1, UNIFORM FIRE CODE

16. EXIT ACCESS:
    COMMON PATH OF TRAVEL LIMITATIONS (CSBC 1006.2.1)
    ALLOWABLE: 75' (A & E OCC.) PROVIDED: <75'
    ALLOWABLE: 100' (B OCC.) PROVIDED: < 100'
    EXIT ACCESS TRAVEL DISTANCE LIMITATIONS (CSBC 1017.2)
    ALLOWABLE: 250' (A & E OCC.) PROVIDED: < 250'
    ALLOWABLE: 300' (B OCC.) PROVIDED: < 300'
    MINIMUM CORRIDOR WIDTH (CSBC 1020.3)
    ALLOWABLE: 72" (E WHEN OCC. >100) PROVIDED: > 72"

    CORRIDOR DEAD END LIMITATION (CSBC 1020.4)
    ALLOWABLE: 20' (A OCC.) PROVIDED: < 20'
    ALLOWABLE: 50' (B & E OCC.) PROVIDED: < 50'

17. EGRESS CAPACITY OF DOORS (CSBC 1005.1):
    DOORS WITH STANDARD HOLLOW METAL FRAMES AND BUTT HINGES

SIZE	CLEAR WIDTH	MAX. OCC. LOAD (CAP = .2"/OCC)
(1) 3'-0"	33.125"	165 OCCUPANTS
(1) 3'-2"	35.125"	175 OCCUPANTS
(1) 3'-4"	37.125"	185 OCCUPANTS
(1) 3'-6"	39.125"	195 OCCUPANTS
(1) 3'-8"	41.125"	205 OCCUPANTS
(1) 3'-10"	43.125"	215 OCCUPANTS
(1) 4'-0"	45.125"	225 OCCUPANTS
(2) 2'-8"	67.125"	337 OCCUPANTS
(2) 2'-10"	71.125"	357 OCCUPANTS
(2) 3'-0"	73.125"	367 OCCUPANTS
(2) 3'-1"	75.125"	377 OCCUPANTS
(2) 3'-2"	79.125"	397 OCCUPANTS
(2) 3'-7"	81.125"	407 OCCUPANTS
(2) 3'-8"	83.125"	417 OCCUPANTS
(2) 3'-10"	87.125"	437 OCCUPANTS
(2) 4'-0"	91.125"	457 OCCUPANTS

18. INTERIOR FINISHES (CSBC 803.11):
    GROUP A-1, A-2, A-3 AND A-4 OCCUPANCY:
    VERTICAL EXITS & EXIT PASSAGEWAYS - CLASS "A" OR "B"
    EXIT ACCESS CORRIDORS & OTHER EXITS - CLASS "A" OR "B"
    ROOMS AND ENCLOSED SPACES - CLASS "A", "B" OR "C"
    GROUP E AND B OCCUPANCY:
    VERTICAL EXITS & EXIT PASSAGEWAYS - CLASS "A" OR "B"
    EXIT ACCESS CORRIDORS & OTHER EXITS - CLASS "A", "B" OR "C"
    ROOMS AND ENCLOSED SPACES - CLASS "A", "B" OR "C"

19. HISTORIC BUILDING:
    "NO"

20. EGRESS-RELATED CODE INFORMATION:
    FLOOR AREA ALLOWANCES PER OCCUPANT (CSBC 1004.5)
    CLASSROOM OCCUPANCY - 20 NET
    SHOP & VOCATIONAL ROOM OCCUPANCY - 50 NET
    BUSINESS/OFFICE OCCUPANCY - 150 GROSS
    CAFETERIA OCCUPANCY - 15 NET
    GYMNASIUM OCCUPANCY - 5 NET
    MEDIA CENTER READING AREAS - 50 NET
    MEDIA CENTER STACKS AREA - 100 GROSS
    EXERCISE ROOMS - 50 GROSS
    KITCHEN OCCUPANCY - 200 GROSS
    STORAGE & MECHANICAL OCCUPANCY - 300 GROSS
    EGRESS WIDTH PER OCCUPANT SERVED
    EGRESS - STAIRS = .3" PER PERSON (CSBC 1005.3.1)
    EGRESS - CORRIDORS, RAMPS AND DOORS = .2" PER PERSON (CSBC 1005.3.2)

THRESHOLD BUILDING CRITERIA

NO.	THRESHOLD LIMITS	YES	NO
1	HAVING FOUR STORIES		X
2	60 FEET IN HEIGHT		X
3	WITH A CLEAR SPAN OF 150 FEET IN WIDTH		X
4	CONTAINING 150,000 SQUARE FEET OF TOTAL GROSS FLOOR AREA		X
5	WITH AN OCCUPANCY OF 1,000 PERSONS	X	

DEFERRED SUBMITTALS SUMMARY (CSBC 107.3.4.1) - DELEGATED DESIGN

NO.	BUILDING COMPONENTS	SPECIFICATION SECTION
1	UNIT MASONRY	04 2000
2	STRUCTURAL STEEL FRAME CONNECTIONS	05 1000
3	STEEL JOISTS	05 2100
4	COLD FORMED METAL FRAMING	05 4000
5	METAL FABRICATIONS	05 5000
6	METAL STAIRS	05 5100
7	DECORATIVE METAL RAILINGS	05 7000
8	MONUMENTAL STAIRS	05 7100
9	METAL COMPOSITE WALL PANELS	07 4213.13
10	FIBER CEMENT WALL PANELS	07 4646
11	METAL FRAMED SKYLIGHTS	08 3000
12	ALUMINUM FRAMED ENTRANCES AND STOREFRONTS	08 4113
13	GLAZED ALUMINUM CURTAINWALLS	08 4414
14	LOUVERED EQUIPMENT ENCLOSURES	08 9200
15	GROUND SET FLAGPOLES	10 7516
16	STAGE RIGGING AND CURTAINS	11 0610
17	ATHLETIC FIELD EQUIPMENT	11 6833
18	TELESCOPING BLEACHERS	12 6613
19	SITE FURNISHINGS	12 9300
20	ELECTRIC TRACTION ELEVATORS	14 2100
21	FIRE PROTECTION	21 0400, 21 0533, 21 0616, 21 0533, 21 0548, 21 1313, 21 3000
22	EXPANSION FITTINGS AND LOOPS FOR PLUMBING PIPING	22 0516
23	HANGERS AND SUPPORTS FOR PLUMBING AND EQUIPMENT	22 0529
24	HEAT TRACING FOR PLUMBING PIPING	22 0533
25	VIBRATION AND SEISMIC CONTROLS FOR PLUMBING PIPING AND EQUIPMENT	22 0548
26	FUEL GAS PIPING	22 1123
27	EXPANSION FITTINGS AND LOOPS FOR HVAC PIPING	23 0516
28	HANGERS AND SUPPORTS FOR HVAC PIPING, DUCTWORK AND EQUIPMENT	23 0529
29	VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT	23 0548
30	INSTRUMENTATION AND CONTROLS FOR HVAC	23 0900
31	NOT USED	
32	BREECHINGS, CHIMNEYS, AND STACKS	23 5100
33	VIBRATION AND SEISMIC CONTROLS FOR ELECTRIC	26 0548
34	OVERCURRENT PROTECTION DEVICE COORDINATION STUDY	26 0573
35	LIGHTNING PROTECTION FOR STRUCTURES	26 4113
36	CABLE TRAY FOR COMMUNICATIONS SYSTEMS	27 0536
37	SPEAKER AND ELECTRIC SCREEN WIGGING	27 4100
38	EMERGENCY RESPONDER RADIO COVERAGE SYSTEM	27 5010
39	EXCAVATION, BACKFILL, COMPACTION, & DEWATERING	31 2300
40	AGGREGATE PIERS	31 6616
41	SEGMENTAL RETAINING WALLS	32 3223
42	IRRIGATION SYSTEMS	32 8423

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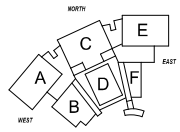
Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
1	11/06/2024	ADDENDUM NO. 6
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

CODE INFORMATION

Date: 07/08/2024
Scale: 12" = 1'-0"
Proj. Number: 22367.00
Drawing Number: GC0A

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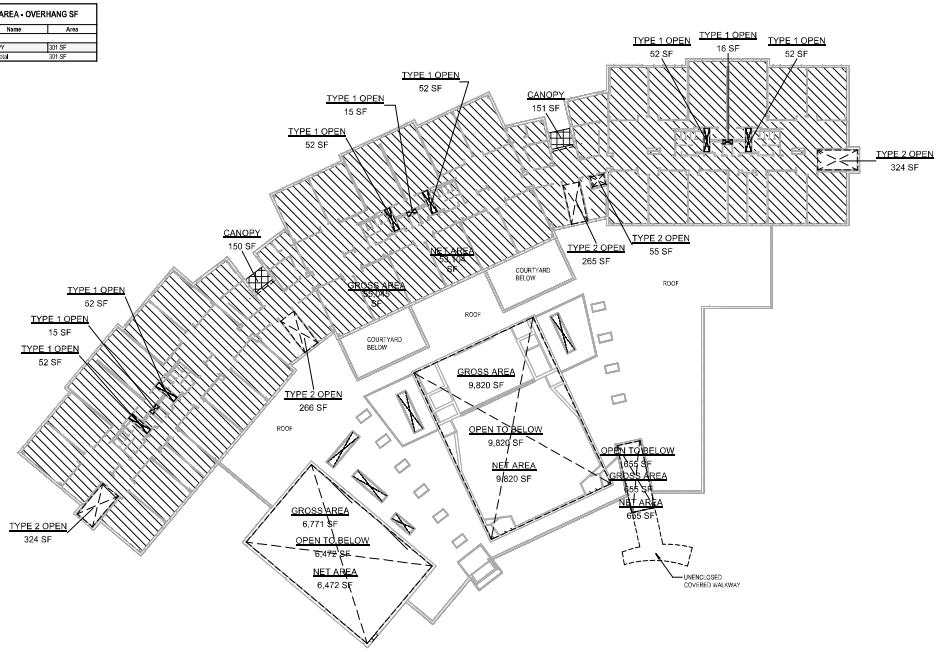
MIDDLE - INSIDE FACE OF EXTERIOR WALL (INCLUDES OPEN AREAS AND OPEN TO BELOW)			MIDDLE - OUTSIDE FACE OF EXTERIOR WALL (INCLUDES OPEN AREAS AND OPEN TO BELOW)			TYPE 1 AREA - OPEN SF		TYPE 2 AREA - OPEN SF		AREA - OPEN TO BELOW		AREA - OVERHANG SF	
Level	Name	Area	Level	Name	Area	Name	Area	Name	Area	Name	Area	Name	Area
1.0 - FIRST FLOOR	NET AREA	74,184 SF	1.0 - FIRST FLOOR	GROSS AREA	75,937 SF	TYPE 1 OPEN	358 SF	TYPE 2 OPEN	1,233 SF	OPEN TO BELOW	16,947 SF	CANOPY	331 SF
2.0 - SECOND FLOOR	NET AREA	70,051 SF	2.0 - SECOND FLOOR	GROSS AREA	72,191 SF	Grand total	358 SF	Grand total	1,233 SF	Grand total	16,947 SF	Grand total	331 SF
Grand total		144,235 SF	Grand total		148,128 SF								

BUILDING AREA DEFINED BY BUILDING CODE (CSBC 506.1)	
BUILDING AREA TOTAL - INSIDE FACE OF EXTERIOR WALL	144,235 SF
SUBTRACT - TOTAL TYPE - 1 OPEN SF (VENT SHAFTS):	(minus) 358 SF
SUBTRACT - TOTAL OPEN TO BELOW SF:	(minus) 16,947 SF
BUILDING AREA (CSBC 506.1):	126,920 SF

BUILDING AREAS OF THE MIDDLE SCHOOL FOR GRANT PURPOSES (OSCG&R Item #16)	
BUILDING AREA TOTAL - INSIDE FACE OF EXTERIOR WALL:	144,235 SF
SUBTRACT - TOTAL TYPE - 1 OPEN SF (VENT SHAFTS):	(minus) 358 SF
SUBTRACT - TOTAL TYPE - 2 OPEN SF (SEE NOTES 1&2 ABOVE):	(minus) 1,233 SF
SUBTRACT - TOTAL OPEN TO BELOW SF (SEE NOTE 3 ABOVE):	(minus) 16,947 SF
BUILDING AREA FOR GRANT PURPOSES (CGS 10-287c-15, SCG-3043, SCG-3055):	125,697 SF
BUILDING ALLOWABLE AREA (CGS 10-287c-15, 10-286 10a-2, (660 Students x 169.7 SF/Student):	111,999 SF
VARIANCE FROM ALLOWABLE AREA (UNDER) / OVER:	13,708 SF
TOTAL EXISTING AREA PRIOR TO THIS PROJECT (EXISTING HIGH SCHOOL BUILDING):	111,164 SF
EXISTING UNALTERED CONSTRUCTION:	0 SF
EXISTING ALTERED CONSTRUCTION:	0 SF
EXISTING BEING DEMOLISHED:	111,164 SF
TOTAL EXISTING CONSTRUCTION:	0 SF
TOTAL NEW CONSTRUCTION:	125,697 SF
BUILDING AREA TOTAL - OUTSIDE FACE OF EXTERIOR WALL:	148,128 SF
SUBTRACT - TOTAL TYPE 1 OPEN SF (VENT SHAFTS):	(minus) 358 SF
SUBTRACT - TOTAL OPEN TO BELOW SF:	(minus) 16,947 SF
SUBTRACT - TYPE 2 OPEN SF FOR OPEN STAIRS:	(minus) 631 SF
TOTAL CONSTRUCTED BUILDING AREA TO THE OUTSIDE FACE OF EXTERIOR WALL; A,K,A, CONTRACTOR BUILDING AREA:	170,292 SF

NOTES:

1. ELEVATOR AREA IS CALCULATED AT THE FIRST FLOOR LEVEL ONLY FOR THE GRANT APPLICATION AREA, IN ACCORDANCE WITH ITEM 12 ON FORM SCG-3052, REVISION DATED 12/13/21. ELEVATOR SHAFT AREA ON FLOORS OTHER THAN THE FIRST FLOOR ARE DEDUCTED FROM BUILDING AREA FOR GRANT PURPOSES ON THOSE LEVELS AND INDICATED AS "TYPE-2 OPEN SF".
2. STAIR SHAFT AREA IS CALCULATED AT THE FIRST FLOOR LEVEL ONLY FOR THE GRANT APPLICATION AREA, IN ACCORDANCE WITH ITEM 26 ON FORM SCG-3052, REVISION DATED 12/13/21. STAIRWELL SHAFT AREA ON FLOORS OTHER THAN THE FIRST FLOOR ARE DEDUCTED FROM BUILDING AREA FOR GRANT PURPOSES ON THOSE LEVELS, AND INDICATED AS "TYPE-2 OPEN SF".
3. GYMNASIA, CAFETERIA, AUDITORIUM AND LOBBIES ARE CONSIDERED TALL SINGLE - STORY SPACES, IN ACCORDANCE WITH ITEM 2 ON FORM SCG-3043, REVISION DATED 05/29/17.



B4 2.0 - SECOND FLOOR
1/32" = 1'-0"



D4 1.0 - FIRST FLOOR
1/32" = 1'-0"

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Greenwich Central Middle School

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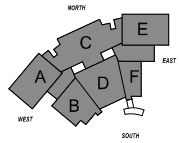

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

BUILDING AREA PLANS

Date: 07/08/2024
Scale: 1/32" = 1'-0"
Proj. Number: 22367.00
Drawing Number: GC0B

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1E 1 - FIRST FLOOR FIRE SAFETY PLAN
1/16" = 1'-0"

FIRE SAFETY PLAN GENERAL NOTES

1. FIRE BARRIERS, FIRE WALLS, FIRE PARTITIONS, SMOKE BARRIERS AND SMOKE PARTITIONS SHALL BE LABELED IN ACCESSIBLE CONCEALED FLOOR, FLOOR/CEILING AND ATTIC SPACES WITH PAINTED SIGNAGE.

FIRE SAFETY LEGEND

REFER TO FLOOR PLANS AND WALL PARTITION TYPES (DRAWING A605) FOR SPECIFIC PARTITION DETAILS AND LOCATIONS

ROOM OCCUPANT LOAD
AREA IN SQ. FT.
OCCUPANT LOAD FACTOR (IBC TABLE 1004.1.2)

EXIT CAPACITY
ACTUAL LOAD
EXIT CAPACITY

DIRECTION OF TRAVEL WITH ACCUMULATED OCCUPANT LOAD

MAXIMUM TRAVEL DISTANCE FROM FURTHEST POINT

AREA OF REFUGE

NON ACCESSIBLE EXIT

ACCESSIBLE EXIT

RE REQUIRED EXIT FOR BALANCED EGRESS CAPACITY PER 1005.1.1

FLUSH CONDITION

FIRE RATING DESIGNATIONS:

- 0S - 0S - 0S	NON-FIRE RATED SMOKE PARTITION
- 1E - 1E - 1E	1 HOUR EXTERIOR WALL
- 1H - 1H - 1H	1 HOUR FIRE BARRIER
- 2L - 2L - 2L	2 HOUR LOAD BEARING EXTERIOR WALL
- 2H - 2H - 2H	2 HOUR FIRE BARRIER

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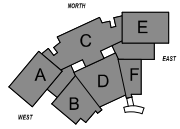

KEYPLAN

Number	Date	Issued For
	05/03/2024	BIDDING PERMIT
	07/05/2024	PHASE 2

FIRST FLOOR FIRE SAFETY PLAN

Date: 07/08/2024
Scale: 1/16" = 1'-0"
Proj. Number: 22367.00
Drawing Number: GC01

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1E OVERALL FIRST FLOOR PLAN
1/16" = 1'-0"

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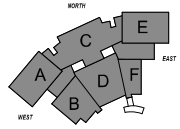

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

SECOND FLOOR FIRE SAFETY PLAN

Date: 07/08/2024
Scale: 1/16" = 1'-0"
Proj. Number: 22367.00
Drawing Number: GC02

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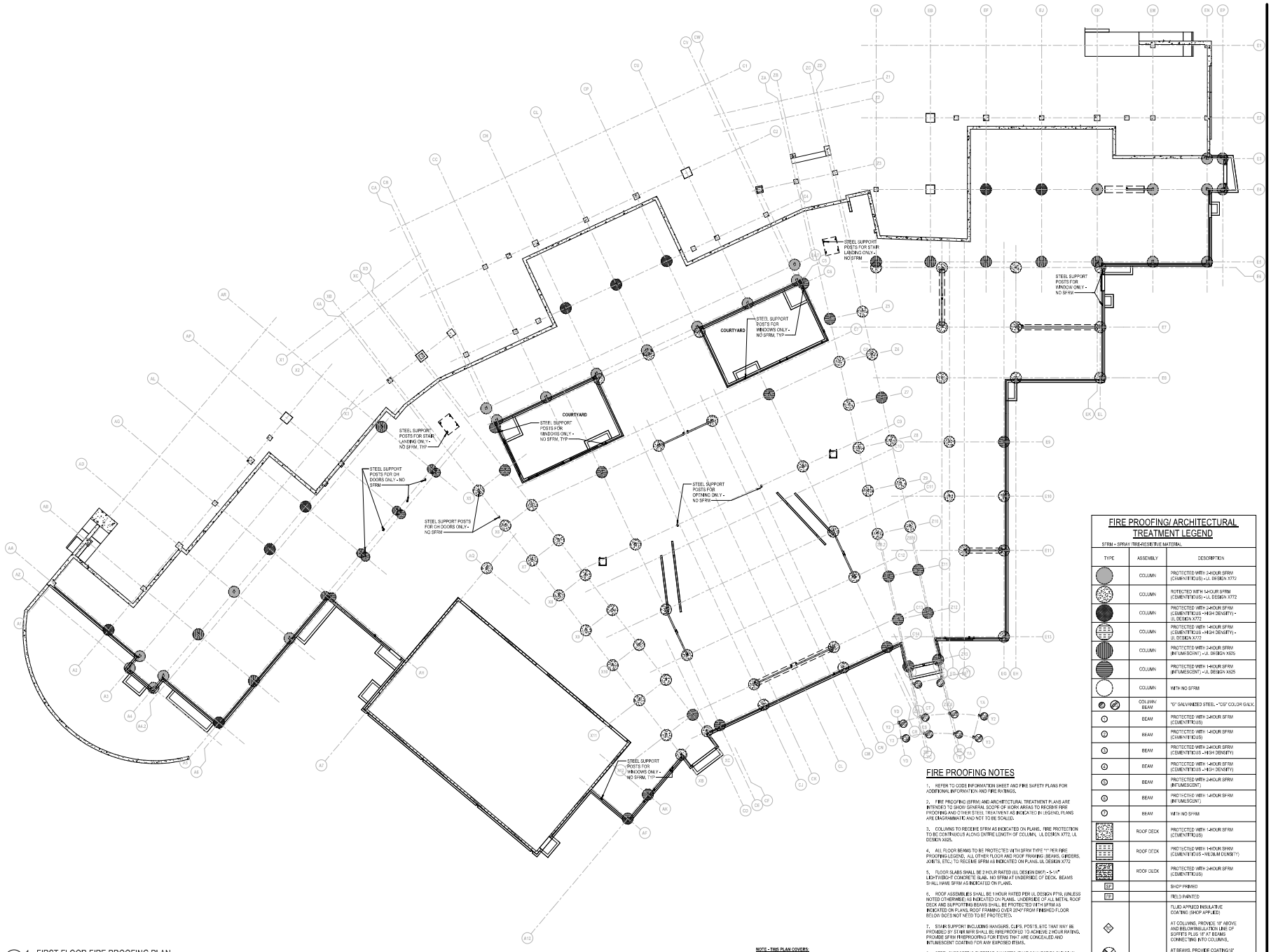

1E 1 - FIRST FLOOR FIRE PROOFING PLAN
1/16" = 1'-0"

NOTE - THIS PLAN COVERS:
- ALL FIRE COLUMNS THAT SPAN BETWEEN THE LOWER AND FIRST FLOOR LEVELS

FIRE PROOFING/ ARCHITECTURAL TREATMENT LEGEND

SFRM - SPRAY FIRE-RESISTIVE MATERIAL

TYPE	ASSEMBLY	DESCRIPTION
	COLUMN	PROTECTED WITH 2-HOUR SFRM (CEMENTITIOUS) - UL DESIGN X772
	COLUMN	ROTECTED WITH 1-HOUR SFRM (CEMENTITIOUS) - UL DESIGN X772
	COLUMN	PROTECTED WITH 2-HOUR SFRM (CEMENTITIOUS - HIGH DENSITY) - UL DESIGN X772
	COLUMN	PROTECTED WITH 1-HOUR SFRM (CEMENTITIOUS - HIGH DENSITY) - UL DESIGN X772
	COLUMN	PROTECTED WITH 2-HOUR SFRM (INTUMESCENT) - UL DESIGN X625
	COLUMN	PROTECTED WITH 1-HOUR SFRM (INTUMESCENT) - UL DESIGN X625
	COLUMN	WITH NO SFRM
	COLUMN/ BEAM	"G" GALVANIZED STEEL - "OS" COLOR GALV.
	BEAM	PROTECTED WITH 2-HOUR SFRM (CEMENTITIOUS)
	BEAM	PROTECTED WITH 1-HOUR SFRM (CEMENTITIOUS)
	BEAM	PROTECTED WITH 2-HOUR SFRM (CEMENTITIOUS - HIGH DENSITY)
	BEAM	PROTECTED WITH 1-HOUR SFRM (CEMENTITIOUS - HIGH DENSITY)
	BEAM	PROTECTED WITH 2-HOUR SFRM (INTUMESCENT)
	BEAM	PROTECTED WITH 1-HOUR SFRM (INTUMESCENT)
	BEAM	WITH NO SFRM
	ROOF DECK	PROTECTED WITH 1-HOUR SFRM (CEMENTITIOUS)
	ROOF DECK	PROTECTED WITH 1-HOUR SFRM (CEMENTITIOUS - MEDIUM DENSITY)
	ROOF DECK	PROTECTED WITH 2-HOUR SFRM (CEMENTITIOUS)
SP		SHOP PRIMED
FP		FIELD PAINTED
		FLUID APPLIED INSULATIVE COATING SHOP APPLIED AT COLUMNS, PROVIDE 18" ABOVE AND BELOW INSULATION LINE OF SUPPER PLUS 18" AT BEAMS CONNECTING INTO COLUMNS, AT BEAMS, PROVIDE COATING 18" ON BOTH SIDES OF INSULATION LINE PLUS ANY OTHER BEAM AND/OR COLUMN FRAMING INTO THE BEAM.
		18" DIA. SPHERE FOR EXTENTS OF COATING

FIRE PROOFING NOTES

1. REFER TO CODE INFORMATION SHEET AND FIRE SAFETY PLANS FOR ADDITIONAL INFORMATION AND FIRE RATINGS.
2. FIRE PROOFING (SFRM) AND ARCHITECTURAL TREATMENT PLANS ARE INTENDED TO SHOW GENERAL SCOPE OF WORK AREAS TO RECEIVE FIRE PROOFING AND OTHER STEEL TREATMENT AS INDICATED IN LEGEND. PLANS ARE DIAGRAMMATIC AND NOT TO BE SCALED.
3. COLUMNS TO RECEIVE SFRM AS INDICATED ON PLANS. FIRE PROTECTION TO BE CONTINUOUS ALONG ENTIRE LENGTH OF COLUMN. UL DESIGN X772, UL DESIGN X625.
4. ALL FLOOR BEAMS TO BE PROTECTED WITH SFRM TYPE "1" PER FIRE PROOFING LEGEND, ALL OTHER FLOOR AND ROOF FRAMING (BEAMS, GIRDERS, JOISTS, ETC.) TO RECEIVE SFRM AS INDICATED ON PLANS. UL DESIGN X772
5. FLOOR SLABS SHALL BE 2 HOUR RATED (UL DESIGN D907) - 5-1/4" LIGHTWEIGHT CONCRETE SLAB. NO SFRM AT UNDERSIDE OF DECK. BEAMS SHALL HAVE SFRM AS INDICATED ON PLANS.
6. ROOF ASSEMBLIES SHALL BE 1 HOUR RATED PER UL DESIGN P719, (UNLESS NOTED OTHERWISE) AS INDICATED ON PLANS. UNDERSIDE OF ALL METAL ROOF DECK AND SUPPORTING BEAMS SHALL BE PROTECTED WITH SFRM AS INDICATED ON PLANS. ROOF FRAMING OVER 20'-0" FROM FINISHED FLOOR BELOW DOES NOT NEED TO BE PROTECTED.
7. STAIR SUPPORT INCLUDING HANGERS, CLIPS, POSTS, ETC THAT MAY BE PROVIDED BY STAIR MFR SHALL BE FIREPROOFED TO ACHIEVE 2 HOUR RATING. PROVIDE SFRM FIREPROOFING FOR ITEMS THAT ARE CONCEALED AND INTUMESCENT COATING FOR ANY EXPOSED ITEMS.
8. STEEL SUPPORTING EXTERIOR CANOPIES (THAT CONNECT TO BUILDING) SHALL BE 1 HOUR RATED WITH INTUMESCENT COATING.
9. ALL EXPOSED STEEL LOOSE LINTELS AND HUNG STEEL LINTELS TO BE GALVANIZED, SHOP PRIMED AND FIELD PAINTED.
10. REFER TO SHEET A600 FOR SPECIFIC UL-TESTED PARTITION ASSEMBLIES
15. REFER TO FINISH PRODUCT LIST FOR FINISH COATINGS FOR FIREPROOFING.

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Greenwich Central Middle School

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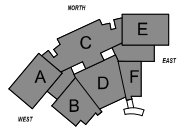

KEYPLAN

Number	Date	Issued For
	05/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRST FLOOR FIRE PROOFING AND STEEL TREATMENT PLAN

Date 07/08/2024
Scale As indicated
Proj. Number 22367.00
Drawing Number GC11

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1E OVERALL FIRST FLOOR PLAN
1/16" = 1'-0"

FIRE PROOFING/ ARCHITECTURAL TREATMENT LEGEND

SFRM - SPRAY FIRE-RESISTIVE MATERIAL

TYPE	ASSEMBLY	DESCRIPTION
	COLUMN	PROTECTED WITH 2-HOUR SFRM (CEMENTITIOUS) - UL DESIGN X772
	COLUMN	PROTECTED WITH 1-HOUR SFRM (CEMENTITIOUS) - UL DESIGN X772
	COLUMN	PROTECTED WITH 2-HOUR SFRM (CEMENTITIOUS - HIGH DENSITY) - UL DESIGN X772
	COLUMN	PROTECTED WITH 1-HOUR SFRM (CEMENTITIOUS - HIGH DENSITY) - UL DESIGN X772
	COLUMN	PROTECTED WITH 2-HOUR SFRM (INTUMESCENT) - UL DESIGN X625
	COLUMN	PROTECTED WITH 1-HOUR SFRM (INTUMESCENT) - UL DESIGN X625
	COLUMN	WITH NO SFRM
	COLUMN/ BEAM	"G" GALVANIZED STEEL - "OS" COLOR GALV.
1	BEAM	PROTECTED WITH 2-HOUR SFRM (CEMENTITIOUS)
2	BEAM	PROTECTED WITH 1-HOUR SFRM (CEMENTITIOUS)
3	BEAM	PROTECTED WITH 2-HOUR SFRM (CEMENTITIOUS - HIGH DENSITY)
4	BEAM	PROTECTED WITH 1-HOUR SFRM (CEMENTITIOUS - HIGH DENSITY)
5	BEAM	PROTECTED WITH 2-HOUR SFRM (INTUMESCENT)
6	BEAM	PROTECTED WITH 1-HOUR SFRM (INTUMESCENT)
7	BEAM	WITH NO SFRM
	ROOF DECK	PROTECTED WITH 1-HOUR SFRM (CEMENTITIOUS)
	ROOF DECK	PROTECTED WITH 1-HOUR SFRM (CEMENTITIOUS - MEDIUM DENSITY)
	ROOF DECK	PROTECTED WITH 2-HOUR SFRM (CEMENTITIOUS)
SP		SHOP PRIMED
FP		FIELD PAINTED
10" DIA. SPHERE FOR EXTENTS OF COATING		FLUID APPLIED INSULATIVE COATING SHOP APPLIED AT COLUMNS, PROVIDE 10" ABOVE AND BELOW INSULATION LINE OF SUPPER PLUS 10" AT BEAMS CONNECTING INTO COLUMNS. AT BEAMS, PROVIDE COATING 10" ON BOTH SIDES OF INSULATION LINE PLUS ANY OTHER BEAM AND/OR COLUMN FRAMING INTO THE BEAM.

FIRE PROOFING NOTES

1. REFER TO CODE INFORMATION SHEET AND FIRE SAFETY PLANS FOR ADDITIONAL INFORMATION AND FIRE RATINGS.
2. FIRE PROOFING (SFRM) AND ARCHITECTURAL TREATMENT PLANS ARE INTENDED TO SHOW GENERAL SCOPE OF WORK AREAS TO RECEIVE FIRE PROOFING AND OTHER STEEL TREATMENT AS INDICATED IN LEGEND. PLANS ARE DIAGRAMMATIC AND NOT TO BE SCALED.
3. COLUMNS TO RECEIVE SFRM AS INDICATED ON PLANS. FIRE PROTECTION TO BE CONTINUOUS ALONG ENTIRE LENGTH OF COLUMN. UL DESIGN X772, UL DESIGN X625.
4. ALL FLOOR BEAMS TO BE PROTECTED WITH SFRM TYPE "1" PER FIRE PROOFING LEGEND. ALL OTHER FLOOR AND ROOF FRAMING (BEAMS, GIRDERS, JOISTS, ETC.) TO RECEIVE SFRM AS INDICATED ON PLANS. UL DESIGN X772
5. FLOOR SLABS SHALL BE 2 HOUR RATED (UL DESIGN D907) - 5-1/4" LIGHTWEIGHT CONCRETE SLAB. NO SFRM AT UNDERSIDE OF DECK. BEAMS SHALL HAVE SFRM AS INDICATED ON PLANS.
6. ROOF ASSEMBLIES SHALL BE 1 HOUR RATED PER UL DESIGN P719, (UNLESS NOTED OTHERWISE) AS INDICATED ON PLANS. UNDERSIDE OF ALL METAL ROOF DECK AND SUPPORTING BEAMS SHALL BE PROTECTED WITH SFRM AS INDICATED ON PLANS. ROOF FRAMING OVER 20'-0" FROM FINISHED FLOOR BELOW DOES NOT NEED TO BE PROTECTED.
7. STAIR SUPPORT INCLUDING HANGERS, CLIPS, POSTS, ETC THAT MAY BE PROVIDED BY STAIR MFR SHALL BE FIREPROOFED TO ACHIEVE 2 HOUR RATING. PROVIDE SFRM FIREPROOFING FOR ITEMS THAT ARE CONCEALED AND INTUMESCENT COATING FOR ANY EXPOSED ITEMS.
8. STEEL SUPPORTING EXTERIOR CANOPIES (THAT CONNECT TO BUILDING) SHALL BE 1 HOUR RATED WITH INTUMESCENT COATING.
9. ALL EXPOSED STEEL LOOSE LINTELS AND HUNG STEEL LINTELS TO BE GALVANIZED, SHOP PRIMED AND FIELD PAINTED.
10. REFER TO SHEET A600 FOR SPECIFIC UL-TESTED PARTITION ASSEMBLIES
11. REFER TO FINISH PRODUCT LIST FOR FINISH COATINGS FOR FIREPROOFING.

NOTE - THIS PLAN COVERS:
- ALL FLOOR AND ROOF FRAMING ASSOCIATED WITH THE SECOND FLOOR LEVEL
- ALL THE COLUMNS THAT SPAN BETWEEN THE SECOND AND ROOF LEVELS

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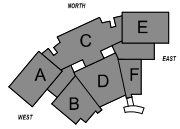


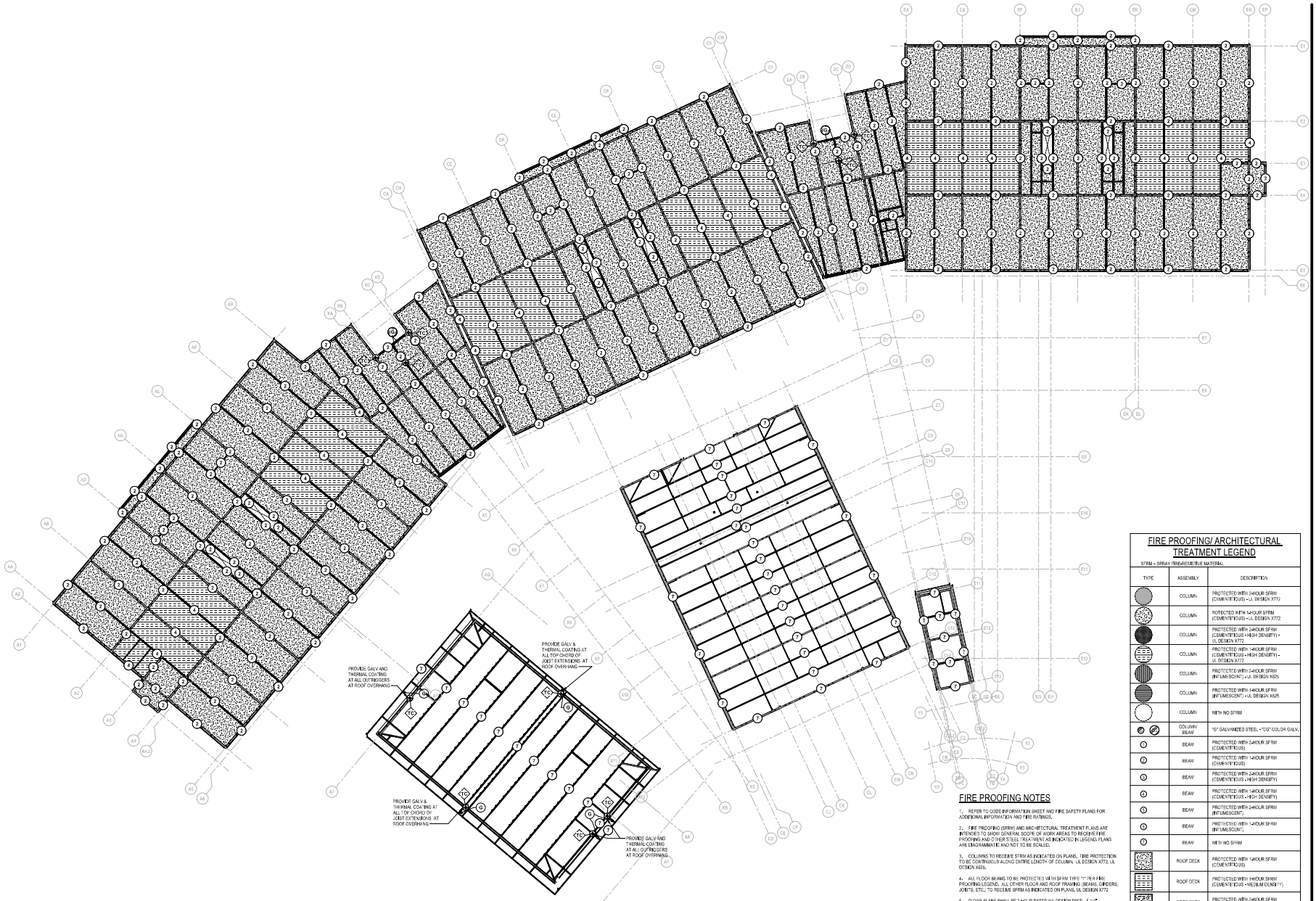
KEYPLAN

Number	Date	Issued For
	05/03/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

SECOND FLOOR FIRE PROOFING AND STEEL TREATMENT PLAN

Date 07/08/2024
Scale As indicated
Proj. Number 22367.00
Drawing Number GC12

3/25/2024 11:06:13 AM Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_GREENWICH_CENTRAL_MS_R22.rvt



1E 3 - ROOF LEVEL FIRE PROOFING PLAN
1/16" = 1'-0"

NOTE - THIS PLAN COVERS:
- ALL FLOOR AND ROOF FRAMING ASSOCIATED WITH THE ROOF LEVEL

FIRE PROOFING/ ARCHITECTURAL TREATMENT LEGEND

SFRM - SPRAY FIRE-RESISTIVE MATERIAL

TYPE	ASSEMBLY	DESCRIPTION
	COLUMN	PROTECTED WITH 2-HOUR SFRM (CEMENTITIOUS) - UL DESIGN X772
	COLUMN	ROTECTED WITH 1-HOUR SFRM (CEMENTITIOUS) - UL DESIGN X772
	COLUMN	PROTECTED WITH 2-HOUR SFRM (CEMENTITIOUS - HIGH DENSITY) - UL DESIGN X772
	COLUMN	PROTECTED WITH 1-HOUR SFRM (CEMENTITIOUS - HIGH DENSITY) - UL DESIGN X772
	COLUMN	PROTECTED WITH 2-HOUR SFRM (INTUMESCENT) - UL DESIGN X825
	COLUMN	PROTECTED WITH 1-HOUR SFRM (INTUMESCENT) - UL DESIGN X825
	COLUMN	WITH NO SFRM
	COLUMN/ BEAM	"G" GALVANIZED STEEL - "OS" COLOR GALV.
1	BEAM	PROTECTED WITH 2-HOUR SFRM (CEMENTITIOUS)
2	BEAM	PROTECTED WITH 1-HOUR SFRM (CEMENTITIOUS)
3	BEAM	PROTECTED WITH 2-HOUR SFRM (CEMENTITIOUS - HIGH DENSITY)
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6	BEAM	PROTECTED WITH 1-HOUR SFRM (INTUMESCENT)
7	BEAM	WITH NO SFRM
	ROOF DECK	PROTECTED WITH 1-HOUR SFRM (CEMENTITIOUS)
	ROOF DECK	PROTECTED WITH 1-HOUR SFRM (CEMENTITIOUS - MEDIUM DENSITY)
	ROOF DECK	PROTECTED WITH 2-HOUR SFRM (CEMENTITIOUS)
BP		SHOP PRIMED
FP		FIELD PAINTED
1HR		FLUID APPLIED INSULATIVE COATING SHOP APPLIED AT COLUMNS, PROVIDE 18" ABOVE AND BELOW INSULATION LINE OF SOFFITS PLUS 18" AT BEAMS CONNECTING INTO COLUMNS. AT BEAMS, PROVIDE COATING 18" ON BOTH SIDES OF INSULATION LINE PLUS ANY OTHER BEAM AND/OR COLUMN FRAMING INTO THE BEAM.
18" DIA. SPHERE FOR EXTENTS OF COATING		

FIRE PROOFING NOTES

1. REFER TO CODE INFORMATION SHEET AND FIRE SAFETY PLANS FOR ADDITIONAL INFORMATION AND FIRE RATINGS.
2. FIRE PROOFING (SFRM) AND ARCHITECTURAL TREATMENT PLANS ARE INTENDED TO SHOW GENERAL SCOPE OF WORK AREAS TO RECEIVE FIRE PROOFING AND OTHER STEEL TREATMENT AS INDICATED IN LEGEND. PLANS ARE DIAGRAMMATIC AND NOT TO BE SCALED.
3. COLUMNS TO RECEIVE SFRM AS INDICATED ON PLANS. FIRE PROTECTION TO BE CONTINUOUS ALONG ENTIRE LENGTH OF COLUMN. UL DESIGN X772, UL DESIGN X825.
4. ALL FLOOR BEAMS TO BE PROTECTED WITH SFRM TYPE "1" PER FIRE PROOFING LEGEND. ALL OTHER FLOOR AND ROOF FRAMING (BEAMS, GIRDERS, JOISTS, ETC.) TO RECEIVE SFRM AS INDICATED ON PLANS. UL DESIGN X772
5. FLOOR SLABS SHALL BE 2 HOUR RATED (UL DESIGN D907) - 5-1/4" LIGHTWEIGHT CONCRETE SLAB. NO SFRM AT UNDERSIDE OF DECK. BEAMS SHALL HAVE SFRM AS INDICATED ON PLANS.
6. ROOF ASSEMBLIES SHALL BE 1 HOUR RATED PER UL DESIGN P719, (UNLESS NOTED OTHERWISE) AS INDICATED ON PLANS. UNDERSIDES OF ALL METAL ROOF DECK AND SUPPORTING BEAMS SHALL BE PROTECTED WITH SFRM AS INDICATED ON PLANS. ROOF FRAMING OVER 20'-0" FROM FINISHED FLOOR BELOW DOES NOT NEED TO BE PROTECTED.
7. STAIR SUPPORT INCLUDING HANGERS, CLIPS, POSTS, ETC THAT MAY BE PROVIDED BY STAIR MFR SHALL BE FIREPROOFED TO ACHIEVE 2 HOUR RATING. PROVIDE SFRM FIREPROOFING FOR ITEMS THAT ARE CONCEALED AND INTUMESCENT COATING FOR ANY EXPOSED ITEMS.
8. STEEL SUPPORTING EXTERIOR CANOPIES (THAT CONNECT TO BUILDING) SHALL BE 1 HOUR RATED WITH INTUMESCENT COATING.
9. ALL EXPOSED STEEL LOOSE LINTELS AND HUNG STEEL LINTELS TO BE GALVANIZED, SHOP PRIMED AND FIELD PAINTED.
10. REFER TO SHEET A600 FOR SPECIFIC UL-TESTED PARTITION ASSEMBLIES
11. REFER TO FINISH PRODUCT LIST FOR FINISH COATINGS FOR FIREPROOFING.

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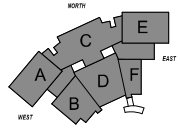
Drawn JZ
Checked JZ

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ROOF LEVEL FIRE PROOFING AND STEEL TREATMENT PLAN

Date 07/08/2024
Scale As indicated
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DRAWING LIST

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FP000	FIRE PROTECTION ABBREVIATIONS, NOTES AND SYMBOLS
FP001	FIRE PROTECTION ZONING PLAN
FP101A	FIRE PROTECTION FIRST FLOOR PLAN - PART A
FP101B	FIRE PROTECTION FIRST FLOOR PLAN - PART B
FP101C	FIRE PROTECTION FIRST FLOOR PLAN - PART C
FP101D	FIRE PROTECTION FIRST FLOOR PLAN - PART D
FP101E	FIRE PROTECTION FIRST FLOOR PLAN PART - E
FP101F	FIRE PROTECTION FIRST FLOOR PLAN - PART F
FP102A	FIRE PROTECTION SECOND FLOOR PLAN - PART A
FP102B	FIRE PROTECTION SECOND FLOOR PLAN - PART B
FP102C	FIRE PROTECTION SECOND FLOOR PLAN - PART C
FP102D	FIRE PROTECTION SECOND FLOOR PLAN - PART D
FP102E	FIRE PROTECTION SECOND FLOOR PLAN - PART E
FP401	FIRE PROTECTION ENLARGED PLANS
FP501	FIRE PROTECTION DETAILS
[49] PLUMBING	
P000	PLUMBING ABBREVIATIONS, NOTES AND SYMBOLS
P001	PLUMBING FIRST FLOOR OVERALL PLAN
P100A	PLUMBING FIRST FLOOR UNDERSLAB PLAN - PART A
P100B	PLUMBING FIRST FLOOR UNDERSLAB PLAN - PART B
P100C	PLUMBING FIRST FLOOR UNDERSLAB PLAN - PART C
P100D	PLUMBING FIRST FLOOR UNDERSLAB PLAN - PART D
P100E	PLUMBING FIRST FLOOR UNDERSLAB PLAN - PART E
P100F	PLUMBING FIRST FLOOR UNDERSLAB PLAN - PART F
P101A	PLUMBING FIRST FLOOR PLAN - PART A
P101B	PLUMBING FIRST FLOOR PLAN - PART B
P101C	PLUMBING FIRST FLOOR PLAN - PART C
P101D	PLUMBING FIRST FLOOR PLAN - PART D
P101E	PLUMBING FIRST FLOOR PLAN - PART E
P101F	PLUMBING FIRST FLOOR PLAN - PART F
P102	PLUMBING SECOND FLOOR OVERALL PLAN
P102A	PLUMBING SECOND FLOOR PLAN - PART A
P102C	PLUMBING SECOND FLOOR PLAN - PART E
P102E	PLUMBING SECOND FLOOR PLAN - PART C
P103	PLUMBING ROOF OVERALL PLAN
P103A	PLUMBING ROOF PLAN - PART A
P103B	PLUMBING ROOF PLAN - PART B
P103C	PLUMBING ROOF PLAN - PART C
P103D	PLUMBING ROOF PLAN - PART D
P103E	PLUMBING ROOF PLAN - PART E
P103F	PLUMBING ROOF PLAN - PART F
P400	PLUMBING ENLARGED VIEWS - KITCHEN
P401	PLUMBING ENLARGED VIEWS
P402	PLUMBING ENLARGED VIEWS
P403	PLUMBING ENLARGED VIEWS
P404	PLUMBING ENLARGED VIEWS
P405	PLUMBING ENLARGED VIEWS
P500	PLUMBING DETAILS
P501	PLUMBING DETAILS
P600	PLUMBING SCHEDULES AND DIAGRAMS
P601	PLUMBING SCHEDULES AND DIAGRAMS
[50] MECHANICAL	
MEPD000	MEP DEMOLITION ABBREVIATIONS, NOTES, AND SYMBOLS
MEPD001	MEP DEMO PLAN - VIEW
M0.00	MECHANICAL ABBREVIATIONS, NOTES AND SYMBOLS
M001	OVERALL MECHANICAL FIRST FLOOR PLAN
M101A	MECHANICAL FIRST FLOOR PLAN - PART A
M101B	MECHANICAL FIRST FLOOR PLAN - PART B
M101C	MECHANICAL FIRST FLOOR PLAN - PART C
M101D	MECHANICAL FIRST FLOOR PLAN - PART D
M101E	MECHANICAL FIRST FLOOR PLAN - PART E
M101F	MECHANICAL FIRST FLOOR PLAN - PART F
M002	OVERALL MECHANICAL SECOND FLOOR PLAN
M102A	MECHANICAL SECOND FLOOR PLAN - PART A
M102B	MECHANICAL SECOND FLOOR PLAN - PART B
M102C	MECHANICAL SECOND FLOOR PLAN - PART C
M102D	MECHANICAL SECOND FLOOR PLAN - PART D
M102E	MECHANICAL SECOND FLOOR PLAN - PART E
M003	OVERALL MECHANICAL ROOF PLAN
M103A	MECHANICAL ROOF PLAN - PART A
M103B	MECHANICAL ROOF PLAN - PART B
M103C	MECHANICAL ROOF PLAN - PART C
M103D	MECHANICAL ROOF PLAN - PART D
M103E	MECHANICAL ROOF PLAN - PART E
M103F	MECHANICAL ROOF PLAN - PART F
MP101A	MECHANICAL PIPING FIRST FLOOR PLAN - PART A
MP101B	MECHANICAL PIPING FIRST FLOOR PLAN - PART B
MP101C	MECHANICAL PIPING FIRST FLOOR PLAN - PART C
MP101D	MECHANICAL PIPING FIRST FLOOR PLAN - PART D
MP101E	MECHANICAL PIPING FIRST FLOOR PLAN - PART E
MP101F	MECHANICAL PIPING FIRST FLOOR PLAN - PART F
MP102A	MECHANICAL PIPING SECOND FLOOR PLAN - PART A
MP102B	MECHANICAL PIPING SECOND FLOOR PLAN - PART B
MP102C	MECHANICAL PIPING SECOND FLOOR PLAN - PART C
MP102D	MECHANICAL PIPING SECOND FLOOR PLAN - PART D
MP102E	MECHANICAL PIPING SECOND FLOOR PLAN - PART E
M500	MECHANICAL DETAILS
M501	MECHANICAL DETAILS
M502	MECHANICAL DETAILS
M503	MECHANICAL DETAILS
M504	MECHANICAL DETAILS
M505	MECHANICAL DETAILS
M600	MECHANICAL SCHEDULES
M601	MECHANICAL SCHEDULES
M602	MECHANICAL SCHEDULES
M700	MECHANICAL CONTROLS DIAGRAMS
M701	MECHANICAL CONTROLS DIAGRAMS
[70] ELECTRICAL	
E000	ELECTRICAL ABBREVIATIONS, NOTES AND SYMBOLS
EL001	ELECTRICAL LIGHTING FIRST FLOOR OVERALL PLAN
EL101A	ELECTRICAL LIGHTING FIRST FLOOR PLAN - PART A
EL101B	ELECTRICAL LIGHTING FIRST FLOOR PLAN - PART B
EL101C	ELECTRICAL LIGHTING FIRST FLOOR PLAN - PART C
EL101D	ELECTRICAL LIGHTING FIRST FLOOR PLAN - PART D
EL101E	ELECTRICAL LIGHTING FIRST FLOOR PLAN - PART E
EL101F	ELECTRICAL LIGHTING FIRST FLOOR PLAN - PART F
EL002	ELECTRICAL LIGHTING SECOND FLOOR OVERALL PLAN
EL102A	ELECTRICAL LIGHTING SECOND FLOOR PLAN - PART A
EL102B	ELECTRICAL LIGHTING SECOND FLOOR PLAN - PART B
EL102C	ELECTRICAL LIGHTING SECOND FLOOR PLAN - PART C
EL102D	ELECTRICAL LIGHTING SECOND FLOOR PLAN - PART D
EL102E	ELECTRICAL LIGHTING SECOND FLOOR PLAN - PART E
EP001	ELECTRICAL POWER FIRST FLOOR OVERALL PLAN
EP101A	ELECTRICAL POWER FIRST FLOOR PLAN - PART A
EP101B	ELECTRICAL POWER FIRST FLOOR PLAN - PART B
EP101C	ELECTRICAL POWER FIRST FLOOR PLAN - PART C
EP101D	ELECTRICAL POWER FIRST FLOOR PLAN - PART D
EP101E	ELECTRICAL POWER FIRST FLOOR PLAN - PART E
EP101F	ELECTRICAL POWER FIRST FLOOR PLAN - PART F
EP002	ELECTRICAL POWER SECOND FLOOR OVERALL PLAN
EP102A	ELECTRICAL POWER SECOND FLOOR PLAN - PART A
EP102B	ELECTRICAL POWER SECOND FLOOR PLAN - PART B
EP102C	ELECTRICAL POWER SECOND FLOOR PLAN - PART C
EP102D	ELECTRICAL POWER SECOND FLOOR PLAN - PART D
EP102E	ELECTRICAL POWER SECOND FLOOR PLAN - PART E
EP003	ELECTRICAL POWER ROOF OVERALL PLAN
EP103A	ELECTRICAL POWER ROOF PLAN - PART A
EP103B	ELECTRICAL POWER ROOF PLAN - PART B
EP103C	ELECTRICAL POWER ROOF PLAN - PART C
EP103D	ELECTRICAL POWER ROOF PLAN - PART D
EP103E	ELECTRICAL POWER ROOF PLAN - PART E
EP103F	ELECTRICAL POWER ROOF PLAN - PART F
E400	ELECTRICAL ENLARGED PLANS - KITCHEN
E401	ELECTRICAL ENLARGED PLANS - AUDITORIUM
E402	ELECTRICAL ENLARGED PLANS - ELEVATORS
E500	ELECTRICAL DETAILS
E501	ELECTRICAL DETAILS
E502	ELECTRICAL DETAILS
E503	ELECTRICAL DETAILS
E504	ELECTRICAL DETAILS
E600	ELECTRICAL SCHEDULES AND DIAGRAMS
E601	ELECTRICAL SCHEDULES AND DIAGRAMS
E602	ELECTRICAL PANEL SCHEDULES
E603	ELECTRICAL PANEL SCHEDULES
E604	ELECTRICAL PANEL SCHEDULES
E605	ELECTRICAL PANEL SCHE

ABBREVIATIONS

@	AT
A.B.	ANCHOR BOLT
A.C	AIR CONDITIONING
ACOUST	ACOUSTICAL
AC.T.	ACOUSTIC TILE
ACT	ACTUAL
ACP	ACOUSTIC CEILING PANEL
A.D.	AREA DRAIN
ADDL	ADDITIONAL
ADJ	ADJUSTABLE / ADJUST
A.F.F.	ABOVE FINISHED FLOOR
AGGR	AGGREGATE
A.H.U.	AIR HANDLING UNIT
ALT	ALTERNATE
ALUM	ALUMINUM
ANOD	ANODIZED
APPROX	APPROXIMATE
ARCH	ARCHITECTURAL
ASPH	ASPHALT
A.T.	ASPHALT TILE
L	ANGLE
B.C.	BRICK COURSE
BC	BOTTOM OF CURB
BD	BOARD
B.E.J.	BRICK (BLOCK) EXPANSION JOINT
B.F.	BOTTOM OF FOOTING
BITUM	BITUMINOUS
BLDG	BUILDING
BLK	BLOCK
BLKG	BLOCKING
BM	BEAM
B.M.	BENCH MARK
BOT	BOTTOM
B.P.	BOTTOM OF POCKET
B.P.L.	BEARING PLATE / BASE PLATE
BRK	BRICK
B.S.	BOTH SIDES
B.U.R.	BUILT-UP ROOFING
BW	BOTTOM OF WALL
B.W.W.	BOTH WAYS WALL
CAB	CABINET
C.B.	CATCH BASIN
CEM	CEMENT
CER	CERAMIC
C.F.M.F.	COLD FORMED METAL FRAMING
C.H.	CABINET HEATER
CHBD	CHALKBOARD
C.I.	CAST IRON
C.J.	CONTROL JOINT
C.G. HT.	CEILING HEIGHT
CLO	CLOSET
CLR	CLEAR
CLRM	CLASSROOM
C.M.U.	CONCRETE MASONRY UNIT
CMP	COMPOSITE METAL PANEL
CNTR	COUNTER
C.O.	CLEAN OUT
COL	COLUMN
COMP	COMPACTED / COMPOSITION
CONC	CONCRETE
CONF	CONFERENCE
CONN	CONNECTION
CONST	CONSTRUCTION
CONT	CONTINUOUS
C.J.J.	CONTRACT JOINT LINE
CONTR	CONTRACTOR
CONV	CONNECTOR
COORD	COORDINATE
CORR	CORRIDOR
C.P.	CONTROL PANEL
CPT	CARPET
C.R.	CEILING REGISTER
C.T.	CERAMIC TILE
CTR	CENTER
C.U.H.	CABINET UNIT HEATER
C.Y.	CUBIC YARD
DBL	DOUBLE
DEPT	DEPARTMENT
DET	DETAIL
D.F.	DRINKING FOUNTAIN
DIA	DIAMETER
DIM	DIMENSION
DISP	DISPENSER
DIV	DIVISION
D.L.	DEAD LOAD
DN	DOWN
D.O.	DOOR OPENING
DR	DOOR
DS	DOWNSPOUT
D.S.P.	DRY STAND PIPE
DWG	DRAWING
DWL	DOWEL
E	EAST
EA	EACH
E.B.F.	EXISTING BOTTOM OF FOOTING
E.C.	EXPOSED CONSTRUCTION
E.I.F.S.	EXTERIOR INSULATION & FINISH SYSTEM
E.J.	EXPANSION JOINT
E.J.C.	EXPANSION JOINT COVER
EL	ELEVATION
ELEC	ELECTRICAL
ELEV	ELEVATOR
EMER	EMERGENCY
ENCL	ENCLOSURE
ENGR	ENGINEER
E.P.	ELECTRICAL PANEL
EQ	EQUAL
EQUIP	EQUIPMENT
E.W.	EACH WAY
E.W.C.	ELECTRIC WATER COOLER
EXH	EXHAUST
EXIST	EXISTING
EXP	EXPANSION
EXPD	EXPANDED
EXPO	EXPOSED
EXT	EXTERIOR
F.A.	FIRE ALARM
F.A.P.	FIRE ALARM PANEL
F.B.	FOOTING BREAK
F.BRK	FACE BRICK
FCP	FIBER CEMENT PANEL
F.D.	FLOOR DRAIN
FDN	FOUNDATION
F.E.	FIRE EXTINGUISHER
F.E.C.	FIRE EXTINGUISHER CABINET (WITH EXTINGUISHER PROVIDED)
F.F.	FACTORY FINISH
F.H.	FIRE HYDRANT
F.H.C.	FIRE HOSE CABINET
FIN	FINISH
FN FL	FINISHED FLOOR
FXT	FIXTURE
FL	FLOOR
FLASH	FLASHING
FLEX	FLEXIBLE
FLUOR	FLUORESCENT
F.O.C.	FACE OF CONCRETE
F.O.F.	FACE OF FINISH
F.O.G.	FACE OF GYPSUM BOARD
F.O.M.	FACE OF MASONRY
F.O.S.	FACE OF STUD
FPD	FLAT PANEL DISPLAY
FPFG	FIREPROOFING
F.R.	FIRE RATED
F.R.T	FIRE RETARDANT TREATED
F.S.	FULL SIZE
FT	FOOT OR FEET
F.T.R.	FINNED TUBE RADIATION
FUR	FURRING
FUT	FUTURE
F.W.C.	FABRIC WALL COVERING
GA	GAUGE
GALV	GALVANIZED
G.B.	GRAB BAR
G.C.	GENERAL CONTRACTOR
GL	GLASS
GLZ	GLAZE
GND	GROUND
GRD	GRADE
GWB	GYPSUM WALL BOARD
GYP BD	GYPSUM BOARD / GYPSUM BOARD UNIT
H.B.	HOSE BIBB
HC	HANDICAPPED
H.C.	HOLLOW CORE
HD	HEAD
H.P.	HIGH POINT
HWD	HARDWOOD
HDW	HARDWARE
H.M.	HOLLOW METAL
HOR	HORIZONTAL
HTG	HEATING
HT	HEIGHT
HYD	HYDRANT
H&V	HEATING AND VENTILATING
H.U.	HEATING UNIT
I.D.	INSIDE DIAMETER
I.F.	INSIDE FACE
INCAND	INCANDESCENT
INCL	INCLUDE
INSUL	INSULATION
INT	INTERIOR
INV	INVERT
I.P.S.	IRON PIPE SIZE
JAN	JANITOR
JST	JOIST
JT	JOINT
K	KITCHEN
LAM	LAMINATED
LAV	LAVATORY
LCKR	LOCKER
L.F.	LINEAR FOOT
L.L.	LIVE LOAD
L.P.	LOW POINT
LT	LIGHT
MAS	MASONRY
MATL	MATERIAL
MAX	MAXIMUM
M.C.	MASONRY COURSE
MECH	MECHANICAL
MEMB	MEMBRANE
MET	METAL
MET.P.	METAL TOILET PARTITION
MEZZ	MEZZANINE
MFR	MANUFACTURER
MH	MANHOLE
MIN	MINIMUM
MIR	MIRROR
MISC	MISCELLANEOUS
M.O.	MASONRY OPENING
MTD	MOUNTED
M.U.	MASONRY UNIT
MULL	MULLION
N	NORTH
N.I.C.	NOT IN CONTRACT
NO.	NUMBER
NOM	NOMINAL
N.R.C.	NOISE REDUCTION COEFFICIENT
N.T.S.	NOT TO SCALE
O/A	OUTSIDE AIR
O.C.	ON CENTER
O.D.	OUTSIDE DIAMETER
O.F.	OUTSIDE FACE
OFF	OFFICE
OH	OVERHEAD
OPNG	OPENING
OPP	OPPOSITE
O.H.	OPPOSITE HAND
OZ	OUNCE
PART	PARTITION
PL	PLATE
P.LAM	PLASTIC LAMINATE
P.S	PLASTER
PLYWD	PLYWOOD
PR	PAIR
PREFAB	PREFABRICATED
PROJ	PROJECTION
PROP	PROPERTY
PTD	PAINTED
P.T.D.	PAPER TOWEL DISPENSER
Q.T.	QUARRY TILE
R	RISER (RADIUS)
RA	RETURN AIR
RAD	RADIATION
R.B.	RESILIENT BASE
R.D.	ROOF DRAIN
RECPT	RECEPTACLE
REF	REFERENCE
REFL	REFLECTED / REFLECTIVE
REFR	REFRIGERATOR
REG	REGISTER
REINF	REINFORCING
REQ'D	REQUIRED
RES	RESILIENT
RET	RETAINING
REV	REVISION
RM	ROOM
R.O.	ROUGH OPENING
R.O.W.	RIGHT OF WAY
R.T.	RUBBER TILE
RV	ROOF VENT
R.W.L.	RAIN WATER LEADER
S	SOUTH
S.C.	SOLID CORE
S.C.D.	SEAT COVER DISPENSER
SCHED	SCHEDULE
S.D.	SOAP DISPENSER
SEC	SECTION
S.F.	SQUARE FOOT
SFRM	SPRAY APPLIED FIRE-RESISTIVE MATERIAL
S.G.F.T.	STRUCTURAL GLAZED FACING TILE
SH	SHELF
SHR	SHOWER
SHT	SHEET
SIM	SIMILAR
S.N.D.	SANITARY NAPKIN DISPENSER
S.N.R.	SANITARY NAPKIN RECEPTACLE
SPEC	SPECIFICATIONS
SPKLR	SPRINKLER
S.P.R.	SINGLE PLY ROOF
SQ	SQUARE
S.S	SOLID SURFACE
S.SK.	SERVICE SINK
S.STL.	STAINLESS STEEL
STA	STATION
STD	STANDARD
ST. FT.	STEP FOOTING
STIFF	STIFFENERS
STL	STEEL
STOR	STORAGE
S. TR.	SOUND TRANSMISSION
STRUCT	STRUCTURAL
SURF	SURFACE
SUSP	SUSPENDED
SYM	SYMMETRICAL
T	TREAD
T & B	TOP AND BOTTOM
TB	TACKBOARD
T.B.	TOWEL BAR
T.C.	TOP OF CURB
TEL	TELEPHONE
TEMP	TEMPERED
TERR	TERRAZZO
T.F.	TOP OF FOUNDATION
T. & G.	TONGUE AND GROOVE
THK	THICK
THRES	THRESHOLD
TIP	TOP OF PAVEMENT
T.P.D.	TOILET PAPER DISPENSER
TPR	TOP OF PIER
TS	TOP OF SLAB
TSH	TOP OF SHELF
TSTL	TOP OF STEEL
T.W.	TOP OF WALL
TYP	TYPICAL
U.H.	UNIT HEATER
U.L.	UNDERWRITERS'S LABORATORY
UNFIN	UNFINISHED
U.N.O.	UNLESS NOTED OTHERWISE
UR	URINAL
U.V.	UNIT VENTILATOR
V.B.	VINYL BASE
V.C.T.	VINYL COMPOSITION TILE
VERT	VERTICAL
VEST	VESTIBULE
V.F.	VINYL FABRIC
V.G.	VERTICAL GRAIN
V.I.F.	VERIFY IN FIELD
VOL	VOLUME
V.W.C.	VINYL WALL COVERING
W	WEST
W	WITH
W.C.	WATER CLOSET
WD	WOOD
WND	WINDOW
W/O	WITHOUT
WP	WATERPROOF
W.P.T.	WORKING POINT
W.S.	WALL SLEEVE
WSCT	WAINSCOT
WT	WEIGHT
WWF	WELDED WIRE FABRIC

GRAPHIC LEGEND

EARTHWORK
- EARTH
- POROUS FILL / GRAVEL

STONE
- NATURAL STONE

CONCRETE
- CAST IN PLACE CONCRETE
- CAST STONE
- ARCHITECTURAL PRECAST CONCRETE

MASONRY
- BRICK
- GLAZED BRICK / S.G.F.T.
- CONCRETE MASONRY UNIT
- GLAZED CONCRETE MASONRY UNIT
- MANUFACTURED STONE MASONRY UNIT
- MORTAR / GROUT
- SAND / PLASTER

METAL
- STEEL
- ALUMINUM

WOOD
- ROUGH LUMBER (CONTINUOUS)
- ROUGH LUMBER (INTERMITTENT)
- FINISH WOOD
- PLYWOOD
- PARTICLE BOARD / MDF

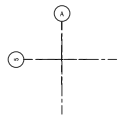
INSULATION
- RIGID INSULATION
- SEMI-RIGID INSULATION
- SPRAY FOAM INSULATION
- BLANKET INSULATION
- FIRE SAFING

MISCELLANEOUS
- GYPSUM BOARD
- ACOUSTIC TILE
- SOLID SURFACE

WALL DESIGNATION
- NEW
- EXISTING
- EXISTING TO BE REMOVED

DOOR DESIGNATION
- NEW
- EXISTING
- EXISTING TO BE REMOVED

GRID LINES AND HEADS



DETAIL / DRAWING TITLE



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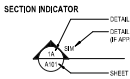

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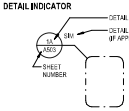

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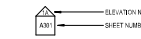

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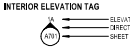
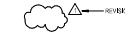


ROOM TAG



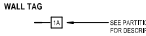
REVISION INDICATOR



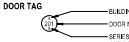
CEILING HEIGHT TAG



WALL TAG



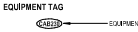
DOOR TAG



WINDOW / LOUVER / STOREFRONT / CURTAIN WALL TAG



EQUIPMENT TAG



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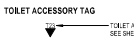
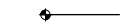


ELEVATION DATUM MARK



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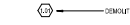

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Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

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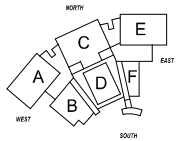

KEYPLAN

Number	Date	Issued For
	05/03/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

GENERAL INFORMATION

Date 07/08/2024
Scale 12" = 1'-0"
Proj. Number 22367.00

Drawing Number **GI02.1**

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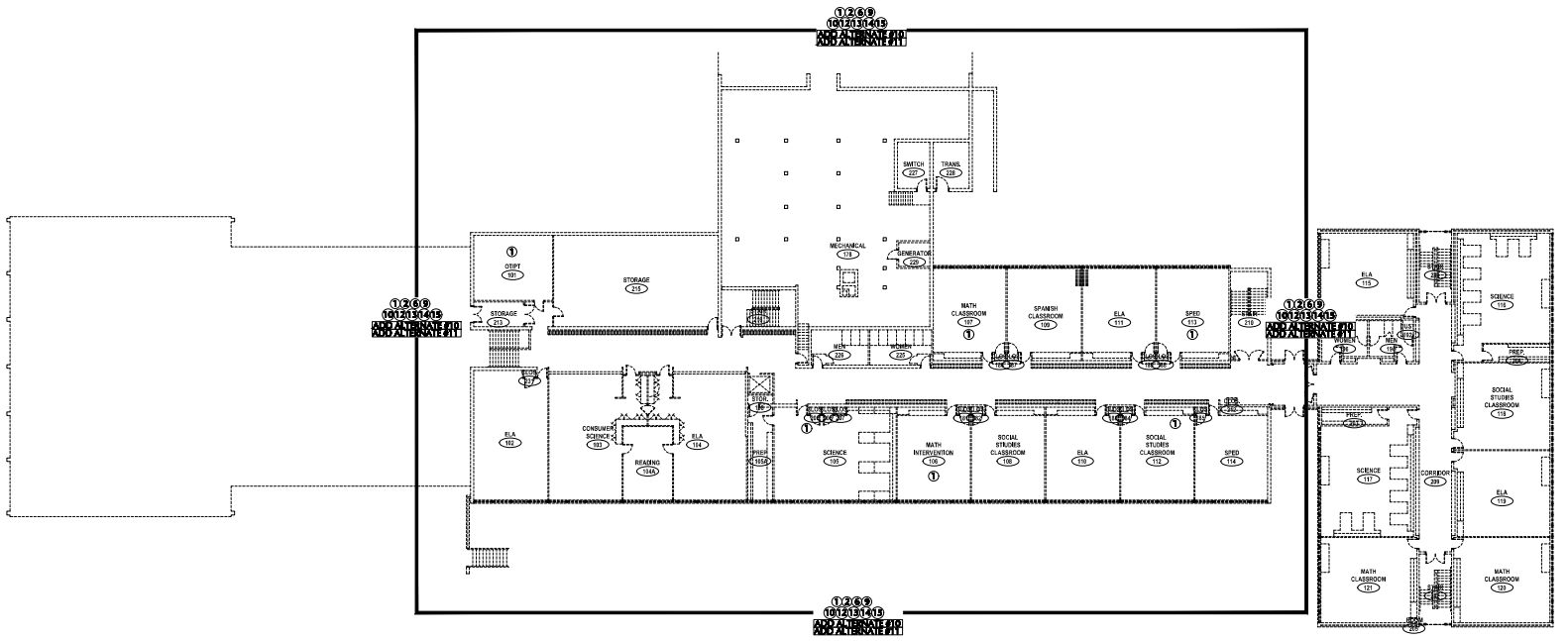

HAZARDOUS BUILDING MATERIALS ABATEMENT PLAN - FIRST FLOOR

GENERAL NOTES:

1. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR IS RESPONSIBLE FOR THE VERIFICATION OF ALL EXISTING CONDITIONS, QUANTITIES, AND FOR NOTIFYING THE CONSULTANT OF ANY DISCREPANCIES PRIOR TO THE BIDDING BID.
2. ABATEMENT AND REMEDIATION IN ALL AREAS WILL START WITH SELECTIVE DEMOLITION AND REMOVING MATERIALS AT THE CEILING LEVEL AND END WITH THE MATERIALS AT THE FLOORING LEVEL. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR WILL COORDINATE AND PERFORM SHOULD SELECTIVE DEMOLITION/DEMOLITION TO IDENTIFY, LOCATE AND ACCESS ALL MATERIALS TO BE REMOVED/ABATED/REMEDIATED. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL OPEN UP WALLS, AND CEILINGS TO CHECK FOR HIDDEN PIPING, DUCT, ETC. AS WELL AS DEMOLISHING MILLWORK, CABINETRY, ALL NONMOVEABLE OBJECTS, LAYERS) OF FLOORING, WALLS, MATERIALS ATTACHED TO WALLS, ETC. TO LOCATE KNOWN AND POTENTIAL ASBESTOS AND ASSUMED PCB CONTAINING MATERIALS. INTERIOR AND EXTERIOR SELECTIVE DEMOLITION/DEMOLITION AND PROBING MUST OCCUR THROUGHOUT THE WORK AREAS BEFORE CONTAINMENT CONSTRUCTION AND ABATEMENT CAN START. ASSUME THE ABATEMENT WORK WILL INCLUDE FULL CONTAINMENTS THROUGHOUT THE ENTIRE INTERIOR OF THE 1957 ORIGINAL BUILDING. EXTERIOR ABATEMENT/REMEDIATION WILL BE EITHER PERFORMED IN CONTAINMENT (INTERIOR) OR THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR WILL INSTALL POLYETHYLENE SHEETING ON THE INTERIOR OF THE BUILDING AND REMOVE MATERIALS FROM THE EXTERIOR. ALL GROUND SURFACES MUST ALSO BE PROTECTED WITH PLYWOOD AND TWO LAYERS OF 10MIL REINFORCED POLYETHYLENE SHEETING. THE GROUND PROTECTION MUST EXTEND AT LEAST 20 FEET AWAY FROM THE BUILDING FOUNDATION (OR FARTHER - ENOUGH TO PREVENT BUILDING MATERIALS FROM TOUCHING UNPROTECTED GROUND AND FLOOR SURFACES). THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR WILL PAY FOR ALL CONTAMINATION/REMEDIATION/ABATEMENT OF INTERIOR AND EXTERIOR SURFACES, INCLUDING GROUND SURFACES IF LANGAN DEEMS THEY HAVE CONTAMINATED THESE SURFACES. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR WILL SUPPLY, IF ITS SCAFFOLDING, STAGING, ETC. TO LANGAN IN AREAS OF REMEDIATION/ABATEMENT UNTIL ALL VISUAL INSPECTIONS HAVE PASSED. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR WILL PROVIDE TEMPORARY SHORING IN AREAS THAT REQUIRE IT.
3. MATERIALS FOUND TO CONTAIN LESS THAN ONE PERCENT ASBESTOS AND DISTURBANCE OR REMOVAL OF THESE MATERIALS IS PART OF THE BASE BID WORK, THESE MATERIALS MUST BE REMOVED USING PROPER ENGINEERING CONTROLS TO PREVENT AIRBORNE DUST AND BE PROPERLY DISPOSED OF.
4. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR/DEMOLITION CONTRACTOR SHALL ONLY USE HEAVY EQUIPMENT OPERATORS THAT HAVE PROPER ASBESTOS AND/OR HAZWOPER TRAINING WHEN DISTURBING/REMOVING/MOVING AND LOADING ASBESTOS, LEAD, AND PCB CONTAINING MATERIALS. ACCEPTABLE TRAINING FOR ASBESTOS CAN BE 32 OR 40 HOUR ASBESTOS WORKER/SUPERVISOR WITH ANNUAL REFRESHER TRAINING, 40 HOUR HAZWOPER TRAINING AND ANNUAL REFRESHER TRAINING IS REQUIRED FOR OPERATORS HANDLING LEAD AND/OR FOR CONTAINING/CONTAMINATED MATERIALS. ALL OPERATORS MUST ALSO HAVE CURRENT MEDICAL, FIT TEST DATA, AND VISEAR RESPIRATORS DURING WORK. ALL CONTRACTORS MUST COMPLY WITH ALL APPLICABLE OSHA LEAD REGULATIONS AND THE WORK (AND ALL CORRESPONDING OSHA REGULATION COMPLIANCE) IS INCLUDED IN THE BASE BID.
5. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR, THEIR SUBCONTRACTORS, WASTE TRANSPORTERS MUST SUBMIT LANDFILL INFORMATION TO LANGAN AND THE OWNER PRIOR TO THE SHIPMENT OF ANY WASTE. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTORS/HAULER(S) CANNOT SHIP WASTE UNTIL LANGAN AND THE OWNER HAVE APPROVED THE LANDFILL THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR/HAULER HAS PROPOSED TO USE. UNTIL THE LANDFILL HAS BEEN APPROVED BY LANGAN AND THE OWNER, THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR CANNOT SHIP ANY WASTE TO ANY LANDFILL NOT APPROVED BY LANGAN AND THE OWNER. WHEN LANGAN PASSES THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR'S WASTE PAPERWORK AND THE RESULTS MADE AVAILABLE TO LANGAN AND THE OWNER PRIOR TO WASTE SHIPMENT, LANGAN MAY PERFORM ADDITIONAL TCLP SAMPLING TO CONFIRM THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR'S RESULTS. LANGAN WILL PERFORM THE LEAD TCLP SAMPLING FOR CLASSIFICATION OF THE DEMOLITION AND ABATEMENT WASTE. PLEASE SEE THE ASBESTOS, PCB, AND LEAD-BASED PAINT SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS AND CONTRACTORS LIABILITY.
6. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR, THEIR SUBCONTRACTORS, WASTE TRANSPORTERS AND/OR LANDFILL(S) DO NOT HAVE PERMISSION TO TAKE/ANALYZE BUILDING MATERIALS FOR PCB CONTENT CONCENTRATIONS WITHOUT WRITTEN PERMISSION FROM THE BUILDING OWNER PRIOR TO SUCH SAMPLING. SHOULD THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR OR OTHER PARTIES LISTED ABOVE TAKE/ANALYZE PCB SAMPLES WITHOUT THE OWNER'S PERMISSION AND PCBS ARE FOUND TO BE >1 PPM, THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR WILL BE RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH THE ABATEMENT/REMEDIATION/REPLACEMENT OF ALL THE INTERIOR/EXTERIOR BUILDING MATERIALS AND ADJACENT SURFACES, INCLUDING SCHEDULING/LOGISTICS/ETC, AS WELL AS ALL COSTS ASSOCIATED WITH PROJECT DELAYS, ATTORNEY FEES FOR ALL PARTIES AFFECTED AND ALL COSTS RESULTING FROM CT DEEP/EPA REQUIREMENTS THAT MAY OCCUR AS A RESULT.
7. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR WILL BE RESPONSIBLE FOR HIRING AN ENGINEER AND OTHER APPROPRIATE PERSONNEL TO ENSURE THAT ALL REQUIRED SELECTIVE DEMOLITION AND DEMOLITION ACTIVITIES ARE SAFE TO PERFORM FOR ALL PERSONNEL ON SITE. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR(S) WILL BE FINANCIALLY RESPONSIBLE FOR ANY DAMAGE THAT MAY OCCUR TO THE SITE, ON-SITE PERSONNEL, FINES, PENALTIES, ETC. THEY WILL ALSO BE RESPONSIBLE FOR PAYING/REIMBURSING ALL LEGAL FEES/COSTS FOR ALL PARTIES INVOLVED WITH THE PROJECT SHOULD SELECTIVE DEMOLITION OR DEMOLITION ACTIVITIES CAUSE INJURY OR DEATH TO ANY PERSONS ON SITE.
8. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR IS RESPONSIBLE FOR PROVIDING TEMPORARY WATER, POWER, AND HEAT AS NEEDED AT THE SITE (24 HOURS A DAY). TEMPORARY LIGHTING WITHIN THE WORK AREAS MUST BE CONNECTED TO GROUND FAULT CIRCUIT INTERRUPTER (GFCI) POWER PANELS INSTALLED BY A STATE OF CONNECTICUT LICENSED ELECTRICIAN AND LOCATED OUTSIDE OF THE WORK AREAS. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL BE RESPONSIBLE FOR PAYING FOR THE USE OF POWER AND WATER UNLESS THE OWNER AGREES IN WRITING TO PAY FOR THESE UTILITIES. IT SHALL ALSO BE THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR'S RESPONSIBILITY TO PROVIDE ALL FIXED AND TEMPORARY CONNECTIONS AND HOOKUPS AS WELL AS OBTAINING PERMITS AND PAYING ALL FEES FOR MAKING SUCH SERVICES AVAILABLE FOR HIS WORK AS IS NECESSARY. ALL POWER AND WATER MUST BE SUPPLIED 24 HOURS A DAY THROUGHOUT THE ABATEMENT PROJECT. CT DPH WILL BE NOTIFIED IMMEDIATELY IF ACTIVE CONTAINMENTS DO NOT HAVE SUFFICIENT NEGATIVE PRESSURE THROUGHOUT THE ABATEMENT PROCESS UNLESS ALTERNATE NEGOTIATED RECOVERY ARRANGEMENTS ARE REACHED. THE USE OF PORTABLE GENERATORS IS NOT TO TAKE PLACE 7 DAYS A WEEK, 24 HOURS A DAY. ALL ASBESTOS REMOVAL IN FLOW/MANEUVERING AREAS OF THE BUILDING MUST BE DONE DURING NON-OCCUPIED HOURS. ALL ASBESTOS REMOVAL MUST BE COMPLETED BY UNTIL THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR HAS PASSED THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR WILL PAY THE OWNER A $250 PENALTY SHOULD THE POWER BE FOUND TO NOT BE RUNNING THE NEGATIVE AIR MACHINES IN ACTIVE ABATEMENT CONTAINMENTS. THE PENALTY WILL APPLY DAILY AND THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR IS ALSO RESPONSIBLE FOR PAYING ALL CT DPH FINES THAT MAY BE IMPOSED ON THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR AND OWNER.
9. THE WORK IN THE TUNNEL/CRAWLSPACE/MECHANICAL DUCT SPACES IS NOT SHOWN ON DRAWINGS, VERIFY WORK PRIOR TO BID.

HAZARDOUS BUILDING MATERIALS ABATEMENT NOTES (SEE ASBESTOS ABATEMENT SPECIFICATION AND PCB >50 PPM SPECIFICATIONS FOR ADDITIONAL INFORMATION NOT INCLUDED ON DRAWINGS)

1. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS CONTAINING FLOOR TILES (MULTIPLE LAYERS OF MATERIALS) AS ACM.
2. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS CONTAINING PIPE, PIPE FITTING, PIPE HANGER AND ROOF DRAIN INSULATION AS ACM.
3. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS CONTAINING SINK UNDERCOATING AS ACM.
4. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS CONTAINING CERAMIC FLOOR AND COVE BASE MUD BED AND ADHESIVE/MASTIC AS ACM.
5. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS CONTAINING WOOD WALL PANEL ADHESIVE AS ACM.
6. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS CONTAINING BULLETIN BOARD, "CHALK" BOARD AND OTHER WALL ADHESIVES/GLUE DAUBS AS ACM.
7. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS AND ASSUMED PCB >50 PPM CONTAINING COUNTERTOP/DECK CAULKING COMPOUND MATERIALS AS ACM AND PCB BULK PRODUCT WASTE.
8. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS AND ASSUMED PCB >50 PPM CONTAINING INTERIOR WINDOW GLAZING COMPOUNDS AS ACM AND PCB BULK PRODUCT WASTE.
9. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS AND ASSUMED PCB >50 PPM CONTAINING INTERIOR/EXTERIOR WALL/WALL AND WALL/COLUMN CAULKING COMPOUNDS AS ACM AND PCB BULK PRODUCT WASTE.
10. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASSUMED PCB >50 PPM CONTAINING INTERIOR/EXTERIOR DOOR WINDOW GLAZING COMPOUNDS AS PCB BULK PRODUCT WASTE.
11. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS AND ASSUMED PCB >50 PPM CONTAINING INTERIOR/EXTERIOR DOOR/WINDOW/DOOR WINDOW/WALL/COLUMN CAULKING AND GLAZING COMPOUNDS AS ACM AND PCB BULK PRODUCT WASTE.
12. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS AND ASSUMED PCB >50 PPM CONTAINING INTERIOR/EXTERIOR VENT CAULKING COMPOUNDS AS ACM AND PCB BULK PRODUCT WASTE.
13. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS AND ASSUMED PCB >50 PPM CONTAINING INTERIOR/EXTERIOR DOORS/WINDOW/WALL/COLUMN CAULKING AND GLAZING COMPOUNDS AS ACM AND PCB BULK PRODUCT WASTE.
14. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS AND ASSUMED PCB >50 PPM CONTAINING INTERIOR/EXTERIOR WINDOW/WALL/COLUMN WINDOW WALL/DOOR CAULKING AND GLAZING COMPOUNDS AS ACM AND PCB BULK PRODUCT WASTE.
15. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS AND ASSUMED PCB >50 PPM CONTAINING EXTERIOR WALL/WALL EXPANSION AND COLUMN CAULKING COMPOUNDS AS ACM AND PCB BULK PRODUCT WASTE.
16. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS CONTAINING ROOF PENETRATION FLASHING MATERIALS AS ACM.

ADD ALTERNATE #10
THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF PCB >50 PPM CONTAINING PAINTED/PAINTED MATERIALS AS PCB BULK PRODUCT WASTE.

ADD ALTERNATE #11
THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF PCB >50 PPM CONTAINING PAINTED/PAINTED MATERIALS AS PCB CITIZEN REGULATED WASTE.

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Greenwich Central Middle School

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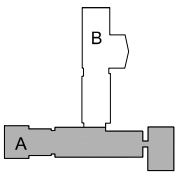
STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	09/20/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

HAZARDOUS BUILDING MATERIALS ABATEMENT PLAN - FIRST FLOOR

Date 07/08/2024
Scale No Scale
Proj. Number 22367.00

Drawing Number HBM-01

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Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_GreenwichCMS_R22_Existing Conditions.rvt

12/7/2023 10:31:51 AM

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GENERAL NOTES:

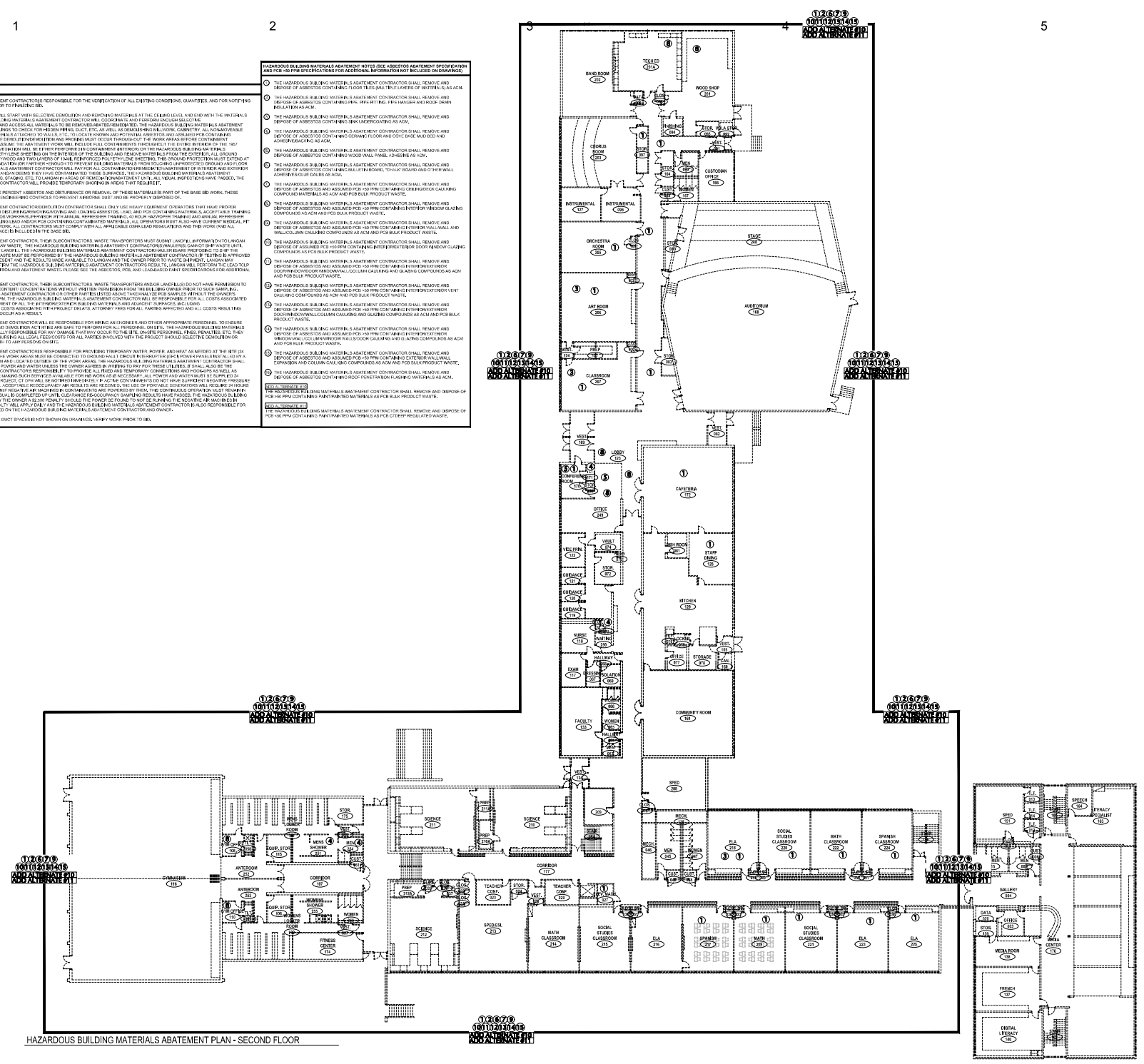
1. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR IS RESPONSIBLE FOR THE VERIFICATION OF ALL EXISTING CONDITIONS, QUANTITIES, AND FOR NOTIFYING THE CONSULTANT OF ANY DISCREPANCIES PRIOR TO FINALIZING BID.
2. ABATEMENT AND REMEDIATION IN ALL AREAS WILL START WITH SELECTIVE DEMOLITION AND REMOVING MATERIALS AT THE CEILING LEVEL AND END WITH THE MATERIALS AT THE FLOORING LEVEL. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR WILL COORDINATE AND PERFORM ENGLISH SELECTIVE DEMOLITION/DEMOLITION TO IDENTIFY/LOCATE AND ACCESS ALL MATERIALS TO BE REMOVED/ABATED/REMEDIATED. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL OPEN UP WALLS, AND CEILINGS TO CHECK FOR HIDDEN PIPING, DUCT, ETC, AS WELL AS DEMOLISHING MILLWORK, CABINETRY, ALL NONREMOVEABLE OBJECTS, LAYERS OF FLOORING, WALLS, MATERIALS ATTACHED TO WALLS, ETC., TO LOCATE KNOWN AND POTENTIAL ASBESTOS AND ASSUMED PCB CONTAINING MATERIALS. FOCUS SHALL BE ON INTERIOR SELECT AREAS. CONTRACTOR MUST PLAN AND LAYOUT CONTAINMENT BARRIERS AND ASSOCIATED EQUIPMENT TO ISOLATE WORK AREAS. THE CONTRACTOR IS RESPONSIBLE FOR ALL ASBESTOS AND PCB CONTAINING MATERIALS IN THE ORIGINAL BUILDING, EXTERIOR AREAS AND DEMOLITION. THIS IS WHETHER PRESENTED IN THE DRAWINGS OR NOT. REMOVAL OF THE HAZARDOUS BUILDING MATERIAL ABATEMENT CONTRACTOR WILL INSTALL POLYETHYLENE SHEETING ON THE INTERIOR OF THE BUILDING AND REMOVE MATERIALS FROM THE EXTERIOR, ALL GROUND SURFACES MUST ALSO BE PROTECTED WITH PLYWOOD AND TWO LAYERS OF 10MIL REINFORCED POLYETHYLENE SHEETING. THIS GROUND PROTECTION MUST EXTEND AT LEAST 20 FEET AWAY FROM THE BUILDING CONSTRUCTION OR FARTHER ENOUGH TO PREVENT BUILDING MATERIALS FROM TOUCHING UNPROTECTED GROUND AND FLOOR SURFACES. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR WILL PAY FOR ALL CONTAINMENT/REMEDIATION/ABATEMENT OF INTERIOR AND EXTERIOR SURFACES, INCLUDING GROUND SURFACES IF LANGAN DEEMS THEY HAVE CONTAMINATED THESE SURFACES. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR WILL SUPPLY LIFTS, SCAFFOLDING, STAGING, ETC, TO LANGAN IN AREAS OF REMEDIATION/ABATEMENT UNTIL ALL VISUAL INSPECTIONS HAVE PASSED, THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR WILL PROVIDE TEMPORARY SHORING IN AREAS THAT REQUIRE IT.
3. MATERIALS FOUND TO CONTAIN LESS THAN ONE PERCENT ASBESTOS AND DISTURBANCE OR REMOVAL OF THESE MATERIALS IS PART OF THE BASE BID WORK. THESE MATERIALS MUST BE REMOVED USING PROPER ENGINEERING CONTROLS TO PREVENT AIRBORNE DUST AND BE PROPERLY DISPOSED OF.
4. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR/DEMOLITION CONTRACTOR SHALL ONLY USE HEAVY EQUIPMENT OPERATORS THAT HAVE PROPER ASBESTOS AND/OR HAZWOPER TRAINING WHEN DISTURBING/REMOVING/HOISTING AND LOADING ASBESTOS, LEAD, AND PCB CONTAINING MATERIALS. ACCEPTABLE TRAINING FOR ASBESTOS CAN BE 32 OR 40 HOUR ASBESTOS WORKER/SUPERVISOR WITH ANNUAL REFRESHER TRAINING, 40 HOUR HAZWOPER TRAINING AND ANNUAL REFRESHER TRAINING IS REQUIRED FOR OPERATORS HANDLING LEAD AND/OR PCB CONTAINING/CONTAMINATED MATERIALS. ALL OPERATORS MUST ALSO HAVE CURRENT MEDICAL, FIT TEST DATA, AND WEAR RESPIRATORS DURING WORK. ALL CONTRACTORS MUST COMPLY WITH ALL APPLICABLE OSHA LEAD REGULATIONS AND THIS WORK AND ALL CORRESPONDING OSHA REGULATION COMPLIANCE IS INCLUDED IN THE BASE BID.
5. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR, THEIR SUBCONTRACTORS, WASTE TRANSPORTERS MUST SUBMIT LANDFILL INFORMATION TO LANGAN AND THE OWNER PRIOR TO THE SHIPMENT OF ANY WASTE. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR(S)/HAULER(S) CANNOT SHIP WASTE UNTIL LANGAN AND THE OWNER HAVE APPROVED THE LANDFILL. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR/HAULER/S ARE PROPOSING TO SHIP THE WASTE TO. ALL PCB TCLP SAMPLING OF THE WASTE MUST BE PERFORMED BY THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR (IF TESTING IS APPROVED BY LANGAN AND THE OWNER) WITH LANGAN PRESENT AND THE RESULTS MADE AVAILABLE TO LANGAN AND THE OWNER PRIOR TO WASTE SHIPMENT. LANGAN MAY PERFORM ADDITIONAL TCLP SAMPLING TO CONFIRM THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR'S RESULTS. LANGAN WILL PERFORM THE LEAD TCLP SAMPLING FOR CLASSIFICATION OF THE DEMOLITION AND ABATEMENT WASTE. PLEASE SEE THE ASBESTOS, PCB, AND LEAD-BASED PAINT SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS AND CONTRACTORS LIABILITY.
6. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR, THEIR SUBCONTRACTORS, WASTE TRANSPORTERS AND/OR LANDFILL(S) DO NOT HAVE PERMISSION TO TRANSFER, TOW OR HANDLE ANY BUILDING MATERIALS WITH PCB CONTENT CONCENTRATIONS WITHOUT WRITTEN PERMISSION FROM THE BUILDING OWNER PRIOR TO SUCH SAMPLING. SHOULD THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR COUNTER PAINTED LISTED ABOVE TASKS/VALUE PCB SAMPLES WITHOUT THE OWNERS PERMISSION AND PCB'S ARE FOUND TO BE >1 PPM, THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR WILL BE RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH THE ABATEMENT/REMEDIATION/DISPOSAL/MOVEMENT OF ALL THE INTERCONNECTED BUILDING MATERIALS AND ADJACENT SURFACES, INCLUDING SOIL/ASPHALT/CONCRETE/ETC. AS WELL AS ALL COSTS ASSOCIATED WITH PROJECT DELAYS, ATTORNEY FEES FOR ALL PARTIES AFFECTED AND ALL COSTS RESULTING FROM CT DEEP/EPA REQUIREMENTS THAT MAY OCCUR AS A RESULT.
7. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR WILL BE RESPONSIBLE FOR HIRING AN ENGINEER AND OTHER APPROPRIATE PERSONNEL TO ENSURE THAT ALL REQUIRED SELECTIVE DEMOLITION AND DEMOLITION ACTIVITIES ARE SAFE TO PERFORM FOR ALL PERSONNEL ON SITE. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR WILL BE FINANCIALLY RESPONSIBLE FOR ANY DAMAGE THAT MAY OCCUR TO THE SITE, ON-SITE PERSONNEL, FINES, PENALTIES, ETC. THEY WILL ALSO BE RESPONSIBLE FOR PAYING/REIMBURSING ALL LEGAL FEES/COSTS FOR ALL PARTIES INVOLVED WITH THE PROJECT SHOULD SELECTIVE DEMOLITION OR DEMOLITION ACTIVITIES CAUSE INJURY OR DEATH TO ANY PERSONS ON SITE.
8. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR IS RESPONSIBLE FOR PROVIDING TEMPORARY WATER, POWER, AND HEAT AS NEEDED AT THE SITE (24 HOURS A DAY). TEMPORARY LIGHTING WITHIN THE WORK AREAS MUST BE CONNECTED TO GROUND-FAULT CIRCUIT INTERRUPTER (GFCI)-POWER PANELS INSTALLED BY A STATE OF CONNECTICUT LICENSED ELECTRICIAN AND LOCATED OUTSIDE OF THE WORK AREAS. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL BE RESPONSIBLE FOR PAYING FOR THE USE OF POWER AND WATER UNLESS THE OWNER AGREES IN WRITING TO PAY FOR THESE UTILITIES. IT SHALL ALSO BE THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTORS RESPONSIBILITY TO PROVIDE ALL FIXED AND TEMPORARY CONNECTIONS AND HOOK-UPS AS WELL AS OBTAINING PERMITS AND PAYING ALL FEES FOR MAKING SUCH SERVICES AVAILABLE FOR HIS WORK AS IS NECESSARY. ALL POWER AND WATER MUST BE SUPPLIED 24 HOURS A DAY THROUGHOUT THE ABATEMENT PROJECT, CT DPH WILL BE NOTIFIED IMMEDIATELY IF ACTIVE CONTAINMENTS DO NOT HAVE SUFFICIENT NEGATIVE PRESSURE THROUGHOUT THE ABATEMENT PROCESS UNTIL ACCEPTABLE REOCCUPANCY AIR RESULTS ARE RECEIVED, THE USE OF PORTABLE GENERATORS WILL REQUIRE 24 HOURS A DAY, 7 DAYS A WEEK CONTINUOUS OPERATION IF NEGATIVE AIR MACHINES IN CONTAINMENTS ARE POWERED BY THEM. THIS CONTINUOUS OPERATION MUST REMAIN IN PLACE FROM THE TIME THE PRE-ABATEMENT VISUAL IS COMPLETED UP UNTIL CLEARANCE RE-OCCUPANCY SAMPLING RESULTS HAVE PASSED. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR WILL PAY THE OWNER A $2,500 PENALTY SHOULD THE POWER BE FOUND TO NOT BE RUNNING THE NEGATIVE AIR MACHINES IN ACTIVE ABATEMENT CONTAINMENTS. THIS PENALTY WILL APPLY DAILY AND THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR IS ALSO RESPONSIBLE FOR PAYING ALL CT DPH FINES THAT MAY BE IMPOSED ON THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR AND OWNER.
9. THE WORK IN THE TUNNEL/CRAWL/MECHANICAL DUCT SPACES IS NOT SHOWN ON DRAWINGS. VERIFY WORK PRIOR TO BID.

HAZARDOUS BUILDING MATERIALS ABATEMENT NOTES (SEE ASBESTOS ABATEMENT SPECIFICATION AND PCB >50 PPM SPECIFICATIONS FOR ADDITIONAL INFORMATION NOT INCLUDED ON DRAWINGS):

1. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS CONTAINING FLOOR TILES (MULTIPLE LAYERS OF MATERIAL S) AS ACM.
2. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS CONTAINING PIPE, PIPE FITTING, PIPE HANGER AND ROOF DRAIN INSULATION AS ACM.
3. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS CONTAINING SINK UNDERCOATING AS ACM.
4. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS CONTAINING CERAMIC FLOOR AND COVE BASE MUD BED AND ADHESIVE/BACKING AS ACM.
5. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS CONTAINING WOOD WALL PANEL ADHESIVE AS ACM.
6. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS CONTAINING BULLETIN BOARD, "CHALK" BOARD AND ETHER WALL ADHESIVES/GLUE DAUBS AS ACM.
7. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS AND ASSUMED PCB >50 PPM CONTAINING CHILINGIRON CAULKING COMPOUND MATERIALS AS ACM AND PCB BULK PRODUCT WASTE.
8. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS AND ASSUMED PCB >50 PPM CONTAINING INTERIOR WINDOW GLAZING COMPOUNDS AS ACM AND PCB BULK PRODUCT WASTE.
9. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS AND ASSUMED PCB >50 PPM CONTAINING INTERIOR WALL/WALL AND WALL/COLUMN CAULKING COMPOUNDS AS ACM AND PCB BULK PRODUCT WASTE.
10. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASSUMED PCB >50 PPM CONTAINING INTERIOR/EXTERIOR DOOR WINDOW GLAZING COMPOUNDS AS PCB BULK PRODUCT WASTE.
11. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS AND ASSUMED PCB >50 PPM CONTAINING INTERIOR/EXTERIOR DOOR/WINDOW/DOOR WINDOW/WALL/COLUMN CAULKING AND GLAZING COMPOUNDS AS ACM AND PCB BULK PRODUCT WASTE.
12. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS AND ASSUMED PCB >50 PPM CONTAINING INTERIOR/EXTERIOR VENT CAULKING COMPOUNDS AS ACM AND PCB BULK PRODUCT WASTE.
13. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS AND ASSUMED PCB >50 PPM CONTAINING INTERIOR/EXTERIOR DOOR/WINDOW/WALL/COLUMN/WINDOW WALLS/DOOR CAULKING AND GLAZING COMPOUNDS AS ACM AND PCB BULK PRODUCT WASTE.
14. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS AND ASSUMED PCB >50 PPM CONTAINING INTERIOR/EXTERIOR WINDOW/WALL/COLUMN/WINDOW WALLS/DOOR CAULKING AND GLAZING COMPOUNDS AS ACM AND PCB BULK PRODUCT WASTE.
15. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS AND ASSUMED PCB >50 PPM CONTAINING EXTERIOR WALL/WALL EXPANSION AND COLUMN CAULKING COMPOUNDS AS ACM AND PCB BULK PRODUCT WASTE.
16. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS CONTAINING ROOF PENETRATION FLASHING MATERIALS AS ACM.

ADD ALTERNATE #10
THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF PCB >50 PPM CONTAINING PAINT/PAINTED MATERIALS AS PCB BULK PRODUCT WASTE.

ADD ALTERNATE #11
THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF PCB >50 PPM CONTAINING PAINT/PAINTED MATERIALS AS PCB OTDEEP REGULATED WASTE.



HAZARDOUS BUILDING MATERIALS ABATEMENT PLAN - SECOND FLOOR

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Greenwich Central Middle School

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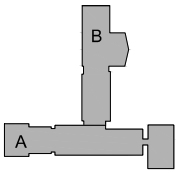
STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	09/20/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

HAZARDOUS BUILDING MATERIALS ABATEMENT PLAN - SECOND FLOOR

Date: 07/08/2024
Scale: No Scale
Proj. Number: 22367.00
Drawing Number: HBM-02

Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_GreenwichCMS_R22_Existing Conditions.rvt
12/7/2023 10:31:51 AM
Filename: N:\langan.com\data\HAdata\14\c0\95\14\Project Data\Sped\Archive Drawings\HBM-02 - HBMAP Second Floor.dwg Date: 9/20/2024 Time: 13:59 User: tgriebesch Style Table: Langan.ctb Layout: HBM-02

GENERAL NOTES:

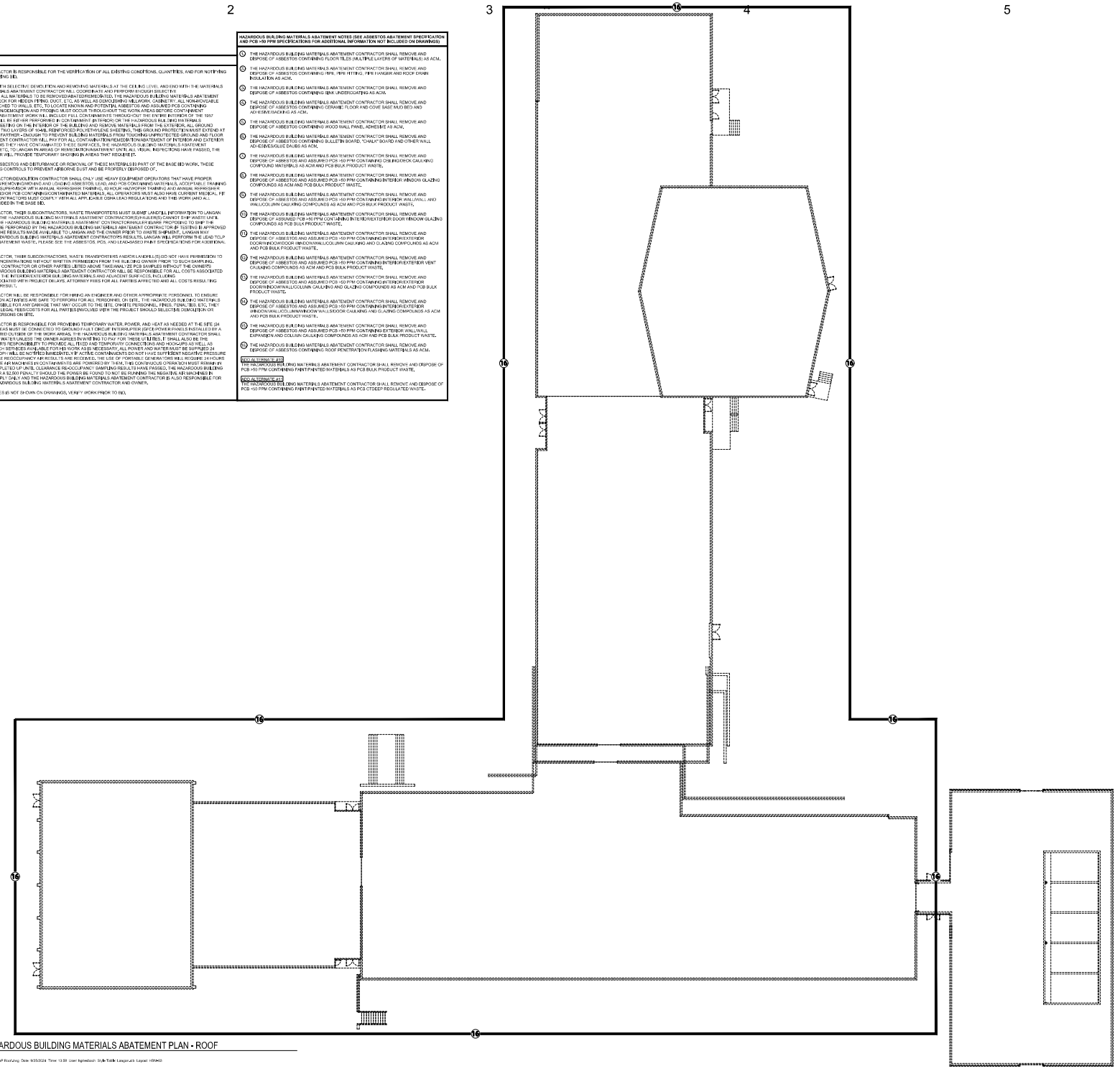
1. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR IS RESPONSIBLE FOR THE VERIFICATION OF ALL EXISTING CONDITIONS, QUANTITIES, AND FOR NOTIFYING THE CONSULTANT OF ANY DISCREPANCIES PRIOR TO FINALIZING BID.
2. ABATEMENT AND REMEDIATION IN ALL AREAS WILL START WITH SELECTIVE DEMOLITION AND REMOVING MATERIALS AT THE CEILING LEVEL AND END WITH THE MATERIALS AT THE FLOORING LEVEL. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR WILL COORDINATE AND PERFORM ENOUGH SELECTIVE DEMOLITION/DEMOLITION TO IDENTIFY/LOCATE AND ACCESS ALL MATERIALS TO BE REMOVED/ABATED/REMEDIATED. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL OPEN UP WALLS, AND CEILINGS TO CHECK FOR HIDDEN PIPING, DUCT, ETC. AS WELL AS DEMOLISHING MILLWORK, CABINETRY, ALL NON-MOVEABLE OBJECTS, LAYERS OF FLOORING, WALLS, MATERIALS ATTACHED TO WALLS, ETC, TO LOCATE KNOWN AND POTENTIAL ASBESTOS AND ASSUMED PCB CONTAINING MATERIALS. INTERIOR AND EXTERIOR SELECTIVE DEMOLITION/DEMOLITION AND PROBING MUST OCCUR THROUGHOUT THE WORK AREAS BEFORE CONTAINMENT CONSTRUCTION AND ABATEMENT CAN START. ASSUME THE ABATEMENT WORK WILL INCLUDE FULL CONTAINMENTS THROUGHOUT THE ENTIRE INTERIOR OF THE 1957 ORIGINAL BUILDING. EXTERIOR ABATEMENT/REMEDIATION WILL BE EITHER PERFORMED IN CONTAINMENT (INTERIOR) OR THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR WILL INSTALL POLYETHYLENE SHEETING ON THE INTERIOR OF THE BUILDING AND REMOVE MATERIALS FROM THE EXTERIOR. ALL GROUND SURFACES MUST ALSO BE PROTECTED WITH PLYWOOD AND TWO LAYERS OF 10-MIL REINFORCED POLYETHYLENE SHEETING. THIS GROUND PROTECTION MUST EXTEND AT LEAST 20 FEET AWAY FROM THE BUILDING FOUNDATION OR PARTNER +ENOUGH TO PREVENT BUILDING MATERIALS FROM TOUCHING UNPROTECTED GROUND AND FLOOR SURFACES. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR WILL PAY FOR ALL CONTAMINATION/REMEDIATION/ABATEMENT OF INTERIOR AND EXTERIOR SURFACES, INCLUDING GROUND SURFACES IF LANGAN DEEMS THEY HAVE CONTAMINATED THESE SURFACES. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR WILL SUPPLY BITS, SCAFFOLDING, STAGING, ETC, TO LANGAN IN AREAS OF REMEDIATION/ABATEMENT UNTIL ALL VISUAL INSPECTIONS HAVE PASSED. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR WILL PROVIDE TEMPORARY SHORING IN AREAS THAT REQUIRE IT.
3. MATERIALS FOUND TO CONTAIN LESS THAN ONE PERCENT ASBESTOS AND DISTURBANCE OR REMOVAL OF THESE MATERIALS IS PART OF THE BASE BID WORK. THESE MATERIALS MUST BE REMOVED USING PROPER ENGINEERING CONTROLS TO PREVENT AIRBORNE DUST AND BE PROPERLY DISPOSED OF.
4. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR/DEMOLITION CONTRACTOR SHALL ONLY USE HEAVY EQUIPMENT OPERATORS THAT HAVE PROPER ASBESTOS AND/OR HAZWOPER TRAINING WHEN DISTURBING/REMOVING/MOVING AND LOADING ASBESTOS, LEAD, AND PCB CONTAINING MATERIALS. ACCEPTABLE TRAINING FOR ASBESTOS CAN BE 32 OR 40 HOUR ASBESTOS WORKER/SUPERVISOR WITH ANNUAL REFRESHER TRAINING, 40 HOUR HAZWOPER TRAINING AND ANNUAL REFRESHER TRAINING IS REQUIRED FOR OPERATORS HANDLING LEAD AND/OR PCB CONTAINING/CONTAMINATED MATERIALS. ALL OPERATORS MUST ALSO HAVE CURRENT MEDICAL, FIT TEST DATA, AND WEAR RESPIRATORS DURING WORK. ALL CONTRACTORS MUST COMPLY WITH ALL APPLICABLE OSHA LEAD REGULATIONS AND THE WORK (AND ALL CORRESPONDING OSHA REGULATION COMPLIANCE) IS INCLUDED IN THE BASE BID.
5. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR, THEIR SUBCONTRACTORS, WASTE TRANSPORTERS MUST SUBMIT LANDFILL INFORMATION TO LANGAN AND THE OWNER PRIOR TO THE SHIPMENT OF ANY WASTE. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTORS/HAULERS/LEAD CANNOT SHIP WASTE UNTIL LANGAN AND THE OWNER HAVE APPROVED THE LANDFILL THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR/HAULER IS/ARE PROPOSING TO SHIP THE WASTE TO. ALL PCB TCLP SAMPLING OF THE WASTE MUST BE PERFORMED BY THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR. TESTING IS APPROVED BY LANGAN AND THE OWNER) WITH LANGAN PRESENT AND THE RESULTS MADE AVAILABLE TO LANGAN AND THE OWNER PRIOR TO WASTE SHIPMENT. LANGAN MAY PERFORM ADDITIONAL TCLP SAMPLING TO CONFIRM THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTORS RESULTS. LANGAN WILL PERFORM THE LEAD TCLP SAMPLING FOR CLASSIFICATION OF THE DEMOLITION AND ABATEMENT WASTE. PLEASE SEE THE ASBESTOS, PCS, AND LEAD-BASED PAINT SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS AND CONTRACTORS LIABILITY.
6. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR, THEIR SUBCONTRACTORS, WASTE TRANSPORTERS AND/OR LANDFILL(S) DO NOT HAVE PERMISSION TO TARE/ANALYZE BUILDING MATERIALS FOR PCB CONTENT/ CONCENTRATIONS WITHOUT WRITTEN PERMISSION FROM THE BUILDING OWNER PRIOR TO SUCH SAMPLING. SHOULD THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR OR OTHER PARTIES LISTED ABOVE TARE/ANALYZE PCB SAMPLES WITHOUT THE OWNERS PERMISSION AND PCB'S ARE FOUND TO BE > 1 PPM, THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR WILL BE RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH THE ABATEMENT/ REMEDIATION/ PLACEMENT OF ALL THE INTERIOR/EXTERIOR BUILDING MATERIALS AND ADJACENT SURFACES, INCLUDING SCALASPHALT/CONCRETE/ETC, AS WELL AS ALL COSTS ASSOCIATED WITH PROJECT DELAYS, ATTORNEY FEES FOR ALL PARTIES AFFECTED AND ALL COSTS RESULTING FROM CT DEEP/EPA REQUIREMENTS THAT MAY OCCUR AS A RESULT.
7. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR WILL BE RESPONSIBLE FOR HIRING AN ENGINEER AND OTHER APPROPRIATE PERSONNEL TO ENSURE THAT ALL REQUIRED SELECTIVE DEMOLITION AND DEMOLITION ACTIVITIES ARE SAFE TO PERFORM FOR ALL PERSONNEL ON SITE. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR(S) WILL BE FINANCIALLY RESPONSIBLE FOR ANY DAMAGE THAT MAY OCCUR TO THE SITE, OWNERS PERSONNEL, FINES, PENALTIES, ETC. THEY WILL ALSO BE RESPONSIBLE FOR PAYING/REIMBURSING ALL LEGAL FEES/COSTS FOR ALL PARTIES INVOLVED WITH THE PROJECT SHOULD SELECTIVE DEMOLITION OR DEMOLITION ACTIVITIES CAUSE INJURY OR DEATH TO ANY PERSONS ON SITE.
8. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR IS RESPONSIBLE FOR PROVIDING TEMPORARY WATER, POWER, AND HEAT AS NEEDED AT THE SITE (24 HOURS A DAY). TEMPORARY LIGHTING WITHIN THE WORK AREAS MUST BE CONNECTED TO GROUND FAULT CIRCUIT INTERRUPTER (GFCI) POWER PANELS INSTALLED BY A STATE OF CONNECTICUT LICENSED ELECTRICIAN AND LOCATED OUTSIDE OF THE WORK AREAS. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL BE RESPONSIBLE FOR PAYING FOR THE USE OF POWER AND WATER UNLESS THE OWNER AGREES IN WRITING TO PAY FOR THESE UTILITIES. IT SHALL ALSO BE THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR'S RESPONSIBILITY TO PROVIDE ALL FIXED AND TEMPORARY CONNECTIONS AND HOOKUPS AS WELL AS OBTAINING PERMITS AND PAYING ALL FEES FOR MAKING SUCH SERVICES AVAILABLE FOR HIS WORK AS IS NECESSARY. ALL POWER AND WATER MUST BE SUPPLIED 24 HOURS A DAY THROUGHOUT THE ABATEMENT PROJECT. CT DPH WILL BE NOTIFIED IMMEDIATELY IF ACTIVE CONTAINMENTS DO NOT HAVE SUFFICIENT NEGATIVE PRESSURE THROUGHOUT THE ABATEMENT PROCESS UNTIL ACCEPTABLE RE-OCCUPANCY AIR RESULTS ARE RECEIVED. THE USE OF PORTABLE GENERATORS WILL REQUIRE 24 HOURS A DAY, 7 DAYS A WEEK CONTINUOUS OPERATION IF NEGATIVE AIR MACHINES IN CONTAINMENTS ARE POWERED BY THEM. THIS CONTINUOUS OPERATION MUST REMAIN IN PLACE FROM THE TIME THE PRE-ABATEMENT VISUAL IS COMPLETED UP UNTIL CLEARANCE RE-OCCUPANCY SAMPLING RESULTS HAVE PASSED. THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR WILL PAY THE OWNER A $2,500 PENALTY SHOULD THE POWER BE FOUND TO NOT BE RUNNING THE NEGATIVE AIR MACHINES IN ACTIVE ABATEMENT CONTAINMENTS. THIS PENALTY WILL APPLY ONLY AND THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR IS ALSO RESPONSIBLE FOR PAYING ALL CT DPH FINES THAT MAY BE IMPOSED ON THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR AND OWNER.
9. THE WORK IN THE TUNNEL/CRAWL/MECHANICAL DUCT SPACES IS NOT SHOWN ON DRAWINGS. VERIFY WORK PRIOR TO BID.

HAZARDOUS BUILDING MATERIALS ABATEMENT NOTES (SEE ASBESTOS ABATEMENT SPECIFICATION AND PCB >50 PPM SPECIFICATIONS FOR ADDITIONAL INFORMATION NOT INCLUDED ON DRAWINGS)

(A) THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS CONTAINING FLOOR TILES (MULTIPLE LAYERS OF MATERIALS) AS ACM.
(B) THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS CONTAINING "PITE - PITE FITTING, PITE HANGER AND ROOF DRAIN INSULATION AS ACM.
(C) THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS CONTAINING SINK UNDERCOATING AS ACM.
(D) THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS CONTAINING CERAMIC FLOOR AND COVE BASE MUD BED AND ADHESIVE/BACKING AS ACM.
(E) THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS CONTAINING WOOD WALL PANEL ADHESIVE AS ACM.
(F) THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS CONTAINING BULLETIN BOARD, "CHALK" BOARD AND OTHER WALL ADHESIVES/GLUE DAUBS AS ACM.
(G) THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS AND ASSUMED PCB >50 PPM CONTAINING CAULK/GLAZING COMPOUND MATERIALS AS ACM AND PCB BULK PRODUCT WASTE.
(H) THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS AND ASSUMED PCB >50 PPM CONTAINING INTERIOR WINDOW GLAZING COMPOUNDS AS ACM AND PCB BULK PRODUCT WASTE.
(I) THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS AND ASSUMED PCB >50 PPM CONTAINING INTERIOR/EXTERIOR WALL/WALL AND WALL/COLUMN CAULKING COMPOUNDS AS ACM AND PCB BULK PRODUCT WASTE.
(J) THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASSUMED PCB >50 PPM CONTAINING INTERIOR/EXTERIOR DOOR/WINDOW GLAZING COMPOUNDS AS PCB BULK PRODUCT WASTE.
(K) THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS AND ASSUMED PCS >50 PPM CONTAINING INTERIOR/EXTERIOR DOOR/WINDOW/WALL/COLUMN CAULKING AND GLAZING COMPOUNDS AS ACM AND PCB BULK PRODUCT WASTE.
(L) THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS AND ASSUMED PCS >50 PPM CONTAINING INTERIOR/EXTERIOR VENT CAULKING COMPOUNDS AS ACM AND PCB BULK PRODUCT WASTE.
(M) THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS AND ASSUMED PCS >50 PPM CONTAINING INTERIOR/EXTERIOR DOOR/WINDOW/WALL/COLUMN CAULKING AND GLAZING COMPOUNDS AS ACM AND PCB BULK PRODUCT WASTE.
(N) THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS AND ASSUMED PCS >50 PPM CONTAINING EXTERIOR WALL/WALL EXPANSION AND COLUMN CAULKING COMPOUNDS AS ACM AND PCB BULK PRODUCT WASTE.
(O) THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF ASBESTOS CONTAINING ROOF PENETRATION FLASHING MATERIALS AS ACM.

NO ALTERNATE #3
THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF PCB >50 PPM CONTAINING PAINT/PAINTED MATERIALS AS PCB BULK PRODUCT WASTE.

NO ALTERNATE #4
THE HAZARDOUS BUILDING MATERIALS ABATEMENT CONTRACTOR SHALL REMOVE AND DISPOSE OF PCB >50 PPM CONTAINING PAINT/PAINTED MATERIALS AS PCB CTDEEP-REGULATED WASTE.



HAZARDOUS BUILDING MATERIALS ABATEMENT PLAN - ROOF

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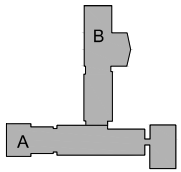
STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	09/20/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

HAZARDOUS BUILDING MATERIALS ABATEMENT PLAN - ROOF

Date: 07/08/2024
Scale: No Scale
Proj. Number: 22367.00
Drawing Number: HBM-03

Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_GreenwichCMS_R22_Existing Conditions.rvt
12/7/2023 10:31:51 AM

Filename: \\langan.com\data\Whitestone\140555161\Project Data\Specifications\Drawings\HBM-03 - HBMAP Roof.dwg Date: 9/20/2024 Time: 13:39 User: hgriesbach Style Table: Langan.ctb Layout: HBM-03

MAP NOTES:

1. THIS MAP AND SURVEY HAVE BEEN PREPARED PURSUANT TO THE REGULATIONS OF CONNECTICUT STATE AGENCIES SECTIONS 20-300b-1 THROUGH 20-300b-20 AND "THE MINIMUM STANDARDS FOR SURVEYS AND MAPS IN THE STATE OF CONNECTICUT" ADOPTED JUNE 21, 1996; AMENDED OCTOBER 26, 2018.
2. THE TYPE OF SURVEY PERFORMED AND THE MAPPED FEATURES DEPICTED HEREON ARE IN ACCORDANCE WITH THE REQUIREMENTS OF AN PROPERTY AND TOPOGRAPHIC SURVEY AND IS INTENDED TO DEPICT TOPOGRAPHIC FEATURES AS THEY RELATE TO THE ADJACENT PROPERTY/BOUNDARY LINES.
3. THE PROPERTY / BOUNDARY DETERMINATION / OPINION IS BASED UPON A RESURVEY OF MAP REFERENCE A & B AND CONFORMS TO CLASS A-2 ACCURACY.
4. THE HORIZONTAL BASELINE CONFORMS TO A CLASS A-2 ACCURACY. THE VERTICAL BASELINE CONFORMS TO A CLASS V-2 ACCURACY. THE TOPOGRAPHIC FEATURES CONFORM TO A CLASS T-2 ACCURACY.
5. THE NORTH ARROW AND BEARINGS ARE BASED UPON THE CONNECTICUT STATE COORDINATE SYSTEM N.A.D. 1983 (2011). THE ELEVATIONS ARE BASED UPON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88). USING GEOID 18. COORDINATES AND ELEVATIONS WERE DETERMINED FROM RTK GPS OBSERVATIONS MADE ON FEBRUARY 23, 2023, USING THE CT DOT RTK NETWORK KNOWN AS ACORN (CTDA BASE), HAVING THE FOLLOWING VALUES:

   LATITUDE = N 41° 03' 57.06988"
   LONGITUDE = W 73° 30' 28.94233"
   ELLIPSOID HEIGHT = -13.266M
6. UNDERGROUND UTILITIES, STRUCTURES AND FACILITY LOCATIONS DEPICTED AND NOTED HEREON HAVE BEEN COMPILED, IN PART FROM RECORD MAPPING SUPPLIED BY THE RESPECTIVE COMPANIES OR GOVERNMENTAL AGENCIES, FROM OTHER SOURCES, AND OBSERVABLE SURFACE EVIDENCE WHILE CONDUCTING THE FIELD SURVEY. THESE LOCATIONS MUST BE CONSIDERED AS APPROXIMATE IN NATURE. ADDITIONALLY, OTHER SUCH FEATURES MAY EXIST ON THE SITE, THE EXISTENCE WHICH IS UNKNOWN TO MARTIN SURVEYING ASSOCIATES, LLC. ALL CONTRACTORS ARE REQUIRED TO CONTACT CALL-BEFORE-YOU-DIG AT 1-800-922-4455 FOR LOCATION AND OR STAKEOUT OF ANY UTILITY PRIOR TO ANY EXCAVATION.
7. THE TOPOGRAPHIC FEATURES DEPICTED HEREON ARE THE RESULT OF A FIELD SURVEY CONDUCTED FEBRUARY, 2023 THROUGH MAY, 2023.

MAP REFERENCES:

A. "PROPERTY OF TOWN OF GREENWICH GREENWICH, CONN." SCALE: 1"=50', BY: S. E. MINOR & COMPANY, INC.; DATED MAY 1, 1956 AND REVISED MAY 14, 1956. G.L.R. #3472
B. "PROPERTY OF TOWN OF GREENWICH GREENWICH, CONN." SCALE: 1"=50', BY: S. E. MINOR & COMPANY, INC.; DATED JUNE 20, 1958 AND REVISED JANUARY 21, 1959. G.L.R. #4108
C. "PROPERTY OF WALTER R. BROOKS, JR. GREENWICH, CONN." SCALE: 1"=50' BY: S. E. MINOR & COMPANY, INC.; DATED NOVEMBER 18, 1955, G.L.R. #3483
D. "PROPERTY OF EVERETT SCOFIELD GREENWICH, CONN." SCALE: 1"=50', BY: S. E. MINOR & COMPANY, INC.; DATED AUGUST 23, 1956 AND REVISED TO SEPTEMBER 14, 1956, G.L.R. #3703
E. "PROPERTY OF IRVING R. & JULIET NEWMAN GREENWICH, CONN." SCALE: 1"=50'; BY: S. E. MINOR & COMPANY, INC.; DATED OCTOBER 3, 1979, G.L.R. #5728

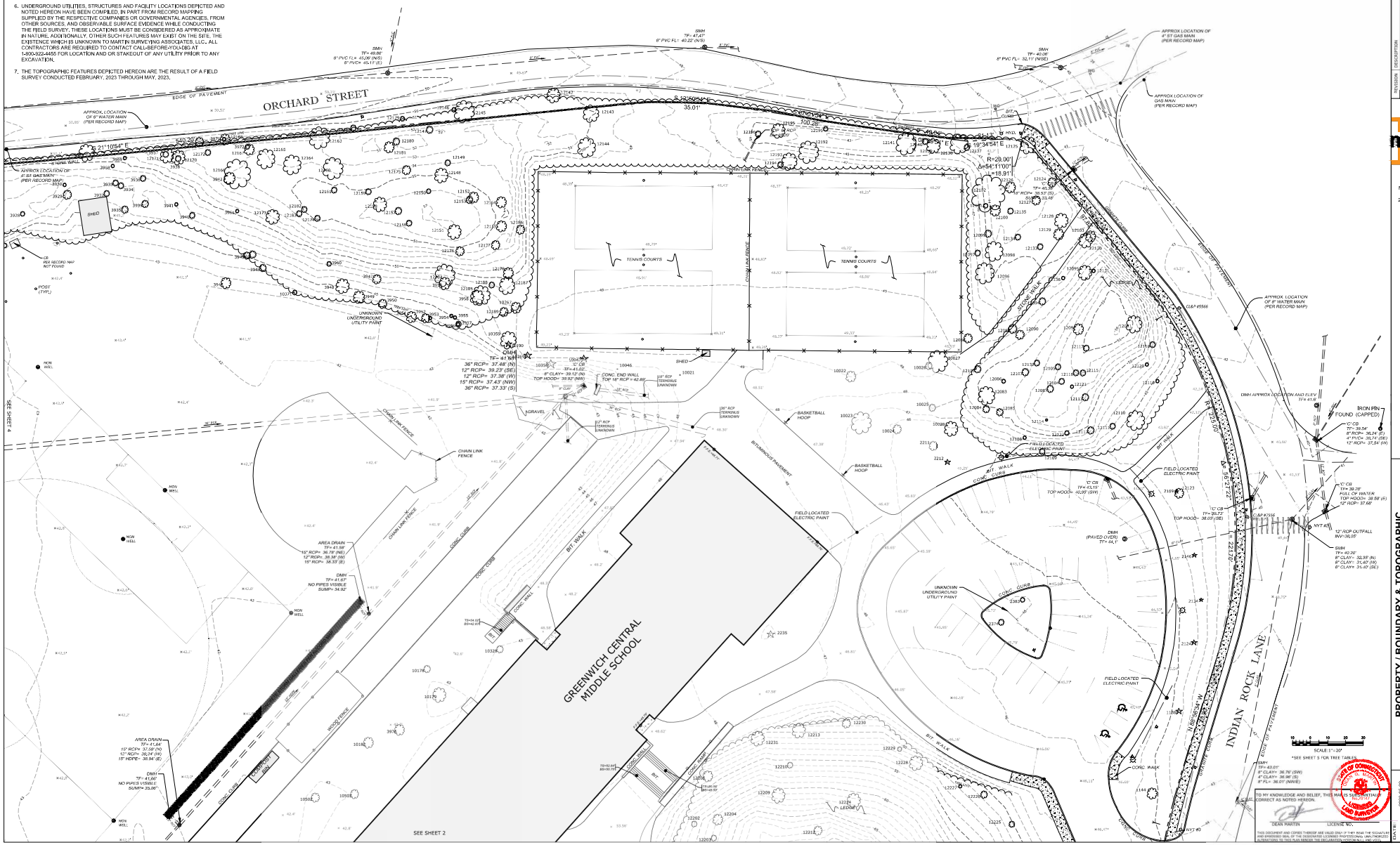
SUBJECT PARCEL
VOL: 547 PG: 68
94,606 S.F. 2.717 AC.

LEGEND:

- IRON PIN (FOUND)
- Rebar/Drill Hole (To Be Set)
- MONUMENT (FOUND)
- MANHOLE
- DRAINAGE MANHOLE
- SANITARY MANHOLE
- ELEC. MANHOLE
- TELE. MANHOLE
- "C" CATCH BASIN
- "C-L" CATCH BASIN
- DECIDUOUS TREES
- EVERGREEN TREES
- SHRUB/BUSH
- FLAG POLE
- TRAFFIC CONTROL BOX
- SIGN
- POST
- LIGHT POLE
- GUY ANCHOR
- UTILITY POLE
- WATER GATE
- WATER METER
- GAS VALVE
- GAS METER
- TRANSFORMER
- ELEC. METER
- MAIL BOX
- HAND HOLE
- BUTTON BOX
- A.C. UNIT
- TRAFFIC LIGHT POLE
- BOUNDARY LINE
- GUARD RAIL
- UNDERGROUND PIPING (San., Stm.)
- G — U/G GAS LINE
- E — U/G ELEC. LINE
- W — WATER LINE
- OHU — OVERHEAD UTILITIES
- T — U/G TELE. LINE
- CHAIN LINK FENCE
- TREE LINE



SITE LOCATION MAP (NOT TO SCALE)



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MARTIN SURVEYING ASSOCIATES, LLC
201 CHRISTIAN LANE
SUITE 8
BERLIN, CT 06037
860-832-9328

REVISION	DESCRIPTION	DATE

PROPERTY / BOUNDARY & TOPOGRAPHIC SURVEY
"GREENWICH CENTRAL MIDDLE SCHOOL"
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

DATE:	2023-05-22
SCALE:	1"=20'
SHEET:	1 OF 5
DWG NO.:	23-011

TO MY KNOWLEDGE AND BELIEF, THIS MAP IS CORRECT AS NOTED HEREON.

DEAN MARTIN — LICENSE NO.:

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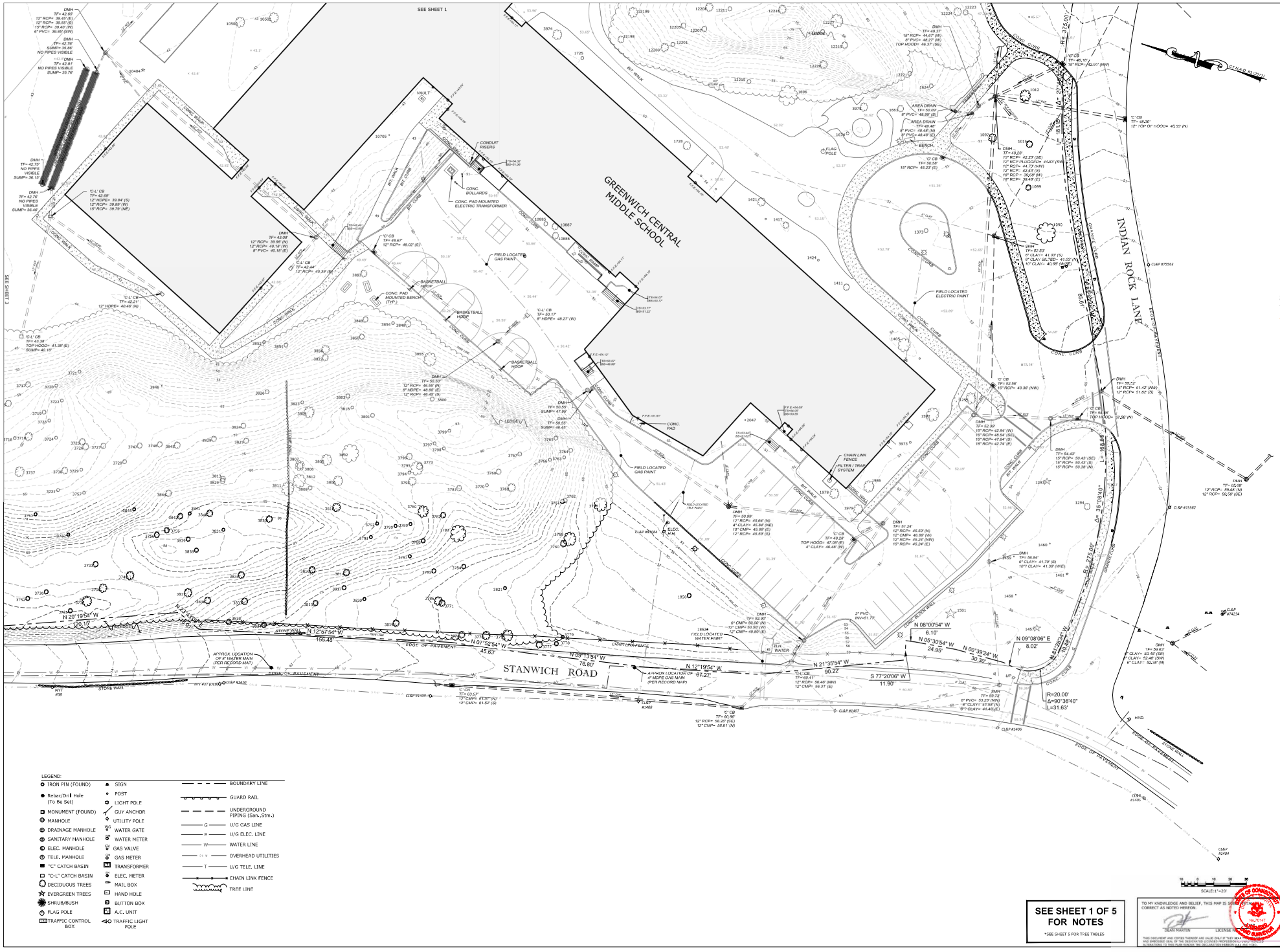

SEE SHEET 1 OF 5 FOR NOTES

*SEE SHEET 5 FOR TREE TABLES

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STATE OF CONNECTICUT LICENSED LAND SURVEYOR

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REVISION	DESCRIPTION	DATE

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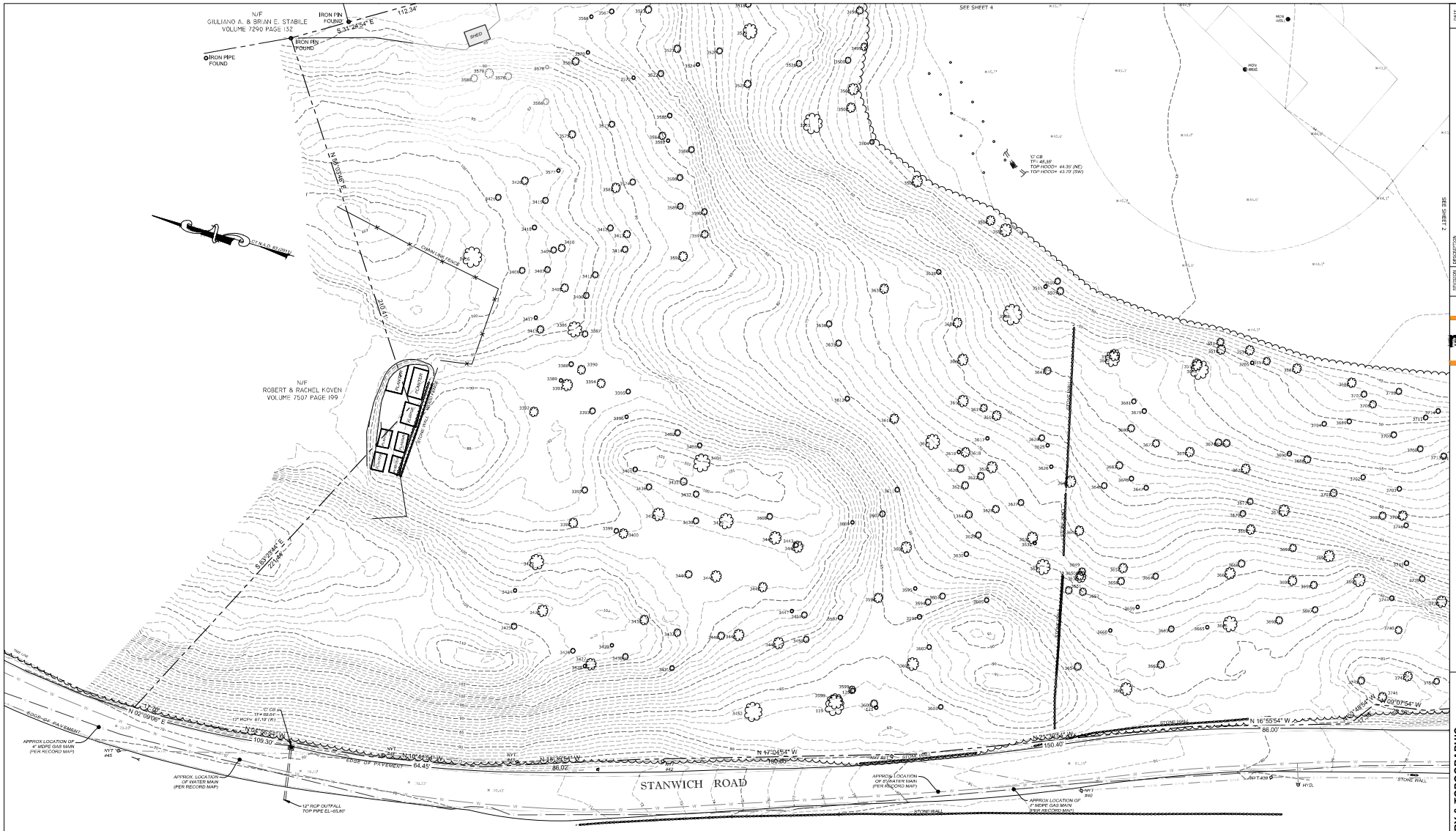
PROPERTY / BOUNDARY & TOPOGRAPHIC SURVEY
"GREENWICH CENTRAL MIDDLE SCHOOL"
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

DATE: 2023-05-22
SCALE: 1"=20'
SHEET: 2 OF 5
DWG NO: 23-011



LEGEND:

- IRON PIN (FOUND)
- Rebar/Drill Hole (To Be Set)
- MONUMENT (FOUND)
- MANHOLE
- DRAINAGE MANHOLE
- SANITARY MANHOLE
- ELEC. MANHOLE
- TELE. MANHOLE
- "C" CATCH BASIN
- "C-L" CATCH BASIN
- DECIDUOUS TREES
- EVERGREEN TREES
- SHRUB/BUSH
- FLAG POLE
- TRAFFIC CONTROL BOX
- SIGN
- POST
- LIGHT POLE
- GUY ANCHOR
- UTILITY POLE
- WATER GATE
- WATER METER
- GAS VALVE
- GAS METER
- TRANSFORMER
- ELEC. METER
- MAIL BOX
- HAND HOLE
- BUTTON BOX
- A.C. UNIT
- TRAFFIC LIGHT POLE
- BOUNDARY LINE
- GUARD RAIL
- UNDERGROUND PIPING (San., Stm.)
- G — U/G GAS LINE
- E — U/G ELEC. LINE
- W — WATER LINE
- OVERHEAD UTILITIES
- T — U/G TELE. LINE
- CHAIN LINK FENCE
- TREE LINE

SEE SHEET 1 OF 5 FOR NOTES

*SEE SHEET 5 FOR TREE TABLES

SCALE: 1" = 20'

TO MY KNOWLEDGE AND BELIEF, THIS MAP IS SURVEY CORRECT AS NOTED HEREON.

DEAN MARTIN — LICENSE NO. RLS-17147

STATE OF CONNECTICUT — DEAN MARTIN — RLS-17147 — LICENSED LAND SURVEYOR

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NO.	DESCRIPTION	DATE

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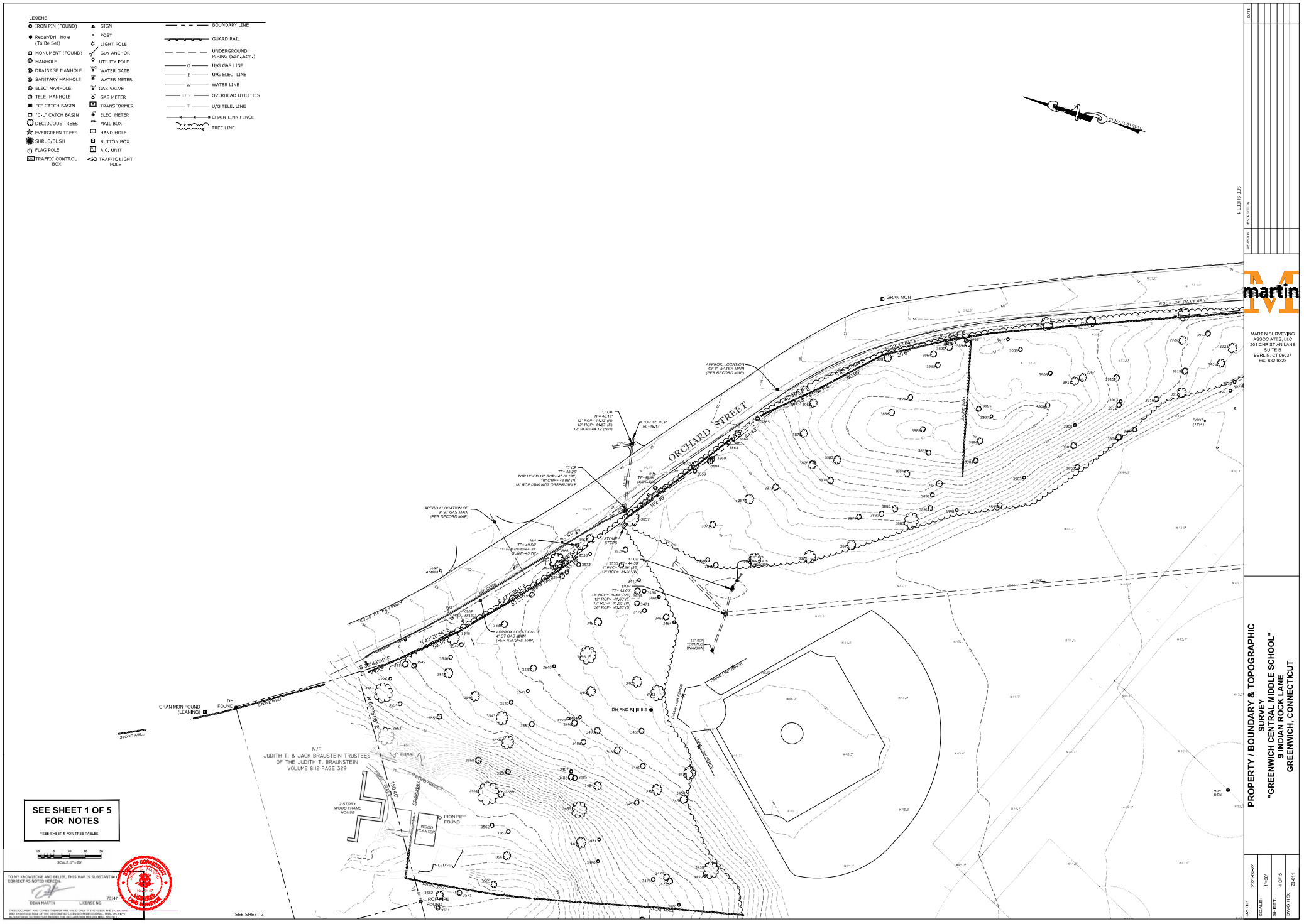
860-832-9328

PROPERTY / BOUNDARY & TOPOGRAPHIC SURVEY
"GREENWICH CENTRAL MIDDLE SCHOOL"
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

DATE:	2023-05-22
SCALE:	1"=20'
SHEET:	3 OF 5
DWG NO.:	22-011



DATE | DESCRIPTION | REVISION

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201 CHRISTIAN LANE
SUITE B
BERLIN, CT 06037
860-832-9328

PROPERTY / BOUNDARY & TOPOGRAPHIC SURVEY
"GREENWICH CENTRAL MIDDLE SCHOOL"
9 INDIAN ROCK LANE
GREENWICH, CONNECTICUT

DATE: 2023-05-22
SCALE: 1"=20'
SHEET: 4 OF 5
DWG NO: 23-011

TAG	TRUNK	TYPE
119	32"	BLACK OAK
120	8"	SHAGWOOD
121	6"	AMERICAN BEECH
1012	20"	JAPANESE CHERRY
1015	12"	SUGAR MAPLE
1090	36"	PIN OAK
1097	15"	JAPANESE CHERRY
1099	10"	CHERRY PLUM
1138	20"	WHITE PINE
1144	18"	BALD CYPRESS
1255	20"	HONEY LOCUST
1293	24"	WHITE PINE
1294	12"	DAWN REDWOOD
1373	8"	JAPANESE LILAC
1405	24"	HONEY LOCUST
1411	12"	JAPANESE CHERRY
1417	12"	HONEY LOCUST
1421	15"	HONEY LOCUST
1424	4"	CHERRY PLUM
1457	24"	EASTERN WHITE PINE
1458	2"	BALD CYPRESS
1459	2"	BALD CYPRESS
1460	2"	BALD CYPRESS
1461	8"	BLUE SPRUCE
1501	36"	EASTERN WHITE PINE
1592	24"	HONEY LOCUST
1624	8"	BLACK OAK
1661	12"	SHAGBARK HICKORY
1674	6"	KOUSA DOGWOOD
1696	36"	RED OAK
1725	6"	CALLERY PEAR
1728	15"	NORWAY MAPLE
1856	8"	SWEET CHERRY
1862	2"	BUR OAK
1978	18"	HONEY LOCUST
1979	18"	HONEY LOCUST
1986	20"	HONEY LOCUST
2047	2"	DOGWOOD
2124	18"	NORWAY SPRUCE
2134	12"	WHITE PINE
2146	15"	NORWAY SPRUCE
2169	12"	WHITE PINE
2211	15"	PIN OAK
2212	18"	WHITE PINE
2235	24"	WHITE PINE
2374	10"	GINGKO
2383	8"	GINGKO
3386	24"	BLACK OAK
3387	10"	PIGNUT HICKORY
3388	8"	TRIPLE WHITE ASH
3389	6"	WHITE ASH
3390	14"	SWEET BIRCH
3391	18"	NORTHERN RED OAK
3392	15"	TWIN SILVER MAPLE
3393	10"	SUGAR MAPLE
3394	14"	SWEET BIRCH
3395	8"	WHITE ASH
3396	6"	RED MAPLE
3397	10"	WHITE ASH
3398	15"	TWIN SWEET BIRCH
3399	8"	SWEET BIRCH
3400	15"	SWEET BIRCH
3401	8"	BLACK LOCUST
3402	10"	COMMON SASSAFRAS
3403	8"	BUTTERNUT
3404	28"	TWIN BLACK OAK
3405	13"	BLACK OAK
3406	10"	SHAGBARK HICKORY
3407	10"	PIGNUT HICKORY
3408	10"	SHAGBARK HICKORY
3409	10"	BLACK MAPLE
3410	12"	BLACK OAK
3411	10"	SHAGBARK HICKORY
3412	10"	NORWAY MAPLE
3413	12"	PIGNUT HICKORY
3414	10"	BLACK LOCUST
3415	12"	SCARLET OAK
3416	32"	BLACK OAK
3417	6"	DOGWOOD
3418	8"	SCARLET OAK
3419	10"	SHAG BARK HICKORY
3420	12"	BLACK MAPLE
3421	10"	BITTERNUT HICKORY
3422	24"	BLK OAK
3423	18"	WHITE OAK
3424	6"	SWEET BIRCH
3425	10"	TWIN BLACK OAK
3426	8"	DEAD
3427	18"	BLACK GUMP
3428	6"	AMERICAN ELM
3429	6"	BLACK OAK
3430	10"	SHAGBARK HICKORY
3431	8"	SLIPPERY ELM
3432	12"	SWEET BIRCH
3433	15"	BLACK CHERRY
3434	20"	BLACK OAK
3435	12"	TWIN SWEET BIRCH
3436	10"	WHITE OAK
3437	10"	PEANUT HICKORY
3438	10"	RED MAPLE
3439	24"	BLACK OAK
3440	12"	NORTHERN RED OAK
3441	18"	TWIN BLACK OAK
3442	20"	BLACK OAK
3443	8"	AMERICAN ELM
3444	18"	BLACK OAK
3445	15"	BLACK OAK
3446	12"	WHITE ASH
3447	6"	RED MAPLE
3448	18"	BLACK OAK
3449	18"	BLACK OAK
3450	10"	WHITE ASH
3451	10"	RED MAPLE
3452	30"	BLACK OAK
3453	24"	RED MAPLE
3454	6"	SHAGBARK HICKORY
3455	15"	SHAGBARK HICKORY
3456	20"	SHAGBARK HICKORY
3457	10"	SWEET BIRCH
3458	30"	SHAGBARK
3459	6"	WHITE MAPLE
3460	10"	BLACK OAK
3461	10"	WHITE OAK
3462	28"	RED MAPLE
3463	20"	RED MAPLE
3464	6"	RED MAPLE
3465	12"	RED MAPLE
3466	6"	RED MAPLE
3468	8"	GREEN ASH
3469	12"	GREEN ASH
3470	6"	GREEN ASH
3471	10"	GREEN ASH
3472	8"	TWINGREEN ASH
3473	12"	PINE OAK
3474	12"	PINE OAK
3475	8"	SUGAR MAPLE
3476	6"	AMERICAN ELM
3480	6"	SUGAR MAPLE
3481	6"	SUGAR MAPLE
3482	20"	BLACK OAK
3483	30"	BLACK OAK
3484	15"	PINE OAK
3485	10"	BLACK OAK

TAG	TRUNK	TYPE
3486	12"	BLACK OAK
3487	6"	BLACK OAK
3488	10"	RED MAPLE
3489	12"	PINE OAK
3490	12"	PINE OAK
3492	12"	RED MAPLE
3493	6"	RED MAPLE
3494	6"	RED MAPLE
3495	18"	PIGNUT HICKORY
3496	32"	RED MAPLE
3497	15"	PINE OAK
3498	12"	TWIN RED MAPLE
3499	12"	TWIN PINE OAK
3500	10"	PIGNUT HICKORY
3501	18"	BLACK OAK
3502	15"	WHITE OAK
3503	32"	BLACK OAK
3504	8"	TREE OF HAVEN
3505	18"	BITTERNUT HICKORY
3506	15"	SHAGBARK HICKORY
3507	20"	TWIN SHAGBARK HICKORY
3508	32"	BLACK OAK
3509	12"	BLACK OAK
3510	10"	BLACK OAK
3511	6"	PIGNUT HICKORY
3512	18"	BLACK OAK
3513	18"	BLACK OAK
3514	12"	TULIP
3515	15"	SWEET BIRCH
3516	15"	SWEET BIRCH
3517	12"	BLACK OAK
3518	10"	BLACK MAPLE
3519	24"	WHITE OAK
3520	10"	SHAGBARK HICKORY
3521	12"	TWIN SHAGBARK HICKORY
3522	10"	SCARLET OAK
3523	12"	SHAGBARK HICKORY
3524	6"	SHAGBARK HICKORY
3525	12"	SHAGBARK HICKORY
3526	10"	TREE OF HAVEN
3527	30"	SCARLET OAK
3528	15"	SWEET BIRCH
3529	10"	RED MAPLE
3530	10"	RED MAPLE
3532	8"	RED MAPLE
3533	6"	RED MAPLE
3534	10"	NORTHERN RED OAK
3535	8"	RED MAPLE
3536	10"	BLACK MAPLE
3538	12"	BLACK MAPLE
3539	12"	WHITE ASH
3540	6"	AMERICAN BEECH
3541	6"	AMERICAN BEECH
3542	8"	RED MAPLE
3543	24"	SWEET BIRCH
3544	18"	RED MAPLE
3545	18"	SHAGWOOD HICKORY
3546	8"	PINE OAK
3547	8"	PINE OAK
3548	24"	TWIN BLACK CHERRY
3550	12"	RED MAPLE
3551	36"	RED MAPLE
3552	6"	RED MAPLE
3553	32"	NORTHERN RED OAK
3554	8"	RED OAK
3555	10"	RED MAPLE
3556	24"	SWEET BIRCH
3557	10"	RED MAPLE
3558	10"	BLACK MAPLE
3559	12"	BLACK MAPLE
3560	12"	BLACK OAK
3561	42"	BLACK OAK
3562	8"	PINE OAK
3563	8"	BLACK GUMP
3564	15"	NORTHERN RED OAK
3565	12"	SHAGBARK HICKORY
3566	10"	BLACK CHERRY
3567	8"	SHAGBARK HICKORY
3568	6"	SHAGBARK HICKORY
3569	12"	TWIN SHAGBARK HICKORY
3570	6"	SWAMP CHESTNUT OAK
3571	10"	BLACK MAPLE
3572	6"	BLACK CHERRY
3573	10"	BLACK CHERRY
3574	10"	SHAGBARK HICKORY
3575	12"	SHAGBARK HICKORY
3576	12"	BLACK OAK
3577	6"	SUGAR MAPLE
3578	6"	RED MAPLE
3579	15"	BLACK OAK
3580	12"	BLACK OAK
3581	8"	RED MAPLE
3582	15"	RED MAPLE
3583	15"	SHAGBARK HICKORY
3584	12"	TWIN SHAGBARK HICKORY
3585	8"	SHAGBARK HICKORY
3586	10"	TREE OF HAVEN
3587	6"	SHAGBARK HICKORY
3588	10"	SHAGBARK HICKORY
3589	10"	SHAGBARK HICKORY
3590	10"	TREE OF HAVEN
3591	12"	RED MAPLE
3592	15"	SHAGBARK HICKORY
3593	8"	NORWAY MAPLE
3594	10"	SHAGBARK HICKORY
3595	6"	RED MAPLE
3596	15"	SWEET BIRCH
3597	8"	SHAGBARK HICKORY
3598	24"	RED MAPLE
3599	12"	RED MAPLE
3600	12"	AMERICAN BEECH
3601	20"	TWIN TULIP
3602	8"	RED MAPLE
3603	8"	SHAG BARK
3604	10"	NORWAY MAPLE
3605	8"	TWIN NORWAY MAPLE
3606	18"	YELLOW WOOD
3607	10"	AMERICAN LINDEN
3608	10"	BLACK OAK-NOS
3609	6"	BLACK CHERRY-NOS
3610	15"	BLACK OAK-NOS
3611	8"	RED MAPLE
3612	8"	TREE OF HAVEN-NOS
3613	24"	BLACK OAK
3614	18"	RED MAPLE
3615	12"	RED MAPLE
3616	15"	RED MAPLE
3617	6"	RED MAPLE
3618	15"	DEAD
3619	6"	RED MAPLE
3620	12"	RED MAPLE
3621	12"	RED MAPLE
3622	12"	RED MAPLE
3623	18"	RED MAPLE
3624	10"	RED MAPLE
3625	6"	RED MAPLE
3626	6"	RED MAPLE
3627	10"	RED MAPLE
3628	12"	BLACK OAK
3629	10"	RED MAPLE
3630	8"	RED MAPLE
3631	18"	BLACK OAK
3632	6"	RED MAPLE

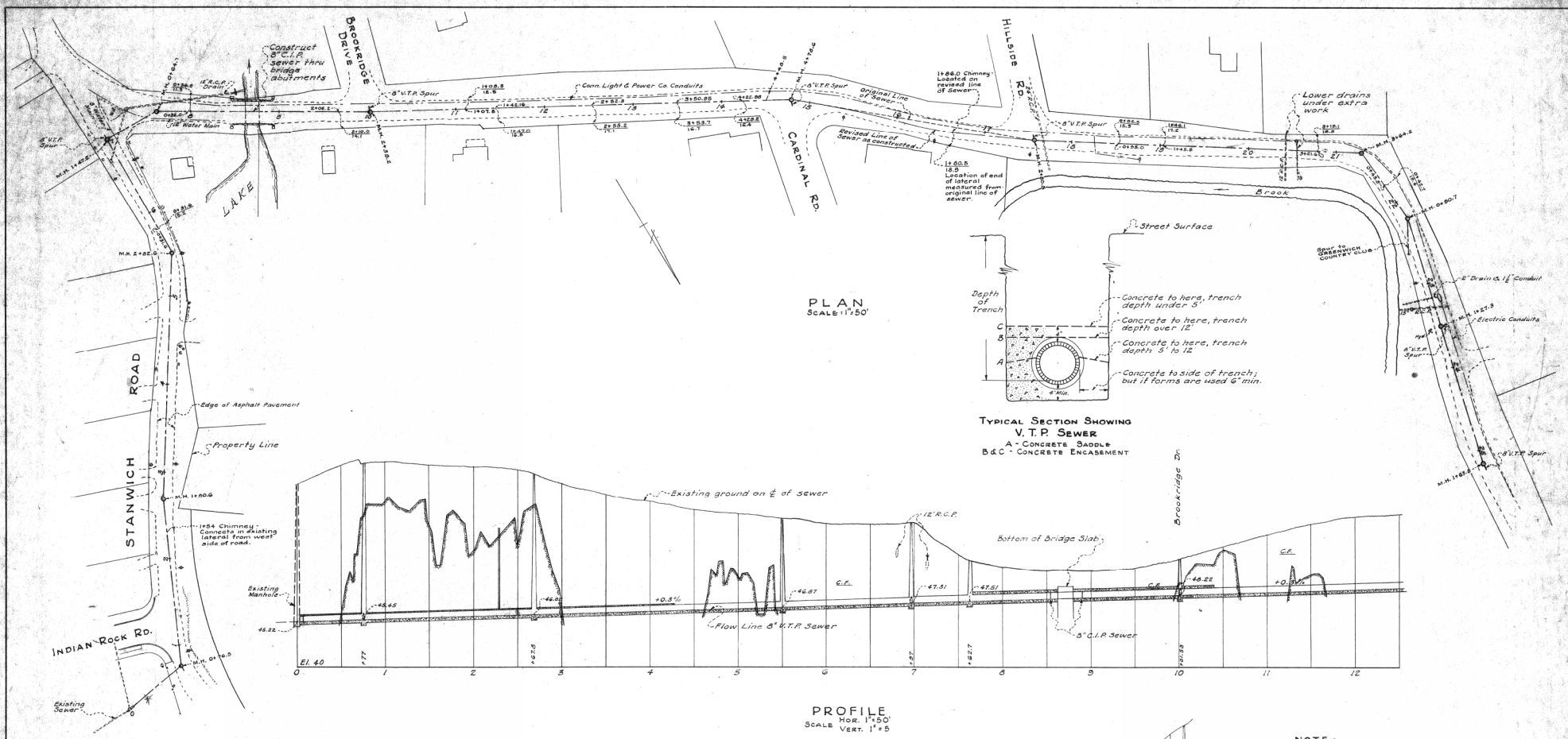
TAG	TRUNK	TYPE
3633	24"	TREE
3634	18"	BLACK OAK
3635	10"	SHAGBARK HICKORY
3636	10"	SHAGBARK HICKORY
3637	15"	TREE OF HAVEN
3638	8"	RED MAPLE
3639	15"	BLACK OAK
3640	18"	TWIN BLACK OAK
3641	12"	RED MAPLE
3642	12"	RED MAPLE
3643	18"	AMERICAN BEECH
3645	10"	AMERICAN BEECH
3646	8"	BLACK CHERRY
3647	8"	RED MAPLE
3648	15"	BEECH-NOS
3649	12"	NORWAY MAPLE
3650	12"	RED MAPLE
3651	12"	BEECH
3652	12"	OAK
3654	12"	HICKORY TWIN
3657	15"	PINE OAK
3658	12"	NORWAY MAPLE
3659	6"	NORWAY MAPLE-NOS
3660	6"	ELM
3661	20"	BLACK OAK
3662	12"	BLACK OAK-NOS
3663	10"	WHITE MAPLE
3664	10"	RED MAPLE
3665	6"	ELM
3666	24"	BLACK OAK
3667	18"	BLACK OAK
3668	12"	RED OAK
3669	15"	RED OAK
3670	10"	BEECH
3671	18"	NORWAY MAPLE
3672	10"	RED OAK
3673	15"	BLACK CHERRY
3674	12"	MAPLE
3675	12"	DEAD
3676	15"	RED OAK-NOS
3677	12"	RED OAK-NOS
3678	30"	BLACK OAK-NOS
3679	8"	TULIP
3680	12"	RED OAK-NOS
3681	8"	RED MAPLE
3682	24"	BLACK OAK
3683	12"	DEAD
3686	12"	NORWAY MAPLE
3687	15"	SWEET BIRCH
3688	15"	RED MAPLE
3689	8"	SWEET BIRCH
3690	8"	NORWAY MAPLE
3691	12"	TWIN BLACK OAK
3692	18"	NORWAY MAPLE
3693	20"	BLACK OAK
3695	15"	RED MAPLE
3696	12"	RED MAPLE
3697	10"	SWEET BEECH
3698	12"	AMERICAN BEECH
3699	12"	BLACK OAK
3700	15"	BLACK OAK
3701	12"	SWEET BIRCH
3702	8"	SWEET BIRCH
3703	8"	SWEET BIRCH
3704	8"	RED OAK
3705	6"	SHAGBARK HICKORY
3706	12"	RED MAPLE
3707	10"	RED MAPLE
3708	10"	SWEET BIRCH
3709	10"	SWEET BIRCH
3710	10"	SHAGBARK HICKORY
3711	8"	SHAGBARK HICKORY
3713	10"	SWEET BIRCH
3714	8"	SHAGBARK HICKORY
3715	12"	BLACK OAK
3716	6"	SWEET BIRCH
3717	10"	SWEET BIRCH
3718	15"	BLACK OAK
3719	8"	SWEET BIRCH
3720	6"	SWEET BIRCH
3721	6"	RED MAPLE
3722	6"	SHAGBARK HICKORY
3723	6"	SWEET BIRCH
3724	6"	SWEET BIRCH
3725	12"	SWEET BIRCH
3726	12"	SWEET BIRCH
3727	10"	SWEET BIRCH
3728	8"	SWEET BIRCH
3729	6"	SWEET BIRCH
3730	12"	SWEET BIRCH
3731	6"	SWEET BIRCH
3732	6"	SWEET BIRCH
3733	10"	BLACK OAK
3734	18"	BLACK OAK
3735	8"	SHAGBARK HICKORY
3736	8"	SHAGBARK HICKORY
3737	18"	BLACK OAK
3738	18"	WHITE OAK-NOS
3739	10"	SWEET BIRCH
3740	12"	BLACK OAK
3741	15"	BLACK OAK
3742	15"	BLACK OAK
3743	12"	BLACK OAK
3744	8"	RED MAPLE
3745	8"	RED MAPLE
3746	8"	RED OAK
3747	10"	SWEET BIRCH
3748	10"	SWEET BIRCH
3749	15"	BLACK OAK
3750	15"	RED MAPLE
3751	6"	SWEET BIRCH
3752	8"	SHAG BARK HICKORY
3754	10"	SHAG BARK HICKORY
3755	10"	RED MAPLE
3756	10"	RED MAPLE
3757	6"	SHAGBARK HICKORY
3758	24"	TWIN NORWAY RED OAK
3759	24"	NORWAY RED OAK
3760	12"	RED MAPLE-NOS
3761	8"	RED MAPLE
3762	8"	NUT HICKORY
3763	6"	NUT HICKORY
3764	8"	TREE OF HAVEN
3765	8"	TREE OF HAVEN
3766	6"	RED OAK
3767	8"	RED OAK
3768	10"	RED MAPLE
3769	15"	RED OAK
3770	6"	RED OAK
3771	12"	TWIN SWEET BIRCH
3773	12"	NORTHERN RED OAK
3774	12"	SHAGBARK HICKORY
3775	20"	BITTERNUT HICKORY
3776	15"	BITTERNUT HICKORY
3777	12"	PIGNUT HICKORY
3778	8"	TWIN NORWAY MAPLE
3779	6"	TRIPLE NORWAY MAPLE
3780	20"	RED OAK
3781	10"	RED OAK
3782	10"	RED OAK
3783	30"	RED OAK
3784	8"	NORWAY MAPLE
3785	8"	NORWAY MAPLE

TAG	TRUNK	TYPE
3786	15"	SWEET BIRCH
3787	6"	SUGAR MAPLE
3788	8"	TWIN NORWAY MAPLE
3789	6"	RED MAPLE
3790	6"	BEECH
3791	6"	NORWAY MAPLE
3792	6"	NORWAY MAPLE
3793	15"	DEAD
3794	6"	NORWAY MAPLE
3795	24"	RED OAK
3796	12"	TWIN RED OAK
3797	6"	NORWAY MAPLE
3798	6"	TWIN RED OAK
3799	6"	RED OAK
3800	8"	SHANDONG MAPLE
3801	8"	RED OAK
3802	32"	DEAD-NOS
3803	8"	DEAD
3804	20"	BLACK OAK
3805	20"	WHITE OAK
3806	18"	BLACK OAK
3807	18"	BLACK OAK
3808	12"	RED OAK
3809	8"	RED OAK
3810	15"	RED OAK
3811	24"	DEAD
3812	24"	TREE
3813	10"	RED MAPLE
3814	12"	AMERICAN BEECH
3815	10"	NORTHERN RED OAK
3816	12"	NORTHERN RED OAK
3817	8"	RED MAPLE
3818	6"	SHAGBARK HICKORY
3819	12"	BLACK OAK
3820	6"	NORWAY MAPLE
3821	6"	NORWAY MAPLE
3822	12"	SHAG BARK-NOS
3823	6"	NORWAY MAPLE
3824	10"	SWEET BEECH
3825	10"	RED OAK
3826	8"	BLACK OAK
3828	10"	SWEET BEECH
3829	10"	RED OAK
3830	12"	RED OAK
3831	6"	BLACK CHERRY
3832	12"	RED MAPLE
3833	12"	RED MAPLE
3834	10"	RED OAK
3835	10"	RED MAPLE
3836	12"	RED OAK
3837	15"	WHITE OAK
3838	8"	NORWAY MAPLE
3839	8"	BLACK OAK
3840	12"	RED OAK
3841	6"	RED MAPLE
3842	10"	RED MAPLE
3843	6"	RED MAPLE
3844	12"	BLACK OAK
3845	12"	SWEET BIRCH
3846	2"	SAPLING AREA
3848	12"	WHITE OAK
3849	10"	SWEET BIRCH
3850	10"	NORWAY MAPLE
3851	8"	TREE OF HAVEN
3852	6"	TULIP
3853	12"	JAPANESE CHERRY
3854	6"	NORWAY MAPLE
3855	24"	TWIN NORTHERN RED OAK
3856	15"	WHITE OAK
3857	30"	DEAD
3858	15"	ELM
3859	8"	RED MAPLE
3860	10"	TWIN SWEET BIRCH
3861	12"	RED MAPLE
3862	8"	RED MAPLE
3863	6"	RED MAPLE
3864	12"	BEECH
3865	9"	ELM
3866	28"	RED OAK
3867	15"	RED MAPLE
3868	10"	RED MAPLE
3869	8"	RED MAPLE
3870	24"	SHAGBARK HICKORY
3871	12"	SHAGBARK HICKORY
3872	24"	BLACK OAK
3873	18"	RED OAK
3874	12"	RED OAK
3875	18"	WHITE OAK
3876	15"	RED MAPLE
3877	15"	RED MAPLE
3878	12"	AMERICAN ELM
3879	10"	SWEET BIRCH
3880	15"	RED OAK
3881	10"	BLACK OAK
3883	28"	NORTHERN RED OAK
3884	12"	NORWAY MAPLE
3885	12"	BLACK OAK
3886	12"	WHITE OAK
3887	15"	WHITE OAK
3888	10"	BLACK OAK
3889	10"	SWEET BIRCH
3890	15"	BLACK OAK
3891	10"	SWEET BIRCH
3892	8"	SWEET BIRCH
3893	12"	NORWAY MAPLE
3894	12"	WHITE OAK
3895	10"	RED MAPLE
3896	12"	BLACK OAK
3897	6"	RED MAPLE
3898	6"	SHAGBARK HICKORY
3899	10"	BLACK CHERRY
3900	10"	RED MAPLE
3901	12"	RED MAPLE
3902	10"	NORTHERN RED OAK
3903	6"	WHITE OAK
3904	10"	NORWAY MAPLE
3905	6"	TWIN RED MAPLE
3906	12"	BLACK OAK
3907	8"	NORWAY MAPLE
3908	8"	AMERICAN BEECH
3909	8"	SWEET BIRCH
3910	6"	SHAGBARK HICKORY
3911	15"	RED MAPLE
3912	10"	RED MAPLE
3913	6"	TRIPLE SWEET BIRCH
3914	24"	BLACK OAK
3915	12"	RED MAPLE
3916	10"	DOUBLE WHITE OAK
3917	20"	TWIN BLACK OAK
3918	18"	NORWAY MAPLE
3919	12"	NORWAY MAPLE
3920	15"	WHITE OAK
3921	24"	WHITE OAK NOS
3922	10"	WHITE OAK
3923	18"	WHITE OAK
3924	15"	WHITE OAK
3925	8"	TWIN SWEET BIRCH
3926	6"	RED MAPLE
3927	6"	RED MAPLE
3928	8"	TRIPLE RED MAPLE
3929	15"	RED MAPLE
3930	6"	AMERICAN BEECH
3931	28"	WHITE OAK

TAG	TRUNK	TYPE
3932	10"	RED MAPLE
3933	10"	NORWAY MAPLE
3934	10"	NORWAY MAPLE
3935	12"	NORWAY MAPLE
3936	10"	NORWAY MAPLE
3937	10"	SHAG BARK
3938	10"	NORWAY MAPLE
3939	12"	NORWAY MAPLE
3940	10"	NORWAY MAPLE
3941	6"	SHAGBARK HICKORY
3942	20"	SHAGBARK HICKORY
3943	12"	NORWAY MAPLE
3944	12"	NORWAY MAPLE
3945	18"	DEAD
3946	12"	NORWAY MAPLE
3947	15"	SWEET BIRCH
3948	24"	BLACK OAK
3949	20"	NORWAY MAPLE
3950	15"	NORWAY MAPLE
3951	18"	RED MAPLE
3952	15"	SWEET BIRCH
3953	6"	RED MAPLE
3954	6"	ELM
3955	6"	ELM
3956	6"	ELM
3957	16"	RED MAPLE
3958	24"	RED OAK
3959	20"	RED OAK
3960	8"	RED OAK
3961	6"	BEECH
3962	10"	WHITE OAK
3963	15"	WHITE OAK
3964	12"	WHITE OAK
3965	10"	BLACK OAK
3966	8"	RED MAPLE
3967	15"	RED MAPLE
3968	6"	RED MAPLE
3969	6"	SWEET BIRCH
3971	6"	BLACK OAK
3972	8"	WHITE OAK
3973	4"	COMMON PEAR
3974	18"	HONEY LOCUST
3975	15"	BLACK OAK
3976	18"	HONEY LOCUST
10021	2"	RED MAPLE
10022	18"	WHITE PINE
10023	36"	WHITE OAK
10024	15"	PIN OAK
10025	12"	TWIN RED MAPLE
10026	12"	WHITE OAK
10027	36"	WHITE OAK
10028	24"	WHITE OAK
10046	18"	WHITE PINE
10047	24"	WHITE PINE
10178	12"	HONEY LOCUST
10179	24"	HONEY LOCUST
10182	18"	HONEY LOCUST
10267	18"	NORTHERN RED MAPLE
10269	24"	WHITE PINE
10328	12"	HONEY LOCUST
10358	30"	WHITE PINE
10359	20"	WHITE PINE
10360	12"	RED OAK
10484	12"	WHITE PINE
10500	18"	HONEY LOCUST
10501	18"	HONEY LOCUST
10502	15"	HONEY LOCUST
10503	15"	HONEY LOCUST
10705	2"	CLUSTER KOUSA DOGWOOD
10865	8"	TWIN JAPANESE CHERRY
10866	12"	JAPANESE CHERRY
10867	12"	JAPANESE CHERRY
12083	30"	BLACK OAK
12084	12"	SWEET BIRCH
12085	12"	SWEET BIRCH
12086	7"	SWEET BIRCH
12087	12"	WHITE OAK
12088	15"	SWEET BIRCH
12089	15"	SWEET BIRCH
12090	15"	TWIN SWEET BIRCH
12091	28"	BLACK OAK
12092	18"	AMERICAN BEECH
12094	12"	SWEET BIRCH
12095	24"	WHITE OAK
12096	36"	TWIN WHITE OAK
12097	10"	SWEET BIRCH
12098	32"	WHITE OAK
12099	12"	SWEET BIRCH
12100	18"	WHITE OAK
12101	8"	AMERICAN BEECH
12102	60"	TWIN AMERICAN LINDEN
12103	18"	RED MAPLE
12104	10"	SWEET BIRCH
12105	10"	SWEET BIRCH
12106	12"	SWEET BIRCH
12107	12"	SWEET BIRCH
12108	6"	BLACK OAK
12109	10"	BLACK OAK
12110	32"	BLACK OAK
12111	10"	BLACK OAK
12112	12"	SWEET BIRCH
12113	12"	WHITE OAK
12114	4"	CLUSTER OF SWEET BIRCH
12115	10"	SWEET BIRCH
12116	10"	SWEET BIRCH
12117	10"	SWEET BIRCH
12118	10"	PIGNUT HICKORY
12119	6"	SOURWOOD
12120	6"	MOCKERNUT HICKORY
12121	6"	SWEET BIRCH
12122	8"	BLACK CHERRY
12123	16"	WHITE PINE
12124	15"	WHITE OAK
12125	28"	TWIN WHITE OAK
12126	18"	WHITE OAK
12127	15"	SWEET BIRCH
12128	24"	BLACK OAK
12129	18"	WHITE OAK
12130	24"	SWEET BIRCH
12131	6"	FLOWERING DOGWOOD
12132	10"	TWIN RED MAPLE
12133	10"	RED MAPLE
12134	10"	SWEET BIRCH
12135	10"	RED MAPLE
12136	6"	AMERICAN BEECH
12137	10"	SWAMP CHESTNUT OAK
12138	32"	WHITE OAK
12139	24"	PIGNUT HICKORY
12140	10"	SCARLET OAK
12141	36"	TWIN SWEETGUM
12142	24"	WHITE OAK
12143	28"	TWIN RED MAPLE
12144	32"	NORTHERN RED OAK
12145	36"	BLACK OAK
12146	8"	RED MAPLE
12147	12"	WHITE OAK
12148	24"	NORTHERN RED OAK
12149	10"	NORTHERN RED OAK
12150	8"	CLUSTER SWEET BIRCH
12151	24"	NORTHERN RED OAK
12152	18"	RED MAPLE
12153	12"	RED MAPLE
12154	18"	BLACK OAK

TAG	TRUNK	TYPE
12155	18"	SWAMP CHESTNUT OAK
12156	10"	NORTHERN RED OAK
12157	12"	NORTHERN RED OAK
12158	24"	NORTHERN RED OAK
12159	10"	AMERICAN BEECH
12160	36"	NORTHERN RED OAK
12161	10"	AMERICAN BEECH
12162	10"	BLACK CHERRY
12163	36"	WHITE OAK
12164	32"	WHITE OAK
12165	32"	WHITE OAK
12166	48"	TWIN WHITE OAK
12167	18"	SWAMP CHESTNUT OAK
12168	18"	PIGNUT HICKORY
12169	15"	PIGNUT HICKORY
12170	24"	WHITE OAK
12171	24"	BLACK CHERRY
12172	10"	CHINQUAPIN OAK
12173	24"	NORTHERN RED OAK
12174	10"	RED MAPLE
12175	15"	NORTHERN RED OAK
12176	15"	RED MAPLE
12177	15"	SCARLET OAK
12178	18"	SWAMP CHESTNUT OAK
12179	8"	AMERICAN BEECH
12180	12"	SWEET BIRCH
12181	18"	NORTHERN RED OAK
12182	10"	PIGNUT HICKORY
12183	10"	AMERICAN BEECH
12184	36"	PIN OAK
12185	32"	NORTHERN RED OAK
12186	15"	NORTHERN RED OAK
12187	28"	RED MAPLE
12188	10"	RED MAPLE
12189	15"	RED MAPLE
12190	28"	EASTERN WHITE PINE
12191	8"	WHITE ASH
12192	36"	BLACK POPLAR
12193	28"	WHITE OAK
12194	10"	BLACK OAK
12195	24"	SWEET GUM
12196	10"	NORTHERN RED OAK
12198	12"	WHITE OAK
12199	18"	NORTHERN RED OAK
12200	15"	SWEET BIRCH
12201	8"	SWEET BIRCH
12202	10"	NORTHERN RED MAPLE
12203	10"	WHITE MAPLE
12204	18"	BLACK OAK
12205	10"	SWEET BIRCH
12206	18"	BLACK OAK
12207	10"	SWEET BIRCH
12208	15"	NORWAY MAPLE
12209	24"	BLACK OAK
12210	10"	BLACK OAK
12

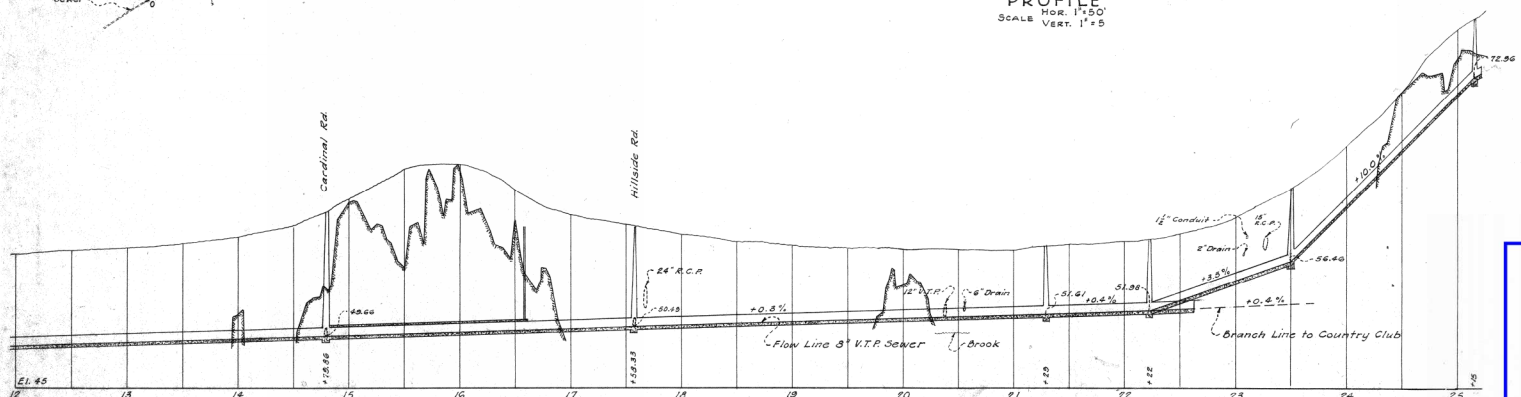
PLATE F



PLAN
SCALE 1" = 50'

TYPICAL SECTION SHOWING
V. T. P. SEWER
A - CONCRETE SADDLE
B & C - CONCRETE ENCASEMENT

PROFILE
SCALE HOR. 1"=50'
VERT. 1"=5



NOTE:
Water main on west side of Stanwich Road and north side of Fairfield Road.
Gas mains on east side of Stanwich Road and north side of Fairfield Road to Hillside Road.
Greenwich Sewer Datum.

PROVIDED AS A
FOR-REFERENCE-ONLY DOCUMENT

PLAN AND PROFILE
OF SEWER
IN
STANWICH ROAD &
FAIRFIELD ROAD
GREENWICH, CONN.

1651

Approved W. F. Johnson Sept. 6, 1961
Commissioner of Public Works

S. E. MINOR & Co., INC. CIVIL ENGINEERS
GREENWICH, CONN. Sept. 6, 1961

SCALE 1" IN = FT.

RECORD

Stanwich Road & Fairfield Road
Plan and Profile of Sewer-Record Map
Drawing #4

GENERAL NOTES

1. NOTIFY "CALL BEFORE YOU DIG" AT 1-800-922-4455 AND OTHER UTILITY OWNERS IN THE AREA NOT ON THE "CALL BEFORE YOU DIG" LIST AT LEAST 72 HOURS PRIOR TO ANY DIGGING, TRENCHING, ROCK REMOVAL, DEMOLITION, BORING, BACKFILLING, GRADING, LANDSCAPING, OR ANY OTHER EARTH MOVING OPERATIONS.
2. REFERENCE IS MADE TO PLAN ENTITLED "PROPERTY/ BOUNDARY & TOPOGRAPHIC SURVEY" PREPARED FOR GREENWICH CENTRAL MIDDLE SCHOOL. PREPARED BY MARTIN SURVEYING ASSOCIATES, LLC, DATED MAY 22, 2023.
3. LOCATIONS OF EXISTING UTILITIES ARE APPROXIMATE. IN ADDITION, SOME UTILITIES MAY NOT BE SHOWN. DETERMINE THE EXACT LOCATION OF UTILITIES BY TEST PIT OR OTHER METHODS, AS NECESSARY TO PREVENT DAMAGE TO UTILITIES AND/OR INTERRUPTIONS IN UTILITY SERVICE. PERFORM TEST PIT EXCAVATIONS AND OTHER INVESTIGATIONS TO LOCATE UTILITIES, AND PROVIDE THIS INFORMATION TO THE ENGINEER, PRIOR TO CONSTRUCTING THE PROPOSED IMPROVEMENTS. LOCATE ALL EXISTING UTILITIES TO BE CROSSED BY HAND EXCAVATION.
4. NOT ALL OF THE UTILITY SERVICES TO BUILDING ARE SHOWN. THE CONTRACTOR SHALL ANTICIPATE THAT THE PROPERTY HAS SERVICE CONNECTIONS FOR THE VARIOUS UTILITIES.
5. BOLD TEXT AND LINES INDICATE PROPOSED WORK. LIGHT TEXT AND LINES INDICATE APPROXIMATE EXISTING CONDITIONS.
6. TIGHE & BOND ASSUMES NO RESPONSIBILITY FOR ANY ISSUES, LEGAL OR OTHERWISE, RESULTING FROM CHANGES MADE TO THESE DRAWINGS WITHOUT WRITTEN AUTHORIZATION FROM TIGHE & BOND.
7. EXCAVATE ADDITIONAL TEST PITS TO LOCATE EXISTING UTILITIES AS DIRECTED OR APPROVED BY THE ENGINEER.
8. NOTIFY THE ENGINEER OF ANY UTILITIES IDENTIFIED DURING CONSTRUCTION THAT ARE NOT SHOWN ON THE DRAWINGS OR THAT DIFFER IN SIZE OR MATERIAL.
9. THE CONTRACTOR IS RESPONSIBLE FOR SITE SAFETY: COORDINATION WITH THE OWNER, ALL SUBCONTRACTORS, AND WITH OTHER CONTRACTORS WORKING WITHIN THE LIMITS OF WORK, THE MEANS AND METHODS OF CONSTRUCTING THE PROPOSED WORK.
10. OBTAIN, PAY FOR AND COMPLY WITH PERMITS, NOTICES AND FEES NECESSARY TO COMPLETE THE WORK. ARRANGE AND PAY FOR NECESSARY INSPECTIONS AND APPROVALS FROM THE JURISDICTIONAL AUTHORITIES.
11. SHORE UTILITY TRENCHES WHERE FIELD CONDITIONS DICTATE AND/OR WHERE REQUIRED BY LOCAL, STATE AND FEDERAL HEALTH AND SAFETY CODES.
12. FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO CONSTRUCTION. IF FIELD CONDITIONS ARE OBSERVED THAT VARY SIGNIFICANTLY FROM THOSE SHOWN ON THE DRAWINGS, IMMEDIATELY NOTIFY THE ENGINEER IN WRITING FOR RESOLUTION OF THE CONFLICTING INFORMATION.
13. ALL CONSTRUCTION SHALL COMPLY WITH THE TOWN OF GREENWICH REQUIREMENTS, THE STATE OF CONNECTICUT BASIC BUILDING CODE, AMERICANS WITH DISABILITIES ACT (ADA), THE CONNECTICUT GUIDELINES FOR SOIL AND EROSION AND SEDIMENT CONTROL, OSHA, CT DOT FORM 818 (LATEST EDITION).
14. ALL DEVELOPMENT ACTIVITIES TO BE UNDERTAKEN WITHIN THE STREET RIGHT-OF-WAY AND OTHER PUBLIC LANDS SHALL COMPLY FULLY WITH TOWN STANDARDS UNLESS APPROVED DEVIATION IS SPECIFICALLY SET FORTH AS PART OF THIES APPLICATION. ALL WORK WITHIN THE STATE RIGHT-OF-WAY WILL COMPLY WITH THE CT DOT FORM 818 WITH THE LATEST SPECIAL PROVISIONS AND TYPICAL STATE STANDARD DETAILS.
15. PROTECT AND MAINTAIN ALL UTILITIES IN THE AREAS UNDER CONSTRUCTION DURING THE WORK. LEAVE ALL PIPES AND STRUCTURES WITHIN THE LIMITS OF THE CONTRACT IN A CLEAN AND OPERABLE CONDITION AT THE COMPLETION OF THE WORK. TAKE ALL NECESSARY PRECAUTIONS TO PREVENT SAND AND SILT FROM DISTURBED AREAS FROM ENTERING THE DRAINAGE SYSTEM.
16. NOTIFY THE ENGINEER IN WRITING OF ANY CONFLICT, ERROR, AMBIGUITY, OR DISCREPANCY WITH THE PLANS OR BETWEEN THE PLANS AND ANY APPLICABLE LAW, REGULATION, CODE, STANDARD SPECIFICATION, OR MANUFACTURER'S INSTRUCTIONS.
17. THE CONTRACTOR IS RESPONSIBLE FOR SUPPORT OF EXISTING UTILITIES AND REPAIR OR REPLACEMENT COSTS OF UTILITIES DAMAGED DURING CONSTRUCTION, WHETHER ABOVE OR BELOW GRADE. REPLACE DAMAGED UTILITIES IMMEDIATELY AT NO ADDITIONAL COST TO THE OWNER AND AT NO COST TO THE PROPERTY OWNER.
18. TAKE NECESSARY MEASURES AND PROVIDE CONTINUOUS BARRIERS OF SUFFICIENT TYPE, SIZE, AND STRENGTH TO PREVENT ACCESS TO ALL WORK AND STAGING AREAS AT THE COMPLETION OF EACH DAYS WORK.
19. NO OPEN TRENCHES WILL BE ALLOWED OVER NIGHT. THE USE OF ROAD PLATES TO PROTECT THE EXCAVATION WILL BE CONSIDERED UPON REQUEST. BUT BACKFILLING IS PREFERRED.
20. THE CONTRACTOR IS RESPONSIBLE FOR ALL NECESSARY TRAFFIC CONTROL/SAFETY DEVICES TO ENSURE SAFE VEHICULAR AND PEDESTRIAN ACCESS THROUGH THE WORK AREA, OR FOR SAFELY IMPLEMENTING DETOURS AROUND THE WORK AREA. PERFORM TRAFFIC CONTROL IN ACCORDANCE WITH THE CONTRACTOR'S APPROVED TRAFFIC CONTROL PLAN.
21. MAINTAIN EMERGENCY ACCESS TO ALL PROPERTIES WITHIN THE PROJECT AREA AT ALL TIMES DURING CONSTRUCTION.
22. WHEN WORKING IN THE ROAD, PROVIDE THE OWNER AND LOCAL FIRE/POLICE/SCHOOL AUTHORITIES A DETAILED PLAN OF APPROACH INDICATING METHODS OF PROPOSED TRAFFIC ROUTING ON A DAILY BASIS. PROVIDE COORDINATION TO ENSURE COMMUNICATION AND COORDINATION BETWEEN THE OWNER, CONTRACTOR AND LOCAL FIRE/POLICE/SCHOOL AUTHORITIES THROUGHOUT THE CONSTRUCTION PERIOD.
23. REMOVE AND DISPOSE OF ALL CONSTRUCTION-RELATED WASTE MATERIALS AND DEBRIS IN STRICT ACCORDANCE WITH ALL APPLICABLE LOCAL, STATE, AND FEDERAL LAWS.
24. REMOVE STUMPS AND BRUSH FROM SITE, OR CHIP AND USE DURING LANDSCAPING. DO NOT BURY STUMPS ON SITE.
25. THE TERM "DEMOLISH" USED ON THE DRAWINGS MEANS TO REMOVE AND DISPOSE OF IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL REQUIREMENTS.
26. THE TERM "ABANDON" USED ON THE DRAWINGS MEANS TO LEAVE IN PLACE AND TAKE APPROPRIATE MEASURES TO DECOMMISSION AS SPECIFIED OR NOTED ON THE DRAWINGS.
27. ALL PROPOSED WORK MAY BE ADJUSTED IN THE FIELD BY THE OWNER'S PROJECT REPRESENTATIVE TO MEET EXISTING CONDITIONS.
28. SPECIAL ATTENTION OF THE CONTRACTOR IS CALLED TO THE REQUIRED TYPE AND COMPACTION OF PIPE BEDDING AND BACKFILL SPECIFIED ON THESE DRAWINGS. THESE REQUIREMENTS WILL BE STRICTLY ENFORCED.
29. THE GENERAL CONTRACTOR SHALL RETAIN A PROFESSIONAL ENGINEER OR LAND SURVEYOR REGISTERED BY THE STATE OF CONNECTICUT TO LAY OUT THE BUILDING, UNDERGROUND UTILITY LINES, AND OTHER SITE WORK FROM THE HORIZONTAL AND VERTICAL CONTROL INFORMATION FURNISHED BY THE OWNER AND TO ESTABLISH AND RECORD THE NECESSARY ELEVATIONS, AT NO ADDITIONAL COST TO THE OWNER.
30. THE GENERAL CONTRACTOR SHALL FORWARD A LETTER FROM HIS LAND SURVEYOR OR PROFESSIONAL ENGINEER STATING THAT THE CONTROL INFORMATION FURNISHED BY THE OWNER IS ACCURATE OR SHALL IDENTIFY INACCURACIES, IF THEY EXIST. THE GENERAL CONTRACTOR SHALL NOT TAKE ADVANTAGE OF ERRORS, WHICH MAY BE INCLUDED IN THE CONTROL INFORMATION. STAKES AND MARKINGS SHALL BE PRESERVED.
31. PRIOR TO ISSUANCE OF A CERTIFICATE OF OCCUPANCY, THE ENGINEERING BUREAU MAY REQUIRE A CERTIFICATION LETTER STATING THAT THE DEVELOPMENT WAS CONSTRUCTED IN ACCORDANCE TO THE APPROVED PLANS, AND AN "AS-BUILT" DRAWING SHALL BE SUBMITTED.
32. THE GENERAL CONTRACTOR IS RESPONSIBLE FOR COORDINATING WITH A LICENSED SURVEYOR TO PREPARE AN "AS-BUILT" PLAN. THE CONTRACTOR IS RESPONSIBLE TO COORDINATE WITH A SITE ENGINEER 48 HOURS PRIOR TO ANY INSPECTIONS.
33. THE ENGINEERING DIVISION OF THE DEPARTMENT OF PUBLIC WORKS AND THE INSPECTING ENGINEER SHALL BE NOTIFIED BY THE CONTRACTOR THREE (3) DAYS PRIOR TO THE COMMENCEMENT OF EACH PHASE OF CONSTRUCTION.
34. THE WORK SHALL BE DONE IN CONFORMANCE WITH THE CONTRACT DOCUMENTS/PLANS UNLESS CHANGES HAVE BEEN APPROVED IN WRITING BY THE DESIGN ENGINEER PRIOR TO THE WORK BEING DONE.
35. A PRECONSTRUCTION MEETING SHALL BE HELD WITH THE OWNER, ARCHITECT AND ENGINEER TO REVIEW THE SCOPE OF CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE TO COORDINATE THE PRECONSTRUCTION MEETING.
36. ALL CONSTRUCTION SHALL MEET OR EXCEED TOWN OF GREENWICH AND STATE OF CONNECTICUT STANDARDS AND SPECIFICATIONS, INCLUDING APPLICABLE SECTIONS OF THE CONNECTICUT AND TOWN OF GREENWICH BUILDING AND HEALTH CODES.
37. ALL CONSTRUCTION SHALL BE OBSERVED BY A PROFESSIONAL ENGINEER PRIOR TO BACKFILL AND AS THE WORK PROGRESSES.
38. UPON COMPLETION OF CONSTRUCTION AND PRIOR TO THE ISSUANCE OF A CERTIFICATE OF OCCUPANCY, A LETTER OF CERTIFICATION FROM A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF CONNECTICUT AND AN "IMPROVEMENT SURVEY" MAP THAT DEPICTS AS-BUILT CONDITIONS FROM A LAND SURVEYOR REGISTERED IN THE STATE OF CONNECTICUT SHALL BE SUBMITTED TO THE ENGINEERING DIVISION OF THE PUBLIC WORKS DEPARTMENT FOR REVIEW AND APPROVAL FOR THE PURPOSE OF CONFIRMING THAT CONSTRUCTION WAS COMPLETED SUBSTANTIALLY IN COMPLIANCE WITH THE APPROVED PLANS AS AMENDED FROM TIME TO TIME.
39. A CERTIFICATION TO THE SATISFACTION OF THE TOWN ENGINEER SHALL BE SUBMITTED BY A REGISTERED PROFESSIONAL ENGINEER DECLARING THAT CONSTRUCTION HAS BEEN COMPLETED SUBSTANTIALLY IN ACCORDANCE WITH THE APPROVED PLANS.

TOWN OF GREENWICH STANDARD CONSTRUCTION NOTES

1. A HIGHWAY PERMIT IS REQUIRED FOR ALL WORK WITHIN THE TOWN OF GREENWICH - RIGHT OF WAY.
2. ALL WORK WITHIN THE TOWN OF GREENWICH -- RIGHT OF WAY SHALL BE CONSTRUCTED TO TOWN OF GREENWICH STANDARDS.
3. CATCH BASINS FOR PRIVATE DRIVEWAYS SHALL HAVE A MINIMUM GRATE OF TWO FEET BY TWO FEET. IF THE DRIVEWAY IS CURBED THE CATCH BASIN SHALL HAVE A MINIMUM CURB INLET OF SIX INCHES. EACH DRIVEWAY CATCH BASIN SHALL ALSO HAVE A MINIMUM TWO -FOOT SUMP AND BELL TRAP.
4. ALL DRAINAGE CONNECTIONS TO THE TOWN DRAINAGE SYSTEM SHALL BE GRAVITY LINES. IF A DISCHARGE FROM A SUMP PUMP IS CONNECTED TO THE TOWN DRAINAGE SYSTEM, IT MUST DISCHARGE TO A DRAINAGE STRUCTURE ON PRIVATE PROPERTY AND THEN BE CONNECTED TO THE TOWN DRAINAGE SYSTEM. ALL SUMP PUMPS REQUIRE A BACKFLOW PREVENTER (CHECK VALVE) BETWEEN THE PUMP AND THE DRAINAGE STRUCTURE. A DRAIN CONNECTION PERMIT FROM THE HIGHWAY DIVISION IS REQUIRED FOR ALL CONNECTIONS TO THE TOWN DRAINAGE SYSTEM.
5. IN ROADWAY CUTS, SUBDRAINS SHALL BE REQUIRED IF SEEPAGE OCCURS DURING CONSTRUCTION OR WITHIN ONE YEAR AFTER ROAD CONSTRUCTION IS COMPLETED AND ACCEPTED, EVEN THOUGH PLANS MAY HAVE BEEN APPROVED WITHOUT SUBDRAINS AND/OR ROADWAY CONSTRUCTION HAS BEEN COMPLETED.
6. ALL RETAINING WALLS GREATER THAN THREE FEET ARE REQUIRED TO BE DESIGNED, AND INSPECTED DURING CONSTRUCTION BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF CONNECTICUT.
7. ALL DETENTION/RETENTION SYSTEMS SHALL BE INSTALLED PER MANUFACTURER'S SPECIFICATIONS. ALL SYSTEMS SHALL USE A MANIFOLD SYSTEM TO DISTRIBUTE RUNOFF EVENLY INTO EACH ROW OF INFILTRATORS. DETENTION SYSTEMS WILL HAVE A MANIFOLD SYSTEM THAT CREATES THE LONGEST TRAVEL TIME TO THE CONTROL STRUCTURE. ALL DETENTION/RETENTION SYSTEMS MUST USE A STRUCTURE SUCH AS A MANHOLE FOR THE CONTROL STRUCTURE SO ALL FLOW CONTROL DEVICES CAN BE ACCESSED FOR MAINTENANCE.
8. ALL INFILTRATION SYSTEMS MUST MEET THE STORMWATER INFILTRATION/RECHARGE DESIGN REQUIREMENTS IN APPENDIX B OF THE TOWN OF GREENWICH DRAINAGE MANUAL. THERE MUST BE AT LEAST A 2-FOOT SEPARATION DISTANCE FROM THE BOTTOM OF STONE BELOW THE INFILTRATION STRUCTURE TO THE SEASONAL HIGH GROUNDWATER OR BEDROCK/LEDGE (THIS SEPARATION REQUIREMENT MAY BE WAIVED OR REDUCED BY THE APPROVING AUTHORITY ON A CASE-BY-CASE BASIS). A 3-FOOT SEPARATION DISTANCE IS REQUIRED FROM THE BOTTOM OF STONE BELOW THE INFILTRATION STRUCTURE TO SEASONAL HIGH GROUNDWATER FOR LAND USES WITH HIGHER POTENTIAL POLLUTANT LOADS (HIGH LOAD AREAS). PRIOR TO THE INSTALLATION OF THE INFILTRATORS THE ENGINEER SHALL VERIFY THE INFILTRATION STRUCTURE IS BEING INSTALLED IN THE APPROVED LOCATION AND IF THE LOCATION HAS BEEN CHANGED ADDITIONAL SOIL TESTING SHALL BE PERFORMED AND THE ENGINEER SHALL APPROVE THE REVISED LOCATION. A REVIEW BY THE APPROVING AUTHORITY WILL BE REQUIRED.
9. EACH BMP TO BE INSTALLED SHALL HAVE THE SOILS BENEATH THE BMP SCARIFIED OR TILLED TO IMPROVE INFILTRATION.
10. THE CONTRACTOR MUST CONSTRUCT THE BIORETENTION AREA FOLLOWING THE SPECIFICATIONS IN APPENDIX G OF THE TOWN OF GREENWICH DRAINAGE MANUAL FEBRUARY 2012 AS AMENDED.
11. ALL AREAS THAT ARE USED BY CONSTRUCTION EQUIPMENT AND USED FOR CONTRACTOR PARKING MUST HAVE THE SOIL TILLED 12 TO 16 INCHES AND AMENDED WITH SMALL AMOUNTS OF ORGANIC MATERIAL IF NEEDED. THE AREA TO BE RESTORED SHALL BE DETERMINED BY THE SITE ENGINEER.
12. COMPOST-AMENDED SOILS MUST FOLLOW THE REQUIREMENTS AS STATED IN THE TOWN OF GREENWICH DRAINAGE MANUAL FEBRUARY 2012 AS AMENDED.
13. TO OBTAIN A CERTIFICATE OF OCCUPANCY THE SUBMITTAL MUST INCLUDE THE FOLLOWING:
    - ITEMS ON CHECKLIST FOR CERTIFICATE OF OCCUPANCY — FORM CL-105
    - IMPROVEMENT LOCATION SURVEY (ITEMS ON CHECKLIST FOR IMPROVEMENT LOCATION SURVEY DEPICTING "AS-BUILT" CONDITIONS - FORM CL-106)

LEGEND

DESCRIPTION	EXISTING	PROPOSED
PROPERTY LINE		
RIGHT-OF-WAY LINE		
EASEMENT LINE		
LIMITS OF WORK		
INTERMEDIATE CONTOURS		
INDEX CONTOURS	25	25
SPOT GRADE	X 141.2	+ 33.0
MAGNITUDE & DIRECTION OF SLOPE		0.05%
STORM DRAIN	SD	SD
STORM UNDERDRAIN		UD
GRAVITY SANITARY SEWER	SS	SS
SANITARY SEWER FORCE MAIN	SFM	SFM
SANITARY SEWER LOW PRESSURE	SSLP	SSLP
SANITARY SEWER COMBINED	COMB	COMB
WATER SERVICE	W	W
POTABLE WATER	PW	PW
FIRE SERVICE		F
HIGH PRESSURE FIRE SERVICE		HF
UNDERGROUND ELECTRIC	E	E
PRIMARY ELECTRIC SERVICE	PE	PE
SECONDARY ELECTRIC	SE	SE
OVERHEAD ELECTRIC	OE	OE
TELEPHONE SERVICE	T	T
TEL-DATA SERVICE	T-D	T-D
COMMUNICATIONS SERVICE	T-C	T-C
CABLE TV SERVICE	CTV	CTV
GAS SERVICE	G	G
CHILLED WATER RETURN	CWR	CWR
CHILLED WATER SUPPLY	CWS	CWS
HOT WATER RETURN	HWR	HWR
HOT WATER SUPPLY	HWS	HWS
STEAM CONDENSATE	C	C
LOW PRESSURE STEAM	LPS	LPS
MEDIUM PRESSURE STEAM	MPS	MPS
HIGH PRESSURE STEAM	HPS	HPS
OXYGEN SERVICE		O
OVERHEAD UTILITY (UNSPECIFIED)	OHW	OHW
CURB		
EDGE OF PAVEMENT		
DIRT ROAD		
SIDEWALK		
RETAINING WALL		
STONE WALL		
FENCE - UNSPECIFIED	X X X	X X X
FENCE - CHAIN LINK		
FENCE - WOOD POST		
GUARDRAIL		
METAL BEAM RAIL		
TRAIN TRACKS		
STORM DRAIN STRUCTURES	MANHOLE, CATCH BASIN	MANHOLE, AREA DRAIN, CATCH BASIN
SANITARY SEWER MANHOLE		
WATER SERVICE STRUCTURES	HYDRANT, MANHOLE, VALVE	HYDRANT, MANHOLE, VALVE
GAS SERVICE STRUCTURES	MANHOLE, VALVE	MANHOLE, VALVE
ELECTRIC SERVICE STRUCTURES	UTILITY CO. POLE #, MANHOLE, LIGHT	UTILITY CO. POLE #, MANHOLE, LIGHT
TELECOMMUNICATIONS MANHOLE		
TREELINE		
TREE	EVERGREEN, DECIDUOUS	EVERGREEN, DECIDUOUS

ABBREVIATIONS

ABON(*D)	ABANDON(ED)
AC	ASBESTOS CEMENT PIPE
BC	BITUMINOUS CURB
BFP	BACK FLOW PREVENTOR
BIT	BITUMINOUS
BL	BASELINE
BLDG	BUILDING
BND	BOUND
BOC	BOTTOM OF CURB
BOT	BOTTOM
BS	BOTTOM OF STEP
BW	BOTTOM OF WALL
CATV	CABLE TELEVISION
CB	CATCH BASIN
CEM	CEMENT
CI	CAST IRON PIPE
CL	CENTERLINE
CLF	CHAIN LINK FENCE
CO	CLEAN OUT
CONC	CONCRETE
CPP	CORRUGATED POLYETHYLENE PIPE
CY	CUBIC YARD
DH	DRILL HOLE
DI	DUCTILE IRON PIPE
DIA	DIAMETER
DMH	DRAIN MANHOLE
E	EAST
EF	EACH FACE
EG	EXISTING GRADE
EL/ELEV	ELEVATION
ELEC	ELECTRIC
EMH	ELECTRIC MANHOLE
EOP	EDGE OF PAVEMENT
EW	EACH WAY
EXIST	EXISTING
FES	FLARED END SECTION
FF	FINISH FLOOR
FM	FORCE MAIN
G	GAS
GG	GAS GATE
GRAN	GRANITE
HC	HANDICAP
HDPE	HIGH DENSITY POLYETHYLENE
HMA	HOT MIX ASPHALT
HYD	HYDRANT
IN	INCHES
INV	INVERT
IP	IRON PIN
L	LENGTH OF CURB
LP	LIGHT POLE
LT	LEFT
MAX	MAXIMUM
MH	MANHOLE
MIN	MINIMUM
MISC	MISCELLANEOUS
MON	MONUMENT
MJ	MECHANICAL JOINT

ABBREVIATIONS CONT'D

N	NORTH
NITC	NOT IN THIS CONTRACT
NTS	NOT TO SCALE
N/A	NOT APPLICABLE
N/F	NOW OR FORMERLY
OC	ON CENTER
OCS	OUTLET CONTROL STRUCTURE
OH	OVERHEAD
PB	PLANT BED
PC	POINT OF CURVATURE
PCC	POINT OF COMPOUND CURVATURE
PCPP	PERFORATED CORRUGATED POLYETHYLENE PIPE
PERF	PERFORATED
PI	POINT OF INTERSECTION
PRC	POINT OF REVERSE-CURVATURE
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PT	POINT OF TANGENCY
PVC	POLYVINYLCHLORIDE
PVMT	PAVEMENT
R	RADIUS
RCP	REINFORCED CONCRETE PIPE
RD	ROOF DRAIN
REV	REVISION
ROW	RIGHT OF WAY
RT	RIGHT
R&D	REMOVE AND DISPOSE
R&R	REMOVE AND RESET
R&S	REMOVE AND STACK
S	SOUTH
SAN	SANITARY
SCH	SCHEDULE
SF	SQUARE FOOT
SMH	SEWER MANHOLE
SS	STAINLESS STEEL
STA	STATION
STL	STEEL
STRM	STORM
T	TANGENT LENGTH
TC	TOP OF CURB
TEL	TEL-DATA
TP	TEST PIT
TS	TOP OF STEP
TW	TOP OF WALL
TYP	TYPICAL
UP	UTILITY POLE
W	WATER
WG	WATER GATE
WV	WATER VALVE
XFMR	TRANSFORMER
VIF	VERIFY IN FIELD

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Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N

NORTH
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SOUTH
KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

GENERAL NOTES, ABBREVIATIONS, AND LEGEND

Date: 07/08/2024
Scale: AS SHOWN
Proj Number: 22367.00
Drawing Number: C001

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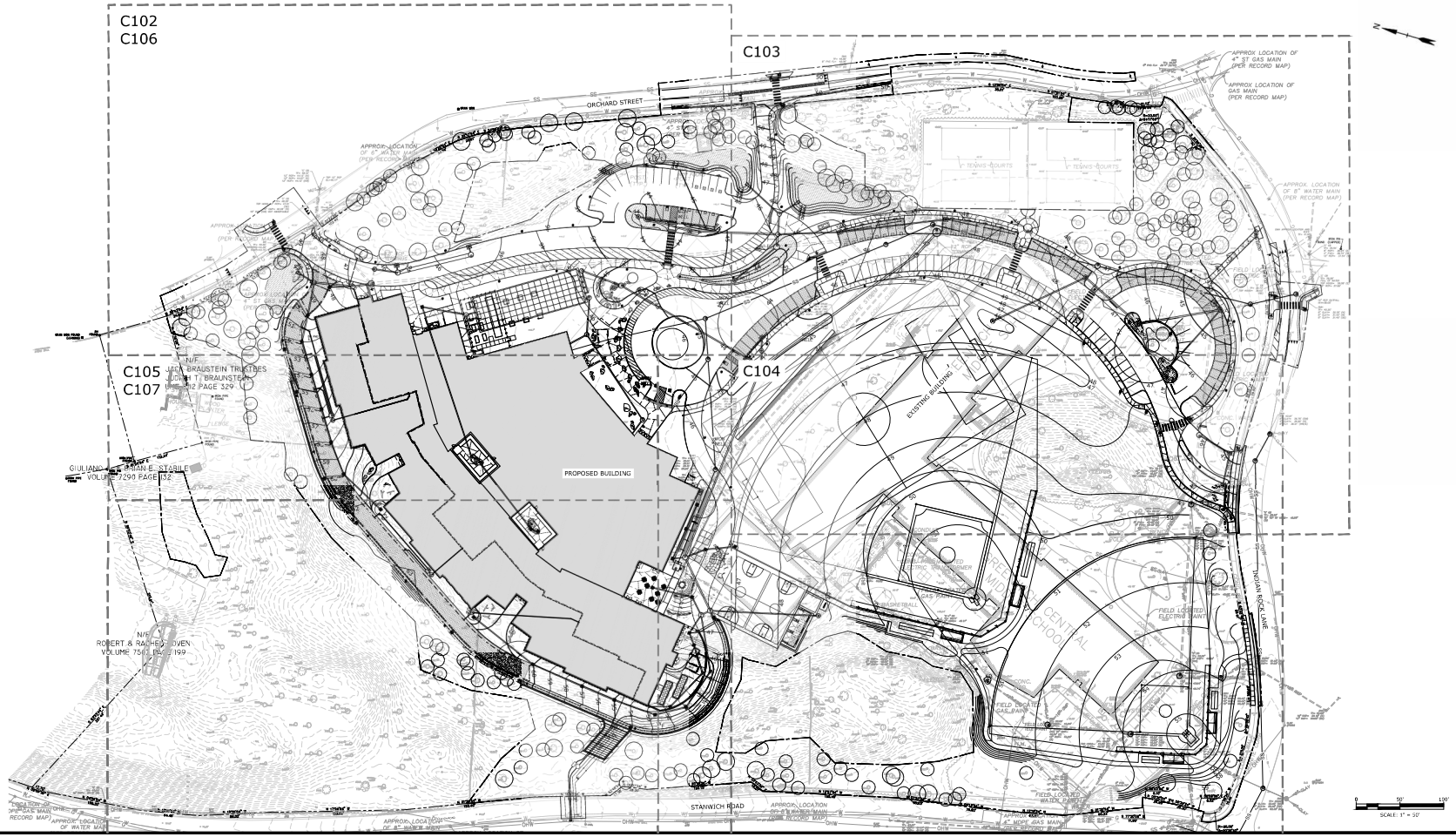

SITE STORMWATER NOTES

1. REFERENCE IS MADE TO PLAN ENTITLED "PROPERTY/ BOUNDARY & TOPOGRAPHIC SURVEY" PREPARED FOR GREENWICH CENTRAL MIDDLE SCHOOL. PREPARED BY MARTIN SURVEYING ASSOCIATES, LLC, DATED MAY 22, 2023.
2. ELEVATIONS REFER TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 - NAVD88.
3. THE CONTRACTOR SHALL COORDINATE/VERIFY THE EXACT SIZES, LOCATIONS, ELEVATIONS, OF ALL PROPOSED BUILDING UTILITY SERVICES WITH THE PROJECT MECHANICAL, ELECTRICAL AND PLUMBING DRAWINGS PRIOR TO ANY CONSTRUCTION OPERATIONS.
4. THE CONTRACTOR SHALL COORDINATE HIS WORK WITH THE WORK DONE BY THE RESPECTIVE UTILITY COMPANIES.
5. INSTALL CLEANOUT TO GRADE 5' OFF FACE OF BUILDING ON ALL ROOF LEADERS.
6. THE CONTRACTOR SHALL MAINTAIN EXISTING STORM SEWER FLOWS BY PUMPING OR OTHER MEANS APPROVED BY THE OWNER'S REPRESENTATIVE DURING CONSTRUCTION OF THE PROPOSED STORM SEWER IN LOCATIONS WHERE SEWERS ARE BEING INSTALLED, REPLACED OR RELOCATED.
7. ALL PROPOSED ROOF DRAINS FOR THE PROPOSED BUILDINGS SHALL BE CONNECTED TO THE PROPOSED STORM DRAINAGE SYSTEMS AS DEPICTED ON SHEETS C-102 - C-105. FINAL LOCATION OF THE PROPOSED ROOF DRAINS SHALL BE COORDINATED BETWEEN THE CONTRACTOR, THE ARCHITECT, AND THE PROJECT ENGINEER.
8. THE PROPOSED BUILDING FOOTING DRAINS SHALL DISCHARGE VIA GRAVITY TO GRADE AS DEPICTED ON SHEET SHEETS C-102 - C-105. THE CONTRACTOR SHALL VERIFY THE EXISTING PIPE INVERT IN THE FILED PRIOR TO START OF CONSTRUCTION.
9. MINIMUM COVER ON ALL PIPES SHALL BE TWO FEET (2') UNLESS OTHERWISE NOTED.
10. ALL PIPE SHALL BE INSTALLED STRAIGHT AND AT THE VERTICAL AND HORIZONTAL ALIGNMENT SHOWN. PIPES SHALL HAVE A UNIFORM SLOPE AS SPECIFIED.
11. ALL STORM PIPES AND FITTINGS SPECIFIED AS HDPE SHALL BE ADS N-12 WT (WATERTIGHT) PIPE AS MANUFACTURED BY ADVANCED DRAINAGE SYSTEMS, HILLIARD, OHIO, OR APPROVED EQUAL.
12. ALL STORM PIPE SPECIFIED AS POLY VINYL CHLORIDE PIPE (PVC) SHALL BE SDR 35 WITH RUBBER GASKETED JOINTS AND MEET THE REQUIREMENTS OF ASTM D3034 AND D3212.
13. INSTALL "FERNCO" STYLE SHIELDED COUPLINGS AT ALL LOCATIONS WHERE JOINING PIPES OF DIFFERENT MATERIALS AND/OR SIZES PER MANUFACTURER'S RECOMMENDATIONS. "FERNCO" STYLE SHIELDED COUPLINGS SHALL BE BANDED RUBBER (SHIELD COUPLINGS) GASKETED COUPLING TYPE WITH TYPE 316 S.S. HARDWARE AND OUTSIDE SHEER RING SHALL BE STRONG BACK SEWER COUPLING RC 5000 SERIES BY FERNCO, FLEX-SEAL ADJUSTABLE REPAIR COUPLING (ARC) BY MISSION RUBER COMPANY, OR APPROVED EQUAL.
14. ALL CATCH BASINS SHALL HAVE A FOUR-FOOT (4') SUMP WITH BELL TRAPS OR 90° PVC ELBOWS PER TOWN OF GREENWICH STANDARD DETAILS AND YARD DRAINS SHALL HAVE A TWO-FOOT (2') SUMP WITH BELL TRAPS OR 90° PVC ELBOWS.
15. THE LOCATIONS OF ITEMS NOT DIMENSIONED ON THE DRAWINGS SHALL BE FIELD STAKED BY THE CONTRACTOR AND THEIR LOCATIONS APPROVED BY THE OWNER'S REPRESENTATIVE PRIOR TO INSTALLATION.
16. THE CONTRACTOR SHALL ADJUST THE TOP OF FRAME/GRATE ELEVATIONS OF ALL EXISTING AND PROPOSED SANITARY/STORM/WATER MANHOLES, CATCH BASINS, AREA DRAINS, VALVE COVERS AND APPURTENANCES, WITHIN THE PROJECT LIMIT LINE TO MEET THE PROPOSED GRADES.
17. WHEN RAISING EXISTING CATCH BASINS AND MANHOLES TO FINISHED GRADE, CONTRACTOR SHALL NOT EXCEED THE MAXIMUM AMOUNT OF BRICK COURSES AS SHOWN ON THE DETAILS. CONTRACTOR SHALL RAISE STRUCTURE WITH STANDARD MANHOLE/CATCH BASIN COMPONENTS AS APPROVED BY THE ENGINEER.
18. THE MANHOLE FRAME AND COVER SHALL BE CENTERED ON THE PRECAST OPENING. UNDER NO CIRCUMSTANCES WILL AN OFFSET FRAME AND COVER BE ACCEPTABLE. PRIOR TO FINAL PAVING, THE CONTRACTOR SHALL CHECK ALL MANHOLE STRUCTURES TO ASSURE THE FRAME AND COVER IS CENTERED ON THE PRECAST OPENING. THE CONTRACTOR WILL BE RESPONSIBLE FOR ALL WORK REQUIRED TO CENTER FRAME AND COVER.
19. WHEN CONNECTING NEW PIPES TO EXISTING STRUCTURES SUCH AS MANHOLES AND CATCH BASINS, THE STRUCTURE SHALL BE COMPLETELY CLEANED OUT. THE HOLE MADE IN THE STRUCTURE SHALL BE MADE AS SMALL AS POSSIBLE. THE STRUCTURE SHALL BE REPAIRED TO MATCH ITS ORIGINAL TYPE OF CONSTRUCTION. THE JOINT BETWEEN THE STRUCTURE AND THE PIPE SHALL BE MADE WATERTIGHT BY UTILIZING AN A-LOK SYSTEM OR KOR-N-SEAL-BOOT CONNECTION.
20. UNDER NO CIRCUMSTANCES SHALL TRENCH WATER BE ALLOWED TO DRAIN OFF THROUGH SANITARY SEWER LINES.
21. ALL CRUSHED STONE SHALL BE GRADATION NO. 4 AS PER CT DOT FORM 818, ARTICLE M.01.01. STONE SHALL CONSIST OF SOUND, TOUGH, DURABLE PARTICLES FREE FROM SOFT, THIN, ELONGATED, LAMINATED, FRIABLE, MICACEOUS, OR DISINTEGRATED PIECES OF MUD, DIRT OR OTHER DELETERIOUS MATERIAL.
22. THE STORM AND SANITARY SEWER SHALL BE ENCASED IN CONCRETE FOR A DISTANCE OF 10 FEET ON EITHER SIDE OF ANY INTERSECTION BETWEEN THE SANITARY SEWER AND STORM SEWER. WHERE CONCRETE ENCASEMENT IS REQUIRED, TEMPORARILY SUPPORT THE PIPES IN PLACE. USE SUFFICIENT CONCRETE TO ENCASE PIPING NOT LESS THAN 6 INCHES AT ALL POINTS. THE ENCASEMENT SHALL BE ADEQUATELY SUPPORTED WITH A STONE BASE AND SHALL BE KEYED INTO THE FOUNDATION WALL TO PREVENT DAMAGE FROM SETTLEMENT.
23. UNDERGROUND-TYPE PLASTIC LINE MARKER: MANUFACTURER'S STANDARD PERMANENT, BRIGHT-COLORED DETECTABLE TAPE, CONTINUOUS-PRINTED PLASTIC TAPE, INTENDED FOR DIRECT-BURIAL SERVICE; NOT LESS THAN 6" WIDE X 4 MILS THICK.
24. THE CONTRACTOR SHALL COMPLETE TWO CCTV INSPECTIONS PER SPECIFICATION 33 31 13.13 OF THE 36" RCP PIPE TO REMAIN. ONE INSPECTION SHALL OCCUR PRIOR TO OBTAINING THE CERTIFICATE OF PERMIT AND THE SECOND SHALL OCCUR ONCE CONSTRUCTION IS COMPLETE. THE CCTV INSPECTIONS SHALL BE FORWARDED TO THE ENGINEER-OF-RECORD AND THE GREENWICH ENGINEERING DEPARTMENT. THE COST FOR COMPLETING THE CCTV INSPECTIONS SHALL BE INCLUDED AT NO ADDITIONAL COST TO THE OWNER."

SITE DRAINAGE LEGEND

	EXISTING	PROPOSED
WORK LIMIT LINE		
PROPERTY LINE		
SETBACK LINE		
SAWCUT		
PROPOSED STORM SEWER		
PROPOSED AREA DRAIN		
PROPOSED STORM MANHOLE		
PROPOSED RAIN GARDEN		
ROOF LEADER		
UNDER-DRAIN		
MINOR CONTOURS	115	101
MAJOR CONTOURS	120	100
SPOT ELEVATIONS	x 23.6	+37.5

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9 Indian Rock
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SOUTH
KEYPLAN

Number	Date	Issued For
1	10/16/2024	ADDENDUM #2
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

OVERALL SITE STORMWATER MANAGEMENT PLAN

Date: 07/08/2024
Scale: 1" = 50'
Proj Number: 22367.00
Drawing Number: C101

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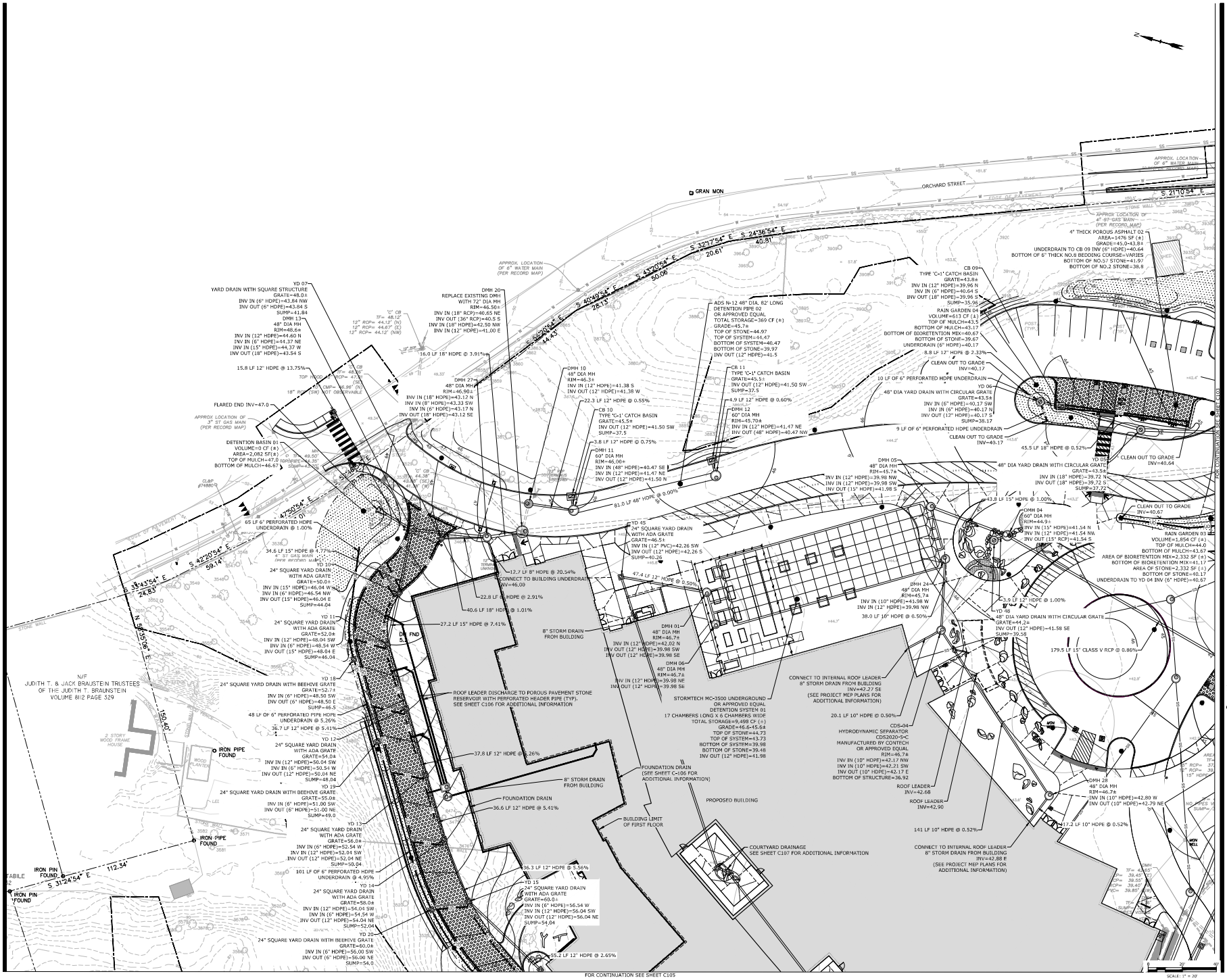

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Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SITE STORMWATER MANAGEMENT PART PLAN

Date: 07/08/2024
Scale: 1" = 20'
Proj Number: 22367.00
Drawing Number: C102

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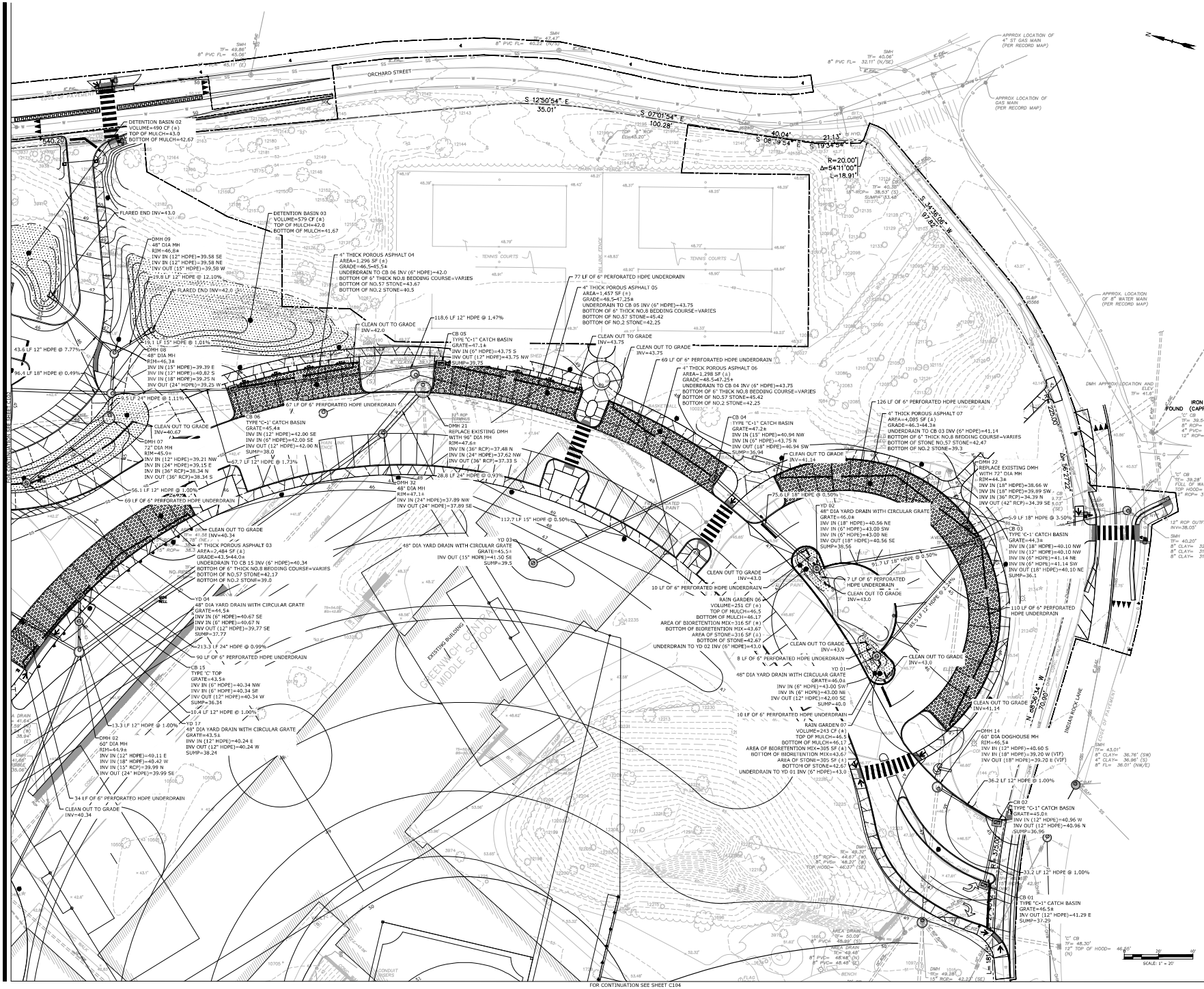

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	07/08/2024	PHASE 2

SITE STORMWATER MANAGEMENT PART PLAN

Date: 07/08/2024
Scale: 1" = 20'
Proj Number: 22367.00
Drawing Number: **C103**

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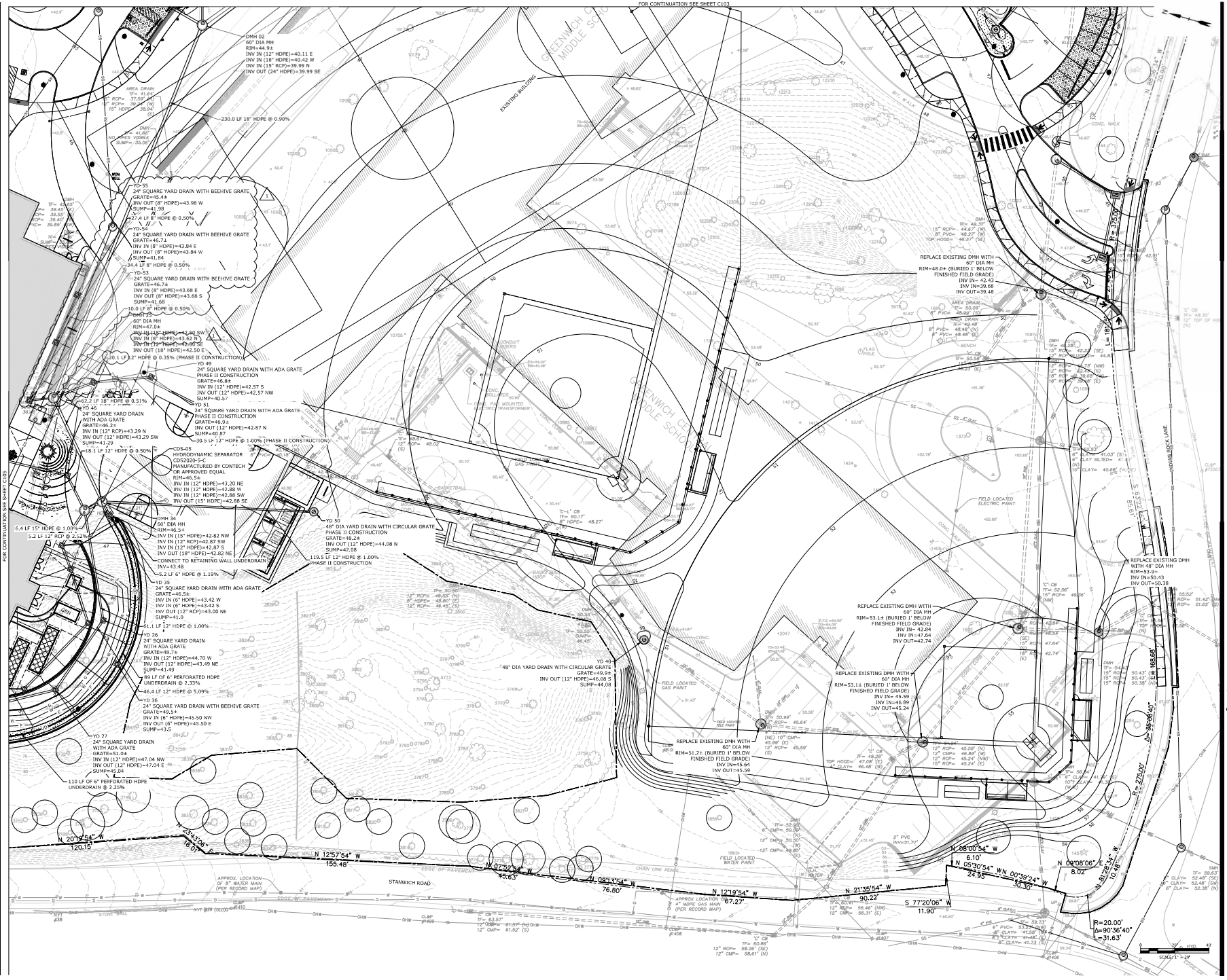

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Number	Date	Issued For
1	10/16/2024	ADDENDUM #2
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SITE STORMWATER MANAGEMENT PART PLAN

Date
07/08/2024
Scale
1" = 20'
Proj Number
22367.00

Drawing Number
C104

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Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SITE STORMWATER MANAGEMENT PART PLAN

Date: 07/08/2024
Scale: 1" = 20'
Proj Number: 22367.00
Drawing Number: **C105**

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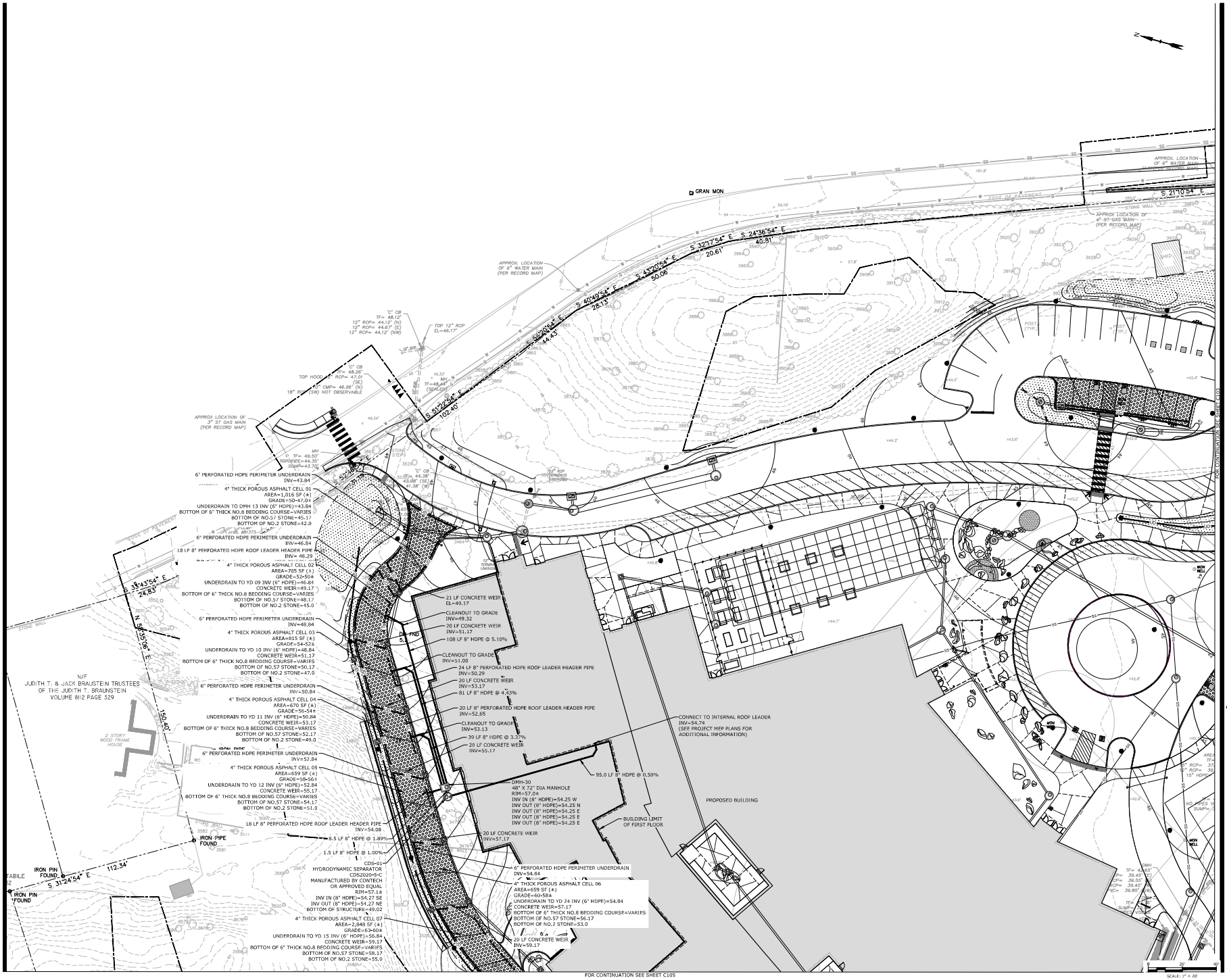

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SITE STORMWATER MANAGEMENT PART PLAN

Date: 07/08/2024
Scale: 1" = 20'
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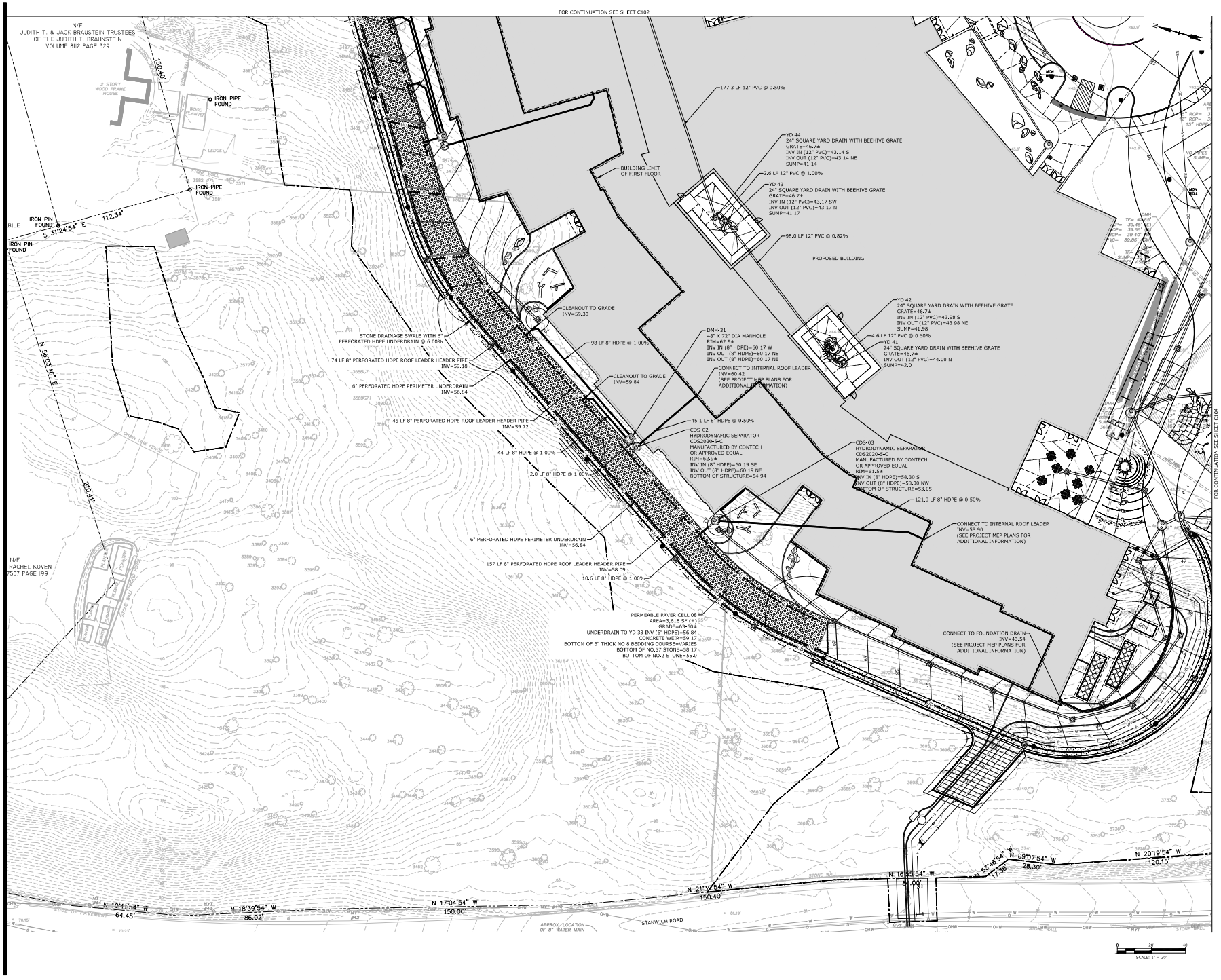

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SITE STORMWATER MANAGEMENT PART PLAN

Date: 07/08/2024
Scale: 1" = 20'
Proj Number: 22367.00
Drawing Number: **C107**

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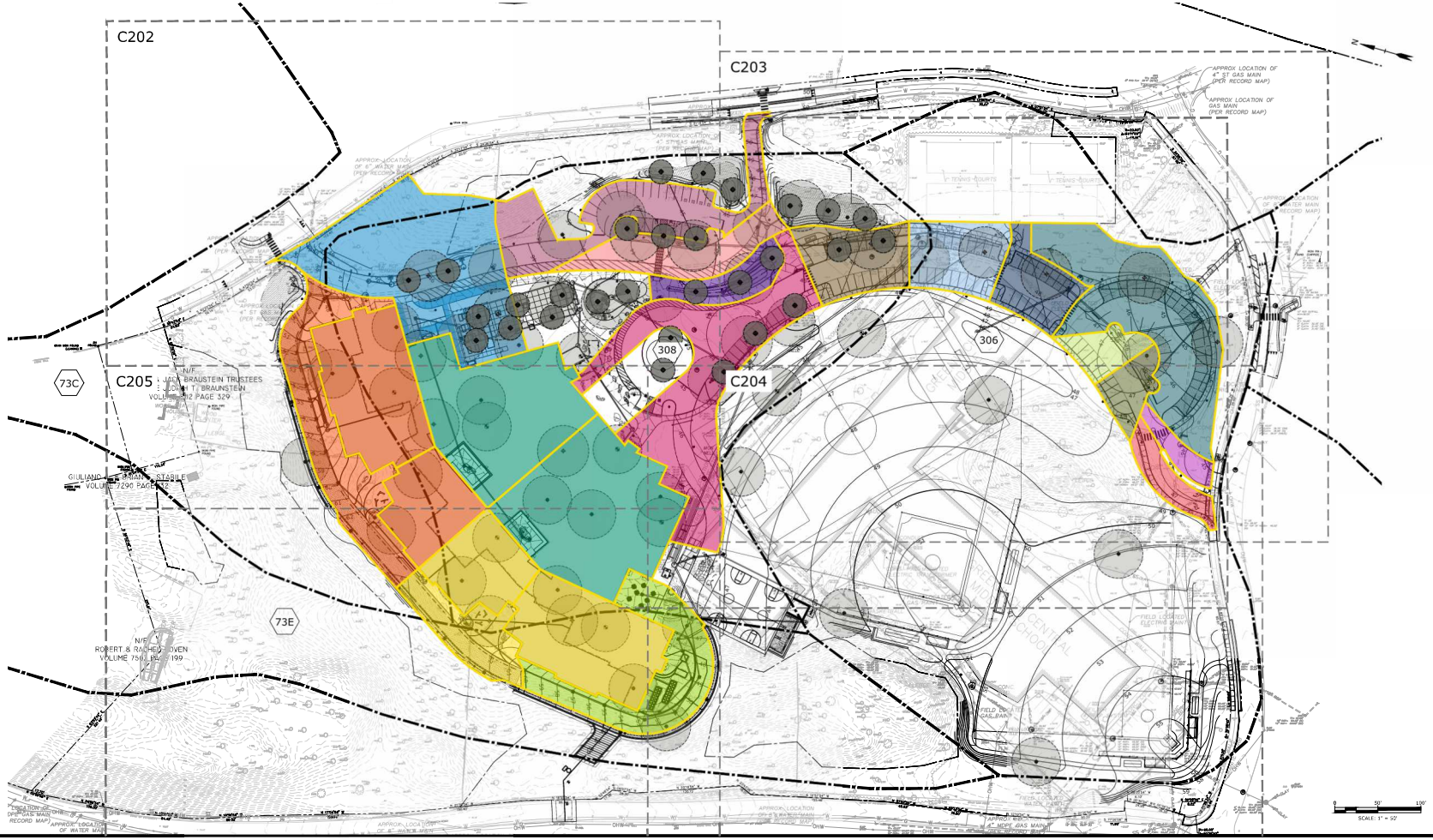

GREENWICH LID NOTES

1. THE PROPONENT SHALL NOTIFY THE APPROVING AUTHORITY BEFORE STARTING LAND-DISTURBING ACTIVITY. THE PROPONENT SHALL ALSO NOTIFY THE APPROVING AUTHORITY BEFORE CONSTRUCTING THE KEY COMPONENTS OF THE STORMWATER MANAGEMENT SYSTEM.
2. PERIODIC INSPECTIONS OF THE STORMWATER MANAGEMENT SYSTEM CONSTRUCTION SHALL BE CONDUCTED BY THE APPROVED PROFESSIONAL ENGINEER OF RECORD (SEE "ENGINEER & DEVELOPER OF RECORD" CERTIFICATION FORM IN APPENDIX K OF THE TOWN OF GREENWICH DRAINAGE MANUAL), THE TOWN RESERVES THE RIGHT TO CONDUCT INSPECTIONS AT ANY TIME. WRITTEN INSPECTION REPORTS SHALL INCLUDE: THE INSPECTION DATE AND LOCATION; EVALUATION OF COMPLIANCE WITH THE STORMWATER APPROVAL; AND ANY DEVIATIONS FROM THE APPROVED PLANS.
3. AT A MINIMUM, INSPECTIONS SHALL INCLUDE: AN INITIAL SITE INSPECTION PRIOR TO APPROVAL OF ANY PLAN; INSPECTION OF SITE EROSION CONTROLS; INSPECTION OF THE STORMWATER MANAGEMENT SYSTEM PRIOR TO BACKFILLING OF ANY UNDERGROUND DRAINAGE OR STORMWATER CONVEYANCE STRUCTURES; AND A FINAL INSPECTION BEFORE THE SURETY IS RELEASED. THE STORMWATER SYSTEM SHALL BE INSPECTED TO VERIFY ITS AS-BUILT FEATURES, AND THE INSPECTOR SHALL ALSO EVALUATE THE SYSTEM DURING A STORM EVENT. IF THE INSPECTOR FINDS THE SYSTEM ADEQUATE, THIS SHALL BE REPORTED TO THE APPROVING AUTHORITY.
4. IF THE SYSTEM IF FOUND TO BE INADEQUATE TO OPERATIONAL FAILURE, EVEN THOUGH BUILT ACCORDING TO THE APPROVED PLANS, THE SYSTEM SHALL BE CORRECTED BY THE PROPONENT BEFORE FINAL APPROVAL IS GRANTED BY THE APPROVING AUTHORITY. IF THE PROPONENT FAILS TO ACT, THE APPROVING AUTHORITY MAY USE THE SURETY TO COMPLETE THE WORK. IF THE SYSTEM DOES NO COMPLY WITH THE APPROVED PLANS, CORRECTIVE ACTION SHALL BE REQUIRED AND A STOP WORK ORDER SHALL BE ISSUES UNTIL ANY VIOLATIONS ARE CORRECTED AND ALL WORK PREVIOUSLY COMPLETED HAS RECEIVED APPROVAL BY THE APPROVING AUTHORITY.
5. UPON COMPLETION, THE PROPONENT SHALL CERTIFY THAT THE PROJECT IS IN ACCORDANCE WITH APPROVED PLANS AND SPECIFICATIONS, AND SHALL PROVIDE INSPECTIONS TO ADEQUATELY DOCUMENT COMPLIANCE. THE APPROVING AUTHORITY WILL ISSUE A LETTER CERTIFYING COMPLETION UPON ITS RECEIPT AND APPROVAL OF THE FINAL INSPECTION AND REPORTS, AND/OR UPON OTHERWISE DETERMINING THAT ALL WORK WAS COMPLETED IN CONFORMANCE WITH THE APPROVED PLANS.

LOW IMPACT DESIGN PLAN LEGEND

- WATER QUALITY AREA LIMITS
- SETBACK LINE
- LIMIT OF DISTURBANCE LINE
- SOIL GROUP BOUNDARY
- DRI-XX — DOUBLE RING INFILTROMETER TEST LOCATION
- DTH-XX — DEEP TEST HOLE LOCATION

IMPERVIOUS AREAS TO BMP

- WQA-2
- WQA-3
- WQA-4A
- WQA-4B
- WQA-5
- WQA-6
- WQA-7
- WQA-9
- WQA-11
- WQA-12
- WQA-15
- WQA-16
- WQA-17
- WQA-18
- WQA-19
- WQA-20
- WQA-21
- WQA-22

NOTES

ALL ON-SITE SOILS HAVE BEEN CLASSIFIED AS HYDROLOGIC SOIL GROUP B OR C AS PER USDA NRCS WEB SOIL SURVEY. THE NRCS REPORT CAN BE FOUND AS AN APPENDIX TO THE PROJECT DRAINAGE REPORT.

SUBSURFACE SOIL INVESTIGATION RESULTS CAN BE FOUND ON APPENDIX B OF THE DRAINAGE SUMMARY REPORT.

REFER TO SHEET PZ-L401 THROUGH PZ-403 FOR INFORMATION REGARDING LANDSCAPING.

USDA NRCS SOIL IDENTIFICATION:

- 73A — B - CHALTON-CHATFIELD COMPLEX, 0 TO 15 % SLOPES, VERY ROCKY
- 73B — B - CHALTON-CHATFIELD COMPLEX, 15 TO 45 % SLOPES, VERY ROCKY
- 306 — B - UDORTHENTS-URBAN LAND COMPLEX
- 308 — C - UDORTHENTS, SMOOTHED

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Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N

NORTH
EAST
WEST
SOUTH
KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

OVERALL SITE LOW IMPACT DEVELOPMENT PLAN

Date: 07/08/2024
Scale: 1" = 50'
Proj Number: 22367.00
Drawing Number: C201

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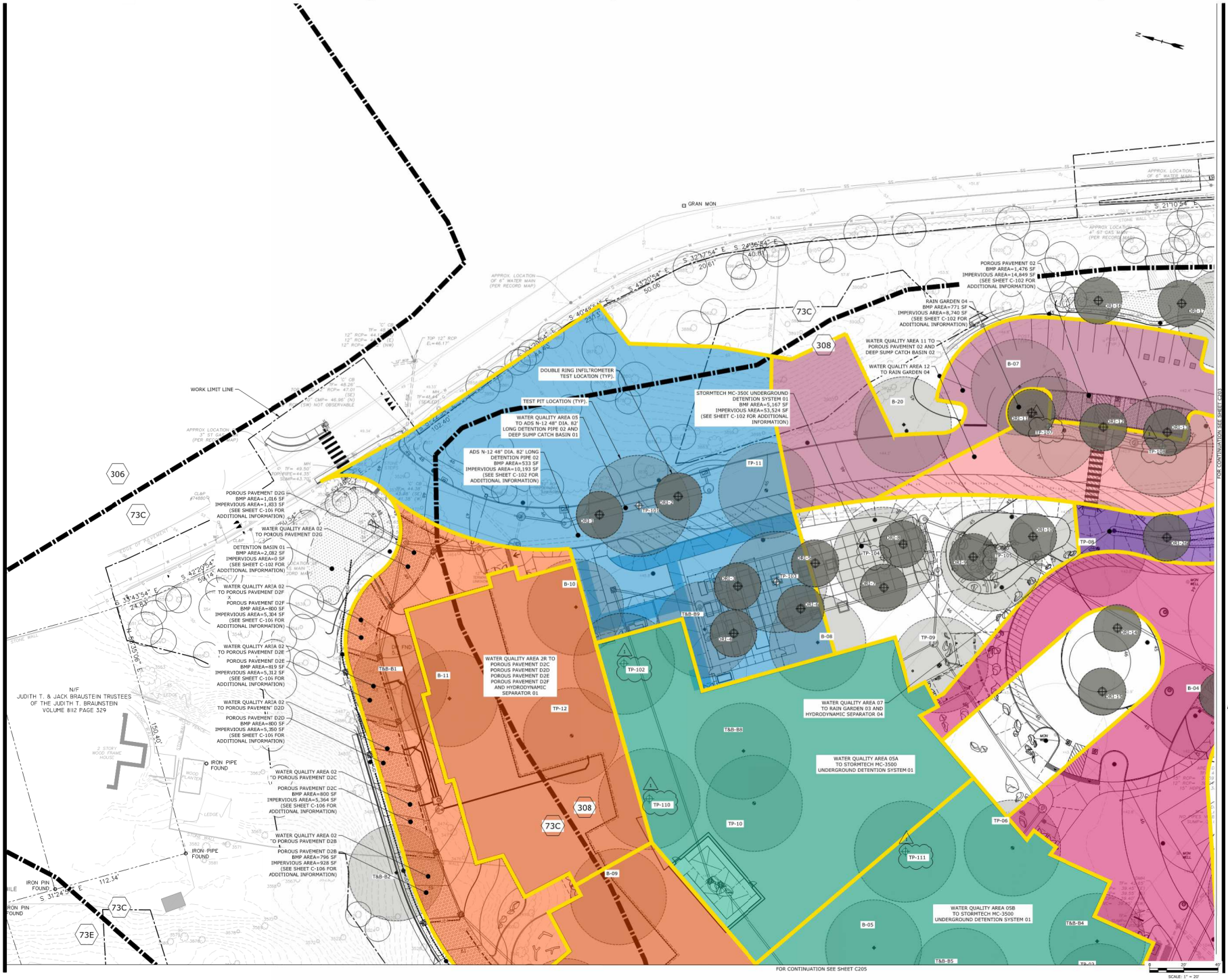

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KEYPLAN

Number	Date	Issued For
1	10/30/2024	ADDENDUM #4
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SITE LOW IMPACT DEVELOPMENT PART PLAN

Date: 07/08/2024
Scale: 1" = 20'
Proj. Number: 22367.00
Drawing Number: **C202**

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KEYPLAN

Number	Date	Issued For
1	10/30/2024	ADDENDUM #4
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SITE LOW IMPACT DEVELOPMENT PART PLAN

Date: 07/08/2024
Scale: 1" = 20'
Proj Number: 22367.00
Drawing Number: C203

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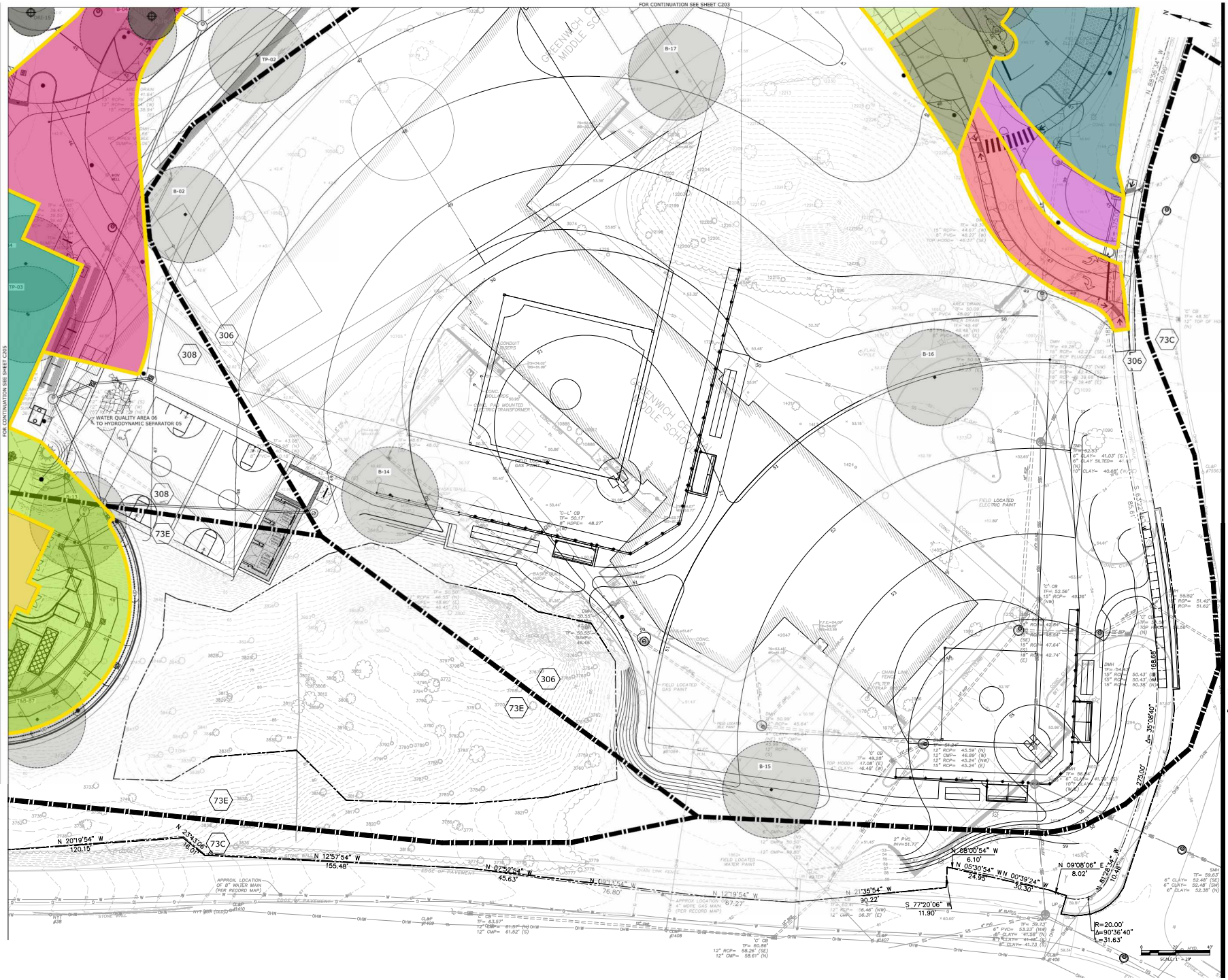

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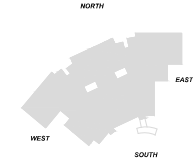

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SITE LOW IMPACT DEVELOPMENT PART PLAN

Date
07/08/2024
Scale
1" = 20'
Proj. Number
22367.00

Drawing Number
C204

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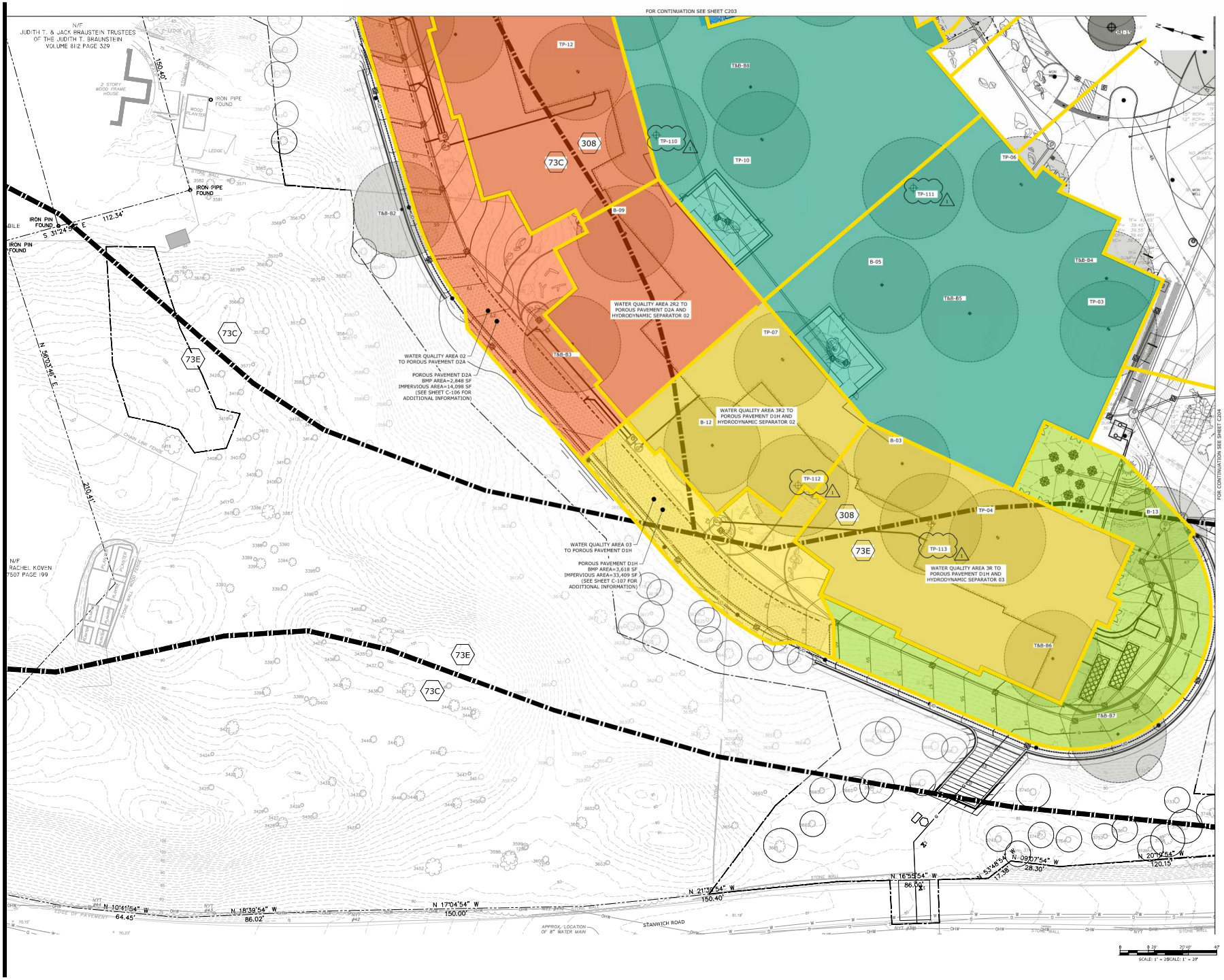

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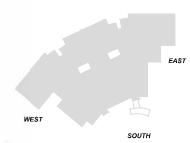

KEYPLAN

Number	Date	Issued For
1	10/30/2024	ADDENDUM #4
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SITE LOW IMPACT DEVELOPMENT PART PLAN

Date
07/08/2024
Scale
1" = 20'
Proj. Number
22367.00

Drawing Number
C205

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NOTES

1. ALL ON-SITE SOILS HAVE BEEN CLASSIFIED AS HYDROLOGIC SOIL GROUP B OR C AS PER USDA NRCS WEB SOIL SURVEY. THE NRCS REPORT CAN BE FOUND AS AN APPENDIX TO THE PROJECT DRAINAGE REPORT.
2. SUBSURFACE SOIL INVESTIGATION RESULTS CAN BE FOUND ON APPENDIX B OF THE DRAINAGE SUMMARY REPORT.
3. REFER TO SHEET PZ-L401 THROUGH PZ-403 FOR INFORMATION REGARDING LANDSCAPING.
4. ESTIMATED LIMITS OF UNSUITABLE SOIL WITHIN THE BUILDING FOOTPRINT IS BASED UPON SUBSURFACE CONDITIONS ENCOUNTERED AT SPECIFIC SUBSURFACE EXPLORATION LOCATIONS, AND INTERPOLATION BETWEEN THE SUBSURFACE CONDITIONS. ACTUAL LIMITS MAY VARY. REFER TO SUBSURFACE EXPLORATION LOGS. CONTRACTOR SHALL PERFORM SUBSURFACE EXPLORATIONS (TEST PITS) DURING CONSTRUCTION TO VERIFY LIMITS.

USDA NRCS SOIL IDENTIFICATION:

- 73C — B - CHALTON-CHATFIELD COMPLEX, 0 TO 15 % SLOPES, VERY ROCKY
- 73E — B - CHALTON-CHATFIELD COMPLEX, 15 TO 45 % SLOPES, VERY ROCKY
- 306 — B - UDORTHENTS-URBAN LAND COMPLEX
- 308 — C - UDORTHENTS, SMOOTHED

SOIL TEST LOCATION PLAN LEGEND

- SETBACK LINE
- LIMIT OF DISTURBANCE LINE
- SOIL GROUP BOUNDARY
- ESTIMATED LIMITS OF UNSUITABLE SOIL WITHIN BUILDING FOOTPRINT
- DTH-XX — DEEP TEST HOLE LOCATION
- B-XX — BORING LOCATION

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Greenwich Public Schools

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Greenwich, CT 06830

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KEYPLAN

Number	Date	Issued For
1	10/30/2024	ADDENDUM #4
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

OVERALL SOIL TEST LOCATIONS PLAN

Date: 07/08/2024
Scale: 1" = 50'
Proj. Number: 22367.00
Drawing Number: C206

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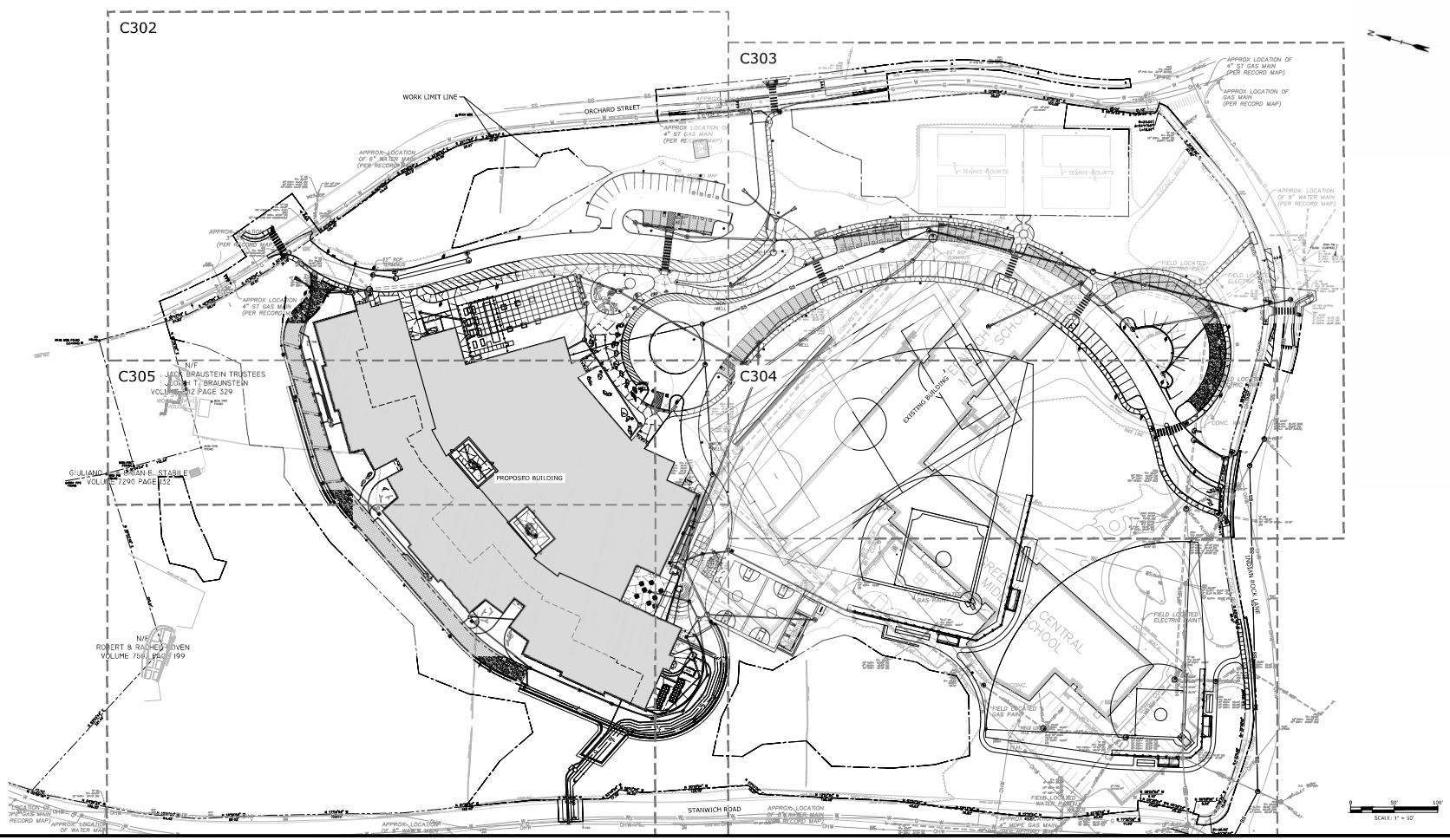

SITE UTILITY NOTES

1. REFERENCE IS MADE TO PLAN ENTITLED "PROPERTY/ BOUNDARY & TOPOGRAPHIC SURVEY" PREPARED FOR GREENWICH CENTRAL MIDDLE SCHOOL. PREPARED BY MARTIN SURVEYING ASSOCIATES, LLC, DATED MAY 22, 2023.
2. ELEVATIONS REFER TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 - NAVD88.
3. THE CONTRACTOR SHALL COORDINATE/VERIFY THE EXACT SIZES, LOCATIONS, ELEVATIONS, OF ALL PROPOSED BUILDING UTILITY SERVICES WITH THE PROJECT MECHANICAL, ELECTRICAL AND PLUMBING DRAWINGS PRIOR TO ANY CONSTRUCTION OPERATIONS.
4. THE CONTRACTOR SHALL COORDINATE HIS WORK WITH THE WORK DONE BY THE RESPECTIVE UTILITY COMPANIES.
5. INSTALL CLEANOUT TO GRADE 5' OFF FACE OF BUILDING ON ALL ROOF LEADERS AND SANITARY LATERALS. (2)
6. THE CONTRACTOR SHALL MAINTAIN EXISTING STORM SEWER FLOWS BY PUMPING OR OTHER MEANS APPROVED BY THE OWNER'S REPRESENTATIVE DURING CONSTRUCTION OF THE PROPOSED STORM SEWER IN LOCATIONS WHERE SEWERS ARE BEING INSTALLED, REPLACED OR RELOCATED.
7. ALL PROPOSED ROOF DRAINS FOR THE PROPOSED BUILDINGS SHALL BE CONNECTED TO THE PROPOSED STORM DRAINAGE SYSTEMS AS DEPICTED ON SHEETS C-102 - C-105. FINAL LOCATION OF THE PROPOSED ROOF DRAINS SHALL BE COORDINATED BETWEEN THE CONTRACTOR, THE ARCHITECT, AND THE PROJECT ENGINEER.
8. THE PROPOSED BUILDING FOOTING DRAINS SHALL DISCHARGE VIA GRAVITY TO GRADE AS DEPICTED ON SHEET SHEETS C-102 - C-105. THE CONTRACTOR SHALL VERIFY THE EXISTING PIPE INVERT IN THE FILED PRIOR TO START OF CONSTRUCTION.
9. MINIMUM COVER ON ALL PIPES SHALL BE TWO FEET (2') UNLESS OTHERWISE NOTED.
10. ALL PIPE SHALL BE INSTALLED STRAIGHT AND AT THE VERTICAL AND HORIZONTAL ALIGNMENT SHOWN. PIPES SHALL HAVE A UNIFORM SLOPE AS SPECIFIED.
13. INSTALL "FERNCO" STYLE SHIELDED COUPLINGS AT ALL LOCATIONS WHERE JOINING PIPES OF DIFFERENT MATERIALS AND/OR SIZES PER MANUFACTURER'S RECOMMENDATIONS. "FERNCO" STYLE SHIELDED COUPLINGS SHALL BE BANDED RUBBER (SHIELD COUPLINGS) GASKETED COUPLING TYPE WITH TYPE 316 S.S. HARDWARE AND OUTSIDE SHEER RING SHALL BE STRONG BACK SEWER COUPLING RC 5000 SERIES BY FERNCO, FLEX-SEAL ADJUSTABLE REPAIR COUPLING (ARC) BY MISSION RUBER COMPANY, OR APPROVED EQUAL.
15. THE LOCATIONS OF ITEMS NOT DIMENSIONED ON THE DRAWINGS SHALL BE FIELD STAKED BY THE CONTRACTOR AND THEIR LOCATIONS APPROVED BY THE OWNER'S REPRESENTATIVE PRIOR TO INSTALLATION.
16. THE CONTRACTOR SHALL ADJUST THE TOP OF FRAME/GRATE ELEVATIONS OF ALL EXISTING AND PROPOSED SANITARY/STORM/WATER MANHOLES, CATCH BASINS, AREA DRAINS, VALVE COVERS AND APPURTENANCES, WITHIN THE PROJECT LIMIT LINE TO MEET THE PROPOSED GRADES.
17. WHEN RAISING EXISTING MANHOLES TO FINISHED GRADE, CONTRACTOR SHALL NOT EXCEED THE MAXIMUM AMOUNT OF BRICK COURSES AS SHOWN ON THE DETAILS. CONTRACTOR SHALL RAISE STRUCTURE WITH STANDARD MANHOLE COMPONENTS AS APPROVED BY THE ENGINEER.
18. THE MANHOLE FRAME AND COVER SHALL BE CENTERED ON THE PRECAST OPENING. UNDER NO CIRCUMSTANCES WILL AN OFFSET FRAME AND COVER BE ACCEPTABLE. PRIOR TO FINAL PAVING, THE CONTRACTOR SHALL CHECK ALL MANHOLE STRUCTURES TO ASSURE THE FRAME AND COVER IS CENTERED ON THE PRECAST OPENING. THE CONTRACTOR WILL BE RESPONSIBLE FOR ALL WORK REQUIRED TO CENTER FRAME AND COVER.
19. WHEN CONNECTING NEW PIPES TO EXISTING STRUCTURES SUCH AS MANHOLES, THE STRUCTURE SHALL BE COMPLETELY CLEANED OUT. THE HOLE MADE IN THE STRUCTURE SHALL BE MADE AS SMALL AS POSSIBLE. THE STRUCTURE SHALL BE REPAIRED TO MATCH ITS ORIGINAL TYPE OF CONSTRUCTION. THE JOINT BETWEEN THE STRUCTURE AND THE PIPE SHALL BE MADE WATERTIGHT BY UTILIZING AN A-LOK SYSTEM OR KOR-N-SEAL-BOOT CONNECTION.
20. THE CONTRACTOR SHALL MAINTAIN SANITARY SEWER FLOWS BY PUMPING OR OTHER MEANS APPROVED BY THE OWNER'S REPRESENTATIVE DURING CONSTRUCTION OF THE PROPOSED SANITARY SEWER IN LOCATIONS WHERE SEWERS ARE BEING INSTALLED, REPLACED OR RELOCATED.
21. UNDER NO CIRCUMSTANCES SHALL TRENCH WATER BE ALLOWED TO DRAIN OFF THROUGH SANITARY SEWER LINES.
22. ALL CRUSHED STONE SHALL BE GRADATION NO. 6 AS PER CT DOT FORM 818, ARTICLE M.01.01. STONE SHALL CONSIST OF SOUND, TOUGH, DURABLE PARTICLES FREE FROM SOFT, THIN, ELONGATED, LAMINATED, FRIABLE, MICACEOUS, OR DISINTEGRATED PIECES OF MUD, DIRT OR OTHER DELETERIOUS MATERIAL.
23. THE STORM AND SANITARY SEWER SHALL BE ENCASED IN CONCRETE FOR A DISTANCE OF 10 FEET ON EITHER SIDE OF ANY INTERSECTION BETWEEN THE SANITARY SEWER AND STORM SEWER OR SANITARY SEWER AND POROUS ASPHALT (2) WHERE CONCRETE ENCASEMENT IS REQUIRED, TEMPORARILY SUPPORT THE PIPE PRIOR TO PLACING CONCRETE TO ENCASE PIPING NOT LESS THAN 6 INCHES AT ALL POINTS. THE ENCASEMENT SHALL BE ADEQUATELY SUPPORTED WITH A STONE BASE AND SHALL BE KEYED INTO THE FOUNDATION WALL TO PREVENT DAMAGE FROM SETTLEMENT.
24. UTILITIES SHOWN ON THESE PLANS ARE "NOT GUARANTEED" TO BE COMPLETE OR CORRECT. PRIOR TO ANY SITE ACTIVITIES, THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFICATION OF CLEARANCES OF PROPOSED UTILITIES FROM EXISTING UTILITIES. THIS VERIFICATION SHALL INCLUDE PHYSICAL OBSERVATION BY MEANS OF TEST PITS OF THE LOCATIONS OF AFFECTED UTILITIES. THE CONTRACTOR SHALL NOTIFY THE SITE ENGINEER IMMEDIATELY OF ANY CONFLICT.
25. EASEMENTS MAY BE REQUIRED IN FAVOR OF THE VARIOUS UTILITY COMPANIES.
26. ELECTRIC, TELEPHONE, AND CABLE SERVICES SHALL BE INSTALLED IN CONFORMANCE TO THE REQUIREMENTS OF THE GOVERNING UTILITY COMPANIES.
27. DOMESTIC WATER, FIRE PROTECTION SERVICES, AND ALL WATER MAIN TAPS SHALL CONFORM TO THE REQUIREMENTS OF THE AQUARION WATER COMPANY.
28. IT IS THE CONTRACTOR'S RESPONSIBILITY TO INSTALL UTILITIES AS SHOWN ON THIS SHEET. THE CONTRACTOR SHALL WORK WITH THE UTILITY COMPANIES AND SITE ENGINEER TO ENSURE THE INSTALLATION IS IN CONFORMANCE TO THE REQUIREMENTS OF THE GOVERNING UTILITY COMPANY. ALL CONDUITS SHALL BE CONCRETE ENCASED AS MAY BE REQUIRED BY THE GOVERNING UTILITY COMPANY. PROPOSED ELECTRIC, TELEPHONE, CABLE, GAS AND WATER SERVICES ARE SHOWN FOR SCHEMATIC PURPOSES ONLY AND ARE SUBJECT TO CHANGE PENDING UTILITY COMPANY REVIEW. THESE UTILITIES SHALL BE DESIGNED BY OTHERS AND INSTALLED IN CONFORMANCE TO THE REQUIREMENTS OF THE GOVERNING UTILITY COMPANIES.
29. FOR INFORMATION ON THE PRIMARY ELECTRICAL WIRING AND THE SECONDARY ELECTRICAL CONDUITS, WIRING, AND MATERIALS - SEE PROJECT ELECTRICAL DRAWINGS.
30. THE CONTRACTOR MUST SUPPLY AND INSTALL DRAG LINES WITH ALL CONDUITS.
31. IN GENERAL, EACH UTILITY SHALL HAVE A MINIMUM HORIZONTAL CLEARANCE OF THREE FEET TO ANY OTHER UNDERGROUND UTILITY.
32. ALL UTILITIES ABANDONED SHALL BE CAPPED OR REMOVED IN ACCORDANCE WITH UTILITY COMPANIES' REQUIREMENTS.
33. DETECTABLE TAPE SHALL BE USED TO MARK PIPING LISTED BELOW. THE IDENTIFICATION TAPE SHALL BE BURIED AT LEAST 6-INCHES TO 12-INCHES BELOW FINAL GRADE BUT NO CLOSER THAN 12-INCHES TO THE BURIED UTILITY PIPING OR SERVICE.

ELECTRIC	RED	CAUTION ELECTRIC LINE BURIED BELOW
TELEPHONE & CONTROL	ORANGE	CAUTION TELEPHONE LINE BURIED BELOW
NATURAL GAS	YELLOW	CAUTION GAS LINE BURIED BELOW
WATER SYSTEMS	BLUE	CAUTION WATER LINE BURIED BELOW
FIRE PROTECTION SYSTEMS	BLUE	CAUTION FIRE LINE BURIED BELOW
SEWER SYSTEM	GREEN	CAUTION SEWER LINE BURIED BELOW
COMMUNICATION CONDUIT	ORANGE	CAUTION COMMUNICATION LINE BURIED BELOW

UNDERGROUND-TYPE PLASTIC LINE MARKER: MANUFACTURER'S STANDARD PERMANENT, BRIGHT-COLORED DETECTABLE TAPE, CONTINUOUS-PRINTED PLASTIC TAPE, INTENDED FOR DIRECT-BURIAL SERVICE; NOT LESS THAN 6" WIDE X 4 MILS THICK.

34. FOR ADDITIONAL INFORMATION, SEE DETAIL SHEETS. (1)
35. ALL SANITARY SEWER MAINS AND LATERALS SHALL BE VIDEO RECORDED PER SEWER DIVISION PERMIT REQUIREMENTS AND PER SPECIFICATION 33 31 15.

SITE UTILITY LEGEND

	EXISTING	PROPOSED
WORK LIMIT LINE		
PROPERTY LINE		
SETBACK LINE		
SAWCUT		
WATER MAIN	W	W
FIRE SERVICE	FW	FW
WATER VALVE		
OVERHEAD WIRES	OH	
UTILITY POLE		
SANITARY SEWER		
ELECTRIC		E
GAS SERVICE	G	G
GAS GATE VALVE	GV	
COMMUNICATION	CO	T/C
COMMUNICATION HANDHOLE	T/C H.H.	

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Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N

NORTH
EAST
WEST
SOUTH
KEYPLAN

Number	Date	Issued For
2	10/30/2024	ADDENDUM #4
1	10/16/2024	ADDENDUM #2
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

OVERALL SITE UTILITY PLAN

Date: 07/08/2024
Scale: 1" = 50'
Proj Number: 22367.00
Drawing Number: C301

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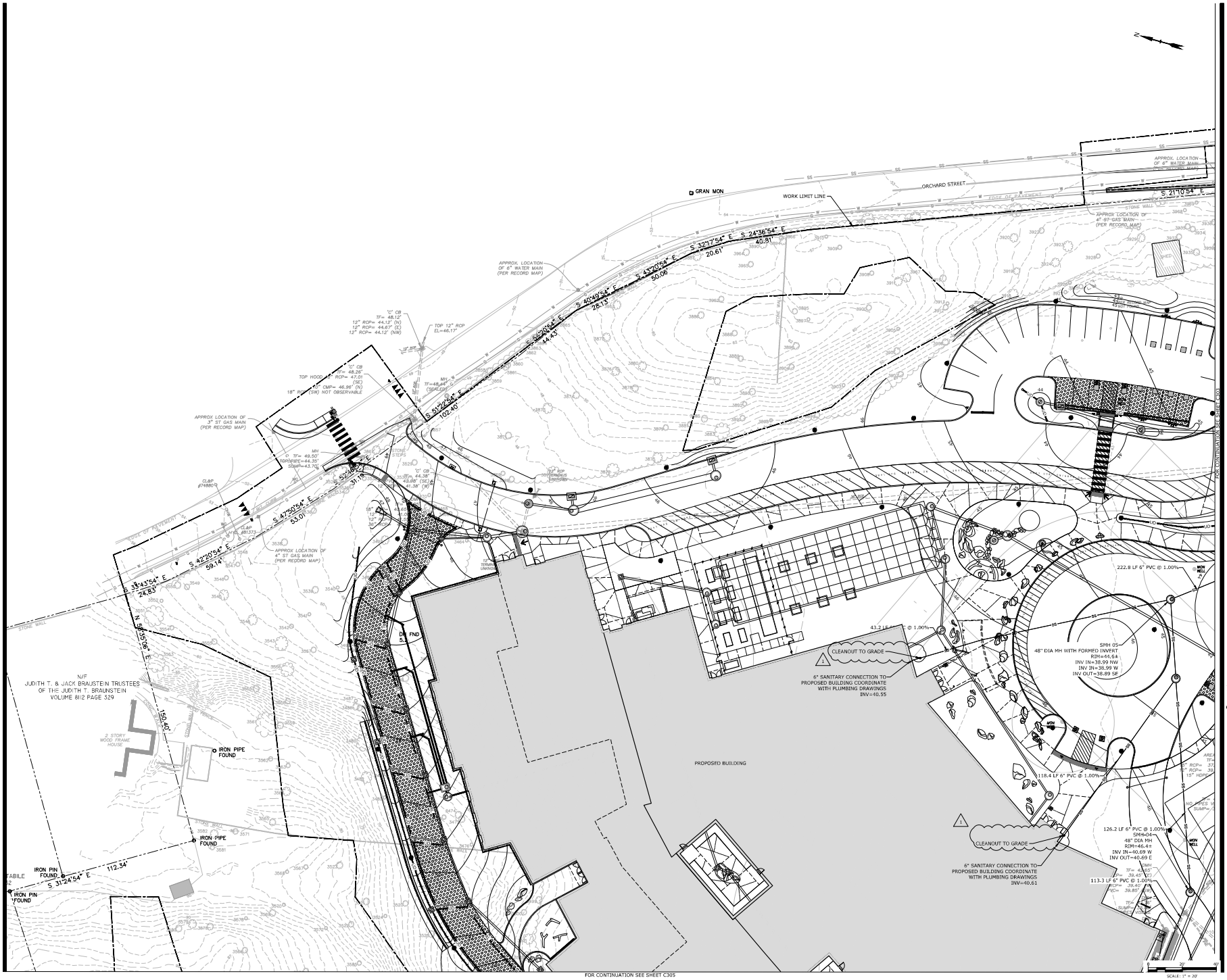

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KEYPLAN

Number	Date	Issued For
1	10/30/2024	ADDENDUM #4
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SITE UTILITY PART PLAN

Date
07/08/2024
Scale
1" = 20'
Proj. Number
22367.00

Drawing Number
C302

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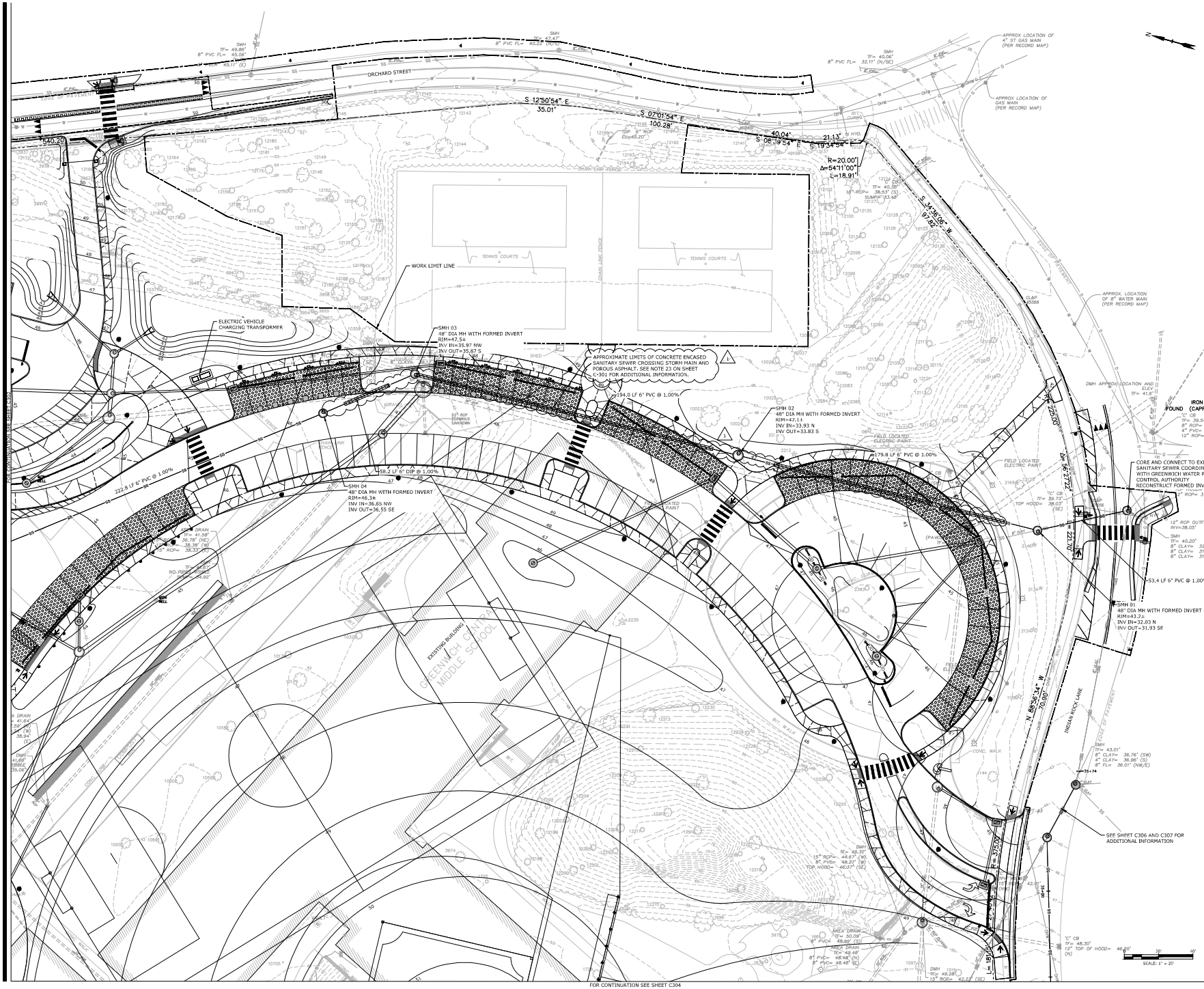

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Checked: APW

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NORTH
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KEYPLAN

Number	Date	Issued For
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	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SITE UTILITY PART PLAN

Date: 07/08/2024
Scale: 1" = 20'
Proj Number: 22367.00
Drawing Number: **C303**

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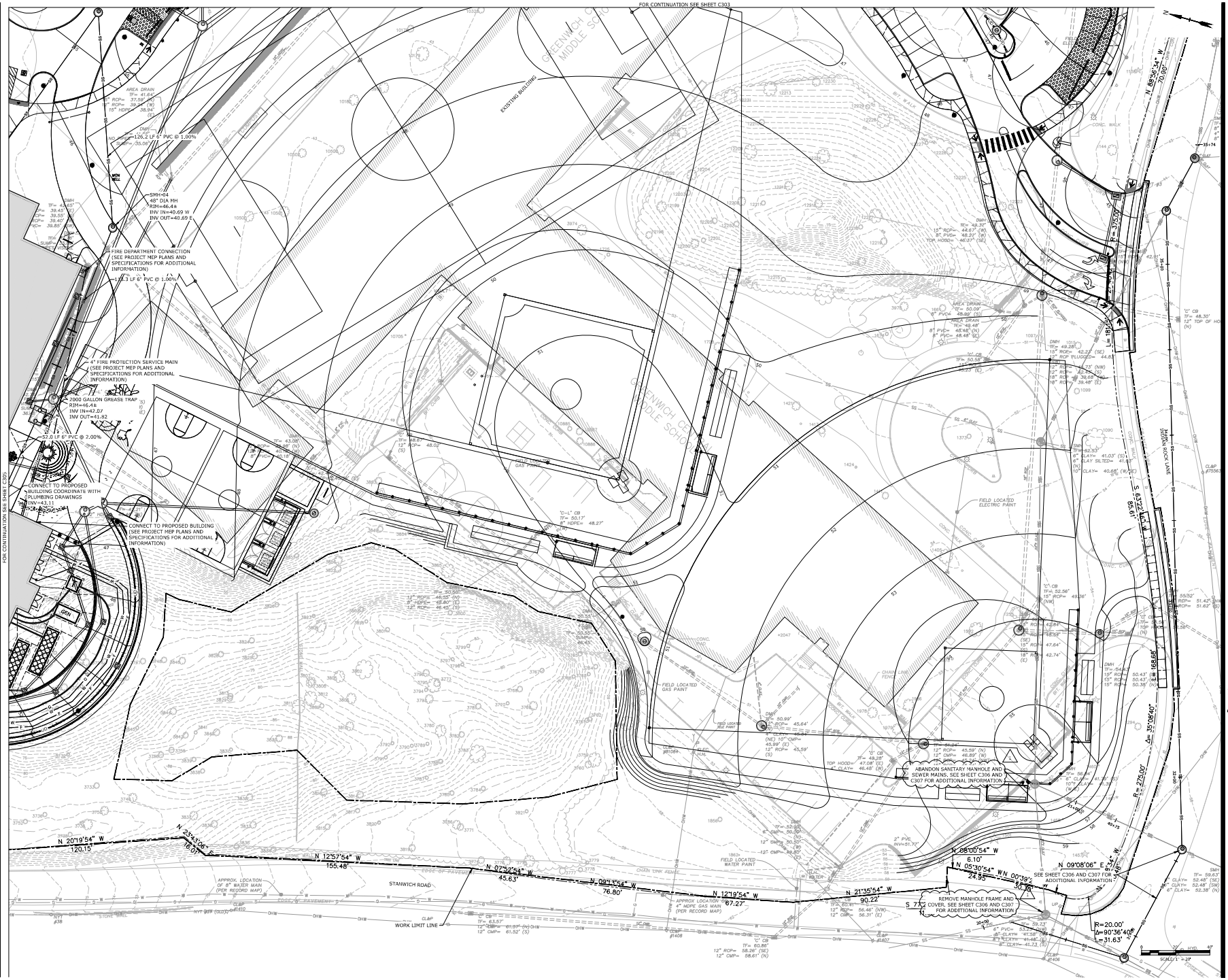

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Greenwich Public Schools

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NORTH
EAST
WEST
SOUTH

KEYPLAN

Number	Date	Issued For
1	10/30/2024	ADDENDUM #4
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SITE UTILITY PART PLAN

Date: 07/08/2024
Scale: 1" = 20'
Proj Number: 22367.00
Drawing Number: C304

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WEST
SOUTH
KEYPLAN

Number	Date	Issued For
1	10/30/2024	ADDENDUM #4
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SITE UTILITY PART PLAN

Date: 07/08/2024
Scale: 1" = 20'
Proj Number: 22367.00
Drawing Number: C305

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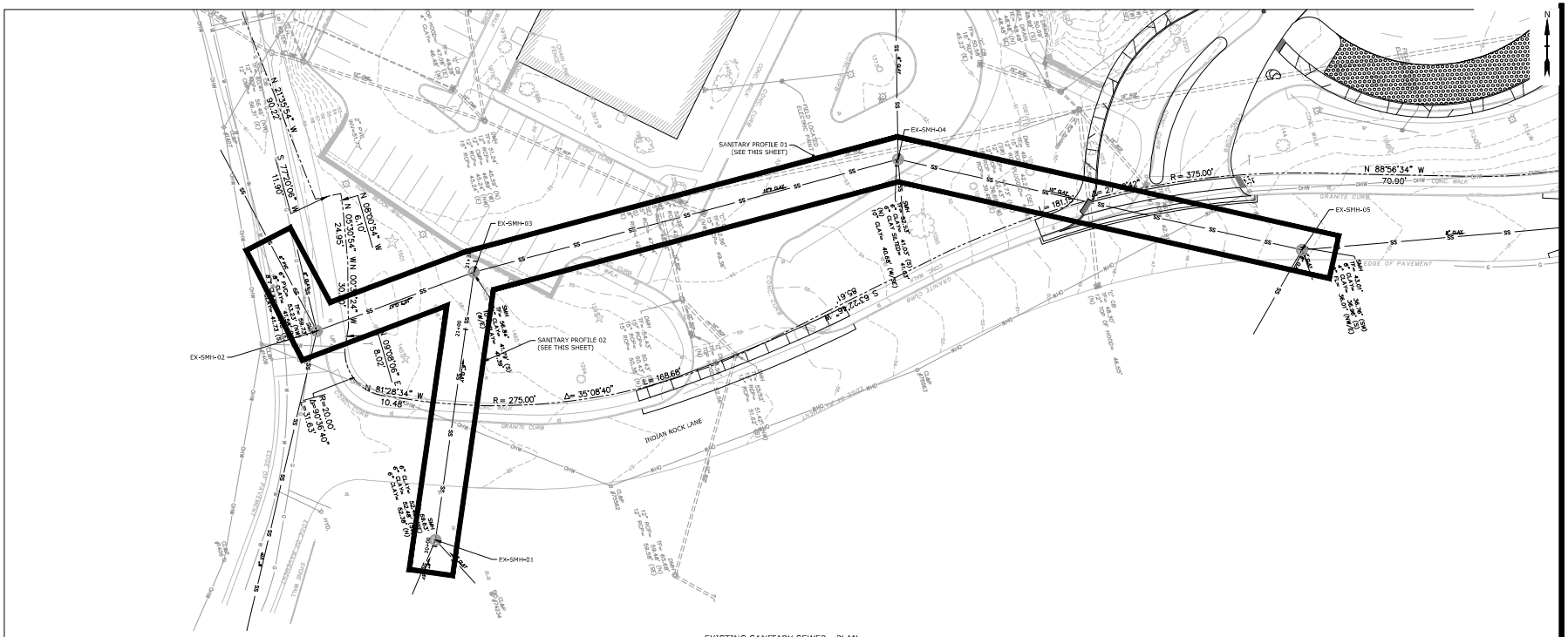
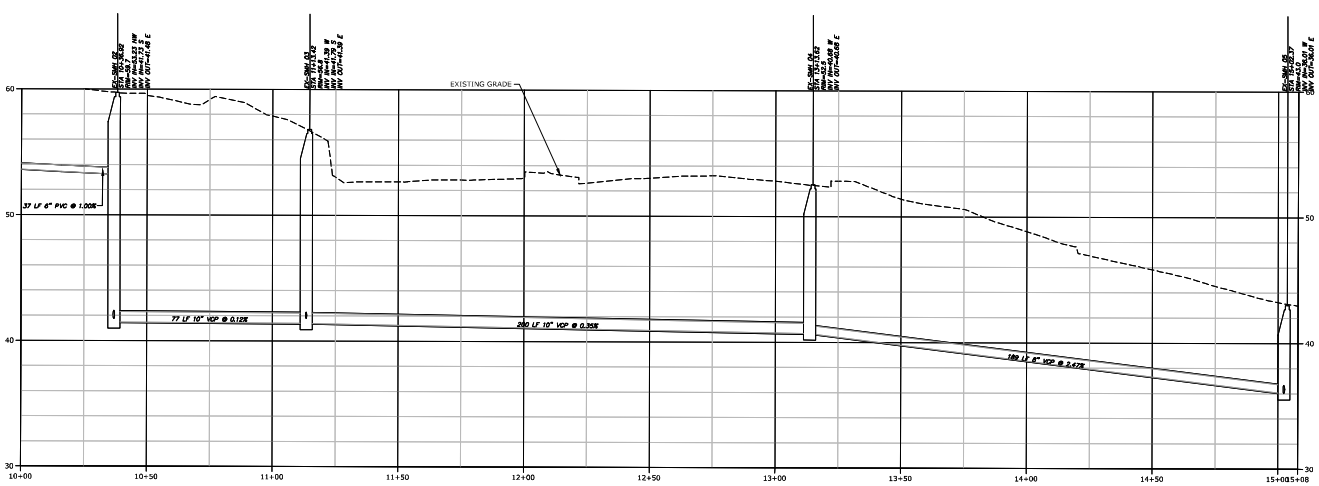
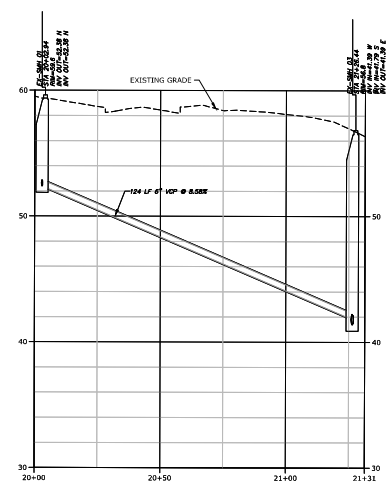


EXISTING SANITARY SEWER - PLAN
SCALE: 1" = 20'



EXISTING SANITARY SEWER - PROFILE 01
SCALE: HOR: 1" = 20'; VERT: 1" = 4'



EXISTING SANITARY SEWER - PROFILE 02
SCALE: HOR: 1" = 20'; VERT: 1" = 4'

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KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SANITARY SEWER EXISTING PLAN AND PROFILE

Date
07/08/2024
Scale
1" = 20'
Proj. Number
22367.00

Drawing Number
C306

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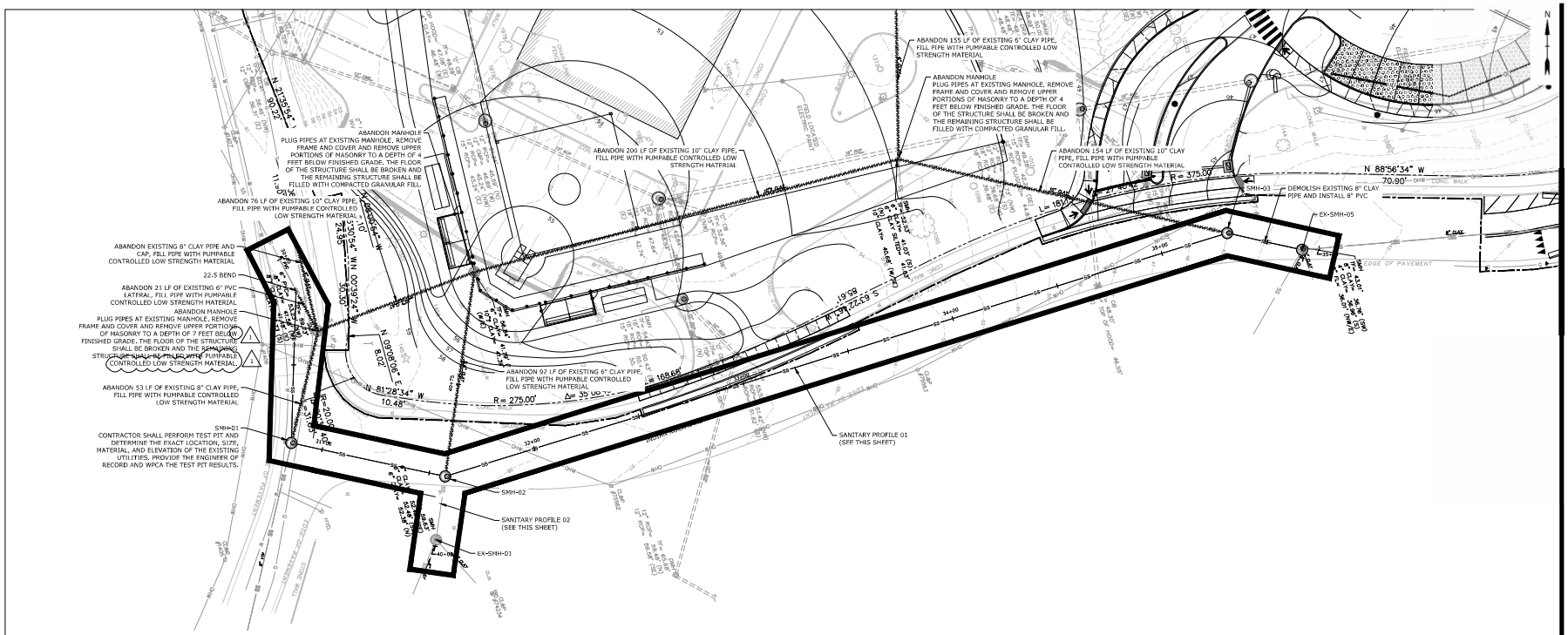
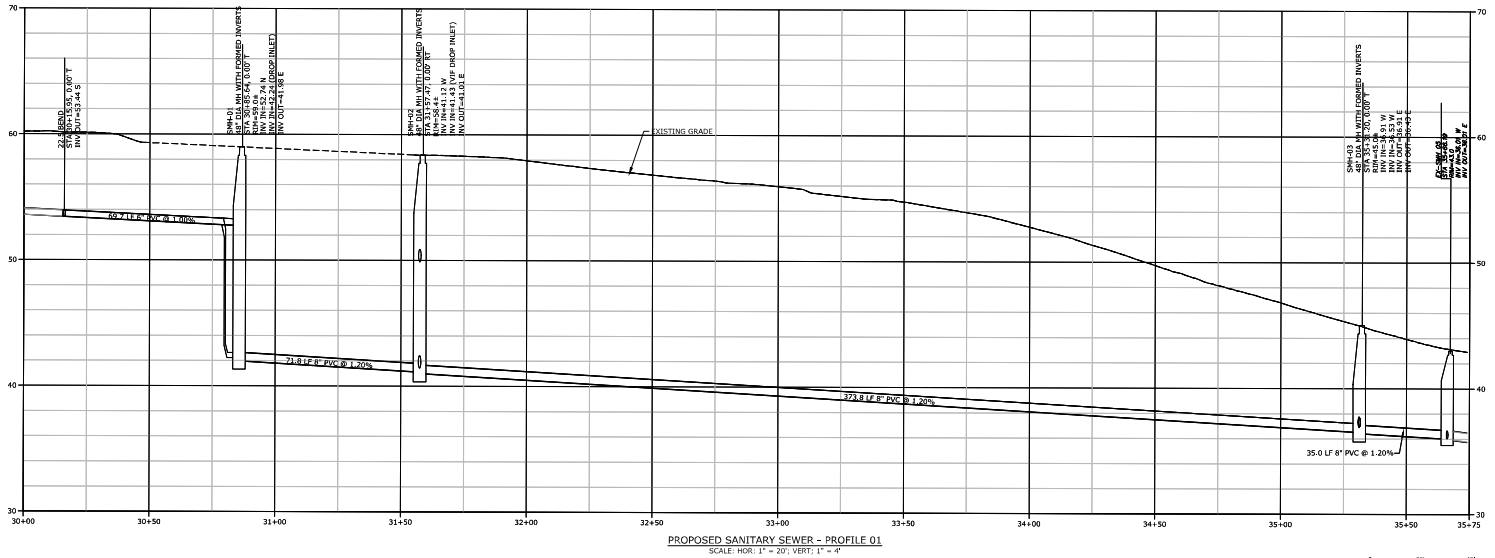
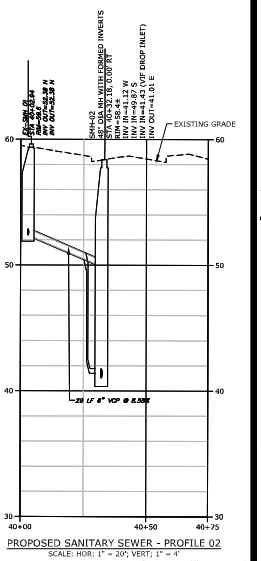


PROPOSED SANITARY SEWER - PLAN
SCALE: 1" = 20'



PROPOSED SANITARY SEWER - PROFILE 01
SCALE: HOR: 1" = 20'; VERT: 1" = 4'



PROPOSED SANITARY SEWER - PROFILE 02
SCALE: HOR: 1" = 20'; VERT: 1" = 4'

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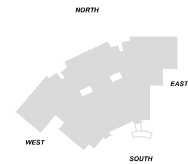

KEYPLAN

Number	Date	Issued For
1	10/30/2024	ADDENDUM #4
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SANITARY SEWER PROPOSED PLAN AND PROFILE

Date: 07/08/2024
Scale: 1" = 20'
Proj Number: 22367.00
Drawing Number: C307

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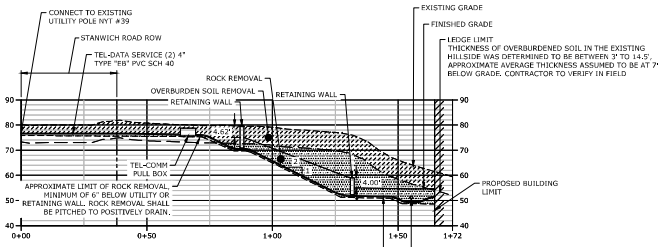
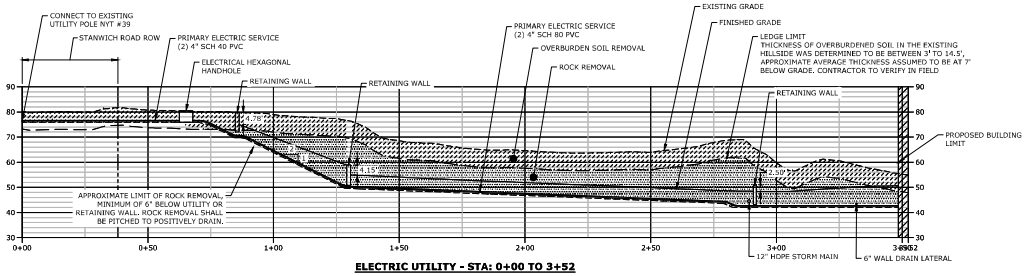
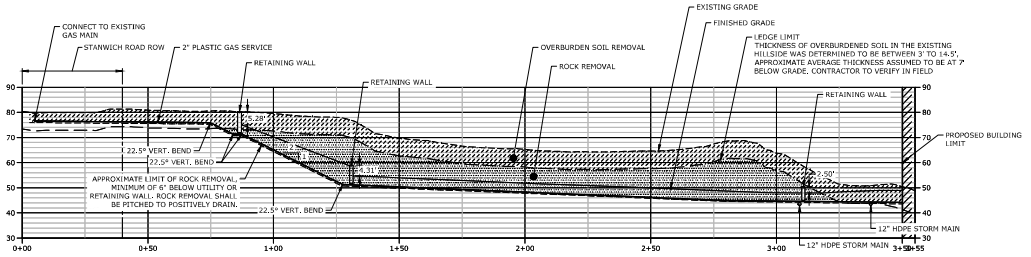


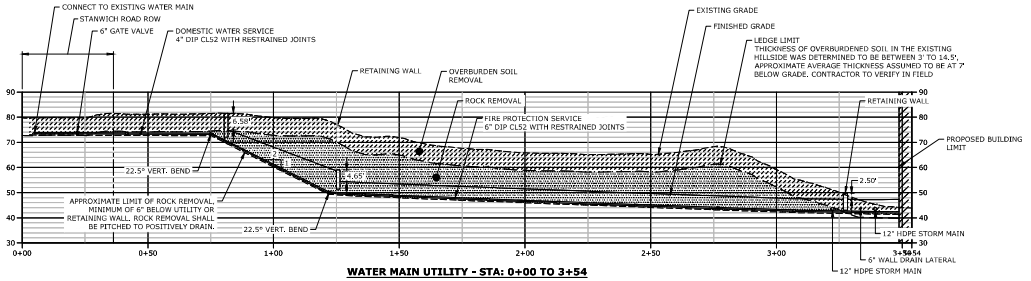
TEL-COMM UTILITY - STA: 0+00 TO 1+72



ELECTRIC UTILITY - STA: 0+00 TO 3+52



GAS UTILITY - STA: 0+00 TO 3+55



WATER MAIN UTILITY - STA: 0+00 TO 3+54

HORIZONTAL SCALE 1" = 20'
VERTICAL SCALE 1" = 1'

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WEST
SOUTH

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SITE UTILITY PROFILES

Date: 07/08/2024
Scale: 1" = 20'
Proj Number: 22367.00
Drawing Number: **C308**

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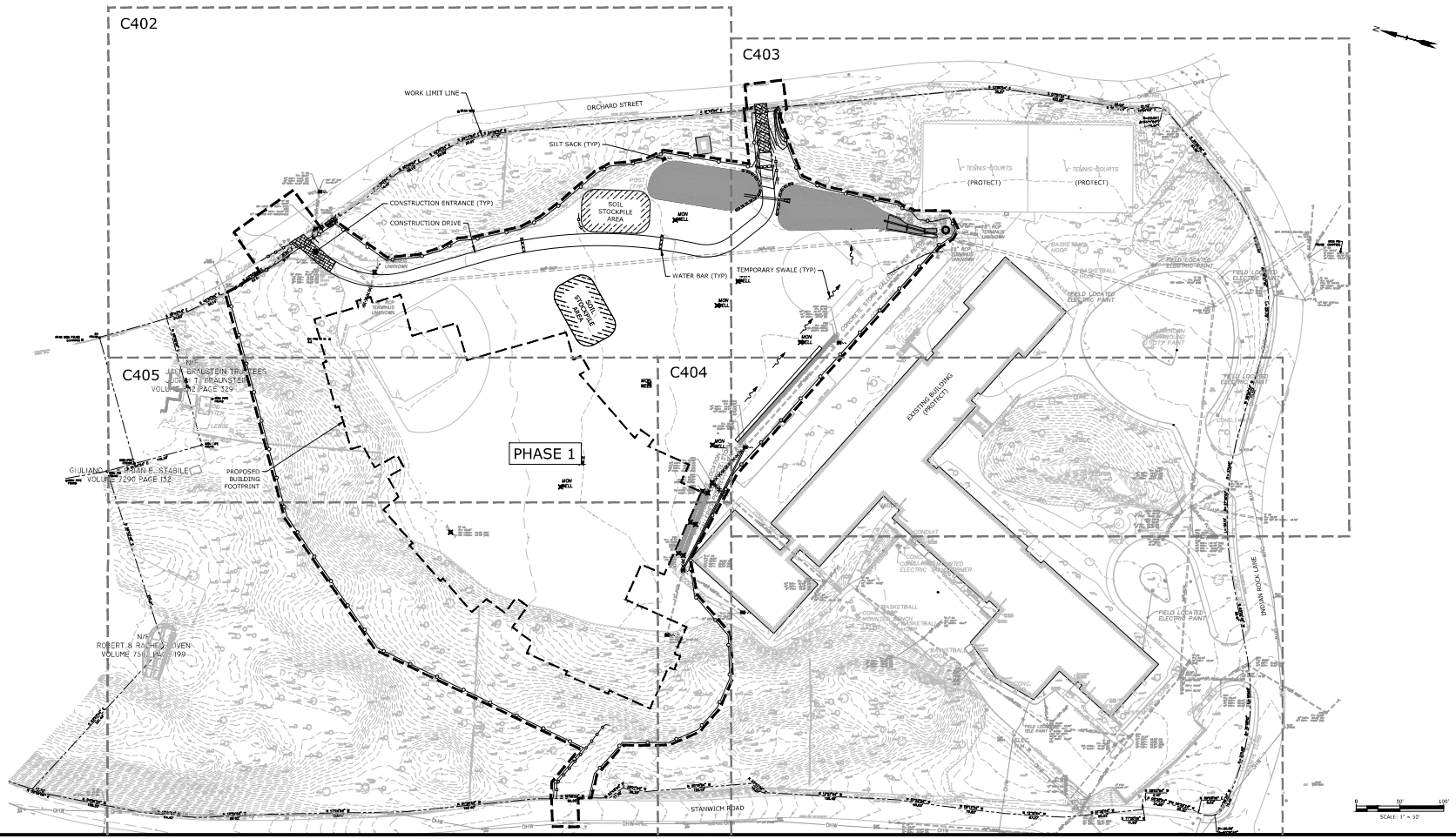

SOIL EROSION AND SEDIMENTATION CONTROL NARRATIVE:

GREENWICH CENTRAL MIDDLE SCHOOL IS A NEW MIDDLE SCHOOL AND BALL FIELDS LOCATED ON THE EXISTING CENTRAL MIDDLE SCHOOL CAMPUS ON INDIAN ROCK LANE IN GREENWICH, CT.

THIS PHASE WILL INCLUDE THE CONSTRUCTION OF A NEW MIDDLE SCHOOL BUILDING, STORMWATER MANAGEMENT SYSTEM, BITUMINOUS CONCRETE DRIVEWAYS AND PARKING, RETAINING WALLS, CURBS, LANDSCAPING, LIGHTING, AND SIDEWALKS

STORMWATER MANAGEMENT WILL BE ACCOMMODATED ON-SITE. SURFACE RUNOFF WILL BE COLLECTED AND CONVEYED IN CATCH BASINS AND LOW IMPACT DEVELOPMENT BEST MANAGEMENT PRACTICES THAT WILL TREAT THE FIRST 1" OF RUNOFF TO MEET THE TOWN OF GREENWICH DRAINAGE MANUAL AND THE CTDEEP WATER QUALITY MANUAL GUIDELINES FOR 80% TSS REMOVAL. THE STORMWATER MANAGEMENT SYSTEM WILL TREAT THE WATER QUALITY VOLUME AND REDUCE THE PEAK FLOW AND RUNOFF QUANTITY FROM THE SITE.

APPROXIMATELY 7.6 ACRES WILL BE DISTURBED.

PHASE 1 CONSTRUCTION START: FALL 2024

PHASE 1 CONSTRUCTION END: SUMMER 2026

SITE SOIL EROSION AND SEDIMENTATION CONTROL SHALL FOLLOW THE TOWN OF GREENWICH REQUIREMENTS AND DETAILS AS WELL AS THE CTDEEP 2024 CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENT CONTROL.

SOIL EROSION AND SEDIMENT CONTROL LEGEND

- PROPERTY LINE
- EASEMENT LINE
- SETBACK LINE
- GEOTEXTILE SILTFENCE
- INLET PROTECTION
- SILT SACK
- HAYBALE BARRIER
- CONSTRUCTION ENTRANCE
- EROSION CONTROL BLANKET
- SOIL STOCKPILE AREA
- TEMPORARY SEDIMENT TRAP
- TREE CLEARING

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NORTH
EAST
WEST
SOUTH

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

OVERALL PHASE 1 DEMOLITION, ENABLING AND SITE SOIL EROSION AND SEDIMENTATION CONTROL PLAN

Date: 07/08/2024
Scale: 1" = 50'
Proj Number: 22367.00
Drawing Number: **C401**

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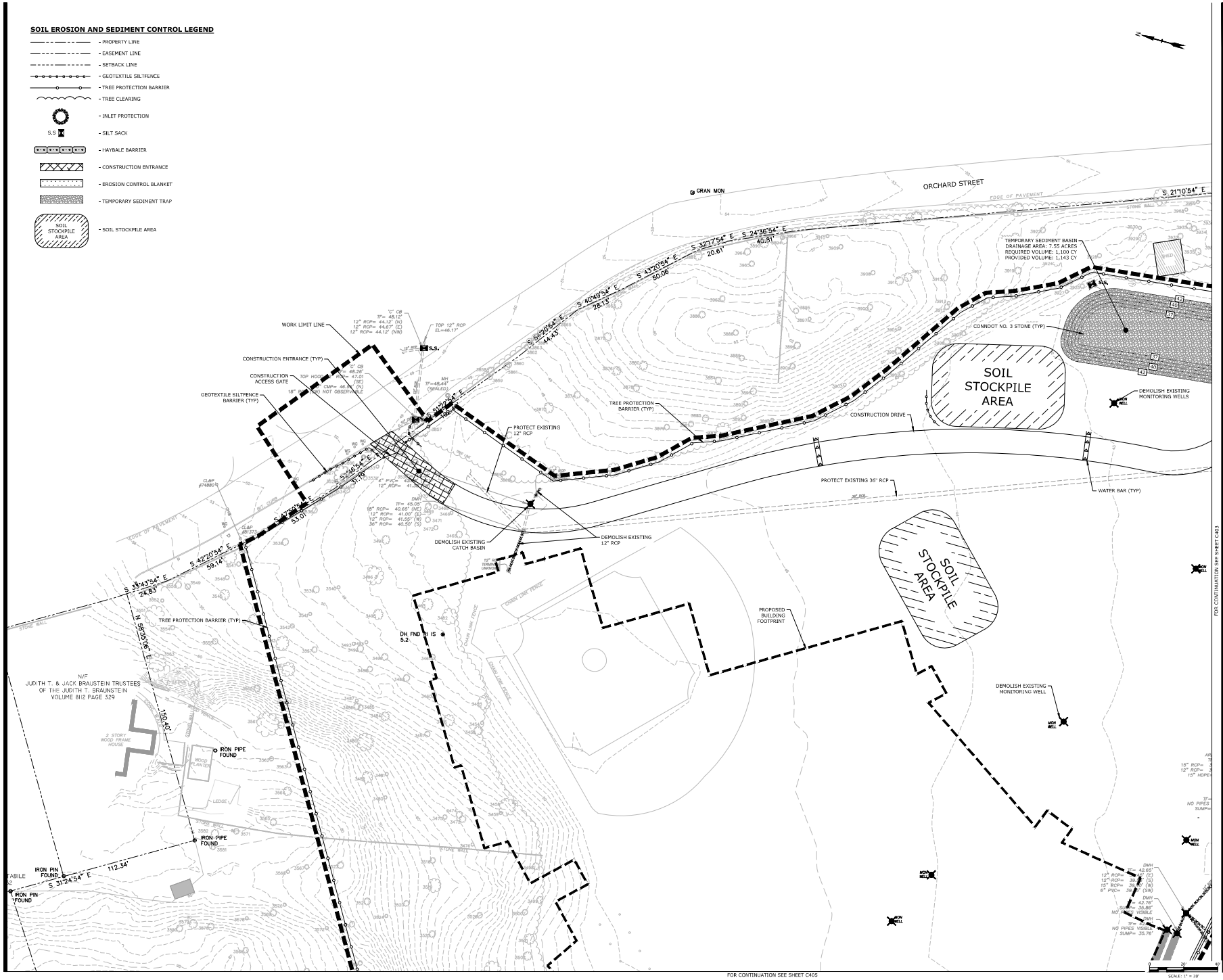

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SOUTH
KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

PHASE 1 DEMOLITION, ENABLING AND SITE SOIL EROSION AND SEDIMENTATION CONTROL PART PLAN

Date: 07/08/2024
Scale: 1" = 20'
Proj Number: 22367.00
Drawing Number: **C402**

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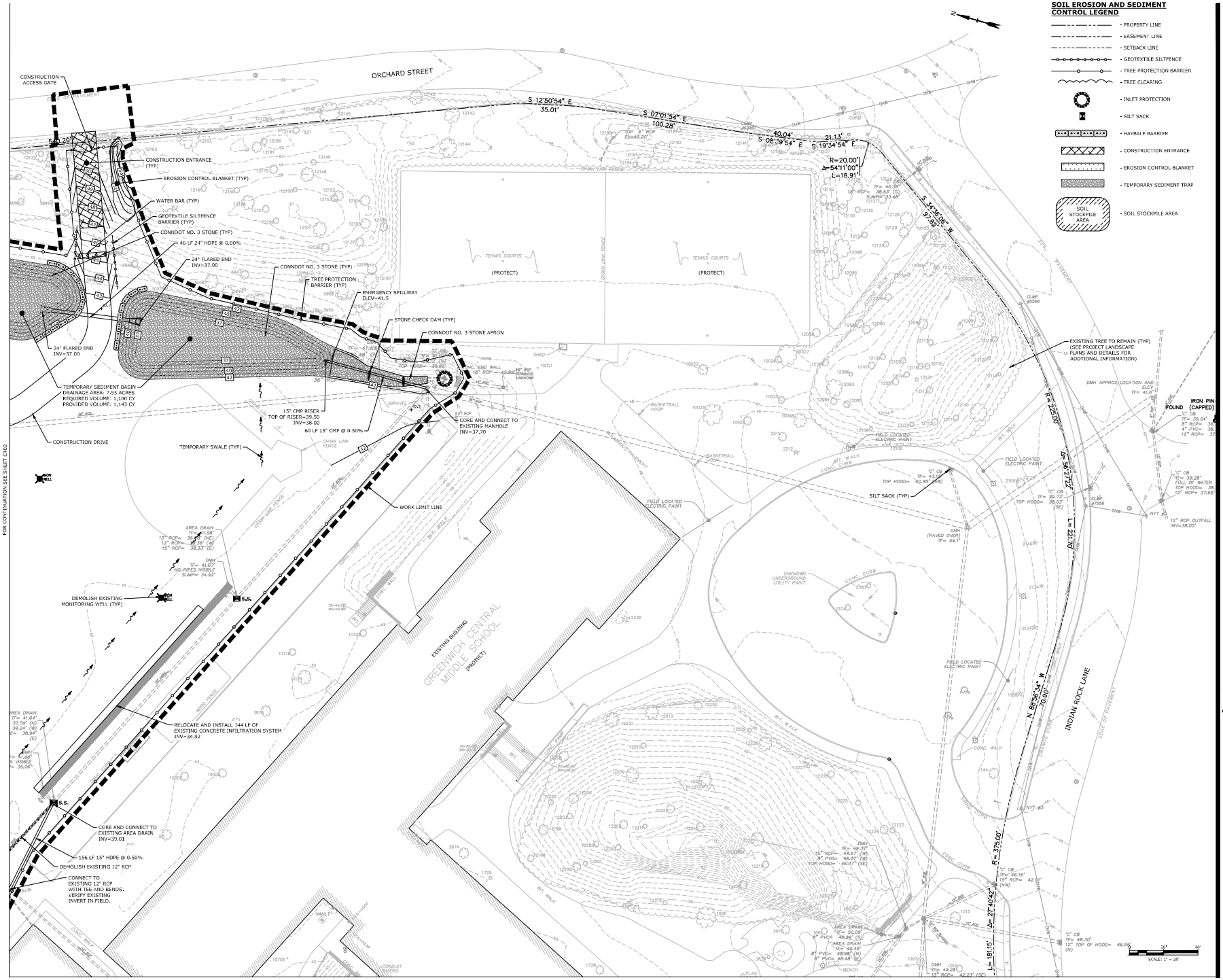

SOIL EROSION AND SEDIMENT CONTROL LEGEND

- PROPERTY LINE
- EASEMENT LINE
- SETBACK LINE
- GEOTEXTILE SILTFENCE
- TREE PROTECTION BARRIER
- TREE CLEARING
- INLET PROTECTION
- SILT SACK
- HAYBALE BARRIER
- CONSTRUCTION ENTRANCE
- EROSION CONTROL BLANKET
- TEMPORARY SEDIMENT TRAP
- SOIL STOCKPILE AREA
- SOIL STOCKPILE AREA

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KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

PHASE 1 DEMOLITION, ENABLING AND SITE SOIL EROSION AND SEDIMENTATION CONTROL PART PLAN

Date: 07/08/2024
Scale: 1" = 20'
Proj. Number: 22367.00
Drawing Number: C403

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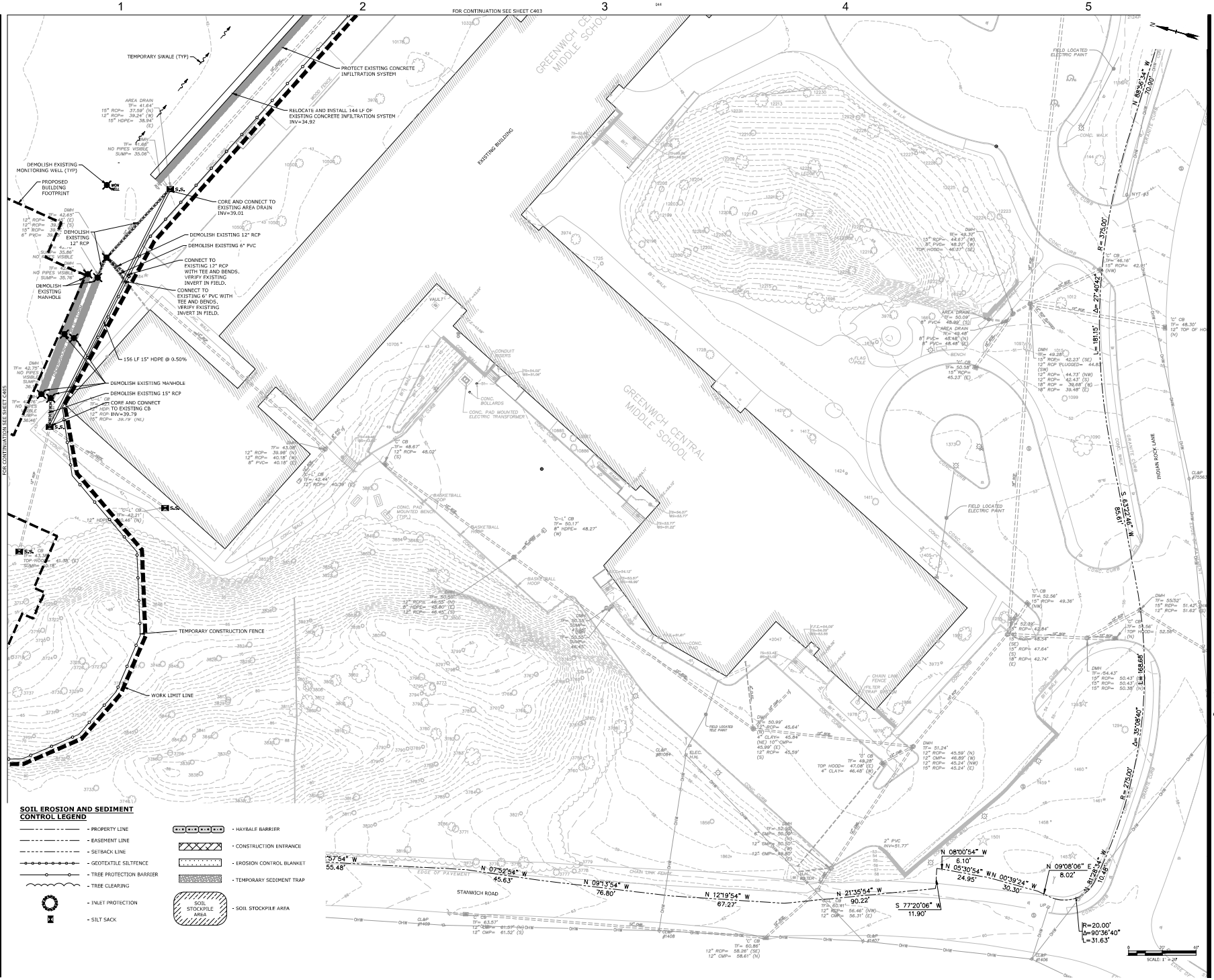

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KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

PHASE 1 DEMOLITION, ENABLING AND SITE SOIL EROSION AND SEDIMENTATION CONTROL PART PLAN

Date
07/08/2024
Scale
1" = 20'
Proj. Number
22367.00

Drawing Number
C404

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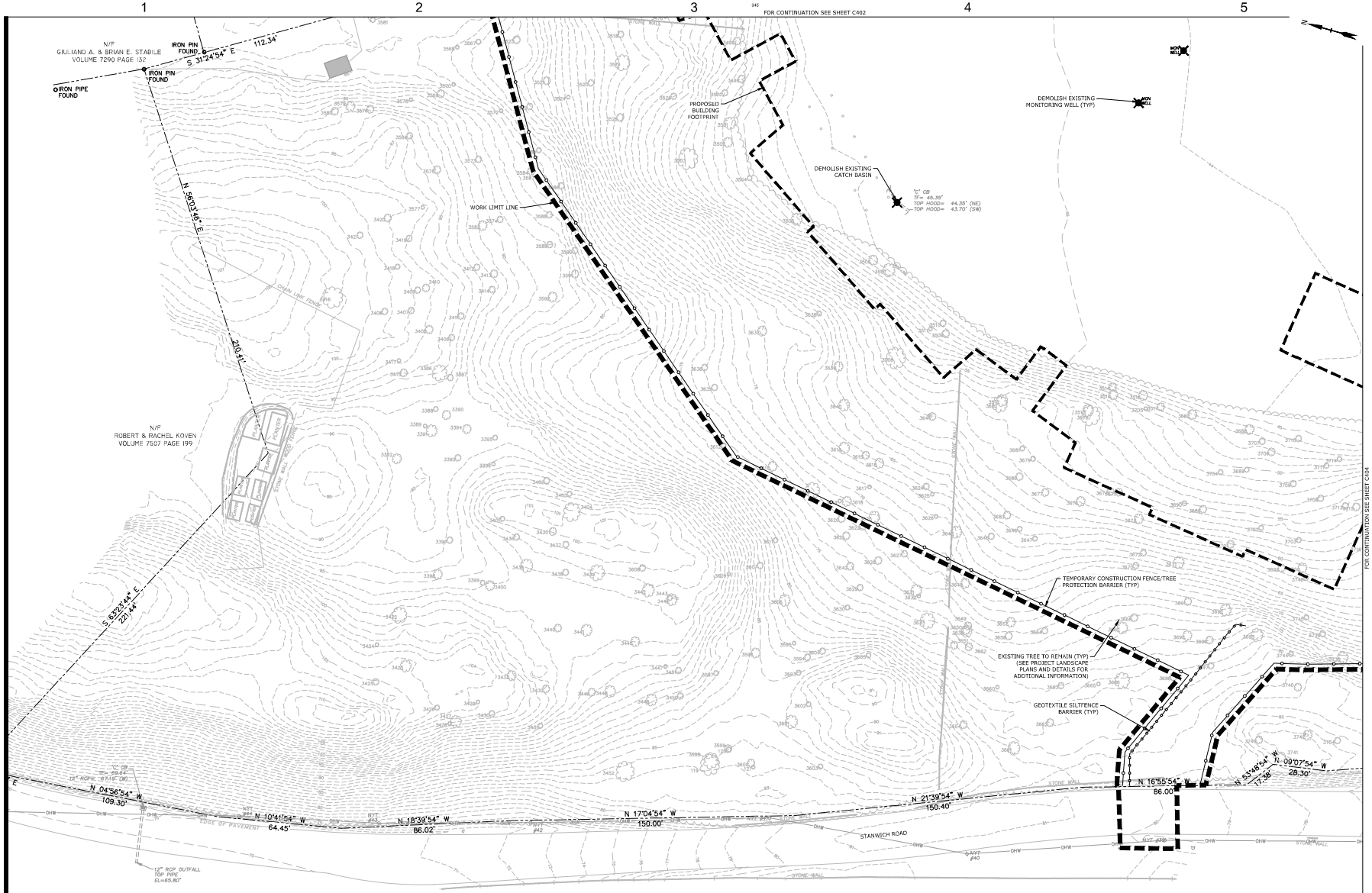

SOIL EROSION AND SEDIMENT CONTROL LEGEND

- PROPERTY LINE
- EASEMENT LINE
- SETBACK LINE
- GEOTEXTILE SILTFENCE
- TREE PROTECTION BARRIER
- TREE CLEARING
- INLET PROTECTION
- SILT SACK
- HAYBALE BARRIER
- CONSTRUCTION ENTRANCE
- EROSION CONTROL BLANKET
- TEMPORARY SEDIMENT TRAP
- SOIL STOCKPILE AREA

SCALE: 1" = 20'

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KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

PHASE 1 DEMOLITION, ENABLING AND SITE SOIL EROSION AND SEDIMENTATION CONTROL PART PLAN

Date
07/08/2024
Scale
1" = 20'
Proj. Number
22367.00

Drawing Number
C405

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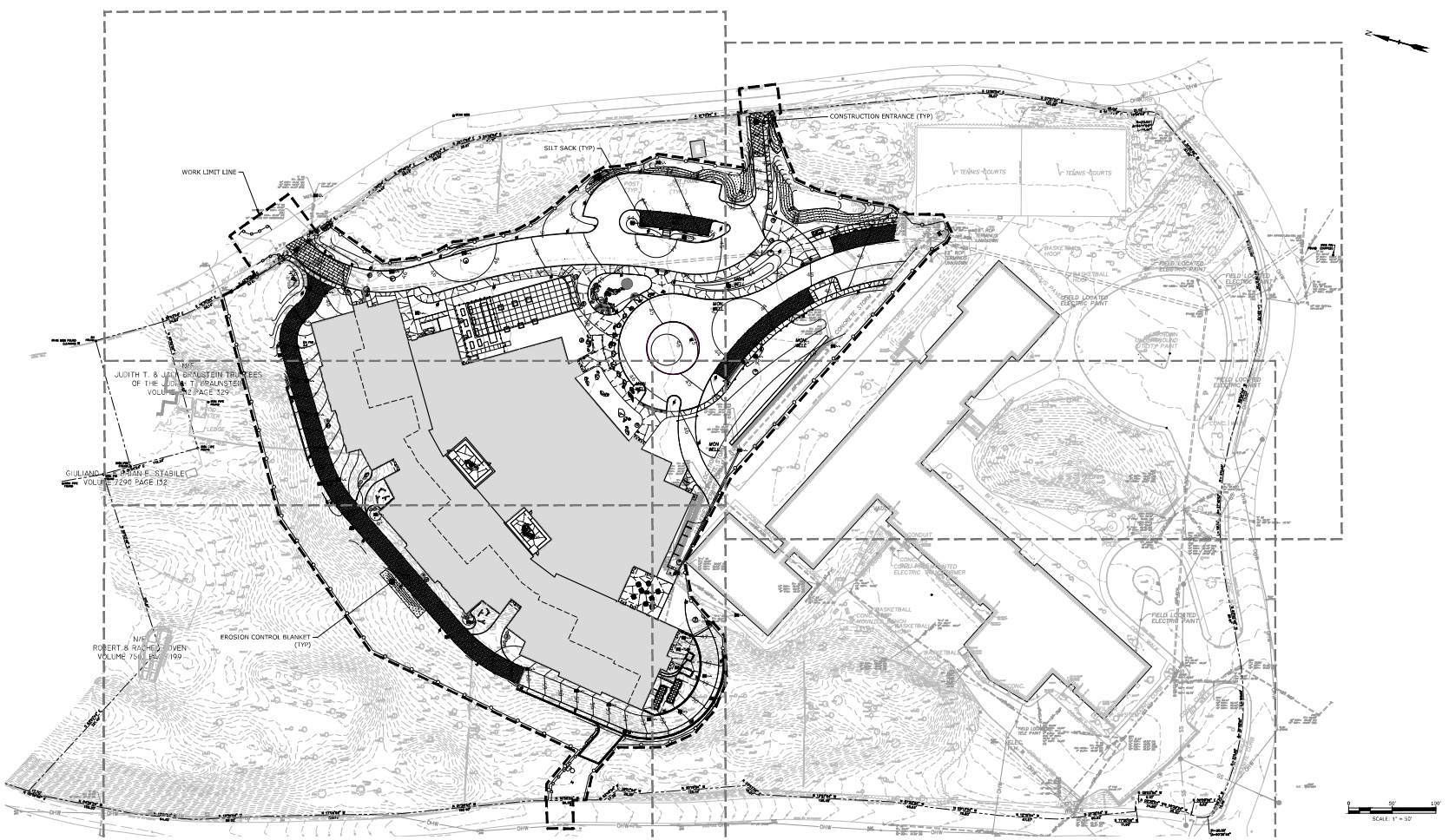

SOIL EROSION AND SEDIMENT CONTROL LEGEND

- PROPERTY LINE
- EASEMENT LINE
- SETBACK LINE
- GEOTEXTILE SILTFENCE
- INLET PROTECTION
- SILT SACK
- HAYBALE BARRIER
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- TEMPORARY SEDIMENT TRAP
- TREE CLEARING

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KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

PHASE 1 IMPROVED CONDITIONS SOIL EROSION AND SEDIMENTATION CONTROL PLAN

Date
07/08/2024
Scale
1" = 50'
Proj. Number
22367.00

Drawing Number
C406

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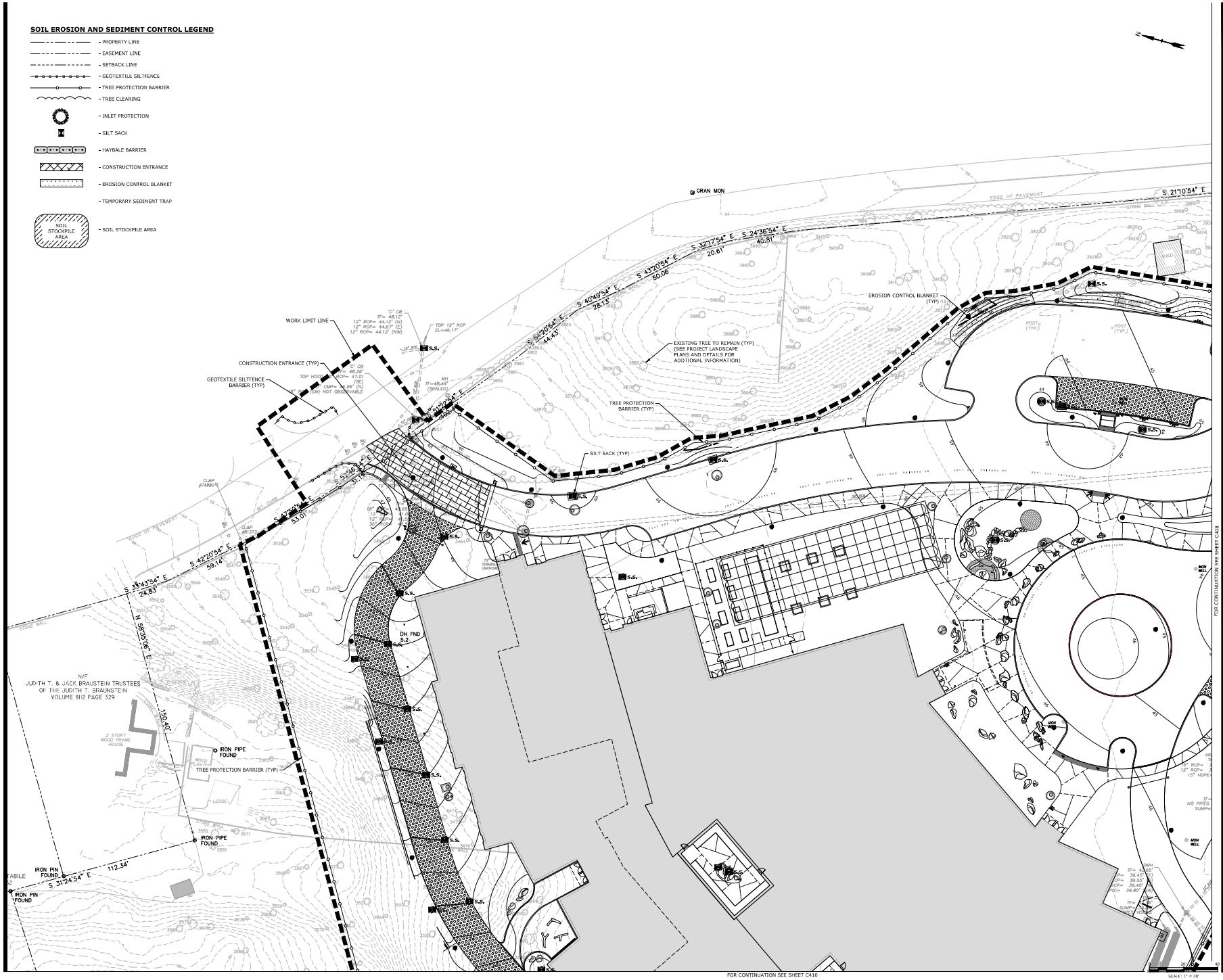

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KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

PHASE 1 IMPROVED CONDITIONS SOIL EROSION AND SEDIMENTATION CONTROL PART PLAN

Date: 07/08/2024
Scale: 1" = 20'
Proj Number: 22367.00
Drawing Number: C407

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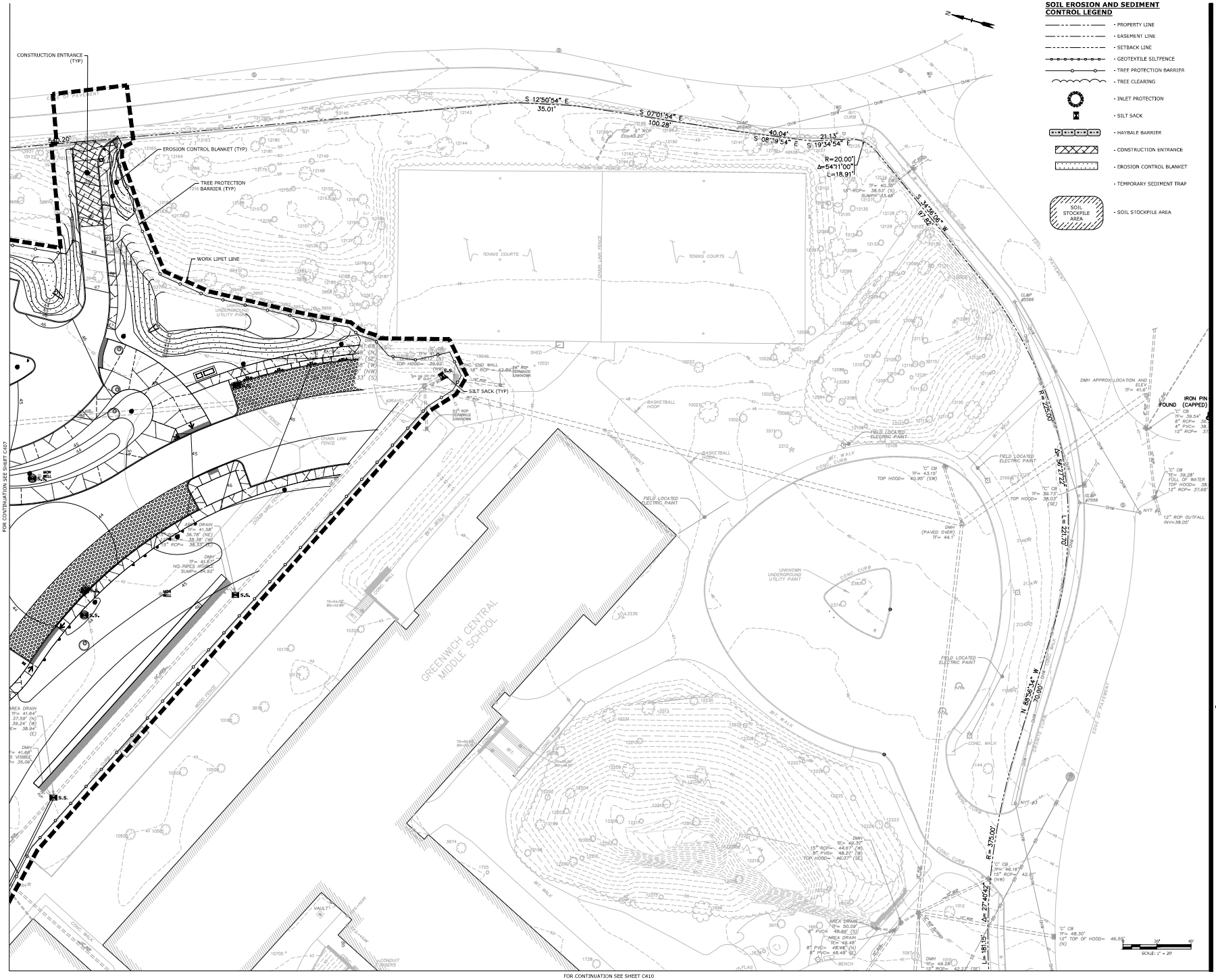

SOIL EROSION AND SEDIMENT CONTROL LEGEND

- PROPERTY LINE
- EASEMENT LINE
- SETBACK LINE
- GEOTEXTILE SILTFENCE
- TREE PROTECTION BARRIER
- TREE CLEARING
- INLET PROTECTION
- SILT SACK
- HAYBALE BARRIER
- CONSTRUCTION ENTRANCE
- EROSION CONTROL BLANKET
- TEMPORARY SEDIMENT TRAP
- SOIL STOCKPILE AREA

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SOUTH

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

PHASE 1 IMPROVED CONDITIONS SOIL EROSION AND SEDIMENTATION CONTROL PART PLAN

Date: 07/08/2024
Scale: 1" = 20'
Proj Number: 22367.00
Drawing Number: C408

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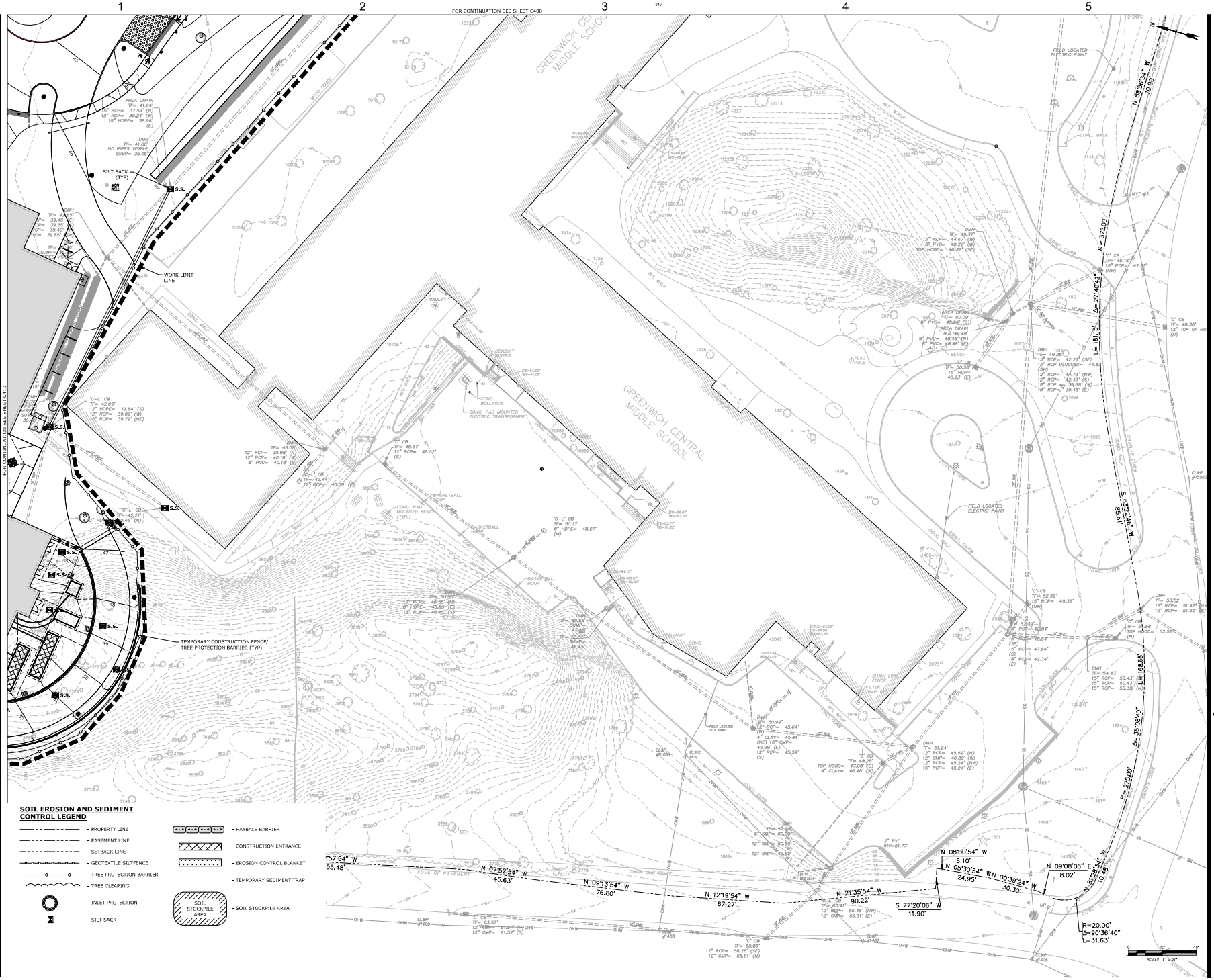

SOIL EROSION AND SEDIMENT CONTROL LEGEND

- PROPERTY LINE
- EASEMENT LINE
- SETBACK LINE
- GEOTEXTILE SILTFENCE
- TREE PROTECTION BARRIER
- TREE CLEARING
- INLET PROTECTION
- SILT SACK
- HAYBALE BARRIER
- CONSTRUCTION ENTRANCE
- EROSION CONTROL BLANKET
- TEMPORARY SEDIMENT TRAP
- SOIL STOCKPILE AREA

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Greenwich Public Schools

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NORTH
EAST
WEST
SOUTH

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

PHASE 1 IMPROVED CONDITIONS SOIL EROSION AND SEDIMENTATION CONTROL PART PLAN

Date
07/08/2024
Scale
1" = 20'
Proj. Number
22367.00

Drawing Number
C409

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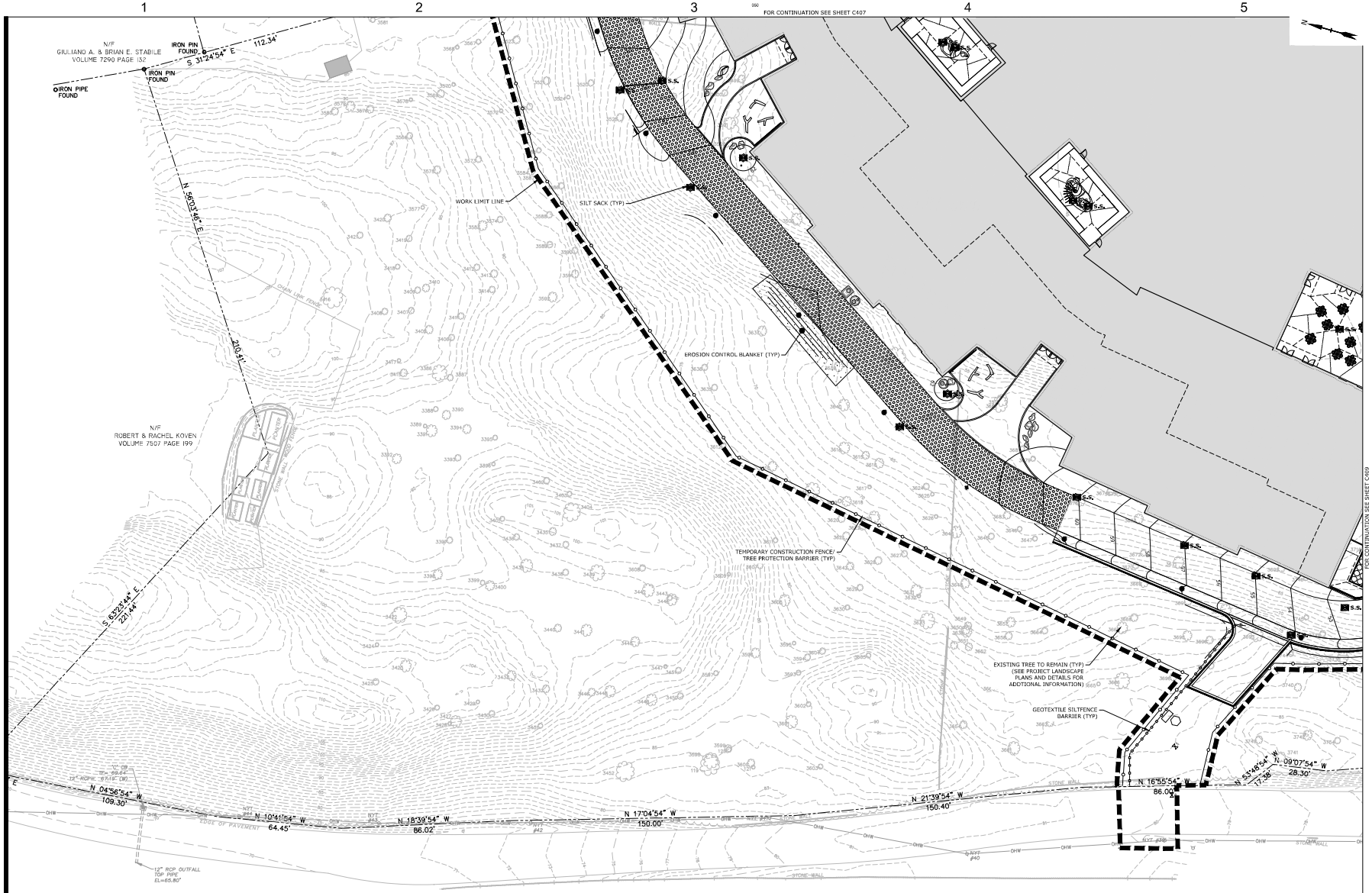

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Date: 07/08/2024
Scale: 1" = 20'
Proj Number: 22367.00
Drawing Number: **C410**

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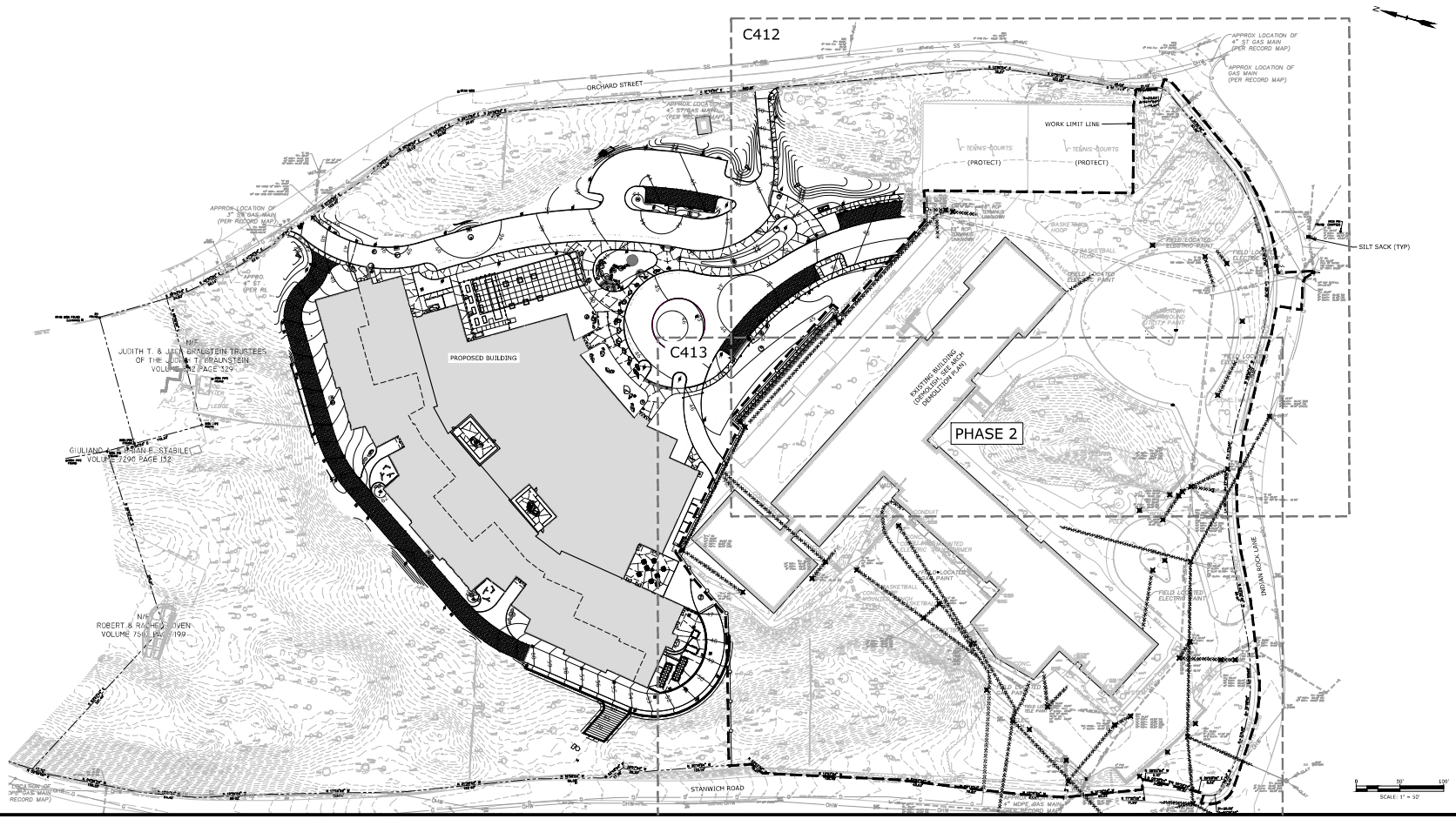

SOIL EROSION AND SEDIMENTATION CONTROL NARRATIVE:

GREENWICH CENTRAL MIDDLE SCHOOL IS A NEW MIDDLE SCHOOL AND BALL FIELDS LOCATED ON THE EXISTING CENTRAL MIDDLE SCHOOL CAMPUS ON INDIAN ROCK LANE IN GREENWICH, CT.

THE PHASE WILL INCLUDE DEMOLITION OF THE EXISTING MIDDLE SCHOOL, CONSTRUCTION OF BALL FIELDS, SANITARY SEWER, GAS, WATER, UNDERGROUND ELECTRIC AND TEL-DATA UTILITIES, STORMWATER MANAGEMENT SYSTEM, BITUMINOUS CONCRETE DRIVEWAYS AND PARKING, RETAINING WALLS, CURBS, LANDSCAPING, LIGHTING, AND SIDEWALKS

STORMWATER MANAGEMENT WILL BE ACCOMMODATED ON-SITE. SURFACE RUNOFF WILL BE COLLECTED AND CONVEYED IN CATCH BASINS AND LOW IMPACT DEVELOPMENT BEST MANAGEMENT PRACTICES THAT WILL TREAT THE FIRST 1" OF RUNOFF TO MEET THE TOWN OF GREENWICH DRAINAGE MANUAL AND THE CTDEEP WATER QUALITY MANUAL GUIDELINES FOR 80% TSS REMOVAL. THE STORMWATER MANAGEMENT SYSTEM WILL TREAT THE WATER QUALITY VOLUME AND REDUCE THE PEAK FLOW AND RUNOFF QUANTITY FROM THE SITE.

APPROXIMATELY 6.2 ACRES WILL BE DISTURBED.

PHASE 2 CONSTRUCTION START: SUMMER 2026

PHASE 2 CONSTRUCTION END: SUMMER 2027

SITE SOIL EROSION AND SEDIMENTATION CONTROL SHALL FOLLOW THE TOWN OF GREENWICH REQUIREMENTS AND DETAILS AS WELL AS THE CTDEEP 2024 CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENT CONTROL.

SOIL EROSION AND SEDIMENT CONTROL LEGEND

- PROPERTY LINE
- EASEMENT LINE
- SETBACK LINE
- GEOTEXTILE SILTFENCE
- INLET PROTECTION
- S.S. — SILT SACK
- HAYBALE BARRIER
- CONSTRUCTION ENTRANCE
- EROSION CONTROL BLANKET
- SOIL STOCKPILE AREA — SOIL STOCKPILE AREA
- TEMPORARY SEDIMENT TRAP
- TREE CLEARING

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NORTH
EAST
WEST
SOUTH
KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

PHASE 2 DEMOLITION SOIL EROSION AND SEDIMENTATION CONTROL PLAN

Date: 07/08/2024
Scale: 1" = 50'
Proj Number: 22367.00
Drawing Number: C411

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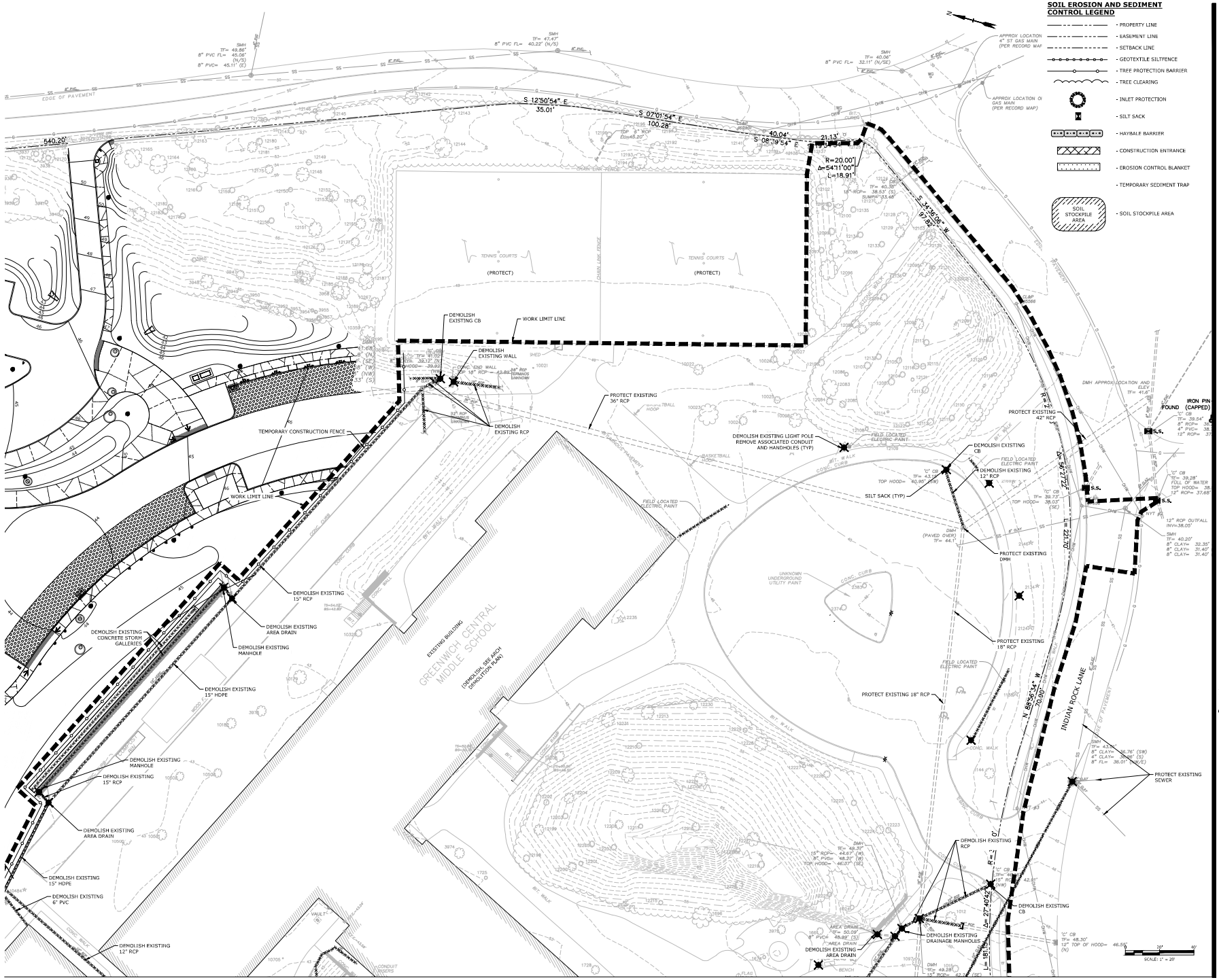

FOR CONTINUATION SEE SHEET C413

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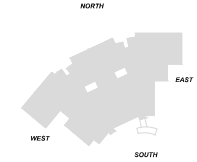

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
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PHASE 2 DEMOLITION SOIL EROSION AND SEDIMENTATION CONTROL PART PLAN

Date
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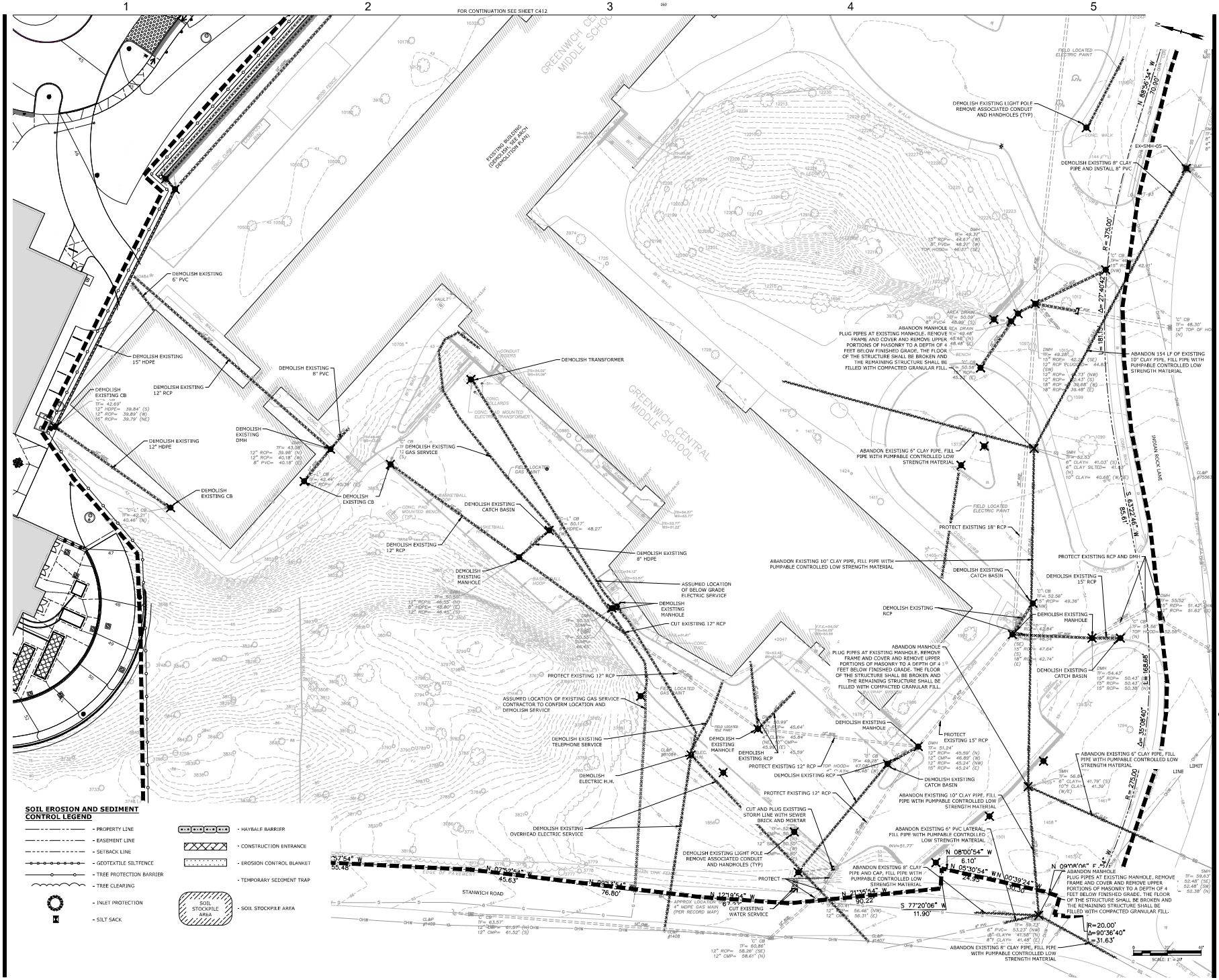

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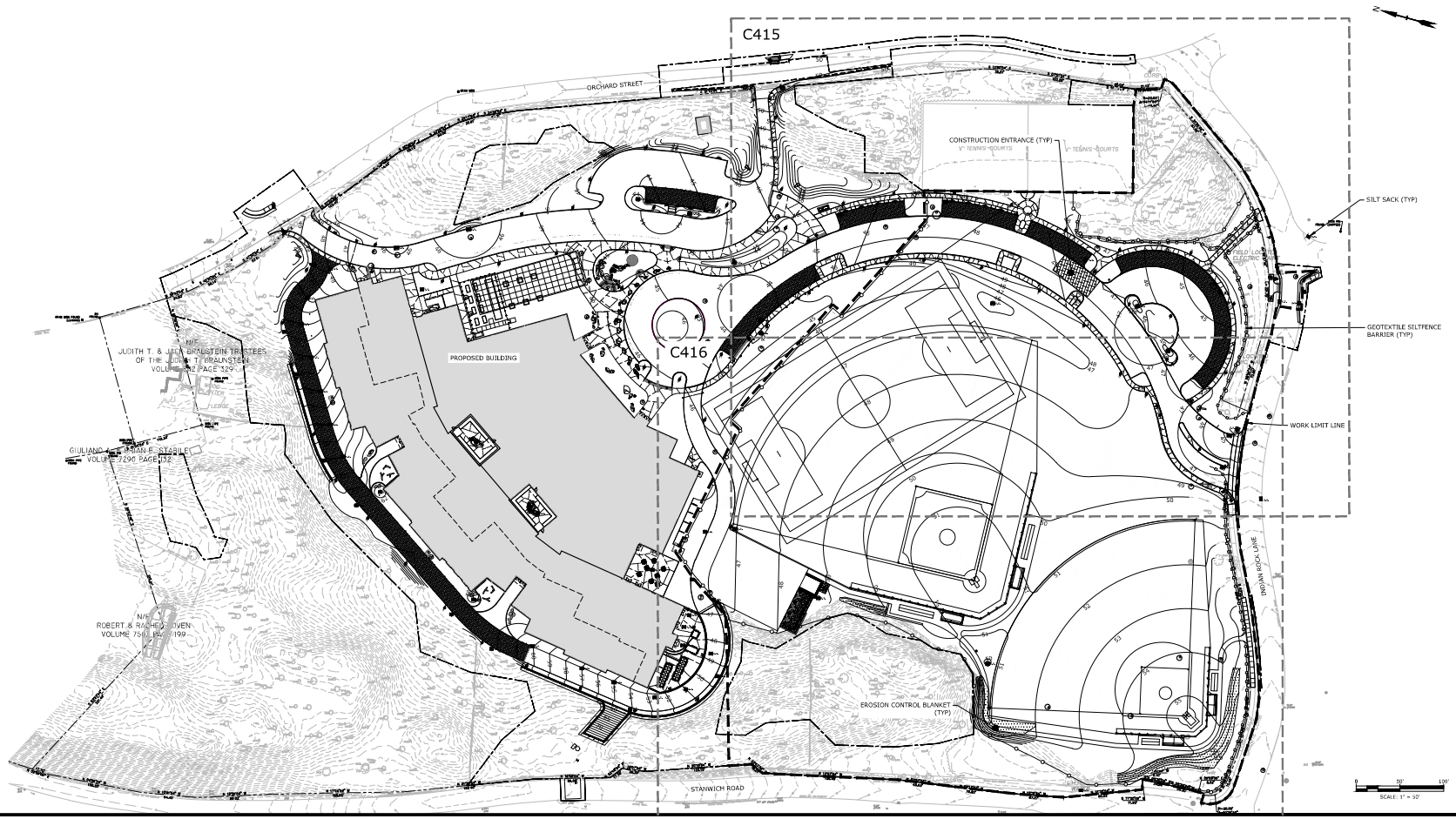

SOIL EROSION AND SEDIMENTATION CONTROL NARRATIVE:

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PHASE 2 CONSTRUCTION START: SUMMER 2026

PHASE 2 CONSTRUCTION END: SUMMER 2027

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PHASE 2 IMPROVED CONDITIONS SOIL EROSION AND SEDIMENTATION CONTROL PLAN

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Proj. Number: 22367.00
Drawing Number: C414

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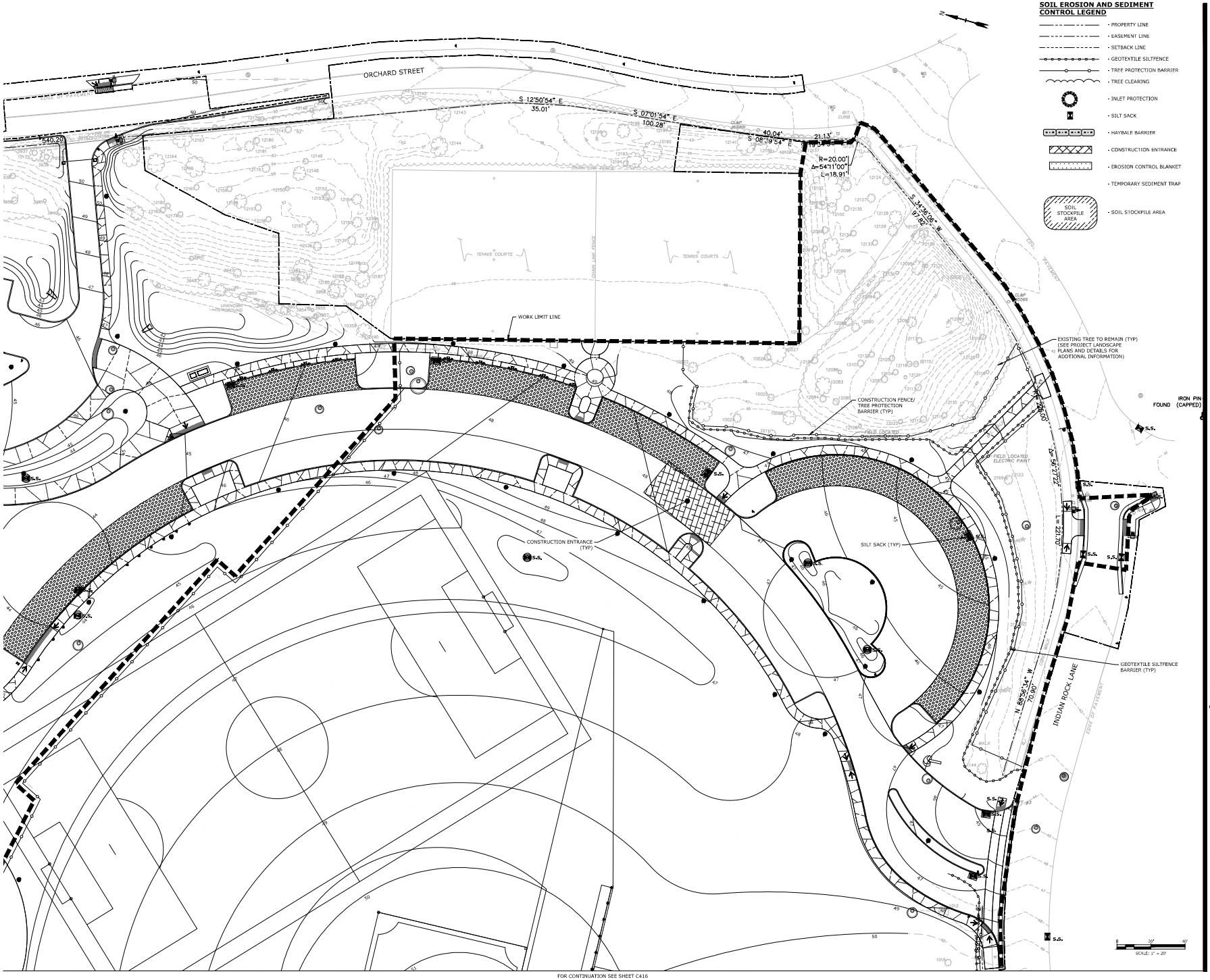

SOIL EROSION AND SEDIMENT CONTROL LEGEND

- PROPERTY LINE
- EASEMENT LINE
- SETBACK LINE
- GEOTEXTILE SILTFENCE
- TREE PROTECTION BARRIER
- TREE CLEARING
- INLET PROTECTION
- SILT SACK
- HAYBALE BARRIER
- CONSTRUCTION ENTRANCE
- EROSION CONTROL BLANKET
- TEMPORARY SEDIMENT TRAP
- SOIL STOCKPILE AREA
- SOIL STOCKPILE AREA

FOR CONTINUATION SEE SHEET C416

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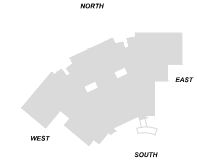

KEYPLAN

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PHASE 2 IMPROVED CONDITIONS SOIL EROSION AND SEDIMENTATION CONTROL PART PLAN

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Scale
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Proj. Number
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Drawing Number
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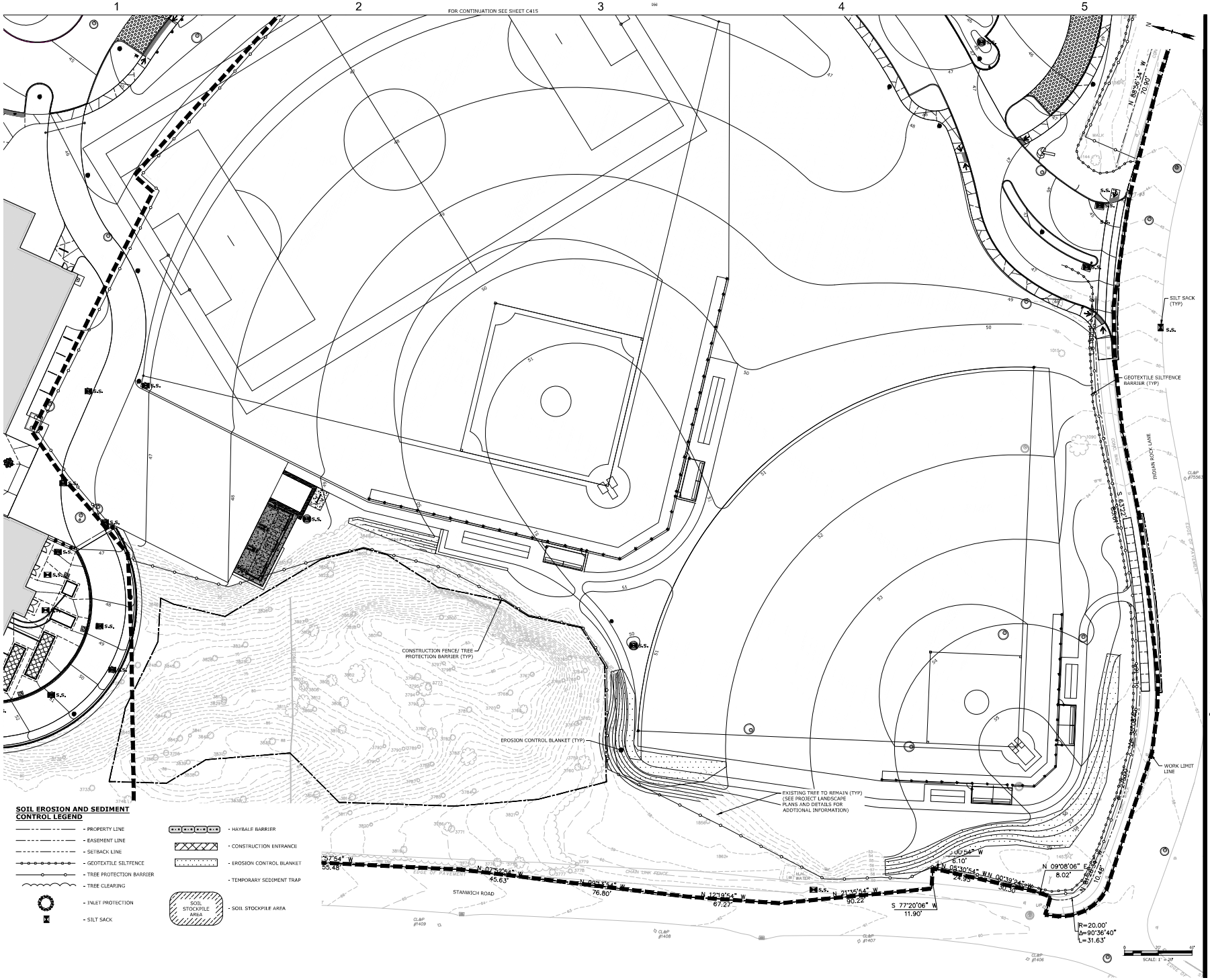

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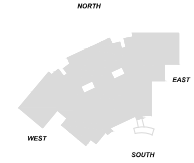

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SITE SOIL EROSION AND SEDIMENTATION CONTROL NOTES:

1. THE PROPOSED DEVELOPMENT IS ENTITLED "GREENWICH CENTRAL MIDDLE SCHOOL" IN GREENWICH, CONNECTICUT.
2. EROSION CONTROL NARRATIVE REFERS TO DRAWINGS C-401 THROUGH C-416.
3. THE PROPOSED SITE DEVELOPMENT WILL CONSIST OF SELECTIVE CLEARING AND GRUBBING STORMWATER MANAGEMENT, AND UTILITIES.
4. THE DEVELOPMENT IS LOCATED IN GREENWICH, CONNECTICUT AND IS LOCATED OFF OF INDIAN ROCK LANE, BETWEEN ORCHARD STREET AND STANWICH ROAD.
5. SURVEY CONDITIONS TAKEN FROM PLAN ENTITLED "PROPERTY / BOUNDARY & TOPOGRAPHIC SURVEY 'GREENWICH CENTRAL MIDDLE SCHOOL' 9 INDIAN ROCK LANE GREENWICH, CONNECTICUT" . PREPARED BY MARTIN SURVEYING ASSOCIATES LLC, 201 CHRISTIAN LANE,SUITE B BERLIN, CT 06037, 860-832-9328, DATED 5-22-2023.
6. ALL EROSION CONTROL MEASURES SHALL BE INSTALLED AS SHOWN ON THE PLANS AND ELSEWHERE AS ORDERED BY THE OWNER'S REPRESENTATIVE, OR THE TOWN OF GREENWICH.
7. ALL CATCH BASINS SHALL BE PROTECTED WITH SILT SACKS, HAYBALE RING, SILT FENCE OR BLOCK AND STONE INLET PROTECTION THROUGHOUT THE CONSTRUCTION PERIOD AND UNTIL ALL DISTURBED AREAS ARE THOROUGHLY STABILIZED.
8. WHEREVER POSSIBLE, EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED PRIOR TO CONSTRUCTION.
9. ADDITIONAL CONTROL MEASURES SHALL BE INSTALLED DURING CONSTRUCTION PERIOD AS ORDERED BY THE OWNER'S REPRESENTATIVE, OR THE TOWN OF GREENWICH. THE PROCUREMENT, INSTALLATION AND MAINTENANCE OF ADDITIONAL SOIL EROSION AND SEDIMENTATION CONTROL MEASURES TO REPLACE DAMAGED MEASURES, EMERGENCY REPAIRS, AND TO MEET CONDITIONS OF THE SITE AS CONSTRUCTION PROGRESSES SHALL BE INCLUDED IN CONTRACTORS LUMP SUM BID PRICE.
10. ALL SEDIMENTATION AND EROSION CONTROL MEASURES SHALL BE MAINTAINED IN EFFECTIVE CONDITION THROUGHOUT THE CONSTRUCTION PERIOD.
11. SEDIMENT REMOVED SHALL BE DISPOSED OF LEGALLY OFFSITE.
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONSTRUCTION AND MAINTENANCE OF ALL EROSION CONTROL MEASURES THROUGHOUT THE CONSTRUCTION PERIOD.
13. THE CONTRACTOR SHALL MAINTAIN A SUPPLY OF SILT FENCE/HAYBALES AND ANTI-TRACKING CRUSHED STONE ON-SITE FOR EMERGENCY REPAIRS.
14. THE CONTRACTOR SHALL UTILIZE APPROVED METHODS/MATERIALS FOR PREVENTING THE BLOWING AND MOVEMENT OF DUST FROM EXPOSED SOIL SURFACES ONTO ADJACENT PROPERTIES AND SITE AREAS.
15. ALL DRAINAGE STRUCTURES SHALL BE INSPECTED WEEKLY BY THE CONTRACTOR AND CLEANED TO PREVENT THE BUILD-UP OF SILT.
16. THE CONTRACTOR SHALL CAREFULLY COORDINATE THE PLACEMENT OF EROSION CONTROL MEASURES WITH THE PHASING OF CONSTRUCTION.
17. KEEP ALL PAVED ROADWAYS CLEAN. SWEEP BEFORE FORECASTED STORMS OR WEEKLY AS NECESSARY.
18. TREAT ALL UNPAVED SURFACES IN ACCORDANCE WITH LANDSCAPE PLANS.
19. HAYBALE BARRIERS AND SILT FENCING SHALL BE INSTALLED ALONG THE TOE OF CRITICAL CUT AND FILL SLOPES AS SHOWN ON THE PLANS AND AS DIRECTED BY THE TOWN OF GREENWICH.
20. ALL TRUCKS LEAVING THE SITE MUST BE COVERED.
21. DISTURBED SLOPES GREATER THAN 3:1 AND SEDIMENT TRAPS AS SHOWN ON THE PLANS SHALL BE IMMEDIATELY STABILIZED WITH EROSION CONTROL BLANKET, NORTH AMERICAN GREEN SC150BN OR APPROVED EQUIVALENT.
22. ALL SEDIMENTATION AND EROSION CONTROLS SHALL BE CHECKED WEEKLY AND AFTER EACH RAINFALL EVENT. NECESSARY REPAIRS SHALL BE MADE WITHOUT DELAY.
23. PRIOR TO ANY FORECASTED RAINFALL, EROSION AND SEDIMENT CONTROLS SHALL BE INSPECTED AND REPAIRED AS NECESSARY.
24. AFTER ALL DISTURBED AREAS HAVE BEEN STABILIZED, EROSION CONTROLS MAY BE REMOVED ONCE AUTHORIZATION TO DO SO HAS BEEN SECURED FROM THE TOWN. DISTURBED AREAS SHALL BE SEEDED AND MULCHED.
25. ALL DRAINAGE SWALES SHALL BE STABILIZED WITH EROSION CONTROL BLANKET, NORTH AMERICAN GREEN C125BN OR APPROVED EQUIVALENT.
26. CONTRACTOR IS TO COMPLY WITH THE REQUIREMENTS OF THE SOIL EROSION AND SEDIMENTATION CONTROL PLAN, DETAILS, AND SPECIFICATIONS.

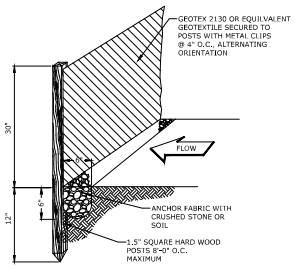
CONSTRUCTION SEQUENCE

PHASE 1:

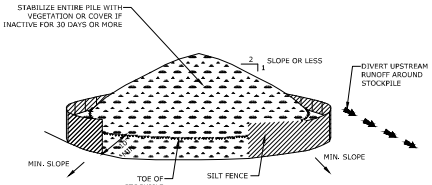
1. THE INSPECTING ENGINEER AND ARBORIST SHALL MEET WITH THE CONTRACTOR AND OWNER TO REVIEW THE SEDIMENT AND EROSION CONTROL (S&E PLAN) AND DISCUSS ANY MODIFICATIONS TO CONSTRUCTION SEQUENCE OR S&E PLAN.
2. INSTALL TREE PROTECTION AND TRIM LIMBS THAT MAY BE DAMAGED BY CONSTRUCTION EQUIPMENT.
3. INSTALL CONSTRUCTION FENCE AND ACCESS GATES AS SHOWN ON THE PLANS.
4. INSTALL TRACKING PAD AND ESTABLISH STAGING AREA WITH TRAILERS.
5. CONSTRUCT TEMPORARY SEDIMENT BASIN AND REQUIRED PIPING AS SHOWN ON THE PLANS.
6. INSTALL SILT FENCE AND CONSTRUCTION FENCE AS SHOWN ON THE PLANS.
7. INSTALL REMAINING SEDIMENT AND EROSION CONTROLS.
8. RELOCATE AND INSTALL THE EXISTING CONCRETE INFILTRATION SYSTEM AS SHOWN ON THE PLANS.
9. DEMOLISH ANY STRUCTURES OR UNDERGROUND UTILITIES AS SPECIFIED ON THE PLANS.
10. PERFORM GENERAL EARTHWORK FOR THE BUILDING. EXCAVATE AND INSTALL FOUNDATION.
11. CONSTRUCT THE BUILDING AND BACKFILL THE FOUNDATION AS SOON AS POSSIBLE.
12. INSTALL UNDERGROUND STORMWATER SYSTEM.
13. INSTALL SANITARY SEWER, WATER, GAS, ELECTRIC, AND TELEPHONE UTILITIES.
14. ROUGH GRADE DRIVEWAY AND INSTALL DRIVEWAY BASE.
15. INSTALL BITUMINOUS CONCRETE BINDER COURSE.
16. SEED & MULCH DISTURBED AREAS AND INSTALL LANDSCAPING AS SOON AS POSSIBLE.
17. MAINTAIN ALL SEDIMENT AND EROSION CONTROLS IN AN EFFECTIVE CONDITION DURING THE PHASE 1 CONSTRUCTION PERIOD.
18. CLEAN EFFECTED PORTION OF ON & OFF SITE ROADS AND DRIVEWAYS.
19. REMOVE ACCUMULATED SILT AND DEBRIS FROM CATCH BASINS, AREA DRAIN SUMPS & PIPES OF EFFECTED STORM DRAINS.
20. REMOVE ACCUMULATED SEDIMENT FROM EFFECTED AREAS AND DISPOSE OF LEGALLY.
21. REMOVE TEMPORARY SEDIMENT AND EROSION CONTROLS AND TREE PROTECTION.

PHASE 2:

1. THE INSPECTING ENGINEER AND ARBORIST SHALL MEET WITH THE CONTRACTOR AND OWNER TO REVIEW THE SEDIMENT AND EROSION CONTROL (S&E PLAN) AND DISCUSS ANY MODIFICATIONS TO CONSTRUCTION SEQUENCE OR S&E PLAN.
2. INSTALL TREE PROTECTION AND TRIM LIMBS THAT MAY BE DAMAGED BY CONSTRUCTION EQUIPMENT.
3. INSTALL CONSTRUCTION FENCE AND ACCESS GATES AS SHOWN ON THE PLANS.
4. INSTALL TRACKING PAD AND ESTABLISH STAGING AREA WITH TRAILERS.
5. INSTALL SILT FENCE AND CONSTRUCTION FENCE AS SHOWN ON THE PLANS.
6. INSTALL REMAINING SEDIMENT AND EROSION CONTROLS.
7. DEMOLISH EXISTING BUILDING.
8. DEMOLISH ANY STRUCTURES OR UNDERGROUND UTILITIES AS SPECIFIED ON THE PLANS.
9. PERFORM GENERAL EARTHWORK FOR THE BUILDING. EXCAVATE AND INSTALL FOUNDATION.
10. ROUGH GRADE THE BALL FIELDS.
11. INSTALL STORMWATER, SANITARY SEWER, WATER, GAS, ELECTRIC, AND TELEPHONE UTILITIES.
12. ROUGH GRADE DRIVEWAY AND INSTALL DRIVEWAY BASE.
13. INSTALL BITUMINOUS CONCRETE BINDER COURSE.
14. SEED & MULCH DISTURBED AREAS AND INSTALL LANDSCAPING AS SOON AS POSSIBLE.
15. MAINTAIN ALL SEDIMENT AND EROSION CONTROLS IN AN EFFECTIVE CONDITION DURING THE PHASE 2 CONSTRUCTION PERIOD.
16. CLEAN EFFECTED PORTION OF ON & OFF SITE ROADS AND DRIVEWAYS.
17. REMOVE ACCUMULATED SILT AND DEBRIS FROM CATCH BASINS, AREA DRAIN SUMPS & PIPES OF EFFECTED STORM DRAINS.
18. REMOVE ACCUMULATED SEDIMENT FROM EFFECTED AREAS AND DISPOSE OF LEGALLY.
19. REMOVE TEMPORARY SEDIMENT AND EROSION CONTROLS AND TREE PROTECTION.



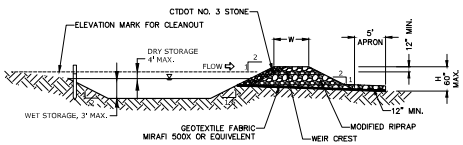
SILT FENCE
NO SCALE

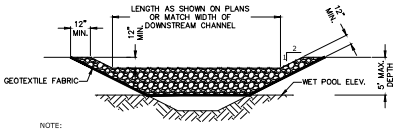


INSTALLATION NOTES:

1. AREA CHOSEN FOR STOCKPILING OPERATIONS SHALL BE DRY AND STABLE.
2. MAXIMUM SLOPE OF STOCKPILE SHALL BE 2H: 1V.
3. UPON COMPLETION OF SOIL STOCKPILING, EACH PILE SHALL BE SURROUNDED WITH EITHER SILT FENCING OR HAYBALES, THEN STABILIZED WITH VEGETATION OR COVERED.

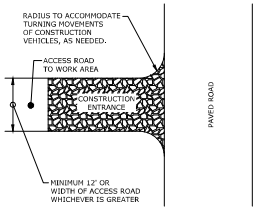
TEMPORARY SOIL STOCKPILING
NO SCALE



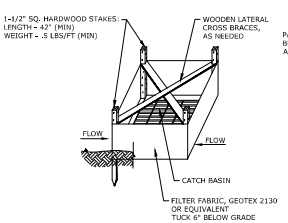


NOTE:
NON-OVERFLOW PORTIONS AND ABUTMENTS MAYBE CONSTRUCTED OF COMPACTED EARTH FILL.

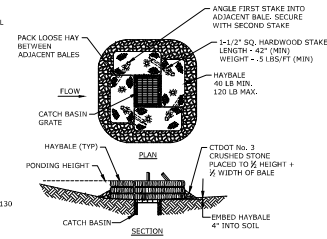
TEMPORARY SEDIMENT TRAP
NO SCALE



CONSTRUCTION ENTRANCE
NO SCALE



SILT FENCE INSTALLATION AT CATCH BASIN AT LOW POINTS



HAYBALE FILTER INSTALLATION AT CATCH BASIN AT LOW POINTS

CATCH BASIN EROSION CONTROL
NO SCALE

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Checked: APW

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N

NORTH
EAST
WEST
SOUTH
KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SOIL EROSION AND SEDIMENTATION CONTROL NOTES, CONSTRUCTION SEQUENCE AND DETAILS - 1

Date: 07/08/2024
Scale: 1" = 20'
Proj Number: 22367.00
Drawing Number: C417

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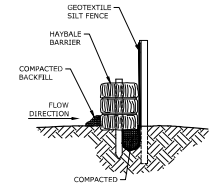
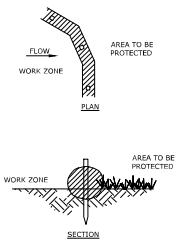


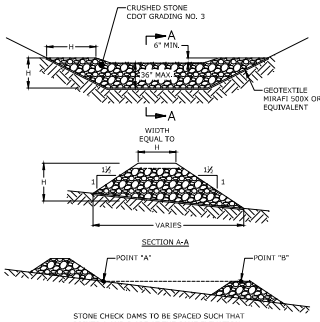
NOTE:

1. BACKFILL AND COMPACT THE EXCAVATED SOIL AS SHOWN ON THE UPHILL SIDE OF THE BARRIER TO PREVENT PIPING.

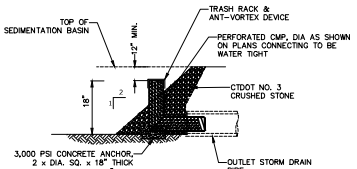
SILT FENCE AND HAYBALE COMBINED BARRIER



BARK MULCH LOG BARRIER
NO SCALE



STONE CHECK DAM
NO SCALE

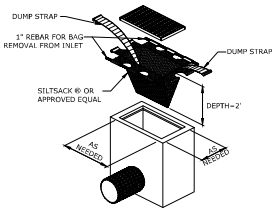


CORRUGATED METAL PIPE REQUIREMENTS FOR RISERS:

CORRUGATED STEEL PIPE								
PIPE DIA. INCHES	8-12	24	30	36	48	54	60	66
MIN. GAUGE	16	16	14	14	12	10	10	10

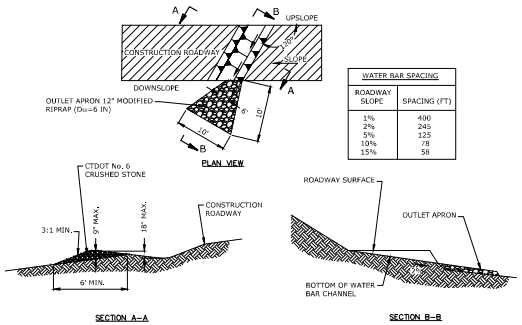
CORRUGATED ALUMINUM PIPE						
PIPE DIA. INCHES	8-12	24	30	36	48	54
MIN. GAUGE	16	14	14	14	10	10

TEMPORARY SEDIMENTATION BASIN INLET STANDPIPE
NO SCALE



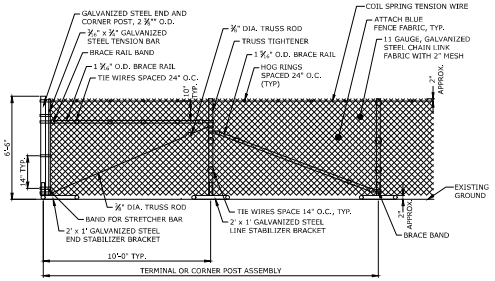
SILTSACK MANUFACTURED BY:
ACF ENFIRONMENTAL
2831 CARDWELL ROAD
RICHMOND, VIRGINIA 23237

SILTSACK®
NO SCALE



WATER BAR SPACING	
ROADWAY SLOPE	SPACING (FT)
1%	400
2%	245
5%	125
10%	78
15%	58

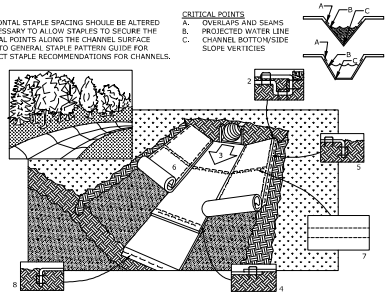
WATER BAR
NO SCALE



6' TEMPORARY CHAIN LINK CONSTRUCTION FENCE
NO SCALE

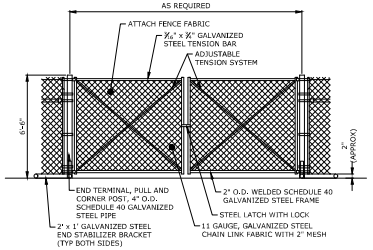
NOTE:
HORIZONTAL STAPLE SPACING SHOULE BE ALTERED IF NECESSARY TO ALLOW STAPLES TO SECURE THE CRITICAL POINTS ALONG THE CHANNEL SURFACE REFER TO GENERAL STAPLE PATTERN GUIDE FOR CORRECT STAPLE RECOMMENDATIONS FOR CHANNELS.

CRITICAL POINTS
A. OVERLAPS AND SEAMS
B. PROJECTED WATER LINE
C. CHANNEL BOTTOM/SIDE SLOPE VERTICIES



1. PREPARE SOIL BEFORE INSTALLING BLANKETS, INCLUDING APPLICATION OF LIME, FERTILIZER, AND SEED.
2. BEGIN AT THE TOP OF THE CHANNEL BY ANCHORING THE BLANKET IN A 6" DEEP X 6" WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
3. ROLL CENTER BLANKET IN DIRECTION OF WATER FLOW ON BOTTOM OF CHANNEL.
4. PLACE BLANKETS END OVER END (SHINGLE STYLE) WITH A 6" OVERLAP. USE A DOUBLE ROW OF STAGGERED STAPLES 4' APART TO SECURE BLANKETS.
5. FULL LENGTH EDGE OF BLANKETS AT TOP OF SIDE SLOPES MUST BE ANCHORED IN 6" DEEP X 6" WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
6. BLANKETS ON SIDE SLOPES MUST BE OVERLAPPED 4" OVER THE CENTER BLANKET AND STAPLED (2' FOR C350 MATTING).
7. IN HIGH FLOW CHANNEL APPLICATIONS, A STAPLE CHECK SLOT IS RECOMMENDED AT 30 TO 40 FOOT INTERVALS. USE A ROW OF STAPLES 4' APART OVER THE ENTIRE WIDTH OF THE CHANNEL. PLACE A SECOND ROW 4" BELOW THE FIRST ROW IN A STAGGERED PATTERN.
8. TERMINAL END OF THE BLANKETS MUST BE ANCHORED IN A 6" DEEP X 6" WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.

EROSION CONTROL BLANKET INSTALLATION
NO SCALE



6' TEMPORARY CHAIN LINK CONSTRUCTION GATE
NO SCALE

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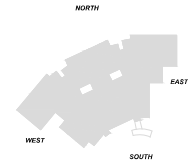
Greenwich Central Middle School

9 Indian Rock
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SITE SOIL EROSION AND SEDIMENTATION CONTROL DETAILS - 2

Date: 07/08/2024
Scale: 1" = 20'
Proj Number: 22367.00
Drawing Number: C418

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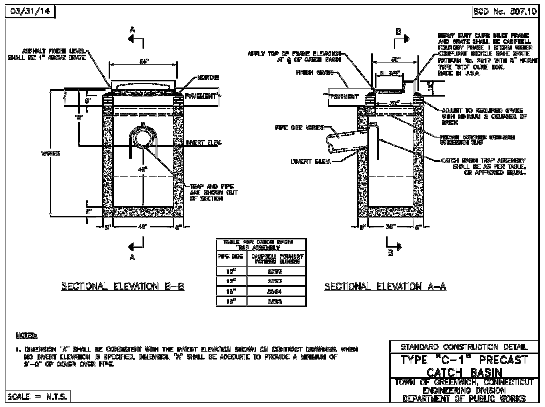
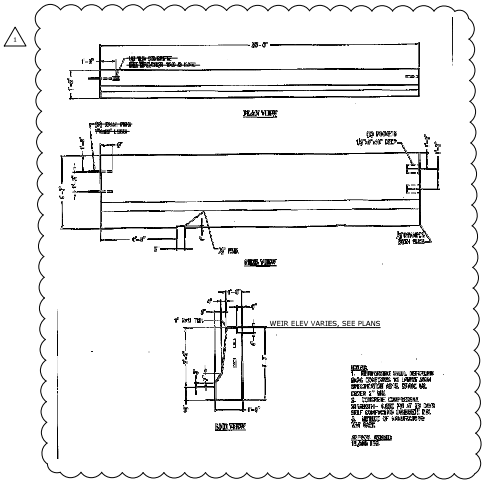
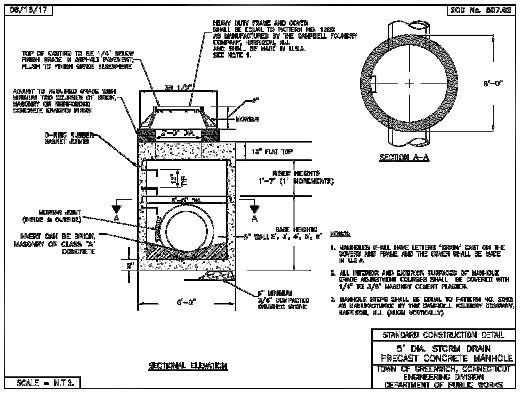
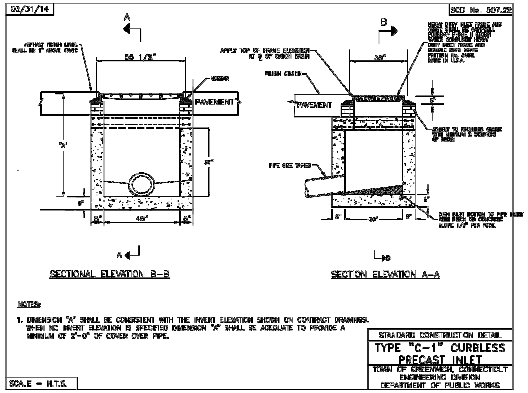
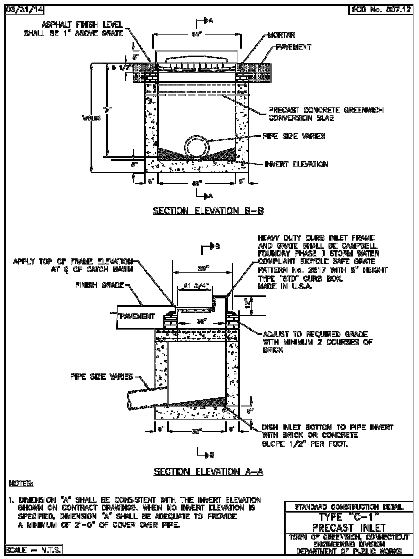


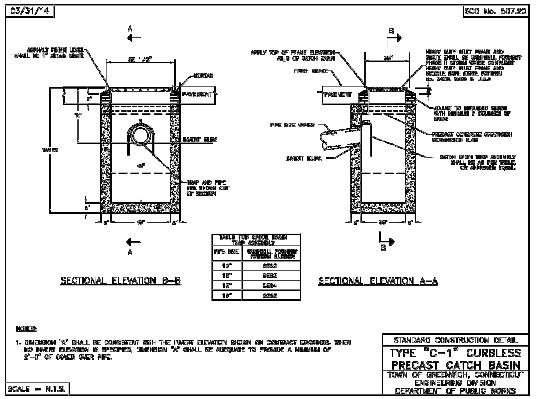


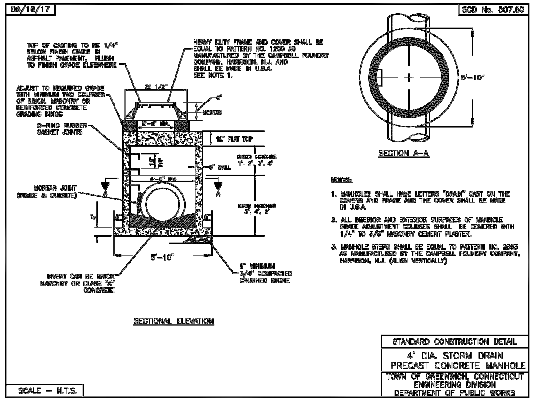
CTDOT TYPE SINGLE-F BARRIER
POROUS ASPHALT WEIR WALL DETAIL
NO SCALE

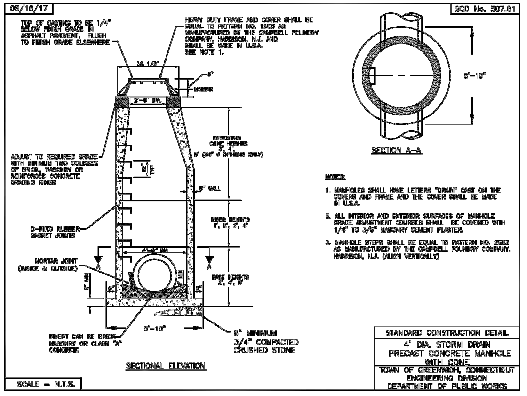












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Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N

NORTH
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WEST
SOUTH
KEYPLAN

Number	Date	Issued For
1	10/23/2024	ADDENDUM #3
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SITE STORMWATER MANAGEMENT DETAILS - 1

Date
07/08/2024
Scale
AS SHOWN
Proj Number
22367.00

Drawing Number
C501

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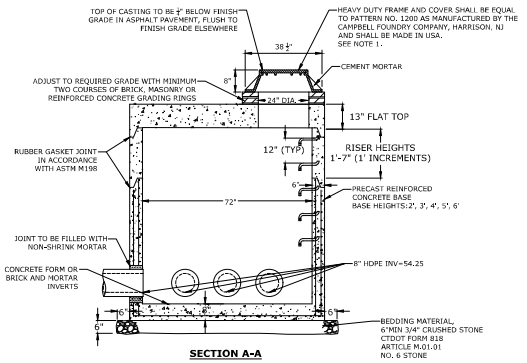
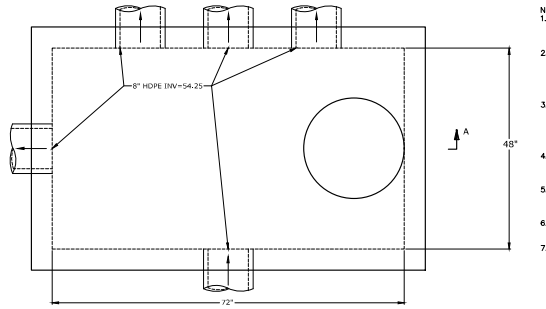
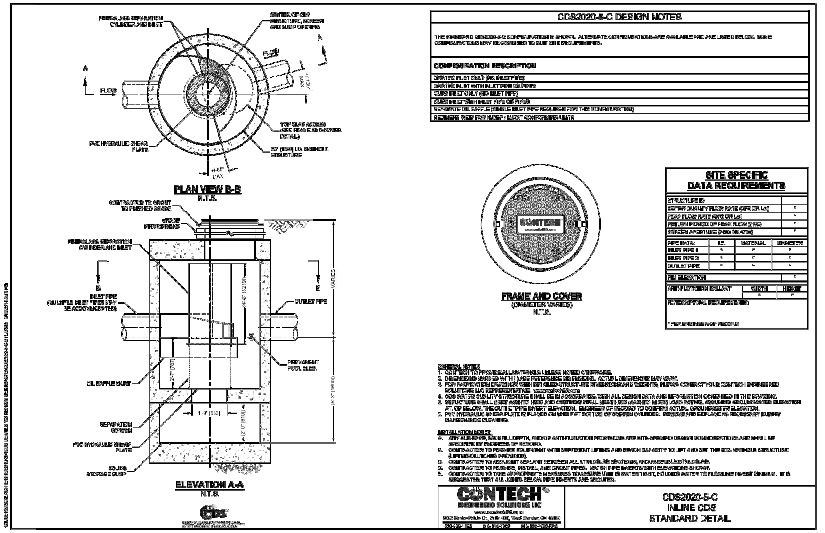


SECTION A-A

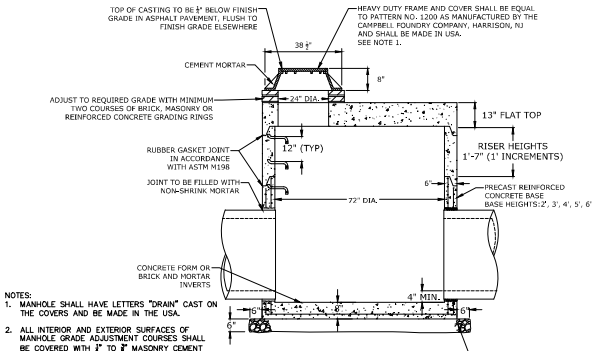


48 x 72" MANHOLE
NO SCALE

NOTES:
1. MANHOLE SHALL HAVE LETTERS "DRAIN" CAST ON THE COVERS AND BE MADE IN THE USA.
2. ALL INTERIOR AND EXTERIOR SURFACES OF MANHOLE GRADE ADJUSTMENT COURSES SHALL BE COVERED WITH ½" TO ¾" MASONRY CEMENT PLASTER.
3. MANHOLE STEPS SHALL BE EQUAL TO PATTERN NO. 2593 AS MANUFACTURED BY THE CAMPBELL FOUNDRY COMPANY, HARRISON, NJ. (ALIGN VERTICALLY)
4. REINFORCING STEEL WELDED WIRE FABRIC SHALL CONFORM TO LATEST ASTM SPECIFICATION A185.
5. REINFORCING STEEL DEFORMED BARS SHALL CONFORM TO LATEST ASTM SPECIFICATION A615.
6. CONCRETE COMPRESSIVE STRENGTH: 5,000 PSI – 28 DAYS.
7. MONOLITHIC BASE SECTION.



HYDRODYNAMIC SEPARATOR
NO SCALE



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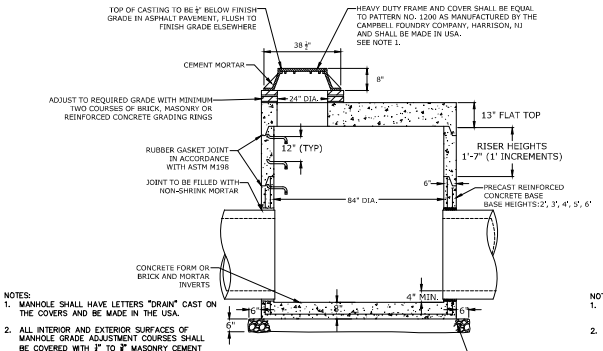
6. CONCRETE COMPRESSIVE STRENGTH: 5,000 PSI – 28 DAYS.
7. MONOLITHIC BASE SECTION.

72" DIAMETER MANHOLE
NO SCALE



NOTES:
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2. ALL INTERIOR AND EXTERIOR SURFACES OF MANHOLE GRADE ADJUSTMENT COURSES SHALL BE COVERED WITH ½" TO ¾" MASONRY CEMENT PLASTER.
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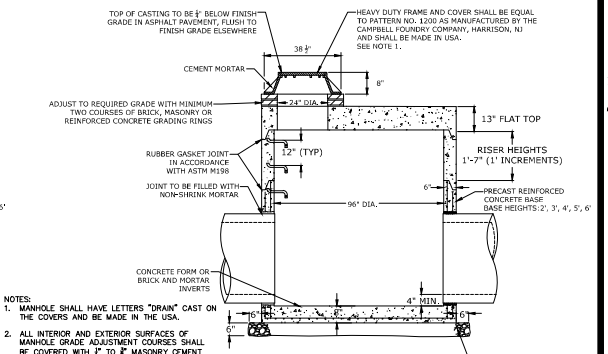
5. REINFORCING STEEL DEFORMED BARS SHALL CONFORM TO LATEST ASTM SPECIFICATION A615.
6. CONCRETE COMPRESSIVE STRENGTH: 5,000 PSI – 28 DAYS.
7. MONOLITHIC BASE SECTION.

84" DIAMETER MANHOLE
NO SCALE



NOTES:
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2. ALL INTERIOR AND EXTERIOR SURFACES OF MANHOLE GRADE ADJUSTMENT COURSES SHALL BE COVERED WITH ½" TO ¾" MASONRY CEMENT PLASTER.
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5. REINFORCING STEEL DEFORMED BARS SHALL CONFORM TO LATEST ASTM SPECIFICATION A615.
6. CONCRETE COMPRESSIVE STRENGTH: 5,000 PSI – 28 DAYS.
7. MONOLITHIC BASE SECTION.

96" DIAMETER MANHOLE
NO SCALE

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Glastonbury, CT 06033-4410
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Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N

NORTH
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WEST
SOUTH
KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SITE STORMWATER MANAGEMENT DETAILS - 2

Date: 07/08/2024
Scale: AS SHOWN
Proj Number: 22367.00
Drawing Number: C502

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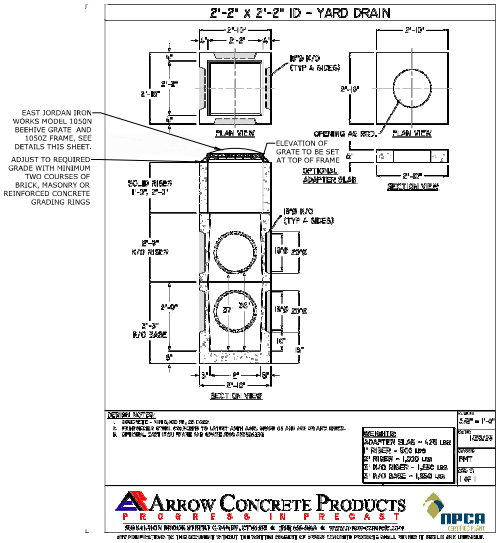
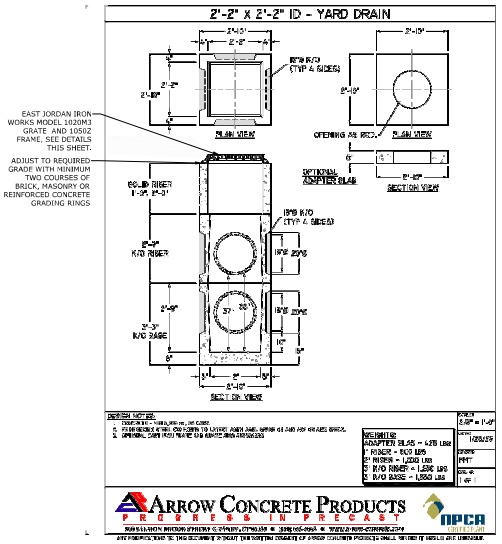
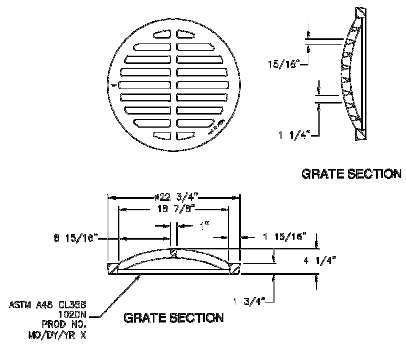


24" SQ YARD DRAIN WITH BEEHIVE GRATE
NO SCALE



24" SQ YARD DRAIN WITH ADA GRATE
NO SCALE

1020N Grate



YARD DRAIN BEEHIVE GRATE
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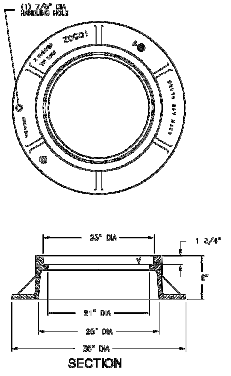
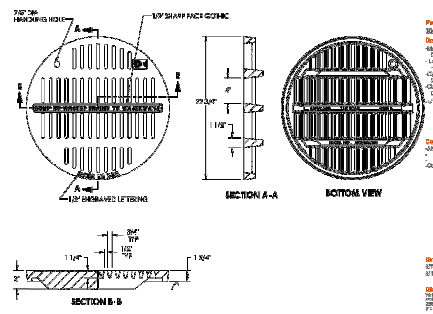
1050Z Frame



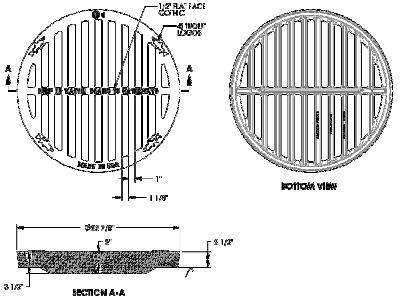
YARD DRAIN FRAME
NO SCALE

1020M3 Grate



YARD DRAIN ADA GRATE
NO SCALE

1545M Grate



48" YARD DRAIN GRATE
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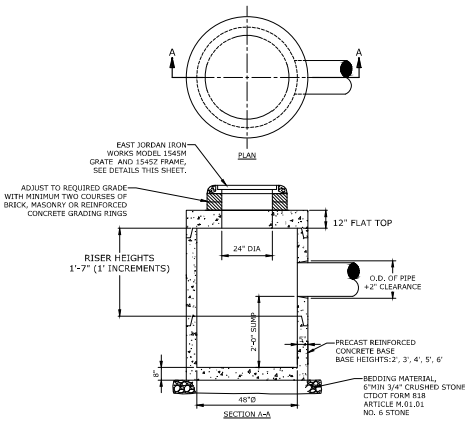
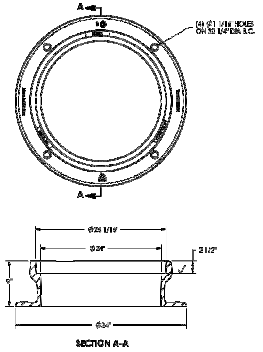


48" DIA YARD DRAIN WITH CIRCULAR GRATE
NO SCALE

1545Z Frame



48" YARD DRAIN FRAME
NO SCALE

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Greenwich Central Middle School

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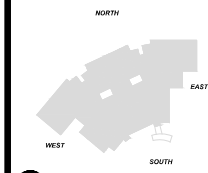

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SITE STORMWATER MANAGEMENT DETAILS - 3

Date
07/08/2024
Scale
AS SHOWN
Proj. Number
22367.00

Drawing Number
C503

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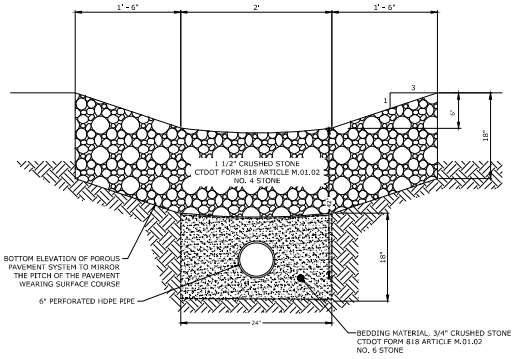
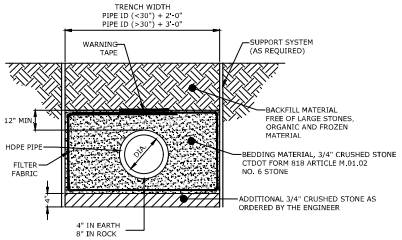
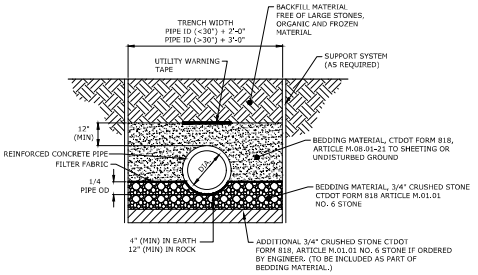


5' WIDE STONE SWALE WITH 6" UNDERDRAIN
NO SCALE



HDPE TRENCH BEDDING
NO SCALE



CIRCULAR RCP TRENCH BEDDING
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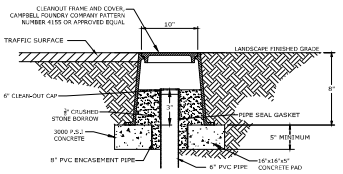
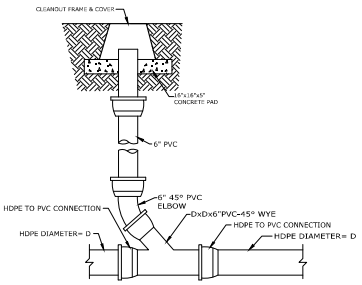
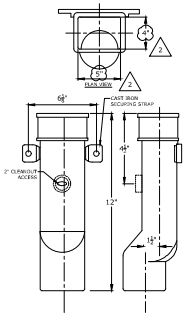


CLEANOUT FRAME & COVER

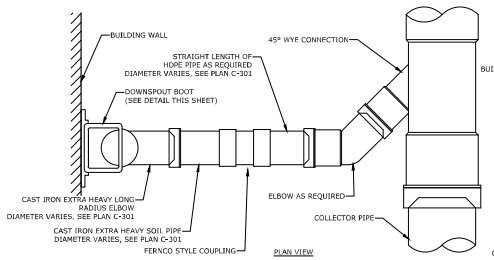


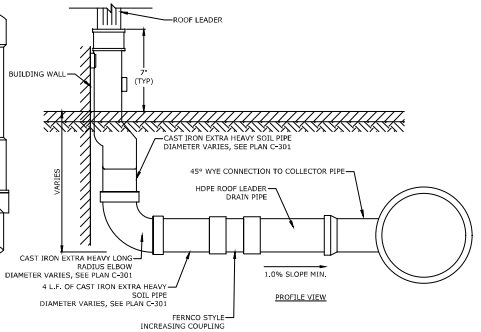
CLEANOUT
NO SCALE



DOWNSPOUT BOOT
NO SCALE

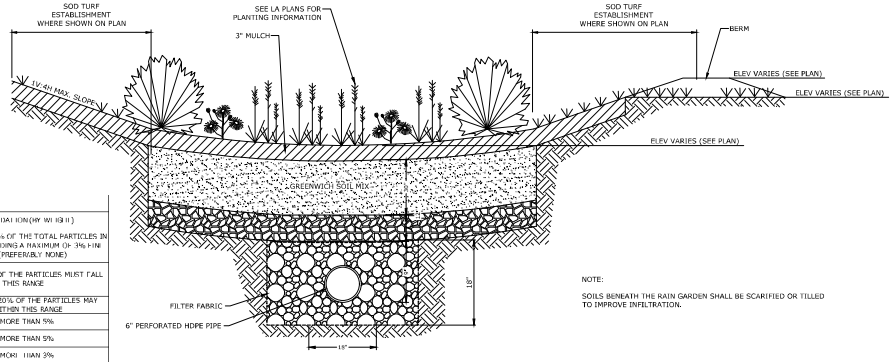
NOTES
1. DOWNSPOUT BOOT SHALL BE JAY R. SMITH MFG. CO. MODEL 886-1000 APPROVED EQUAL.
2. DOWNSPOUT BOOT SHALL HAVE A CLEANOUT PROVIDED
3. THE BODY AND STRAP MATERIAL SHALL BE CAST IRON
4. THE TOP OF BOOT SHALL BE INSTALLED NO HIGHER THAN 7" ABOVE FINISHED GRADE.





ROOF LEADER DRAIN LINE
NO SCALE

NOTES:
1. CAST IRON PIPE SHALL BE EXTRA HEAVY CAST IRON SOIL PIPE AS MANUFACTURED BY CHARLOTTE PIPE AND FOUNDRY COMPANY, CHARLOTTE, NC 28235 OR APPROVED EQUAL.
2. PIPE AND FITTINGS SHALL COMPLY WITH ASTM A 74. COMPRESSION GASKETS SHALL COMPLY WITH ASTM C 564. ALL PIPE AND FITTING SHALL BE MADE IN THE UNITED STATES, AND MARKED WITH THE COLLECTIVE TRADEMARK OF THE CAST IRON SOIL PIPE INSTITUTE.

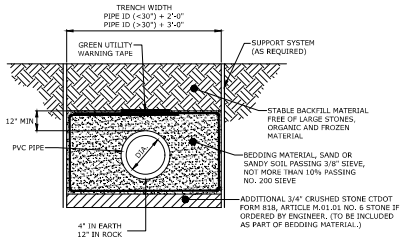


GREENWICH SOIL MIX

NAME	PARTICLE DIAMETER	RECOMMENDATION (BY WEIGHT)
FINE GRAVEL	2.0 – 3.4 MM	NOT MORE THAN 30% OF THE TOTAL PARTICLES IN THIS RANGE, INCLUDING A MAXIMUM OF 3% FINE GRAVEL (PREFERABLY NONE)
VERY COARSE SAND	1.0 – 2.0 MM	
COARSE SAND	0.5 – 1.0 MM	MINIMUM OF 60% OF THE PARTICLES MUST FALL IN THIS RANGE
MEDIUM SAND	0.25 – 0.50 MM	
FINE SAND	0.15 – 0.25 MM	NOT MORE THAN 20% OF THE PARTICLES MAY FALL WITHIN THIS RANGE
VERY FINE SAND	0.05 – 0.15 MM	NOT MORE THAN 5%
SILT	0.002 – 0.05 MM	NOT MORE THAN 5%
CLAY	LESS THAN 0.002 MM	NOT MORE THAN 3%
TOTAL FINES	VERY FINE SAND + SILT + CLAY	LESS THAN OR EQUAL TO 10%

NOTE:
SOILS BENEATH THE RAIN GARDEN SHALL BE SCARIFIED OR TILLED TO IMPROVE INFILTRATION.

RAIN GARDEN TYPICAL CROSS SECTION
NO SCALE



PVC TRENCH BEDDING
NO SCALE

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NORTH
EAST
WEST
SOUTH
KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SITE STORMWATER MANAGEMENT DETAILS - 4

Date: 07/08/2024
Scale: AS SHOWN
Proj Number: 22367.00
Drawing Number: C504

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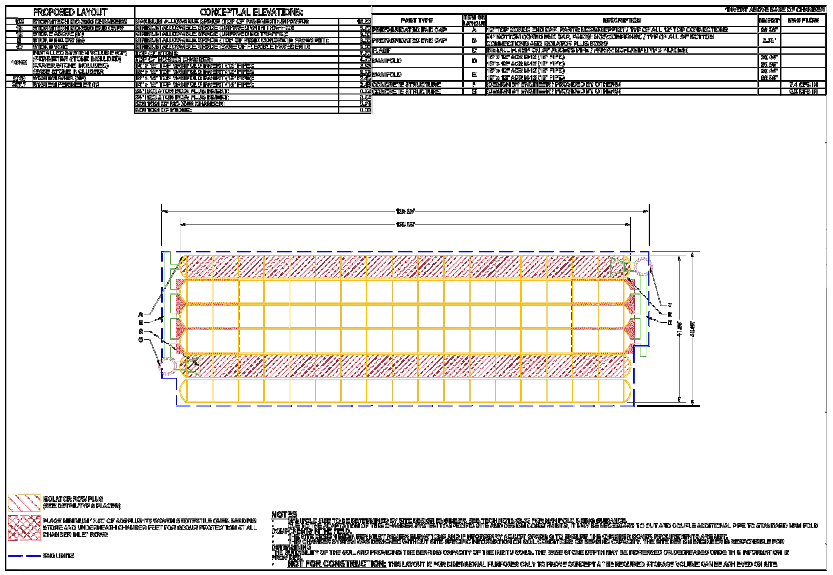

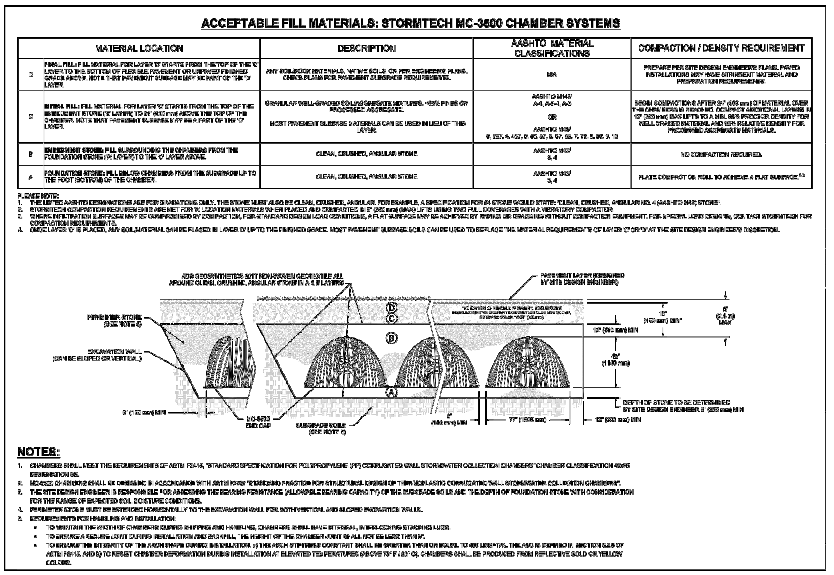

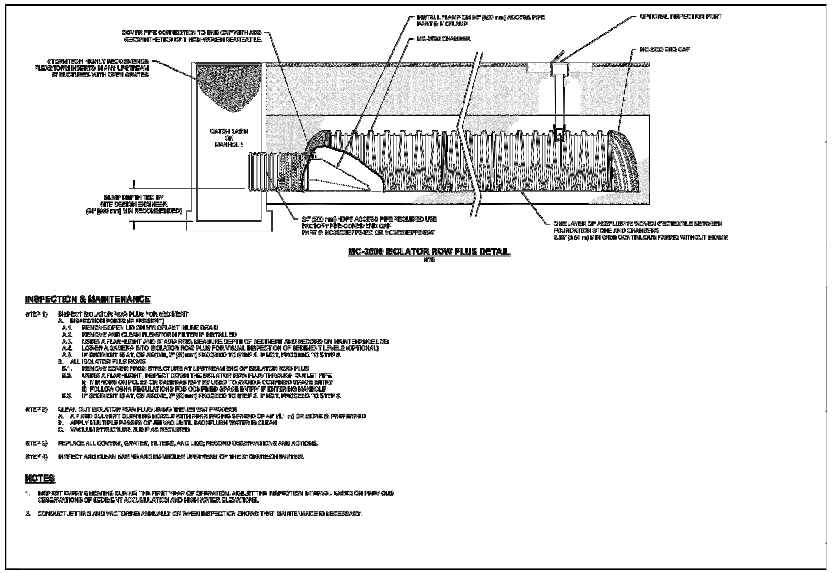

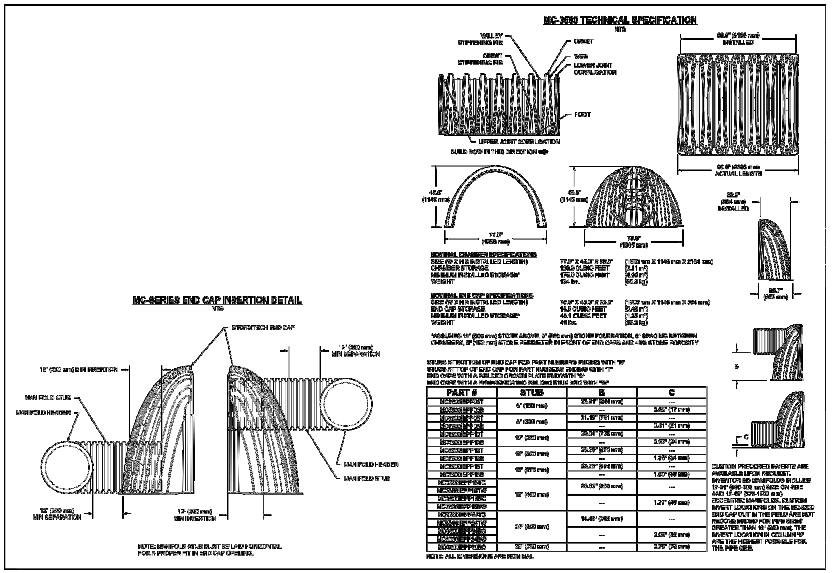

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KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SITE STORMWATER MANAGEMENT DETAILS - 5

Date
07/08/2024
Scale
AS SHOWN
Proj. Number
22367.00

Drawing Number
C505

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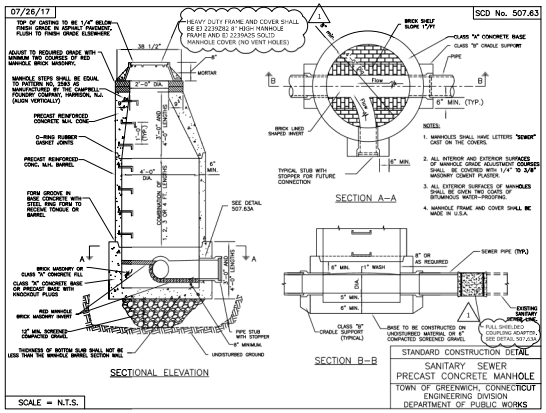

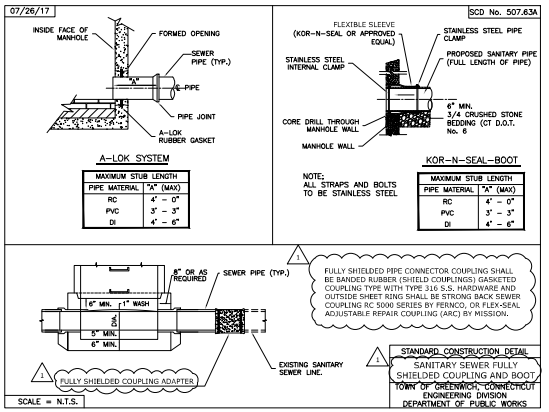

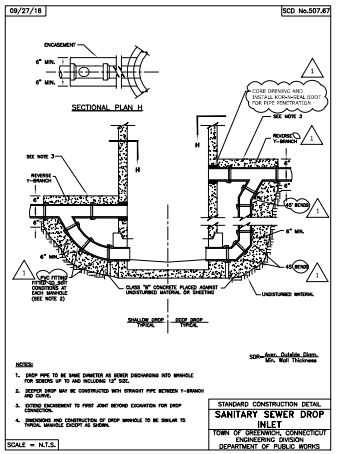

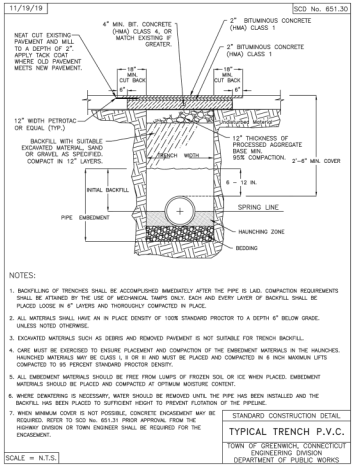

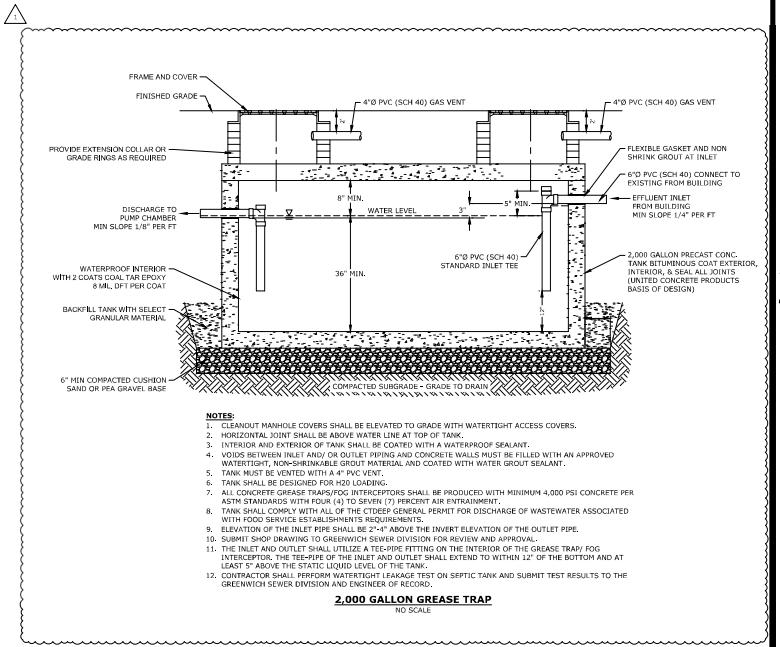

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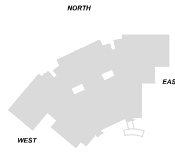

KEYPLAN

Number	Date	Issued For
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	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SANITARY SEWER DETAILS

Date
07/08/2024
Scale
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Proj Number
22367.00
Drawing Number
C506

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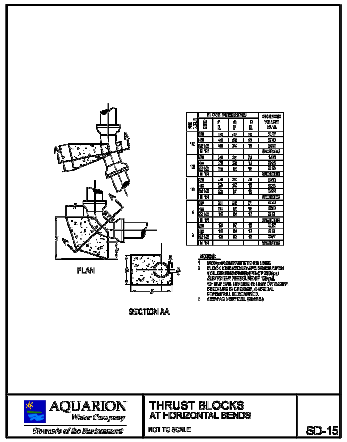
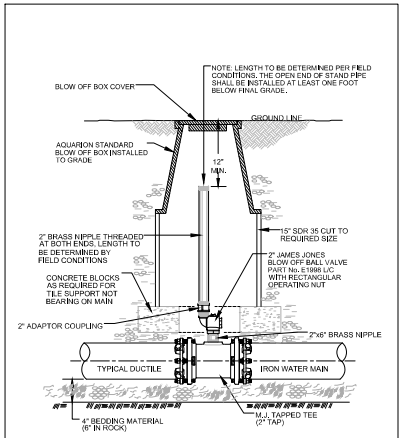


AQUARION Water Company — Stewards of the Environment

THRUST BLOCKS AT HORIZONTAL BENDS

NOT TO SCALE

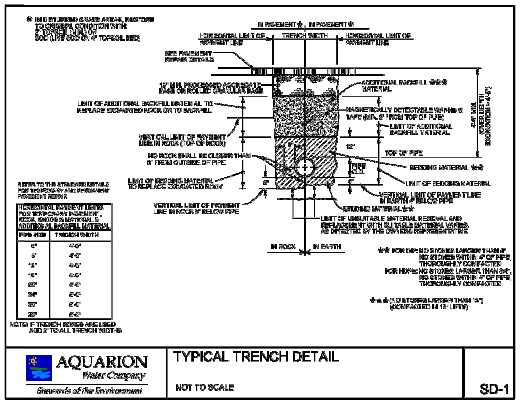
SD-15



AQUARION Water Company — Stewards of the Environment

ON LINE AIR VENT / BLOW-OFF (DIP)

SD-4

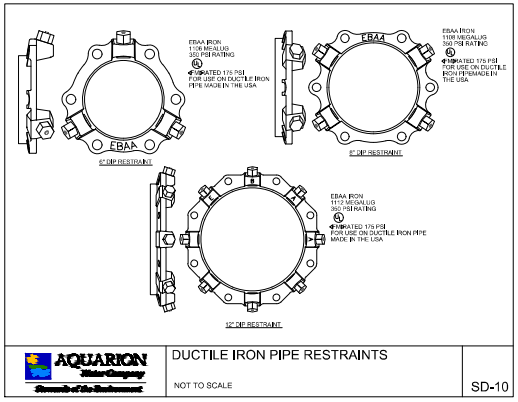


AQUARION Water Company — Stewards of the Environment

TYPICAL TRENCH DETAIL

NOT TO SCALE

SD-1

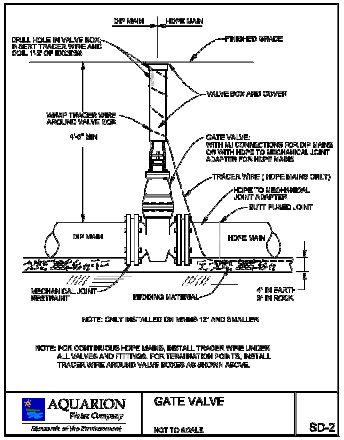


AQUARION Water Company — Stewards of the Environment

DUCTILE IRON PIPE RESTRAINTS

NOT TO SCALE

SD-10



AQUARION Water Company — Stewards of the Environment

GATE VALVE

NOT TO SCALE

SD-2

WATER MAIN INSTALLATION NOTES

1. WATER MAIN DETAILS, SPECIFICATION, TESTING AND INSTALLATION SHALL COMPLY WITH THE STANDARDS AND REQUIREMENTS OF AQUARION WATER COMPANY.
2. CONTRACTOR SHALL COORDINATE ALL WATER MAIN INSTALLATION INCLUDING ALL PIPING, FITTINGS, VALVES, TAPPING, SHUT DOWNS, ETC. WITH AQUARION WATER COMPANY.
3. AFTER PLACING APPROXIMATELY 2 FEET OF BACKFILL MATERIAL OVER ALL UTILITY PIPING, THE CONTRACTOR SHALL PLACE A 6" WIDE STRIP OF DURABLE, COLOR CODED (BLUE FOR WATER) UNDERGROUND UTILITY DETECTABLE WARNING TAPE IMPRINTED WITH AN APPROPRIATE WARNING INDICATING THE PRESENCE OF THE BURIED UTILITY.
4. WHEN CROSSING A SEWER, WATER MAIN JOINTS SHALL BE SPACED A MINIMUM OF 9' FROM THE INTERSECTION WITH THE SEWER.
5. CONTRACTOR SHALL EXCAVATE TEST PITS AT LOCATIONS SHOWN ON THE CONTRACT DRAWINGS WELL IN ADVANCE OF PIPE LAYING OPERATIONS TO CHECK FOR POSSIBLE CONFLICTS AND SUBSEQUENT METHODS OF REMEDY, AS DETERMINED BY THE OWNER'S REPRESENTATIVE, SHOULD CONFLICTS EXIST. ALL COST FOR TEST PITS SHALL BE INCLUDED IN THE PRICE BID FOR THE CONTRACT.
6. ALL JOINTS SHALL BE RESTRAINED WITH RETAINER GLANDS (MEGALUG SERIES 1100, MANUFACTURED BY EBAA IRON SALES, INC. OR AQUARION APPROVED EQUIVALENT).
7. ALL FITTINGS SHALL BE MECHANICAL JOINT WITH RETAINER GLANDS IN EACH DIRECTION. ALL FOLLOWER GLANDS SHALL BE REPLACED WITH RETAINER GLANDS.
8. INSTALLATION OF DUCTILE IRON PIPE, FITTINGS, BLOW-OFFS, PIPE SUPPORTS AND APPURTENANCES SHALL BE IN ACCORDANCE WITH AQUARION WATER COMPANY STANDARDS.
9. THE WATER MAIN SHALL BE DUCTILE IRON PIPE CLASS 52, LINED WITH DOUBLE THICKNESS CEMENT MORTAR, IN ACCORDANCE WITH ANSI/AWWA C151/A21.51-81, AND SPECIFICATIONS INCLUDED IN THIS CONTRACT.
10. ALL EXISTING STRUCTURES, INCLUDING SANITARY SEWERS, LATERALS, STORM SEWERS, CATCH BASINS, MANHOLES AND UTILITY POLES, WHICH DURING THE EXECUTION WILL BE CONSIDERED BY THE OWNER'S REPRESENTATIVE AS BEING DISTURBED OR DAMAGED BY THE WATER MAIN INSTALLATION SHALL BE RESTORED OR REPLACED BY THE CONTRACTOR IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS WHICH GOVERNED THE CONSTRUCTION OF THAT STRUCTURE AND TO THE SATISFACTION OF THE CTARNG, THE AUTHORITY HAVING JURISDICTION, AND THE OWNER'S REPRESENTATIVE. ALL COSTS FOR SUCH WORK, INCLUDING TEMPORARY RELOCATION OF THE AFOREMENTIONED STRUCTURES, SHALL BE CONSIDERED AS HAVING BEEN INCLUDED IN THE LUMP SUM CONTRACT PRICE.
11. ANY DEFLECTION OF THE WATER MAIN SHALL BE MADE ACCORDING TO THE RECOMMENDATION CONTAINED WITHIN DUCTILE IRON PIPE RESEARCH ASSOCIATION STANDARDS.
12. MINIMUM DEPTH OF COVER OVER PROPOSED WATER MAIN SHALL BE 4.5 FEET.
13. ALL INSTALLED WATER MAIN SHALL BE TESTED ACCORDING TO THE REQUIREMENTS OF AQUARION WATER COMPANY. TEST PRESSURE FOR THE WATER MAIN IS 200 PSI.
14. WATER MAIN, FITTINGS, VALVES, CURB BOXES, ETC. SHALL BE INSTALLED ACCORDING TO THE LATEST AQUARION WATER COMPANY RULES, REGULATIONS, AND SPECIFICATIONS.
15. CONTRACTOR SHALL INSTALL TEMPORARY BLOW-OFF ASSEMBLY, INCLUDING GATE VALVE, AS REQUIRED FOR FLUSHING PROPOSED WATER MAIN IN ACCORDANCE WITH AQUARION WATER COMPANY REQUIREMENTS. REMOVAL OF ALL TEMPORARY SYSTEMS IS INCLUDED IN THE LUMP SUM BID PRICE.
16. NOT ALL BENDS, FITTINGS, OFFSETS, CONNECTORS, CHLORINATION VALVES, BLOW-OFF ASSEMBLIES, ETC. ARE NOT SHOWN ON THE DRAWINGS. INSTALLATION OF WATER MAIN AND SERVICES SHALL CONFORM TO AQUARION WATER STANDARDS AND GUIDELINES.

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STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SITE UTILITY - 1 DETAILS

Date: 07/08/2024
Scale: AS SHOWN
Proj Number: 22367.00
Drawing Number: C507

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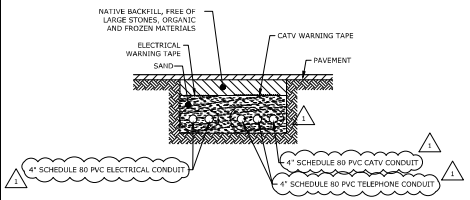
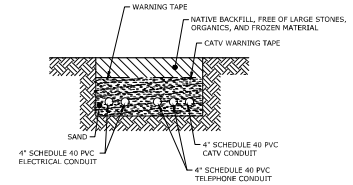


ELECTRIC, CATV, AND TELEPHONE SERVICE INSTALLATION BENEATH PAVED AREAS

ELECTRIC DUCTBANK NOTES:

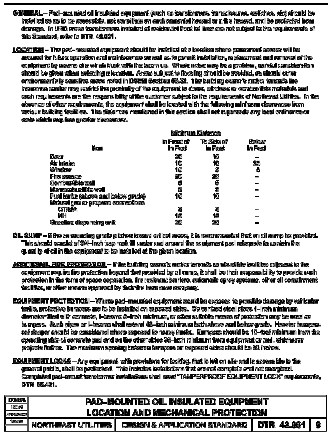
1. ALL CONDUIT SHOWN ARE 4" DIAMETER PVC SCHEDULE 80 UNLESS OTHERWISE NOTED.
2. ALL SWEEPS AND RISER CONDUITS SHALL BE PVC TYPE EB UNLESS OTHERWISE NOTED.
3. PROVIDE BASE AND INTERMEDIATE SPACERS WHICH CONNECT TOGETHER TO FORM A UNIFORM SUPPORT 4'-0" ON CENTER.
4. WHERE NOTED, PROVIDE THE REQUIRED RACKING IN EACH MANHOLE TO ALLOW ALL CARRIERS TO TIE OFF SLACK IN AN ORDERLY FASHION.
5. ALL "SPARE" OR UNUSED CONDUITS SHALL BE PROVIDED WITH A ¾" NYLON DRAG LINE.
6. ALL CONDUIT BENDS SHALL BE A MINIMUM OF 12X THE CONDUIT RADIUS.
7. PITCH CONDUITS TOWARDS MANHOLES AND AWAY FROM BUILDINGS. AVOID CREATING LOW POINTS IN CONDUIT RUNS BETWEEN MANHOLES.
8. CONDUITS EXTENDED FROM MANHOLES, TRANSFORMERS, SWITCHGEAR, TUNNEL WALLS, BUILDING FOUNDATION WALLS SHALL BE GALVANIZED RIGID STEEL.
9. ALL DUCTBANK MATERIALS SHALL CONFORM TO THE RESPECTIVE UTILITY COMPANIES' STANDARDS AND MEET ALL REQUIREMENTS.



ELECTRIC, CATV, AND TELEPHONE SERVICE INSTALLATION BENEATH LANDSCAPED AREAS

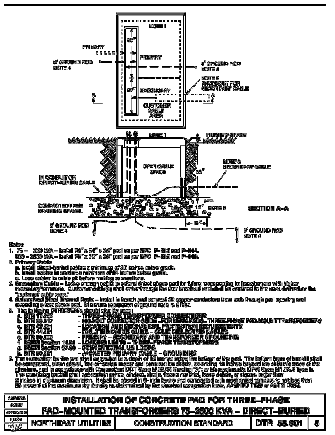
TEL-DATA/CATV DUCTBANK NOTES:

1. DUCTS SHOWN ARE 4" DIAMETER PVC TYPE EB UNLESS OTHERWISE NOTED.
2. ALL SWEEPS AND RISER CONDUITS SHALL BE PVC TYPE EB UNLESS OTHERWISE NOTED.
3. PROVIDE BASE AND INTERMEDIATE SPACERS WHICH CONNECT TOGETHER TO FORM A UNIFORM SUPPORT 6'-0" ON CENTER.
4. PROVIDE THREE 1.4" NON-METALLIC FLEX INTERDUCT WITH STRING LINES IN EACH OF THE 6 PVC DUCTS.
5. WHERE NOTED, PROVIDE THE REQUIRED RACKING IN EACH MANHOLE TO ALLOW ALL CARRIERS TO TIE OFF SLACK IN AN ORDERLY FASHION.
6. TEL-CATA/CATV MANHOLES SHALL NOT BE SPACED FURTHER THAN 500 FEET APART.
7. ALL CONDUITS TO BE LABELLED A TO Z.
8. ALL CONDUIT BENDS SHALL BE A MINIMUM OF 12X THE CONDUIT RADIUS.
9. PITCH CONDUITS TOWARDS MANHOLES AND AWAY FROM BUILDINGS. AVOID CREATING LOW POINTS IN CONDUIT RUNS BETWEEN MANHOLES.
10. ALL DUCTBANK MATERIALS SHALL CONFORM TO THE RESPECTIVE UTILITY COMPANIES' STANDARDS AND MEET ALL REQUIREMENTS.



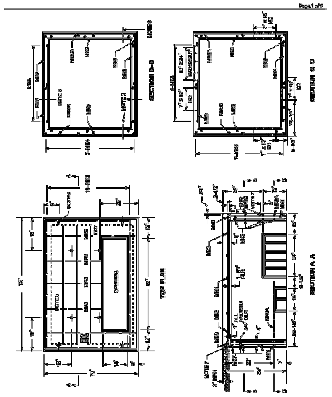
PAD-MOUNTED OIL INSULATED EQUIPMENT LOCATION AND MECHANICAL PROTECTION

NORTHEAST UTILITIES | DESIGN & APPLICATION STANDARD | DTR 43.001 | 6



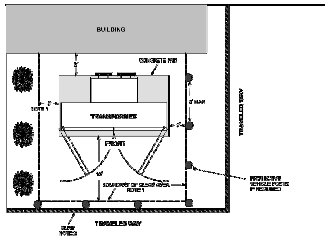
INSTALLATION OF CONCRETE PAD FOR THREE-PHASE PAD-MOUNTED TRANSFORMERS 75–2500 KVA – DIRECT-BURIED

NORTHEAST UTILITIES | CONSTRUCTION STANDARD | DTR 58.001 | 6



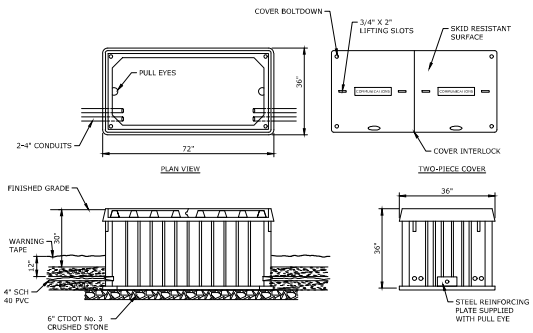
PAD – PRECAST CONCRETE – THREE-PHASE TRANSFORMER 500–2500 KVA – 76" x 70" x 30"

NORTHEAST UTILITIES | MATERIAL SPECIFICATION | SPC F-019 | 7

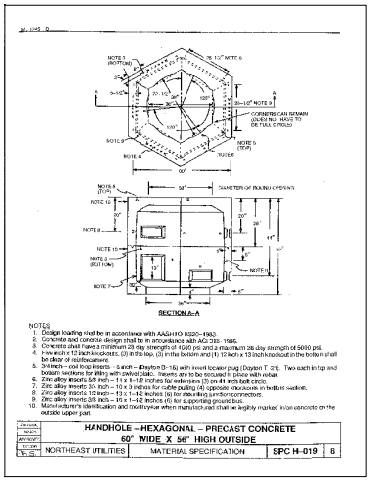


PAD-MOUNTED TRANSFORMERS LOCATION TO BUILDINGS AND ROADWAYS

NORTHEAST UTILITIES | CONSTRUCTION STANDARD | DTR 43.047 | 6



COMMUNICATIONS PULL BOX
NO SCALE



HANDHOLE – HEXAGONAL – PRECAST CONCRETE 60" WIDE X 56" HIGH OUTSIDE

NORTHEAST UTILITIES | MATERIAL SPECIFICATION | SPC H-019 | 8

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KEYPLAN

Number	Date	Issued For
1	11/06/2024	ADDENDUM #6
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SITE UTILITY DETAILS - 2

Date: 07/08/2024
Scale: AS SHOWN
Proj Number: 22367.00
Drawing Number: C508

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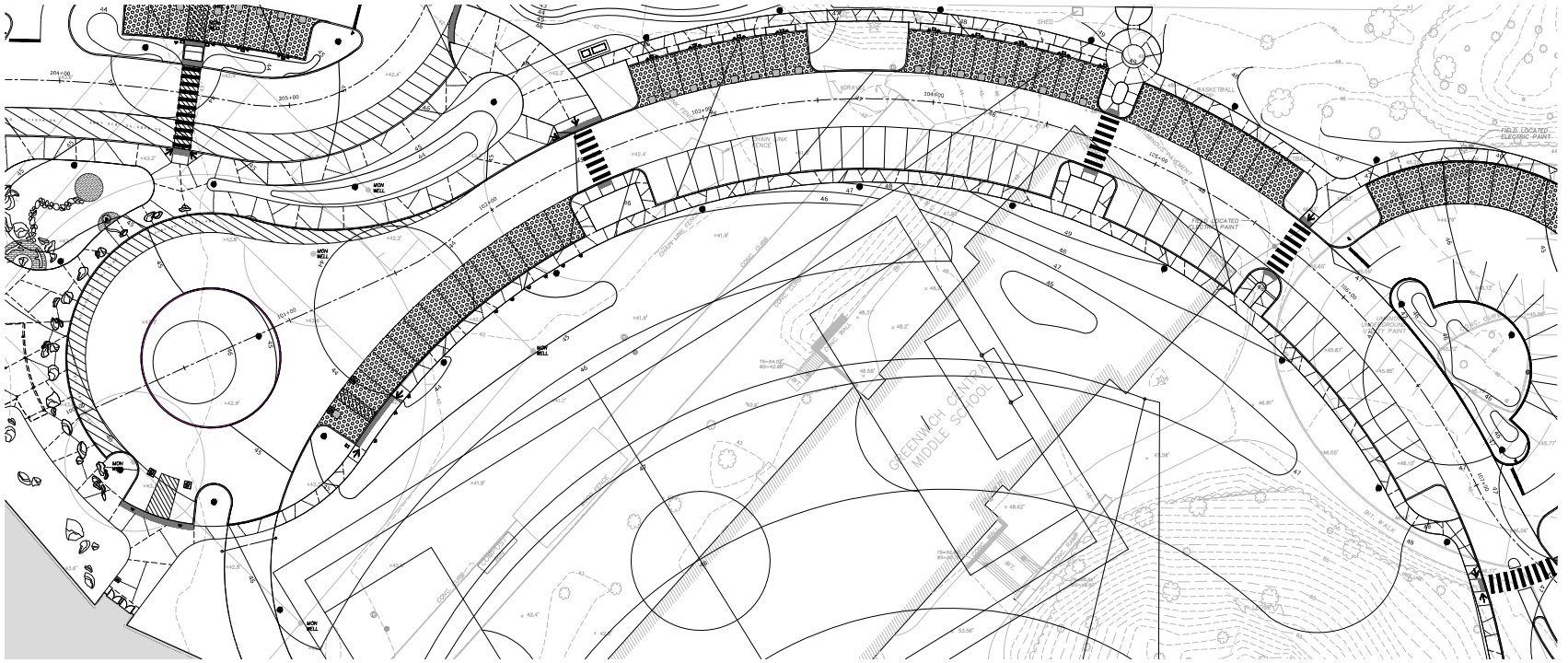

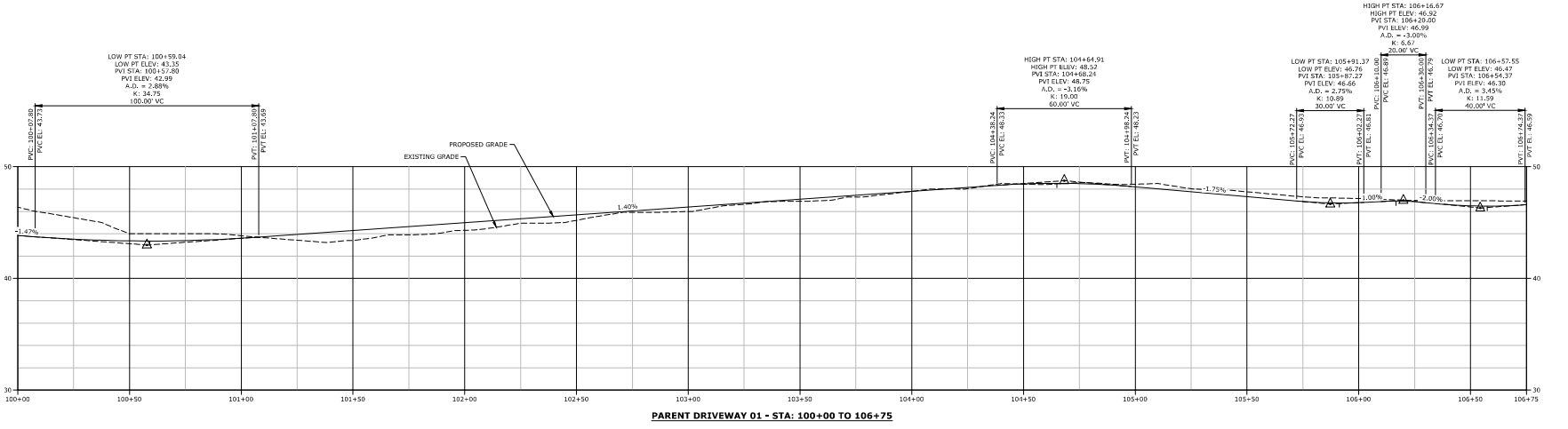

PARENT DRIVEWAY 01 - STA: 100+00 TO 106+75

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 4'

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	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

PARENT DRIVEWAY PROFILE 01

Date
07/08/2024
Scale
AS SHOWN
Proj. Number
22367.00

Drawing Number
C601

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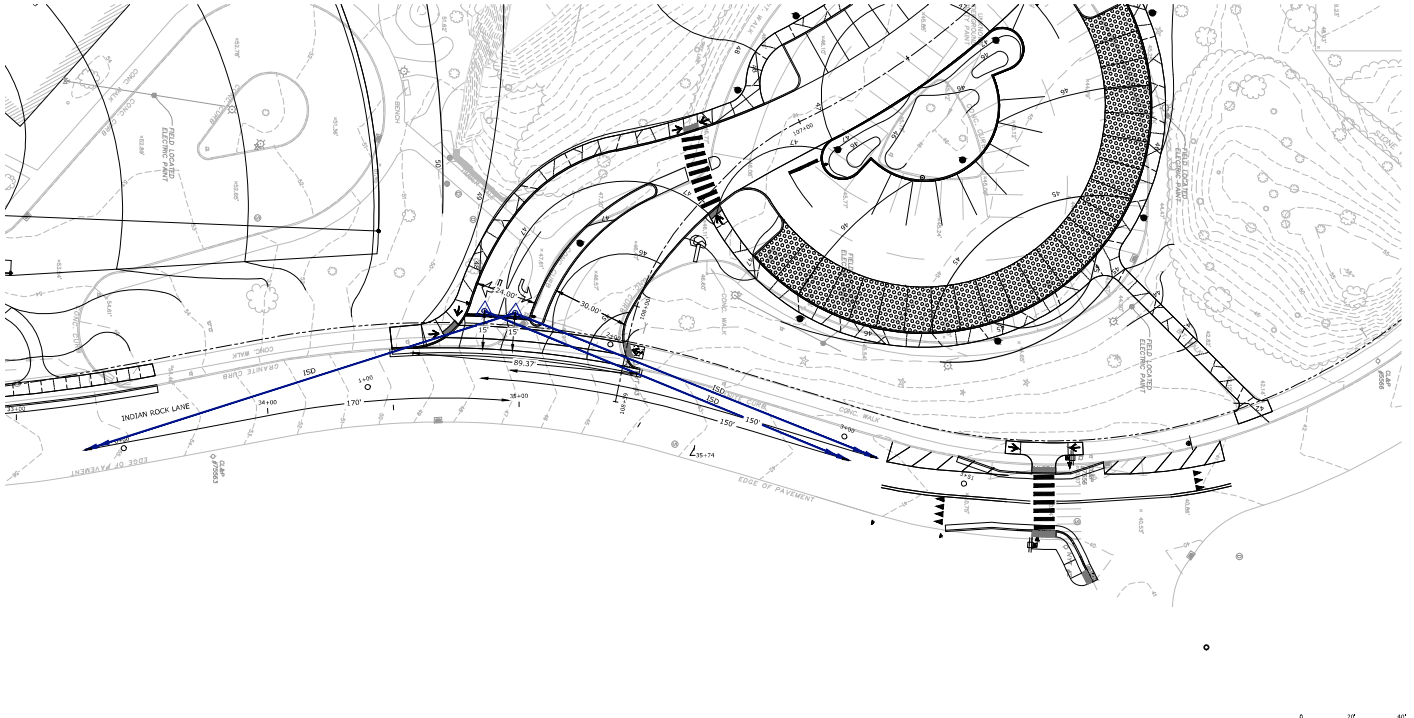
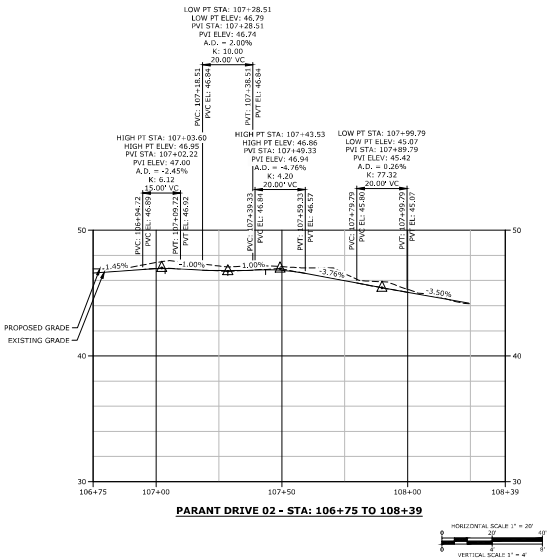
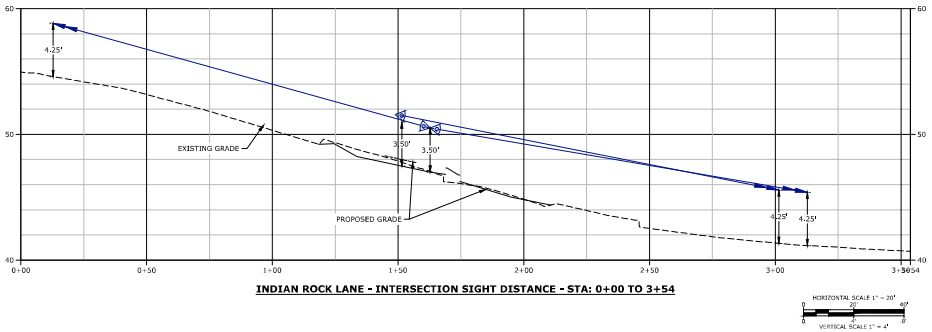




PARANT DRIVE 02 - STA: 106+75 TO 108+39



INDIAN ROCK LANE - INTERSECTION SIGHT DISTANCE - STA: 0+00 TO 3+54

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NORTH
EAST
WEST
SOUTH
KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

PARENT DRIVEWAY PROFILE 02

Date: 07/08/2024
Scale: AS SHOWN
Proj Number: 22367.00
Drawing Number: C602

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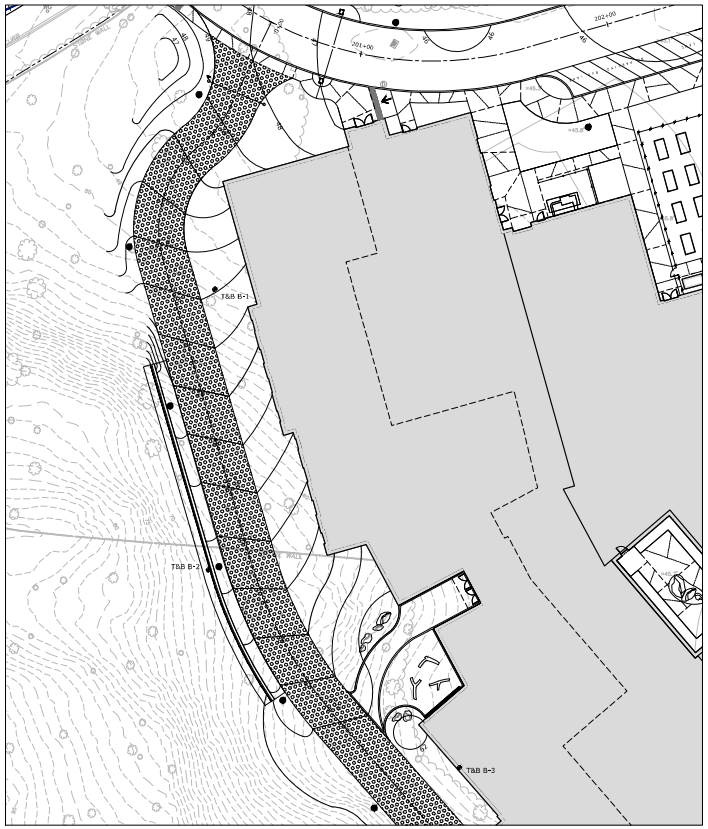



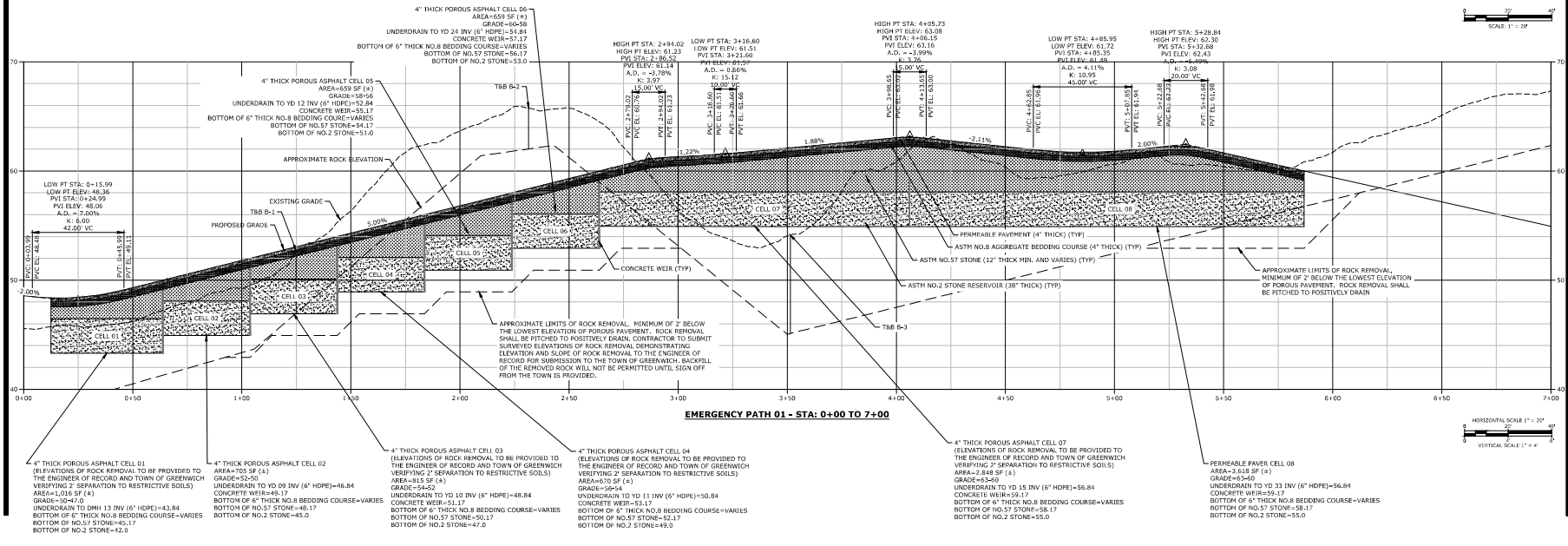

EMERGENCY PATH 01 - STA: 0+00 TO 7+00

4" THICK POROUS ASPHALT CELL 01
(ELEVATIONS OF ROCK REMOVAL TO BE PROVIDED TO THE ENGINEER OF RECORD AND TOWN OF GREENWICH VERIFYING 2' SEPARATION TO RESTRICTIVE SOILS)
AREA=1,016 SF (±)
GRADE=50-47.0
UNDERDRAIN TO DMH 13 INV (6" HDPE)=43.84
BOTTOM OF 6" THICK NO.8 BEDDING COURSE=VARIES
BOTTOM OF NO.57 STONE=45.17
BOTTOM OF NO.2 STONE=42.0

4" THICK POROUS ASPHALT CELL 02
AREA=705 SF (±)
GRADE=52-50
UNDERDRAIN TO YD 09 INV (6" HDPE)=46.84
CONCRETE WEIR=49.17
BOTTOM OF 6" THICK NO.8 BEDDING COURSE=VARIES
BOTTOM OF NO.57 STONE=48.17
BOTTOM OF NO.2 STONE=45.0

4" THICK POROUS ASPHALT CELL 03
(ELEVATIONS OF ROCK REMOVAL TO BE PROVIDED TO THE ENGINEER OF RECORD AND TOWN OF GREENWICH VERIFYING 2' SEPARATION TO RESTRICTIVE SOILS)
AREA=815 SF (±)
GRADE=54-52
UNDERDRAIN TO YD 10 INV (6" HDPE)=48.84
CONCRETE WEIR=51.17
BOTTOM OF 6" THICK NO.8 BEDDING COURSE=VARIES
BOTTOM OF NO.57 STONE=50.17
BOTTOM OF NO.2 STONE=47.0

4" THICK POROUS ASPHALT CELL 04
(ELEVATIONS OF ROCK REMOVAL TO BE PROVIDED TO THE ENGINEER OF RECORD AND TOWN OF GREENWICH VERIFYING 2' SEPARATION TO RESTRICTIVE SOILS)
AREA=670 SF (±)
GRADE=56-54
UNDERDRAIN TO YD 11 INV (6" HDPE)=50.84
CONCRETE WEIR=53.17
BOTTOM OF 6" THICK NO.8 BEDDING COURSE=VARIES
BOTTOM OF NO.57 STONE=52.17
BOTTOM OF NO.2 STONE=49.0

4" THICK POROUS ASPHALT CELL 07
(ELEVATIONS OF ROCK REMOVAL TO BE PROVIDED TO THE ENGINEER OF RECORD AND TOWN OF GREENWICH VERIFYING 2' SEPARATION TO RESTRICTIVE SOILS)
AREA=2,848 SF (±)
GRADE=63-60
UNDERDRAIN TO YD 15 INV (6" HDPE)=56.84
CONCRETE WEIR=59.17
BOTTOM OF 6" THICK NO.8 BEDDING COURSE=VARIES
BOTTOM OF NO.57 STONE=58.17
BOTTOM OF NO.2 STONE=55.0

PERMEABLE PAVER CELL 08
AREA=3,618 SF (±)
GRADE=63-60
UNDERDRAIN TO YD 33 INV (6" HDPE)=56.84
CONCRETE WEIR=59.17
BOTTOM OF 6" THICK NO.8 BEDDING COURSE=VARIES
BOTTOM OF NO.57 STONE=58.17
BOTTOM OF NO.2 STONE=55.0

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KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

EMERGENCY PATH PROFILE 01

Date: 07/08/2024
Scale: AS SHOWN
Proj Number: 22367.00
Drawing Number: C603

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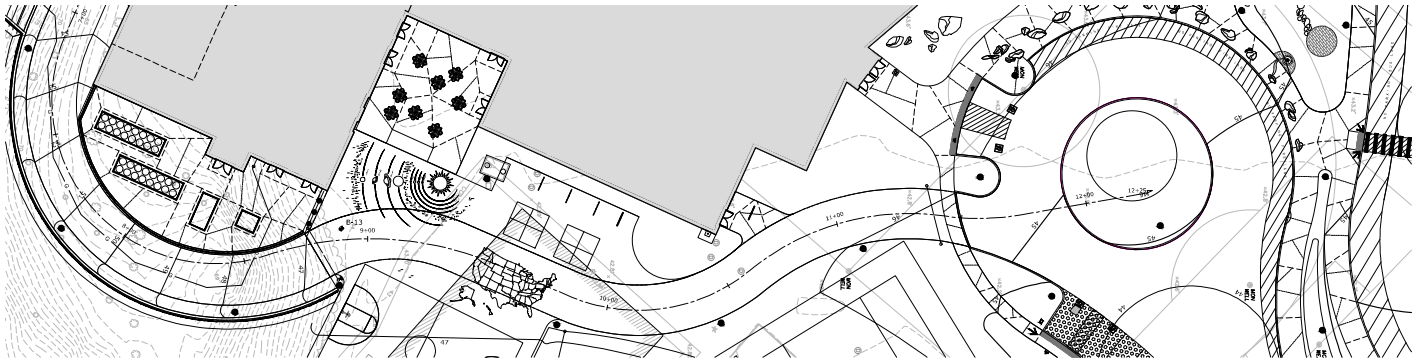

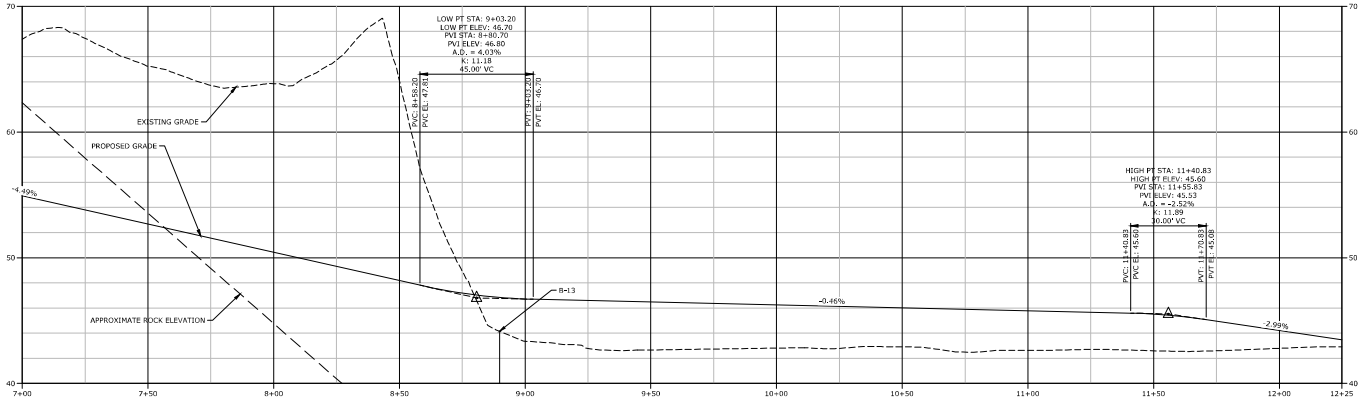

EMERGENCY PATH 02 - STA: 7+00 TO 12+25

HORIZONTAL SCALE 1" = 20'
VERTICAL SCALE 1" = 4'

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NORTH
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WEST
SOUTH
KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

EMERGENCY PATH PROFILE 02

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Proj Number: 22367.00
Drawing Number: C604

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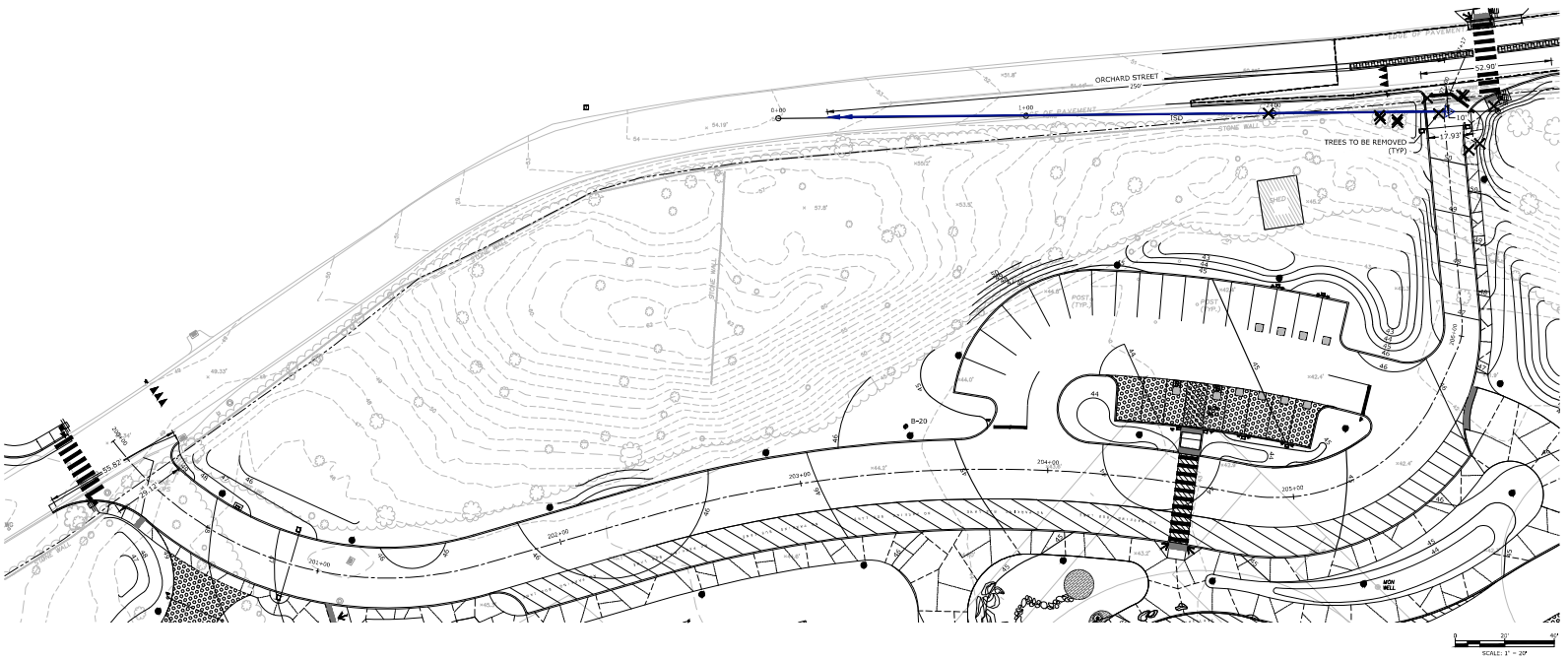
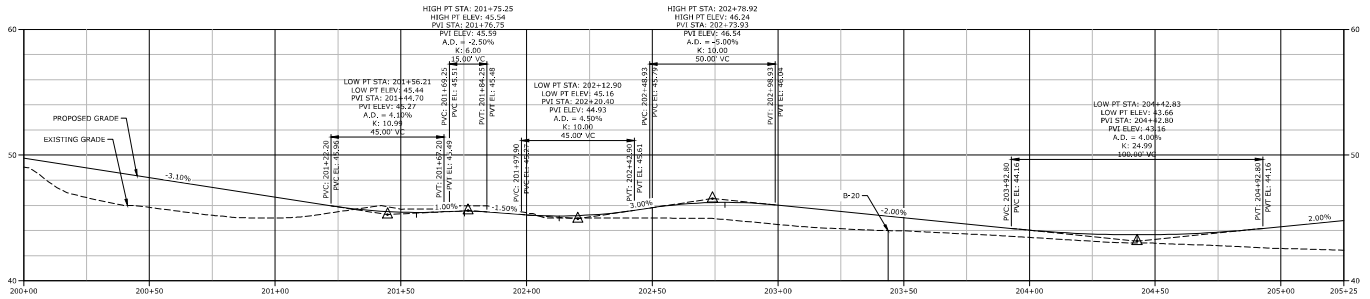
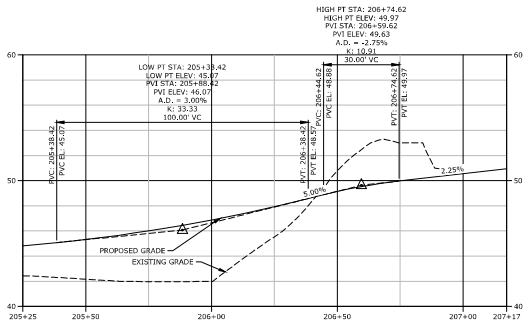
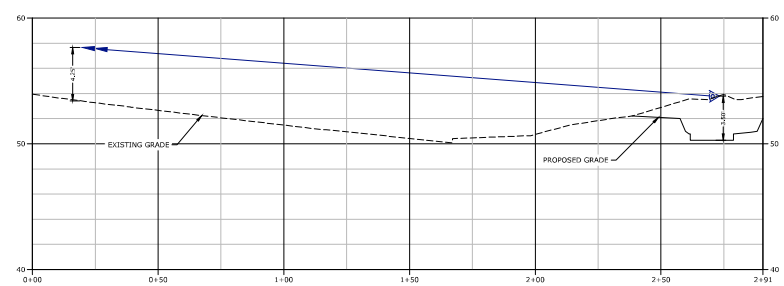




BUS DRIVEWAY 01 - STA: 200+00 TO 205+25



BUS DRIVEWAY 02 - STA: 205+25 TO 207+17



ORCHARD STREET - INTERSECTION SIGHT DISTANCE - STA: 0+00 TO 2+91

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KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

BUS DRIVEWAY PROFILE

Date
07/08/2024
Scale
AS SHOWN
Proj. Number
22367.00

Drawing Number
C605

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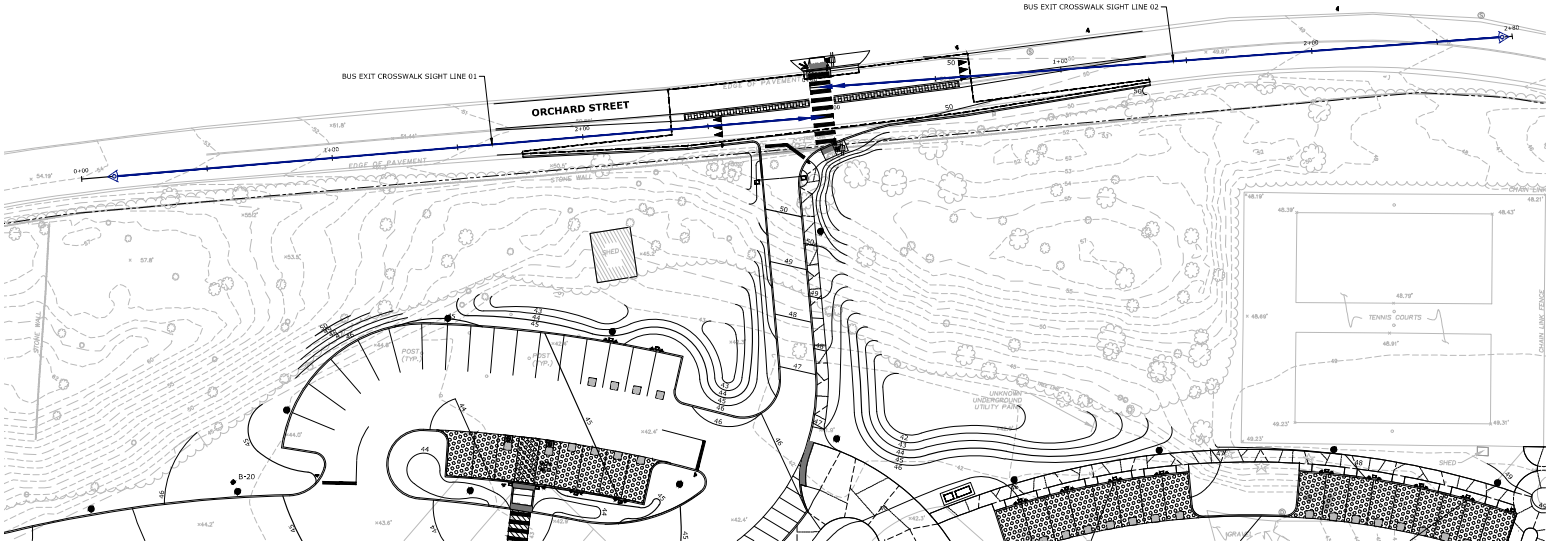
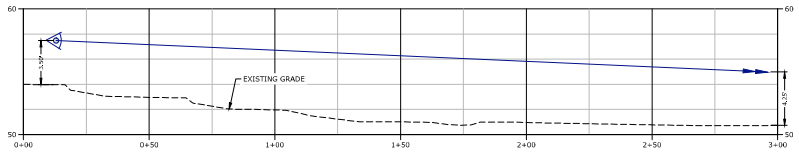
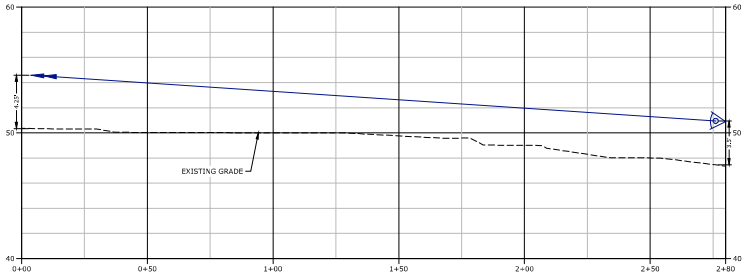




BUS EXIT CROSSWALK - 01 - STA: 0+00 TO 3+00



BUS EXIT CROSSWALK - 02 - STA: 0+00 TO 2+80

HORIZONTAL SCALE 1" = 20'
VERTICAL SCALE 1" = 4'

HORIZONTAL SCALE 1" = 20'
VERTICAL SCALE 1" = 4'

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KEYPLAN

Number	Date	Issued For
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	07/08/2024	PHASE 2

SIGHT LINE PROFILES

Date
07/08/2024
Scale
AS SHOWN
Proj. Number
22367.00

Drawing Number
C605A

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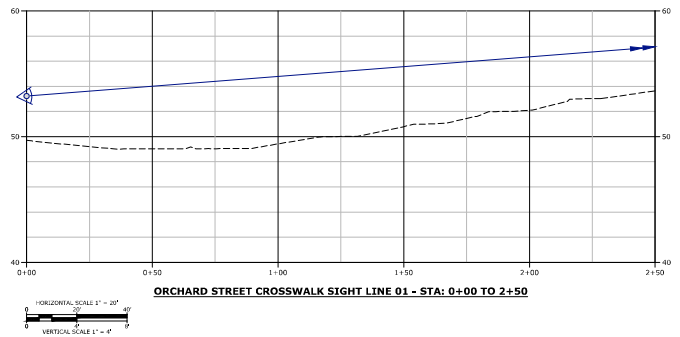
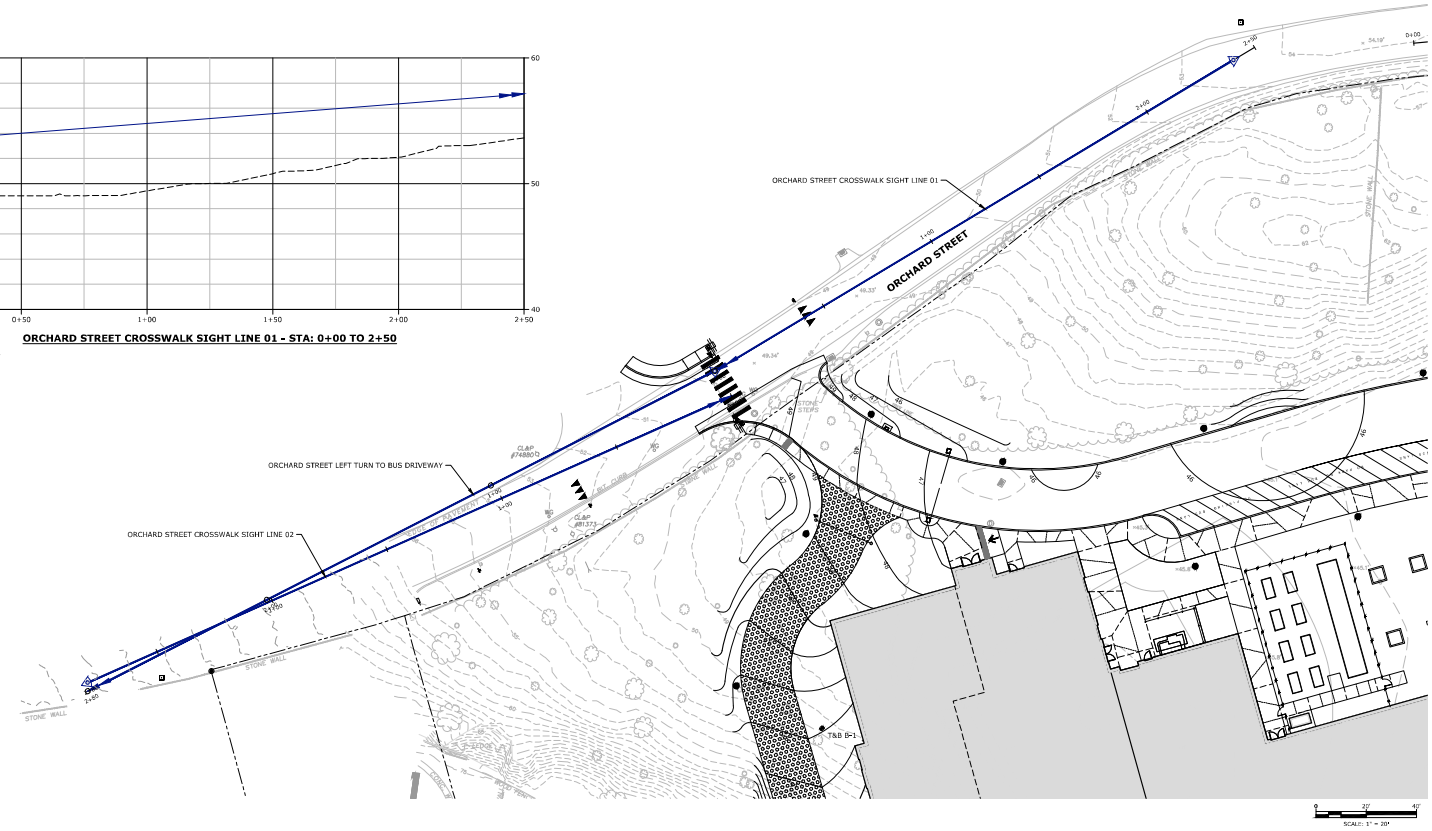
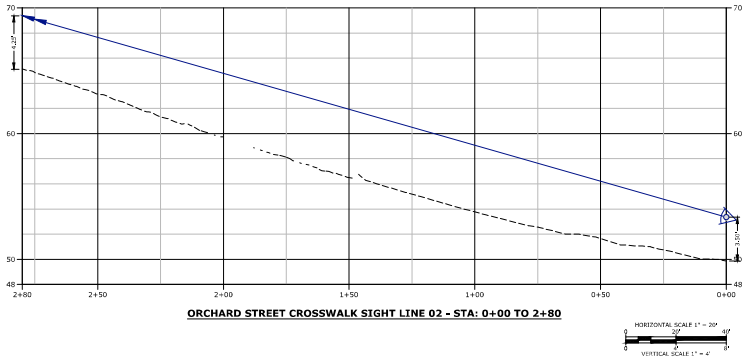
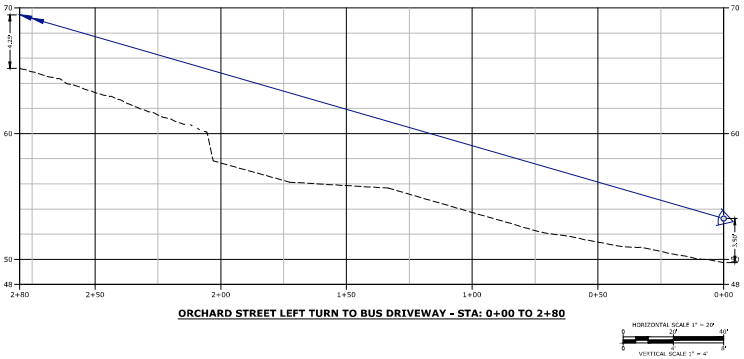


ORCHARD STREET CROSSWALK SIGHT LINE 01 - STA: 0+00 TO 2+50





ORCHARD STREET CROSSWALK SIGHT LINE 02 - STA: 0+00 TO 2+80



ORCHARD STREET LEFT TURN TO BUS DRIVEWAY - STA: 0+00 TO 2+80

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KEYPLAN

Number	Date	Issued For
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	07/08/2024	PHASE 2

SIGHT LINE PROFILES

Date
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Proj. Number
22367.00

Drawing Number
C606

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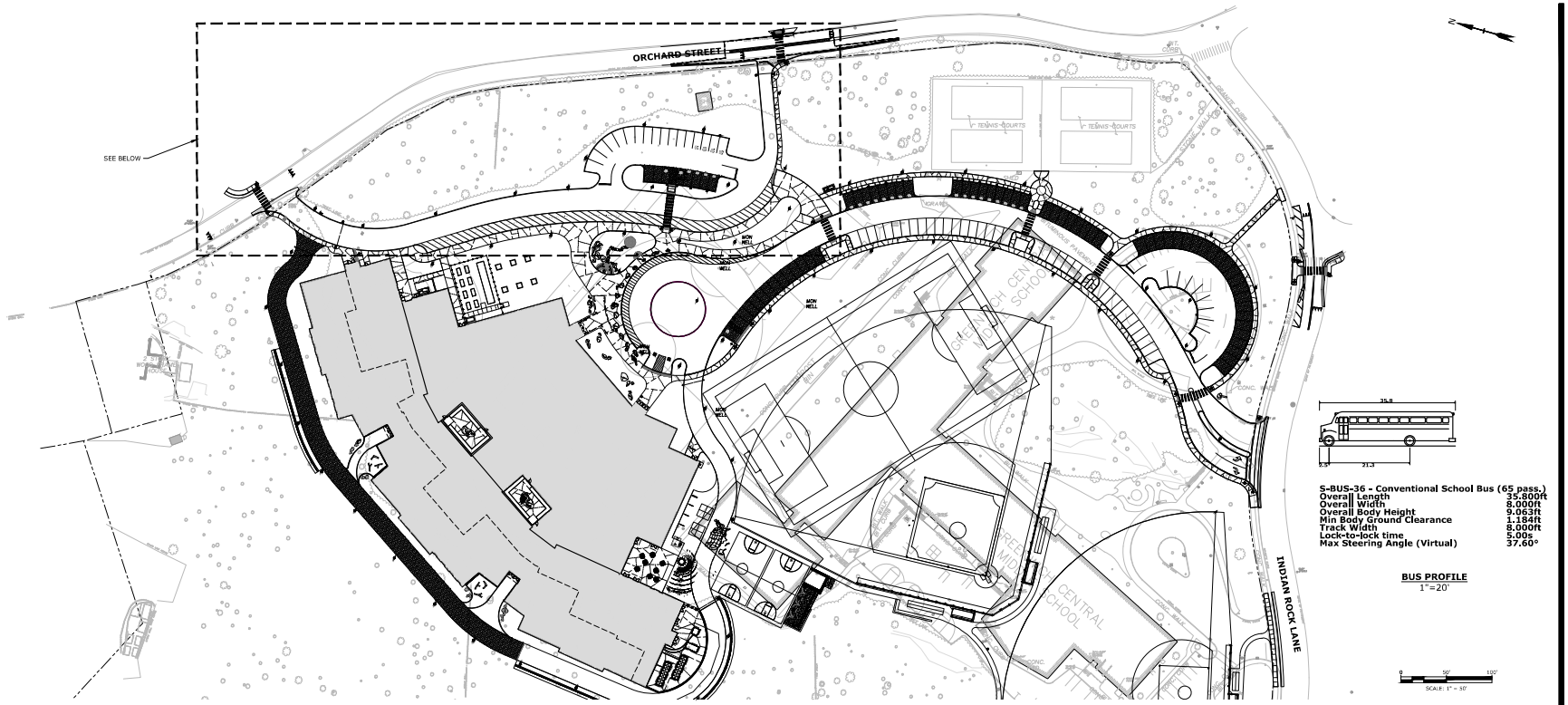
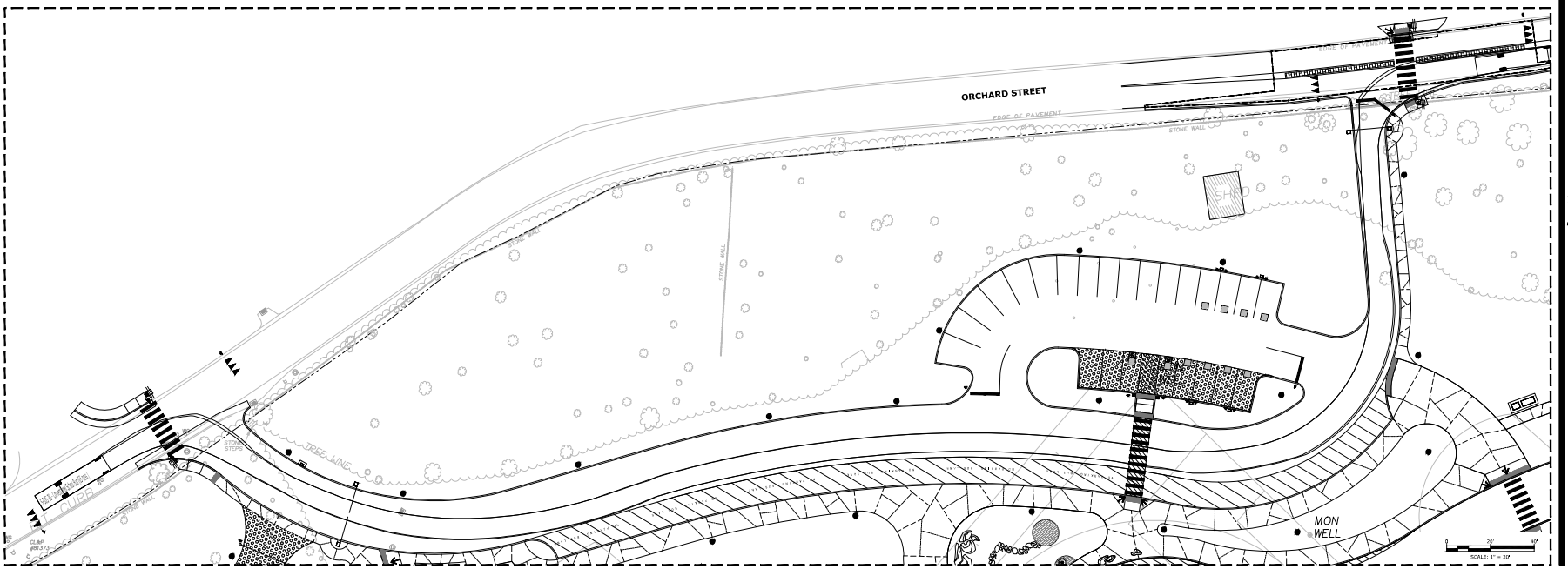


S-BUS-36 - Conventional School Bus (65 pass.)

Overall Length	35.800ft
Overall Width	8.000ft
Overall Body Height	9.063ft
Min Body Ground Clearance	1.184ft
Track Width	8.000ft
Lock-to-lock time	5.00s
Max Steering Angle (Virtual)	37.60°

BUS PROFILE
1"=20'

SCALE: 1" = 30'



SCALE: 1" = 20'

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Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

BUS TURNING MOVEMENT PLAN

Date
07/08/2024
Scale
AS SHOWN
Proj. Number
22367.00

Drawing Number
C607

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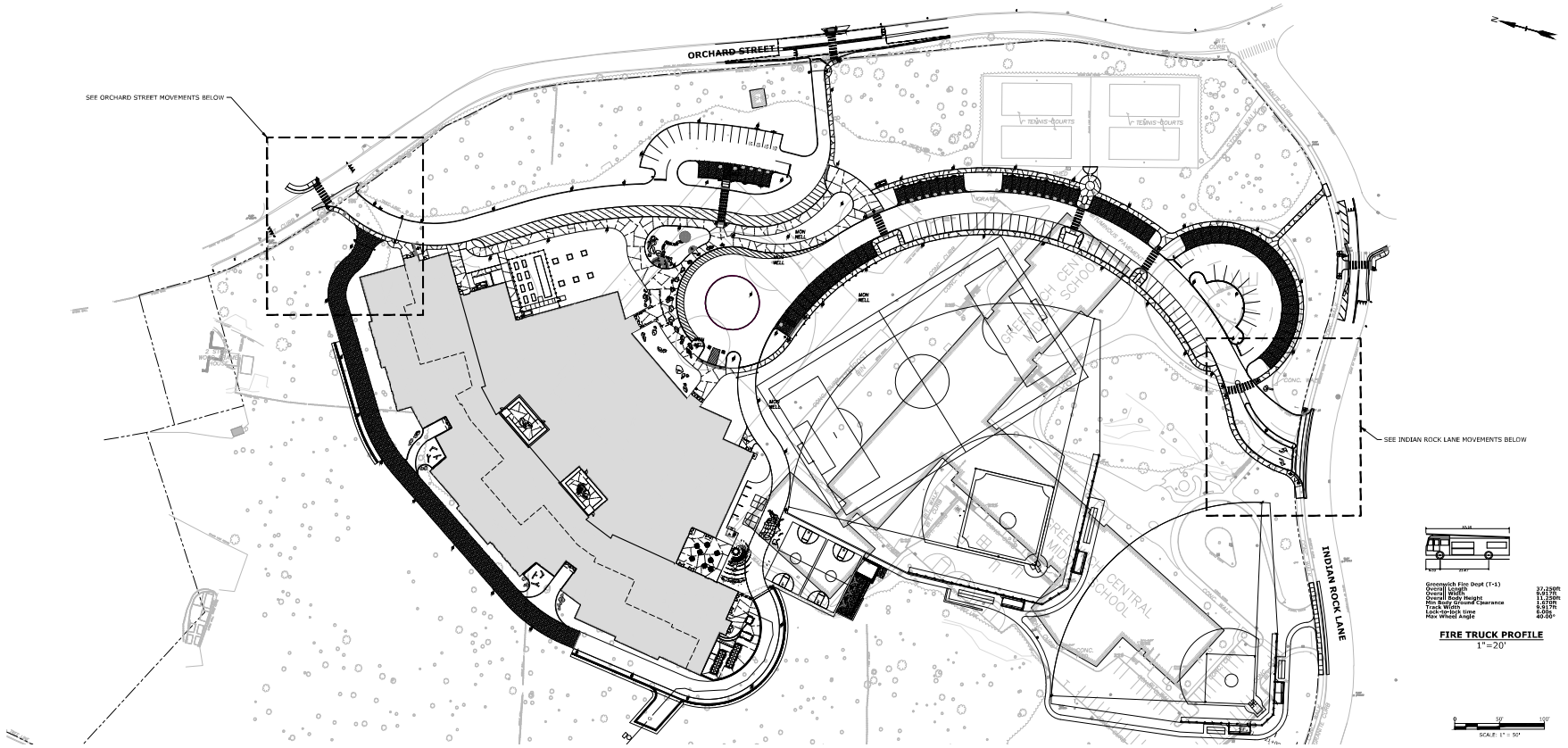
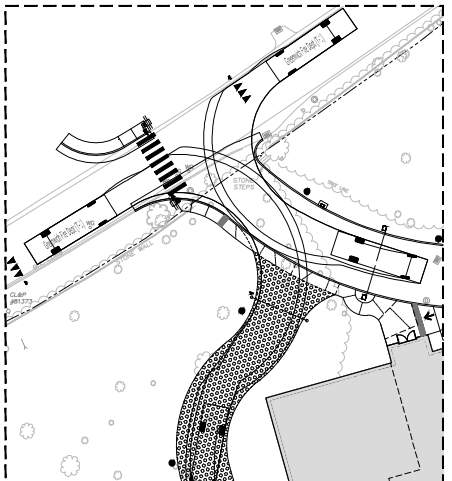
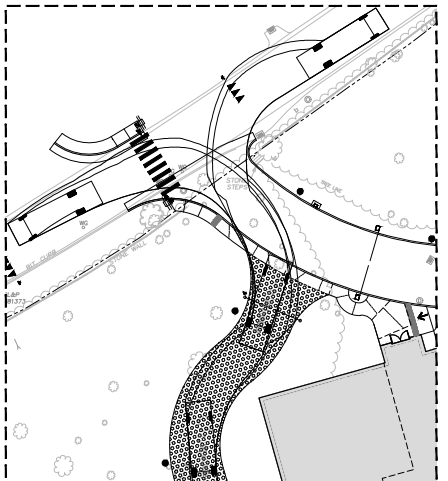




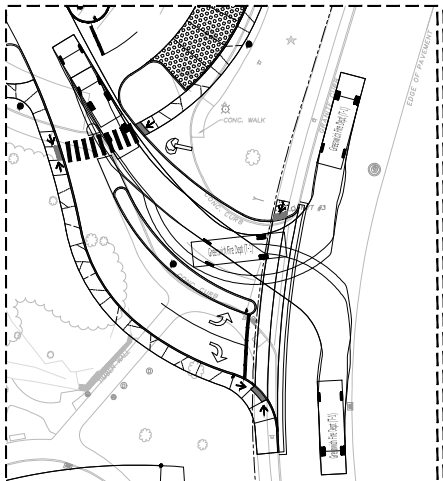
ENTERING FROM ORCHARD STREET

SCALE: 1" = 20'



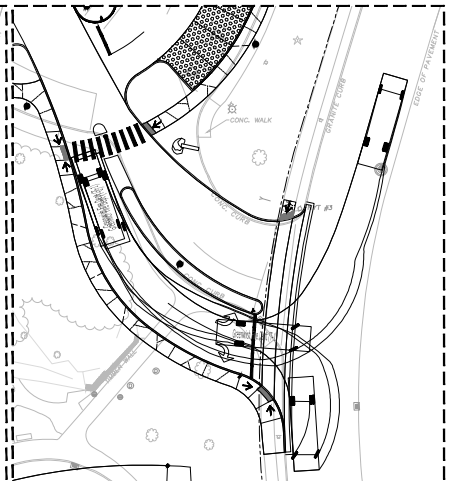
EXITING TO ORCHARD STREET

SCALE: 1" = 20'



ENTERING FROM INDIAN ROCK LANE

SCALE: 1" = 20'



EXITING TO INDIAN ROCK LANE

SCALE: 1" = 20'

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Greenwich Public Schools

Greenwich Central Middle School

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STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

FIRE TRUCK TURNING MOVEMENT PLAN

Date
07/08/2024
Scale
AS SHOWN
Proj. Number
22367.00

Drawing Number
C608

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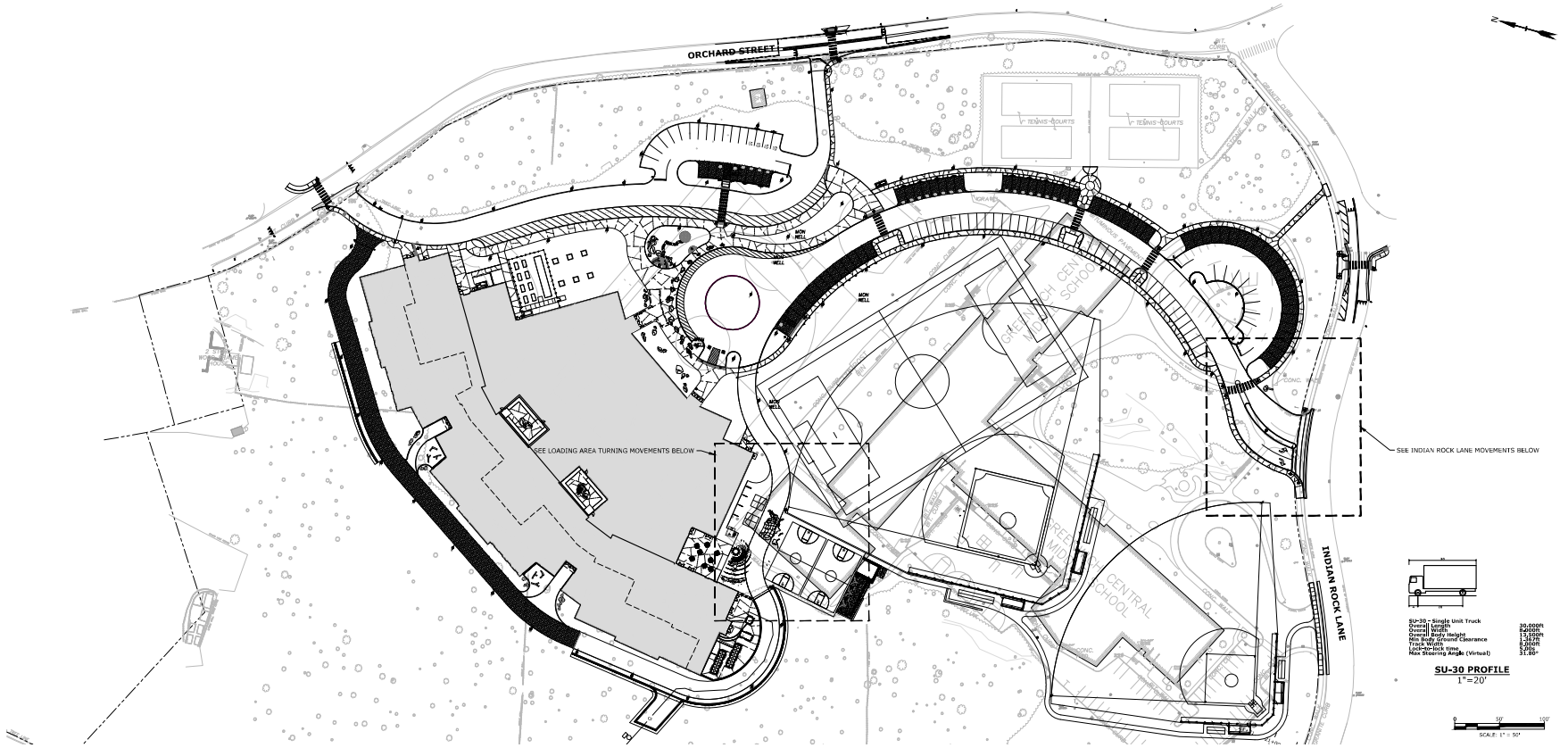
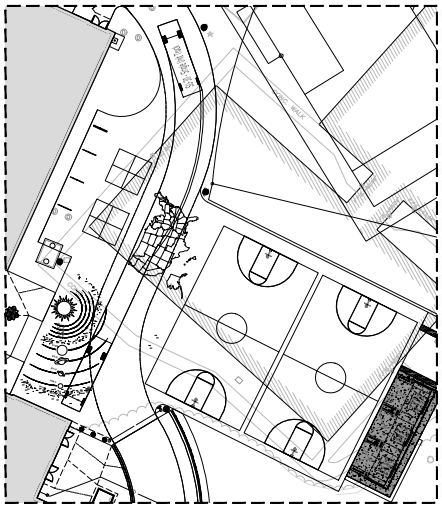
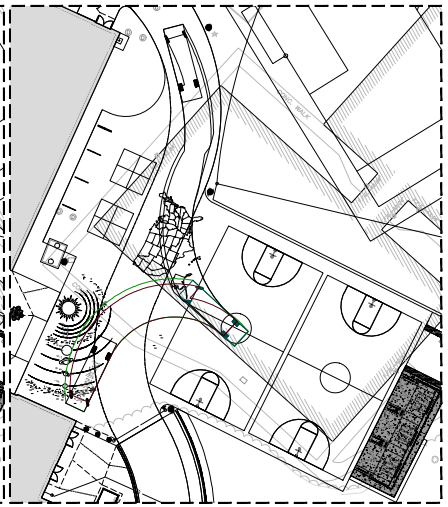




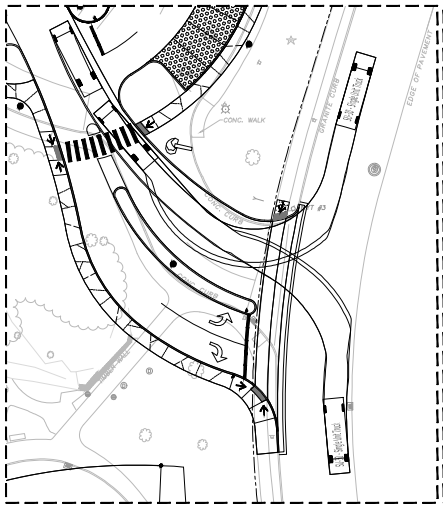
ENTERING LOADING AREA

SCALE: 1" = 20'



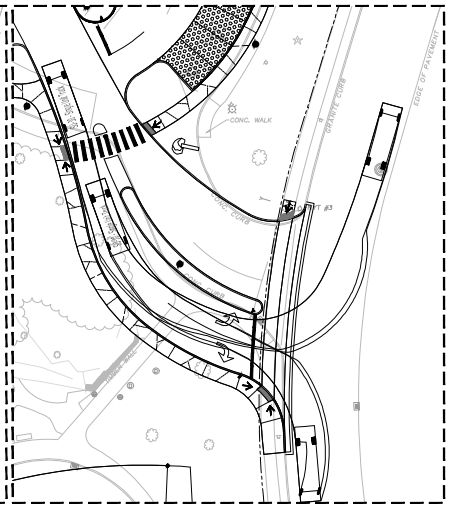
EXITING LOADING AREA

SCALE: 1" = 20'



ENTERING FROM INDIAN ROCK LANE

SCALE: 1" = 20'



EXITING TO INDIAN ROCK LANE

SCALE: 1" = 20'

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Greenwich Public Schools

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STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SU-30 TURNING MOVEMENT PLAN

Date
07/08/2024
Scale
AS SHOWN
Proj. Number
22367.00

Drawing Number
C609

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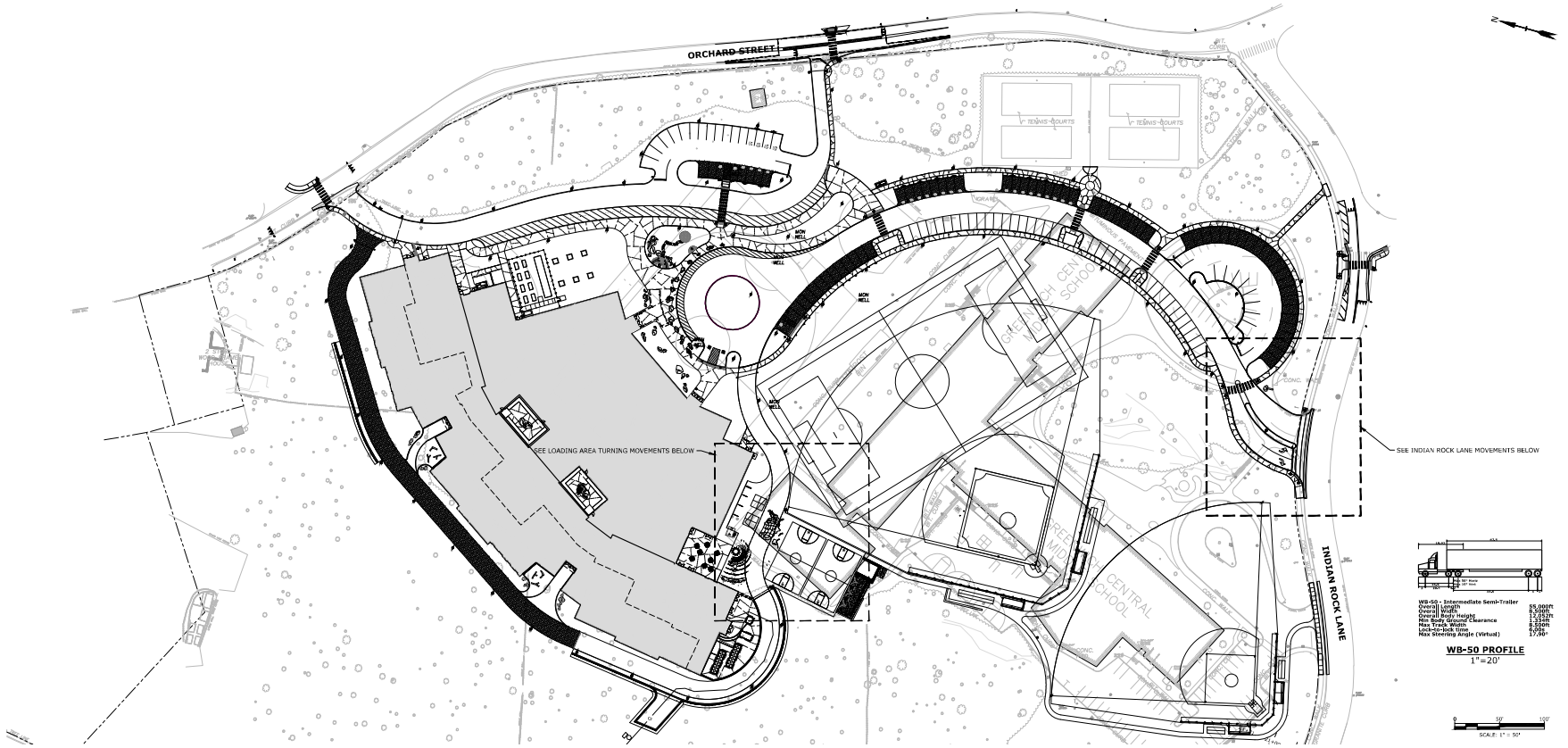
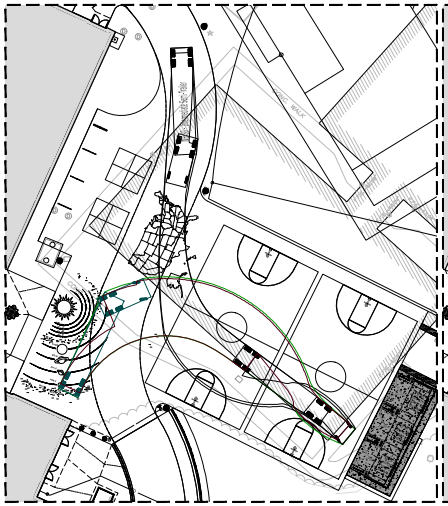
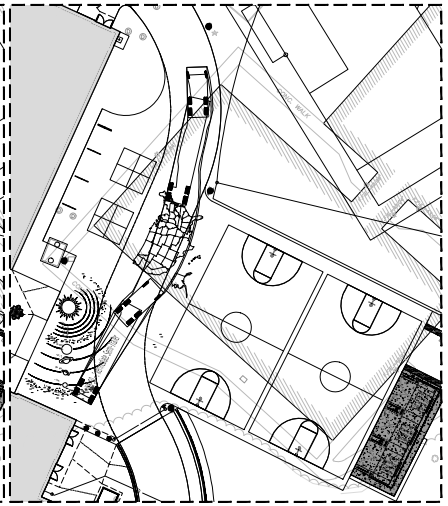




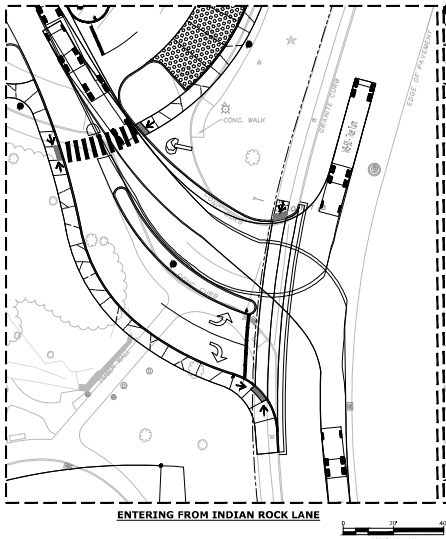
ENTERING LOADING AREA

SCALE: 1" = 20'



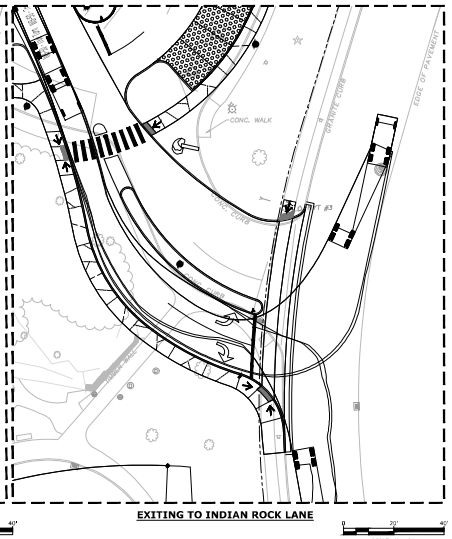
EXITING LOADING AREA

SCALE: 1" = 20'



ENTERING FROM INDIAN ROCK LANE

SCALE: 1" = 20'



EXITING TO INDIAN ROCK LANE

SCALE: 1" = 20'

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Greenwich Central Middle School

9 Indian Rock
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

WB-50 TURNING MOVEMENT PLAN

Date
07/08/2024
Scale
AS SHOWN
Proj. Number
22367.00

Drawing Number
C610

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MOVEMENT DIAGRAM

	NTOR	PHASE 1			PHASE 2 PRE-EMPT 1			PHASE 3			PHASE 4			PHASE 5			PHASE 6			PHASE 7			PHASE 8			PHASE 9		
	FLASH	GRN	CL	CL	GRN	CL	CL	GRN	CL	CL	GRN	CL	CL	GRN	CL	CL	GRN	CL	CL	GRN	CL	CL	GRN	CL	CL	GRN	CL	CL
PAGE #																												
INTERVALS	MIN GRN																											
	WALK																											
	PED CLR																											
	VEH EXT																											
	MAX 1																											
	MAX 2																											
	YELLOW																											
	RED																											
	ADD INT																											
	MAX INT																											
	TBP																											
	TTP																											
	MIN GAP																											
	MODE																											
	INT START																											

TECHNICAL NOTES

RECTANGULAR RAPID FLASHERS TO FLASH FOR 16 SECONDS UPON EACH ACTUATION.

16 SECOND TIMER SHOULD RESET UPON EACH ACTUATION.

SPEECH MESSAGE OF "YELLOW LIGHTS ARE FLASHING" TO PLAY TWICE UPON EACH ACTUATION.

OFFICE RECORD

REV # TIR # N/A SM # SIGNAL REVISED:

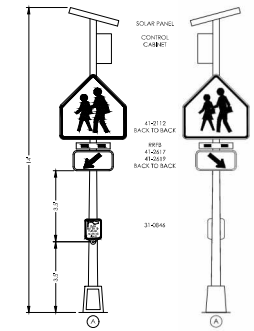
INSTALLED RECTANGULAR RAPID FLASHING BEACON (RRFB) ASSEMBLY UNDER PERMIT

SIGN LEGEND:

(A) INSTALL RECTANGULAR RAPID FLASHING BEACON ASSEMBLY TYPE B. TOWN OWNED AND MAINTAINED.

(B) INSTALL 31-0510

(C) INSTALL 41-2112, 41-6126



RRFB ASSEMBLY TYPE B
DETAILS NOT TO SCALE



NOTES:

ALL RRFB EQUIPMENT, SIGNS, AND PAVEMENT MARKINGS TO BE OWNED AND MAINTAINED BY THE TOWN OF GREENWICH.

TOWN RRFB ASSEMBLY

CONSTRUCTION NOTES:

ALL MATERIALS AND CONSTRUCTION METHODS SHALL CONFORM TO THE FOLLOWING CURRENT D.O.T. DOCUMENTS WHICH CAN BE ACCESSED ON THE CTDOT WEBSITE:

- STANDARD SPECIFICATION FOR ROADS, BRIDGES, AND INCIDENTAL CONSTRUCTION (FORM 818)
- SUPPLEMENTAL SPECIFICATIONS TO FORM 818
- STANDARD INSTALLATION AND GUIDE DETAIL SHEETS

ALL TRAFFIC SIGNAL EQUIPMENT IS NEW.

STAKE ALL R.O.W. PRIOR TO EXCAVATION.

ANY PROPOSED REVISIONS TO THE LOCATION OF THE APPURTENANCES SHOWN ON THE PLAN MUST BE SUBMITTED FOR REVIEW AND APPROVAL BY THE TOWN PRIOR TO INSTALLATION.

PUSH BUTTON TO HAVE LOCATOR TONES AND AUDIBLE MESSAGE.

THE LOCATION OF TRAFFIC SIGNAL FOUNDATIONS WHEN IN OR ADJACENT TO SIDEWALK SHALL BE VERIFIED PRIOR TO INSTALLATION TO PROVIDE A FREE PATH OF NOT LESS THAN 4 FEET. IF A MINIMUM OF 4 FOOT FREE PATH IS UNAVAILABLE, NOTIFY THE ENGINEER AND CONTACT THE TOWN OF GREENWICH.

SEE SPECIAL PROVISION ITEM #1117111A - RECTANGULAR RAPID FLASHING BEACON - TYPE B.

RECTANGULAR RAPID FLASHING BEACON TO BE PEDESTRIAN ACTUATED, SOLAR POWERED, AND WIRELESS ACTIVATED.

COORDINATE WITH UTILITY COMPANY REPRESENTATIVES LISTED IN SPECIAL PROVISION 1.07 - LEGAL RELATIONS AND RESPONSIBILITIES.

INSTALL RRFB ASSEMBLIES ON 14' PEDESTALS.

RRFB SHALL MEET THE FLASHING REQUIREMENTS OF THE MUTCD AND FHWA INTERIM APPROVAL AND REMAIN ACTIVATED FOR 16 SECONDS TO ALLOW PEDESTRIAN CROSSING OF THE FULL WIDTH OF ORCHARD STREET.

PUSH BUTTONS TO BE INSTALLED WITH "PUSH BUTTON TO TURN ON WARNING LIGHTS" SIGN (CTDOT NO. 31-0846).

THE RRFB AND PUSH BUTTONS SHALL BE DIRECTIONAL CONFIGURATION AND HAVE SIDE-EMITTING PEDESTRIAN CONFIRMATION LIGHTS.

REMOVE EXISTING "SCHOOL CROSSING" SIGN.

THE CONTRACTOR SHALL REPLACE IN KIND ALL DISTURBED AREAS ASSOCIATED WITH THE CONSTRUCTION OF SIGNAL EQUIPMENT TO THE SATISFACTION OF THE TOWN OF GREENWICH.

(D) INSTALL TYPE 10 SIDEWALK RAMP PER GUIDE SHEET.

PAVEMENT MARKING NOTES:

ERADICATE ANY EXISTING CONFLICTING PAVEMENT MARKINGS.

INSTALL NEW CROSSWALK ACROSS ORCHARD STREET AS SHOWN ON THE PLAN.

INSTALL YIELD LINES AS SHOWN ON THE PLAN.

	TRAFFIC	DATE	ELECTRICAL	DATE	REV #	INTERSECTION #
ENGINEER	Tighe&Bond 1000 Bridgeport Avenue Suite 320 Shelton, CT 06484 (203) 712-1100				RECTANGULAR RAPID FLASHING BEACON ASSEMBLY (RRFB)	
DRAWN BY					ENERGY BY - SOLAR	ADDRESS #
CHECKED BY					MAINT LEVEL N/A	SERVICE POLE - SOLAR
SUBMITTED BY						UNMETERED SERVICE
APPROVED BY						
APPROVED DATE						

LEGEND: PL FLASHING, PED ARROW, YELLOW ARROW, GREEN ARROW, WKD WALK/ PED. CLR, DW DON'T WALK, DET. LEADS IN SAW CUT, PROPOSED IMC, EXISTING IMC, CABLE CLOSURE, VC VIDEO CAMERA CABLE, RC RADAR CABLE, PROPOSED WOOD SPAN POLE, EXISTING WOOD SPAN POLE, PROPOSED STEEL SPAN POLE, EXISTING STEEL SPAN POLE, PROPOSED UTILITY POLE, EXISTING UTILITY POLE, PEDESTAL MOUNTING, PEDESTRIAN PUSH BUTTON & SIGN, DIRECTIONAL ARW. FOR PUSH BUTTON, TRAFFIC SIGNAL FACE, PEDESTRIAN SIGNAL FACE, GUY WIRE, PROPOSED HANDHOLE, EXISTING HANDHOLE, AUXILIARY TERMINATION CABINET, AUXILIARY EQUIPMENT CABINET, PROPOSED CONTROLLER, EXISTING CONTROLLER, DETECTOR, RADAR DETECTOR, THERMAL DETECTOR, AUDIO DETECTOR, 360° CAMERA ASSEMBLY, OPTICAL DETECTOR, BACK TO BACK RRFB, SDD SYSTEM DETECTOR, VIDEO DETECTION ZONE, LOOP DETECTOR, RADIO ANTENNA

STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION

PROJECT NUMBER: GS068-003
ORCHARD STREET AT COACHLAMP LANE
TOWN(S): GREENWICH
DRAWING TITLE: TRAFFIC CONTROL SIGNAL PLAN

DRAWING NO.: TCS-001
SHEET NO.:

Last Saved: 6/24/2024
Plotted On: Jul 02, 2024 - 1:42pm By: ESkidsberg
Tighe & Bond P:\Projects\GS2068 Greenwich Public Schools\003 Central Middle School\Drawings\AutoCAD\Sheet\GS068-003-TCS-SPM.dwg

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Checked: APW

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock
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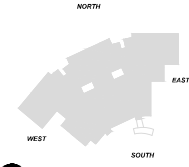
STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

TRAFFIC CONTROL SIGNAL PLAN

Date: 07/08/2024
Scale: 1" = 40'
Proj Number: 22367.00
Drawing Number: **TC101**

F:\Projects\GS2068 Greenwich Public Schools\003 Central Middle School\Drawings\AutoCAD\Sheet\GS068-003-TCS-SPM.dwg - July 03, 2024 - 4:42 PM

MOVEMENT DIAGRAM

	NTOR	PHASE 1			PHASE 2 PRE-EMPT 1			PHASE 3			PHASE 4			PHASE 5			PHASE 6			PHASE 7			PHASE 8			PHASE 9		
		FLASH	GRN	CL	CL	GRN	CL	CL	GRN	CL	CL	GRN	CL	CL	GRN	CL	CL	GRN	CL	CL	GRN	CL	CL	GRN	CL	CL	GRN	CL	CL
PAGE #																												
INTERVALS	MIN GRN																											
	WALK																											
	PED CLR																											
	VEH EXT																											
	MAX 1																											
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	YELLOW																											
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	ADD INT																											
	MAX INT																											
	TBP																											
	TTP																											
	MIN GAP																											
	MODE																											
	INIT START																											

TECHNICAL NOTES

RECTANGULAR RAPID FLASHERS TO FLASH FOR 16 SECONDS UPON EACH ACTUATION.

16 SECOND TIMER SHOULD RESET UPON EACH ACTUATION.

SPEECH MESSAGE OF "YELLOW LIGHTS ARE FLASHING TO PLAY TWICE UPON EACH ACTUATION.

OFFICE RECORD

REV # TIR # N/A SM # SIGNAL REVISED:

INSTALLED RECTANGULAR RAPID FLASHING BEACON (RRFB) ASSEMBLY UNDER PERMIT

SIGN LEGEND:

(A) INSTALL RECTANGULAR RAPID FLASHING BEACON ASSEMBLY TYPE B. TOWN OWNED AND MAINTAINED.

(B) INSTALL  31-0510

CONSTRUCTION NOTES:

ALL MATERIALS AND CONSTRUCTION METHODS SHALL CONFORM TO THE FOLLOWING CURRENT D.O.T. DOCUMENTS WHICH CAN BE ACCESSED ON THE CTDOT WEBSITE:

- STANDARD SPECIFICATION FOR ROADS, BRIDGES, AND INCIDENTAL CONSTRUCTION (FORM 818)
- SUPPLEMENTAL SPECIFICATIONS TO FORM 818
- STANDARD INSTALLATION AND GUIDE DETAIL SHEETS

ALL TRAFFIC SIGNAL EQUIPMENT IS NEW.

STAKE ALL R.O.W. PRIOR TO EXCAVATION.

ANY PROPOSED REVISIONS TO THE LOCATION OF THE APPURTENANCES SHOWN ON THE PLAN MUST BE SUBMITTED FOR REVIEW AND APPROVAL BY THE TOWN PRIOR TO INSTALLATION.

PUSH BUTTON TO HAVE LOCATOR TONES AND AUDIBLE MESSAGE.

THE LOCATION OF TRAFFIC SIGNAL FOUNDATIONS WHEN IN OR ADJACENT TO SIDEWALK SHALL BE VERIFIED PRIOR TO INSTALLATION TO PROVIDE A FREE PATH OF NOT LESS THAN 4 FEET. IF A MINIMUM OF 4 FOOT FREE PATH IS UNAVAILABLE, NOTIFY THE ENGINEER AND CONTACT THE TOWN OF GREENWICH.

SEE SPECIAL PROVISION ITEM #1117111A - RECTANGULAR RAPID FLASHING BEACON - TYPE B.

RECTANGULAR RAPID FLASHING BEACON TO BE PEDESTRIAN ACTUATED, SOLAR POWERED, AND WIRELESS ACTIVATED.

COORDINATE WITH UTILITY COMPANY REPRESENTATIVES LISTED IN SPECIAL PROVISION 1.07 - LEGAL RELATIONS AND RESPONSIBILITIES.

INSTALL RRFB ASSEMBLIES ON 14' PEDESTALS.

RRFB SHALL MEET THE FLASHING REQUIREMENTS OF THE MUTCD AND FHWA INTERIM APPROVAL AND REMAIN ACTIVATED FOR 16 SECONDS TO ALLOW PEDESTRIAN CROSSING OF THE FULL WIDTH OF ORCHARD STREET.

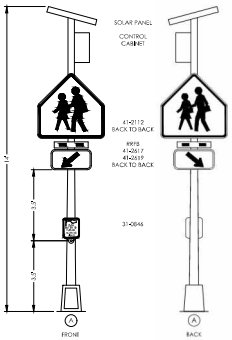
PUSH BUTTONS TO BE INSTALLED WITH "PUSH BUTTON TO TURN ON WARNING LIGHTS" SIGN (CTDOT NO. 31-0846).

THE RRFB AND PUSH BUTTONS SHALL BE DIRECTIONAL CONFIGURATION AND HAVE SIDE-EMITTING PEDESTRIAN CONFIRMATION LIGHTS.

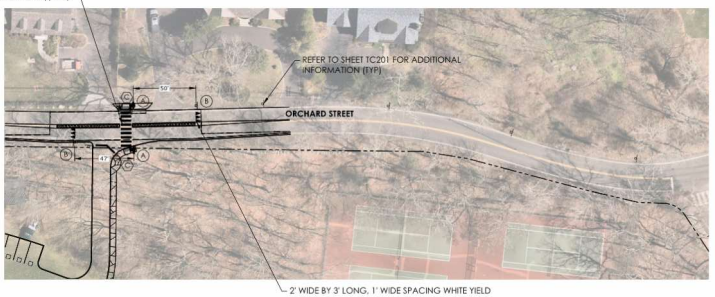
THE CONTRACTOR SHALL REPLACE IN KIND ALL DISTURBED AREAS ASSOCIATED WITH THE CONSTRUCTION OF SIGNAL EQUIPMENT TO THE SATISFACTION OF THE TOWN OF GREENWICH.

(C) INSTALL TYPE B SIDEWALK RAMP PER GUIDE SHEET.

16" WIDE BY 8' LONG, 24" WIDE SPACE WHITE CROSSWALK PAVEMENT MARKINGS (EPOXY RESIN)(TYP.)



RRFB ASSEMBLY TYPE B
DETAILS NOT TO SCALE



PAVEMENT MARKING NOTES:

ERADICATE ANY EXISTING CONFLICTING PAVEMENT MARKINGS.

INSTALL NEW CROSSWALK ACROSS ORCHARD STREET AS SHOWN ON THE PLAN.

INSTALL YIELD LINES AS SHOWN ON THE PLAN.

NOTES:

ALL RRFB EQUIPMENT, SIGNS, AND PAVEMENT MARKINGS TO BE OWNED AND MAINTAINED BY THE TOWN OF GREENWICH.

TOWN RRFB ASSEMBLY

	TRAFFIC	DATE	ELECTRICAL	DATE	REV #	INTERSECTION #
ENGINEER	Tighe&Bond 1000 Bridgeport Avenue Suite 320 Shelton, CT 06484 (203) 712-1100				RECTANGULAR RAPID FLASHING BEACON ASSEMBLY (RRFB)	
DRAWN BY					ENERGY BY - SOLAR	ADDRESS #
CHECKED BY					MAINT LEVEL N/A	SERVICE POLE - SOLAR
SUBMITTED BY						UNMETERED SERVICE
APPROVED BY						
APPROVED DATE						

LEGEND: PL FLASHING, R RED, Y YELLOW, G GREEN, WALK/ PED. CLR DW. DON'T WALK, DET. LEADS IN SAW CUT, RED ARROW, YELLOW ARROW, GREEN ARROW, PROPOSED XWC, EXISTING XWC, CABLE CLOSURE, VC VIDEO CAMERA CABLE, RC RADAR CABLE, PROPOSED WOOD SPAN POLE, EXISTING WOOD SPAN POLE, PROPOSED STEEL SPAN POLE, EXISTING STEEL SPAN POLE, PROPOSED UTILITY POLE, EXISTING UTILITY POLE, PEDESTAL MOUNTING, PEDESTRIAN PUSH BUTTON & SIGN, DIRECTIONAL ARW. FOR PUSH BUTTON, TRAFFIC SIGNAL FACE, PEDESTRIAN SIGNAL FACE, GUY WIRE, PROPOSED HANDHOLE, EXISTING HANDHOLE, AUXILIARY TERMINATION CABINET, AUXILIARY EQUIPMENT CABINET, PROPOSED CONTROLLER, EXISTING CONTROLLER, IP DETECTOR, RADAR DETECTOR, THERMAL DETECTOR, AUDIO DETECTOR, 360° CAMERA ASSEMBLY, OPTICAL DETECTOR, VDS SYSTEM DETECTOR, VIDEO DETECTION ZONE, LOOP DETECTOR, RADIO ANTENNA, BACK TO BACK RRFB

STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION

PROJECT NUMBER: GS068-003
ORCHARD STREET AT BUS EXIT DRIVEWAY
TOWN(S): GREENWICH
DRAWING TITLE: TRAFFIC CONTROL SIGNAL PLAN

DRAWING NO.: TCS-001 A
SHEET NO.:

Last Saved: 8/27/2024
Plotted On: Sep 25, 2024-2:48pm By: EGoldberg
Tighe & Bond P:\Projects\GS0068 Greenwich Public Schools\003 Central Middle School\Drawings\AutoCAD\Sheet\GS068-003-TCS-SPM.dwg

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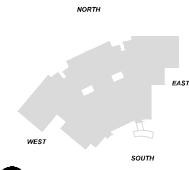
Drawn: TJW
Checked: APW

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

TRAFFIC CONTROL SIGNAL PLAN

Date: 07/08/2024
Scale: 1" = 40'
Proj Number: 22367.00
Drawing Number: **TC101A**

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MOVEMENT DIAGRAM

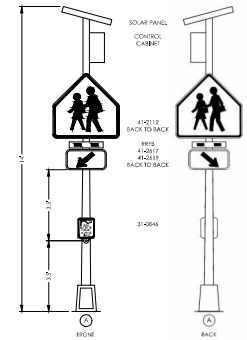
	NTOR	PHASE 1			PHASE 2 PRE-EMPT 1			PHASE 3			PHASE 4			PHASE 5			PHASE 6			PHASE 7			PHASE 8			PHASE 9		
		FLASH	GRN	CL	CL	GRN	CL	CL	GRN	CL	CL	GRN	CL	CL	GRN	CL	CL	GRN	CL	CL	GRN	CL	CL	GRN	CL	CL	GRN	CL	CL
PAGE #																												
INTERVALS	MIN GRN																											
	WALK																											
	PED CLR																											
	VEH EXT																											
	MAX 1																											
	MAX 2																											
	YELLOW																											
	RED																											
	ADD'L INT																											
	MAX INT																											
	TBP																											
	TTP																											
	MIN GAP																											
	MODE																											
	INIT START																											

TECHNICAL NOTES

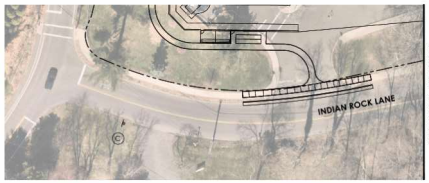
TECHNICAL NOTES	OFFICE RECORD
RECTANGULAR RAPID FLASHERS TO FLASH FOR 15 SECONDS UPON EACH ACTUATION.	REV # TIR # N/A SM # SIGNAL REVISED:
15 SECOND TIMER SHOULD RESET UPON EACH ACTUATION.	INSTALLED RECTANGULAR RAPID FLASHING BEACON (RRFB) ASSEMBLY UNDER PERMIT
SPEECH MESSAGE OF "YELLOW LIGHTS ARE FLASHING" TO PLAY TWICE UPON EACH ACTUATION.	

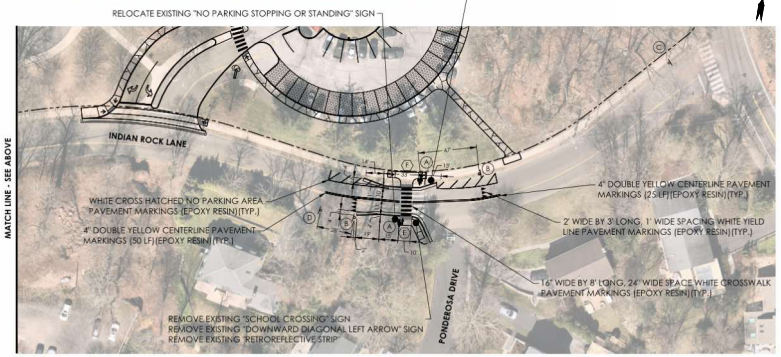
SIGN LEGEND:

- (A) INSTALL RECTANGULAR RAPID FLASHING BEACON ASSEMBLY TYPE B. TOWN OWNED AND MAINTAINED.
- (B) INSTALL — 31-0510
- (C) EXISTING
- (D) RELOCATE



RRFB ASSEMBLY TYPE B
DETAILS NOT TO SCALE





CONSTRUCTION NOTES:

ALL MATERIALS AND CONSTRUCTION METHODS SHALL CONFORM TO THE FOLLOWING CURRENT D.O.T. DOCUMENTS WHICH CAN BE ACCESSED ON THE CTDOT WEBSITE:

- STANDARD SPECIFICATION FOR ROADS, BRIDGES, AND INCIDENTAL CONSTRUCTION (FORM 818)
- SUPPLEMENTAL SPECIFICATIONS TO FORM 818
- STANDARD INSTALLATION AND GUIDE DETAIL SHEETS

ALL TRAFFIC SIGNAL EQUIPMENT IS NEW.

STAKE ALL R.O.W. PRIOR TO EXCAVATION.

ANY PROPOSED REVISIONS TO THE LOCATION OF THE APPURTENANCES SHOWN ON THE PLAN MUST BE SUBMITTED FOR REVIEW AND APPROVAL BY THE TOWN PRIOR TO INSTALLATION.

PUSH BUTTON TO HAVE LOCATOR TONES AND AUDIBLE MESSAGE.

THE LOCATION OF TRAFFIC SIGNAL FOUNDATIONS WHEN IN OR ADJACENT TO SIDEWALK SHALL BE VERIFIED PRIOR TO INSTALLATION TO PROVIDE A FREE PATH OF NOT LESS THAN 4 FEET. IF A MINIMUM OF 4 FOOT FREE PATH IS UNAVAILABLE, NOTIFY THE ENGINEER AND CONTACT THE TOWN OF GREENWICH.

SEE SPECIAL PROVISION ITEM #1117111A - RECTANGULAR RAPID FLASHING BEACON - TYPE B.

RECTANGULAR RAPID FLASHING BEACON TO BE PEDESTRIAN ACTUATED, SOLAR POWERED, AND WIRELESS ACTIVATED.

COORDINATE WITH UTILITY COMPANY REPRESENTATIVES LISTED IN SPECIAL PROVISION 1.07 - LEGAL RELATIONS AND RESPONSIBILITIES.

INSTALL RRFB ASSEMBLIES ON 14' PEDESTALS.

RRFB SHALL MEET THE FLASHING REQUIREMENTS OF THE MUTCD AND FHWA INTERIM APPROVAL AND REMAIN ACTIVATED FOR 15 SECONDS TO ALLOW PEDESTRIAN CROSSING OF THE FULL WIDTH OF INDIAN ROCK LANE.

PUSH BUTTONS TO BE INSTALLED WITH "PUSH BUTTON TO TURN ON WARNING LIGHTS" SIGN (CTDOT NO. 31-0846).

THE RRFB AND PUSH BUTTONS SHALL BE DIRECTIONAL CONFIGURATION AND HAVE SIDE-EMITTING PEDESTRIAN CONFIRMATION LIGHTS.

REMOVE ALL EXISTING "SCHOOL CROSSING" SIGNS, "DOWNWARD DIAGONAL LEFT ARROW" SIGNS, AND GREEN/YELLOW FLUORESCENT RETROREFLECTIVE STRIPS.

THE CONTRACTOR SHALL REPLACE IN KIND ALL DISTURBED AREAS ASSOCIATED WITH THE CONSTRUCTION OF SIGNAL EQUIPMENT TO THE SATISFACTION OF THE TOWN OF GREENWICH.

(E) INSTALL TYPE 10 SIDEWALK RAMP PER GUIDE SHEET.

(F) INSTALL TYPE 13 SIDEWALK RAMP PER GUIDE SHEET.

PAVEMENT MARKING NOTES:

ERADICATE ANY EXISTING CONFLICTING PAVEMENT MARKINGS.

INSTALL NEW CROSSWALK ACROSS INDIAN ROCK LANE AS SHOWN ON THE PLAN.

INSTALL YIELD LINES AS SHOWN ON THE PLAN.

INSTALL REALIGNED DOUBLE YELLOW CENTERLINE AS SHOWN ON THE PLAN.

INSTALL CROSS HATCHED NO PARKING AREA AS SHOWN ON THE PLAN.

NOTES:

ALL RRFB EQUIPMENT, SIGNS, AND PAVEMENT MARKINGS TO BE OWNED AND MAINTAINED BY THE TOWN OF GREENWICH.

TOWN RRFB ASSEMBLY

	TRAFFIC	DATE	ELECTRICAL	DATE	REV #	INTERSECTION #
ENGINEER	Tighe&Bond				RECTANGULAR RAPID FLASHING BEACON ASSEMBLY (RRFB)	
DRAWN BY					ENERGY BY - SOLAR	ADDRESS #
CHECKED BY					MAINT LEVEL N/A	SERVICE POLE - SOLAR
SUBMITTED BY						UNMETERED SERVICE
APPROVED BY						
APPROVED DATE						

Tighe&Bond
1000 Bridgeport Avenue
Suite 320
Shelton, CT 06484
(203) 712-1100

LEGEND: HI FLASHING, R RED, Y YELLOW, G GREEN, W WALK/ PED. CLR, D DON'T WALK, RED ARROW, YELLOW ARROW, GREEN ARROW, DET. LEADS IN SAW CUT, PROPOSED RMC, EXISTING RMC, CABLE CLOSURE, VC VIDEO CAMERA CABLE, RC RADAR CABLE, PROPOSED WOOD SPAN POLE, EXISTING WOOD SPAN POLE, PROPOSED STEEL SPAN POLE, EXISTING STEEL SPAN POLE, PROPOSED UTILITY POLE, EXISTING UTILITY POLE, PEDESTAL MOUNTING, PEDESTRIAN PUSH BUTTON & SIGN, DIRECTIONAL ARW. FOR PUSH BUTTON, TRAFFIC SIGNAL FACE, PEDESTRIAN SIGNAL FACE, GUY WIRE, PROPOSED HANDHOLE, EXISTING HANDHOLE, AUXILIARY TERMINATION CABINET, AUXILIARY EQUIPMENT CABINET, PROPOSED CONTROLLER, EXISTING CONTROLLER, DETECTOR, RADAR DETECTOR, THERMAL DETECTOR, AUDIO DETECTOR, 360° CAMERA ASSEMBLY, OPTICAL DETECTOR, BACK TO BACK RRFB, SDS SYSTEM DETECTOR, VIDEO DETECTION ZONE, LOOP DETECTOR, RADIO ANTENNA

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

PROJECT NUMBER: GS068-003
INDIAN ROCK LANE AT PONDEROSA DRIVE
TOWN(S): GREENWICH
DRAWING TITLE: TRAFFIC CONTROL SIGNAL PLAN

DRAWING NO. TCS-002
SHEET NO.

Last Saved: 8/27/2024
Plotted On: Sep 25, 2024-2:49pm By: EGoldberg
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Greenwich Central Middle School

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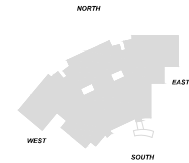
STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

TRAFFIC CONTROL SIGNAL PLAN

Date: 07/08/2024
Scale: 1" = 40'
Proj Number: 22367.00
Drawing Number: **TC102**

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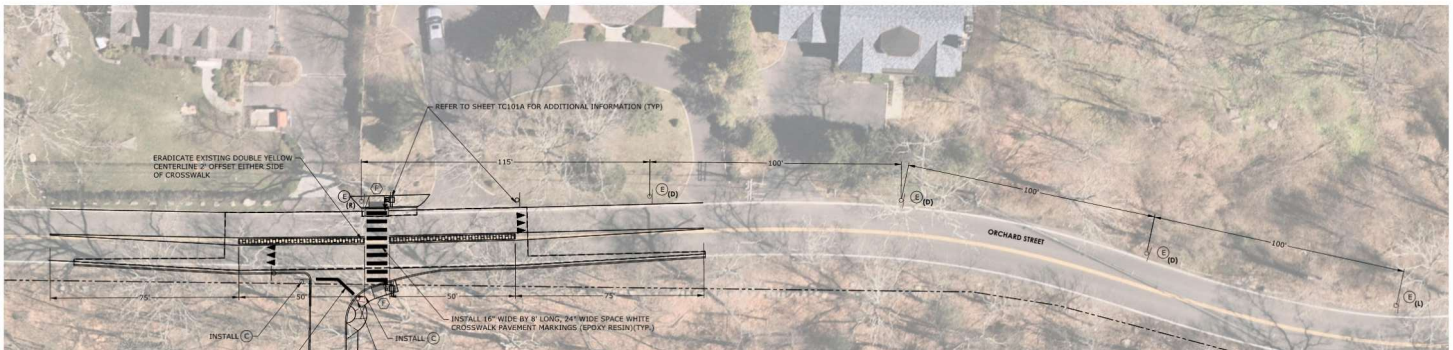
SIGN LEGEND:

- (A) INSTALL STOP 31-0552
- (B) INSTALL RED RETROREFLECTIVE STRIP 31-5004
- (C) INSTALL 31-1119
- (D) INSTALL 31-1603
- (E) INSTALL NO STANDING ANY TIME (L) / NO STANDING ANY TIME (D) / NO STANDING ANY TIME (R) 31-1916
- (F) INSTALL TYPE 8 SIDEWALK RAMP PER GUIDE SHEET.

LEGEND:

- 12" STOP BAR
- 16" WIDE BY 8' LONG, 24" WIDE SPACE WHITE CROSSWALK
- PROPOSED SIGN



NOTES:

1. ALL SIGNS TO BE INSTALLED 7' ABOVE THE GROUND ON BREAKAWAY POSTS. SIGN PLACEMENT TO BE VERIFIED IN THE FIELD WITH THE ENGINEER AND LOCATED ACCORDING TO TR-1208_01.
2. ALL MATERIALS AND CONSTRUCTION METHODS SHALL CONFORM TO THE FOLLOWING CURRENT D.O.T. DOCUMENTS WHICH CAN BE ACCESSED ON THE CTDOT WEBSITE:
   - 2.1. STANDARD SPECIFICATIONS FOR ROADS, BRIDGES, AND INCIDENTAL CONSTRUCTION (FORM 818)
   - 2.2. SUPPLEMENTAL SPECIFICATIONS TO FORM 818
   - 2.3. STANDARD INSTALLATION AND GUIDE DETAIL SHEETS

0 20' 40'
SCALE: 1" = 20'

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STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SIGNAGE AND PAVEMENT MARKING PLAN

Date
07/08/2024
Scale
1" = 20'
Proj. Number
22367.00

Drawing Number
TC201

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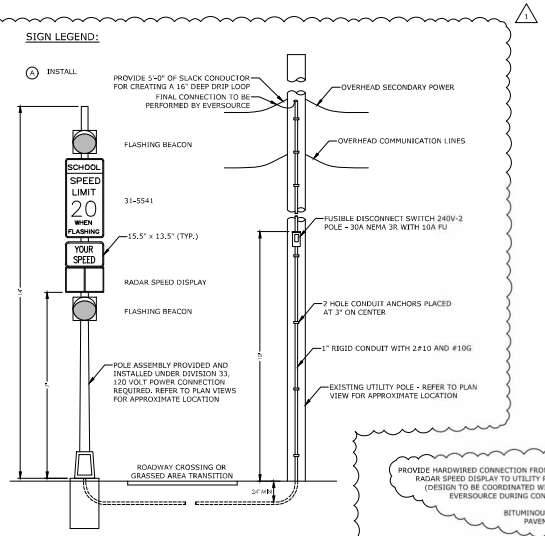
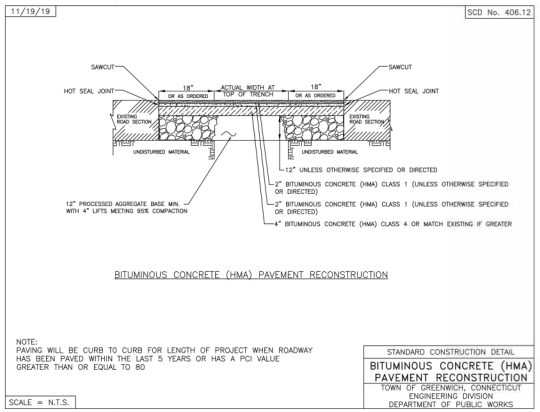
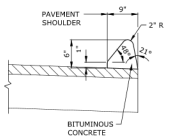
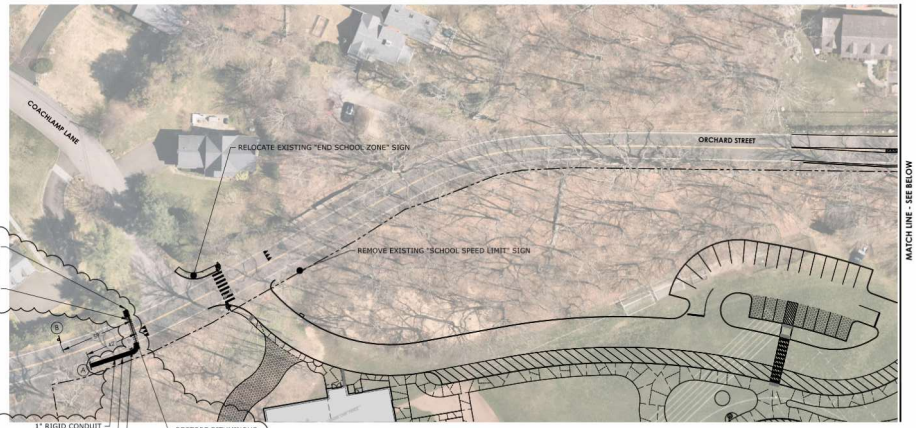






BITUMINOUS CONCRETE LIP CURBING
NO SCALE





LEGEND:

- PROPOSED SIGN
- EXISTING UTILITY POLE

NOTES:

1. ALL SIGNS TO BE INSTALLED 7' ABOVE THE GROUND ON BREAKAWAY POSTS. SIGN PLACEMENT TO BE VERIFIED IN THE FIELD WITH THE ENGINEER AND LOCATED ACCORDING TO TR-1208_01.
2. ALL MATERIALS AND CONSTRUCTION METHODS SHALL CONFORM TO THE FOLLOWING CURRENT D.O.T. DOCUMENTS WHICH CAN BE ACCESSED ON THE CTDOT WEBSITE:
   - 2.1. STANDARD SPECIFICATIONS FOR ROADS, BRIDGES, AND INCIDENTAL CONSTRUCTION (FORM 818)
   - 2.2. SUPPLEMENTAL SPECIFICATIONS TO FORM 818
   - 2.3. STANDARD INSTALLATION AND GUIDE DETAIL SHEETS

0 40' 80'
SCALE: 1" = 40'

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Greenwich Public Schools

Greenwich Central Middle School

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STATE PROJECT NO: 057-0114 N

NORTH
EAST
WEST
SOUTH
KEYPLAN

Number	Date	Issued For
1	10/23/2024	ADDENDUM #3
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SIGNAGE AND PAVEMENT MARKING PLAN

Date 07/08/2024
Scale 1" = 40'
Proj Number 22367.00
Drawing Number TC202

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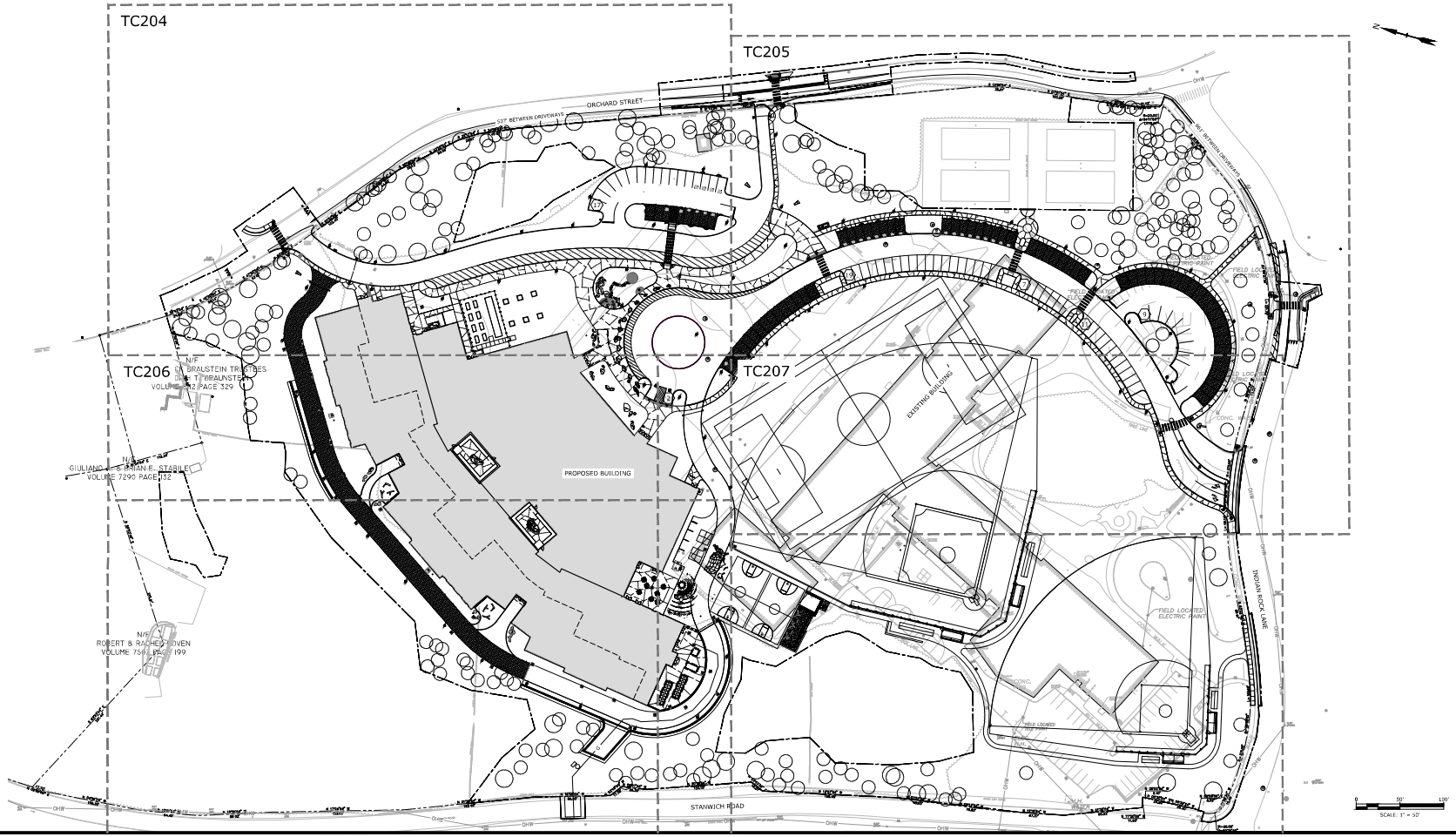
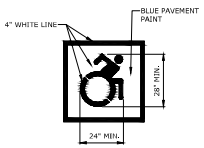


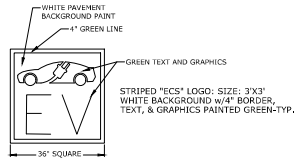
ON-SITE TRAFFIC SIGNAGE, PAVEMENT MARKING AND PARKING SPACE LAYOUT PLAN NOTES

1. REFERENCE IS MADE TO PLAN ENTITLED "PROPERTY/ BOUNDARY & TOPOGRAPHIC SURVEY" PREPARED FOR GREENWICH CENTRAL MIDDLE SCHOOL. PREPARED BY MARTIN SURVEYING ASSOCIATES, LLC, DATED MAY 22, 2023.
2. ALL ON-SITE PAVEMENT MARKINGS SHALL BE WATERBORNE PAINT UNLESS OTHERWISE NOTED.
3. ALL PAVEMENT MARKINGS WITHIN THE TOWN RIGHT-OF-WAY SHALL BE EPOXY RESIN PAINT UNLESS OTHERWISE NOTED.

PARKING SUMMARY	
PROPOSED PARKING	NUMBER OF SPACES
STANDARD PARKING SPACES	104
STANDARD HANDICAP SPACES	2
VAN ACCESSIBLE SPACES	2
ACCESSIBLE CHARGING SPACES	2
VEHICLE CHARGING SPACES	25
TOTAL PARKING SPACES	**135**



INTERNATIONAL SYMBOL OF ACCESSIBILITY



STRIPED "ECS" LOGO: SIZE: 3'X3' WHITE BACKGROUND w/4" BORDER, TEXT, & GRAPHICS PAINTED GREEN-TYP.

ELECTRIC VEHICLE PAVEMENT SYMBOL

ON-SITE TRAFFIC SIGNAGE, PAVEMENT MARKING AND PARKING SPACE LAYOUT PLAN LEGEND

WORK LIMIT LINE
PROPERTY LINE
STOP BAR
CROSSWALK
PROPOSED SIGN
ACCESSABLE SPACE
ACCESABLE CHARGING SPACE
ELECTRIC VEHICLE CHARGING SPACE

SIGN LEGEND:

12" STOP BAR

16" WIDE BY 8' LONG, 24" WIDE SPACE WHITE CROSSWALK

PROPOSED SIGN

SIGN LEGEND

A INSTALL — 31-0552
C INSTALL RED RETROREFLECTIVE STRIP
D INSTALL — 31-1119
E INSTALL — 31-1603
F INSTALL — 31-0662 (18" X 24")
G INSTALL — 31-0662 (18" X 24") / 31-0648 (18" X 6")
H INSTALL — (18" X 24")

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STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

OVERALL ON-SITE TRAFFIC SIGNAGE, PAVEMENT MARKINGS, AND PARKING SPACE LAYOUT PLAN

Date: 07/08/2024
Scale: 1" = 50'
Proj. Number: 22367.00
Drawing Number: TC203

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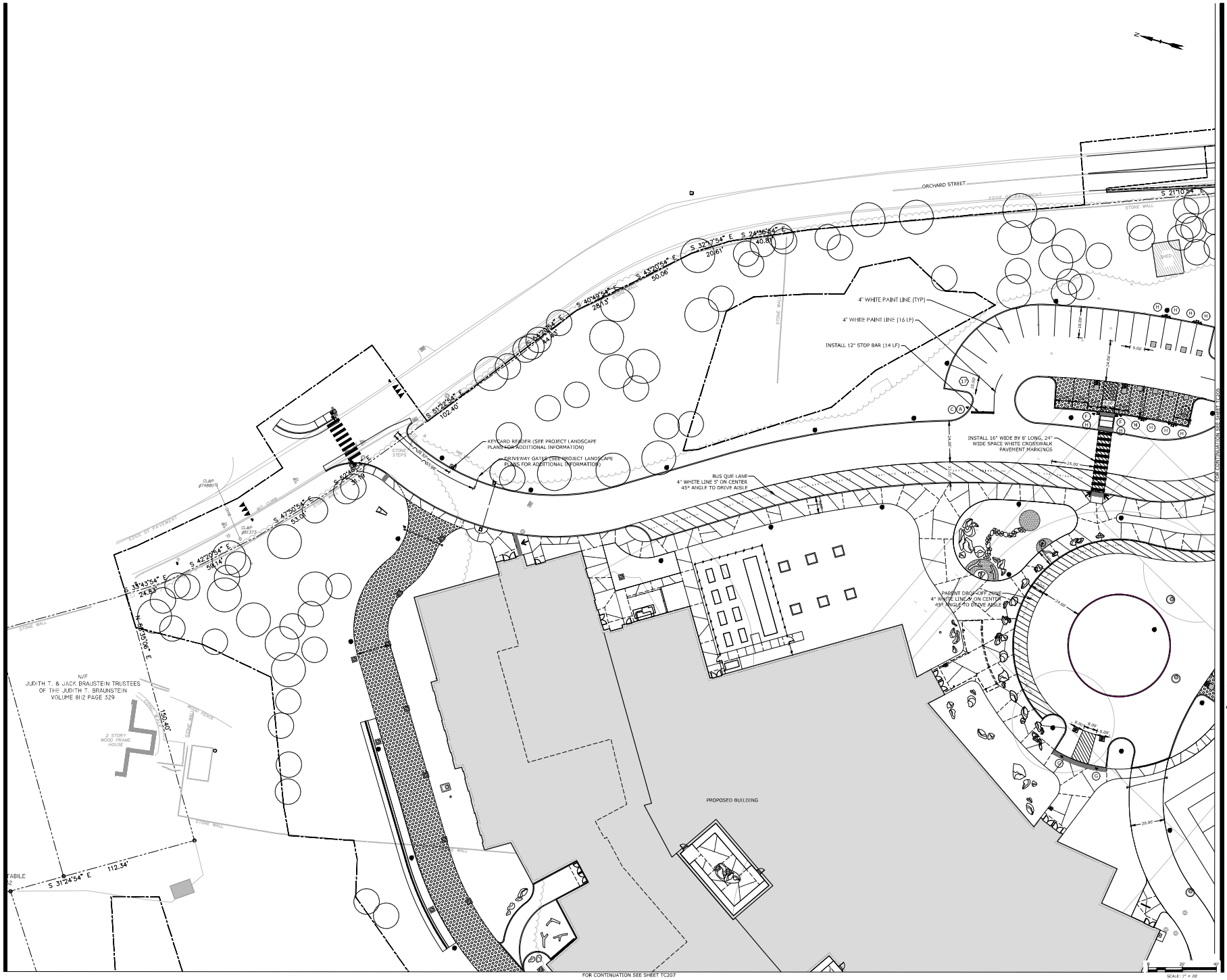

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STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

ON-SITE TRAFFIC SIGNAGE, PAVEMENT MARKINGS, AND PARKING SPACE LAYOUT PART PLAN

Date
07/08/2024
Scale
1" = 20'
Proj. Number
22367.00

Drawing Number
TC204

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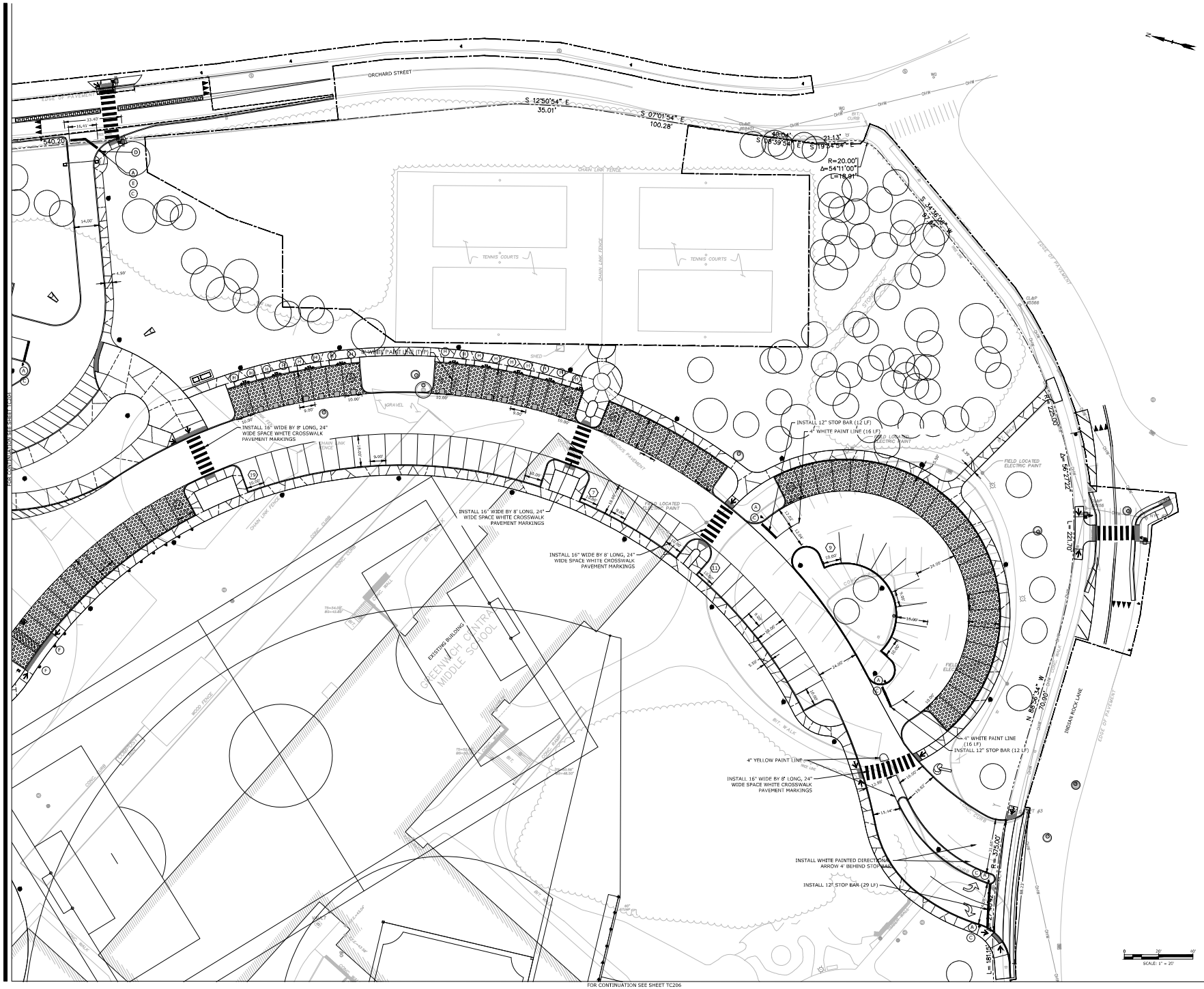

FOR CONTINUATION SEE SHEET TC206

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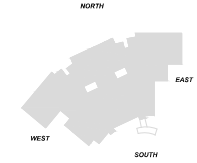
STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

ON-SITE TRAFFIC SIGNAGE, PAVEMENT MARKINGS, AND PARKING SPACE LAYOUT PART PLAN

Date
07/08/2024
Scale
1" = 20'
Proj. Number
22367.00

Drawing Number
TC205

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STATE PROJECT NO: 057-0114 N

NORTH
EAST
WEST
SOUTH

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

ON-SITE TRAFFIC SIGNAGE, PAVEMENT MARKINGS, AND PARKING SPACE LAYOUT PART PLAN

Date
07/08/2024
Scale
1" = 20'
Proj. Number
22367.00

Drawing Number
TC206

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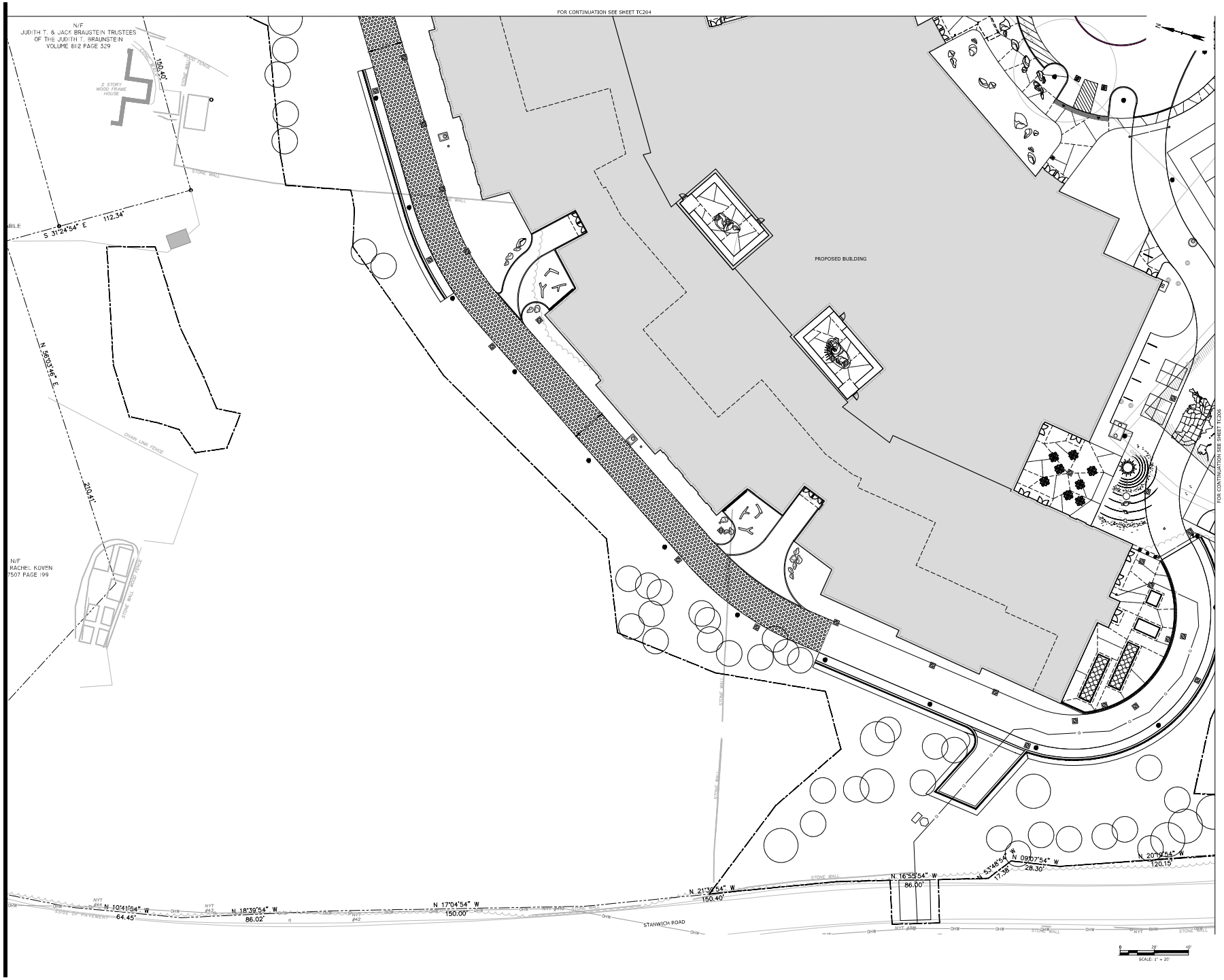
F:\Projects\G\G5698 Greenwich Public Schools\003 Central Middle School\Drawings\AutoCAD\Sheet\G5698-003-TC-203-Site S&SP.dwg September 25, 2024 - 2:51 PM



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Glastonbury, CT 06033-4410
Phone: 860 657.8077

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EG/AC
Checked
APW/CJC

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N

NORTH
EAST
WEST
SOUTH

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

ON-SITE TRAFFIC SIGNAGE, PAVEMENT MARKINGS, AND PARKING SPACE LAYOUT PART PLAN

Date
07/08/2024
Scale
1" = 20'
Proj. Number
22367.00

Drawing Number
TC207

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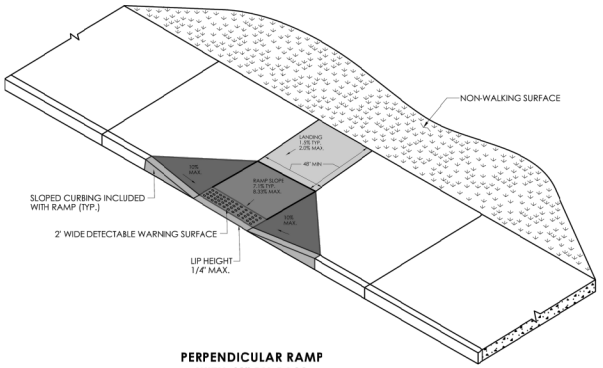
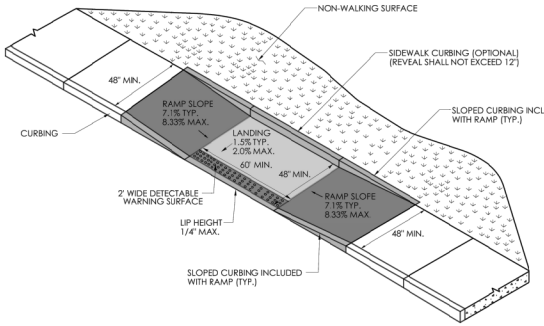
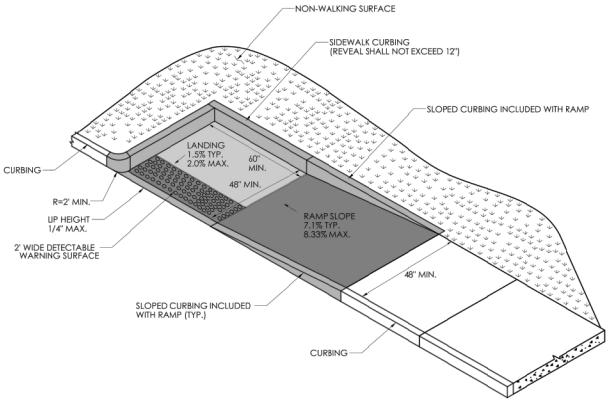


PERPENDICULAR RAMP WITH 48" BY-PASS (TYPE 8)



PARALLEL RAMP WITHOUT NON-WALKING SURFACE (TYPE 9)



PARALLEL RAMP WITH LANDING AT BOTTOM ON CORNER (TYPE 10)

REV	DATE	REVISION DESCRIPTION

DESIGNER/DRAFTER: T. WAMSER CHECKED BY: A. WHITE

SIGNATURE/ BLOCK:

APPROVED BY:

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

PROJECT NUMBER: G5068-003
PROJECT DESCRIPTION: GREENWICH CENTRAL MIDDLE SCHOOL OFF-SITE IMPROVEMENTS
TOWN(S): GREENWICH
DRAWING TITLE: CONCRETE SIDEWALK RAMPS SHEET 4 OF 11

DRAWING NO. CSR-01
SHEET NO.

LASTED SAVED BY: RichardSH **FILE NAME:** W:\CT_CONNECT_DDE\CT_Configuration\Organization\Civil\CTDOT_Borders_Contract.cat
PLOTTED DATE: 12/6/2023

THE DETECTABLE WARNING STRIP SHALL BE CONSTRUCTED USING ADA SOLUTIONS (OR APPROVED EQUAL) 24" X 48" CAST-IN-PLACE TACTILE PANELS IN BRICK RED. ALTERNATIVE COLORS AND DESIGNS REQUIRE APPROVAL BY THE HIGHWAY DIVISION.

NOTES:

1. SIDEWALK RAMPS SHALL BE CONSTRUCTED AT ALL PEDESTRIAN CROSSWALKS IN ALL NEW DESIGNS AND AT PEDESTRIAN CROSSWALK LOCATIONS WHERE AN EXISTING CURB OR WALK IS TO BE DISTURBED BY CONSTRUCTION.
2. DRAINAGE DESIGN IN THE VICINITY OF SIDEWALK RAMPS SHALL BE CONSIDERED AN INTEGRAL PART OF THE DESIGN OF THOSE RAMPS. NO DRAINAGE STRUCTURES SHALL BE PLACED WITHIN THE LIMITS OF A SIDEWALK RAMP ON THE DESIGNS.
3. REGARDLESS OF THE TYPE OF PAVEMENT OF ADJACENT SIDEWALK, ALL SIDEWALK RAMPS SHALL BE CONSTRUCTED OF CLASS "C" CONCRETE IN ACCORDANCE WITH THE STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION FORM 817 SECTION M.03.02 (AS AMENDED).
4. ALL SIDEWALK RAMPS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE DETAILS FOR SIDEWALKS, EXCEPT THE FINAL TEXTURE OF THE CONCRETE SURFACE SHALL HAVE A COARSE BROOM FINISH TRANSVERSE TO THE SLOPE OF THE RAMP.
5. CARE SHALL BE TAKEN TO ASSURE A UNIFORM GRADE ON THE RAMP, FREE OF SAGS AND SHORT GRADE CHANGES.
6. MINIMUM WIDTH OF SIDEWALK RAMPS SHALL BE 4 FEET.
7. THE BOTTOM OF THE RAMP SHALL MEET THE BACK ELEVATION OF THE CURB. THE CURB LIP HEIGHT IS NOT TO EXCEED 1/4" ABOVE THE EDGE OF THE ROADWAY PAVEMENT.
8. SUBBASE FOR SIDEWALK RAMPS SHALL BE 6"-3/4" COMPACTED TRAPROCK (95% COMPACTION REQUIRED).

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Phone: 860 657.8077
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Drawn: TJW
Checked: APW

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

TRAFFIC DETAIL PLAN

Date: 07/08/2024
Scale: AS SHOWN
Proj Number: 22367.00
Drawing Number: **TC301**

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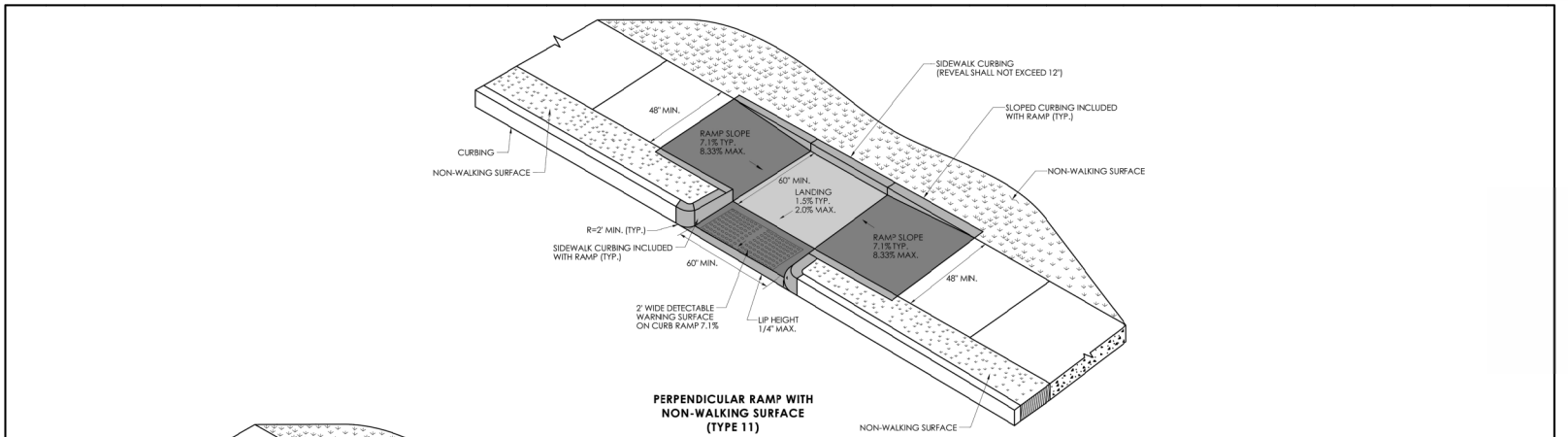
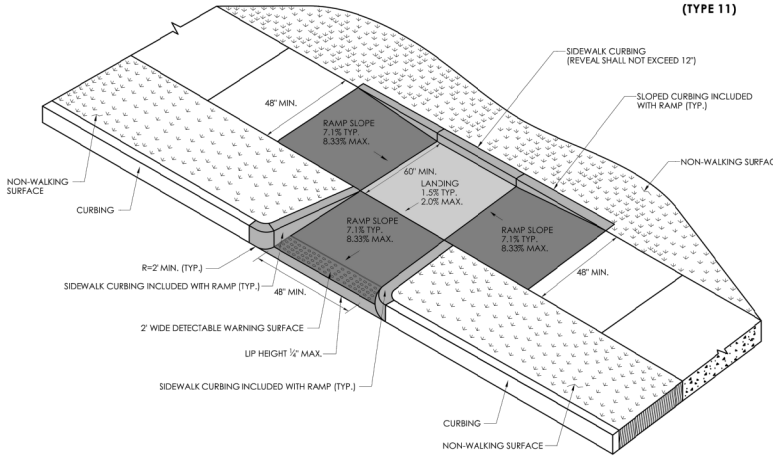
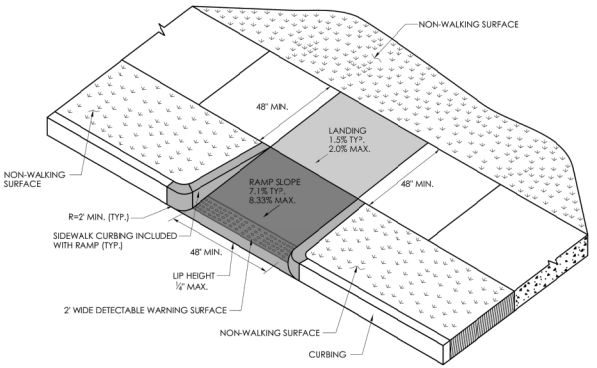


PERPENDICULAR RAMP WITH NON-WALKING SURFACE (TYPE 11)



PERPENDICULAR RAMP WITH SIDEWALK CURB AND NON-WALKING SURFACE (TYPE 12)



PERPENDICULAR RAMP WITH NON-WALKING SURFACE (TYPE 13)

REV	DATE	REVISION DESCRIPTION

DESIGNER/DRAFTER: T. WAMSER CHECKED BY: A. WHITE

SIGNATURE/ BLOCK:

APPROVED BY:

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

PROJECT NUMBER: G-5068-003
PROJECT DESCRIPTION: GREENWICH CENTRAL MIDDLE SCHOOL OFF-SITE IMPROVEMENTS
TOWN(S): GREENWICH
DRAWING TITLE: CONCRETE SIDEWALK RAMPS SHEET 5 OF 11

DRAWING NO. CSR-02
SHEET NO.

LASTED SAVED BY: RichardSH FILE NAME: W:\CT_CONNECT_DOE\CT_Configuration\Organization\Civil\CTDOT_Borders_Contract.cat
PLOTTED DATE: 12/6/2023

THE DETECTABLE WARNING STRIP SHALL BE CONSTRUCTED USING ADA SOLUTIONS (OR APPROVED EQUAL) 24" X 48" CAST-IN-PLACE TACTILE PANELS IN BRICK RED. ALTERNATIVE COLORS AND DESIGNS REQUIRE APPROVAL BY THE HIGHWAY DIVISION.

NOTES:

1. SIDEWALK RAMPS SHALL BE CONSTRUCTED AT ALL PEDESTRIAN CROSSWALKS IN ALL NEW DESIGNS AND AT PEDESTRIAN CROSSWALK LOCATIONS WHERE AN EXISTING CURB OR WALK IS TO BE DISTURBED BY CONSTRUCTION.
2. DRAINAGE DESIGN IN THE VICINITY OF SIDEWALK RAMPS SHALL BE CONSIDERED AN INTEGRAL PART OF THE DESIGN OF THOSE RAMPS. NO DRAINAGE STRUCTURES SHALL BE PLACED WITHIN THE LIMITS OF A SIDEWALK RAMP ON THE DESIGNS.
3. REGARDLESS OF THE TYPE OF PAVEMENT OF ADJACENT SIDEWALK, ALL SIDEWALK RAMPS SHALL BE CONSTRUCTED OF CLASS "C" CONCRETE IN ACCORDANCE WITH THE STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION FORM 817 SECTION M.03.02 (AS AMENDED).
4. ALL SIDEWALK RAMPS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE DETAILS FOR SIDEWALKS, EXCEPT THE FINAL TEXTURE OF THE CONCRETE SURFACE SHALL HAVE A COARSE BROOM FINISH TRANSVERSE TO THE SLOPE OF THE RAMP.
5. CARE SHALL BE TAKEN TO ASSURE A UNIFORM GRADE ON THE RAMP, FREE OF SAGS AND SHORT GRADE CHANGES.
6. MINIMUM WIDTH OF SIDEWALK RAMPS SHALL BE 4 FEET.
7. THE BOTTOM OF THE RAMP SHALL MEET THE BACK ELEVATION OF THE CURB. THE CURB LIP HEIGHT IS NOT TO EXCEED 1/4" ABOVE THE EDGE OF THE ROADWAY PAVEMENT.
8. SUBBASE FOR SIDEWALK RAMPS SHALL BE 6"-3/4" COMPACTED TRAPROCK (95% COMPACTION REQUIRED).

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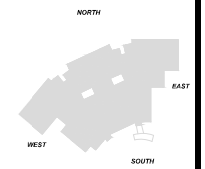
Drawn: TJW
Checked: APW

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

TRAFFIC DETAIL PLAN

Date: 07/08/2024
Scale: AS SHOWN
Proj Number: 22367.00
Drawing Number: **TC302**

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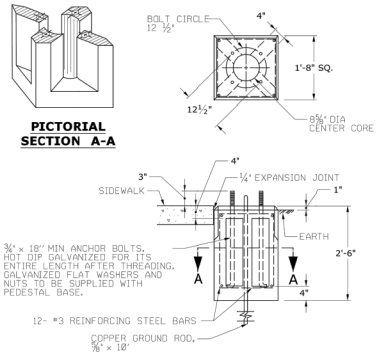

PICTORIAL SECTION A-A

TRAFFIC CONTROL FOUNDATION PEDESTAL - TYPE I - PRECAST

TRAFFIC CONTROL FOUNDATION PEDESTAL TYPE I NOTES:

INSTALL FOUNDATION ON 12" OF COMPACTED GRAVEL IN ACCORDANCE WITH SECTION 2.14.
LEVEL FOUNDATION WITH A PROJECTION OF 1" ABOVE FINISHED GRADE.
INSTALL COPPER GROUND ROD: 5/8" X 10'
PLACE NO. 6 CRUSHED STONE IN THE CENTER OPENINGS AFTER THE CONDUITS AND GROUND ROD HAVE BEEN INSTALLED.
CONCRETE: (PRECAST) PRC04060 IN ACCORDANCE WITH ARTICLE M.14.01

LEGEND AS SHOWN ON TRAFFIC CONTROL SIGNAL PLAN:

- PROPOSED CONTROLLER
- EXISTING CONTROLLER
- PEDESTAL MOUNTING

REV.	DATE	REVISION DESCRIPTION	SHEET NO.
2	6-2023	REVISED MINIMUM CONCRETE CLASS AND MINOR REVISIONS	
1	7-2021	REVISED MINIMUM CONCRETE CLASS.	

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 12/6/2023

DESIGNER/DRAFTER: T. WAMSER
CHECKED BY: A. WHITE
NOT TO SCALE

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\GS_TRAFFIC FOUNDATIONS.DGN

SIGNATURE/BLOCK:
APPROVED BY:

PROJECT TITLE: GREENWICH CENTRAL MIDDLE SCHOOL OFF-SITE IMPROVEMENTS

TOWN: GREENWICH
DRAWING TITLE: TRAFFIC CONTROL FOUNDATIONS

PROJECT NO. G5068-003
DRAWING NO. GS-1002_01
SHEET NO.

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Drawn: TJW
Checked: APW

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

TRAFFIC DETAIL PLAN

Date: 07/08/2024
Scale: AS SHOWN
Proj Number: 22367.00
Drawing Number: TC303

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R1 - SERIES

R1-1 *


LEGEND - WHITE
BACKGROUND - RED

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
1.85	18	31-0532	1	.080
5.19	30	31-0552	1	.080
7.98	36	31-0553	1	.080
13.3	48	31-0557	2	.100

R1-2 *


LEGEND - RED
BACKGROUND - WHITE

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
0.97	18	31-0520	1	.080
3.90	36	31-0523	1	.080
6.77	48	31-0522	2	.100
10.83	60	31-0528	2	.100

R1-3P *


LEGEND - WHITE
BACKGROUND - RED

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
0.75	18X6	31-0508		.080

R1-5


LEGEND - BLACK
BACKGROUND - WHITE
TRIANGLE - RED AND WHITE

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
2.25	18X18	31-0510	1	.080
9.00	36X36	31-0512	2	.080

R2 - SERIES

R2-1


AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
5.00	24X30	31-5505	1	.080
7.50	30X36	31-5504	1	.080
12.00	36X48	31-5506	2	.100
20.00	48X60	31-5507	2	.100

R2-4a


AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
32.00	48X96	31-5510	2	.125

R3 - SERIES

R3-1

LEGEND - BLACK
BACKGROUND - WHITE
CIRCLE & DIAGONAL - RED

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
4.00	24X24	31-1684	1	.080
9.00	36X36	31-1627	2	.080

R3-2

LEGEND - BLACK
BACKGROUND - WHITE
CIRCLE & DIAGONAL - RED

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
4.00	24X24	31-1683	1	.080
9.00	36X36	31-1629	2	.080

R3-3


AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
4.00	24X24	31-1648	1	.080
9.00	30X36	31-1647	2	.080

R3-4

LEGEND - BLACK
BACKGROUND - WHITE
CIRCLE & DIAGONAL - RED

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
4.00	24X24	31-1622	1	.080
9.00	36X36	31-1632	2	.080

R3-5


31-0183 31-0184

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
7.50	30X36		1	.080

R3-6


31-0157 31-0158

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
7.50	30X36		1	.080

R3-7


AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
6.25	30X30	31-0117	1	.080
9.00	36X36	31-0120	2	.080

R3-7


AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
6.25	30X30	31-0118	1	.080
9.00	36X36	31-0123	2	.080

R3-6


AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
7.50	36X30	31-0290	1	.080

R3-8


31-0222 31-0223

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
6.25	30X30		1	.080

R3-8


31-0262 31-0261

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
6.25	30X30		1	.080

R3-8


31-0282 31-0283

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
7.50	30X24	31-0175	1	.080
7.50	36X30		2	.080

R3-8


31-0295 31-0219

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
7.50	36X30		2	.080

R3-8


AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
8.75	42X30	31-0279	2	.100

R3-8

31-0262 31-0261

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
6.25	30X30		1	.080

R3-8b


AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
10.00	48X30	31-0302	2	.100

R3-8b


31-0307 31-0372

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
10.00	48X30		2	.100

R3-8b


AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
8.75	42X30		2	.100

R3-8b


31-0370 31-0371

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
8.75	42X30		2	.100

R4 - SERIES

R4-1


AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
5.00	24X30	31-1582	1	.080

R4-16

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
20.00	48X60	31-1574	2	.100

R4-3


AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
5.00	24X30	31-1562	1	.080
20.00	48X60	31-1564	2	.100

R4-7

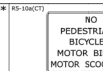

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
5.00	24X30	31-1526	1	.080
12.00	36X48	31-1536	2	.100
20.00	48X60	31-1546	2	.100

R5 - SERIES

R5-1 *


LEGEND - WHITE
BACKGROUND - WHITE
CIRCLE - RED

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
6.25	30X30	31-1119	1	.080
9.00	36X36	31-1120	2	.080
16.00	48X48	31-1121	2	.100

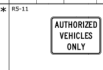
R5-10a(CT)


AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
9.00	36X36	31-1775	2	.100

R5-1a *


LEGEND - WHITE
BACKGROUND - RED

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
6.00	36X24	31-1122	2	.080
8.75	42X30	31-1123	2	.100

R5-11


AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
5.00	30X24	31-1790	1	.080
20.00	48X36	31-1792	2	.100

R5-10a(CT)

LEGEND - BLACK
TOP SECTION BACKGROUND - YELLOW
BOTTOM SECTION BACKGROUND - WHITE

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
32.50	60X78	31-1719	2	.125

R5-10c


AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
2.00	24X12	31-1774	1	.080

R6 - SERIES

R6-1 *


AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
3.00	36X12	31-1189	1	.080
6.75	54X18	31-1189	2	.100

R6-1 *


AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
3.00	36X12	31-1177	1	.080
6.75	54X18	31-1178	2	.100

R7 - SERIES

R7-1


LEGEND - RED
BACKGROUND - WHITE

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
1.50	12X18	31-0630	1	.080

R7-2a


LEGEND - RED
BACKGROUND - WHITE

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
1.50	12X18	31-0603	1	.080

R7-4


LEGEND - RED
BACKGROUND - WHITE

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
1.50	12X18	31-1916	1	.080

R8 - SERIES

R8-7

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
12.00	48X36	31-0670	2	.100

R9 - SERIES

R9-3

LEGEND - BLACK
BACKGROUND - WHITE
CIRCLE & DIAGONAL - RED

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
2.25	18X18	31-1705	1	.080
4.00	24x24	31-1769	1	.080
6.25	30x30	31-1770	1	.080

R9-3a

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
1.50	12X18	31-1702	1	.080

R10 - SERIES

R10-6

31-0801 31-0802

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
6.00	24X36		1	.080

R10-7

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
5.00	24X30	31-0806	1	.080

R10-11b

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
9.00	36X36	31-0816	2	.080

R10-10L

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
7.50	30X36	31-0852	1	.080

R10-11a

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
7.50	30X36	31-0830	1	.080
12.00	36X48	31-0859	2	.100

R10-11c(CT)

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
7.50	30X36	31-0847	1	.080

R10-15 *

31-1626 31-1625
LEGEND AND SYMBOLS - BLACK
BOTTOM - WHITE
BACKGROUND
TOP - FLUORESCENT YELLOW-GREEN

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
6.25	30X30		1	.080

R11 - SERIES

R11-1

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
5.00	24X30	31-1915	1	.080
20.00	48X60	31-1918	2	.100

RETROREFLECTIVE STRIP

LEGEND - N/A
BACKGROUND - RED

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
1.00	4X48	31-5003	1	.080
2.00	4X72	31-5004	1	.080

* THIS SIGN ADDED FOR THIS PROJECT ONLY.

NOTES:

1. THE LEGEND "O.S.T.A." SHALL APPEAR ON ALL R- SERIES SIGNS EXCEPT WHEN SUFFIXED WITH THE LETTER "Z".
2. FOR SPECIFIC SIGN DESIGN CONTACT CONN. D.O.T., DIVISION OF TRAFFIC ENGINEERING. FOR BOLT HOLE PATTERN REFER TO FHWA PUBLICATION "STANDARD HIGHWAY SIGNS". SIGNS OF DIFFERENT DIMENSIONS TO BE ERECTED ON THE SAME POSTS, OR SPAN/MAST ARM MOUNTED, MAY REQUIRE SPECIAL BOLT HOLE PATTERNS.
3. POSTS - SEE STANDARD SHEET TR-1208.02 - "METAL SIGN POSTS AND SIGN MOUNTING DETAILS."
4. POSTS SHALL BE 4 LBS./FT.
5. SIGNS SHALL BE FABRICATED OF ONE CONTINUOUS PIECE OF SHEET ALUMINUM. SPLICING OF SHEET ALUMINUM WILL NOT BE ACCEPTED.
6. FOR OVERHEAD MOUNTED SIGNS, SEE STANDARD SHEET TR-1114.01 - "BONDING AND UTILITY POLE ATTACHMENT DETAILS, SIGN HANGER, "Y" CLAMP DETAIL."

COLORS:

BACKGROUND - WHITE - EXCEPT AS NOTED.
LEGEND - BLACK - EXCEPT AS NOTED.
ALL SIGNS TO USE TYPE IX RETROREFLECTIVE SHEETING WITH THE EXCEPTION OF OVERHEAD MOUNTED SIGNS AND SIGNS DESIGNATED WITH AN * WHICH SHALL BE TYPE XI RETROREFLECTIVE SHEETING.

REV.	DATE	REVISION DESCRIPTION	SHEET NO.
4	10-2021	REVISED SHEETING TYPE	TR-GS_01
3	12-2018	REVISED RETROREFLECTIVE STRIPS	TR-GS_01
2	10-2018	REVISED R5-11 SIGNS PER MUTCD	TR-GS_01
1	6-2018	NEW SHEET ISSUED	TR-GS_01

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES, SHOWN ON THESE DRAWINGS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 12/7/2023

DESIGNED/DRAFTED: T. WAMSER
CHECKED BY: A. WHITE
NOT TO SCALE

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION
Filename: ...\CTDOT_TRAFFIC_GS.dgn

SIGNATURE/BLOCK:
APPROVED BY: DATE:

PROJECT TITLE:
GREENWICH CENTRAL MIDDLE SCHOOL OFF-SITE IMPROVEMENTS

TOWN: GREENWICH
DRAWING TITLE: SIGN FACE SHEET ALUMINUM R SERIES TYPICAL SIGN DETAILS

PROJECT NO. G5068-003
DRAWING NO. TR-GS_01
SHEET NO.

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Checked: APW

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

TRAFFIC DETAIL PLAN

Date: 07/08/2024
Scale: AS SHOWN
Proj Number: 22367.00
Drawing Number: TC304

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S - SERIES

S1-1



LEGEND - BLACK
BACKGROUND - FLUORESCENT YELLOW GREEN

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
6.75	36	41-2112	1	.080
12.00	48	41-2113	2	.100

S5-1



SCHOOL SPEED LIMIT 20 WHEN FLASHING

LEGEND - BLACK
BACKGROUND - WHITE
BACKGROUND (SCHOOL) - FLUORESCENT YELLOW/GREEN

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
8.00	24X48	31-5541	1	.080
18.00	36X72	31-5542	2	.100

W1 - SERIES

W1-1L



AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
6.25	30	41-4006	1	.080
9.00	36	41-4031	1	.080

W1-1R



AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
6.25	30	41-4005	1	.080
9.00	36	41-4160	1	.080

W1-6



LEGEND - BLACK
BACKGROUND - FLUORESCENT YELLOW (LEFT OR RIGHT)

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
8.00	48X24	41-4223	2	.100
12.50	60X30	41-4262	2	.100

W1-2



AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
6.25	30	41-4029	1	.080
9.00	36	41-4169	1	.080

W1-2



AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
6.25	30	41-4168	1	.080
9.00	36	41-4032	1	.080

W1-7



AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
8.00	48X24	41-4207	2	.100
12.50	60X30	41-4208	2	.100

W1-8



LEGEND - BLACK
BACKGROUND - FLUORESCENT YELLOW (LEFT OR RIGHT)

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
3.00	18X24	41-3951	1	.080
7.50	30X36	41-4211	1	.080
12.00	36X48	41-4260	2	.080

W2 - SERIES

W2-1



AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
6.25	30	41-4226	1	.080
9.00	36	41-4236	1	.080

W2-2



(LEFT OR RIGHT)

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
6.25	30	41-4225	1	.080
9.00	36	41-4235	1	.080

W3 - SERIES

W3-1



OCTAGON - RED

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
6.25	30	41-0501	1	.080
16.00	48	41-0503	2	.100

W3-2



TRIANGLE - RED & WHITE

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
6.25	30	41-0504	1	.080
16.00	48	41-0506	2	.100

W3-3



SYMBOL & LEGEND - BLACK
BACKGROUND - YELLOW
TOP CIRCLE - RED
BOTTOM CIRCLE - GREEN

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
6.25	30	41-0835	1	.080
16.00	48	41-0848	2	.100

WHEN FLASHING STOP AHEAD

W/ FLASHERS

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
25.00	60	41-0534	2	.125

W4 - SERIES

W4-1



AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
9.00	36	41-4448	1	.080
16.00	48	41-4452	2	.100

W4-1



AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
9.00	36	41-4449	1	.080
16.00	48	41-4459	2	.100

W4-2



AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
9.00	36	41-4442	1	.080
16.00	48	41-4446	2	.100

W4-2



AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
9.00	36	41-4441	1	.080
16.00	48	41-4447	2	.100

W4-3



AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
9.00	36	41-4468	1	.080
16.00	48	41-4435	2	.100

W4-3



AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
9.00	36	41-4470	1	.080
16.00	48	41-4434	2	.100

W5 - SERIES

W5-1



ROAD NARROWS

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
9.00	36	41-4482	1	.080
16.00	48	41-4484	2	.100

W6 - SERIES

W6-1



W6-2



AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
9.00	36	41-4335	1	.080
16.00	48	41-4330	2	.100

W6-3



AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
9.00	36	41-4329	1	.080
16.00	48	41-4331	2	.100

W7 - SERIES

W7-1



AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
6.25	30	41-4506	1	.080
9.00	36	41-4530	1	.080
16.00	48	41-4508	2	.100

W8 - SERIES

W8-5



AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
6.25	30	41-4519	1	.080
9.00	36	41-4520	1	.080
16.00	48	41-4521	2	.100

W9 - SERIES

W9-1



LEFT LANE ENDS

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
9.00	36	41-4443	1	.080
16.00	48	41-4444	2	.100

W9-1



RIGHT LANE ENDS

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
9.00	36	41-4440	1	.080
16.00	48	41-4445	2	.100

W9-2



LANE ENDS MERGE LEFT

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
9.00	36	41-4454	1	.080
16.00	48	41-4456	2	.100

W9-2



LANE ENDS MERGE RIGHT

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
9.00	36	41-4453	1	.080
16.00	48	41-4455	2	.100

W11 - SERIES

W11-2



LEGEND - BLACK
BACKGROUND - FLUORESCENT YELLOW GREEN

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
6.25	30	41-4829	1	.080
9.00	36	41-4830	1	.080

W11-8



AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
6.25	30	41-4680	1	.080
9.00	36	41-4681	1	.080

W12 - SERIES

W12-1



(SUBPLATE)

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
6.25	30	41-4213	1	.080
9.00	36	41-4215	1	.080

W12-2



00 - 0"

(SUBPLATE)

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
9.00	36	41-4706	1	.080
16.00	48	41-4708	2	.100

LEFT LANE

(SUBPLATE)

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
5.00	30X24	41-4721		.080

RIGHT LANE

(SUBPLATE)

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
5.00	30X24	41-4722		.080

W13 - SERIES

W13-1P



00 M.P.H.

(SUBPLATE)

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
2.25	18X18	41-5566		.080
4.00	24X24	41-5567		.080
6.25	30X30	41-5574		.080

W13-2



EXIT 00 M.P.H.

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
12.00	36X48	41-5596	2	.100

W13-3



RAMP 00 M.P.H.

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
12.00	36X48	41-5581	2	.100

W16 - SERIES

W16-2aP



900 FT

(SUBPLATE)
USE AT ADVANCE SIGN LOCATION
LEGEND - BLACK
BACKGROUND - FLUORESCENT YELLOW GREEN

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
2.00	24X12	41-6140		.080

W16-7PL



(SUBPLATE)
USE AT CROSSWALK
LEGEND - BLACK
BACKGROUND - FLUORESCENT YELLOW GREEN

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
2.00	24X12	41-2617		.080

W16-7PR



(SUBPLATE)
USE AT CROSSWALK
LEGEND - BLACK
BACKGROUND - FLUORESCENT YELLOW GREEN

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
2.00	24X12	41-2619		.080

W16-9P

AHEAD

(SUBPLATE)
USE AT ADVANCE SIGN LOCATION
LEGEND - BLACK
BACKGROUND - FLUORESCENT YELLOW GREEN

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
2.00	24X12	41-6126		.080

W16-2aP

41-6130 000 FT
41-6134 0000 FT

(SUBPLATE)
USE AT ADVANCE SIGN LOCATION

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
2.00	24X12	41-6130		.080
3.75	30X18	41-6134		.080

RETROREFLECTIVE STRIP

LEGEND - N/A
BACKGROUND - FLUORESCENT YELLOW GREEN

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
2.00	4X72	41-5010	1	.080

LEGEND - N/A
BACKGROUND - FLUORESCENT YELLOW

AREA (SQ. FT)	SIZE (INCHES)	CONN. D.O.T. #	POSTS	ALUM. THK.
1.50	4X48	41-5001	1	.080
2.00	4X72	41-5006	1	.080

THIS SIGN ADDED FOR THIS PROJECT ONLY.

NOTES:

1. FOR SPECIFIC SIGN DESIGN CONTACT CONN. D.O.T., DIVISION OF TRAFFIC ENGINEERING. FOR BOLT HOLE PATTERN REFER TO FHWA PUBLICATION "STANDARD HIGHWAY SIGNS". SIGNS OF DIFFERENT DIMENSIONS TO BE ERECTED ON THE SAME POSTS, OR SPAN/MAST ARM MOUNTED, MAY REQUIRE SPECIAL BOLT HOLE PATTERNS.
2. POSTS - SEE STANDARD SHEET TR-1208..02 "METAL SIGN POSTS AND SIGN MOUNTING DETAILS."
3. POSTS SHALL BE 4 LBS./FT.
4. SIGNS SHALL BE FABRICATED OF ONE CONTINUOUS PIECE OF SHEET ALUMINUM. SPLICING OF SHEET ALUMINUM WILL NOT BE ACCEPTED.
5. FLUORESCENT YELLOW RETROREFLECTIVE STRIPS SHALL BE INSTALLED ON ALL SIGN POSTS FOR W1-6 AND W1-8 SIGNS. FLUORESCENT YELLOW GREEN RETROREFLECTIVE STRIPS SHALL BE INSTALLED ON ALL SIGN POSTS FOR S1-1 AND W11-2 SIGNS LOCATED AT CROSSINGS. RETROREFLECTIVE STRIPS SHOULD NOT BE INSTALLED ON ADVANCE CROSSING WARNING SIGNS. SEE STANDARD SHEET TR-1208..01 "SIGN PLACEMENT AND RETROREFLECTIVE STRIP DETAILS" FOR RETROREFLECTIVE STRIP DETAILS AND INSTALLATION.

COLORS:

BACKGROUND - YELLOW - EXCEPT AS NOTED.
LEGEND - BLACK - EXCEPT AS NOTED.
ALL SIGNS TO USE TYPE XI RETROREFLECTIVE SHEETING.

REV.	DATE	REVISION DESCRIPTION	SHEET NO.
2	10-2021	REVISED SHEETING TYPE	TR-GS_02
1	6-2018	NEW SHEET ISSUED	TR-GS_02

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES, SHOWN ON THESE DRAWINGS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 12/7/2023

DESIGNED/DRAFTED: T. WAMSER
CHECKED BY: A. WHITE
NOT TO SCALE

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION
Filename: ...\CTDOT_TRAFFIC_GS.dgn

SIGNATURE/BLOCK:
APPROVED BY: DATE:

PROJECT TITLE:
GREENWICH CENTRAL MIDDLE SCHOOL OFF-SITE IMPROVEMENTS

TOWN: GREENWICH
DRAWING TITLE: SIGN FACE SHEET ALUMINUM S&W SERIES TYPICAL SIGN DETAILS

PROJECT NO. G5068-003
DRAWING NO. TR-GS_02
SHEET NO.

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Drawn: TJW
Checked: APW

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

TRAFFIC DETAIL PLAN

Date: 07/08/2024
Scale: AS SHOWN
Proj Number: 22367.00
Drawing Number: TC305

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DOCUMENT ALL LOOP DETECTOR VALUES BOTH CALCULATED AND MEASURED.

DEFINITIONS:

LOOP: #14 AWG WIRE IN SAWCUT, TERMINATED IN HANDHOLE, IMSA SPEC 51-7.
LEAD-IN: 4/2 SHIELDED TWISTED PAIR CABLE FROM HANDHOLE TO CONTROLLER, IMSA SPEC 50-2.
LOOP CIRCUIT: LOOP SAWCUT WIRE SPLICED TO 14/2 LEAD-IN CABLE.
AMPLIFIER: ELECTRONIC DEVICE CONNECTED TO LOOP CIRCUIT. SENSES CHANGE IN RESONANT FREQUENCY AND CREATES AN OUTPUT TO THE CONTROLLER.
MEGOHMETER: INSTRUMENT SPECIFICALLY DESIGNED TO TEST THE INSULATION RESISTANCE OF A CIRCUIT. COMMON MANUFACTURERS: AMEC®, AMPROBE®, FLUKE®, MEGGER®.

1: RESISTANCE:

1a: INSULATION RESISTANCE: PERFORM A 500 VOLT (MINIMUM) MEGOHMETER TEST ON LOOP CIRCUIT. THE LOOP AMPLIFIER MUST BE DISCONNECTED FROM THE LOOP CIRCUIT OR THE LOOP AMPLIFIER WILL BE DAMAGED. THE RESISTANCE OF THE LOOP WIRE TO GROUND MUST BE GREATER THAN 100 MEG OHMS.

1b: WIRE RESISTANCE: MEASURE THE DC RESISTANCE OF THE LOOP CIRCUIT. THE LOOP CIRCUIT MUST BE DISCONNECTED FROM THE AMPLIFIER. USING AN OHMMETER CONNECTED ACROSS THE LOOP CIRCUIT, MEASURE THE DC RESISTANCE OF THE CONDUCTORS. THE RESISTANCE SHOULD BE LESS THAN 4 OHMS.

NOTE: ALL TESTS SHALL BE DONE AT THE CONTROLLER ASSEMBLY (CA), HOWEVER IT IS RECOMMENDED TO PERFORM A PRELIMINARY MEGOHMETER TEST AT THE HANDHOLE PRIOR TO SEALING THE SAWCUT AND SPLICING TO THE LEAD-IN. IF A DEFECTIVE LOOP WIRE IS FOUND, IT MAY BE EASILY REPLACED.

2: LOOP CIRCUIT INDUCTANCE

2a: CALCULATE INDUCTANCE OF LOOP (L_{LOOP}) AND LEAD-IN CABLE ($L_{14/2}$).

LOOP INDUCTANCE (ENGLISH)

$L_{LOOP} = (P/4)\ (N^2 + N)$

LEAD-IN INDUCTANCE

$L_{14/2} = (0.24\ \mu H/FT)\ (D)$

LOOP INDUCTANCE (METRIC)

$L_{LOOP} = (3.28P/4)\ (N^2 + N)$

LEAD-IN INDUCTANCE

$L_{14/2} = (0.78\ \mu H/m)\ (D)$

WHERE:

L_{LOOP} = INDUCTANCE OF INDIVIDUAL LOOP SEGMENTS IN MICROHENRIES (μH).
$L_{14/2}$ = INDUCTANCE OF LEAD-IN CABLE.
P = PERIMETER OF INDIVIDUAL LOOP SEGMENT, IN FEET OR METERS.
N = NUMBER OF TURNS.
D = LENGTH OF LEAD-IN CABLE FROM SPLICE IN HANDHOLE TO CONTROLLER, IN FEET OR METERS.

$L_T = L_1 + L_2 + L_3$ etc.,
(TOTAL INDUCTANCE OF SEGMENTED LOOP SPLICED IN SERIES)

$L_T = 1 / [(1 / L_1) + (1 / L_2) + (1 / L_3) + \text{etc}]$,
(TOTAL INDUCTANCE OF SEGMENTED LOOP SPLICED IN PARALLEL.

WHERE:

L_T = TOTAL INDUCTANCE OF THE SEGMENTED ARRANGEMENT.
L_1, L_2, L_3 = INDUCTANCE OF INDIVIDUAL LOOP SEGMENTS.

EXAMPLE: (IN ENGLISH)

6 x 6', 4 TURNS, APPROXIMATELY 300' FROM THE CONTROLLER

$L_{LOOP} = (24/4)\ (4^2 + 4)$
$L_{LOOP} = (5)\ (20)$
$L_{LOOP} = 120\ \mu H$

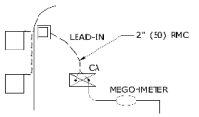
$L_{14/2} = (0.24\ \mu H/FT)\ (300)$
$L_{14/2} = (0.24)\ (300)$
$L_{14/2} = 72\ \mu H$

2b: MEASURE INDUCTANCE OF LOOP AND LEAD-IN AT CONTROLLER. USE INSTRUMENT DESIGNED TO MEASURE LOOP CIRCUIT INDUCTANCE.

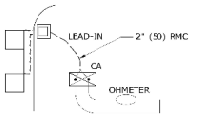
3: POWER INTERRUPTION:

AFTER THE AMPLIFIER HAS TUNED AND IS OPERATING, DISCONNECT POWER BY REMOVING FUSE OR HARNESS CONNECTOR. RETURN POWER TO THE AMPLIFIER AND CONFIRM IT RE-TUNES AUTOMATICALLY WITHOUT ANY MANUAL ADJUSTMENTS.

INDUCTIVE LOOP TEST PROCEDURE



TEST 1a



TEST 1b

PROJECT:
TOWN:
LOCATION:

LOOP NUMBER	RESISTANCE OHMS TO GROUND LOOP WIRE (1a)	RESISTANCE OHMS (1b)	INDUCTANCE MICROHENRIES (μH) CALCULATED (2a)	INDUCTANCE MICROHENRIES (μH) MEASURED (2b)	AMPLIFIER POWER INTERRUPTION PASS/FAIL (3)
B1 FRONT					
B1 REAR					
B2A					
B2B					
B4A FRONT					
B4B REAR					
B5					
B6A					
B6B					

LOOP CIRCUIT TEST DATA (EXAMPLE)

PIN	COLOR	FUNCTION
A	WHITE	110 VAC Neutral
B	BROWN	Output Relay Common (moving contact)
C	BLACK	110 VAC (Fused)
D	RED	Loop
E	ORANGE	Loop
F	YELLOW	Output Relay Contact (Closes with moving contact when detecting vehicle)
G	BLUE	Output Relay Contact (Opens with moving contact when detecting vehicle)
H	GREEN	Chassis Ground
J	GREY	110 VAC Delay/Extend Override
Shell		Ground (shall be connected to pin H in the connector)

DETECTOR AMPLIFIER PIN DESIGNATION

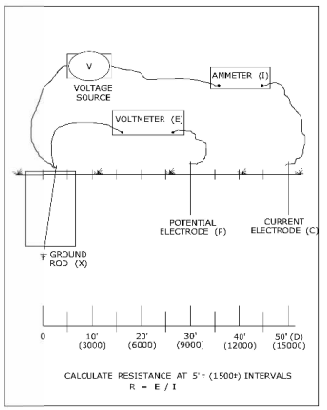
TEST PROCEDURE:

- INSERT ELECTRODE (C) A DISTANCE (D) FROM THE FOUNDATION. RECOMMEND A MINIMUM 50'.
- CONNECT A VOLTAGE SOURCE AND AMMETER BETWEEN THE FOUNDATION GROUND ROD (X) AND C.
- MEASURE THE CURRENT FLOW (I) BETWEEN X AND C.
- INSERT POTENTIAL ELECTRODE (P) AT 5' (1500) INTERVALS IN A STRAIGHT LINE TO ELECTRODE C
- MEASURE VOLTAGE (E) AT EACH LOCATION OF P.
- CALCULATE RESISTANCE (R) AT EACH LOCATION OF P USING THE FORMULA R=E/I.
- PLOT THE VALUES ON A RxD GROUND RESISTANCE CHART.
- THE ACTUAL GROUND RESISTANCE IS WHERE THE PLOTTED CURVE IS RELATIVELY FLAT, USUALLY AT 62%± OF D.
  SEE EXAMPLE CHART: CURVE FLATTENS OUT AT 1(OHMS, APPROXIMATELY 30' (9000) FROM FOUNDATION.
- IF GROUND RESISTANCE IS GREATER THAN 10 OHMS, PERFORM CORRECTIVE ACTION AND RE-TEST.

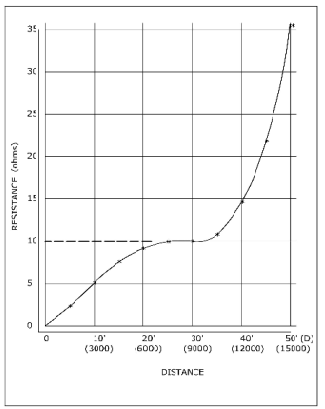
SUGGESTED CORRECTIVE ACTION:

A. INSTALL ADDITIONAL 10' (3000) GROUND ROD(S).
   REFER TO NESC SECTION 09, RULE 94.B.2.
   DRIVE ADDITIONAL GROUND RODS NO CLOSER TO FOUNDATION THAN 6' (1800). IF MORE THAN ONE IS NEEDED, SPACE MINIMUM 6' (1800) APART.
   BONDS TO ADDITIONAL GROUND ROD(S) SHALL BE MADE BY A CLAMP DESIGN FOR DIRECT BURIAL OR BY EXOTHERMIC WELDING TECHNIQUE.
   TOP OF ADDITIONAL GROUND ROD(S) SHALL BE 6' (150) BELOW GRADE.

B. IN AREAS OF SHALLOW BEDROCK, INSTALL A GROUND GRID OR ARRAY CONSISTING OF BURIED WIRE, RODS, STRIPS OR PLATES.
   REFER TO NESC SECTION 09, RULE 94.B.3.
   REFER TO NEC SECTION 250.
   MINIMUM DEPTH OF 18' (450).
   GRID CONNECTIONS AND BONDS ON GROUND GRID SHALL BE MADE BY CLAMPS DESIGNED FOR DIRECT BURIAL OR BY EXOTHERMIC WELDING TECHNIQUE



3 POINT GROUND RESISTANCE TEST CIRCUIT



GROUND RESISTANCE CHART (EXAMPLE)

NOTES:
1. WHEN REQUESTED BY THE ENGINEER, MEASURE RESISTANCE-TO-GROUND OF GROUND ROD AT TRAFFIC CONTROL FOUNDATIONS. SEE FALL-OF-POTENTIAL METHOD. IF LESS THAN 10 ohms, INSTALL SUPPLEMENTAL ELECTRODES AS REQUIRED. NEC ARTICLE 250.
2. DURING THE TEST, THE GROUND ROD SHOULD NOT BE BONDED TO ANY RMC IN THE FOUNDATION.
3. THE VOLTAGE SOURCE, VOLTMETER, AMMETER, ELECTRODES P AND C, AND CONNECTING CABLES ARE AVAILABLE AS A SPECIALIZED TEST INSTRUMENT.
4. REFER TO NATIONAL ELECTRICAL SAFETY CODE (NESC) SECTION 09, GROUNDING METHODS FOR ELECTRIC SUPPLY AND COMMUNICATIONS FACILITIES.
5. REFER TO NATIONAL ELECTRICAL CODE (NEC) CHAPTER 2, ARTICLE 250, GROUNDING.

3 POINT FALL-OF-POTENTIAL GROUND RESISTANCE TEST

LEGEND AS SHOWN IN TRAFFIC CONTROL SIGNAL PLAN:
INDUCTIVE LOOP DETECTOR
SAW CUT
RIGID METAL CONDUIT
HOLDOWN

REV	DATE	REVISION DESCRIPTION
2	1-2014	REVISED GROUND RESISTANCE NOTES.
1	4-2012	MINOR REVISIONS.

THE INFORMATION, CONCEPTS, ESTIMATED QUANTITIES AND DESIGN DETAILS OF THESE PLANS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS TO IN NO WAY GUARANTEE TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Printed Date: 7/2014

DIMENSIONS ARE IN INCHES (") UNLESS OTHERWISE NOTED. METRIC DIMENSIONS ARE ROUNDED OFF TO NEAREST 5 mm UNDER 1 m TO NEAREST 1 mm.

NOT TO SCALE

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: CTDOT_TRAFFIC_STD.DGN Model: TR1000_01

SUBMITTED BY: NAME/DATE/TIME: Tracy L Fogarty 2014.01.07 16:11:26-05'00'
APPROVED BY: NAME/DATE/TIME: Charles S. Harlow 2014.01.08 09:09:11-05'00'

CTDOT STANDARD SHEET
OFFICE OF ENGINEERING

STANDARD SHEET TITLE: GENERAL CLAUSES (TEST PROCEDURES)

STANDARD SHEET NO.: TR-1000_01

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Drawn: TJW
Checked: APW

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

TRAFFIC DETAIL PLAN

Date: 07/08/2024
Scale: AS SHOWN
Proj Number: 22367.00
Drawing Number: TC306

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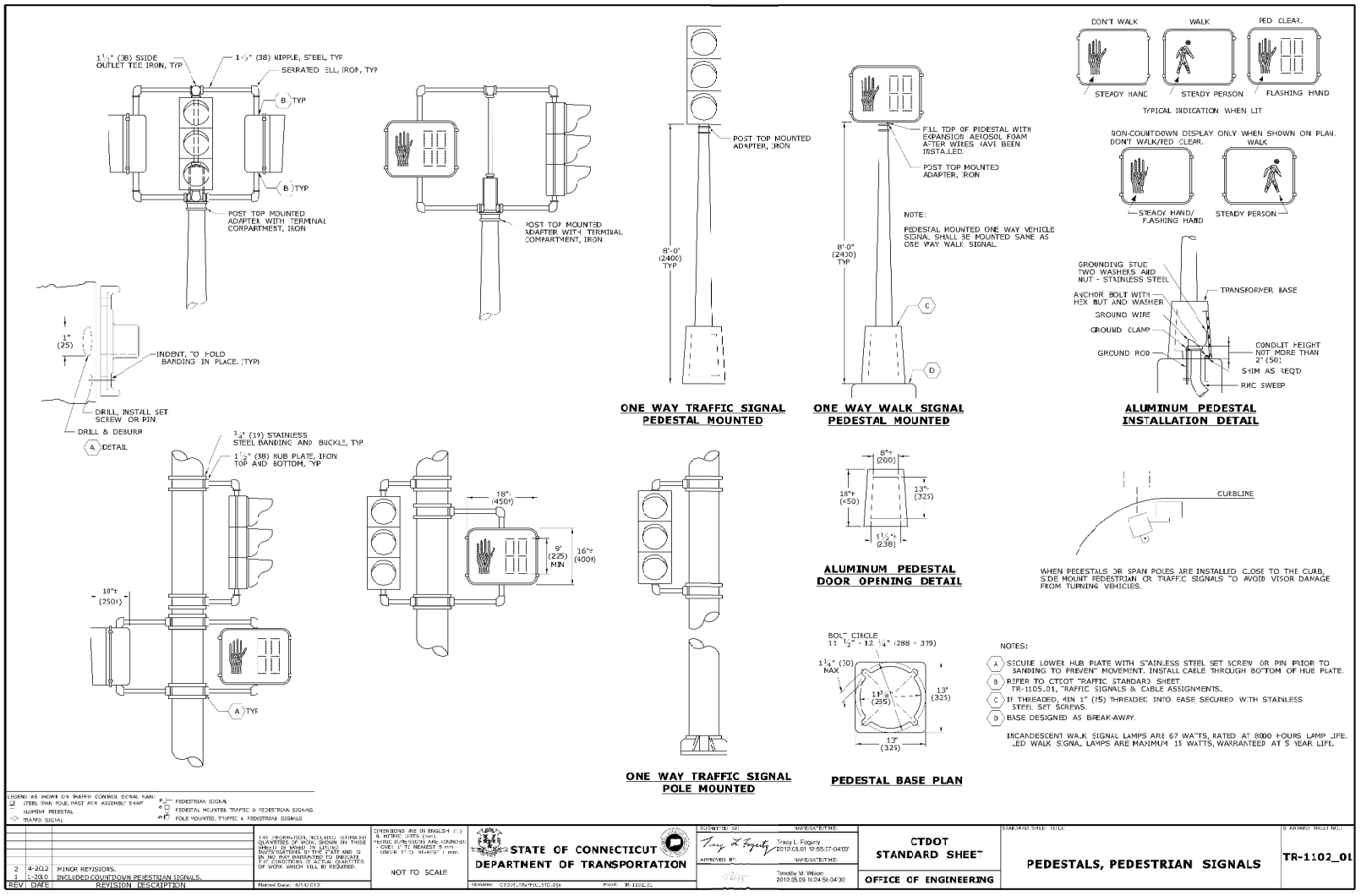

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Greenwich Public Schools

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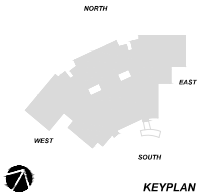

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

TRAFFIC DETAIL PLAN

Date: 07/08/2024
Scale: AS SHOWN
Proj Number: 22367.00
Drawing Number: TC307

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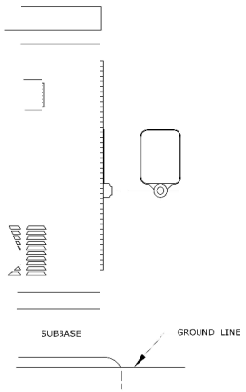
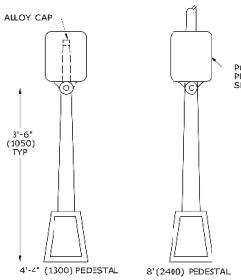
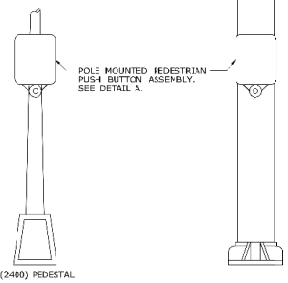


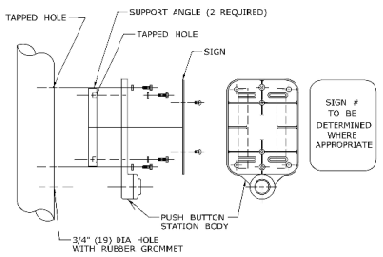
SURFACE MOUNTED



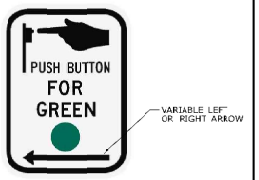


PEDESTAL MOUNTED

SPAN POLE/MAST ARM MOUNTED



DETAIL A



SIGN # 31-0833
USE APPROPRIATE LEFT OR RIGHT ARROW

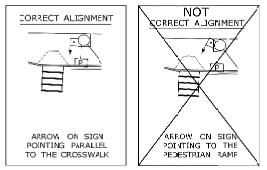


SIGN # 31-0835

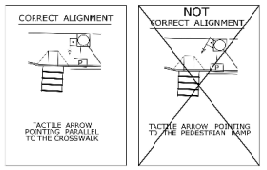
FOR CROSSING WITH SIDE STREET GREEN

GENERAL NOTES:

3'-6' (1050) FROM FINISHED GRADE SUCH AS SIDEWALK TO CENTER OF PUSH BUTTON.
PUSH BUTTON INSTALLATIONS SHALL CONFORM TO THE REQUIREMENTS OF THE AMERICANS WITH DISABILITIES ACT (ADA) STANDARDS FOR ACCESSIBLE DESIGN, CURRENT EDITION GOVERNS.
4'-4' (1300) PEDESTAL TO INCLUDE ALLOY CAP SECURED WITH STAINLESS STEEL SET SCREW.

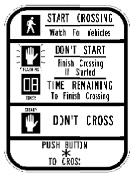


PEDESTRIAN PUSH BUTTON ALIGNMENT



ACCESSIBLE PEDESTRIAN SIGNAL AND DETECTOR

EXAMPLE ALIGNMENTS
FOR EXCLUSIVE PEDESTRIAN PHASE



*USE APPROPRIATE ARROW UNLESS OTHERWISE NOTED ON PLAN.

FOR NEW PUSHBUTTON HOUSING, USE 9" x 15" SIGN NO. 31-0855.

FOR EXISTING PUSHBUTTON HOUSING, WITH 9" : 12" SIZE, USE SIGN NO. 31-0845.

LEGEND AS SHOWN ON TRAFFIC CONTROL SIGNAL PLAN:
- PEDESTRIAN PUSH BUTTON
- PEDESTRIAN PUSH BUTTON, PEDESTAL MOUNTED
- PEDESTRIAN PUSH BUTTON, POLE MOUNTED

REV.	DATE	REVISION DESCRIPTION
3	8-2118	UPDATED PEDESTRIAN SIGN LEGENDS AND NOTES.
2	4-2114	ADDED PEDESTRIAN EXAMPLE ALIGNMENTS
1	4-2112	MINOR REVISIONS & UPDATED SIGN #31-0845.

THE DESCRIPTION INCLUDED, ESTIMATED QUANTITIES, AND NOTES SHOWN ON THIS DRAWING ARE FOR GENERAL UNDERSTANDING IN THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 8/9/2118

DIMENSIONS ARE IN ENGLISH (") & METRIC UNITS (mm). METRIC DIMENSIONS ARE ROUNDED:
- OVER 1" TO NEAREST 5 mm.
- UNDER 1" TO NEAREST 1 mm.

NOT TO SCALE

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: CTDOT_TRAFFIC_STD_2018-01-15.dgn Model: TR-1107_01

SUBMITTED BY: Tracy L. Fogarty, P.E. 2018.08.16 12:13:38-04'00' NAME/DATE/TIME
APPROVED BY: Mark F. Carlino, P.E. 2018.08.21 07:46:57-04'00' NAME/DATE/TIME

CTDOT STANDARD SHEET
OFFICE OF ENGINEERING

STANDARD SHEET TITLE: PEDESTRIAN PUSH BUTTONS

STANDARD SHEET NO.: TR-1107_01

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Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

TRAFFIC DETAIL PLAN

Date: 07/08/2024
Scale: AS SHOWN
Proj Number: 22367.00
Drawing Number: TC308

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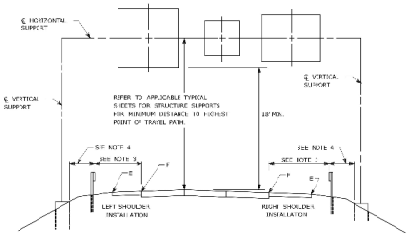


TYPICAL PLACEMENT OF OVERHEAD SIGNS ON SIGN SUPPORTS

NOTES:

1) FOR PLACEMENT OF CANTILEVER SIGN SUPPORT USE APPLICABLE PORTION OF ABOVE DETAIL.
2) BARRIER SYSTEMS MAY BE REQUIRED FOR BOTH SIDES OF SUPPORTS IN MEDIANS.
3) IMPACT PROTECTION SHALL BE PROVIDED FOR THE SIGN SUPPORTS LOCATED WITHIN CLEAR ZONE.
4) SIGN SUPPORT FOUNDATIONS SHALL BE LOCATED OUTSIDE OF BARRIER SYSTEMS DEFLECTION AREA.
5) ALL SIGNS ARE TO BE LEVEL REGARDLESS OF CAMBER IN SUPPORT.

FOR MAXIMUM EFFECTIVENESS, POSITION SIDE MOUNTED SIGNS ON STRUCTURAL STEEL BREAKAWAY SIGN SUPPORTS AS FOLLOWS:

ON A TANGENT SECTION, POSITION THE SIGN SO THE VERTICAL AXIS IS PLUMB AND THE HORIZONTAL AXIS IS AT AN ANGLE OF 90° WITH THE TRAFFIC LANE WHICH THE SIGN SERVES. SIGNS LOCATED 30 FT OR MORE FROM THE EDGE OF THE ROAD SHALL BE TURNED APPROXIMATELY 3° TOWARD THE ROAD.

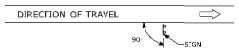


DIAGRAM "A"

ON A HORIZONTAL CURVE SECTION, POSITION THE SIGN SO THE VERTICAL AXIS IS PLUMB AND THE HORIZONTAL AXIS IS AT AN ANGLE OF 90° WITH A STRAIGHT LINE BETWEEN THE SIGN AND THE POINT AT WHICH THE SIGN SHALL BE READ.

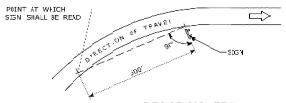
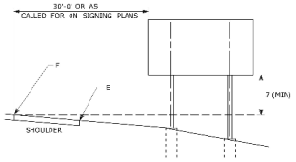


DIAGRAM "B"

SIGN ORIENTATION DETAILS FOR SIDE MOUNTED SIGNS ON STRUCTURAL STEEL BREAKAWAY SIGN SUPPORTS



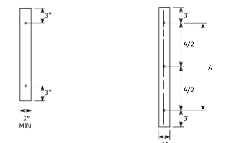
TYPICAL PLACEMENT OF SIDE MOUNTED SIGNS ON STRUCTURAL STEEL BREAKAWAY SIGN SUPPORTS

NOTES:

1) MIN. VERTICAL CLEARANCE ABOVE SIDEWALKS SHALL BE 7'.
2) WHERE GUIDE RAIL IS USED THE OFFSET TO THE NEAR EDGE OF SIGN FACE SHALL BE AS SHOWN ELSEWHERE IN THE CONTRACT PLANS.
3) ON INTERSECTING ROADS A RAMP TERMINAL THE OFFSET TO THE NEAR EDGE OF OF SIGN FACE SHALL BE 6' MIN. FROM POINT "E".
4) IF 30'-0" MIN. CANNOT BE MET, PLEASE CONTACT THE ENGINEER.

RETROREFLECTIVE STRIPS 48" LONG OR LESS:

RETROREFLECTIVE STRIPS OVER 48" LONG:

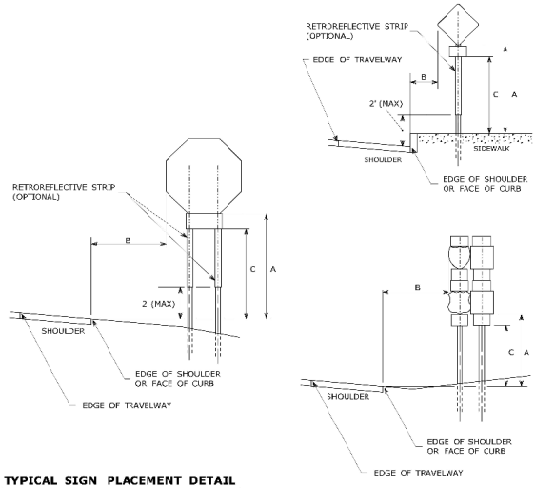


RETROREFLECTIVE STRIP DETAIL

NOTES:

RETROREFLECTIVE STRIPS WHICH ARE 48 IN. LONG OR LESS SHALL BE ATTACHED USING 2 BOLTS AND RETROREFLECTIVE STRIPS OVER 48 IN. LONG SHALL BE ATTACHED USING 3 BOLTS AS SHOWN ON THE DETAILS ABOVE.
REFER TO STANDARD SHEET No. TR-1208_02 "METAL SIGN POSTS AND SIGN MOUNTING DETAILS" FOR MOUNTING DETAILS.

RETROREFLECTIVE STRIP COLOR SHALL MATCH THE BACKGROUND COLOR OF THE SIGN, EXCEPT THAT THE COLOR OF THE STRIP FOR "YIELD" AND "DO NOT ENTER" SIGNS SHALL BE RED.



TYPICAL SIGN PLACEMENT DETAIL

NOTES:

ALL SIGNS AND SHIELDS ON DIRECTIONAL ASSEMBLIES SHALL ABUT VERTICALLY.

REFER TO STANDARD SHEET No. TR-1208_02 "METAL SIGN POSTS AND SIGN MOUNTING DETAILS" FOR SIGN POSTS AND SIGN MOUNTING.

IF A RETROREFLECTIVE STRIP IS USED ON SIGN SUPPORT, IT SHALL BE PLACED FOR THE FULL LENGTH OF THE SUPPORT FROM THE BOTTOM OF THE SIGN TO WITHIN 2 FT ABOVE THE EDGE OF THE ROADWAY.

PARKING SIGNS TYPICALLY USE 45° MOUNTING BRACKET.

DIM."A" MIN SIGN HEIGHT	DIM."B" MIN LATERAL OFFSET ①	DIM."C" MIN PLAQUE HEIGHT ①	ASSEMBLY LOCATION
7' ②	6' 12' ③	5'	SIGNS ON FREEWAYS AND EXPRESSWAYS EXCEPT CHEVRON ALIGNMENT SIGNS, ONE-DIRECTION LARGE ARROW SIGNS, DO NOT ENTER SIGNS, AND WRONG WAY SIGNS
5'	2'	4'	• SIGNS IN RURAL AREAS • DO NOT ENTER AND WRONG WAY SIGNS ALONG EXIT RAMPS • DO NOT ENTER AND WRONG WAY SIGNS ON LIMITED ACCESS HIGHWAYS
5'	2'	N/A	• CHEVRON ALIGNMENT SIGNS LOCATED ON FREEWAYS, EXPRESSWAYS, RAMPS, AND IN RURAL AREAS • ONE-DIRECTION LARGE ARROW SIGNS LOCATED ON FREEWAYS, EXPRESSWAYS, RAMPS, AND IN RURAL AREAS
4'	6' 12' ③	N/A	INCIDENT MANAGEMENT SIGNS AND MILE POST MARKER ASSEMBLIES LOCATED ON FREEWAYS AND EXPRESSWAYS
4'	2'	4'	CENTRAL ISLANDS OF ROUNDABOUTS
7'	2' ④	6'	BUSINESS & RESIDENTIAL AREAS WHERE PARKING OR OTHER OBSTRUCTIONS LIMIT VISIBILITY
7'	2' ④	7'	SIDEWALKS ⑤

① OR AS DIRECTED BY THE ENGINEER

② 8 FT MINIMUM HEIGHT REQUIRED IF A SUPPLEMENTAL PLAQUE IS SUBMOUNTED BELOW THE MAJOR SIGN.

③ 6 FT FROM EDGE OF SHOULDER, WHEN SHOULDER IS OVER 6 FT WIDE
12 FT FROM EDGE OF TRAVELWAY, WHEN SHOULDER IS LESS THAN 6 FT WIDE.

④ A LATERAL OFFSET OF AT LEAST 1 FT FROM THE FACE OF THE CURB MAY BE USED WHERE SIDEWALK WIDTH IS LIMITED OR WHERE EXISTING UTILITY POLES ARE CLOSE TO THE CURB.

⑤ A CLEAR PATH OF NOT LESS THAN 4 FT SHALL BE PROVIDED IN SIDEWALK AREAS.

REV.	DATE	REVISION DESCRIPTION
3	8-2018	INCLUDED INCIDENT MANAGEMENT AND MILE MARKER SIGNS.
2	4-2017	MINOR REVISIONS.
1	2-2011	MINOR REVISIONS.

THE INFORMATION INCLUDED IS BASED QUANTITIES OF WORK SHOWN IN THESE CONTRACT PLANS. ANY INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTIES TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 8/10/2018

NOT TO SCALE

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

SUBMITTED BY	NAME/DATE/TIME
	Mark F. Mauuch, P.E. 2018.08.17 09:08:06 -04'00'
APPROVED BY	NAME/DATE/TIME
	Mark F. Carino, P.E. 2018.08.21 17:48:06 -04'00'

Filename: TR_1208_02_1_2018.dgn Model: TR_1208_01

CTDOT STANDARD SHEET

OFFICE OF ENGINEERING

STANDARD SHEET TITLE:

SIGN PLACEMENT AND RETROREFLECTIVE STRIP DETAILS

STANDARD SHEET NO.:

TR-1208_01

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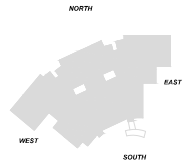
Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

TRAFFIC DETAIL PLAN

Date: 07/08/2024
Scale: AS SHOWN
Proj Number: 22367.00
Drawing Number: TC309

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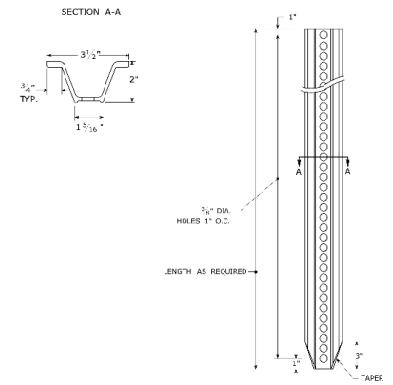
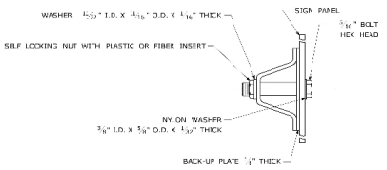
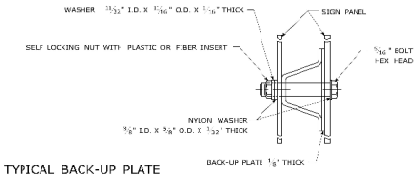
TYPICAL METAL SIGN POSTS



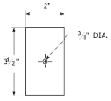
TYPICAL SIGN PANEL ATTACHMENT



TYPICAL BACK TO BACK SIGN PANEL ATTACHMENT



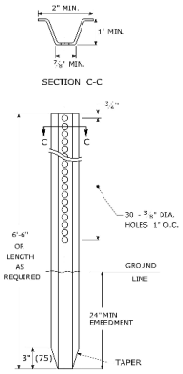
TYPICAL BACK-UP PLATE



BOLTS - STAINLESS STEEL CONFORMING TO ASTM F593, ALLOY GROUP 1 OR 2 (ALLOY TYPES 304 OR 316).
SELF LOCKING NUTS - STAINLESS STEEL CONFORMING TO ASTM F594, ALLOY GROUP 1 OR 2 (ALLOY TYPES 304 OR 316).
WASHERS - STAINLESS STEEL CONFORMING TO ASTM A240, (ALLOY TYPES 304 OR 316).

METAL DELINEATOR POST

WT./FT. = 1.12 LBS./FT. MIN.

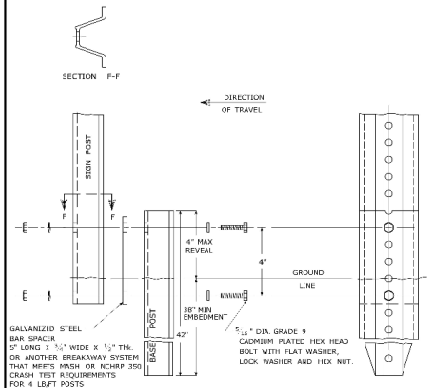


GENERAL NOTES:

1. STEEL FOR DELINEATOR POSTS SHALL BE ASTM A36 STEEL. STEEL FOR ALL OTHER POSTS SHALL CONFORM TO THE MECHANICAL REQUIREMENTS OF ASTM A 499 GRADE 80 AND TO THE CHEMICAL REQUIREMENTS OF ASTM A1 CARBON STEEL TEE RAIL HAVING NOMINAL WEIGHT (MASS) OF 91 LBS. OR GREATER PER LINEAR YARD.
2. AFTER FABRICATION, ALL STEEL POSTS, STRAPS AND PLATES SHALL BE GALVANIZED TO MEET THE REQUIREMENTS OF ASTM A123.
3. WASHERS FOR BREAKAWAY INSTALLATIONS SHALL MEET ASTM F436, TYPE 1.
4. SPACER BAR FOR BREAKAWAY INSTALLATION SHALL CONFORM TO THE MECHANICAL REQUIREMENTS OF ASTM A36.
5. ALL BOLTS, NUTS, AND WASHERS FOR BREAKAWAY INSTALLATIONS SHALL BE GALVANIZED TO MEET THE REQUIREMENTS OF ASTM A153.
6. ALL SIGN POSTS SHALL HAVE BREAKAWAY FEATURES THAT MEET AASHTO REQUIREMENTS CONTAINED IN THE CURRENT "STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS." THE BREAKAWAY FEATURES SHALL BE STRUCTURALLY ADEQUATE TO CARRY THE SIGNS SHOWN IN THE PLANS AT 80 mph WIND LOADINGS. INSTALLATIONS SHALL BE IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.
7. SIGN POSTS SHALL BE 4 LBS./FT.

BREAKAWAY INSTALLATION

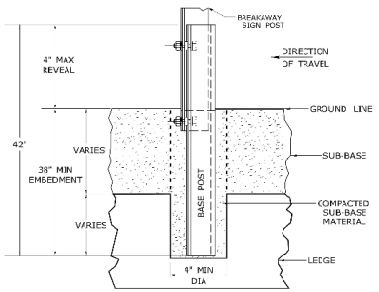
FOR 4 LBS./FT POSTS



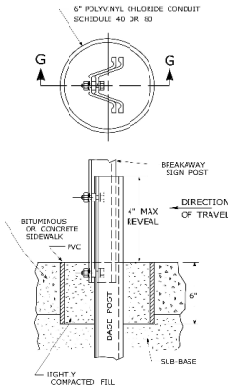
TYPICAL SIGN POST INSTALLATION IN LEDGE

LEDGE SHALL BE REMOVED TO DRIVE THE BASE POST TO A DEPTH OF 38".

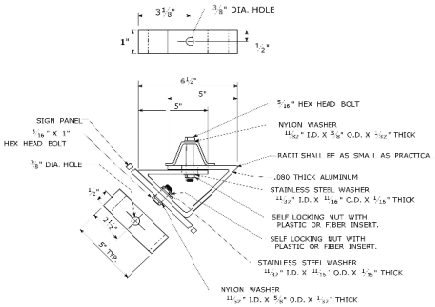
HOLE SHALL BE FILLED WITH SUB-BASE MATERIAL AND COMPACTED WITH A TAMPING BAR, OR TECHNIQUE APPROVED BY THE ENGINEER PRIOR TO BASE POST INSTALLATION.



TYPICAL SLEEVE FOR PAVED AREAS



45° MOUNTING BRACKET FOR INSTALLATION OF PARKING SIGNS



REV.	DATE	REVISION DESCRIPTION
2	6-2017	SIGN POST REVISIONS.
1	2-2011	MINOR REVISIONS.

THE DIMENSION INCLUDING ESTIMATED QUANTITIES SHOWN ON THIS SHEET ARE FOR GUIDANCE ONLY. THE STATE MAKES NO WARRANTIES TO INDICATE THE CONDITIONS OR ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 6/6/2017

NOT TO SCALE

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: TR-1208_02_FEB-2017_Revised.dgn Model: TR-1208_02

SUBMITTED BY: Mark F. Mahuni, P.E. NAME/DATE/TIME: 2017.06.07 07:10:30-04'00'
APPROVED BY: Gregory M. Borost, P.E. NAME/DATE/TIME: 2017.06.15 09:27:29-04'00'

CTDOT STANDARD SHEET
OFFICE OF ENGINEERING

STANDARD SHEET TITLE: METAL SIGN POSTS AND SIGN MOUNTING DETAILS

GUIDE SHEET NO.: TR-1208_02

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Greenwich Public Schools

Greenwich Central Middle School

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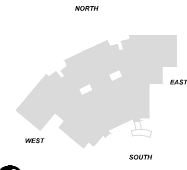
STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

TRAFFIC DETAIL PLAN

Date: 07/08/2024
Scale: AS SHOWN
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Drawing Number: TC310

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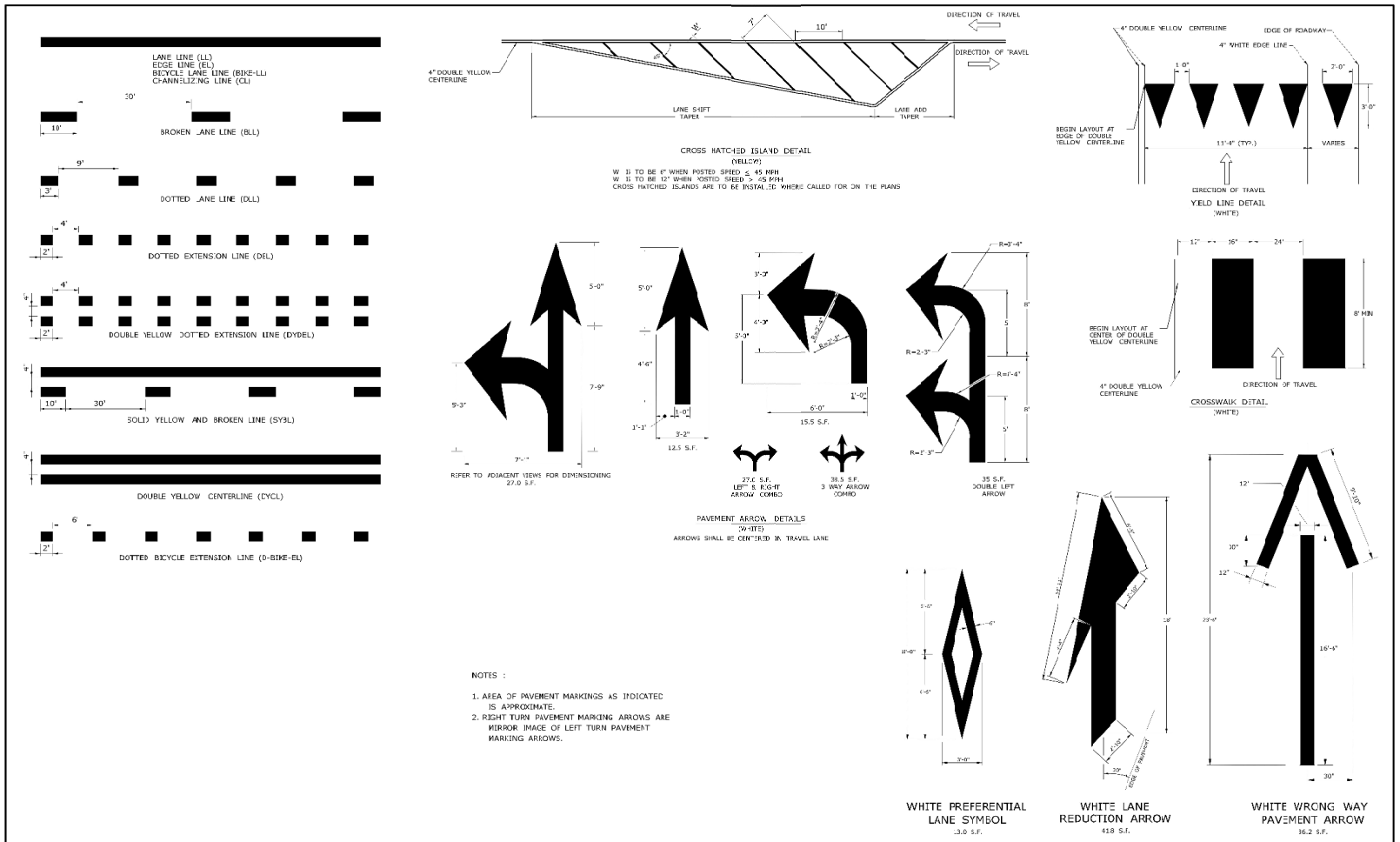

REV	DATE	REVISION DESCRIPTION
1	8-2018	REMOVED ROUNDABOUT MARKINGS.

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Plotted Date: 8/10/2018

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STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: TR-1210_04.dgn Model: CT_CIVIL2D_SHEET

SUBMITTED BY: Mark F. Malach, P.E. 2018.08.17 09:07:44-04'00'
APPROVED BY: Mark F. Carino, P.E. 2018.08.21 07:48:15-04'00'

CTDOT STANDARD SHEET
OFFICE OF ENGINEERING

STANDARD SHEET TITLE: PAVEMENT MARKING LINES AND SYMBOLS

STANDARD SHEET NO.: TR-1210_04

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STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

TRAFFIC DETAIL PLAN

Date: 07/08/2024
Scale: AS SHOWN
Proj Number: 22367.00
Drawing Number: TC311

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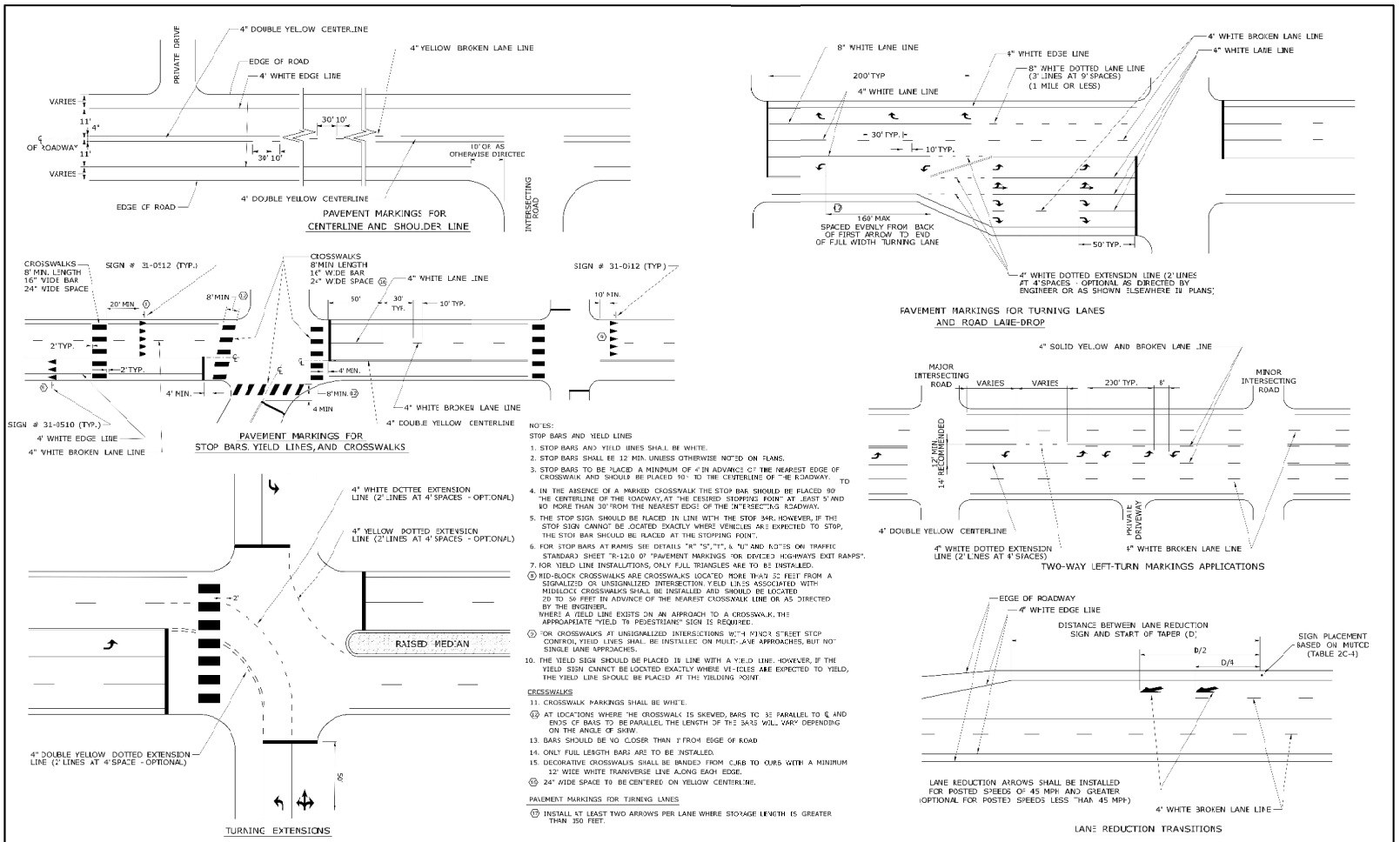

NOTES:

STOP BARS AND YIELD LINES

1. STOP BARS AND YIELD LINES SHALL BE WHITE.
2. STOP BARS SHALL BE 12 MIN. UNLESS OTHERWISE NOTED ON PLANS.
3. STOP BARS TO BE PLACED A MINIMUM OF 4' IN ADVANCE OF THE NEAREST EDGE OF CROSSWALK AND SHOULD BE PLACED 90° TO THE CENTERLINE OF THE ROADWAY. TO
4. IN THE ABSENCE OF A MARKED CROSSWALK THE STOP BAR SHOULD BE PLACED 90° THE CENTERLINE OF THE ROADWAY, AT THE DESIRED STOPPING POINT" AT LEAST 5' AND NO MORE THAN 30' FROM THE NEAREST EDGE OF THE INTERSECTING ROADWAY.
5. THE STOP SIGN SHOULD BE PLACED IN LINE WITH THE STOP BAR, HOWEVER, IF THE STOP SIGN CANNOT BE LOCATED EXACTLY WHERE VEHICLES ARE EXPECTED TO STOP, THE STOP BAR SHOULD BE PLACED AT THE STOPPING POINT.
6. FOR STOP BARS AT RAMPS SEE DETAILS "R" "S", "T", & "U" AND NOTES ON TRAFFIC STANDARD SHEET "TR-1210 0" "PAVEMENT MARKINGS FOR DIVIDED HIGHWAYS EXIT RAMPS".
7. FOR YIELD LINE INSTALLATIONS, ONLY FULL TRIANGLES ARE TO BE INSTALLED.
8. MID-BLOCK CROSSWALKS ARE CROSSWALKS LOCATED MORE THAN 30 FEET FROM A SIGNALIZED OR UNSIGNALIZED INTERSECTION. YIELD LINES ASSOCIATED WITH MIDBLOCK CROSSWALKS SHALL BE INSTALLED AND SHOULD BE LOCATED 20 TO 50 FEET IN ADVANCE OF THE NEAREST CROSSWALK LINE OR AS DIRECTED BY THE ENGINEER. WHERE A YIELD LINE EXISTS ON AN APPROACH TO A CROSSWALK, THE APPROPRIATE "YIELD TO PEDESTRIANS" SIGN IS REQUIRED.
9. FOR CROSSWALKS AT UNSIGNALIZED INTERSECTIONS WITH MINOR STREET STOP CONTROL, YIELD LINES SHALL BE INSTALLED ON MULTI-LANE APPROACHES, BUT NOT SINGLE LANE APPROACHES.
10. THE YIELD SIGN SHOULD BE PLACED IN LINE WITH A YIELD LINE. HOWEVER, IF THE YIELD SIGN CANNOT BE LOCATED EXACTLY WHERE VEHICLES ARE EXPECTED TO YIELD, THE YIELD LINE SHOULD BE PLACED AT THE YIELDING POINT.

CROSSWALKS

11. CROSSWALK MARKINGS SHALL BE WHITE.
12. AT LOCATIONS WHERE THE CROSSWALK IS SKEWED, BARS TO BE PARALLEL TO ℄ AND ENDS OF BARS TO BE PARALLEL. THE LENGTH OF THE BARS WILL VARY DEPENDING ON THE ANGLE OF SKEW.
13. BARS SHOULD BE NO CLOSER THAN 1' FROM EDGE OF ROAD
14. ONLY FULL LENGTH BARS ARE TO BE INSTALLED.
15. DECORATIVE CROSSWALKS SHALL BE BANDED FROM CURB TO CURB WITH A MINIMUM 12" WIDE WHITE TRANSVERSE LINE ALONG EACH EDGE.
16. 24" WIDE SPACE TO BE CENTERED ON YELLOW CENTERLINE.

PAVEMENT MARKINGS FOR TURNING LANES

17. INSTALL AT LEAST TWO ARROWS PER LANE WHERE STORAGE LENGTH IS GREATER THAN 150 FEET.

REV.	DATE	REVISION DESCRIPTION
1	8-2018	REVISED YIELD LINE SIGNAGE AND NOTES.

THE INFORMATION, INCLUDING, BUT NOT LIMITED TO, DIMENSIONS, SYMBOLS, AND NOTES CONTAINED IN THESE DRAWINGS IS THE PROPERTY OF THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 8/10/2018

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STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

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SUBMITTED BY: Mark F. Makuch, P.E. 2018.08.17 09:10:18-04'00'
APPROVED BY: Mark F. Carino, P.E. 2018.08.21 17:48:18 04'00'

CTDOT STANDARD SHEET
OFFICE OF ENGINEERING

STANDARD SHEET TITLE: PAVEMENT MARKINGS FOR NON FREEWAYS

STANDARD SHEET NO.: TR-1210_08

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KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

TRAFFIC DETAIL PLAN

Date: 07/08/2024
Scale: AS SHOWN
Proj Number: 22367.00
Drawing Number: TC312

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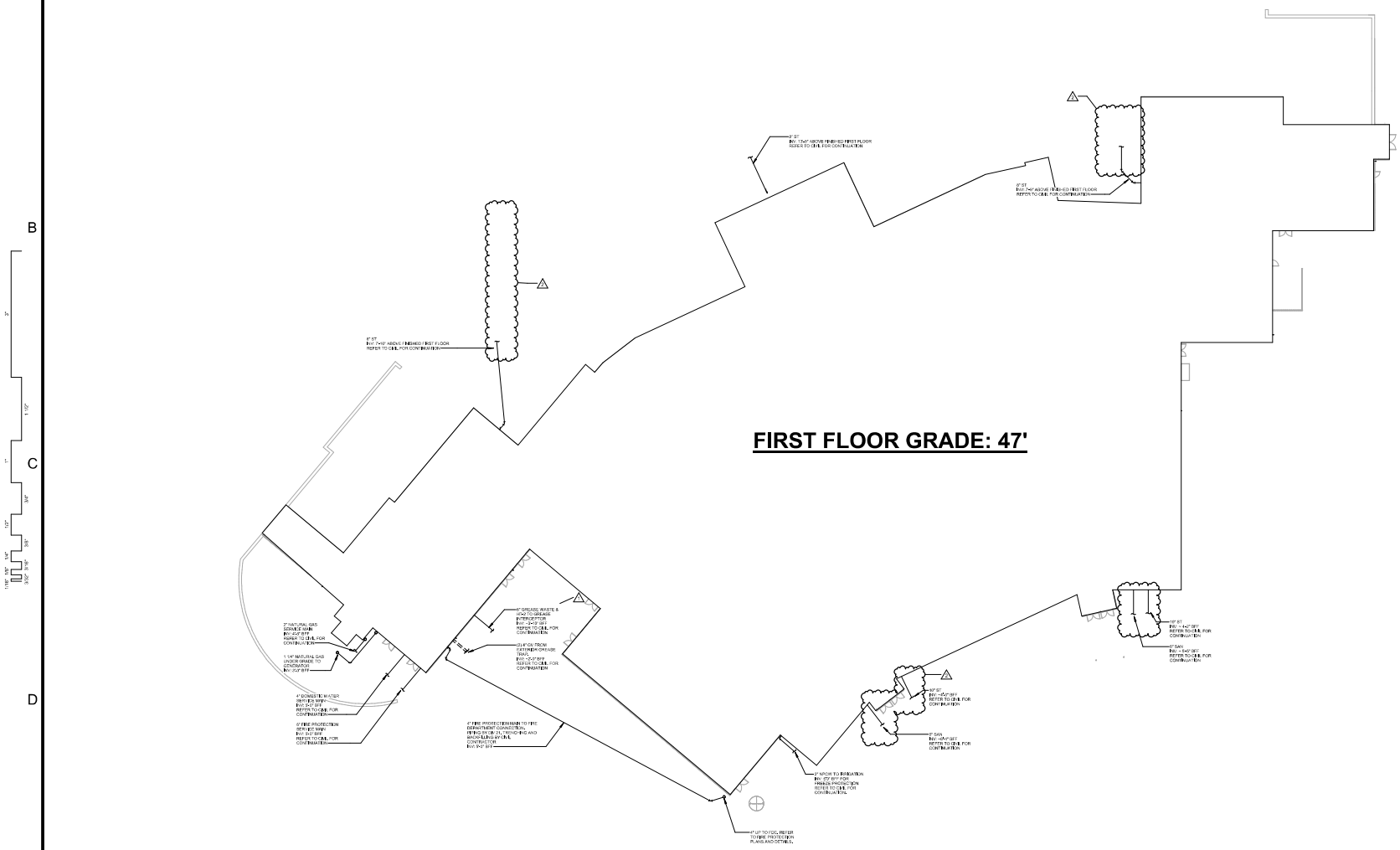

1 PLUMBING SITE UTILITY PLAN
1" = 20'-0"

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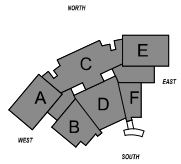

KEYPLAN

Number	Date	Issued For
2	10/23/2024	ADDENDUM NO. 3
1	10/18/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

PLUMBING SITE UTILITY PLAN

Date
07/08/2024
Scale
1" = 20'-0"
Proj. Number
22367.00

Drawing Number
PSU001

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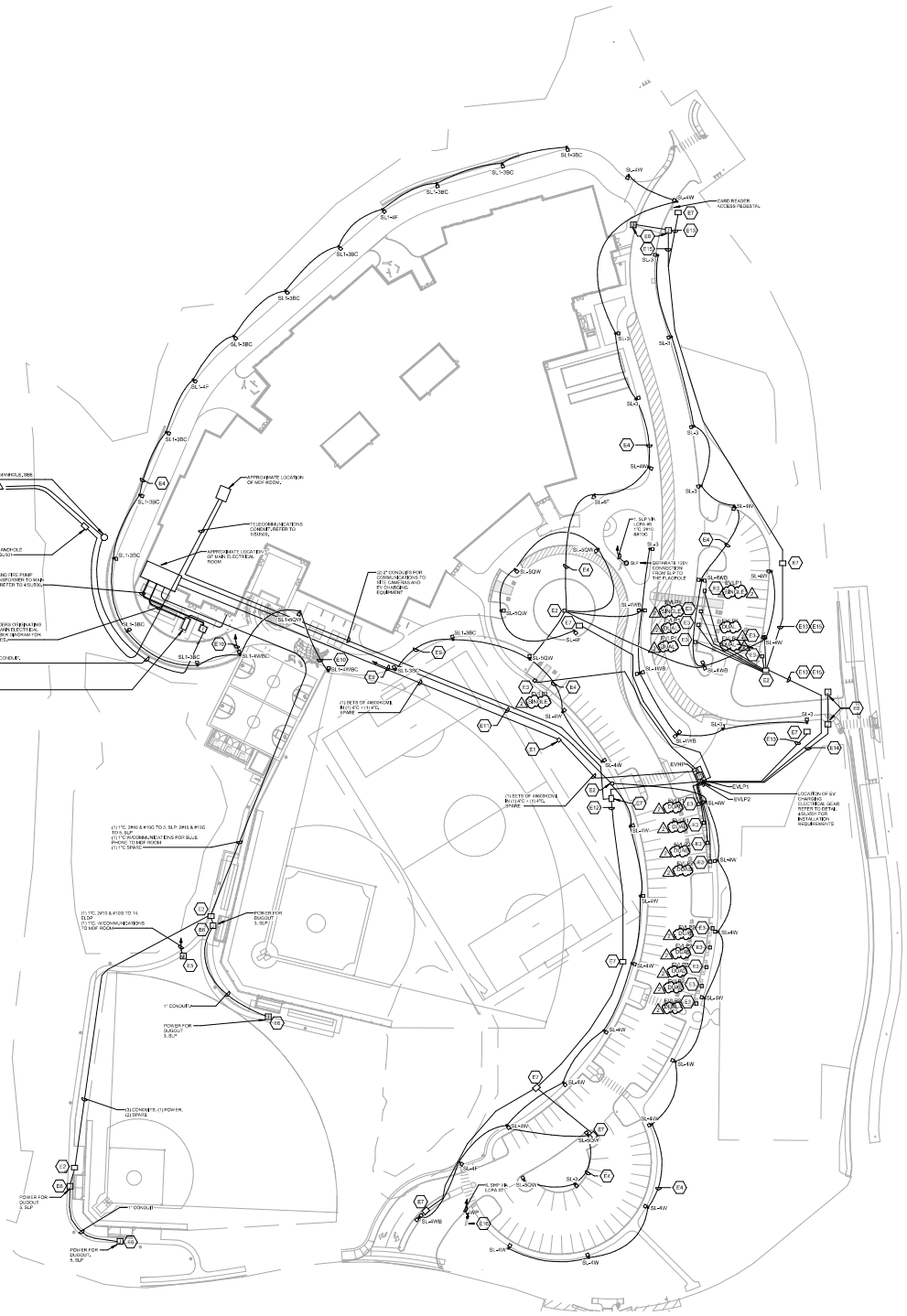

1 MEP SITE UTILITY PLAN
1" = 45'-0"

GENERAL SITE ELECTRICAL NOTES

1. REFER TO DRAWING E000 FOR SYMBOLS LIST.
2. COORDINATE SITE LIGHTING LOCATIONS WITH SITE LANDSCAPING PLANS.
3. REFER TO DRAWING SU500 & SU501 FOR SITE ELECTRICAL DETAILS.
4. REFER TO SU501 FOR LIGHT FIXTURE AND SITE POLE SCHEDULES.
5. WHERE UNDERGROUND UTILITIES ARE LIKELY TO BE ENCOUNTERED THE CONTRACTOR SHALL EXCAVATE BY HAND.
6. REFER TO LANDSCAPE & CIVIL SITE PLANS FOR FINAL LOCATIONS OF LIGHTING FIXTURES, FLAGPOLES AND OTHER SITE UTILITIES.
7. WHERE 277V & 120V CIRCUITS OCCUPY THE SAME HANDHOLE/RACEWAY, IDENTIFY NEUTRAL CONDUCTORS PER NEC.
8. PROVIDE CONDUIT PLUGS WITH 1/4" NYLON DRAG LINE ATTACHED IN ALL EMPTY CONDUITS.
9. EXISTING OVERHEAD UTILITIES NOT SHOWN. COORDINATE WITH UTILITY COMPANY AS REQUIRED.

UNDERGROUND UTILITY NOTE

THE CONTRACTOR IS TO BE FULLY RESPONSIBLE FOR CONTACTING THE LOCAL CABLE TELEVISION COMPANY, POWER COMPANY, TELEPHONE COMPANY, GAS COMPANY, WATER AND SEWER COMPANY AND ANY OTHER UTILITY COMPANY WITHIN THE AREA PRIOR TO PROCEEDING WITH ANY EXCAVATION. BY LAW, THE CONTRACTOR IS REQUIRED TO CALL BEFORE DOING ANY EXCAVATION, DIGGING HOLES OR DRIVING POSTS REGARDLESS OF WHETHER IT IS WITHIN THE STREET LINE OR ON PRIVATE PROPERTY, OBTAIN INFORMATION REGARDING THE EXISTENCE AND LOCATION OF ANY UNDERGROUND FACILITIES BY CALLING 811.

WATER PREVENTION MEASURES

1. PITCH ALL UNDERGROUND CONDUITS SUCH THAT THEY ARE ANGLED DOWNWARDS AWAY FROM THE BUILDING. CONDUITS SHALL NOT BE PITCHED DOWNWARDS TOWARD THE BUILDING, ALLOWING GROUND WATER TO ENTER BUILDING.
2. PROVIDE DUCT SEALANT FOR ALL ACTIVE ELECTRIC CONDUITS CONTAINING CONDUCTORS, EQUAL TO POLYWATER FSK. SEAL AT BOTH ENDS OF EACH ACTIVE CONDUIT (AT EXTERIOR KNOCKOUTS) AND WHERE CONDUIT TERMINATES IN BUILDING). FOR SPARE CONDUITS WITHOUT CONDUCTORS, PROVIDE CAP AT EACH END.
3. ALL CONDUITS (ACTIVE AND SPARE) SHALL SWEEP UPWARD A MINIMUM OF 12" ABOVE THE BASE OF HANDHOLES OR OTHER EXTERIOR STRUCTURES.
4. COORDINATE SWEEP AT TRANSFORMER PADS WITH UTILITY COMPANY DETAILS AND STANDARDS.

ELECTRICAL SITE UTILITY KEY NOTES

- E1 FURNISH AND INSTALL A POLYMER CONCRETE HANDHOLE WITH SECURABLE STAMPED COVER IDENTIFYING "ELECTRICAL" THAT IS 30"X30"X24" WITH OPEN BOTTOM
- E2 FURNISH AND INSTALL A POLYMER CONCRETE HANDHOLE WITH SECURABLE STAMPED COVER IDENTIFYING "ELECTRICAL" THAT IS 18"X18"X24" WITH OPEN BOTTOM
- E3 EV CHARGING STATION - SHALL BE SINGLE PEDESTAL MOUNT FOR ADA PARKING SPACES AND DUAL PEDESTAL MOUNT FOR TANDEM CHARGING STATION LOCATIONS. EC SHALL PROVIDE AND INSTALL CHARGEPOINT #CPF50-L23-PD (SINGLE PORT) AND #CPF50-L23-PD-DUAL (DUAL-PORT). REFER TO DETAIL #3 / SU500 FOR THE CONCRETE BASE MOUNTING DETAIL.
- E4 1"C, 4#8 & 1 GND (TYPICAL 277V SITE LIGHTING)
- E5 EMERGENCY BLUE LIGHT COMMUNICATION STATION REFER TO DETAIL 7/SU500 FOR BASE AND MOUNTING DETAIL. PROVIDE AND INSTALL A CODE BLUE CORPORATION ICS-S SERIES EMERGENCY PHONE TOWER. THE PROVIDED UNIT SHALL HAVE THE FOLLOWING FEATURES: LS2000 FULL DUPLEX SIP COMPATIBLE VOIP PHONE; BEACON/STROBE; SAFETY BLUE.
  PROVIDE GFCI DUPLEX RECEPTACLE WITH IN-USE WEATHERPROOF COVER INSIDE NEMA 4X LOCKABLE ENCLOSURE, EQUAL TO HOFFMAN CSNLINE, 12"X12"X6" IN SIZE, MOUNT ON SIDE OF DUGOUT, 42" ABOVE GRADE. PROVIDE 2#10+1#10G, 1"C.
- E6 FURNISH AND INSTALL A POLYMER CONCRETE HANDHOLE WITH SECURABLE STAMPED COVER IDENTIFYING "COMMUNICATION" THAT IS 18"X18"X24" WITH OPEN BOTTOM
- E7 POWER FOR MOTORIZED GATE CONTROLLER
- E8 1"C, 4#8 & #8G (277V SITE LIGHTING) "SHIP", 1.3 VIA LCPA #1, LCPA #2
- E10 1"C, 4#8 & #8G (277V SITE LIGHTING) "SHIP", 2.4 VIA LCPA #3, LCPA #4
- E11 1"C, 4#8 & #8G (277V SITE LIGHTING) "SHIP", 5.7 VIA LCPA #5, LCPA #6
- E12 (1) 2" CONDUIT FOR FUTURE COMMUNICATIONS
  (1) 1" C, 2#10 & #10G (SITE CAMERAS) "EVLP", 1
- E13 (1) 2" CONDUIT FOR FUTURE COMMUNICATIONS
  (1) 1" C, 2#10 & #10G (SITE CAMERAS) "EVLP", 2
- E14 1"C, 2#10 & #10G (MOTORIZED GATE CONTROLLER), "EVLP", 3
- E15 1"C, 2#10 & #10G (MOTORIZED GATE CONTROLLER), "EVLP", 4
- E16 PROVIDE 6'-0" RECESSED LINEAR LIGHT FIXTURE EACH SIDE OF MONUMENT AND ELECTRICAL BACKBOX WITH WEATHERPROOF SERVICE SWITCH. COORDINATE EXACT MOUNTING LOCATION WITH ARCHITECTURAL DETAILS.

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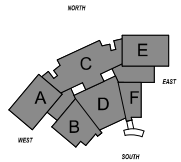
Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane,
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
2	10/23/2024	ADDENDUM NO. 3
1	10/16/2024	ADDENDUM NO. 2
	09/20/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

MEP SITE UTILITY PLAN

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: SU100

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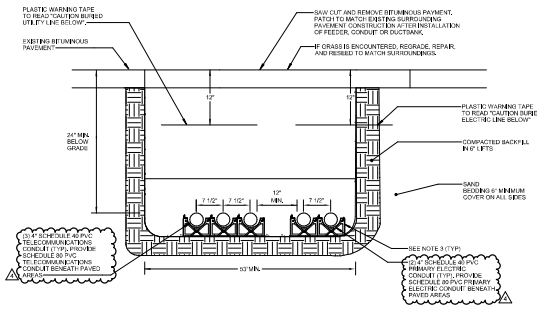
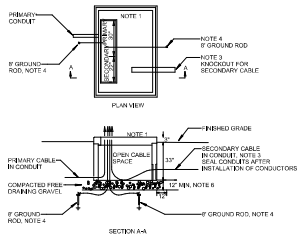


NOTES:

1. TYPICAL CONDUITS AND QUANTITIES SHOWN, REFER TO DRAWINGS FOR QUANTITIES AND SIZES.
2. COORDINATE AND GROUP CONDUITS IN COMMON TRENCH. SINGLE ROW SHOWN, MULTIPLE ROW DUCT BANKS ARE ACCEPTABLE, MAINTAINING SEPARATION DISTANCE REQUIREMENTS.
3. PROVIDE SUITABLE SEPARATORS AND CHAIRS 4 FT. MAX. ON CENTER, SET TO COMPACTED TRENCH BOTTOM AND BAND CONDUITS TOGETHER PRIOR TO BACKFILL OR PLACING CONCRETE.
4. REFER TO CONCRETE ENCASEMENT DETAIL WHERE CONCRETE ENCASEMENT IS REQUIRED, USE "TYPE EB" SCHEDULE 40 PVC CONDUIT.

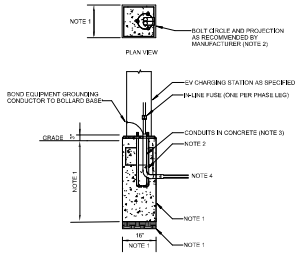
1 TYPICAL PRIMARY ELECTRIC/TELECOMMUNICATIONS TRENCHING DETAIL
1/8" = 1'-0"



NOTES

1. 500-2500 KVA - INSTALL 76"X 70" X 30" PAD AS PER UTILITY CO. SPC PV315 AND PV316 (BY DIVISION 33)
2. PRIMARY CABLE
   A. INSTALL DIRECT BURIED CABLES A MINIMUM OF 30" BELOW GRADE.
   B. INSTALL CABLES IN CONDUIT A MINIMUM OF 24" BELOW GRADE.
   C. LOOP CABLES IN CABLE PIT BEFORE MAKING CONNECTIONS.
3. SECONDARY CABLE - LEAVE SLACK FOR FUTURE RECONNECTING TO TRANSFORMERS WITH HIGHER SECONDARY TERMINALS.
4. 3/4" COPPER GROUND ROD - INSTALL IN TRENCH AND CONNECT A #2 COPPER CONDUCTOR FROM ROD THROUGH PAD OPENING AND EXTENDING 6" ABOVE PAD.
5. THE FOLLOWING UTILITY CO. DTM'S SHOULD ALSO BE USED:
   A. DTR 45.2401 - LOCATION AND MECHANICAL PROTECTION REQUIREMENTS.
   B. DTR 55.005 - PRIMARY, SECONDARY AND TRANSFORMER GROUNDING.
   C. DTR 17.060 - THREE PHASE TRANSFORMER CONNECTIONS.
6. THE EXCAVATION FOR THE PAD SHALL BE CARRIED TO A DEPTH OF 12" BELOW THE BOTTOM OF THE PAD WALLS. THE BACKFILL UNDER THE PAD WALLS SHALL BE A CLEAN GRAVEL, FREE OF FOREIGN MATTER AND CONSTRUCTION DEBRIS, AND IN ACCORDANCE WITH CONNECTICUT DOT SPEC M.02.06 GRADING 'A'; OR MASSACHUSETTS DPW SPEC M1.03.01 TYPE B. BACKFILL SHALL BE PLACED IN 6" LAYERS AND COMPACTED WITH MECHANICAL TAMPERS TO NOT LESS THAN 95 PERCENT OF THE MAXIMUM DRY DENSITY AS DETERMINED BY STANDARD COMPACTION TESTS, AASHTO T180 OR ASTM D698.

2 EVERSOURCE CT/WMA - TRANSFORMER PAD DETAIL
NTS

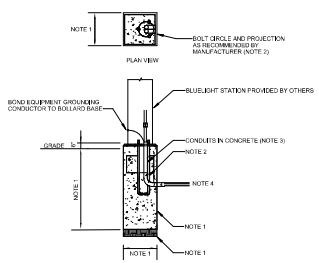


NOTES:

1. CONCRETE EV CHARGING STATION BASE SHALL BE PROVIDED BY SITE CONTRACTOR. REFER TO STRUCTURAL BASE DETAILS FOR REQUIRED DEPTH, REINFORCEMENT AND CONCRETE SPECIFICATIONS. EV CHARGING STATION BASE SHALL BE SET ON UNDISTURBED SOIL.
2. ANCHOR BOLTS SHALL BE PROVIDED IN EV CHARGING STATION BASE BY SITE CONTRACTOR, ADHERING TO STRUCTURAL BASE DETAILS AND SPECIFICATIONS. COORDINATE EXACT BOLT HOLE PATTERN WITH ELECTRICAL CONTRACTOR AND APPROVED EV CHARGING STATION MANUFACTURER PRIOR TO INSTALLATION.
3. ELECTRICAL CONTRACTOR SHALL PROVIDE SCHEDULE 40 PVC CONDUIT SWEEPS WITHIN EV CHARGING STATION BASE. COORDINATE EXACT STUB-UP LOCATION OF ALL CONDUITS WITH APPROVED EV CHARGING STATION MANUFACTURER BOLT HOLE PATTERN PRIOR TO INSTALLATION.
4. ELECTRICAL CONTRACTOR SHALL PROVIDE UNDERGROUND CONDUITS TO THE EV CHARGING STATION AS SPECIFIED ON SITE ELECTRICAL PLAN. REFER TO TRENCHING DETAILS FOR MINIMUM BURIAL DEPTH AND ADDITIONAL INFORMATION. MINIMUM SIZE/QUANTITY SHALL BE:

   * SINGLE PORT EV CHARGING STATION CIRCUIT: 3#8+1#10G, 1-1/4" SCHEDULE 40 PVC CONDUIT. 1" SCHEDULE 40 PVC CONDUIT FOR COMMUNICATIONS. COORDINATE WITH EV.
   * DUAL PORT EV CHARGING STATION CIRCUIT: 4#8+1#10G, 1-1/2" SCHEDULE 40 PVC CONDUIT. 1" SCHEDULE 40 PVC CONDUIT FOR COMMUNICATIONS. COORDINATE WITH EV.

3 EXTERIOR EV BASE DETAIL
NTS

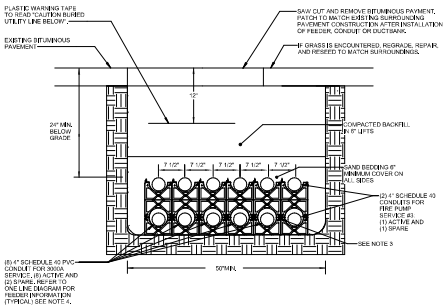


NOTES:

1. CONCRETE BLUELIGHT STATION BASE SHALL BE PROVIDED BY SITE CONTRACTOR. REFER TO STRUCTURAL BASE DETAILS FOR REQUIRED DEPTH, REINFORCEMENT AND CONCRETE SPECIFICATIONS. BASE TO EXTEND 9" ABOVE GRADE AND 6" BEYOND THE OVERALL UNIT DIAMETER. BLUELIGHT STATION BASE SHALL BE SET ON UNDISTURBED SOIL.
2. ANCHOR BOLTS SHALL BE PROVIDED IN BLUELIGHT STATION BASE BY SITE CONTRACTOR, ADHERING TO STRUCTURAL BASE DETAILS AND SPECIFICATIONS. COORDINATE EXACT BOLT HOLE PATTERN WITH ELECTRICAL CONTRACTOR AND APPROVED BLUELIGHT STATION MANUFACTURER PRIOR TO INSTALLATION.
3. ELECTRICAL CONTRACTOR SHALL PROVIDE SCHEDULE 40 PVC CONDUIT SWEEPS WITHIN BLUELIGHT STATION BASE. COORDINATE EXACT STUB-UP LOCATION OF ALL CONDUITS WITH APPROVED BLUELIGHT STATION MANUFACTURER BOLT HOLE PATTERN PRIOR TO INSTALLATION.
4. ELECTRICAL CONTRACTOR SHALL PROVIDE UNDERGROUND CONDUITS TO THE BLUELIGHT STATION AS SPECIFIED ON SITE ELECTRICAL PLAN. REFER TO TRENCHING DETAILS FOR MINIMUM BURIAL DEPTH AND ADDITIONAL INFORMATION. MINIMUM SIZE/QUANTITY SHALL BE:

   * POWER CIRCUIT: 3#8+1#10G, 1-1/4" SCHEDULE 40 PVC CONDUIT
   * COMMUNICATIONS CONDUIT: 1-1/2" SCHEDULE 40 PVC CONDUIT

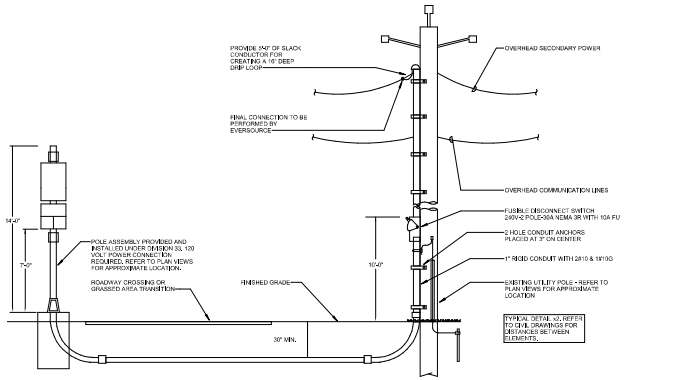
7 BLUELIGHT BASE DETAIL
NTS



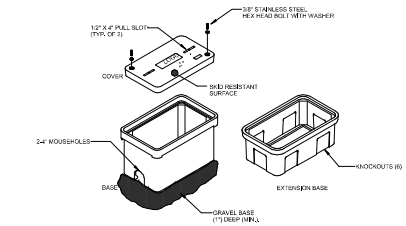
NOTES:

1. TYPICAL CONDUITS AND QUANTITIES SHOWN, REFER TO DRAWINGS FOR QUANTITIES AND SIZES.
2. COORDINATE AND GROUP CONDUITS IN COMMON TRENCH. SINGLE ROW SHOWN, MULTIPLE ROW DUCT BANKS ARE ACCEPTABLE, MAINTAINING SEPARATION DISTANCE REQUIREMENTS.
3. PROVIDE SUITABLE SEPARATORS AND CHAIRS 4 FT. MAX. ON CENTER, SET TO COMPACTED TRENCH BOTTOM AND BAND CONDUITS TOGETHER PRIOR TO BACKFILL OR PLACING CONCRETE.
4. REFER TO CONCRETE ENCASEMENT DETAIL WHERE CONCRETE ENCASEMENT IS REQUIRED. USE "TYPE EB" SCHEDULE 40 PVC CONDUIT.

4 TRENCH DETAIL - MAIN 3000A ELECTRICAL SERVICE AND FIRE PUMP SERVICE
NTS



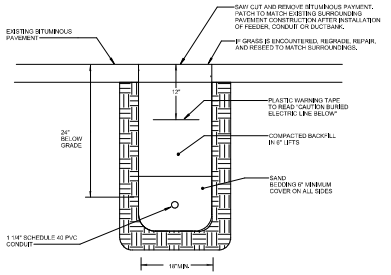
9 TRAFFIC SIGNAL RISER DETAIL
NTS



NOTES:

1. PROVIDE STANDARD HANDHOLE, COVER COLOR SHALL BE AS COORDINATED WITH THE OWNER
2. COVER, RING AND BOX SHALL BE MADE OF SAME MATERIAL
3. PROVIDE IMPRINTED LOGO WITH "ELECTRIC OR "COMMUNICATIONS" LOGO AS INDICATED ON DRAWINGS.
4. PROVIDE EXTENSION BASES AND GRADE ADJUSTABLE EXTENSIONS TO SET FLUSH WITH GRADE AND TO SET AT DEPTH TO ALLOW CONDUITS TO ENTER THE BASE HORIZONTALLY.
5. PITCH CONDUITS AWAY FROM HANDHOLE.
6. REFER TO DRAWINGS FOR SIZES.
7. PROVIDE TIER 22 DESIGN FOR ALL HANDHOLES LOCATED IN PAVED AREAS OR WHERE SUBJECT TO VEHICULAR TRAFFIC. TIER 15 DESIGN ELSEWHERE.
8. PROVIDE HANDHOLE WITH DIVIDED INTERIOR OPTION TO SEPARATE POWER AND COMMUNICATIONS CABLING, WHERE MULTIPLE SERVICES ARE SHOWN ON SITE PLAN.

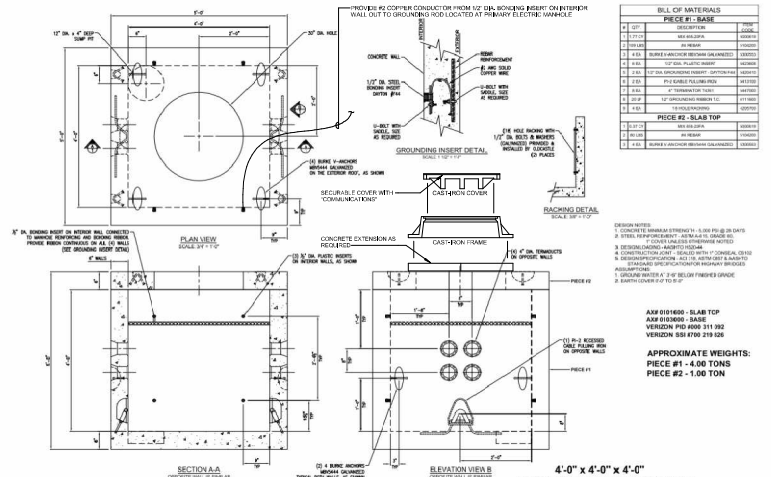
5 HANDHOLE DETAIL
NTS



NOTES:

1. TYPICAL CONDUITS AND QUANTITIES SHOWN, REFER TO DRAWINGS FOR QUANTITIES AND SIZES.

6 TYPICAL SITE BRANCH CIRCUIT TRENCHING DETAIL
1/8" = 1'-0"



8 TELECOMMUNICATION HANDHOLE DETAIL
NTS

SLAM
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Greenwich Public Schools

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9 Indian Rock Lane,
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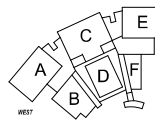
STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
4	11/06/2024	ADDENDUM NO. 6
1	10/16/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

MEP SITE UTILITY PLAN - DETAILS & SCHEDULES

Date: 07/08/2024
Scale: NTS
Proj. Number: 22367.00
Drawing Number: SU500

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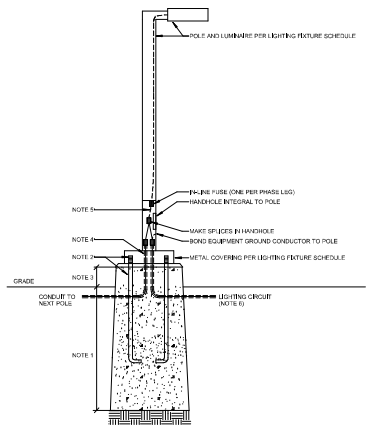
SITE LIGHTING FIXTURE SCHEDULE

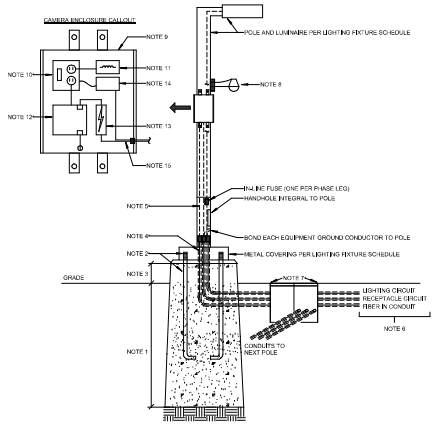
TYPE	BASIS OF DESIGN MANUFACTURER / MODEL	VOLTAGE	SOURCE	FIXTURE DESCRIPTION - BASIS OF DESIGN
SL1-BIC	EXO / SLING ASL1-80L-2F-3K7-UNV-BC-BLT	UNV	5900LM, 37W 3000K LED	POLE MOUNTED EXTERIOR LED LIGHTING FIXTURE WITH 24 INCH X 11.7 INCH HEAD, MOUNTED T.O.F. AT 12 FEET ABOVE FINISHED GRADE. CORROSION RESISTANT, DIE-CAST ALUMINUM HOUSING WITH POWDER COAT FINISH. TM CRI: L70 AT 450,000+ HOURS. 0-10V STANDARD DIMMING DRIVER, BACKLIGHT CONTROL. **COLOR:** TO BE SELECTED BY ARCHITECT
SL-1-IF	EXO / SLING ASL1-80L-2S-3K7-IF-UNV-BC-BLT	UNV	5900LM, 74W 3000K LED	SAME AS TYPE "SL1-BIC" EXCEPT WITH "TYPE IF" OPTIC STRIKE PHOTOMETRY. **COLOR:** TO BE SELECTED BY ARCHITECT
SL1-WBC	EXO / SLING ASL1-80L-2F-3K7-4AWUNV-BC-BLT	UNV	5900LM, 37W 3000K LED	SAME AS TYPE "SL1-BIC" EXCEPT WITH "TYPE 4W" OPTIC STRIKE PHOTOMETRY. **COLOR:** TO BE SELECTED BY ARCHITECT
SL1-SQW	EXO / SLING ASL1-80L-2S-3K7-SQW-UNV-BLT	UNV	5900LM, 37W 3000K LED	SAME AS TYPE "SL1-BIC" EXCEPT WITH "TYPE SQW" OPTIC STRIKE PHOTOMETRY AND WITHOUT BACKLIGHT CONTROL. **COLOR:** TO BE SELECTED BY ARCHITECT
SL-3	EXO / SLING ASL1-80L-3S-3K7-3-UNV-BLT	UNV	4976LM, 39W 3000K LED	POLE MOUNTED EXTERIOR LED LIGHTING FIXTURE WITH 24 INCH X 11.7 INCH HEAD, MOUNTED T.O.F. AT 14 FEET ABOVE FINISHED GRADE. CORROSION RESISTANT, DIE-CAST ALUMINUM HOUSING WITH POWDER COAT FINISH. TM CRI: L70 AT 450,000+ HOURS. 0-10V STANDARD DIMMING DRIVER. **COLOR:** TO BE SELECTED BY ARCHITECT
SL-4F	EXO / SLING ASL1-80L-3S-3K7-4F-UNV-BLT	UNV	4695LM, 29W 3000K LED	SAME AS TYPE "SL-3" EXCEPT WITH "TYPE 4F" OPTIC STRIKE PHOTOMETRY. **COLOR:** TO BE SELECTED BY ARCHITECT
SL-4W	EXO / SLING ASL1-80L-3S-3K7-4W-UNV-BLT	UNV	4678LM, 39W 3000K LED	SAME AS TYPE "SL-3" EXCEPT WITH "TYPE 4W" OPTIC STRIKE PHOTOMETRY. **COLOR:** TO BE SELECTED BY ARCHITECT
SL-4WB	EXO / SLING ASL1-80L-3S-3K7-4W-UNV-4-BLT	UNV	(2) 4678LM, 39W 3000K LED	SAME AS TYPE "SL-4W" EXCEPT WITH DUAL HEAD LAYOUT. **COLOR:** TO BE SELECTED BY ARCHITECT
SL-SQW	EXO / SLING ASL1-80L-3S-3K7-SQW-UNV-4BLT	UNV	4975LM, 39W 3000K LED	SAME AS TYPE "SL-3" EXCEPT WITH "TYPE SQW" OPTIC STRIKE PHOTOMETRY. **COLOR:** TO BE SELECTED BY ARCHITECT
SLF	POLETOP MOUNTED LED FLAGPOLE LIGHT - PROVIDED WITH THE FLAGPOLE - WIRED UNDER DIVISION 26	120V	1060LM, 15W 3000K LED	PROVIDE POWER AND CONTROL TO A SELF CONTRAINED LIGHTING FIXTURE PROVIDED WITH THE FLAGPOLE.

NOTES:
1. LIGHT FIXTURES IN THE SCHEDULE SHALL BE CONSIDERED BASES OF DESIGN. EQUAL FIXTURE SUBSTITUTIONS ARE ACCEPTABLE FOR ALL FIXTURES IN THE LIGHTING FIXTURE SCHEDULE, UNLESS INDICATED OTHERWISE. EQUAL FIXTURE APPROVAL SHALL BE AS JUDGED BY THE ENGINEER AND THE ARCHITECT, IN ADDITION TO THE REQUIREMENTS LISTED IN THE LIGHTING FIXTURE SCHEDULE AND IN THE SPECIFICATIONS, THE PROPOSED EQUAL FIXTURES SHALL:
   A. BE THE SAME GENERAL SIZE, STYLE AND SHAPE, INCLUDING BUT NOT LIMITED TO, LENS CONSTRUCTION AND SHADING.
   B. BE OF EQUAL QUALITY CONSTRUCTION AND FINISH.
   C. BE SUPPLIED WITH ALL INSTALLED ACCESSORIES TO MATCH THE SPECIFIED (BASIS OF DESIGN) FIXTURE.
   D. PROVIDE THE SAME DISTRIBUTION, EFFICACY AND SOURCE LUMEN OUTPUT.
   E. BE LISTED IN THE MANUFACTURER'S BASIS OF DESIGN FIXTURE, INCLUDING DLC AND ENERGY STAR QUALIFICATIONS.
2. ALL FIXTURES SHALL BE UL LISTED.
3. ALL NECESSARY MOUNTING HARDWARE SHALL BE FURNISHED AND INSTALLED.
4. REFER TO ARCHITECTURAL DRAWINGS FOR SPECIFIC DETAILS, ARRANGEMENT, MOUNTING HEIGHTS, SUSPENSION LENGTHS, CEILING CONSTRUCTION, ETC., ALL COLORS AND FINISHES SHALL BE SELECTED BY ARCHITECT.
5. FIXTURES SHALL BE STRUCTURALLY SUPPORTED AS REQUIRED BY THE APPLICABLE BUILDING CODE. FIXTURES SHALL BE SUPPORTED FROM THE BUILDING STRUCTURE AND SHALL BE INDEPENDENT OF DUCTS, PIPES, CEILINGS AND THEIR SUPPORTING MEMBERS. FIXTURES SHALL BE SUPPORTED WITH A MINIMUM OF 2 SUPPORTS.
6. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.



NOTES:
1. CONCRETE POLE BASE SHALL BE PROVIDED BY SITE CONTRACTOR. REFER TO STRUCTURAL POLE BASE DETAILS FOR REQUIRED DEPTH AND CONCRETE SPECIFICATIONS. POLE BASE SHALL BE SET ON UNDISTURBED SOIL. DIAMETER OF POLE BASE SHALL BE COORDINATED WITH BASE PLATE COVER DIMENSIONS. AS SPECIFIED. CONCRETE BASE SHALL BE LARGE ENOUGH TO ACCOMMODATE BASE PLATE WITH NO OVERHANG.
2. ANCHOR BOLTS SHALL BE PROVIDED IN POLE BASE BY SITE CONTRACTOR, ADHERING TO STRUCTURAL POLE BASE DETAILS AND SPECIFICATIONS. COORDINATE EXACT BOLT PATTERN WITH ELECTRICAL CONTRACTOR AND APPROVED POLE MANUFACTURER PRIOR TO INSTALLATION.
3. IN GRASSY AREAS IN PARKING AREAS, SIDEWALKS OR OTHER AREAS WITHOUT VEHICLE PARKING, 3 INCHES OF CONCRETE SHALL BE EXPOSED ABOVE GRADE. IN PARKING AREAS, 30 INCHES OF CONCRETE SHALL BE EXPOSED ABOVE GRADE. PROVIDE 1 INCH CHAMFER AROUND TOP OF CONCRETE BASE.
4. ELECTRICAL CONTRACTOR SHALL PROVIDE SCHEDULE 40 PVC CONDUIT SWEEPS WITHIN CONCRETE POLE BASE. COORDINATE EXACT STUB-UP LOCATION OF ALL CONDUITS WITH APPROVED POLE MANUFACTURER BOLT PATTERN PRIOR TO INSTALLATION.
5. ELECTRICAL CONTRACTOR SHALL PROVIDE FLEXIBLE METAL CONDUIT WITHIN POLE TO LIGHT FIXTURE AND CAMERA ENCLOSURE.
6. ELECTRICAL CONTRACTOR SHALL PROVIDE UNDERGROUND CONDUITS TO THE LIGHT POLE AS SPECIFIED ON SITE PLAN. REFER TO TRENCHING DETAILS FOR MINIMUM BURIAL DEPTH AND ADDITIONAL INFORMATION. MINIMUM SEISMOGRAPH SHALL BE:
   - LIGHTING CIRCUIT: PROVIDE 2#10+1#10G, ¾"-1¼"C, SCH.40 PVC.

2 SITE LIGHTING POLE DETAIL
NTS



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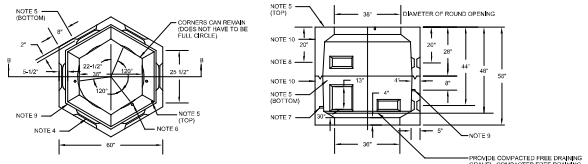
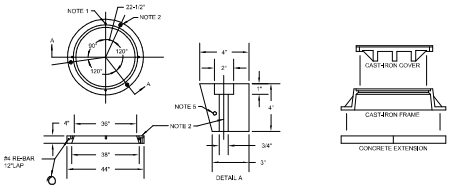
5. ELECTRICAL CONTRACTOR SHALL PROVIDE FLEXIBLE METAL CONDUIT WITHIN POLE TO LIGHT FIXTURE AND CAMERA ENCLOSURE.
6. ELECTRICAL CONTRACTOR SHALL PROVIDE UNDERGROUND CONDUITS TO THE LIGHT POLE AS SPECIFIED ON SITE PLAN. REFER TO TRENCHING DETAILS FOR MINIMUM BURIAL DEPTH AND ADDITIONAL INFORMATION. MINIMUM SEISMOGRAPH SHALL BE:
   - LIGHTING CIRCUIT: PROVIDE 2#10+1#10G, ¾"-1¼"C, SCH.40 PVC.
   - RECEPTACLE CIRCUIT: PROVIDE 2#10+1#10G, ¾"-1¼"C, SCH.40 PVC.
   - FIBER: PROVIDE 2-STRAND OM4 MM FIBER OPTIC CABLE (OUTDOOR RATED) IN 2"C, SCH.40 PVC. PROVIDE INDIVIDUAL 2-STRAND FIBER FOR EACH CAMERA ON CIRCUIT. ROUTED IN SAME CONDUIT. MAXIMUM OF 10 CAMERAS. REFER TO SITE PLAN FOR CAMERAS ON FIBER CIRCUIT. AT EACH POLE, ONE 2-STRAND FIBER CABLE SHALL BRANCH OFF TO MEDIA CONVERTER FOR CAMERA AND REMAINING CABLES SHALL CONTINUE TO NEXT POLE.
7. ELECTRICAL CONTRACTOR SHALL PROVIDE 24"L x 24"W x 30"D PRECAST POLYMER CONCRETE ENCLOSURE WITH ANSI 77 TIER 15 OR 22 COVER RATED FOR TRAFFIC APPLICATIONS. PROVIDE WITH DIMPLED PATTERN TO SEPARATE POWER AND FIBER WIRING. REFER TO SITE HANDHOLE DETAIL FOR ADDITIONAL INFORMATION.
8. SECURITY SUBCONTRACTOR SHALL PROVIDE CAMERA PER SECURITY SPECIFICATIONS AND/OR CAMERA SCHEDULE. PROVIDE WITH POLE MOUNTING KIT AS REQUIRED BY MANUFACTURER. MOUNTING HEIGHT OF CAMERA SHALL BE PER SECURITY SPECIFICATIONS AND CAMERA SCHEDULE. WHERE NOT NOTED, CAMERA SHALL BE MOUNTED 2 FEET ABOVE TOP OF LIGHT POLE.
9. ELECTRICAL CONTRACTOR SHALL PROVIDE NEMA 4X ENCLOSURE ON POLE EQUAL TO HOFFMAN NVENTCONLINE SERIES, 16"H x 16"W x 8"D (IN DIMENSION) PROVIDE WITH MANUFACTURER APPROVED MOUNTING KIT FOR POLE APPLICATIONS. PROVIDE WITH GASKETED, LOCKABLE HINGED FRONT DOOR. LOCATE OPPOSITE OF CAMERA AT SAME MOUNTING HEIGHT OR POLE.
10. EC SHALL PROVIDE GFCI DUPLEX RECEPTACLE WITH INTEGRAL TOGGLE SWITCH POWERED VIA 120VAC CIRCUIT TO POLE. PROVIDE WITH WEATHERPROOF BACKBOX WITHIN ENCLOSURE ON POLE.
11. EC SHALL PROVIDE ELECTRIC HEATER FOR ENCLOSURE, EQUAL TO HOFFMAN NVENT SERIES 22W, 120VAC INPUT, 3.2"H x 1.5"W x 3.0"D) POWER VIA RECEPTACLE IN ENCLOSURE. PROVIDE WITH THERMOSTAT BY SAME MANUFACTURER.
12. SECURITY SUBCONTRACTOR SHALL PROVIDE 1+1 SM FIBER MEDIA CONVERTER FOR CAMERA. PER SECURITY SPECIFICATIONS, POWER VIA RECEPTACLE IN ENCLOSURE. TERMINATE FIBER AT MEDIA CONVERTER USING MANUFACTURER APPROVED CONNECTORS.
13. SECURITY SUBCONTRACTOR SHALL PROVIDE ETHERNET SURGE PROTECTIVE DEVICE FOR CAMERA CABLING. BONDED TO METAL POLE.
14. WHERE APPLICABLE PER CAMERA SPECIFICATIONS, IF CAMERA REQUIRES AN EXTERNAL POWER SUPPLY FOR PTZ FUNCTIONALITY, LENS HEATER, ETC., POWER SUPPLY SHALL BE PROVIDED BY SECURITY SUBCONTRACTOR IN ENCLOSURE. PROVIDE POWER SUPPLY PER CAMERA MANUFACTURER REQUIREMENTS. POWER VIA LINE SIDE OF RECEPTACLE CIRCUIT.
15. WHERE APPLICABLE PER CAMERA SPECIFICATIONS, IF CAMERA REQUIRES TO CAMERA AND PTZ CABLING FROM EXTERNAL POWER SUPPLY IS REQUIRED BY CAMERA SPECIFICATIONS, PROVIDE SUBCONTRACTOR ENCLOSURE. CABLING SHALL BE ROUTED IN LIQUID TIGHT FLEXIBLE METAL CONDUIT. SECURED TIGHT TO POLE, AND TERMINATED IN CAMERA MOUNTING KIT PER MANUFACTURER'S REQUIREMENTS.

3 SITE LIGHTING POLE DETAIL WITH CAMERA
NTS

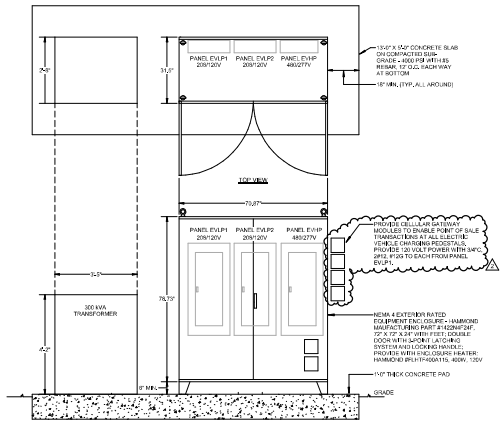




NOTES:
1. DESIGN LOADING SHALL BE IN ACCORDANCE WITH AASHTO HS20-1983.
2. CONCRETE AND CONCRETE DESIGN SHALL BE IN ACCORDANCE WITH ACI 318-1986.
3. CONCRETE SHALL HAVE A MINIMUM 28 DAY STRENGTH OF 4000 PSI AND A MAXIMUM 28 DAY STRENGTH OF 5000 PSI.
4. FIVE (INCH X 12 INCH KNOCKOUTS: (3) IN THE TOP, (1) IN THE BOTTOM AND (1) 12"INCH X 13" INCH KNOCKOUT IN THE BOTTOM SHALL BE CLEAR OF RISING CROSS MEMBERS.
5. 3/4 INCH HOT LOOP INSERTS (4 INCH-DAYTON B-16) WITH INSERT, LOCATOR PLUG (DAYTON T-21), TWO EACH IN TOP AND BOTTOM SECTIONS FOR LIFTING WITH SWIVEL PLATE. INSERTS ARE TO BE SECURED IN PLACE WITH REBAR.
6. ZINC ALLOY INSERTS (6 INCH-14-1-2 INCHES FOR EXTENSION (1) ON 41 INCH BOLT CIRCLE.
7. ZINC ALLOY INSERTS (4 INCH-10x3 INCHES, WITH GALVANIZED SHOULDERED MACHINERY EYE BOLTS 3/4 INCH-10x2 INCHES, FOR CABLE PULLING (4) OPPOSITE KNOCKUPS IN BOTTOM SECTION, MINIMUM STRENGTH OF EYE BOLTS TO BE 5000 lbs.
8. ZINC ALLOY INSERTS 1/2 INCH-13x1-1/2 INCHES (6) FOR MOUNTING JUNCTION CONNECTORS.
9. ZINC ALLOY INSERTS 3/8 INCH-16x1-1/2 INCHES (6) FOR SUPPORTING GROUND BUS.
10. MANUFACTURER'S IDENTIFICATION AND MONTH/YEAR WHEN MANUFACTURED SHALL BE LEGIBLY MARKED IN/ON CONCRETE ON THE OUTSIDE UPPER PART.
11. PROVIDE (2) 3/4" DIAMETER x 8' COPPER CLAD DRIVEN GROUND RODS AT OPPOSITE CORNERS WITH A #2 COPPER CONDUCTOR CONNECTED TO EACH ROD WITH EXO WELD ALL COILED INSIDE THE STRUCTURE.

NORTHEAST UTILITIES
REF: SPC #4010.01

5 EVERSOURCE HEX MANHOLE DETAIL
NTS



NOTES:
1. FOUR 3/8" INCH - 16 X 1-1/2 INCHES ZINC ALLOY INSERTS EQUALLY SPACED ON 35-1/2" INCH BOLT CIRCLE.
2. THREE HOLES EQUALLY SPACED ON 41 INCH BOLT CIRCLE.
3. FINAL 28 DAY CONCRETE STRENGTH 5000 psi.
4. CONCRETE AND CONCRETE DESIGN SHALL BE IN ACCORDANCE WITH ACI 318-1988 (OR LATEST REVISION THEREOF).
5. MANUFACTURER'S IDENTIFICATION AND MONTH/YEAR WHEN MANUFACTURED SHALL BE LEGIBLY MARKED IN/ON CONCRETE ON THE INNER SIDE.

NORTHEAST UTILITIES
REF: SPC E-046

4 ELECTRICAL SERVICE EQUIPMENT ENCLOSURE1
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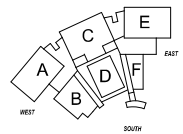
CES #2023066.00

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
2	10/23/2024	ADDENDUM NO. 3
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

MEP SITE UTILITY PLAN - DETAILS & SCHEDULES

Date 07/08/2024
Scale NTS
Proj. Number 22367.00
Drawing Number SU501

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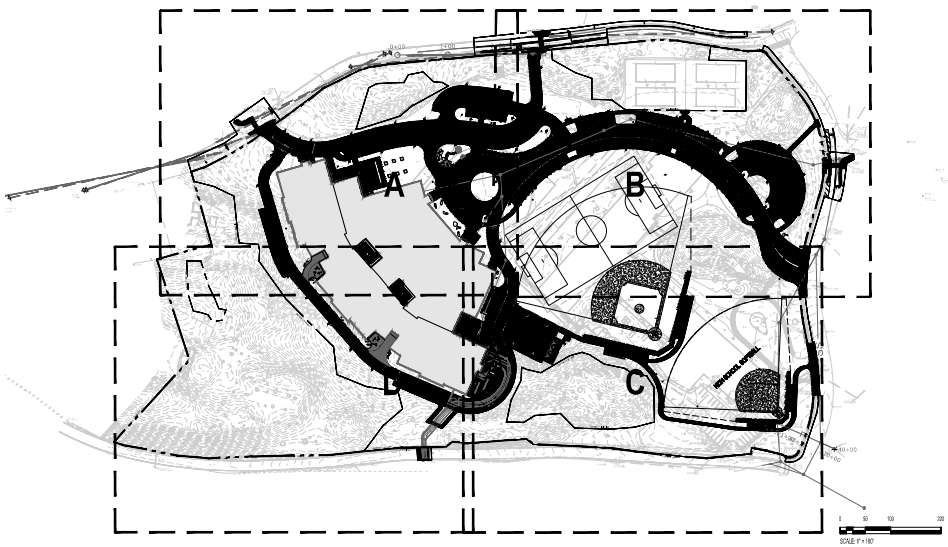

KEY PLAN

1" = 100'

TRAFFIC SIGNAGE LEGEND

KEY	NAME	IMAGE	SIZE	REFERENCE
A	STOP	STOP	18" X 18"	R1-1 DETAIL
B	HC PARKING	PERSON	12" X 18"	R7-8 DETAIL
C	HC VAN PARKING	PERSON VAN ACCESSIBLE	12" X 18" 12" X 6"	R7-8P DETAIL
D	DO NOT ENTER	DO NOT ENTER	12" X 18"	R5-1 DETAIL
E	TRUCK NO MIGHT TURN	NO TRUCK TURN	18" X 18"	R3-2 DETAIL
F	NO PARKING EMERGENCY VEHICLES ONLY	FIRE LANE NO PARKING	12" X 18"	R8-3a DETAIL
G	CARPOOL VEHICLES ONLY(LEFT ARROW)	CARPOOL ONLY	12" X 18"	R3-8b DETAIL
H	CARPOOL VEHICLES ONLY(RIGHT ARROW)	CARPOOL ONLY	12" X 18"	R3-8c DETAIL
I	ELECTRIC VEHICLE CHARGING	ELECTRIC VEHICLE CHARGING	12" X 18"	R7-8E DETAIL
J	VISITOR PARKING ONLY	VISITOR PARKING ONLY	12" X 18"	R7-8c DETAIL

GENERAL SITE NOTES:

1. BOUNDARY AND TOPOGRAPHIC DATA WAS OBTAINED FROM SURVEY PREPARED BY MARTIN SURVEYING ASSOCIATES, LLC. THE LANDSCAPE ARCHITECT MAKES NO WARRANTY FOR INFORMATION SHOWN. AS EXISTING, CONTRACTOR SHALL VERIFY CONDITIONS IN FIELD AND THEIR RELATIONSHIP TO NEW CONSTRUCTION. DISCREPANCIES SHALL BE REPORTED TO THE OWNER'S REPRESENTATIVE FOR RESOLUTION PRIOR TO COMMENCING RELATED WORK.

2. PRIOR TO COMMENCING CONSTRUCTION, CONTRACTOR SHALL NOTIFY "CALL BEFORE YOU DIG" (PHONE NUMBER: 811) FOR FIELD LOCATING AND CLEAR MARKING OF SUBSURFACE UTILITIES PRIOR TO ANY EXCAVATION.

3. CONTRACTOR SHALL ESTABLISH AND/OR MAINTAIN AT LEAST ONE (1) BENCHMARK ON SITE FOR VERTICAL AND HORIZONTAL REFERENCE.

4. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE TOWN OF GREENWICH, ALL LOCAL, STATE AND FEDERAL REQUIREMENTS SHALL BE ADHERED TO IN THE PERFORMANCE OF THIS WORK.

5. THE CONSTRUCTION LIMITS ARE AS DEFINED IN THE SPECIFICATIONS AND AS SHOWN IN THE DRAWINGS. DRAWINGS INDICATE MINIMUM LIMITS OF DEMOLITION/PAVEMENT REMOVAL REQUIRED FOR CONSTRUCTION OF NEW IMPROVEMENTS. WORK SHALL NOT EXCEED CONTRACT LIMIT LINES UNLESS PRIOR WRITTEN APPROVAL IS OBTAINED FROM THE OWNER'S REPRESENTATIVE.

6. ALL EXISTING TREES ALONG NEWLY ESTABLISHED TREELINE TO BE EVALUATED BY LICENSED ARBORIST FOR HEALTH PRIOR TO CONSTRUCTION, DURING CONSTRUCTION, AND AFTER CONSTRUCTION. CORRECTIVE ACTIONS PER ARBORIST RECOMMENDATIONS ARE THE RESPONSIBILITY OF THE CONTRACTOR.

SITE PREPARATION NOTES:

1. COORDINATE WORK ON THIS SHEET WITH ALL DRAWINGS PERTAINING TO SITE WORK IN THE CONTRACT DOCUMENT SET. THE CONTRACTOR IS RESPONSIBLE FOR MAKING HIM OR HERSELF FAMILIAR WITH THE FULL SET OF DOCUMENTS FOR ALL SITE RELATED ITEMS.

2. PRIOR TO ANY DEMOLITION ACTIVITY THE CONTRACTOR SHALL INSTALL ALL EROSION CONTROL MEASURES. SEE SHEET C101, DRAWINGS FOR EROSION CONTROL PLANS & NOTES.

3. CONTRACTOR SHALL COORDINATE WITH OWNERS REPRESENTATIVE AND THE GENERAL CONTRACTOR REGARDING STAGING AREAS, CONSTRUCTION FENCING LIMITS AND GATES, AND CONSTRUCTION TRAFFIC & PARKING.

4. LIMITS OF EXISTING PAVEMENTS AND CURBS TO REMAIN SHALL BE NEATLY SAWCUT TO PROVIDE FOR A NEAT, CLEAN JOINT/OR FINISHED EDGE.

5. REMOVAL OF SITE IMPROVEMENTS SHALL INCLUDE ALL SURFACE AND SUBSURFACE IMPROVEMENTS RELATED TO THE ITEMS DESIGNATED FOR REMOVAL EXCEPT WHERE INDICATED OTHERWISE. REMOVAL OF TREES AND SHRUBS INCLUDES CLEARING AND GRUBBING OF STUMPS.

6. DEBRIS FROM DEMOLITION SHALL BE REMOVED FROM SITE AND DISPOSED OF PROPERLY BY CONTRACTOR.

7. UTILITIES DESIGNATED TO BE ABANDONED SHALL BE DONE SO IN A SAFE AND LEGAL MANNER, COORDINATE WITH THE APPROPRIATE UTILITY AUTHORITIES AND THE OWNER'S REPRESENTATIVE.

8. ITEMS NOTED TO BE REMOVED AND SAVED FOR OWNER SHALL BE STORED ON SITE AND PROTECTED BY CONTRACTOR FOR RECOVERY BY OWNER. ITEMS NOTED TO BE RE-LOCATED SHALL BE REMOVED, STORED AND PROTECTED FROM DAMAGE UNTIL RE-INSTALLATION. STORED ITEMS DAMAGED BY CONTRACTOR SHALL BE REPLACED TO MATCH BY CONTRACTOR.

9. ALL SAW CUTS SHALL BE STRAIGHT AND CLEAN.

10. COORDINATE WITH LANDSCAPE ARCHITECT AND MANUFACTURER TO SELECT UP TO 7 TREES OF THOSE DESIGNATED TO BE REMOVED TO BE SALVAGED AND SALVAGED FOR REUSE AS SITE BENCHES (LIVE EDGE WOOD BENCH). SEE DETAILS AND SPECIFICATIONS.

11. CONTRACTOR TO OVER EXCAVATE TO A DEPTH OF 6" AND AS NOTED BY THE GEOTECHNICAL ENGINEER IN AREAS OF ROCK REMOVAL TO ALLOW FOR PROPOSED PLANTING. REMAINING ROCK TO BE MODIFIED TO ALLOW FOR POSITIVE DRAINAGE.

12. PRIOR TO ANY CONSTRUCTION WITHIN THE EXISTING WOODLAND AREAS TO BE PROTECTED, THE CONTRACTOR SHALL NOTIFY THE LANDSCAPE ARCHITECT AND TREE WARDEN TO ENSURE THAT ANY PRECONSTRUCTION MEETINGS OR EXPECTATIONS FOR CONSTRUCTIONS WITH IN THOSE AREAS ARE MET.

SPECIAL NOTE: NO ADDITIONAL TREES SHALL BE REMOVED WITHOUT SPECIFIC WRITTEN AUTHORIZATION FROM THE LA AND TREE WARDEN.

13. THE CONTRACTOR SHALL PROVIDE THE SERVICES OF AN ARBORIST TO MONITOR ALL TREES TO REMAIN BEFORE, DURING, AND AFTER CONSTRUCTION. ARBORIST SHALL COORDINATE WITH THE LANDSCAPE ARCHITECT, TREE WARDEN, AND TOWN ARBORIST TO ENSURE THE PROPER METHODS ARE COORDINATED.

SITE LAYOUT NOTES:

1. COORDINATE WORK ON THIS SHEET WITH ALL DRAWINGS PERTAINING TO SITE WORK IN THE CONTRACT DOCUMENT SET. THE CONTRACTOR IS RESPONSIBLE FOR MAKING HIM OR HERSELF FAMILIAR WITH THE FULL SET OF DOCUMENTS FOR ALL SITE RELATED ITEMS.

2. LOCATION AND ALIGNMENT OF SITE IMPROVEMENTS SUCH AS FENCES, ETC., SHALL BE STAKED IN FIELD BY CONTRACTOR AND APPROVED BY THE LANDSCAPE ARCHITECT OR CONSTRUCTION MANAGER PRIOR TO CONSTRUCTION OF ANY AND ALL SUCH IMPROVEMENTS.

3. ALL DIMENSIONS ARE TO THE NEAREST FOOT UNLESS OTHERWISE NOTED. ALL ANGLES ARE 90° UNLESS OTHERWISE NOTED. ALL PROPOSED RADII ARE 5' RADIUS UNLESS OTHERWISE NOTED. DIMENSIONS ARE TO THE FACE OF CURB OR WALLS AND TO CENTERLINES OF PAVEMENT MARKINGS. DOORS AND LIGHT POLES EXCEPT WHERE OTHERWISE INDICATED ON THIS PLAN.

4. ALL PAVEMENT CUTS IN CONCRETE ARE TO THE NEAREST JOINT - CONCRETE WALK PAVEMENT LIMITS SHOWN ARE APPROXIMATE. CONTRACTOR SHALL INSTALL NEW WALK TO MATCH EXISTING TO THE GREATEST EXTENT POSSIBLE.

SITE GRADING NOTES:

1. COORDINATE WORK ON THIS SHEET WITH ALL DRAWINGS PERTAINING TO SITE WORK IN THE CONTRACT DOCUMENT SET. THE CONTRACTOR IS RESPONSIBLE FOR MAKING HIM OR HERSELF FAMILIAR WITH THE FULL SET OF DOCUMENTS FOR ALL SITE RELATED ITEMS.

2. BLEND PROPOSED GRADES INTO EXISTING GRADES SMOOTHLY AND NEATLY. ALL SAWCUTS SHALL BE STRAIGHT AND CLEAN.

3. DISTURBED AREAS NOT INDICATED TO RECEIVE PAVEMENT OR OTHER TREATMENT SHALL BE SEEDED LAWN.

4. SEE SITE PLANTING PLANS FOR EXTENT AND REQUIRED DEPTH AND WIDTH OF CONTINUOUS PLANTING BEDS.

5. PRIOR TO FINAL ACCEPTANCE THE CONTRACTOR SHALL PUMP ALL ON-SITE DRAINAGE STRUCTURE SUMPS OF SILT AND DEBRIS.

6. ALL ACCESSIBLE ROUTES SHOWN ON PLAN SHALL BE A MAXIMUM OF 1:12 (AT RAMPS) OR 1:20 (ALL OTHER AREAS) IN THE DIRECTION OF TRAVEL WITH A MAXIMUM OF 1:50 CROSS SLOPE.

SITE PLANTING NOTES:

1. COORDINATE WORK ON THIS SHEET WITH ALL DRAWINGS PERTAINING TO SITE WORK IN THE CONTRACT DOCUMENT SET. THE CONTRACTOR IS RESPONSIBLE FOR MAKING HIM OR HERSELF FAMILIAR WITH THE FULL SET OF DOCUMENTS FOR ALL SITE RELATED ITEMS.

2. ALL DISTURBED AREAS NOT COVERED BY STRUCTURES, PAVEMENTS, MULCHES, PLANTING BEDS OR TREE PITS SHALL BE SEEDED LAWN.

3. CONTRACTOR SHALL SET PLANTS OUT IN FIELD FOR APPROVAL OF LOCATIONS BY ARCHITECT PRIOR TO PLANTING.

4. SPADE EDGE ALL PLANTING BEDS WITHIN LAWN AREAS UNLESS NOTED OTHERWISE. TO RECEIVE STEEL EDGING, PROVIDE CLEAN SPADED EDGE AT PERIMETER OF ALL PLANTING BEDS AND TREE PITS ADJACENT LAWN AREAS. SPADE EDGE OF NEWLY PLANTED LAWN AREAS FOLLOWING SECOND MOWING.

5. ALL PLANTING BEDS AND PITS TO RECEIVE APPROVED MULCH TO DEPTHS INDICATED IN PLANTING DETAILS.

6. WHERE DISCREPANCIES OCCUR BETWEEN PLANTING QUANTITIES OR TYPES SHOWN ON PLAN AND IN THE PLANT LIST, THE QUANTITY OF PLANTINGS SHOWN ON PLAN SHALL PREVAIL.

7. CONTRACTOR SHALL MEET WITH LANDSCAPE ARCHITECT AND TREE WARDEN PRIOR TO CONSTRUCTION TO DETERMINE STRATEGY FOR PLANTING INSTALLATION WITHIN ESTABLISHED WOODED AREAS AND AREAS OF LEDGE. ACCESS, METHOD OF INSTALL AND MAINTENANCE OF THESE AREAS TO BE SENSITIVE TO SURROUNDING ESTABLISHED ECOSYSTEM.

8. PLANTINGS PROVIDED WITHIN WOODED AREAS TO FOLLOW PLANTING DETAILS AND INPUT FROM TREE WARDEN.

SITE IRRIGATION NOTES:

1. COORDINATE WORK ON THIS SHEET WITH ALL DRAWINGS PERTAINING TO SITE WORK IN THE CONTRACT DOCUMENT SET. THE CONTRACTOR IS RESPONSIBLE FOR MAKING HIM OR HERSELF FAMILIAR WITH THE FULL SET OF DOCUMENTS FOR ALL SITE RELATED ITEMS.

2. CONTRACTOR IS RESPONSIBLE FOR, BUT NOT LIMITED TO, IRRIGATION SYSTEM DESIGN AND COMPLETE INSTALLATION OF IRRIGATION SYSTEM FOLLOWING ALL APPLICABLE CODES AND LAWS.

3. SEPARATE ZONES SHALL BE CREATED ACCORDING TO USE, AS EITHER PLANTING BED OR LAWN AREA IS DELINEATED BY SHEET L404 FOR BASE BID PLANTINGS.

GENERAL SITE LEGEND

- CONTRACT LIMIT LINE
- PROPERTY LINE
- SAWCUT LINE
- CURB
- CATCH BASIN
- YARD DRAIN
- DRAIN INLET
- BOLLARD
- DECORATIVE LIGHT STANDARD (SEE SITE ELECTRICAL PLANS)
- EMERGENCY PHONE BLUE LIGHT (SEE SITE ELECTRICAL PLANS)
- CUSTOM WOOD BENCH / SALVAGED WOOD FROM TREE REMOVAL
- BOULDER
- LARGE PLANTER
- CHAIN LINK FENCE
- METAL SCREEN FENCE

GENERAL SITE ABBREVIATIONS

BIT.	BITUMINOUS
CLF	CHAIN LINK FENCE
CLL	CONTRACT LIMIT LINE
CONC.	CONCRETE
N.I.C.	NOT IN CONTRACT

SITE LAYOUT ABBREVIATIONS

℄	CENTER LINE
DIA.	DIAMETER
EJ	EXPANSION JOINT
EQ.	EQUAL
MAX.	MAXIMUM
MIN.	MINIMUM
R	RADIUS
(TYP.)	TYPICAL CONDITION

SITE GRADING ABBREVIATIONS

BC	BOTTOM OF CURB
BFE	BASEMENT FLOOR ELEVATION
BS	BOTTOM OF STAIR
BW	BOTTOM OF WALL
CB	CATCH BASIN
DI	DRAIN INLET
EL.	ELEVATION
FFE	FINISH FLOOR ELEVATION
FLUSH	FLUSH CONDITION
HP	HIGH POINT
LP	LOW POINT
MAT	MATCH EXISTING GRADE
TC	TOP OF CURB
TF	TOP OF FRAME
TRC	TRANSITION CURB
TS	TOP OF STAIR
TW	TOP OF WALL
YD	YARD DRAIN

SITE PLANTING ABBREVIATIONS

B&B	BALLED & BURLAPPED
CAL.	CALIPER AT 4' HT.
CONT.	CONTAINER
GAL	GALLON CONTAINER
HT.	HEIGHT
O.C.	ON CENTER
PT	PINT CONTAINER
QTY	QUANTITY
SPD	SPREAD

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Greenwich Public Schools

GREENWICH CENTRAL MIDDLE SCHOOL

9 INDIAN ROCK LANE
GREENWICH, CT 06830

STATE PROJECT NO:057-0114 N

Number	Date	Issued For
1	11/05/2024	ADDENDUM NO. 1
	09/09/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

GENERAL SITE INFORMATION

Date: 07/08/2024
Scale: AS SHOWN
Proj. Number: 22367.00
Drawing Number: L001

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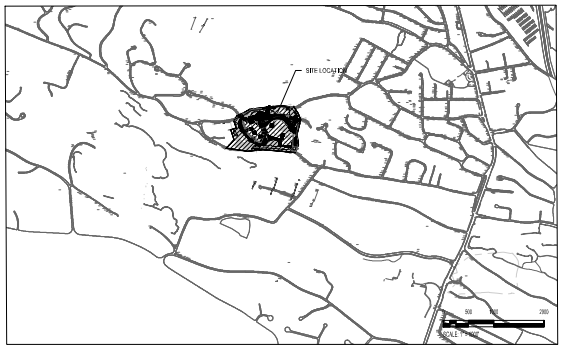

LOCATION MAP

KEY PLAN

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GREENWICH, CT 06830

STATE PROJECT NO:057-0114 N

Number	Date	Issued For
	05/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 3

VICINITY MAP

Date	Drawing Number
07/08/2024	L002
Scale: AS SHOWN	
Proj. Number: 22367.00	

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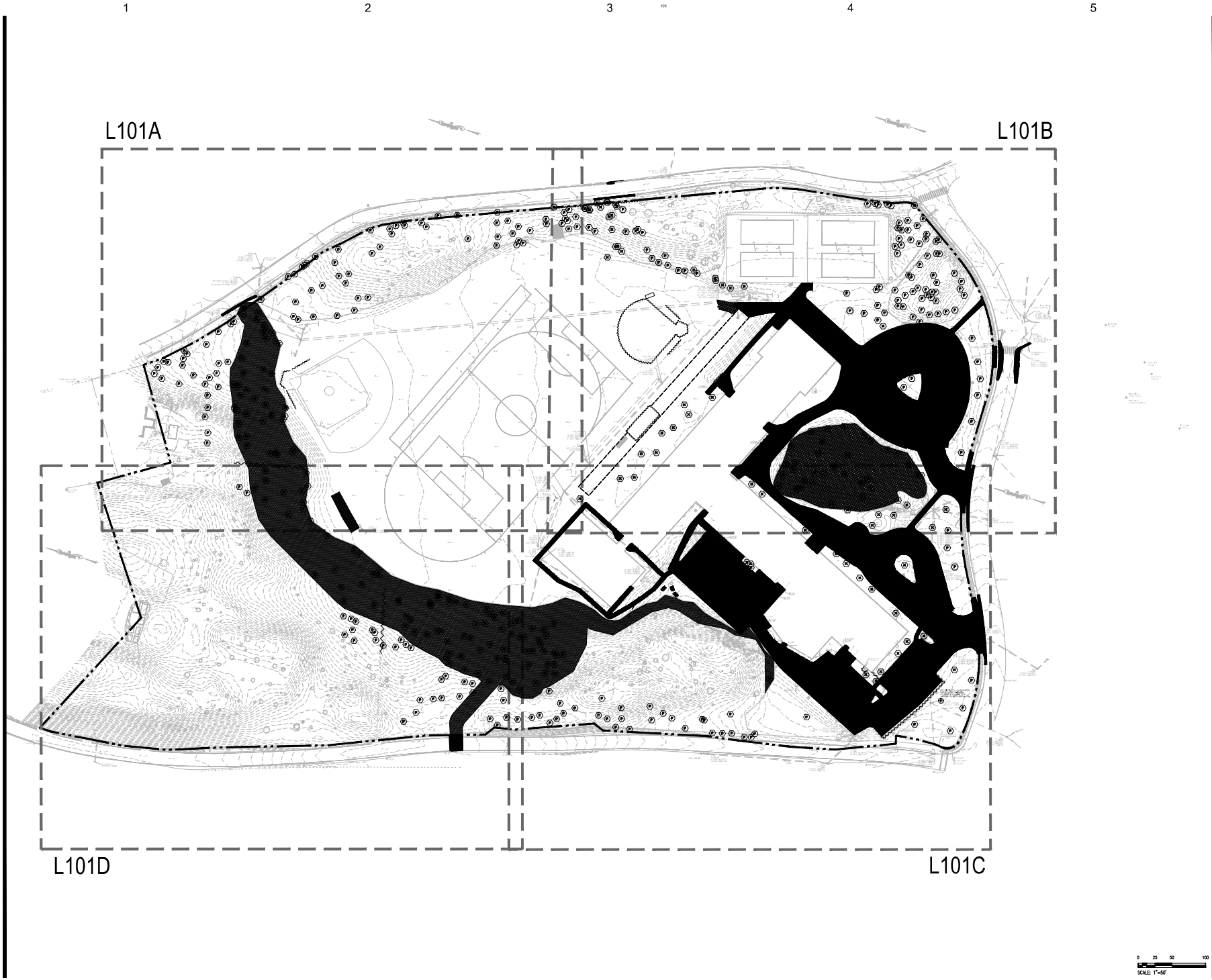

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STATE PROJECT NO:057-0114 N

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SITE DEMOLITION AND PREPARATION OVERALL

Date
07/08/2024
Scale
1" = 50'
Proj. Number
22367.00

Drawing Number
L101

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Greenwich Public Schools

GREENWICH CENTRAL MIDDLE SCHOOL

9 INDIAN ROCK LANE
GREENWICH, CT 06830

STATE PROJECT NO:057-0114 N

Number	Date	Issued For
	05/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SITE DEMOLITION AND PREPARATION NORTHEAST

Date
07/08/2024
Scale
1" = 20'
Proj. Number
22367.00

Drawing Number
L101A

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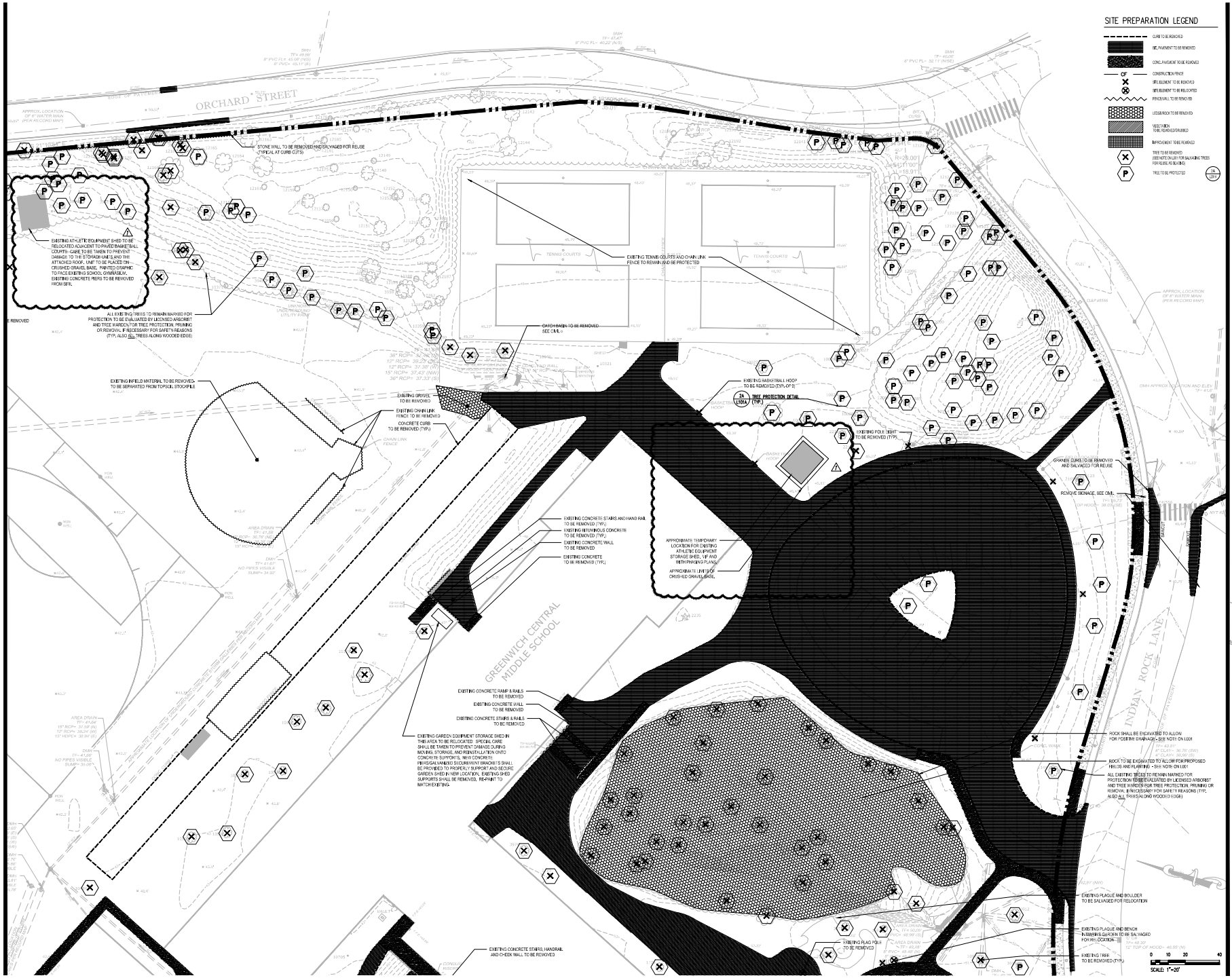

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HWW

Greenwich Public Schools

GREENWICH CENTRAL MIDDLE SCHOOL

9 INDIAN ROCK LANE
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STATE PROJECT NO:057-0114 N

Number	Date	Issued For
1	10/15/2024	ADDENDUM NO.2
	09/09/2024	NEIGHBORHOOD
	07/08/2024	PHASE 2

SITE DEMOLITION AND PREPARATION SOUTHEAST

Date
07/08/2024
Scale
1" = 20'
Proj. Number
22367.00

Drawing Number
L101B

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SITE PREPARATION LEGEND

- CURB TO BE REMOVED
- INT. PAVEMENT TO BE REMOVED
- CONC. PAVEMENT TO BE REMOVED
- CF — CONSTRUCTION FENCE
- SITE ELEMENT TO BE REMOVED
- SITE ELEMENT TO BE RELOCATED
- FENCEWALL TO BE REMOVED
- LEDGE ROCK TO BE REMOVED
- VEGETATION TO BE REMOVED/SALVAGED
- IMPROVEMENT TO BE REMOVED
- TREE TO BE REMOVED (SEE NOTE ON LEGS FOR SALVAGING TREES FOR REUSE AS SEATING)
- P — TREE TO BE PROTECTED (2A / 1914)

0 10 20 40
SCALE: 1"=20'

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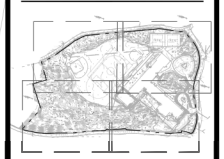
Checked: HWW

Greenwich Public Schools

GREENWICH CENTRAL MIDDLE SCHOOL

9 INDIAN ROCK LANE
GREENWICH, CT 06830

STATE PROJECT NO:057-0114 N



Number	Date	Issued For
	05/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SITE DEMOLITION AND PREPARATION SOUTHWEST

Date: 07/08/2024
Scale: 1" = 20'
Proj. Number: 22367.00
Drawing Number: L101C

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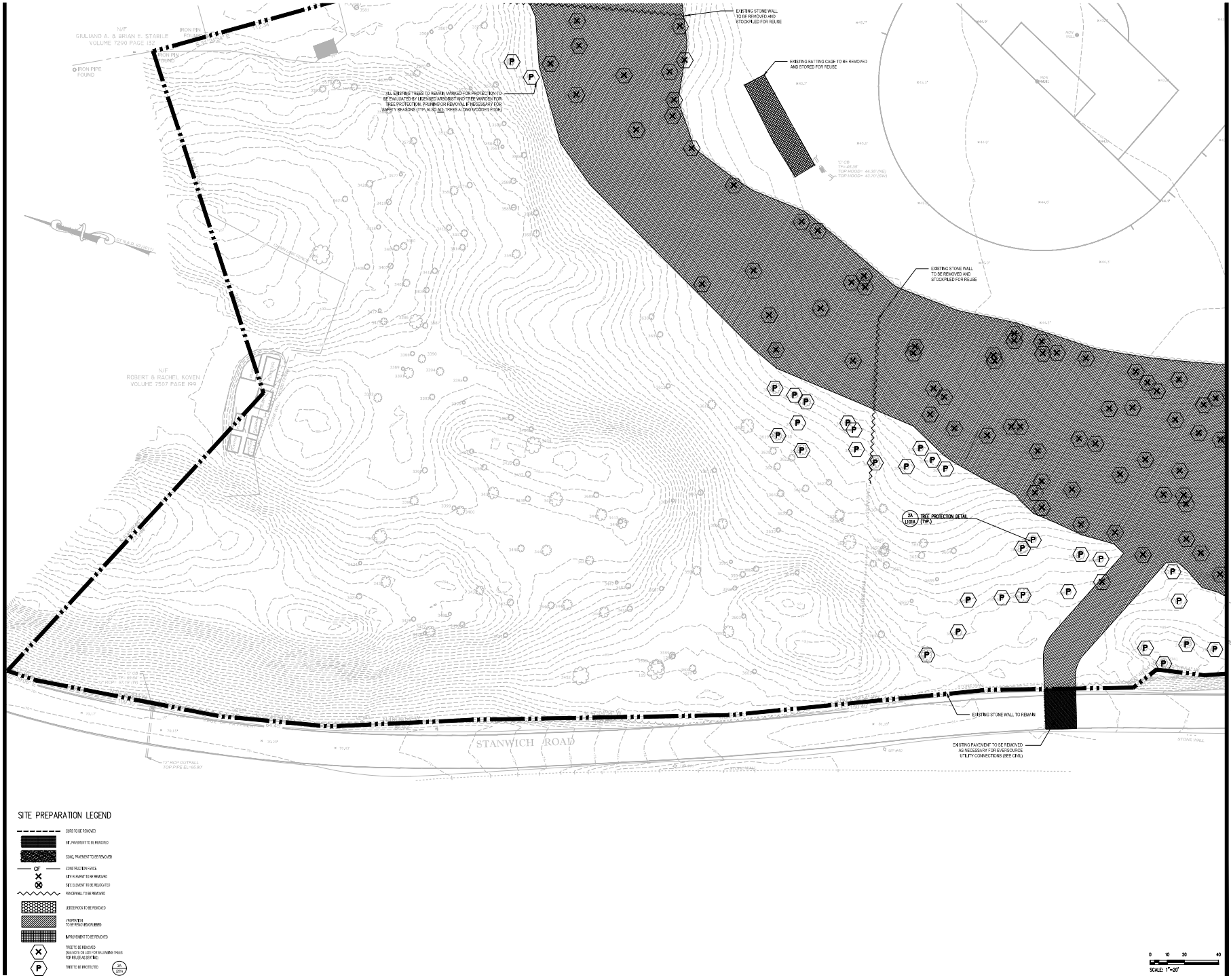

SITE PREPARATION LEGEND

- CURB TO BE REMOVED
- BIT. PAVEMENT TO BE REMOVED
- CONC. PAVEMENT TO BE REMOVED
- CONSTRUCTION FENCE
- SITE ELEMENT TO BE REMOVED
- SITE ELEMENT TO BE RELOCATED
- FENCE/WALL TO BE REMOVED
- LEDGEROCK TO BE REMOVED
- VEGETATION TO BE REMOVED/GRUBBED
- IMPROVEMENT TO BE REMOVED
- TREE TO BE REMOVED (SEE NOTE ON LEFT FOR SALVAGING TREES FOR IN-USE AS SNITING)
- TREE TO BE PROTECTED (3A 1/101A)

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Number	Date	Issued For
	08/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 3

SITE DEMOLITION AND PREPARATION NORTHWEST

Date	Drawing Number
07/08/2024	L101D
Scale: 1" = 20'	
Proj. Number: 22367.00	

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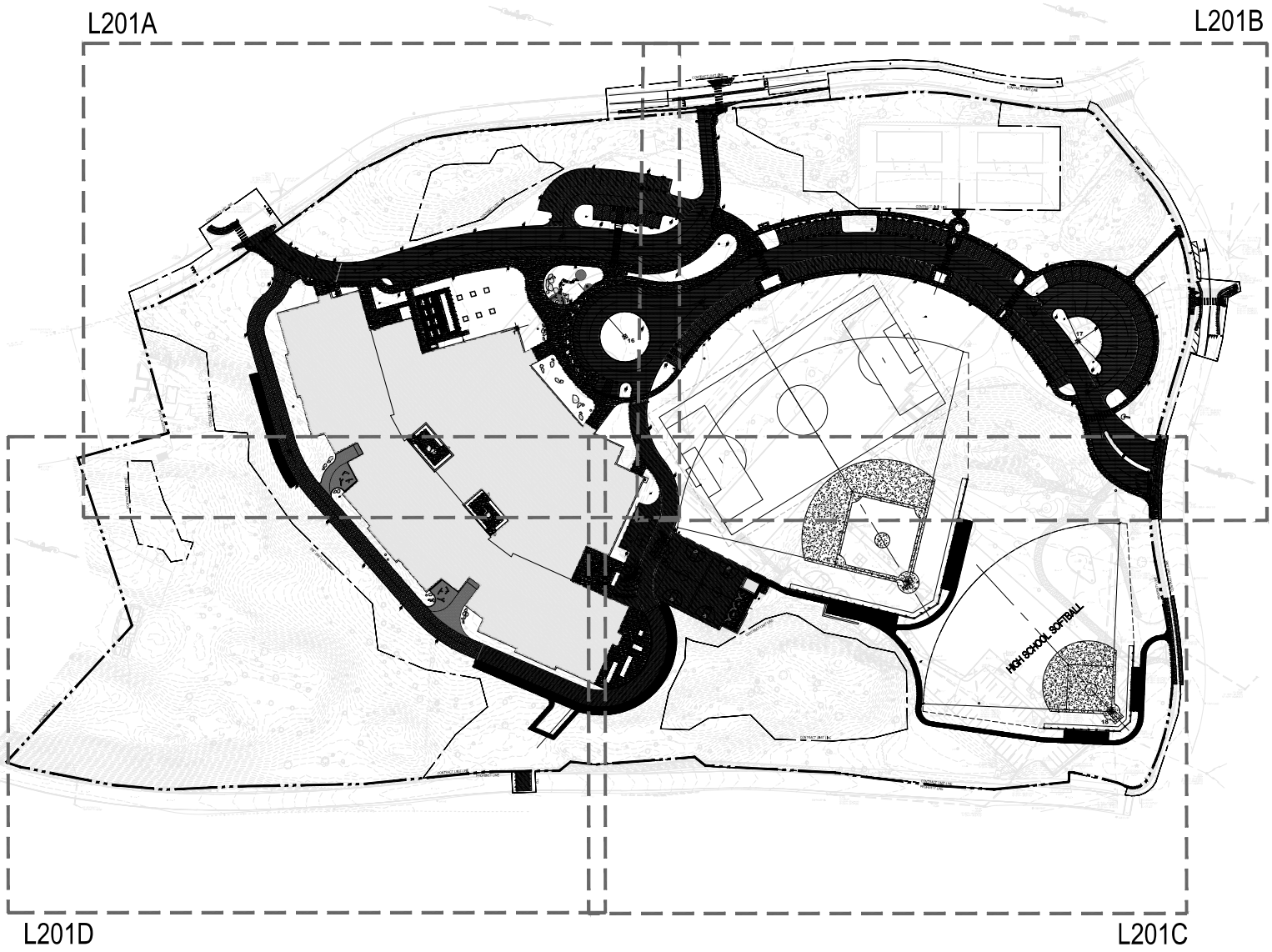

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4	764081.0040	580114.7747
5	764115.9073	580059.3985
6	764178.5127	579914.3728
7	764193.0614	579826.1348
8	764249.4404	579783.9612
9	764256.8882	579782.7955
10	764268.1062	579762.7574
11	764368.6210	579794.0230
12	764087.7174	579158.6711
13	764172.9247	579261.6980
14	764244.7870	579348.1732
15	764148.6193	579733.5967
16	764083.6958	579809.9124
17	764227.9704	579289.0436
18	763814.2844	579128.5142
19	763895.8226	579404.2313

0 25 50 100
SCALE: 1"=50'

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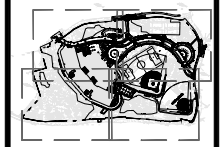
STATE PROJECT NO:057-0114 N



Number	Date	Issued For
	05/10/2024	BIDDING/PERMIT
	07/08/2024	PHASE 3

SITE LAYOUT OVERALL

Date
07/08/2024
Scale
1" = 50'
Proj. Number
22367.00

Drawing Number
L201

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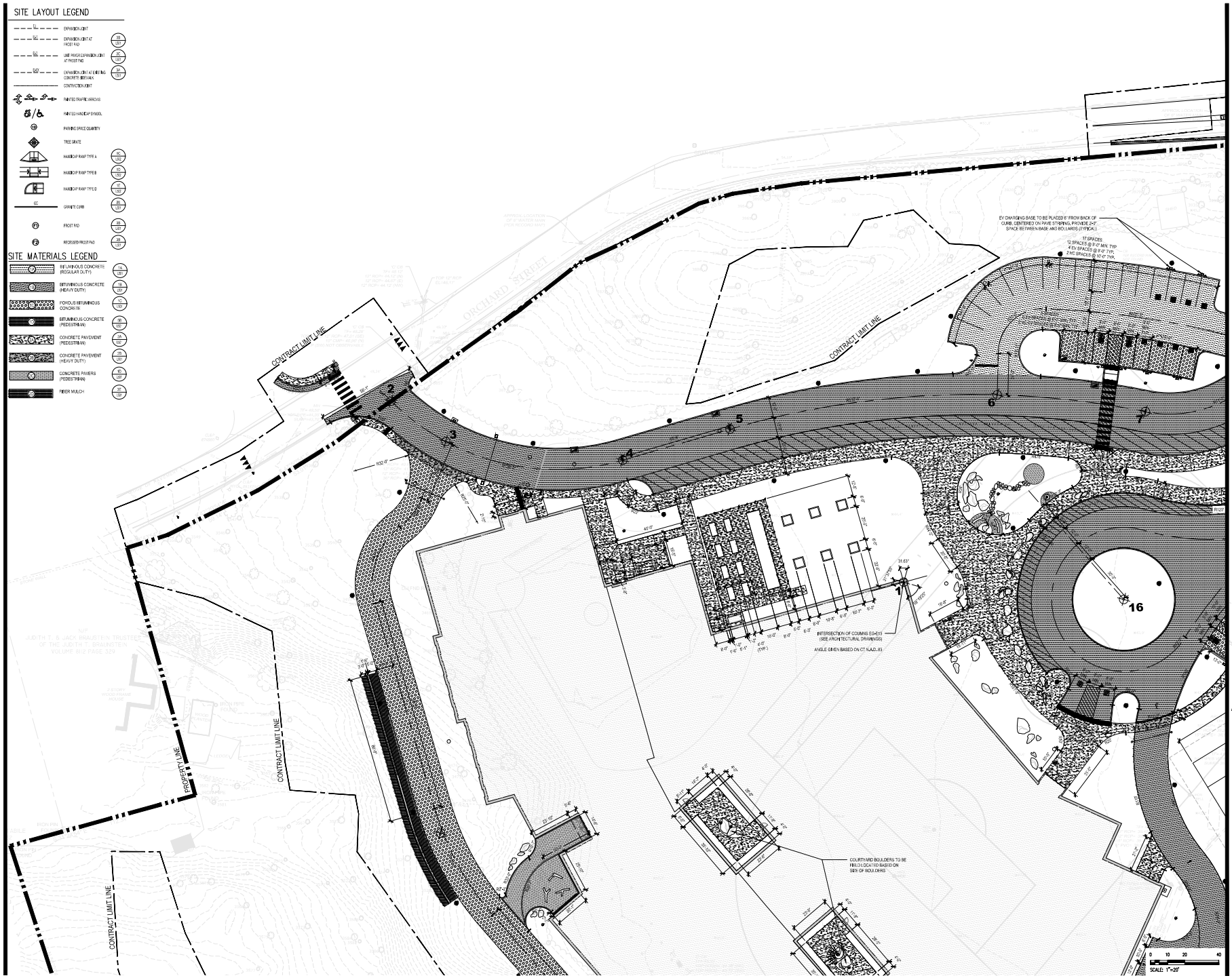

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STATE PROJECT NO:057-0114 N

Number	Date	Issued For
	05/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 3

SITE LAYOUT NORTHEAST

Date: 07/08/2024
Scale: 1" = 20'
Proj. Number: 22367.00
Drawing Number: L201A

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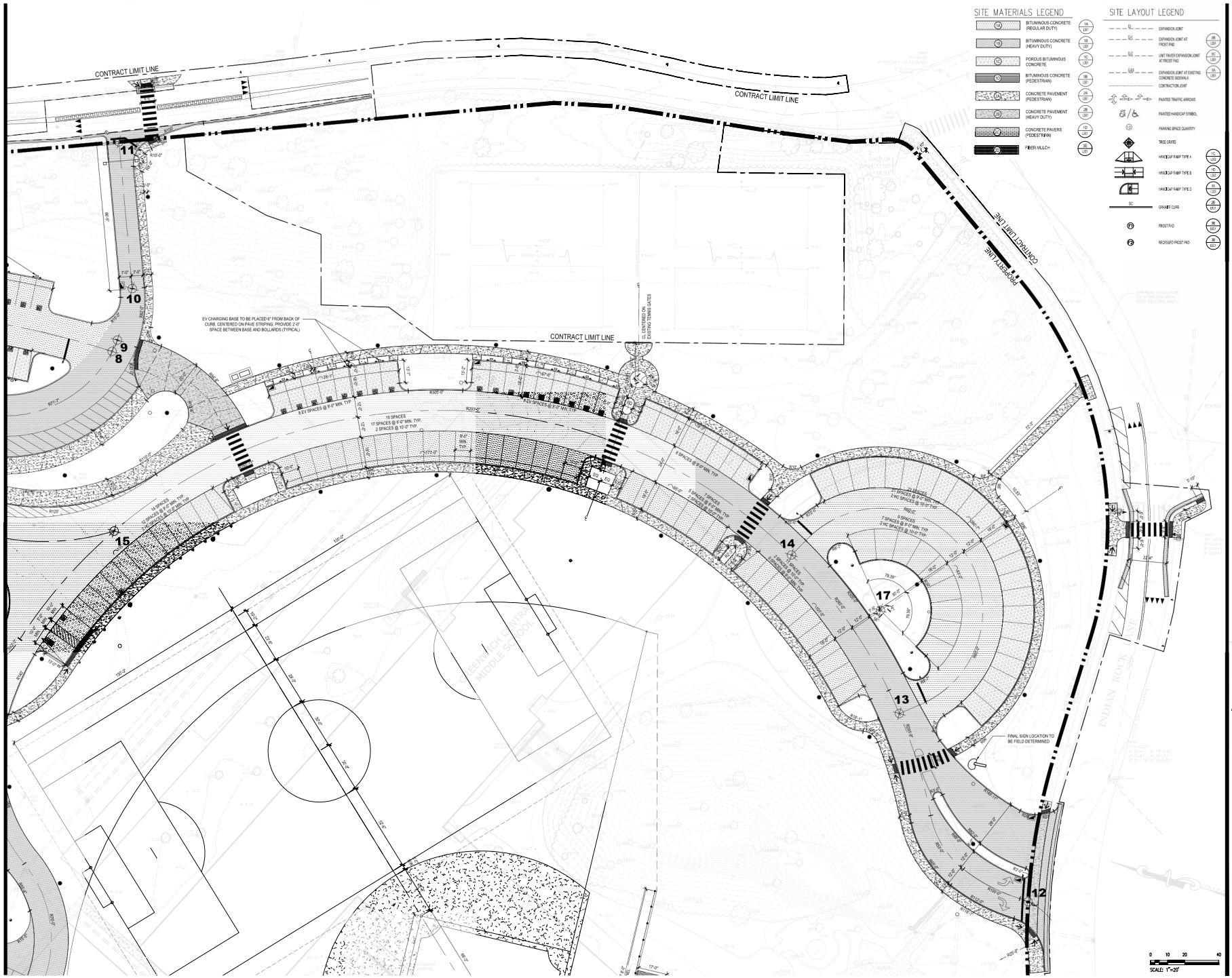

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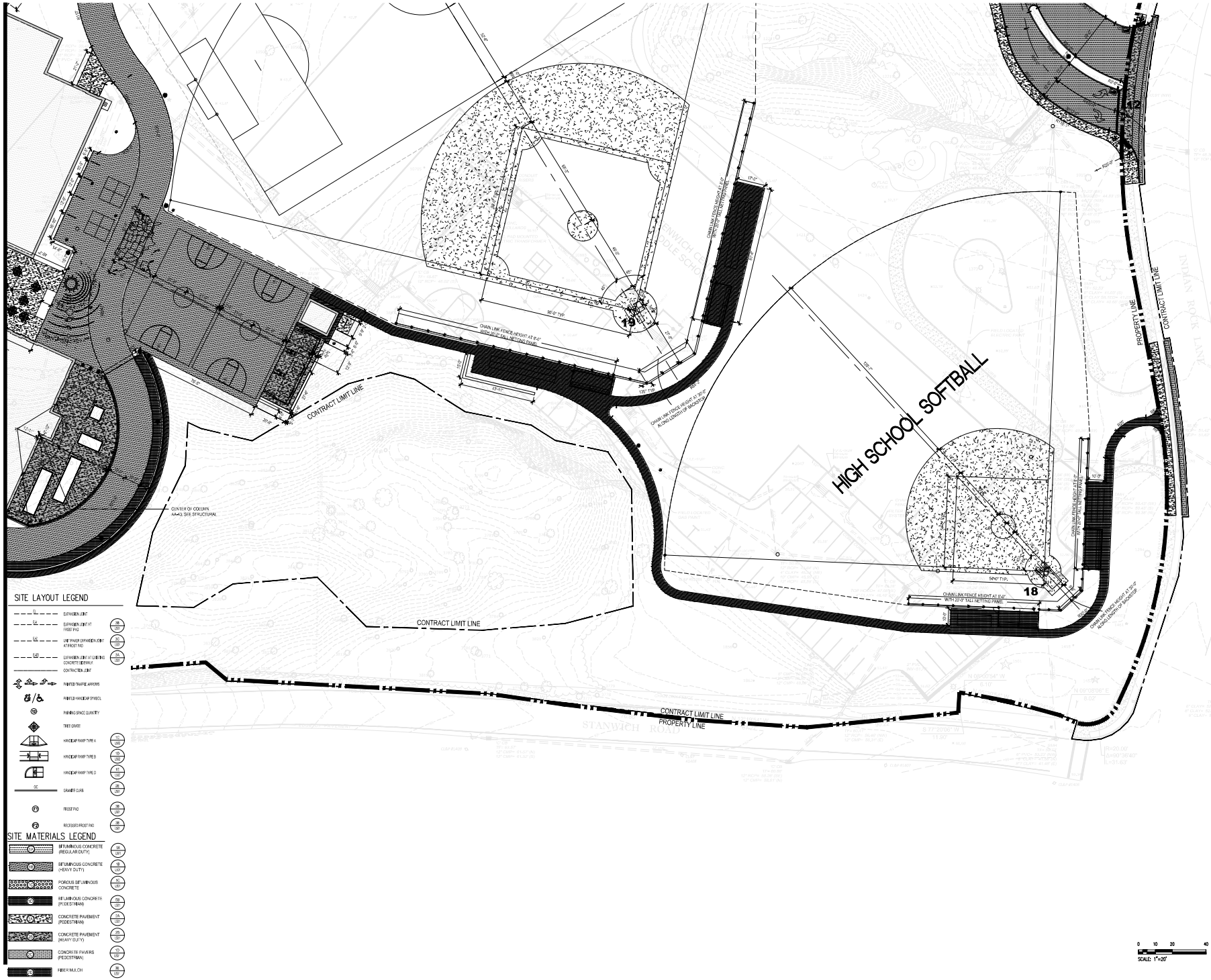
STATE PROJECT NO:057-0114 N

Number	Date	Issued For
	05/10/2024	BIDDING/PERMIT
	07/08/2024	PHASE 3

SITE LAYOUT SOUTHEAST

Date: 07/08/2024
Scale: 1" = 20'
Proj. Number: 22367.00
Drawing Number: L201B

P:\Projects\Proj\22-22367-00-Documentation\03-Drawings\ArchiCAD\Sht\L201-SiteLayout.dwg September 26, 2024 - 8:37 AM



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Number	Date	Issued For
	05/10/2024	BIDDING/PERMIT
	07/08/2024	PHASE 3

SITE LAYOUT SOUTHWEST

Date: 07/08/2024
Scale: 1" = 20'
Proj. Number: 22367.00
Drawing Number: L201C

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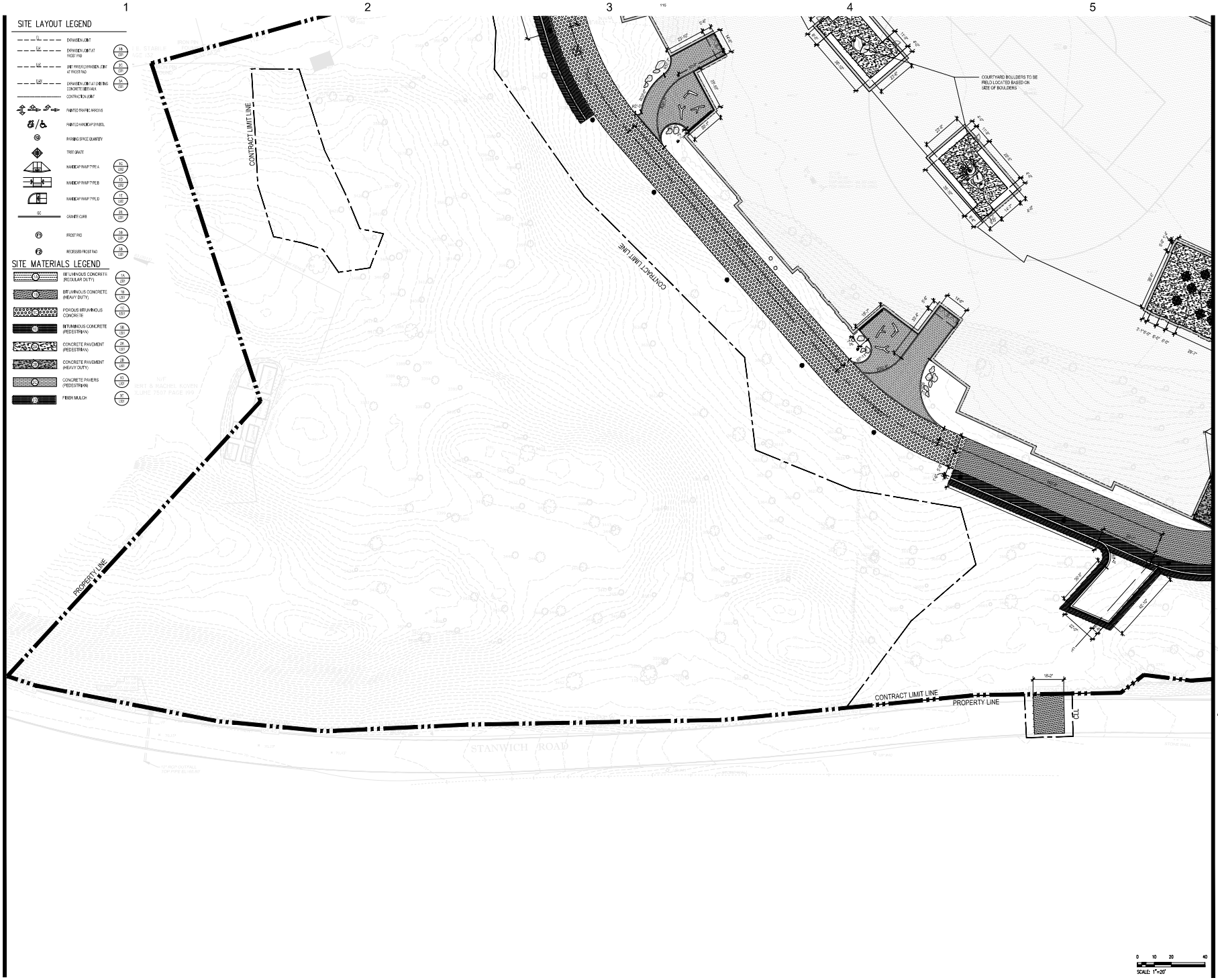

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Number	Date	Issued For
	05/10/2024	BIDDING/PERMIT
	07/08/2024	PHASE 3

SITE LAYOUT NORTHWEST

Date
07/08/2024
Scale
1" = 20'
Proj. Number
22367.00

Drawing Number
L201D

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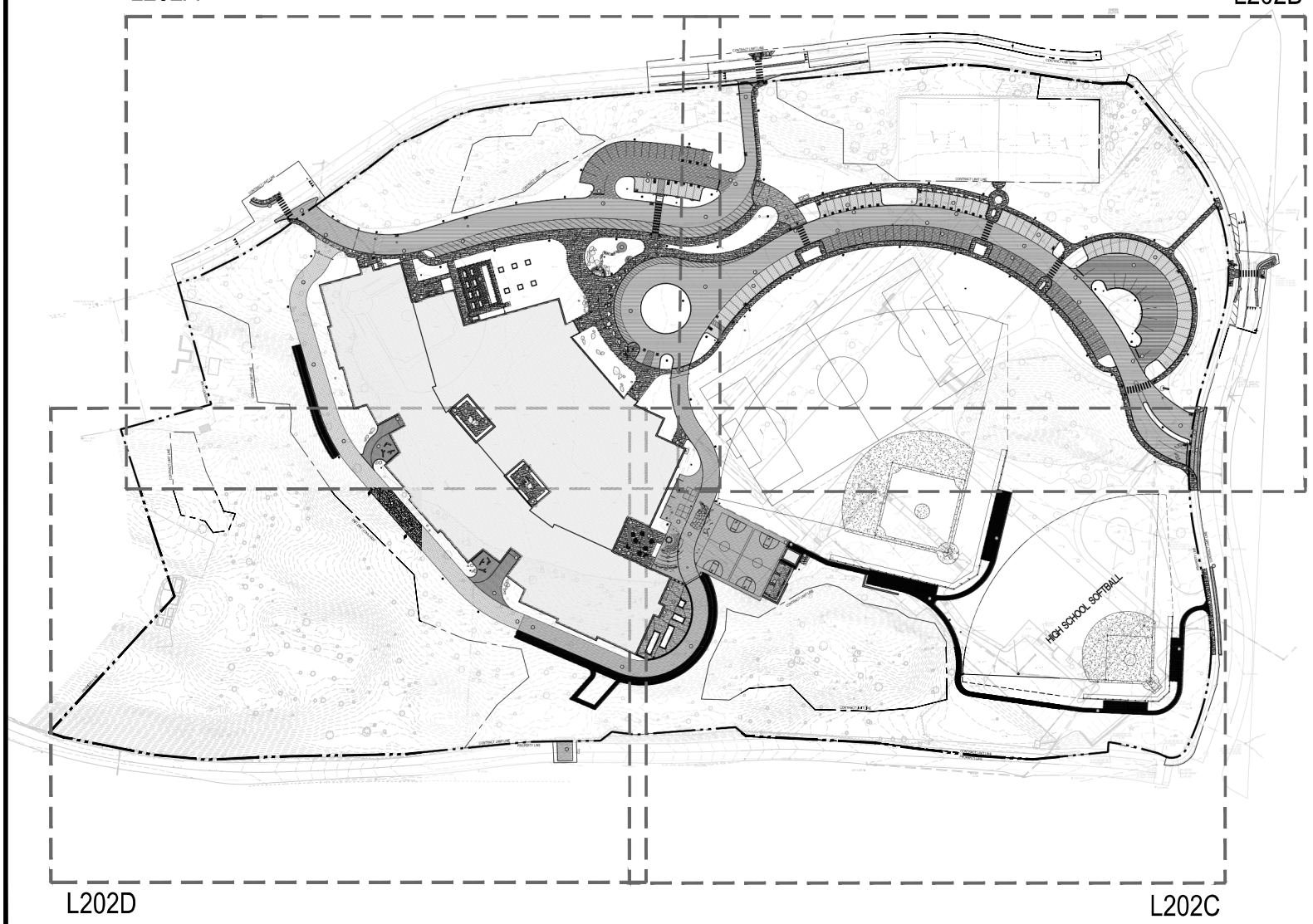

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SCALE: 1"=50'

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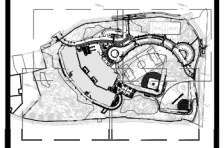
STATE PROJECT NO:057-0114 N



Number	Date	Issued For
	05/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SITE MATERIALS OVERALL

Date
07/08/2024
Scale
1" = 50'
Proj. Number
22367.00

Drawing Number
L202

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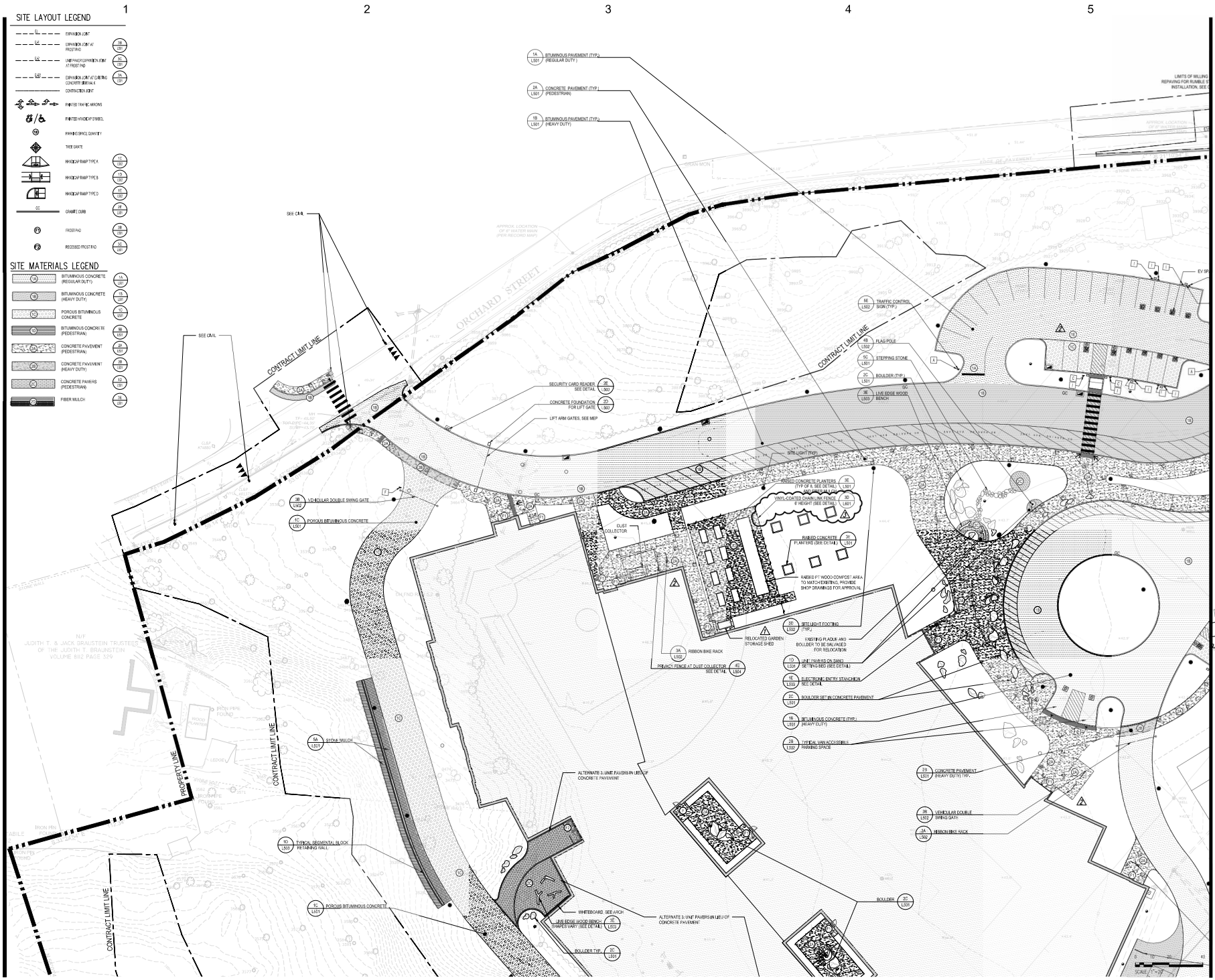

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GREENWICH CENTRAL MIDDLE SCHOOL

9 INDIAN ROCK LANE
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STATE PROJECT NO:057-0114 N

Number	Date	Issued For
3	11/05/2024	ADDENDUM NO. 6
2	10/30/2024	ADDENDUM NO. 4
1	10/15/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SITE MATERIALS NORTHEAST

Date
07/08/2024
Scale
1" = 20'
Proj. Number
22367.00

Drawing Number
L202A

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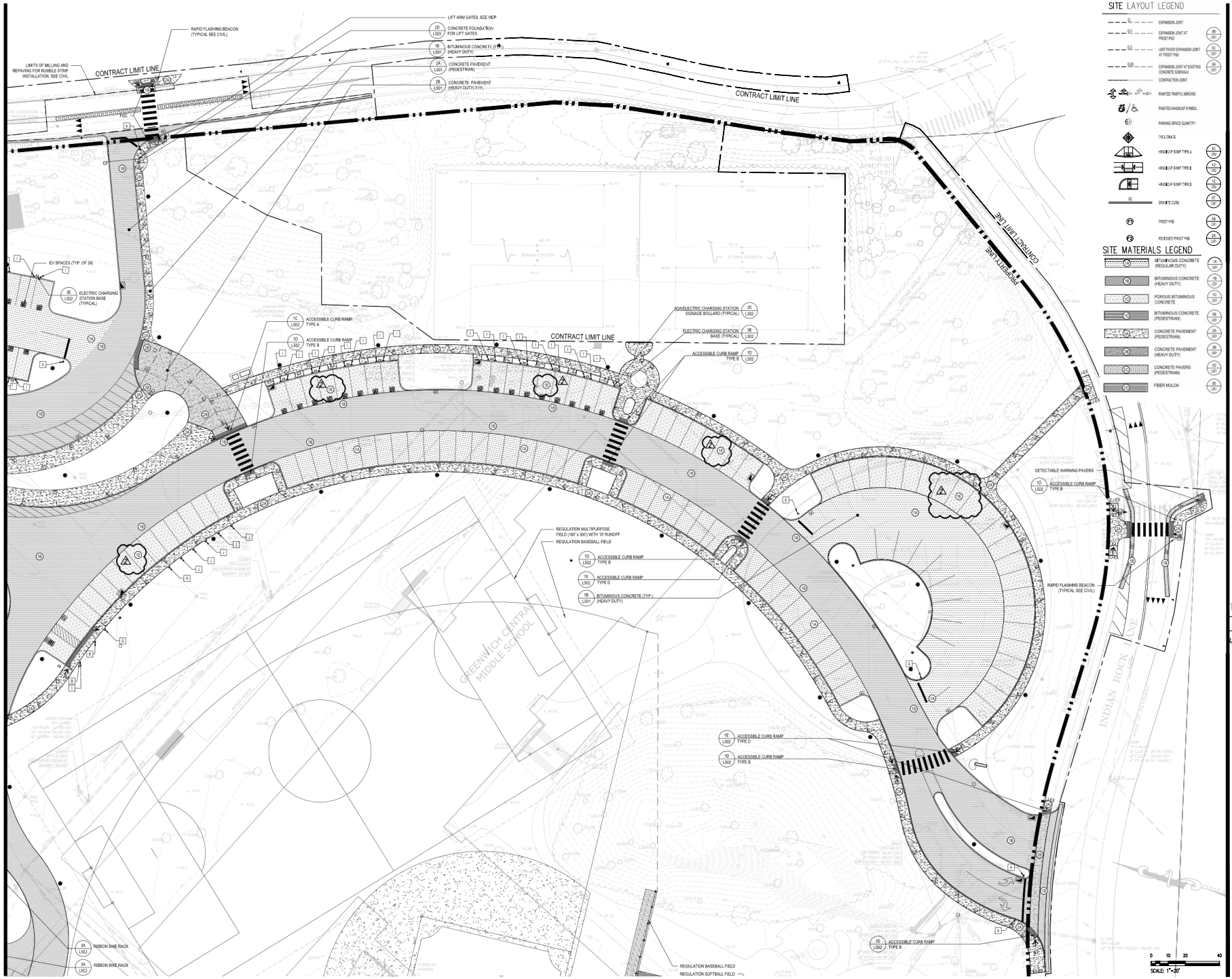

SITE LAYOUT LEGEND

- EXPANSION JOINT
- EXPANSION JOINT AT FROST PAD
- UNIT PAVER EXPANSION JOINT AT FROST PAD
- EXPANSION JOINT AT EXISTING CONCRETE SIDEWALK
- CONTRACTION JOINT
- PAINTED TRAFFIC ARROWS
- PAINTED HANDICAP SYMBOL
- PARKING SPACE QUANTITY
- TREE GRATE
- HANDICAP RAMP TYPE A
- HANDICAP RAMP TYPE B
- HANDICAP RAMP TYPE D
- GRANITE CURB
- FROST PAD
- RECESSED FROST PAD

SITE MATERIALS LEGEND

- BITUMINOUS CONCRETE (REGULAR DUTY)
- BITUMINOUS CONCRETE (HEAVY DUTY)
- POROUS BITUMINOUS CONCRETE
- BITUMINOUS CONCRETE (PEDESTRIAN)
- CONCRETE PAVEMENT (PEDESTRIAN)
- CONCRETE PAVEMENT (HEAVY DUTY)
- CONCRETE PAVERS (PEDESTRIAN)
- FIBER MULCH

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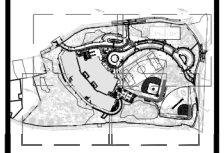
STATE PROJECT NO:057-0114 N



Number	Date	Issued For
1	10/30/2024 09/30/2024 07/08/2024	ADDENDUM NO. 4 BIDDING/PERMIT PHASE 2

SITE MATERIALS SOUTHEAST

Date
07/08/2024
Scale
1" = 20'
Proj. Number
22367.00

Drawing Number
L202B

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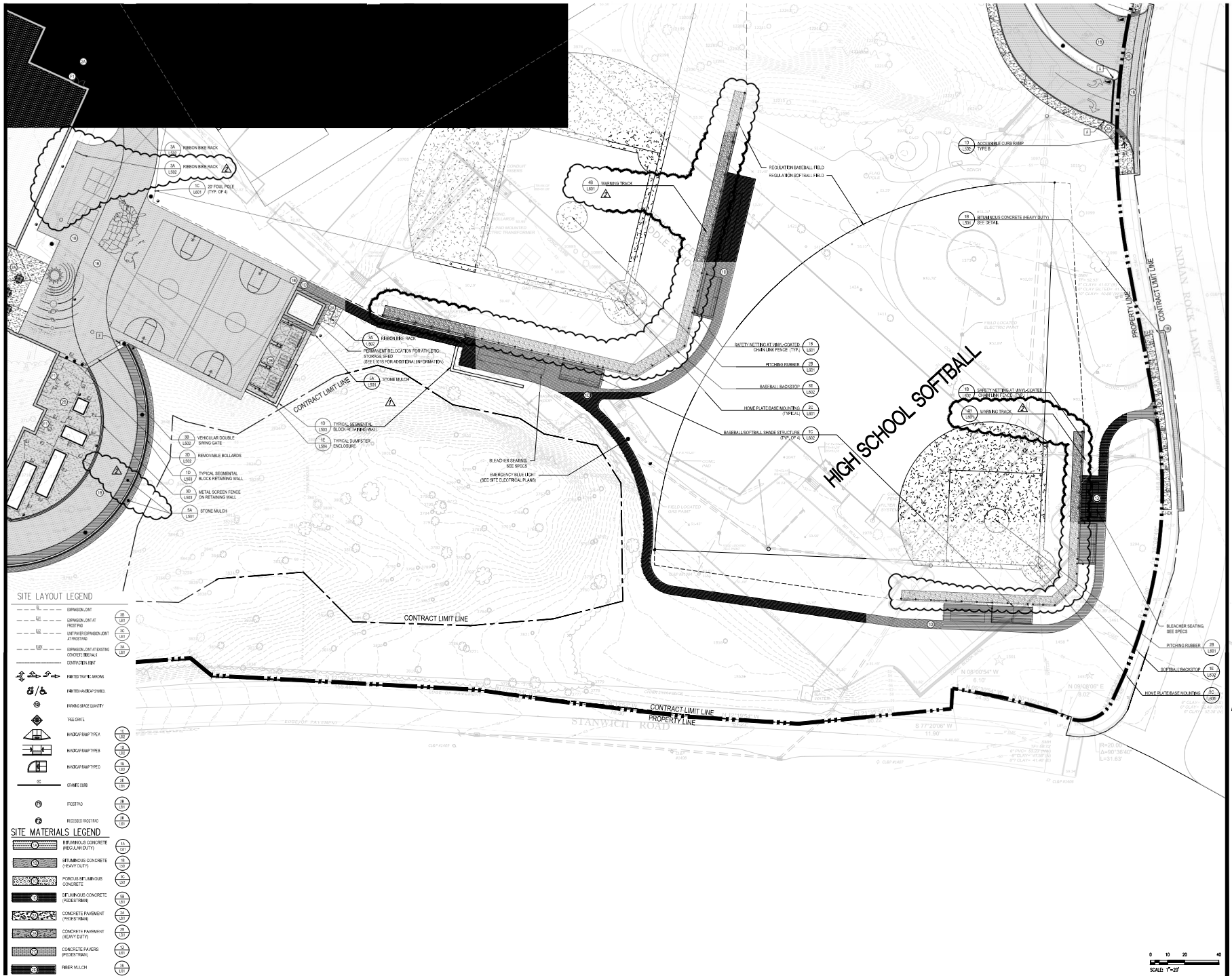

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9 INDIAN ROCK LANE
GREENWICH, CT 06830

STATE PROJECT NO:057-0114 N

Number	Date	Issued For
2	10/30/2024	ADDENDUM NO. 4
1	10/15/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SITE MATERIALS SOUTHWEST

Date
07/08/2024
Scale
1" = 20'
Proj. Number
22367.00

Drawing Number
L202C

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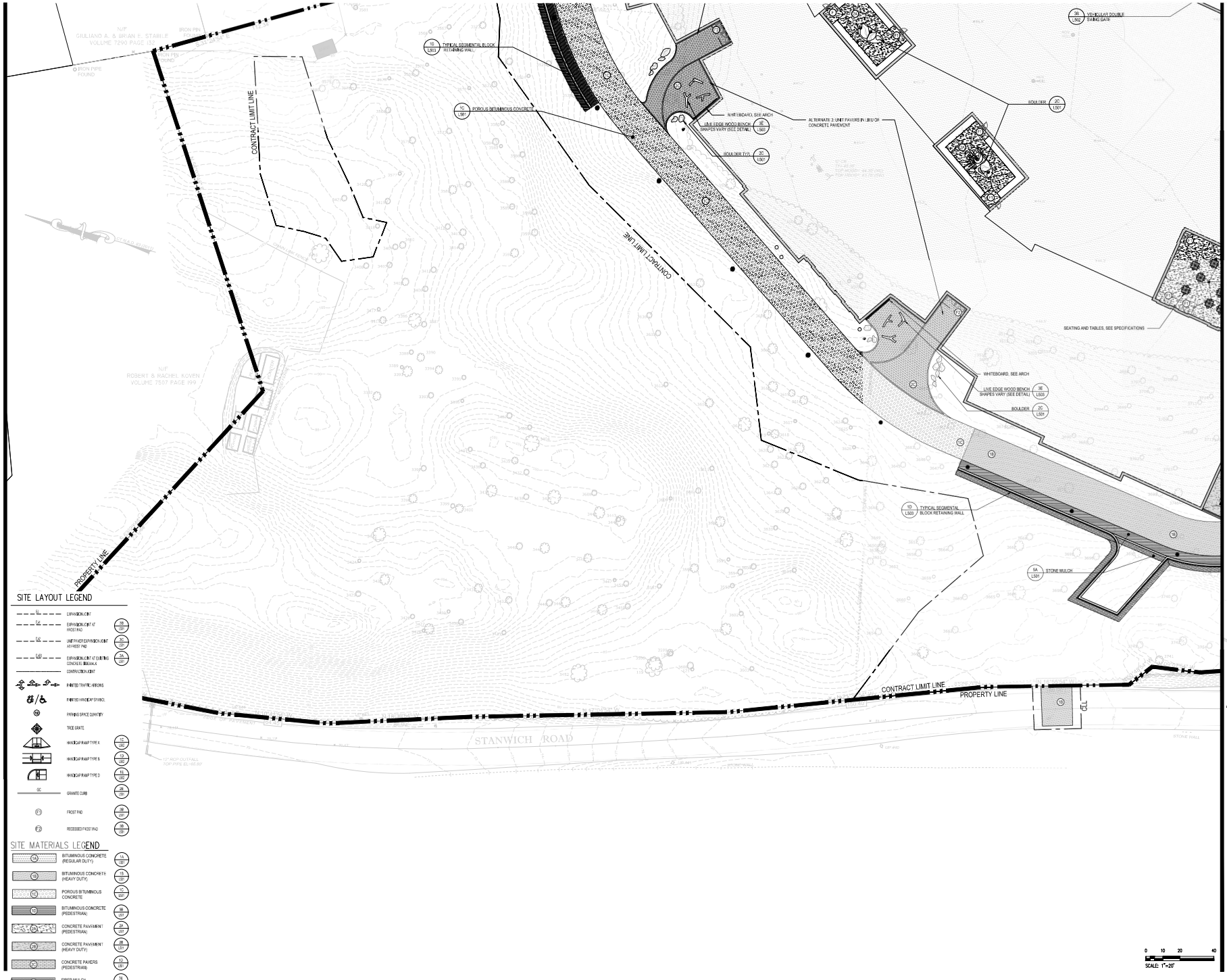

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GREENWICH CENTRAL MIDDLE SCHOOL

9 INDIAN ROCK LANE
GREENWICH, CT 06830

STATE PROJECT NO:057-0114 N

Number	Date	Issued For
	05/10/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SITE MATERIALS NORTHWEST

Date: 07/08/2024
Scale: 1" = 20'
Proj. Number: 22367.00
Drawing Number: L202D

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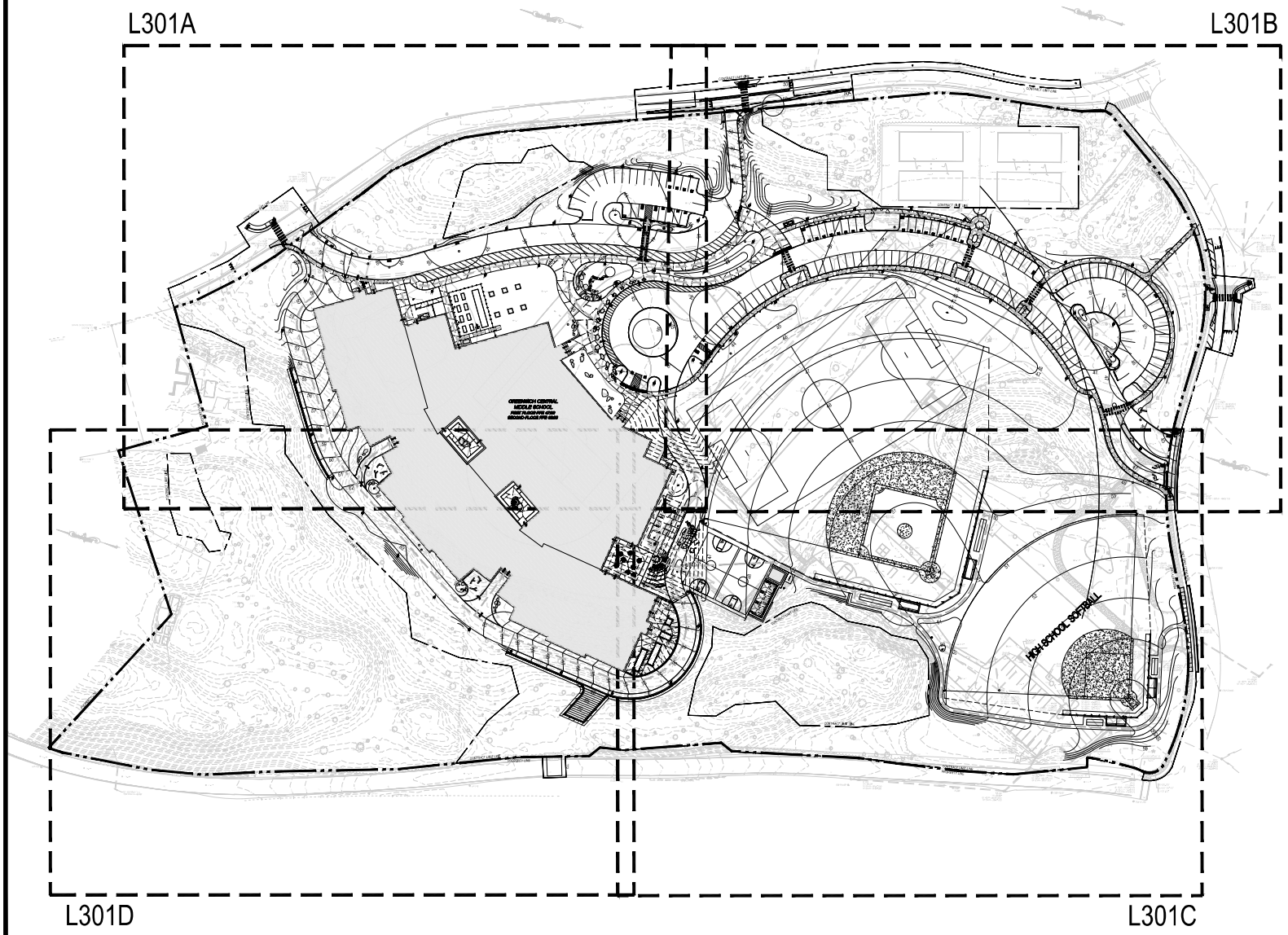

SITE GRADING LEGEND

- DIRECTION OF SURFACE DRAINAGE FLOW
- 65 PROPOSED INTERMEDIATE CONTOUR
- 70 PROPOSED INDEX CONTOUR
- 123.45 PROPOSED SPOT ELEVATION
- 123.45 MATCH EXISTING SPOT ELEVATION
- FLUSH CONDITION
- ACCESSIBLE ROUTE

SCALE: 1"=50'

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Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 3

SITE GRADING

Date: 07/08/2024
Scale: 1" = 50'
Proj. Number: 22367.00
Drawing Number: L301

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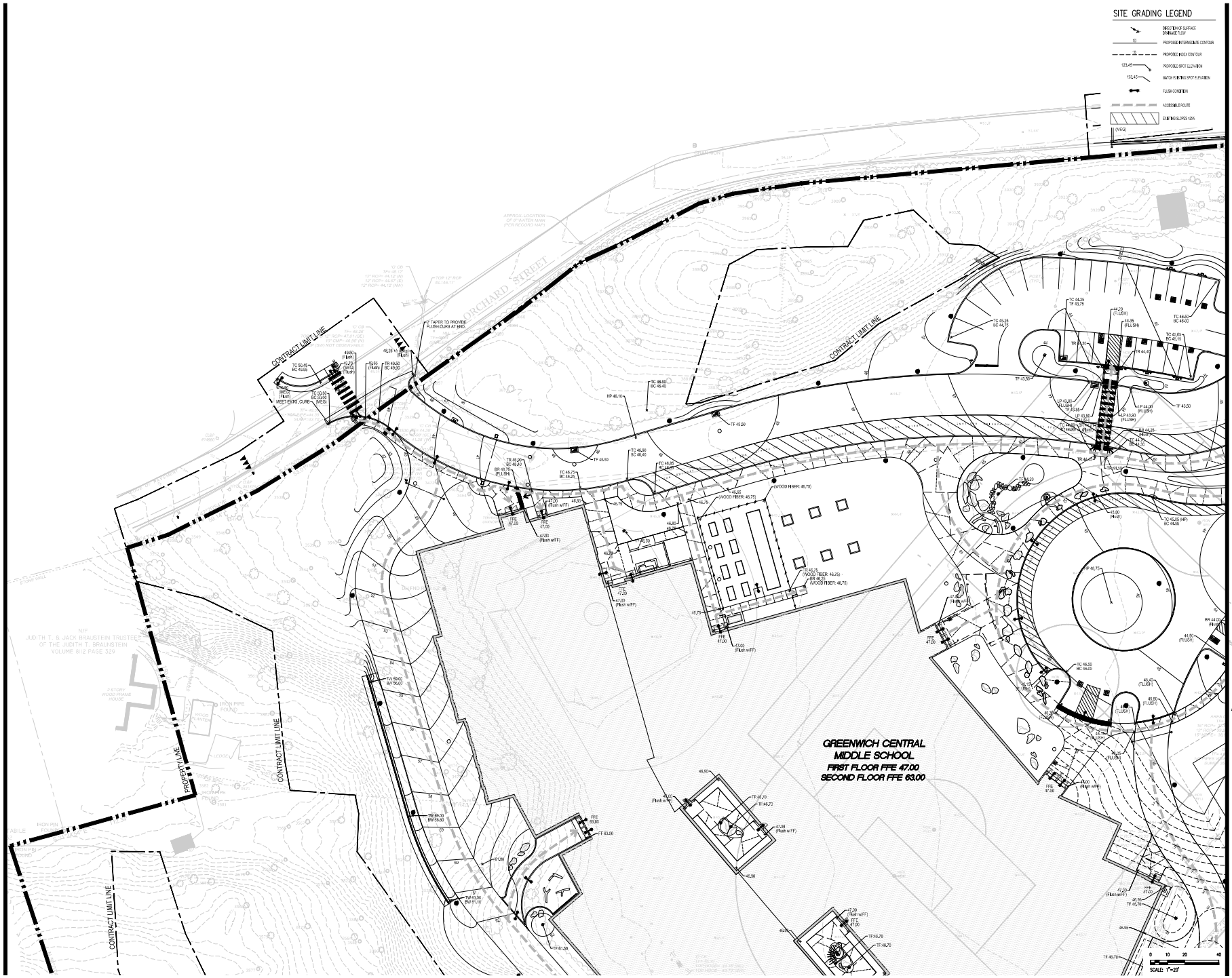

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STATE PROJECT NO:057-0114 N

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 3

SITE GRADING NORTHEAST

Date
07/08/2024
Scale
1" = 20'
Proj. Number
22367.00

Drawing Number
L301A

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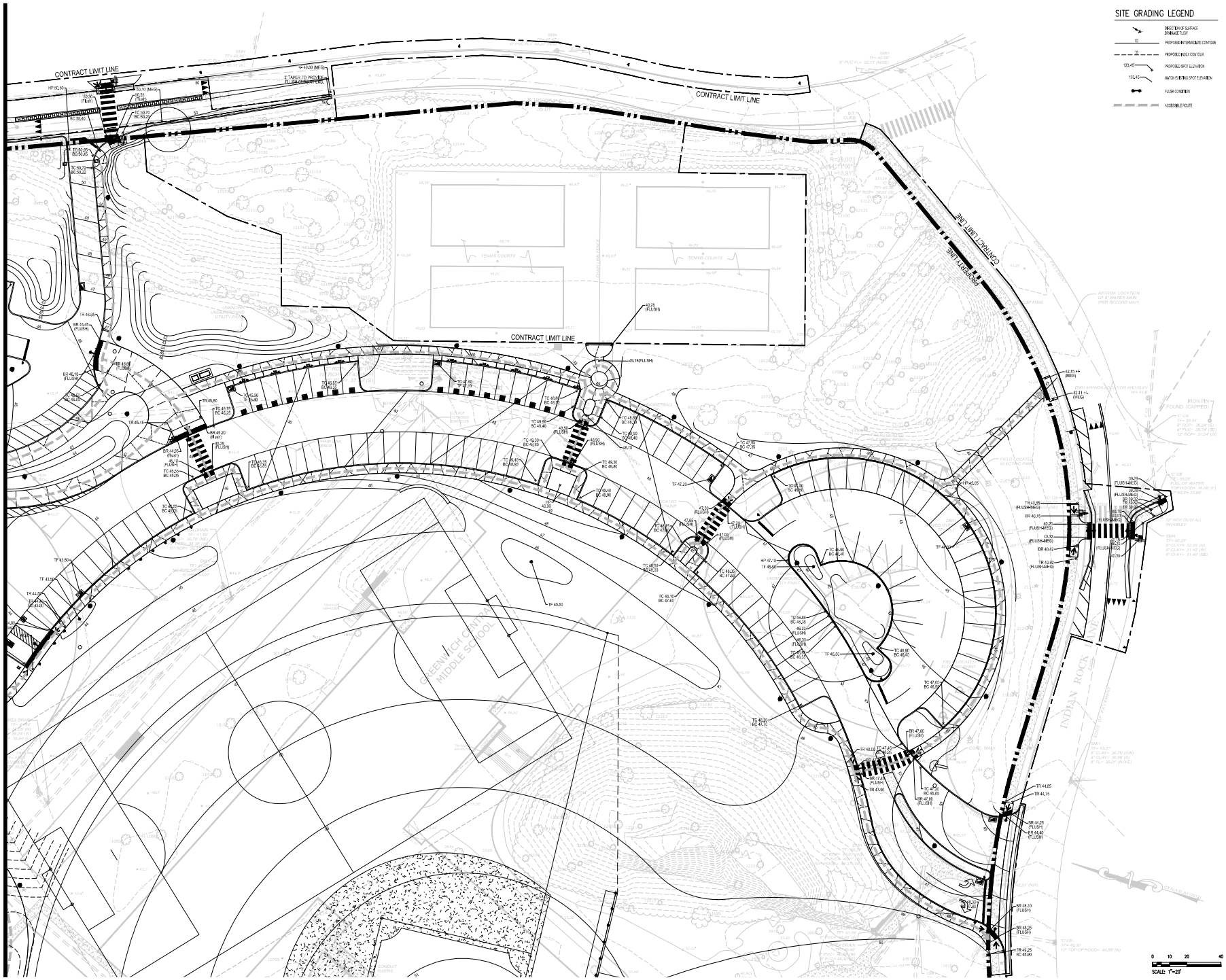

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STATE PROJECT NO:057-0114 N

Number	Date	Issued For
	05/10/2024	BIDDING/PERMIT PHASE 3

SITE GRADING SOUTHEAST

Date: 07/08/2024
Scale: 1" = 20'
Proj. Number: 22367.00
Drawing Number: L301B

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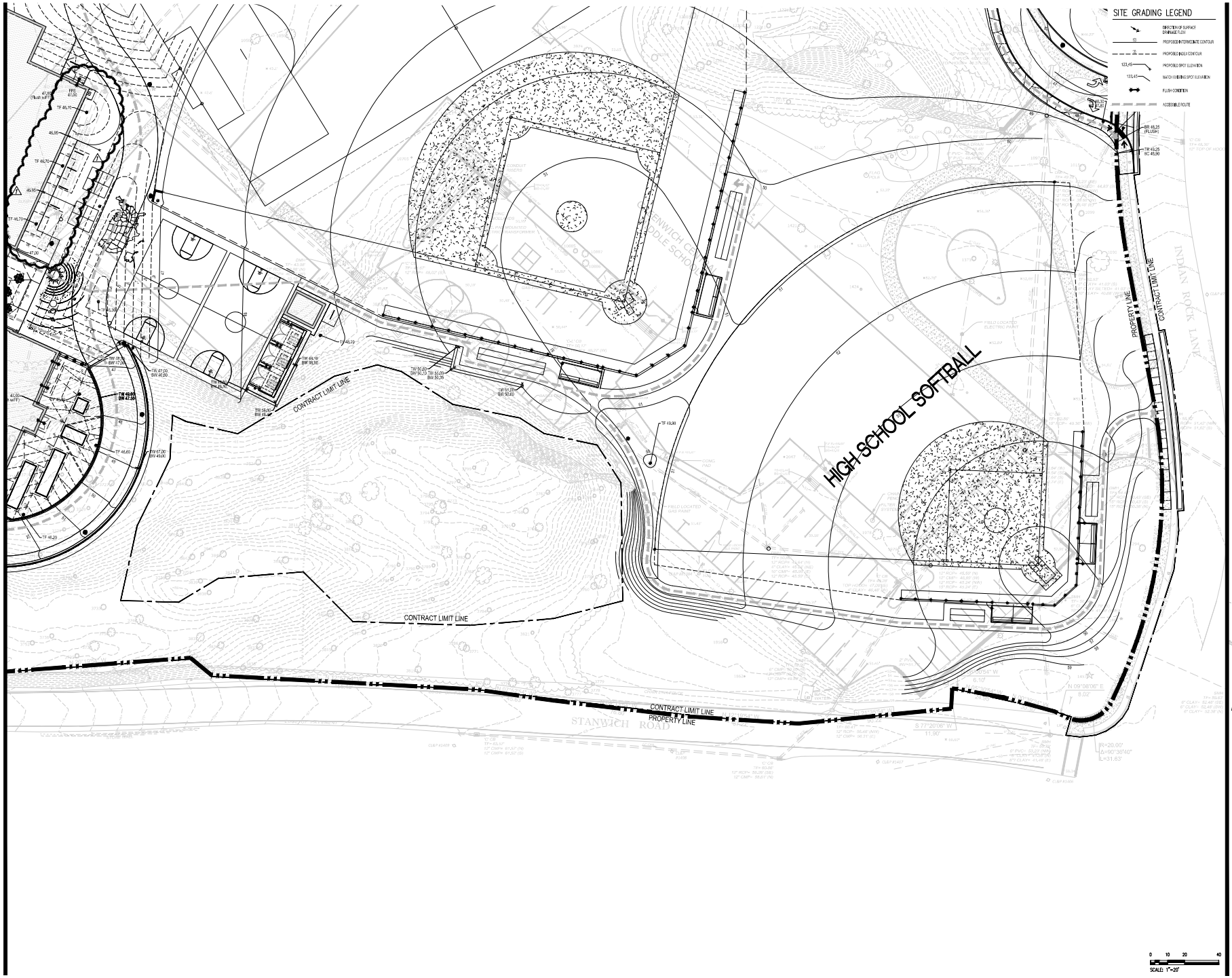

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Checked: HW

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STATE PROJECT NO:057-0114 N

Number	Date	Issued For
1	10/16/2024 09/09/2024 07/08/2024	ADDENDUM NO. 2 NEIGHBORHOOD PHASE 2

SITE GRADING SOUTHWEST

Date: 07/08/2024
Scale: 1" = 20'
Proj. Number: 22367.00
Drawing Number: L301C

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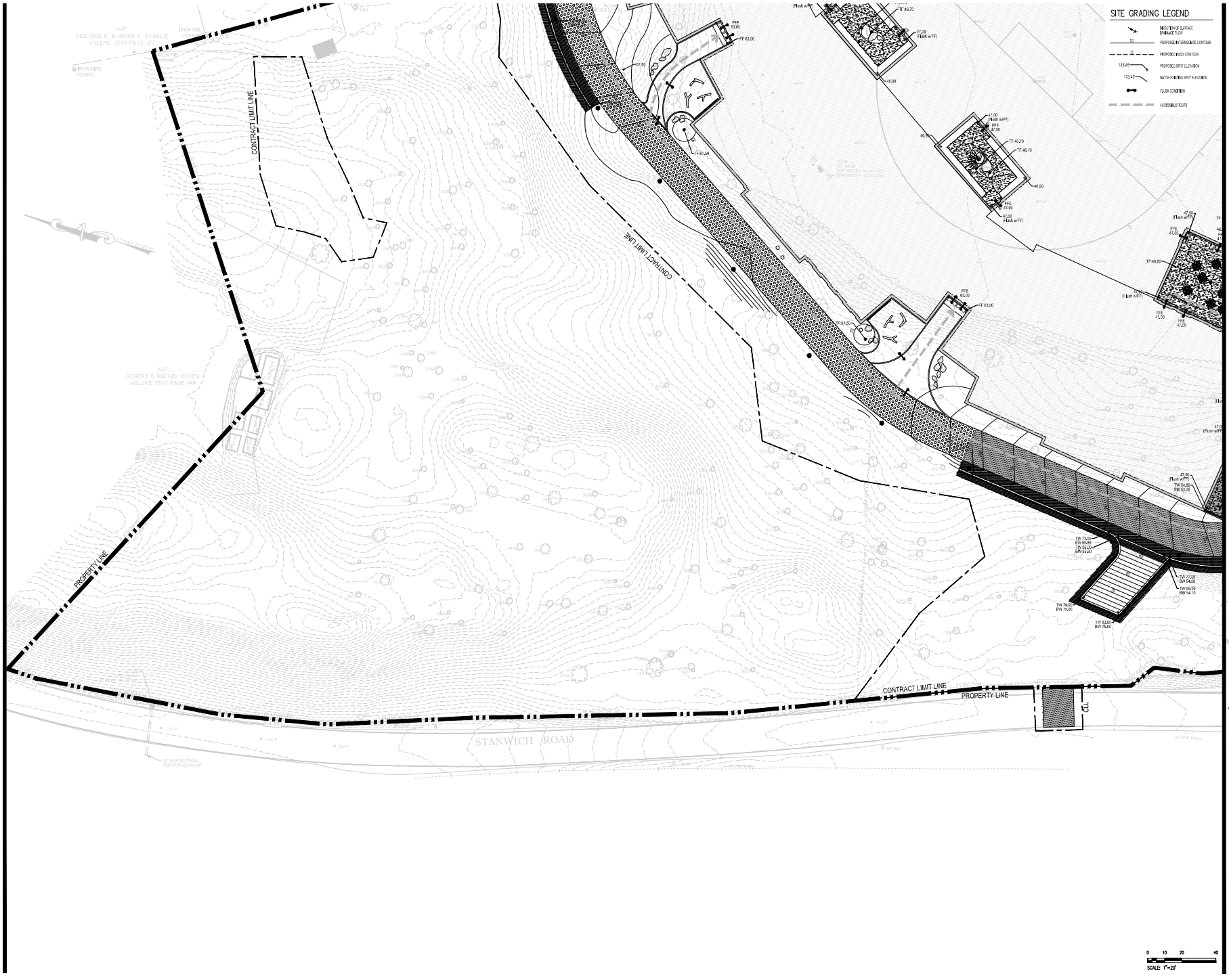

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Glastonbury, CT 06033-4410
Phone: 860 657.8077
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Greenwich Public Schools

GREENWICH CENTRAL MIDDLE SCHOOL

9 INDIAN ROCK LANE
GREENWICH, CT 06830

STATE PROJECT NO:057-0114 N

Number	Date	Issued For
	05/10/2024	BIDDING/PERMIT
	07/08/2024	PHASE 3

SITE GRADING NORTHWEST

Date: 07/08/2024
Scale: 1" = 20'
Proj. Number: 22367.00
Drawing Number: L301D

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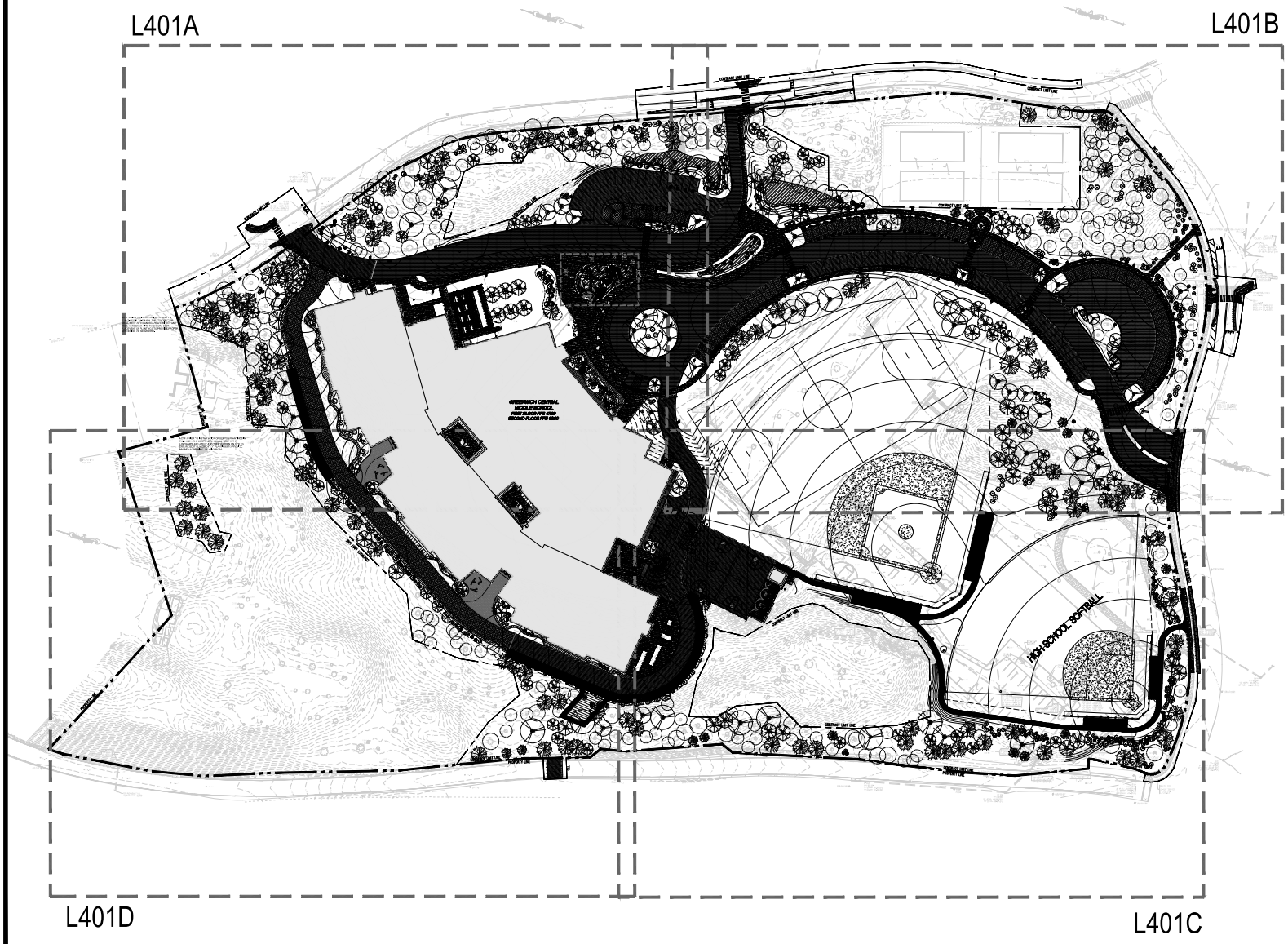

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SCALE: 1"=50'

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STATE PROJECT NO:057-0114 N

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	11/08/2024	PHASE 2

SITE PLANTING OVERALL

Date
07/08/2024
Scale
1" = 50'
Proj. Number
22367.00

Drawing Number
L401

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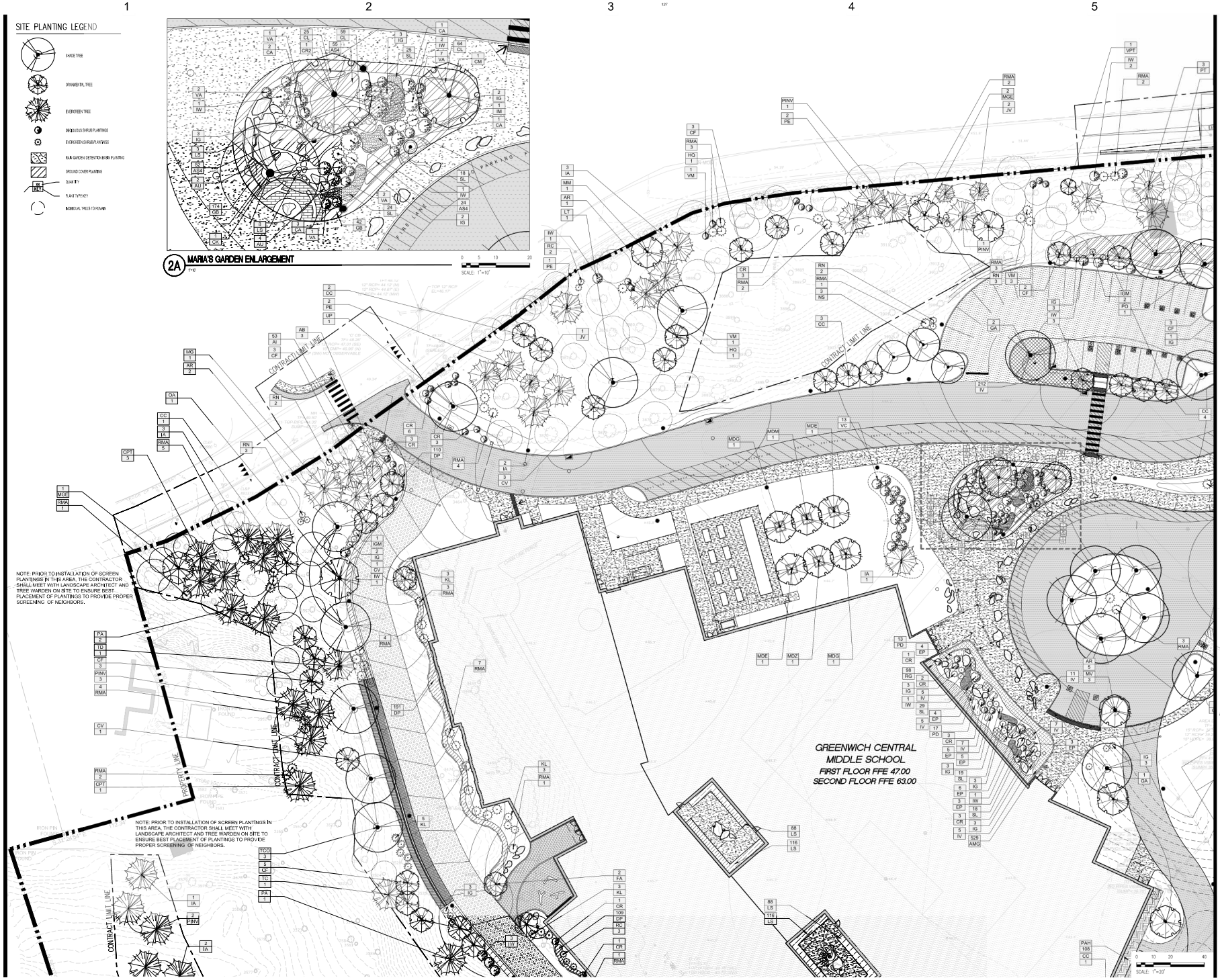

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STATE PROJECT NO:057-0114 N

Number	Date	Issued For
	03/08/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SITE PLANTING NORTHEAST

Date
07/08/2024
Scale
1" = 20'
Proj. Number
22367.00

Drawing Number
L401A

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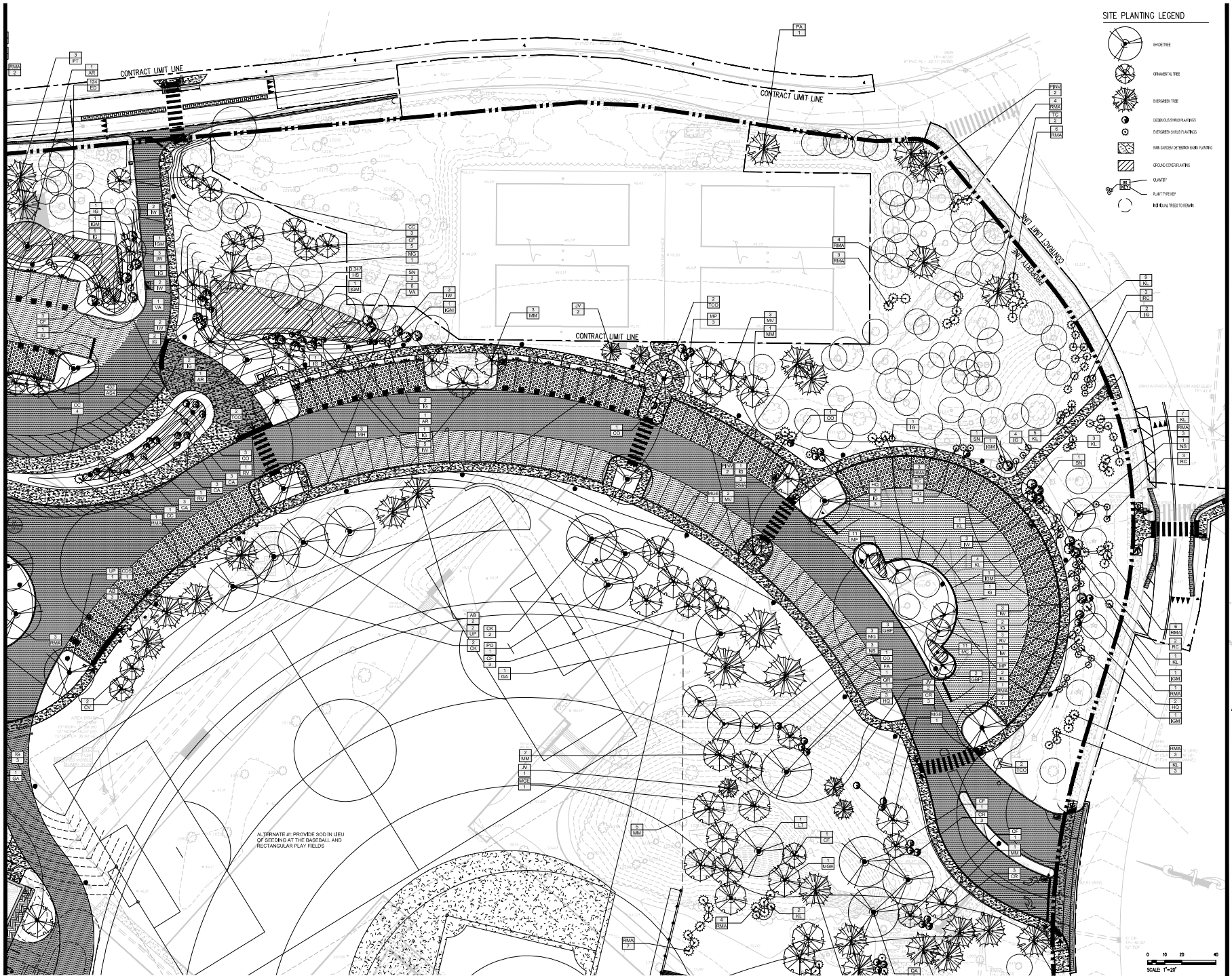

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Number	Date	Issued For
	05/10/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SITE PLANTING SOUTHEAST

Date: 07/08/2024
Scale: 1" = 20'
Proj. Number: 22367.00
Drawing Number: L401B

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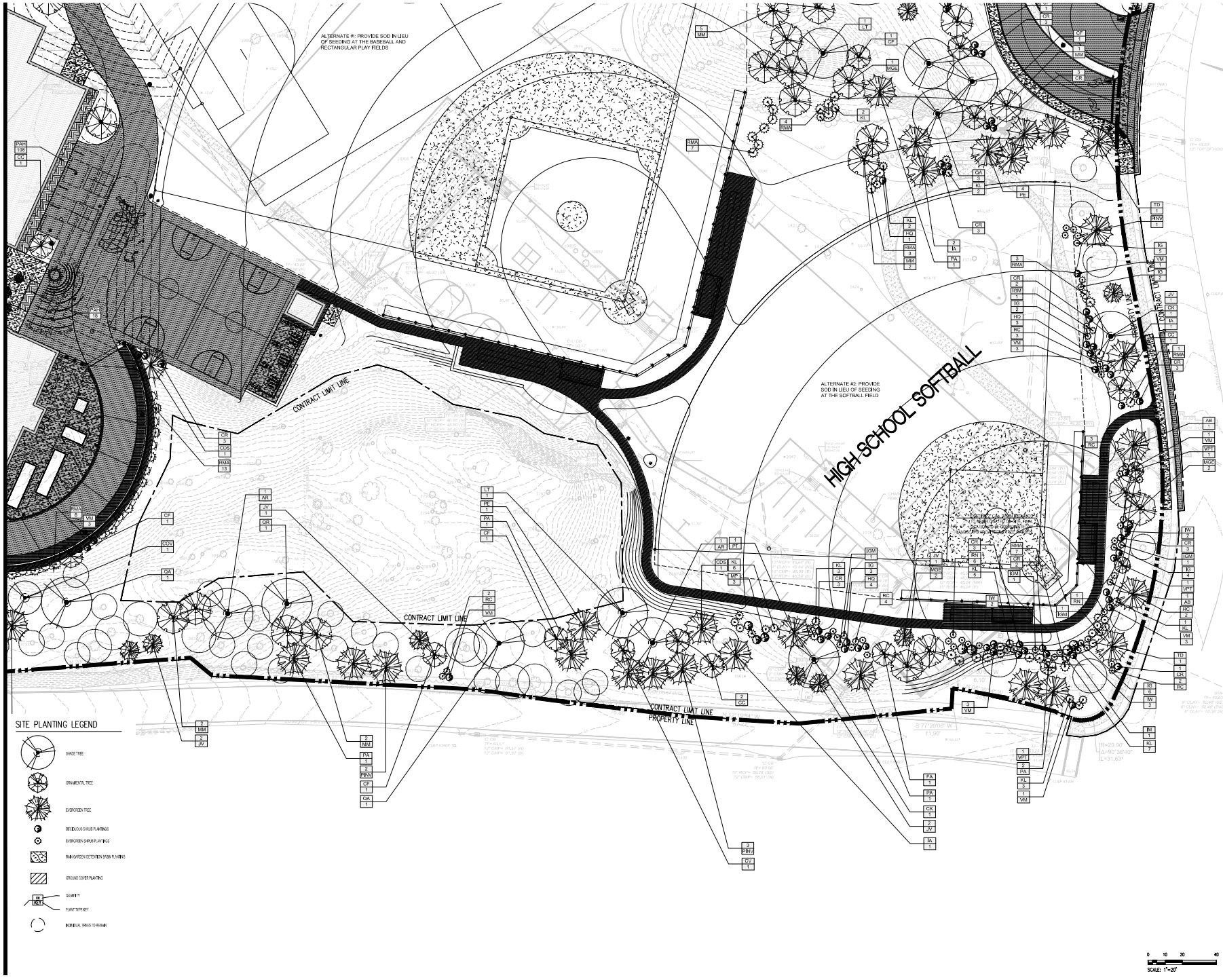

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Number	Date	Issued For
	05/10/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SITE PLANTING SOUTHWEST

Date: 07/08/2024
Scale: 1" = 20'
Proj. Number: 22367.00
Drawing Number: L401C

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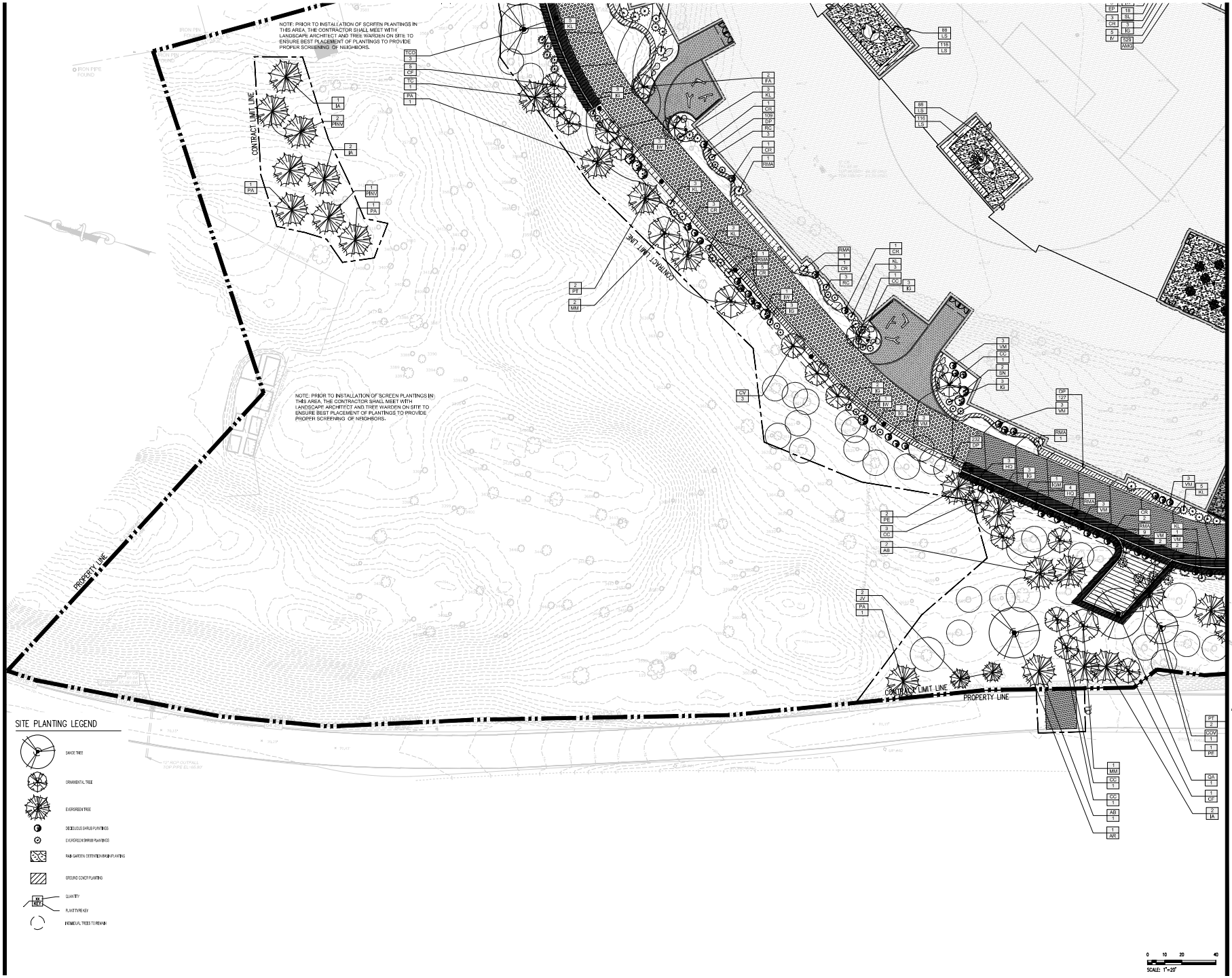

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Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SITE PLANTING NORTHWEST

Date
07/08/2024
Scale
1" = 20'
Proj. Number
22367.00

Drawing Number
L401D

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PLANT SCHEDULE

CODE	QTY	BOTANICAL NAME	COMMON NAME	ROOT	CAL	SIZE		REMARKS
DECIDUOUS TREES								
AR	14	ACER RUBRUM	RED MAPLE	B & B		2-2.5" (66%), 3-3.5" (33%)		SINGLE, STRAIGHT TRUNK, SPECIMEN QUALITY, FREE OF BRANCHING TO 5'-6", DENSE FOLIAGE, WELL-BRANCHED, GOOD COLOR
CK	7	CLADRASTIS KENTUKEA	AMERICAN YELLOWWOOD	B & B		6-8' (66%), 8-10' (33%)		SINGLE, STRAIGHT TRUNK, SPECIMEN QUALITY, FREE OF BRANCHING TO 5'-6", DENSE FOLIAGE, WELL-BRANCHED, GOOD COLOR
COV	2	CARYA OVATA	SHAGBARK HICKORY	B & B		2-2.5" (66%), 3-3.5" (33%)		SINGLE, STRAIGHT TRUNK, SPECIMEN QUALITY, FREE OF BRANCHING TO 5'-6", DENSE FOLIAGE, WELL-BRANCHED, GOOD COLOR
GA	4	GLEDITSIA TRIACANTHOS INERMIS 'SHADE MASTER'	THORNLESS HONEY LOCUST	B & B		2-2.5" (66%), 3-3.5" (33%)		SINGLE, STRAIGHT TRUNK, SPECIMEN QUALITY, FREE OF BRANCHING TO 5'-6", DENSE FOLIAGE, WELL-BRANCHED, GOOD COLOR
LT	3	LIRIODENDRON TULIPIFERA	TULIP POPLAR	B & B		2-2.5" (66%), 3-3.5" (33%)		SINGLE, STRAIGHT TRUNK, SPECIMEN QUALITY, FREE OF BRANCHING TO 5'-6", DENSE FOLIAGE, WELL-BRANCHED, GOOD COLOR
NS	7	NYSSA SYLVATICA	TUPELO	B & B		2-2.5" (66%), 3-3.5" (33%)		SINGLE, STRAIGHT TRUNK, SPECIMEN QUALITY, FREE OF BRANCHING TO 5'-6", DENSE FOLIAGE, WELL-BRANCHED, GOOD COLOR
OA	1	OXYDENDRUM ARBOREUM	SOURWOOD TREE	B & B		2-2.5" (66%), 3-3.5" (33%)		
PO	2	PLATANUS OCCIDENTALIS	AMERICAN SYCAMORE	B & B		2-2.5" (66%), 3-3.5" (33%)		SINGLE, STRAIGHT TRUNK, SPECIMEN QUALITY, FREE OF BRANCHING TO 5'-6", DENSE FOLIAGE, WELL-BRANCHED, GOOD COLOR
QA	6	QUERCUS ALBA	WHITE OAK	B & B		2-2.5" (66%), 3-3.5" (33%)		SINGLE, STRAIGHT TRUNK, SPECIMEN QUALITY, FREE OF BRANCHING TO 5'-6", DENSE FOLIAGE, WELL-BRANCHED, GOOD COLOR
QR	2	QUERCUS RUBRA	RED OAK	B & B		2-2.5" (66%), 3-3.5" (33%)		SINGLE, STRAIGHT TRUNK, SPECIMEN QUALITY, FREE OF BRANCHING TO 5'-6", DENSE FOLIAGE, WELL-BRANCHED, GOOD COLOR
TCO	9	TILIA CORDATA	LITTLELEAF LINDEN	B & B		2-2.5" (66%), 3-3.5" (33%)		SINGLE, STRAIGHT TRUNK, SPECIMEN QUALITY, FREE OF BRANCHING TO 5'-6", DENSE FOLIAGE, WELL-BRANCHED, GOOD COLOR
UP	4	ULMUS AMERICANA 'PRINCETON'	PRINCETON AMERICAN ELM	B & B		2-2.5" (66%), 3-3.5" (33%)		SINGLE, STRAIGHT TRUNK, SPECIMEN QUALITY, FREE OF BRANCHING TO 5'-6", DENSE FOLIAGE, WELL-BRANCHED, GOOD COLOR
EVERGREEN TREES								
AB	13	ABIES BALSAMEA	BALSAM FIR	B & B	CONIFER	6-8' (40%), 8-10' (40%), 10-12' (20%)		SINGLE, STRAIGHT TRUNK, SPECIMEN QUALITY, FREE OF BRANCHING TO 5'-6", DENSE FOLIAGE, WELL-BRANCHED, GOOD COLOR
CDS	3	CEDRUS DEODARA 'SANDERS BLUE'	SANDERS BLUE DEODAR CEDAR	B & B	CONIFER	6-8' (40%), 8-10' (40%), 10-12' (20%)		
CPT	4	CHAMAECYPARIS THYOIDES	ATLANTIC WHITE CYPRESS	B & B	CONIFER	6-8' (40%), 8-10' (40%), 10-12' (20%)		SINGLE, STRAIGHT TRUNK, SPECIMEN QUALITY, FREE OF BRANCHING TO 5'-6", DENSE FOLIAGE, WELL-BRANCHED, GOOD COLOR
IA	18	ILEX OPACA	AMERICAN HOLLY	B & B		6-8' (40%), 8-10' (40%), 10-12' (20%)		SINGLE, STRAIGHT TRUNK, SPECIMEN QUALITY, FREE OF BRANCHING TO 5'-6", DENSE FOLIAGE, WELL-BRANCHED, GOOD COLOR
JV	17	JUNIPERUS VIRGINIANA	EASTERN REDCEDAR	B & B	CONIFER	6-8' (40%), 8-10' (40%), 10-12' (20%)		SINGLE, STRAIGHT TRUNK, SPECIMEN QUALITY, FREE OF BRANCHING TO 5'-6", DENSE FOLIAGE, WELL-BRANCHED, GOOD COLOR
MG	6	METASEQUOIA GLYPTOSTROBOIDES	DAWN REDWOOD	B & B	CONIFER	6-8' (40%), 8-10' (40%), 10-12' (20%)		SINGLE, STRAIGHT TRUNK, SPECIMEN QUALITY, FREE OF BRANCHING TO 5'-6", DENSE FOLIAGE, WELL-BRANCHED, GOOD COLOR
PA	13	PICEA ABIES	NORWAY SPRUCE	B & B	CONIFER	6-8' (40%), 8-10' (40%), 10-12' (20%)		SINGLE, STRAIGHT TRUNK, SPECIMEN QUALITY, FREE OF BRANCHING TO 5'-6", DENSE FOLIAGE, WELL-BRANCHED, GOOD COLOR
PE	13	PINUS ECHINATA	SHORT LEAF PINE	B & B	CONIFER	6-8' (40%), 8-10' (40%), 10-12' (20%)		SINGLE, STRAIGHT TRUNK, SPECIMEN QUALITY, FREE OF BRANCHING TO 5'-6", DENSE FOLIAGE, WELL-BRANCHED, GOOD COLOR
PNV	16	PINUS VIRGINIANA	VIRGINIA PINE	B & B	CONIFER	6-8' (40%), 8-10' (40%), 10-12' (20%)		SINGLE, STRAIGHT TRUNK, SPECIMEN QUALITY, FREE OF BRANCHING TO 5'-6", DENSE FOLIAGE, WELL-BRANCHED, GOOD COLOR
PT	8	PINUS TAEDA	LOBLOLLY PINE	B & B	CONIFER	6-8' (40%), 8-10' (40%), 10-12' (20%)		SINGLE, STRAIGHT TRUNK, SPECIMEN QUALITY, FREE OF BRANCHING TO 5'-6", DENSE FOLIAGE, WELL-BRANCHED, GOOD COLOR
TC	3	TAXUS CANADENSIS	AMERICAN YEW	B & B	CONIFER	6-8' (40%), 8-10' (40%), 10-12' (20%)		PULL TO GROUND, DENSE FOLIAGE
TD	1	TAXODIUM DISTICHUM	BALD CYPRESS	B & B	CONIFER	6-8' (40%), 8-10' (40%), 10-12' (20%)		WELL-BRANCHED, GOOD COLOR, PYRAMIDAL FORM
								SINGLE, STRAIGHT TRUNK, SPECIMEN QUALITY, FREE OF BRANCHING TO 5'-6", DENSE FOLIAGE, WELL-BRANCHED, GOOD COLOR
ORNAMENTAL TREES								
CC	25	CERCIS CANADENSIS	EASTERN REDBUD	B & B		6-8' (66%), 8-10' (33%)		SINGLE, STRAIGHT TRUNK, SPECIMEN QUALITY, DENSE FOLIAGE, WELL-BRANCHED, GOOD COLOR
CF	34	CORNUS FLORIDA	FLOWERING DOGWOOD	B & B		6-8' (66%), 8-10' (33%)		SINGLE, STRAIGHT TRUNK, SPECIMEN QUALITY, DENSE FOLIAGE, WELL-BRANCHED, GOOD COLOR
CM	1	CORNUS MAS	CORNELIAN CHERRY	B & B		6-8' (66%), 8-10' (33%)		SINGLE, STRAIGHT TRUNK, SPECIMEN QUALITY, DENSE FOLIAGE, WELL-BRANCHED, GOOD COLOR
CK2	1	CORNUS X 'RUTCAN'	CONSTELLATION® FLOWERING DOGWOOD	B & B		6-8' (66%), 8-10' (33%)		SINGLE, STRAIGHT TRUNK, SPECIMEN QUALITY, DENSE FOLIAGE, WELL-BRANCHED, GOOD COLOR
CV	11	CHIONANTHUS VIRGINICUS	WHITE FRINGETREE	B & B		6-8' (66%), 8-10' (33%)		SINGLE, STRAIGHT TRUNK, SPECIMEN QUALITY, DENSE FOLIAGE, WELL-BRANCHED, GOOD COLOR
FA	4	FRANKLINIA ALATAMAHA	FRANKLIN TREE	B & B		6-8' (66%), 8-10' (33%)		SINGLE, STRAIGHT TRUNK, SPECIMEN QUALITY, DENSE FOLIAGE, WELL-BRANCHED, GOOD COLOR
GBP	5	GINKGO BILOBA 'PRINCETON SENTRY'	PRINCETON SENTRY MAIDENHAIR TREE	B & B		6-8' (66%), 8-10' (33%)		SINGLE, STRAIGHT TRUNK, SPECIMEN QUALITY, DENSE FOLIAGE, WELL-BRANCHED, GOOD COLOR
MCR	2	MALUS X DOMESTICA 'EMPIRE'	EMPIRE APPLE	B & B		6-8' (66%), 8-10' (33%)		SINGLE, STRAIGHT TRUNK, SPECIMEN QUALITY, DENSE FOLIAGE, WELL-BRANCHED, GOOD COLOR
MCS	2	MALUS X DOMESTICA 'GRANNY SMITH'	GRANNY SMITH APPLE	B & B		6-8' (66%), 8-10' (33%)		SINGLE, STRAIGHT TRUNK, SPECIMEN QUALITY, DENSE FOLIAGE, WELL-BRANCHED, GOOD COLOR
MCM	1	MALUS X DOMESTICA 'MCINTOSH'	MCINTOSH APPLE	B & B		6-8' (66%), 8-10' (33%)		SINGLE, STRAIGHT TRUNK, SPECIMEN QUALITY, DENSE FOLIAGE, WELL-BRANCHED, GOOD COLOR
MCZ	1	MALUS X DOMESTICA 'ZESTAR'	ZESTAR APPLE	B & B		6-8' (66%), 8-10' (33%)		SINGLE, STRAIGHT TRUNK, SPECIMEN QUALITY, DENSE FOLIAGE, WELL-BRANCHED, GOOD COLOR
MGE	10	MAGNOLIA GRANDIFLORA 'EDITH BOGUE'	EDITH BOGUE SOUTHERN MAGNOLIA	B & B		6-8' (66%), 8-10' (33%)		SINGLE, STRAIGHT TRUNK, SPECIMEN QUALITY, DENSE FOLIAGE, WELL-BRANCHED, GOOD COLOR
MH	3	MALUS X '20TH CENTURY'	20TH CENTURY APPLE	B & B		6-8' (66%), 8-10' (33%)		SINGLE, STRAIGHT TRUNK, SPECIMEN QUALITY, DENSE FOLIAGE, WELL-BRANCHED, GOOD COLOR
MM	22	MAGNOLIA MACROPHYLLA	BIGLEAF MAGNOLIA	B & B		6-8' (66%), 8-10' (33%)		SINGLE, STRAIGHT TRUNK, SPECIMEN QUALITY, DENSE FOLIAGE, WELL-BRANCHED, GOOD COLOR
MV	8	MAGNOLIA VIRGINIANA	SWEETBAY MAGNOLIA	B & B		6-8' (66%), 8-10' (33%)		SINGLE, STRAIGHT TRUNK, SPECIMEN QUALITY, DENSE FOLIAGE, WELL-BRANCHED, GOOD COLOR
VPT	4	VIBURNUM PLICATUM TOMENTOSUM 'MARESII'	MARE BOOLLEFILE VIBURNUM	B & B		6-8' (66%), 8-10' (33%)		SINGLE, STRAIGHT TRUNK, SPECIMEN QUALITY, DENSE FOLIAGE, WELL-BRANCHED, GOOD COLOR

CODE	QTY	BOTANICAL NAME	COMMON NAME	ROOT	MIN. HT.	MIN. SPR.		REMARKS
DECIDUOUS SHRUBS								
CA	19	CLETHRA ALNIFOLIA	SUMMERSWEET	3 GAL.	30" - 36"			WELL-ROOTED; DENSE FOLIAGE; HEALTHY STEMS; GOOD COLOR
CO	6	CORNUS ALTERNIFOLIA	ALTERNATE-LEAF DOGWOOD	3 GAL.	30" - 36"			WELL-ROOTED; DENSE FOLIAGE; HEALTHY STEMS; GOOD COLOR
CR	70	CORNUS STERICEA	RED TWIG DOGWOOD	3 GAL.	30" - 36"			WELL-ROOTED; DENSE FOLIAGE; HEALTHY STEMS; GOOD COLOR
HG	28	HYDRANGEA QUERCIFOLIA	OAKLEAF HYDRANGEA	3 GAL.	30" - 36"			WELL-ROOTED; DENSE FOLIAGE; HEALTHY STEMS; GOOD COLOR
IM	2	ILEX VERTICILLATA 'MALE'	MALE WINTERBERRY	3 GAL.	30" - 36"			WELL-ROOTED; DENSE FOLIAGE; HEALTHY STEMS; GOOD COLOR
IV	48	ILEX VERTICILLATA	WINTERBERRY	3 GAL.	30" - 36"			WELL-ROOTED; DENSE FOLIAGE; HEALTHY STEMS; GOOD COLOR
MP	7	MYRICA PENSYLVANICA	NORTHERN BAYBERRY	3 GAL.	30" - 36"			WELL-ROOTED; DENSE FOLIAGE; HEALTHY STEMS; GOOD COLOR
SN	6	SAMBUCUS NIGRA	BLACK ELDERBERRY	3 GAL.	30" - 36"			
VA	21	VACCINIUM ANGUSTIFOLIUM	LOWBUSH BLUEBERRY	3 GAL.	30" - 36"			WELL-ROOTED; DENSE FOLIAGE; HEALTHY STEMS; GOOD COLOR
VC	13	VACCINIUM CORYMBOSUM	HIGHBUSH BLUEBERRY	3 GAL.	30" - 36"			WELL-ROOTED; DENSE FOLIAGE; HEALTHY STEMS; GOOD COLOR
VM	40	VIBURNUM ACERIFOLIUM	MAPLELEAF VIBURNUM	3 GAL.	30" - 36"			WELL-ROOTED; DENSE FOLIAGE; HEALTHY STEMS; GOOD COLOR
EVERGREEN SHRUBS								
IG	104	ILEX GLABRA	INKBERRY HOLLY	3 GAL.	30" - 36"			WELL-ROOTED; DENSE FOLIAGE; HEALTHY STEMS; GOOD COLOR
IGM	17	ILEX GLABRA	INKBERRY HOLLY MALE	3 GAL.	30" - 36"			WELL-ROOTED; DENSE FOLIAGE; HEALTHY STEMS; GOOD COLOR
KL	65	KALMIA LATIFOLIA	MOUNTAIN LAUREL	3 GAL.	30" - 36"			WELL-ROOTED; DENSE FOLIAGE; HEALTHY STEMS; GOOD COLOR
RC	35	RHODODENDRON CATAWBIENSE	CATAWBA RHODODENDRON	3 GAL.	30" - 36"			WELL-ROOTED; DENSE FOLIAGE; HEALTHY STEMS; GOOD COLOR
RMA	143	RHODODENDRON MAXIMUM	ROSEBAY RHODODENDRON	3 GAL.	30" - 36"			WELL-ROOTED; DENSE FOLIAGE; HEALTHY STEMS; GOOD COLOR
RN	17	RHODODENDRON NUDIFLORUM	PINKTERBLOOM AZALEA	3 GAL.	30" - 36"			WELL-ROOTED; DENSE FOLIAGE; HEALTHY STEMS; GOOD COLOR
RV	6	RHODODENDRON VISCOSUM	SWAMP AZALEA	3 GAL.	30" - 36"			WELL-ROOTED; DENSE FOLIAGE; HEALTHY STEMS; GOOD COLOR

CODE	QTY	BOTANICAL NAME	COMMON NAME	ROOT	MIN. HT.	MIN. SPR.	SPACING	REMARKS
GRASSES								
AAG	1092	ARUNDINELLA AUTUMNALIS	AUTUMN MOOR GRASS	1 PT. (33%), 1 GAL. (33%), 3 GAL. (33%)			12" o.c.	WELL-ROOTED; HEALTHY STEMS; GOOD COLOR
PAH	176	PENNISETUM ALOPECUROIDES 'HAMELN'	HAMELN FOUNTAIN GRASS	1 PT. (33%), 1 GAL. (33%), 3 GAL. (33%)			36" o.c.	WELL-ROOTED; HEALTHY STEMS; GOOD COLOR
SL	133	SCHIZACHYRIUM SCOPARIUM	LITTLE BLUESTEM	1 PT. (33%), 1 GAL. (33%), 3 GAL. (33%)			18" o.c.	WELL-ROOTED; HEALTHY STEMS; GOOD COLOR
GROUND COVER								
AU	6	ARCTOSTAPHYLOS UVA-URSI	KINNIKINNICK	1 PT. (33%), 1 GAL. (33%), 3 GAL. (33%)			24" o.c.	WELL-ROOTED; DENSE FOLIAGE; HEALTHY STEMS; GOOD COLOR
DF	199	DENNSTAEDTIA PUNCTILOBULA	HAY-SCENTED FERN	1 PT. (33%), 1 GAL. (33%), 3 GAL. (33%)			24" o.c.	WELL-ROOTED; DENSE FOLIAGE; HEALTHY STEMS; GOOD COLOR
GB	216	GERANIUM MACRORRHIZUM	BIGROOT GERANIUM	1 PT. (33%), 1 GAL. (33%), 3 GAL. (33%)			18" o.c.	WELL-ROOTED; DENSE FOLIAGE; HEALTHY STEMS; GOOD COLOR
LS	419	LIRIOPE SPICATA	CREEPING LILYTURF	1 PT. (33%), 1 GAL. (33%), 3 GAL. (33%)			18" o.c.	WELL-ROOTED; DENSE FOLIAGE; HEALTHY STEMS; GOOD COLOR
OSC	12	OSMUNDA CINNAMOMEA	CINNAMON FERN	1 PT. (33%), 1 GAL. (33%), 3 GAL. (33%)			18" o.c.	WELL-ROOTED; DENSE FOLIAGE; HEALTHY STEMS; GOOD COLOR
RG	68	RHUS AROMATICA 'GRO-LOW'	GRO-LOW FRAGRANT SUMAC	1 PT. (33%), 1 GAL. (33%), 3 GAL. (33%)			24" o.c.	WELL-ROOTED; DENSE FOLIAGE; HEALTHY STEMS; GOOD COLOR
PERENNIALS								
AI	63	ASCLEPIAS INCARNATA	SWAMP MILKWEED	1 PT. (33%), 1 GAL. (33%), 3 GAL. (33%)			18" o.c.	WELL-ROOTED; DENSE FOLIAGE; HEALTHY STEMS; GOOD COLOR
AS1	593	ASCLEPIAS SPECIOSA	SHOWY MILKWEED	1 PT. (33%), 1 GAL. (33%), 3 GAL. (33%)			18" o.c.	WELL-ROOTED; DENSE FOLIAGE; HEALTHY STEMS; GOOD COLOR
CL	118	COREOPSIS LANCEOLATA	LANCELEAF TICKSEED	1 PT. (33%), 1 GAL. (33%), 3 GAL. (33%)			18" o.c.	WELL-ROOTED; DENSE FOLIAGE; HEALTHY STEMS; GOOD COLOR
ED	124	EUTROCHIUM MACULATUM 'RED DWARF'	RED DWARF JOE PYE WEED	1 PT. (33%), 1 GAL. (33%), 3 GAL. (33%)			48" o.c.	WELL-ROOTED; DENSE FOLIAGE; HEALTHY STEMS; GOOD COLOR
EP	39	ECHINACEA PURPUREA	CONEFLOWER	1 PT. (33%), 1 GAL. (33%), 3 GAL. (33%)			24" o.c.	WELL-ROOTED; DENSE FOLIAGE; HEALTHY STEMS; GOOD COLOR
IV	202	IRIS VERSICOLOR	BLUE FLAG	1 PT. (33%), 1 GAL. (33%), 3 GAL. (33%)			24" o.c.	WELL-ROOTED; DENSE FOLIAGE; HEALTHY STEMS; GOOD COLOR
MC	11	MONARDA CLINOPODIA	WHITE BERGAMOT	1 PT. (33%), 1 GAL. (33%), 3 GAL. (33%)			36" o.c.	WELL-ROOTED; DENSE FOLIAGE; HEALTHY STEMS; GOOD COLOR
MF	11	MONARDA FISTULOSA	BERGAMOT	1 PT. (33%), 1 GAL. (33%), 3 GAL. (33%)			36" o.c.	WELL-ROOTED; DENSE FOLIAGE; HEALTHY STEMS; GOOD COLOR
PD	33	PENSTEMON DIGITALIS	BEARDTONGUE	1 PT. (33%), 1 GAL. (33%), 3 GAL. (33%)			18" o.c.	WELL-ROOTED; DENSE FOLIAGE; HEALTHY STEMS; GOOD COLOR

⚠ ATHLETIC TURF SEED MIX - SEE SPEC

GENERAL LAWN AREAS - FOUNDATION SEED MIX
15% FALCON IV TURF TYPE TALL FESCUE
20% AMBROSE CHEWINGS FESCUE
20% VIKING H20 HARD FESCUE
15% DOUBLE TIME TETRAPLOID PRG
10% MAZAMARA KBG
10% DIVA KBG

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Drawn: EFS
Checked: HWW

Greenwich Public Schools

GREENWICH CENTRAL MIDDLE SCHOOL

9 INDIAN ROCK LANE
GREENWICH, CT 06830

STATE PROJECT NO:057-0114 N

Number	Date	Issued For
1	11/05/2024	ADDENDUM NO. 6
	09/06/2024	BID DOCUMENTS
	07/08/2024	PHASE 2

PLANT MATERIAL LIST

Date: 07/08/2024
Scale: AS SHOWN
Proj. Number: 22367.00
Drawing Number: L402

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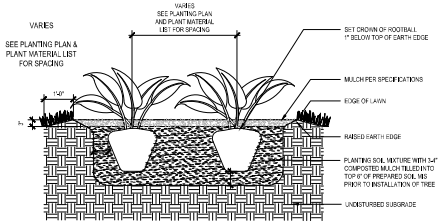
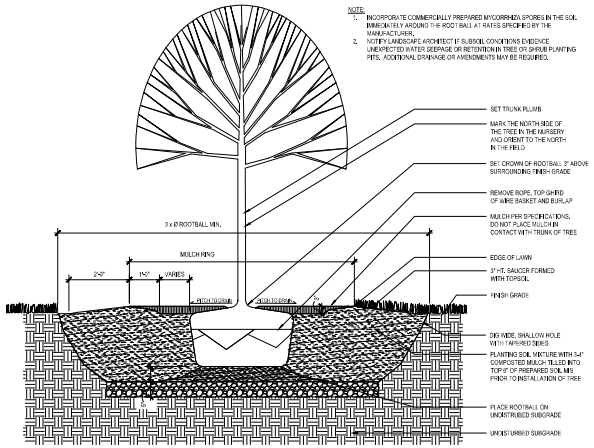


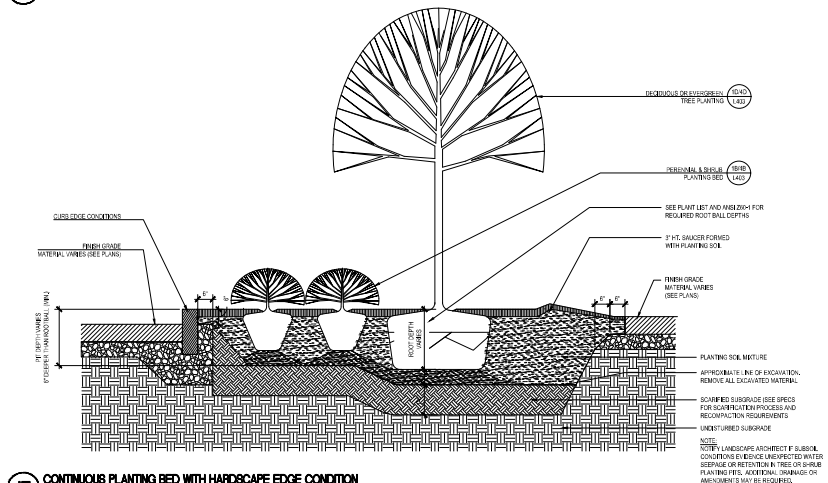
1B PERENNIAL PLANTING (CONTINUOUS PLANTING BED)

NOT TO SCALE



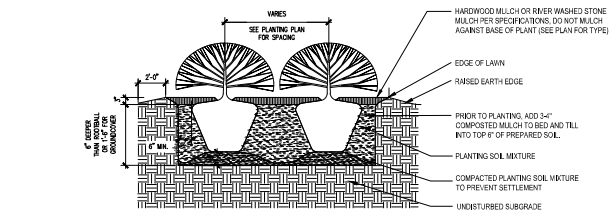
1D DECIDUOUS TREE PLANTING

NOT TO SCALE



1E CONTINUOUS PLANTING BED WITH HARDSCAPE EDGE CONDITION

NOT TO SCALE

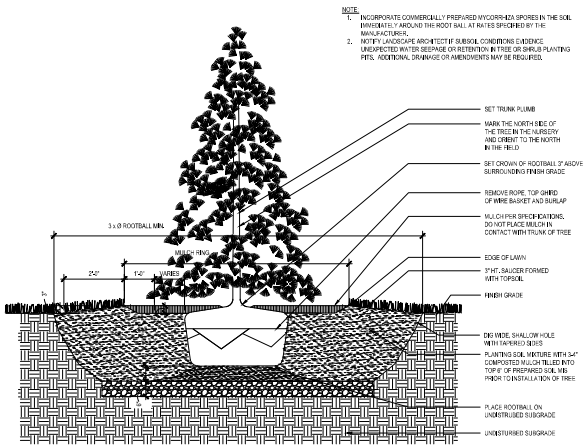


NOTES:

1. FOR CONTAINER GROWN SHRUBS, GENTLY PULL THE ROOTS OUT OF THE OUTER LAYER OF POTTING SOIL; THEN CUT OR PULL APART ANY ROOTS CIRCLING THE PERIMETER OF CONTAINER.
2. FOR B&B SHRUBS, FOLD BURLAP FROM TOP OF ROOT BALL DOWN TO GROUND.
3. INCORPORATE COMMERCIALLY PREPARED MYCORRHIZA SPORES IN THE SOIL IMMEDIATELY AROUND THE ROOT BALL AT RATES SPECIFIED BY THE MANUFACTURER.
4. CONFIRM THAT WATER DRAINS OUT OF THE SOIL DURING THE DESIGN PHASE. DESIGN ALTERNATIVE DRAINAGE SYSTEMS, AS REQUIRED. NOTIFY LANDSCAPE ARCHITECT IF SUBSOIL CONDITIONS EVIDENCE UNEXPECTED WATER SEEPAGE OR RETENTION IN TREE OR SHRUB PLANTING PITS. ADDITIONAL DRAINAGE OR AMENDMENTS MAY BE REQUIRED.

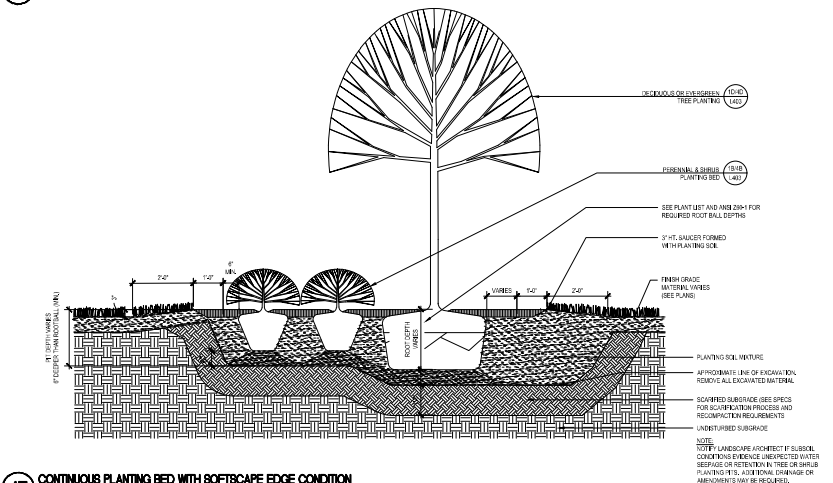
4B SHRUB PLANTING (CONTINUOUS PLANTING BED)

NOT TO SCALE



4D EVERGREEN TREE PLANTING

NOT TO SCALE



4E CONTINUOUS PLANTING BED WITH SOFTSCAPE EDGE CONDITION

NOT TO SCALE

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Drawn: EFS
Checked: HWW

Greenwich Public Schools

GREENWICH CENTRAL MIDDLE SCHOOL

9 INDIAN ROCK LANE
GREENWICH, CT 06830

STATE PROJECT NO:057-0114 N

Number	Date	Issued For
	05/10/2024	BIDDING/PERMIT
	07/08/2024	PHASE 3

PLANTING DETAILS

Date: 07/08/2024
Scale: AS SHOWN
Proj. Number: 22367.00
Drawing Number: L403

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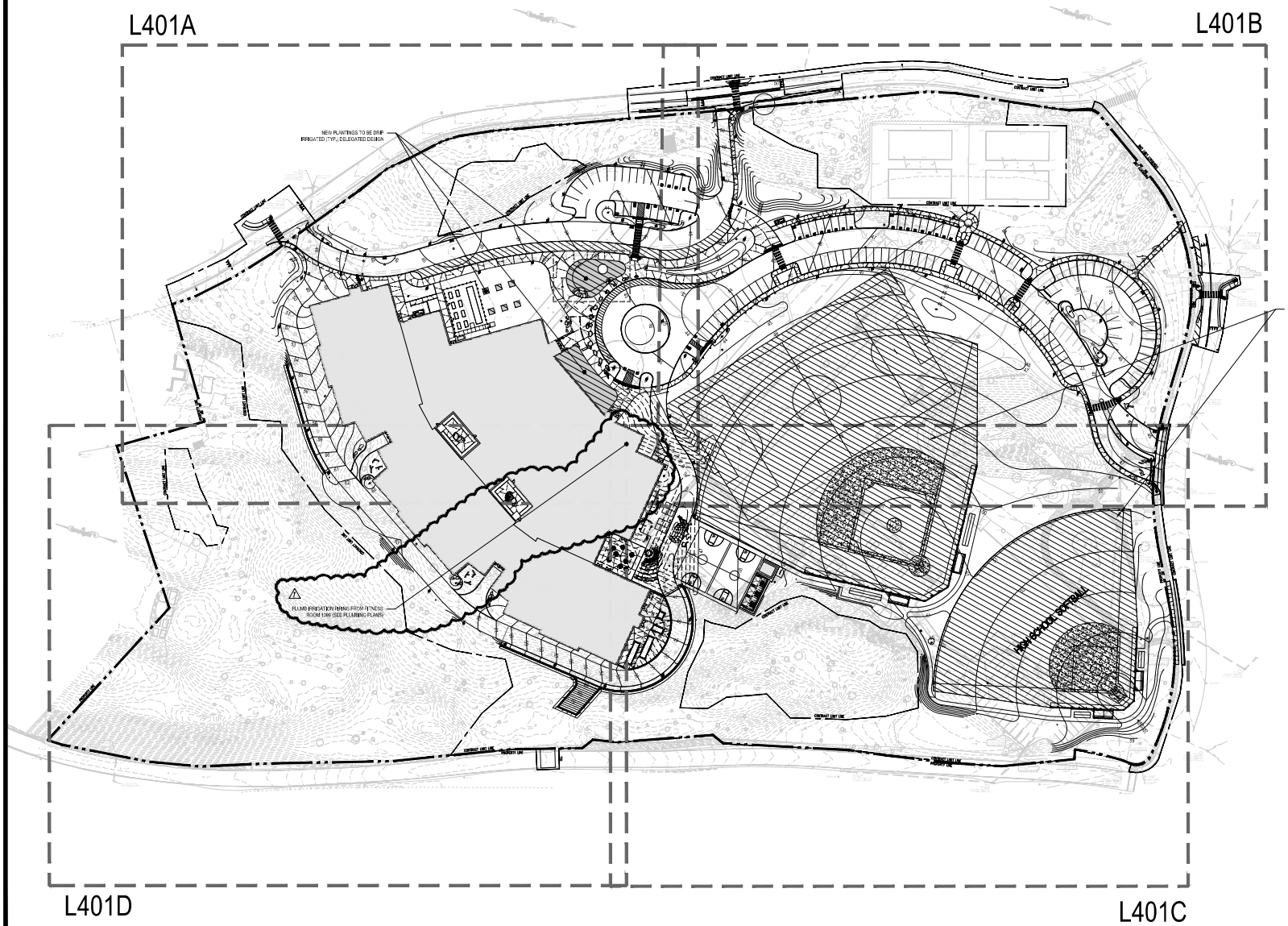

SITE IRRIGATION LEGEND

- DRIP IRRIGATION
- SPRAY IMPACT IRRIGATION
- SLEEVE LOCATION
- SLEEVE LOCATION AT WALL (SEE GRADING PLAN FOR B.L.)

0 25 50 100
SCALE: 1"=50'

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Phone: 860 657.8077

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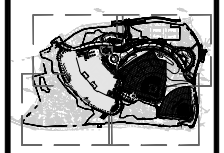
Greenwich Public Schools

GREENWICH CENTRAL MIDDLE SCHOOL

9 INDIAN ROCK LANE
GREENWICH, CT 06830

STATE PROJECT NO:057-0114 N



Number	Date	Issued For
1	10/15/2024 09/30/2024 07/08/2024	ADDENDUM NO. 2 BID DISPERSIT PHASE 2

SITE IRRIGATION PLAN

Date
07/08/2024
Scale
1" = 50'
Proj. Number
22367.00

Drawing Number
L404

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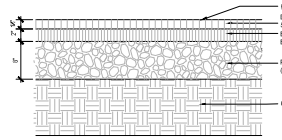
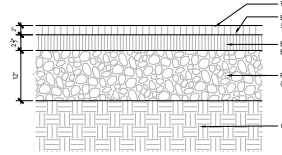


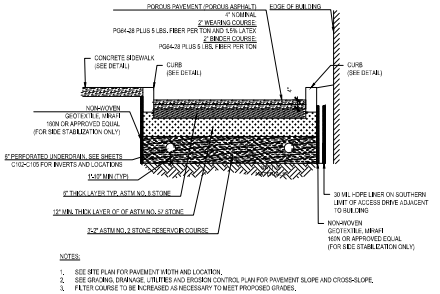
1A BITUMINOUS CONCRETE PAVEMENT (REGULAR DUTY)

1 1/2" = 1'-0"



1B BITUMINOUS CONCRETE PAVEMENT (HEAVY DUTY)

1 1/2" = 1'-0"

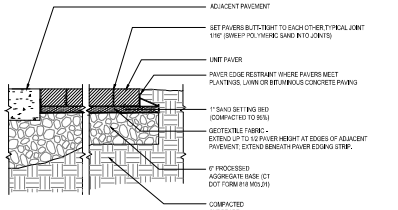


NOTES:
1. SEE SITE PLAN FOR PAVEMENT WIDTH AND LOCATION.
2. SEE GRADING, DRAINAGE, UTILITIES AND EROSION CONTROL PLAN FOR PAVEMENT SLOPE AND CROSS-SLOPE.
3. FILTER COURSE TO BE INCREASED AS NECESSARY TO MEET PROPOSED GRADES.

1C BITUMINOUS CONCRETE PAVEMENT (POROUS) FIRE LANE ONLY ⚠

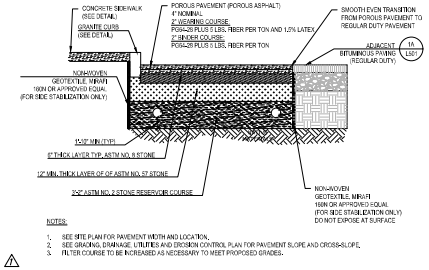
NTS

SEE DETAIL 1E FOR BITUMINOUS CONCRETE PAVEMENT (POROUS) IN PARKING AREAS



1D UNIT PAVERS ON SAND SETTING BED WITH EDGE RESTRAINT

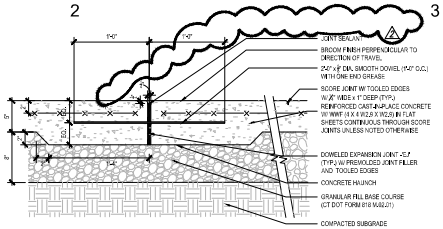
1 1/2" = 1'-0"



NOTES:
1. SEE SITE PLAN FOR PAVEMENT WIDTH AND LOCATION.
2. SEE GRADING, DRAINAGE, UTILITIES AND EROSION CONTROL PLAN FOR PAVEMENT SLOPE AND CROSS-SLOPE.
3. FILTER COURSE TO BE INCREASED AS NECESSARY TO MEET PROPOSED GRADES.

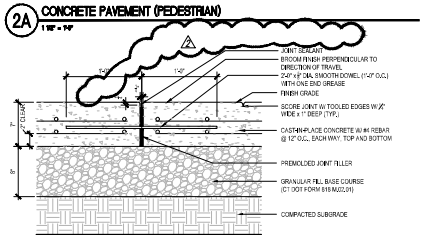
1E BITUMINOUS CONCRETE PAVEMENT (POROUS) PARKING AREAS ONLY

NTS



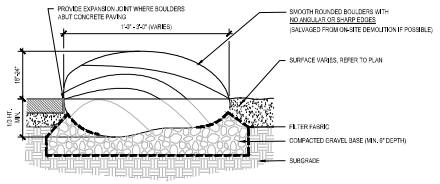
2A CONCRETE PAVEMENT (PEDESTRIAN)

1 1/2" = 1'-0"



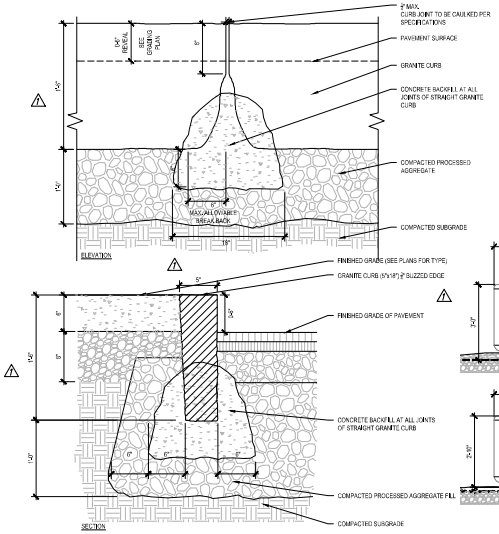
2B CONCRETE PAVEMENT (HEAVY DUTY)

1 1/2" = 1'-0"



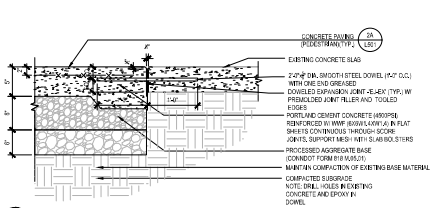
2C BOULDER

3/4" = 1'-0"



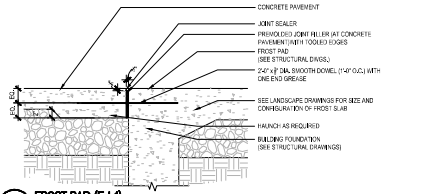
2E GRANITE CURB (GC)

1 1/2" = 1'-0"



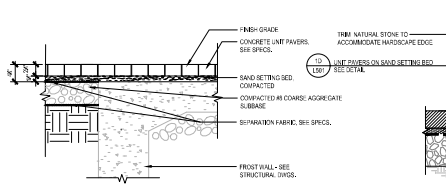
3A CONCRETE ADJACENT TO EXISTING CONCRETE SIDEWALK (EJ-EX)

1" = 1'-0"



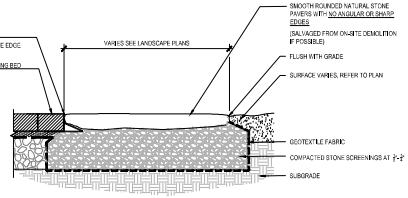
3B FROST PAD (EJ-1)

1" = 1'-0"



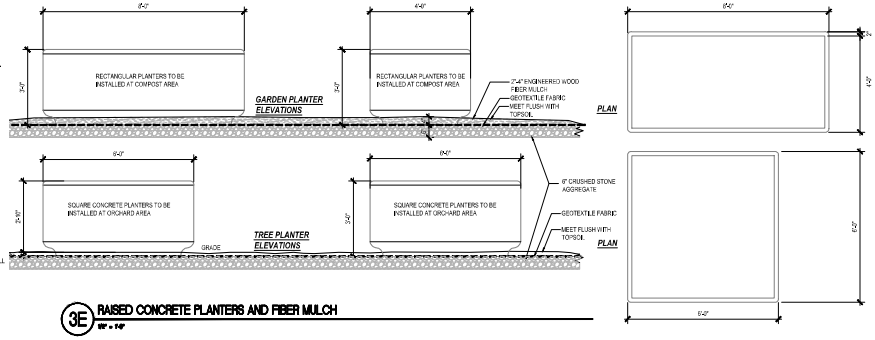
3C FROST PAD AT PEDESTRIAN UNIT PAVERS (EJ-2)

1" = 1'-0"



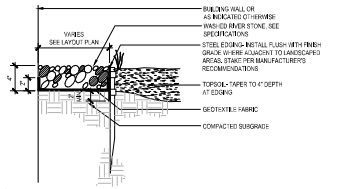
3E RAISED CONCRETE PLANTERS AND FIBER MULCH

1/8" = 1'-0"



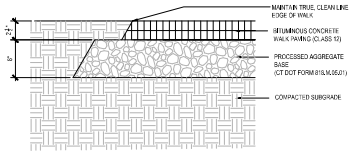
5A STONE MULCH

1 1/2" = 1'-0"



5B BITUMINOUS CONCRETE WALK

1 1/2" = 1'-0"



5C STEPPING STONE

3/4" = 1'-0"

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Checked: HWW

Greenwich Public Schools

GREENWICH CENTRAL MIDDLE SCHOOL

9 INDIAN ROCK LANE
GREENWICH, CT 06830

STATE PROJECT NO:057-0114 N

Number	Date	Issued For
2	11/05/2024	ADDENDUM NO. 4
1	10/31/2024	ADDENDUM NO. 3
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SITE DETAILS

Date: 07/08/2024
Scale: AS SHOWN
Proj. Number: 22367.00
Drawing Number: L501

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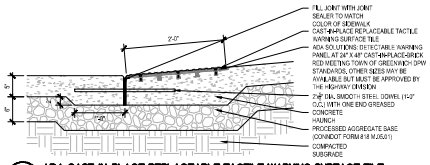
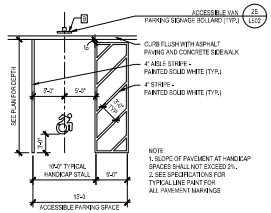
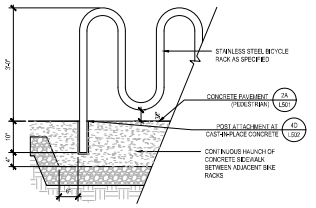


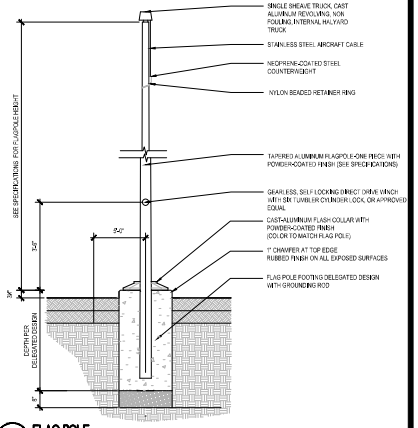
1A ADA CAST-IN-PLACE REPLACEABLE TACTILE WARNING SURFACE TILE



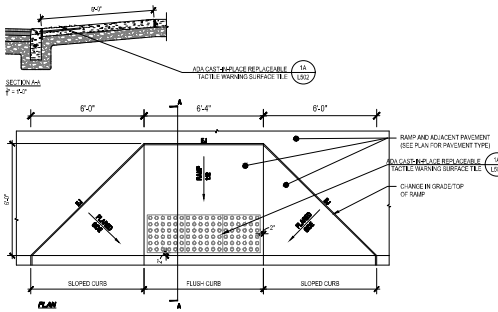
2A TYPICAL ACCESSIBLE PARKING SPACE



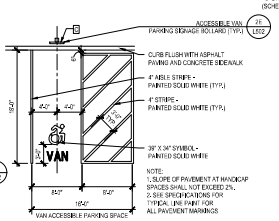
3A BICYCLE RACK



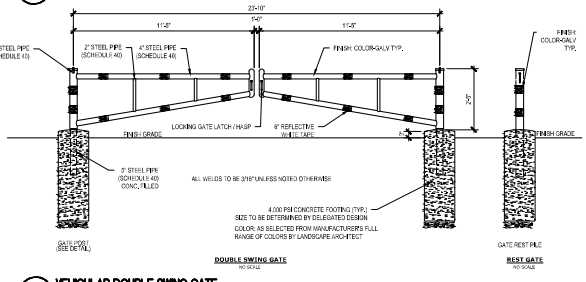
4B FLAG POLE



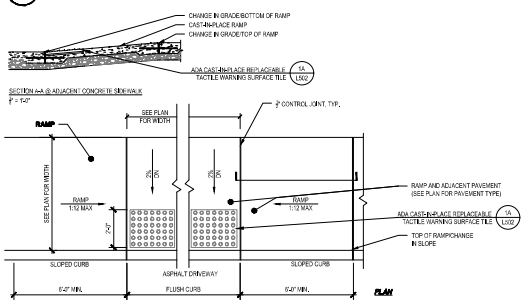
1C ACCESSIBLE CURB RAMP - TYPE A



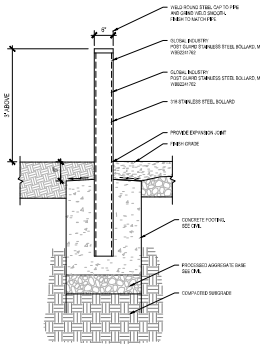
2B TYPICAL VAN ACCESSIBLE PARKING SPACE



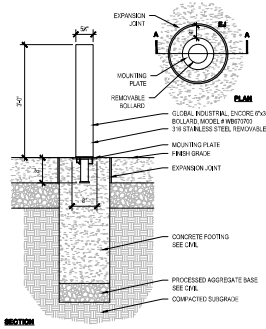
3B VEHICULAR DOUBLE SWING GATE



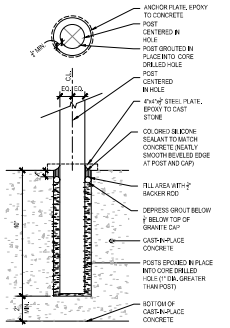
1D ACCESSIBLE CURB RAMP - TYPE B



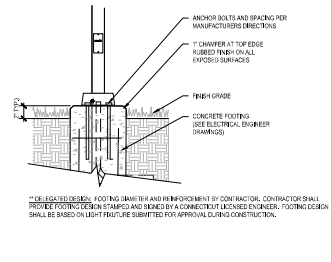
2D STEEL PIPE BOLLARD - CONCRETE FILLED



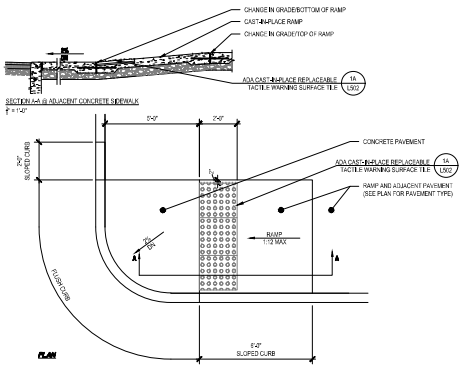
3D REMOVABLE BOLLARDS



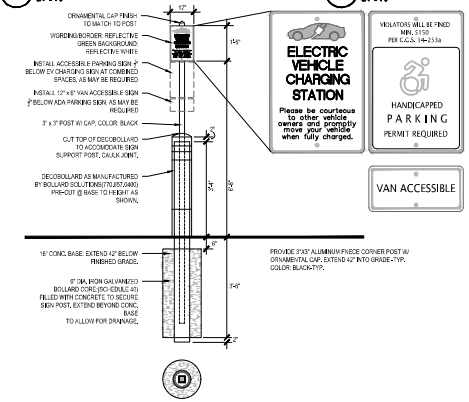
4D POST ATTACHMENT AT CAST-IN-PLACE CONCRETE



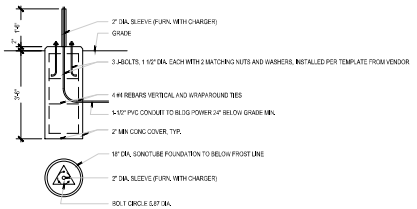
5D TYPICAL SITE LIGHT POLE FOOTING PROFILE



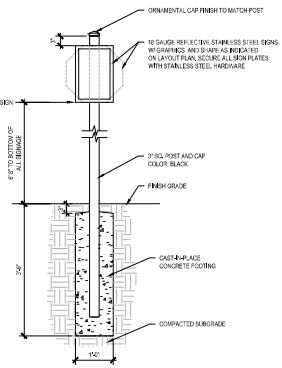
1E ACCESSIBLE CURB RAMP - TYPE D



2E ADA/ELECTRIC CHARGING STATION SIGNAGE/BOLLARD-TYP.



3E ELECTRIC CHARGING STATION BASE-TYP.



5E TRAFFIC CONTROL SIGN

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Greenwich Public Schools

GREENWICH CENTRAL MIDDLE SCHOOL

9 INDIAN ROCK LANE
GREENWICH, CT 06830

STATE PROJECT NO:057-0114 N

Number	Date	Issued For
	05/10/2021	BIDDING/PERMIT
	07/08/2024	PHASE 3

SITE DETAILS

Date 07/08/2024
Scale AS SHOWN
Proj. Number 22367.00
Drawing Number L502

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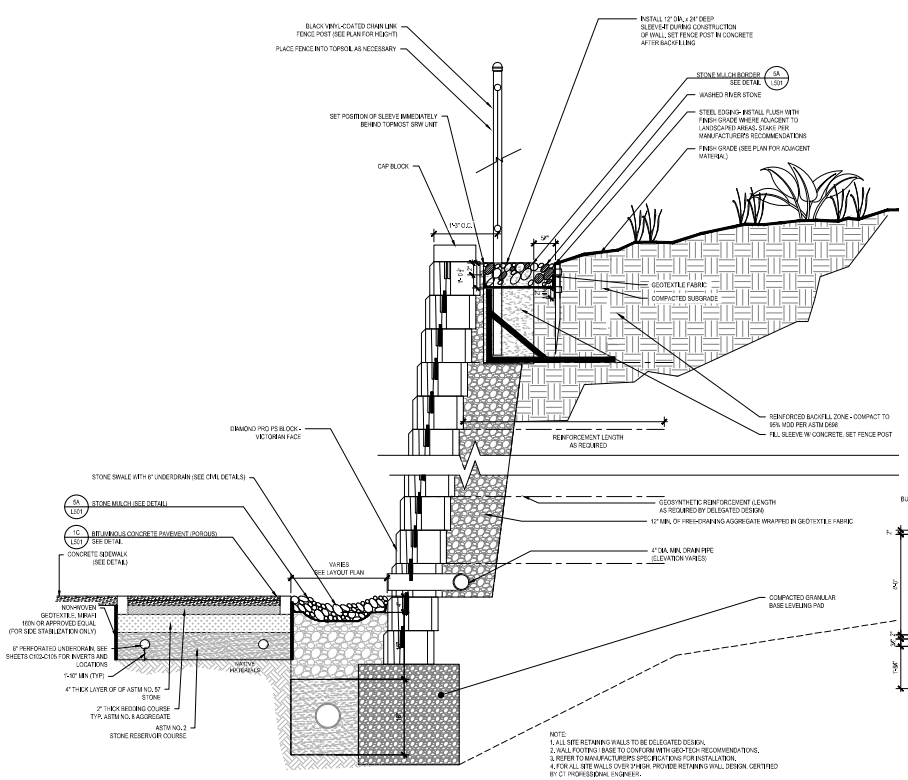
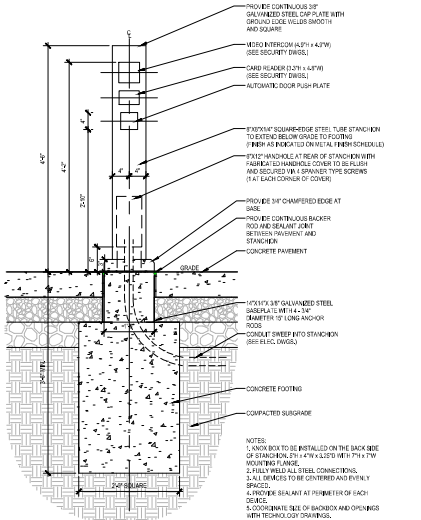
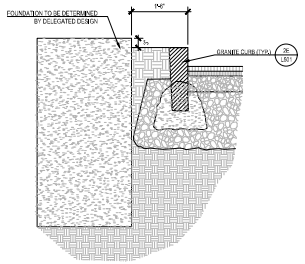


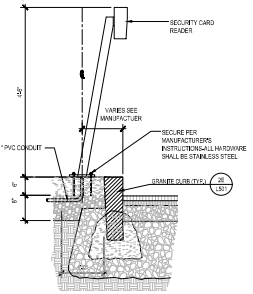
1D FIRE LANE RETAINAGE: TYPICAL SEGMENTAL BLOCK RETAINING WALL
1" = 1'-0"



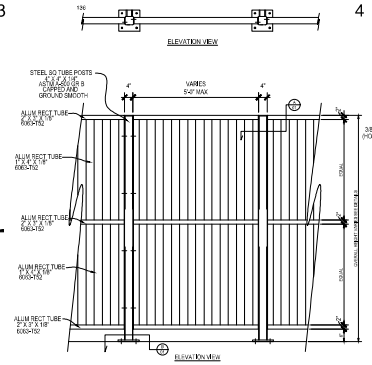
1E ELECTRONIC ENTRY STANCHION
1" = 1'-0"



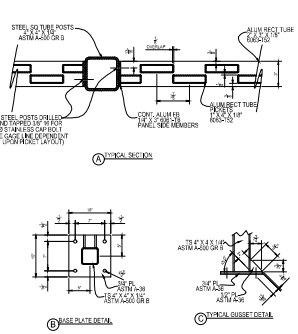
2D CONCRETE FOUNDATION FOR LIFT GATE
3/4" = 1'-0"

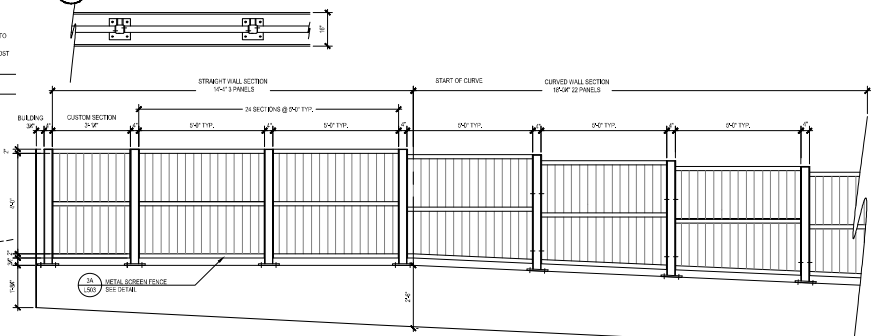


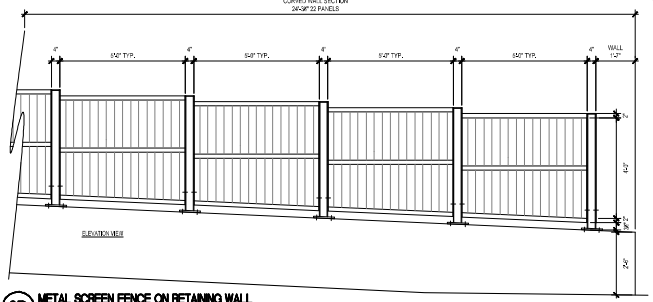
2E SECURITY CARD READER
3/4" = 1'-0"



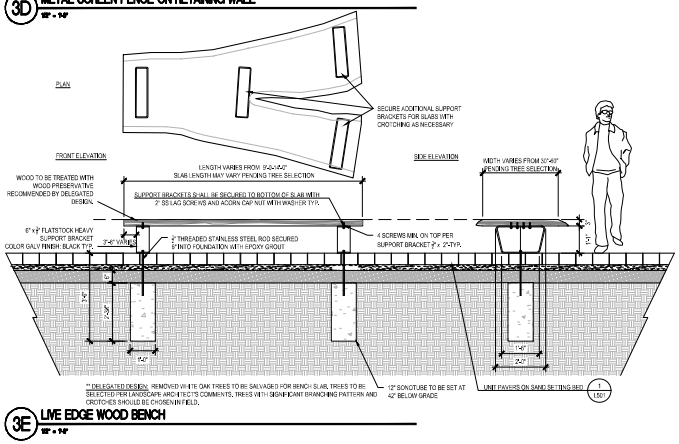
3A METAL SCREEN FENCE
1/2"







3D METAL SCREEN FENCE ON RETAINING WALL
1/2" = 1'-0"



3E LIVE EDGE WOOD BENCH
1/2" = 1'-0"

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Greenwich Public Schools

GREENWICH CENTRAL MIDDLE SCHOOL

9 INDIAN ROCK LANE
GREENWICH, CT 06830

STATE PROJECT NO:057-0114 N

Number	Date	Issued For
	05/10/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SITE DETAILS

Date: 07/08/2024
Scale: AS SHOWN
Proj. Number: 22367.00
Drawing Number: L503

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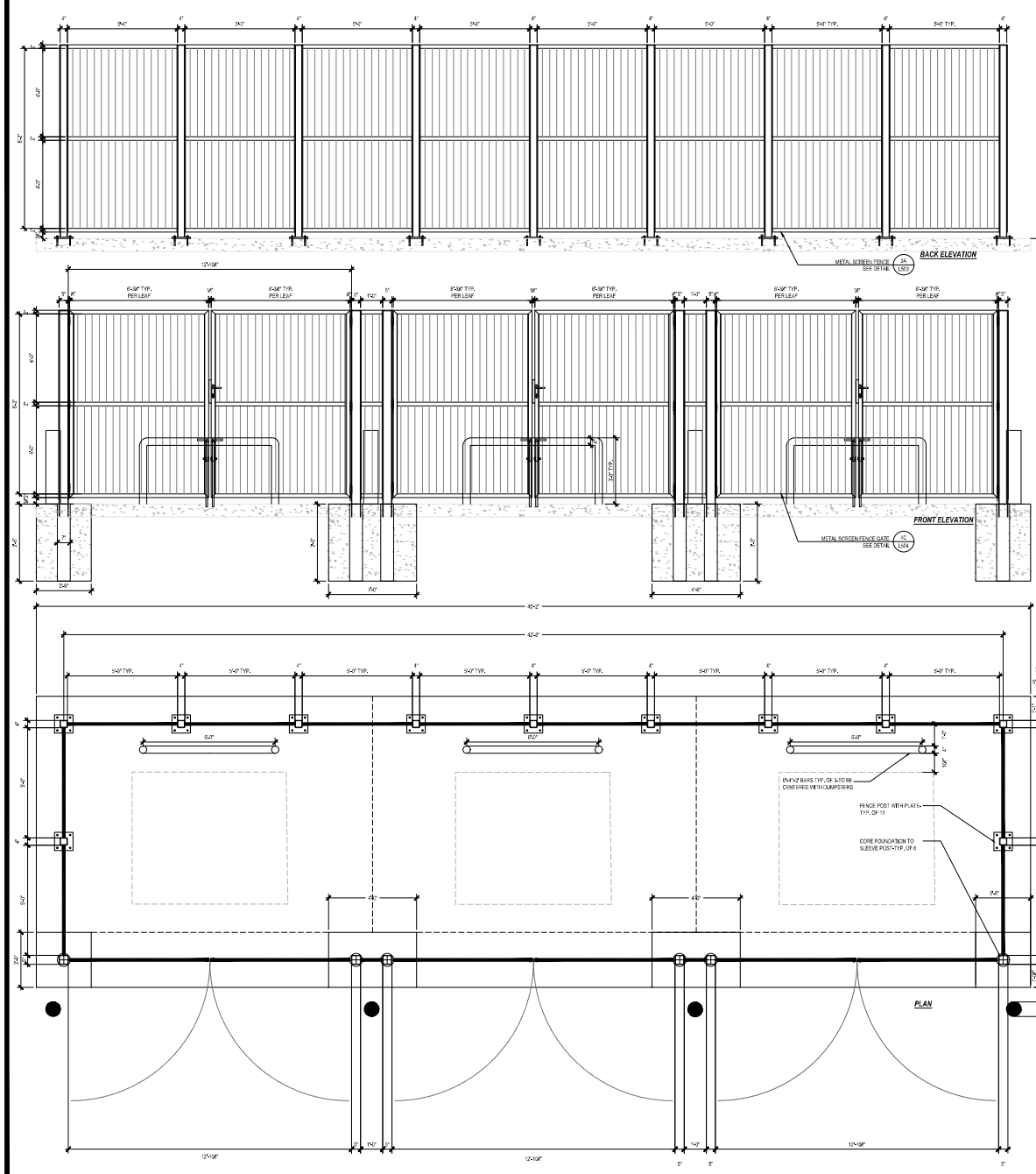
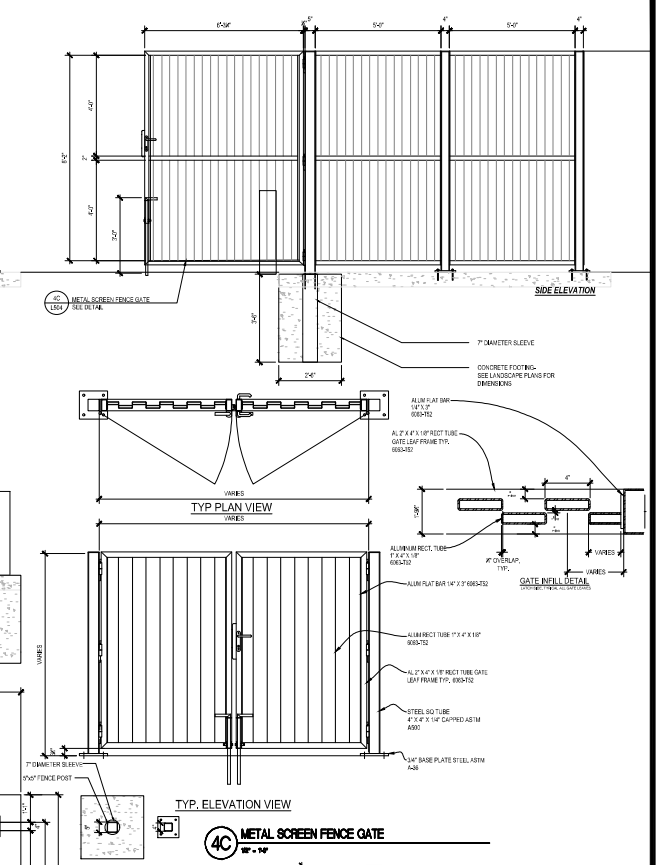
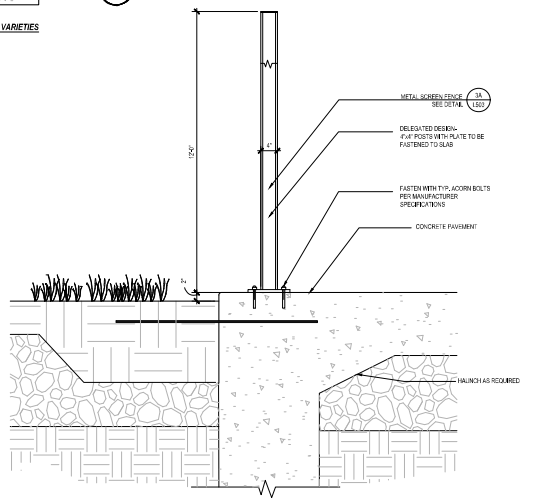


1E DUMPSTER ENCLOSURE
1/2" = 1'-0"



4C METAL SCREEN FENCE GATE
1/2" = 1'-0"



4E PRIVACY FENCE AT DUST COLLECTOR
1" = 1'-0"

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GREENWICH CENTRAL MIDDLE SCHOOL

9 INDIAN ROCK LANE
GREENWICH, CT 06830

STATE PROJECT NO:057-0114 N

Number	Date	Issued For
	05/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

SITE DETAILS

Date
07/08/2024
Scale
AS SHOWN
Proj. Number
22367.00

Drawing Number
L504

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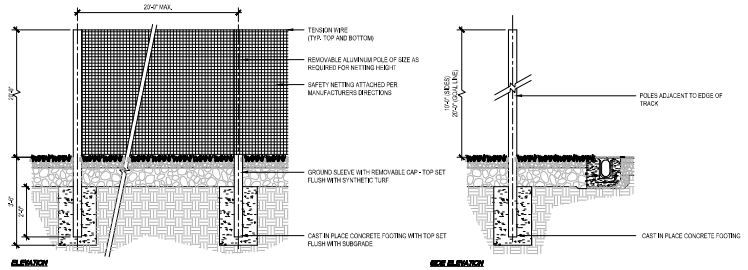
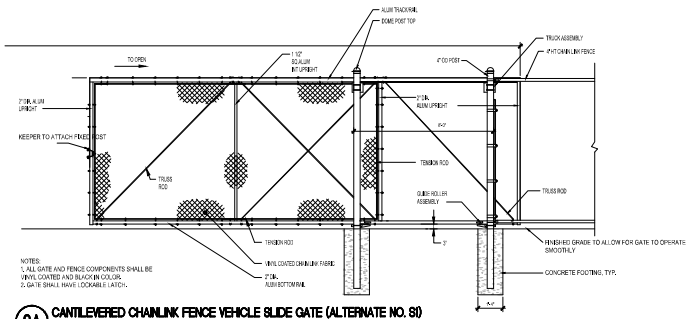
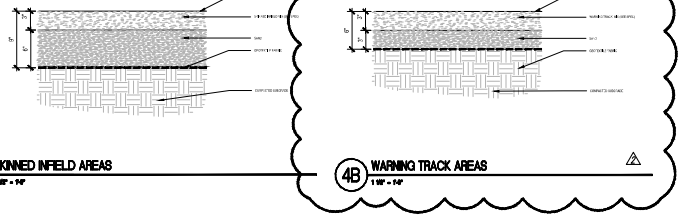


1A SAFTEY NETTING

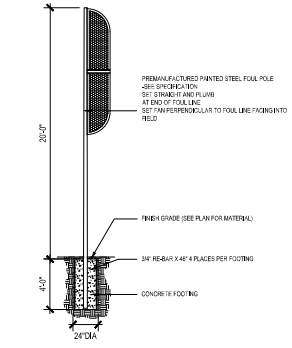


3A CANTILEVERED CHAINLINK FENCE VEHICLE SLIDE GATE (ALTERNATE NO. 8I)

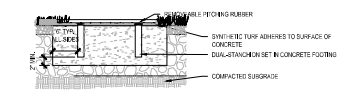


3B SKINNED INFIELD AREAS

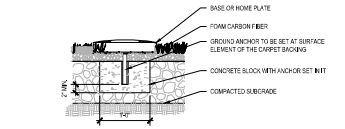
4B WARNING TRACK AREAS



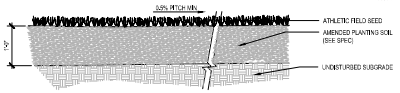
1C 20' FOUL POLE



2B PITCHING RUBBER



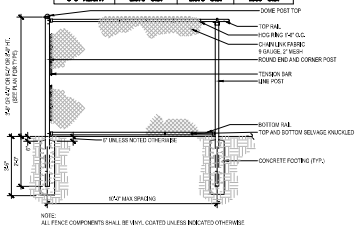
2C HOME PLATE / BASE MOUNTING



NOTES:
1. GRADE OF SUBGRADE BASE SHALL BE PARALLEL TO FINISHED GRADE OF PLAY FIELD SURFACE.
2. EXTEND NATURAL TURF SECTION TO LIMITS OF SAFETY ZONE OF FIELD.

3C TOPSOIL-BASED NATURAL TURF ATHLETIC FIELD

CHAIN LINK FRAMEWORK SIZES			
FENCE HEIGHT	END AND CORNER POST	LINE POST	TOP AND BOTTOM RAIL
3'-0" HEIGHT	2.375" O.D.	1.900" O.D.	1.660" O.D.
4'-0" HEIGHT	2.375" O.D.	1.900" O.D.	1.660" O.D.
6'-0" HEIGHT	2.375" O.D.	1.900" O.D.	1.660" O.D.
8'-0" HEIGHT	2.875" O.D.	2.500" O.D.	1.660" O.D.



3D VINYL-COATED CHAIN LINK FENCE

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Greenwich Public Schools

GREENWICH CENTRAL MIDDLE SCHOOL

9 INDIAN ROCK LANE
GREENWICH, CT 06830

STATE PROJECT NO:057-0114 N

Number	Date	Issued For
1	10/30/2024	ADDENDUM NO. 4
	09/09/2024	RECONSIDER#2
	07/08/2024	PHASE 2

ATHLETIC FIELD SITE DETAILS

Date 07/08/2024
Scale AS SHOWN
Proj. Number 22367.00
Drawing Number L601

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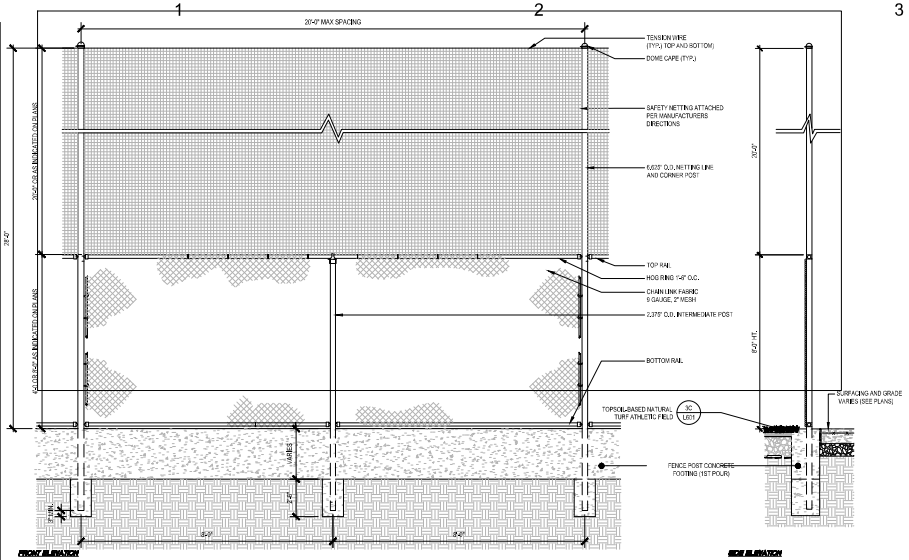
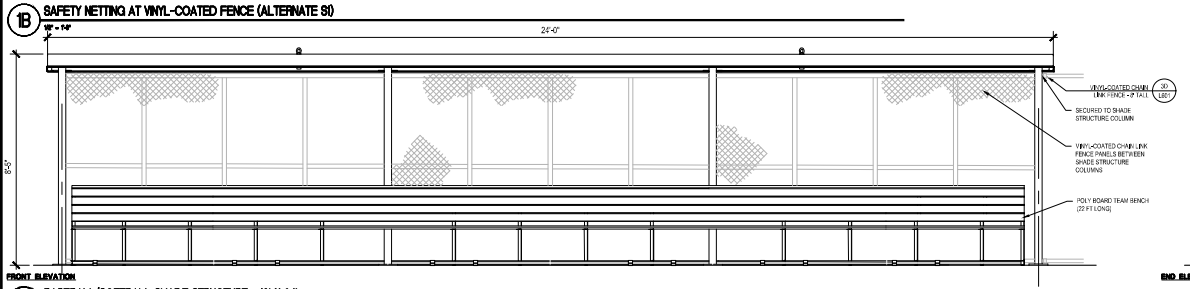


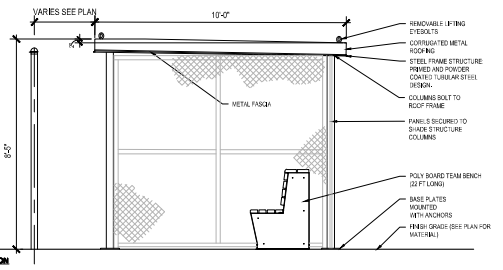
1B SAFETY NETTING AT VINYL-COATED FENCE (ALTERNATE S1)

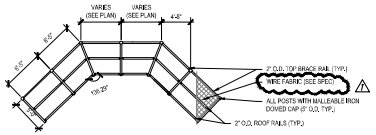
1/8" = 1'-0"

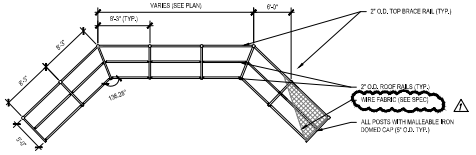


1C BASEBALL/SOFTBALL SHADE STRUCTURE - 10' X 24'

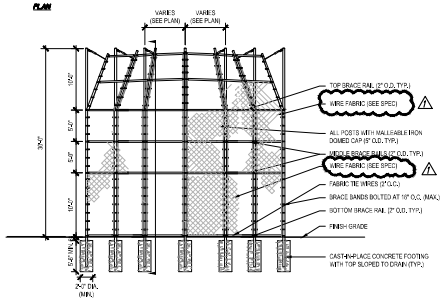
1/8" = 1'-0"

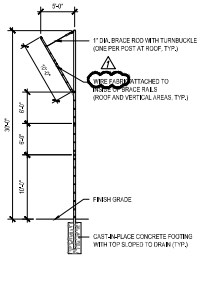






PLAN

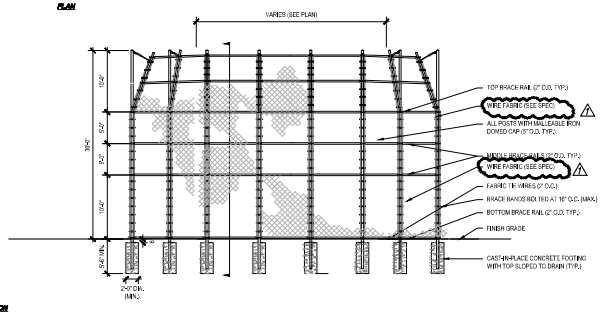


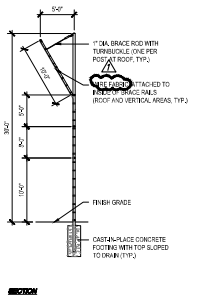


1E SOFTBALL BACKSTOP

1/8" = 1'-0"

PLAN





3E BASEBALL BACKSTOP

1/8" = 1'-0"

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Greenwich Public Schools

GREENWICH CENTRAL MIDDLE SCHOOL

9 INDIAN ROCK LANE
GREENWICH, CT 06830

STATE PROJECT NO:057-0114 N

Number	Date	Issued For
1	11/05/2024 10/30/2024 07/08/2024	ADDENDUM #1 SD/DD/PERMIT PHASE 2

ATHLETIC FIELD SITE DETAILS

Date: 07/08/2024
Scale: AS SHOWN
Proj. Number: 22367.00
Drawing Number: L602

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STRUCTURAL GENERAL NOTES

A. **CODES AND STANDARDS:**
THE FOLLOWING CODES AND STANDARDS, AND ALL REFERENCED STANDARDS THEREIN, SHALL APPLY TO THE DESIGN, CONSTRUCTION, AND QUALITY CONTROL OF ALL WORK PERFORMED ON THE PROJECT. USE THE LATEST EDITIONS UNLESS NOTED OTHERWISE. SAFETY AND CONSTRUCTION MEANS AND METHODS ARE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
1. 2022 STATE BUILDING CODE, STATE OF CONNECTICUT
2. INTERNATIONAL BUILDING CODE 2021
3. "MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES" (SEI/ASCE 7-16), AMERICAN SOCIETY OF CIVIL ENGINEERS.
4. "STEEL CONSTRUCTION MANUAL" 15TH EDITION, 2017, AMERICAN INSTITUTE OF STEEL CONSTRUCTION (INCLUDING SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS)
5. "BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE" ACI 318-19, AMERICAN CONCRETE INSTITUTE
6. "BUILDING CODE REQUIREMENTS AND SPECIFICATION FOR MASONRY STRUCTURES" (TMS 402-16 & TMS 602-16)

B. **DESIGN DATA:**
1. FLOOR LIVE LOAD:

AREA	UNIFORM LOAD	CONC. LOAD	LL REDUCIBLE	IMPACT LOAD
a. OFFICES	50 psf	2,000 lbs	Yes	N/A
b. CLASSROOMS	40 psf	1,000 lbs	Yes	N/A
c. FIRST FLOOR CORRIDORS	100 psf	1,000 lbs	Yes	N/A
d. CORRIDORS ABOVE FIRST FLOOR	80 psf	1,000 lbs	Yes	N/A
e. GYMNASIUMS	100 psf	—	Yes	N/A
f. STAIRS AND EXIT WAYS	100 psf	300 lbs	Yes	N/A
g. CATWALKS FOR MAINTENANCE ACCESS	40 psf	300 lbs	Yes	N/A

2. ROOF LIVE LOAD:
(ROOF SNOW LOAD GOVERNS DESIGN)

3. ROOF SNOW LOAD:
a. GROUND SNOW LOAD, P_g = 30 psf
b. FLAT ROOF SNOW LOAD, $P_f = 0.7 C_e C_t I_s P_g$ = 23.1 psf
c. SNOW EXPOSURE FACTOR, C_e = 1.0
d. SNOW LOAD IMPORTANCE FACTOR, I_s = 1.1
e. THERMAL FACTOR, C_t = 1.0
f. DRIFT SURCHARGE LOADS. SEE DRAWING S700

4. WIND LOAD:
a. BASIC WIND SPEED (3 SECOND GUST) MPH, V_{ult} = 130 mph
b. NOMINAL DESIGN WIND SPEED MPH, $V_{asd} = V_{ult}\sqrt{0.6}$ = 101 mph
c. RISK CATEGORY II
d. WIND EXPOSURE B
e. INTERNAL PRESSURE COEFFICIENT GC_{pi} = ± 0.18
f. COMPONENTS AND CLADDING:
• WIND DIRECTIONALITY FACTOR, K_d = 0.85
• TOPOGRAPHIC FACTOR, K_{zt} = 1.0
• WIND PRESSURES. SEE DRAWING S701

5. EARTHQUAKE DESIGN DATA:
a. RISK CATEGORY III
b. SEISMIC IMPORTANCE FACTOR, I_e = 1.25
c. MAPPED SPECTRAL RESPONSE COEFFICIENTS S_s = 0.274 S_1 = 0.056
d. SOIL SITE CLASS D
e. DESIGN SPECTRAL RESPONSE COEFFICIENTS, S_{DS} = 0.289 S_{D1} = 0.094
f. SEISMIC DESIGN CATEGORY B
g. BASIC SEISMIC FORCE RESISTING SYSTEM STEEL SYSTEM NOT SPECIFICALLY DETAILED PART B GYM - INTERMEDIATE MASS SHEAR WALLS
h. DESIGN BASE SHEAR 120.3 KIPS
i. SEISMIC RESPONSE COEFFICIENT C_s = 0.120
j. RESPONSE MODIFICATION FACTOR,
• PARTS A-F (EXCEPT B) R = 3.0
• PART B- GYMNASIUM R = 3.0
k. DEFLECTION AMPLIFICATION FACTOR,
• PARTS A-F (EXCEPT B) C_d = 3.0
• PART B- GYMNASIUM C_d = 2.25
l. OVERSTRENGTH FACTOR
• PARTS A-F (EXCEPT) Ω_o = 3.0
• PART B- GYMNASIUM Ω_o = 2.5
m. ANALYSIS PROCEDURE EQUIVALENT LATERAL FORCE
n. LONG-PERIOD TRANSITION PERIOD T_L = 6 SEC

6. FLOOD DESIGN DATA:
a. FLOOD DESIGN CLASS (per ASCE 24) - N/A
b. ELEVATION LOWEST FLOOR _ft RELATIVE TO DATUM - N/A
c. ELEVATION OF DRY FLOODPROOFING ___ft - N/A
d. BOTTOM OF THE LOWEST ELEVATION OF THE LOWEST HORIZONTAL STRUCTURAL MEMBER OF THE LOWEST FLOOR ___ ft. - N/A

7. SPECIAL LOADS:
a. HYDROSTATIC UPLIFT N/A
b. HYDRODYNAMIC LOADS N/A
c. CONSTRUCTION LOADS 25 psf LL
d. AT REST SOIL PRESSURE 65 psf/ft
e. ACTIVE SOIL PRESSURE 45 psf/ft
f. PASSIVE SOIL PRESSURE 400 psf/ft
g. ELEVATOR HOIST BEAM 7500 LB

C. **FOUNDATIONS/GEOTECHNICAL REPORT:**
1. FOUNDATIONS HAVE BEEN DESIGNED IN ACCORDANCE WITH THE GEOTECHNICAL REPORT PREPARED BY TIGHE & BOND, DATED JANUARY 26, 2024, REPORT NO. 16-5006-003. SEE THAT REPORT FOR ADDITIONAL REQUIREMENTS.

2. ALL FOUNDATIONS SUSCEPTIBLE TO FROST SHALL BEAR A MINIMUM OF 3'-6" BELOW GRADE, IN CASE OF CONFLICT, NOTIFY THE ARCHITECT AND STRUCTURAL ENGINEER IN ADVANCE OF ANY CONSTRUCTION TO ALLOW FOR ENGINEER BY-ADVICE.

3. FOUNDATIONS, WITHIN THE EXTENT OF UNSUITABLE MATERIAL DENOTED ON THE FOUNDATION PLANS, HAVE BEEN DESIGNED FOR AN ALLOWABLE NET BEARING PRESSURE OF 4000 PSF BASED ON RECOMMENDATIONS FROM THE GEOTECHNICAL REPORT. THIS ASSUMES THAT SOIL IMPROVEMENT USING AGGREGATE PIERS HAS BEEN IMPLEMENTED.

4. FOUNDATIONS PLACED ON UNDISTURBED NATIVE INORGANIC SOILS OR COMPACTED GRANULAR FILL PLACED OVER UNDISTURBED NATIVE INORGANIC SOILS AT ELEVATIONS INDICATED HAVE BEEN DESIGNED FOR AN ALLOWABLE NET BEARING PRESSURE OF 4000 PSF.

D. **MATERIALS:**
1. THE FOLLOWING ASTM STANDARDS AND DESIGN STRESSES SHALL BE USED FOR THE APPROPRIATE MATERIALS USED IN THE CONSTRUCTION OF THIS PROJECT.

2. CEMENT: ASTM C150, TYPE I / II
ASTM C595, TYPE 1L

3. CONCRETE:
ALL ELEVATED SLABS SHALL BE LIGHT-WEIGHT CONCRETE.
ALL OTHER CONCRETE SHALL BE NORMAL WEIGHT CONCRETE.

APPLICATION	f'c @ 28 DAYS (PSI)
INTERIOR SLABS ON GROUND	4000
EXTERIOR SLDG. SLABS ON GROUND	4000
LIGHT-WEIGHT FILL ON METAL DECK	4000
FOUNDATION WALLS/FOOTINGS	4000
SITE RETAINING WALLS & FOOTINGS	4000

4. REINFORCEMENT:
a. DEFORMED REINFORCING BARS - ASTM A615, GRADE 60

5. STEEL:
a. STRUCTURAL STEEL WIDE FLANGE & TEE SECTIONS ASTM A992
b. STRUCTURAL ANGLES, CHANNELS & PLATES ASTM A36
c. ROUND HOLLOW STRUCTURAL SHAPES ASTM A500, GRADE C, Fy=46ksi
d. RECTANGULAR HOLLOW STRUCTURAL SHAPES ASTM A500, GRADE C, Fy=50ksi
e. STRUCTURAL BOLTS ASTM A307, GRADE A
f. HIGH STRENGTH BOLTS ASTM F3125, GRADE A325-N, TYPE 1
WITH COMPATABLE NUTS ASTM A563
WITH WASHERS ASTM F436
g. TENSION CONTROL BOLTS (TWIST-OFF) ASTM F3125, GRADE F1852-N, TYPE 1
h. UNHEADED ANCHOR RODS (HOOKED) ASTM F1554, GRADE PER SCHEDULE
WITH MATCHING NUTS ASTM A563
AND WASHERS ASTM F436
i. HEADED ANCHOR RODS (EMBEDDED HEX NUT) ASTM F1554, GRADE PER SCHEDULE
j. WELDING ELECTRODES AWS A5.1 OR A5.5, E70XX

6. MASONRY:
a. CONCRETE MASONRY UNITS
• HOLLOW ASTM C90, MINIMUM COMPRESSIVE STRENGTH ON NET AREA = 3750 PSI
• SOLID ASTM C90
b. BRICK ASTM C55, MINIMUM COMPRESSIVE STRENGTH ON NET AREA = 2000 PSI.
c. MORTAR ASTM C270 - TYPE M (BELOW GRADE)
TYPE S (ABOVE GRADE)
d. GROUT ASTM C476, MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS = 2000 PSI.
e. PRISM STRENGTH f'm = 2500 PSI PER ACI 530/ASCE 5, UNIT STRENGTH METHOD. INSPECTION REQUIRED.

7. STRUCTURAL GRADE RIGID FILLER MATERIAL. SEE SPECIFICATION DIVISION 03.

E. **CONSTRUCTION:**
1. GENERAL:
a. IN CASE OF CONFLICT BETWEEN THE GENERAL NOTES, DETAILS AND SPECIFICATIONS, THE MOST STRINGENT REQUIREMENTS SHALL GOVERN.

b. TYPICAL DETAILS APPLY REPETITIVELY ON THE PROJECT. CONTRACTOR SHALL COORDINATE THE GENERAL REQUIREMENTS OF TYPICAL DETAILS WITH PROJECT CONDITIONS, PLANS, SPECIFICATIONS, AND SECTIONS.

c. REPRODUCTION OF ANY PORTION OF THE STRUCTURAL CONTRACT DRAWINGS FOR RESUBMITTAL AS SHOP DRAWINGS IS PROHIBITED. SHOP DRAWINGS PRODUCED IN SUCH A MANNER WILL BE REJECTED AND RETURNED.

d. THESE DRAWINGS REPRESENT THE COMPLETED PROJECT WHICH HAS BEEN DESIGNED FOR THE WEIGHTS OF THE MATERIALS INDICATED ON THE DRAWINGS AND FOR THE SUPERIMPOSED LOADS INDICATED IN THE DESIGN DATA. IT IS THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE ALLOWABLE CONSTRUCTION LOADS AND TO PROVIDE PROPER DESIGN AND CONSTRUCTION OF FALSEWORK, FORMWORK, STAGINGS, BRACING, SHEETING AND SHORING, ETC.

e. DIMENSIONS AND DETAILS OF EXISTING CONSTRUCTION SHOWN ON THE STRUCTURAL DRAWINGS ARE APPROXIMATE AND ARE BASED ON LIMITED INFORMATION. THE CONTRACTOR SHALL VERIFY ALL INFORMATION PERTAINING TO EXISTING CONDITIONS BY ACTUAL MEASUREMENT AND OBSERVATION AT THE SITE AND SHALL NOTIFY THE ARCHITECT AND STRUCTURAL ENGINEER OF ANY DISCREPANCIES PRIOR TO SHOP DRAWING SUBMITTALS, UNLESS INDICATED OTHERWISE, NEW SLABS ARE TO BE AT THE SAME ELEVATIONS AS ADJACENT EXISTING SLABS. FOUNDATION ELEVATIONS OR COLUMN LENGTHS SHALL BE ADJUSTED WITH THE APPROVAL OF THE STRUCTURAL ENGINEER TO ACHIEVE MATCHING SLAB ELEVATIONS.

f. IMPLEMENTING JOB SITE SAFETY AND CONSTRUCTION PROCEDURES, TEMPORARY SHORING, AND BRACING OF CONSTRUCTION ARE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.

g. ALL COSTS OF INVESTIGATION AND OR REDESIGN, DUE TO CONTRACTOR MISLOCATION OF STRUCTURAL ELEMENTS OR OTHER LACK OF CONFORMANCE WITH THE PROJECT DOCUMENTS, SHALL BE AT THE CONTRACTOR'S EXPENSE, THEY SHALL HIRE THEIR OWN INDEPENDENT ENGINEER, LICENSED IN THE JURISDICTION OF THIS PROJECT FOR THIS WORK.

h. CONTRACTOR SHALL COORDINATE WITH ALL ARCHITECTURAL, MECHANICAL, PLUMBING, ELECTRICAL, LAUNDRY AND FOOD SERVICE DRAWINGS FOR SIZE AND LOCATIONS OF OPENINGS, SLEEVES, CONCRETE HOUSEKEEPING PADS, INSERTS, AND DEPRESSIONS.

i. OPENINGS, SLEEVES, CONCRETE HOUSEKEEPING PADS, INSERTS, STEEL FRAMED SLAB OPENINGS, AND SLAB DEPRESSIONS FOR ARCHITECTURAL, MECHANICAL, ELECTRICAL, PLUMBING AND FOOD SERVICE ITEMS HAVE BEEN SHOWN BASED ON SCHEMATIC DRAWINGS THAT WERE AVAILABLE FOR COORDINATION PRIOR TO THE ISSUANCE OF THE FINAL BID DOCUMENTS. THESE ITEMS ARE SHOWN TO ASSIST THE CONTRACTOR IN UNDERSTANDING THE GENERAL SCOPE OF WORK, BUT ARE NOT INTENDED TO REPRESENT EXACT LOCATIONS, QUANTITIES, OR COMPLETE EXTENT OF REQUIRED COORDINATION. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING THESE ITEMS WITH THE WORK OF ALL OTHER TRADES.

j. WHERE SLEEVES, OPENINGS, ETC. ARE REQUIRED IN BASEMENT WALLS, COORDINATE WATER TIGHT SEAL REQUIREMENTS WITH WEP DRAWINGS AND SPECIFICATIONS.

k. THE SLAB-ON-GROUND AND THE FRAMED STRUCTURAL FLOORS OF THIS BUILDING HAVE NOT BEEN DESIGNED OR ANALYZED FOR THEIR ABILITY TO SUPPORT THE LOADS/WEIGHT OF MECHANICAL OR ELECTRICAL WANLETS, MATERIAL LIFTS OR OTHER CONSTRUCTION MATERIALS DURING CONSTRUCTION. CONTRACTORS AND/OR SUB-CONTRACTORS SHALL HIRE THEIR OWN INDEPENDENT ENGINEER, LICENSED IN THE JURISDICTION OF THIS PROJECT, TO DETERMINE THE ADEQUACY OF THE FLOOR OR SLAB TO SUPPORT THE WEIGHT OF THE LIFTS, NUMBER OF LIFTS THAT CAN BE ON THE FLOOR, ADJACENCY TO OTHER LIFTS AND WEIGHT OF STORED MATERIALS, ETC. THE SLAM COLLABORATIVE, INC. TAKES NO RESPONSIBILITY FOR ANY DAMAGE TO THE FLOORS CAUSED BY CONTRACTOR SUPPLIED LIFTS OR STORED MATERIALS, ASSESSED SLAB-ON-GROUND AND FRAMED FLOOR LIVE LOADS ARE LISTED ABOVE.

2. INSPECTION AND TESTING:
a. THE OWNER SHALL ENGAGE A TESTING AGENCY AND A SPECIAL INSPECTOR TO PROVIDE SERVICES AND SUBMIT REPORTS AS INDICATED IN THE SPECIFICATIONS AND STATEMENT OF SPECIAL INSPECTIONS.

b. THE OWNER SHALL ENGAGE A TESTING AGENCY TO PROVIDE SERVICES AND SUBMIT REPORTS AS INDICATED IN THE SPECIFICATIONS.

F. **FOUNDATIONS & STRUCTURAL EARTHWORK:**
1. GENERAL:
a. SEE THE SPECIFICATIONS AND GEOTECHNICAL REPORT REQUIREMENTS FOR EXCAVATION AND PREPARATION OF THE FOUNDATION BEARING SUBGRADE, INCLUDING CONSTRUCTION PROCEDURES. REQUIREMENTS CONTAINED IN THE GEOTECHNICAL REPORT ARE PART OF THIS WORK.

b. EXISTING UTILITIES KNOWN TO BE IN THE CONSTRUCTION AREA HAVE BEEN INDICATED. THE SIZE, LOCATION AND DEPTH OF THE UTILITIES ARE NOT KNOWN EXACTLY AND MAY VARY SIGNIFICANTLY FROM THAT INDICATED. OTHER UNKNOWN UTILITIES NOT INDICATED MAY ALSO BE PRESENT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING AND PROTECTING ALL EXISTING UTILITIES, WHETHER INDICATED OR NOT, WHICH MAY BE AFFECTED BY THE CONSTRUCTION OPERATIONS. CONTACT DIG SAFE SYSTEM AT LEAST TWO BUSINESS DAYS BEFORE DIGGING FIELD CONDITIONS THAT MAY AFFECT THE INSTALLATION OF THE FOUNDATION SYSTEM AS SHOWN PRIOR TO STARTING WORK.

c. ALL FOUNDATIONS SHALL BE PLACED ON UNDISTURBED SOIL OR COMPACTED STRUCTURAL FILL. BEARING ELEVATIONS ARE BASED ON RECOMMENDATIONS IN THE GEOTECHNICAL REPORT. DETERMINATION OF FINAL BEARING ELEVATIONS AND FIELD VERIFICATION OF ALLOWABLE BEARING PRESSURE SHALL BE MADE BY AN EXPERIENCED, QUALIFIED GEOTECHNICAL ENGINEER PRIOR TO PLACING FOUNDATIONS.

d. CONCRETE FOR FOUNDATIONS SHALL BE PLACED ON THE SAME DAY SUBGRADE APPROVAL IS GIVEN.

e. UTILITY LINES SHALL NOT BE PLACED THROUGH OR BELOW FOUNDATIONS WITHOUT THE STRUCTURAL ENGINEERS APPROVAL.

f. THE SLOPE BETWEEN THE LOWER EDGES OF ADJACENT FOOTINGS SHALL NOT EXCEED 45 DEGREES WITH THE HORIZONTAL, UNLESS INDICATED OTHERWISE IN THE GEOTECHNICAL REPORT.

g. ALL SHORING, SHEETING, AND DEWATERING SHALL BE THE TOTAL RESPONSIBILITY OF THE CONTRACTOR. SHEETING AND SHORING SHALL BE DESIGNED BY THE CONTRACTOR'S ENGINEER REGISTERED IN THE PROJECT'S JURISDICTION. ALL SUBMITTALS SHALL BEAR CONTRACTOR'S ENGINEERING SEAL AND SIGNATURE.

2. BACKFILL:
a. ALL RETAINING WALLS SHALL BE BACKFILLED PRIOR TO ERECTION OF FLOOR FRAMING OR METAL DECK AT TOP OF WALL.

b. WHERE THE FINAL GRADE ELEVATIONS ARE APPROXIMATELY EQUAL ON BOTH SIDES OF A WALL OR PIER, BACKFILL IN LIFTS TO MAINTAIN LEVEL ELEVATIONS WITHIN 12" ON ALL SIDES AT ANY TIME.

c. BASEMENT RETAINING WALLS HAVE NOT BEEN DESIGNED FOR CONSTRUCTION SURCHARGE LOADING.

G. **CONCRETE:**
1. CAST-IN-PLACE:
REINFORCING STEEL CLEAR COVER SHALL BE AS FOLLOWS UNLESS NOTED OTHERWISE:
• NONPOST-TENSIONED CONCRETE:
CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH 3"
CONCRETE EXPOSED TO EARTH OR WEATHER:
#5 BARS AND LARGER 2"
#5 BARS AND SMALLER 1½"
CONCRETE NOT EXPOSED TO WEATHER OR IN CONTACT WITH GROUND:
SLABS, WALL, JOISTS
#11 BARS AND SMALLER ¾"
BEAMS, COLUMNS:
PRIMARY REINFORCEMENT, TIES, STIRRUPS, SPIRALS 1½"

a. CONSTRUCTION JOINTS AND CONTRACTION JOINTS IN SLABS-ON-GROUND SHALL BE ARRANGED TO LIMIT MAXIMUM AREA BETWEEN JOINTS TO 400 S.F., APPROXIMATELY SQUARE. MAXIMUM 1:1.5 RATIO. ALLOW A MINIMUM OF 48 HOURS TIME BETWEEN PLACEMENT OF ADJACENT SECTIONS. CONTRACTOR SHALL SUBMIT A CONTROL JOINT LAYOUT FOR ARCHITECT APPROVAL.

b. ALL INSERTS AND SLEEVES SHALL BE CAST-IN-PLACE WHENEVER FEASIBLE. NO SLEEVE SHALL BE PLACED THROUGH ANY CONCRETE ELEMENT UNLESS AUTHORIZED BY THE STRUCTURAL DRAWINGS, APPROVED SLEEVING SUBMITTAL, OR SPECIFICALLY AUTHORIZED IN WRITING BY THE STRUCTURAL ENGINEER. ALL SLEEVE PENETRATIONS THROUGH FOUNDATION BASEMENT WALLS TO BE WATERTIGHT.

c. CORE DRILLING SHALL NOT BE PERMITTED UNLESS AUTHORIZED IN WRITING BY THE STRUCTURAL ENGINEER.

d. SPLICES OF REINFORCEMENT SHALL BE AS DETAILED ON THE APPROVED PLACEMENT DRAWINGS OR AS AUTHORIZED BY THE STRUCTURAL ENGINEER. WHEN PERMITTED, SPLICES SHALL BE MADE BY CONTACT TOWN LAP SPLICES UNLESS OTHERWISE NOTED.

e. WHEN INSTALLING EXPANSION BOLTS OR ADHESIVE ANCHORS, THE CONTRACTOR SHALL TAKE MEASURES TO AVOID DRILLING OR CUTTING OF ANY EXISTING REINFORCING AND DESTRUCTION OF CONCRETE. INSTALL ADHESIVE ANCHORS PER MANUFACTURER'S WRITTEN INSTRUCTIONS.

f. ACTUAL SLAB THICKNESS MAY VARY DUE TO BEAM AND DECK DEFLECTIONS. CONTRACTOR SHALL PROVIDE ADDITIONAL CONCRETE AS NECESSARY TO MAINTAIN A LEVEL SLAB SURFACE AT THE ELEVATION INDICATED. ADDITIONAL CONCRETE FROM BEAM DEFLECTION HAS BEEN ACCOUNTED FOR IN THE DESIGN.

g. DO NOT PLACE ANY TYPE OF CONDUITS/PIPES IN ANY STRUCTURAL SLAB.

h. NO WELDING OF REINFORCING SHALL BE PERMITTED UNLESS SPECIFICALLY CALLED FOR OR APPROVED BY THE STRUCTURAL ENGINEER.

i. SUBMIT MATERIAL TEST REPORTS FROM A QUALIFIED TESTING AGENCY DEMONSTRATING THAT TEST RESULTS FOR TRIAL MIX BATCHES FOR EACH CONCRETE MIX DESIGN COMPLY WITH ACI 301 AND THE ADDITIONAL REQUIREMENTS OF THE PROJECT CONTRACT DOCUMENTS.

j. CONCRETE SLABS THAT ARE PART OF COMPOSITE FLOOR FRAMING SYSTEMS SHALL ACHIEVE 28-DAY DESIGN STRENGTH PRIOR TO THE APPLICATION OF ANY SUPERIMPOSED LOADS SUCH AS CURTAIN WALLS, MASONRY VENEERS AND STAIRS.

k. ALL POST INSTALLED CONCRETE ANCHORS SHALL BE EVALUATED BY THE ICC EVALUATION SERVICE AND SHALL BE TESTED IN ACCORDANCE WITH AC 193 (ACCEPTANCE CRITERIA FOR MECHANICAL ANCHORS) OR AC 308 (ACCEPTANCE CRITERIA FOR ADHESIVE ANCHORS). APPROVED ANCHORS SHALL BE SUITABLE FOR USE IN SEISMIC ZONES A-F IN ADDITION TO CRACKED CONCRETE. CONTRACTORS SHALL SUBMIT MANUFACTURER PRODUCT INFORMATION AND CALCULATIONS SHOWING ANCHOR TYPE, DIAMETER AND EMBEDMENT IS TO BE USED AS WELL AS INSTALLATION PROCEDURE TO THE STRUCTURAL ENGINEER FOR THEIR REVIEW. ANCHOR INSTALLATION SHALL BE INSPECTED IN ACCORDANCE WITH THE PROGRAM OF SPECIAL INSPECTIONS.

H. **MASONRY:**
1. GENERAL:
a. ALL WALL SECTIONS AND PIERS LESS THAN 4 SQUARE FEET IN CROSS-SECTIONAL AREA TO BE FULLY GROUTED OR OF 100% SOLID MASONRY UNITS.

b. SUBMIT GROUT MIX DESIGN AND MASONRY UNIT CERTIFICATIONS TO THE STRUCTURAL ENGINEER FOR APPROVAL.

c. CONTRACTOR SHALL PROVIDE ADEQUATE BRACING AND SUPPORT FOR ALL MASONRY WORK UNTIL PERMANENT CONSTRUCTION IS IN PLACE.

d. THE CONTRACTOR SHALL VERIFY ALL OPENINGS BELOW UNTILS INDICATED ARE ADEQUATE TO ACCEPT DOOR FRAMES, LOUVERS, ETC, AS SHOWN ON THE ARCHITECTURAL AND MECHANICAL DRAWINGS. NOTIFY THE ARCHITECT AND STRUCTURAL ENGINEER OF ANY DISCREPANCIES PRIOR TO LINTEL INSTALLATION.

e. NO OPENINGS SHALL BE PLACED ABOVE ANY LINTEL WITHIN A HEIGHT LESS THAN OR EQUAL TO THE WIDTH OF THE CLEAR OPENING BELOW THE LINTEL, UNLESS SPECIFICALLY SHOWN OR APPROVED BY THE STRUCTURAL ENGINEER.

f. NO OPENINGS OTHER THAN THOSE INDICATED ON CONSTRUCTION DOCUMENTS SHALL BE PLACED IN ANY SHEAR WALL UNLESS APPROVED BY THE STRUCTURAL ENGINEER.

g. ALL MASONRY REINFORCING SHALL BE FULLY SPACED OR DEVELOPED IN GROUTED MASONRY PER THE DIMENSIONS PROVIDED ON THE MASONRY REINFORCING STEEL SPLICE LENGTH SCHEDULE. ALL NON-CONTACT SPLICES WHERE VERTICAL WALL REINFORCING IS BEING LAPPED WITH REINFORCING IN AN ADJACENT CELL SHALL BE 48 INCHES LONG MINIMUM.

h. NO VERTICAL CONDUIT/PIPES/LEAVE STEALL BE PLACED IN ANY MASONRY GROUTED CELLS UNLESS APPROVED BY THE STRUCTURAL ENGINEER. IF APPROVED BY THE STRUCTURAL ENGINEER, CONDUITS (THAT ARE COMPATIBLE WITH GROUT AND MORTAR) SHALL BE LOCATED TO ENSURE MINIMUM REINFORCEMENT COVER OF 2" IS MAINTAINED FOR ALL VERTICAL REINFORCEMENT AND SHALL NOT BE SPACED CLOSER THAN 3 CONDUIT DIAMETERS ON CENTER. CONDUITS PLACED IN MASONRY COLUMNS OR PILASTERS SHALL NOT DISPLACE MORE THAN 2 PERCENT OF THE NET CROSS SECTIONS.

I. **STRUCTURAL STEEL:**
1. GENERAL:
a. PERMANENT FRAMING AND FINAL CONNECTION DETAILS ARE SHOWN ON THE DRAWINGS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ERECTION SEQUENCES, MEANS, AND METHODS, AND FOR THE DESIGN OF TEMPORARY LATERAL AND VERTICAL BRACING. TEMPORARY BRACING SHALL REMAIN IN PLACE UNTIL THE COMPLETE VERTICAL AND LATERAL FORCE RESISTING SYSTEMS HAVE BEEN INSTALLED.

b. THE COMPLETE LATERAL FORCE RESISTING SYSTEM (LFRS) INCLUDES HORIZONTAL ELEMENTS, SUCH AS DIAPHRAGMS AND COLLECTORS, VERTICAL ELEMENTS SUCH AS SHEAR WALLS, BRACED FRAMES MOMENT FRAMES, FOUNDATIONS, AND ALL ASSOCIATED CONNECTIONS AND ANCHORAGES. CONTRACTORS RESPONSIBLE FOR THE INSTALLATION OF LATERAL FORCE RESISTING ELEMENTS SHALL REVIEW THE DRAWINGS TO BECOME FAMILIAR WITH THE COMPLETE SYSTEM. IF THE COMPLETE LFRS IS NOT UNDERSTOOD, THE CONTRACTOR SHALL OBTAIN WRITTEN CLARIFICATION FROM THE STRUCTURAL ENGINEER OF RECORD, AND ALSO ANY SPECIALTY STRUCTURAL ENGINEERS THAT ARE RESPONSIBLE FOR THE DESIGN OF SPECIFIC ELEMENTS OF THE LFRS.

c. PROVIDE ACCESS FOR INSPECTION OF ALL SHOP AND FIELD CONNECTIONS FOR PROPER MATERIALS AND WORKMANSHIP.

d. WHEN INSTALLING EXPANSION BOLTS OR ADHESIVE ANCHORS, THE CONTRACTOR SHALL TAKE MEASURES TO AVOID DRILLING OR CUTTING OF ANY EXISTING REINFORCING AND DESTRUCTION OF CONCRETE. INSTALL EXPANSION BOLTS AND ADHESIVE ANCHORS PER MANUFACTURER'S RECOMMENDATIONS.

e. WELDING ELECTRODES, WELDING PROCESS, MINIMUM PREHEAT AND INTERPASS TEMPERATURES SHALL BE IN ACCORDANCE WITH THE AISC AND AWS SPECIFICATIONS. ANY STRUCTURAL STEEL DAMAGED IN WELDING IS TO BE REPLACED OR REINFORCED AS APPROVED BY THE STRUCTURAL ENGINEER.

f. WELDERS SHALL HAVE CURRENT EVIDENCE OF PASSING THE APPROPRIATE AWS QUALIFICATION TESTS. THE ENGINEER MAY REQUEST SUCH EVIDENCE AT ANY TIME DURING THE PROJECT.

g. THE CONTRACTOR SHALL NOTIFY THE STRUCTURAL ENGINEER OF ANY FABRICATION OR ERECTION ERRORS OR DEVIATIONS AND SHALL RECEIVE WRITTEN APPROVAL BEFORE ANY FIELD CORRECTIONS ARE MADE.

h. REFER TO ARCHITECTURAL DRAWINGS FOR FIRE PROTECTION, GALVANDING, PAINTING AND ACESS REQUIREMENTS.

i. ALL STRUCTURAL STEEL THAT IS DIRECTLY EXPOSED TO WEATHER, SHALL BE HOT-DIPPED GALVANIZED, UNLESS OTHERWISE INDICATED.

j. STRUCTURAL STEEL THAT IS LOCATED IN EXTERIOR UNHEATED SPACES AND NOT DIRECTLY EXPOSED TO WEATHER, SHALL BE PICKED TOOL CLEANED AND PAINTED WITH THREE COATS OF OIL BASE PAINTIN ACCORDANCE WITH STEEL STRUCTURES PAINTING COUNCIL PAINTING SYSTEM SPECIFICATION NO. 1.09 OR HOT DIPPED GALVANIZED, AT THE CONTRACTORS OPTION.

k. STEEL FRAMED OPENINGS FOR ARCHITECTURAL, MECHANICAL, ELECTRICAL, PLUMBING AND OTHER ITEMS HAVE BEEN SHOWN BASED ON PRELIMINARY DESIGN DRAWINGS THAT WERE AVAILABLE FOR COORDINATION PRIOR TO THE ISSUANCE OF THE FINAL BID DOCUMENTS. THESE ITEMS ARE SHOWN TO ASSIST THE CONTRACTOR IN UNDERSTANDING THE GENERAL SCOPE OF WORK, BUT ARE NOT INTENDED TO REPRESENT EXACT LOCATIONS, QUANTITIES, OR COMPLETE EXTENT OF REQUIRED COORDINATION. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING THESE ITEMS WITH THE WORK OF ALL OTHER TRADES. THE CONTRACTOR SHALL PROVIDE STEEL FRAMED OPENINGS AS REQUIRED BY THE FINAL FRAMED OPENING DETAIL ON DRAWING S400, WHETHER THEY ARE SHOWN OR NOT SHOWN IN THE DRAWINGS.

2. CONNECTIONS
a. THE FABRICATOR SHALL EMPLOY A PROFESSIONAL ENGINEER TO BE RESPONSIBLE-IC-HARGE OF THE DEVELOPMENT OF FABRICATION AND ERECTION DRAWINGS, THE REGISTERED DESIGN PROFESSIONAL RDP) SHALL BE REGISTERED AND APPROVED TO PERFORM STRUCTURAL ENGINEERING IN THE PROJECT'S JURISDICTION.

b. ALL CONNECTIONS SHALL BE SELECTED, COMPLETED, DESIGNED, AND DETAILED BY THE FABRICATOR'S RDP IN RESPONSIBLE CHARGE OF THE DEVELOPMENT OF FABRICATION AND ERECTION DRAWINGS. CONNECTIONS SHALL BE DESIGNED BY THE FABRICATOR IN ACCORDANCE WITH THE GOVERNING AISC SPECIFICATION. SUBMIT CALCULATIONS BEARING THE RDP'S SEAL AND SIGNATURE PRIOR TO, OR ALONG WITH, PIECE DETAILS.

c. ALL CONNECTIONS, SPLICES, SHOP STANDARDS, AND TEMPORARY SUPPORT SHALL BE DESIGNED BY THE FABRICATOR'S ENGINEER REGISTERED IN THE PROJECT'S JURISDICTION. CALCULATIONS AND SHOP STANDARDS SHALL BE SUBMITTED BEARING THE ENGINEER'S SEAL AND SIGNATURE PRIOR TO, OR ALONG WITH, PIECE DETAILS.
• SIMPLE SHEAR CONNECTIONS MAY BE SELECTED FROM AISC's TABULATED SIMPLE SHEAR CONNECTIONS, SUBJECT TO RESTRICTIONS INDICATED.
• SPECIALTY CONNECTIONS SHALL BE DESIGNED BASED ON THE LOAD DATA AND SCHEMATIC DETAILS INDICATED.

d. REACTIONS INDICATED ON FRAMING PLANS ARE BASED ON UNFACTORED LOADS (ASD COMBINATIONS), UNLESS OTHERWISE NOTED. ALL SIMPLE SHEAR CONNECTIONS SHALL BE DESIGNED FOR THE REACTIONS INDICATED BUT NOT LESS THAN kips. ALL SIMPLE SHEAR CONNECTIONS SHALL BE DESIGNED FOR 1.25 TIMES THE REACTION INDICATED ON PLAN. EXAMPLE: 2 kips x 1.25 = 2.5 kips, THEREFORE DESIGN FOR 6 kips. 5 kips x 1.25 = 6.25 kips THEREFORE DESIGN FOR 6.25 kips.

e. PROVIDE NO LESS THAN 3/16" WELDS EXCEPT ALONG EDGES OF MATERIALS THAT ARE ½" OR LESS IN THICKNESS. FOR EDGES OF MATERIALS THAT ARE ½" OR LESS IN THICKNESS, USE THE MAXIMUM SIZE WELD PERMITTED BY THE GOVERNING AISC SPECIFICATION.

f. ALL SHOP AND FIELD CONNECTIONS SHALL BE MADE WITH HIGH STRENGTH BOLTS OR WELDS. ALL HIGH STRENGTH BOLTS AND NUTS SHALL BE CLEARLY MARKED AS REQUIRED BY AISC SPECIFICATIONS. CONNECTIONS MADE WITH UNMARKED BOLTS AND NUTS WILL BE REJECTED.

g. UNLESS OTHERWISE NOTED, ALL BOLTS SHALL BE TIGHTENED TO THE "SNUG TIGHT" CONDITION DEFINED AS THE TIGHTNESS ATTAINED BY A FEW IMPACTS OF AN IMPACT WRENCH OR THE FULL EFFORT OF A PERSON USING AN ORDINARY SPUD WRENCH. THE ENDS TIGHT CONDITION MUST ENSURE THAT THE PLIES OF THE CONNECTED MATERIAL HAVE BEEN BROUGHT INTO SNUG CONTACT.

h. BO

PIER SCHEDULE

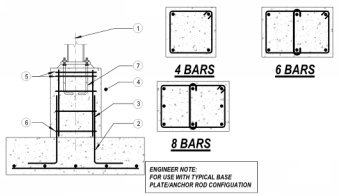
Column Location Mark	Pier			Reinforcing		Reference Level	Remarks
	Top Of Pier	Width	Length	Vertical	Ties		
A1-AA	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
A1-AB	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
A1-AD	-1'-0"	2'-0"	2'-0"	6 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
A1-AG	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
A1-AL	-1'-0"	2'-0"	2'-0"	6 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
A1-AP	-1'-0"	2'-0"	2'-0"	6 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
A1-AR	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
A2-AA	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
A2-AB	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
A2-AD	-1'-0"	2'-0"	2'-0"	6 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
A2-AG	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
A2-AL	-1'-0"	2'-0"	2'-0"	6 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
A2-AP	-1'-0"	2'-0"	2'-0"	6 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
A2-AR	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
A2-AR(1'-11-5/8")	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
A3-AR	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
A3-MA	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
A3-MZ	-1'-0"	1'-6"	1'-6"	6 - #7	#3 @ 12" OC	1,2 - FIRST FLOOR	
A4-AA	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
A4-AD	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
A4-AL	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
A4-AP	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
A4-AR(1'-11-5/8")	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
A4-MZ	-1'-0"	1'-6"	1'-6"	6 - #7	#3 @ 12" OC	1,2 - FIRST FLOOR	
A5-MA	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
A5-AB	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
A5-AD	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
A5-AG	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
A5-AR	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
A6-AH	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
A6-AR	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
A12-AF	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
A13-AA	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
A13-AB	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
C1-CB	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
C1-CC	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
C1-CH	-1'-0"	2'-0"	2'-0"	6 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
C1-CI	-1'-0"	2'-0"	2'-0"	6 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
C1-CP	-1'-0"	2'-0"	2'-0"	6 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
C1-CU	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
C1-CV	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
C2-CB	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
C2-CC	-1'-0"	2'-0"	2'-0"	6 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
C2-CQ(11'-4")	-1'-0"	2'-0"	2'-0"	6 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
C2-CH	-1'-0"	2'-0"	2'-0"	6 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
C2-CL	-1'-0"	2'-0"	2'-0"	6 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
C2-CP	-1'-0"	2'-0"	2'-0"	6 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
C2-CU	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
C2-CV	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
C3-CB	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
C3-CC	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
C3-CQ(11'-4")	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
C3-CU	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
C4-CB(3'-4")	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
C4-CV	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
C4-CW	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
C4-CX	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
C5-CB	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
C5-CC	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
C5-CH	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
C5-CP	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
C5-CU	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
C5-CV	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
C5-CA	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
C5-CH	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
C5-CP	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
C5-CW	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
C5-CX	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
C5-CM	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
C5-CN(2'-7")	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
C5-CW(7'-7")	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
C5-CS	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
C11-CE	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
C11-CS	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
C13-CE	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
C13-CS	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
C13-CJ	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
C13-CN	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
C14-CO	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
C14-CE	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
C14-CJ	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
C14-CN	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
C14-CS	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
E1-EA	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
E1-EB	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
E1-EF	-1'-0"	2'-0"	2'-0"	6 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
E1-EJ	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
E1-EK	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
E1-EM	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
E1-EN	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
E2-EA	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
E2-EB	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
E2-EJ	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
E2-EK	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
E2-EN	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
E2-EM(1'-1"-F)	-1'-0"	2'-0"	2'-0"	6 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
E2-EN	-1'-0"	2'-0"	2'-0"	6 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
E3-EN	-1'-0"	2'-0"	2'-0"	6 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
E3-EP	-1'-0"	1'-6"	1'-6"	6 - #7	#3 @ 12" OC	1,2 - FIRST FLOOR	
E4-EA	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
E4-EB	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
E4-EN	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
E4-EP	-1'-0"	1'-6"	1'-6"	6 - #7	#3 @ 12" OC	1,2 - FIRST FLOOR	
E5-EB	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
E5-EK	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
E5-EM	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
E5-EN	-1'-0"	2'-0"	2'-0"	6 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
E6-EC	-1'-0"	2'-0"	2'-0"	6 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
E6-EL	-1'-0"	2'-0"	2'-0"	6 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
E7-EC	-1'-0"	2'-0"	2'-0"	6 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
E7-EH	-1'-0"	2'-0"	2'-0"	6 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
E7-EL	-1'-0"	2'-0"	2'-0"	6 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
E8-EH	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
E8-EL	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
E8-ED	-1'-0"	2'-0"	2'-0"	6 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
E8-EG	-1'-0"	2'-0"	2'-0"	6 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
E10-ED	-1'-0"	2'-0"	2'-0"	6 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
E10-EE	-1'-0"	2'-0"	2'-0"	6 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
E11-EE	-1'-0"	2'-0"	2'-0"	6 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
E11-EG	-1'-0"	2'-0"	2'-0"	6 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
E13-EG	-1'-0"	2'-0"	2'-0"	6 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
X1-AR	-1'-0"	2'-0"	2'-0"	6 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
X1-XA	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
X2-CA	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
X2-XA	-1'-0"	2'-0"	2'-0"	6 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
X2-XD	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
X3-CA	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
X3-XA	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
X3-XD	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
X5-XB	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
X5-XC	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	

PIER SCHEDULE

Column Location Mark	Pier			Reinforcing		Reference Level	Remarks
	Top Of Pier	Width	Length	Vertical	Ties		
X6-XB	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
X6-XC	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
X7-XB	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
X7-XC	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
X8-XB	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
X8-XC	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
X9-XB	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
X9-XC	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
X10-XB	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
X10-XC	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
X11-XB	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
X11-XC	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
X12-XB	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
X12-XC	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
Y1-YA	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
Y1-YC	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
Y2-YA	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
Y2-YB	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
Y2-YC	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
Y2-YD	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
Y3-CR	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
Y3-YA	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
Y3-YB	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
Y3-YD	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
Z1-ZA	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
Z1-ZD	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
Z2-CW	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
Z2-ZA	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
Z2-ZW	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
Z3-ZA	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
Z3-ZD	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	2,3 - SECOND FLOOR	
Z3-ZE	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
Z3-ZC	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
Z13-ZB.2	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	
Z13-ZB.3	-1'-0"	2'-0"	2'-0"	4 - #8	#3 @ 12" OC	1,2 - FIRST FLOOR	

KEY NOTES:

1. CENTER PIER REINFORCING ABOUT COLUMN CENTERLINE.
2. ANCHOR VERTICAL PIER REINFORCING BARS INTO FOUNDATION USING STANDARD HOOKS.
3. PROVIDE CLASS B LAP SPLICES AS REQUIRED FOR CONSTRUCTABILITY.
4. PLACE PIERS MONOLITHICALLY WITH ADJACENT WALLS OR GRADE BEAM.
5. PROVIDE 2- #4 CLOSED TIES WITHIN THE TOP 5" OF PIERS AND REMAINING CLOSED TIES @ 12" OC.
6. LOCATE FIRST TIE NOT MORE THAN ONE-HALF OF A TYPICAL TIE SPACING ABOVE THE FOUNDATION.
7. HOOKS SHALL BE WITHIN THE TIES AND TURNED TOWARDS THE CENTER OF THE PIER.



CONCRETE PIER REINFORCING DETAILS

MASONRY REINFORCING STEEL SPLICE LENGTH

f'm=2500 psi, fy=60 ksi

BAR SIZE	SPLICE LENGTH
#4	13 INCH
#5	21 INCH
#6	38 INCH
#7	52 INCH
#8	78 INCH

1. REBAR IS TO BE PLACED IN THE MIDDLE OF THE CELL. BAR SPLICES ARE TO ALIGN VERTICALLY.
2. COUPLERS MAY BE USED IN LIEU OF SPLICING REBAR AND MUST DEVELOPE A MINIMUM 100% OF THE REBAR Fy STRENGTH.

CONCRETE REINFORCING STEEL SPLICE LENGTH

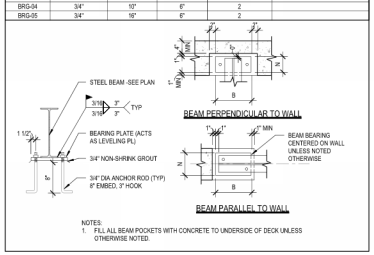
f'c = 4,000 psi, fy = 60 ksi

BAR SIZE	TOP BARS		OTHER BARS	
	CASE 1	CASE 2	CASE 1	CASE 2
#3	25	37	19	28
#4	33	49	25	37
#5	41	61	31	47
#6	49	73	37	56
#7	71	106	54	81
#8	81	121	62	93
#9	91	136	70	105
#10	102	153	79	118
#11	114	170	87	131

1. SPLICE LENGTHS IN THESE TABLES ARE GIVEN IN INCHES.
2. TOP BARS INCLUDE FOOTING REINFORCEMENT WITH MORE THAN 12" OF CONCRETE CAST BELOW THE REBAR, AND ALL HORIZONTAL WALL REINFORCEMENT WITHOUT EXCEPTION. REFER TO ACI 318 FOR MORE INFORMATION.
3. OTHER BARS INCLUDE FOOTING REINFORCEMENT WITH LESS THAN 12" OF CONCRETE CAST BELOW THE REBAR AND VERTICAL WALL REINFORCEMENT.
4. PROVIDE LAP SPLICES FOR PIER REINFORCEMENT PER OTHER BARS CATEGORY.
5. **CASE 1:** MINIMUM CLEAR SPACING OF BARS SHALL NOT BE LESS THAN 2 BAR DIAMETERS. CLEAR COVER SHALL NOT BE LESS THAN THE MOST RESTRICTIVE REQUIREMENT OF 1 BAR DIAMETER, THE MINIMUM CLEAR COVER DIMENSION LISTED IN THE CONTRACT DOCUMENTS, AND THE ACI CODE. REPORT ANY DISCREPANCIES TO THE ENGINEER OF RECORD IMMEDIATELY.
   CASE 2: WHEN CASE 1 SPACING AND CLEAR COVER IS NOT MET.
6. SPLICES INDICATED ARE CLASS B LAP SPLICES. PROVIDE CLASS B LAP SPLICES AT ALL SPLICE LOCATIONS UNLESS NOTED OTHERWISE.
7. FOR LIGHTWEIGHT CONCRETE, DIVIDE TABULATED VALUES BY 0.75.

BEARING PLATE SCHEDULE

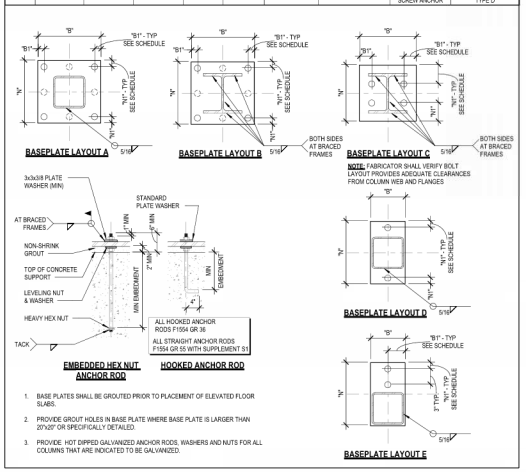
Mark	Bearing Plate			Anchor Bolt	Remark
	Thickness	Width (B)	Length (N)	Quantity	
BRG-01	3/4"	14"	6"	2	
BRG-02	3/4"	13"	6"	2	
BRG-03	3/4"	12"	6"	2	
BRG-04	3/4"	10"	6"	2	
BRG-05	3/4"	16"	6"	2	



NOTES:
1. FILL ALL BEAM POCKETS WITH CONCRETE TO UNDERSIDE OF DECK UNLESS OTHERWISE NOTED.

BASE PLATE SCHEDULE

Mark	Base Plate			Anchor Rod				Remark
	Thickness	Width (B)	Length (N)	Quantity	Diameter	Embedment	Edge Distance (B1, N1)	Type	
BP-01	3/4"	11"	11"	4	3/4"	1'-0"	B1: 1 1/2", N1: 1 1/2"	HOOKED	
BP-02	1"	11"	11"	4	3/4"	1'-0"	B1: 1 1/2", N1: 1 1/2"	HOOKED	
BP-03	3/4"	12"	1'-0"	4	3/4"	1'-0"	B1: 1 1/2", N1: 1 1/2"	HOOKED	
BP-04	1"	12"	1'-0"	4	3/4"	1'-0"	B1: 1 1/2", N1: 1 1/2"	HOOKED	
BP-05	3/4"	14"	1'-2"	4	3/4"	1'-0"	B1: 1 1/2", N1: 1 1/2"	HOOKED	
BP-06	1"	14"	1'-2"	4	3/4"	1'-0"	B1: 1 1/2", N1: 1 1/2"	HOOKED	
BP-07	1"	13"	1'-1"	4	1"	1'-0"	B1: 2", N1: 2"	EMBEDDED HEX NUT	HIGH STRENGTH
BP-08	1"	16"	1'-4"	4	1"	1'-0"	B1: 2", N1: 2"	EMBEDDED HEX NUT	HIGH STRENGTH
BP-09	1"	16"	1'-4"	4	1"	1'-0"	B1: 2", N1: 2"	EMBEDDED HEX NUT	HIGH STRENGTH
BP-10	3/4"	10"	10"	4	3/4"	1'-0"	B1: 1 1/2", N1: 1 1/2"	HOOKED	
BP-11	1/2"	5"	10 1/2"	2	5/8"	3 1/2"	N1: 1 1/2"	HILTI KWIK HUS (KH) SCREW ANCHOR	BASEPLATE LAYOUT TYPE E
BP-12	1/2"	6"	11"	2	5/8"	3 1/2"	N1: 1 1/2"	HILTI KWIK HUS (KH) SCREW ANCHOR	BASEPLATE LAYOUT TYPE D



1. BASE PLATES SHALL BE GROUTED PRIOR TO PLACEMENT OF ELEVATED FLOOR SLABS.
2. PROVIDE GROUT HOLES IN BASE PLATE WHERE BASE PLATE IS LARGER THAN 20"x20" OR SPECIFICALLY DETAILED.
3. PROVIDE HOT DIPPED GALVANIZED ANCHOR RODS, WASHERS AND NUTS FOR ALL COLUMNS THAT ARE INDICATED TO BE GALVANIZED.

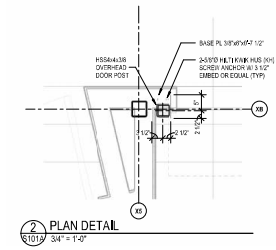
COLUMN FOOTING SCHEDULE

Mark	Width	Length	Thickness	Reinforcement				Remarks
				Longitudinal		Transverse		
				Top	Bottom	Top	Bottom	
F3.0	3'-0"	3'-0"	1'-0"		4-#6		4-#6	
F3.0A	3'-0"	3'-0"	1'-0"	4-#6	4-#6	4-#6	4-#6	
F4.0	4'-0"	4'-0"	1'-0"		5-#6		5-#6	
F4.0A	4'-0"	4'-0"	1'-0"	5-#6	5-#6	5-#6	5-#6	
F5.0	5'-0"	5'-0"	1'-0"		6-#6		6-#6	
F5.0A	5'-0"	5'-0"	1'-0"	6-#6	6-#6	6-#6	6-#6	
F6.0	6'-0"	6'-0"	1'-0"		7-#6		7-#6	
F6.0A	6'-0"	6'-0"	1'-0"	7-#6	7-#6	7-#6	7-#6	
F7.0	7'-0"	7'-0"	2'-0"		8-#7		8-#7	
F7.0A	7'-0"	7'-0"	2'-0"	8-#7	8-#7	8-#7	8-#7	
F7.0B	7'-0"	7'-0"	1'-6"	8-#6	8-#6	8-#6	8-#6	
F9.0	9'-0"	9'-0"	2'-0"	9-#7	9-#7	9-#7	9-#7	
F9.0A	9'-0"	9'-0"	1'-6"	9-#6	9-#6	9-#6	9-#6	
F9.0	9'-0"	9'-0"	2'-0"	10-#7	10-#7	10-#7	10-#7	
F10.0	10'-0"	10'-0"	2'-0"	11-#7	11-#7	11-#7	11-#7	

1. PROVIDE STANDARD 90° OR 180° HOOKS EACH END OF FOOTING REBAR.

DECK AND SUSPENDED SLAB SCHEDULE

Mark	Deck						Slab		Remarks
	Type	Gage	Depth	Fastening			Total Depth	Reinforcement	
				End



2 S101A PLAN DETAIL
3/4" = 1'-0"

FOUNDATION PLAN NOTES

1. ELEVATIONS AS NOTED ON PLANS CORRESPONDS TO DATUM ELEVATION 47.0'-0"-8", ALL ELEVATIONS ARE NOTED ±X'-X" FROM THAT ELEVATION.
2. TOP OF PIER ELEVATION. SEE PIER SCHEDULE.
3. TYPICAL PIER SIZE. SEE PIER SCHEDULE.
4. BOTTOM OF FOOTING ELEVATION TO BE -4'-0" UNLESS OTHERWISE NOTED.
5. REFER TO ARCHITECTURAL DRAWING ELEVATIONS FOR TOP OF SHELF ELEVATIONS AND LOCATIONS OF STEPS.
6. SEE DRAWING "S200" AND "S201" FOR TYPICAL DETAILS.
7. SEE GENERAL NOTES ON S001 FOR ADDITIONAL REQUIREMENTS.

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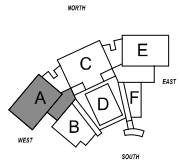

KEYPLAN

Number	Date	Issued For
2	11/06/2024	ADDENDUM NO. 6
1	10/16/2024	ADDENDUM NO. 2
	09/20/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

FOUNDATION PLAN - PART A

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: **S101A**

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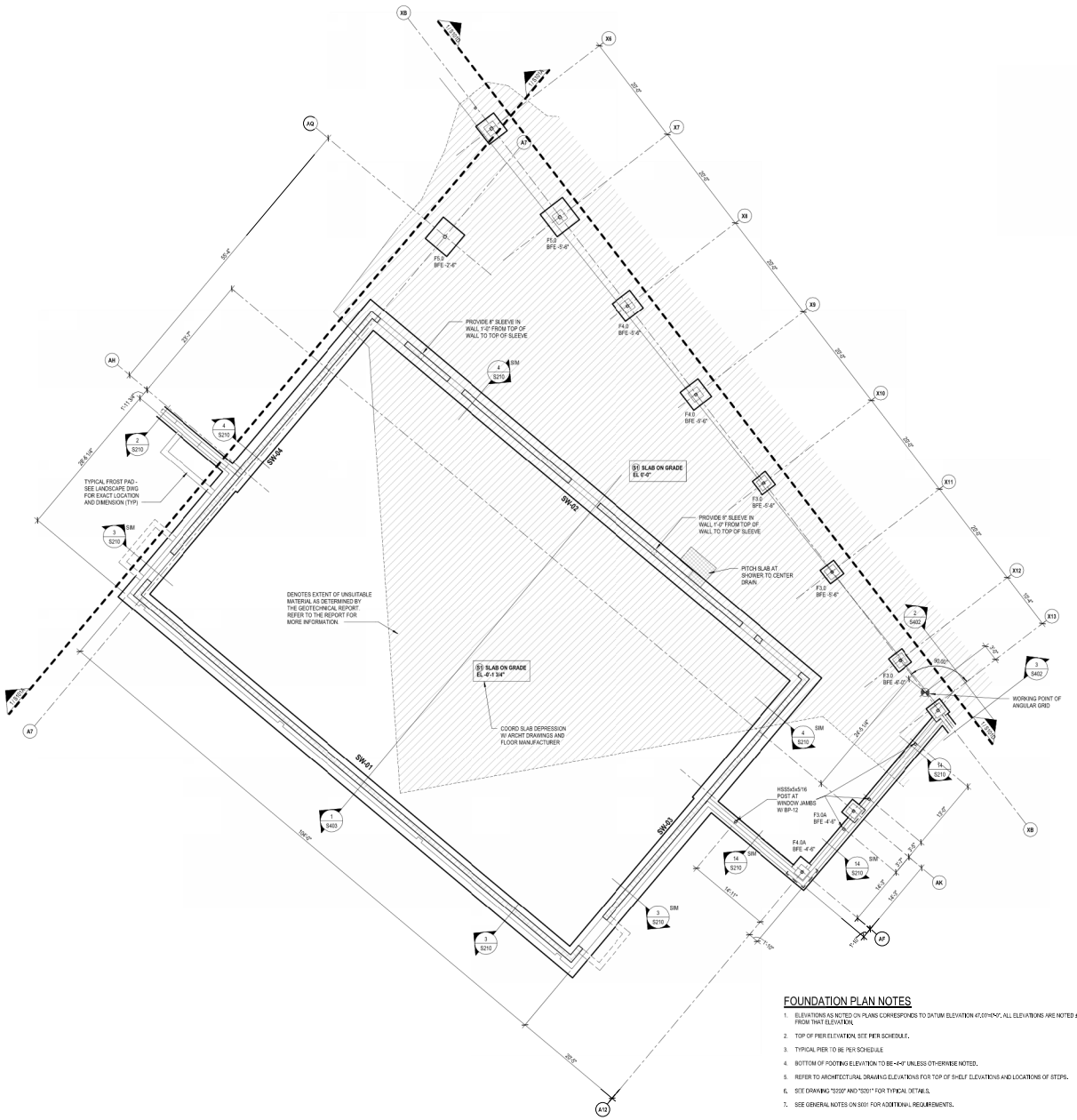

FOUNDATION PLAN NOTES

1. ELEVATIONS AS NOTED ON PLANS CORRESPONDS TO DATUM ELEVATION 47.00'=0'-0". ALL ELEVATIONS ARE NOTED ±X'-X" FROM THAT ELEVATION.
2. TOP OF PIER ELEVATION, SEE PIER SCHEDULE.
3. TYPICAL PIER TO BE PER SCHEDULE
4. BOTTOM OF FOOTING ELEVATION TO BE -1'-0" UNLESS OTHERWISE NOTED.
5. REFER TO ARCHITECTURAL DRAWING ELEVATIONS FOR TOP OF SHELF ELEVATIONS AND LOCATIONS OF STEPS.
6. SEE DRAWING "S200" AND "S201" FOR TYPICAL DETAILS.
7. SEE GENERAL NOTES ON S001 FOR ADDITIONAL REQUIREMENTS.

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KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

FOUNDATION PLAN - PART B

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: S101B

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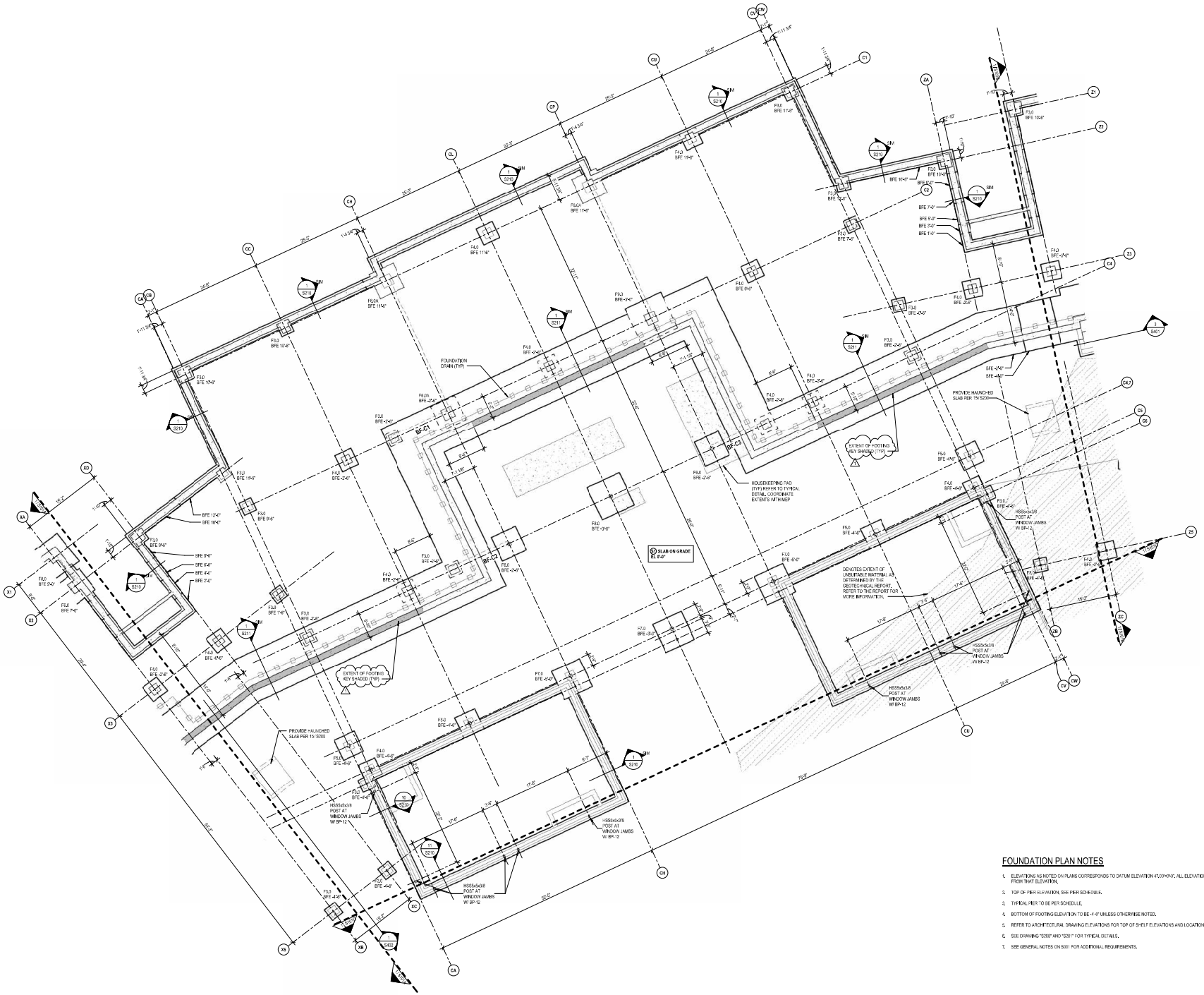

FOUNDATION PLAN NOTES

1. ELEVATIONS AS NOTED ON PLANS CORRESPONDS TO DATUM ELEVATION 47.00'=0'-0", ALL ELEVATIONS ARE NOTED ±X'-X" FROM THAT ELEVATION.
2. TOP OF PIER ELEVATION, SEE PIER SCHEDULE.
3. TYPICAL PIER TO BE PER SCHEDULE.
4. BOTTOM OF FOOTING ELEVATION TO BE -1'-0" UNLESS OTHERWISE NOTED.
5. REFER TO ARCHITECTURAL DRAWING ELEVATIONS FOR TOP OF SHELF ELEVATIONS AND LOCATIONS OF STEPS.
6. SEE DRAWING "S000" AND "S001" FOR TYPICAL DETAILS.
7. SEE GENERAL NOTES ON S001 FOR ADDITIONAL REQUIREMENTS.

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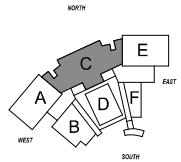

KEYPLAN

Number	Date	Issued For
1	10/16/2024	ADDENDUM NO. 2
	09/20/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

FOUNDATION PLAN - PART C

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **S101C**

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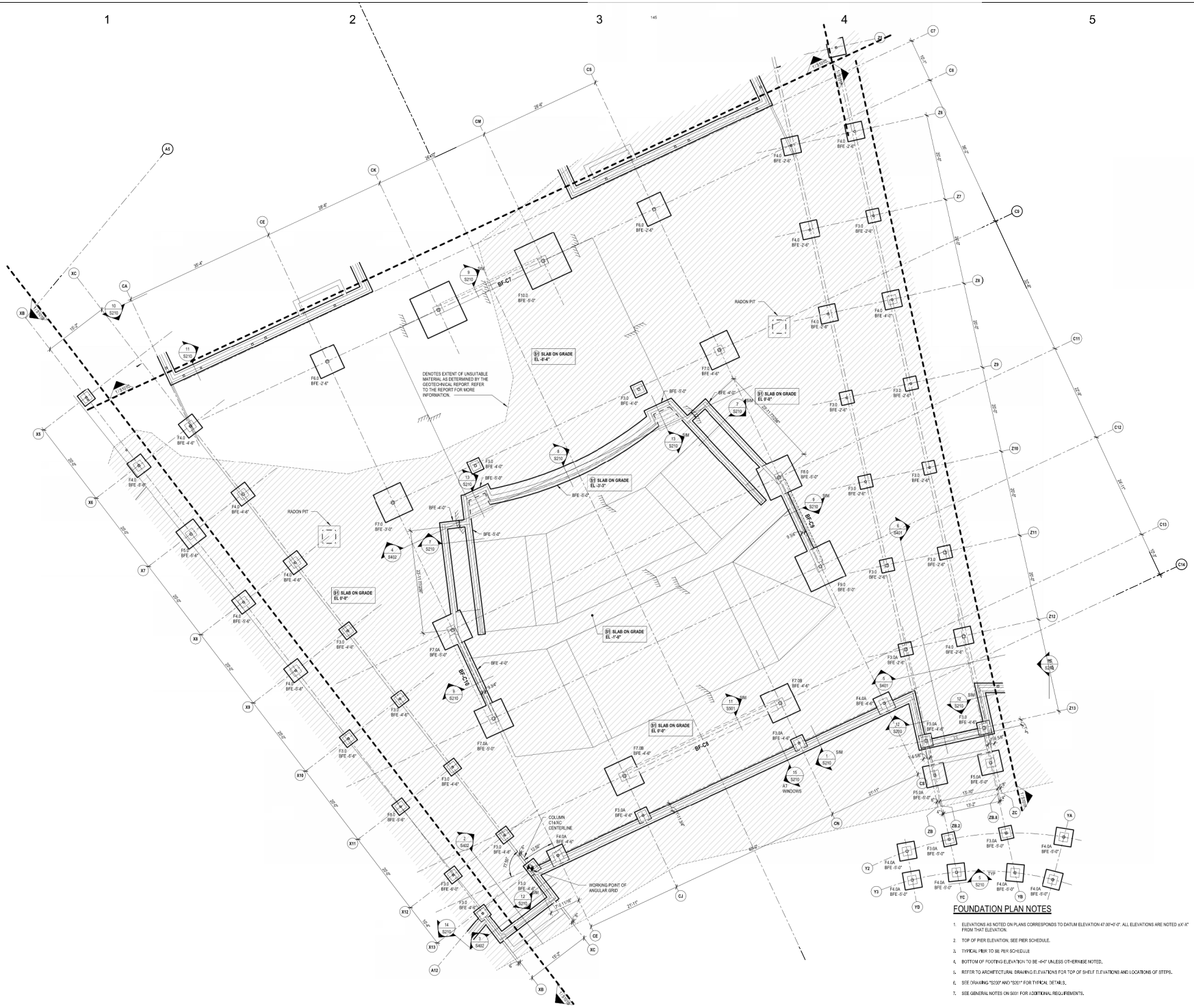

FOUNDATION PLAN NOTES

1. ELEVATIONS AS NOTED ON PLANS CORRESPONDS TO DATUM ELEVATION 47.00'-0"-0". ALL ELEVATIONS ARE NOTED ±X'-X" FROM THAT ELEVATION.
2. TOP OF PIER ELEVATION, SEE PIER SCHEDULE.
3. TYPICAL PIER TO BE PER SCHEDULE
4. BOTTOM OF FOOTING ELEVATION TO BE -4'-0" UNLESS OTHERWISE NOTED.
5. REFER TO ARCHITECTURAL DRAWING ELEVATIONS FOR TOP OF SHELF ELEVATIONS AND LOCATIONS OF STEPS.
6. SEE DRAWING "S200" AND "S201" FOR TYPICAL DETAILS.
7. SEE GENERAL NOTES ON S001 FOR ADDITIONAL REQUIREMENTS.

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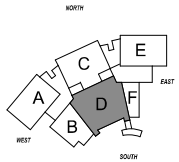

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

FOUNDATION PLAN - PART D

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: S101D

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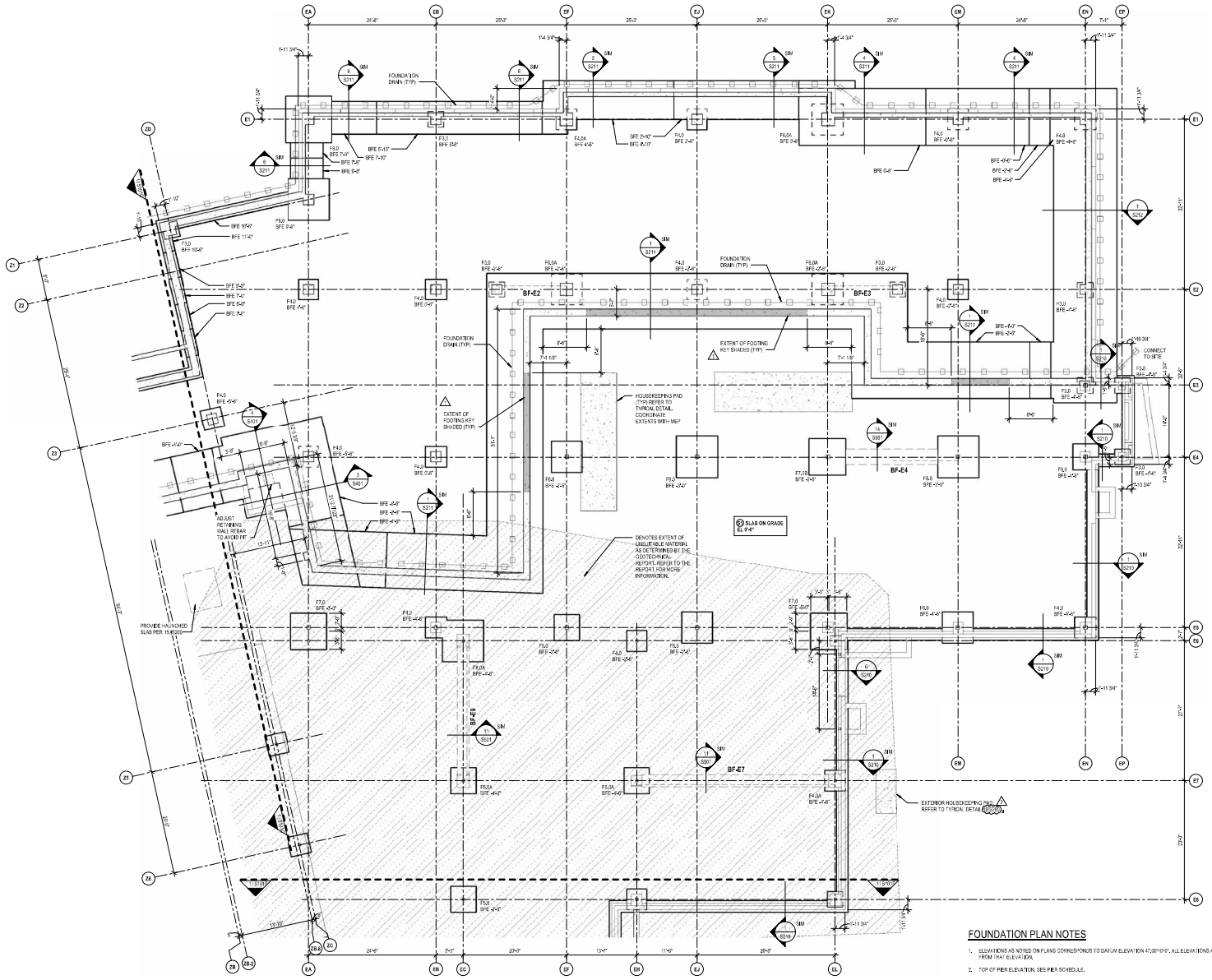

FOUNDATION PLAN NOTES

1. ELEVATIONS AS NOTED ON PLANS CORRESPONDS TO DATUM ELEVATION 47.00'-0"=0'-0". ALL ELEVATIONS ARE NOTED AS "-" FROM THAT ELEVATION.
2. TOP OF PIER ELEVATION, SEE PIER SCHEDULE.
3. TYPICAL PIER TO BE PER SCHEDULE
4. BOTTOM OF FOOTING ELEVATION TO BE -4'-0" UNLESS OTHERWISE NOTED.
5. REFER TO ARCHITECTURAL DRAWING ELEVATIONS FOR TOP OF SHELF ELEVATIONS AND LOCATIONS OF STEPS.
6. SEE DRAWING "S300" AND "S201" FOR TYPICAL DETAILS.
7. SEE GENERAL NOTES ON S101 FOR ADDITIONAL REQUIREMENTS.

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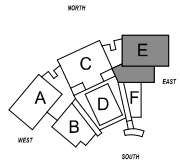

KEYPLAN

Number	Date	Issued For
2	11/06/2024	ADDENDUM NO. 0
1	10/16/2024	ADDENDUM NO. 2
	09/20/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

FOUNDATION PLAN - PART E

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **S101E**

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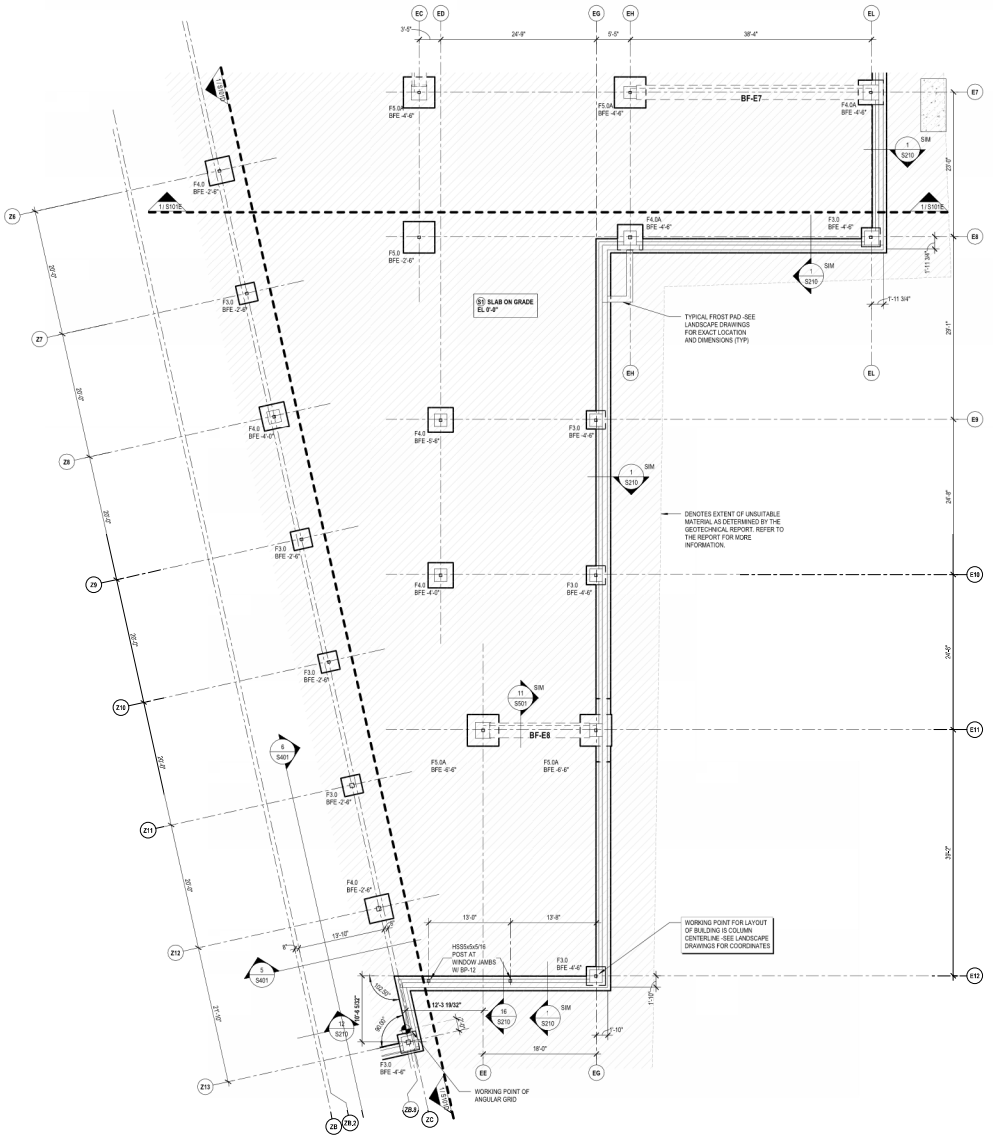

FOUNDATION PLAN NOTES

1. ELEVATIONS AS NOTED ON PLANS CORRESPONDS TO DATUM ELEVATION 47.00'=0'-0". ALL ELEVATIONS ARE NOTED ±X'-X" FROM THAT ELEVATION.
2. TOP OF PIER ELEVATION. SEE PIER SCHEDULE.
3. TYPICAL PIER TO BE PER SCHEDULE
4. BOTTOM OF FOOTING ELEVATION TO BE -4'-0" UNLESS OTHERWISE NOTED.
5. REFER TO ARCHITECTURAL DRAWING ELEVATIONS FOR TOP OF SHELF ELEVATIONS AND LOCATIONS OF STEPS.
6. SEE DRAWING "S207" AND "S201" FOR TYPICAL DETAILS.
7. SEE GENERAL NOTES ON S001 FOR ADDITIONAL REQUIREMENTS.

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NORTH
EAST
WEST
SOUTH

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

FOUNDATION PLAN - PART F

Date: 07/08/2024
Scale: 1/8" = 1'-0"
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Drawing Number: S101F

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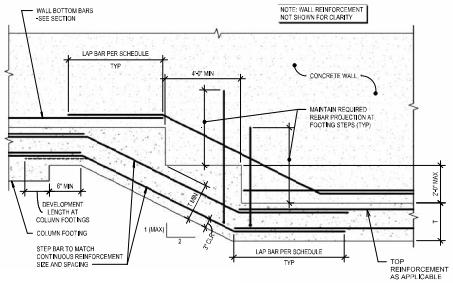
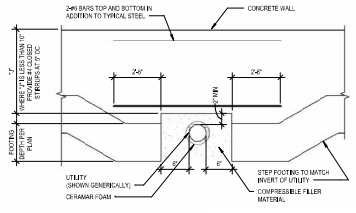
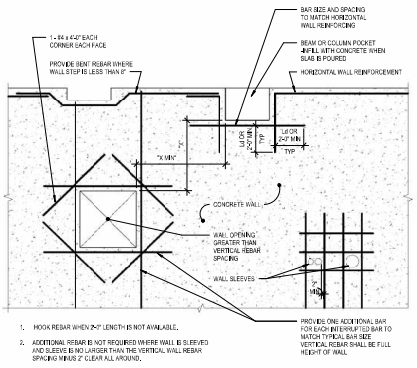


1 S200 TYPICAL STEPPED FOOTING
NOT TO SCALE

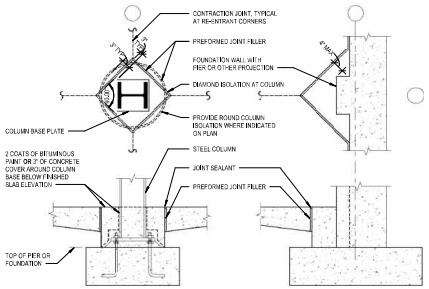


2 S200 TYPICAL FOOTING BREAK
NOT TO SCALE

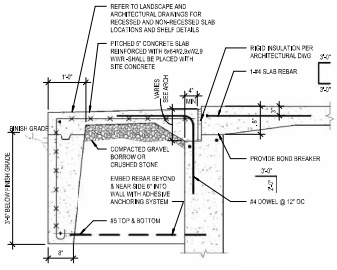


1. HOOK REBAR WHEN 2'-7" LENGTH IS NOT AVAILABLE.
2. ADDITIONAL REBAR IS NOT REQUIRED WHERE WALL IS SLEEVED AND SLEEVE IS NO LARGER THAN THE VERTICAL WALL REBAR SPACING WINUS 2" CLEAR ALL AROUND.

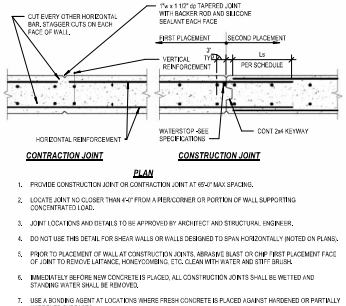
3 S200 TYPICAL WALL REINFORCING
NOT TO SCALE



4 S200 TYPICAL ISOLATION JOINT AT COLUMN OR PIER
NOT TO SCALE



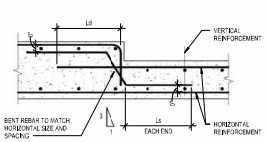
5 S200 TYPICAL SLAB AT EXTERIOR DOOR
NOT TO SCALE



PLAN

1. PROVIDE CONSTRUCTION JOINT OR CONTRACTION JOINT AT 65'-0" MAX SPACING.
2. LOCATE JOINT NO CLOSER THAN 4'-0" FROM A PIER/CORNER OR PORTION OF WALL SUPPORTING CONCENTRATED LOAD.
3. JOINT LOCATIONS AND DETAILS TO BE APPROVED BY ARCHITECT AND STRUCTURAL ENGINEER.
4. DO NOT USE THIS DETAIL FOR SHEAR WALLS OR WALLS DESIGNED TO SPAN HORIZONTALLY (NOTED ON PLANS).
5. PRIOR TO PLACEMENT OF WALL AT CONSTRUCTION JOINTS, ABRASIVE BLAST OR CHIP FIRST PLACEMENT FACE OF JOINT TO REMOVE LAITANCE, HONEYCOMBING, ETC. CLEAN WITH WATER AND STIFF BRUSH.
6. IMMEDIATELY BEFORE NEW CONCRETE IS PLACED, ALL CONSTRUCTION JOINTS SHALL BE WETTED AND STANDING WATER SHALL BE REMOVED.
7. USE A BONDING AGENT AT LOCATIONS WHERE FRESH CONCRETE IS PLACED AGAINST HARDENED OR PARTIALLY HARDENED SURFACES.
8. CLEAN JOINT PRIOR TO INSTALLING JOINT SEALANT.

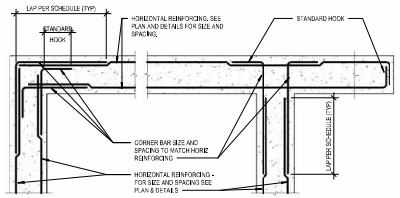
6 S200 TYPICAL WALL JOINTS
NOT TO SCALE



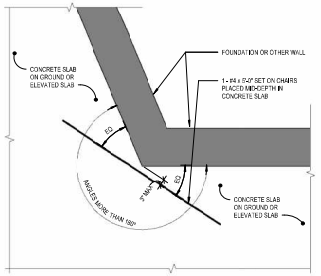
PLAN

1. REFER TO PLANS OR SECTIONS FOR WALL THICKNESSES.

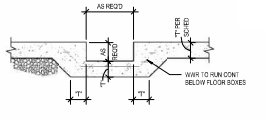
7 S200 TYPICAL CHANGE IN WALL THICKNESS
NOT TO SCALE



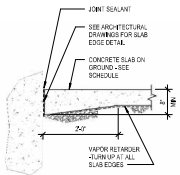
8 S200 TYPICAL WALL INTERSECTIONS
NOT TO SCALE



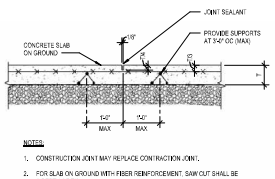
9 S200 TYPICAL RE-ENTRANT CORNER
NOT TO SCALE



10 S200 TYPICAL SLAB ON GRADE AT FLOOR BOXES
NOT TO SCALE

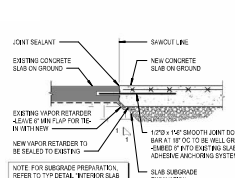


12 S200 TYPICAL SLAB ON GROUND PERIMETER
NOT TO SCALE



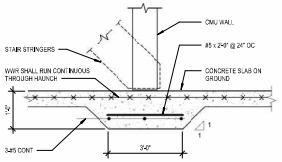
NOTES:
1. CONSTRUCTION JOINT MAY REPLACE CONTRACTION JOINT.
2. FOR SLAB ON GROUND WITH FIBER REINFORCEMENT, SAW CUT SHALL BE A DEPTH OF T/3.

13 S200 TYPICAL SLAB ON GROUND CONTRACTION JOINT
NOT TO SCALE



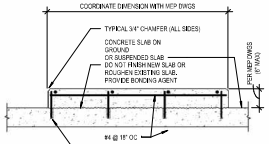
NOTE: FOR SUBGRADE PREPARATION, REFER TO TYP DETAIL "INTERIOR SLAB ON GROUND PREPARATION" ON THIS DWG

14 S200 TYPICAL NEW SLAB TO EXISTING SLAB DETAIL
NOT TO SCALE



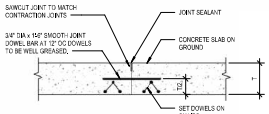
1. PROVIDE HAUNCHED SLAB BENEATH ALL CMU WALLS AND STAIR STRINGER BEARING LOCATIONS.
2. HAUNCH SHALL BE CONTINUOUS AT CMU WALLS AND TO EXTEND 6"ON" WIDER THAN THE WIDTH OF THE STAIRS EACH SIDE.
3. CONTRACTOR TO SUBMIT DRAWING THAT INDICATES LAYOUT OF HAUNCHED SLABS FOR A/E APPROVAL.

15 S200 TYPICAL HAUNCHED SLAB
NOT TO SCALE

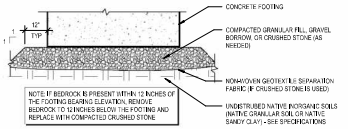


NOTE: VERIFY ALL PAD LOCATIONS, DIMENSIONS, AND ADEQUACY WITH THE MECHANICAL ENGINEER AND THE INDIVIDUAL EQUIPMENT REQUIREMENTS. MECHANICAL ENGINEER TO SPECIFY ISOLATION DATA.

16 S200 TYPICAL HOUSEKEEPING PAD
NOT TO SCALE

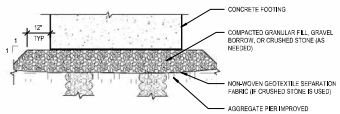


11 S200 TYPICAL SLAB CONSTRUCTION JOINT
NOT TO SCALE

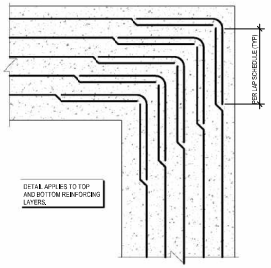


NOTE: IF BEDROCK IS PRESENT WITHIN 12 INCHES OF THE FOOTING BEARING ELEVATION, REMOVE BEDROCK TO 12 INCHES BELOW THE FOOTING AND REPLACE WITH COMPACTED CRUSHED STONE

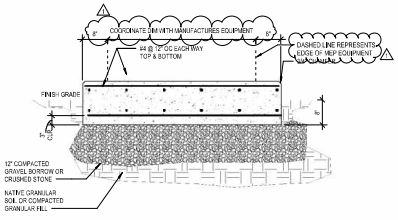
19 S200 TYPICAL FOOTING PREPARATION - NON AGGREGATE PIER AREAS
NOT TO SCALE



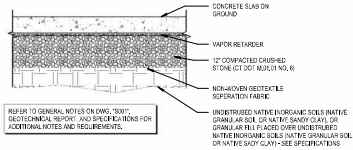
21 S200 TYPICAL FOOTING PREPARATION - AGGREGATE PIER AREAS
NOT TO SCALE



17 S200 TYPICAL FOOTING CORNER BAR DETAIL
NOT TO SCALE

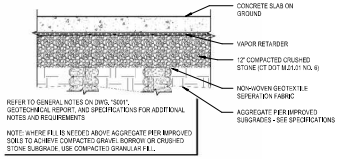


18 S200 EXTERIOR REINFORCED CONCRETE PAD
NOT TO SCALE



REFER TO GENERAL NOTES ON DWG. "S001", GEOTECHNICAL REPORT, AND SPECIFICATIONS FOR ADDITIONAL NOTES AND REQUIREMENTS.

20 S200 TYPICAL INTERIOR SLAB ON GROUND PREPARATION - NON AGGREGATE PIER AREAS
NOT TO SCALE



REFER TO GENERAL NOTES ON DWG. "S001", GEOTECHNICAL REPORT, AND SPECIFICATIONS FOR ADDITIONAL NOTES AND REQUIREMENTS

NOTE: WHERE FILL IS NEEDED ABOVE AGGREGATE PIER IMPROVED SOILS TO ACHIEVE COMPACTED GRAVEL BORROW OR CRUSHED STONE SUBGRADE, USE COMPACTED GRANULAR FILL.

22 S200 TYPICAL INTERIOR SLAB ON GROUND PREPARATION - AGGREGATE PIER AREAS
NOT TO SCALE

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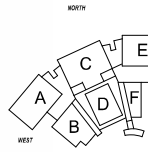

KEYPLAN

Number	Date	Issued For
1	11/09/2024	ADDENDUM NO. 6
	09/30/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

TYPICAL FOUNDATION DETAILS

Date 07/08/2024
Scale 3/4" = 1'-0"
Proj. Number 22367.00
Drawing Number S200

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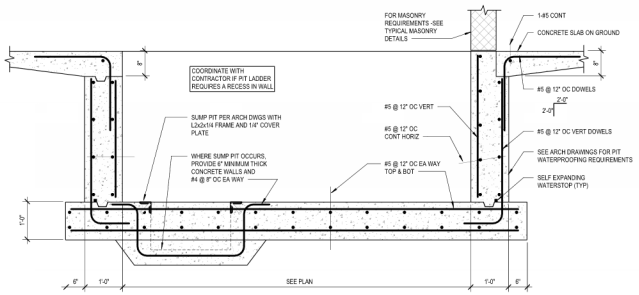
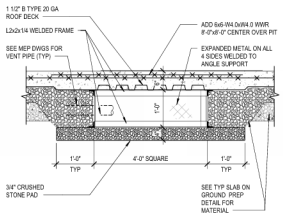
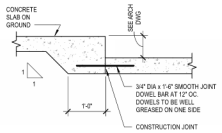
1/9/2025 2:35:15 PM



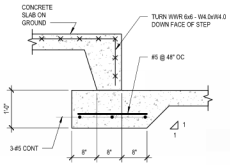
1 S201 TYPICAL ELEVATOR PIT
NOT TO SCALE



2 S201 TYPICAL RADON PIT
NOT TO SCALE



3 S201 TYPICAL SLAB DEPRESSION 12" OR LESS
NOT TO SCALE



4 S201 TYPICAL SLAB DEPRESSION GREATER THAN 12"
NOT TO SCALE

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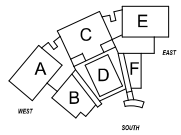

KEYPLAN

Number	Date	Issued For
	05/30/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

TYPICAL FOUNDATION DETAILS

Date 07/08/2024
Scale 3/4" = 1'-0"
Proj. Number 22367.00
Drawing Number **S201**

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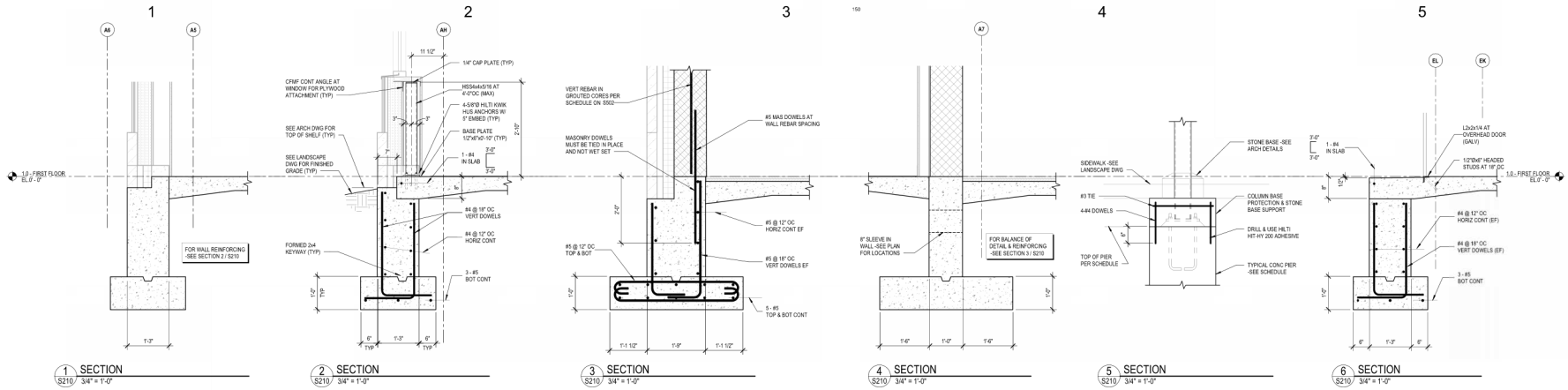

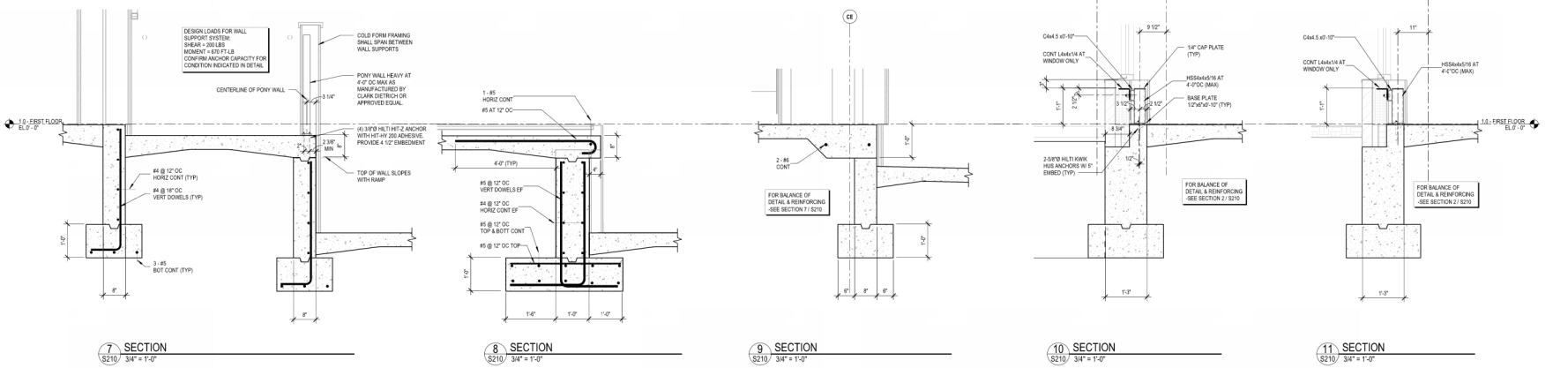

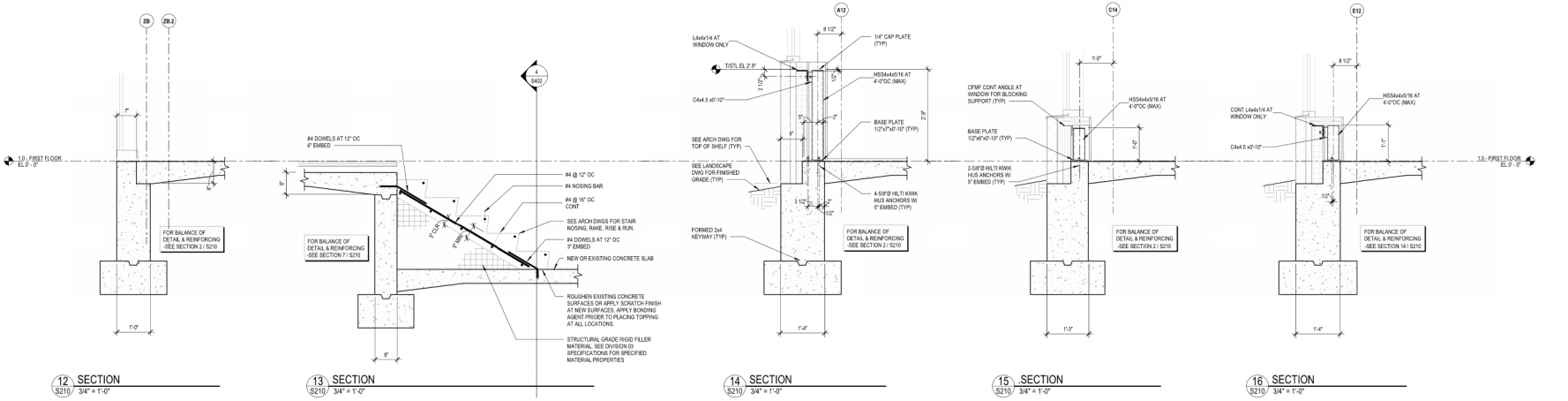

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NORTH
EAST
WEST
SOUTH
KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

FOUNDATION DETAILS

Date 07/08/2024
Scale 3/4" = 1'-0"
Proj. Number 22367.00
Drawing Number **S210**

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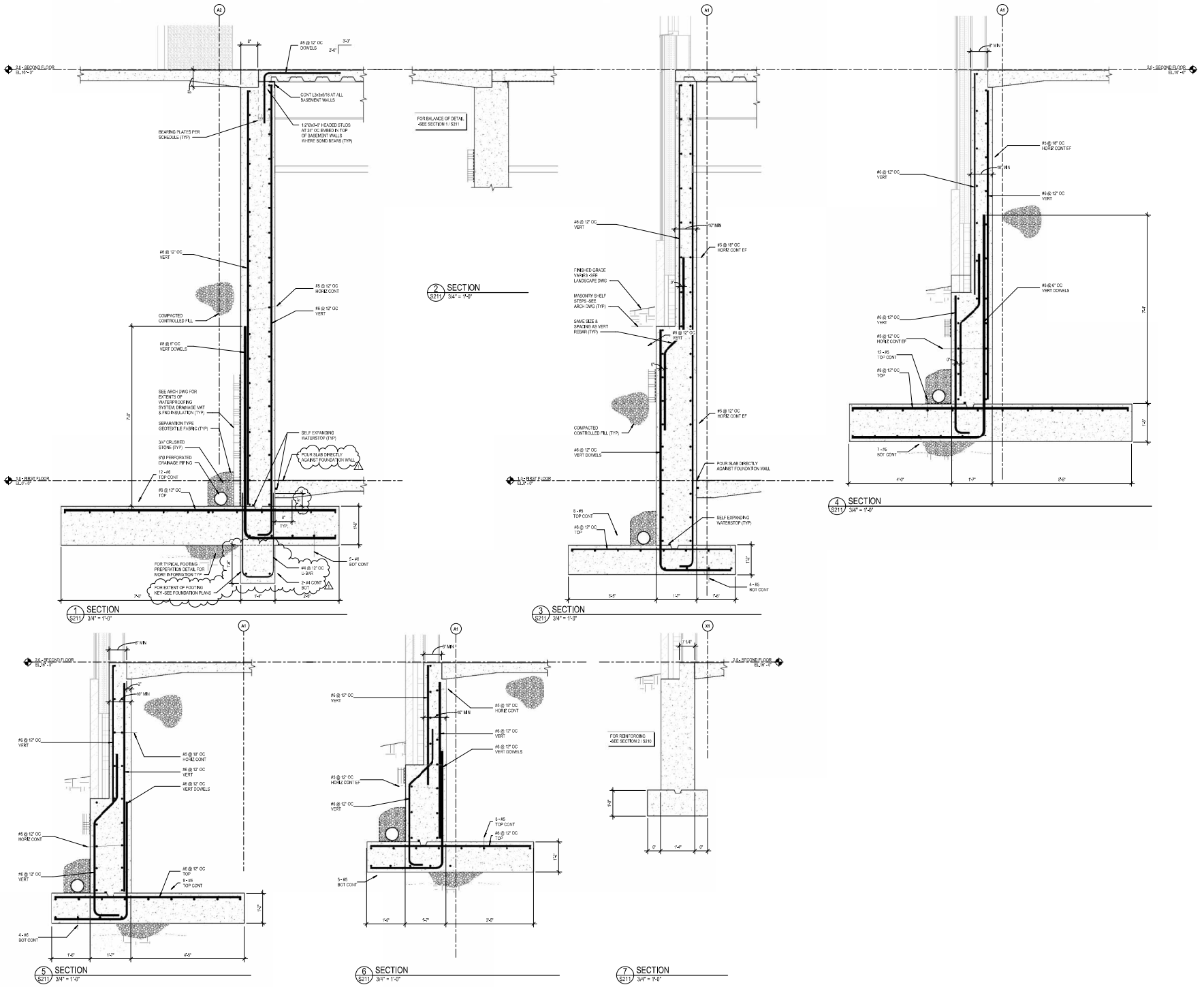

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NORTH
EAST
WEST
SOUTH

KEYPLAN

Number	Date	Issued For
1	10/16/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

FOUNDATION DETAILS

Date: 07/08/2024
Scale: 3/4" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **S211**

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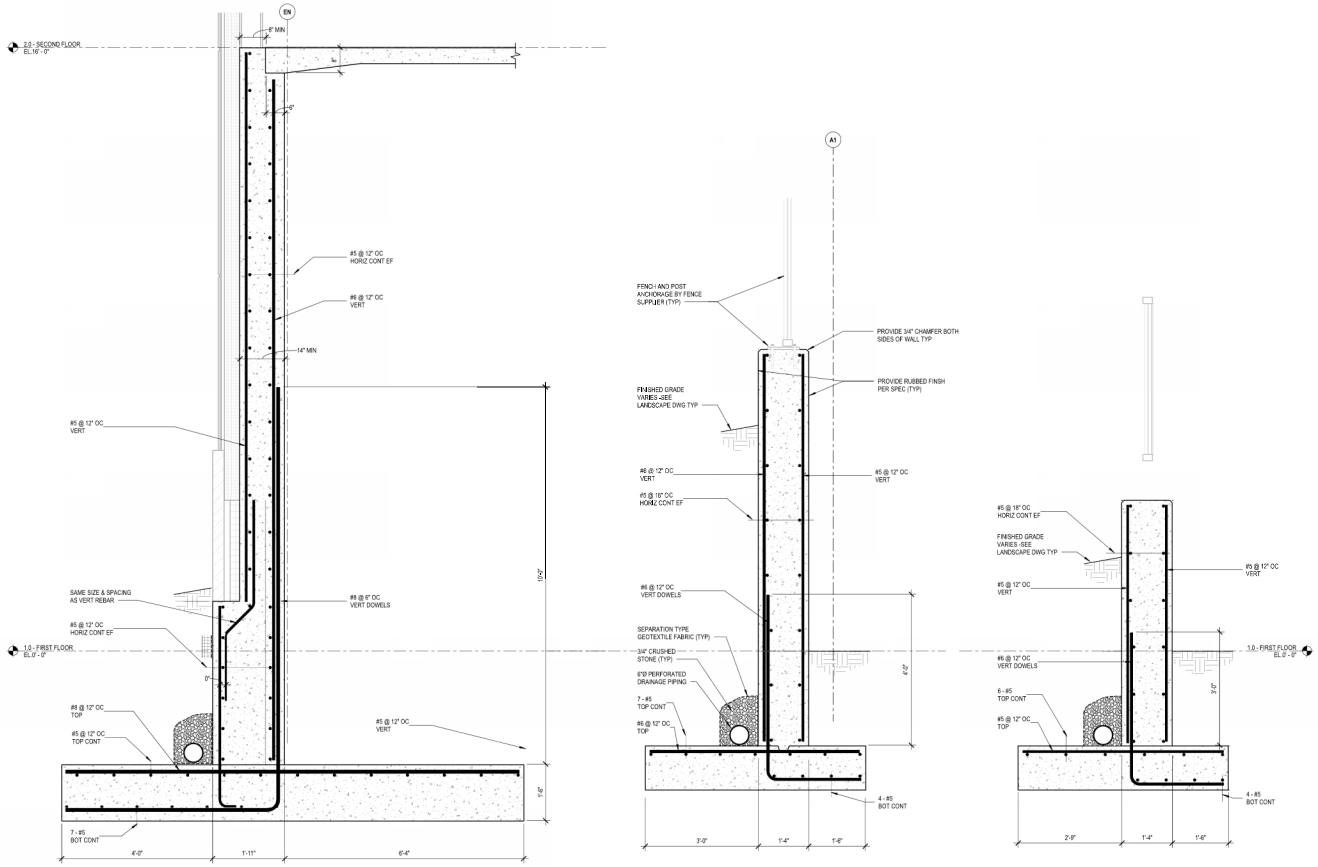
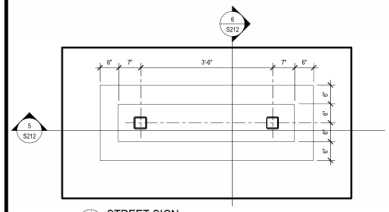


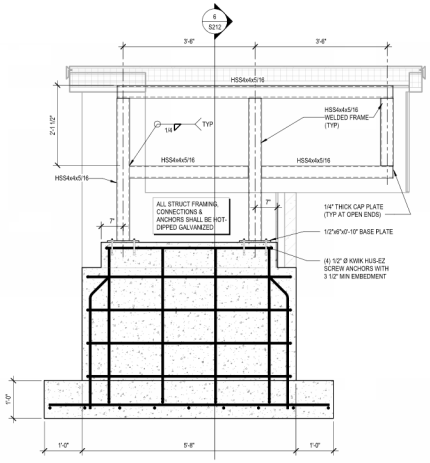
1 SECTION
S212 3/4" = 1'-0"

2 SECTION
S212 3/4" = 1'-0"

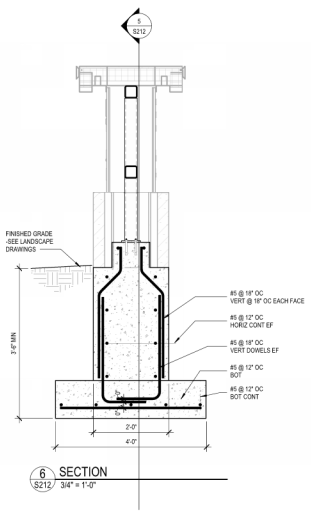
3 SECTION
S212 3/4" = 1'-0"



4 STREET SIGN
S212 3/4" = 1'-0"



5 SECTION
S212 3/4" = 1'-0"



6 SECTION
S212 3/4" = 1'-0"

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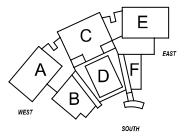

KEYPLAN

Number	Date	Issued For
	05/30/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

FOUNDATION DETAILS

Date 07/08/2024
Scale 3/4" = 1'-0"
Proj. Number 22367.00

Drawing Number **S212**

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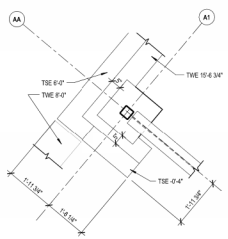
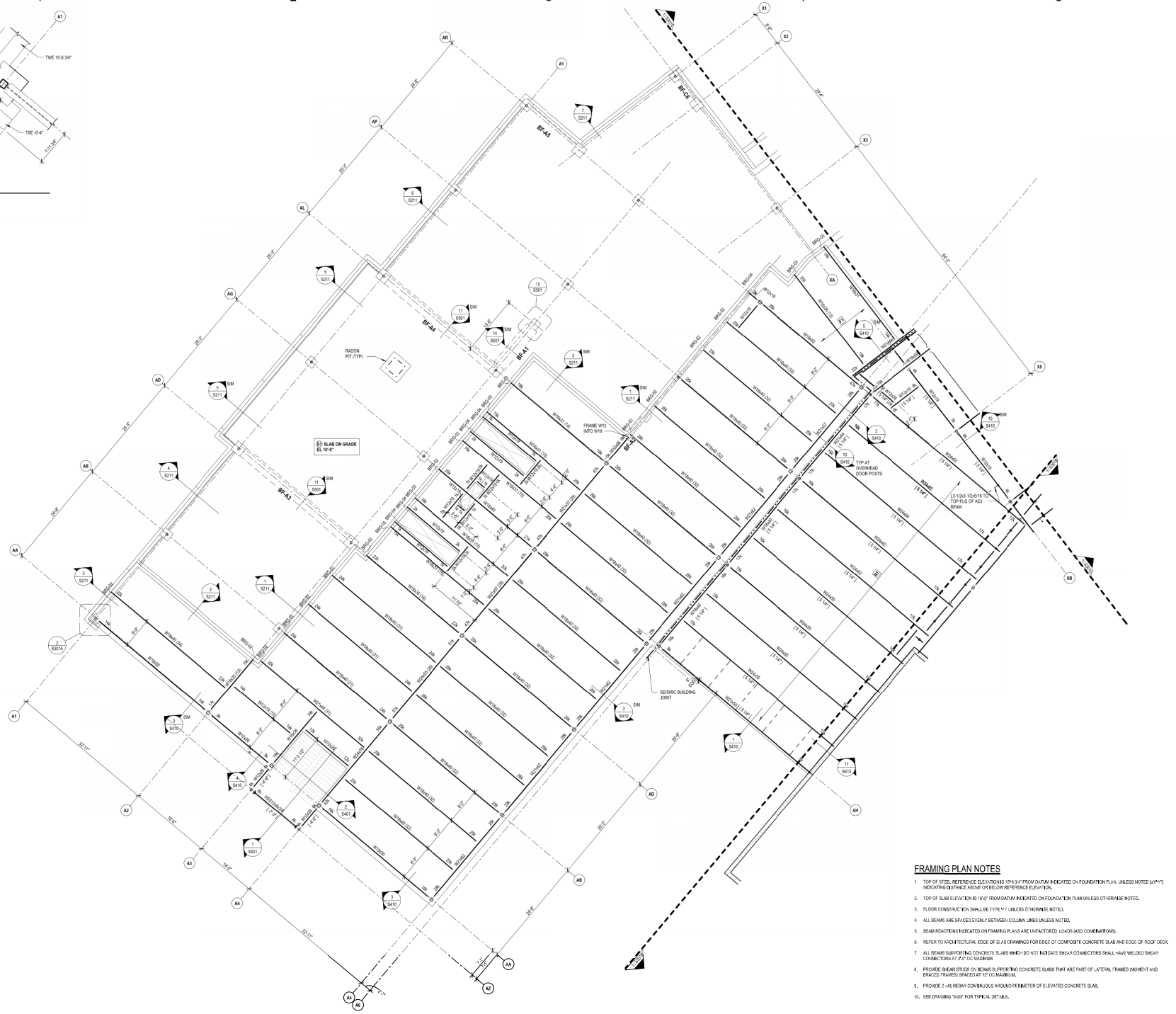


2 PLAN DETAIL
S301A 1/2" = 1'-0"



FRAMING PLAN NOTES

1. TOP OF STEEL REFERENCE ELEVATION IS 15'-6 3/4" FROM DATUM INDICATED ON FOUNDATION PLAN, UNLESS NOTED [eY'-"] INDICATING DISTANCE ABOVE OR BELOW REFERENCE ELEVATION.
2. TOP OF SLAB ELEVATION IS 16'-0" FROM DATUM INDICATED ON FOUNDATION PLAN UNLESS OTHERWISE NOTED.
3. FLOOR CONSTRUCTION SHALL BE TYPE "1" UNLESS OTHERWISE NOTED.
4. ALL BEAMS ARE SPACED EVENLY BETWEEN COLUMN LINES UNLESS NOTED.
5. BEAM REACTIONS INDICATED ON FRAMING PLANS ARE UNFACTORED LOADS (ASD COMBINATIONS).
6. REFER TO ARCHITECTURAL EDGE OF SLAB DRAWINGS FOR EDGE OF COMPOSITE CONCRETE SLAB AND EDGE OF ROOF DECK.
7. ALL BEAMS SUPPORTING CONCRETE SLABS WHICH DO NOT INDICATE SHEAR CONNECTORS SHALL HAVE WELDED SHEAR CONNECTORS AT 9'-0" OC MAXIMUM.
8. PROVIDE SHEAR STUDS ON BEAMS SUPPORTING CONCRETE SLABS THAT ARE PART OF LATERAL FRAMES (MOMENT AND BRACED FRAMES) SPACED AT 12" OC MAXIMUM.
9. PROVIDE 2 - #5 REBAR CONTINUOUS AROUND PERIMETER OF ELEVATED CONCRETE SLAB.
10. SEE DRAWING "S100" FOR TYPICAL DETAILS.

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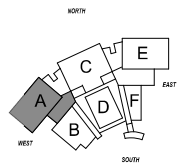

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

SECOND FLOOR FRAMING PLAN - PART A

Date 07/08/2024
Scale As indicated
Proj. Number 22367.00
Drawing Number S301A

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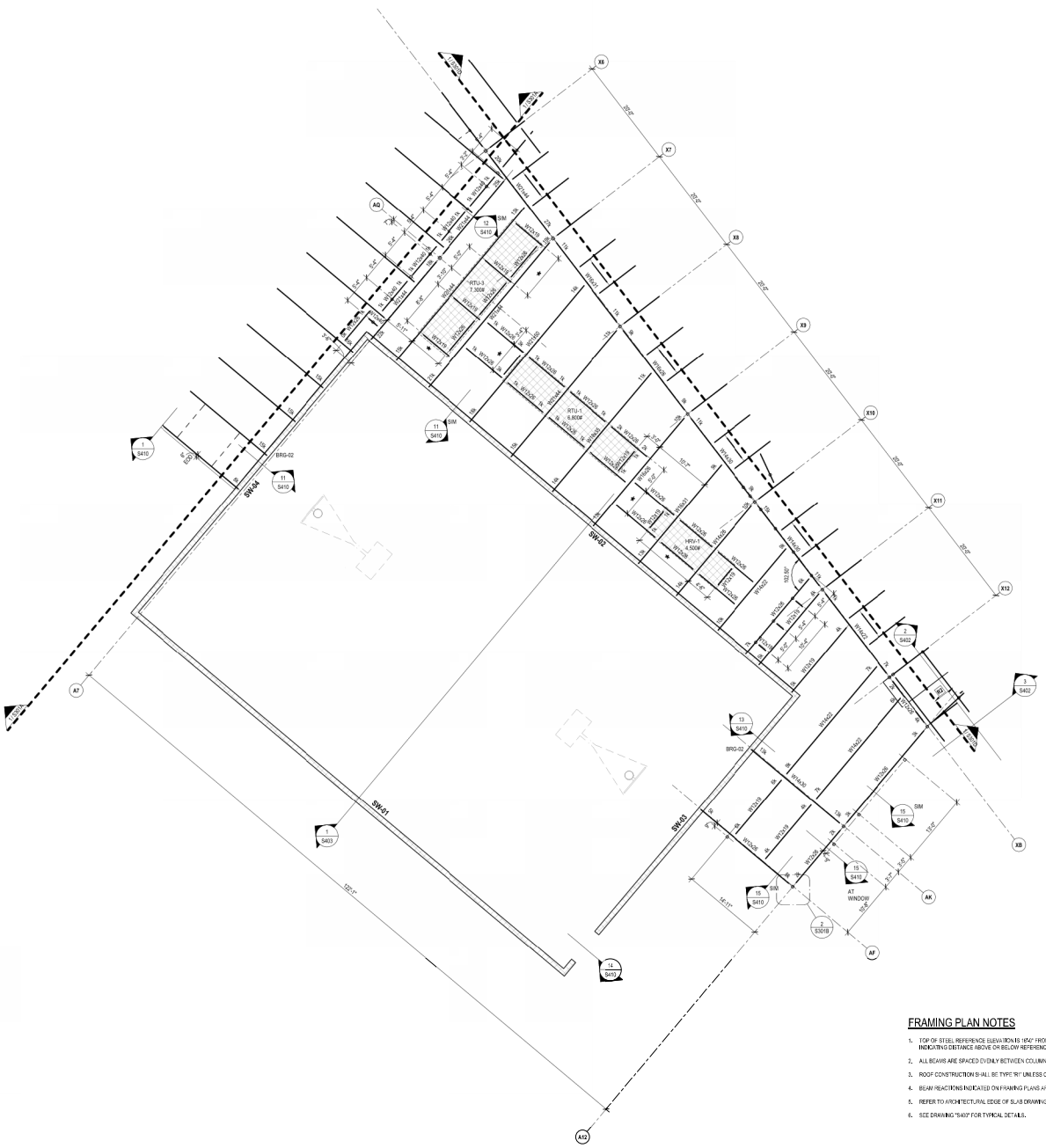

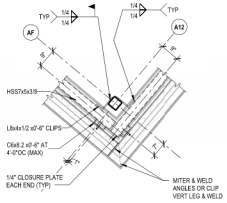

2 S301B PLAN DETAIL 1/2" = 1'-0"

FRAMING PLAN NOTES

1. TOP OF STEEL REFERENCE ELEVATION IS '(E)-0" FROM DATUM INDICATED ON FOUNDATION PLAN, UNLESS NOTED (±Y'-Y") INDICATING DISTANCE ABOVE OR BELOW REFERENCE ELEVATION.
2. ALL BEAMS ARE SPACED EVENLY BETWEEN COLUMN LINES UNLESS NOTED.
3. ROOF CONSTRUCTION SHALL BE TYPE 'R' UNLESS OTHERWISE NOTED.
4. BEAM REACTIONS INDICATED ON FRAMING PLANS ARE UNFACTORED LOADS (ASD COMBINATIONS).
5. REFER TO ARCHITECTURAL EDGE OF SLAB DRAWINGS FOR EDGE OF COMPOSITE CONCRETE SLAB.
6. SEE DRAWING "S400" FOR TYPICAL DETAILS.

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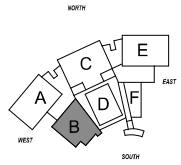

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

LOW ROOF FRAMING PLAN - PART B

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: **S301B**

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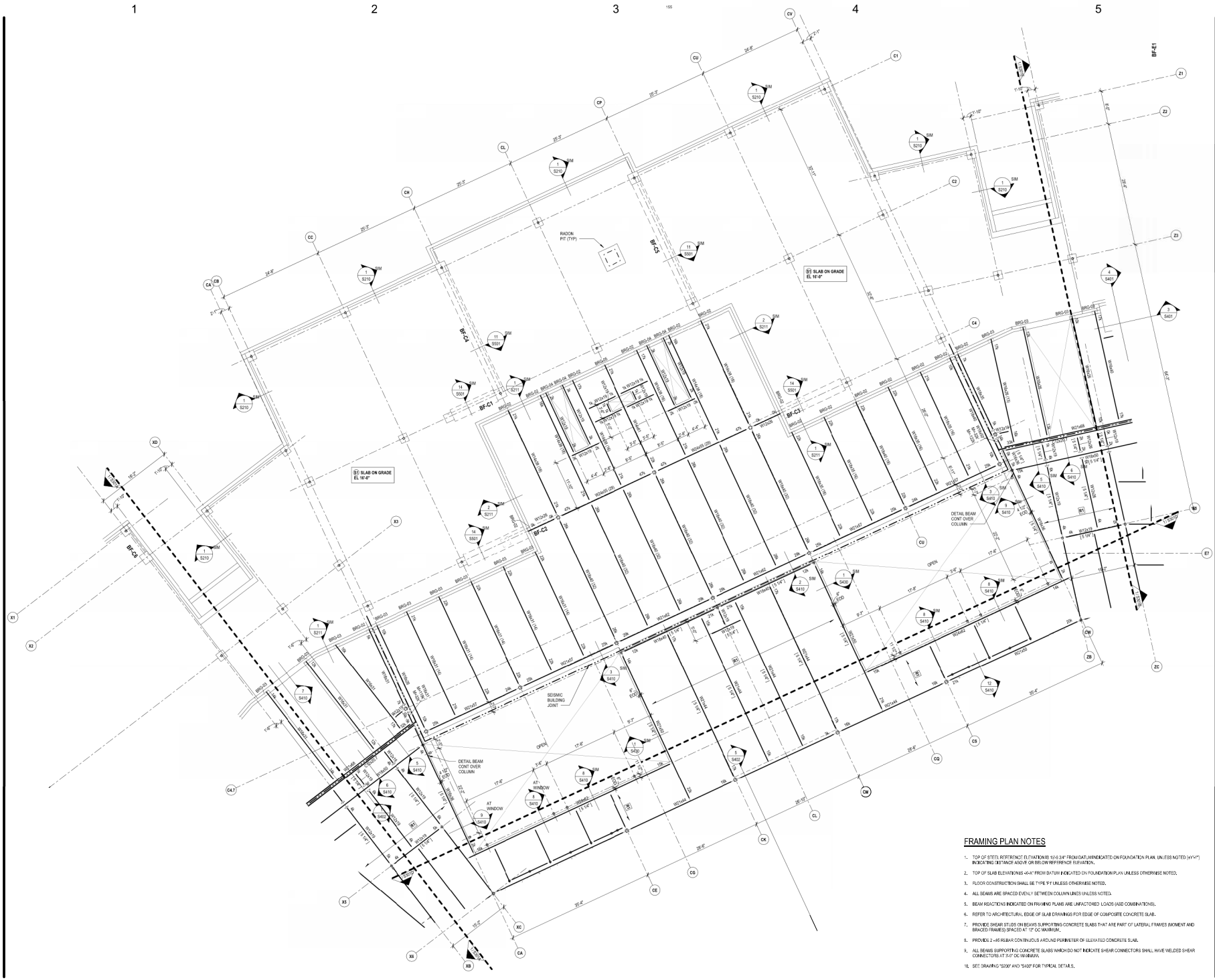

FRAMING PLAN NOTES

1. TOP OF STEEL REFERENCE ELEVATION IS 13'-5 3/4" FROM DATUM INDICATED ON FOUNDATION PLAN, UNLESS NOTED [eY'-i"] INDICATING DISTANCE ABOVE OR BELOW REFERENCE ELEVATION.
2. TOP OF SLAB ELEVATIONS vS'-X" FROM DATUM INDICATED ON FOUNDATION PLAN UNLESS OTHERWISE NOTED.
3. FLOOR CONSTRUCTION SHALL BE TYPE 'F' UNLESS OTHERWISE NOTED.
4. ALL BEAMS ARE SPACED EVENLY BETWEEN COLUMN LINES UNLESS NOTED.
5. BEAM REACTIONS INDICATED ON FRAMING PLANS ARE UNFACTORED LOADS (ASD COMBINATIONS).
6. REFER TO ARCHITECTURAL EDGE OF SLAB DRAWINGS FOR EDGE OF COMPOSITE CONCRETE SLAB.
7. PROVIDE SHEAR STUDS ON BEAMS SUPPORTING CONCRETE SLABS THAT ARE PART OF LATERAL FRAMES (MOMENT AND BRACED FRAMES) SPACED AT 12" OC MAXIMUM.
8. PROVIDE 2 #5 REBAR CONTINUOUS AROUND PERIMETER OF ELEVATED CONCRETE SLAB.
9. ALL BEAMS SUPPORTING CONCRETE SLABS WHICH DO NOT INDICATE SHEAR CONNECTORS SHALL HAVE WELDED SHEAR CONNECTORS AT 3'-0" OC MAXIMUM.
10. SEE DRAWING "S200" AND "S400" FOR TYPICAL DETAILS.

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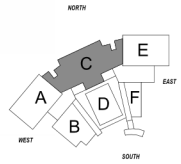

KEYPLAN

Number	Date	Issued For
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	07/08/2024	PHASE 2

SECOND FLOOR FRAMING PLAN - PART C

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: S301C

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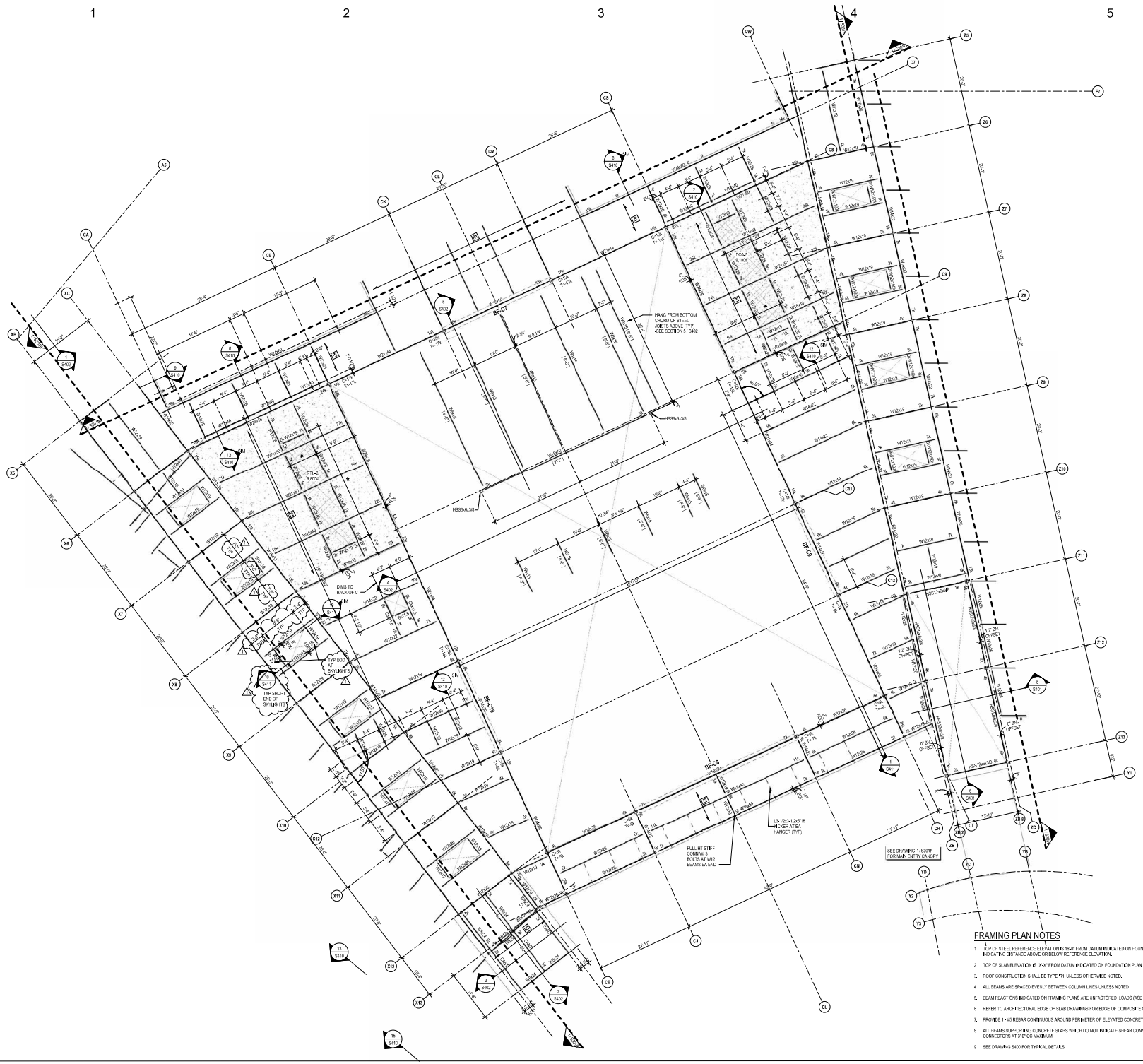

FRAMING PLAN NOTES

1. TOP OF STEEL REFERENCE ELEVATION IS 99'-0" FROM DATUM INDICATED ON FOUNDATION PLAN, UNLESS NOTED [±Y-Y"] INDICATING DISTANCE ABOVE OR BELOW REFERENCE ELEVATION.
2. TOP OF SLAB ELEVATION IS -X-X" FROM DATUM INDICATED ON FOUNDATION PLAN UNLESS OTHERWISE NOTED.
3. ROOF CONSTRUCTION SHALL BE TYPE "I1" UNLESS OTHERWISE NOTED.
4. ALL BEAMS ARE SPACED EVENLY BETWEEN COLUMN LINES UNLESS NOTED.
5. BEAM REACTIONS INDICATED ON FRAMING PLANS ARE UNFACTORED LOADS (ASD COMBINATIONS).
6. REFER TO ARCHITECTURAL EDGE OF SLAB DRAWINGS FOR EDGE OF COMPOSITE CONCRETE SLAB.
7. PROVIDE 1 - #5 REBAR CONTINUOUS AROUND PERIMETER OF ELEVATED CONCRETE SLAB.
8. ALL BEAMS SUPPORTING CONCRETE SLABS WHICH DO NOT INDICATE SHEAR CONNECTORS SHALL HAVE WELDED SHEAR CONNECTORS AT 2'-0" OC MAXIMUM.
9. SEE DRAWING S400 FOR TYPICAL DETAILS.

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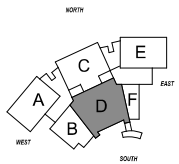

KEYPLAN

Number	Date	Issued For
1	10/30/2024	ADDENDUM NO. 4
	09/20/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

LOW ROOF FRAMING PLAN - PART D

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **S301D**

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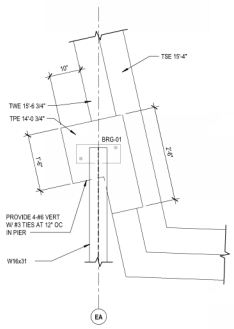
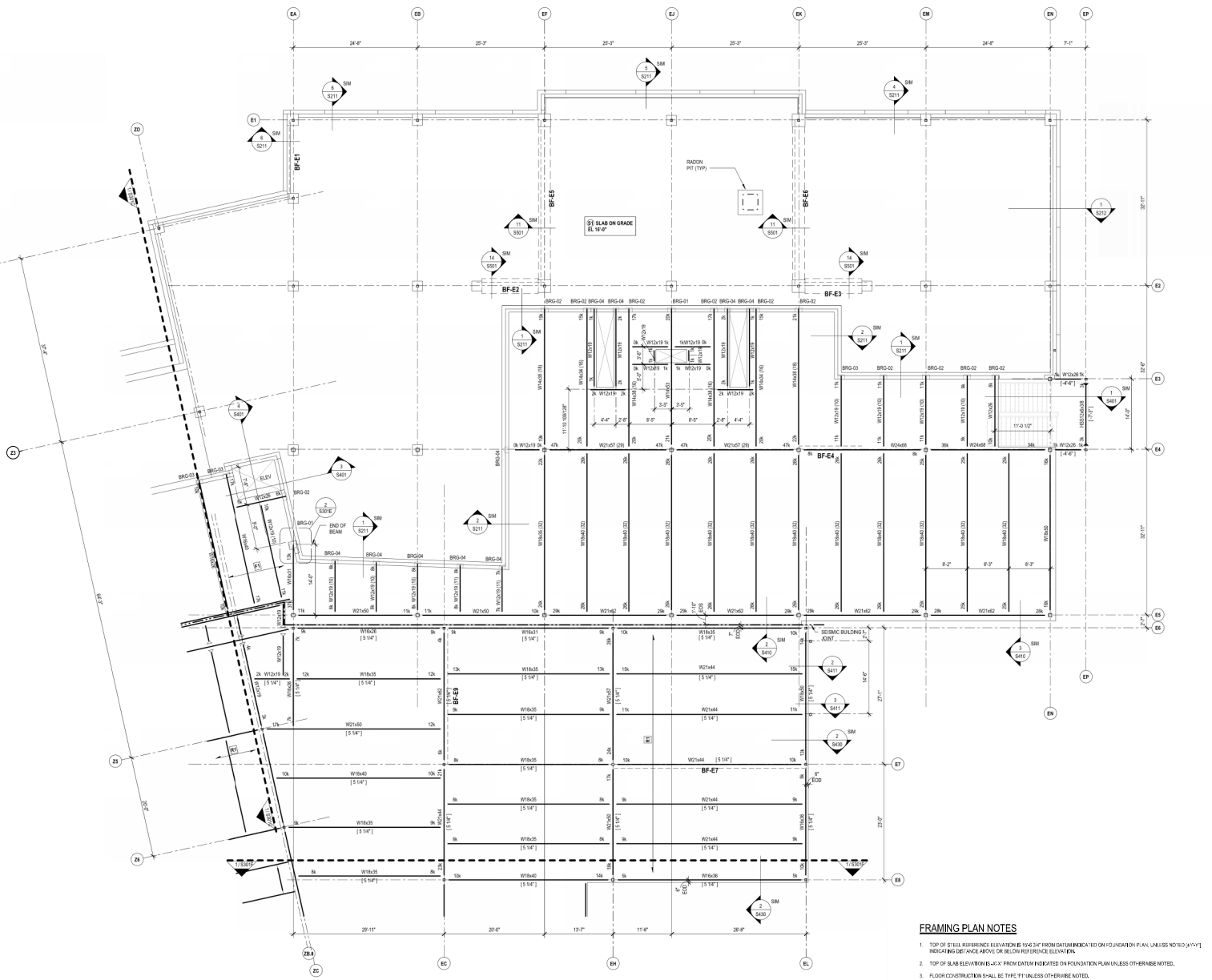


2 PLAN DETAIL
S301E 3/4" = 1'-0"



FRAMING PLAN NOTES

1. TOP OF STEEL REFERENCE ELEVATION IS 15'-0 3/4" FROM DATUM INDICATED ON FOUNDATION PLAN, UNLESS NOTED [X'-Y"] INDICATING DISTANCE ABOVE OR BELOW REFERENCE ELEVATION.
2. TOP OF SLAB ELEVATION IS +X.X" FROM DATUM INDICATED ON FOUNDATION PLAN UNLESS OTHERWISE NOTED.
3. FLOOR CONSTRUCTION SHALL BE TYPE "F1" UNLESS OTHERWISE NOTED.
4. ALL BEAMS ARE SPACED EVENLY BETWEEN COLUMN LINES UNLESS NOTED.
5. BEAM REACTIONS INDICATED ON FRAMING PLANS ARE UNFACTORED LOADS (ASD COMBINATIONS).
6. REFER TO ARCHITECTURAL EDGE OF SLAB DRAWINGS FOR EDGE OF COMPOSITE CONCRETE SLAB.
7. PROVIDE SHEAR STUDS ON BEAMS SUPPORTING CONCRETE SLABS THAT ARE PART OF LATERAL FRAMES (MOMENT AND BRACED FRAMES) SPACED AT 12" OC MAXIMUM.
8. PROVIDE 2 - #5 REBAR CONTINUOUS AROUND PERIMETER OF ELEVATED CONCRETE SLAB.
9. ALL BEAMS SUPPORTING CONCRETE SLABS WHICH DO NOT INDICATE SHEAR CONNECTORS SHALL HAVE WELDED SHEAR CONNECTORS AT 3'-0" OC MAXIMUM.
10. SEE DRAWING "S400" FOR TYPICAL DETAILS.

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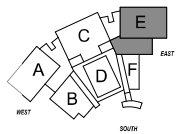

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SECOND FLOOR FRAMING PLAN - PART E

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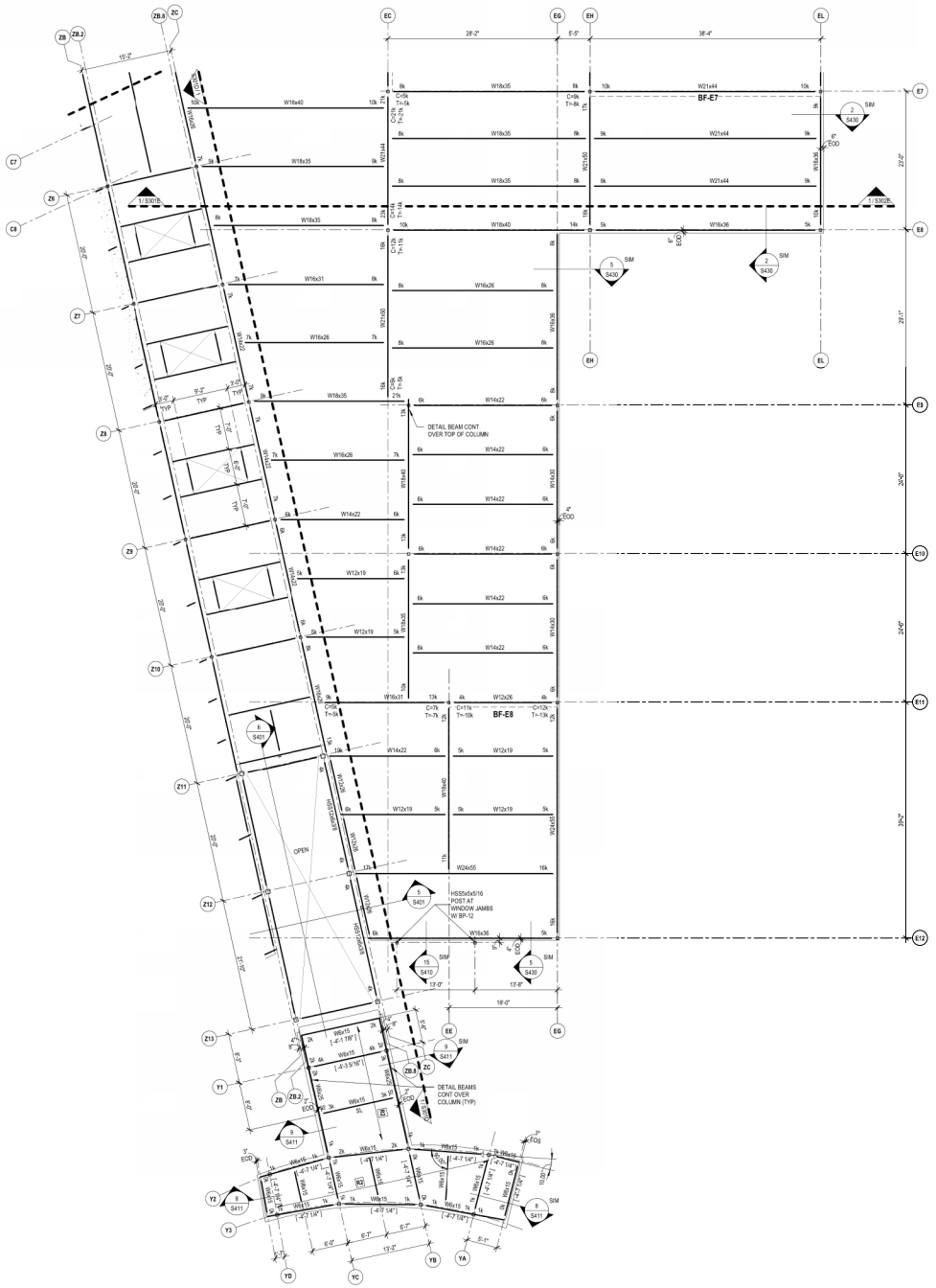

FRAMING PLAN NOTES

1. TOP OF STEEL REFERENCE ELEVATION IS 182" FROM DATUM INDICATED ON FOUNDATION PLAN, UNLESS NOTED [±"Y"] INDICATING DISTANCE ABOVE OR BELOW REFERENCE ELEVATION.
2. ROOF CONSTRUCTION SHALL BE TYPE 'R1' UNLESS OTHERWISE NOTED.
3. ALL BEAMS ARE SPACED EVENLY BETWEEN COLUMN LINES UNLESS NOTED.
4. BEAM REACTIONS INDICATED ON FRAMING PLANS ARE UNFACTORED LOADS (ASD COMBINATIONS).
5. C=17= INDICATES BEAM AXIAL END LOADS DUE TO WIND OR SEISMIC FORCES WHICH CONNECTIONS SHALL BE DESIGNED FOR. AXIAL LOADS INDICATED HAVE ALREADY BEEN MULTIPLIED BY OVERSTRENGTH FACTOR = 3Ω.
6. SEE DRAWING "S300" AND "S400" FOR TYPICAL DETAILS.

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NORTH
EAST
SOUTH
WEST
A B C D E F

KEYPLAN

Number	Date	Issued For
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	07/08/2024	PHASE 2

LOW ROOF FRAMING PLAN - PART F

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **S301F**

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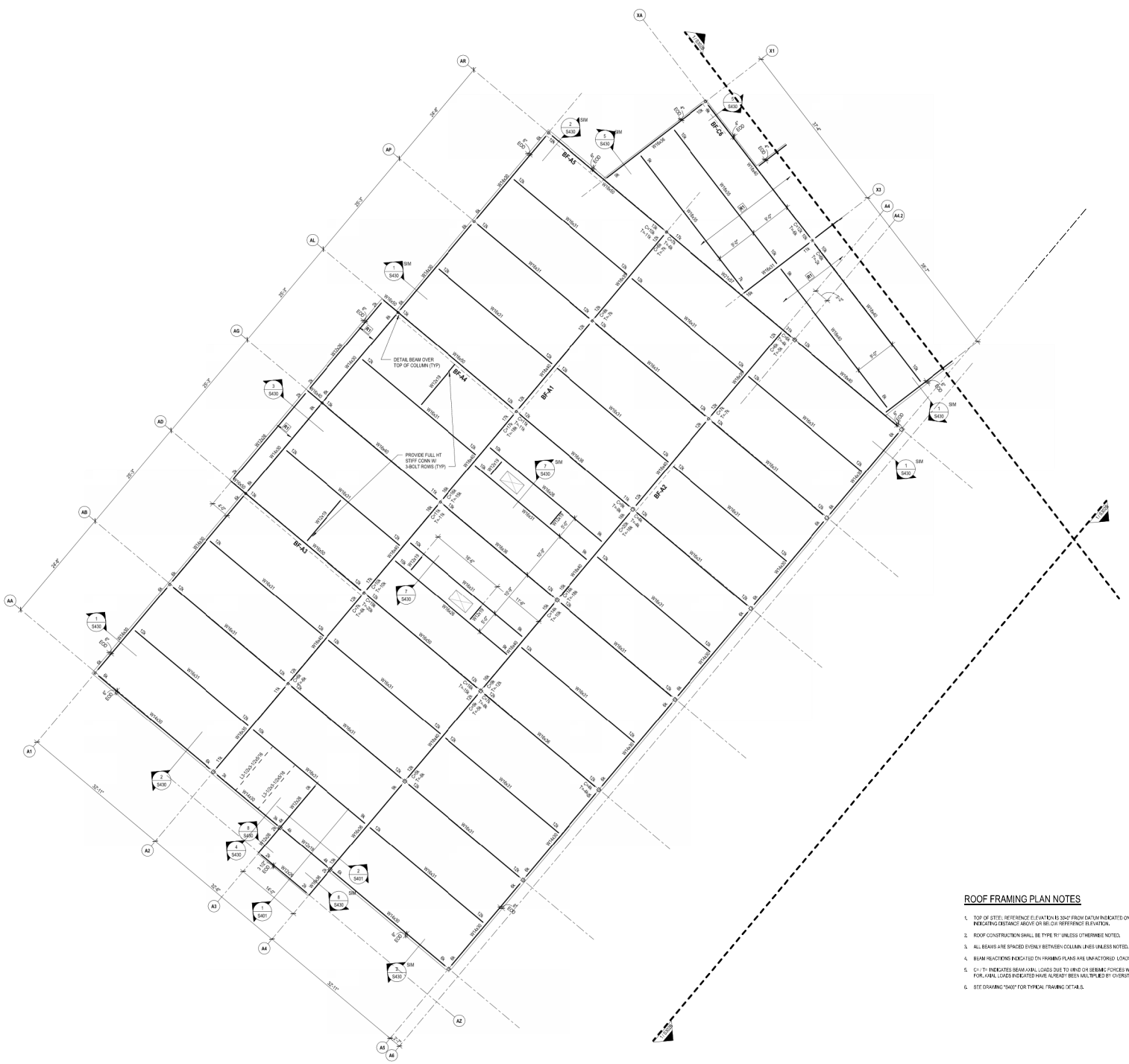

ROOF FRAMING PLAN NOTES

1. TOP OF STEEL REFERENCE ELEVATION IS 354'-0" FROM DATUM INDICATED ON FOUNDATION PLAN, UNLESS NOTED (+Y'-Y") INDICATING DISTANCE ABOVE OR BELOW REFERENCE ELEVATION.
2. ROOF CONSTRUCTION SHALL BE TYPE "R1" UNLESS OTHERWISE NOTED.
3. ALL BEAMS ARE SPACED EVENLY BETWEEN COLUMN LINES UNLESS NOTED.
4. BEAM REACTIONS INDICATED ON FRAMING PLANS ARE UNFACTORED LOADS (ASD COMBINATIONS).
5. C+ / T+ INDICATES BEAM AXIAL LOADS DUE TO WIND OR SEISMIC FORCES WHICH CONNECTIONS SHALL BE DESIGNED FOR. AXIAL LOADS INDICATED HAVE ALREADY BEEN MULTIPLIED BY OVERSTRENGTH FACTOR = 3.0.
6. SEE DRAWING "S400" FOR TYPICAL FRAMING DETAILS.

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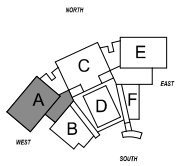

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

ROOF FRAMING PLAN - PART A

Date: 07/08/2024
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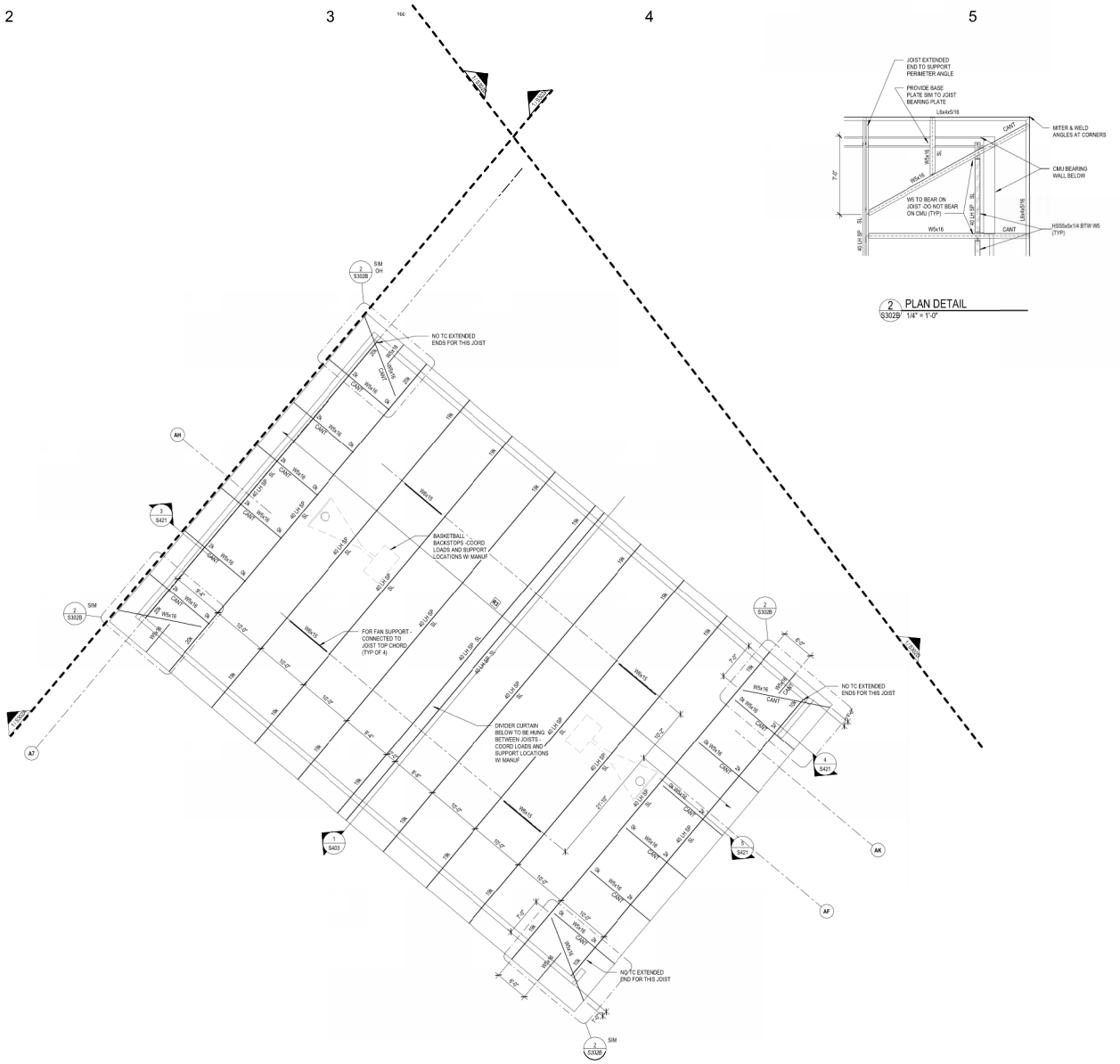

2 PLAN DETAIL
S302B 1/4" = 1'-0"

GYMNASIUM JOIST LOADS

1. GYMNASIUM ROOF JOIST DESIGN SHALL USE A UNIFORM DEAD LOAD OF 25 PSF FOR GRAVITY DESIGN. SEE 700 SERIES DRAWINGS FOR SNOW, WIND AND NET UPLIFT PRESSURES. ADDITIONAL HUNG EQUIPMENT LOADS SHALL BE COORDINATED WITH THE EQUIPMENT SUPPLIER.
2. 20# CONCENTRATED LOAD ANYWHERE ALONG BOTTOM CHORD.
3. 60 PLF UNIFORM BOTTOM CHORD LOAD
4. SEE PLAN FOR ADDITIONAL JOIST LOADS.

ROOF FRAMING PLAN NOTES

1. TOP OF STEEL REFERENCE ELEVATION IS +37'-1" FROM DATUM INDICATED ON FOUNDATION PLAN, UNLESS NOTED [+Y'-Y"] INDICATING DISTANCE ABOVE OR BELOW REFERENCE ELEVATION.
2. ROOF CONSTRUCTION SHALL BE TYPE 1B2 UNLESS OTHERWISE NOTED.
3. BEAM REACTIONS INDICATED ON FRAMING PLANS ARE UNFACTORED LOADS (ASD COMBINATIONS).
4. SEE DRAWING "S400" FOR TYPICAL FRAMING DETAILS.

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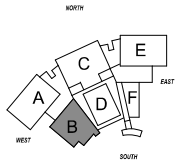

KEYPLAN

Number	Date	Issued For
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HIGH ROOF FRAMING PLAN - PART B

Date 07/08/2024
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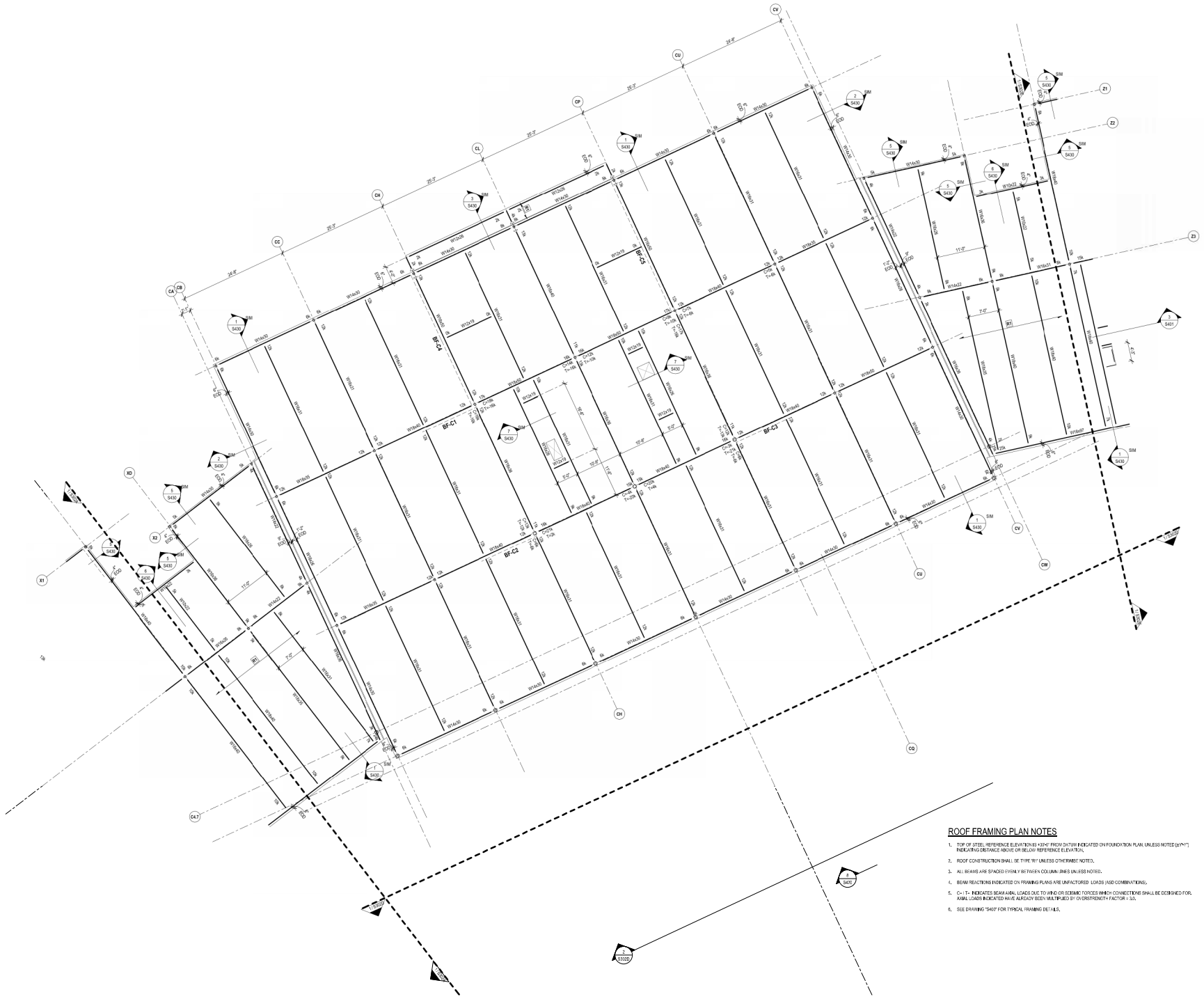

ROOF FRAMING PLAN NOTES

1. TOP OF STEEL REFERENCE ELEVATION IS +37'-0" FROM DATUM INDICATED ON FOUNDATION PLAN. UNLESS NOTED [±Y'-Y"] INDICATING DISTANCE ABOVE OR BELOW REFERENCE ELEVATION.
2. ROOF CONSTRUCTION SHALL BE TYPE 'R1' UNLESS OTHERWISE NOTED.
3. ALL BEAMS ARE SPACED EVENLY BETWEEN COLUMN LINES UNLESS NOTED.
4. BEAM REACTIONS INDICATED ON FRAMING PLANS ARE UNFACTORED LOADS (ASD COMBINATIONS).
5. C+ / T+ INDICATES BEAM AXIAL LOADS DUE TO WIND OR SEISMIC FORCES WHICH CONNECTIONS SHALL BE DESIGNED FOR. AXIAL LOADS INDICATED HAVE ALREADY BEEN MULTIPLIED BY OVERSTRENGTH FACTOR = Ω0.
6. SEE DRAWING 'S402' FOR TYPICAL FRAMING DETAILS.

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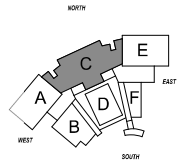

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

ROOF FRAMING PLAN - PART C

Date: 07/08/2024
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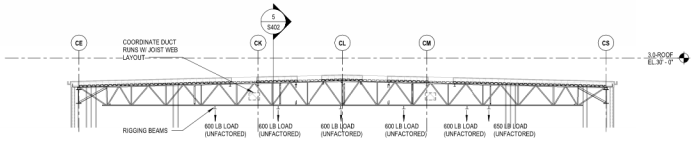

'TYPE J1' AUDITORIUM JOIST LOADING DIAGRAM

1. TYPICAL LOADS INDICATED BELOW ARE IN ADDITION THE LOADS NOTED IN THIS DIAGRAM.
2. SEE PLAN FOR LOCATION OF 'TYPE J1' JOISTS.

TYPICAL AUDITORIUM JOIST LOADS

1. AUDITORIUM ROOF JOIST DESIGN SHALL USE A UNIFORM DEAD LOAD OF 35 PSF FOR GRAVITY DESIGN. SEE 700 SERIES DRAWINGS FOR SNOW, WIND AND NET UPLIFT PRESSURES. ADDITIONAL HUNG EQUIPMENT LOADS SHALL BE COORDINATED WITH THE EQUIPMENT SUPPLIER.
2. 200# CONCENTRATED LOAD ANYWHERE ALONG BOTTOM CHORD.
3. 60 PLF UNIFORM BOTTOM CHORD LOAD.

ROOF FRAMING PLAN NOTES

1. TOP OF STEEL REFERENCE ELEVATION IS +307.47 FROM DATUM INDICATED ON FOUNDATION PLAN, UNLESS NOTED (#'-#") INDICATING DISTANCE ABOVE OR BELOW REFERENCE ELEVATION.
2. ROOF CONSTRUCTION SHALL BE TYPE IV-HT UNLESS OTHERWISE NOTED.
3. ALL BEAMS AND JOISTS ARE SPACED EVENLY BETWEEN COLUMN LINES UNLESS OTHERWISE NOTED.
4. BEAM REACTIONS INDICATED ON FRAMING PLANS ARE UNFACTORED LOADS (ASD COMBINATIONS).
5. C+T= INDICATES BEAM AXIAL LOADS DUE TO WIND OR SEISMIC FORCES WHICH CONNECTIONS SHALL BE DESIGNED FOR. AXIAL LOADS INDICATED HAVE ALREADY BEEN MULTIPLIED BY OVERSTRENGTH FACTOR = 2.0.
6. SEE DRAWING "S400" FOR TYPICAL FRAMING DETAILS.

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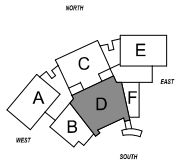

KEYPLAN

Number	Date	Issued For
	05/03/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

HIGH ROOF FRAMING PLAN - PART D

Date: 07/08/2024
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Drawing Number: S302D

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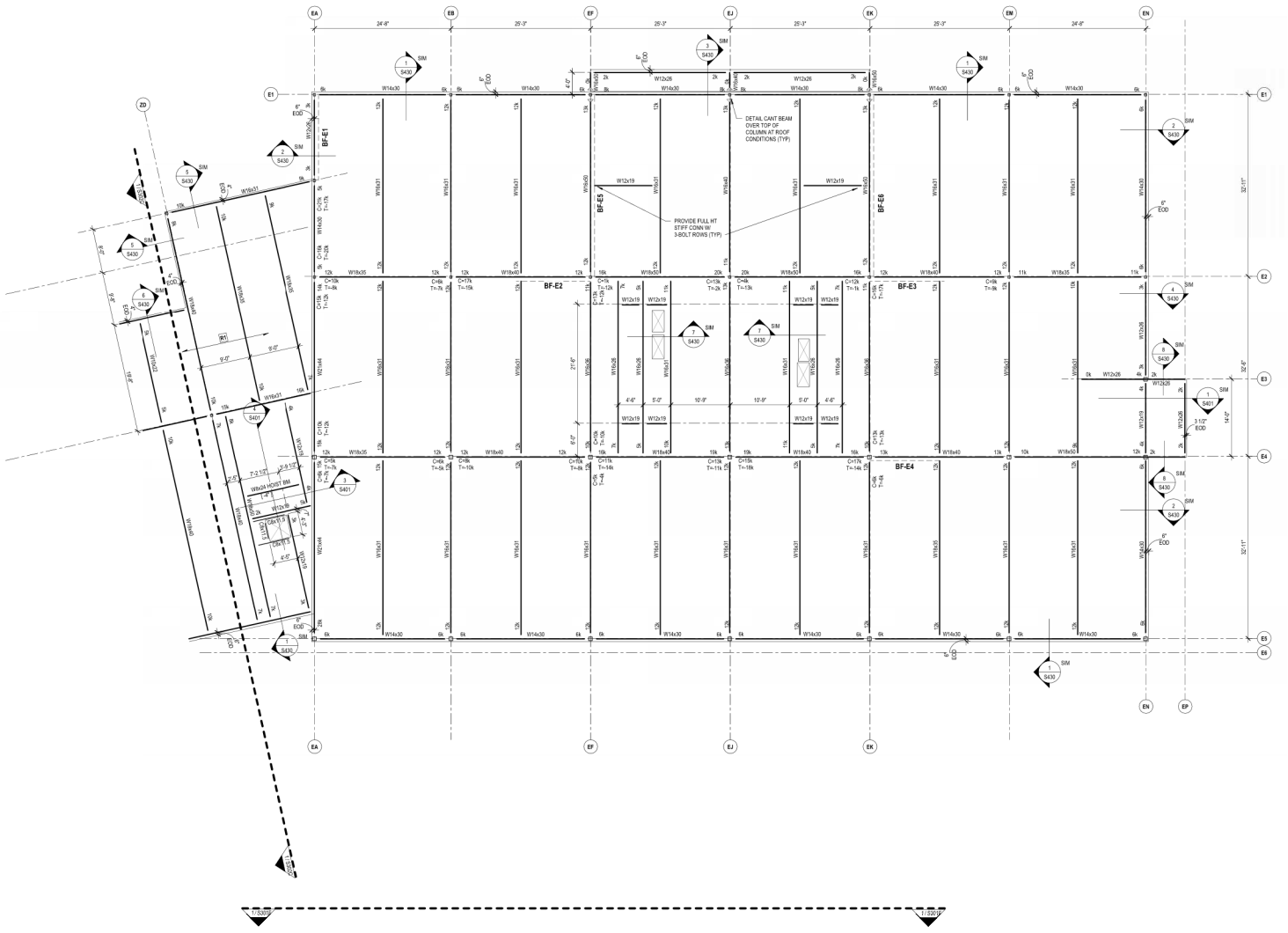

ROOF FRAMING PLAN NOTES

1. TOP OF STEEL REFERENCE ELEVATION IS +33'-0" FROM DATUM INDICATED ON FOUNDATION PLAN, UNLESS NOTED [#'-#"] INDICATING DISTANCE ABOVE OR BELOW REFERENCE ELEVATION.
2. ROOF CONSTRUCTION SHALL BE TYPE 'R1' UNLESS OTHERWISE NOTED.
3. ALL BEAMS ARE SPACED EVENLY BETWEEN COLUMN LINES UNLESS NOTED.
4. BEAM REACTIONS INDICATED ON FRAMING PLANS ARE UNFACTORED LOADS (ASD COMBINATIONS).
5. C= / T= INDICATES BEAM AXIAL LOADS DUE TO WIND OR SEISMIC FORCES WHICH CONNECTIONS SHALL BE DESIGNED FOR. AXIAL LOADS INDICATED HAVE ALREADY BEEN MULTIPLIED BY OVERSTRENGTH FACTOR = 3.0.
6. SEE DRAWING "S400" FOR TYPICAL FRAMING DETAILS.

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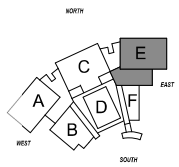

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

ROOF FRAMING PLAN - PART E

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00

Drawing Number: **S302E**

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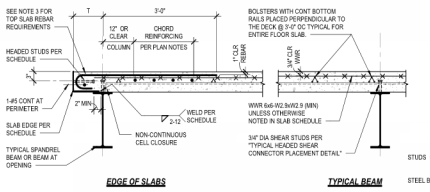
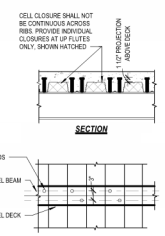


EDGE OF SLABS ***TYPICAL BEAM***

NOTES:

1. INSTALLATION OF FLOOR DECK SHALL BE DONE IN ACCORDANCE WITH THE SDI MANUAL OF CONSTRUCTION WITH STEEL DECK.
2. CONTRACTOR TO INCLUDE IN THEIR BID THE ADDITIONAL QUANTITY OF CONCRETE REQUIRED TO COMPENSATE FOR THE DEFLECTION OF BEAMS AND STEEL DECK.
3. TOP SLAB HOOKED REINFORCEMENT SHALL BE PROVIDED WHERE 'T' DIMENSION EXCEEDS 9". PROVIDE #5 @ 12" OC WHERE 'T' IS LESS THAN 20" **<16">** AND #5 @ 8" OC WHERE 'T' IS 20" TO 24" **<16" TO 20">**.
4. PROVIDE INDIVIDUAL CELL CLOSURES WHERE REQUIRED SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
5. SLAB EDGE TO EXTEND CONTINUOUS AROUND COLUMNS. PROVIDE SUPPORT AT FACE OF COLUMN.
6. REFER TO ARCHITECTURAL EDGE OF SLAB DRAWINGS FOR EDGE OF COMPOSITE CONCRETE SLAB.



SECTION ***PLAN***

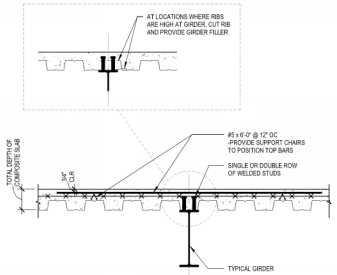
POUR STOP SCHEDULE

SLAB OVERHANG	PLATE THICKNESS	WELD SIZE
0"- <10"	12 GAGE	1/8"
10"- <12"	10 GAGE	1/8"
12"- <16"	3/16"	3/16"
16"- <19"	1/4"	3/16"
19"- <22"	5/16"	3/16"
22"-24"	3/8"	3/16"

BENT PLATE W/ HEADED STUDS SCHEDULE

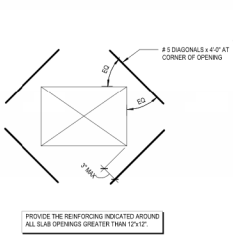
SLAB OVERHANG	BENT PLATE THICKNESS	HEADED STUDS	WELD SIZE
0"- <19"	1/4"	1/2"Ø x 0'-6" AT 16" OC	3/16"
19"- <22"	5/16"	1/2"Ø x 0'-6" AT 16" OC	3/16"
22"-24"	3/8"	1/2"Ø x 0'-6" AT 16" OC	3/16"

1 TYPICAL SLAB DETAILS
S400 NOT TO SCALE

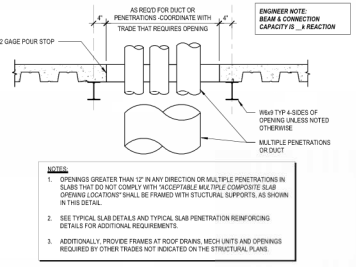


TYPICAL GIRDERS

2 COMPOSITE STEEL DECK PARALLEL TO BEAM
S400 NOT TO SCALE



3 TYPICAL SLAB REINFORCING AT OPENINGS
S400 NOT TO SCALE



4 TYPICAL SLAB OPENING AT COMPOSITE FLOOR
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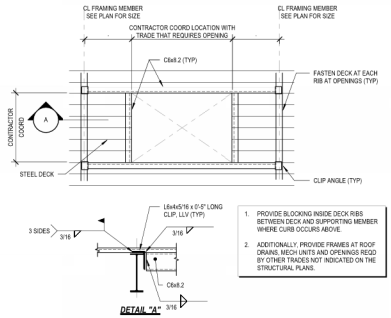
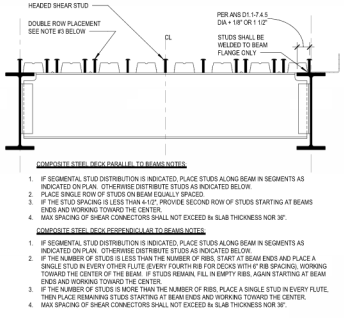
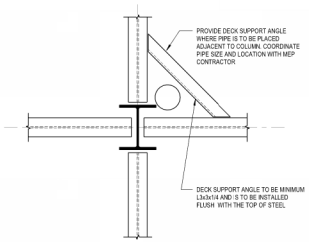


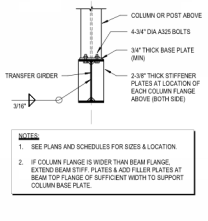
5 TYPICAL SUPPORT AT ROOF PENETRATION
S400 NOT TO SCALE



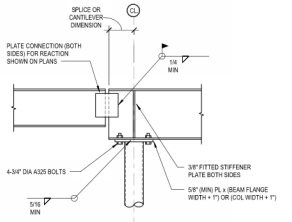
6 TYPICAL HEADED SHEAR CONNECTOR PLACEMENT DETAIL
S400 NOT TO SCALE



7 TYPICAL DECK SUPPORT AT COLUMN
S400 NOT TO SCALE



COLUMN TO TRANSFER GIRDER CONNECTION
S400 NOT TO SCALE



9 BEAM OVER COLUMN CONNECTION
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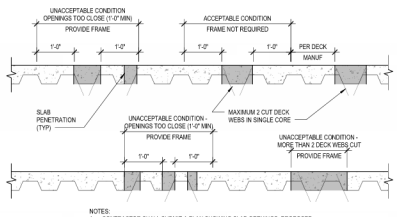
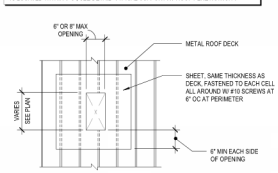


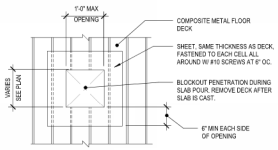
ACCEPTABLE MULTIPLE COMPOSITE SLAB OPENING LOCATIONS
S400 NOT TO SCALE

NOTES:
1. ALL ROOF PENETRATIONS SHALL BE PROVIDED TO ENGINEER FOR THEIR REVIEW.
2. OPENINGS EXCEEDING 6" FOR WIDE RIB AND 8" FOR DEEP RIB OR IF SECOND OPENING IS LOCATED WITHIN 3'-0", SEE DETAIL "TYPICAL SUPPORT AT ROOF PENETRATION".

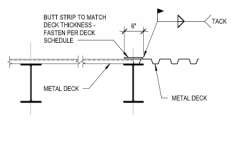


11 DETAIL FOR ROOF DECK OPENINGS
S400 NOT TO SCALE

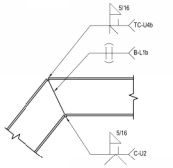
NOTES:
1. ALL SLAB PENETRATIONS SHALL BE PROVIDED TO ENGINEER FOR THEIR REVIEW.
2. OPENINGS IN SLABS GREATER THAN 12" IN ANY DIRECTION OR MULTIPLE OPENINGS THAT DO NOT COMPLY WITH SECTION "ACCEPTABLE MULTIPLE COMPOSITE SLAB OPENING LOCATIONS" SHALL BE FRAMED WITH STRUCTURAL SUPPORTS AS SHOWN IN SECTION "TYPICAL SLAB OPENINGS AT COMPOSITE FLOOR".



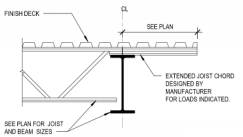
12 DETAIL FOR COMPOSITE FLOOR OPENINGS
S400 NOT TO SCALE



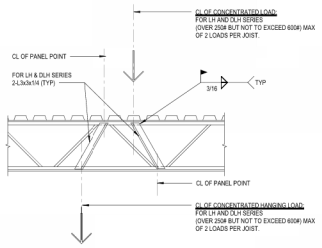
ROOF DECK SUPPORT AT SPAN DIRECTION CHANGE
S400 NOT TO SCALE



TYPICAL WELD AT BENT BEAMS
S400 NOT TO SCALE

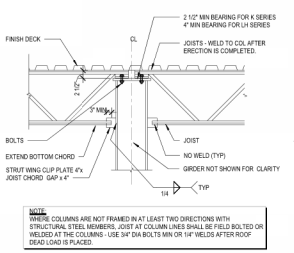


15 EXTENDED JOIST END
S400 NOT TO SCALE



THIS DETAIL APPLIES TO "LH" SERIES JOISTS

16 CONCENTRATED LOAD REINFORCING
S400 NOT TO SCALE



17 JOIST CONNECTION AT COLUMN
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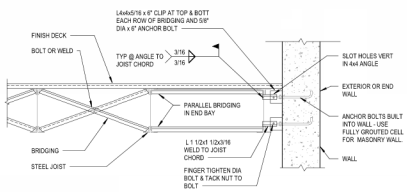

18 JOIST BRIDGING ANCHORAGE AT WALLS
S400 NOT TO SCALE

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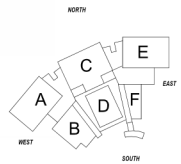

KEYPLAN

Number	Date	Issued For
	05/03/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

TYPICAL FRAMING DETAILS

Date: 07/08/2024
Scale: 3/4" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **S400**

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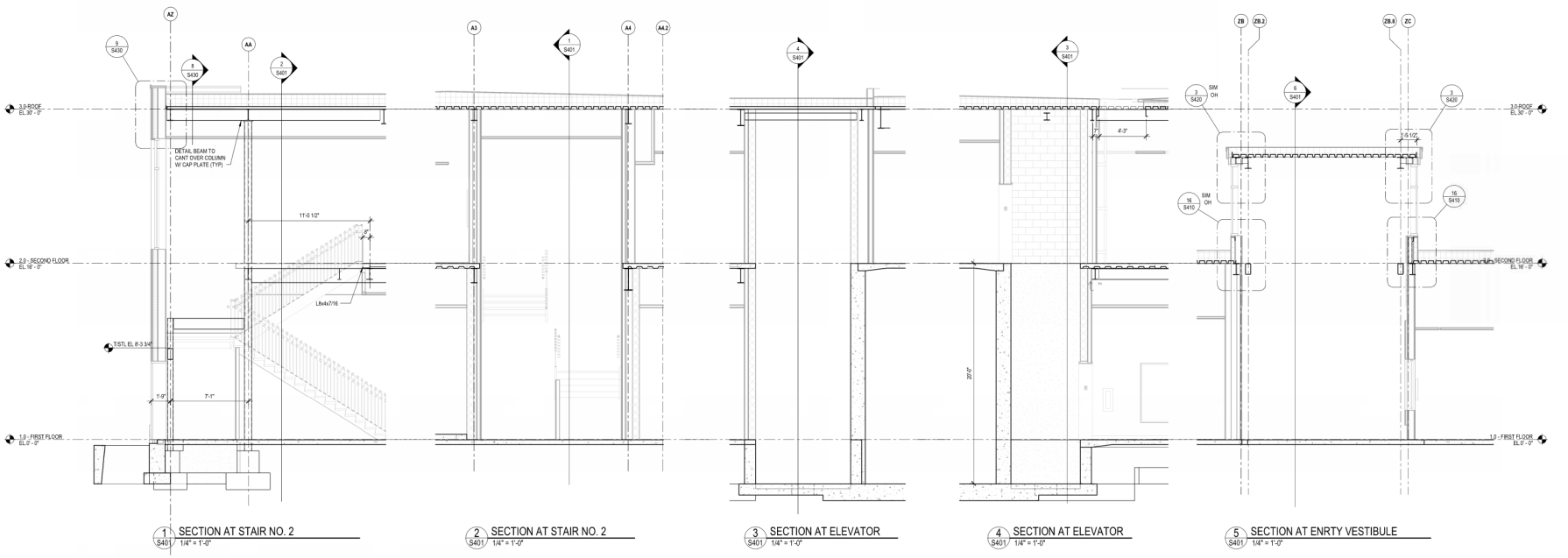

1 SECTION AT STAIR NO. 2
S401 1/4" = 1'-0"

2 SECTION AT STAIR NO. 2
S401 1/4" = 1'-0"

3 SECTION AT ELEVATOR
S401 1/4" = 1'-0"

4 SECTION AT ELEVATOR
S401 1/4" = 1'-0"

5 SECTION AT ENRTY VESTIBULE
S401 1/4" = 1'-0"

6 SECTION AT ENRTY VESTIBULE
S401 1/4" = 1'-0"

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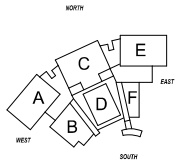

KEYPLAN

Number	Date	Issued For
	05/03/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

BUILDING SECTIONS

Date
07/08/2024
Scale
1/4" = 1'-0"
Proj. Number
22367.00

Drawing Number
S401

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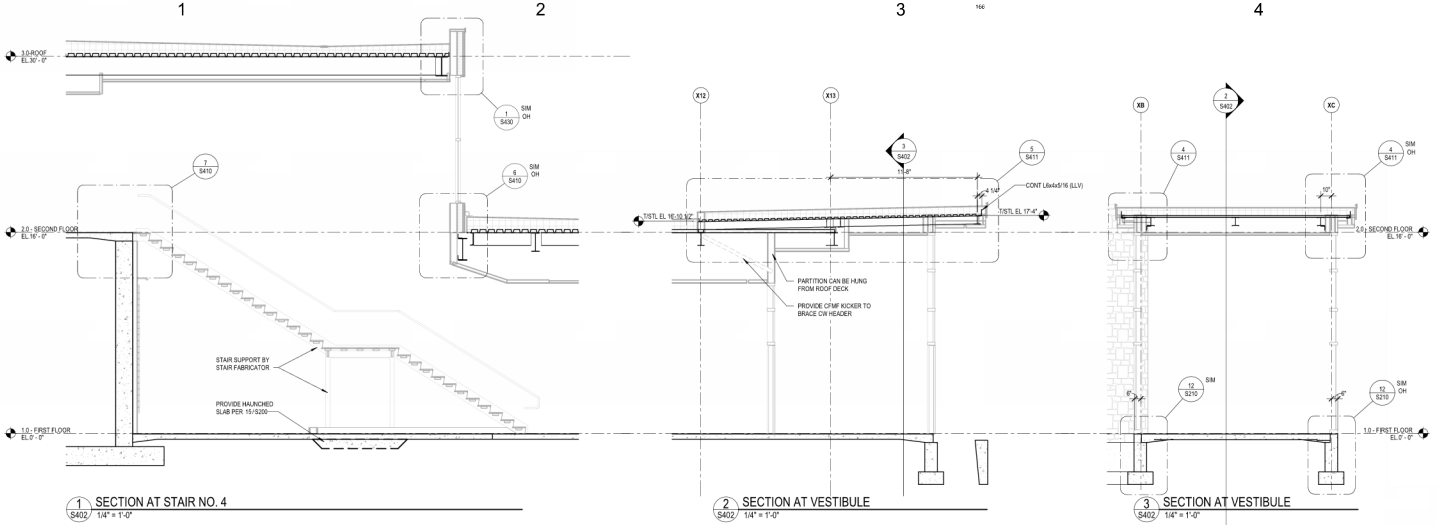

1 SECTION AT STAIR NO. 4
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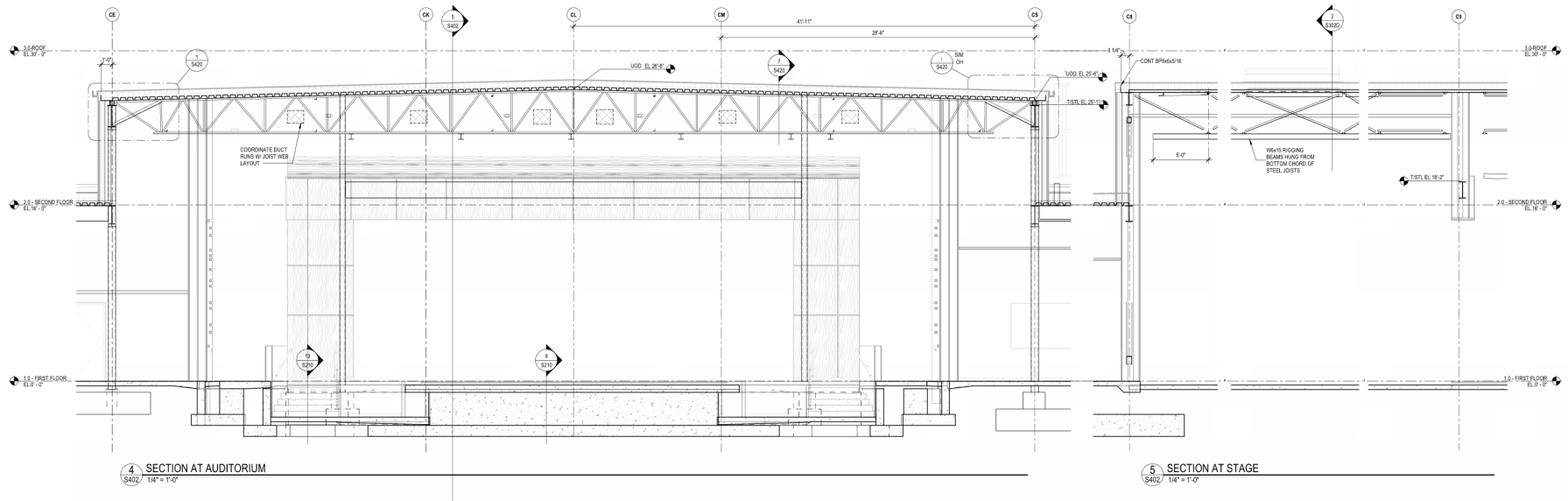
2 SECTION AT VESTIBULE
S402 1/4" = 1'-0"

3 SECTION AT VESTIBULE
S402 1/4" = 1'-0"



4 SECTION AT AUDITORIUM
S402 1/4" = 1'-0"

5 SECTION AT STAGE
S402 1/4" = 1'-0"

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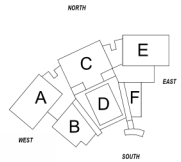

KEYPLAN

Number	Date	Issued For
	05/03/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

BUILDING SECTIONS

Date 07/08/2024
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Proj. Number 22367.00
Drawing Number **S402**

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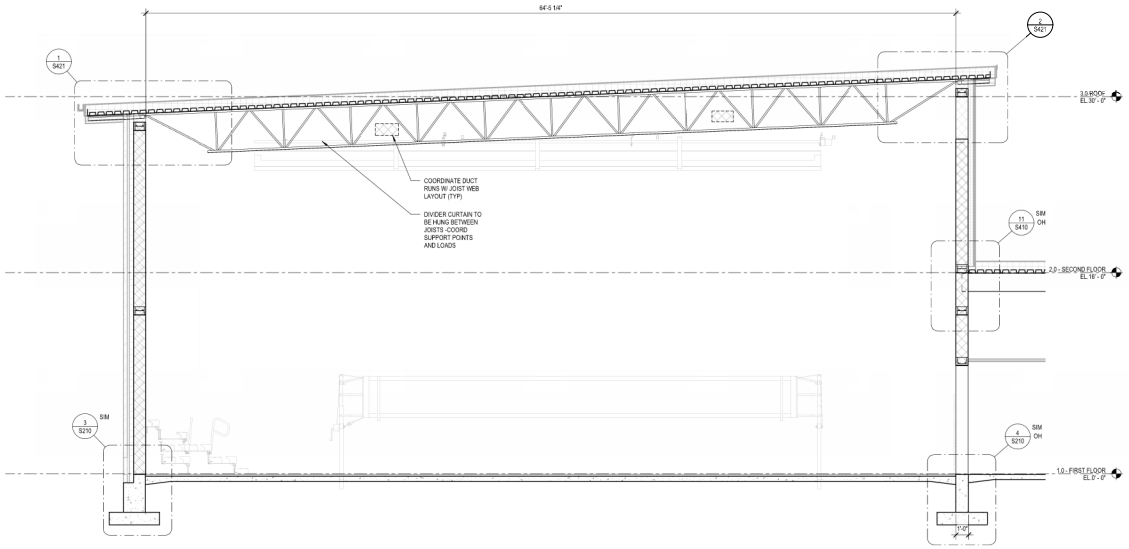

1 S403 SECTION AT GYMNASIUM
1/4" = 1'-0"

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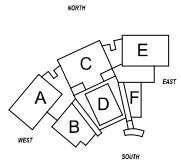

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Number	Date	Issued For
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	07/08/2024	PHASE 2

BUILDING SECTIONS

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07/08/2024
Scale
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Proj. Number
22367.00

Drawing Number
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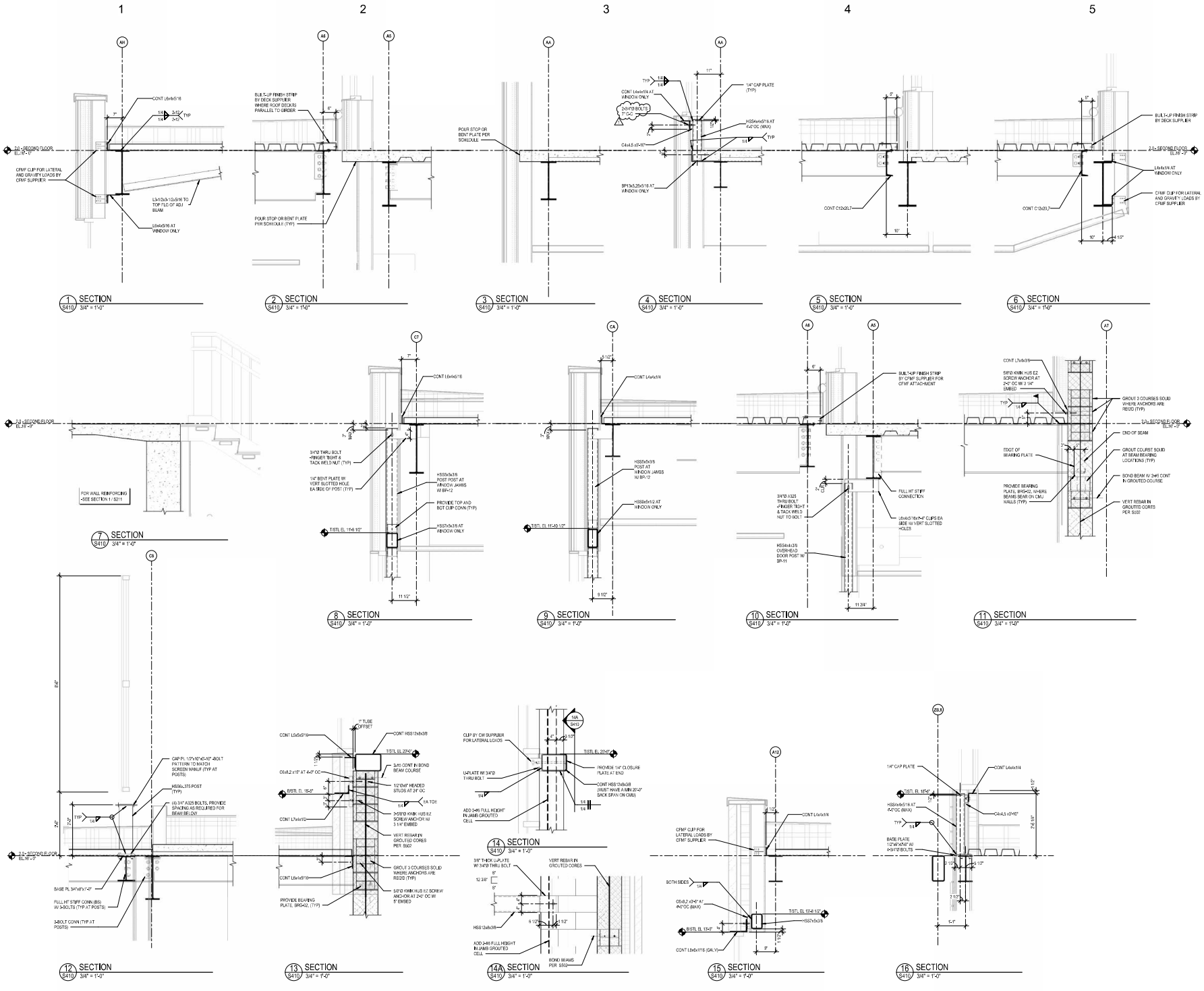

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EAST
WEST
SOUTH

KEYPLAN

Number	Date	Issued For
1	10/30/2024	ADDENDUM NO. 4
	09/20/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

FRAMING DETAILS

Date 07/08/2024
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Proj. Number 22367.00
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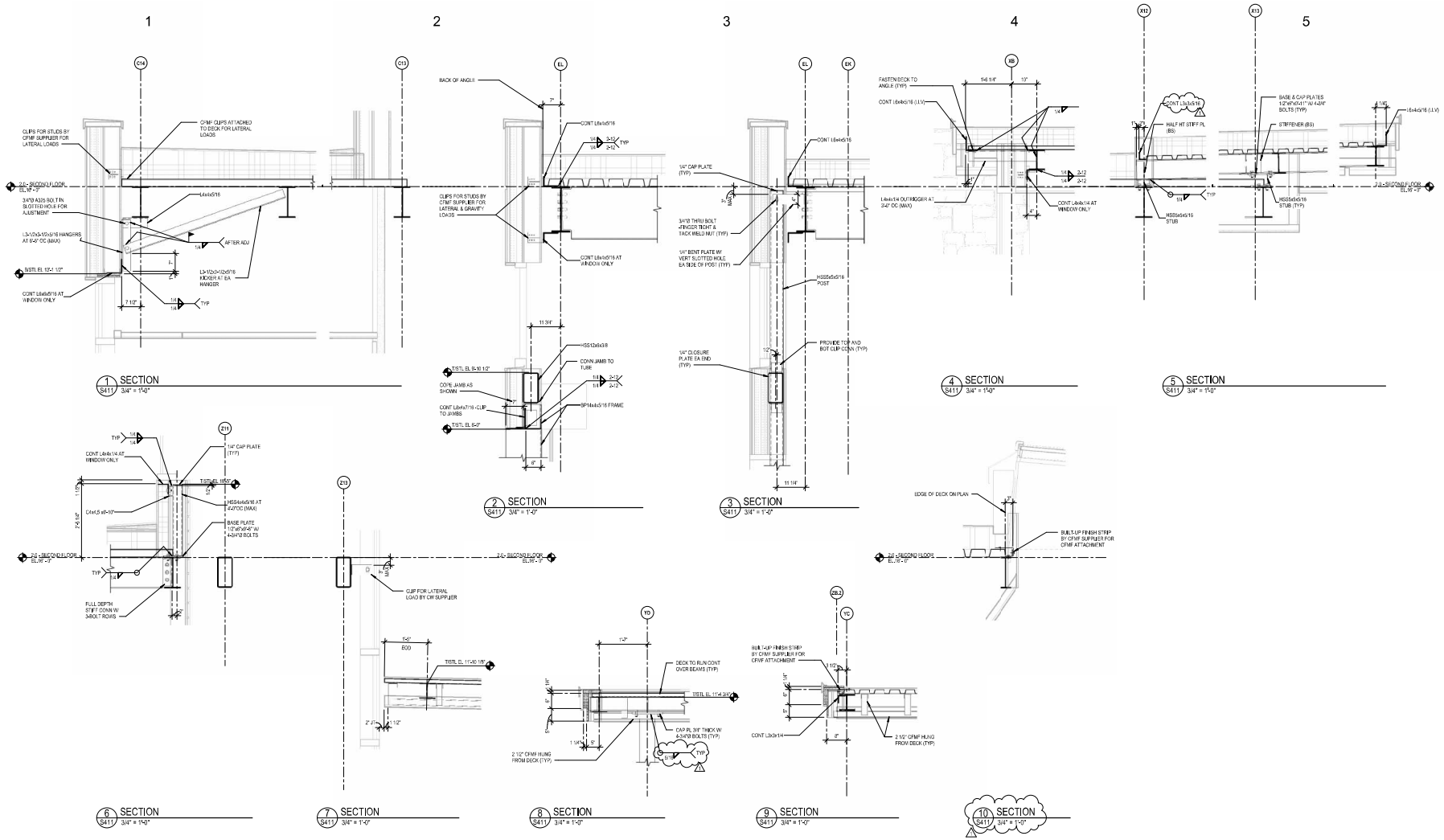

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KEYPLAN

Number	Date	Issued For
1	10/30/2024	ADDENDUM NO. 4
	09/20/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

FRAMING DETAILS

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Proj. Number: 22367.00
Drawing Number: S411

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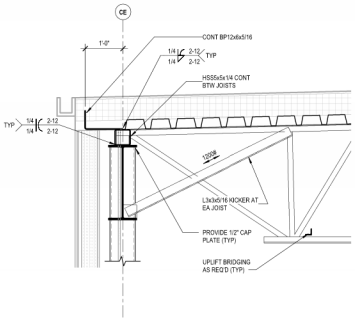
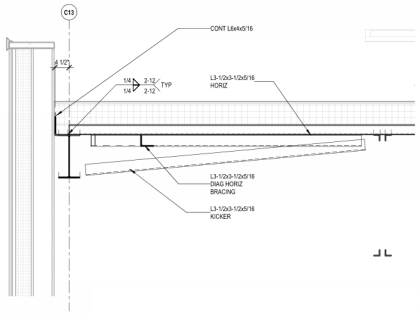


1 S420 SECTION 3/4" = 1'-0"



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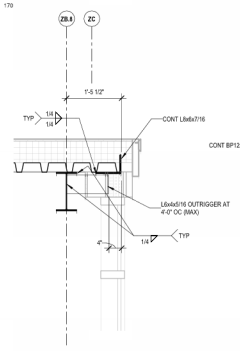
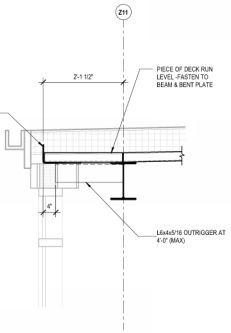
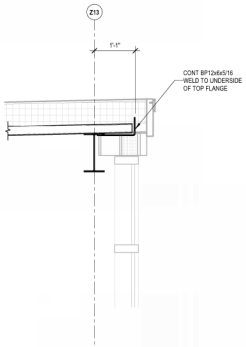


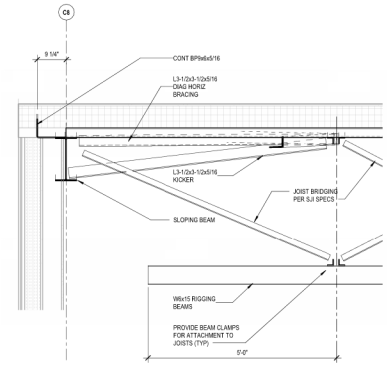
3 S420 SECTION 3/4" = 1'-0"



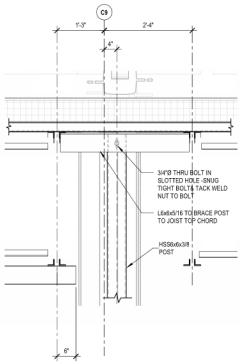
4 S420 SECTION 3/4" = 1'-0"



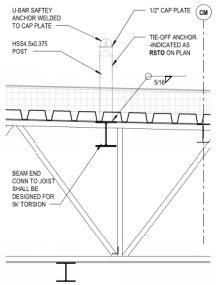
5 S420 SECTION 3/4" = 1'-0"



6 S420 SECTION 3/4" = 1'-0"



7 S420 SECTION 3/4" = 1'-0"



8 S420 SECTION 3/4" = 1'-0"

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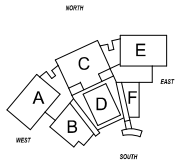

KEYPLAN

Number	Date	Issued For
	05/30/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

FRAMING DETAILS

Date 07/08/2024
Scale 3/4" = 1'-0"
Proj. Number 22367.00
Drawing Number **S420**

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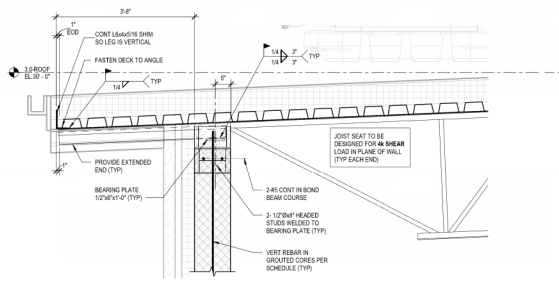
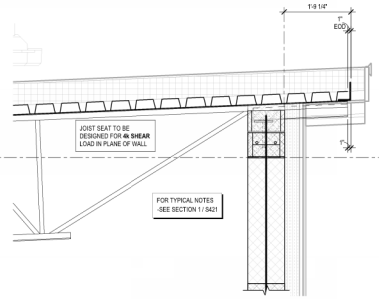
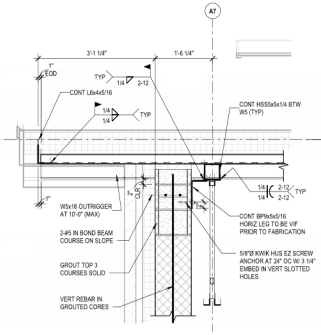


1 SECTION
S421 3/4" = 1'-0"



2 SECTION
S421 3/4" = 1'-0"



3 SECTION
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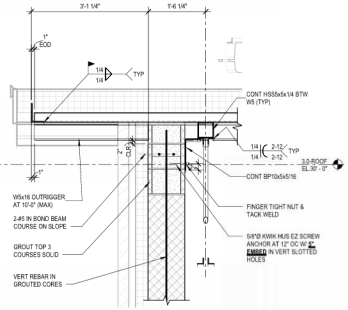

4 SECTION
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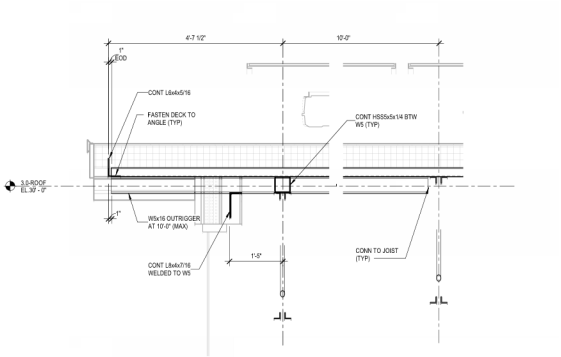

5 SECTION
S421 3/4" = 1'-0"

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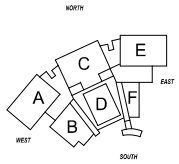

KEYPLAN

Number	Date	Issued For
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	07/08/2024	PHASE 2

FRAMING DETAILS

Date
07/08/2024
Scale
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Proj. Number
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Drawing Number
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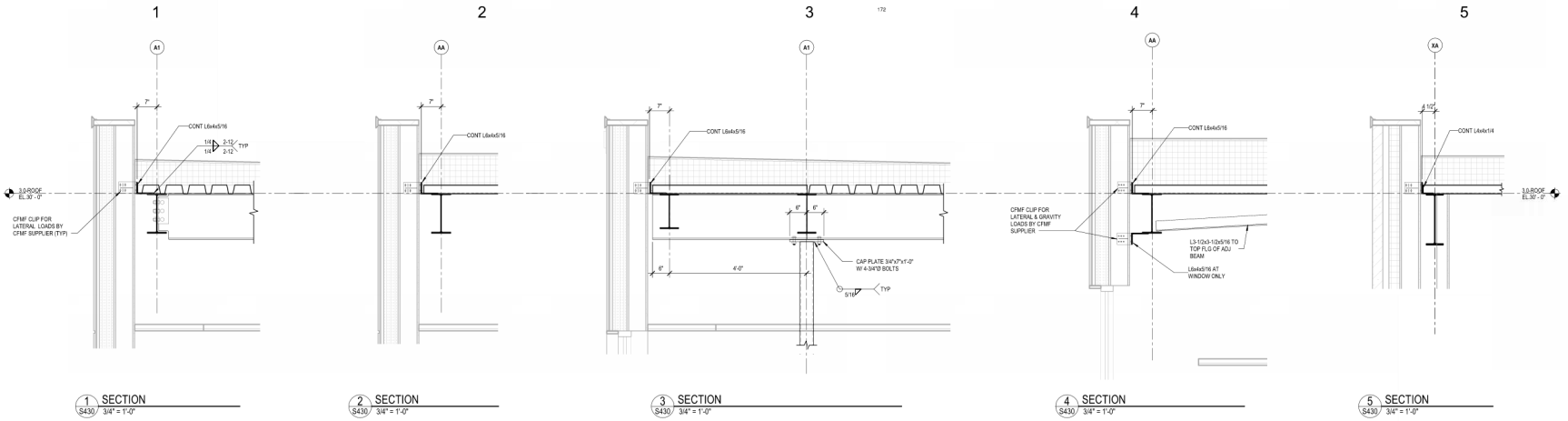


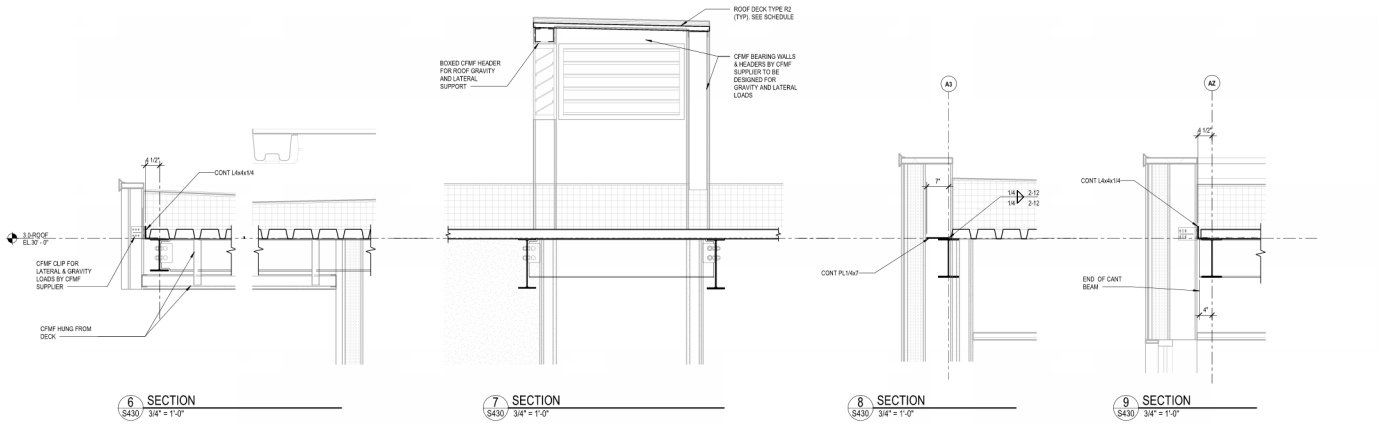
1 SECTION S430 3/4" = 1'-0"

2 SECTION S430 3/4" = 1'-0"

3 SECTION S430 3/4" = 1'-0"

4 SECTION S430 3/4" = 1'-0"

5 SECTION S430 3/4" = 1'-0"



6 SECTION S430 3/4" = 1'-0"

7 SECTION S430 3/4" = 1'-0"

8 SECTION S430 3/4" = 1'-0"

9 SECTION S430 3/4" = 1'-0"

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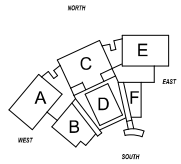

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

FRAMING DETAILS

Date 07/08/2024
Scale 3/4" = 1'-0"
Proj. Number 22367.00

Drawing Number **S430**

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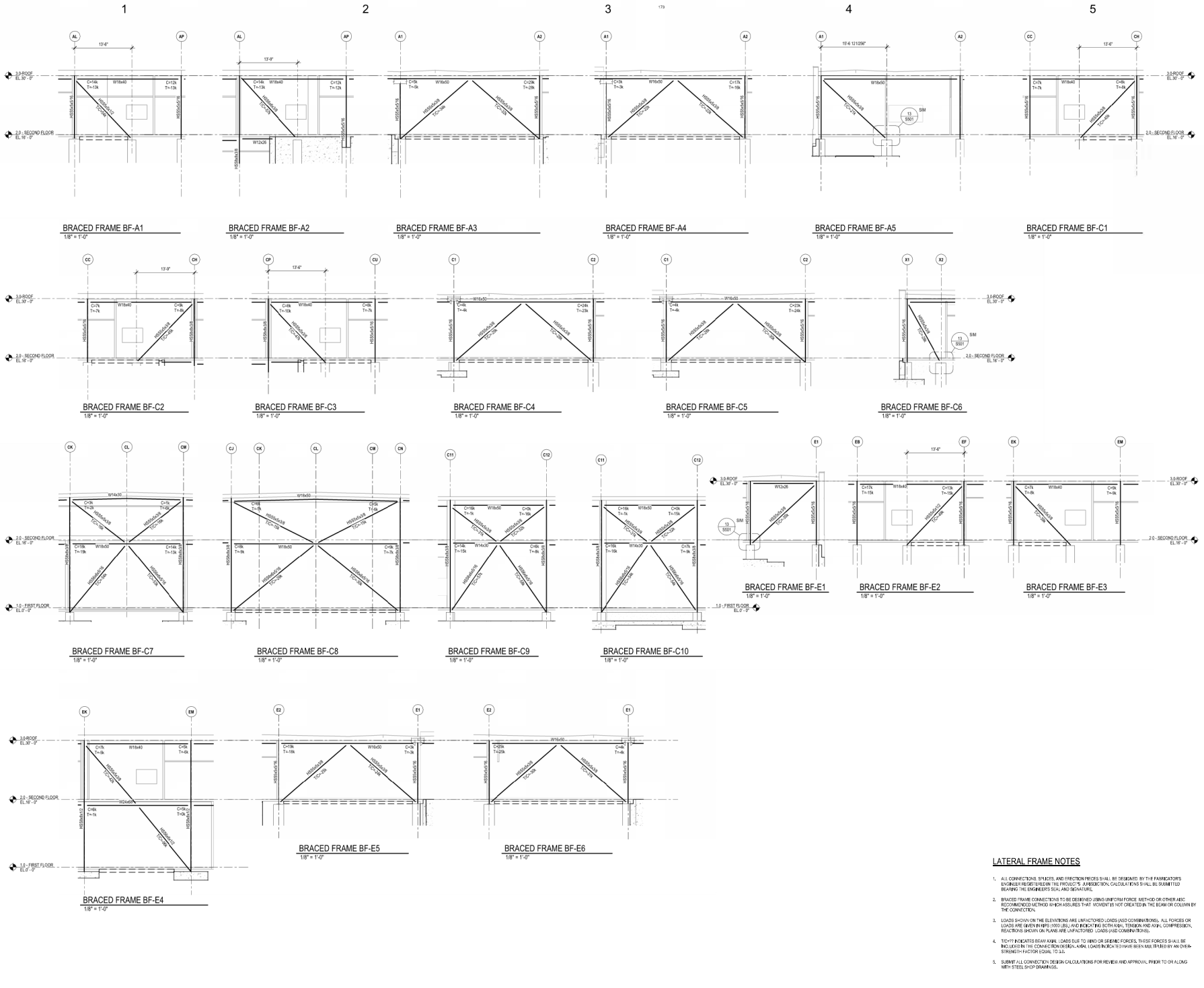

LATERAL FRAME NOTES

1. ALL CONNECTIONS, SPLICES, AND ERECTION PIECES SHALL BE DESIGNED BY THE FABRICATOR'S ENGINEER REGISTERED IN THE PROJECT'S JURISDICTION. CALCULATIONS SHALL BE SUBMITTED BEARING THE ENGINEER'S SEAL AND SIGNATURE.
2. BRACED FRAME CONNECTIONS TO BE DESIGNED USING UNIFORM FORCE METHOD OR OTHER AISC RECOMMENDED METHOD WHICH ASSURES THAT MOMENT IS NOT CREATED IN THE BEAM OR COLUMN BY THE CONNECTION.
3. LOADS SHOWN ON THE ELEVATIONS ARE UNFACTORED LOADS (ASD COMBINATIONS). ALL FORCES OR LOADS ARE GIVEN IN KIPS (1000 LBS.) AND INDICATING BOTH AXIAL TENSION AND AXIAL COMPRESSION. REACTIONS SHOWN ON PLANS ARE UNFACTORED LOADS (ASD COMBINATIONS).
4. T/C=T7 INDICATES BEAM AXIAL LOADS DUE TO WIND OR SEISMIC FORCES. THESE FORCES SHALL BE INCLUDED IN THE CONNECTION DESIGN. AXIAL LOADS INDICATED HAVE BEEN MULTIPLIED BY AN OVER-STRENGTH FACTOR EQUAL TO 2.0.
5. SUBMIT ALL CONNECTION DESIGN CALCULATIONS FOR REVIEW AND APPROVAL PRIOR TO OR ALONG WITH STEEL SHOP DRAWINGS.

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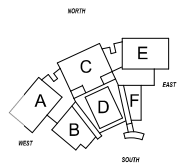

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

LATERAL FRAME ELEVATIONS

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **S500**

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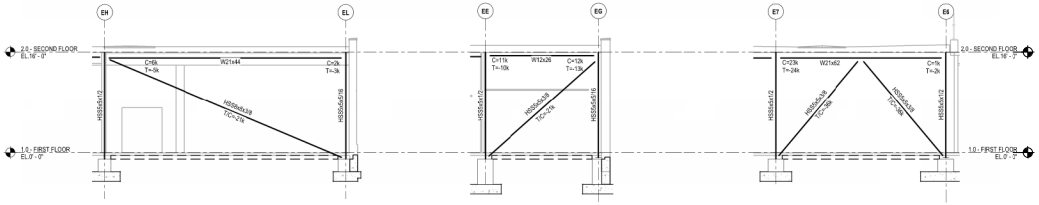
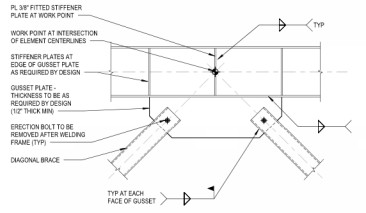


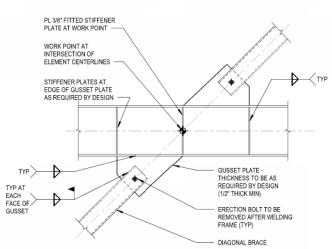
BRACED FRAME BF-E7
1/8" = 1'-0"

BRACED FRAME BF-E8
1/8" = 1'-0"

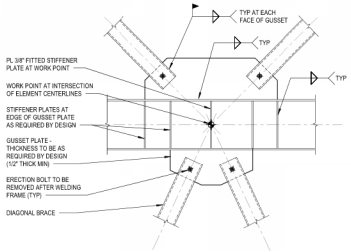
BRACE FRAME BF-E9
1/8" = 1'-0"



5 S501 TYPICAL HSS BRACE TO BEAM CONNECTION
NOT TO SCALE



6 S501 TYPICAL HSS BRACE TO BEAM THROUGH CONNECTION
NOT TO SCALE



7 S501 TYPICAL HSS BRACE TO BEAM THROUGH CONNECTION
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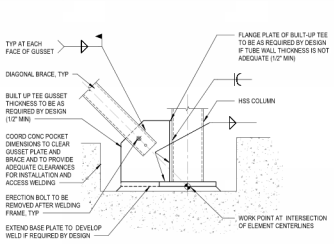
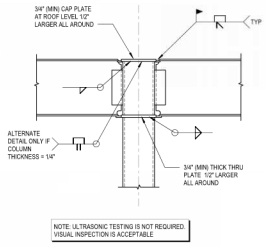
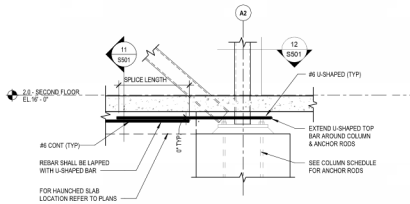


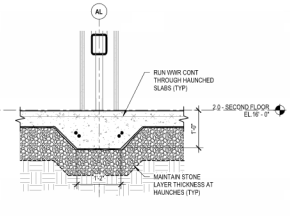
8 S501 TYPICAL HSS BRACE TO COLUMN BASE CONNECTION
NOT TO SCALE



9 S501 TYPICAL MOMENT CONNECTION DETAIL
NOT TO SCALE



10 S501 SECTION
3/4" = 1'-0"



11 S501 SECTION
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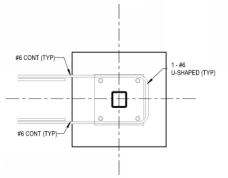
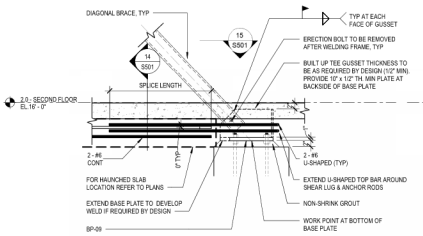


12 S501 PLAN DETAIL
3/4" = 1'-0"



13 S501 TYPICAL HSS BRACE TO PIER CONNECTION
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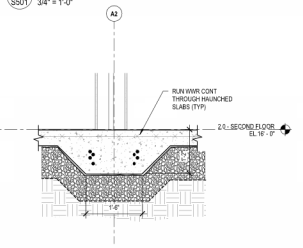

14 S501 SECTION
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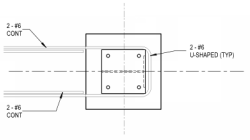

15 S501 PLAN DETAIL
3/4" = 1'-0"

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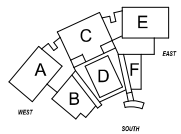

KEYPLAN

Number	Date	Issued For
	05/03/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

LATERAL FRAME ELEVATIONS AND DETAILS

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: **S501**

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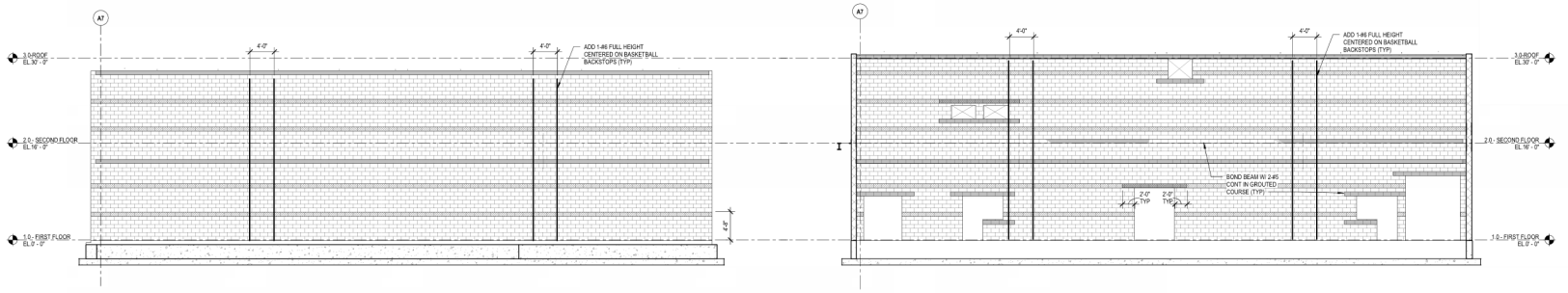
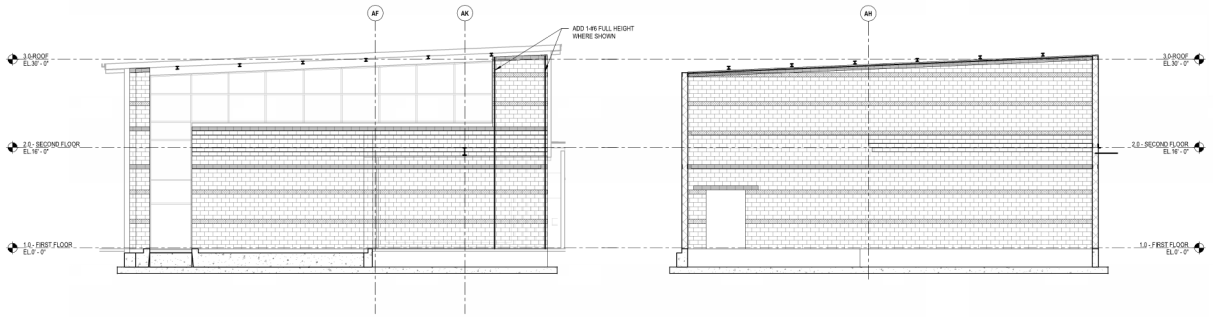


SHEAR WALL SW-01
1/8" = 1'-0"

SHEAR WALL SW-02
1/8" = 1'-0"



SHEAR WALL SW-03
1/8" = 1'-0"

SHEAR WALL SW-04
1/8" = 1'-0"

SHEAR WALL SCHEDULE

Mark	Typ Horizontal Reinforcing	Typ Vertical Reinforcing	Vertical Chord Reinforcement	Additional Bond Beams & Reinf	Qty of Anchors at TOW
SW-01	JOINT REINFORCING AT 16" OC	#5 AT 24" OC	N/A	AS NOTED IN ELEVATIONS	
SW-02	JOINT REINFORCING AT 16" OC	#5 AT 24" OC	N/A	AS NOTED IN ELEVATIONS	
SW-03	JOINT REINFORCING AT 16" OC	#5 AT 24" OC	N/A	AS NOTED IN ELEVATIONS	
SW-03	JOINT REINFORCING AT 16" OC	#5 AT 24" OC	N/A	AS NOTED IN ELEVATIONS	
SW-04	JOINT REINFORCING AT 16" OC	#5 AT 24" OC	N/A	AS NOTED IN ELEVATIONS	

1. IN ADDITION TO THE REINFORCING INDICATED ABOVE, PROVIDE ONE ADDITIONAL VERT #5 AT CORNERS, WITHIN 16" OF EACH SIDE OF OPENINGS AND WITHIN 8" OF THE ENDS OF WALLS.

TYPICAL BOND BEAMS WITH 2-#5 CONTINUOUS AT 4'-0" OC

ADDITIONAL BOND BEAMS WITH 2-#5 CONTINUOUS

SHEAR WALL STEEL REINFORCING EMBEDMENT + LAP LENGTH SCHEDULE

REBAR	MIN EMBED AND LAP LENGTH
#5	30"
#6	36"
#7	42"
#8	48"

SHEAR WALL NOTES

1. CONTRACTORS SHALL PROVIDE TEMPORARY SHORING AT MASONRY LINTELS UNTIL GROUT AND MORTAR REACH THEIR DESIGN STRENGTH.
2. ALL WALL SECTIONS AND PIERS LESS THAN 4 SQUARE FEET IN CROSS-SECTIONAL AREA TO BE FULLY GROUTED.
3. NO OPENINGS OTHER THAN THOSE INDICATED ON CONSTRUCTION DOCUMENTS (S502 DRAWINGS) SHALL BE PLACED IN ANY SHEAR WALL UNLESS APPROVED BY THE STRUCTURAL ENGINEER.
4. ALL MASONRY REINFORCING SHALL BE FULLY SPLICED OR DEVELOPED IN GROUTED MASONRY PER THE DIMENSIONS PROVIDED ON THE MASONRY REINFORCING STEEL SPLICE LENGTH SCHEDULE. ALL NON-CONTACT SPLICES WHERE VERTICAL WALL REINFORCING IS BEING LAPPED WITH REINFORCING IN AN ADJACENT CELL SHALL BE 48 INCHES LONG MINIMUM.
5. VERTICAL REINFORCEMENT IN MASONRY SHEAR WALLS SHALL BE EMBEDDED 24" IN THE SUPPORTING CONCRETE.
6. ALL REINFORCED MASONRY OTHER THAN PARTITION WALLS SHALL HAVE A CONTINUOUS REINFORCED BOND BEAM DIRECTLY UNDER THE STEEL ROOF BEAMS.
7. PROVIDE VERTICAL REINFORCEMENT BARS IN SHEAR WALLS ACCORDING TO REINFORCEMENT SHOWN IN SCHEDULE ON S502.

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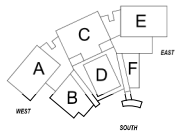
NORTH



KEYPLAN

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SHEAR WALL ELEVATIONS AND DETAILS

Date
07/08/2024
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Drawing Number
S502

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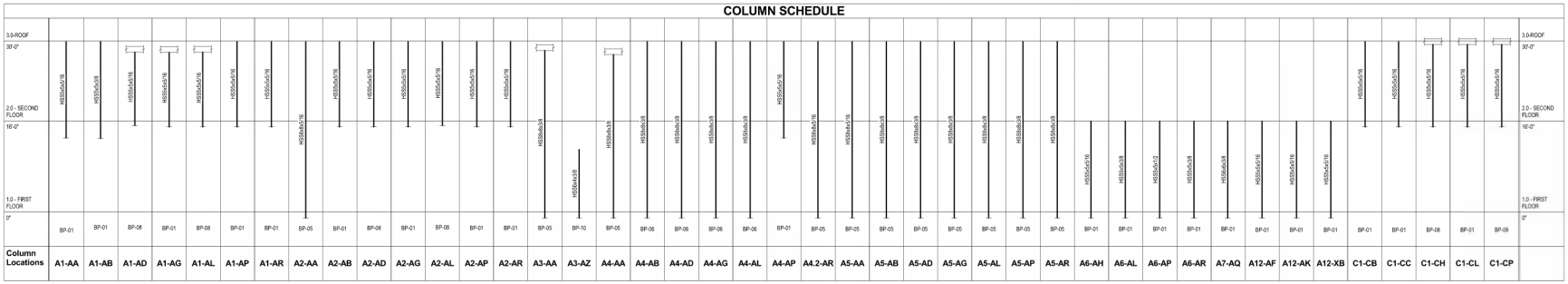
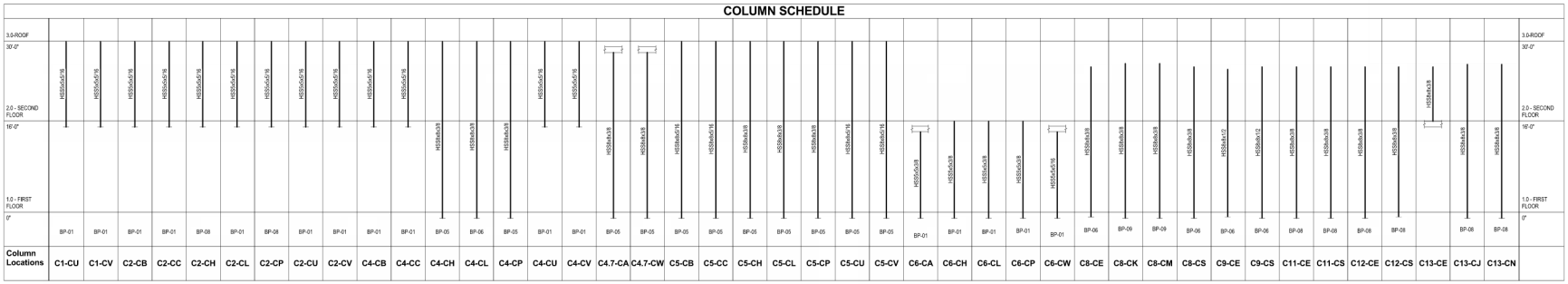
COLUMN SCHEDULE



Column Locations	A1-AA	A1-AB	A1-AD	A1-AG	A1-AL	A1-AP	A1-AR	A2-AA	A2-AB	A2-AD	A2-AG	A2-AL	A2-AP	A2-AR	A3-AA	A3-AZ	A4-AA	A4-AB	A4-AD	A4-AG	A4-AL	A4-AP	A4.2-AR	A5-AA	A5-AB	A5-AD	A5-AG	A5-AL	A5-AP	A5-AR	A6-AH	A6-AL	A6-AP	A6-AR	A7-AQ	A12-AF	A12-AK	A12-XB	C1-CB	C1-CC	C1-CH	C1-CL	C1-CP
	BP-01	BP-01	BP-08	BP-01	BP-08	BP-01	BP-01	BP-05	BP-01	BP-08	BP-01	BP-08	BP-01	BP-01	BP-05	BP-10	BP-05	BP-06	BP-06	BP-06	BP-06	BP-01	BP-05	BP-05	BP-05	BP-05	BP-05	BP-05	BP-05	BP-05	BP-01	BP-01	BP-01	BP-01	BP-01	BP-01	BP-01	BP-01	BP-01	BP-01	BP-08	BP-01	BP-08

COLUMN SCHEDULE



Column Locations	C1-CU	C1-CV	C2-CB	C2-CC	C2-CH	C2-CL	C2-CP	C2-CU	C2-CV	C4-CB	C4-CC	C4-CH	C4-CL	C4-CP	C4-CU	C4-CV	C4.7-CA	C4.7-CW	C5-CB	C5-CC	C5-CH	C5-CL	C5-CP	C5-CU	C5-CV	C6-CA	C6-CH	C6-CL	C6-CP	C6-CW	C8-CE	C8-CK	C8-CM	C8-CS	C9-CE	C9-CS	C11-CE	C11-CS	C12-CE	C12-CS	C13-CE	C13-CJ	C13-CN
	BP-01	BP-01	BP-01	BP-01	BP-08	BP-01	BP-08	BP-01	BP-01	BP-01	BP-01	BP-05	BP-06	BP-05	BP-01	BP-01	BP-05	BP-05	BP-05	BP-05	BP-05	BP-05	BP-05	BP-05	BP-05	BP-01	BP-01	BP-01	BP-01	BP-01	BP-06	BP-09	BP-09	BP-06	BP-06	BP-06	BP-08	BP-08	BP-08	BP-08		BP-08	BP-08

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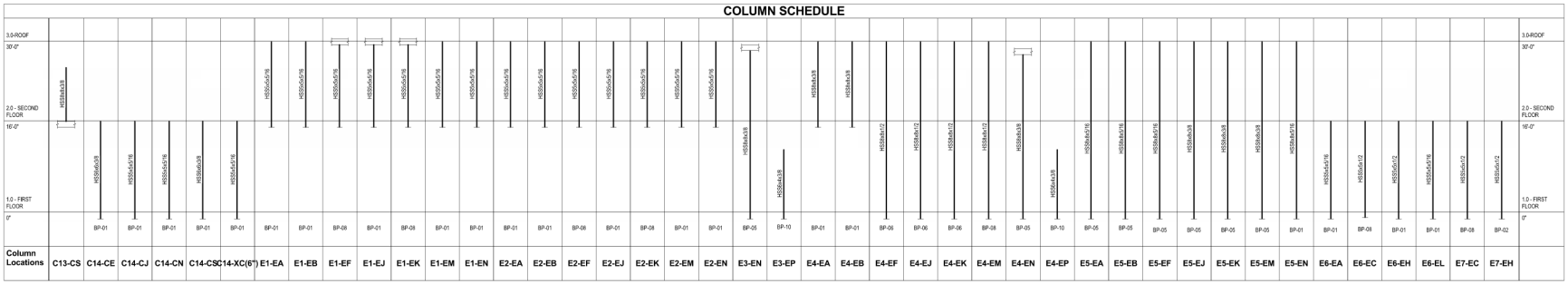

Column Locations	C13-CS	C14-CE	C14-CJ	C14-CN	C14-CS	C14-XC(6")	E1-EA	E1-EB	E1-EF	E1-EJ	E1-EK	E1-EM	E1-EN	E2-EA	E2-EB	E2-EF	E2-EJ	E2-EK	E2-EM	E2-EN	E3-EN	E3-EP	E4-EA	E4-EB	E4-EF	E4-EJ	E4-EK	E4-EM	E4-EN	E4-EP	E5-EA	E5-EB	E5-EF	E5-EJ	E5-EK	E5-EM	E5-EN	E6-EA	E6-EC	E6-EH	E6-EL	E7-EC	E7-EH
		BP-01	BP-01	BP-01	BP-01	BP-01	BP-01	BP-01	BP-08	BP-01	BP-08	BP-01	BP-01	BP-01	BP-01	BP-06	BP-01	BP-08	BP-01	BP-01	BP-05	BP-10	BP-01	BP-01	BP-06	BP-06	BP-06	BP-08	BP-05	BP-10	BP-05	BP-05	BP-05	BP-05	BP-05	BP-05	BP-01	BP-01	BP-08	BP-01	BP-01	BP-08	BP-02

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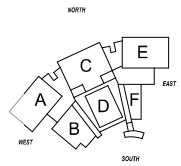

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

COLUMN SCHEDULE

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: S600

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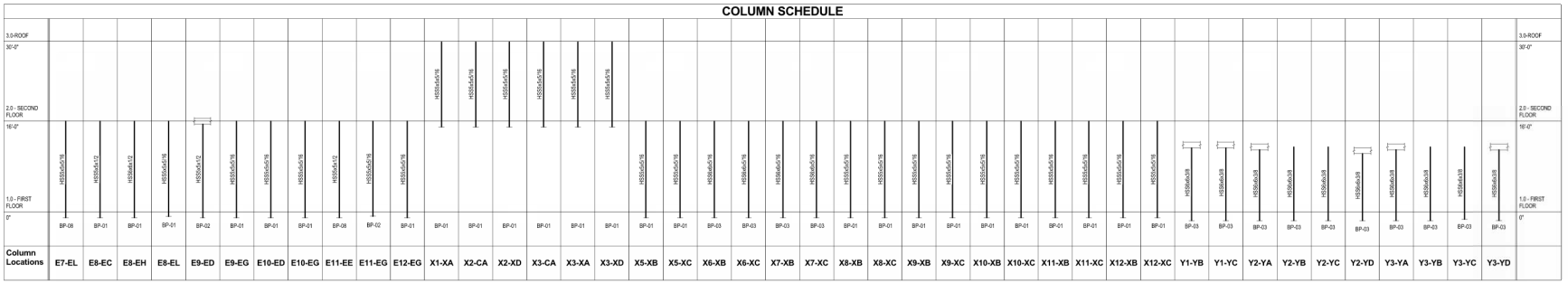

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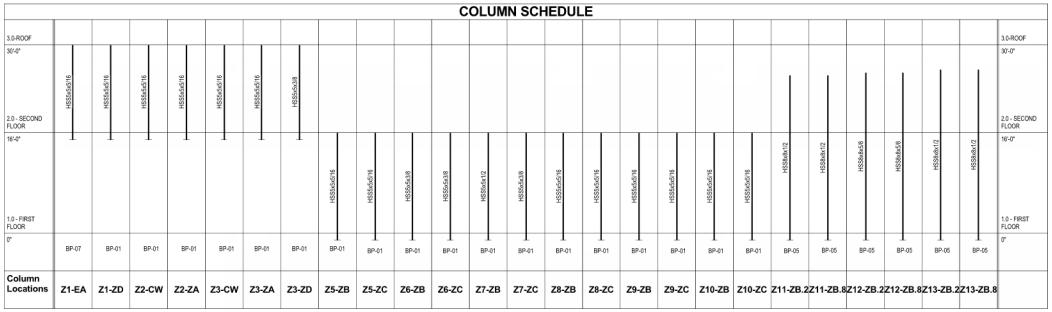

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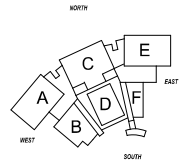

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

COLUMN SCHEDULE

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00

Drawing Number: S601

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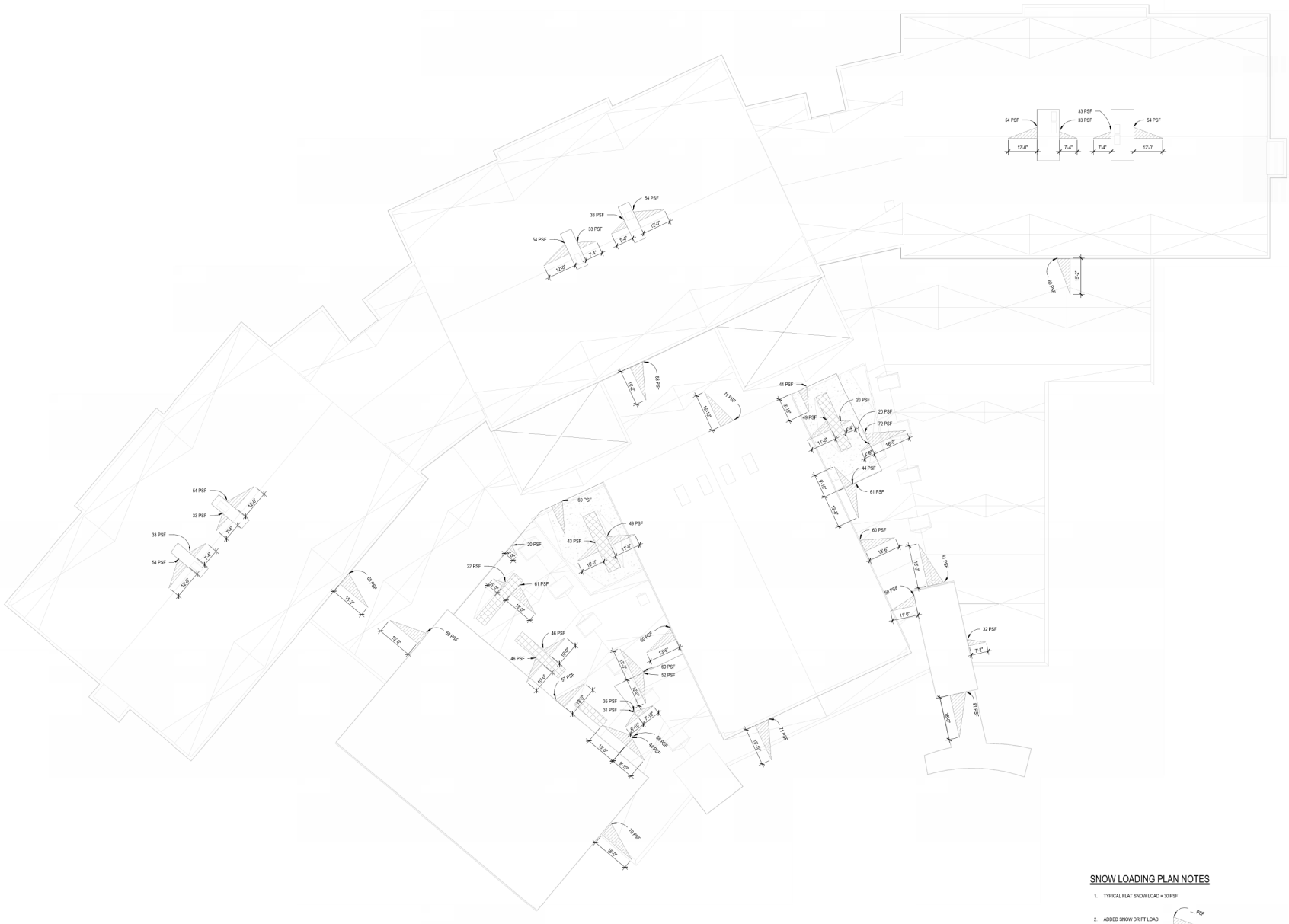

SNOW LOADING PLAN NOTES

1. TYPICAL FLAT SNOW LOAD = 30 PSF
2. ADDED SNOW DRIFT LOAD



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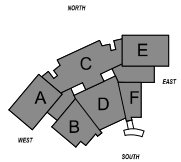

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

SNOW DRIFT LOADING PLAN

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: **S700**

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AREA 1

Components and cladding pressures - Wall (Table 30.3-1)

Component	Zone	Length (ft)	Width (ft)	Eff... (ft2)	+GCp	-GCp	Pres (+ve) (psf)	Pres (-ve) (psf)
<=10 sf	4	-	-	10	0,9	-1,99	27,8	-36,1
50 sf	4	-	-	50	0,79	-1,85	24,9	-37,3
200 sf	4	-	-	200	0,69	-1,78	22,5	-24,8
>500 sf	4	-	-	500,1	0,63	-1,72	21,9	-23,2
<=10 sf	5	-	-	10	0,9	-1,26	27,8	-37,1
50 sf	5	-	-	50	0,79	-1,04	24,9	-31,3
200 sf	5	-	-	200	0,69	-1,05	22,5	-28,4
>500 sf	5	-	-	500,1	0,63	-0,72	21,9	-23,2

DATA FOR WALL

Components and cladding pressures - Roof (Figure 30.3-2A)

Component	Zone	Length (ft)	Width (ft)	Eff... (ft2)	+GCp	-GCp	Pres (+ve) (psf)	Pres (-ve) (psf)
<=10 sf	1	-	-	10	0,3	-1,7	12,4	-48,4
100 sf	1	-	-	100	0,2	-1,29	9,8	-37,8
200 sf	1	-	-	200	0,2	-1,16	9,8	-34,6
>500 sf	1	-	-	500,1	0,2	-1	9,8	-30,4
<=10 sf	1'	-	-	10	0,3	0	12,4	-4,8
100 sf	1'	-	-	100	0,2	0	9,8	-4,8
500 sf	1'	-	-	500	0,2	0	9,8	-4,8
>1000 sf	1'	-	-	1000,1	0,2	0	9,8	-4,8
<=10 sf	2	-	-	10	0,3	-2,3	12,4	-63,8
100 sf	2	-	-	100	0,2	-1,77	9,8	-50,2
200 sf	2	-	-	200	0,2	-1,61	9,8	-46,1
>500 sf	2	-	-	500,1	0,2	-1,4	9,8	-40,7
<=10 sf	3	-	-	10	0,3	-1,7	12,4	-47
100 sf	3	-	-	100	0,2	-2,14	9,8	-59,7
200 sf	3	-	-	200	0,2	-1,82	9,8	-51,5
>500 sf	3	-	-	500,1	0,2	-1,4	9,8	-40,7

DATA FOR ROOF

AREA 3

Components and cladding pressures - Wall (Table 30.3-1)

Component	Zone	Length (ft)	Width (ft)	Eff... (ft2)	+GCp	-GCp	Pres (+ve) (psf)	Pres (-ve) (psf)
<=10 sf	4	-	-	10	0,9	-1,99	26,8	-31,2
50 sf	4	-	-	50	0,79	-1,85	25,3	-30,2
200 sf	4	-	-	200	0,69	-1,78	23,2	-29,8
>500 sf	4	-	-	500,1	0,63	-1,72	21,9	-24
<=10 sf	5	-	-	10	0,9	-1,26	28,8	-30,2
50 sf	5	-	-	50	0,79	-1,04	25,9	-32,4
200 sf	5	-	-	200	0,69	-1,05	23,2	-27,2
>500 sf	5	-	-	500,1	0,63	-0,72	21,9	-24

DATA FOR WALL

Components and cladding pressures - Roof (Figure 30.3-2A)

Component	Zone	Length (ft)	Width (ft)	Eff... (ft2)	+GCp	-GCp	Pres (+ve) (psf)	Pres (-ve) (psf)
<=10 sf	1	-	-	10	0,3	-1,1	12,8	-34,1
20 sf	1	-	-	20	0,27	-1,1	12	-34,1
50 sf	1	-	-	50	0,23	-1,1	10,9	-34,1
>100 sf	1	-	-	100,1	0,2	-1,1	10,1	-34,1
<=10 sf	1'	-	-	10	0,3	-1,3	12,8	-39,4
20 sf	1'	-	-	20	0,27	-1,27	12	-38,8
50 sf	1'	-	-	50	0,23	-1,23	10,9	-37,2
>100 sf	1'	-	-	100,1	0,2	-1,2	10,1	-36,7
<=10 sf	2	-	-	10	0,3	-1,5	12,8	-47,4
20 sf	2	-	-	20	0,27	-1,47	12	-46,8
50 sf	2	-	-	50	0,23	-1,33	10,9	-43,5
>100 sf	2	-	-	100,1	0,2	-1,3	10,1	-44,7
<=10 sf	3	-	-	10	0,3	-1,5	12,8	-50,7
20 sf	3	-	-	20	0,27	-1,53	12	-47,8
50 sf	3	-	-	50	0,23	-1,38	10,9	-47,8
>100 sf	3	-	-	100,1	0,2	-1,2	10,1	-36,7
<=10 sf	3'	-	-	10	0,3	-0,6	12,8	-16
20 sf	3'	-	-	20	0,27	-0,3	12	-48
50 sf	3'	-	-	50	0,23	-1,3	10,9	-49,4
>100 sf	3'	-	-	100,1	0,2	-1,5	10,1	-47,4

DATA FOR ROOF

AREA 5

Components and cladding pressures - Wall (Table 30.3-1)

Component	Zone	Length (ft)	Width (ft)	Eff... (ft2)	+GCp	-GCp	Pres (+ve) (psf)	Pres (-ve) (psf)
<=10 sf	4	-	-	10	0,9	-0,99	23	-25
50 sf	4	-	-	50	0,79	-0,88	20,7	-22,6
200 sf	4	-	-	200	0,69	-0,78	18,6	-20,5
>500 sf	4	-	-	500,1	0,63	-0,72	17,3	-19,2
<=10 sf	5	-	-	10	0,9	-1,26	23	-30,7
50 sf	5	-	-	50	0,79	-1,04	20,7	-26
200 sf	5	-	-	200	0,69	-0,85	18,6	-21,9
>500 sf	5	-	-	500,1	0,63	-0,72	17,3	-19,2

DATA FOR WALL

Components and cladding pressures - Roof (Figure 30.3-2A)

Component	Zone	Length (ft)	Width (ft)	Eff... (ft2)	+GCp	-GCp	Pres (+ve) (psf)	Pres (-ve) (psf)
<=10 sf	1	-	-	10	0,3	-1,7	10,2	-40,1
100 sf	1	-	-	100	0,2	-1,29	8,1	-31,3
200 sf	1	-	-	200	0,2	-1,16	8,1	-28,7
>500 sf	1	-	-	500,1	0,2	-1	8,1	-25,2
<=10 sf	1'	-	-	10	0,2	0	10,2	-3,8
100 sf	1'	-	-	100	0,2	0	8,1	-3,8
500 sf	1'	-	-	500	0,2	0	8,1	-3,8
>1000 sf	1'	-	-	1000,1	0,2	0	8,1	-3,8
<=10 sf	2	-	-	10	0,2	-2,3	10,2	-52,9
100 sf	2	-	-	100	0,2	-1,77	8,1	-41,6
200 sf	2	-	-	200	0,2	-1,61	8,1	-38,2
>500 sf	2	-	-	500,1	0,2	-1,4	8,1	-33,7
<=10 sf	3	-	-	10	0,2	-3,2	10,2	-72,1
100 sf	3	-	-	100	0,2	-2,14	8,1	-49,5
200 sf	3	-	-	200	0,2	-1,82	8,1	-42,7
>500 sf	3	-	-	500,1	0,2	-1,4	8,1	-33,7

DATA FOR ROOF

AREA 2

Components and cladding pressures - Wall (Table 30.3-1)

Component	Zone	Length (ft)	Width (ft)	Eff... (ft2)	+GCp	-GCp	Pres (+ve) (psf)	Pres (-ve) (psf)
<=10 sf	4	-	-	10	0,9	-1,99	27,7	-35,1
50 sf	4	-	-	50	0,79	-1,85	24,4	-35,8
200 sf	4	-	-	200	0,69	-1,78	22	-24,2
>500 sf	4	-	-	500,1	0,63	-1,72	20,4	-22,6
<=10 sf	5	-	-	10	0,9	-1,26	27,2	-36,2
50 sf	5	-	-	50	0,79	-1,04	24,4	-30,6
200 sf	5	-	-	200	0,69	-1,05	22	-28,9
>500 sf	5	-	-	500,1	0,63	-0,72	20,4	-22,6

DATA FOR WALL

Components and cladding pressures - Roof (Figure 30.3-2A)

Component	Zone	Length (ft)	Width (ft)	Eff... (ft2)	+GCp	-GCp	Pres (+ve) (psf)	Pres (-ve) (psf)
<=10 sf	2	-	-	10	0,3	-2,3	12,1	-62,4
100 sf	2	-	-	100	0,2	-1,77	9,6	-49,1
200 sf	2	-	-	200	0,2	-1,61	9,6	-45
>500 sf	2	-	-	500,1	0,2	-1,4	9,6	-39,7
<=10 sf	3	-	-	10	0,3	-2,2	12,1	-60
100 sf	3	-	-	100	0,2	-2,14	9,6	-58,4
200 sf	3	-	-	200	0,2	-1,82	9,6	-50,3
>500 sf	3	-	-	500,1	0,2	-1,4	9,6	-39,7

DATA FOR ROOF

AREA 4

Components and cladding pressures - Wall (Table 30.3-1)

Component	Zone	Length (ft)	Width (ft)	Eff... (ft2)	+GCp	-GCp	Pres (+ve) (psf)	Pres (-ve) (psf)
<=10 sf	4	-	-	10	0,9	-1,99	26,8	-35,2
50 sf	4	-	-	50	0,79	-1,85	23,8	-35
200 sf	4	-	-	200	0,69	-1,78	21,5	-23,7
>500 sf	4	-	-	500,1	0,63	-1,72	19,9	-22,1
<=10 sf	5	-	-	10	0,9	-1,26	26,5	-35,4
50 sf	5	-	-	50	0,79	-1,04	23,8	-29,9
200 sf	5	-	-	200	0,69	-0,85	21,5	-29,2
>500 sf	5	-	-	500,1	0,63	-0,72	19,9	-22,1

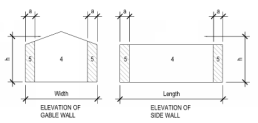
DATA FOR WALL

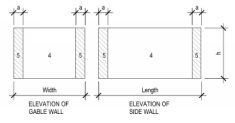
Components and cladding pressures - Roof (Figure 30.3-2A)

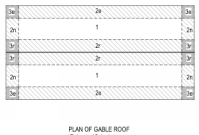
Component	Zone	Length (ft)	Width (ft)	Eff... (ft2)	+GCp	-GCp	Pres (+ve) (psf)	Pres (-ve) (psf)
<=10 sf	1	-	-	10	0,3	-1,7	11,8	-46,2
100 sf	1	-	-	100	0,2	-1,29	9,3	-36,1
200 sf	1	-	-	200	0,2	-1,16	9,3	-33
>500 sf	1	-	-	500,1	0,2	-	9,3	-29
<=10 sf	1'	-	-	10	0,3	0	11,8	-4,6
100 sf	1'	-	-	100	0,2	0	9,3	-4,6
500 sf	1'	-	-	500	0,2	0	9,3	-4,6
>1000 sf	1'	-	-	1000,1	0,2	0	9,3	-4,6
<=10 sf	2	-	-	10	0,3	-2,3	11,8	-60,8
100 sf	2	-	-	100	0,2	-1,77	9,3	-47,8
200 sf	2	-	-	200	0,2	-1,61	9,3	-44
>500 sf	2	-	-	500,1	0,2	-1,4	9,3	-38,8
<=10 sf	3	-	-	10	0,3	-3,2	11,8	-83
100 sf	3	-	-	100	0,2	-2,14	9,3	-57
200 sf	3	-	-	200	0,2	-1,82	9,3	-49,2
>500 sf	3	-	-	500,1	0,2	-1,4	9,3	-38,8

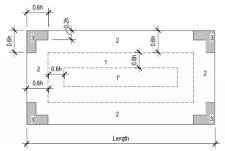
DATA FOR ROOF

Key Plan Area	a (ft)	h (ft)	Length (ft)	Width (ft)	Roof Type
1	10.6	30	618	106	FLAT ROOF
2	3	28	47	15	FLAT ROOF
3	7.3	34	111	73	FLAT ROOF
4	8.1	26	118	81	FLAT ROOF
5	6.4	16	171	75	FLAT ROOF









WIND PRESSURE PLAN NOTES

1. THE WIND PRESSURES INDICATED ARE COMPONENTS AND CLADDING GROSS PRESSURES IN PSF. THESE VALUES IN THE TABLES CAN BE MULTIPLIED BY 0.6 TO CONVERT THEM TO ASD VALUES.
2. THESE WIND PRESSURES ARE PROVIDED FOR EXTERIOR COMPONENT AND CLADDING MATERIALS NOT SPECIFICALLY DESIGNED BY THE ENGINEER OF RECORD.
3. THESE ROOF WIND PRESSURES HAVE NOT BEEN INCLUDED IN THE JOIST DESIGN.
4. THE JOISTS HAVE BEEN DESIGNED FOR THE MAIN WIND FORCE RESISTING SYSTEM DOWNWARD PRESSURES. THESE PRESSURES CAN BE CALCULATED USING THE DESIGN CRITERIA ON DRAWING S001.
5. FOR THE NET UPLIFT PRESSURE VALUE, SUBTRACT THE ROOF DEAD OF 10 PSF FROM THE GROSS PRESSURES INDICATED IN THE DIAGRAMS.

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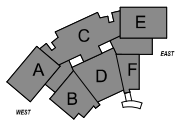
Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

WALL & ROOF WIND PRESSURE PLANS

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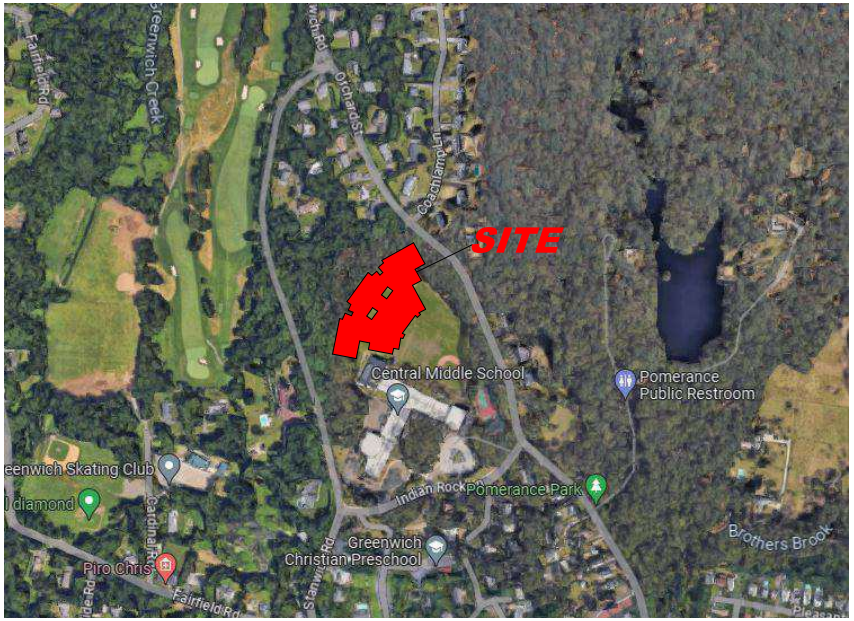

Greenwich Public Schools

GREENWICH CENTRAL MIDDLE SCHOOL

9 Indian Rock Lane, Greenwich, CT

State Project No: 057-0114 N

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- FP102C FIRE PROTECTION SECOND FLOOR PLAN - PART C
- FP102D FIRE PROTECTION SECOND FLOOR PLAN - PART D
- FP102E FIRE PROTECTION SECOND FLOOR PLAN - PART E
- FP103 FIRE PROTECTION ENLARGED PLANS
- FP003 FIRE PROTECTION DETAILS

[45] PLUMBING
- P000 PLUMBING ABBREVIATIONS, NOTES AND SYMBOLS
- P001 PLUMBING FIRST FLOOR OVERALL PLAN
- P101A PLUMBING FIRST FLOOR UNDERSLAB PLAN - PART A
- P101B PLUMBING FIRST FLOOR UNDERSLAB PLAN - PART B
- P101C PLUMBING FIRST FLOOR UNDERSLAB PLAN - PART C
- P101D PLUMBING FIRST FLOOR UNDERSLAB PLAN - PART D
- P101E PLUMBING FIRST FLOOR UNDERSLAB PLAN - PART E
- P101F PLUMBING FIRST FLOOR UNDERSLAB PLAN - PART F
- P101A PLUMBING FIRST FLOOR PLAN - PART A
- P101B PLUMBING FIRST FLOOR PLAN - PART B
- P101C PLUMBING FIRST FLOOR PLAN - PART C
- P101D PLUMBING FIRST FLOOR PLAN - PART D
- P101E PLUMBING FIRST FLOOR PLAN - PART E
- P101F PLUMBING FIRST FLOOR PLAN - PART F
- P102 PLUMBING SECOND FLOOR OVERALL PLAN
- P102A PLUMBING SECOND FLOOR PLAN - PART A
- P102B PLUMBING SECOND FLOOR PLAN - PART B
- P102C PLUMBING SECOND FLOOR PLAN - PART C
- P102D PLUMBING SECOND FLOOR PLAN - PART D
- P102E PLUMBING SECOND FLOOR PLAN - PART E
- P102F PLUMBING SECOND FLOOR PLAN - PART F
- P103A PLUMBING ROOF PLAN - PART A
- P103B PLUMBING ROOF PLAN - PART B
- P103C PLUMBING ROOF PLAN - PART C
- P103D PLUMBING ROOF PLAN - PART D
- P103E PLUMBING ROOF PLAN - PART E
- P103F PLUMBING ROOF PLAN - PART F
- P400 PLUMBING ENLARGED VIEWS - KITCHEN
- P401 PLUMBING ENLARGED VIEWS
- P402 PLUMBING ENLARGED VIEWS
- P403 PLUMBING ENLARGED VIEWS
- P404 PLUMBING ENLARGED VIEWS
- P405 PLUMBING ENLARGED VIEWS
- P500 PLUMBING DETAILS
- P501 PLUMBING DETAILS
- P600 PLUMBING SCHEDULES AND DIAGRAMS
- P601 PLUMBING SCHEDULES AND DIAGRAMS

[65] MECHANICAL
- MEP0000 MEP DEMOLITION ABBREVIATIONS, NOTES, AND SYMBOLS
- MEP0001 MEP DEMO PLAN VIEW
- M0-00 MECHANICAL ABBREVIATIONS, NOTES AND SYMBOLS
- M001 OVERALL MECHANICAL FIRST FLOOR PLAN
- M101A MECHANICAL FIRST FLOOR PLAN - PART A
- M101B MECHANICAL FIRST FLOOR PLAN - PART B
- M101C MECHANICAL FIRST FLOOR PLAN - PART C
- M101D MECHANICAL FIRST FLOOR PLAN - PART D
- M101E MECHANICAL FIRST FLOOR PLAN - PART E
- M101F MECHANICAL FIRST FLOOR PLAN - PART F
- M002 OVERALL MECHANICAL SECOND FLOOR PLAN
- M102A MECHANICAL SECOND FLOOR PLAN - PART A
- M102B MECHANICAL SECOND FLOOR PLAN - PART B
- M102C MECHANICAL SECOND FLOOR PLAN - PART C
- M102D MECHANICAL SECOND FLOOR PLAN - PART D
- M102E MECHANICAL SECOND FLOOR PLAN - PART E
- M003 OVERALL MECHANICAL ROOF PLAN
- M103A MECHANICAL ROOF PLAN - PART A
- M103B MECHANICAL ROOF PLAN - PART B
- M103C MECHANICAL ROOF PLAN - PART C
- M103D MECHANICAL ROOF PLAN - PART D
- M103E MECHANICAL ROOF PLAN - PART E
- M103F MECHANICAL ROOF PLAN - PART F
- MP101A MECHANICAL PIPING FIRST FLOOR PLAN - PART A
- MP101B MECHANICAL PIPING FIRST FLOOR PLAN - PART B
- MP101C MECHANICAL PIPING FIRST FLOOR PLAN - PART C
- MP101D MECHANICAL PIPING FIRST FLOOR PLAN - PART D
- MP101E MECHANICAL PIPING FIRST FLOOR PLAN - PART E
- MP101F MECHANICAL PIPING FIRST FLOOR PLAN - PART F
- MP102A MECHANICAL PIPING SECOND FLOOR PLAN - PART A
- MP102B MECHANICAL PIPING SECOND FLOOR PLAN - PART B
- MP102C MECHANICAL PIPING SECOND FLOOR PLAN - PART C
- MP102D MECHANICAL PIPING SECOND FLOOR PLAN - PART D
- MP102E MECHANICAL PIPING SECOND FLOOR PLAN - PART E
- M500 MECHANICAL DETAILS
- M501 MECHANICAL DETAILS
- M502 MECHANICAL DETAILS
- M503 MECHANICAL DETAILS
- M504 MECHANICAL DETAILS
- M505 MECHANICAL DETAILS
- M600 MECHANICAL SCHEDULES
- M601 MECHANICAL SCHEDULES
- M602 MECHANICAL SCHEDULES
- M700 MECHANICAL CONTROLS DIAGRAMS
- M701 MECHANICAL CONTROLS DIAGRAMS

[70] ELECTRICAL
- E000 ELECTRICAL ABBREVIATIONS, NOTES AND SYMBOLS
- EL001 ELECTRICAL LIGHTING FIRST FLOOR OVERALL PLAN
- EL101A ELECTRICAL LIGHTING FIRST FLOOR PLAN - PART A
- EL101B ELECTRICAL LIGHTING FIRST FLOOR PLAN - PART B
- EL101C ELECTRICAL LIGHTING FIRST FLOOR PLAN - PART C
- EL101D ELECTRICAL LIGHTING FIRST FLOOR PLAN - PART D
- EL101E ELECTRICAL LIGHTING FIRST FLOOR PLAN - PART E
- EL101F ELECTRICAL LIGHTING FIRST FLOOR PLAN - PART F
- EL002 ELECTRICAL LIGHTING SECOND FLOOR OVERALL PLAN
- EL102A ELECTRICAL LIGHTING SECOND FLOOR PLAN - PART A
- EL102B ELECTRICAL LIGHTING SECOND FLOOR PLAN - PART B
- EL102C ELECTRICAL LIGHTING SECOND FLOOR PLAN - PART C
- EL102D ELECTRICAL LIGHTING SECOND FLOOR PLAN - PART D
- EL102E ELECTRICAL LIGHTING SECOND FLOOR PLAN - PART E
- EP001 ELECTRICAL POWER FIRST FLOOR OVERALL PLAN
- EP101A ELECTRICAL POWER FIRST FLOOR PLAN - PART A
- EP101B ELECTRICAL POWER FIRST FLOOR PLAN - PART B
- EP101C ELECTRICAL POWER FIRST FLOOR PLAN - PART C
- EP101D ELECTRICAL POWER FIRST FLOOR PLAN - PART D
- EP101E ELECTRICAL POWER FIRST FLOOR PLAN - PART E
- EP101F ELECTRICAL POWER FIRST FLOOR PLAN - PART F
- EP002 ELECTRICAL POWER SECOND FLOOR OVERALL PLAN
- EP102A ELECTRICAL POWER SECOND FLOOR PLAN - PART A
- EP102B ELECTRICAL POWER SECOND FLOOR PLAN - PART B
- EP102C ELECTRICAL POWER SECOND FLOOR PLAN - PART C
- EP102D ELECTRICAL POWER SECOND FLOOR PLAN - PART D
- EP102E ELECTRICAL POWER SECOND FLOOR PLAN - PART E
- EP003 ELECTRICAL POWER ROOF OVERALL PLAN
- EP103A ELECTRICAL POWER ROOF PLAN - PART A
- EP103B ELECTRICAL POWER ROOF PLAN - PART B
- EP103C ELECTRICAL POWER ROOF PLAN - PART C
- EP103D ELECTRICAL POWER ROOF PLAN - PART D
- EP103E ELECTRICAL POWER ROOF PLAN - PART E
- EP103F ELECTRICAL POWER ROOF PLAN - PART F
- E400 ELECTRICAL ENLARGED PLANS - KITCHEN
- E401 ELECTRICAL ENLARGED PLANS - AUDITORIUM
- E402 ELECTRICAL ENLARGED PLANS - ELEVATORS
- E500 ELECTRICAL DETAILS
- E501 ELECTRICAL DETAILS
- E502 ELECTRICAL DETAILS
- E503 ELECTRICAL DETAILS
- E504 ELECTRICAL DETAILS
- E600 ELECTRICAL SCHEDULES AND DIAGRAMS
- E601 ELECTRICAL SCHEDULES AND DIAGRAMS
- E602 ELECTRICAL PANEL SCHEDULES
- E603 ELECTRICAL PANEL SCHEDULES
- E604 ELECTRICAL PANEL SCHEDULES
- E605 ELECTRICAL PANEL SCHEDULES
- E606 ELECTRICAL PANEL SCHEDULES
- E607 ELECTRICAL PANEL SCHEDULES
- E700 ELECTRICAL RISER DIAGRAM
- E701 FIRE ALARM RISER DIAGRAM

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[80] Technology
- T000 TECHNOLOGY SYMBOL LEGEND & GENERAL NOTES
- T001 TECHNOLOGY OVERALL FIRST FLOOR PLAN CABLING DELINIATION PLAN
- T002 TECHNOLOGY OVERALL SECOND FLOOR PLAN CABLE DELINIATION PLAN
- T101A TECHNOLOGY FIRST FLOOR PLAN A
- T101B TECHNOLOGY FIRST FLOOR PLAN B
- T101C TECHNOLOGY FIRST FLOOR PLAN C
- T101D TECHNOLOGY FIRST FLOOR PLAN D
- T101E TECHNOLOGY FIRST FLOOR PLAN E
- T101F TECHNOLOGY FIRST FLOOR PLAN F
- T102A TECHNOLOGY SECOND FLOOR PLAN A
- T102B TECHNOLOGY SECOND FLOOR PLAN B
- T102C TECHNOLOGY SECOND FLOOR PLAN C
- T102D TECHNOLOGY SECOND FLOOR PLAN D
- T102E TECHNOLOGY SECOND FLOOR PLAN E
- T201 TECHNOLOGY MDF 1000 DETAILS
- T202 TECHNOLOGY IDF 1046 & 1023 DETAILS
- T301 TECHNOLOGY DETAILS
- T302 TECHNOLOGY DETAILS
- T400 TECHNOLOGY WIRING DIAGRAM

[81] Audio Visual
- TA000 AUDIO VISUAL SYMBOL LEGEND & GENERAL NOTES
- TA101A AUDIO VISUAL FIRST FLOOR PLAN A
- TA101B AUDIO VISUAL FIRST FLOOR PLAN B
- TA101C AUDIO VISUAL FIRST FLOOR PLAN C
- TA101D AUDIO VISUAL FIRST FLOOR

ABBREVIATIONS

@	AT
A.B.	ANCHOR BOLT
A/C	AIR CONDITIONING
ACOUST	ACOUSTICAL
AC.T.	ACOUSTIC TILE
ACT	ACTUAL
ACP	ACOUSTIC CEILING PANEL
A.D.	AREA DRAIN
ADDL	ADDITIONAL
ADJ	ADJUSTABLE / ADJUST
A.F.F.	ABOVE FINISHED FLOOR
AGGR	AGGREGATE
A.H.U.	AIR HANDLING UNIT
ALT	ALTERNATE
ALUM	ALUMINUM
ANOD	ANODIZED
APPROX	APPROXIMATE
ARCH	ARCHITECTURAL
ASPH	ASPHALT
A.T.	ASPHALT TILE
L	ANGLE
B.C.	BRICK COURSE
BC	BOTTOM OF CURB
BD	BOARD
B.E.J.	BRICK (BLOCK) EXPANSION JOINT
B.F.	BOTTOM OF FOOTING
BITUM	BITUMINOUS
BLDG	BUILDING
BLK	BLOCK
BLKG	BLOCKING
BM	BEAM
B.M.	BENCH MARK
BOT	BOTTOM
B.P.	BOTTOM OF POCKET
B.R.	BEARING PLATE / BASE PLATE
BRK	BRICK
B.S.	BOTH SIDES
B.U.R.	BUILT UP ROOFING
BW	BOTTOM OF WALL
B.W.W.	BOTH WAYS WALL
CAB	CABINET
C.B.	CATCH BASIN
CEM	CEMENT
CER	CERAMIC
C.F.M.F.	COLD FORMED METAL FRAMING
C.H.	CABINET HEATER
CHBD	CHALKBOARD
C.I.	CAST IRON
C.J.	CONTROL JOINT
C.L.G. HT.	CEILING HEIGHT
CLO	CLOSET
CLR	CLEAR
CLRM	CLASSROOM
C.M.U.	CONCRETE MASONRY UNIT
CMP	COMPOSITE METAL PANEL
CNTR	COUNTER
C.O.	CLEAN OUT
COL	COLUMN
COMP	COMPACTED / COMPOSITION
CONC	CONCRETE
CONF	CONFERENCE
CONN	CONNECTION
CONST	CONSTRUCTION
CONT	CONTINUOUS
C.J.J.	CONTRACT JOINT LINE
CONTR	CONTRACTOR
CONV	CONVECTOR
COORD	COORDINATE
CORR	CORRIDOR
C.P.	CONTROL PANEL
CPT	CARPET
C.R.	CEILING REGISTER
C.T.	CERAMIC TILE
CTR	CENTER
C.U.H.	CABINET UNIT HEATER
C.Y.	CUBIC YARD
DBL	DOUBLE
DEPT	DEPARTMENT
DET	DETAIL
D.F.	DRINKING FOUNTAIN
DIA	DIAMETER
DIM	DIMENSION
DISP	DISPENSER
DIV	DIVISION
D.L.	DEAD LOAD
DN	DOWN
D.O.	DOOR OPENING
DR	DOOR
DS	DOWNSPOUT
D.S.P.	DRY STAND PIPE
DWG	DRAWING
DWL	DOWEL
E	EAST
EA	EACH
E.B.F.	EXISTING BOTTOM OF FOOTING
E.C.	EXPOSED CONSTRUCTION
E.I.F.S.	EXTERIOR INSULATION & FINISH SYSTEM
E.J.	EXPANSION JOINT
E.J.C.	EXPANSION JOINT COVER
EL	ELEVATION
ELEC	ELECTRICAL
ELEV	ELEVATOR
EMER	EMERGENCY
ENCL	ENCLOSURE
ENGR	ENGINEER
E.P.	ELECTRICAL PANEL
EQ	EQUAL
EQUIP	EQUIPMENT
E.W.	EACH WAY
E.W.C.	ELECTRIC WATER COOLER
EXH	EXHAUST
EXIST	EXISTING
EXP	EXPANSION
EXPD	EXPANDED
EXPO	EXPOSED
EXT	EXTERIOR
F.A.	FIRE ALARM
F.A.P.	FIRE ALARM PANEL
F.B.	FOOTING BREAK
F.BRK	FACE BRICK
FCP	FIBER CEMENT PANEL
F.D.	FLOOR DRAIN
FDN	FOUNDATION
F.E.	FIRE EXTINGUISHER
F.E.C.	FIRE EXTINGUISHER CABINET (WITH EXTINGUISHER PROVIDED)
F.F.	FACTORY FINISH
F.H.	FIRE HYDRANT
F.H.C.	FIRE HOSE CABINET
FIN	FINISH
FIN FL.	FINISHED FLOOR
FIXT	FIXTURE
FL	FLOOR
FLASH	FLASHING
FLEX	FLEXIBLE
FLUOR	FLUORESCENT
F.O.C.	FACE OF CONCRETE
F.O.F.	FACE OF FINISH
F.O.G.	FACE OF GYPSUM BOARD
F.O.M.	FACE OF MASONRY
F.O.S.	FACE OF STUD
FPD	FLAT PANEL DISPLAY
FPFG	FIREPROOFING
F.R.	FIRE RATED
F.R.T	FIRE RETARDANT TREATED
F.S.	FULL SIZE
FT	FOOT OR FEET
F.T.R.	FINNED TUBE RADIATION
FUR	FURRING
FUT	FUTURE
F.W.C.	FABRIC WALL COVERING
GA	GAUGE
GALV	GALVANIZED
G.B.	GRAB BAR
G.C.	GENERAL CONTRACTOR
G.	GLASS
GLZ	GLAZE
GND	GROUND
GRD	GRADE
GWB	GYPSUM WALL BOARD
GYP BD	GYPSUM BOARD / GYPSUM BOARD UNIT
H.B.	HOSE BIBB
HC	HANDICAPED
H.C.	HOLLOW CORE
HD	HEAD
H.P.	HIGH POINT
HRD	HARDWOOD
HDW	HARDWARE
H.M.	HOLLOW METAL
HOR	HORIZONTAL
HTG	HEATING
HT	HEIGHT
HYD	HYDRANT
H&V	HEATING AND VENTILATING
H.U.	HEATING UNIT
I.D.	INSIDE DIAMETER
I.F.	INSIDE FACE
INCAND	INCANDESCENT
INCL	INCLUDE
INSUL	INSULATION
INT	INTERIOR
INV	INVERT
I.P.S.	IRON PIPE SIZE
JAN	JANITOR
JST	JOIST
JT	JOINT
K	KITCHEN
LAM	LAMINATED
LAV	LAVATORY
LCKR	LOCKER
L.F.	LINEAR FOOT
L.L.	LIVE LOAD
L.P.	LOW POINT
LT	LIGHT
MAS	MASONRY
MATL	MATERIAL
MAX	MAXIMUM
M.C.	MASONRY COURSE
MECH	MECHANICAL
MEMB	MEMBRANE
MET	METAL
MET.T.P.	METAL TOILET PARTITION
MEZZ	MEZZANINE
MFR	MANUFACTURER
MH	MANHOLE
MIN	MINIMUM
MIR	MIRROR
MISC	MISCELLANEOUS
M.O.	MASONRY OPENING
MTD	MOUNTED
M.U.	MASONRY UNIT
MULL	MULLION
N	NORTH
N.I.C.	NOT IN CONTRACT
NO.	NUMBER
NOM	NOMINAL
N.R.C.	NOISE REDUCTION COEFFICIENT
N.T.S.	NOT TO SCALE
O/A	OUTSIDE AIR
O.C.	ON CENTER
O.D.	OUTSIDE DIAMETER
O.F.	OUTSIDE FACE
OFF	OFFICE
OH	OVERHEAD
OPNG	OPENING
OPP	OPPOSITE
O.H.	OPPOSITE HAND
OZ	OUNCE
PART	PARTITION
PL	PLATE
P.LAM	PLASTIC LAMINATE
P.S.	PLASTER
PLYWD	PLYWOOD
PR	PAIR
PREFAB	PREFABRICATED
PROJ	PROJECTION
PROP	PROPERTY
PTD	PAINTED
P.T.D.	PAPER TOWEL DISPENSER
Q.T.	QUARRY TILE
R	RISER (RADIUS)
R/A	RETURN AIR
RAD	RADIATION
R.B.	RESILIENT BASE
R.D.	ROOF DRAIN
RECPT	RECEPTACLE
REF	REFERENCE
REFL	REFLECTED / REFLECTIVE
REFR	REFRIGERATOR
REG	REGISTER
REINF	REINFORCING
REQ'D	REQUIRED
RES	RESILIENT
RET	RETAINING
REV	REVISION
RM	ROOM
R.O.	ROUGH OPENING
R.O.W.	RIGHT OF WAY
R.T.	RUBBER TILE
RV	ROOF VENT
R.W.L.	RAIN WATER LEADER
S	SOUTH
S.C.	SOLID CORE
S.C.D.	SEAT COVER DISPENSER
SCHED	SCHEDULE
S.D.	SOAP DISPENSER
SEC	SECTION
S.F.	SQUARE FOOT
SPRM	SPRAY APPLIED FIRE-RESISTIVE MATERIAL
S.G.F.T.	STRUCTURAL GLAZED FACING TILE
SH	SHELF
SHR	SHOWER
SHT	SHEET
SIM	SIMILAR
S.N.D.	SANITARY NAPKIN DISPENSER
S.N.R.	SANITARY NAPKIN RECEPTACLE
SPEC	SPECIFICATIONS
SPKLR	SPRINKLER
S.P.R.	SINGLE PLY ROOF
SQ	SQUARE
S.S	SOLID SURFACE
S.SK.	SERVICE SINK
S.STL.	STAINLESS STEEL
STA	STATION
STD	STANDARD
ST. FT.	STEP FOOTING
STIFF	STIFFENERS
STL	STEEL
STOR	STORAGE
S. TR.	SOUND TRANSMISSION
STRUCT	STRUCTURAL
SURF	SURFACE
SUSP	SUSPENDED
SYM	SYMMETRICAL
T	TREAD
T & B	TOP AND BOTTOM
TB	TACKBOARD
T.B.	TOWEL BAR
T.C.	TOP OF CURB
TEL	TELEPHONE
TEMP	TEMPERED
TERR	TERRAZZO
T.F.	TOP OF FOUNDATION
T. & G.	TONGUE AND GROOVE
THK	THICK
THRES	THRESHOLD
TIP	TOP OF PAVEMENT
T.P.D.	TOILET PAPER DISPENSER
TPR	TOP OF PIER
TS	TOP OF SLAB
TSH	TOP OF SHELF
TSTL	TOP OF STEEL
T.W.	TOP OF WALL
TYP	TYPICAL
U.H.	UNIT HEATER
U.L.	UNDERWRITER'S LABORATORY
UNFIN	UNFINISHED
U.N.O.	UNLESS NOTED OTHERWISE
UR	URINAL
U.V.	UNIT VENTILATOR
V.B.	VINYL BASE
V.C.T.	VINYL COMPOSITION TILE
VERT	VERTICAL
VEST	VESTIBULE
V.F.	VINYL FABRIC
V.G.	VERTICAL GRAIN
V.I.F.	VERIFY IN FIELD
VOL	VOLUME
V.W.C.	VINYL WALLCOVERING
W	WEST
W	WITH
W.C.	WATER CLOSET
WD	WOOD
WND	WINDOW
W/O	WITHOUT
WP	WATERPROOF
W.P.T.	WORKING POINT
W.S.	WALL SLEEVE
WSCT	WAINSCOT
WT	WEIGHT
WWF	WELDED WIRE FABRIC

GRAPHIC LEGEND

EARTHWORK
- EARTH
- POROUS FILL / GRAVEL

STONE
- NATURAL STONE

CONCRETE
- CAST IN PLACE CONCRETE
- CAST STONE
- ARCHITECTURAL PRECAST CONCRETE

MASONRY
- BRICK
- GLAZED BRICK / S.G.F.T.
- CONCRETE MASONRY UNIT
- GLAZED CONCRETE MASONRY UNIT
- MANUFACTURED STONE MASONRY UNIT
- MORTAR / GROUT
- SAND / PLASTER

METAL
- STEEL
- ALUMINUM

WOOD
- ROUGH LUMBER (CONTINUOUS)
- ROUGH LUMBER (INTERMITTENT)
- FINISH WOOD
- PLYWOOD
- PARTICLE BOARD / MDF

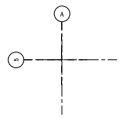
INSULATION
- RIGID INSULATION
- SEMI-RIGID INSULATION
- SPRAY FOAM INSULATION
- BLANKET INSULATION
- FIRE SAFING

MISCELLANEOUS
- GYPSUM BOARD
- ACOUSTIC TILE
- SOLID SURFACE

WALL DESIGNATION
- NEW
- EXISTING
- EXISTING TO BE REMOVED

DOOR DESIGNATION
- NEW
- EXISTING
- EXISTING TO BE REMOVED

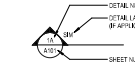
GRID LINES AND HEADS



DETAIL / DRAWING TITLE



SECTION INDICATOR



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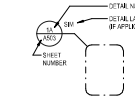

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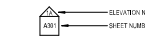

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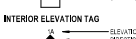

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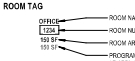

REVISION INDICATOR



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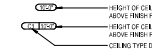
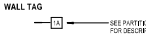
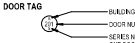


WALL TAG



DOOR TAG



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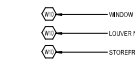

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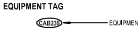

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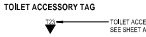

ELEVATION DATUM MARK



DEMOLITION KEYNOTE



MATCH LINE



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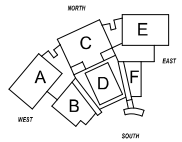
Checked: JZ

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

GENERAL INFORMATION

Date: 07/08/2024
Scale: 12" = 1'-0"
Proj. Number: 22367.00
Drawing Number: GI02.2

Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_GREENWICH_CENTRAL_MS_R22.rvt
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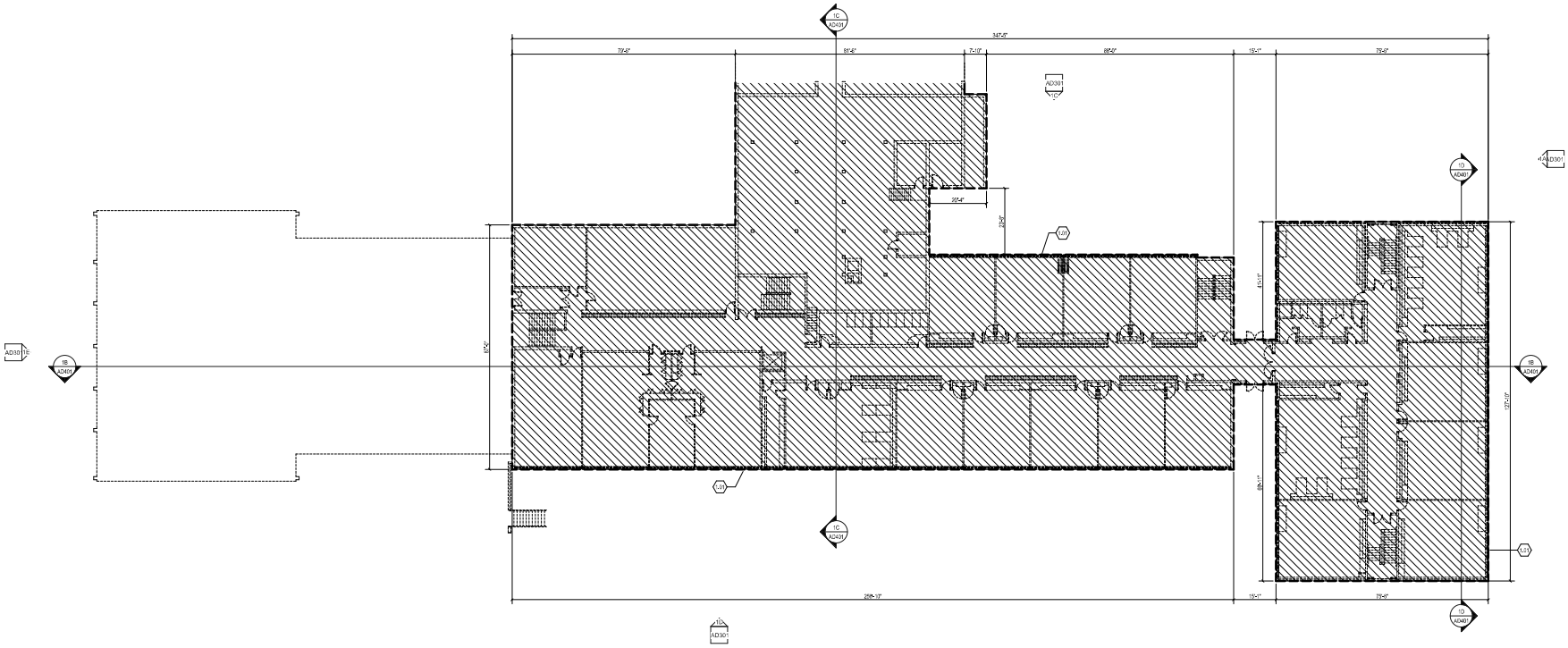

1E 1 - DEMO FIRST FLOOR PLAN
1/16" = 1'-0"

DEMOLITION KEYNOTE LEGEND	
Key Value	Keynote Text
1.01	REMOVE EXISTING BUILDING IN ITS ENTIRETY. DEMOLITION INCLUDES, BUT IS NOT LIMITED TO, WALLS AND OTHER PARTITIONS, STEEL STRUCTURE, CONCRETE SLAB-ON-GRADE, CONCRETE FOUNDATIONS, FLOOR FINISHES, ROOFING, ROOF TOP UNITS, HVAC, PLUMBING AND ELECTRICAL SYSTEMS. REFER TO MECHANICAL AND CIVIL DRAWINGS FOR EXTENT OF EXISTING SITE UTILITIES REMOVEL AND TERMINATION.

DEMOLITION PLAN LEGEND

EXISTING CONSTRUCTION TO BE REMOVED IN ITS ENTIRETY, REFER TO DEMOLITION KEYNOTE 1.01

WALL DESIGNATION

EXISTING TO REMAIN

EXISTING TO BE REMOVED

DOOR DESIGNATION

EXISTING TO REMAIN

EXISTING TO BE REMOVED

DEMOLITION KEYNOTE

X.XX — DEMOLITION KEYNOTE NUMBER

DEMOLITION GENERAL NOTES

A. REFER TO DIVISION 02 SECTION "STRUCTURE DEMOLITION" AND/OR "SELECTIVE STRUCTURE DEMOLITION" FOR ADDITIONAL DEMOLITION REQUIREMENTS.

B. COORDINATE PROPOSED METHODS AND OPERATIONS OF DEMOLITION WITH OWNER'S DESIGNATED REPRESENTATIVE PRIOR TO START OF DEMOLITION WORK. INCLUDE, BUT NOT LIMITED TO, SCHEDULE COORDINATION FOR SHUT-OFF, CAPPING AND CONTINUATION OF UTILITY SERVICES AS REQUIRED.

C. DEMOLITION WORK SHALL BE PHASED. REFER TO DIVISION 01 SECTION "SUMMARY" FOR DESCRIPTION OF PHASING REQUIREMENTS.

D. INTERRUPTIONS IN DAILY OPERATIONS MUST BE COORDINATED IN ADVANCE WITH OWNER'S DESIGNATED REPRESENTATIVE. THIS SHALL INCLUDE SERVICE INTERRUPTIONS AND CONNECTIONS, RELOCATION OF OCCUPANTS, REMOVAL OF EQUIPMENT, SHIFTS IN LOCATION OF WORK, MECHANICAL AND ELECTRICAL DISRUPTION, ETC. ANY OF THE ABOVE INTERRUPTIONS REQUIRE A MINIMUM OF THREE FULL WORKING DAYS NOTICE TO THE OWNER. FRIDAY P.M. NOTICE FOR MONDAY A.M. INTERRUPTIONS WILL NOT BE ACCEPTABLE.

E. CONDUCT DEMOLITION AND DEBRIS REMOVAL IN A SAFE MANNER TO MINIMIZE INTERFERENCE WITH CORRIDORS, WALLS, STAIRS, AND OTHER ADJACENT FACILITIES AND TO AVOID DAMAGE TO SAME. DO NOT CLOSE OR OBSTRUCT TRAFFIC WAYS WITHOUT PERMISION OF THE OWNER.

F. ERECT TEMPORARY ENCLOSURE(S) AROUND ALL EXTERIOR OPENINGS CREATED IN THE BUILDING. THE BUILDING SHALL BE LEFT WEATHER-TIGHT AND SECURE AT THE END OF EACH WORKDAY.

G. PROVIDE TEMPORARY DUST ENCLOSURES AROUND ALL AREAS OF WORK. PREVENT DUST, DEBRIS, ETC. FROM REACHING ADJACENT AREAS OF BUILDING.

H. REFER TO MECHANICAL, PLUMBING AND ELECTRICAL DRAWINGS AND SPECIFICATIONS FOR ADDITIONAL DEMOLITION REQUIREMENTS.

I. ALL SALVAGEABLE MATERIAL AND EQUIPMENT SHOWN OR SCHEDULED TO BE REMAIN AS THE PROPERTY OF THE OWNER OR NOT DISCLAIMED BY THE OWNER PRIOR TO THE BEGINNING OF DEMOLITION WORK SHALL BE CAREFULLY REMOVED AND STORED WHERE DIRECTED BY THE OWNER. THE CONTRACTOR SHALL VERIFY WITH THE OWNER ALL ITEMS TO BE SALVAGED.

J. ALL SALVAGEABLE MATERIAL AND EQUIPMENT SCHEDULED TO BE REMOVED AND NOT REUSED AND DISCLAIMED BY THE OWNER SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE TRANSPORTED FROM THE SITE AS THEY ARE REMOVED. STORAGE OR SALE OF REMOVED ITEMS ON SITE WILL NOT BE PERMITTED.

K. VERIFY SAVING AND REUSE OF ALL MISCELLANEOUS ITEMS AND EQUIPMENT NOT SPECIFICALLY LISTED ON THE DRAWINGS OR IN THE SPECIFICATIONS WITH THE OWNER PRIOR TO DEMOLITION.

L. UNLESS OTHERWISE INDICATED ON THE DRAWINGS OR THE FINISH SCHEDULE, ALL PORTIONS OF THE EXISTING BUILDING INCLUDING FINISHES DISTURBED BY DEMOLITION OF EXISTING CONSTRUCTION AND/OR INSTALLATION OF NEW CONSTRUCTION, INCLUDING MECHANICAL AND ELECTRICAL WORK, SHALL BE REPAIRED AS REQUIRED AND RETURNED TO ITS ORIGINAL UNDISTURBED CONDITION OR BETTER.

M. REMOVE ALL EXISTING WALL CONSTRUCTION, MILLWORK, EQUIPMENT, ETC. SHOWN DASHED ON THIS DRAWING IN ITS ENTIRETY TO THE EXTENT SHOWN ON THE DRAWINGS. PARTITIONS SHALL BE REMOVED FROM FLOOR TO UNDERSIDE OF STRUCTURE ABOVE UNLESS OTHERWISE NOTED.

N. REFER TO HAZMAT DRAWINGS HBMA1 THRU HBM10 - WORK SHALL BE COORDINATED WITH OMGC.

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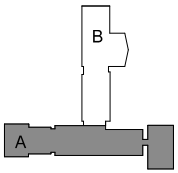
Drawn: JP, JZ
Checked: JZ

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



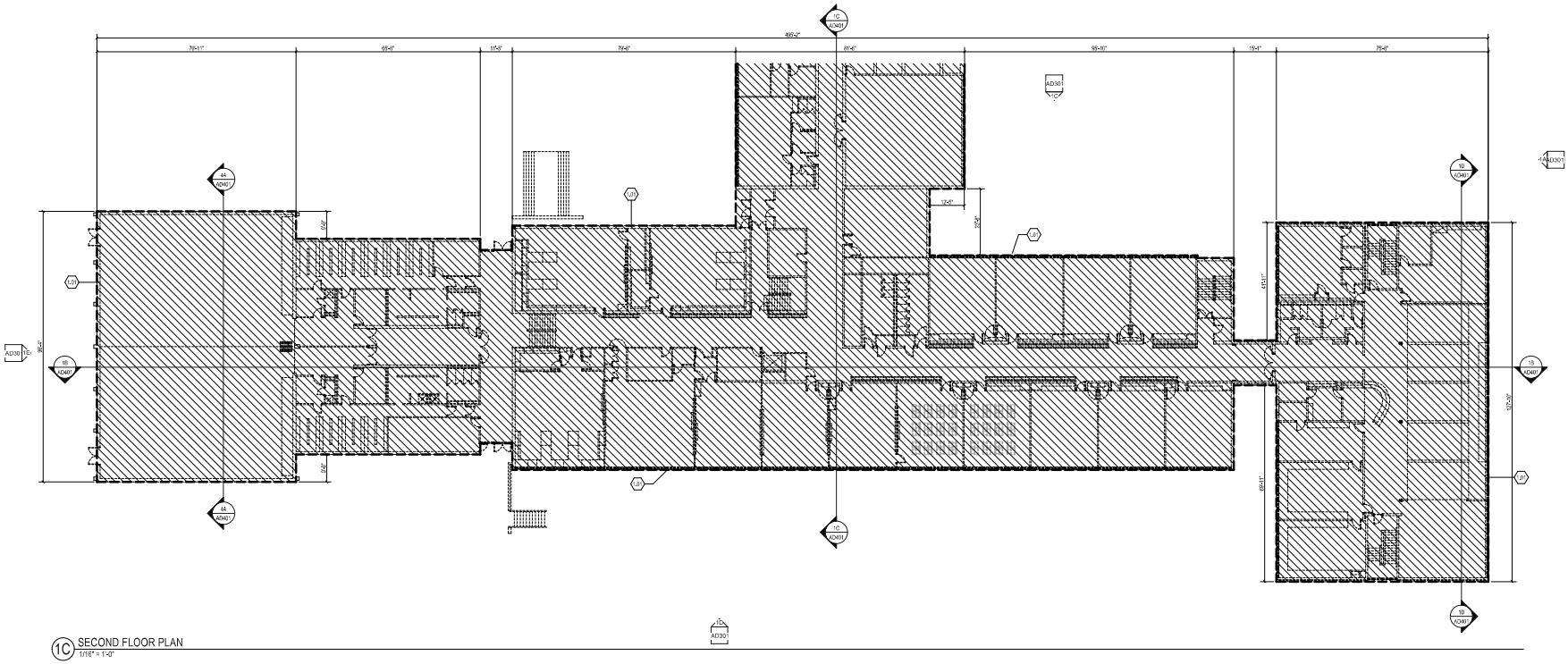
KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRST FLOOR DEMOLITION PLAN PART A

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: **AD101A**

Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_Greenwich CMS_R22_Existing Conditions.rvt
3/25/2024 3:05:49 PM



1C SECOND FLOOR PLAN
1/16" = 1'-0"

DEMOLITION KEYNOTE LEGEND	
Key Value	Keynote Text
1.01	REMOVE EXISTING BUILDING IN ITS ENTIRETY. DEMOLITION INCLUDES, BUT IS NOT LIMITED TO, WALLS AND OTHER PARTITIONS, STEEL STRUCTURE, CONCRETE SLAB-ON-GRADE, CONCRETE FOUNDATIONS, FLOOR FINISHES, ROOFING, ROOF TOP UNITS, HVAC, PLUMBING AND ELECTRICAL SYSTEMS. REFER TO MECHANICAL AND CIVIL DRAWINGS FOR EXTENT OF EXISTING SITE UTILITIES REMOVEL AND TERMINATION.

DEMOLITION PLAN LEGEND

EXISTING CONSTRUCTION TO BE REMOVED IN ITS ENTIRETY, REFER TO DEMOLITION KEYNOTE 1.01

WALL DESIGNATION

EXISTING TO REMAIN

EXISTING TO BE REMOVED

DOOR DESIGNATION

EXISTING TO REMAIN

EXISTING TO BE REMOVED

DEMOLITION KEYNOTE

X.XX — DEMOLITION KEYNOTE NUMBER

DEMOLITION GENERAL NOTES

A. REFER TO DIVISION 02 SECTION "STRUCTURE DEMOLITION" AND/OR "SELECTIVE STRUCTURE DEMOLITION" FOR ADDITIONAL DEMOLITION REQUIREMENTS.

B. COORDINATE PROPOSED METHODS AND OPERATIONS OF DEMOLITION WITH OWNER'S DESIGNATED REPRESENTATIVE PRIOR TO START OF DEMOLITION WORK. INCLUDE IN SCHEDULE COORDINATION FOR SHUT-OFF, CAPPING AND CONTINUATION OF UTILITY SERVICES AS REQUIRED.

C. DEMOLITION WORK SHALL BE PHASED. REFER TO DIVISION 01 SECTION "SUMMARY" FOR DESCRIPTION OF PHASING REQUIREMENTS.

D. INTERRUPTIONS IN DAILY OPERATIONS MUST BE COORDINATED IN ADVANCE WITH OWNER'S DESIGNATED REPRESENTATIVE. THIS SHALL INCLUDE SERVICE INTERRUPTIONS AND CONNECTIONS, RELOCATION OF OCCUPANTS, REMOVAL OF EQUIPMENT, SHIFTS IN LOCATION OF WORK, MECHANICAL AND ELECTRICAL DISRUPTION, ETC. ANY OF THE ABOVE INTERRUPTIONS REQUIRE A MINIMUM OF THREE FULL WORKING DAYS NOTICE TO THE OWNER. FRIDAY P.M. NOTICE FOR MONDAY A.M. INTERRUPTIONS WILL NOT BE ACCEPTABLE.

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F. ERECT TEMPORARY ENCLOSURE(S) AROUND ALL EXTERIOR OPENINGS CREATED IN THE BUILDING. THE BUILDING SHALL BE LEFT WEATHER-TIGHT AND SECURE AT THE END OF EACH WORKDAY.

G. PROVIDE TEMPORARY DUST ENCLOSURES AROUND ALL AREAS OF WORK. PREVENT DUST, DEBRIS, ETC. FROM REACHING ADJACENT AREAS OF BUILDING.

H. REFER TO MECHANICAL, PLUMBING AND ELECTRICAL DRAWINGS AND SPECIFICATIONS FOR ADDITIONAL DEMOLITION REQUIREMENTS.

I. ALL SALVAGEABLE MATERIAL AND EQUIPMENT SHOWN OR SCHEDULED TO BE REMAIN AS THE PROPERTY OF THE OWNER OR NOT DISCLAIMED BY THE OWNER PRIOR TO THE BEGINNING OF DEMOLITION WORK SHALL BE CAREFULLY REMOVED AND STORED WHERE DIRECTED BY THE OWNER. THE CONTRACTOR SHALL VERIFY WITH THE OWNER ALL ITEMS TO BE SALVAGED.

J. ALL SALVAGEABLE MATERIAL AND EQUIPMENT SCHEDULED TO BE REMOVED AND NOT REUSED AND DISCLAIMED BY THE OWNER SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE TRANSPORTED FROM THE SITE AS THEY ARE REMOVED. STORAGE OR SALE OF REMOVED ITEMS ON SITE WILL NOT BE PERMITTED.

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M. REMOVE ALL EXISTING WALL CONSTRUCTION, MILLWORK, EQUIPMENT, ETC. SHOWN DASHED ON THIS DRAWING IN ITS ENTIRETY TO THE EXTENT SHOWN ON THE DRAWINGS. PARTITIONS SHALL BE REMOVED FROM FLOOR TO UNDERSIDE OF STRUCTURE ABOVE UNLESS OTHERWISE NOTED.

N. REFER TO HAZMAT DRAWINGS HBMA1 THRU HBMA3 - WORK SHALL BE COORDINATED WITH OMGC.

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Checked: JZ

Greenwich Public Schools

Greenwich Central Middle School

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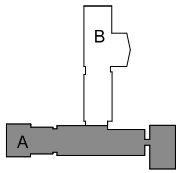
STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

SECOND FLOOR DEMOLITION PLAN PART A

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: **AD102A**

Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_Greenwich CMS_R22_Existing Conditions.rvt
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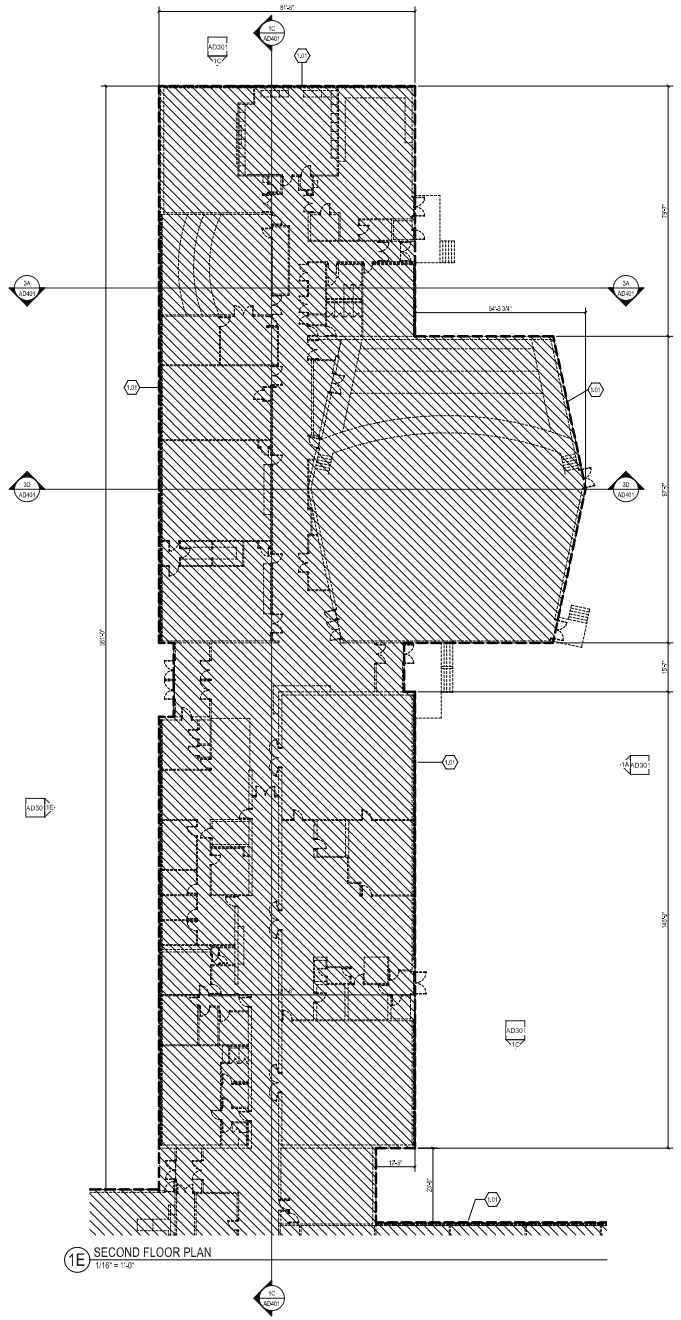

DEMOLITION KEYNOTE LEGEND	
Key Value	Keynote Text
1.01	REMOVE EXISTING BUILDING IN ITS ENTIRETY. DEMOLITION INCLUDES, BUT IS NOT LIMITED TO, WALLS AND OTHER PARTITIONS, STEEL STRUCTURE, CONCRETE SLAB-ON-GRADE, CONCRETE FOUNDATIONS, FLOOR FINISHES, ROOFING, ROOF TOP UNITS, HVAC, PLUMBING AND ELECTRICAL SYSTEMS. REFER TO MECHANICAL AND CIVIL DRAWINGS FOR EXTENT OF EXISTING SITE UTILITIES REMOVEL AND TERMINATION.

DEMOLITION PLAN LEGEND

EXISTING CONSTRUCTION TO BE REMOVED IN ITS ENTIRETY, REFER TO DEMOLITION KEYNOTE 1.01

WALL DESIGNATION

EXISTING TO REMAIN

EXISTING TO BE REMOVED

DOOR DESIGNATION

EXISTING TO REMAIN

EXISTING TO BE REMOVED

DEMOLITION KEYNOTE

X.XX — DEMOLITION KEYNOTE NUMBER

DEMOLITION GENERAL NOTES

A. REFER TO DIVISION 02 SECTION "STRUCTURE DEMOLITION" AND/OR "SELECTIVE STRUCTURE DEMOLITION" FOR ADDITIONAL DEMOLITION REQUIREMENTS.

B. COORDINATE PROPOSED METHODS AND OPERATIONS OF DEMOLITION WITH OWNER'S DESIGNATED REPRESENTATIVE PRIOR TO START OF DEMOLITION WORK. INCLUDE IN SCHEDULE COORDINATION FOR SHUT-OFF, CAPPING AND CONTINUATION OF UTILITY SERVICES AS REQUIRED.

C. DEMOLITION WORK SHALL BE PHASED. REFER TO DIVISION 01 SECTION "SUMMARY" FOR DESCRIPTION OF PHASING REQUIREMENTS.

D. INTERRUPTIONS IN DAILY OPERATIONS MUST BE COORDINATED IN ADVANCE WITH OWNER'S DESIGNATED REPRESENTATIVE. THIS SHALL INCLUDE SERVICE INTERRUPTIONS AND CONNECTIONS, RELOCATION OF OCCUPANTS, REMOVAL OF EQUIPMENT, SHIFTS IN LOCATION OF WORK, MECHANICAL AND ELECTRICAL DISRUPTION, ETC. ANY OF THE ABOVE INTERRUPTIONS REQUIRE A MINIMUM OF THREE FULL WORKING DAYS NOTICE TO THE OWNER. FRIDAY P.M. NOTICE FOR MONDAY A.M. INTERRUPTIONS WILL NOT BE ACCEPTABLE.

E. CONDUCT DEMOLITION AND DEBRIS REMOVAL IN A SAFE MANNER TO MINIMIZE INTERFERENCE WITH CORRIDORS, WALLS, STAIRS, AND OTHER ADJACENT FACILITIES AND TO AVOID DAMAGE TO SAME. DO NOT CLOSE OR OBSTRUCT TRAFFIC WAYS WITHOUT PERMISSION OF THE OWNER.

F. ERECT TEMPORARY ENCLOSURE(S) AROUND ALL EXTERIOR OPENINGS CREATED IN THE BUILDING. THE BUILDING SHALL BE LEFT WEATHER-TIGHT AND SECURE AT THE END OF EACH WORKDAY.

G. PROVIDE TEMPORARY DUST ENCLOSURES AROUND ALL AREAS OF WORK. PREVENT DUST, DEBRIS, ETC. FROM REACHING ADJACENT AREAS OF BUILDING.

H. REFER TO MECHANICAL, PLUMBING AND ELECTRICAL DRAWINGS AND SPECIFICATIONS FOR ADDITIONAL DEMOLITION REQUIREMENTS.

I. ALL SALVAGEABLE MATERIAL AND EQUIPMENT SHOWN OR SCHEDULED TO BE REMAIN AS THE PROPERTY OF THE OWNER OR NOT DISCLAIMED BY THE OWNER PRIOR TO THE BEGINNING OF DEMOLITION WORK SHALL BE CAREFULLY REMOVED AND STORED WHERE DIRECTED BY THE OWNER. THE CONTRACTOR SHALL VERIFY WITH THE OWNER ALL ITEMS TO BE SALVAGED.

J. ALL SALVAGEABLE MATERIAL AND EQUIPMENT SCHEDULED TO BE REMOVED AND NOT REUSED AND DISCLAIMED BY THE OWNER SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE TRANSPORTED FROM THE SITE AS THEY ARE REMOVED. STORAGE OR SALE OF REMOVED ITEMS ON SITE WILL NOT BE PERMITTED.

K. VERIFY SAVING AND REUSE OF ALL MISCELLANEOUS ITEMS AND EQUIPMENT NOT SPECIFICALLY LISTED ON THE DRAWINGS OR IN THE SPECIFICATIONS WITH THE OWNER PRIOR TO DEMOLITION.

L. UNLESS OTHERWISE INDICATED ON THE DRAWINGS OR THE FINISH SCHEDULE, ALL PORTIONS OF THE EXISTING BUILDING INCLUDING FINISHES DISTURBED BY DEMOLITION OF EXISTING CONSTRUCTION AND/OR INSTALLATION OF NEW CONSTRUCTION, INCLUDING MECHANICAL AND ELECTRICAL WORK, SHALL BE REPAIRED AS REQUIRED AND RETURNED TO ITS ORIGINAL UNDISTURBED CONDITION OR BETTER.

M. REMOVE ALL EXISTING WALL CONSTRUCTION, MILLWORK, EQUIPMENT, ETC. SHOWN DASHED ON THIS DRAWING IN ITS ENTIRETY TO THE EXTENT SHOWN ON THE DRAWINGS. PARTITIONS SHALL BE REMOVED FROM FLOOR TO UNDERSIDE OF STRUCTURE ABOVE UNLESS OTHERWISE NOTED.

N. REFER TO HAZMAT DRAWINGS HBM-H THRU HBM-III - WORK SHALL BE COORDINATED WITH OMGC.

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Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane,
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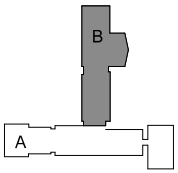
STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

SECOND FLOOR DEMOLITION PLAN PART B

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: AD102B

Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_Greenwich CMS_R23_Existing Conditions.rvt
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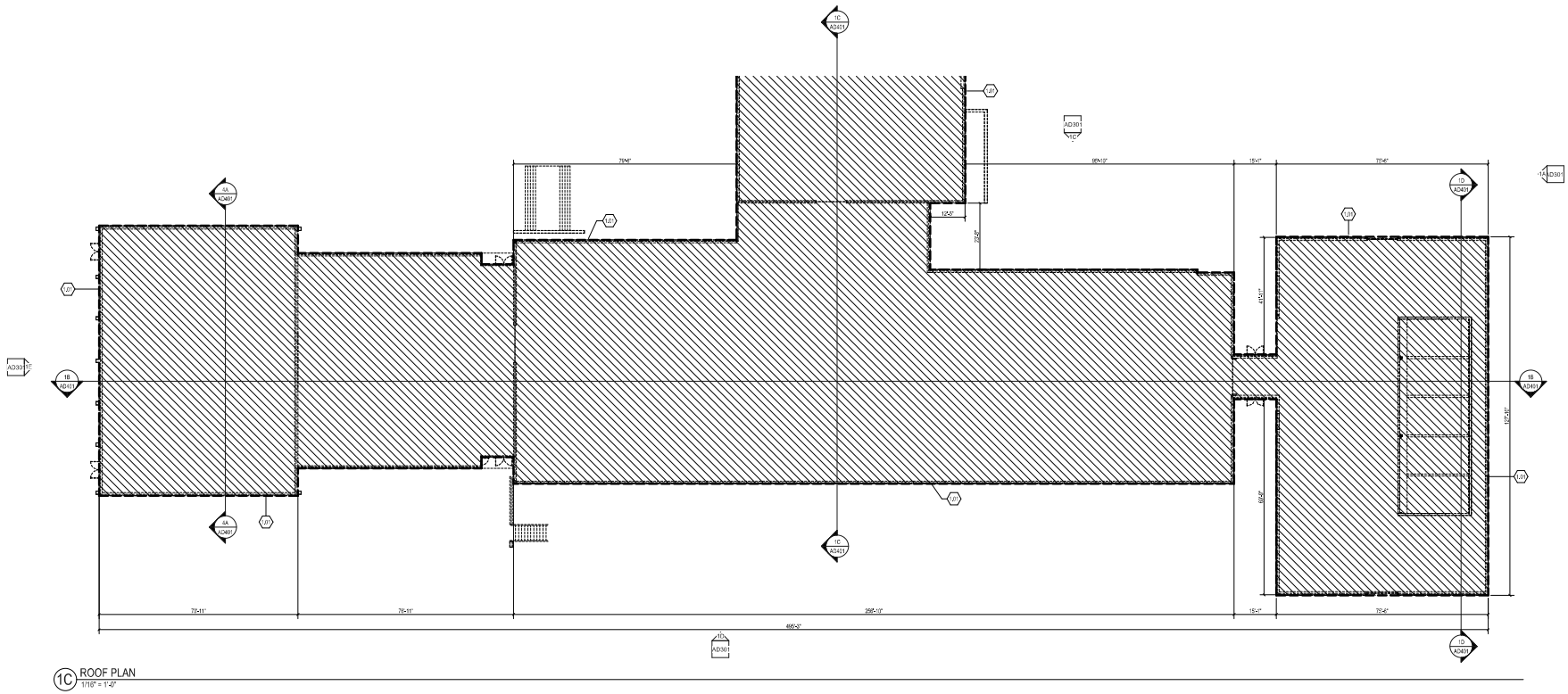
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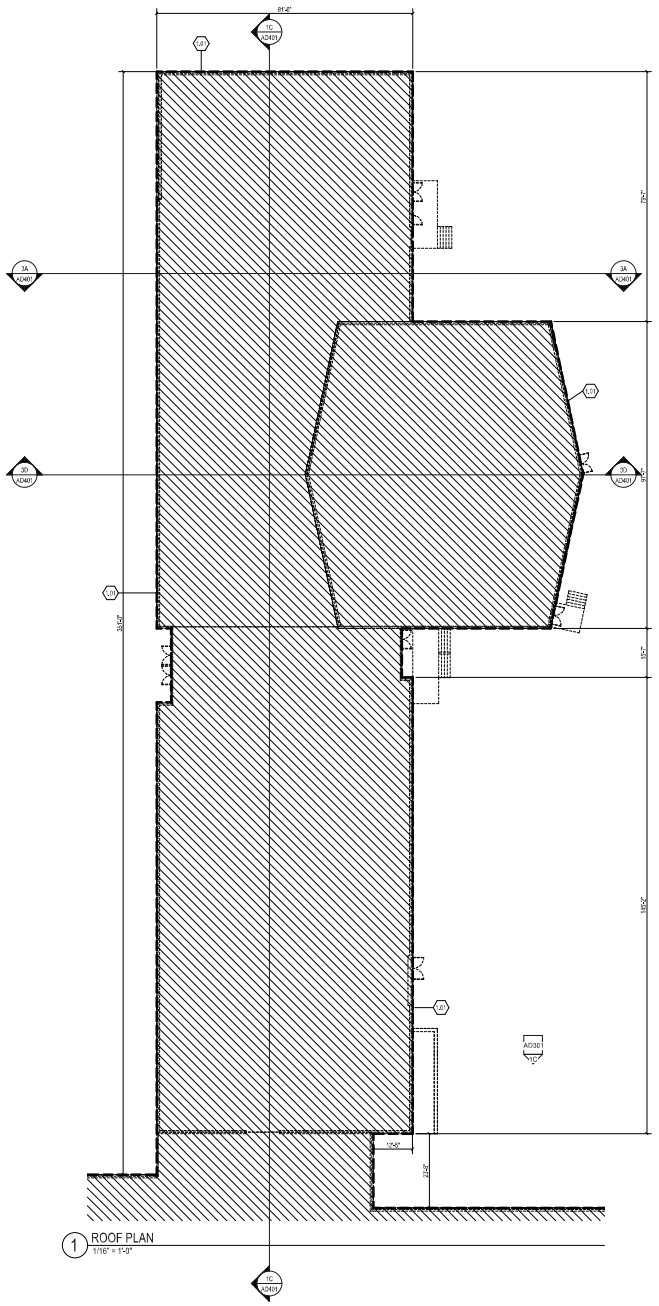

1 ROOF PLAN
1/16" = 1'-0"

DEMOLITION KEYNOTE LEGEND	
Key Value	Keynote Text
1.01	REMOVE EXISTING BUILDING IN ITS ENTIRETY. DEMOLITION INCLUDES, BUT IS NOT LIMITED TO, WALLS AND OTHER PARTITIONS, STEEL STRUCTURE, CONCRETE SLAB-ON-GRADE, CONCRETE FOUNDATIONS, FLOOR FINISHES, ROOFING, ROOF TOP UNITS, HVAC, PLUMBING AND ELECTRICAL SYSTEMS. REFER TO MECHANICAL AND CIVIL DRAWINGS FOR EXTENT OF EXISTING SITE UTILITIES REMOVEL AND TERMINATION.

DEMOLITION PLAN LEGEND

EXISTING CONSTRUCTION TO BE REMOVED IN ITS ENTIRETY, REFER TO DEMOLITION KEYNOTE 1.01

WALL DESIGNATION

EXISTING TO REMAIN

EXISTING TO BE REMOVED

DOOR DESIGNATION

EXISTING TO REMAIN

EXISTING TO BE REMOVED

DEMOLITION KEYNOTE

L01 — DEMOLITION KEYNOTE NUMBER

DEMOLITION GENERAL NOTES

A. REFER TO DIVISION 02 SECTION "STRUCTURE DEMOLITION" AND/OR "SELECTIVE STRUCTURE DEMOLITION" FOR ADDITIONAL DEMOLITION REQUIREMENTS.

B. COORDINATE PROPOSED METHODS AND OPERATIONS OF DEMOLITION WITH OWNER'S DESIGNATED REPRESENTATIVE PRIOR TO START OF DEMOLITION WORK. INCLUDE IN SCHEDULE COORDINATION FOR SHUT-OFF, CAPPING AND CONTINUATION OF UTILITY SERVICES AS REQUIRED.

C. DEMOLITION WORK SHALL BE PHASED. REFER TO DIVISION 01 SECTION "SUMMARY" FOR DESCRIPTION OF PHASING REQUIREMENTS.

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G. PROVIDE TEMPORARY DUST ENCLOSURES AROUND ALL AREAS OF WORK. PREVENT DUST, DEBRIS, ETC. FROM REACHING ADJACENT AREAS OF BUILDING.

H. REFER TO MECHANICAL, PLUMBING AND ELECTRICAL DRAWINGS AND SPECIFICATIONS FOR ADDITIONAL DEMOLITION REQUIREMENTS.

I. ALL SALVAGEABLE MATERIAL AND EQUIPMENT SHOWN OR SCHEDULED TO BE REMAIN AS THE PROPERTY OF THE OWNER OR NOT DISCLAIMED BY THE OWNER PRIOR TO THE BEGINNING OF DEMOLITION WORK SHALL BE CAREFULLY REMOVED AND STORED WHERE DIRECTED BY THE OWNER. THE CONTRACTOR SHALL VERIFY WITH THE OWNER ALL ITEMS TO BE SALVAGED.

J. ALL SALVAGEABLE MATERIAL AND EQUIPMENT SCHEDULED TO BE REMOVED AND NOT REUSED AND DISCLAIMED BY THE OWNER SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE TRANSPORTED FROM THE SITE AS THEY ARE REMOVED. STORAGE OR SALE OF REMOVED ITEMS ON SITE WILL NOT BE PERMITTED.

K. VERIFY SAVING AND REUSE OF ALL MISCELLANEOUS ITEMS AND EQUIPMENT NOT SPECIFICALLY LISTED ON THE DRAWINGS OR IN THE SPECIFICATIONS WITH THE OWNER PRIOR TO DEMOLITION.

L. UNLESS OTHERWISE INDICATED ON THE DRAWINGS OR THE FINISH SCHEDULE, ALL PORTIONS OF THE EXISTING BUILDING INCLUDING FINISHES DISTURBED BY DEMOLITION OF EXISTING CONSTRUCTION AND/OR INSTALLATION OF NEW CONSTRUCTION, INCLUDING MECHANICAL AND ELECTRICAL WORK, SHALL BE REPAIRED AS REQUIRED AND RETURNED TO ITS ORIGINAL UNDISTURBED CONDITION OR BETTER.

M. REMOVE ALL EXISTING WALL CONSTRUCTION, MILLWORK, EQUIPMENT, ETC. SHOWN DASHED ON THIS DRAWING IN ITS ENTIRETY TO THE EXTENT SHOWN ON THE DRAWINGS. PARTITIONS SHALL BE REMOVED FROM FLOOR TO UNDERSIDE OF STRUCTURE ABOVE UNLESS OTHERWISE NOTED.

N. REFER TO HAZMAT DRAWINGS HBM-H THRU HBM-III - WORK SHALL BE COORDINATED WITH OMGC.

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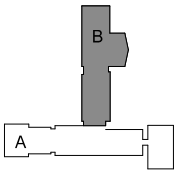

KEYPLAN

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	07/08/2024	PHASE 2

ROOF DEMOLITION PLAN PART B

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Drawing Number: **AD103B**

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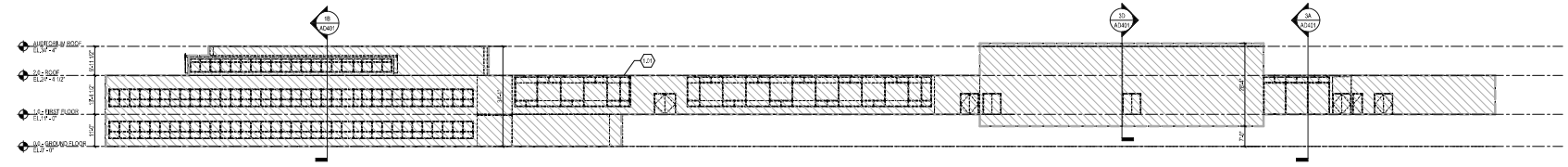
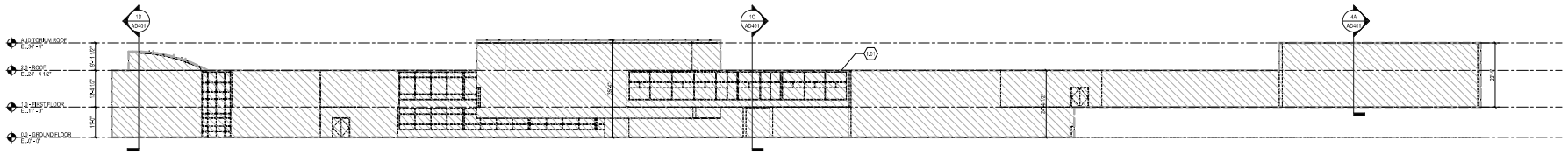
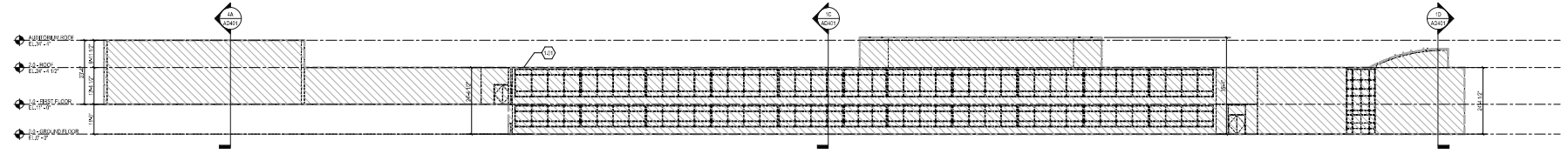


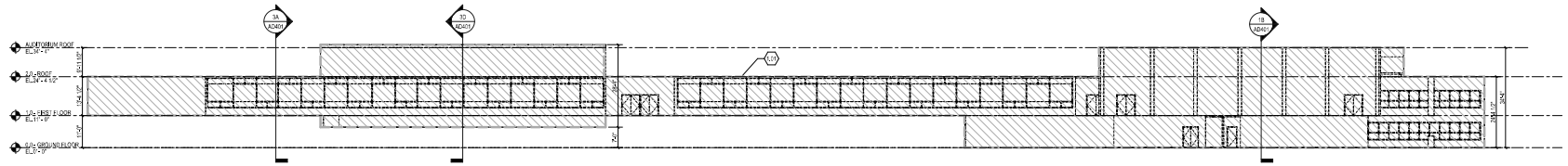
1A EAST ELEVATION
1/16" = 1'-0"



1C NORTH ELEVATION
1/16" = 1'-0"



1D SOUTH ELEVATION
1/16" = 1'-0"



1E WEST ELEVATION
1/16" = 1'-0"

DEMOLITION KEYNOTE LEGEND	
Key Value	Keynote Text
1.01	REMOVE EXISTING BUILDING IN ITS ENTIRETY. DEMOLITION INCLUDES, BUT IS NOT LIMITED TO, WALLS AND OTHER PARTITIONS, STEEL STRUCTURE, CONCRETE SLAB-ON-GRADE, CONCRETE FOUNDATIONS, FLOOR FINISHES, ROOFING, ROOF TOP UNITS, HVAC, PLUMBING AND ELECTRICAL SYSTEMS. REFER TO MECHANICAL AND CIVIL DRAWINGS FOR EXTENT OF EXISTING SITE UTILITIES REMOVEL AND TERMINATION.

DEMOLITION PLAN LEGEND

EXISTING CONSTRUCTION TO BE REMOVED IN ITS ENTIRETY. REFER TO DEMOLITION KEYNOTE 1.01

WALL DESIGNATION

EXISTING TO REMAIN — EXISTING TO BE REMOVED

DOOR DESIGNATION

EXISTING TO REMAIN — EXISTING TO BE REMOVED

DEMOLITION KEYNOTE

1.01 — DEMOLITION KEYNOTE NUMBER

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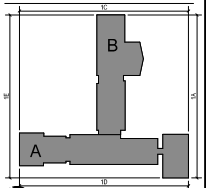

KEYPLAN

Number	Date	Issued For
	05/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

DEMOLITION ELEVATIONS

Date
07/08/2024
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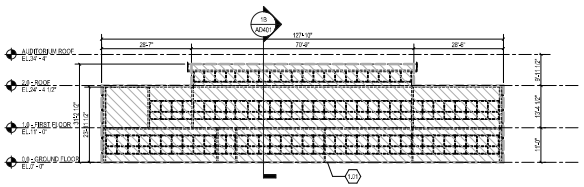
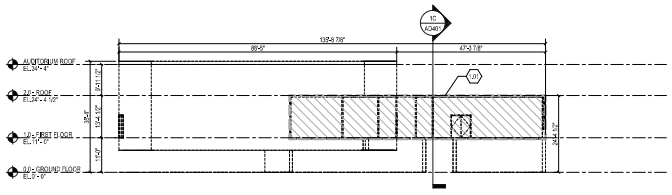
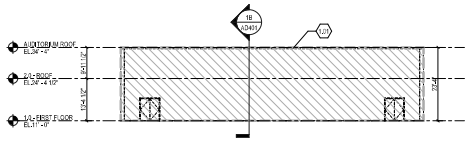


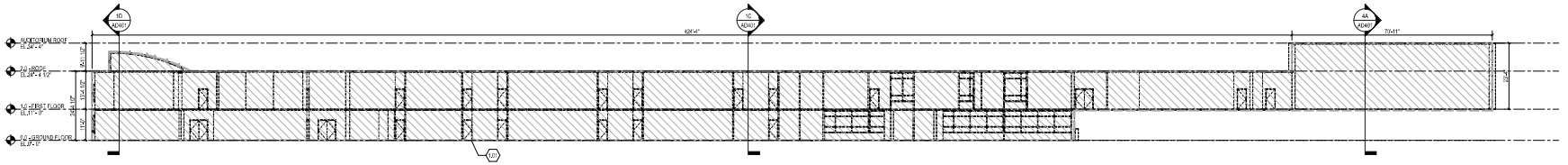
1A BUILDING SECTION 01
1/16" = 1'-0"



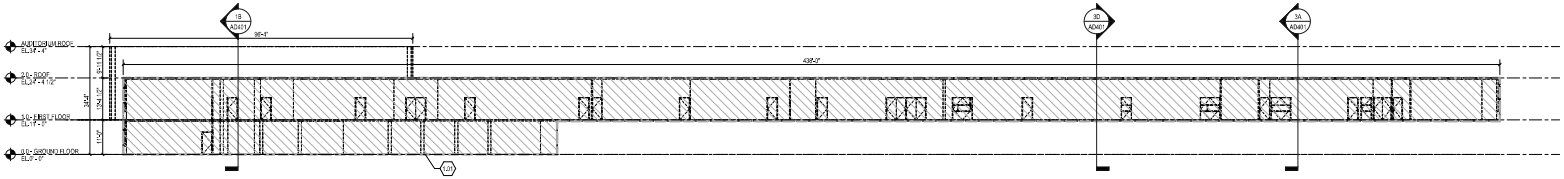
3A BUILDING SECTION 02
1/16" = 1'-0"



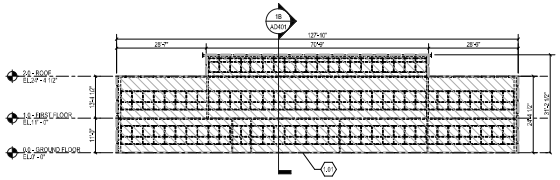
4A BUILDING SECTION 03
1/16" = 1'-0"



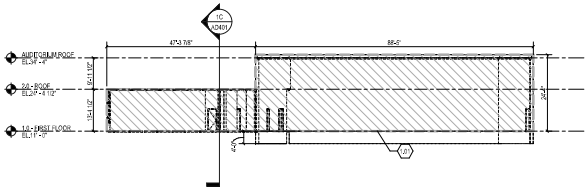
1B BUILDING SECTION 04
1/16" = 1'-0"



1C BUILDING SECTION 05
1/16" = 1'-0"



1D BUILDING SECTION 06
1/16" = 1'-0"



3D BUILDING SECTION 07
1/16" = 1'-0"

DEMOLITION KEYNOTE LEGEND	
Key Value	Keynote Text
1.01	REMOVE EXISTING BUILDING IN ITS ENTIRETY. DEMOLITION INCLUDES, BUT IS NOT LIMITED TO, WALLS AND OTHER PARTITIONS, STEEL STRUCTURE, CONCRETE SLAB-ON-GRADE, CONCRETE FOUNDATIONS, FLOOR FINISHES, ROOFING, ROOF TOP UNITS, HVAC, PLUMBING AND ELECTRICAL SYSTEMS. REFER TO MECHANICAL AND CIVIL DRAWINGS FOR EXTENT OF EXISTING SITE UTILITIES REMOVEL AND TERMINATION.

DEMOLITION PLAN LEGEND

EXISTING CONSTRUCTION TO BE REMOVED IN IT'S ENTIRETY, REFER TO DEMOLITION KEYNOTE 1.01

WALL DESIGNATION

EXISTING TO REMAIN

EXISTING TO BE REMOVED

DOOR DESIGNATION

EXISTING TO REMAIN

EXISTING TO BE REMOVED

DEMOLITION KEYNOTE

1.01 DEMOLITION KEYNOTE NUMBER

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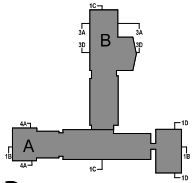

KEYPLAN

Number	Date	Issued For
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DEMO BUILDING SECTIONS

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1E SLAB EDGE AND MASONRY SHELF PLAN
1/16" = 1'-0"

EDGE OF SLAB PLAN GENERAL NOTES

1. DIMENSIONS LOCATE EDGE OF SLAB AT PERIMETER AND OPENINGS RELATIVE TO STRUCTURAL COLUMN CENTERLINES.

2. SLAB RECESSES, DEPRESSIONS, OVERPOURS AND HOUSEKEEPING PADS INDICATED VIA "SLAB PLAN GRAPHIC LEGEND" ON THIS SHEET.

3. REFER TO STRUCTURAL DRAWINGS FOR ADDITIONAL INFORMATION ON SLABS.

4. SEE SHEET A500 & A511 FOR TYPICAL SLAB DETAILS

EDGE OF SLAB PLAN GRAPHIC LEGEND

REFER TO STRUCTURAL DRAWINGS FOR REQUIRED SLAB THICKNESS/ COMPOSITION

- FLOOR SLAB (S.O.S. / ELEVATED SLAB)
- DEPRESSED OR ELEVATED SLAB
- ROOF DECK
- (-) X" - X" - SLAB ELEVATION (RELATIVE TO FLOOR LEVEL)

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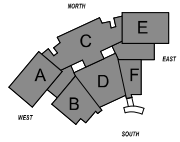

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRST FLOOR SLAB EDGE PLAN

Date: 07/08/2024
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Drawing Number: A091

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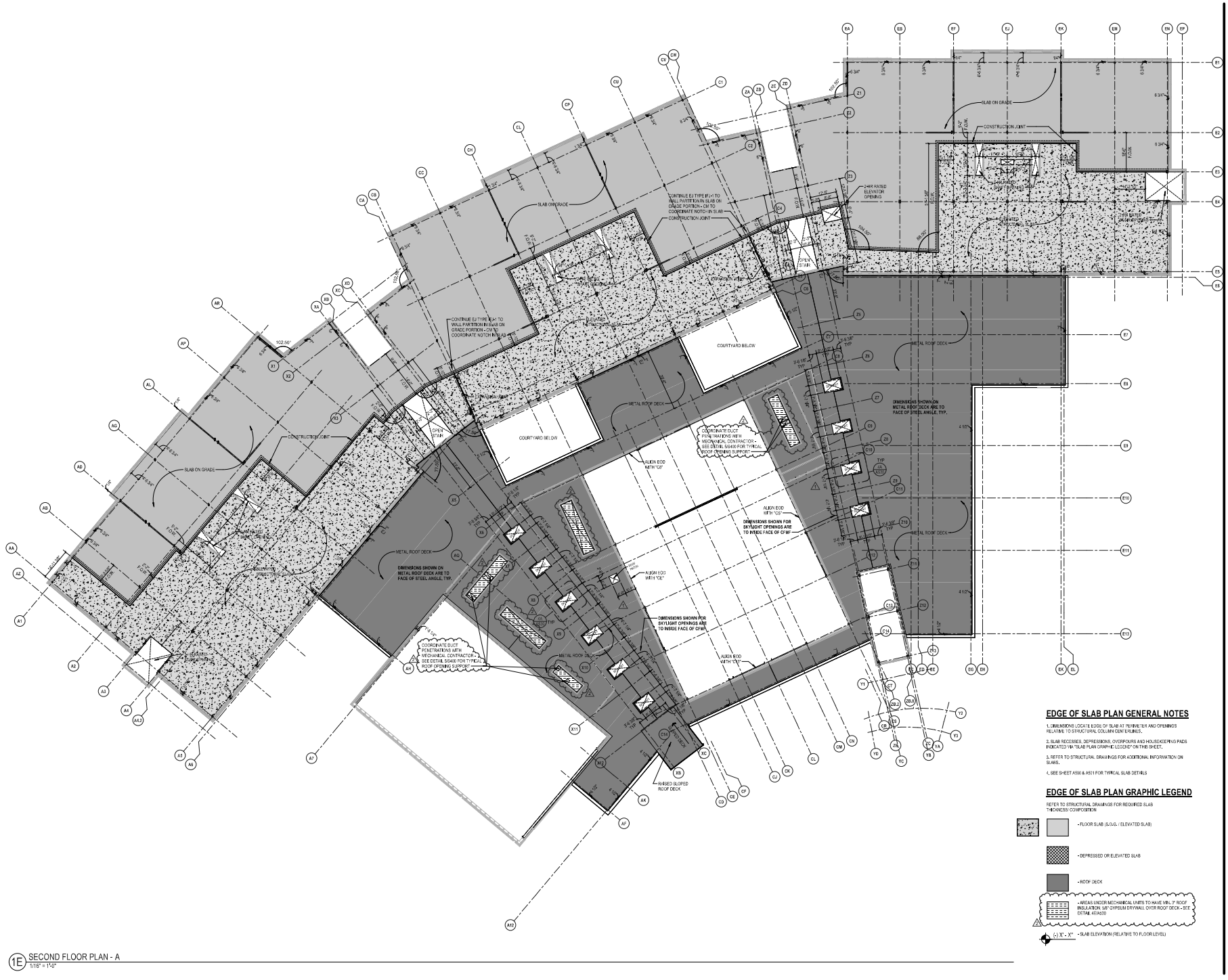

1E SECOND FLOOR PLAN - A
1/16" = 1'-0"

EDGE OF SLAB PLAN GENERAL NOTES

1. DIMENSIONS LOCATE EDGE OF SLAB AT PERIMETER AND OPENINGS RELATIVE TO STRUCTURAL COLUMN CENTERLINES.
2. SLAB RECESSES, DEPRESSIONS, OVERPOURS AND HOUSEKEEPING PADS INDICATED VIA "SLAB PLAN GRAPHIC LEGEND" ON THIS SHEET.
3. REFER TO STRUCTURAL DRAWINGS FOR ADDITIONAL INFORMATION ON SLABS.
4. SEE SHEET A500 & A511 FOR TYPICAL SLAB DETAILS

EDGE OF SLAB PLAN GRAPHIC LEGEND

REFER TO STRUCTURAL DRAWINGS FOR REQUIRED SLAB THICKNESS/ COMPOSITION

- FLOOR SLAB (S.O.G. / ELEVATED SLAB)
- DEPRESSED OR ELEVATED SLAB
- ROOF DECK
- AREAS UNDER MECHANICAL UNITS TO HAVE MIN. 3" ROOF INSULATION, 5/8" GYPSUM DRYWALL OVER ROOF DECK - SEE DETAIL 4/A5430
- (-) X' - X" - SLAB ELEVATION (RELATIVE TO FLOOR LEVEL)

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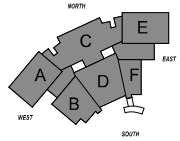

KEYPLAN

Number	Date	Issued For
2	11/06/2024	ADDENDUM NO. 6
1	10/30/2024	ADDENDUM NO. 4
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

SECOND FLOOR & LOWER ROOF SLAB EDGE PLAN

Date: 07/08/2024
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Drawing Number: A092

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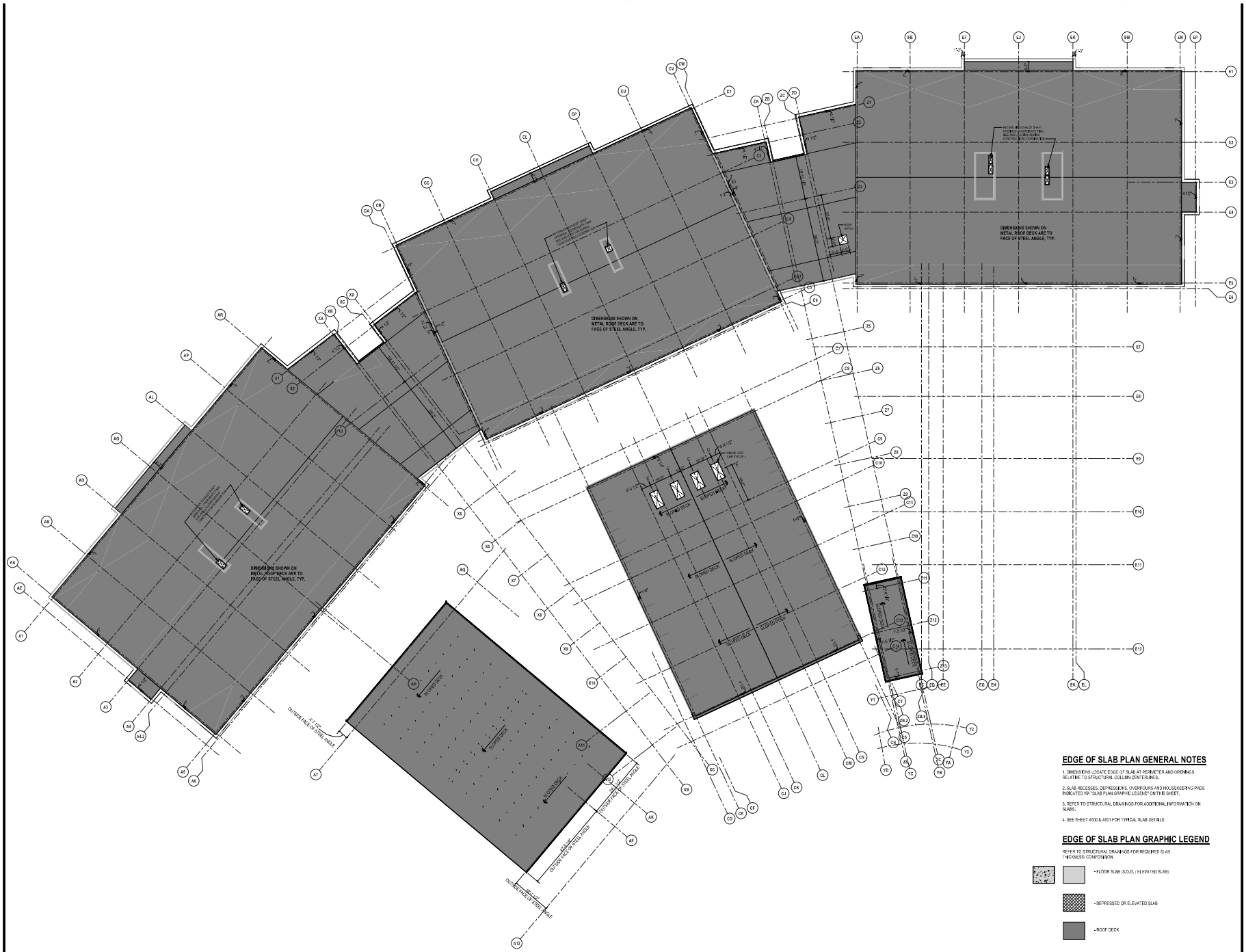

EDGE OF SLAB PLAN GENERAL NOTES

1. DIMENSIONS LOCATE EDGE OF SLAB AT PERIMETER AND OPENINGS RELATIVE TO STRUCTURAL COLUMN CENTERLINES.

2. SLAB RECESSES, DEPRESSIONS, OVERPOURS AND HOUSEKEEPING PADS INDICATED VIA "SLAB PLAN GRAPHIC LEGEND" ON THIS SHEET.

3. REFER TO STRUCTURAL DRAWINGS FOR ADDITIONAL INFORMATION ON SLABS.

4. SEE SHEET A500 & A511 FOR TYPICAL SLAB DETAILS

EDGE OF SLAB PLAN GRAPHIC LEGEND

REFER TO STRUCTURAL DRAWINGS FOR REQUIRED SLAB THICKNESS/ COMPOSITION

- FLOOR SLAB (S.O.S. / ELEVATED SLAB)
- DEPRESSED OR ELEVATED SLAB
- ROOF DECK
- (-) X' - X" - SLAB ELEVATION (RELATIVE TO FLOOR LEVEL)

1E 3 - ROOF SLAB EDGE PLAN
1/16" = 1'-0"

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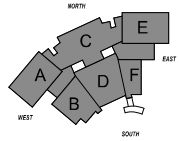

KEYPLAN

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ROOF SLAB EDGE PLAN

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Drawing Number: A093

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FLOOR PLAN GRAPHIC LEGEND

- NEW WALL CONSTRUCTION
- NEW MASONRY CONSTRUCTION
- PATH OF EXPANSION JOINT - PROVIDE EXPANSION JOINT COVERS AS SHOWN ON "AL" SERIES AND A200 SERIES
- CASEWORK COUNTER OR SILL - SEE DETAILS & FINISH DRAWINGS
- FE — FIRE EXTINGUISHER
- FEC — FIRE EXTINGUISHER CABINET
- FEL — FIRE EXTINGUISHER LOCKER UNIT
- FEB — FIRE EXTINGUISHER / FIRE BLANKET CABINET
- FVC — FIRE VALVE CABINET
- EP — ELECTRICAL PANEL
- ACCESSIBLE CLEAR FLOOR SPACE
- CR — CARD READER
- APF — AUTOMATIC DOOR OPERATOR PUSH PLATE
- HO — HOLD OPEN
- MHO — MAGNETIC HOLD OPEN
- ES — EMERGENCY SHOWER
- EW — EYE WASH
- EWC — ELECTRIC WATER COOLER
- DF/ BF — DRINKING FOUNTAIN/ BOTTLE FILLER
- FB — FLOOR BOX - RE: MEP AND TECH
- P.T. — FLOOR POKE THROUGH - SEE SBA602 & ELEC TECH
- AED — DEFIBRILLATOR
- FD — FLOOR DRAIN - RE: SEA606
- CO — FLOOR CLEANOUT
- IFP — INTERACTIVE FLAT PANEL
- FPD — FLAT PANEL DISPLAY
- MPS — MANUAL PROJECTION SCREEN
- PPS — POWERED PROJECTION SCREEN
- WB__ — WHITE BOARD (NUMBER IS LENGTH IN FEET)
- TB__ — TACK BOARD (NUMBER IS LENGTH IN FEET)
- VD1 - VD2 — VISUAL DISPLAY SURFCE - RE: FINISH PLANS
- EXTENT OF BELOW GRADE WATERPROOFING AND 2" INSULATION - REFER TO DETAIL 3A/A601
- 12"w x 18"d x 76"h - 2 TIER STUDENT LOCKER - TYPE "A"
- 12"w x 18"d x 42"h - 1 TIER STUDENT LOCKER - TYPE "B"
- 18"w x 18"d x 72"h - 1 TIER CUSTODIAN LOCKER - TYPE "C"
- 12"w x 18"d x 76"h - 2 TIER ATHLETICS LOCKER - TYPE "D"
- 12"w x 18"d x 76"h - 4 TIER PE LOCKER - TYPE "E"

* REFER TO THE FINISH PRODUCT LIST FOR LIST OF MATERIALS USED IN THE ATOM MODELING SERIES.

FLOOR PLAN GENERAL NOTES

1. REFER TO GENERAL INFORMATION SHEET FOR LIST OF TYPICAL ABBREVIATIONS AND TYPICAL ARCHITECTURAL GRAPHIC LEGENDS AND SYMBOLS.

2. REFER TO TYPICAL PARTITION TYPES AND DETAILS SHEETS A600 - A606. ALL PARTITIONS SHALL BE TYPE 1 U.O.N. ALL MASONRY PARTITIONS SHALL BE TYPE M5 U.O.N.. FOR ACOUSTIC CONTINUITY AT TOPS OF PARTITIONS CENTERED ON OR DIRECTLY ADJACENT TO STEEL BEAMS, REFER TO SPECTIC DETAILS ON SHEET A602

3. REFER TO CODE INFORMATION AND FIRE SAFETY PLAN DRAWINGS FOR LOCATIONS OF FIRE-RESISTANCE RATED PARTITIONS AND NON-FIRE-RESISTANCE RATED SMOKE PARTITIONS.

4. ALIGN PARTITIONS WITH COLUMN OR MULLION CENTERLINE, UNLESS OTHERWISE NOTED.

5. DIMENSIONS ARE FROM FACE OF WALL TO FACE OF WALL, (U.E.; FACE OF GYPSUM BOARD OR MASONRY) OR FROM FACE OF EXISTING CONDITION OR FROM COLUMN CENTERLINE, UNLESS OTHERWISE NOTED. DIMENSIONS NOTED AS "CLEAR" SHALL BE FROM FINISH FACE TO FINISH FACE (ie. FACE OF CERAMIC TILE TO FACE OF CERAMIC TILE). VERIFY ALL EXISTING DIMENSIONS IN THE FIELD.

6. ALL MASONRY DIMENSIONS, INDICATED "M.O.", ARE NOMINAL DIMENSIONS, UNLESS OTHERWISE NOTED. ACTUAL MASONRY OPENING DIMENSION = NOMINAL MASONRY OPENING DIMENSION + ONE MORTAR JOINT (I.E. 4'-0" M.O. = 4'-0" + 1" ACTUAL OPENING DIMENSION).

7. REFER TO "AL" SERIES AND PLAN ENLARGEMENTS FOR ADDITIONAL DIMENSIONS.

8. REFER TO DOOR AND FRAME DETAILS FOR ADDITIONAL INFORMATION. PROVIDE MINIMUM 4-INCH CLEARANCE FROM FACE OF DOOR JAMB TO FACE OF ADJACENT WALL, UNLESS OTHERWISE NOTED.

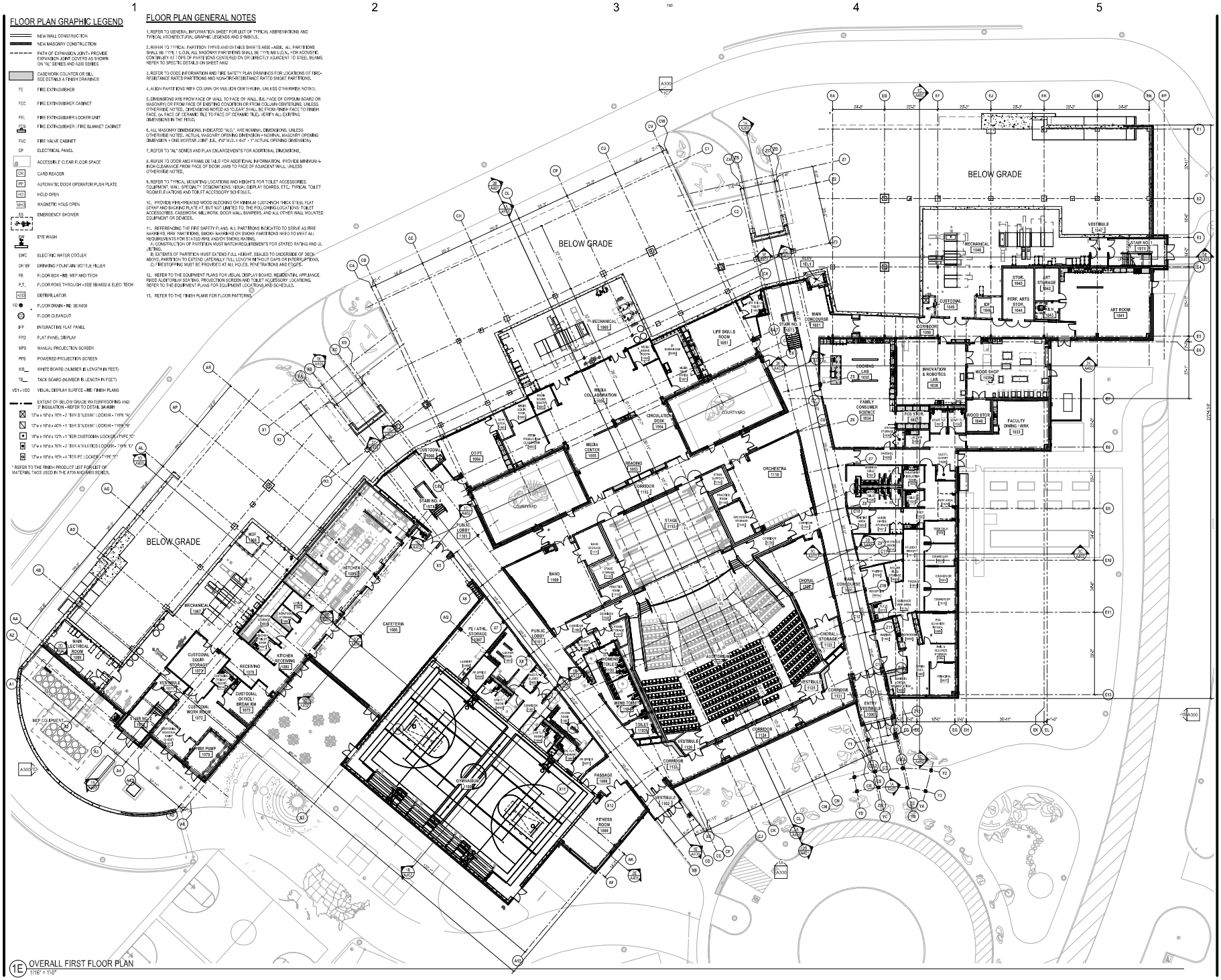
9. REFER TO TYPICAL MOUNTING LOCATIONS AND HEIGHTS FOR TOILET ACCESSORIES, EQUIPMENT, WALL SPECIALTY DESIGNATIONS, VISUAL DISPLAY BOARDS, ETC., TYPICAL TOILET ROOM ELEVATIONS AND TOILET ACCESSORY SCHEDULES.

10. PROVIDE FIRE-TREATED WOOD BLOCKING OR MINIMUM 0.075-INCH THICK STEEL FLAT STRAP AND BACKING PLATE AT, BUT NOT LIMITED TO, THE FOLLOWING LOCATIONS: TOILET ACCESSORIES, CASEWORK, MILLWORK, DOOR WALL BUMPERS, AND ALL OTHER WALL MOUNTED EQUIPMENT OR DEVICES.

11. REFERENCING THE FIRE SAFETY PLANS, ALL PARTITIONS INDICATED TO SERVE AS FIRE BARRIERS, FIRE PARTITIONS, SMOKE BARRIERS OR SMOKE PARTITIONS NEED TO MEET ALL REQUIREMENTS FOR STATED FIRE AND/OR SMOKE RATING.
A) CONSTRUCTION OF PARTITION MUST MATCH REQUIREMENTS FOR STATED RATING AND UL LISTING.
B) EXTENTS OF PARTITION MUST EXTEND FULL HEIGHT, SEALED TO UNDERSIDE OF DECK ABOVE. PARTITION TO EXTEND LATERALLY FULL LENGTH WITHOUT GAPS OR INTERRUPTIONS.
C) FIRESTOPPING MUST BE PROVIDED AT ALL HOLES, PENETRATIONS AND FISSURES.

12. REFER TO THE EQUIPMENT PLANS FOR VISUAL DISPLAY BOARD, RESIDENTIAL APPLIANCE, FIXED AUDITORIUM SEATING, PROJECTION SCREEN AND TOILET ACCESSORY LOCATIONS. REFER TO THE EQUIPMENT PLANS FOR EQUIPMENT LOCATIONS AND SCHEDULE.

13. REFER TO THE FINISH PLANS FOR FLOOR PATTERNS.



1E OVERALL FIRST FLOOR PLAN
1/16" = 1'-0"

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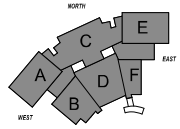
Checked: JZ

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane,
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

OVERALL FIRST FLOOR PLAN

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A101

Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_GREENWICH_CENTRAL_MS_R23.rvt
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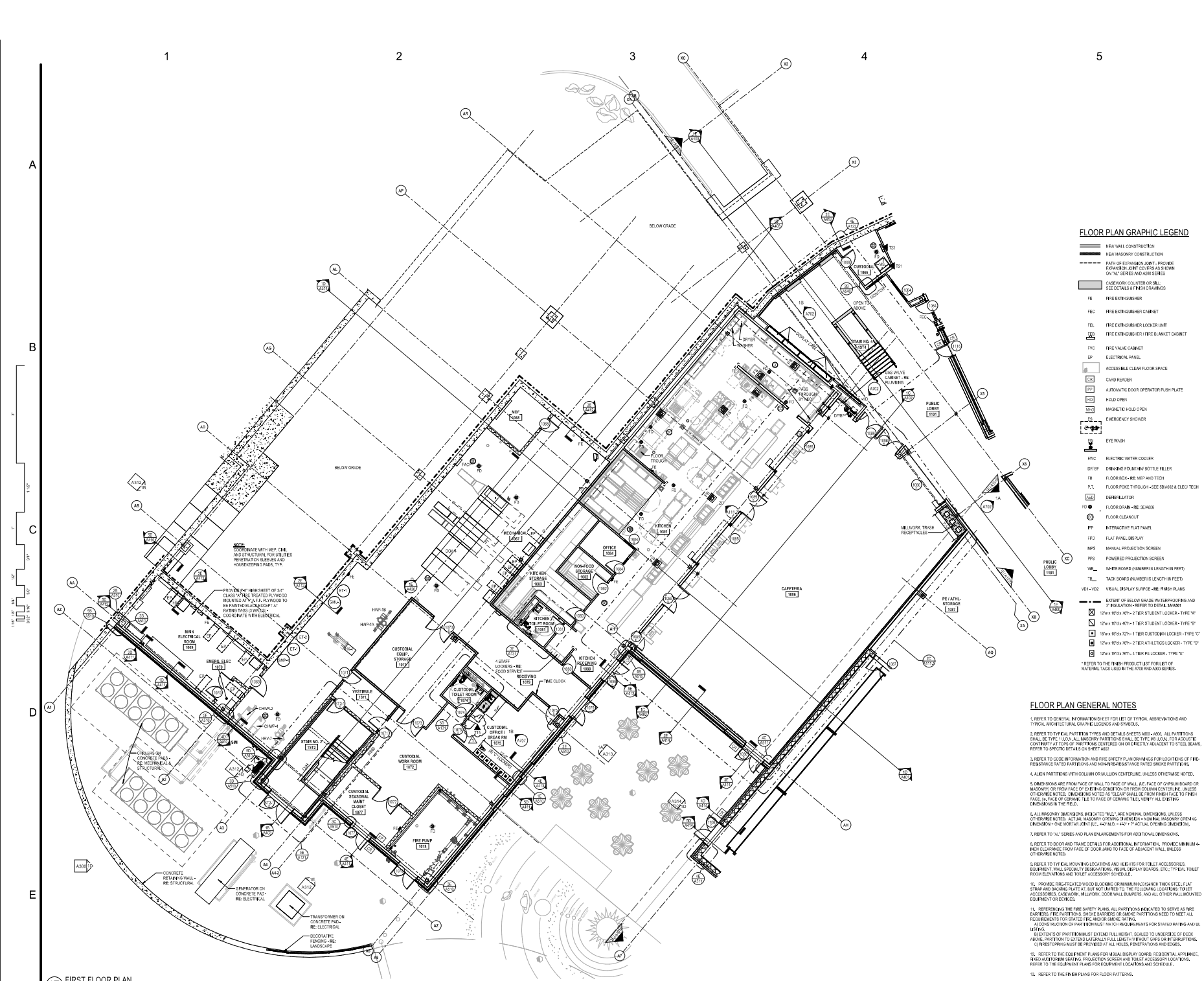

FLOOR PLAN GRAPHIC LEGEND

- NEW WALL CONSTRUCTION
- NEW MASONRY CONSTRUCTION
- PATH OF EXPANSION JOINT - PROVIDE EXPANSION JOINT COVERS AS SHOWN ON "AL" SERIES AND A200 SERIES
- CASEWORK COUNTER OR SILL, SEE DETAILS & FINISH DRAWINGS
- FE FIRE EXTINGUISHER
- FEC FIRE EXTINGUISHER CABINET
- FEL FIRE EXTINGUISHER LOCKER UNIT
- FEB FIRE EXTINGUISHER / FIRE BLANKET CABINET
- FVC FIRE VALVE CABINET
- EP ELECTRICAL PANEL
- ACCESSIBLE CLEAR FLOOR SPACE
- CR CARD READER
- DO AUTOMATIC DOOR OPERATOR PUSH PLATE
- HO HOLD OPEN
- MHO MAGNETIC HOLD OPEN
- ES EMERGENCY SHOWER
- EW EYE WASH
- EWC ELECTRIC WATER COOLER
- DF/ BF DRINKING FOUNTAIN/ BOTTLE FILLER
- FB FLOOR BOX - RE: MEP AND TECH
- P.T. FLOOR POKE THROUGH - SEE 5B/A602 & ELEC/ TECH
- DEF DEFIBRILLATOR
- FD FLOOR DRAIN - RE: 3E/A606
- FC FLOOR CLEANOUT
- IFP INTERACTIVE FLAT PANEL
- FPD FLAT PANEL DISPLAY
- MPS MANUAL PROJECTION SCREEN
- PPS POWERED PROJECTION SCREEN
- WB__ WHITE BOARD (NUMBER IS LENGTH IN FEET)
- TB__ TACK BOARD (NUMBER IS LENGTH IN FEET)
- VD1 - VD2 VISUAL DISPLAY SURFCE - RE: FINISH PLANS
- EXTENT OF BELOW GRADE WATERPROOFING AND 2" INSULATION - REFER TO DETAIL 3A/A601
- 12"w x 18"d x 76"h - 2 TIER STUDENT LOCKER - TYPE "A"
- 12"w x 18"d x 47"h - 1 TIER STUDENT LOCKER - TYPE "B"
- 18"w x 18"d x 72"h - 1 TIER CUSTODIAN LOCKER - TYPE "C"
- 12"w x 18"d x 76"h - 2 TIER ATHLETICS LOCKER - TYPE "D"
- 12"w x 18"d x 76"h - 4 TIER PE LOCKER - TYPE "E"

* REFER TO THE FINISH PRODUCT LIST FOR LIST OF MATERIAL TAGS USED IN THE A700 AND A900 SERIES.

FLOOR PLAN GENERAL NOTES

1. REFER TO GENERAL INFORMATION SHEET FOR LIST OF TYPICAL ABBREVIATIONS AND TYPICAL ARCHITECTURAL GRAPHIC LEGENDS AND SYMBOLS.

2. REFER TO TYPICAL PARTITION TYPES AND DETAILS SHEETS A600 - A606. ALL PARTITIONS SHALL BE TYPE 1 U.O.N., ALL MASONRY PARTITIONS SHALL BE TYPE MB U.O.N., FOR ACOUSTIC CONTINUITY AT TOPS OF PARTITIONS CENTERED ON OR DIRECTLY ADJACENT TO STEEL BEAMS. REFER TO SPECIFIC DETAILS ON SHEET A602

3. REFER TO CODE INFORMATION AND FIRE SAFETY PLAN DRAWINGS FOR LOCATIONS OF FIRE-RESISTANCE RATED PARTITIONS AND NON-FIRE-RESISTANCE RATED SMOKE PARTITIONS.

4. ALIGN PARTITIONS WITH COLUMN OR MULLION CENTERLINE, UNLESS OTHERWISE NOTED.

5. DIMENSIONS ARE FROM FACE OF WALL TO FACE OF WALL, (E., FACE OF GYPSUM BOARD OR MASONRY, OR FROM FACE OF EXISTING CONDITION OR FROM COLUMN CENTERLINE, UNLESS OTHERWISE NOTED. DIMENSIONS NOTED AS "CLEAR" SHALL BE FROM FINISH FACE TO FINISH FACE, (E., FACE OF CERAMIC TILE TO FACE OF CERAMIC TILE), VERIFY ALL EXISTING DIMENSIONS IN THE FIELD.

6. ALL MASONRY DIMENSIONS, INDICATED "M.D.", ARE NOMINAL DIMENSIONS, UNLESS OTHERWISE NOTED. ACTUAL MASONRY OPENING DIMENSION = NOMINAL MASONRY OPENING DIMENSION + ONE MORTAR JOINT (E., 4-0" M.O. = 4'-0" + 1" ACTUAL OPENING DIMENSION).

7. REFER TO "AL" SERIES AND PLAN ENLARGEMENTS FOR ADDITIONAL DIMENSIONS.

8. REFER TO DOOR AND FRAME DETAILS FOR ADDITIONAL INFORMATION. PROVIDE MINIMUM 4-INCH CLEARANCE FROM FACE OF DOOR JAMB TO FACE OF ADJACENT WALL UNLESS OTHERWISE NOTED.

9. REFER TO TYPICAL MOUNTING LOCATIONS AND HEIGHTS FOR TOILET ACCESSORIES, EQUIPMENT, WALL SPECIALTY DESIGNATIONS, VISUAL DISPLAY BOARDS, ETC., TYPICAL TOILET ROOM ELEVATIONS AND TOILET ACCESSORY SCHEDULE.

10. PROVIDE FIRE-TREATED WOOD BLOCKING OR MINIMUM 0.03/GAUGE THICK STEEL FLAT STRAP AND BACKING PLATE AT, BUT NOT LIMITED TO, THE FOLLOWING LOCATIONS: TOILET ACCESSORIES, CASEWORK, MILLWORK, DOOR WALL BUMPERS, AND ALL OTHER WALL MOUNTED EQUIPMENT OR DEVICES.

11. REFERENCING THE FIRE SAFETY PLANS, ALL PARTITIONS INDICATED TO SERVE AS FIRE BARRIERS, FIRE PARTITIONS, SMOKE BARRIERS OR SMOKE PARTITIONS NEED TO MEET ALL REQUIREMENTS FOR STATED FIRE AND/OR SMOKE RATING.
A) CONSTRUCTION OF PARTITION MUST MATCH REQUIREMENTS FOR STATED RATING AND UL LISTING.
B) EXTENTS OF PARTITION MUST EXTEND FULL HEIGHT, SEALED TO UNDERSIDE OF DECK ABOVE. PARTITION TO EXTEND LATERALLY FULL LENGTH WITHOUT GAPS OR INTERRUPTIONS.
C) FIRESTOPPING MUST BE PROVIDED AT ALL HOLES, PENETRATIONS AND EDGES.

12. REFER TO THE EQUIPMENT PLANS FOR VISUAL DISPLAY BOARD, RESIDENTIAL APPLIANCE, FIXED AUDITORIUM SEATING, PROJECTION SCREEN AND TOILET ACCESSORY LOCATIONS. REFER TO THE EQUIPMENT PLANS FOR EQUIPMENT LOCATIONS AND SCHEDULE.

13. REFER TO THE FINISH PLANS FOR FLOOR PATTERNS.

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Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane,
Greenwich, CT 06830

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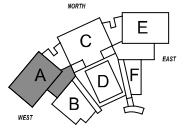

KEYPLAN

Number	Date	Issued For
1	10/30/2024	ADDENDUM NO. 4
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRST FLOOR PLAN - PART A

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: A101A

Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_GREENWICH_CENTRAL_MS_R23.rvt
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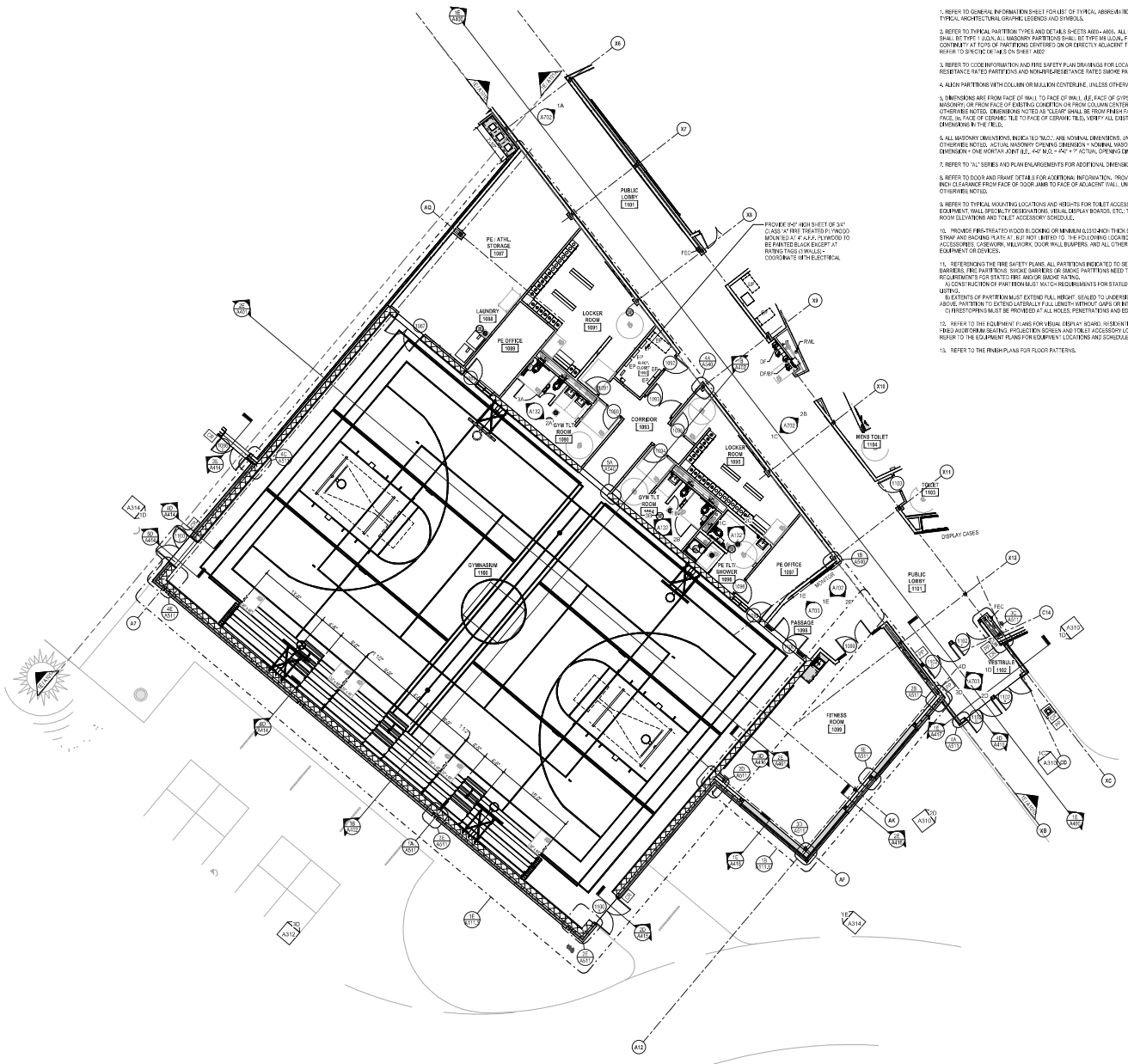

FLOOR PLAN GENERAL NOTES

1. REFER TO GENERAL INFORMATION SHEET FOR LIST OF TYPICAL ABBREVIATIONS AND TYPICAL ARCHITECTURAL GRAPHIC LEGENDS AND SYMBOLS.

2. REFER TO TYPICAL PARTITION TYPES AND DETAILS SHEETS A600 - A605. ALL PARTITIONS SHALL BE TYPE 1 U.O.N. ALL MASONRY PARTITIONS SHALL BE TYPE MS U.O.N.. FOR ACOUSTIC CONTINUITY AT TOPS OF PARTITIONS CENTERED ON OR DIRECTLY ADJACENT TO STEEL BEAMS, REFER TO SPECIFIC DETAILS ON SHEET A602

3. REFER TO CODE INFORMATION AND FIRE SAFETY PLAN DRAWINGS FOR LOCATIONS OF FIRE-RESISTANCE RATED PARTITIONS AND NONFIRE-RESISTANCE RATED SMOKE PARTITIONS.

4. ALIGN PARTITIONS WITH COLUMN OR MULLION CENTERLINE, UNLESS OTHERWISE NOTED.

5. DIMENSIONS ARE FROM FACE OF WALL TO FACE OF WALL, (U.E. FACE OF GYPSUM BOARD OR MASONRY, OR FROM FACE OF EXISTING CONDITION OR FROM COLUMN CENTERLINE, UNLESS OTHERWISE NOTED. DIMENSIONS NOTED AS "CLEAR" SHALL BE FROM FINISH FACE TO FINISH FACE, (U. FACE OF CERAMIC TILE TO FACE OF CERAMIC TILE). VERIFY ALL EXISTING DIMENSIONS IN THE FIELD.

6. ALL MASONRY DIMENSIONS, INDICATED "M.O.", ARE NOMINAL DIMENSIONS, UNLESS OTHERWISE NOTED. ACTUAL MASONRY OPENING DIMENSION = NOMINAL MASONRY OPENING DIMENSION + ONE MORTAR JOINT (U.E., 4-0" M.O. = 4'-0" + 1" ACTUAL OPENING DIMENSION).

7. REFER TO "A.1" SERIES AND PLAN ENLARGEMENTS FOR ADDITIONAL DIMENSIONS.

8. REFER TO DOOR AND FRAME DETAILS FOR ADDITIONAL INFORMATION. PROVIDE MINIMUM 4-INCH CLEARANCE FROM FACE OF DOOR JAMB TO FACE OF ADJACENT WALL, UNLESS OTHERWISE NOTED.

9. REFER TO TYPICAL MOUNTING LOCATIONS AND HEIGHTS FOR TOILET ACCESSORIES, EQUIPMENT, WALL SPECIALTY DESIGNATIONS, VISUAL DISPLAY BOARDS, ETC., TYPICAL TOILET ROOM ELEVATIONS AND TOILET ACCESSORY SCHEDULE.

10. PROVIDE FIRE-TREATED WOOD BLOCKING OR MINIMUM 0.0312-INCH THICK STEEL FLAT STRAP AND BACKING PLATE AT, BUT NOT LIMITED TO, THE FOLLOWING LOCATIONS: TOILET ACCESSORIES, CASEWORK, MILLWORK, DOOR WALL BUMPERS, AND ALL OTHER WALL MOUNTED EQUIPMENT OR DEVICES.

11. REFERENCING THE FIRE SAFETY PLANS, ALL PARTITIONS INDICATED TO SERVE AS FIRE BARRIERS, FIRE PARTITIONS, SMOKE BARRIERS OR SMOKE PARTITIONS NEED TO MEET ALL REQUIREMENTS FOR STATED FIRE AND/OR SMOKE RATING.
A) CONSTRUCTION OF PARTITION MUST MATCH REQUIREMENTS FOR STATED RATING AND UL LISTING.
B) EXTENTS OF PARTITION MUST EXTEND FULL HEIGHT, SEALED TO UNDERSIDE OF DECK ABOVE. PARTITION TO EXTEND LATERALLY FULL LENGTH WITHOUT GAPS OR INTERRUPTIONS.
C) FIRESTOPPING MUST BE PROVIDED AT ALL HOLES, PENETRATIONS AND EDGES.

12. REFER TO THE EQUIPMENT PLANS FOR VISUAL DISPLAY BOARD, RESIDENTIAL APPLIANCE, FIXED AUDITORIUM SEATING, PROJECTION SCREEN AND TOILET ACCESSORY LOCATIONS. REFER TO THE EQUIPMENT PLANS FOR EQUIPMENT LOCATIONS AND SCHEDULE.

13. REFER TO THE FINISH PLANS FOR FLOOR PATTERNS.

FLOOR PLAN GRAPHIC LEGEND

- NEW WALL CONSTRUCTION
- NEW MASONRY CONSTRUCTION
- PATH OF EXPANSION JOINT - PROVIDE EXPANSION JOINT COVERS AS SHOWN ON "A" SERIES AND A200 SERIES
- CASEWORK COUNTER OR SILL SEE DETAILS & FINISH DRAWINGS
- FE — FIRE EXTINGUISHER
- FEC — FIRE EXTINGUISHER CABINET
- FEL — FIRE EXTINGUISHER LOCKER UNIT
- FEC — FIRE EXTINGUISHER / FIRE BLANKET CABINET
- FVC — FIRE VALVE CABINET
- EP — ELECTRICAL PANEL
- ACCESSIBLE CLEAR FLOOR SPACE
- CR — CARD READER
- EP — AUTOMATIC DOOR OPERATOR PUSH PLATE
- HO — HOLD OPEN
- MHO — MAGNETIC HOLD OPEN
- ES — EMERGENCY SHOWER
- EW — EYE WASH
- EWC — ELECTRIC WATER COOLER
- DF/ BF — DRINKING FOUNTAIN/ BOTTLE FILLER
- FB — FLOOR BOX - RE: MEP AND TECH
- F.T. — FLOOR FOKE THROUGH - SEE SB/A02 & ELEC/ TECH
- AED — DEFIBRILLATOR
- FD — FLOOR DRAIN - RE: SEA/A06
- FC — FLOOR CLEANOUT
- IFP — INTERACTIVE FLAT PANEL
- FPD — FLAT PANEL DISPLAY
- MPS — MANUAL PROJECTION SCREEN
- PPS — POWERED PROJECTION SCREEN
- WB__ — WHITE BOARD (NUMBER IS LENGTH IN FEET)
- TB__ — TACK BOARD (NUMBER IS LENGTH IN FEET)
- VD1 - VD2 — VISUAL DISPLAY SURFCE - RE: FINISH PLANS
- EXTENT OF SELOW GRADE WATERPROOFING AND 2" INSULATION - REFER TO DETAIL 3A/A001
- 12'w x 18"d x 76"h - 2 TIER STUDENT LOCKER - TYPE "A"
- 12'w x 18"d x 40"h - 1 TIER STUDENT LOCKER - TYPE "B"
- 18"w x 18"d x 72"h - 1 TIER CUSTODIAN LOCKER - TYPE "C"
- 12'w x 18"d x 76"h - 2 TIER ATHLETICS LOCKER - TYPE "D"
- 12'w x 18"d x 76"h - 4 TIER PE LOCKER - TYPE "E"

* REFER TO THE FINISH PRODUCT LIST FOR LIST OF MATERIAL TAGS USED IN THE A700 AND A900 SERIES.

1E FIRST FLOOR PLAN
1/8" = 1'-0"

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Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane,
Greenwich, CT 06830

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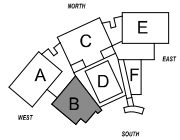

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRST FLOOR PLAN - PART B

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: A101B

Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_GREENWICH_CENTRAL_MS_R23.rvt
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1E FIRST FLOOR PLAN
1/8" = 1'-0"

FLOOR PLAN GRAPHIC LEGEND

- NEW WALL CONSTRUCTION
- NEW MASONRY CONSTRUCTION
- PATH OF EXPANSION JOINT - PROVIDE EXPANSION JOINT COVERS AS SHOWN ON "A" SERIES AND A500 SERIES
- CASEWORK COUNTER OR SILL: SEE DETAILS & FINISH DRAWINGS
- FE FIRE EXTINGUISHER
- FEC FIRE EXTINGUISHER CABINET
- FEL FIRE EXTINGUISHER LOCKER UNIT
- FEB FIRE EXTINGUISHER / FIRE BLANKET CABINET
- FVC FIRE VALVE CABINET
- EP ELECTRICAL PANEL
- ACCESSIBLE CLEAR FLOOR SPACE
- CR CARD READER
- PP AUTOMATIC DOOR OPERATOR PUSH PLATE
- HO HOLD OPEN
- MHO MAGNETIC HOLD OPEN
- ES EMERGENCY SHOWER
- EYE WASH
- EWC ELECTRIC WATER COOLER
- DF/ BF DRINKING FOUNTAIN/ BOTTLE FILLER
- FB FLOOR BOX - RE: MEP AND TECH
- F.T. FLOOR POKE THROUGH - SEE S5A002 & ELEC/ TECH
- AED DEFIBRILLATOR
- FD FLOOR DRAIN - RE: S5A000
- FC FLOOR CLEANOUT
- IFP INTERACTIVE FLAT PANEL
- FPD FLAT PANEL DISPLAY
- MPS MANUAL PROJECTION SCREEN
- PPS POWERED PROJECTION SCREEN
- WB_ WHITE BOARD (NUMBER IS LENGTH IN FEET)
- TB_ TACK BOARD (NUMBER IS LENGTH IN FEET)
- VDI - VD2 VISUAL DISPLAY SURFCE - RE: FINISH PLANS
- EXTENT OF BELOW GRADE WATERPROOFING AND 3" INSULATION - REFER TO DETAIL 3A/A551
- 12"w x 18"d x 78"h - 2 TIER STUDENT LOCKER - TYPE "A"
- 12"w x 18"d x 40"h - 1 TIER STUDENT LOCKER - TYPE "B"
- 18"w x 18"d x 72"h - 1 TIER CUSTODIAN LOCKER - TYPE "C"
- 12"w x 18"d x 78"h - 2 TIER ATHLETICS LOCKER - TYPE "D"
- 12"w x 18"d x 78"h - 4 TIER PE LOCKER - TYPE "E"

* REFER TO THE FINISH PRODUCT LIST FOR LIST OF MATERIAL TAGS USED IN THE A700 AND A800 SERIES.

FLOOR PLAN GENERAL NOTES

1. REFER TO GENERAL INFORMATION SHEET FOR LIST OF TYPICAL ABBREVIATIONS AND TYPICAL ARCHITECTURAL GRAPHIC LEGENDS AND SYMBOLS.

2. REFER TO TYPICAL PARTITION TYPES AND DETAILS SHEETS A600 - A606. ALL PARTITIONS SHALL BE TYPE 1 (U.O.N. ALL MASONRY PARTITIONS SHALL BE TYPE M5 U.O.N. FOR ACOUSTIC CONTINUITY AT TOPS OF PARTITIONS CENTERED ON OR DIRECTLY ADJACENT TO STEEL BEAMS, REFER TO SPECTIC DETAILS ON SHEET A602

3. REFER TO CODE INFORMATION AND FIRE SAFETY PLAN DRAWINGS FOR LOCATIONS OF FIRE-RESISTANCE RATED PARTITIONS AND NONFIRE-RESISTANCE RATED SMOKE PARTITIONS.

4. ALIGN PARTITIONS WITH COLUMN OR MULLION CENTERLINE, UNLESS OTHERWISE NOTED.

5. DIMENSIONS ARE FROM FACE OF WALL TO FACE OF WALL (I.E. FACE OF GYPSUM BOARD OR MASONRY, OR FROM FACE OF EXISTING CONDITION OR FROM COLUMN CENTERLINE, UNLESS OTHERWISE NOTED. DIMENSIONS NOTED AS "CLEAR" SHALL BE FROM FINISH FACE TO FINISH FACE, (e.g. FACE OF CERAMIC TILE TO FACE OF CERAMIC TILE). VERIFY ALL EXISTING DIMENSIONS IN THE FIELD.

6. ALL MASONRY DIMENSIONS INDICATED "M.O." ARE NOMINAL DIMENSIONS, UNLESS OTHERWISE NOTED. ACTUAL MASONRY OPENING DIMENSION = NOMINAL MASONRY OPENING DIMENSION + ONE MORTAR JOINT (I.E., 4'-0" M.O. = 3'-11 1/2" + 1/2" ACTUAL OPENING DIMENSION).

7. REFER TO "A." SERIES AND PLAN ENLARGMENTS FOR ADDITIONAL DIMENSIONS.

8. REFER TO DOOR AND FRAME DETAILS FOR ADDITIONAL INFORMATION. PROVIDE MINIMUM 4-INCH CLEARANCE FROM FACE OF DOOR JAMB TO FACE OF ADJACENT WALL, UNLESS OTHERWISE NOTED.

9. REFER TO TYPICAL MOUNTING LOCATIONS AND HEIGHTS FOR TOILET ACCESSORIES, EQUIPMENT, WALL SPECIALTY DESIGNATIONS, VISUAL DISPLAY BOARDS, ETC.; TYPICAL TOILET ROOM ELEVATIONS AND TOILET ACCESSORY SCHEDULE.

10. PROVIDE FIRE-TREATED WOOD BLOCKING OR MINIMUM (GS)14GAGE THICK STEEL FLAT STRAP AND BACKING PLATE AT, BUT NOT LIMITED TO, THE FOLLOWING LOCATIONS: TOILET ACCESSORIES, CASEWORK, MILLWORK, DOOR WALL BUMPERS, AND ALL OTHER WALL MOUNTED EQUIPMENT OR DEVICES.

11. REFERENCING THE FIRE SAFETY PLANS, ALL PARTITIONS INDICATED TO SERVE AS FIRE BARRIERS, FIRE PARTITIONS, SMOKE BARRIERS OR SMOKE PARTITIONS NEED TO MEET ALL REQUIREMENTS FOR STATED FIRE AND/OR SMOKE RATING.
A) CONSTRUCTION OF PARTITION MUST MATCH REQUIREMENTS FOR STATED RATING AND UL LISTING.
B) EXTENTS OF PARTITION MUST EXTEND FULL HEIGHT, SEALED TO UNDERSIDE OF DECK ABOVE. PARTITION TO EXTEND LATERALLY FULL LENGTH WITHOUT GAPS OR INTERRUPTIONS.
C) FIRESTOPPING MUST BE PROVIDED AT ALL HOLES, PENETRATIONS AND EDGES.

12. REFER TO THE EQUIPMENT PLANS FOR VISUAL DISPLAY BOARD, PROJECTION APPLIANCE, TIERED AUDITORIUM SEATING, PROJECTION SCREEN AND TOILET ACCESSORY LOCATIONS, REFER TO THE EQUIPMENT PLANS FOR EQUIPMENT LOCATIONS AND SCHEDULE.

13. REFER TO THE FINISH PLANS FOR FLOOR PATTERNS.

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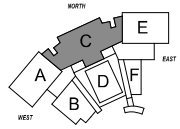
Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane,
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRST FLOOR PLAN - PART C

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: A101C

Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_GREENWICH_CENTRAL_MS_R22.rvt
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1E FIRST FLOOR PLAN
1/8" = 1'-0"

FLOOR PLAN GENERAL NOTES

1. REFER TO GENERAL INFORMATION SHEET FOR LIST OF TYPICAL ABBREVIATIONS AND TYPICAL ARCHITECTURAL DRAWING LEGENDS AND SYMBOLS.

2. REFER TO TYPICAL PARTITION TYPES AND DETAILS SHEETS A600 - A606. ALL PARTITIONS SHALL BE TYPE 1 U.O.N. ALL MASONRY PARTITIONS SHALL BE TYPE MW.U.O.N. FOR ACOUSTIC CONTINUITY AT TOPS OF PARTITIONS CENTERED ON OR DIRECTLY ADJACENT TO STEEL BEAMS, REFER TO SPECTIC DETAILS ON SHEET A602

3. REFER TO CODE INFORMATION AND FIRE SAFETY PLAN DRAWINGS FOR LOCATIONS OF FIRE-RESISTANCE RATED PARTITIONS AND NON-FIRE-RESISTANCE RATED SMOKE PARTITIONS.

4. ALIGN PARTITIONS WITH COLUMN OR MULLION CENTERLINE, UNLESS OTHERWISE NOTED.

5. DIMENSIONS ARE FROM FACE OF WALL TO FACE OF WALL, (I.E. FACE OF GYPSUM BOARD OR MASONRY) OR FROM FACE OF EXISTING CONSTRUCTION OR FROM COLUMN CENTERLINE, UNLESS OTHERWISE NOTED. DIMENSIONS NOTED AS "CLEAR" SHALL BE FROM FINISH FACE TO FINISH FACE, (ie. FACE OF CERAMIC TILE TO FACE OF CERAMIC TILE). VERIFY ALL EXISTING DIMENSIONS IN THE FIELD.

6. ALL MASONRY DIMENSIONS INDICATED "M.O." ARE NOMINAL DIMENSIONS, UNLESS OTHERWISE NOTED. ACTUAL MASONRY OPENING DIMENSION = NOMINAL MASONRY OPENING DIMENSION + ONE MORTAR JOINT (I.E., 4'-0" M.O. + 4'-0" + 1" ACTUAL OPENING DIMENSION).

7. REFER TO "AL" SERIES AND PLAN ENLARGEMENTS FOR ADDITIONAL DIMENSIONS.

8. REFER TO DOOR AND FRAME DETAILS FOR ADDITIONAL INFORMATION. PROVIDE MINIMUM 4-INCH CLEARANCE FROM FACE OF DOOR JAMB TO FACE OF ADJACENT WALL, UNLESS OTHERWISE NOTED.

9. REFER TO TYPICAL MOUNTING LOCATIONS AND HEIGHTS FOR TOILET ACCESSORIES, EQUIPMENT, WALL SPECIALTY DESIGNATIONS, VISUAL DISPLAY BOARDS, ETC., TYPICAL TOILET ROOM ELEVATIONS AND TOILET ACCESSORY SCHEDULE.

10. PROVIDE FIRE-TREATED WOOD BLOCKING OR MINIMUM 0.0312-INCH THICK STEEL FLAT STRAP AND BACKING PLATE AT, BUT NOT LIMITED TO, THE FOLLOWING LOCATIONS: TOILET ACCESSORIES, CASEWORK, MILLWORK, DOOR WALL BUMPERS, AND ALL OTHER WALL MOUNTED EQUIPMENT OR DEVICES.

11. REFERENCING THE FIRE SAFETY PLANS, ALL PARTITIONS INDICATED TO SERVE AS FIRE BARRIERS, FIRE PARTITIONS, SMOKE BARRIERS OR SMOKE PARTITIONS NEED TO MEET ALL REQUIREMENTS FOR STATED FIRE AND/OR SMOKE RATING.
A) CONSTRUCTION OF PARTITION MUST MATCH REQUIREMENTS FOR STATED RATING AND UL LISTING.
B) EXTENTS OF PARTITION MUST EXTEND FULL HEIGHT, SEALED TO UNDERSIDES OF DECK ABOVE. PARTITION TO EXTEND LATERALLY FULL LENGTH WITHOUT GAPS OR INTERRUPTIONS.
C) FIRESTOPPING MUST BE PROVIDED AT ALL HOLES, PENETRATIONS AND EDGES.

12. REFER TO THE EQUIPMENT PLANS FOR VISUAL DISPLAY BOARD, RESIDENTIAL APPLIANCE, FIXED AUDITORIUM SEATING, PROJECTION SCREEN, AND TOILET ACCESSORY LOCATIONS. REFER TO THE EQUIPMENT PLANS FOR EQUIPMENT LOCATIONS AND SCHEDULE.

13. REFER TO THE FINISH PLANS FOR FLOOR PATTERNS.

FLOOR PLAN GRAPHIC LEGEND

- NEW WALL CONSTRUCTION
- NEW MASONRY CONSTRUCTION
- PATH OF EXPANSION JOINT - PROVIDE EXPANSION JOINT COVERS AS SHOWN ON "AL" SERIES AND A200 SERIES
- CASEWORK COUNTER OR SILL. SEE DETAILS & FINISH DRAWINGS
- FE FIRE EXTINGUISHER
- FEC FIRE EXTINGUISHER CABINET
- FEL FIRE EXTINGUISHER LOCKER UNIT
- FEB FIRE EXTINGUISHER / FIRE BLANKET CABINET
- FVC FIRE VALVE CABINET
- EP ELECTRICAL PANEL
- ACCESSIBLE CLEAR FLOOR SPACE
- CR CARD READER
- EPT AUTOMATIC DOOR OPERATOR PUSH PLATE
- HO HOLD OPEN
- MHO MAGNETIC HOLD OPEN
- ES EMERGENCY SHOWER
- EW EYE WASH
- EWC ELECTRIC WATER COOLER
- DFI BF DRINKING FOUNTAIN/ BOTTLE FILLER
- FB FLOOR BOX - RE: MEP AND TECH
- F.T. FLOOR POKE THROUGH - SEE SB/A602 & ELEC/ TECH
- AED DEFIBRILLATOR
- FD FLOOR DRAIN - RE: SE/A606
- FLOOR CLEANOUT
- IFP INTERACTIVE FLAT PANEL
- FPD FLAT PANEL DISPLAY
- MPS MANUAL PROJECTION SCREEN
- PPS POWERED PROJECTION SCREEN
- WB__ WHITE BOARD (NUMBERS IS LENGTH IN FEET)
- TB__ TACK BOARD (NUMBERS IS LENGTH IN FEET)
- VD1 - VD2 VISUAL DISPLAY SURFCE - RE: FINISH PLANS
- EXTENT OF BELOW GRADE WATERPROOFING AND 2" INSULATION - REFER TO DETAIL 3/A/A601
- 12"w x 18"d x 76"h - 2 TIER STUDENT LOCKER - TYPE "A"
- 12"w x 18"d x 40"h - 1 TIER STUDENT LOCKER - TYPE "B"
- 18"w x 18"d x 72"h - 1 TIER CUSTODIAN LOCKER - TYPE "C"
- 12"w x 18"d x 76"h - 2 TIER ATHLETICS LOCKER - TYPE "D"
- 12"w x 18"d x 76"h - 4 TIER PE LOCKER - TYPE "E"

* REFER TO THE FINISH PRODUCT LIST FOR LIST OF MATERIAL TAGS USED IN THE A700 AND A800 SERIES.

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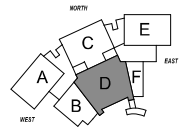
Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane,
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRST FLOOR PLAN - PART D

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: A101D

Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_GREENWICH_CENTRAL_MS_R22.rvt
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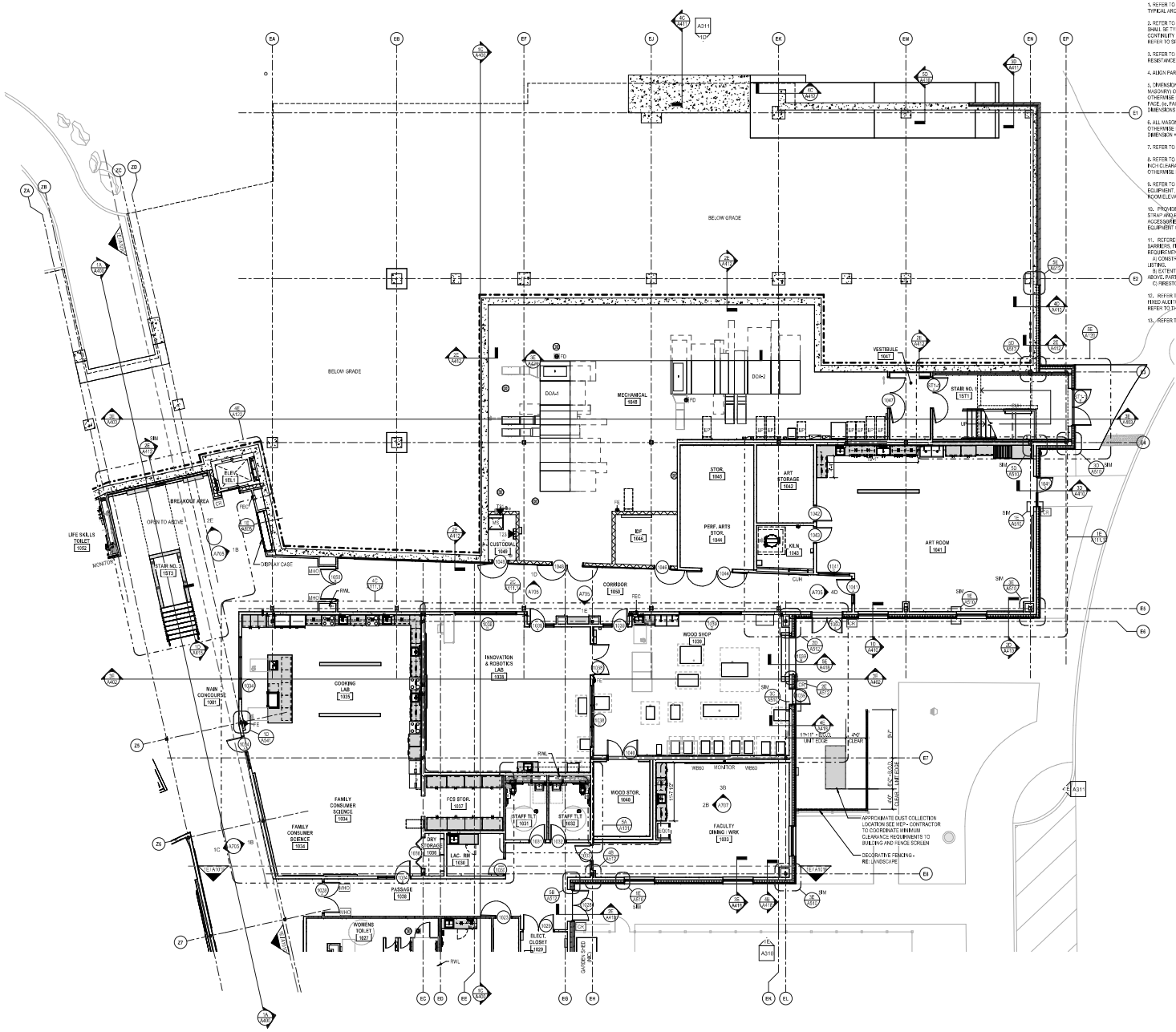

1E FIRST FLOOR PLAN
1/8" = 1'-0"

FLOOR PLAN GENERAL NOTES

1. REFER TO GENERAL INFORMATION SHEET FOR LIST OF TYPICAL ABBREVIATIONS AND TYPICAL ARCHITECTURAL GRAPHIC, LEGENDS AND SYMBOLS.

2. REFER TO TYPICAL PARTITION TYPES AND DETAILS SHEETS A600 - A606. ALL PARTITIONS SHALL BE TYPE 1 U.O.N. ALL MASONRY PARTITIONS SHALL BE TYPE MB U.O.N.. FOR ACOUSTIC CONTINUITY AT TOPS OF PARTITIONS CENTERED ON OR DIRECTLY ADJACENT TO STEEL BEAMS, REFER TO SPECIFIC DETAILS ON SHEET A602

3. REFER TO CODE INFORMATION AND FIRE SAFETY PLAN DRAWINGS FOR LOCATIONS OF FIRE-RESISTANCE RATED PARTITIONS AND NON-FIRE-RESISTANCE RATED SMOKE PARTITIONS.

4. ALIGN PARTITIONS WITH COLUMN OR MULLION CENTERLINE, UNLESS OTHERWISE NOTED.

5. DIMENSIONS ARE FROM FACE OF WALL TO FACE OF WALL, (I.E. FACE OF GYPSUM BOARD OR MASONRY OR FROM FACE OF EXISTING CONDITION OR FROM COLUMN CENTERLINE, UNLESS OTHERWISE NOTED. DIMENSIONS NOTED AS "CLEAR" SHALL BE FROM FINISH FACE TO FINISH FACE. (e.g. FACE OF CERAMIC TILE TO FACE OF CERAMIC TILE), VERIFY ALL EXISTING DIMENSIONS IN THE FIELD.

6. ALL MASONRY DIMENSIONS, INDICATED "M.O." ARE NOMINAL DIMENSIONS, UNLESS OTHERWISE NOTED. ACTUAL MASONRY OPENING DIMENSION = NOMINAL MASONRY OPENING DIMENSION + ONE MORTAR JOINT" I.E., 4'-0" M.O. = 4'-0" + 1" ACTUAL OPENING DIMENSIONS.

7. REFER TO "A" SERIES AND PLAN ENLARGEMENTS FOR ADDITIONAL DIMENSIONS.

8. REFER TO DOOR AND FRAME DETAILS FOR ADDITIONAL INFORMATION. PROVIDE MINIMUM 4-INCH CLEARANCE FROM FACE OF DOOR JAMB TO FACE OF ADJACENT WALL, UNLESS OTHERWISE NOTED.

9. REFER TO TYPICAL MOUNTING LOCATIONS AND HEIGHTS FOR TOILET ACCESSORIES, EQUIPMENT, WALL SPECIALTY DESIGNATIONS, VISUAL DISPLAY BOARDS, ETC., TYPICAL TOILET ROOM ELEVATIONS AND TOILET ACCESSORY SCHEDULE.

10. PROVIDE FIRE-TREATED WOOD BLOCKING OR MINIMUM 0.0312-INCH THICK STEEL FLAT STRAP AND BACKING PLATE AT, BUT NOT LIMITED TO, THE FOLLOWING LOCATIONS: TOILET ACCESSORIES, CASEWORK, MILLWORK, DOOR WALL BUMPERS, AND ALL OTHER WALL MOUNTED EQUIPMENT OR DEVICES.

11. REFERENCING THE FIRE SAFETY PLANS, ALL PARTITIONS INDICATED TO SERVE AS FIRE BARRIERS, FIRE PARTITIONS, SMOKE BARRIERS OR SMOKE PARTITIONS NEED TO MEET ALL REQUIREMENTS FOR STATED FIRE AND/OR SMOKE RATING.
A) CONSTRUCTION OF PARTITION MUST MATCH REQUIREMENTS FOR STATED RATING AND UL LISTING.
B) EXTENTS OF PARTITION MUST EXTEND FULL HEIGHT, SEALED TO UNDERSIDE OF DECK ABOVE. PARTITION TO EXTEND LATERALLY FULL LENGTH WITHOUT GAPS OR INTERRUPTIONS.
C) FIRESTOPPING MUST BE PROVIDED AT ALL HOLES, PENETRATIONS AND EDGES.

12. REFER TO THE EQUIPMENT PLANS FOR VISUAL DISPLAY BOARD, RESIDENTIAL APPLIANCE, FIXED AUDITORIUM SEATING, PROJECTION SCREEN AND TOILET ACCESSORY LOCATIONS. REFER TO THE EQUIPMENT PLANS FOR EQUIPMENT LOCATIONS AND SCHEDULE.

13. REFER TO THE FINISH PLANS FOR FLOOR PATTERNS.

FLOOR PLAN GRAPHIC LEGEND

- NEW WALL CONSTRUCTION
- NEW MASONRY CONSTRUCTION
- PATH OF EXPANSION JOINT - PROVIDE EXPANSION JOINT COVERS AS SHOWN ON "AL" SERIES AND A200 SERIES
- CASEWORK COUNTER OR SILL - SEE DETAILS & FINISH DRAWINGS
- FE FIRE EXTINGUISHER
- FEC FIRE EXTINGUISHER CABINET
- FEL FIRE EXTINGUISHER LOCKER UNIT
- FEB FIRE EXTINGUISHER / FIRE BLANKET CABINET
- FVC FIRE VALVE CABINET
- EP ELECTRICAL PANEL
- ACCESSIBLE CLEAR FLOOR SPACE
- CR CARD READER
- PP AUTOMATIC DOOR OPERATOR PUSH PLATE
- HO HOLD OPEN
- MHO MAGNETIC HOLD OPEN
- ES EMERGENCY SHOWER
- EYE WASH
- EWC ELECTRIC WATER COOLER
- DFI BF DRINKING FOUNTAIN BOTTLE FILLER
- FB FLOOR BOX - RE: MEP AND TECH
- F.T. FLOOR FIXE THROUGH - SEE SEA602 & ELEC/ TECH
- AED DEFIBRILLATOR
- FD FLOOR DRAIN - RE: SEA606
- FLOOR CLEANOUT
- IFP INTERACTIVE FLAT PANEL
- FPD FLAT PANEL DISPLAY
- MPS MANUAL PROJECTION SCREEN
- PPS POWERED PROJECTION SCREEN
- WB__ WHITE BOARD (NUMBER IS LENGTH IN FEET)
- TB__ TACK BOARD (NUMBER IS LENGTH IN FEET)
- VD1 - VD2 VISUAL DISPLAY SURFACE - RE: FINISH PLANS
- EXTENT OF BELOW GRADE WATERPROOFING AND 3" INSULATION - REFER TO DETAIL 3A/A001
- 12"w x 18"d x 72"h - 2 TIER STUDENT LOCKER - TYPE "A"
- 12"w x 18"d x 48"h - 1 TIER STUDENT LOCKER - TYPE "B"
- 18"w x 18"d x 72"h - 1 TIER CUSTODIAN LOCKER - TYPE "C"
- 12"w x 18"d x 76"h - 2 TIER ATHLETICS LOCKER - TYPE "D"
- 12"w x 18"d x 76"h - 4 TIER PE LOCKER - TYPE "E"

* REFER TO THE FINISH PRODUCT LIST FOR LIST OF MATERIAL TAGS USED IN THE A700 AND A900 SERIES.

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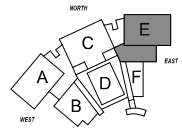
Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



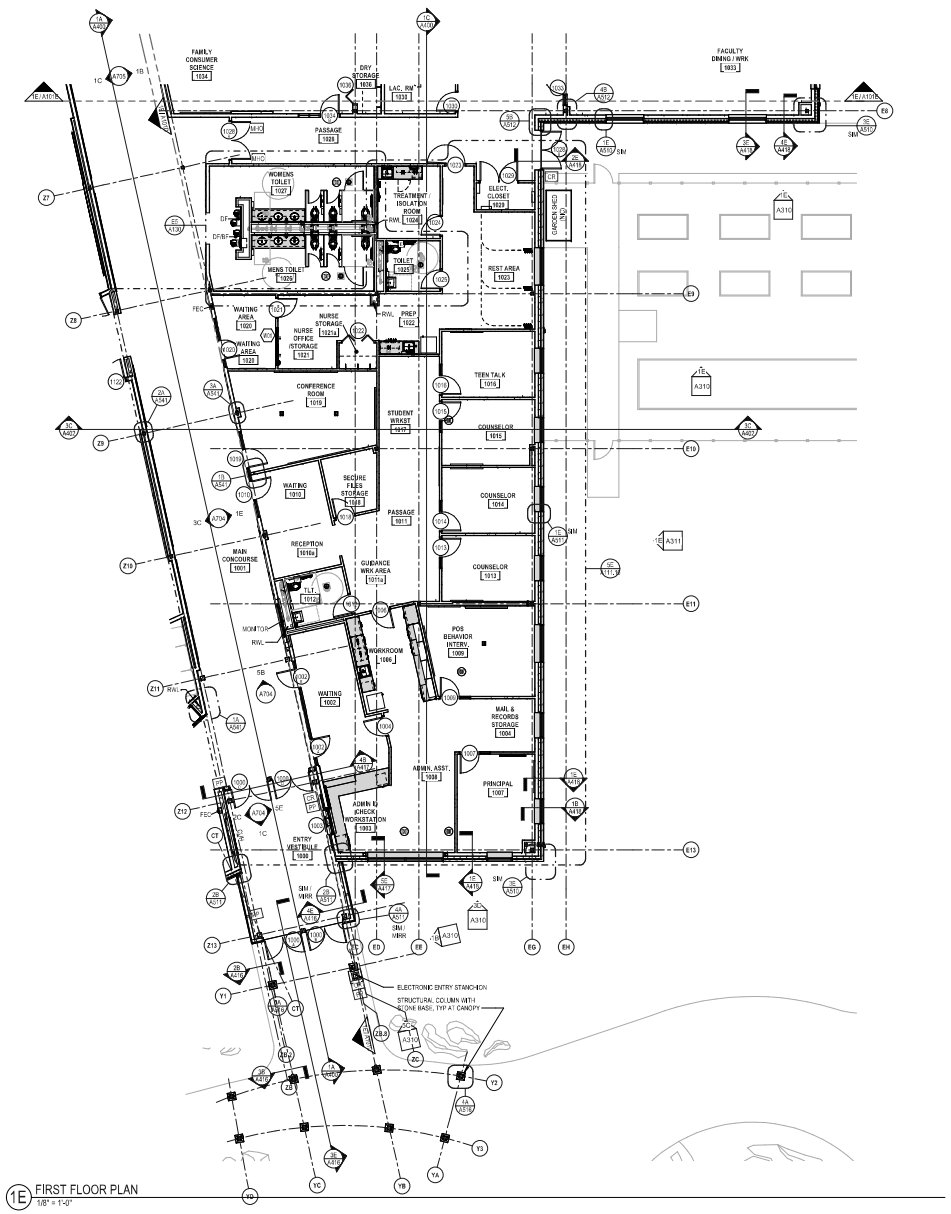
KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRST FLOOR PLAN - PART E

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: A101E

Autodesk Docs://22367.00 - Greenwich Central Middle School/K_22367_GREENWICH_CENTRAL_MS_R22.rvt
3/25/2024 3:51:21 PM



1E FIRST FLOOR PLAN
1/8" = 1'-0"

FLOOR PLAN GENERAL NOTES

1. REFER TO GENERAL INFORMATION SHEET FOR LIST OF TYPICAL ABBREVIATIONS AND TYPICAL ARCHITECTURAL GRAPHIC LEGENDS AND SYMBOLS.

2. REFER TO TYPICAL PARTITION TYPES AND DETAILS SHEETS A650 - A655. ALL PARTITIONS SHALL BE TYPE 1 U.O.N. ALL MASONRY PARTITIONS SHALL BE TYPE MS U.O.N.. FOR ACOUSTIC CONTINUITY AT TOPS OF PARTITIONS CENTERED ON OR DIRECTLY ADJACENT TO STEEL BEAMS, REFER TO SPECIFIC DETAILS ON SHEET A652

3. REFER TO CODE INFORMATION AND FIRE SAFETY PLAN DRAWINGS FOR LOCATIONS OF FIRE-RESISTANCE RATED PARTITIONS AND NONFIRE-RESISTANCE RATED SMOKE PARTITIONS.

4. ALIGN PARTITIONS WITH COLUMN OR MULLION CENTERLINE, UNLESS OTHERWISE NOTED.

5. DIMENSIONS ARE FROM FACE OF WALL TO FACE OF WALL, (E. FACE OF GYPSUM BOARD OR MASONRY, OR FROM FACE OF EXISTING CONDITION OR FROM COLUMN CENTERLINE, UNLESS OTHERWISE NOTED. DIMENSIONS NOTED AS "CLEAR" SHALL BE FROM FINISH FACE TO FINISH FACE, (E. FACE OF CERAMIC TILE TO FACE OF CERAMIC TILE). VERIFY ALL EXISTING DIMENSIONS IN THE FIELD.

6. ALL MASONRY DIMENSIONS, INDICATED "M.O.", ARE NOMINAL DIMENSIONS, UNLESS OTHERWISE NOTED. ACTUAL MASONRY OPENING DIMENSION = NOMINAL MASONRY OPENING DIMENSION + ONE MORTAR JOINT (I.E., 4'-0" M.O. = 4'-0" + 3/8" ACTUAL OPENING DIMENSION).

7. REFER TO "A.1" SERIES AND PLAN ENLARGEMENTS FOR ADDITIONAL DIMENSIONS.

8. REFER TO DOOR AND FRAME DETAIL 8 FOR ADDITIONAL INFORMATION. PROVIDE MINIMUM 4-INCH CLEARANCE FROM FACE OF DOOR JAMB TO FACE OF ADJACENT WALL, UNLESS OTHERWISE NOTED.

9. REFER TO TYPICAL MOUNTING LOCATIONS AND HEIGHTS FOR TOILET ACCESSORIES, EQUIPMENT, WALL SPECIALTY DESIGNATIONS, VISUAL DISPLAY BOARDS, ETC., TYPICAL TOILET ROOM ELEVATIONS AND TOILET ACCESSORY SCHEDULE.

10. PROVIDE FIRE-TREATED WOOD BLOCKING OR MINIMUM 0.0312-INCH THICK STEEL FLAT STRAP AND BACKING PLATE AT, BUT NOT LIMITED TO, THE FOLLOWING LOCATIONS: TOILET ACCESSORIES, CASEWORK, MILLWORK, DOOR WALL BUMPERS, AND ALL OTHER WALL MOUNTED EQUIPMENT OR DEVICES.

11. REFERENCING THE FIRE SAFETY PLANS, ALL PARTITIONS INDICATED TO SERVE AS FIRE BARRIERS, FIRE PARTITIONS, SMOKE BARRIERS OR SMOKE PARTITIONS NEED TO MEET ALL REQUIREMENTS FOR STATED FIRE AND/OR SMOKE RATING.
A) CONSTRUCTION OF PARTITION MUST MATCH REQUIREMENTS FOR STATED RATING AND UL LISTING.
B) EXTENTS OF PARTITION MUST EXTEND FULL HEIGHT, SEALED TO UNDERSIDE OF DECK ABOVE. PARTITION TO EXTEND LATERALLY FULL LENGTH WITHOUT GAPS OR INTERRUPTIONS.
C) FIRESTOPPING MUST BE PROVIDED AT ALL HOLES, PENETRATIONS AND EDGES.

12. REFER TO THE EQUIPMENT PLANS FOR VISUAL DISPLAY BOARD, RESIDENTIAL APPLIANCE, FIXED AUDITORIUM SEATING, PROJECTION SCREEN AND TOILET ACCESSORY LOCATIONS. REFER TO THE EQUIPMENT PLANS FOR EQUIPMENT LOCATIONS AND SCHEDULE.

13. REFER TO THE FINISH PLANS FOR FLOOR PATTERNS.

FLOOR PLAN GRAPHIC LEGEND

- NEW WALL CONSTRUCTION
- NEW MASONRY CONSTRUCTION
- PATH OF EXPANSION JOINT - PROVIDE EXPANSION JOINT COVERS AS SHOWN ON "A" SERIES AND A200 SERIES
- CASEWORK COUNTER OR SILL SEE DETAILS & FINISH DRAWINGS
- FE FIRE EXTINGUISHER
- FEC FIRE EXTINGUISHER CABINET
- FEL FIRE EXTINGUISHER LOCKER UNIT
- FEC FIRE EXTINGUISHER / FIRE BLANKET CABINET
- FVC FIRE VALVE CABINET
- EP ELECTRICAL PANEL
- ACCESSIBLE CLEAR FLOOR SPACE
- CR CARD READER
- EPD AUTOMATIC DOOR OPERATOR PUSH PLATE
- HO HOLD OPEN
- MHO MAGNETIC HOLD OPEN
- ES EMERGENCY SHOWER
- EW EYE WASH
- EWC ELECTRIC WATER COOLER
- DFI BF DRINKING FOUNTAIN- BOTTLE FILLER
- FB FLOOR BOX - RE: MEP AND TECH
- F.T. FLOOR FOKE THROUGH - SEE SB/A602 & ELEC/ TECH
- AED DEFIBRILLATOR
- FD FLOOR DRAIN - RE: SEA/A06
- FC FLOOR CLEANOUT
- IFP INTERACTIVE FLAT PANEL
- FPD FLAT PANEL DISPLAY
- MPS MANUAL PROJECTION SCREEN
- PPS POWERED PROJECTION SCREEN
- WB__ WHITE BOARD (NUMBERS LENGTH IN FEET)
- TB__ TACK BOARD (NUMBERS LENGTH IN FEET)
- VD1 - VD2 VISUAL DISPLAY SURFCE - RE: FINISH PLANS
- EXTENT OF BELOW GRADE WATERPROOFING AND 3" INSULATION - REFER TO DETAIL 3A/A001
- 12'w x 18"d x 76"h - 2 TIER STUDENT LOCKER - TYPE "A"
- 12'w x 18"d x 40"h - 1 TIER STUDENT LOCKER - TYPE "B"
- 18"w x 18"d x 72"h - 1 TIER CUSTODIAN LOCKER - TYPE "C"
- 12'w x 18"d x 76"h - 2 TIER ATHLETICS LOCKER - TYPE "D"
- 12'w x 18"d x 76"h - 4 TIER PE LOCKER - TYPE "E"

* REFER TO THE FINISH PRODUCT LIST FOR LIST OF MATERIAL TAGS USED IN THE A700 AND A900 SERIES.

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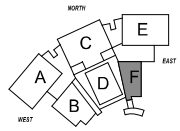
Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRST FLOOR PLAN - PART F

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **A101F**

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5/29/2024 2:51:44 PM

FLOOR PLAN GRAPHIC LEGEND

- NEW WALL CONSTRUCTION
- NEW MASONRY CONSTRUCTION
- PATH OF EXPANSION JOINT - PROVIDE EXPANSION JOINT COVERS AS SHOWN ON "AL" SERIES AND A200 SERIES
- CASEWORK COUNTER OR SILL - SEE DETAILS & FINISH DRAWINGS
- FE — FIRE EXTINGUISHER
- FEC — FIRE EXTINGUISHER CABINET
- FEL — FIRE EXTINGUISHER LOCKER UNIT
- FEB — FIRE EXTINGUISHER / FIRE BLANKET CABINET
- FVC — FIRE VALVE CABINET
- EP — ELECTRICAL PANEL
- ACCESSIBLE CLEAR FLOOR SPACE
- CR — CARD READER
- PD — AUTOMATIC DOOR OPERATOR PUSH PLATE
- HO — HOLD OPEN
- M-HO — MAGNETIC HOLD OPEN
- ES — EMERGENCY SHOWER
- EW — EYE WASH
- EWC — ELECTRIC WATER COOLER
- DFBF — DRINKING FOUNTAIN BOTTLE FILLER
- FB — FLOOR BOX - RE: MEP AND TECH
- F.T. — FLOOR POKE THROUGH - SEE 59/A602 & ELEC/ TECH
- AED — DEFIBRILLATOR
- FD — FLOOR DRAIN - RE: 39/A605
- FC — FLOOR CLEANOUT
- IFP — INTERACTIVE FLAT PANEL
- FPD — FLAT PANEL DISPLAY
- MPS — MANUAL PROJECTION SCREEN
- PPS — POWERED PROJECTION SCREEN
- WB_ — WHITE BOARD (NUMBER IS LENGTH IN FEET)
- TB_ — TACK BOARD (NUMBER IS LENGTH IN FEET)
- VD1 - VD2 — VISUAL DISPLAY SURFCE - RE: FINISH PLANS
- EXTENT OF BELOW GRADE WATERPROOFING AND 3" INSULATION - REFER TO DETAIL 34/A601
- 12"w x 18"d x 60"h - 2 TIER STUDENT LOCKER - TYPE "A"
- 12"w x 18"d x 48"h - 1 TIER STUDENT LOCKER - TYPE "B"
- 18"w x 18"d x 72"h - 1 TIER CUSTODIAN LOCKER - TYPE "C"
- 12"w x 18"d x 76"h - 2 TIER ATHLETICS LOCKER - TYPE "D"
- 12"w x 18"d x 76"h - 4 TIER PE LOCKER - TYPE "E"

* REFER TO THE FINISH PRODUCT LIST FOR LIST OF MATERIAL TAGS USED IN THE A700 AND A900 SERIES.

FLOOR PLAN GENERAL NOTES

1. REFER TO GENERAL INFORMATION SHEET FOR LIST OF TYPICAL ABBREVIATIONS AND TYPICAL ARCHITECTURAL GRAPHIC LEGENDS AND SYMBOLS.

2. REFER TO TYPICAL PARTITION TYPES AND DETAILS SHEETS A600 - A606. ALL PARTITIONS SHALL BE TYPE 1 U.O.N. ALL MASONRY PARTITIONS SHALL BE TYPE MI U.O.N.. FOR ACOUSTIC CONTINUITY AT TOPS OF PARTITIONS CENTERED ON OR DIRECTLY ADJACENT TO STEEL BEAMS, REFER TO SPECTIC DETAILS ON SHEET A602

3. REFER TO CODE INFORMATION AND FIRE SAFETY PLAN DRAWINGS FOR LOCATIONS OF FIRE-RESISTANCE RATED PARTITIONS AND NON-FIRE-RESISTANCE RATED SMOKE PARTITIONS.

4. ALIGN PARTITIONS WITH COLUMN OR MULLION CENTER LINE, UNLESS OTHERWISE NOTED.

5. DIMENSIONS ARE FROM FACE OF WALL TO FACE OF WALL, U.E. FACE OF GYPSUM BOARD OR MASONRY OR FROM FACE OF EXISTING CONDITION OR FROM COLUMN CENTERLINE, UNLESS OTHERWISE NOTED. DIMENSIONS NOTED AS "CLEAR" SHALL BE FROM FINISH FACE TO FINISH FACE, (e. FACE OF CERAMIC TILE TO FACE OF CERAMIC TILE. VERIFY ALL EXISTING DIMENSIONS IN THE FIELD.

6. ALL MASONRY DIMENSIONS INDICATED "M.O." ARE NOMINAL DIMENSIONS, UNLESS OTHERWISE NOTED. ACTUAL MASONRY OPENING DIMENSION = NOMINAL MASONRY OPENING DIMENSION - ONE MORTAR JOINT (I.E., 7'-7" M.O. = 7'-6" - 1" ACTUAL OPENING DIMENSION).

7. REFER TO "AL" SERIES AND PLAN ENLARGEMENTS FOR ADDITIONAL DIMENSIONS.

8. REFER TO DOOR AND FRAME DETAILS FOR ADDITIONAL INFORMATION. PROVIDE MINIMUM 4-INCH CLEARANCE FROM FACE OF DOOR JAMB TO FACE OF ADJACENT WALL, UNLESS OTHERWISE NOTED.

9. REFER TO TYPICAL MOUNTING LOCATIONS AND HEIGHTS FOR TOILET ACCESSORIES, EQUIPMENT, WALL SPECIALTY DESIGNATIONS, VISUAL DISPLAY BOARDS, ETC.; TYPICAL TOILET ROOM ELEVATIONS AND TOILET ACCESSORY SCHEDULE.

10. PROVIDE FIRE-TREATED WOOD BLOCKING OR MINIMUM 0.0312-INCH THICK STEEL FLAT STRAP AND BACKING PLATE AT, BUT NOT LIMITED TO, THE FOLLOWING LOCATIONS: TOILET ACCESSORIES, CASEWORK, MILLWORK, DOOR WALL BUMPERS, AND ALL OTHER WALL MOUNTED EQUIPMENT OR DEVICES.

11. REFERENCING THE FIRE SAFETY PLANS, ALL PARTITIONS INDICATED TO SERVE AS FIRE BARRIERS, FIRE PARTITIONS, SMOKE BARRIERS OR SMOKE PARTITIONS NEED TO MEET ALL REQUIREMENTS FOR STATED FIRE AND/OR SMOKE RATING.
A) CONSTRUCTION OF PARTITION MUST MATCH REQUIREMENTS FOR STATED RATING AND UL LISTING.
B) EXTENTS OF PARTITION MUST EXTEND FULL HEIGHT, SEALED TO UNDERSIDE OF DECK ABOVE. PARTITION TO EXTEND LATERALLY FULL LENGTH WITHOUT GAPS OR INTERRUPTIONS.
C) FIRESTOPPING MUST BE PROVIDED AT ALL HOLES, PENETRATIONS AND EDGES.

12. REFER TO THE EQUIPMENT PLANS FOR VISUAL DISPLAY BOARD, RESIDENTIAL APPLIANCE, FIXED AUDITORIUM SEATING, PROJECTION SCREEN AND TOILET ACCESSORY LOCATIONS. REFER TO THE EQUIPMENT PLANS FOR EQUIPMENT LOCATIONS AND SCHEDULE.

13. REFER TO THE FINISH PLANS FOR FLOOR PATTERNS.

1E OVERALL FIRST FLOOR PLAN
1/16" = 1'-0"

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Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane,
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

OVERALL SECOND FLOOR PLAN

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A102

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1E SECOND FLOOR PLAN - A
1/8" = 1'-0"

FLOOR PLAN GRAPHIC LEGEND

- NEW WALL CONSTRUCTION
- NEW MASONRY CONSTRUCTION
- PATH OF EXPANSION JOINT - PROVIDE EXPANSION JOINT COVERS AS SHOWN ON "AL" SERIES AND A200 SERIES
- CASEWORK COUNTER OR SILL SEE DETAILS & FINISH DRAWINGS
- FE FIRE EXTINGUISHER
- FEC FIRE EXTINGUISHER CABINET
- FEL FIRE EXTINGUISHER LOCKER UNIT
- FEB FIRE EXTINGUISHER / FIRE BLANKET CABINET
- FVC FIRE VALVE CABINET
- EP ELECTRICAL PANEL
- ACCESSIBLE CLEAR FLOOR SPACE
- CR CARD READER
- APP AUTOMATIC DOOR OPERATOR PUSH PLATE
- HO HOLD OPEN
- MHO MAGNETIC HOLD OPEN
- ES EMERGENCY SHOWER
- EW EYE WASH
- EWC ELECTRIC WATER COOLER
- DF/ BF DRINKING FOUNTAIN / BOTTLE FILLER
- FB FLOOR BOX - RE: MEP AND TECH
- P.T. FLOOR POKE THROUGH - SEE SBA602 & ELEC/ TECH
- AED DEFIBRILLATOR
- FD FLOOR DRAIN - RE: SEA606
- FC FLOOR CLEANOUT
- IFP INTERACTIVE FLAT PANEL
- FPD FLAT PANEL DISPLAY
- MPS MANUAL PROJECTION SCREEN
- PPS POWERED PROJECTION SCREEN
- WB__ WHITE BOARD (NUMBER IS LENGTH IN FEET)
- TB__ TACK BOARD (NUMBER IS LENGTH IN FEET)
- VD1 - VD2 VISUAL DISPLAY SURFCE - RE: FINISH PLANS
- EXTENT OF BELOW GRADE WATERPROOFING AND 2" INSULATION - REFER TO DETAIL 3A/A501
- 12"w x 18"d x 76"h - 2 TIER STUDENT LOCKER - TYPE "A"
- 12"w x 18"d x 42"h - 1 TIER STUDENT LOCKER - TYPE "B"
- 18"w x 18"d x 72"h - 1 TIER CUSTODIAN LOCKER - TYPE "C"
- 12"w x 18"d x 76"h - 2 TIER ATHLETICS LOCKER - TYPE "D"
- 12"w x 18"d x 76"h - 4 TIER PE LOCKER - TYPE "E"

* REFER TO THE FINISH PRODUCT LIST FOR LIST OF MATERIAL TAGS USED IN THE A700 AND A900 SERIES.

FLOOR PLAN GENERAL NOTES

1. REFER TO GENERAL INFORMATION SHEET FOR LIST OF TYPICAL ABBREVIATIONS AND TYPICAL ARCHITECTURAL GRAPHIC LEGENDS AND SYMBOLS.

2. REFER TO TYPICAL PARTITION TYPES AND DETAILS SHEETS A001 - A005. ALL PARTITIONS SHALL BE TYPE 1 U.O.N. ALL MASONRY PARTITIONS SHALL BE TYPE M1 U.O.N.. FOR ACOUSTIC CONTINUITY AT TOPS OF PARTITIONS CENTERED ON OR DIRECTLY ADJACENT TO STEEL BEAMS, REFER TO SPECTIC DETAILS ON SHEET A602

3. REFER TO CODE INFORMATION AND FIRE SAFETY PLAN DRAWINGS FOR LOCATIONS OF FIRE-RESISTANCE RATED PARTITIONS AND NON-FIRE-RESISTANCE RATED SMOKE PARTITIONS.

4. ALIGN PARTITIONS WITH COLUMN OR MULLION CENTERLINE, UNLESS OTHERWISE NOTED.

5. DIMENSIONS ARE FROM FACE OF WALL TO FACE OF WALL, @E. FACE OF GYPSUM BOARD OR MASONRY OR FROM FACE OF EXISTING CONDITION OR FROM COLUMN CENTERLINE, UNLESS OTHERWISE NOTED. DIMENSIONS NOTED AS "CLEAR" SHALL BE FROM FINISH FACE TO FINISH FACE, @ FACE OF CERAMIC TILE TO FACE OF CERAMIC TILE. VERIFY ALL EXISTING DIMENSIONS IN THE FIELD.

6. ALL MASONRY DIMENSIONS, INDICATED "M.O.", ARE NOMINAL DIMENSIONS, UNLESS OTHERWISE NOTED. ACTUAL MASONRY OPENING DIMENSION = NOMINAL MASONRY OPENING DIMENSION + ONE MORTAR JOINT (I.E. 4-0" M.O. = 4'-0" + 1" ACTUAL OPENING DIMENSION).

7. REFER TO "AL" SERIES AND PLAN ENLARGEMENTS FOR ADDITIONAL DIMENSIONS.

8. REFER TO DOOR AND FRAME DETAILS FOR ADDITIONAL INFORMATION. PROVIDE MINIMUM 4-INCH CLEARANCE FROM FACE OF DOOR JAMB TO FACE OF ADJACENT WALL, UNLESS OTHERWISE NOTED.

9. REFER TO TYPICAL MOUNTING LOCATIONS AND HEIGHTS FOR TOILET ACCESSORIES, EQUIPMENT, WALL SPECIALTY DESIGNATIONS, VISUAL DISPLAY BOARDS, ETC., TYPICAL TOILET ROOM ELEVATIONS AND TOILET ACCESSORY SCHEDULE.

10. PROVIDE FIRE-TREATED WOOD BLOCKING OR MINIMUM 0.0312-INCH THICK STEEL FLAT STRAP AND BACKING PLATE AS, BUT NOT LIMITED TO, THE FOLLOWING LOCATIONS FOR CT ACCESSORIES, CASEWORK, MILLWORK, DOOR WALL BUMPERS, AND ALL OTHER WALL MOUNTED EQUIPMENT OR DEVICES.

11. REFERENCING THE FIRE SAFETY PLANS, ALL PARTITIONS INDICATED TO SERVE AS FIRE BARRIERS, FIRE PARTITIONS, SMOKE BARRIERS OR SMOKE PARTITIONS NEED TO MEET ALL REQUIREMENTS FOR STATED FIRE AND/OR SMOKE RATING.
A) CONSTRUCTION OF PARTITION MUST MATCH REQUIREMENTS FOR STATED RATING AND UL LISTING.
B) EXTENTS OF PARTITION MUST EXTEND FULL HEIGHT, SEALED TO UNDERSIDE OF DECK ABOVE. PARTITION TO EXTEND LATERALLY FULL LENGTH WITHOUT GAPS OR INTERRUPTIONS.
C) FIRESTOPPING MUST BE PROVIDED AT ALL HOLES, PENETRATIONS AND EDGES.

12. REFER TO THE EQUIPMENT PLANS FOR VISUAL DISPLAY BOARD, RESIDENTIAL APPLIANCE, FIXED AUDITORIUM SEATING, PROJECTION SCREEN AND TOILET ACCESSORY LOCATIONS. REFER TO THE EQUIPMENT PLANS FOR EQUIPMENT LOCATIONS AND SCHEDULE.

13. REFER TO THE FINISH PLANS FOR FLOOR PATTERNS.

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Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane,
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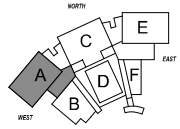

KEYPLAN

Number	Date	Issued For
1	10/23/2024	ADDENDUM NO. 3
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

SECOND FLOOR PLAN - PART A

Date	Drawing Number
07/08/2024	A102A
Scale: 1/8" = 1'-0"	
Proj. Number: 22367.00	

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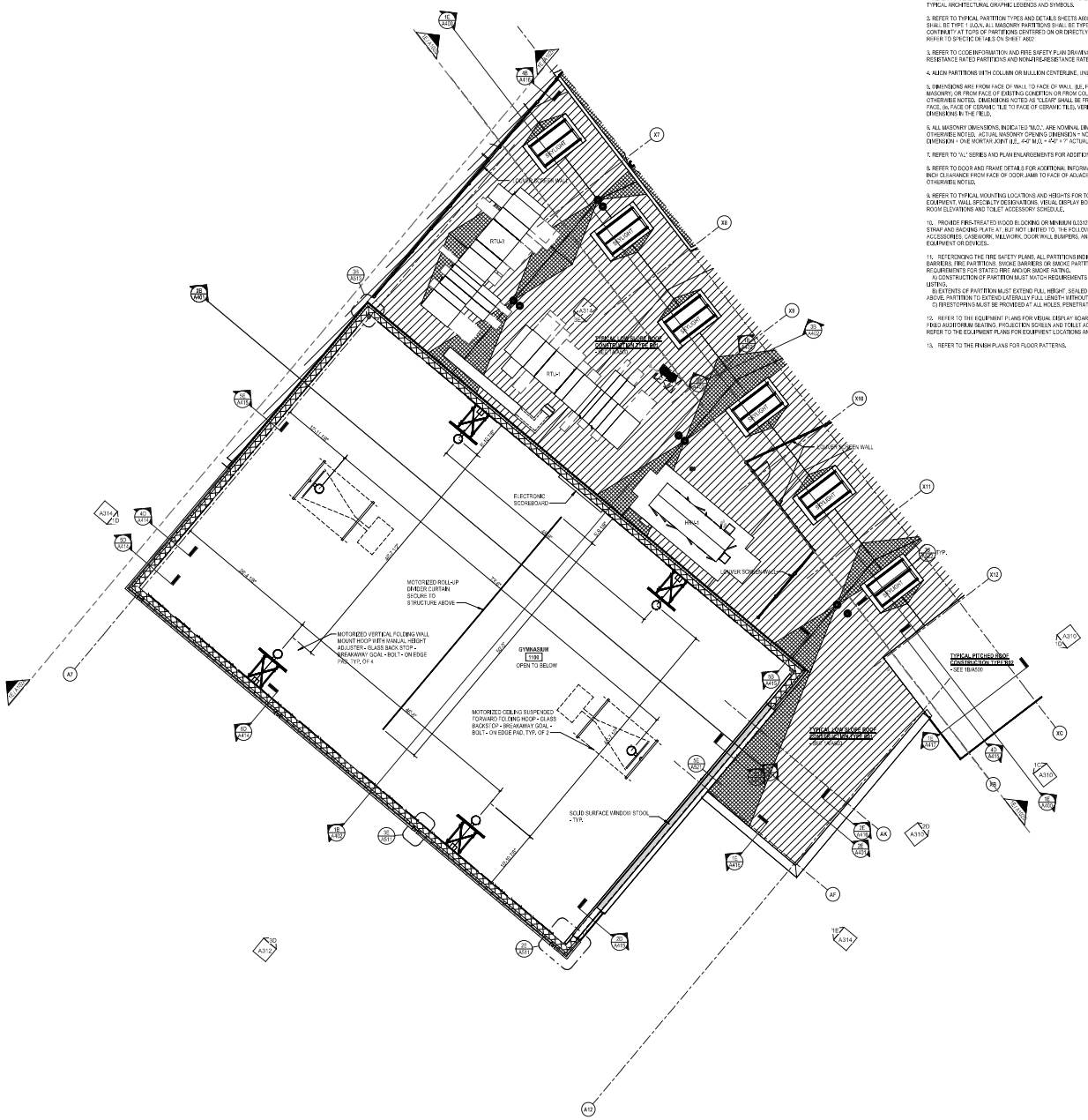

1E SECOND FLOOR PLAN - A
1/8" = 1'-0"

FLOOR PLAN GENERAL NOTES

1. REFER TO GENERAL INFORMATION SHEET FOR LIST OF TYPICAL ABBREVIATIONS AND TYPICAL ARCHITECTURAL GRAPHIC LEGENDS AND SYMBOLS.

2. REFER TO TYPICAL PARTITION TYPES AND DETAILS SHEETS A600 - A605. ALL PARTITIONS SHALL BE TYPE 1 U.O.N. ALL MASONRY PARTITIONS SHALL BE TYPE MS U.O.N.. FOR ACOUSTIC CONTINUITY AT TOPS OF PARTITIONS CERTIFIED ON OR DIRECTLY ADJACENT TO STEEL BEAMS, REFER TO SPECIFIC DETAILS ON SHEET A602

3. REFER TO CODE INFORMATION AND FIRE SAFETY PLAN DRAWINGS FOR LOCATIONS OF FIRE-RESISTANCE RATED PARTITIONS AND NON-FIRE-RESISTANCE RATED SMOKE PARTITIONS.

4. ALIGN PARTITIONS WITH COLUMN OR MULLION CENTERLINE, UNLESS OTHERWISE NOTED.

5. DIMENSIONS ARE FROM FACE OF WALL TO FACE OF WALL, (U.N.O.) FACE OF GYPSUM BOARD OR MASONRY, OR FROM FACE OF EXISTING CONDITION OR FROM COLUMN CENTERLINE, UNLESS OTHERWISE NOTED. DIMENSIONS NOTED AS "CLEAR" SHALL BE FROM FINISH FACE TO FINISH FACE, (U.N.O.) FACE OF CERAMIC TILE TO FACE OF CERAMIC TILES. VERIFY ALL EXISTING DIMENSIONS IN THE FIELD.

6. ALL MASONRY DIMENSIONS, INDICATED "M.O.", ARE NOMINAL DIMENSIONS, UNLESS OTHERWISE NOTED. ACTUAL MASONRY OPENING DIMENSION = NOMINAL MASONRY OPENING DIMENSION + ONE MORTAR JOINT (I.E., 4'-0" M.O. = 4'-0" + 1/2" ACTUAL OPENING DIMENSION).

7. REFER TO "A-" SERIES AND PLAN ENLARGEMENTS FOR ADDITIONAL DIMENSIONS.

8. REFER TO DOOR AND FRAME DETAILS FOR ADDITIONAL INFORMATION. PROVIDE MINIMUM 4-INCH CLEARANCE FROM FACE OF DOOR JAMB TO FACE OF ADJACENT WALL, UNLESS OTHERWISE NOTED.

9. REFER TO TYPICAL MOUNTING LOCATIONS AND HEIGHTS FOR TOILET ACCESSORIES, EQUIPMENT, WALL SPECIALTY DESIGNATIONS, VISUAL DISPLAY BOARDS, ETC., TYPICAL TOILET ROOM ELEVATIONS AND TOILET ACCESSORY SCHEDULE.

10. PROVIDE FIRE-TREATED WOOD BLOCKING OR MINIMUM 0.0312-INCH THICK STEEL FLAT STRAP AND BACKING PLATE AT, BUT NOT LIMITED TO, THE FOLLOWING LOCATIONS: TOILET ACCESSORIES, CASEWORK, MILLWORK, DOOR WALL BUMPERS, AND ALL OTHER WALL MOUNTED EQUIPMENT OR DEVICES.

11. REFERENCING THE FIRE SAFETY PLANS, ALL PARTITIONS INDICATED TO SERVE AS FIRE BARRIERS, FIRE PARTITIONS, SMOKE BARRIERS OR SMOKE PARTITIONS NEED TO MEET ALL REQUIREMENTS FOR STATED FIRE AND/OR SMOKE RATING.
A) CONSTRUCTION OF PARTITION MUST MATCH REQUIREMENTS FOR STATED RATING AND UL LISTING.
B) EXTENTS OF PARTITION MUST EXTEND FULL HEIGHT, SEALED TO UNDERSIDE OF DECK ABOVE. PARTITION TO EXTEND LATERALLY FULL LENGTH WITHOUT GAPS OR INTERRUPTIONS.
C) FIRESTOPPING MUST BE PROVIDED AT ALL HOLES, PENETRATIONS AND EDGES.

12. REFER TO THE EQUIPMENT PLANS FOR VISUAL DISPLAY BOARD, RESIDENTIAL APPLIANCE, FIXED AUDITORIUM SEATING, PROJECTION SCREEN AND TOILET ACCESSORY LOCATIONS. REFER TO THE EQUIPMENT PLANS FOR EQUIPMENT LOCATIONS AND SCHEDULE.

13. REFER TO THE FINISH PLANS FOR FLOOR PATTERNS.

FLOOR PLAN GRAPHIC LEGEND

- NEW WALL CONSTRUCTION
- NEW MASONRY CONSTRUCTION
- PATH OF EXPANSION JOINT - PROVIDE EXPANSION JOINT COVERS AS SHOWN ON "A" SERIES AND A200 SERIES
- CASEWORK COUNTER OR SILL SEE DETAILS & FINISH DRAWINGS
- FE FIRE EXTINGUISHER
- FEC FIRE EXTINGUISHER CABINET
- FEL FIRE EXTINGUISHER LOCKER UNIT
- FEC FIRE EXTINGUISHER / FIRE BLANKET CABINET
- FVC FIRE VALVE CABINET
- EP ELECTRICAL PANEL
- ACCESSIBLE CLEAR FLOOR SPACE
- CR CARD READER
- EP AUTOMATIC DOOR OPERATOR PUSH PLATE
- HO HOLD OPEN
- MHO MAGNETIC HOLD OPEN
- ES EMERGENCY SHOWER
- EW EYE WASH
- EWC ELECTRIC WATER COOLER
- DF/ BF DRINKING FOUNTAIN/ BOTTLE FILLER
- FB FLOOR BOX - RE: MEP AND TECH
- F.T. FLOOR FOKE THROUGH - SEE SB/A602 & ELEC/ TECH
- AED DEFIBRILLATOR
- FD FLOOR DRAIN - RE: SEA/A06
- FC FLOOR CLEANOUT
- IFP INTERACTIVE FLAT PANEL
- FPD FLAT PANEL DISPLAY
- MPS MANUAL PROJECTION SCREEN
- PPS POWERED PROJECTION SCREEN
- WB__ WHITE BOARD (NUMBER IS LENGTH IN FEET)
- TB__ TACK BOARD (NUMBER IS LENGTH IN FEET)
- VD1 - VD2 VISUAL DISPLAY SURFCE - RE: FINISH PLANS
- EXTENT OF BELOW GRADE WATERPROOFING AND 2" INSULATION - REFER TO DETAIL 3A/A001
- 12'w x 18'd x 76'h - 2 TIER STUDENT LOCKER - TYPE "A"
- 12'w x 18'd x 40'h - 1 TIER STUDENT LOCKER - TYPE "B"
- 18'w x 18'd x 72'h - 1 TIER CUSTODIAN LOCKER - TYPE "C"
- 12'w x 18'd x 76'h - 2 TIER ATHLETICS LOCKER - TYPE "D"
- 12'w x 18'd x 76'h - 4 TIER PE LOCKER - TYPE "E"

* REFER TO THE FINISH PRODUCT LIST FOR LIST OF MATERIAL TAGS USED IN THE A700 AND A900 SERIES.

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Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

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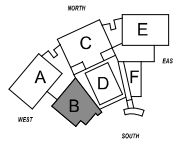

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

SECOND FLOOR PLAN - PART B

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **A102B**

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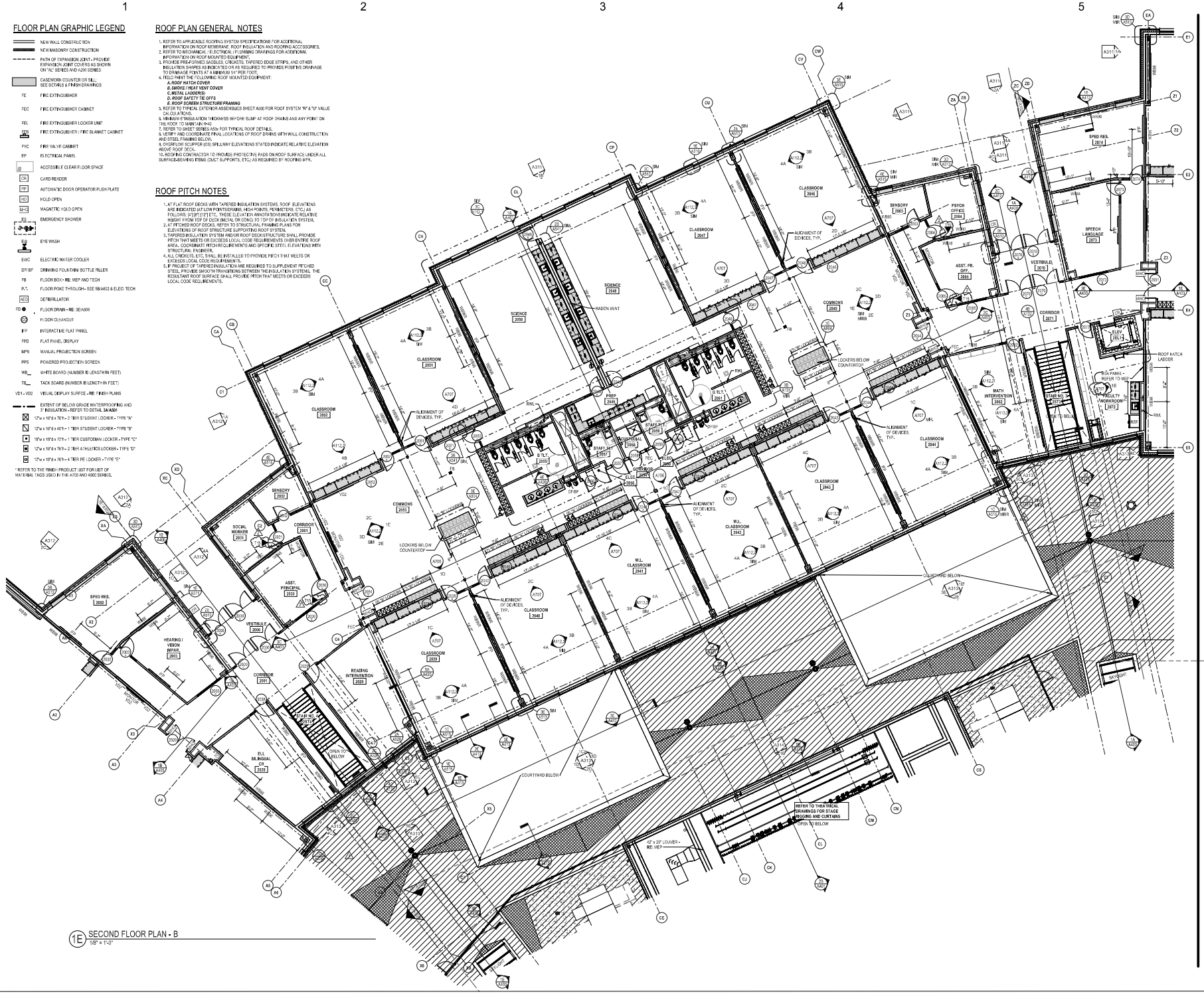

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Greenwich Public Schools

Greenwich Central Middle School

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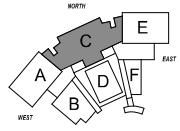

KEYPLAN

Number	Date	Issued For
2	10/30/2024	ADDENDUM NO. 4
1	10/23/2024	ADDENDUM NO. 3
	09/20/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

SECOND FLOOR PLAN - PART C

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: A102C

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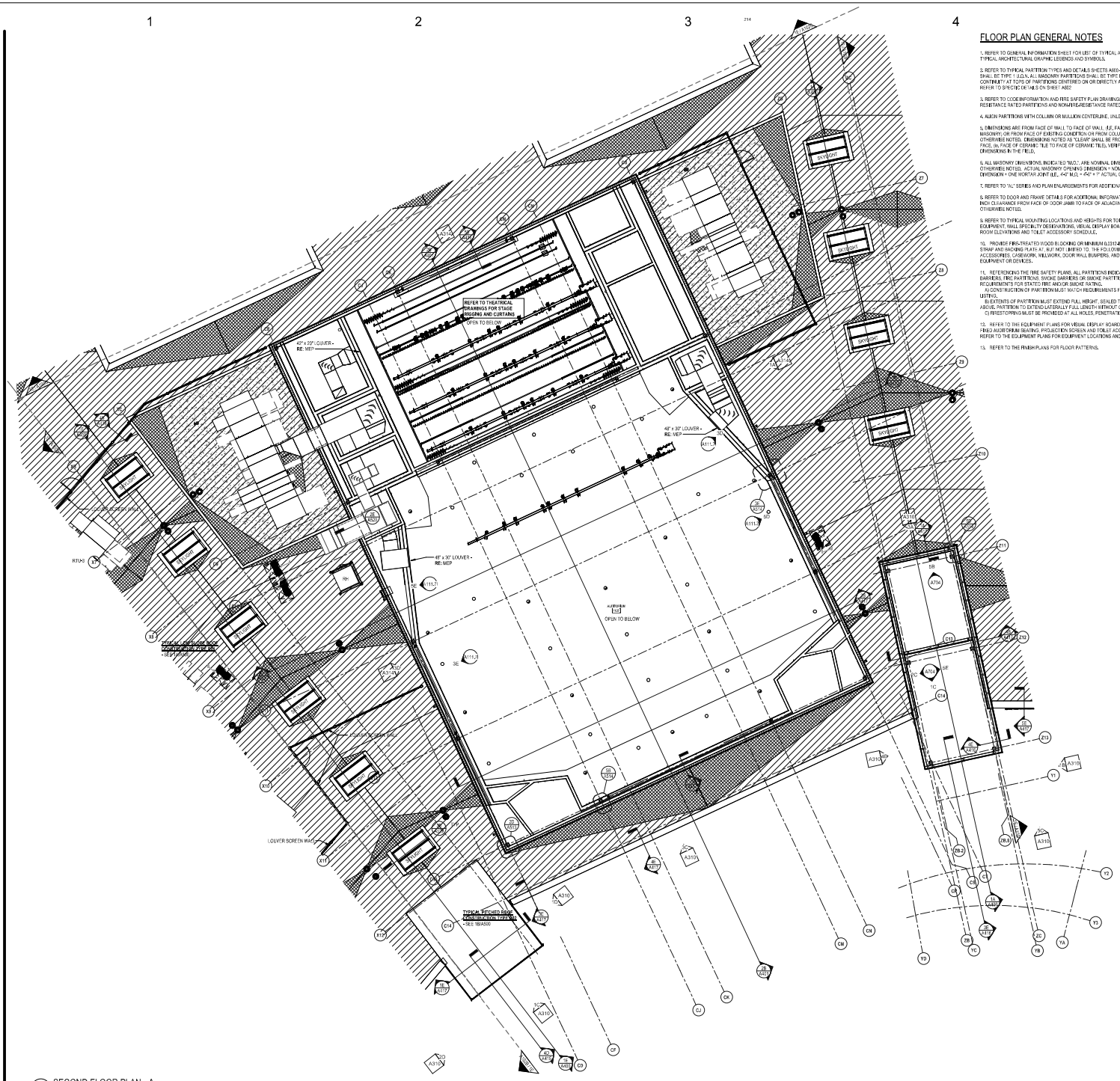

1E SECOND FLOOR PLAN - A
1/8" = 1'-0"

FLOOR PLAN GENERAL NOTES

1. REFER TO GENERAL INFORMATION SHEET FOR LIST OF TYPICAL ABBREVIATIONS AND TYPICAL ARCHITECTURAL GRAPHIC LEGENDS AND SYMBOLS.

2. REFER TO TYPICAL PARTITION TYPES AND DETAILS SHEETS A601- A605. ALL PARTITIONS SHALL BE TYPE 1 U.O.N. ALL MASONRY PARTITIONS SHALL BE TYPE M5 U.O.N.. FOR ACOUSTIC CONTINUITY AT TOPS OF PARTITIONS CENTERED ON OR DIRECTLY ADJACENT TO STEEL BEAMS, REFER TO SPECIFIC DETAILS ON SHEET A602

3. REFER TO CODE INFORMATION AND FIRE SAFETY PLAN DRAWINGS FOR LOCATIONS OF FIRE-RESISTANCE RATED PARTITIONS AND NONFIRE-RESISTANCE RATED SMOKE PARTITIONS.

4. ALIGN PARTITIONS WITH COLUMN OR MULLION CENTERLINE, UNLESS OTHERWISE NOTED.

5. DIMENSIONS ARE FROM FACE OF WALL TO FACE OF WALL (I.E. FACE OF GYPSUM BOARD OR MASONRY) OR FROM FACE OF EXISTING CONDITION OR FROM COLUMN CENTERLINE, UNLESS OTHERWISE NOTED. DIMENSIONS NOTED AS "CLEAR" SHALL BE FROM FINISH FACE TO FINISH FACE. (e.g. FACE OF CERAMIC TILE TO FACE OF CERAMIC TILE). VERIFY ALL EXISTING DIMENSIONS IN THE FIELD.

6. ALL MASONRY DIMENSIONS, INDICATED "M.O.", ARE NOMINAL DIMENSIONS, UNLESS OTHERWISE NOTED. ACTUAL MASONRY OPENING DIMENSION = NOMINAL MASONRY OPENING DIMENSION + ONE MORTAR JOINT (I.E., 4'-0" M.O. = 4'-0" + 1" ACTUAL OPENING DIMENSION).

7. REFER TO "A1." SERIES AND PLAN ENLARGEMENTS FOR ADDITIONAL DIMENSIONS.

8. REFER TO DOOR AND FRAME DETAILS FOR ADDITIONAL INFORMATION. PROVIDE MINIMUM 4-INCH CLEARANCE FROM FACE OF DOOR JAMB TO FACE OF ADJACENT WALL, UNLESS OTHERWISE NOTED.

9. REFER TO TYPICAL MOUNTING LOCATIONS AND HEIGHTS FOR TOILET ACCESSORIES, EQUIPMENT, WALL SPECIALTY DESIGNATIONS, VISUAL DISPLAY BOARDS, ETC., TYPICAL TOILET ROOM ELEVATIONS AND TOILET ACCESSORY SCHEDULE.

10. PROVIDE FIRE-TREATED WOOD BLOCKING OR MINIMUM 0.0312-INCH THICK STEEL FLAT STRAP AND BACKING PLATE AT, BUT NOT LIMITED TO, THE FOLLOWING LOCATIONS: TOILET ACCESSORIES, CASEWORK, MILLWORK, DOOR WALL BUMPERS, AND ALL OTHER WALL MOUNTED EQUIPMENT OR DEVICES.

11. REFERENCING THE FIRE SAFETY PLANS, ALL PARTITIONS INDICATED TO SERVE AS FIRE BARRIERS, FIRE PARTITIONS, SMOKE BARRIERS OR SMOKE PARTITIONS NEED TO MEET ALL REQUIREMENTS FOR STATED FIRE AND/OR SMOKE RATING.
A) CONSTRUCTION OF PARTITION MUST MATCH REQUIREMENTS FOR STATED RATING AND UL LISTING.
B) EXTENTS OF PARTITION MUST EXTEND FULL HEIGHT, SEALED TO UNDERSIDE OF DECK ABOVE. PARTITION TO EXTEND LATERALLY FULL LENGTH WITHOUT GAPS OR INTERRUPTIONS.
C) FIRESTOPPING MUST BE PROVIDED AT ALL HOLES, PENETRATIONS AND EDGES.

12. REFER TO THE EQUIPMENT PLANS FOR VISUAL DISPLAY BOARD, RESIDENTIAL APPLIANCE, FIXED AUDITORIUM SEATING, PROJECTION SCREEN AND TOILET ACCESSORY LOCATIONS. REFER TO THE EQUIPMENT PLANS FOR EQUIPMENT LOCATIONS AND SCHEDULE.

13. REFER TO THE FINISH PLANS FOR FLOOR PATTERNS.

FLOOR PLAN GRAPHIC LEGEND

- NEW WALL CONSTRUCTION
- NEW MASONRY CONSTRUCTION
- PATH OF EXPANSION JOINT - PROVIDE EXPANSION JOINT COVERS AS SHOWN ON "A." SERIES AND A200 SERIES
- CASEWORK COUNTER OR SILL - SEE DETAILS & FINISH DRAWINGS
- FE — FIRE EXTINGUISHER
- FEC — FIRE EXTINGUISHER CABINET
- FEL — FIRE EXTINGUISHER LOCKER UNIT
- FEC — FIRE EXTINGUISHER / FIRE BLANKET CABINET
- FVC — FIRE VALVE CABINET
- EP — ELECTRICAL PANEL
- ACCESSIBLE CLEAR FLOOR SPACE
- CR — CARD READER
- EP — AUTOMATIC DOOR OPERATOR PUSH PLATE
- HO — HOLD OPEN
- MHO — MAGNETIC HOLD OPEN
- ES — EMERGENCY SHOWER
- EW — EYE WASH
- EWC — ELECTRIC WATER COOLER
- DF/ BF — DRINKING FOUNTAIN/ BOTTLE FILLER
- FB — FLOOR BOX - RE: MEP AND TECH
- F.T. — FLOOR FOKS THROUGH - SEE SB/A602 & ELEC/ TECH
- AED — DEFIBRILLATOR
- FD — FLOOR DRAIN - RE: SE/A606
- FC — FLOOR CLEANOUT
- IFP — INTERACTIVE FLAT PANEL
- FPD — FLAT PANEL DISPLAY
- MPS — MANUAL PROJECTION SCREEN
- PPS — POWERED PROJECTION SCREEN
- WB__ — WHITE BOARD (NUMBER IS LENGTH IN FEET)
- TB__ — TACK BOARD (NUMBER IS LENGTH IN FEET)
- VD1 - VD2 — VISUAL DISPLAY SURFCE - RE: FINISH PLANS
- EXTENT OF SELOW GRADE WATERPROOFING AND 3" INSULATION - REFER TO DETAIL 3A/A001
- 12'w x 18'd x 76'h - 2 TIER STUDENT LOCKER - TYPE "A"
- 12'w x 18'd x 48'h - 1 TIER STUDENT LOCKER - TYPE "B"
- 18'w x 18'd x 72'h - 1 TIER CUSTODIAN LOCKER - TYPE "C"
- 12'w x 18'd x 76'h - 2 TIER ATHLETICS LOCKER - TYPE "D"
- 12'w x 18'd x 76'h - 4 TIER PE LOCKER - TYPE "E"

* REFER TO THE FINISH PRODUCT LIST FOR LIST OF MATERIAL TAGS USED IN THE A700 AND A900 SERIES.

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Greenwich Public Schools

Greenwich Central Middle School

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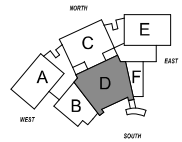

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

SECOND FLOOR PLAN - PART D

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **A102D**

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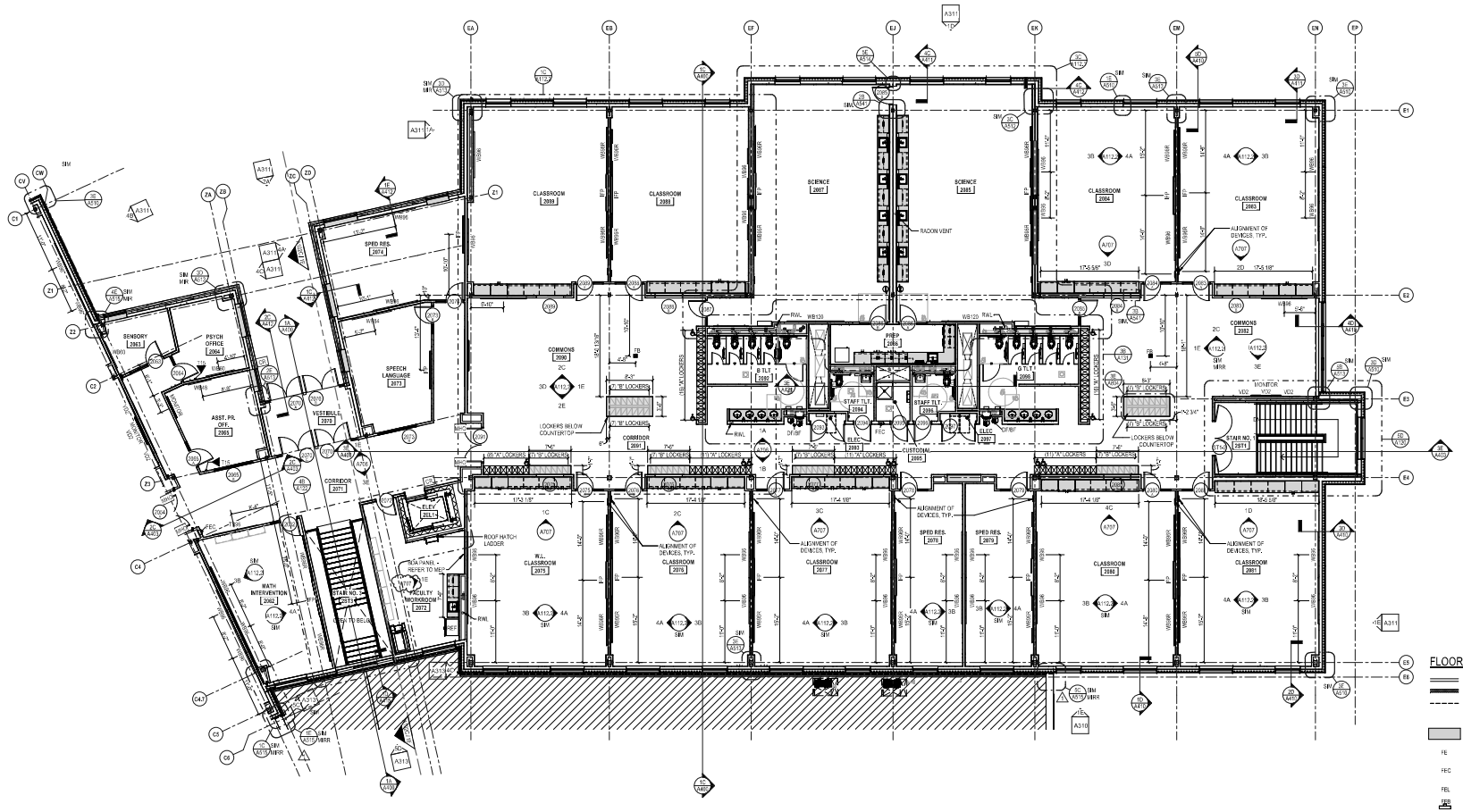

1D SECOND FLOOR PLAN - C
1/8" = 1'-0"

FLOOR PLAN GENERAL NOTES

1. REFER TO GENERAL INFORMATION SHEET FOR LIST OF TYPICAL ABBREVIATIONS AND TYPICAL ARCHITECTURAL GRAPHIC LEGENDS AND SYMBOLS.

2. REFER TO TYPICAL PARTITION TYPES AND DETAILS SHEETS A600 - A606. ALL PARTITIONS SHALL BE TYPE 1 U.O.N. ALL MASONRY PARTITIONS SHALL BE TYPE MB U.O.N. FOR ACOUSTIC CONTINUITY AT TOPS OF PARTITIONS CENTERED ON OR DIRECTLY ADJACENT TO STEEL BEAMS, REFER TO SPECTIC DETAILS ON SHEET A602

3. REFER TO CODE INFORMATION AND FIRE SAFETY PLAN DRAWINGS FOR LOCATIONS OF FIRE-RESISTANCE RATED PARTITIONS AND NON-FIRE-RESISTANCE RATED SMOKE PARTITIONS.

4. ALIGN PARTITIONS WITH COLUMN OR MULLION CENTERLINE, UNLESS OTHERWISE NOTED.

5. DIMENSIONS ARE FROM FACE OF WALL TO FACE OF WALL (I.E. FACE OF GYPSUM BOARD OR MASONRY) OR FROM FACE OF EXISTING CONDITION OR FROM COLUMN CENTER LINE, UNLESS OTHERWISE NOTED. DIMENSIONS NOTED AS "CLEAR" SHALL BE FROM FINISH FACE TO FINISH FACE (ie. FACE OF CERAMIC TILE TO FACE OF CERAMIC TILE). VERIFY ALL EXISTING DIMENSIONS IN THE FIELD.

6. ALL MASONRY DIMENSIONS, INDICATED "MOD.", ARE NOMINAL DIMENSIONS, UNLESS OTHERWISE NOTED. ACTUAL MASONRY OPENING DIMENSION = NOMINAL MASONRY OPENING DIMENSION + ONE MORTAR JOINT (I.E., 4'-0" M.O. = 4'-0" + ½" ACTUAL OPENING DIMENSION).

7. REFER TO "AL" SERIES AND PLAN ENLARGEMENTS FOR ADDITIONAL DIMENSIONS.

8. REFER TO DOOR AND FRAME DETAILS FOR ADDITIONAL INFORMATION. PROVIDE MINIMUM 4-INCH CLEARANCE FROM FACE OF DOOR JAMB TO FACE OF ADJACENT WALL, UNLESS OTHERWISE NOTED.

9. REFER TO TYPICAL MOUNTING LOCATIONS AND HEIGHTS FOR TOILET ACCESSORIES, EQUIPMENT, WALL SPECIALTY DESIGNATIONS, VISUAL DISPLAY BOARDS, ETC.; TYPICAL TOILET ROOM ELEVATIONS AND TOILET ACCESSORY SCHEDULE.

10. PROVIDE FIRE-TREATED WOOD BLOCKING OR MINIMUM 0.0312-INCH THICK STEEL FLAT STRAP AND BACKING PLATE AT, BUT NOT LIMITED TO, THE FOLLOWING LOCATIONS: TOILET ACCESSORIES, CASEWORK, MILLWORK, DOOR WALL BUMPERS, AND ALL OTHER WALL MOUNTED EQUIPMENT OR DEVICES.

11. REFERENCING THE FIRE SAFETY PLANS, ALL PARTITIONS INDICATED TO SERVE AS FIRE BARRIERS, FIRE PARTITIONS, SMOKE BARRIERS OR SMOKE PARTITIONS NEED TO MEET ALL REQUIREMENTS FOR STATED FIRE AND/OR SMOKE RATING.
A) CONSTRUCTION OF PARTITION MUST MATCH REQUIREMENTS FOR STATED RATING AND UL LISTING.
B) EXTENTS OF PARTITION MUST EXTEND FULL HEIGHT, SEALED TO UNDERSIDE OF DECK ABOVE. PARTITION TO EXTEND LATERALLY FULL LENGTH WITHOUT GAPS OR INTERRUPTIONS.
C) FIRESTOPPING MUST BE PROVIDED AT ALL HOLES, PENETRATIONS AND EDGES.

12. REFER TO THE EQUIPMENT PLANS FOR VISUAL DISPLAY BOARD, RESIDENTIAL APPLIANCE, FIXED AUDITORIUM SEATING, PROJECTION SCREEN AND TOILET ACCESSORY LOCATIONS. REFER TO THE EQUIPMENT PLANS FOR EQUIPMENT LOCATIONS AND SCHEDULE.

13. REFER TO THE FINISH PLANS FOR FLOOR PATTERNS.

FLOOR PLAN GRAPHIC LEGEND

- NEW WALL CONSTRUCTION
- NEW MASONRY CONSTRUCTION
- PATH OF EXPANSION JOINT - PROVIDE EXPANSION JOINT COVERS AS SHOWN ON "AL" SERIES AND A200 SERIES
- CASEWORK COUNTER OR SILL SEE DETAILS & FINISH DRAWINGS
- FE FIRE EXTINGUISHER
- FEC FIRE EXTINGUISHER CABINET
- FEL FIRE EXTINGUISHER LOCKER UNIT
- FEC FIRE EXTINGUISHER / FIRE BLANKET CABINET
- FVC FIRE VALVE CABINET
- EP ELECTRICAL PANEL
- ACCESSIBLE CLEAR FLOOR SPACE
- CR CARD READER
- PP AUTOMATIC DOOR OPERATOR PUSH PLATE
- HO HOLD OPEN
- MHO MAGNETIC HOLD OPEN
- ES EMERGENCY SHOWER
- EW EYE WASH
- EWC ELECTRIC WATER COOLER
- DFI BF DRINKING FOUNTAIN/ BOTTLE FILLER
- FB FLOOR BOX - RE: MEP AND TECH
- F.T. FLOOR POKE THROUGH - SEE SB/A02 & ELEC/ TECH
- AED DEFIBRILLATOR
- FD FLOOR DRAIN - RE: SE/A806
- FLOOR CLEANOUT
- IFP INTERACTIVE FLAT PANEL
- FPD FLAT PANEL DISPLAY
- MPS MANUAL PROJECTION SCREEN
- PPS POWERED PROJECTION SCREEN
- WB__ WHITE BOARD (NUMBER IS LENGTH IN FEET)
- TB__ TACK BOARD (NUMBER IS LENGTH IN FEET)
- VD1 - VD2 VISUAL DISPLAY SURFCE - RE: FINISH PLANS
- EXTENT OF BELOW GRADE WATERPROOFING AND 2" INSULATION - REFER TO DETAIL 3A/A501
- 12"w x 18"d x 72"h - 2 TIER STUDENT LOCKER - TYPE "A"
- 12"w x 18"d x 42"h - 1 TIER STUDENT LOCKER - TYPE "B"
- 18"w x 18"d x 72"h - 1 TIER CUSTODIAN LOCKER - TYPE "C"
- 12"w x 18"d x 76"h - 2 TIER ATHLETICS LOCKER - TYPE "D"
- 12"w x 18"d x 76"h - 4 TIER PE LOCKER - TYPE "E"

* REFER TO THE FINISH PRODUCT LIST FOR LIST OF MATERIAL TAGS USED IN THE A700 AND A800 SERIES.

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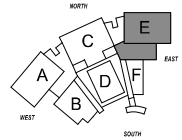
Checked: JZ

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
2	10/30/2024	ADDENDUM NO. 4
1	10/23/2024	ADDENDUM NO. 3
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

SECOND FLOOR PLAN - PART E

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: A102E

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ROOF PLAN GRAPHIC LEGEND

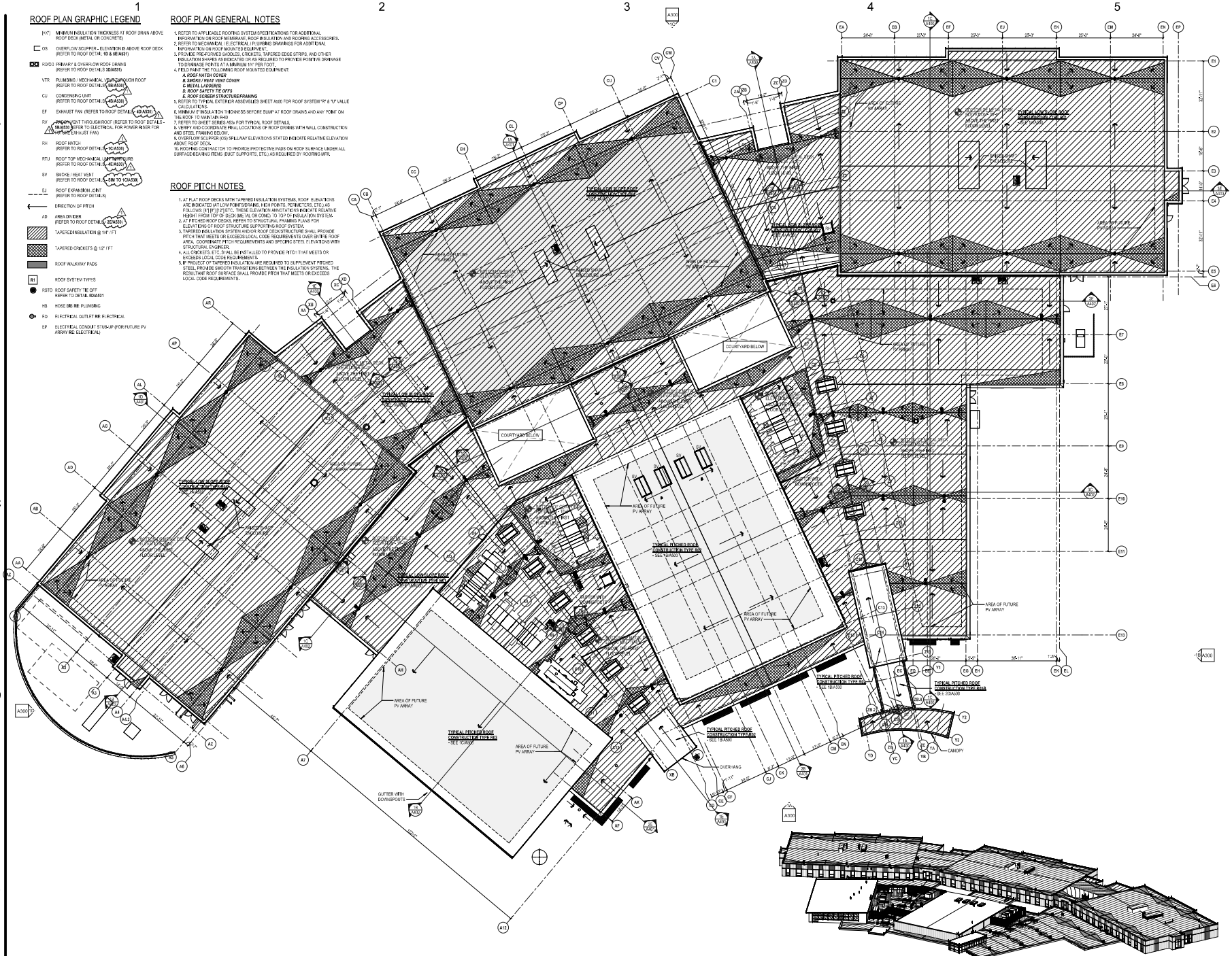
- [VAT] MINIMUM INSULATION THICKNESS AT ROOF DRAIN ABOVE ROOF DECK (METAL OR CONCRETE)
- OS OVERFLOW SCUPPER - ELEVATION IS ABOVE ROOF DECK (REFER TO ROOF DETAIL 1/D & SEI/A531)
- RD/OD PRIMARY & OVERFLOW ROOF DRAINS (REFER TO ROOF DETAILS 1/D/A531)
- VTR PLUMBING / MECHANICAL VENT THROUGH ROOF (REFER TO ROOF DETAILS 5B/A531)
- CU CONDENSING UNIT (REFER TO ROOF DETAILS 4B/A531)
- EF EXHAUST FAN (REFER TO ROOF DETAILS 4D/A531)
- RV PENETRANT THROUGH ROOF (REFER TO ROOF DETAILS - 1B/A531) (REFER TO ELECTRICAL FOR POWER RISER FOR ROOF EXHAUST FAN)
- RH ROOF HATCH (REFER TO ROOF DETAILS 1C/A531)
- RTU ROOF TOP MECHANICAL UNIT MIXTURE (REFER TO ROOF DETAILS 4E/A531)
- SV SMOKE / HEAT VENT (REFER TO ROOF DETAILS - SHV TO 1C/A539)
- EJ ROOF EXPANSION JOINT (REFER TO ROOF DETAILS)
- DIRECTION OF PITCH
- AD AREA DIVIDER (REFER TO ROOF DETAILS 1D/A531)
- TAPERED INSULATION @ 1/4" / FT
- TAPERED CRICKETS @ 1/2" / FT
- ROOF WALKWAY PADS
- R1 ROOF SYSTEM TYPES
- RSTO ROOF SAFETY TIE OFF REFER TO DETAIL 5D/A531
- HB HOSE BIB R/E PLUMBING
- ED ELECTRICAL OUTLET R/E ELECTRICAL
- EP ELECTRICAL CONDUIT STUB-UP (FOR FUTURE PV ARRAY R/E ELECTRICAL)

ROOF PLAN GENERAL NOTES

1. REFER TO APPLICABLE ROOFING SYSTEM SPECIFICATIONS FOR ADDITIONAL INFORMATION ON ROOF MEMBRANE, ROOF INSULATION AND ROOFING ACCESSORIES.
2. REFER TO MECHANICAL / ELECTRICAL / PLUMBING DRAWINGS FOR ADDITIONAL INFORMATION ON ROOF MOUNTED EQUIPMENT.
3. PROVIDE PRE-FORMED SADDLES, CRICKETS, TAPERED EDGE STRIPS, AND OTHER INSULATION SHAPES AS INDICATED OR AS REQUIRED TO PROVIDE POSITIVE DRAINAGE TO DRAINAGE POINTS AT A MINIMUM 1/4" PER FOOT.
4. FIELD PAINT THE FOLLOWING ROOF MOUNTED EQUIPMENT:
   - A. ROOF HATCH COVER
   - B. SMOKE / HEAT VENT COVER
   - C. METAL LADDER(S)
   - D. ROOF SAFETY TIE OFFS
   - E. ROOF SCREEN STRUCTURE/FRAMING
5. REFER TO TYPICAL EXTERIOR ASSEMBLIES SHEET A500 FOR ROOF SYSTEM "R" & "U" VALUE CALCULATIONS.
6. MINIMUM 5" INSULATION THICKNESS BEFORE SUMP AT ROOF DRAINS AND ANY POINT ON THE ROOF TO MAINTAIN R-49.
7. REFER TO SHEET SERIES A5XX FOR TYPICAL ROOF DETAILS.
8. VERIFY AND COORDINATE FINAL LOCATIONS OF ROOF DRAINS WITH WALL CONSTRUCTION AND STEEL FRAMING BELOW.
9. OVERFLOW SCUPPER (OS) SPILLWAY ELEVATIONS STATED INDICATE RELATIVE ELEVATION ABOVE ROOF DECK.
10. ROOFING CONTRACTOR TO PROVIDE PROTECTIVE PADS ON ROOF SURFACE UNDER ALL SURFACE-BEARING ITEMS (DUCT SUPPORTS, ETC.) AS REQUIRED BY ROOFING MFR.

ROOF PITCH NOTES

1. AT FLAT ROOF DECKS WITH TAPERED INSULATION SYSTEMS, ROOF ELEVATIONS ARE INDICATED (AT LOW POINTS/DRAINS, HIGH POINTS, PERIMETERS, ETC.) AS FOLLOWS: (#'1/8")/12"ETC., THESE ELEVATION ANNOTATIONS INDICATE RELATIVE HEIGHT FROM TOP OF DECK (METAL OR CONC.) TO TOP OF INSULATION SYSTEM.
2. AT PITCHED ROOF DECKS, REFER TO STRUCTURAL FRAMING PLANS FOR ELEVATIONS OF ROOF STRUCTURE SUPPORTING ROOF SYSTEM.
3. TAPERED INSULATION SYSTEM AND/OR ROOF DECK/STRUCTURE SHALL PROVIDE PITCH THAT MEETS OR EXCEEDS LOCAL CODE REQUIREMENTS OVER ENTIRE ROOF AREA. COORDINATE PITCH REQUIREMENTS AND SPECIFIC STEEL ELEVATIONS WITH STRUCTURAL ENGINEER.
4. ALL CRICKETS, ETC. SHALL BE INSTALLED TO PROVIDE >1/2" THAT MEETS OR EXCEEDS LOCAL CODE REQUIREMENTS.
5. IF PROJECT OF TAPERED INSULATION ARE REQUIRED TO SUPPLEMENT PITCHED STEEL, PROVIDE SMOOTH TRANSITIONS BETWEEN THE INSULATION SYSTEMS. THE RESULTANT ROOF SURFACE SHALL PROVIDE PITCH THAT MEETS OR EXCEEDS LOCAL CODE REQUIREMENTS.



1E 3 - OVERALL ROOF PLAN
1/16" = 1'-0"

5E ROOF SCAPE - 3D

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Greenwich Public Schools

Greenwich Central Middle School

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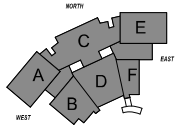

KEYPLAN

Number	Date	Issued For
1	11/06/2024	ADDENDUM NO. 6
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

OVERALL ROOF PLAN

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A103

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ROOF PLAN GRAPHIC LEGEND

- [X"] MINIMUM INSULATION THICKNESS AT ROOF DRAIN ABOVE ROOF DECK (METAL OR CONCRETE)
- OS OVERFLOW SCUPPER - ELEVATIONS ABOVE ROOF DECK (REFER TO ROOF DETAIL 10 & SEAS31)
- RD/OD PRIMARY & OVERFLOW ROOF DRAINS (REFER TO ROOF DETAILS 5BA630)
- VTR PLUMBING / MECHANICAL VENT THROUGH ROOF (REFER TO ROOF DETAILS 5BA630)
- CU CONDENSING UNIT (REFER TO ROOF DETAILS 4BA630)
- EF EXHAUST FAN (REFER TO ROOF DETAILS 4DA630)
- RV PENETRANT THROUGH ROOF (REFER TO ROOF DETAILS - 5BA630 REFER TO ELECTRICAL FOR POWER RISER FOR ROOF MOUNTED EXHAUST FAN)
- RH ROOF HATCH (REFER TO ROOF DETAILS 1CA630)
- RTU ROOF TOP MECHANICAL UNIT CURB (REFER TO ROOF DETAILS 4BA630)
- SV SMOKE / HEAT VENT (REFER TO ROOF DETAILS SIM TO 1CA630)
- EJ ROOF EXPANSION JOINT (REFER TO ROOF DETAILS)
- DIRECTION OF PITCH
- AD AREA DIVIDER (REFER TO ROOF DETAILS 2DA630)
- TAPERED INSULATION @ 1/4" / FT
- TAPERED CRICKETS @ 1/2" / FT
- ROOF WALKWAY PADS
- R1 ROOF SYSTEM TYPES
- RSTO ROOF SAFETY TIE OFF REFER TO DETAIL 5BA631
- HB HOSE BIB RE: PLUMBING
- EO ELECTRICAL OUTLET RE: ELECTRICAL
- EP ELECTRICAL CONDUIT STUB-UP (FOR FUTURE PV ARRAY RE: ELECTRICAL)

ROOF PLAN GENERAL NOTES

1. REFER TO APPLICABLE ROOFING SYSTEM SPECIFICATIONS FOR ADDITIONAL INFORMATION ON ROOF MEMBRANE, ROOF INSULATION AND ROOFING ACCESSORIES.
2. REFER TO MECHANICAL / ELECTRICAL / PLUMBING DRAWINGS FOR ADDITIONAL INFORMATION ON ROOF MOUNTED EQUIPMENT.
3. PROVIDE PRE-FORMED SADDLES, CRICKETS, TAPERED EDGE STRIPS, AND OTHER INSULATION SHAPES AS INDICATED OR AS REQUIRED TO PROVIDE POSITIVE DRAINAGE TO DRAINAGE POINTS AT A MINIMUM 1/4" PER FOOT.
4. FIELD PAINT THE FOLLOWING ROOF MOUNTED EQUIPMENT:
   - *A. ROOF HATCH COVER*
   - *B. SMOKE / HEAT VENT COVER*
   - *C. METAL LADDER(S)*
   - *D. ROOF SAFETY TIE OFFS*
   - *E. ROOF SCREEN STRUCTURE/FRAMING*
5. REFER TO TYPICAL EXTERIOR ASSEMBLIES SHEET A560 FOR ROOF SYSTEM "R" & "U" VALUE CALCULATIONS.
6. MINIMUM 6" INSULATION THICKNESS BEFORE SUMP AT ROOF DRAINS AND ANY POINT ON THE ROOF TO MAIN DRAIN #340
7. REFER TO SHEET SERIES A53x FOR TYPICAL ROOF DETAILS.
8. VERIFY AND COORDINATE FINAL LOCATIONS OF ROOF DRAINS WITH WALL CONSTRUCTION AND STEEL FRAMING BELOW.
9. OVERFLOW SCUPPER (OS) SPILLWAY ELEVATIONS STATED INDICATE RELATIVE ELEVATION ABOVE ROOF DECK.
10. ROOFING CONTRACTOR TO PROVIDE PROTECTIVE PADS ON ROOF SURFACE UNDER ALL SURFACE-BEARING ITEMS (DUCT SUPPORTS, ETC.) AS REQUIRED BY ROOFING MFR.

ROOF PITCH NOTES

1. AT FLAT ROOF DECKS WITH TAPERED INSULATION SYSTEMS, ROOF ELEVATIONS ARE INDICATED AT LOW POINTS/DRAINS, HIGH POINTS, PERIMETERS, ETC., AS FOLLOWS: [4"] [6"] [12"] ETC. THESE ELEVATION ANNOTATIONS INDICATE RELATIVE HEIGHT FROM TOP OF DECK (METAL OR CONC.) TO TOP OF INSULATION SYSTEM.
2. AT FLAT/LOW SLOPE ROOF DECKS, REFER TO STRUCTURAL FRAMING PLANS FOR ELEVATIONS OF ROOF STRUCTURE SUPPORTING ROOF SYSTEM.
3. TAPERED INSULATION SYSTEM AND/OR ROOF DECK/STRUCTURE SHALL PROVIDE PITCH THAT MEETS OR EXCEEDS LOCAL CODE REQUIREMENTS OVER ENTIRE ROOF AREA. COORDINATE PITCH REQUIREMENTS AND SPECIFIC STEEL ELEVATIONS WITH STRUCTURAL ENGINEER.
4. ALL CRICKETS, ETC. SHALL BE INSTALLED TO PROVIDE PITCH THAT MEETS OR EXCEEDS LOCAL CODE REQUIREMENTS.
5. IF PROJECT OF TAPERED INSULATION ARE REQUIRED TO SUPPLEMENT PITCHED STEEL, PROVIDE SMOOTH TRANSITIONS BETWEEN THE INSULATION SYSTEMS. THE RESULTANT ROOF SURFACE SHALL PROVIDE PITCH THAT MEETS OR EXCEEDS LOCAL CODE REQUIREMENTS.


OS - SPILLWAY ELEV. +10'-10"
OS - SPILLWAY ELEV. +10'-0"
OS - SPILLWAY ELEV. +10'
OS - SPILLWAY ELEV. +10"
OS - SPILLWAY ELEV. +10'-10"
102.50°
BRACE SHORT PARAPET STUD WALL AT ROOF WITH CRWF OFF OF LONG PARAPETS
BRACE SHORT PARAPET STUD WALL AT ROOF WITH CRWF OFF OF LONG PARAPETS
HORIZ. LOW SLOPE ROOF CONTINUES TO NEXT LEVEL
HORIZ. LOW SLOPE ROOF CONTINUES TO NEXT LEVEL
HORIZ. LOW SLOPE ROOF CONTINUES TO NEXT LEVEL
HORIZ. LOW SLOPE ROOF CONTINUES TO NEXT LEVEL
PLAN DETAIL IS THRU PARAPET JUST ABOVE ROOF LEVEL
NOTE: SEE A104 FOR SOLAR SCREEN WALL MOUNT INFORMATION
DASHED LINE INDICATES EDGE OF ROOF BELOW OVERHANG
ROOF ACCESS HATCH (TYP.) (SEE DETAIL 1/A630)

ROOF PLAN GRAPHIC LEGEND

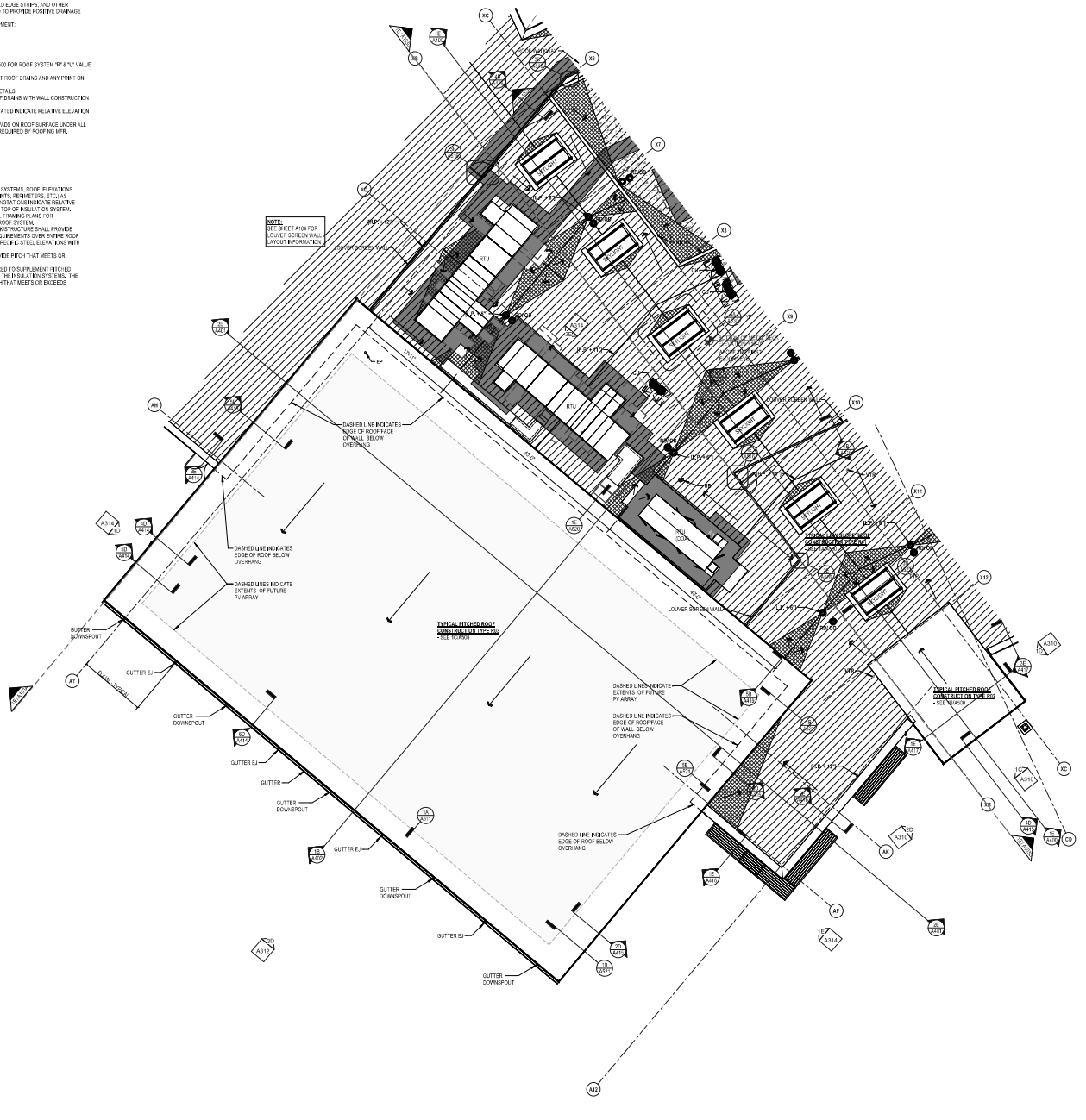
- (-X") MINIMUM INSULATION THICKNESS AT ROOF DRAIN ABOVE ROOF DECK (METAL OR CONCRETE)
- OS OVERFLOW SCUPPER - ELEVATIONS ABOVE ROOF DECK (REFER TO ROOF DETAIL 1/D & 3/EA531)
- RD/OD PRIMARY & OVERFLOW ROOF DRAINS (REFER TO ROOF DETAILS 3D/A531)
- VTR PLUMBING / MECHANICAL VENT THROUGH ROOF (REFER TO ROOF DETAILS - 5B/A531)
- CU CONDENSING UNIT (REFER TO ROOF DETAILS - 6B/A531)
- EF EXHAUST FAN (REFER TO ROOF DETAILS - 4D/A531)
- RV EQUIPMENT THROUGH ROOF (REFER TO ROOF DETAILS - 5B/A531) (REFER TO ELECTRICAL FOR POWER RISER FOR ROOF EXHAUST FAN)
- RH ROOF HATCH (REFER TO ROOF DETAILS - 1C/A531)
- RTU ROOF TOP MECHANICAL EQUIPMENT/UNIT (REFER TO ROOF DETAILS - 4B/A531)
- SV SMOKE / HEAT VENT (REFER TO ROOF DETAILS - SHV TO 1C/A531)
- EJ ROOF EXPANSION JOINT (REFER TO ROOF DETAILS)
- DIRECTION OF PITCH
- AD AREA DIVIDER (REFER TO ROOF DETAILS - 2D/A531)
- TAPERED INSULATION @ 1/4" / FT
- TAPERED CRICKETS @ 1/2" / FT
- ROOF WALKWAY PADS
- R1 ROOF SYSTEM TYPES
- RSTO ROOF SAFETY TIE OFF REFER TO DETAIL 5D/A531
- HB HOSE BIB R/E: PLUMBING
- ED ELECTRICAL OUTLET R/E: ELECTRICAL
- EP ELECTRICAL CONDUIT STUB-UP (FOR FUTURE PV ARRAY R/E: ELECTRICAL)

ROOF PLAN GENERAL NOTES

1. REFER TO APPLICABLE ROOFING SYSTEM SPECIFICATIONS FOR ADDITIONAL INFORMATION ON ROOF MEMBRANE, ROOF INSULATION AND ROOFING ACCESSORIES.
2. REFER TO MECHANICAL / ELECTRICAL / PLUMBING DRAWINGS FOR ADDITIONAL INFORMATION ON ROOF MOUNTED EQUIPMENT.
3. PROVIDE PRE-FORMED SADDLES, CRICKETS, TAPERED EDGE STRIPS, AND OTHER INSULATION SHAPES AS INDICATED OR AS REQUIRED TO PROVIDE POSITIVE DRAINAGE TO DRAINAGE POINTS AT A MINIMUM 1/4" PER FOOT.
4. FIELD PAINT THE FOLLOWING ROOF MOUNTED EQUIPMENT:
   - *A. ROOF HATCH COVER*
   - *B. SMOKE / HEAT VENT COVER*
   - *C. METAL LADDER(S)*
   - *D. ROOF SAFETY TIE OFFS*
   - *E. ROOF SCREEN STRUCTURE FRAMING*
5. REFER TO TYPICAL EXTERIOR ASSEMBLIES SHEET A500 FOR ROOF SYSTEM "R" & "U" VALUE CALCULATIONS.
6. MINIMUM 8" INSULATION THICKNESS BEFORE SUMP AT ROOF DRAINS AND ANY POINT ON THE ROOF TO MAINTAIN "U-0.0
7. REFER TO SHEET SERIES A531 FOR TYPICAL ROOF DETAILS.
8. VERIFY AND COORDINATE FINAL LOCATIONS OF ROOF DRAINS WITH WALL CONSTRUCTION AND STEEL FRAMING BELOW.
9. OVERFLOW SCUPPER (OS) SPILLWAY ELEVATIONS STATED INDICATE RELATIVE ELEVATION ABOVE ROOF DECK.
10. ROOFING CONTRACTOR TO PROVIDE PROTECTIVE PADS ON ROOF SURFACE UNDER ALL SURFACE-BEARING ITEMS (DUCT SUPPORTS, ETC.) AS REQUIRED BY ROOFING MFR.

ROOF PITCH NOTES

1. AT FLAT ROOF DECKS WITH TAPERED INSULATION SYSTEMS, ROOF ELEVATIONS ARE INDICATED AT LOW POINTS/DRAINS, HIGH POINTS, PERIMETERS, ETC.) AS FOLLOWS: X'[-8"]-[1/2"] ETC.. THESE ELEVATION ANNOTATIONS INDICATE RELATIVE HEIGHT FROM TOP OF DECK (METAL OR CONC) TO TOP OF INSULATION SYSTEM.
2. AT PITCHED ROOF DECKS, REFER TO STRUCTURAL FRAMING PLANS FOR ELEVATIONS OF ROOF STRUCTURE SUPPORTING ROOF SYSTEM.
3. TAPERED INSULATION SYSTEM AND/OR ROOF DECK/STRUCTURE SHALL PROVIDE PITCH THAT MEETS OR EXCEEDS LOCAL CODE REQUIREMENTS OVER ENTIRE ROOF AREA. COORDINATE PITCH REQUIREMENTS AND SPECIFIC STEEL ELEVATIONS WITH STRUCTURAL ENGINEER.
4. ALL CRICKETS, ETC. SHALL BE INSTALLED TO PROVIDE PITCH THAT MEETS OR EXCEEDS LOCAL CODE REQUIREMENTS.
5. IF PROJECT OF TAPERED INSULATION ARE REQUIRED TO SUPPLEMENT PITCHED STEEL, PROVIDE SMOOTH TRANSITIONS BETWEEN THE INSULATION SYSTEMS. THE RESULTANT ROOF SURFACE SHALL PROVIDE PITCH THAT MEETS OR EXCEEDS LOCAL CODE REQUIREMENTS.



1E ROOF PLAN
1/8" = 1'-0"

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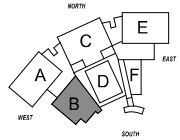
Drawn: JZ, TAS
Checked: JZ

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
1	11/06/2024	ADDENDUM NO. 6
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ROOF PLAN - PART B

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **A103B**

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ROOF PLAN GRAPHIC LEGEND

- [XX"] MINIMUM INSULATION THICKNESS AT ROOF DRAIN ABOVE ROOF DECK (METAL OR CONCRETE)
- OS OVERFLOW SCUPPER - ELEVATION IS ABOVE ROOF DECK (REFER TO ROOF DETAIL 1D & 5E/A531)
- RD/OD PRIMARY & OVERFLOW ROOF DRAINS (REFER TO ROOF DETAILS 5D/A531)
- VTR PLUMBING / MECHANICAL VENT THROUGH ROOF (REFER TO ROOF DETAILS - 1B/A600)
- CU CONDENSING UNIT (REFER TO ROOF DETAILS - 1B/A600)
- EF EXHAUST FAN (REFER TO ROOF DETAILS - 1D/A536)
- RV EQUIPMENT THROUGH ROOF (REFER TO ROOF DETAILS - 1B/A536) (REFER TO ELECTRICAL FOR POWER (REFER FOR FUTURE EXHAUST FAN)
- RH ROOF HATCH (REFER TO ROOF DETAILS - 1D/A536)
- RTU ROOF TOP MECHANICAL UNIT W/ LOUVERS (REFER TO ROOF DETAILS - 4B/A536)
- SV SMOKE / HEAT VENT (REFER TO ROOF DETAILS - SIM TO 1D/A536)
- EJ ROOF EXPANSION JOINT (REFER TO ROOF DETAILS)
- DIRECTION OF PITCH
- AD AREA DIVIDER (REFER TO ROOF DETAILS - 2F/A531)
- TAPERED INSULATION @ 1/4" / FT
- TAPERED CRICKETS @ 1/2" / FT
- ROOF WALKWAY PADS
- R1 ROOF SYSTEM TYPES
- RSTO ROOF SAFETY TIE OFF REFER TO DETAIL 5D/A531
- HB HOSE BIB RE: PLUMBING
- EO ELECTRICAL OUTLET RE: ELECTRICAL
- EP ELECTRICAL CONDUIT STUB-UP (FOR FUTURE PV ARRAY RE: ELECTRICAL)

ROOF PLAN GENERAL NOTES

1. REFER TO APPLICABLE ROOFING SYSTEM SPECIFICATIONS FOR ADDITIONAL INFORMATION ON ROOF MEMBRANE, ROOF INSULATION AND ROOFING ACCESSORIES.
2. REFER TO MECHANICAL / ELECTRICAL / PLUMBING DRAWINGS FOR ADDITIONAL INFORMATION ON ROOF MOUNTED EQUIPMENT.
3. PROVIDE PRE-FORMED SADDLES, CRICKETS, TAPERED EDGE STRIPS, AND OTHER INSULATION SHAPES AS INDICATED OR AS REQUIRED TO PROVIDE POSITIVE DRAINAGE TO DRAINAGE POINTS AT A MINIMUM 1/4" PER FOOT.
4. FIELD PAINT THE FOLLOWING ROOF MOUNTED EQUIPMENT:
   - *A. ROOF HATCH COVER*
   - *B. SMOKE / HEAT VENT COVER*
   - *C. METAL LADDER(S)*
   - *D. ROOF SAFETY TIE OFFS*
   - *E. ROOF SCREEN STRUCTURE/FRAMING*
5. REFER TO TYPICAL EXTERIOR ASSEMBLIES SHEET A600 FOR ROOF SYSTEM "R" & "U" VALUE CALCULATIONS.
6. MINIMUM 6" INSULATION THICKNESS BEFORE SUMP AT ROOF DRAINS AND ANY POINT ON THE ROOF TO MAINTAIN R-40
7. REFER TO SHEET SERIES A53x FOR TYPICAL ROOF DETAILS.
8. VERIFY AND COORDINATE FINAL LOCATIONS OF ROOF DRAINS WITH WALL CONSTRUCTION AND STEEL FRAMING BELOW.
9. OVERFLOW SCUPPER (OS) SPILLWAY ELEVATIONS STATED INDICATE RELATIVE ELEVATION ABOVE ROOF DECK.
10. ROOFING CONTRACTOR TO PROVIDE PROTECTIVE PADS ON ROOF SURFACE UNDER ALL SURFACE-BEARING FETHS (DUCT SUPPORTS, ETC.) AS REQUIRED BY ROOFING MFR.

ROOF PITCH NOTES

1. AT FLAT ROOF DECKS WITH TAPERED INSULATION SYSTEMS, ROOF ELEVATIONS ARE INDICATED AT LOW POINTS (DRAINS, HIGH POINTS, PERIMETERS, ETC.) AS FOLLOWS: (1/4"):(8"):(12") ETC.. THESE ELEVATION ANNOTATIONS INDICATE RELATIVE HEIGHT FROM TOP OF DECK (METAL OR CONC) TO TOP OF INSULATION SYSTEM.
2. AT PITCHED ROOF BACKS, REFER TO STRUCTURAL FRAMING PLANS FOR ELEVATIONS OF ROOF STRUCTURE SUPPORTING ROOF SYSTEM.
3. TAPERED INSULATION SYSTEM AND/OR ROOF DECK/STRUCTURE SHALL PROVIDE PITCH THAT MEETS OR EXCEEDS LOCAL CODE REQUIREMENTS OVER ENTIRE ROOF AREA. COORDINATE PITCH REQUIREMENTS AND SPECIFIC STEEL ELEVATIONS WITH STRUCTURAL ENGINEER.
4. ALL CRICKETS, ETC. SHALL BE INSTALLED TO PROVIDE PITCH THAT MEETS OR EXCEEDS LOCAL CODE REQUIREMENTS.
5. IF PROJECT OF TAPERED INSULATION ARE REQUIRED TO SUPPLEMENT PITCHED STEEL, PROVIDE SMOOTH TRANSITIONS BETWEEN THE INSULATION SYSTEMS. THE RESULTANT ROOF SURFACE SHALL PROVIDE PITCH THAT MEETS OR EXCEEDS LOCAL CODE REQUIREMENTS.

1E ROOF PLAN
1/8" = 1'-0"

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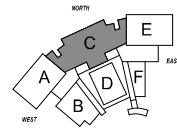

KEYPLAN

Number	Date	Issued For
2	11/06/2024	ADDENDUM NO. 6
1	10/23/2024	ADDENDUM NO. 3
	09/20/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ROOF PLAN - PART C

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: A103C

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1E ROOF PLAN
1/8" = 1'-0"

ROOF PLAN GENERAL NOTES

1. REFER TO APPLICABLE ROOFING SYSTEM SPECIFICATIONS FOR ADDITIONAL INFORMATION ON ROOF MEMBRANE, ROOF INSULATION AND ROOFING ACCESSORIES.
2. REFER TO MECHANICAL (-E) ECTRICAL (-P) LIANING DRAWINGS FOR ADDITIONAL INFORMATION ON ROOF MOUNTED EQUIPMENT.
3. PROVIDE PREFORMED SADDLES, CRICKETS, TAPERED EDGE STRIPS, AND OTHER INSULATION SHAPES AS INDICATED OR AS REQUIRED TO PROVIDE POSITIVE DRAINAGE TO DRAINAGE POINTS AT A MINIMUM 1/4" PER FOOT.
4. FIELD PAINT THE FOLLOWING ROOF MOUNTED EQUIPMENT:
   - *A. ROOF HATCH COVER*
   - *B. SMOKE / HEAT VENT COVER*
   - *C. METAL LADDER(S)*
   - *D. ROOF SAFETY TIE OFFS*
   - *E. ROOF SCREEN STRUCTURE/FRAMING*
5. REFER TO TYPICAL EXTERIOR ASSEMBLIES SHEET A500 FOR ROOF SYSTEM "R" & "U" VALUE CALCULATIONS.
6. MINIMUM 6" INSULATION THICKNESS BEFORE SUMP AT ROOF DRAINS AND ANY POINT ON THE ROOF TO MAINTAIN R-40
7. REFER TO SHEET SERIES A51x FOR TYPICAL ROOF DETAILS.
8. VERIFY AND COORDINATE FINAL LOCATIONS OF ROOF DRAINS WITH WALL CONSTRUCTION AND STEEL FRAMING BELOW.
9. OVERFLOW SCUPPER (OS) SPILLWAY ELEVATIONS STATED INDICATE RELATIVE ELEVATION ABOVE ROOF DECK.
10. ROOFING CONTRACTOR TO PROVIDE PROTECTIVE PADS ON ROOF SURFACE UNDER ALL SURFACE-BEARING ITEMS (DUCT SUPPORTS, ETC.), AS REQUIRED BY ROOFING MFR.

ROOF PITCH NOTES

1. AT FLAT ROOF DECKS WITH TAPERED INSULATION SYSTEMS, ROOF ELEVATIONS ARE INDICATED AT LOW POINTS/DRAINS, HIGH POINTS, PERIMETERS, ETC.) AS FOLLOWS: (4") [5"-12"] ETC. THESE ELEVATION ANNOTATIONS INDICATE RELATIVE HEIGHT FROM TOP OF DECK (METAL OR CONC.) TO TOP OF INSULATION SYSTEM.
2. AT PITCHED ROOF DECKS, REFER TO STRUCTURAL FRAMING PLANS FOR ELEVATIONS OF ROOF STRUCTURE SUPPORTING ROOF SYSTEM.
3. TAPERED INSULATION SYSTEM AND/OR ROOF DECK/STRUCTURE SHALL PROVIDE PITCH THAT MEETS OR EXCEEDS LOCAL CODE REQUIREMENTS OVER ENTIRE ROOF AREA. COORDINATE PITCH REQUIREMENTS AND SPECIFIC STEEL ELEVATIONS WITH STRUCTURAL ENGINEER.
4. ALL CRICKETS, ETC, SHALL BE INSTALLED TO PROVIDE PITCH THAT MEETS OR EXCEEDS LOCAL CODE REQUIREMENTS.
5. IF PRODUCT OF TAPERED INSULATION ARE REQUIRED TO SUPPLEMENT PITCHED STEEL, PROVIDE SMOOTH TRANSITIONS BETWEEN THE INSULATION SYSTEMS. THE RESULTANT ROOF SURFACE SHALL PROVIDE PITCH THAT MEETS OR EXCEEDS LOCAL CODES REQUIREMENTS.

ROOF PLAN GRAPHIC LEGEND

- [x"] MINIMUM INSULATION THICKNESS AT ROOF DRAIN ABOVE ROOF DECK (METAL OR CONCRETE)
- OS OVERFLOW SCUPPER - ELEVATION IS ABOVE ROOF DECK (REFER TO ROOF DETAIL 1D & 9EIA531)
- RD/OD PRIMARY & OVERFLOW ROOF DRAINS (REFER TO ROOF DETAILS 3DIA531)
- VTR PLUMBING / MECHANICAL VENT THROUGH ROOF (REFER TO ROOF DETAILS - 4DIA500)
- CU CONDENSING UNIT (REFER TO ROOF DETAILS - 4DIA500)
- EF EXHAUST FAN (REFER TO ROOF DETAILS - 4DIA531)
- RV KITCHEN VENT THROUGH ROOF (REFER TO ROOF DETAILS - 5DIA531) REFER TO ELECTRICAL FOR POWER RISER FOR KITCHEN EXHAUST FAN)
- RH ROOF HATCH (REFER TO ROOF DETAIL - 7DIA500)
- RTU ROOF TOP MECHANICAL UNIT W/ CURB (REFER TO ROOF DETAIL - 4DIA531)
- SV SMOKE / HEAT VENT (REFER TO ROOF DETAIL - 9M TO 1GIA531)
- EJ ROOF EXPANSION JOINT (REFER TO ROOF DETAILS)
- DIRECTION OF PITCH
- AD AREA DIVIDER (REFER TO ROOF DETAIL - 2EIA500)
- TAPERED INSULATION @ 1/4" / FT
- TAPERED CRICKETS @ 1/2" / FT
- ROOF WALKWAY PADS
- R1 ROOF SYSTEM TYPES
- RSTO ROOF SAFETY TIE OFF REFER TO DETAIL 5DIA531
- HB HOSE BIB RE: PLUMBING
- EO ELECTRICAL OUTLET RE: ELECTRICAL
- EP ELECTRICAL CONDUIT STUB-UP (FOR FUTURE PV ARRAY RE: ELECTRICAL)

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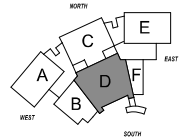

KEYPLAN

Number	Date	Issued For
1	11/06/2024	ADDENDUM NO. 6
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ROOF PLAN - PART D

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **A103D**

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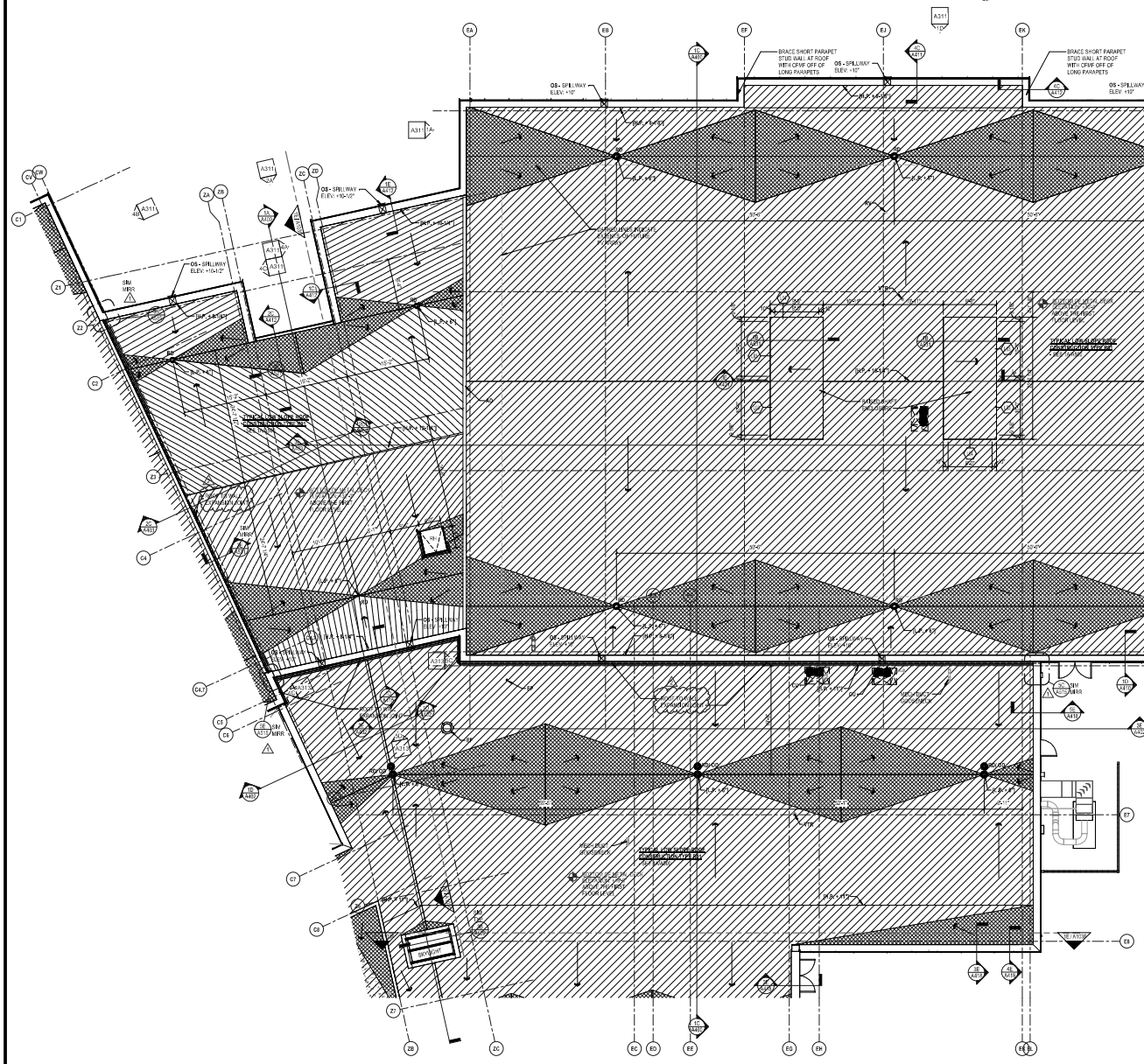

ROOF PLAN GRAPHIC LEGEND

- [XX] MINIMUM INSULATION THICKNESS AT ROOF DRAIN ABOVE ROOF DECK (METAL OR CONCRETE)
- OS OVERFLOW SCUPPER - ELEVATION IS ABOVE ROOF DECK (REFER TO ROOF DETAIL 10 & 9/A9A31)
- RD/OD PRIMARY & OVERFLOW ROOF DRAINS (REFER TO ROOF DETAILS 9/A9A31)
- VTR PLUMBING / MECHANICAL VENT THROUGH ROOF (REFER TO ROOF DETAIL 4/A9A36)
- CU CONDENSING UNIT (REFER TO ROOF DETAILS 4/A9A36)
- EF EXHAUST FAN (REFER TO ROOF DETAIL 4/A9A36)
- RV EQUIPMENT THROUGH ROOF (REFER TO ROOF DETAILS 9/A9A36 REFER TO ELECTRICAL FOR POWER RISER FOR KITCHEN EXHAUST FAN)
- RH ROOF HATCH (REFER TO ROOF DETAIL 1/A9A36)
- RTU ROOF TOP MECHANICAL UNIT W/ CURB (REFER TO ROOF DETAIL 4/A9A36)
- SV SMOKE / HEAT VENT (REFER TO ROOF DETAILS 5 - SIM TO 1/A9A36)
- EJ ROOF EXPANSION JOINT (REFER TO ROOF DETAILS)
- DIRECTION OF PITCH
- AD AREA DIVIDER (REFER TO ROOF DETAIL 2/A9A36)
- TAPERED INSULATION @ 1/4" / FT
- TAPERED CRICKETS @ 1/2" / FT
- ROOF WALKWAY PADS
- R1 ROOF SYSTEM TYPES
- RSTO ROOF SAFETY TIE OFF REFER TO DETAIL 8/A9A31
- HB HOSE BIB RE: PLUMBING
- EO ELECTRICAL OUTLET RE: ELECTRICAL
- EP ELECTRICAL CONDUIT STUB-UP (FOR FUTURE PV ARRAY RE: ELECTRICAL)

ROOF PLAN GENERAL NOTES

1. REFER TO APPLICABLE ROOFING SYSTEM SPECIFICATIONS FOR ADDITIONAL INFORMATION ON ROOF MEMBRANE, ROOF INSULATION AND ROOFING ACCESSORIES.
2. REFER TO MECHANICAL / ELECTRICAL / PLUMBING DRAWINGS FOR ADDITIONAL INFORMATION ON ROOF MOUNTED EQUIPMENT.
3. PROVIDE PRE-FORMED SADDLES, CRICKETS, TAPERED EDGE STRIPS, AND OTHER INSULATION SHAPES AS INDICATED OR AS REQUIRED TO PROVIDE POSITIVE DRAINAGE TO DRAINAGE POINTS AT A MINIMUM 1/4" PER FOOT.
4. FIELD PAINT THE FOLLOWING ROOF MOUNTED EQUIPMENT
   - *A. ROOF HATCH COVER*
   - *B. SMOKE / HEAT VENT COVER*
   - *C. METAL LADDER(S)*
   - *D. ROOF SAFETY TIE OFFS*
   - *E. ROOF SCREEN STRUCTURE FRAMING*
5. REFER TO TYPICAL EXTERIOR ASSEMBLIES SHEET A530 FOR ROOF SYSTEM "R" & "U" VALUE CALCULATIONS.
6. MINIMUM 6" INSULATION THICKNESS BEFORE SUMP AT ROOF DRAINS AND ANY POINT ON THE ROOF TO MAINTAIN R-40.
7. REFER TO SHEET SERIES A9A FOR TYPICAL ROOF DETAILS.
8. VERIFY AND COORDINATE FINAL LOCATIONS OF ROOF DRAINS WITH WALL CONSTRUCTION AND STEEL FRAMING BELOW.
9. OVERFLOW SCUPPER (OS) SPILLWAY ELEVATIONS STATED INDICATE RELATIVE ELEVATION ABOVE ROOF DECK.
10. ROOFING CONTRACTOR TO PROVIDE PROTECTIVE PADS ON ROOF SURFACE UNDER ALL SURFACE-BEARING ITEMS (DUCT SUPPORTS, ETC.) AS REQUIRED BY ROOFING MFR.

ROOF PITCH NOTES

1. AT FLAT ROOF DECKS WITH TAPERED INSULATION SYSTEMS, ROOF ELEVATIONS ARE INDICATED (AT LOW POINTS/DRAINS, HIGH POINTS, PERIMETERS, ETC.) AS FOLLOWS: (17'-0"/17'-1/2") ETC. THESE ELEVATION ANNOTATIONS INDICATE RELATIVE HEIGHT FROM TOP OF DECK (METAL OR CONC) TO TOP OF INSULATION SYSTEM.
2. AT PITCHED ROOF DECKS, REFER TO STRUCTURAL FRAMING PLANS FOR ELEVATIONS OF ROOF STRUCTURE SUPPORTING ROOF SYSTEM.
3. TAPERED INSULATION SYSTEM AND/OR ROOF DECK/STRUCTURE SHALL PROVIDE PITCH THAT MEETS OR EXCEEDS LOCAL CODE REQUIREMENTS OVER ENTIRE ROOF AREA. COORDINATE PITCH REQUIREMENTS AND SPECIFIC STEEL ELEVATIONS WITH STRUCTURAL ENGINEER.
4. ALL CRICKETS, ETC., SHALL BE INSTALLED TO PROVIDE PITCH THAT MEETS OR EXCEEDS LOCAL CODE REQUIREMENTS.
5. IF PROJECT OF TAPERED INSULATION ARE REQUIRED TO SUPPLEMENT PITCHED STEEL, PROVIDE SMOOTH TRANSITIONS BETWEEN THE INSULATION SYSTEMS. THE RESULTANT ROOF SURFACE SHALL PROVIDE PITCH THAT MEETS OR EXCEEDS LOCAL CODE REQUIREMENTS.

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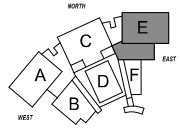

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Number	Date	Issued For
2	11/06/2024	ADDENDUM NO. 6
1	10/23/2024	ADDENDUM NO. 3
	09/20/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ROOF PLAN - PART E

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
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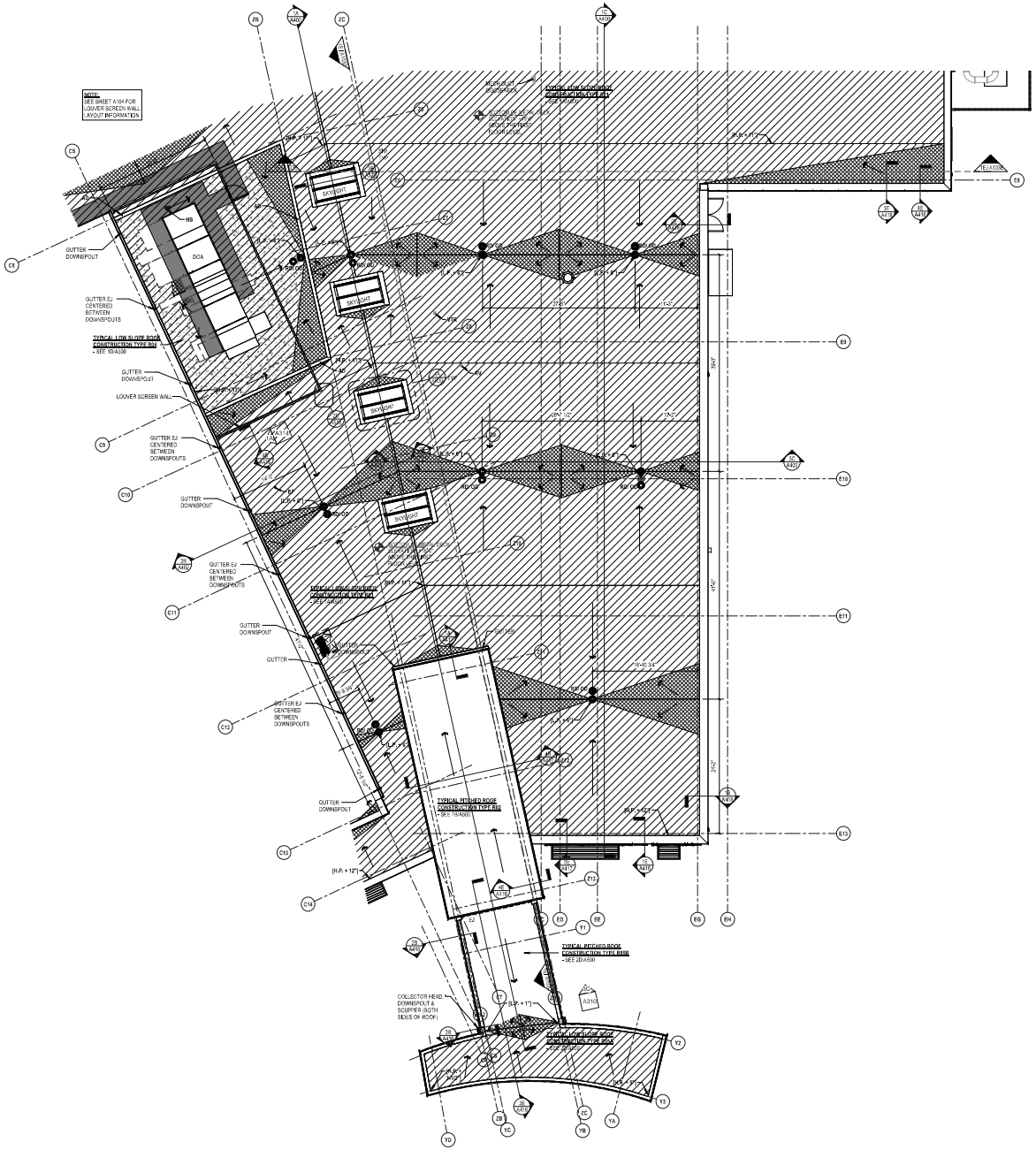

1E ROOF PLAN
1/8" = 1'-0"

ROOF PLAN GRAPHIC LEGEND

- [XX"] MINIMUM INSULATION THICKNESS AT ROOF DRAIN ABOVE ROOF DECK (METAL OR CONCRETE)
- OS OVERFLOW SCUPPER - ELEVATION IS ABOVE ROOF DECK (REFER TO ROOF DETAIL 1D & 5D/A531)
- RD/OD PRIMARY & OVERFLOW ROOF DRAINS (REFER TO ROOF DETAILS 5D/A531)
- VTR PLUMBING / MECHANICAL VENT THROUGH ROOF (REFER TO ROOF DETAILS 5B/A531)
- CU CONDENSING UNIT (REFER TO ROOF DETAILS 4B/A531)
- EF EXHAUST FAN (REFER TO ROOF DETAILS 4D/A530)
- RV PLUMBING VENT THROUGH ROOF (REFER TO ROOF DETAILS - 5B/A530 REFER TO ELECTRICAL FOR POWER RISER FOR ROOFTOP EXHAUST FAN)
- RH ROOF HATCH (REFER TO ROOF DETAILS 1C/A530)
- RTU ROOF TOP MECHANICAL UNIT CURB (REFER TO ROOF DETAILS 4C/A530)
- SV SMOKE / HEAT VENT (REFER TO ROOF DETAILS - 5B TO 1D/A530)
- EJ ROOF EXPANSION JOINT (REFER TO ROOF DETAILS)
- DIRECTION OF PITCH
- AD AREA DIVIDER (REFER TO ROOF DETAILS - 3E/A530)
- TAPERED INSULATION @ 1/4" / FT
- TAPERED CRICKETS @ 1/2" / FT
- ROOF WALKWAY PADS
- R1 ROOF SYSTEM TYPES
- RSTO ROOF SAFETY TIE OFF REFER TO DETAIL 6D/A531
- HB HOSE BIB RE: PLUMBING
- EO ELECTRICAL OUTLET RE: ELECTRICAL
- EP ELECTRICAL CONDUIT STUB-UP (FOR FUTURE PV ARRAY RE: ELECTRICAL)

ROOF PLAN GENERAL NOTES

1. REFER TO APPLICABLE ROOFING SYSTEM SPECIFICATIONS FOR ADDITIONAL INFORMATION ON ROOF MEMBRANE, ROOF INSULATION AND ROOFING ACCESSORIES.
2. REFER TO MECHANICAL / ELECTRICAL / PLUMBING DRAWINGS FOR ADDITIONAL INFORMATION ON ROOF MOUNTED EQUIPMENT.
3. PROVIDE PREFORMED SADDLES, CRICKETS, TAPERED EDGE STRIPS, AND OTHER INSULATION SHAPES AS INDICATED OR AS REQUIRED TO PROVIDE POSITIVE DRAINAGE TO DRAINAGE POINTS AT A MINIMUM 1/4" PER FOOT.
4. FIELD PAINT THE FOLLOWING ROOF MOUNTED EQUIPMENT:
   - *A. ROOF HATCH COVER*
   - *B. SMOKE / HEAT VENT COVER*
   - *C. METAL LADDER(S)*
   - *D. ROOF SAFETY TIE OFFS*
   - *E. ROOF SCREEN STRUCTURE FRAMING*
5. REFER TO TYPICAL EXTERIOR ASSEMBLIES SHEET A500 FOR ROOF SYSTEM "R" & "U" VALUE CALCULATIONS.
6. MINIMUM 5" INSULATION THICKNESS BEFORE SUMP AT ROOF DRAINS AND ANY POINT ON THE ROOF TO MAINTAIN N-40
7. REFER TO SHEET SERIES A50x FOR TYPICAL ROOF DETAILS.
8. VERIFY AND COORDINATE FINAL LOCATIONS OF ROOF DRAINS WITH WALL CONSTRUCTION AND STEEL FRAMING BELOW.
9. OVERFLOW SCUPPER (OS) SPILLWAY ELEVATIONS STATED INDICATE RELATIVE ELEVATION ABOVE ROOF DECK.
10. ROOFING CONTRACTOR TO PROVIDE PROTECTIVE PADS ON ROOF SURFACE UNDER ALL SURFACE-BEARING ITEMS (DUCT SUPPORTS, ETC.) AS REQUIRED BY ROOFING MFR.

ROOF PITCH NOTES

1. AT FLAT ROOF DECKS WITH TAPERED INSULATION SYSTEMS, ROOF ELEVATIONS ARE INDICATED (AT LOW POINTS/DRAINS, HIGH POINTS, PERIMETERS, ETC.) AS FOLLOWS: XX'-X" [XX'-X"] ETC.. THESE ELEVATION ANNOTATIONS INDICATE RELATIVE HEIGHT FROM TOP OF DECK (METAL OR CONC) TO TOP OF INSULATION SYSTEM.
2. AT PITCHED ROOF DECKS, REFER TO STRUCTURAL FRAMING PLANS FOR ELEVATIONS OF ROOF STRUCTURE SUPPORTING ROOF SYSTEM.
3. TAPERED INSULATION SYSTEM AND/OR ROOF DECK/STRUCTURE SHALL PROVIDE PITCH THAT MEETS OR EXCEEDS LOCAL CODE REQUIREMENTS OVER ENTIRE ROOF AREA. COORDINATE PITCH REQUIREMENTS AND SPECIFIC STEEL ELEVATIONS WITH STRUCTURAL ENGINEER.
4. ALL CRICKETS, ETC. SHALL BE INSTALLED TO PROVIDE PITCH THAT MEETS OR EXCEEDS LOCAL CODE REQUIREMENTS.
5. IF PROJECT OF TAPERED INSULATION ARE REQUIRED TO SUPPLEMENT PITCHED STEEL, PROVIDE SMOOTH TRANSITIONS BETWEEN THE INSULATION SYSTEMS. THE RESULTANT ROOF SURFACE SHALL PROVIDE PITCH THAT MEETS OR EXCEEDS LOCAL CODE REQUIREMENTS.

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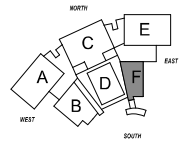

KEYPLAN

Number	Date	Issued For
1	11/06/2024	ADDENDUM NO. 3
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ROOF PLAN - PART F

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **A103F**

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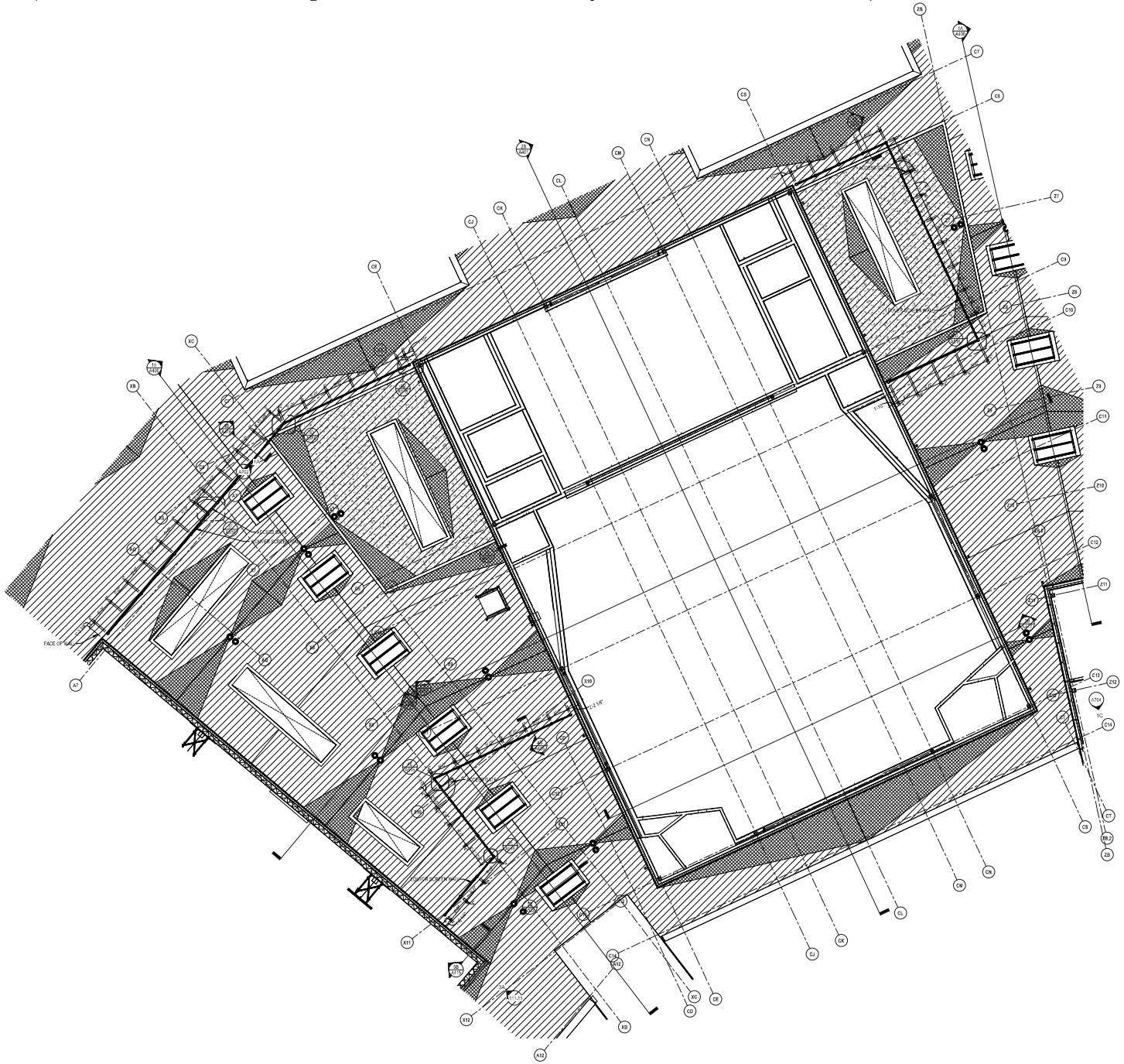

5E 2 - SECOND FLOOR ROOF SCREEN LAYOUT
1/8" = 1'-0"

NOTE:
THIS PLAN IS USED SOLELY FOR INFORMATION RELATING TO THE ROOF SCREEN SYSTEMS. SEE ROOF PLANS FOR ALL INFORMATION RELATED TO ROOFING SYSTEMS, ROOF MOUNTED MEP SYSTEMS, ROOFING DIMENSIONS AND DETAIL KEYS.

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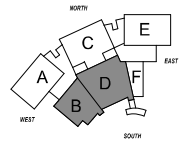

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ROOF SCREEN LAYOUT PLAN

Date	Drawing Number
07/08/2024	A104
Scale: 1/8" = 1'-0"	
Proj. Number: 22367.00	

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INTERIOR ELEVATION GENERAL NOTES:

1. SEE SHEET A701 FOR TYPICAL MOUNTING HEIGHTS OF ACCESSORIES, WALL MOUNTED EQUIPMENT & DEVICES & TYPICAL TOILET/SHOWER ELEVATIONS
2. SEE FURNITURE PLANS, FINISH PLANS & ENLARGED FLOOR PLANS FOR ALL WHITEBOARD, TACKBOARD AND SURFACE MOUNTED LOCATIONS. PROVIDE BLOCKING FOR ALL INTERACTIVE WHITEBOARDS & TACKBOARDS AND PER DETAIL 5/A9002. COORDINATE LOCATIONS WITH ELECTRICAL AND FURNITURE DRAWINGS.
3. WHERE ACCENT PAINT COLOR IS ON A WALL WITH CASEWORK ANY EXPOSED WALL BELOW CASEWORK IS TO BE PAINTED ACCENT COLOR INDICATED AS WELL.
4. EXPOSED OUTER EDGE OF ANY WALL COVERING, TO RECEIVE TRIM. AS SHOWN IN 15/A905.
5. REFER TO EQUIPMENT SCHEDULES ON A912 FOR EXTENT OF EQUIPMENT INFO FOR TAGGED EQUIPMENT.
6. REFER TO FINISH PLANS FOR EXTENT OF ACCENT PAINT COLORS AND LOCATIONS OF SPECIALTY WALL FINISHES.
7. REFER TO FINISH PRODUCT LIST FOR PRODUCT INFO ON ALL TAGGED FINISHES. REFER TO FINISH GENERAL NOTES FOR ADDITIONAL INFORMATION.
8. REFER TO A604 FOR LOCKER ELEVATIONS AND DETAILS. PROVIDE FLAT TOPS AT LOCKERS WITH NO SOFFIT, TYPICAL
9. WHERE WHITEBOARD ARE SHOWN NEXT TO MWB THEY ARE TO BE MOUNTED AS CLOSELY AS POSSIBLE TO THE MWB.
10. WHERE WHITEBOARD AND/OR TACKBOARDS ARE SHOWN NEXT TO EACH OTHER THEY ARE TO BE INSTALLED WITH OUTER FRAME TOUCHING.

ENLARGED FLOOR PLAN GENERAL NOTES

1. REFER TO OVERALL & 1/8" PART FLOOR PLANS FOR FLOOR PLAN GENERAL NOTES, FLOOR PLAN GRAPHIC LEGEND AND OVERALL BUILDING SECTION LOCATIONS AND "A1" SERIES FOR DIMENSIONS.
2. REFER TO G911.1 - G982.1 FOR ABBREVIATIONS AND GRAPHIC LEGEND
3. SEE FINISH PLANS FOR EXTENT OF FINISHES
4. SEE SHEET A701 FOR TYPICAL MOUNTING HEIGHTS OF TOILET ACCESSORIES AND SPECIALTY EQUIPMENT (SEK).
5. SEE FLOOR FINISH PLANS FOR FLOOR TRANSITIONS AND THRESHOLDS
6. FURNITURE IS SHOWN FOR REFERENCE ONLY - NLC, AS IT WILL BE PROCURED AT A LATER PHASE.
7. ALL CASEWORK/ MILLWORK SHOWN SHADED
8. EQ## INDICATES APPLIANCE OR COMMERCIAL EQUIPMENT TYPE - REFER TO SHEETS A912 FOR EQUIPMENT SCHEDULES
9. REFER TO AL-SERIES PLANS, ENLARGED PLANS AND DETAILS FOR ADDITIONAL DIMENSIONS AND WALL TYPES
10. REFER TO A701 FOR TYPICAL TOILET STALL TYPE LAYOUTS AND TOILET ACCESSORY LOCATIONS.
11. REFER TO FOOD SERVICE PLANS FOR EXTENT OF EQUIPMENT INCLUDED IN THE KITCHEN SERVERY.

INTERIOR ELEVATION GRAPHIC LEGEND

FINISH LEGEND

P1 NO GRAPHIC PATTERN SHOWN - FIELD THROUGHOUT UNLESS OTHERWISE NOTED

P5+12 ACCENT PAINT LOCATIONS SHOW AS: REFER TO FINISH PLANS FOR TYPE.

P9, P13, DARK ACCENT PAINTS SHOWN AS: REFER TO FINISH PLANS TAGS FOR TYPE

AWP1-15 & 12 ACOUSTIC PANELS SHOWN AS: REFER TO ELEVATIONS FOR TYPE

AWP11 ACOUSTIC PANELS SHOWN AS:

VC01-VC09 CUSTOM GRAPHIC SHOWN AS: REFER TO FINISH PLANS FOR TYPE.

WWP1 SHOWN AS:

WP2 SHOWN AS:

TACKBOARD SHOWN AS:

LOCKER ACCENT COLOR 1 (GRAY) SHOWN AS

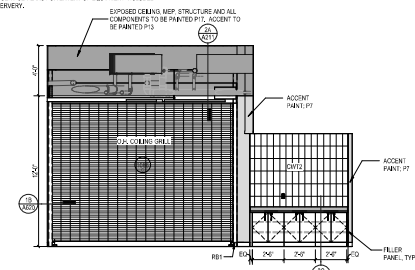
LOCKER ACCENT COLOR 2,3,& 4 SHOWN AS

- ACCENT COLOR 2 AT RIGHT SIDE POD LOCKERS TO MATCH P10
- ACCENT COLOR 3 AT CENTER POD LOCKERS TO MATCH P11
- ACCENT COLOR 4 AT LEFT SIDE POD LOCKERS TO MATCH P12

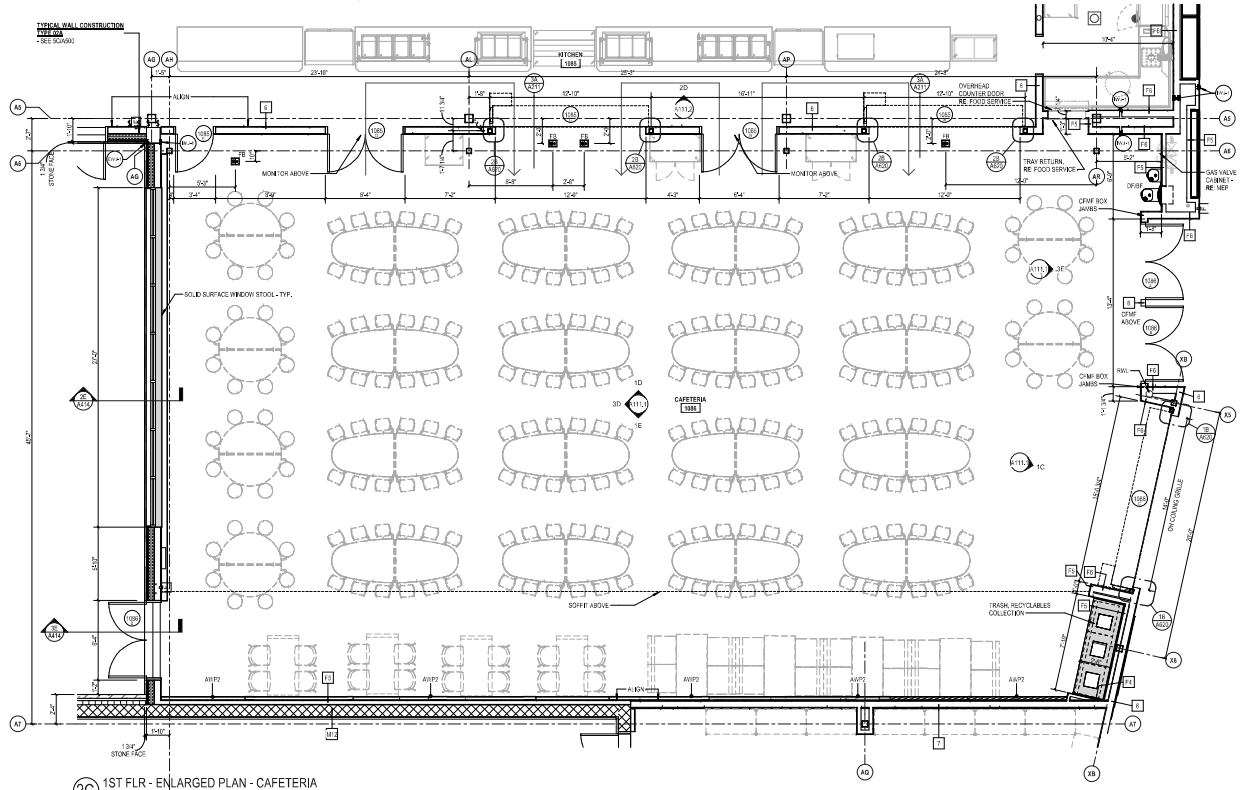
PAPER TOWEL DISPENSER

SOAP DISPENSER

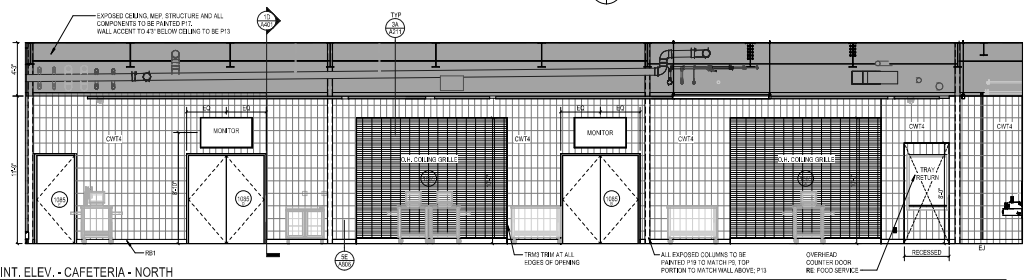
CLOCK



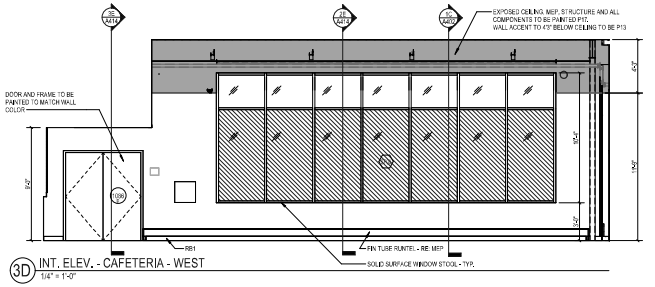
1C INT. ELEV. - CAFETERIA - SOUTHEAST
1/4" = 1'-0"



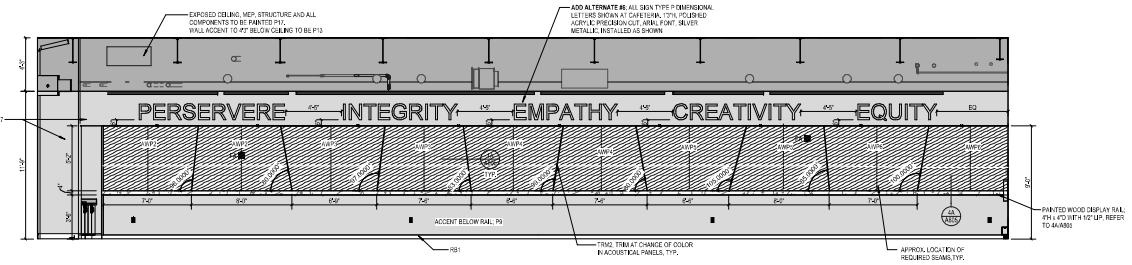
2C 1ST FLR - ENLARGED PLAN - CAFETERIA
1/4" = 1'-0"
PROJECT
PLAN ROTATED TO FIT ON SHEET



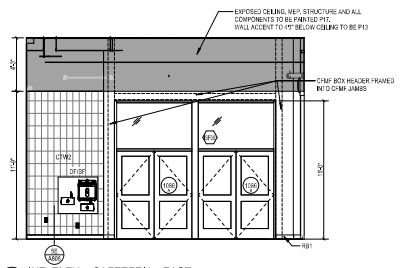
1D INT. ELEV. - CAFETERIA - NORTH
1/4" = 1'-0"



3D INT. ELEV. - CAFETERIA - WEST
1/4" = 1'-0"



1E INT. ELEV. - CAFETERIA - SOUTH
1/4" = 1'-0"



3E INT. ELEV. - CAFETERIA - EAST
1/4" = 1'-0"

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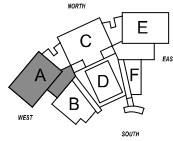
Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane,
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/03/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ENLARGED PLAN & ELEVATIONS - CAFETERIA

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A111.1

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CEILING PLAN GENERAL NOTES

1. "EXPOSED CONSTRUCTION" OR "EXP. CONST." INDICATES NO CEILING. EXPOSED TO DECK, PTD.

2. CENTER LIGHT FIXTURES AND OTHER DEVICES IN ACOUSTICAL PANEL "PATTERN" UNLESS OTHERWISE INDICATED. REFER TO DETAIL BELOW.

3. CENTER ACOUSTICAL PANELS OR GRID IN SPACES UNLESS OTHERWISE INDICATED.

4. SEE SPECIFICATIONS FOR INFORMATION ON SEISMIC RESTRAINT OF CEILING SYSTEMS.

5. SEE CEILING DETAIL SHEETS FOR CEILING AND SOFFIT DETAILS.

6. SPRINKLER HEAD LOCATIONS ARE SHOWN FOR COORDINATION PURPOSES ONLY. NOT ALL SPRINKLER HEADS ARE SHOWN. FIRE PROTECTION SYSTEM INSTALLER SHALL COORDINATE SPRINKLER HEADS. IN AREAS WITHOUT SUSPENDED CEILINGS, COORDINATE LOCATIONS OF SPRINKLER HEADS WITH HVAC DUCTS, EQUIPMENT, BEAMS, COLUMNS, LIGHTS, AND ANY OTHER OBSTRUCTIONS IN ACCORDANCE WITH NFPA 13. IN AREAS WITH SUSPENDED CEILINGS, COORDINATE SPRINKLER MAINS, RUNS AND SPRINKLER HEAD LOCATIONS WITH OTHER WORK TO INSURE CEILING HEIGHTS, LIGHTING, DIFFUSER AND OTHER CEILING DEVICE LOCATIONS ARE MAINTAINED AS SHOWN OR AS REQUIRED TO COMPLY WITH APPLICABLE CODE REQUIREMENTS. ADVISE ARCHITECT OF ANY CONFLICTS WHICH MUST BE RESOLVED PRIOR TO INSTALLATION.

7. LIGHT FIXTURES, FIRE PROTECTION DEVICES AND DIFFUSERS ARE SHOWN FOR LOCATION AND COORDINATION PURPOSES ONLY. REFER TO ELECTRICAL AND HVAC DWGS. FOR ACTUAL LIGHT FIXTURE, DIFFUSER AND FIRE PROTECTION SCHEDULES.

8. REFER TO ELECTRICAL, HVAC AND FIRE PROTECTION DWGS. FOR LIGHT FIXTURES, DIFFUSERS AND FIRE PROTECTION DEVICES IN UNFINISHED AREAS OR AREAS WITH EXPOSED STRUCTURE.

9. COORDINATE ACCESS PANEL LOCATIONS WITH MECHANICAL TRADES. SUBMIT PROPOSED LOCATIONS TO ARCHITECT FOR APPROVAL. CONTRACTOR TO LOCATE SERVICEABLE MEP AND AVIT COMPONENTS OUTSIDE OF HARD CEILING AREAS AND INTO ACCESSIBLE CEILING AREAS TO THE GREATEST EXTENT POSSIBLE.

10. ALL CEILING HEIGHTS SHALL BE 10'-0", UNLESS OTHERWISE NOTED.

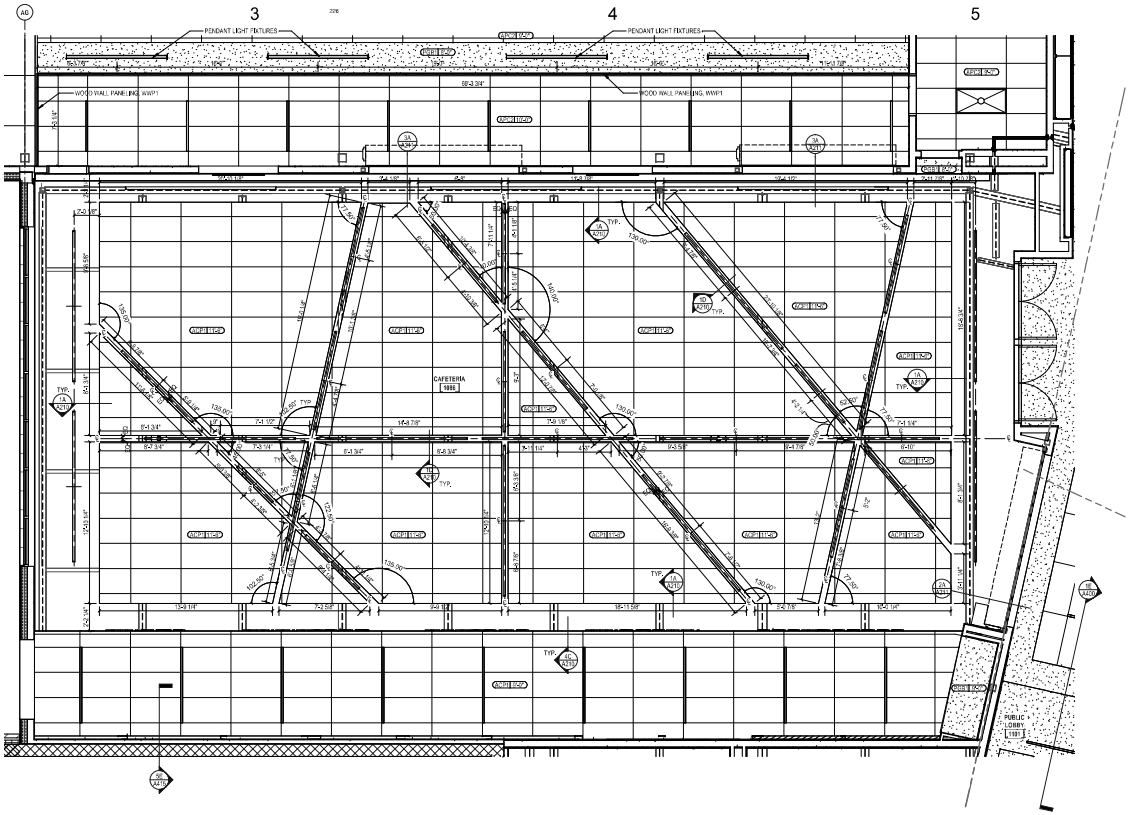
11. ALL SOFFIT HEIGHTS SHALL BE 10'-0", UNLESS OTHERWISE NOTED.

12. HANGING SYSTEMS FROM OVERHEAD STRUCTURE:
   A. FOR BUILDINGS WHERE THE FLOOR & ROOF CONSTRUCTION CONSISTS OF CAST IN PLACE CONCRETE SLABS/BEAMS, PRECAST CONCRETE SLABS/BEAMS, CONCRETE FILLED METAL DECKS (SUPPORTED BY STRUCTURAL STEEL FRAMING), THE FOLLOWING SYSTEMS CAN BE HUNG:
      a. CEILINGS AND SOFFITS SYSTEMS (INCLUDING HUNG PARTITION SYSTEMS),
      b. MECHANICAL, ELECTRICAL, PLUMBING, AND FIRE PROTECTION SYSTEMS AND EQUIPMENT,
      c. FOR ANY HEAVY OR LARGE SYSTEMS OR ITEMS, CONSULT WITH YOUR STRUCTURAL ENGINEER.
   B. FOR BUILDINGS WHERE THE ROOF STRUCTURE IS SIMPLE METAL ROOF DECK (NO CONCRETE FILL), THE FOLLOWING SYSTEMS CAN BE HUNG:
      a. ACOUSTIC CEILING SYSTEMS (ACT TILES, ETC.) WEIGHING LESS THAN 5 LBS/SF AND HUNG AT 4'-0" O.C. BOTH DIRECTIONS.
      b. SINGLE LAYER GYPSUM BOARD CEILING SYSTEMS WEIGHING LESS THAN 5 LBS/SF AND HUNG AT 4'-0" O.C. BOTH DIRECTIONS.
      c. DO NOT HANG ANY OTHER SYSTEM OR ITEM DIRECTLY FROM PLAIN ROOF STEEL DECKS UNLESS STRUCTURAL ECHX CONFIRMS THAT DECK HAS BEEN DESIGNED TO SUPPORT THESE HANGING LOADS. IN LOCATIONS WHERE PLAIN ROOF STEEL DECK (NO CONCRETE FILL) IS OVERHEAD, HANG ONLY FROM STRUCTURAL STEEL FRAMING MEMBERS OR PROVIDE SECONDARY STEEL FRAMING MEMBERS (SLOTTED CHANNEL FRAMING, I.E. "UNISTRUT", ETC.) OF ADEQUATE DESIGN (SPANNING BETWEEN BUILDING STRUCTURAL STEEL FRAMING MEMBERS) AS REQUIRED.
   C. FOR BUILDINGS CONSTRUCTED OF COLD-FORMED METAL FRAMING SYSTEMS, FOLLOW "SIMPLE METAL ROOF DECKS" ABOVE.
   D. REVIEW AND DISCUSS ALL UNUSUAL CONDITIONS WITH YOUR STRUCTURAL ENGINEER.

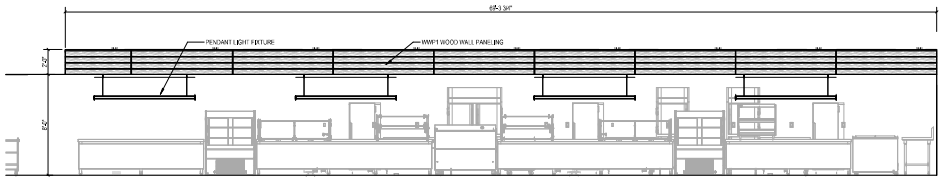
13. WHERE REFERENCED BY THIS NOTE, PROVIDE 14IN. HORIZONTAL SHAFTWALL CEILING (WITH 4" DEEP 20 GA. FRAMING). INSTALL AS HIGH AS POSSIBLE TO UNDERSIDE OF STEEL FRAMING ABOVE.

14. SEE FINISH SCHEDULE FOR ALL WINDOW SHADE INFORMATION

15. FOR ACOUSTIC CONTINUITY AT TOPS OF PARTITIONS CENTERED ON OR DIRECTLY ADJACENT TO STEEL BEAMS, REFER TO SPECTC DETAILS ON SHEET A602



2C 1 - CAFETERIA CEILING
1/4" = 1'-0"



2D INT. ELEV. - SERVERY
1/4" = 1'-0"

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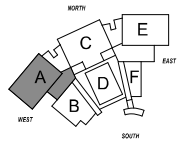
Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane,
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ENLARGED CEILING PLAN & DETAILS - CAFETERIA

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A111.2

Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_GREENWICH_CENTRAL_MS_R22.rvt
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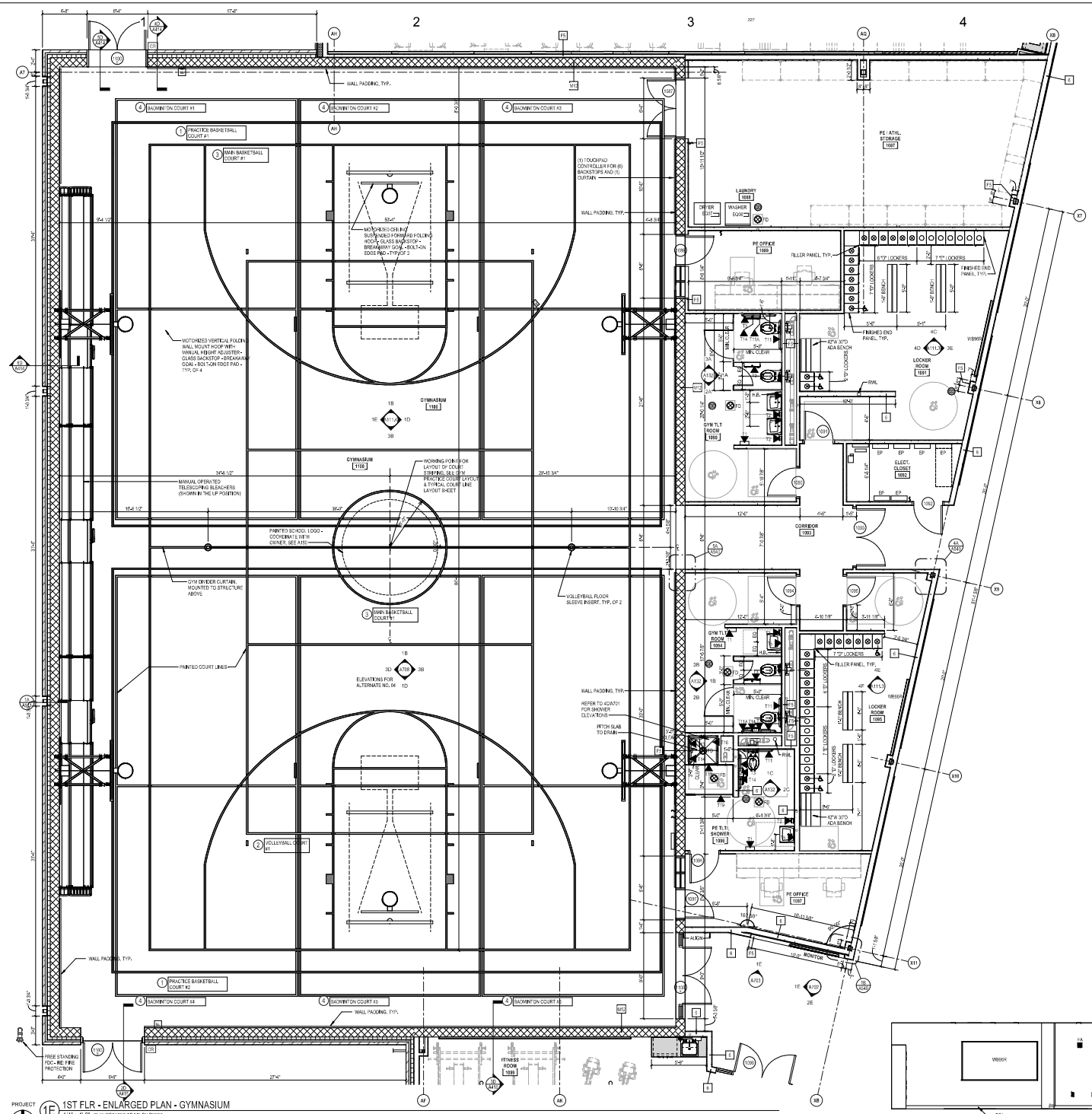


PROJECT NORTH

1E 1ST FLR - ENLARGED PLAN - GYMNASIUM
1/4" = 1'-0" PLAN ROTATED TO FIT ON SHEET

ENLARGED FLOOR PLAN GENERAL NOTES

1. REFER TO OVERALL & 1/8" PART FLOOR PLANS FOR FLOOR PLAN GENERAL NOTES, FLOOR PLAN GRAPHIC LEGEND AND OVERALL BUILDING SECTION LOCATIONS AND "AL" SERIES FOR DIMENSIONS.
2. REFER TO G0A1.1 - G0A2.1 FOR ABBREVIATIONS AND GRAPHIC LEGEND
3. SEE FINISH PLANS FOR EXTENT OF FINISHES
4. SEE SHEET A701 FOR TYPICAL MOUNTING HEIGHTS OF TOILET ACCESSORIES AND SPECIALTY EQUIPMENT (SEK).
5. SEE FLOOR FINISH PLANS FOR FLOOR TRANSITIONS AND THRESHOLDS
6. FURNITURE IS SHOWN FOR REFERENCE ONLY - N.I.C. AS IT WILL BE PROCURED AT A LATER PHASE.
7. ALL CASEWORK/ MILLWORK SHOWN SHADED
8. EQPM INDICATES APPLIANCE OR COMMERCIAL EQUIPMENT TYPE - REFER TO SHEETS A913 FOR EQUIPMENT SCHEDULES
9. REFER TO AL-SERIES PLANS, ENLARGED PLANS AND DETAILS FOR ADDITIONAL DIMENSIONS AND WALL TYPES
10. REFER TO A701 FOR TYPICAL TOILET STALL TYPE LAYOUTS AND TOILET ACCESSORY LOCATIONS.
11. REFER TO FOOD SERVICE PLANS FOR EXTENT OF EQUIPMENT INCLUDED IN THE KITCHEN SERVERY.

INTERIOR ELEVATION GENERAL NOTES:

1. SEE SHEET A701 FOR TYPICAL MOUNTING HEIGHTS OF ACCESSORIES, WALL MOUNTED EQUIPMENT & CASINGS & TYPICAL TOILET/ SHOWER ELEVATIONS
2. SEE FURNITURE PLANS , FINISH PLANS & ENLARGED FLOOR PLANS FOR ALL WHITEBOARD, TACKBOARD AND SHELVING LOCATIONS. PROVIDE BLOCKING FOR ALL INTERACTIVE WHITEBOARDS (STACK BOARDS AND PER DETAIL 5B/A602. COORDINATE LOCATIONS WITH ELECTRICAL AND FURNITURE DRAWINGS.
3. WHERE ACCENT PAINT COLOR IS ON A WALL WITH CASEWORK, ANY EXPOSED WALL BELOW CASEWORK IS TO BE PAINTED ACCENT COLOR INDICATED AS WELL.
4. EXPOSED OUTER EDGE OF ANY WALLCOVERING, TO RECEIVE TRIM, AS SHOWN IN 1B/A805.
5. REFER TO EQUIPMENT SCHEDULES ON A913 FOR EXTENT OF EQUIPMENT INFO FOR TAGGED EQUIPMENT.
6. REFER TO FINISH PLANS FOR EXTENT OF ACCENT PAINT COLORS AND LOCATIONS OF SPECIALTY WALL FINISHES.
7. REFER TO FINISH PRODUCT LIST FOR PRODUCT INFO ON ALL TAGGED FINISHES. REFER TO FINISH GENERAL NOTES FOR ADDITIONAL INFORMATION.
8. REFER TO A913 FOR LOCKER ELEVATIONS AND DETAILS. PROVIDE FLAT TOPS AT LOCKERS WITH NO SOFFIT, TYPICAL
9. WHERE WHITEBOARD ARE SHOWN NEXT TO MIR THEY ARE TO BE MOUNTED AS CLOSELY AS POSSIBLE TO THE MIR.
10. WHERE WHITEBOARD AND/OR TACKBOARDS ARE SHOWN NEXT TO EACH OTHER THEY ARE TO BE INSTALLED WITH OUTER FRAME TOUCHING.

INTERIOR ELEVATION GRAPHIC LEGEND

FINISH LEGEND

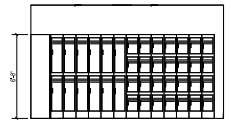
- P1: NO GRAPHIC PATTERN SHOWN - FIELD THROUGHOUT UNLESS OTHERWISE NOTED
- P3-P12 ACCENT PAINT LOCATIONS SHOWN AS: REFER TO FINISH PLANS FOR TYPE.
- P8, P13, DARK ACCENT PAINTS SHOWN AS: REFER TO FINISH PLANS TAGS FOR TYPE
- AWP-10 & 12 ACOUSTIC PANELS SHOWN AS: REFER TO ELEVATIONS FOR TYPE
- AWP11 ACOUSTIC PANELS SHOWN AS:
- WCG1-WCG9 CUSTOM GRAPHIC SHOWN AS: REFER TO FINISH PLANS FOR TYPE.
- WWP1 SHOWN AS:
- WP3 SHOWN AS:
- TACKBOARD SHOWN AS:

LOCKER ACCENT COLOR 1 (GRAY) SHOWN AS

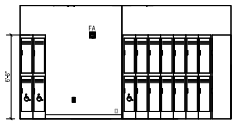
LOCKER ACCENT COLOR 2, 3 & 4 SHOWN AS

- ACCENT COLOR 2 AT RIGHT SIDE POD LOCKERS TO MATCH P10
- ACCENT COLOR 3 AT CENTER POD LOCKERS TO MATCH P11
- ACCENT COLOR 4 AT LEFT SIDE POD LOCKERS TO MATCH P12

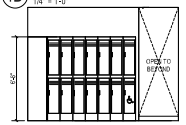
PAPER TOWEL DISPENSER
SOAP DISPENSER
CLOCK



4C INT. ELEV. - LOCKER ROOM (1091) - NORTH
1/4" = 1'-0"

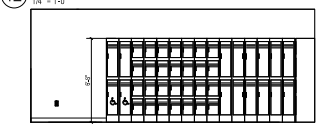


4D INT. ELEV. - LOCKER ROOM (1091) - WEST
1/4" = 1'-0"



4E INT. ELEV. - LOCKER ROOM (1095) - NORTH
1/4" = 1'-0"

3E INT. ELEV. - LOCKER ROOM - EAST
1/4" = 1'-0"



4F INT. ELEV. - LOCKER ROOM (1095) - WEST
1/4" = 1'-0"

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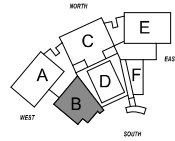
Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ENLARGED PLAN & ELEVATION - GYMNASIUM

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A111.3

Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_GREENWICH_CENTRAL_MS_R22.rvt
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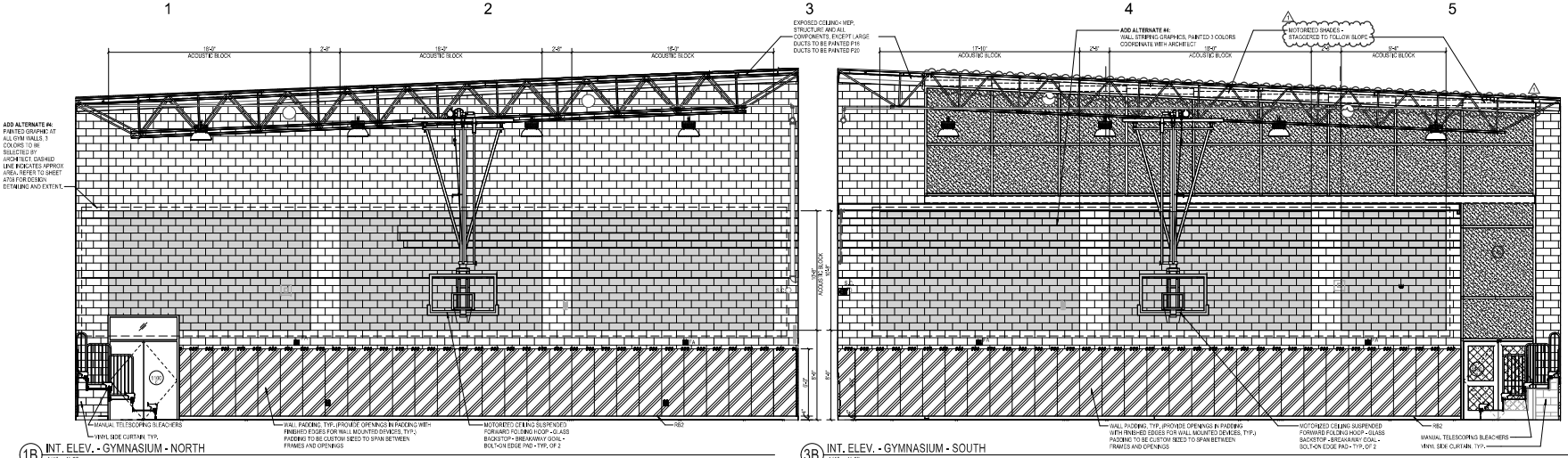
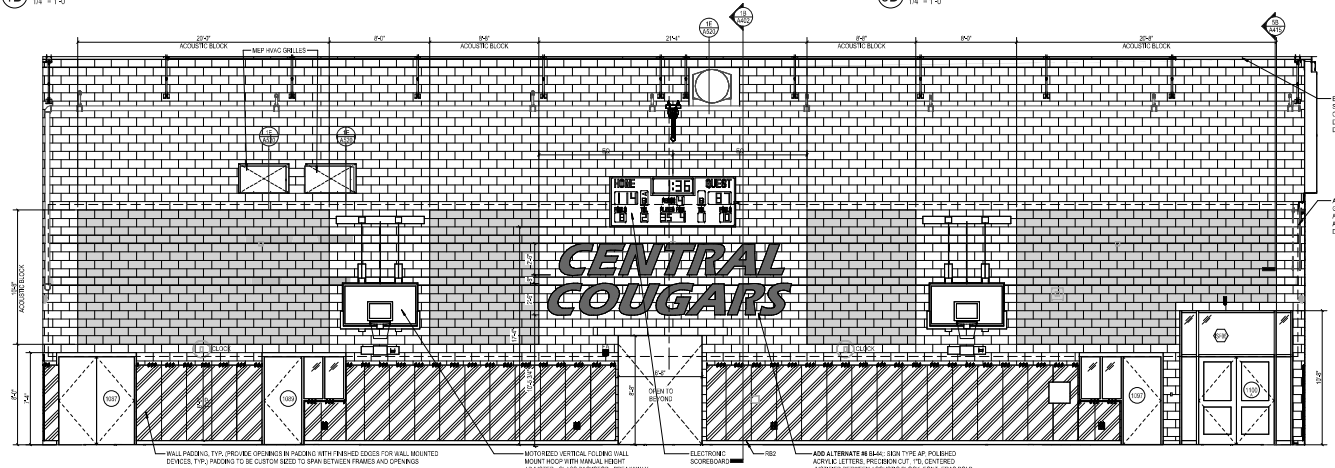
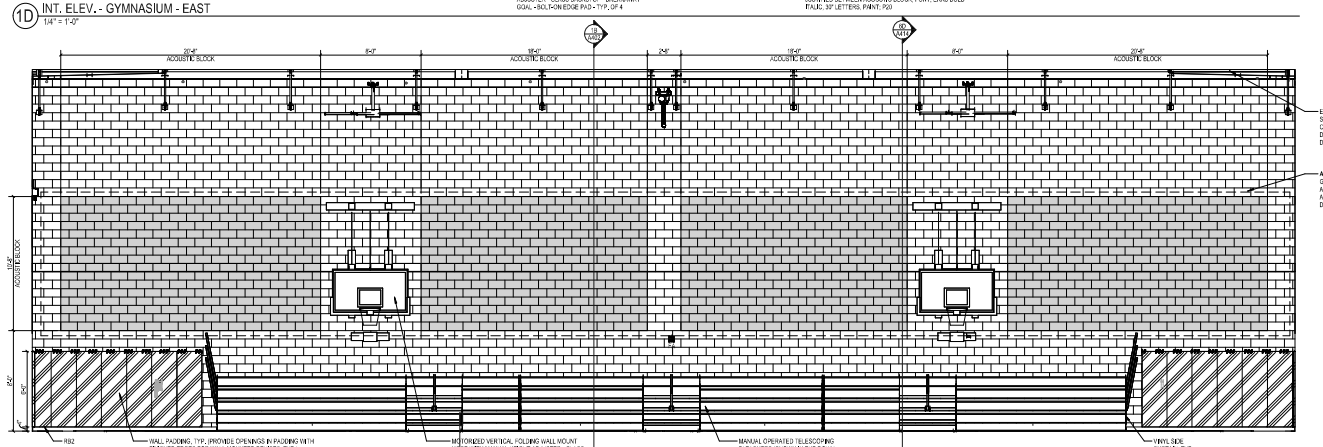


1B INT. ELEV. - GYMNASIUM - NORTH
1/4" = 1'-0"

3B INT. ELEV. - GYMNASIUM - SOUTH
1/4" = 1'-0"



1D INT. ELEV. - GYMNASIUM - EAST
1/4" = 1'-0"



1E INT. ELEV. - GYMNASIUM - WEST
1/4" = 1'-0"

INTERIOR ELEVATION GENERAL NOTES:

1. SEE SHEET A7I1 FOR TYPICAL MOUNTING HEIGHTS OF ACCESSORIES. WALL MOUNTED EQUIPMENT & DEVICES & TYPICAL TOILET/SHOWER ELEVATIONS.
2. SEE FURNITURE PLANS, FINISH PLANS & ENLARGED FLOOR PLANS FOR ALL WHITEBOARD, TACKBOARD AND SHELVING LOCATIONS. PROVIDE BLOCKING FOR ALL INTERACTIVE WHITEBOARDS & LADDER BOARDS AND PER DETAIL 10/A603. COORDINATE LOCATIONS WITH ELECTRICAL AND FURNITURE DRAWINGS.
3. WHERE ACCENT PAINT COLOR IS ON A WALL WITH CASEWORK ANY EXPOSED WALL BELOW CASEWORK IS TO BE PAINTED ACCENT COLOR INDICATED AS INTEL.
4. EXPOSED OUTER EDGE OF ANY WALLCOVERING, TO RECEIVE TRIM, AS SHOWN IN 18/A805.
5. REFER TO EQUIPMENT SCHEDULES ON A912 FOR EXTENT OF EQUIPMENT INFO FOR TAGGED EQUIPMENT.
6. REFER TO FINISH PLANS FOR EXTENT OF ACCENT PAINT COLORS AND LOCATIONS OF SPECIALTY WALL FINISHES.
7. REFER TO FINISH PRODUCT LIST FOR PRODUCT INFO ON ALL TAGGED FINISHES. REFER TO FINISH GENERAL NOTES FOR ADDITIONAL INFORMATION.
8. REFER TO A804 FOR LOCKER ELEVATIONS AND DETAILS. PROVIDE FLAT TOPS AT LOCKERS WITH NO SOFFIT, TYPICAL.
9. WHERE WHITEBOARD ARE SHOWN NEXT TO IWB THEY ARE TO BE MOUNTED AS CLOSELY AS POSSIBLE TO THE IWB.
10. WHERE WHITEBOARD AND/OR TACKBOARDS ARE SHOWN NEXT TO EACH OTHER THEY ARE TO BE INSTALLED WITH OUTER FRAME TOUCHING.

INTERIOR ELEVATION GRAPHIC LEGEND

FINISH LEGEND

P1: NO GRAPHIC PATTERN SHOWN - FIELD THROUGHOUT UNLESS OTHERWISE NOTED

P2/P12 ACCENT PAINT LOCATIONS SHOW AS: REFER TO FINISH PLANS FOR TYPE.

P3, P13 DARK ACCENT PAINTS SHOWN AS: REFER TO FINISH PLANS TAGS FOR TYPE

AWP1-10 & 12 ACOUSTIC PANELS SHOWN AS: REFER TO ELEVATIONS FOR TYPE

AWP11 ACOUSTIC PANELS SHOWN AS:

YCG1-4COS CUSTOM GRAPHIC SHOWN AS: REFER TO FINISH PLANS FOR TYPE.

WWP1 SHOWN AS:

WP2 SHOWN AS:

TACKBOARD SHOWN AS:

LOCKER ACCENT COLOR 1 (GRAY) SHOWN AS

LOCKER ACCENT COLOR 2, 3 & 4 SHOWN AS

- ACCENT COLOR 2 AT FRONT SIDE POD LOCKERS TO MATCH P10
- ACCENT COLOR 3 AT CENTER POD LOCKERS TO MATCH P11
- ACCENT COLOR 4 AT LEFT SIDE POD LOCKERS TO MATCH P12

PAPER TOWEL DISPENSER

SOAP DISPENSER

CLOCK

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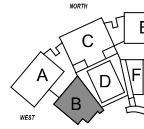
Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
1	10/30/2024	ADDENDUM NO. 4
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ENLARGED PLAN & ELEVATIONS - GYMNASIUM

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A111.4

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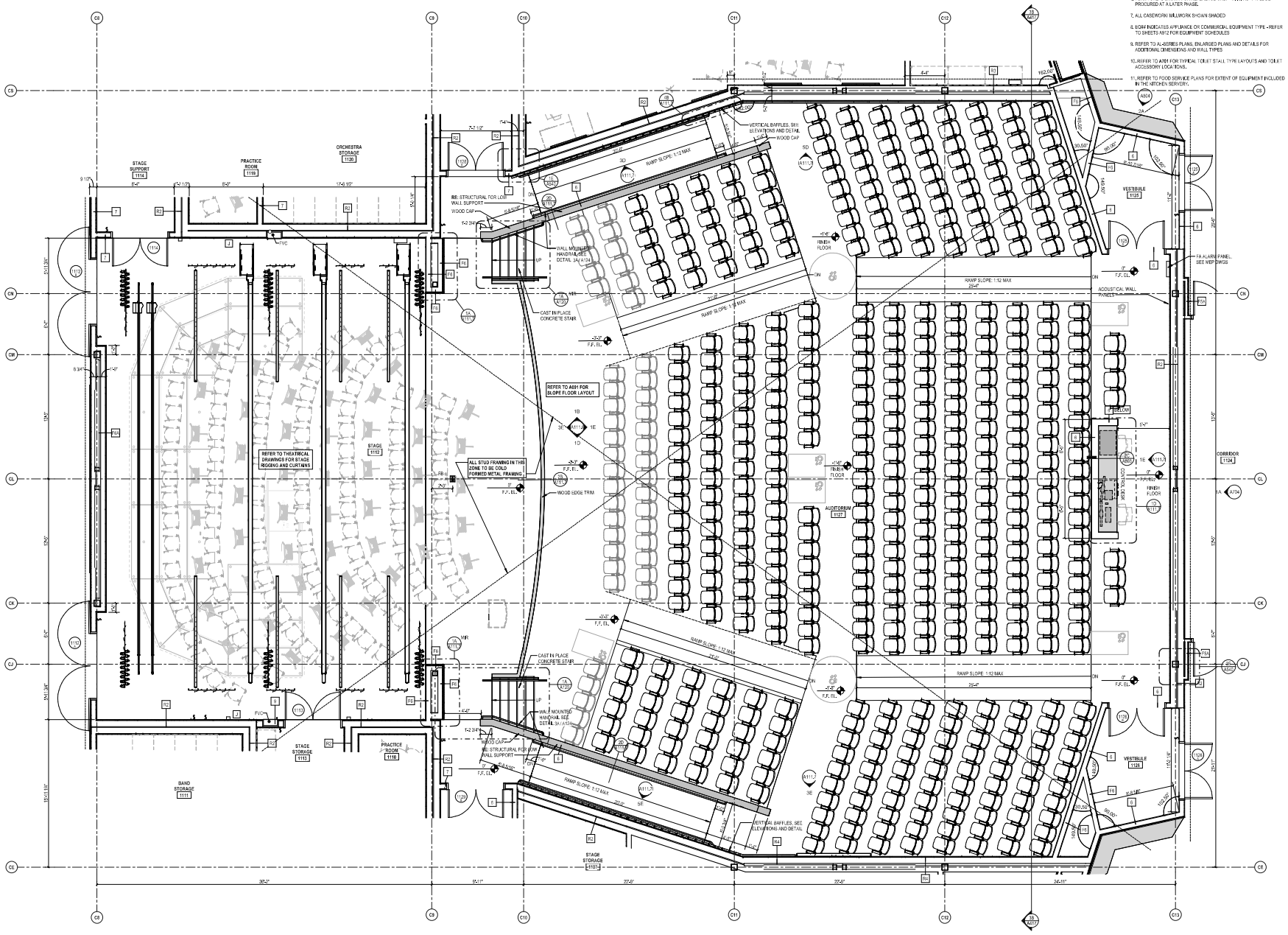

PROJECT NORTH

1E 1ST FLR - ENLARGED PLAN - AUDITORIUM
1/4" = 1'-0"
PLAN ROTATED TO FIT ON SHEET

ENLARGED FLOOR PLAN GENERAL NOTES

1. REFER TO OVERALL & MF PART FLOOR PLANS FOR FLOOR PLAN GENERAL NOTES, FLOOR PLAN GRAPHIC LEGEND AND OVERALL BUILDING SECTION LOCATIONS AND "AL" SERIES FOR DIMENSIONS.
2. REFER TO G101.1 - G102.1 FOR ABBREVIATIONS AND GRAPHIC LEGEND
3. SEE FINISH PLANS FOR EXTENT OF FINISHES
4. SEE SHEET A701 FOR TYPICAL MOUNTING HEIGHTS OF TOILET ACCESSORIES AND SPECIALTY EQUIPMENT (SEE).
5. SEE FLOOR FINISH PLANS FOR FLOOR TRANSITIONS AND THRESHOLDS
6. FURNITURE IS SHOWN FOR REFERENCE ONLY - N.I.C. ASIT WILL BE PROCURED AT A LATER PHASE.
7. ALL CASEWORK/ MILLWORK SHOWN SHADED
8. EQMT INDICATES APPLIANCE OR COMMERCIAL EQUIPMENT TYPE - REFER TO SHEETS A912 FOR EQUIPMENT SCHEDULES
9. REFER TO AL-SERIES PLANS, ENLARGED PLANS AND DETAILS FOR ADDITIONAL DIMENSIONS AND WALL TYPES
10. REFER TO A701 FOR TYPICAL TOILET STALL TYPE LAYOUTS AND TOILET ACCESSORY LOCATIONS.
11. REFER TO FOOD SERVICE PLANS FOR EXTENT OF EQUIPMENT INCLUDED IN THE KITCHEN SERVERY.

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Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

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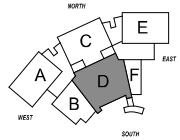

KEYPLAN

Number	Date	Issued For
	05/03/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ENLARGED PLAN - AUDITORIUM

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: **A111.5**

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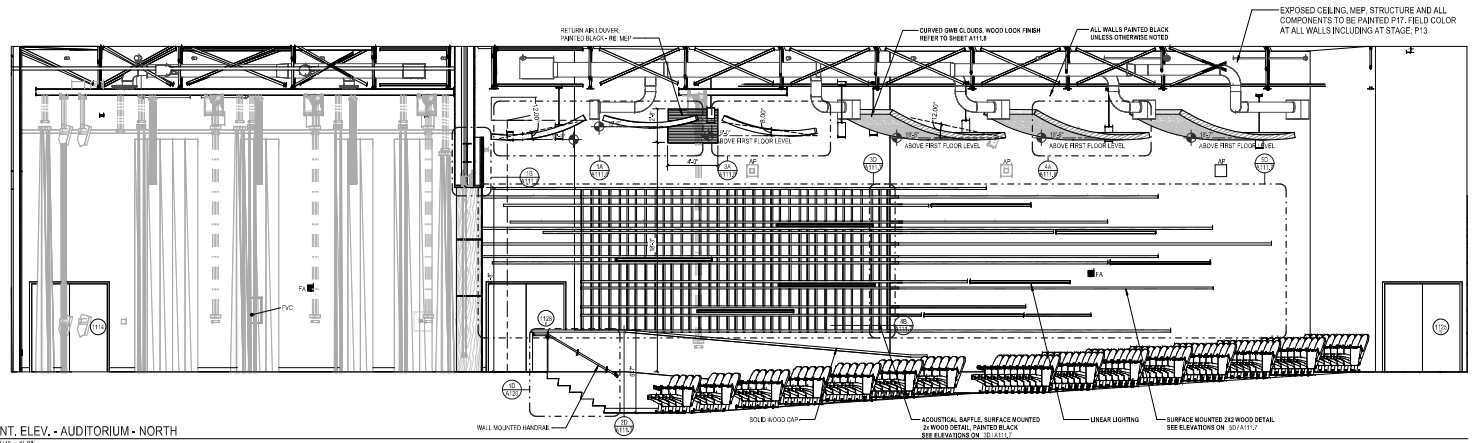
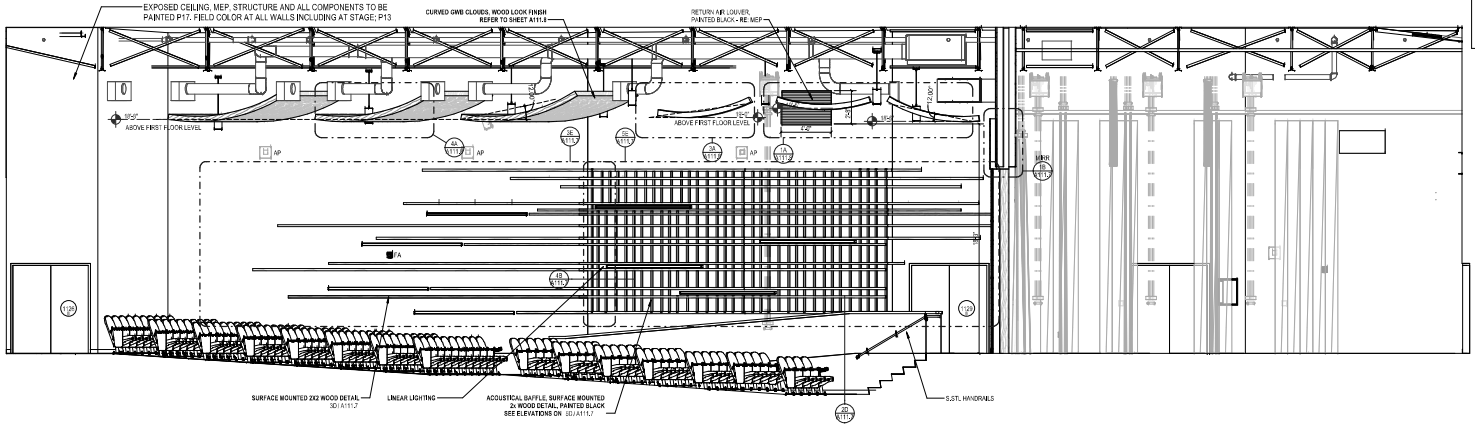
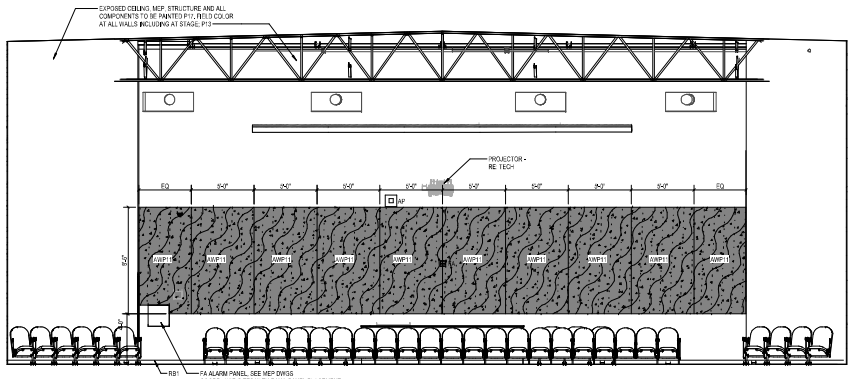


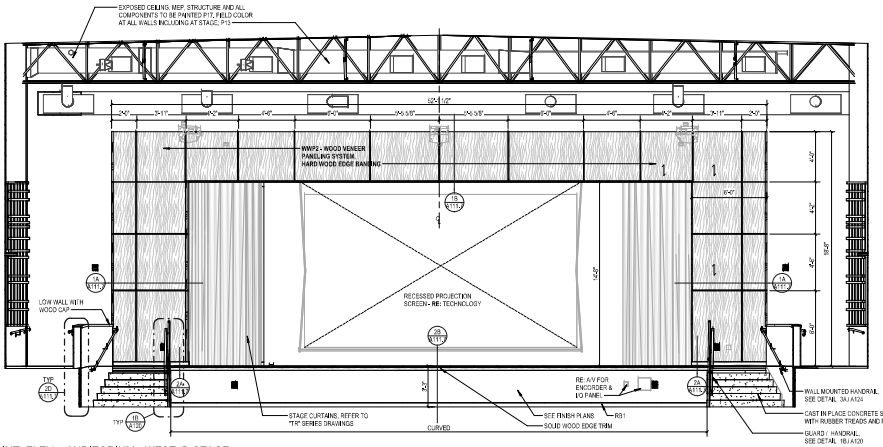
1B INT. ELEV. - AUDITORIUM - NORTH
1/4" = 1'-0"



1D INT. ELEV. - AUDITORIUM - SOUTH
1/4" = 1'-0"



1E INT. ELEV. - AUDITORIUM - EAST @ SEATING
1/4" = 1'-0"



3E INT. ELEV. - AUDITORIUM - WEST @ STAGE
1/4" = 1'-0"

INTERIOR ELEVATION GENERAL NOTES:

1. SEE SHEET A701 FOR TYPICAL MOUNTING HEIGHTS OF ACCESSORIES, WALL MOUNTED EQUIPMENT & DEVICES & TYPICAL TOILET/ SHOWER ELEVATIONS
2. SEE FURNITURE PLANS, FINISH PLANS & ENLARGED FLOOR PLANS FOR ALL WHITEBOARD, TACKBOARD AND SHELVING LOCATIONS. PROVIDE BLOCKING FOR ALL INTERACTIVE WHITEBOARDS &TACK BOARDS AND PER DETAIL 5B/A603. COORDINATE LOCATIONS WITH ELECTRICAL AND FURNITURE DRAWINGS.
3. WHERE ACCENT PAINT COLOR IS ON A WALL WITH CASEWORK, ANY EXPOSED WALL BELOW CASEWORK IS TO BE PAINTED ACCENT COLOR INDICATED AS WELL.
4. EXPOSED OUTER EDGE OF ANY WALLCOVERING, TO RECEIVE TRIM, AS SHOWN IN 1B/A603.
5. REFER TO EQUIPMENT SCHEDULES ON A812 FOR EXTENT OF EQUIPMENT INFO FOR TAGGED EQUIPMENT.
6. REFER TO FINISH PLANS FOR EXTENT OF ACCENT PAINT COLORS AND LOCATIONS OF SPECIALTY WALL FINISHES.
7. REFER TO FINISH PRODUCT LIST FOR PRODUCT INFO ON ALL TAGGED FINISHES. REFER TO FINISH GENERAL NOTES FOR ADDITIONAL INFORMATION.
8. REFER TO A604 FOR LOCKER ELEVATIONS AND DETAIL 5. PROVIDE FLAT TOPS AT LOCKERS WITH NO SOFFIT, TYPICAL
9. WHERE WHITEBOARD ARE SHOWN NEXT TO PWB THEY ARE TO BE MOUNTED AS CLOSELY AS POSSIBLE TO THE PWB.
10. WHERE WHITEBOARD AND/OR TACKBOARDS ARE SHOWN NEXT TO EACH OTHER THEY ARE TO BE INSTALLED WITH OUTER FRAME TOUCHING.

INTERIOR ELEVATION GRAPHIC LEGEND

FINISH LEGEND

- P1 NO GRAPHIC PATTERN SHOWN - FIELD THROUGHOUT UNLESS OTHERWISE NOTED
- P3-P12 ACCENT PAINT LOCATIONS SHOW AS; REFER TO FINISH PLANS FOR TYPE.
- P6, P13, DARK ACCENT PAINTS SHOWN AS; REFER TO FINISH PLANS TAGS FOR TYPE
- AWP1-10 & 12 ACOUSTIC PANELS SHOWN AS; REFER TO ELEVATIONS FOR TYPE
- AWP11 ACOUSTIC PANELS SHOWN AS:
- VCOH-VCOI CUSTOM GRAPHIC SHOWN AS; REFER TO FINISH PLANS FOR TYPE.
- WWP1 SHOWN AS:
- WP2 SHOWN AS:
- TACKBOARD SHOWN AS:

LOCKER ACCENT COLOR 1 (GRAY) SHOWN AS

LOCKER ACCENT COLOR 2, 3 & 4 SHOWN AS

- ACCENT COLOR 2 AT RIGHT SIDE POD LOCKERS TO MATCH P10
- ACCENT COLOR 3 AT CENTER POD LOCKERS TO MATCH P11
- ACCENT COLOR 4 AT LEFT SIDE POD LOCKERS TO MATCH P12

PAPER TOWEL DISPENSER
SOAP DISPENSER
CLOCK

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Greenwich Public Schools

Greenwich Central Middle School

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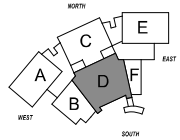

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ENLARGED PLAN & ELEVATIONS - AUDITORIUM

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A111.6

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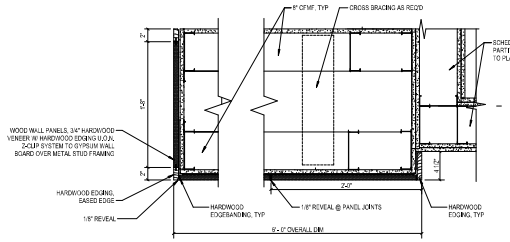
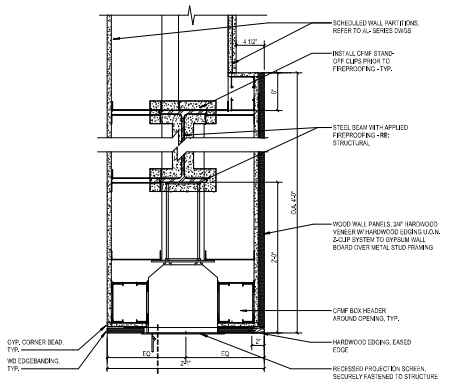
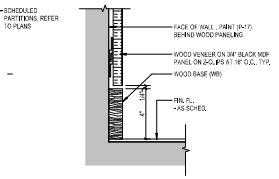


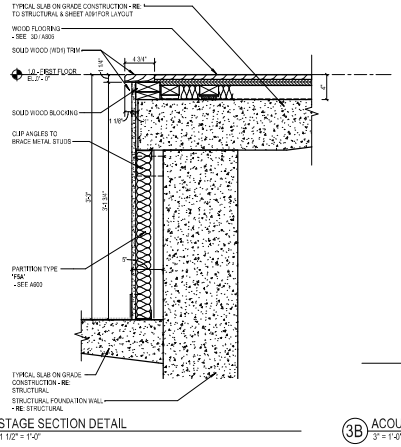
1A PLAN DETAIL - STAGE OPENING
1 1/2" = 1'-0"



1B SECTION DETAIL - STAGE OPENING
1 1/2" = 1'-0"



2A WOOD WALL PANEL BASE DETAIL
3" = 1'-0"



2B STAGE SECTION DETAIL
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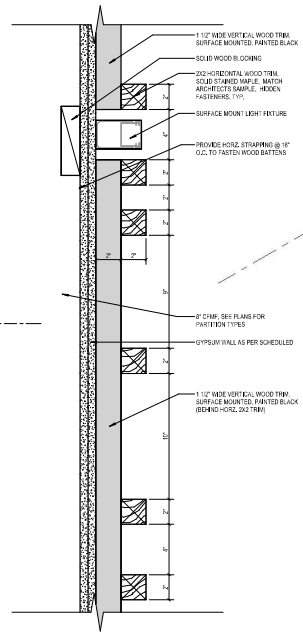
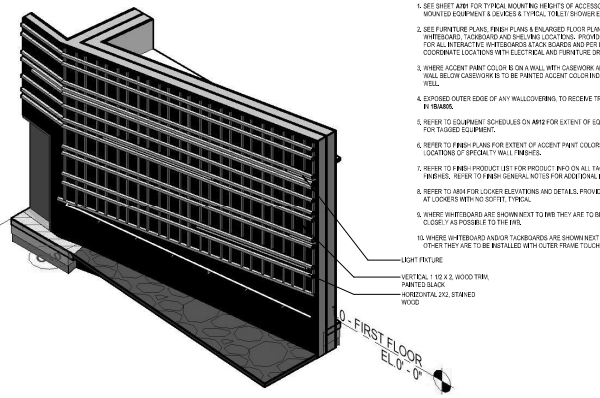
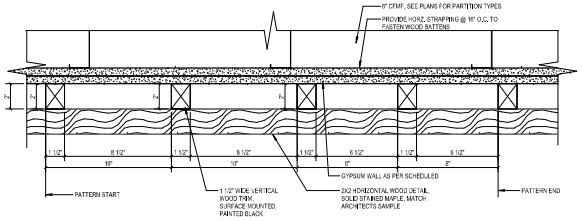


3B ACOUSTICAL BAFFLE SECTION DETAIL
3" = 1'-0"

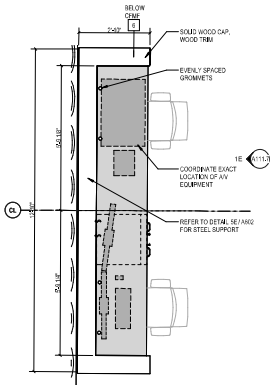


4B ACOUSTICAL BAFFLE PLAN DETAIL
3" = 1'-0"

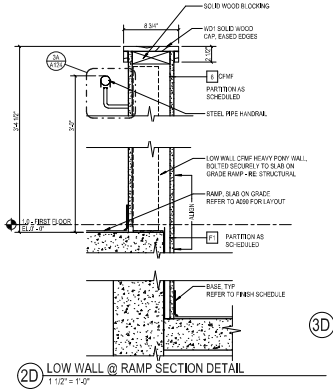


INTERIOR ELEVATION GENERAL NOTES:

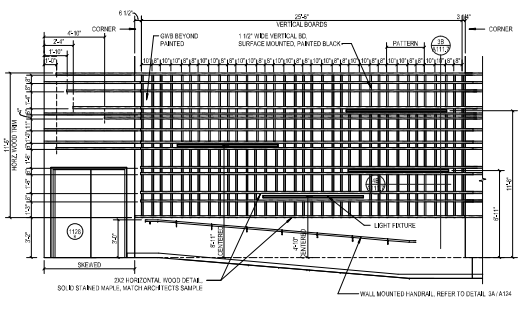
1. SEE SHEET A001 FOR TYPICAL MOUNTING HEIGHTS OF ACCESSORIES, WALL MOUNTED EQUIPMENT & DEVICES & TYPICAL TOILET SHOWER ELEVATIONS
2. SEE FURNITURE PLANS, FINISH PLANS & ENLARGED FLOOR PLANS FOR ALL WHITEBOARD, TACKBOARD AND SHELVING LOCATIONS. PROVIDE BLOCKING FOR ALL INTERACTIVE WHITEBOARDS, STACK BOARDS AND PER DETAIL 5/A/A502. COORDINATE LOCATIONS WITH ELECTRICAL AND FURNITURE DRAWINGS.
3. WHERE ACCENT PAINT COLOR IS ON A WALL WITH CASEWORK ANY EXPOSED WALL BELOW CASEWORK IS TO BE PAINTED ACCENT COLOR INDICATED AS WELL.
4. EXPOSED OUTER EDGE OF ANY WALLCOVERING, TO RECEIVE TRIM, AS SHOWN IN 18/A805.
5. REFER TO EQUIPMENT SCHEDULES ON A002 FOR EXTENT OF EQUIPMENT INFO FOR TAGGED EQUIPMENT.
6. REFER TO FINISH PLANS FOR EXTENT OF ACCENT PAINT COLORS AND LOCATIONS OF SPECIALTY WALL FINISHES.
7. REFER TO FINISH PRODUCT LIST FOR PRODUCT INFO ON ALL TAGGED FINISHES. REFER TO FINISH GENERAL NOTES FOR ADDITIONAL INFORMATION.
8. REFER TO A804 FOR LOCKER ELEVATIONS AND DETAILS, PROVIDE FLAT TOPS AT LOCKERS WITH NO SOFFIT, TYPICAL
9. WHERE WHITEBOARD ARE SHOWN NEXT TO IWB THEY ARE TO BE MOUNTED AS CLOSELY AS POSSIBLE TO THE IWB.
10. WHERE WHITEBOARD AND/OR TACKBOARDS ARE SHOWN NEXT TO EACH OTHER THEY ARE TO BE INSTALLED WITH OUTER FRAME TOUCHING.



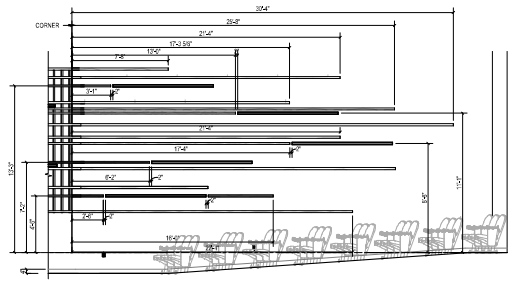
1D 1ST FLR - ENLARGED PLAN - AUDITORIUM - CONTROL DESK
1/2" = 1'-0"



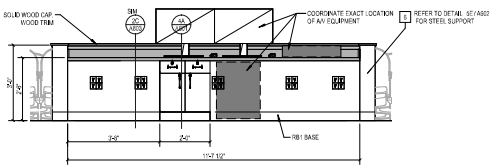
2D LOW WALL @ RAMP SECTION DETAIL
1 1/2" = 1'-0"



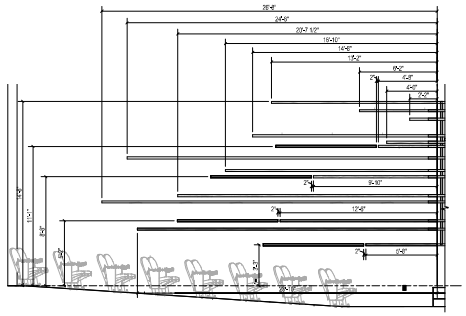
3D INT. ELEV. WALL DETAILING A
1/4" = 1'-0"



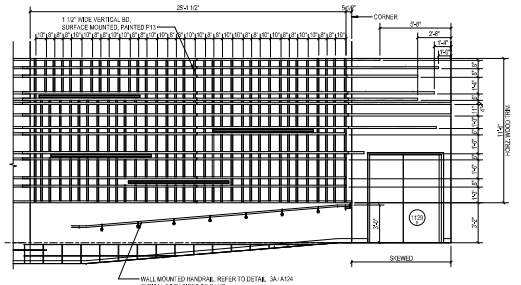
5D INT. ELEV. WALL DETAILING B
1/4" = 1'-0"



1E AUDITORIUM CONTROL DESK
1/2" = 1'-0"



3E INT. ELEV. WALL DETAILING D
1/4" = 1'-0"



5E INT. ELEV. WALL DETAILING C
1/4" = 1'-0"

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Greenwich Public Schools

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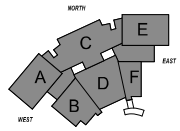

KEYPLAN

Number	Date	Issued For
	05/03/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ENLARGED PLAN & DETAILS - AUDITORIUM

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A111.7

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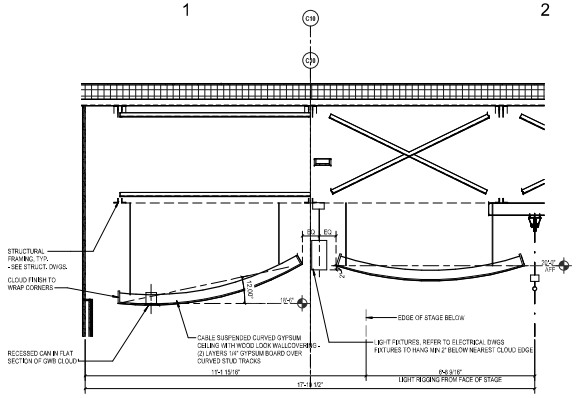
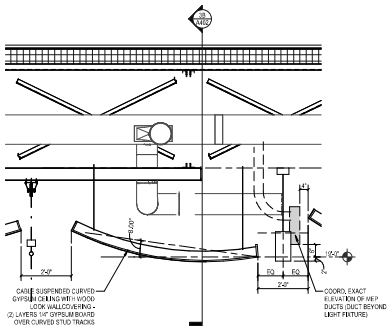
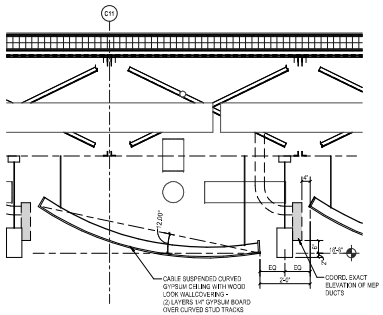


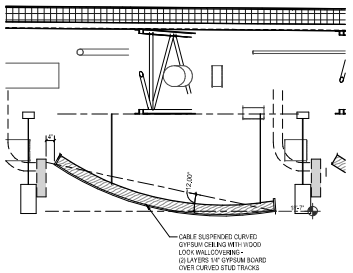
1A CEILING DETAIL - AUDITORIUM CLOUD
1/2" = 1'-0"



3A CEILING DETAIL - AUDITORIUM CLOUD
1/2" = 1'-0"



4A CEILING DETAIL - AUDITORIUM CLOUD
1/2" = 1'-0"



5A CEILING DETAIL @ AUD. SIDE
1/2" = 1'-0"

CEILING PLAN GRAPHIC LEGEND

CEILING TYPES

- 2x2 ACOUSTIC CEILING
- 2x4 ACOUSTIC CEILING
- GYP CEILING
- EXPOSED CEILING
- 4 HR HORIZ. SHAFT
- 9" ALUM. CEILING
- ACOUSTIC-THERMAL SPRAY
- WOOD LOOK GYPSUM CEILING CLOUDS
- 2x4 ADC DIFFUSION PANEL
- 4x4 ADC DIFFUSION PANEL

LIGHT FIXTURES

- CONTINUOUS CEILING RECESSED
- CEILING RECESSED LINEAR - VARIABLE LENGTH
- 2' X 4' CEILING RECESSED
- 2' X 2' CEILING RECESSED
- ROUND CEILING RECESSED
- SQUARE CEILING RECESSED
- CEILING-MOUNTED PENDANT
- WALL-MOUNTED SCONCE
- CEILING-MOUNTED DI PENDANT - VARIABLE LENGTH
- CEILING-MOUNTED VERTICAL SOUND BLADE
- FEATURE CEILING-MOUNTED PENDANT
- CEILING-MOUNTED FAN

HVAC FIXTURES

- 2X2 SUPPLY DIFFUSER
- 2X2 RETURN DIFFUSER
- LINEAR RETURN DIFFUSER
- ROUND DIFFUSER

CEILING EQUIPMENT

- SPRINKLER HEAD RE: FIRE PROTECTION
- UPRIGHT SPRINKLER HEAD
- EXIT SIGN @ CEILING
- EXIT SIGN @ WALL
- SECURITY CAMERA
- OCCUPANCY SENSOR
- VACANCY SENSOR
- SPEAKER
- MICROPHONE/ MOTION DETECTOR RE: TECHNOLOGY/ SECURITY
- FIRE SPEAKER/STROBE
- PHOTOCELL
- CORD REEL - RE: 1A & 1/2A211 & ELEC.
- PROJECTOR SCREEN
- ACCESS PANEL - REFER TO MEP DRAWINGS AND SPECS FOR LOCATIONS
- EXPANSION JOINT LOCATION
- NUMBERED NOTE LEGEND TAG
- VISUAL / AUDIO NOTIFICATION DEVICE
- SMOKE DETECTOR
- 9'-0" A.F.F. — HEIGHT OF CEILING ABOVE FINISH FLOOR
- CEILING TYPE DESIGNATION

CEILING PLAN GENERAL NOTES

1. "EXPOSED CONSTRUCTION" OR "EXP. CONST." INDICATES NO CEILING. EXPOSED TO DECK, PTD.

2. CENTER LIGHT FIXTURES AND OTHER DEVICES IN ACOUSTICAL PANEL "PATTERN" UNLESS OTHERWISE INDICATED. REFER TO DETAIL BELOW.

3. CENTER ACOUSTICAL PANELS OR GRID IN SPACES UNLESS OTHERWISE INDICATED.

4. SEE SPECIFICATIONS FOR INFORMATION ON SEISMIC RESTRAINT OF CEILING SYSTEMS.

5. SEE CEILING DETAIL SHEETS FOR CEILING AND SOFFIT DETAILS.

6. SPRINKLER HEAD LOCATIONS ARE SHOWN FOR COORDINATION PURPOSES ONLY. NOT ALL SPRINKLER HEADS ARE SHOWN. FIRE PROTECTION SYSTEM INSTALLER SHALL COORDINATE SPRINKLER HEADS, IN AREAS WITHOUT SUSPENDED CEILINGS, COORDINATE LOCATIONS OF SPRINKLER HEADS WITH HVAC DUCTS, EQUIPMENT, BEAMS, COLUMNS, LIGHTS, AND ANY OTHER OBSTRUCTIONS IN ACCORDANCE WITH NFPA 13. IN AREAS WITH SUSPENDED CEILINGS, COORDINATE SPRINKLER MAINS, RUNS AND SPRINKLER HEAD LOCATIONS WITH OTHER WORK TO ENSURE CEILING HEIGHTS, LIGHTING, DIFFUSER AND OTHER CEILING DEVICE LOCATIONS ARE MAINTAINED AS SHOWN OR AS REQUIRED TO COMPLY WITH APPLICABLE CODE REQUIREMENTS. ADVISE ARCHITECT OF ANY CONFLICTS WHICH MUST BE RESOLVED PRIOR TO INSTALLATION.

7. LIGHT FIXTURES, FIRE PROTECTION DEVICES AND DIFFUSERS ARE SHOWN FOR LOCATION AND COORDINATION PURPOSES ONLY. REFER TO ELECTRICAL AND HVAC DWGS. FOR ACTUAL LIGHT FIXTURE, DIFFUSER AND FIRE PROTECTION SCHEDULES.

8. REFER TO ELECTRICAL, HVAC AND FIRE PROTECTION DWGS. FOR LIGHT FIXTURES, DIFFUSERS AND FIRE PROTECTION DEVICES IN UNFINISHED AREAS OR AREAS WITH EXPOSED STRUCTURE.

9. COORDINATE ACCESS PANEL LOCATIONS WITH MECHANICAL TRADES. SUBMIT PROPOSED LOCATIONS TO ARCHITECT FOR APPROVAL. CONTRACTOR TO LOCATE SERVICEABLE MEP AND AWP COMPONENTS OUTSIDE OF HARD CEILING AREAS AND INTO ACCESSIBLE CEILING AREAS TO THE GREATEST EXTENT POSSIBLE.

10. ALL CEILING HEIGHTS SHALL BE 10'-0", UNLESS OTHERWISE NOTED.

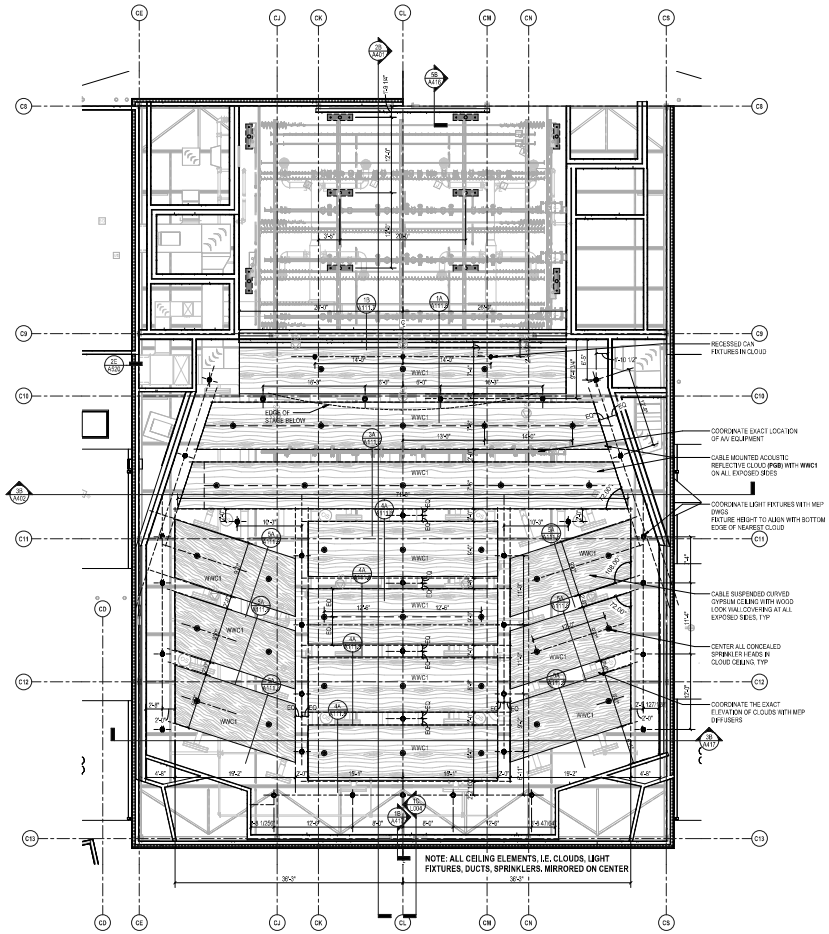
11. ALL SOFFIT HEIGHTS SHALL BE 10'-0", UNLESS OTHERWISE NOTED.

12. HANGING SYSTEMS FROM OVERHEAD STRUCTURE:
   A. FOR BUILDINGS WHERE THE FLOOR & ROOF CONSTRUCTION CONSISTS OF CAST IN PLACE CONCRETE SLABS/BEAMS, PRECAST CONCRETE SLABS/BEAMS, CONCRETE FILLED METAL DECKS (SUPPORTED BY STRUCTURAL STEEL FRAMING), THE FOLLOWING SYSTEMS CAN BE HUNG:
      a. CEILINGS AND SOFFITS SYSTEMS (INCLUDING HUNG PARTITION SYSTEMS).
      b. MECHANICAL, ELECTRICAL, PLUMBING, AND FIRE PROTECTION SYSTEMS AND EQUIPMENT.
      c. FOR ANY HEAVY OR LARGE SYSTEMS OR ITEMS, CONSULT WITH YOUR STRUCTURAL ENGINEER.
   B. FOR BUILDINGS WHERE THE ROOF STRUCTURE IS SIMPLE METAL ROOF DECK (NO CONCRETE FILL), THE FOLLOWING SYSTEMS CAN BE HUNG:
      a. ACOUSTIC CEILING SYSTEMS (ACT TILES, ETC.) WEIGHING LESS THAN 5 LBS/SF AND HUNG AT 4'-0" O.C. BOTH DIRECTIONS.
      b. SINGLE LAYER GYPSUM BOARD CEILING SYSTEMS WEIGHING LESS THAN 5 LBS/SF AND HUNG AT 4'-0" O.C. BOTH DIRECTIONS.
      c. DO NOT HANG ANY OTHER SYSTEM OR ITEM DIRECTLY FROM PLAIN ROOF STEEL DECKS UNLESS STRUCTURAL E.O.R. CONFIRMS THAT DECK HAS BEEN DESIGNED TO SUPPORT THESE HANGING LOADS. IN LOCATIONS WHERE PLAIN ROOF STEEL DECK (NO CONCRETE FILL) IS OVERHEAD, HANG ONLY FROM STRUCTURAL STEEL FRAMING MEMBERS OR PROVIDE SECONDARY STEEL FRAMING MEMBERS (SLOTTED CHANNEL FRAMING, I.E. "UNISTRUT", ETC.) OF ADEQUATE DESIGN (SPANNING BETWEEN BUILDING STRUCTURAL STEEL FRAMING MEMBERS) AS REQUIRED.
   C. FOR BUILDINGS CONSTRUCTED OF COLD-FORMED METAL FRAMING SYSTEMS, FOLLOW "SIMPLE METAL ROOF DECKS" ABOVE.
   D. REVIEW AND DISCUSS ALL UNUSUAL CONDITIONS WITH YOUR STRUCTURAL ENGINEER.

13. WHERE REFERENCED BY THIS NOTE, PROVIDE 1-HR. HORIZONTAL SHAFTWALL CEILING (WITH 4" DEEP 20 GA. FRAMING). INSTALL AS HIGH AS POSSIBLE TO UNDERSIDE OF STEEL FRAMING ABOVE.

14. SEE FINISH SCHEDULE FOR ALL WINDOW SHADE INFORMATION.

15. FOR ACOUSTIC CONTINUITY AT TOPS OF PARTITIONS CENTERED ON OR DIRECTLY ADJACENT TO STEEL BEAMS, REFER TO SPECTIC DETAILS ON SHEET A902



4E 2.0 - SECOND FLOOR AUDITORIUM
1/8" = 1'-0"

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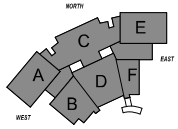
Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ENLARGED CEILING PLAN - AUDITORIUM

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A111.8

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INTERIOR ELEVATION GENERAL NOTES:

1. SEE SHEET A701 FOR TYPICAL MOUNTING HEIGHTS OF ACCESSORIES, WALL MOUNTED EQUIPMENT & DEVICES & TYPICAL TOILET/ SHOWER ELEVATIONS
2. SEE FURNITURE PLANS, FINISH PLANS & ENLARGED FLOOR PLANS FOR ALL WHITEBOARD, TACKBOARD AND SHELVING LOCATIONS. PROVIDE BLOCKING FOR ALL INTERACTIVE WHITEBOARDS &TACK BOARDS AND PER DETAIL 5B/A602. COORDINATE LOCATIONS WITH ELECTRICAL AND FURNITURE DRAWINGS.
3. WHERE ACCENT PAINT COLOR IS ON A WALL WITH CASEWORK ANY EXPOSED WALL BELOW CASEWORK IS TO BE PAINTED ACCENT COLOR INDICATED AS WELL.
4. EXPOSED OUTER EDGE OF ANY WALLCOVERING, TO RECEIVE TRIM, AS SHOWN IN 10/A605.
5. REFER TO EQUIPMENT SCHEDULES ON A912 FOR EXTENT OF EQUIPMENT INFO FOR TAGGED EQUIPMENT.
6. REFER TO FINISH PLANS FOR EXTENT OF ACCENT PAINT COLORS AND LOCATIONS OF SPECIALTY WALL FINISHES.
7. REFER TO FINISH PRODUCT LIST FOR PRODUCT INFO ON ALL TAGGED FINISHES. REFER TO FINISH GENERAL NOTES FOR ADDITIONAL INFORMATION.
8. REFER TO A804 FOR LOCKER ELEVATIONS AND DETAILS. PROVIDE FLAT TOPS AT LOCKERS WITH NO SOFFIT, TYPICAL.
9. WHERE WHITEBOARD ARE SHOWN NEXT TO MIB THEY ARE TO BE MOUNTED AS CLOSELY AS POSSIBLE TO THE MIB.
10. WHERE WHITEBOARD AND/OR TACKBOARDS ARE SHOWN NEXT TO EACH OTHER THEY ARE TO BE INSTALLED WITH OUTER FRAME TOUCHING.

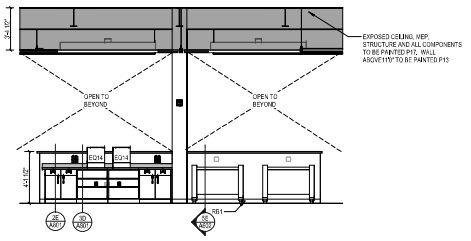
INTERIOR ELEVATION GRAPHIC LEGEND

FINISH LEGEND

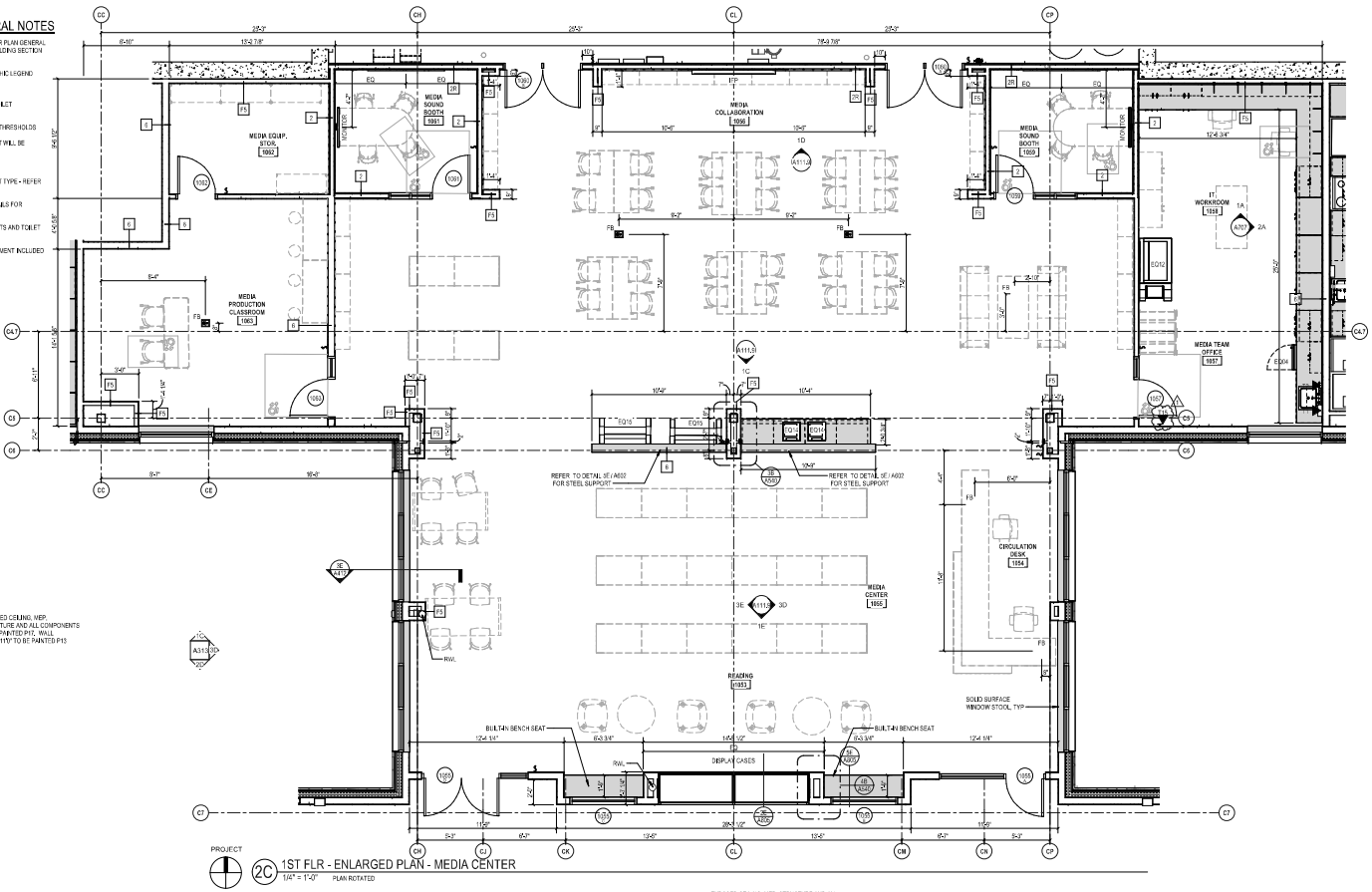
- P1 NO GRAPHIC PATTERN SHOWN - FIELD THROUGHOUT UNLESS OTHERWISE NOTED
- P3-P12 ACCENT PAINT LOCATIONS SHOW AS: REFER TO FINISH PLANS FOR TYPE.
- P6, P13, DARK ACCENT PAINTS SHOWN AS: REFER TO FINISH PLANS TAGS FOR TYPE
- AWP1-10 & 12 ACOUSTIC PANELS SHOWN AS: REFER TO ELEVATIONS FOR TYPE
- AWP11 ACOUSTIC PANELS SHOWN AS:
- VCG/VGSS CUSTOM GRAPHIC SHOWN AS: REFER TO FINISH PLANS FOR TYPE.
- WWP1 SHOWN AS:
- WP2 SHOWN AS:
- TACKBOARD SHOWN AS:
- LOCKER ACCENT COLOR 1 (GRAY) SHOWN AS
- LOCKER ACCENT COLOR 2, 3 & 4 SHOWN AS
  - ACCENT COLOR 2 AT RIGHT SIDE POD LOCKERS TO MATCH P10
  - ACCENT COLOR 3 AT CENTER POD LOCKERS TO MATCH P11
  - ACCENT COLOR 4 AT LEFT SIDE POD LOCKERS TO MATCH P12
- PAPER TOWEL DISPENSER
- SOAP DISPENSER
- CLOCK

ENLARGED FLOOR PLAN GENERAL NOTES

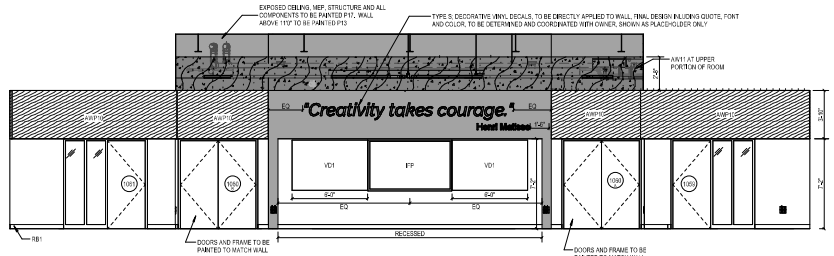
1. REFER TO OVERALL & 1/8" PART FLOOR PLANS FOR FLOOR PLAN GENERAL NOTES, FLOOR PLAN GRAPHIC LEGEND AND OVERALL BUILDING SECTION LOCATIONS AND "AL" SERIES FOR DIMENSIONS.
2. REFER TO G001.1 - G102.1 FOR ABBREVIATIONS AND GRAPHIC LEGEND
3. SEE FINISH PLANS FOR EXTENT OF FINISHES
4. SEE SHEET A701 FOR TYPICAL MOUNTING HEIGHTS OF TOILET ACCESSORIES AND SPECIALTY EQUIPMENT (SER).
5. SEE FLOOR FINISH PLANS FOR FLOOR TRANSITIONS AND THRESHOLDS
6. FURNITURE IS SHOWN FOR REFERENCE ONLY - NIC, AS IT WILL BE PROCURED AT A LATER PHASE.
7. ALL CASEWORK MILLWORK SHOWN SHADED
8. EQ## INDICATES APPLIANCE OR COMMERCIAL EQUIPMENT TYPE - REFER TO SHEETS A912 FOR EQUIPMENT SCHEDULES
9. REFER TO AL-SERIES PLANS, ENLARGED PLANS AND DETAILS FOR ADDITIONAL DIMENSIONS AND WALL TYPES
10. REFER TO A701 FOR TYPICAL TOILET STALL TYPE LAYOUTS AND TOILET ACCESSORY LOCATIONS.
11. REFER TO FOOD SERVICE PLANS FOR EXTENT OF EQUIPMENT INCLUDED IN THE KITCHEN SERVERY.



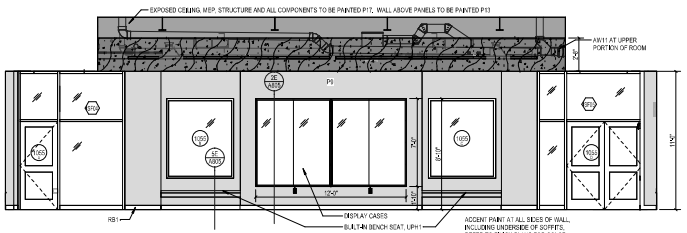
1C INT. ELEV. - MEDIA CENTER CENTER WALL
1/4" = 1'-0"



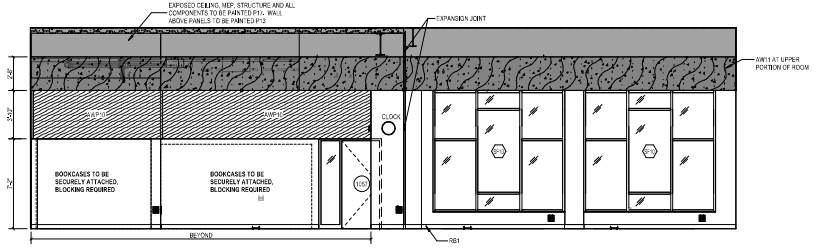
PROJECT
2C 1ST FLR - ENLARGED PLAN - MEDIA CENTER
1/4" = 1'-0" PLAN ROTATED



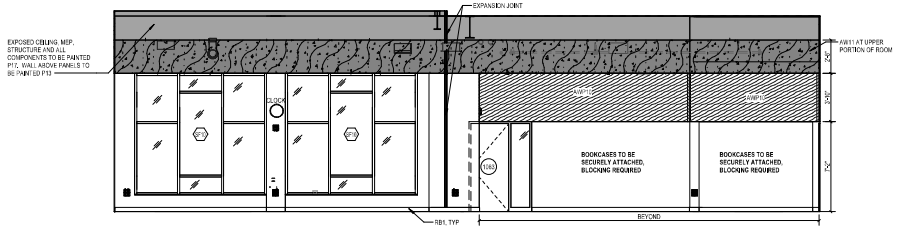
1D INT. ELEV. - MEDIA CENTER - NORTH
1/4" = 1'-0"



1E INT. ELEV. - MEDIA CENTER - SOUTH
1/4" = 1'-0"



3D INT. ELEV. - MEDIA CENTER - EAST
1/4" = 1'-0"



3E INT. ELEV. - MEDIA CENTER - WEST
1/4" = 1'-0"

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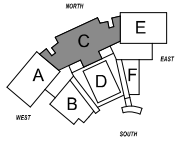
Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
1	10/30/2024	ADDENDUM NO. 4
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ENLARGED PLAN & ELEVATIONS - MEDIA CENTER

Date 07/08/2024
Scale As indicated
Proj. Number 22367.00
Drawing Number A111.9

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ENLARGED FLOOR PLAN GENERAL NOTES

1. REFER TO OVERALL & 1/8" PART FLOOR PLANS FOR FLOOR PLAN GENERAL NOTES. FLOOR PLAN GRAPHIC LEGEND AND OVERALL BUILDING SECTION LOCATIONS
2. REFER TO **G101.1 - G102.1** FOR ABBREVIATIONS AND GRAPHIC LEGEND
3. SEE FINISH PLANS FOR FLOOR FINISHES
4. SEE SHEET **A701** FOR TYPICAL MOUNTING HEIGHTS OF TOILET ACCESSORIES AND SPECIALTY EQUIPMENT (SE#).
5. SEE FLOOR FINISH PLANS FOR FLOOR TRANSITIONS AND THRESHOLDS
6. FURNITURE SHOWN DASHED - N.I.C. FOR REFERENCE ONLY
7. ALL CASEWORK/ MILLWORK SHOWN SHADED
8. EQ## INDICATES APPLIANCE OR COMMERCIAL EQUIPMENT TYPE - REFER TO SHEETS A612-A613
9. REFER TO A1-SERIES PLANS, ENLARGED PLANS AND DETAILS FOR ADDITIONAL DIMENSIONS AND WALL TYPES
10. REFER TO **A701** FOR TYPICAL TOILET STALL TYPE LAYOUTS AND TOILET ACCESSORY LOCATIONS.

INTERIOR ELEVATION GENERAL NOTES

1. SEE SHEET **A701** FOR TYPICAL MOUNTING HEIGHTS OF ACCESSORIES, WALL MOUNTED EQUIPMENT & DEVICES.
2. SEE FURNITURE PLANS, FINISH PLANS & ENLARGED FLOOR PLANS FOR ALL WHITEBOARD, TACKBOARD AND SHELVING LOCATIONS. PROVIDE BLOCKING FOR ALL INTERACTIVE WHITEBOARDS & TACK BOARDS AND PER DETAIL **08/A802**. COORDINATE LOCATIONS WITH ELECTRICAL AND FURNITURE DRAWINGS.
3. WHERE ACCENT PAINT COLOR IS ON A WALL WITH CASEWORK ANY EXPOSED WALL BELOW CASEWORK IS TO BE PAINTED ACCENT COLOR INDICATED AS WELL.
4. EXPOSED OUTER EDGE OF ANY WALL COVERING, TO RECEIVE TRIM, AS SHOWN IN **9A/A805.**
5. EXPOSED OUTER EDGE OF ANY TACKBOARD, VD1, TO HAVE TRIM, AS SHOWN IN **9A/A805.**
6. REFER TO EQUIPMENT SCHEDULES ON A612 FOR EXTENT OF EQUIPMENT INFO FOR TAGGED EQUIPMENT.
7. REFER TO FINISH PLANS FOR EXTENT OF ACCENT PAINT COLORS AND LOCATIONS OF SPECIALTY WALL FINISHES.
8. REFER TO FINISH PRODUCT LIST FOR PRODUCT INFO ON ALL TAGGED FINISHES. REFER TO FINISH GENERAL NOTES FOR ADDITIONAL INFORMATION.
9. REFER TO A804 FOR LOCKER ELEVATIONS AND DETAILS. PROVIDE FLAT TOPS AT LOCKERS WITH NO SOFFIT, TYPICAL

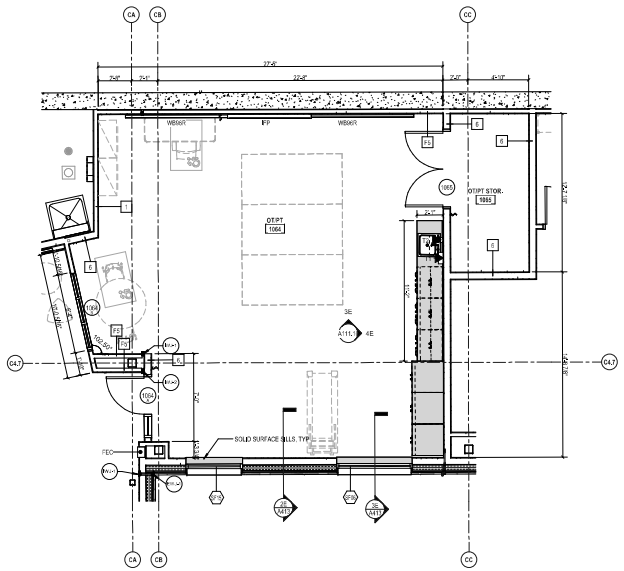
INTERIOR ELEVATION GRAPHIC LEGEND

PAINT LEGEND

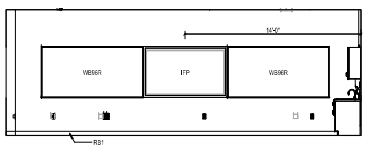
- P1 NO GRAPHIC PATTERN SHOWN - FIELD THROUGHOUT UNLESS OTHERWISE NOTED
- P3-P10 ACCENT PAINT LOCATIONS SHOW AS; REFER TO FINISH PLANS FOR TYPE.
- P6, P13: DARK ACCENT PAINTS SHOWN AS; REFER TO FINISH PLANS TAGS FOR TYPE
- AWP3-10 & 12 ACOUSTIC PANELS SHOWN AS; REFER TO ELEVATIONS FOR TYPE
- AWP11 ACOUSTIC PANELS SHOWN AS;
- VCG1/VCG9 CUSTOM GRAPHIC SHOWN AS; REFER TO FINISH PLANS FOR TYPE.
- WWP1 SHOWN AS;
- WP2 SHOWN AS;
- TACKBOARD SHOWN AS;
- LOCKER ACCENT CO.OR 1 (GRAY) SHOWN AS
- LOCKER ACCENT COLOR 2, 3 & 4 SHOWN AS
  - ACCENT COLOR 2 AT RIGHT SIDE POD LOCKERS TO MATCH P10
  - ACCENT COLOR 3 AT CENTER POD LOCKERS TO MATCH P11
  - ACCENT COLOR 4 AT LEFT SIDE POD LOCKERS TO MATCH P12
- PAPER TOWEL DISPENSER
- SOAP DISPENSER
- CLOCK

CEILING PLAN GENERAL NOTES

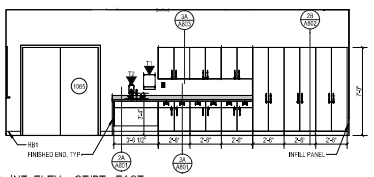
1. "EXPOSED CONSTRUCTION" OR "EXP. CONST." INDICATES NO CEILING, EXPOSED TO DECK, PTD.
2. CENTER LIGHT FIXTURES AND OTHER DEVICES IN ACOUSTICAL PANEL "PATTERN" UNLESS OTHERWISE INDICATED. REFER TO DETAIL BELOW.
3. CENTER ACOUSTICAL PANELS OR GRID IN SPACES UNLESS OTHERWISE INDICATED.
4. SEE SPECIFICATIONS FOR INFORMATION ON SEISMIC RESTRAINT OF CEILING SYSTEMS.
5. SEE CEILING DETAIL SHEETS FOR CEILING AND SOFFIT DETAILS.
6. SPRINKLER HEAD LOCATIONS ARE SHOWN FOR COORDINATION PURPOSES ONLY. NOT ALL SPRINKLER HEADS ARE SHOWN. FIRE PROTECTION SYSTEM INSTALLER SHALL COORDINATE SPRINKLER HEADS, IN AREAS WITHOUT SUSPENDED CEILINGS, COORDINATE LOCATIONS OF SPRINKLER HEADS WITH HVAC DUCTS, EQUIPMENT, BEAMS, COLUMNS, LIGHTS, AND ANY OTHER OBSTRUCTIONS IN ACCORDANCE WITH NFPA 13. IN AREAS WITH SUSPENDED CEILINGS, COORDINATE SPRINKLER WORK RUNS AND SPRINKLER HEAD LOCATIONS WITH OTHER WORK TO INSURE CEILING HEIGHTS, LIGHTING, DIFFUSER AND OTHER CEILING DEVICE LOCATIONS ARE MAINTAINED AS SHOWN OR AS REQUIRED TO COMPLY WITH APPLICABLE CODE REQUIREMENTS. ADVISE ARCHITECT OF ANY CONFLICTS WHICH MUST BE RESOLVED PRIOR TO INSTALLATION.
7. LIGHT FIXTURES, FIRE PROTECTION DEVICES AND DIFFUSERS ARE SHOWN FOR LOCATION AND COORDINATION PURPOSES ONLY. REFER TO ELECTRICAL AND HVAC DWGS. FOR ACTUAL LIGHT FIXTURE, DIFFUSER AND FIRE PROTECTION SCHEDULES.
8. REFER TO ELECTRICAL, HVAC AND FIRE PROTECTION DWGS. FOR LIGHT FIXTURES, DIFFUSERS AND FIRE PROTECTION DEVICES IN UNFINISHED AREAS OR AREAS WITH EXPOSED STRUCTURE.
9. COORDINATE ACCESS PANEL LOCATIONS WITH MECHANICAL TRADES. SUBMIT PROPOSED LOCATIONS TO ARCHITECT FOR APPROVAL. CONTRACTOR TO LOCATE SERVICEABLE MEP AND AVIT. COMPONENTS OUTSIDE OF HARD CEILING AREAS AND INTO ACCESSIBLE CEILING AREAS TO THE GREATEST EXTENT POSSIBLE.
10. ALL CEILING HEIGHTS SHALL BE 10'-0", UNLESS OTHERWISE NOTED.
11. ALL SOFFIT HEIGHTS SHALL BE 10'-0", UNLESS OTHERWISE NOTED.
12. HANGING SYSTEMS FROM OVERHEAD STRUCTURE:
    - A. FOR BUILDINGS WHERE THE FLOOR & ROOF CONSTRUCTION CONSISTS OF CAST IN PLACE CONCRETE SLAB/BEAMS, PRECAST CONCRETE SLABS/BEAMS, CONCRETE FILLED METAL DECKS (SUPPORTED BY STRUCTURAL STEEL FRAMING), THE FOLLOWING SYSTEMS CAN BE HUNG:
      - a. CEILINGS AND SOFFITS SYSTEMS (INCLUDING HUNG PARTITION SYSTEMS).
      - b. MECHANICAL, ELECTRICAL, PLUMBING, AND FIRE PROTECTION SYSTEMS AND EQUIPMENT.
      - c. FOR ANY HEAVY OR LARGE SYSTEMS OR ITEMS, CONSULT WITH YOUR STRUCTURAL ENGINEER.
    - B. FOR BUILDINGS WHERE THE ROOF STRUCTURE IS SIMPLE METAL ROOF DECK (NO CONCRETE FILL), THE FOLLOWING SYSTEMS CAN BE HUNG:
      - a. ACOUSTIC CEILING SYSTEMS (ACT TILES, ETC.) WEIGHING LESS THAN 6 LBS/SF AND HUNG AT 4'-0" O.C., BOTH DIRECTIONS.
      - b. SINGLE LAYER GYPSUM BOARD CEILING SYSTEMS WEIGHING LESS THAN 6 LBS/SF AND HUNG AT 4'-0" O.C., BOTH DIRECTIONS.
      - c. ***DO NOT HANG ANY OTHER SYSTEM OR ITEM DIRECTLY FROM AN ROOF STEEL DECKS*** (UNLESS STRUCTURAL DECK CONTAINING THAT DECK HAS BEEN DESIGNED TO SUPPORT THESE HANGING LOADS). IN LOCATIONS WHERE PLAIN ROOF STEEL DECK (NO CONCRETE FILL) IS OVERHEAD, HANG ONLY FROM STRUCTURAL STEEL FRAMING MEMBERS OR PROVIDE SECONDARY STEEL FRAMING MEMBERS (SLOTTED CHANNEL FRAMING, I.E. "UNISTRUT", ETC.) OF ADEQUATE DESIGN (SPANNING BETWEEN BUILDING STRUCTURAL STEEL FRAMING MEMBERS) AS REQUIRED.
    - C. FOR BUILDINGS CONSTRUCTED OF COLD-FORMED METAL FRAMING SYSTEMS, FOLLOW "SIMPLE METAL ROOF DECKS" ABOVE.
    - D. REVIEW AND DISCUSS ALL UNUSUAL CONDITIONS WITH YOUR STRUCTURAL ENGINEER.
13. WHERE REFERENCED BY THIS NOTE, PROVIDE 1-HR. HORIZONTAL SHAFTWALL CEILING (WITH 4" DEEP 20 GA. FRAMING), INSTALL AS HIGH AS POSSIBLE TO UNDERSIDE OF STEEL FRAMING ABOVE.
14. SEE FINISH SCHEDULE FOR ALL WINDOW SHADE INFORMATION
15. FOR ACOUSTIC CONTINUITY AT TOPS OF PARTITIONS CENTERED ON OR DIRECTLY ADJACENT TO STEEL BEAMS, REFER TO SPECTIC DETAILS ON SHEET A602



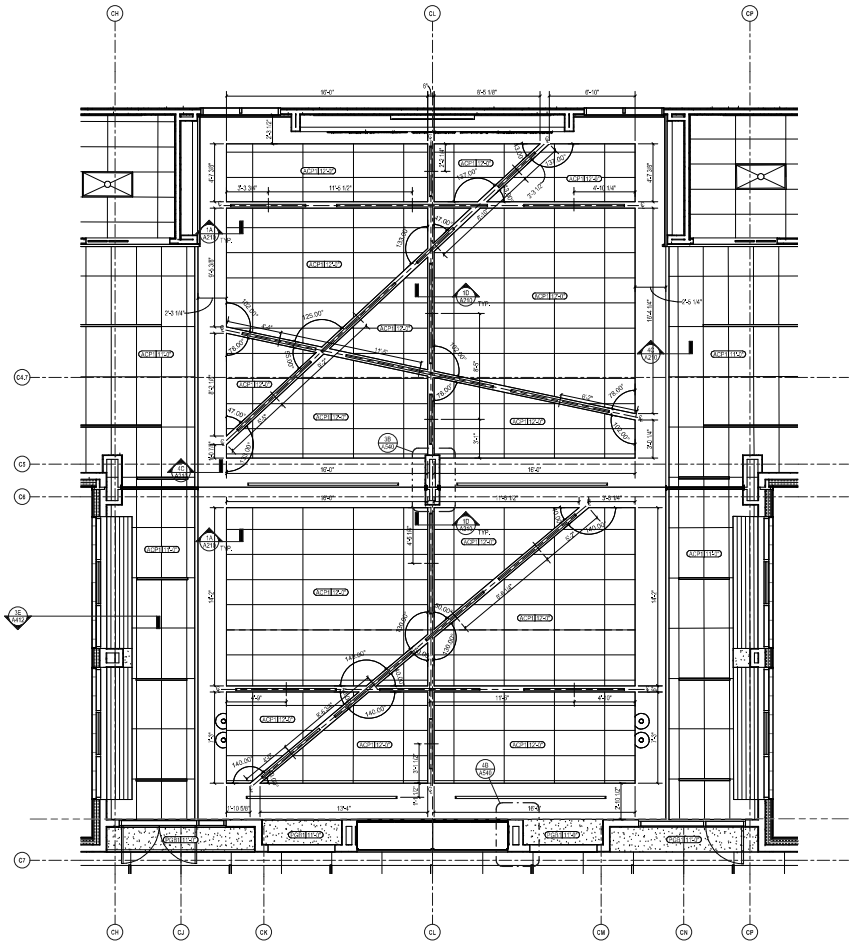
1E 1ST FLR - ENLARGED PLAN - OT/PT
1/4" = 1'-0"



3E INT. ELEV. - OT/PT - NORTH
1/4" = 1'-0"



4E INT. ELEV. - OT/PT - EAST
1/4" = 1'-0"



4D 1.0 - MEDIA CENTER CLOUD CEILING
1/4" = 1'-0"

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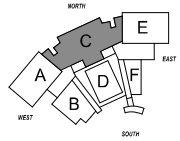
Drawn: AHS, JP
Checked: JZ

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ENLARGED PLAN, ELEVATIONS & CEILING PLAN - MEDIA CENTER & OT/PT

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: **A111.10**

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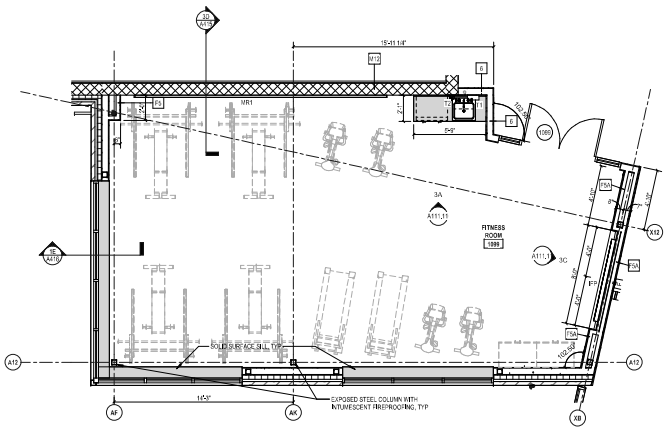
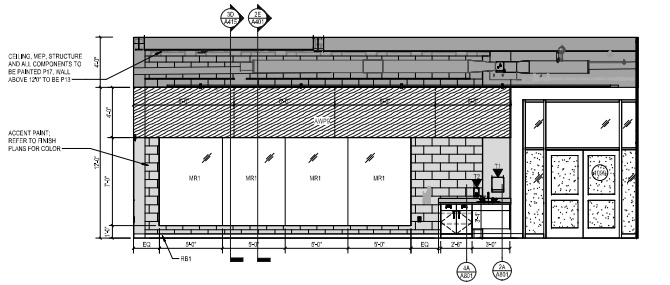
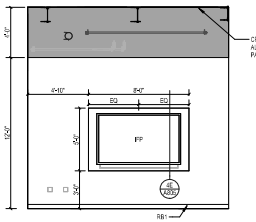


1B 1ST FLR - ENLARGED PLAN - FITNESS
1/4" = 1'-0" PLAN ROTATED

PROJECT



3A INT. ELEV. - FITNESS ROOM - NORTH
1/4" = 1'-0"



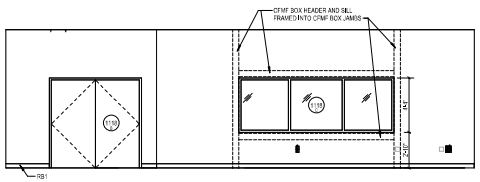
3C INT. ELEV. - FITNESS ROOM - EAST
1/4" = 1'-0"

INTERIOR ELEVATION GENERAL NOTES:

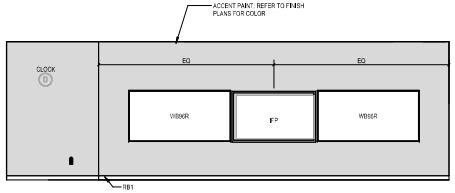
1. SEE SHEET A701 FOR TYPICAL MOUNTING HEIGHTS OF ACCESSORIES, WALL MOUNTED EQUIPMENT & DEVICES & TYPICAL TOILET/ SHOWER ELEVATIONS
2. SEE FURNITURE PLANS, FINISH PLANS & ENLARGED FLOOR PLANS FOR ALL WHITEBOARD, TACKBOARD AND SHELVING LOCATIONS. PROVIDE BLOCKING FOR ALL INTERACTIVE WHITEBOARDS (STACK BOARDS) AND PER DETAIL 09/A602. COORDINATE LOCATIONS WITH ELECTRICAL AND FURNITURE DRAWINGS.
3. WHERE ACCENT PAINT COLOR IS ON A WALL WITH CASEWORK, ANY EXPOSED WALL BELOW CASEWORK IS TO BE PAINTED ACCENT COLOR INDICATED AS WELL.
4. EXPOSED OUTER EDGE OF ANY WALL COVERING, TO RECEIVE TRIM, AS SHOWN IN 19/A605.
5. REFER TO EQUIPMENT SCHEDULES ON A812 FOR EXTENT OF EQUIPMENT INFO FOR TAGGED EQUIPMENT.
6. REFER TO FINISH PLANS FOR EXTENT OF ACCENT PAINT COLORS AND LOCATIONS OF SPECIALTY WALL FINISHES.
7. REFER TO FINISH PRODUCT LIST FOR PRODUCT INFO ON ALL TAGGED FINISHES. REFER TO FINISH GENERAL NOTES FOR ADDITIONAL INFORMATION.
8. REFER TO A604 FOR LOCKER ELEVATIONS AND DETAILS. PROVIDE FLAT TOPS AT LOCKERS WITH NO SOFFIT, TYPICAL
9. WHERE WHITEBOARD ARE SHOWN NEXT TO IWB THEY ARE TO BE MOUNTED AS CLOSELY AS POSSIBLE TO THE IWB.
10. WHERE WHITEBOARD AND/OR TACKBOARDS ARE SHOWN NEXT TO EACH OTHER THEY ARE TO BE INSTALLED WITH OUTER FRAME TOUCHING.

ENLARGED FLOOR PLAN GENERAL NOTES

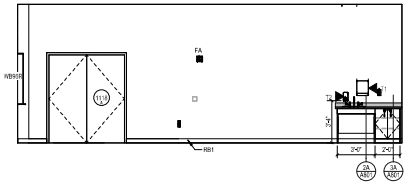
1. REFER TO OVERALL & 1/8" PART FLOOR PLANS FOR FLOOR PLAN GENERAL NOTES, FLOOR PLAN GRAPHIC LEGEND AND OVERALL BUILDING SECTION LOCATIONS AND "KL" SERIES FOR DIMENSIONS.
2. REFER TO G001.1 - G002.1 FOR ABBREVIATIONS AND GRAPHIC LEGEND
3. SEE FINISH PLANS FOR EXTENT OF FINISHES
4. SEE SHEET A701 FOR TYPICAL MOUNTING HEIGHTS OF TOILET ACCESSORIES AND SPECIALTY EQUIPMENT ITEMS.
5. SEE FLOOR FINISH PLANS FOR FLOOR TRANSITIONS AND THRESHOLDS
6. FURNITURE IS SHOWN FOR REFERENCE ONLY - N.I.C. AS IT WILL BE PROCURED AT A LATER PHASE.
7. ALL CASEWORK/ MILLWORK SHOWN SHADED
8. FOR INDICATES APPLIANCE OR COMMERCIAL EQUIPMENT TYPE - REFER TO SHEETS A812 FOR EQUIPMENT SCHEDULES
9. REFER TO A0-SERIES PLANS, ENLARGED PLANS AND DETAILS FOR ADDITIONAL DIMENSIONS AND WALL TYPES
10. REFER TO A701 FOR TYPICAL TOILET STALL TYPE LAYOUTS AND TOILET ACCESSORY LOCATIONS.
11. REFER TO FOOD SERVICE PLANS FOR EXTENT OF EQUIPMENT INCLUDED IN THE KITCHEN SERVERY.



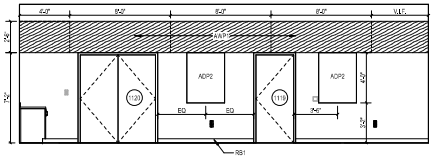
1D INT. ELEV. - ORCHESTRA - NORTH
1/4" = 1'-0"



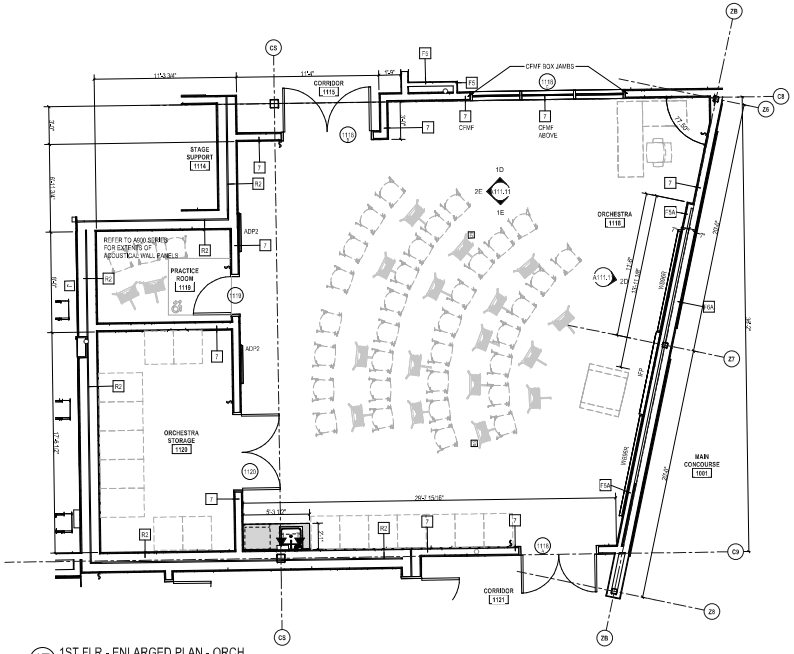
2D INT. ELEV. - ORCHESTRA - EAST
1/4" = 1'-0"



1E INT. ELEV. - ORCHESTRA - SOUTH
1/4" = 1'-0"



2E INT. ELEV. - ORCHESTRA - WEST
1/4" = 1'-0"



4E 1ST FLR - ENLARGED PLAN - ORCH
1/4" = 1'-0" PLAN ROTATED

PROJECT

SLAM
The SLAM Collaborative
80 Glastonbury Boulevard
Glastonbury, CT 06033-4410
Phone: 860 657.8077
www.slamcoll.com

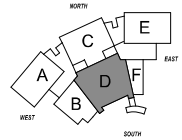
Drawn: AHS, CP
Checked: JZ

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/03/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ENLARGED PLAN & ELEVATIONS - ORCHESTRA & FITNESS

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A111.11

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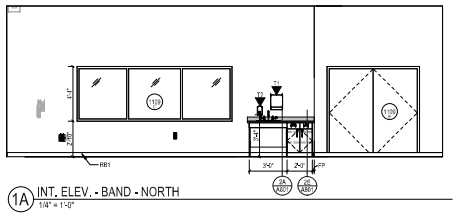
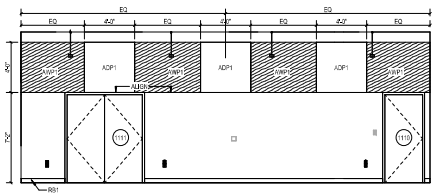
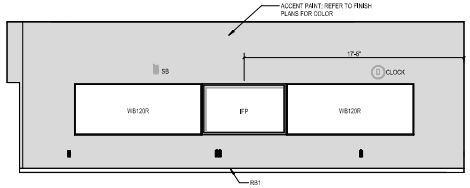


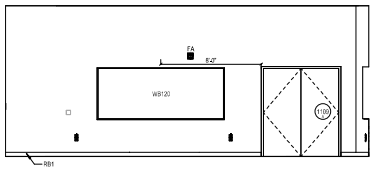
1A INT. ELEV. - BAND - NORTH
1/4" = 1'-0"



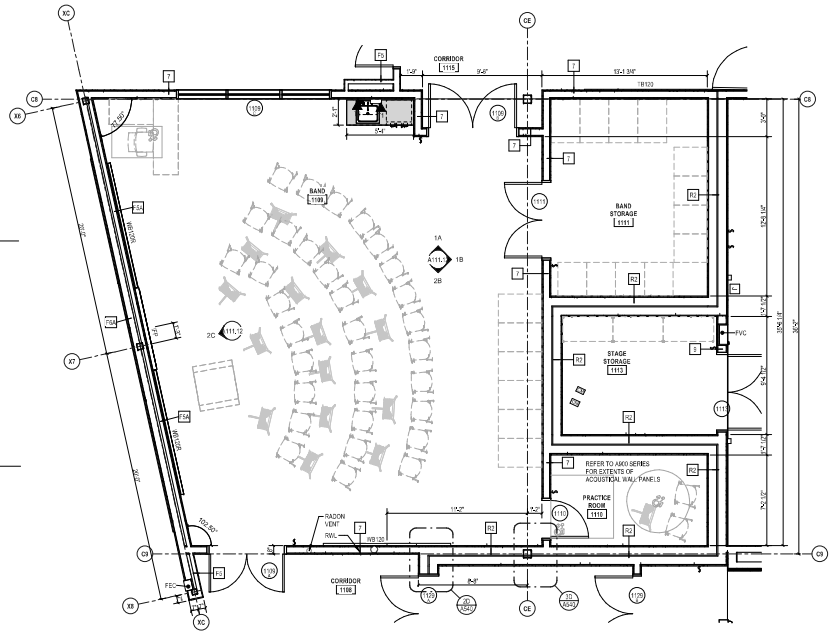
1B INT. ELEV. - BAND - EAST
1/4" = 1'-0"



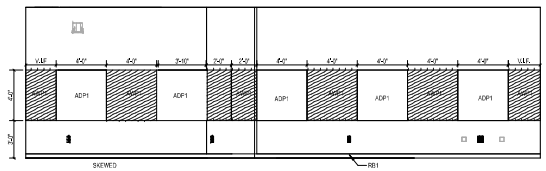
2C INT. ELEV. - BAND - SOUTHWEST
1/4" = 1'-0"



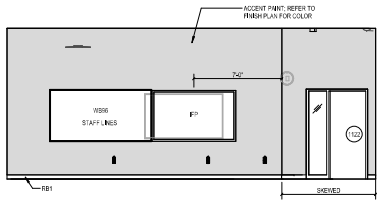
2B INT. ELEV. - BAND - SOUTH
1/4" = 1'-0"



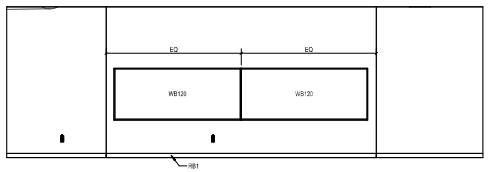
PROJECT
3C 1ST FLR - ENLARGED PLAN - BAND
1/4" = 1'-0" PLAN ROTATED



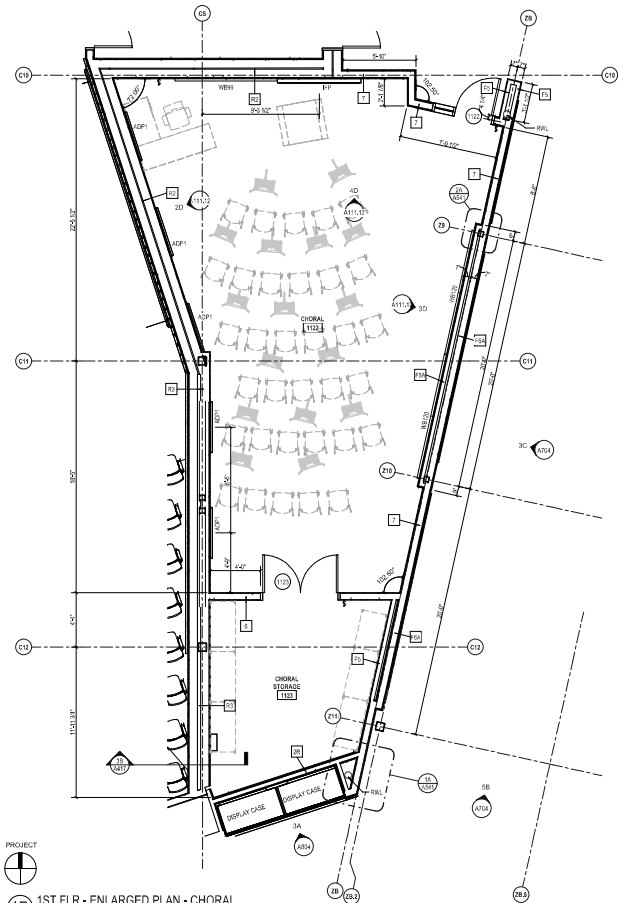
2D INT. ELEV. - CHORAL - SOUTHWEST
1/4" = 1'-0"



4D INT. ELEV. - CHORAL - NORTH
1/4" = 1'-0"



3D INT. ELEV. - CHORAL - SOUTHEAST
1/4" = 1'-0"



PROJECT
1E 1ST FLR - ENLARGED PLAN - CHORAL
1/4" = 1'-0" PLAN ROTATED

INTERIOR ELEVATION GRAPHIC LEGEND

FINISH LEGEND

P1 NO GRAPHIC PATTERN SHOWN - FIELD THROUGHOUT UNLESS OTHERWISE NOTED

P3-P12 ACCENT PAINT LOCATIONS SHOWN AS REFER TO FINISH PLANS FOR TYPE.

P5, P13: DARK ACCENT PAINTS SHOWN AS REFER TO FINISH PLANS TAGS FOR TYPE

AWP1-10 & 12 ACOUSTIC PANELS SHOWN AS REFER TO ELEVATIONS FOR TYPE

AWP11 ACOUSTIC PANELS SHOWN AS:

VCG1-VCG9 CUSTOM GRAPHIC SHOWN AS REFER TO FINISH PLANS FOR TYPE.

WWP1 SHOWN AS:

WP2 SHOWN AS:

TACKBOARD SHOWN AS:

LOCKER ACCENT COLOR 1 (GRAY) SHOWN AS:

LOCKER ACCENT COLOR 2, 3 & 4 SHOWN AS

- ACCENT COLOR 2 AT RIGHT SIDE POD LOCKERS TO MATCH P10
- ACCENT COLOR 3 AT CENTER POD LOCKERS TO MATCH P11
- ACCENT COLOR 4 AT LEFT SIDE POD LOCKERS TO MATCH P12

PAPER TOWEL DISPENSER

SOAP DISPENSER

CLOCK

ENLARGED FLOOR PLAN GENERAL NOTES

1. REFER TO OVERALL & MF PART FLOOR PLANS FOR FLOOR PLAN GENERAL NOTES, FLOOR PLAN GRAPHIC LEGEND AND OVERALL BUILDING SECTION LOCATIONS AND "AL" SERIES FOR DIMENSIONS.
2. REFER TO G105.1 - G105.2 FOR ABBREVIATIONS AND GRAPHIC LEGEND
3. SEE FINISH PLANS FOR EXTENT OF FINISHES
4. SEE SHEET A701 FOR TYPICAL MOUNTING HEIGHTS OF TOILET ACCESSORIES AND SPECIALTY EQUIPMENT (SEP).
5. SEE FLOOR FINISH PLANS FOR FLOOR TRANSITIONS AND THRESHOLDS
6. FURNITURE IS SHOWN FOR REFERENCE ONLY - N.I.C. AS IT WILL BE PROCURED AT A LATER PHASE.
7. ALL CASEWORK MILLWORK SHOWN SHADED
8. EQ## INDICATES APPLIANCE OR COMMERCIAL EQUIPMENT TYPE - REFER TO SHEETS A912 FOR EQUIPMENT SCHEDULES
9. REFER TO AL-SERIES PLANS, ENLARGED PLANS AND DETAILS FOR ADDITIONAL DIMENSIONS AND WALL TYPES
10. REFER TO A701 FOR TYPICAL TOILET STALL TYPE LAYOUTS AND TOILET ACCESSORY LOCATIONS.
11. REFER TO FOOD SERVICE PLANS FOR EXTENT OF EQUIPMENT INCLUDED IN THE KITCHEN SERVERY.

INTERIOR ELEVATION GENERAL NOTES:

1. SEE SHEET A701 FOR TYPICAL MOUNTING HEIGHTS OF ACCESSORIES, WALL MOUNTED EQUIPMENT & DEVICES & TYPICAL TOILET/ SHOWER ELEVATIONS
2. SEE FURNITURE PLANS, FINISH PLANS & ENLARGED FLOOR PLANS FOR ALL WHITEBOARD, TACKBOARD AND SHELVING LOCATIONS. PROVIDE BLOCKING FOR ALL INTERACTIVE WHITEBOARDS & DOOR BOARDS AND PER DETAIL 3/A0402. COORDINATE LOCATIONS WITH ELECTRICAL AND FURNITURE DRAWINGS.
3. WHERE ACCENT PAINT COLOR IS ON A WALL WITH CASEWORK ANY EXPOSED WALL BELOW CASEWORK IS TO BE PAINTED ACCENT COLOR INDICATED AS WELL.
4. EXPOSED OUTER EDGE OF ANY WALLCOVERING, TO RECEIVE TRIM AS SHOWN IN 18/A805.
5. REFER TO EQUIPMENT SCHEDULES ON A912 FOR EXTENT OF EQUIPMENT INFO FOR TAGGED EQUIPMENT.
6. REFER TO FINISH PLANS FOR EXTENT OF ACCENT PAINT COLORS AND LOCATIONS OF SPECIALTY WALL FINISHES.
7. REFER TO FINISH PRODUCT LIST FOR PRODUCT INFO ON ALL TAGGED FINISHES. REFER TO FINISH GENERAL NOTES FOR ADDITIONAL INFORMATION.
8. REFER TO A604 FOR LOCKER ELEVATIONS AND DETAILS; PROVIDE FLAT TOPS AT LOCKERS WITH NO SOFFIT, TYPICAL
9. WHERE WHITEBOARD ARE SHOWN NEXT TO MWB THEY ARE TO BE MOUNTED AS CLOSELY AS POSSIBLE TO THE MWB.
10. WHERE WHITEBOARD AND/OR TACKBOARDS ARE SHOWN NEXT TO EACH OTHER THEY ARE TO BE INSTALLED WITH OUTER FRAME TOUCHING.

SLAM
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Glastonbury, CT 06033-4410
Phone: 860 657.8077
www.slamcoll.com

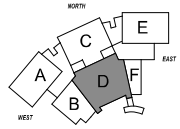
Drawn AHS
Checked JZ

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/03/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ENLARGED PLAN & ELEVATIONS - BAND & CHORAL

Date 07/08/2024
Scale As indicated
Proj. Number 22367.00
Drawing Number A111.12

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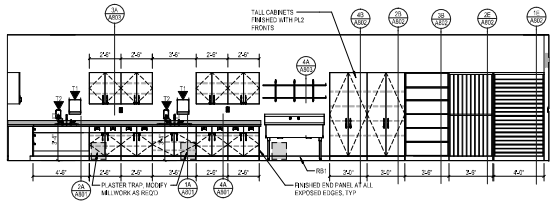
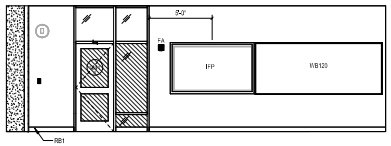
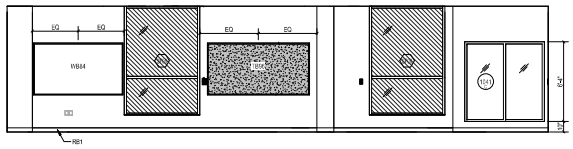


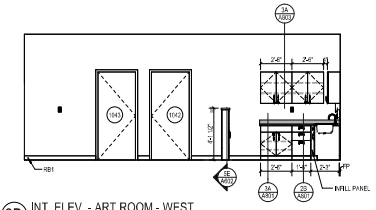
1A INT. ELEV. - ART ROOM - NORTH
1/4" = 1'-0"



2A INT. ELEV. - ART ROOM - EAST
1/4" = 1'-0"



1B INT. ELEV. - ART ROOM - SOUTH
1/4" = 1'-0"



2B INT. ELEV. - ART ROOM - WEST
1/4" = 1'-0"

ENLARGED FLOOR PLAN GENERAL NOTES

1. REFER TO OVERALL & 1/8" PART FLOOR PLANS FOR FLOOR PLAN GENERAL NOTES. FLOOR PLAN GRAPHIC LEGEND AND OVERALL BUILDING SECTION LOCATIONS AND 'A1' SERIES FOR DIMENSIONS.
2. REFER TO G0101 - G1102.1 FOR ABBREVIATIONS AND GRAPHIC LEGEND
3. SEE FINISH PLANS FOR EXTENT OF FINISHES
4. SEE SHEET A701 FOR TYPICAL MOUNTING HEIGHTS OF TOILET ACCESSORIES AND SPECIALTY EQUIPMENT (TEQ).
5. SEE FLOOR FINISH PLANS FOR FLOOR TRANSITIONS AND THRESHOLDS
6. FURNITURE IS SHOWN FOR REFERENCE ONLY - N.I.C. AS IT WILL BE PROCURED AT A LATER PHASE.
7. ALL CASEWORK/ MILLWORK SHOWN SHADED
8. EQ## INDICATES APPLIANCE OR COMMERCIAL EQUIPMENT TYPE - REFER TO SHEETS A912 FOR EQUIPMENT SCHEDULES
9. REFER TO A1-SERIES PLANS, ENLARGED PLANS AND DETAILS FOR ADDITIONAL DIMENSIONS AND WALL TYPES
10. REFER TO A701 FOR TYPICAL TOILET STALL TYPE LAYOUTS AND TOILET ACCESSORY LOCATIONS.
11. REFER TO FOOD SERVICE PLANS FOR EXTENT OF EQUIPMENT INCLUDED IN THE KITCHEN SERVERY.

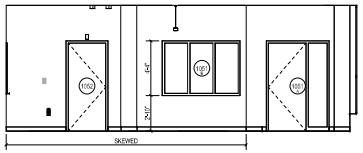
INTERIOR ELEVATION GENERAL NOTES:

1. SEE SHEET A701 FOR TYPICAL MOUNTING HEIGHTS OF ACCESSORIES, WALL MOUNTED EQUIPMENT & DEVICES & TYPICAL TOILET/ SHOWER ELEVATIONS
2. SEE FURNITURE PLANS, FINISH PLANS & ENLARGED FLOOR PLANS FOR ALL WHITEBOARD, TACKBOARD AND SHELVING LOCATIONS. PROVIDE BLOCKING FOR ALL INTERACTIVE WHITEBOARDS, STACK BOARDS AND PEDESTAL SBAM02. COORDINATE LOCATIONS WITH ELECTRICAL AND FURNITURE DRAWINGS.
3. WHERE ACCENT PAINT COLOR IS ON A WALL WITH CASEWORK ANY EXPOSED WALL BELOW CASEWORK IS TO BE PAINTED ACCENT COLOR INDICATED AS WELL.
4. EXPOSED OUTER EDGE OF ANY WALLCOVERING, TO RECEIVE TRIM, AS SHOWN IN 1BIA05.
5. REFER TO EQUIPMENT SCHEDULES ON A912 FOR EXTENT OF EQUIPMENT INTO FOR TAGGED EQUIPMENT.
6. REFER TO FINISH PLANS FOR EXTENT OF ACCENT PAINT COLORS AND LOCATIONS OF SPECIALTY WALL FINISHES.
7. REFER TO FINISH PRODUCT LIST FOR PRODUCT INFO ON ALL TAGGED FINISHES. REFER TO FINISH GENERAL NOTES FOR ADDITIONAL INFORMATION.
8. REFER TO A904 FOR LOCKER ELEVATIONS AND DETAILS. PROVIDE FLAT TOPS AT LOCKERS WITH NO SOFFIT, TYPICAL
9. WHERE WHITEBOARD ARE SHOWN NEXT TO IWB THEY ARE TO BE MOUNTED AS CLOSELY AS POSSIBLE TO THE IWB.
10. WHERE WHITEBOARD AND/OR TACKBOARDS ARE SHOWN NEXT TO EACH OTHER THEY ARE TO BE INSTALLED WITH OUTER FRAME TOUCHING.

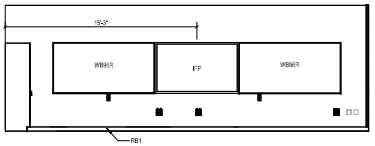
INTERIOR ELEVATION GRAPHIC LEGEND

FINISH LEGEND

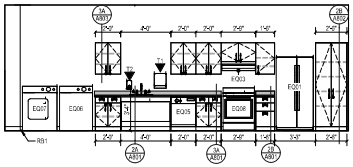
- P1 NO GRAPHIC PATTERN SHOWN - FIELD THROUGHOUT UNLESS OTHERWISE NOTED
- P2-P12 ACCENT PAINT LOCATIONS SHOWN AS: REFER TO FINISH PLANS FOR TYPE.
- P9, P13: DARK ACCENT PAINTS SHOWN AS: REFER TO FINISH PLANS TAGS FOR TYPE
- AWP1-10 & 12 ACOUSTIC PANELS SHOWN AS: REFER TO ELEVATIONS FOR TYPE
- AWP11 ACOUSTIC PANELS SHOWN AS:
- VCG1-VCG9 CUSTOM GRAPHIC SHOW AS: REFER TO FINISH PLANS FOR TYPE:
- WWP1 SHOWN AS:
- WP2 SHOWN AS:
- TACKBOARD SHOWN AS:
- LOCKER ACCENT COLOR 1 (GRAY) SHOWN AS
- LOCKER ACCENT COLOR 2, 3 & 4 SHOWN AS
  - ACCENT COLOR 2 AT RIGHT SIDE POD LOCKERS TO MATCH P10
  - ACCENT COLOR 3 AT CENTER POD LOCKERS TO MATCH P11
  - ACCENT COLOR 4 AT LEFT SIDE POD LOCKERS TO MATCH P12
- PAPER TOWEL DISPENSER
- SOAP DISPENSER
- CLOCK



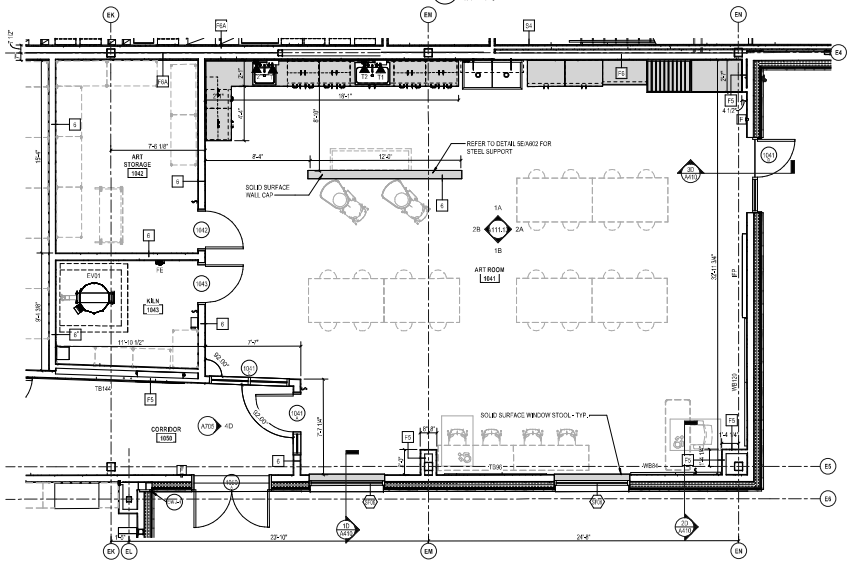
2C INT. ELEV. - LIFE SKILLS - EAST
1/4" = 1'-0"



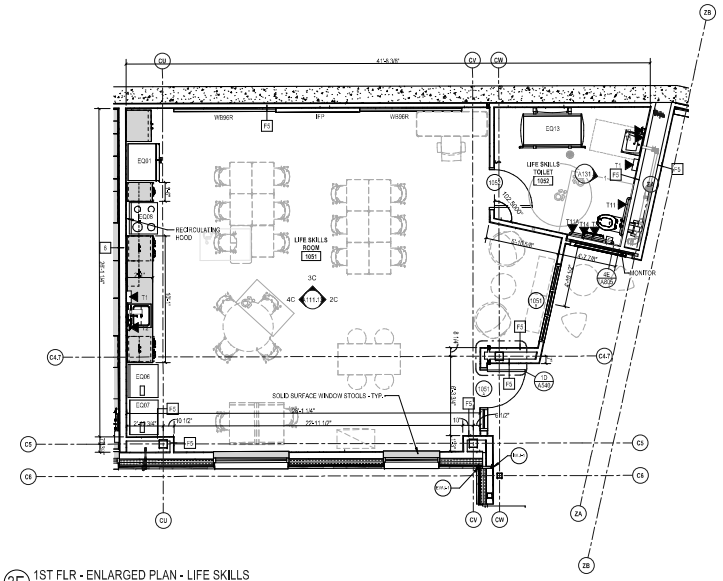
3C INT. ELEV. - LIFE SKILLS - NORTH
1/4" = 1'-0"



4C INT. ELEV. - LIFE SKILLS - WEST
1/4" = 1'-0"



1E 1ST FLR - ENLARGED PLAN - ART ROOM
1/4" = 1'-0"



3E 1ST FLR - ENLARGED PLAN - LIFE SKILLS
1/4" = 1'-0" PLAN ROTATED

PROJECT

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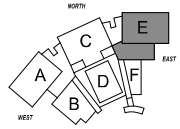
Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ENLARGED PLAN & ELEVATIONS - ART ROOM & LIFE SKILLS

Date 07/08/2024
Scale As indicated
Proj. Number 22367.00
Drawing Number **A111.13**

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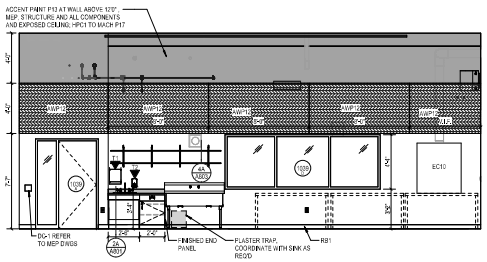
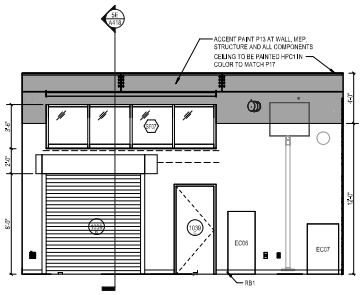
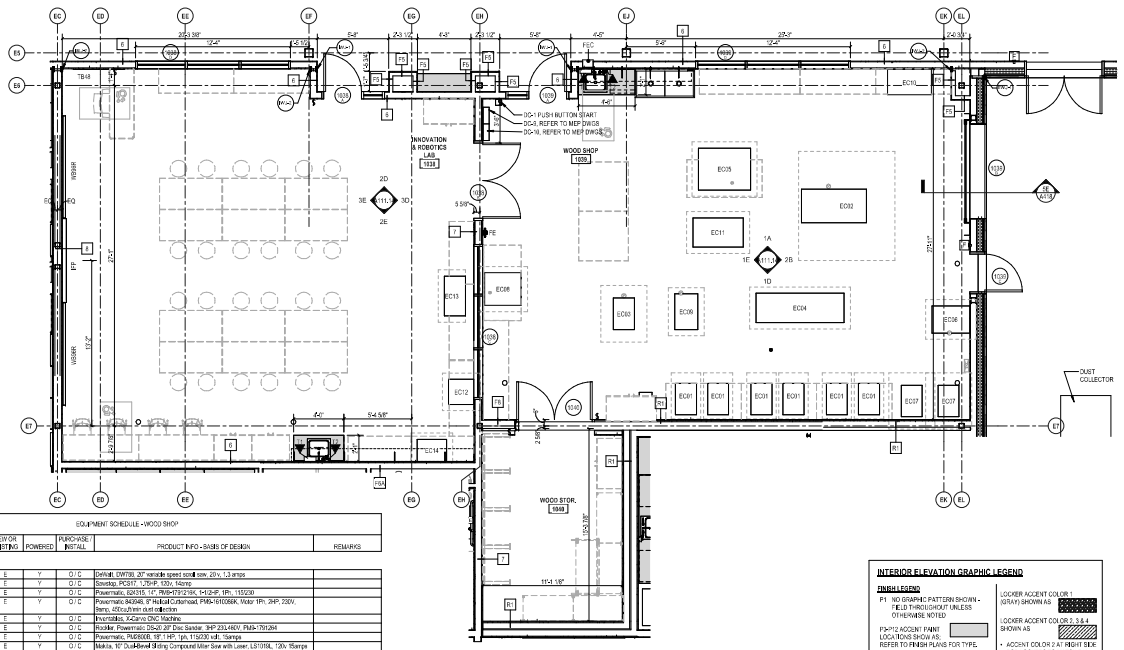


1A INT. ELEV. - WOOD SHOP - NORTH
1/4" = 1'-0"



2B INT. ELEV. - WOOD SHOP - EAST
1/4" = 1'-0"



2C 1ST FLR - ENLARGED PLAN - INNOVATION & WOODSHOP
1/4" = 1'-0"

EQUIPMENT SCHEDULE - WOOD SHOP

	DESCRIPTION	QUANTITY	NEW OR EXISTING	POWERED	PURCHASE / INSTALL	PRODUCT INFO - BASIS OF DESIGN	REMARKS
CONSTRUCTION ENGINEERING							
EC01	SCROLL SAW	6	E	Y	O / C	DeWalt DW788, 20" variable speed scroll saw, 20 v., 1.3 amps	
EC02	TABLE SAW	1	E	Y	O / C	Sawstop, PCS177, 1.75HP, 120v, 14amp	
EC03	BAND SAW	1	E	Y	O / C	Powermatic, 624315, 14", PM1791219K, 1+1/2HP, 1Ph, 115/230	
EC04	JOINTER	1	E	Y	O / C	Powermatic 843948, 8" Helical Cutterhead, PM5-1610066K, Motor 1Ph, 3HP, 230V, 8amp, 400cu.ft/min dust collection	
EC05	CNC MACHINE	1	E	Y	O / C	Inventables, X-Carve CNC Machine	
EC06	DISC SANDER	1	E	Y	O / C	Rikaille, Powermatic 23-40 20" Disc Sander, 3HP 230,460V, PM9-1791264	
EC07	DRILL PRESS	2	E	Y	O / C	Powermatic, PM2800B, 1Ph / 1HP, 1ph, 115/230 volt, 15amps	
EC08	CHOP SAW	1	E	Y	O / C	Makita, 10" DualBevel Sliding Compound Miter Saw with Laser, LS1018L, 120v 15amps	
EC09	DRUM SANDER	1	E	Y	O / C	Powermatic, 22" 4298172, PM64+1792144 Motor 5Ph, 7.5HP, 115V	
EC10	SPRAY BOOTH	1	N	Y	O / C	Sentry, Portable Spray Booth, SB-34DOSH, 115/1/60, 2 amps, 220/1/50, 25 amps	VENTING REQUIRED
EC11	PLANER	1	E	Y	O / C	Powermatic, 209284, PM15-791213, 15HH, 15"Planer Helical, 3 HP, 1PH, 230V	
EC12	3D PRINTER	1	E	Y	O / O	Dark Lite Emblaser 2	
EC13	LASER ENGRAVER	1	E	Y	O / O	Atmo H-1	
EC14	LASER CUTTER	1	E	Y	O / O	Glowforge Pro	

INTERIOR ELEVATION GRAPHIC LEGEND

FINISH LEGEND

P1: NO GRAPHIC PATTERN SHOWN - FIELD THROUGHOUT UNLESS OTHERWISE NOTED

P3-P12 ACCENT PAINT LOCATIONS SHOWN AS: REFER TO FINISH PLANS FOR TYPE.

P8, P13, DARK ACCENT PAINTS SHOWN AS: REFER TO FINISH PLANS TAGS FOR TYPE

AWP1-10 & 12 ACOUSTIC PANELS SHOWN AS: REFER TO ELEVATIONS FOR TYPE

AWP11 ACOUSTIC PANELS SHOWN AS:

WCG1-WCG5 CUSTOM GRAPHIC SHOWN AS: REFER TO FINISH PLANS FOR TYPE.

WWP1 SHOWN AS:

WP2 SHOWN AS:

TACKBOARD SHOWN AS:

LOCKER ACCENT COLOR 1 (GRAY) SHOWN AS

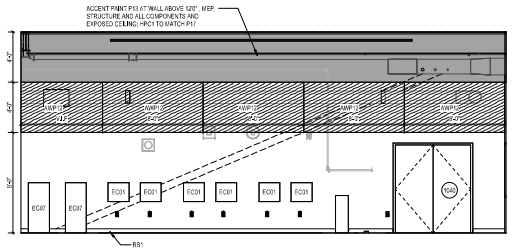
LOCKER ACCENT COLOR 2, 3 & 4 SHOWN AS

- ACCENT COLOR AT RIGHT SIDE POD LOCKERS TO MATCH P10
- ACCENT COLOR 5 AT CENTER POD LOCKERS TO MATCH P11
- ACCENT COLOR AT LEFT SIDE POD LOCKERS TO MATCH P12

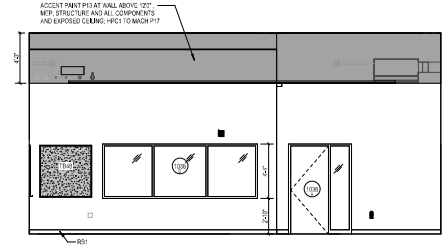
PAPER TOWEL DISPENSER

SOAP DISPENSER

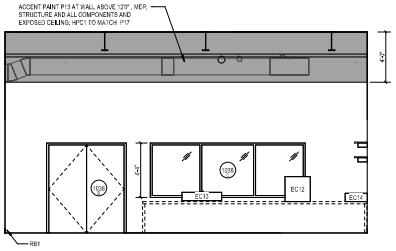
CLOCK



1D INT. ELEV. - WOOD SHOP - SOUTH
1/4" = 1'-0"



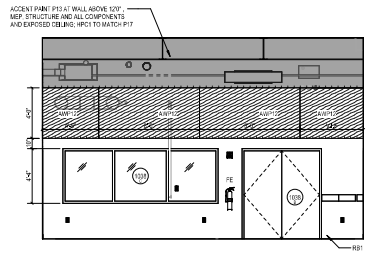
2D INT. ELEV. - INNOVATION & ROBOTICS LAB - NORTH
1/4" = 1'-0"



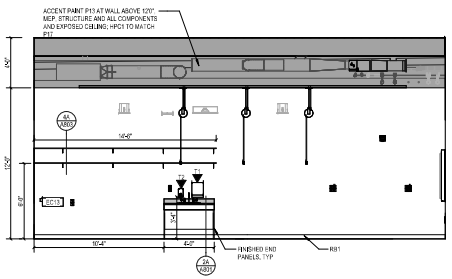
3D INT. ELEV. - INNOVATION & ROBOTICS LAB - EAST
1/4" = 1'-0"

ENLARGED FLOOR PLAN GENERAL NOTES

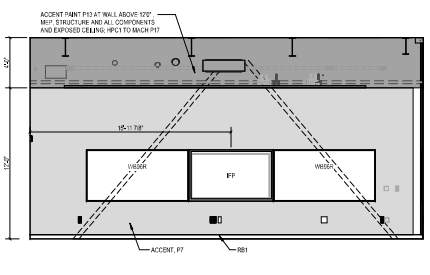
1. REFER TO GENERAL & MP PART FLOOR PLANS FOR FLOOR PLAN GENERAL NOTES, FLOOR PLAN GRAPHIC LEGEND AND OVERALL BUILDING SECTION LOCATIONS AND "A1" SERIES FOR DIMENSIONS.
2. REFER TO G001.1 - G102.1 FOR ABBREVIATIONS AND GRAPHIC LEGEND
3. SEE FINISH PLANS FOR EXTENT OF FINISHES
4. SEE SHEET A701 FOR TYPICAL MOUNTING HEIGHTS OF TOILET ACCESSORIES AND SPECIALTY EQUIPMENT (SEA).
5. SEE FLOOR FINISH PLANS FOR FLOOR TRANSITIONS AND THRESHOLDS
6. FURNITURE IS SHOWN FOR REFERENCE ONLY - N.I.C. AS IT WILL BE PROCURED AT A LATER PHASE.
7. ALL CASEWORK/ MILLWORK SHOWN SHADED
8. EQ## INDICATES APPLIANCE OR COMMERCIAL EQUIPMENT TYPE - REFER TO SHEETS A812 FOR EQUIPMENT SCHEDULES
9. REFER TO A1-SERIES PLANS, ENLARGED PLANS AND DETAILS FOR ADDITIONAL DIMENSIONS AND WALL TYPES
10. REFER TO A701 FOR TYPICAL TOILET STALL TYPE LAYOUTS AND TOILET ACCESSORY LOCATIONS.
11. REFER TO FOOD SERVICE PLANS FOR EXTENT OF EQUIPMENT INCLUDED IN THE KITCHEN SERVERY.



1E INT. ELEV. - WOOD SHOP - WEST
1/4" = 1'-0"



2E INT. ELEV. - INNOVATION & ROBOTICS LAB - SOUTH
1/4" = 1'-0"



3E INT. ELEV. - INNOVATION & ROBOTICS LAB - WEST
1/4" = 1'-0"

INTERIOR ELEVATION GENERAL NOTES:

1. SEE SHEET A701 FOR TYPICAL MOUNTING HEIGHTS OF ACCESSORIES, WALL MOUNTED EQUIPMENT & DEVICES & TYPICAL TOILET SHOWER ELEVATIONS
2. SEE FURNITURE PLANS, FINISH PLANS & ENLARGED FLOOR PLANS FOR ALL WHITEBOARD, TACKBOARD AND SHELVING LOCATIONS. PROVIDE BLOCKING FOR ALL INTERACTIVE WHITEBOARDS & TACK BOARDS AND PER DETAIL 08/A602. COORDINATE LOCATIONS WITH ELECTRICAL AND FURNITURE DRAWINGS.
3. WHERE ACCENT PAINT COLOR IS ON A WALL WITH CASEWORK ANY EXPOSED WALL BELOW CASEWORK IS TO BE PAINTED ACCENT COLOR INDICATED AS WELL.
4. EXPOSED OUTER EDGE OF ANY WALLCOVERING, TO RECEIVE TRIM, AS SHOWN IN 10/A905.
5. REFER TO EQUIPMENT SCHEDULES ON A812 FOR EXTENT OF EQUIPMENT INFO FOR TAGGED EQUIPMENT.
6. REFER TO FINISH PLANS FOR EXTENT OF ACCENT PAINT COLORS AND LOCATIONS OF SPECIALTY WALL FINISHES.
7. REFER TO FINISH PRODUCT LIST FOR PRODUCT INFO ON ALL TAGGED FINISHES. REFER TO FINISH GENERAL NOTES FOR ADDITIONAL INFORMATION.
8. REFER TO A804 FOR LOCKER ELEVATIONS AND DETAILS. PROVIDE FLAT TOPS AT LOCKERS WITH NO SOFFIT, TYPICAL.
9. WHERE WHITEBOARD ARE SHOWN NEXT TO TWB THEY ARE TO BE MOUNTED AS CLOSELY AS POSSIBLE TO THE TWB.
10. WHERE WHITEBOARD AND/OR TACKBOARDS ARE SHOWN NEXT TO EACH OTHER THEY ARE TO BE INSTALLED WITH OUTER FRAME TOUCHING.

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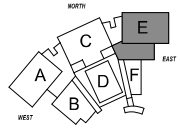
Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ENLARGED PLAN & ELEVATIONS - INNOVATION / ROBOTICS / WOODSHOP

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A111.14

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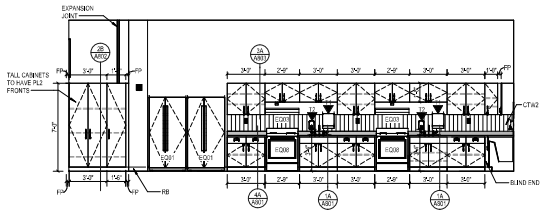
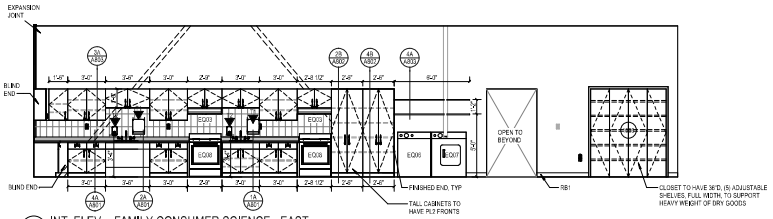
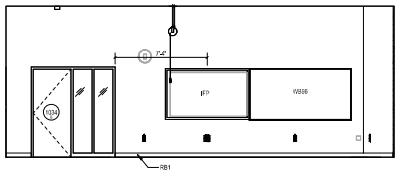


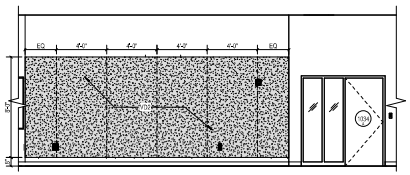
1A INT. ELEV. - FAMILY CONSUMER SCIENCE - NORTH
1/4" = 1'-0"



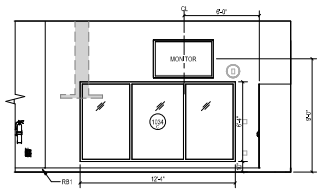
1B INT. ELEV. - FAMILY CONSUMER SCIENCE - EAST
1/4" = 1'-0"



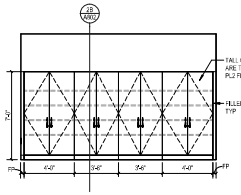
1C INT. ELEV. - FAMILY CONSUMER SCIECNE - SOUTH
1/4" = 1'-0"



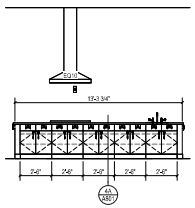
1D INT. ELEV. - FAMILY CONSUMER SCIENCE - WEST - PART A
1/4" = 1'-0"



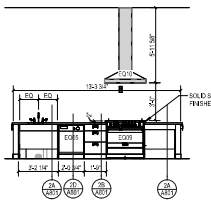
2D INT. ELEV. - FAMILY CONSUMER SCIENCE - WEST - PART B
1/4" = 1'-0"



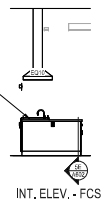
4D INT. ELEV. - FSC STORAGE - NORTH
1/4" = 1'-0"
SIM AT OPPOSITE WALL



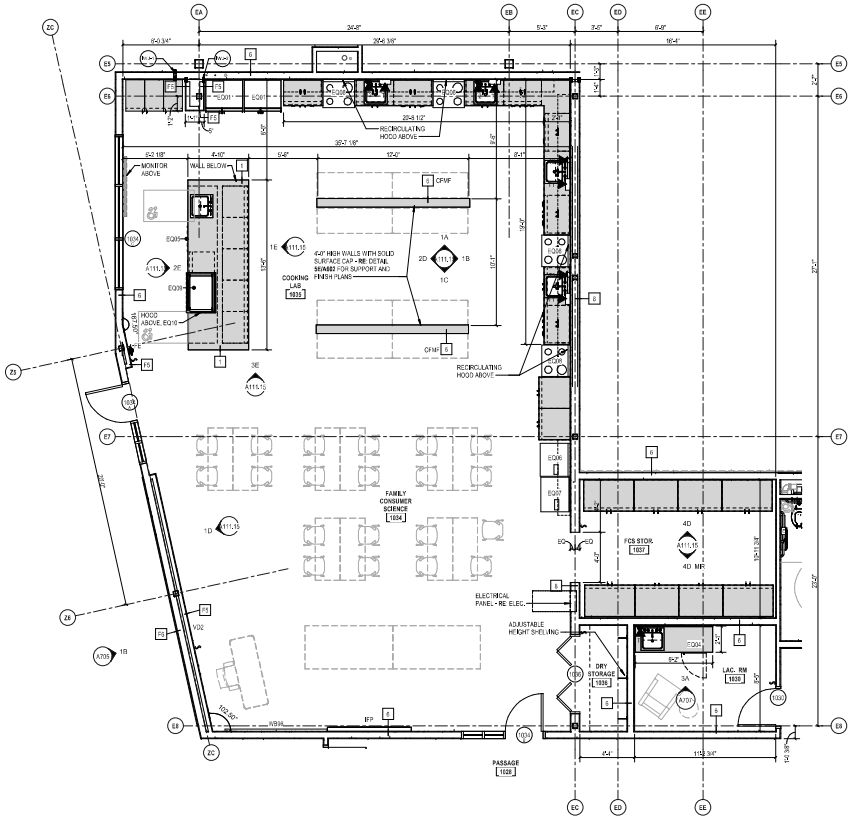
1E INT. ELEV. - FCS DEMO ISLAND - EAST
1/4" = 1'-0"



2E INT. ELEV. - FCS DEMO ISLAND - WEST
1/4" = 1'-0"



3E INT. ELEV. - FCS DEMO ISLAND - TYP. END
1/4" = 1'-0"



4C 1ST FLR - ENLARGED PLAN - FCS
1/4" = 1'-0"

INTERIOR ELEVATION GRAPHIC LEGEND

FINISH LEGEND

- P1: NO GRAPHIC PATTERN SHOWN - HELD THROUGHOUT UNLESS OTHERWISE NOTED
- P3-P12 ACCENT PAINT LOCATIONS SHOWN AS: REFER TO FINISH PLANS FOR TYPE.
- P8, P13: DARK ACCENT PAINTS SHOWN AS: REFER TO FINISH PLANS TAGS FOR TYPE
- AWP1-4,9 & 12 ACOUSTIC PANELS SHOWN AS: REFER TO ELEVATIONS FOR TYPE
- AWP11 ACOUSTIC PANELS SHOWN AS:
- VCG1-VCG9 CUSTOM GRAPHIC SHOWN AS: REFER TO FINISH PLANS FOR TYPE.
- WWP1 SHOWN AS:
- WP2 SHOWN AS:
- TACKBOARD SHOWN AS:
- LOCKER ACCENT COLOR 1 (GRAY) SHOWN AS:
- LOCKER ACCENT COLOR 2, 3 & 4 SHOWN AS:
  - ACCENT COLOR 2 AT RIGHT SIDE POD LOCKERS TO MATCH P10
  - ACCENT COLOR 3 AT CENTER POD LOCKERS TO MATCH P11
  - ACCENT COLOR 4 AT LEFT SIDE POD LOCKERS TO MATCH P12
- PAPER TOWEL DISPENSER
- SOAP DISPENSER
- CLOCK

ENLARGED FLOOR PLAN GENERAL NOTES

1. REFER TO OVERALL & 1/8" PART FLOOR PLANS FOR FLOOR PLAN GENERAL NOTES, FLOOR PLAN GRAPHIC LEGEND AND OVERALL BUILDING SECTION LOCATIONS AND 'AC' SERIES FOR DIMENSIONS.
2. REFER TO G0N1.1 - G1N2.1 FOR ABBREVIATIONS AND GRAPHIC LEGEND
3. SEE FINISH PLANS FOR EXTENT OF FINISHES
4. SEE SHEET A7M1 FOR TYPICAL MOUNTING HEIGHTS OF TOILET ACCESSORIES AND SPECIALTY EQUIPMENT (SEF).
5. SEE FLOOR FINISH PLANS FOR FLOOR TRANSITIONS AND THRESHOLDS
6. FURNITURE IS SHOWN FOR REFERENCE ONLY - N.I.C. AS IT WILL BE PROCURED AT A LATER PHASE.
7. ALL CASEWORK/ MILLWORK SHOWN SHADED
8. EQ(#) INDICATES APPLIANCE OR COMMERCIAL EQUIPMENT TYPE - REFER TO SHEETS A9N2 FOR EQUIPMENT SCHEDULES
9. REFER TO A-SERIES PLANS, ENLARGED PLANS AND DETAILS FOR ADDITIONAL DIMENSIONS AND WALL TYPES
10. REFER TO A7M1 FOR TYPICAL TOILET STALL TYPE LAYOUTS AND TOILET ACCESSORY LOCATIONS.
11. REFER TO FOOD SERVICE PLANS FOR EXTENT OF EQUIPMENT INCLUDED IN THE KITCHEN SERVERY.

INTERIOR ELEVATION GENERAL NOTES:

1. SEE SHEET A7M1 FOR TYPICAL MOUNTING HEIGHTS OF ACCESSORIES, WALL MOUNTED EQUIPMENT & DEVICES & TYPICAL TOILET/ SHOWER ELEVATIONS
2. SEE FURNITURE PLANS, FINISH PLANS & ENLARGED FLOOR PLANS FOR ALL WHITEBOARD / TACKBOARD AND SHELVING LOCATIONS. PROVIDE BLOCKING FOR ALL INTERACTIVE WHITEBOARDS &TACK BOARDS AND PER DETAIL 5B/A602. COORDINATE LOCATIONS WITH ELECTRICAL AND FURNITURE DRAWINGS.
3. WHERE ACCENT PAINT COLOR IS ON A WALL WITH CASEWORK ANY EXPOSED WALL BEYOND CASEWORK IS TO BE PAINTED ACCENT COLOR INDICATED AS WELL.
4. EXPOSED OUTER EDGE OF ANY WALLCOVERING, TO RECEIVE TRIM, AS SHOWN IN 1/8A602.
5. REFER TO EQUIPMENT SCHEDULES ON A9N2 FOR EXTENT OF EQUIPMENT INFO FOR TAGGED EQUIPMENT.
6. REFER TO FINISH PLANS FOR EXTENT OF ACCENT PAINT COLORS AND LOCATIONS OF SPECIALTY WALL FINISHES.
7. REFER TO FINISH PRODUCT LIST FOR PRODUCT INFO ON ALL TAGGED FINISHES. REFER TO FINISH GENERAL NOTES FOR ADDITIONAL INFORMATION.
8. REFER TO A9N1 FOR LOCKER ELEVATIONS AND DETAILS, PROVIDE FLAT TOPS AT LOCKERS WITH NO SOFFIT, TYPICAL.
9. WHERE WHITEBOARD ARE SHOWN NEXT TO WWP THEY ARE TO BE MOUNTED AS CLOSELY AS POSSIBLE TO THE WP.
10. WHERE WHITEBOARD AND/OR TACKBOARDS ARE SHOWN NEXT TO EACH OTHER THEY ARE TO BE INSTALLED WITH OUTER FRAME TOUCHING.

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www.slamcoll.com

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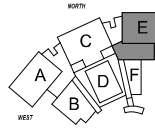
Checked: JZ

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane,
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ENLARGED PLAN & ELEVATIONS - FAMILY CONSUMER SCIENCE

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A111.15

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9/25/2024 3:23:13 PM

INTERIOR ELEVATION GENERAL NOTES:

1. SEE SHEET A701 FOR TYPICAL MOUNTING HEIGHTS OF ACCESSORIES, WALL MOUNTED EQUIPMENT & DEVICES & TYPICAL TOILET/ SHOWER ELEVATIONS
2. SEE FURNITURE PLANS, FINISH PLANS & ENLARGED FLOOR PLANS FOR ALL WHITEBOARD, TACKBOARD AND SHELVING LOCATIONS. PROVIDE BLOCKING FOR ALL INTERACTIVE WHITEBOARDS STACK BOARDS AND PER DETAIL 5/A1402. COORDINATE LOCATIONS WITH ELECTRICAL AND FURNITURE DRAWINGS.
3. WHERE ACCENT PAINT COLOR IS ON A WALL WITH CASEWORK ANY EXPOSED WALL BELOW CASEWORK IS TO BE PAINTED ACCENT COLOR INDICATED AS WELL.
4. EXPOSED OUTER EDGE OF ANY WALLCOVERING, TO RECEIVE TRIM, AS SHOWN IN 1B/A905.
5. REFER TO EQUIPMENT SCHEDULES ON A912 FOR EXTENT OF EQUIPMENT INFO FOR TAGGED EQUIPMENT.
6. REFER TO FINISH PLANS FOR EXTENT OF ACCENT PAINT COLORS AND LOCATIONS OF SPECIALTY WALL FINISHES.
7. REFER TO FINISH PRODUCT LIST FOR PRODUCT INFO ON ALL TAGGED FINISHES. REFER TO 'FINISH GENERAL NOTES FOR ADDITIONAL INFORMATION.
8. REFER TO A804 FOR LOCKER ELEVATIONS AND DETAILS. PROVIDE FLAT TOPS AT LOCKERS WITH NO SOFFIT, TYPICAL
9. WHERE WHITEBOARD ARE SHOWN NEXT TO M/B THEY ARE TO BE MOUNTED AS CLOSELY AS POSSIBLE TO THE M/B.
10. WHERE WHITEBOARD AND/OR TACKBOARDS ARE SHOWN NEXT TO EACH OTHER THEY ARE TO BE INSTALLED WITH OUTER FRAME TOUCHING.

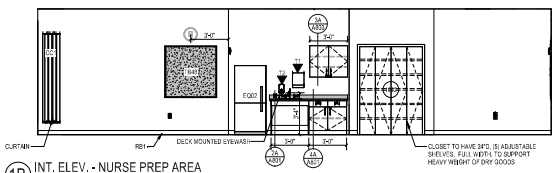
ENLARGED FLOOR PLAN GENERAL NOTES

1. REFER TO OVERALL & 1/8" PART FLOOR PLANS FOR FLOOR PLAN GENERAL NOTES, FLOOR PLAN GRAPHIC LEGEND AND OVERALL BUILDING SECTION LOCATIONS AND "AL" SERIES FOR DIMENSIONS.
2. REFER TO G001.1 - G102.1 FOR ABBREVIATIONS AND GRAPHIC LEGEND
3. SEE FINISH PLANS FOR EXTENT OF FINISHES
4. SEE SHEET A701 FOR TYPICAL MOUNTING HEIGHTS OF TOILET ACCESSORIES AND SPECIALTY EQUIPMENT (SEA).
5. SEE FLOOR FINISH PLANS FOR FLOOR TRANSITIONS AND THRESHOLDS
6. FURNITURE IS SHOWN FOR REFERENCE ONLY - FURC, AS IT WILL BE PROCURED AT A LATER PHASE.
7. ALL CASEWORK/ MILLWORK SHOWN SHADED
8. EQ## INDICATES APPLIANCE OR COMMERCIAL EQUIPMENT TYPE - REFER TO SHEETS A912 FOR EQUIPMENT SCHEDULES
9. REFER TO AL-SERIES PLANS, ENLARGED PLANS AND DETAILS FOR ADDITIONAL DIMENSIONS AND WALL TYPES
10. REFER TO A701 FOR TYPICAL TOILET STALL TYPE LAYOUTS AND TOILET ACCESSORY LOCATIONS.
11. REFER TO FOOD SERVICE PLANS FOR EXTENT OF EQUIPMENT INCLUDED IN THE KITCHEN SERVERY.

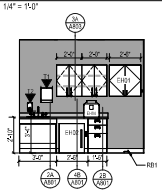
INTERIOR ELEVATION GRAPHIC LEGEND

FINISH LEGEND:

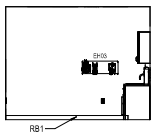
- P1: NO GRAPHIC PATTERN SHOWN - FIELD THROUGHOUT UNLESS OTHERWISE NOTED
- P3-P12 ACCENT PAINT LOCATIONS SHOW AS; REFER TO FINISH PLANS FOR TYPE.
- P6, P13: DARK ACCENT PAINTS SHOWN AS; REFER TO FINISH PLANS TAGS FOR TYPE
- AWP5-10 & 12 ACOUSTIC PANELS SHOWN AS; REFER TO ELEVATIONS FOR TYPE.
- AWP11 ACOUSTIC PANELS SHOWN AS:
- VCG1-VCG9 CUSTOM GRAPHIC SHOW AS; REFER TO FINISH PLANS FOR TYPE.
- WW1 SHOWN AS:
- WP2 SHOWN AS:
- TACKBOARD SHOWN AS:
- LOCKER ACCENT COLOR 1 (GRAY) SHOWN AS
- LOCKER ACCENT COLOR 2, 3 & 4 SHOWN AS
  - ACCENT COLOR 2 AT RIGHT SIDE POD LOCKERS TO MATCH P10
  - ACCENT COLOR 3 AT CENTER POD LOCKERS TO MATCH P11
  - ACCENT COLOR 4 AT LEFT SIDE POD LOCKERS TO MATCH P12
- PAPER TOWEL DISPENSER
- SOAP DISPENSER
- CLOCK



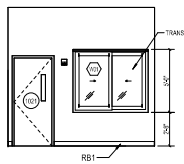
1B INT. ELEV. - NURSE PREP AREA
1/4" = 1'-0"



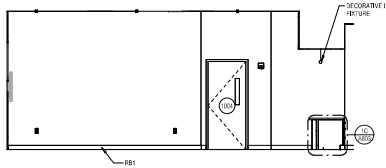
1C INT. ELEV. - TREATMENT ROOM - NORTH
1/4" = 1'-0"



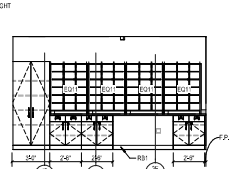
2C INT. ELEV. TREATMENT RM W
1/4" = 1'-0"



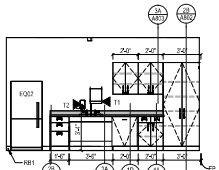
3C INT. ELEV. WAITING AREA
1/4" = 1'-0"



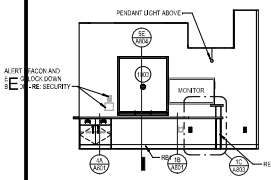
1D INT. ELEV. - ADMIN/ WAITING - EAST
1/4" = 1'-0"



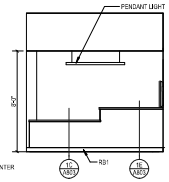
2D INT. ELEV. - WORKROOM - EAST
1/4" = 1'-0"



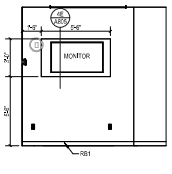
3D INT. ELEV. - WORKROOM - WEST
1/4" = 1'-0"



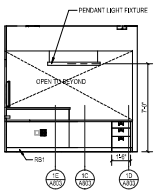
1E INT. ELEV. - ADMIN ID CHECK-IN - W
1/4" = 1'-0"



2E INT. ELEV. - ADMIN WAITING /CHECK-IN -
1/4" = 1'-0"



3E INT. ELEV. - ADMIN. WAITING -N
1/4" = 1'-0"



4E INT. ELEV. - ADMIN ID CHECK WORKSTATION - NORTH
1/4" = 1'-0"



5E ENLARGED PLAN - ADMIN SUITE & HEALTH SUITE
1/4" = 1'-0"

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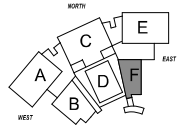
Checked: JZ

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane,
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
1	10/30/2024	ADDENDUM NO. 4
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ENLARGED PLAN & ELEVATIONS - ADMIN SUITE, HEALTH SUITE & GUIDANCE SUITE

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A111.16

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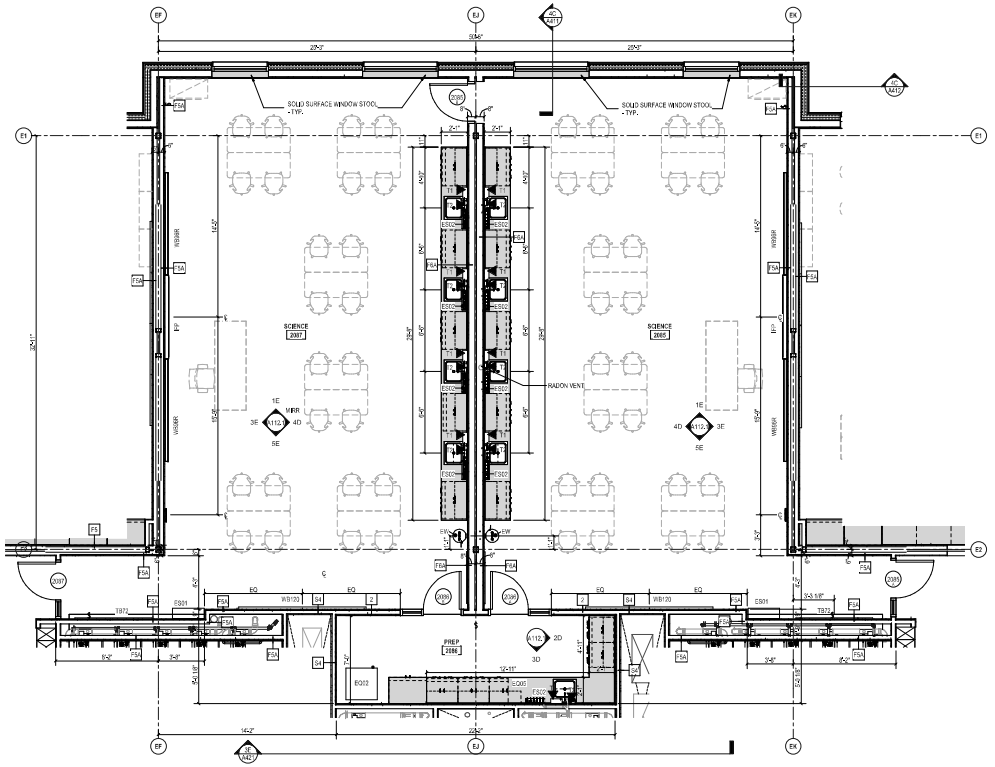


3C 2ND FLR - ENLARGED PLAN - TYPICAL DUAL SCIENCE CLASSROOMS & PREP
1/4" = 1'-0"

ENLARGED FLOOR PLAN GENERAL NOTES

1. REFER TO OVERALL & 1/8" PART FLOOR PLANS FOR FLOOR PLAN GENERAL NOTES, FLOOR PLAN GRAPHIC LEGEND AND OVERALL BUILDING SECTION LOCATIONS AND "A1" SERIES FOR DIMENSIONS.
2. REFER TO G001.1 - G102.1 FOR ABBREVIATIONS AND GRAPHIC LEGEND
3. SEE FINISH PLANS FOR EXTENT OF FINISHES
4. SEE SHEET A701 FOR TYPICAL MOUNTING HEIGHTS OF TOILET ACCESSORIES AND SPECIALTY EQUIPMENT (SIM).
5. SEE FLOOR FINISH PLANS FOR FLOOR TRANSITIONS AND THRESHOLDS
6. FURNITURE IS SHOWN FOR REFERENCE ONLY - N.I.C. AS IT WILL BE PROCURED AT A LATER PHASE.
7. A.I.L. CASEWORK/ MILLWORK SHOWN SHADED
8. EQ## INDICATES APPLIANCE OR COMMERCIAL EQUIPMENT TYPE - REFER TO SHEETS A902 FOR EQUIPMENT SCHEDULES
9. REFER TO A1-SERIES PLANS, ENLARGED PLANS AND DETAILS FOR ADDITIONAL DIMENSIONS AND WALL TYPES
10. REFER TO A701 FOR TYPICAL TOILET STALL TYPE LAYOUTS AND TOILET ACCESSORY LOCATIONS.
11. REFER TO FOOD SERVICE PLANS FOR EXTENT OF EQUIPMENT INCLUDED IN THE KITCHEN SERVERY.

INTERIOR ELEVATION GENERAL NOTES:

1. SEE SHEET A701 FOR TYPICAL MOUNTING HEIGHTS OF ACCESSORIES, WALL MOUNTED EQUIPMENT & DEVICES & TYPICAL TOILET/ SHOWER ELEVATIONS
2. SEE FURNITURE PLANS, FINISH PLANS & ENLARGED FLOOR PLANS FOR ALL WHITEBOARD, TACKBOARD AND SHELVING LOCATIONS. PROVIDE BLOCKING FOR ALL INTERACTIVE WHITEBOARDS STACK BOARDS AND PER DETAIL 5B/A602. COORDINATE LOCATIONS WITH ELECTRICAL AND FURNITURE DRAWINGS.
3. WHERE ACCENT PAINT COLOR IS ON A WALL WITH CASEWORK ANY EXPOSED WALL BELOW CASEWORK IS TO BE PAINTED ACCENT COLOR INDICATED AS WELL.
4. EXPOSED OUTER EDGE OF ANY WALLCOVERING, TO RECEIVE TRIM, AS SHOWN IN 19/A605.
5. REFER TO EQUIPMENT SCHEDULES ON A902 FOR EXTENT OF EQUIPMENT INFO FOR TAGGED EQUIPMENT.
6. REFER TO FINISH PLANS FOR EXTENT OF ACCENT PAINT COLORS AND LOCATIONS OF SPECIALTY WALL FINISHES.
7. REFER TO FINISH PRODUCT LIST FOR PRODUCT INFO ON ALL TAGGED FINISHES. REFER TO FINISH GENERAL NOTES FOR ADDITIONAL INFORMATION.
8. REFER TO A604 FOR LOCKER ELEVATIONS AND DETAILS. PROVIDE FLAT TOPS AT LOCKERS WITH NO SOFFIT, TYPICAL
9. WHERE WHITEBOARD ARE SHOWN NEXT TO IWB THEY ARE TO BE MOUNTED AS CLOSELY AS POSSIBLE TO THE IWB.
10. WHERE WHITEBOARD AND/OR TACKBOARDS ARE SHOWN NEXT TO EACH OTHER THEY ARE TO BE INSTALLED WITH OUTER FRAME TOUCHING.

INTERIOR ELEVATION GRAPHIC LEGEND

FINISH LEGEND

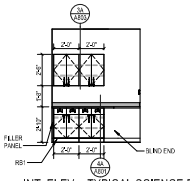
- P1 NO GRAPHIC PATTERN SHOWN - FIELD THROUGHOUT UNLESS OTHERWISE NOTED
- P3-P12 ACCENT PAINT LOCATIONS SHOWN AS: REFER TO FINISH PLANS FOR TYPE.
- P8, P13, DARK ACCENT PAINTS SHOWN AS: REFER TO FINISH PLANS TAGS FOR TYPE
- AWP-10 & 12 ACOUSTIC PANELS SHOWN AS: REFER TO ELEVATIONS FOR TYPE
- AWP11 ACOUSTIC PANELS SHOWN AS:
- VCG1-VCG5 CUSTOM GRAPHIC SHOW AS: REFER TO FINISH PLANS FOR TYPE.
- WWP1 SHOWN AS:
- WP2 SHOWN AS:
- TACKBOARD SHOWN AS:

LOCKER ACCENT COLOR 1 (GRAY) SHOWN AS

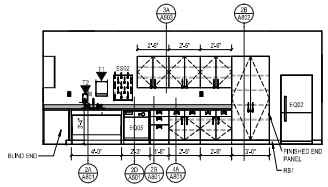
LOCKER ACCENT COLOR 2, 3 & 4 SHOWN AS

- ACCENT COLOR 2 AT RIGHT SIDE POD LOCKERS TO MATCH P10
- ACCENT COLOR 3 AT CENTER POD LOCKERS TO MATCH P11
- ACCENT COLOR 4 AT LEFT SIDE POD LOCKERS TO MATCH P12

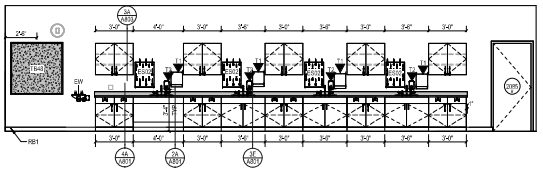
- PAPER TOWEL DISPENSER
- SOAP DISPENSER
- CLOCK



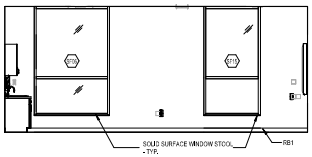
2D INT. ELEV. - TYPICAL SCIENCE PREP ROOM EAST WALL
1/4" = 1'-0"



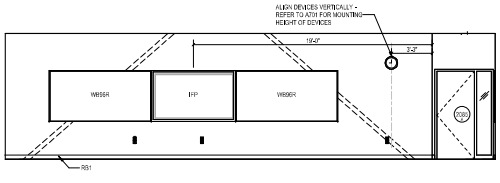
3D INT. ELEV. - TYPICAL SCIENCE PREP ROOM SOUTH WALL
1/4" = 1'-0"



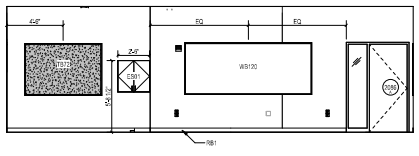
4D INT. ELEV. - TYPICAL SCIENCE CASEWORK WALL
1/4" = 1'-0"



1E INT. ELEV. - TYPICAL SCIENCE NORTH WALL
1/4" = 1'-0"



3E INT. ELEV. - TYPICAL SCIENCE TEACHING WALL
1/4" = 1'-0"



5E INT. ELEV. - TYPICAL SCIENCE SOUTH WALL
1/4" = 1'-0"

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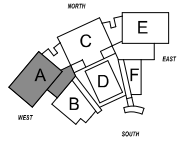
Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ENLARGED PLAN & ELEVATIONS - TYPICAL SCIENCE CLASSROOMS & PREP

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A112.1

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Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_GREENWICH_CENTRAL_MS_R22.rvt

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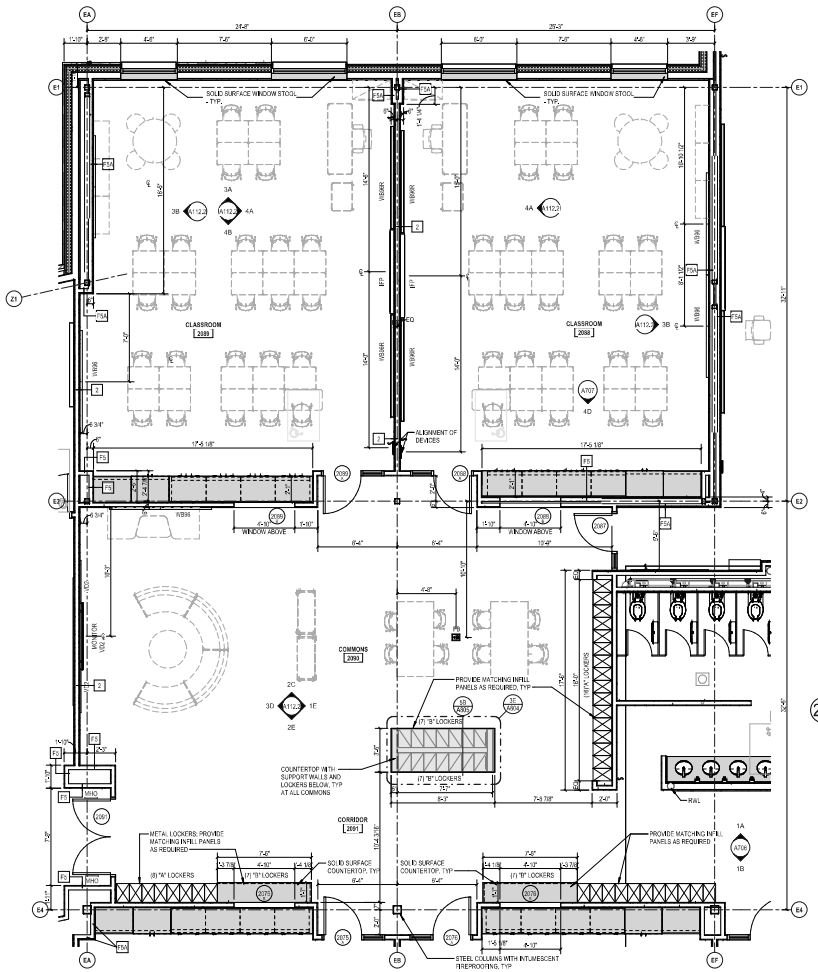
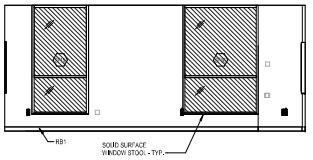
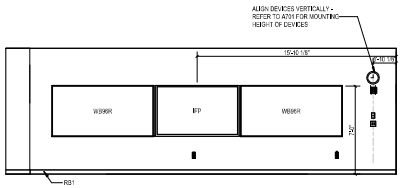


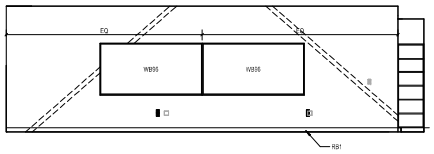
1C 2ND FLR - ENLARGED PLAN - TYPICAL DOUBLE CLASSROOM & COMMONS
1/4" = 1'-0"



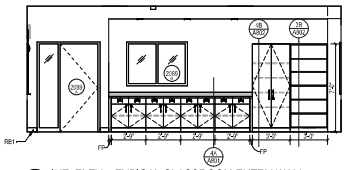
3A INT. ELEV. - TYPICAL CLASSROOM EXTERIOR WALL
1/4" = 1'-0"



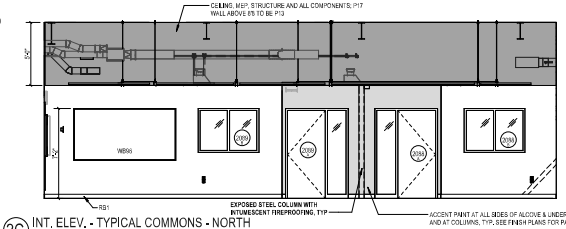
4A INT. ELEV. - TYPICAL CLASSROOM TEACHING WALL
1/4" = 1'-0"



3B INT. ELEV. - TYPICAL CLASSROOM WHITEBOARD WALL
1/4" = 1'-0"



4B INT. ELEV. - TYPICAL CLASSROOM ENTRY WALL
1/4" = 1'-0"

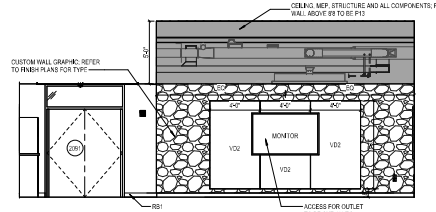


2C INT. ELEV. - TYPICAL COMMONS - NORTH
1/4" = 1'-0"

INTERIOR ELEVATION GRAPHIC LEGEND

PAINT LEGEND

- P1: NO GRAPHIC PATTERN SHOWN - FIELD THROUGHOUT UNLESS OTHERWISE NOTED
- P5/P12 ACCENT PAINT LOCATIONS SHOW AS: REFER TO FINISH PLANS FOR TYPE.
- P8, P13, DARK ACCENT PAINTS SHOWN AS: REFER TO FINISH PLANS TAGS FOR TYPE
- AWP1-10 & 12 ACOUSTIC PANELS SHOWN AS: REFER TO ELEVATIONS FOR TYPE
- AWP11 ACOUSTIC PANELS SHOWN AS:
- VCG1/VCG5 CUSTOM GRAPHIC SHOWN AS: REFER TO FINISH PLANS FOR TYPE.
- WP1 SHOWN AS:
- WP2 SHOWN AS:
- TACKBOARD SHOWN AS:
- LOCKER ACCENT COLOR 1 (GRAY) SHOWN AS:
- LOCKER ACCENT COLOR 2, 3 & 4 SHOWN AS:
  - ACCENT COLOR 2 AT RIGHT SIDE POD LOCKERS TO MATCH P10
  - ACCENT COLOR 3 AT CENTER POD LOCKERS TO MATCH P11
  - ACCENT COLOR 4 AT LEFT SIDE POD LOCKERS TO MATCH P12
- PAPER TOWEL DISPENSER
- SOAP DISPENSER
- CLOCK



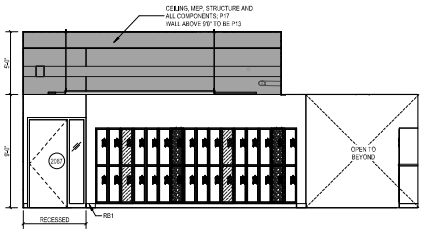
3D INT. ELEV. - TYPICAL COMMONS ACTIVITY WALL
1/4" = 1'-0"

INTERIOR ELEVATION GENERAL NOTES:

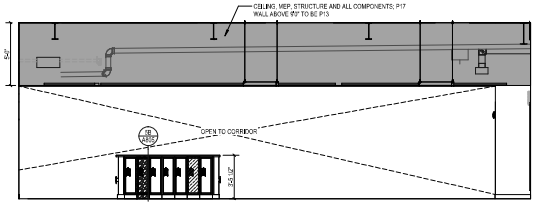
1. SEE SHEET A701 FOR TYPICAL MOUNTING HEIGHTS OF ACCESSORIES, WALL MOUNTED EQUIPMENT & DEVICES & TYPICAL TOILET/ SHOWER ELEVATIONS
2. SEE FURNITURE PLANS, FINISH PLANS & ENLARGED FLOOR PLANS FOR ALL WHITEBOARD, TACKBOARD AND SHELVING LOCATIONS. PROVIDE BLOCKING FOR ALL INTERACTIVE WHITEBOARDS/DISPLAY BOARDS AND PER DETAIL 5/A5002. COORDINATE LOCATIONS WITH ELECTRICAL AND FURNITURE DRAWINGS.
3. WHERE ACCENT PAINT OCCURS ON A WALL WITH CASEWORK ANY EXPOSED WALL BELOW CASEWORK IS TO BE PAINTED ACCENT COLOR INDICATED AS WELL.
4. EXPOSED OUTER EDGE OF ANY WALLCOVERING, TO RECEIVE TRIM, AS SHOWN IN 1B/A805.
5. REFER TO EQUIPMENT SCHEDULES ON A912 FOR EXTENT OF EQUIPMENT INFO FOR TAGGED EQUIPMENT.
6. REFER TO FINISH PLANS FOR EXTENT OF ACCENT PAINT COLORS AND LOCATIONS OF SPECIALTY WALL FINISHES.
7. REFER TO FINISH PRODUCT LIST FOR PRODUCT INFO ON ALL TAGGED FINISHES. REFER TO FINISH GENERAL NOTES FOR ADDITIONAL INFORMATION.
8. REFER TO A804 FOR LOCKER ELEVATIONS AND DETAILS. PROVIDE FLAT TOPS AT LOCKERS WITH NO SOFFIT, TYPICAL.
9. WHERE WHITEBOARD ARE SHOWN NEXT TO IWB THEY ARE TO BE MOUNTED AS CLOSELY AS POSSIBLE TO THE IWB.
10. WHERE WHITEBOARD AND/OR TACKBOARDS ARE SHOWN NEXT TO EACH OTHER THEY ARE TO BE INSTALLED WITH OUTER FRAME TOUCHING.

ENLARGED FLOOR PLAN GENERAL NOTES

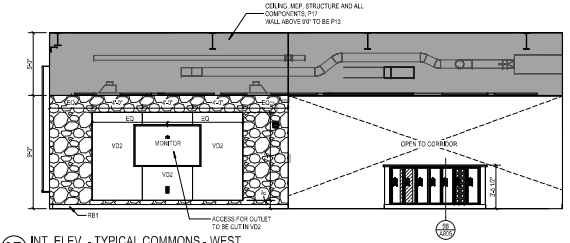
1. REFER TO OVERALL & 1/8" PART FLOOR PLANS FOR FLOOR PLAN GENERAL NOTES, FLOOR PLAN GRAPHIC LEGEND AND OVERALL BUILDING SECTION LOCATIONS AND "A1" SERIES FOR DIMENSIONS.
2. REFER TO G011.1 - G1012 FOR ABBREVIATIONS AND GRAPHIC LEGEND
3. SEE FINISH PLANS FOR EXTENT OF FINISHES
4. SEE SHEET A701 FOR TYPICAL MOUNTING HEIGHTS OF TOILET ACCESSORIES AND SPECIALTY EQUIPMENT (SEP).
5. SEE FLOOR FINISH PLANS FOR FLOOR TRANSITIONS AND THRESHOLDS
6. FURNITURE IS SHOWN FOR REFERENCE ONLY - FURN. AS IT WILL BE PROCURED AT A LATER PHASE.
7. ALL CASEWORK/ MILLWORK SHOWN SHADED
8. EQUIP INDICATES APPLIANCE OR COMMERCIAL EQUIPMENT TYPE - REFER TO SHEETS A912 FOR EQUIPMENT SCHEDULES
9. REFER TO A-SERIES PLANS, ENLARGED PLANS AND DETAILS FOR ADDITIONAL DIMENSIONS AND WALL TYPES.
10. REFER TO A701 FOR TYPICAL TOILET STALL TYPE LAYOUTS AND TOILET ACCESSORY LOCATIONS.
11. REFER TO FOOD SERVICE PLANS FOR EXTENT OF EQUIPMENT INCLUDED IN THE KITCHEN SERVERY.



1E INT. ELEV. - TYPICAL COMMONS - LOCKERS AT SCIENCE ENTRANCE
1/4" = 1'-0"



2E INT. ELEV. - TYPICAL COMMONS - SOUTH
1/4" = 1'-0"



3E INT. ELEV. - TYPICAL COMMONS - WEST
1/4" = 1'-0"

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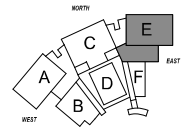

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ENLARGED PLAN & ELEVATIONS - TYPICAL CLASSROOM, COMMONS

Date 07/08/2024
Scale As indicated
Proj. Number 22367.00
Drawing Number **A112.2**

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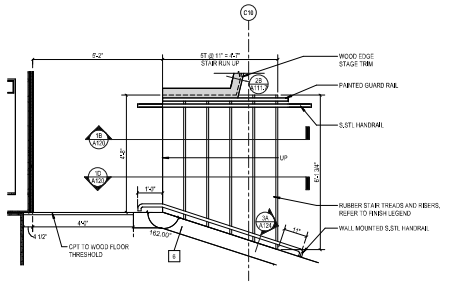
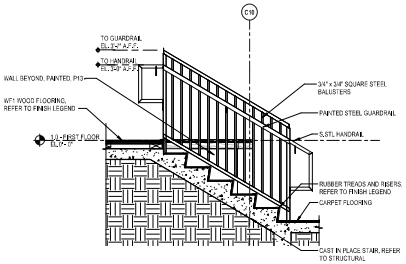
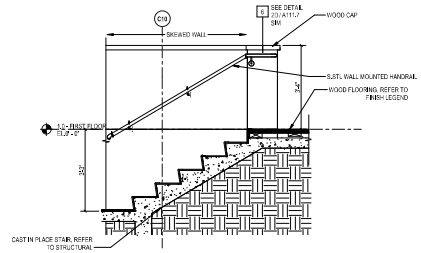


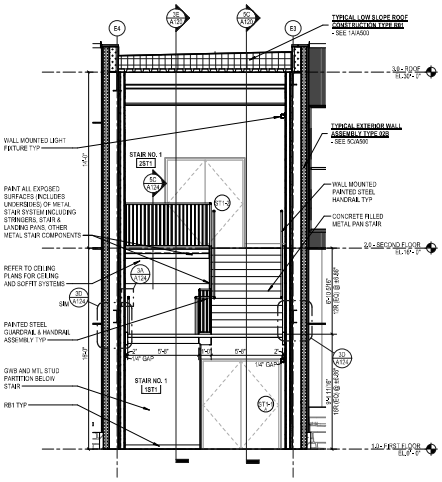
1A 1ST FLR - ENLARGED PLAN - AUDITORIUM - STAIR
1/2" = 1'-0"



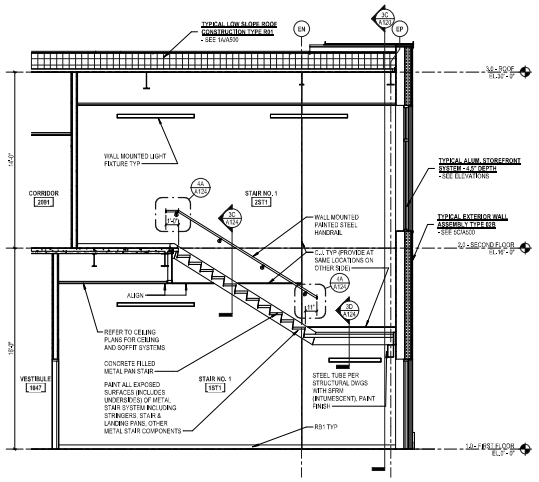
1B AUD. STAIR SECTION
1/2" = 1'-0"



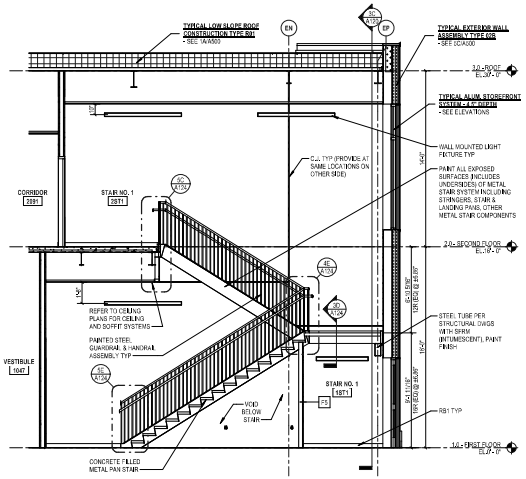
1D AUD. STAIR SECTION1
1/2" = 1'-0"



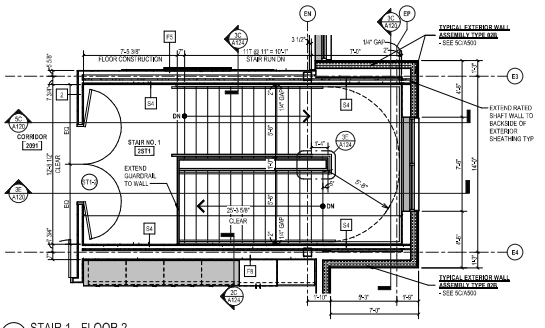
3C STAIR 1 - SECTION 3
1/4" = 1'-0"



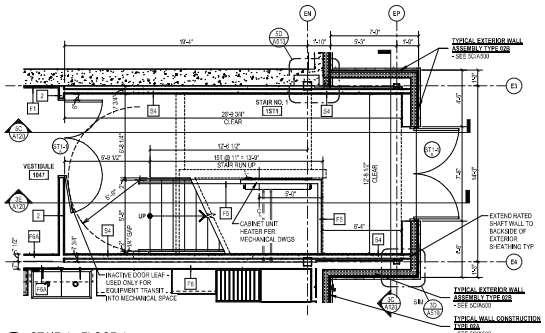
5C STAIR 1 - SECTION 1
1/4" = 1'-0"



3E STAIR 1 - SECTION 2
1/4" = 1'-0"



5D STAIR 1 - FLOOR 2
1/4" = 1'-0"



5E STAIR 1 - FLOOR 1
1/4" = 1'-0"

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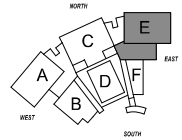

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ENLARGED STAIR PLANS AND SECTIONS

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A120

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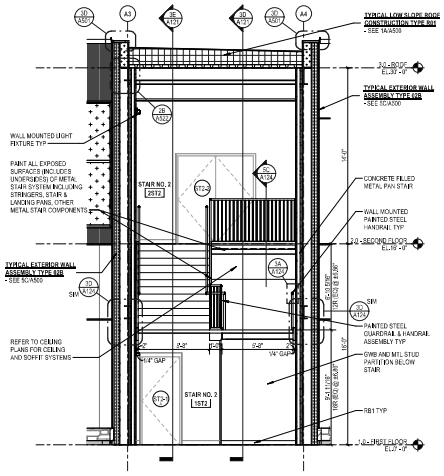
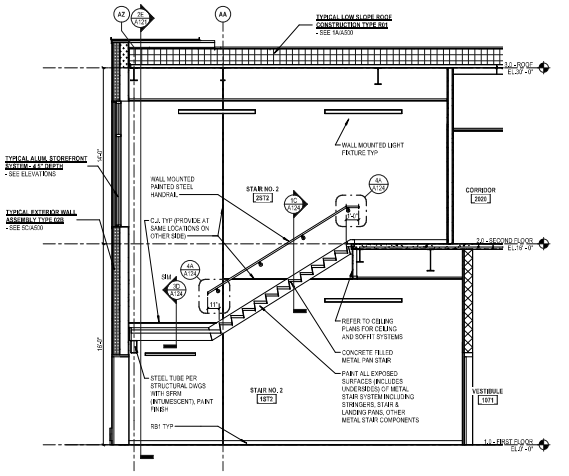
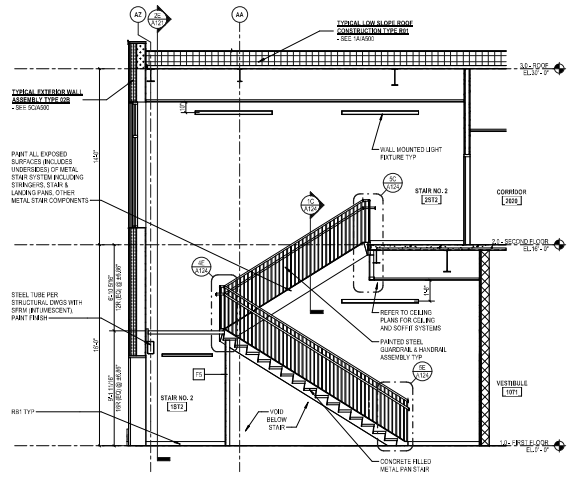


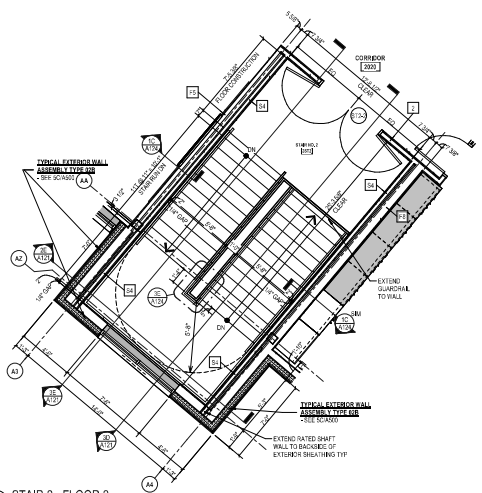
2E STAIR 2 - SECTION 3
1/4" = 1'-0"



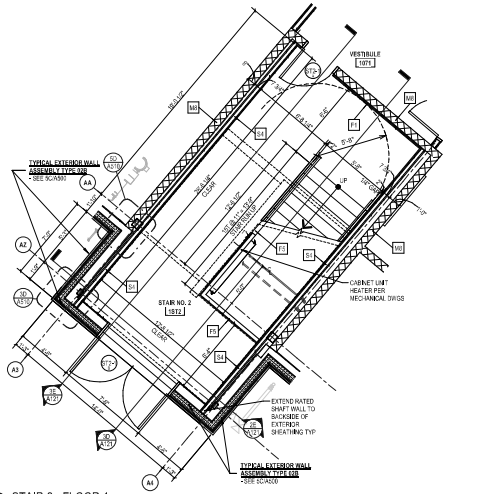
3E STAIR 2 - SECTION 1
1/4" = 1'-0"



3D STAIR 2 - SECTION 2
1/4" = 1'-0"



5D STAIR 2 - FLOOR 2
1/4" = 1'-0"



5E STAIR 2 - FLOOR 1
1/4" = 1'-0"

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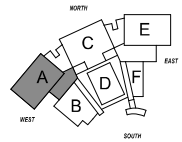

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ENLARGED STAIR PLANS AND SECTIONS

Date: 07/08/2024
Scale: 1/4" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **A121**

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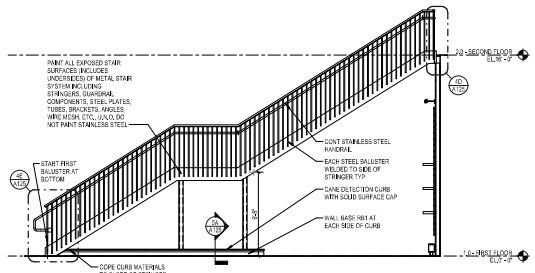
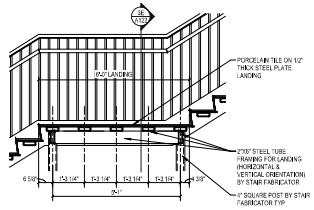
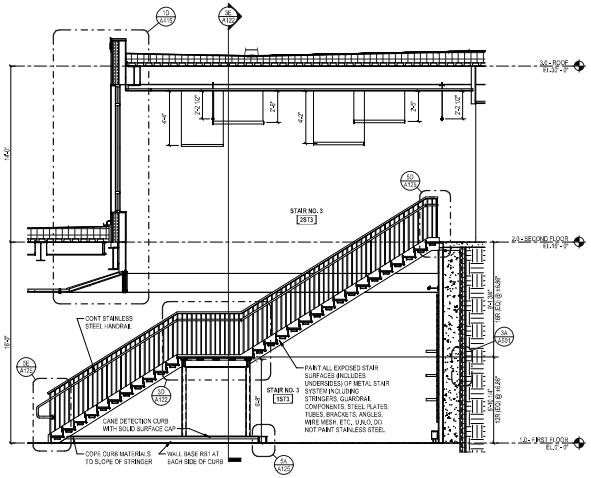


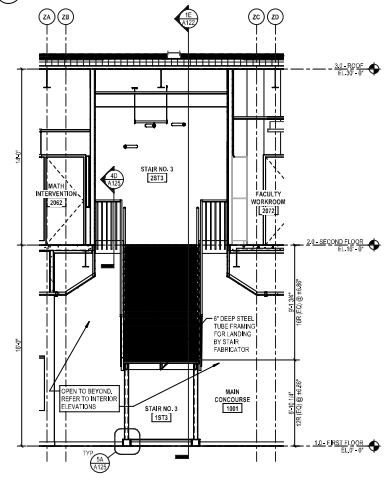
1D STAIR 3 - ELEVATION
1/4" = 1'-0"



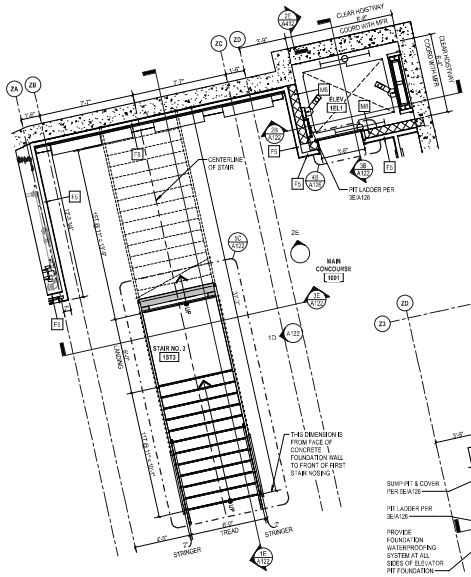
3D STAIR 3 - ENLARGED SECTION AT LANDING
1/2" = 1'-0"



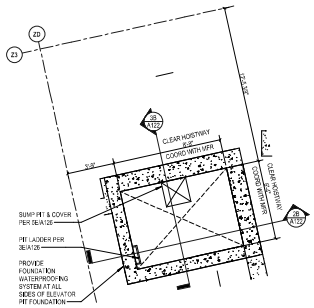
1E STAIR 3 - SECTION 1
1/4" = 1'-0"



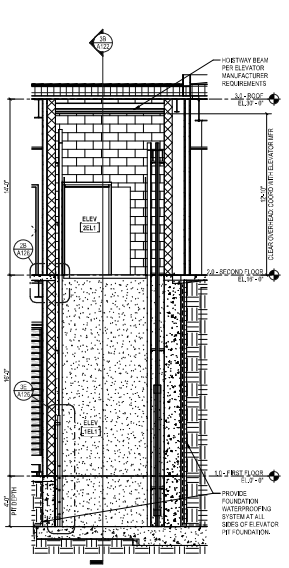
3E STAIR 3 - SECTION 2
1/4" = 1'-0"



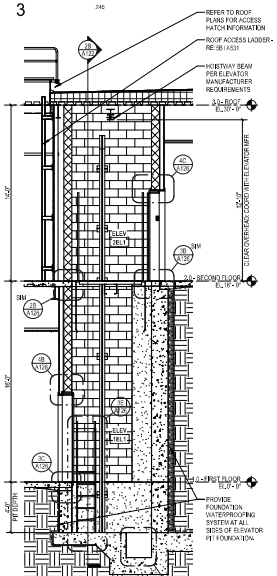
4E STAIR 3 AND ELEVATOR - LEVEL 1
1/4" = 1'-0"



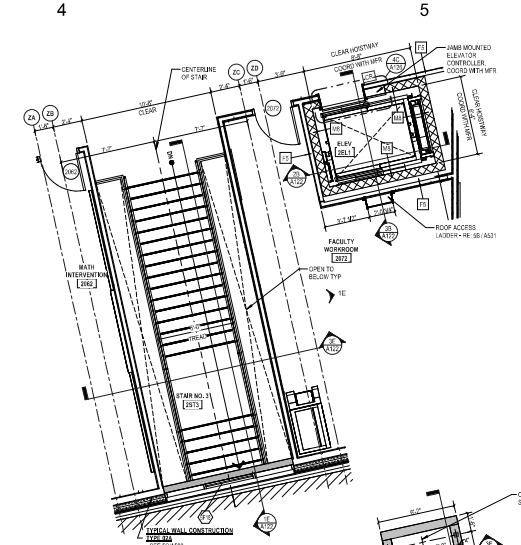
5E ELEVATOR - PIT
1/4" = 1'-0"



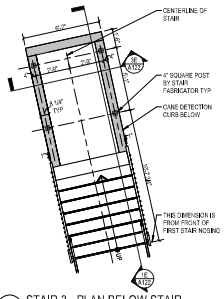
2B ELEVATOR 1 - SECTION 1
1/4" = 1'-0"



3B ELEVATOR 1 - SECTION 2
1/4" = 1'-0"



4B STAIR 3 AND ELEVATOR - LEVEL 2
1/4" = 1'-0"



5C STAIR 3 - PLAN BELOW STAIR
1/4" = 1'-0"

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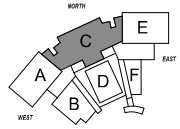

KEYPLAN

Number	Date	Issued For
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ENLARGED STAIR AND ELEVATOR PLAN AND SECTIONS

Date 07/08/2024
Scale As indicated
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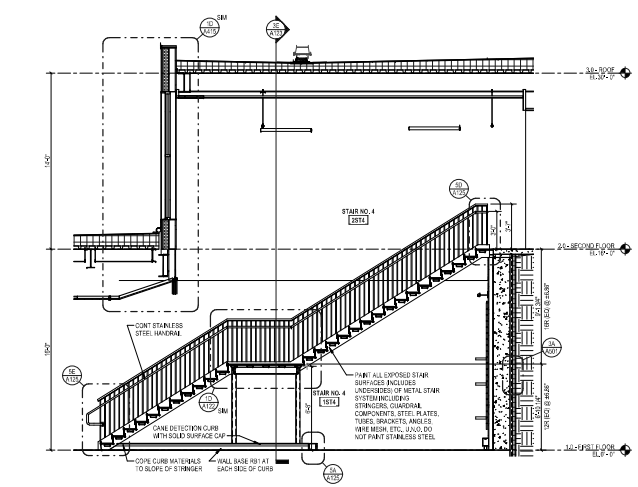
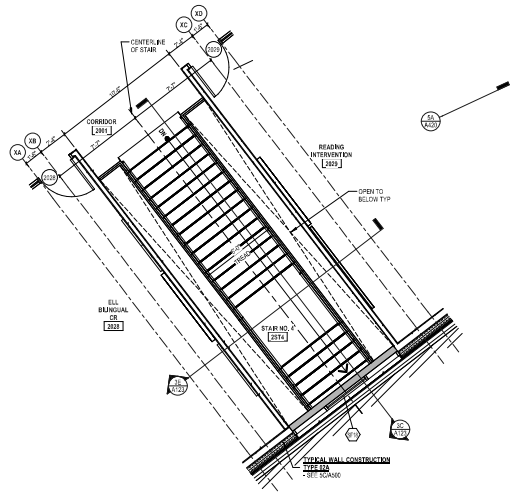
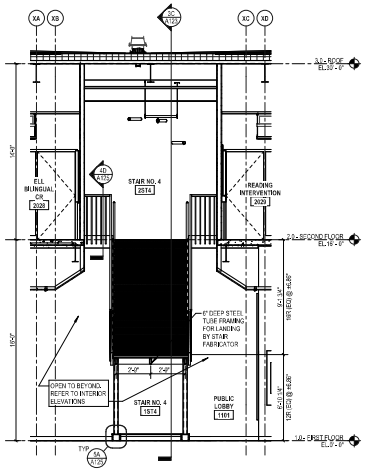


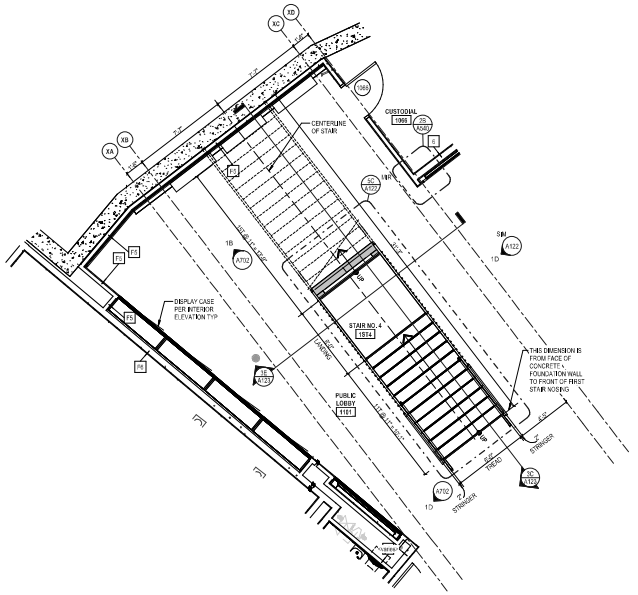
3C STAIR 4 - SECTION 1
1/4" = 1'-0"



4C STAIR 4 - LEVEL 2
1/4" = 1'-0"



3E STAIR 4 - SECTION 2
1/4" = 1'-0"



4E STAIR 4 - LEVEL 1
1/4" = 1'-0"

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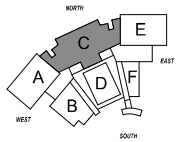

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ENLARGED STAIR PLANS AND SECTIONS

Date: 07/08/2024
Scale: 1/4" = 1'-0"
Proj. Number: 22367.00
Drawing Number: A123

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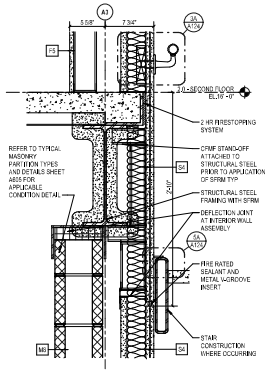
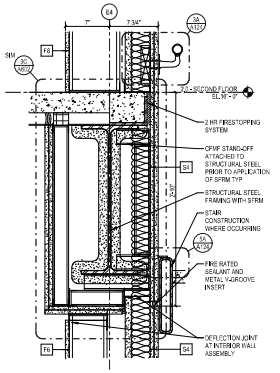
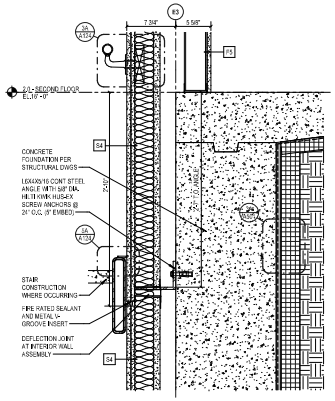


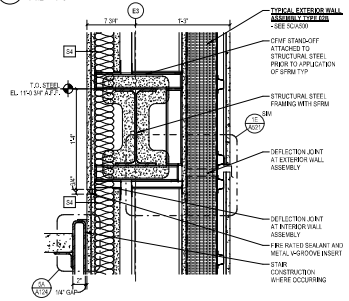
DETAIL AT HORIZONTAL JOINT IN GWB ADJACENT TO CMU WALL
1C 1 1/2" = 1'-0"



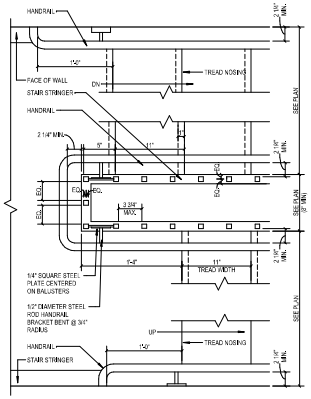
DETAIL AT HORIZONTAL JOINT IN GWB AT LARGE BEAM
2C 1 1/2" = 1'-0"



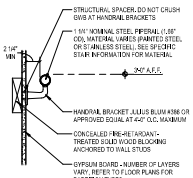
DETAIL AT HORIZONTAL JOINT IN GWB AT FOUNDATION
3C 1 1/2" = 1'-0"



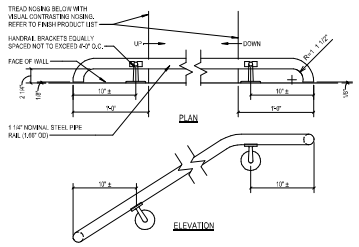
DETAIL AT HORIZONTAL JOINT IN GWB AT EXTERIOR WALL
3D 1 1/2" = 1'-0"



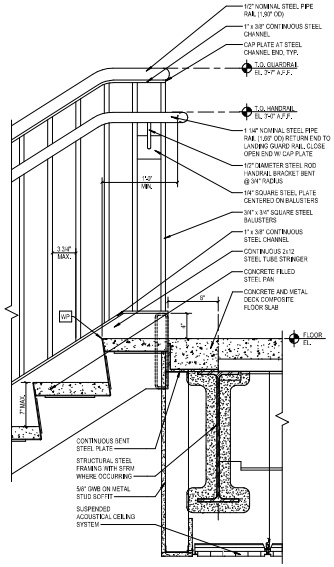
DETAIL STAIR PLAN
3E 1 1/2" = 1'-0"



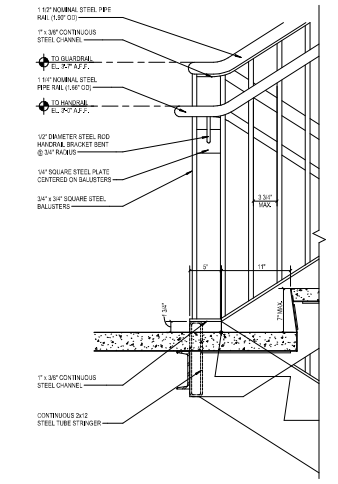
DETAIL AT HANDRAIL BRACKET
3A 1 1/2" = 1'-0"



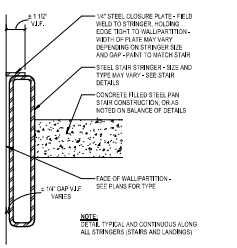
ELEVATION & PLAN OF STAIR HANDRAIL
4A 1 1/2" = 1'-0"



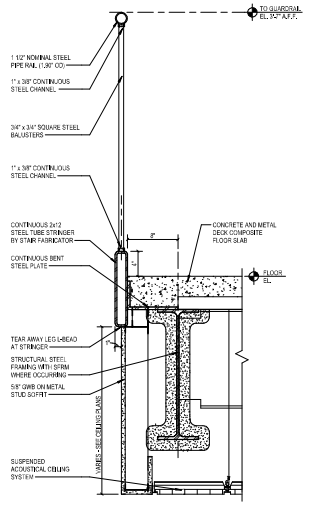
DETAIL AT TOP FLOOR LANDING
4C 1 1/2" = 1'-0"



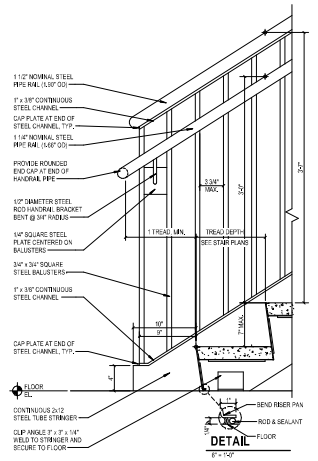
DETAIL AT INTERMEDIATE LANDING
4E 1 1/2" = 1'-0"



DETAIL AT STAIR STRINGER AT WALL
5A 3" = 1'-0"



DETAIL AT TOP LANDING GUARDRAIL
5C 1 1/2" = 1'-0"



DETAIL AT BOTTOM FLOOR
5E 1 1/2" = 1'-0"

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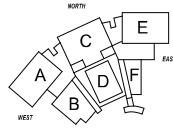

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

STAIR DETAILS

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A124

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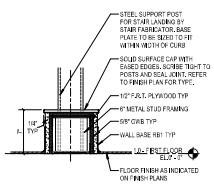
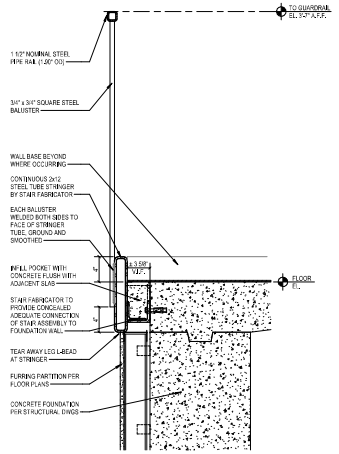
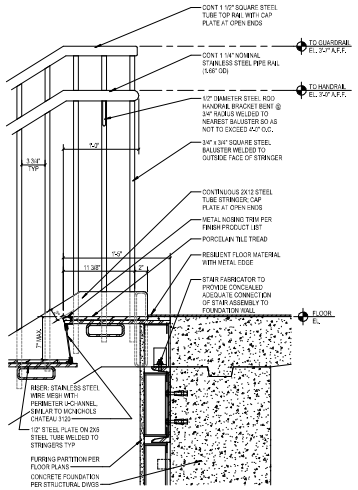


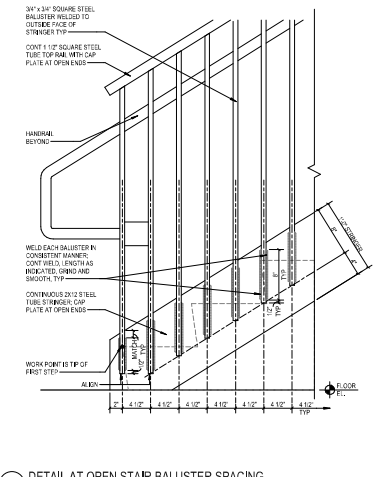
5A CANE DETECTION CURB DETAIL
1 1/2" = 1'-0"



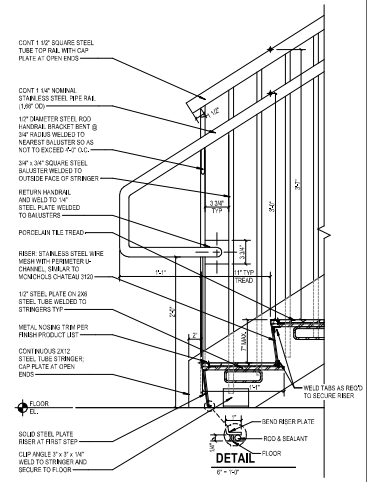
4D DETAIL AT GUARDRAIL AT FOUNDATION WALL
1 1/2" = 1'-0"



5D DETAIL AT TOP FLOOR LANDING AT FOUNDATION WALL
1 1/2" = 1'-0"



4E DETAIL AT OPEN STAIR BALUSTER SPACING
1 1/2" = 1'-0"



5E DETAIL AT BOTTOM FLOOR AT OPEN STAIR
1 1/2" = 1'-0"

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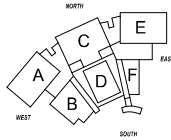

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

STAIR DETAILS

Date: 07/08/2024
Scale: 1 1/2" = 1'-0"
Proj. Number: 22367.00
Drawing Number: A125

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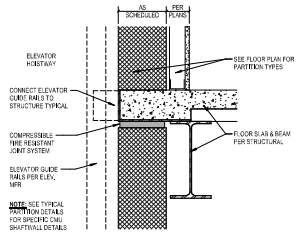
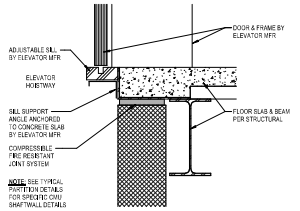
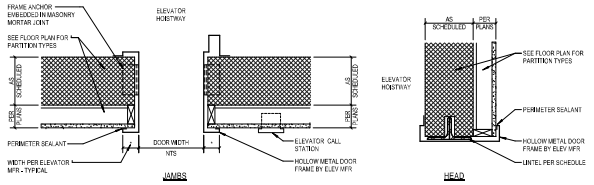


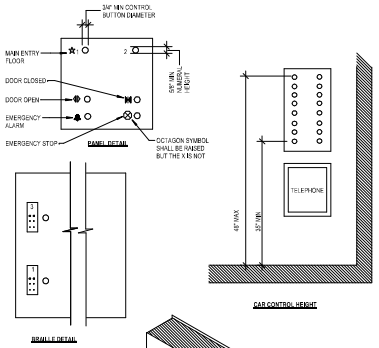
2B ELEVATOR HOISTWAY AT FLOOR - CMU SHAFTWALL
1 1/2" = 1'-0"



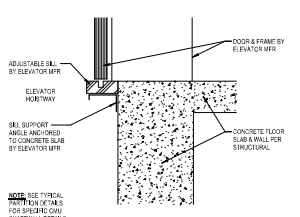
3B ELEVATOR HOISTWAY AT DOOR SILL - CMU SHAFTWALL
1 1/2" = 1'-0"



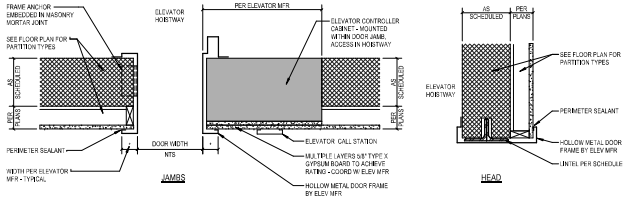
4B ELEVATOR DOOR DETAILS - CMU HOISTWAY
1 1/2" = 1'-0"



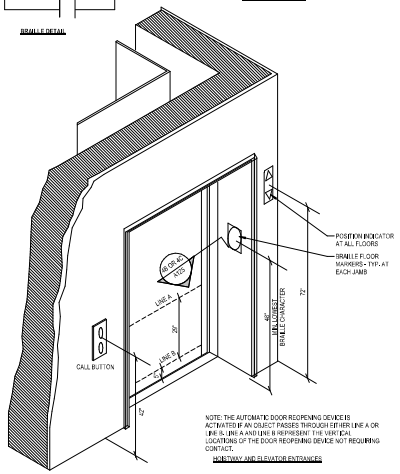
2E ELEV. CONTROL DETAILS
1/4" = 1'-0"



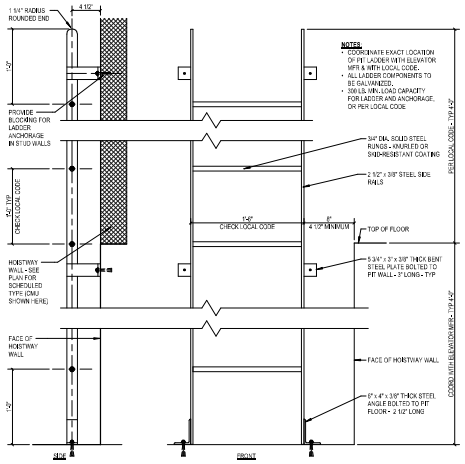
3C ELEVATOR HOISTWAY AT DOOR SILL - FOUNDATION
1 1/2" = 1'-0"



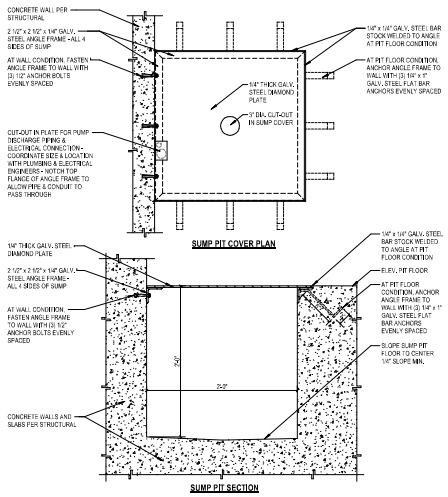
4C ELEVATOR DOOR DETAILS - CMU HOISTWAY - CONTROLLER MOUNTED IN DOOR JAMB
1 1/2" = 1'-0"



2E ELEV. CONTROL DETAILS
1/4" = 1'-0"



3E ELEVATOR PIT LADDER DETAIL
1 1/2" = 1'-0"



5E SUMP PIT COVER DETAIL
1 1/2" = 1'-0"

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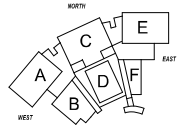

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ELEVATOR DETAILS

Date: 07/08/2024
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Drawing Number: A126

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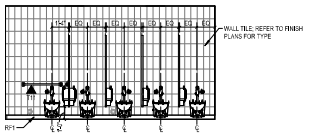
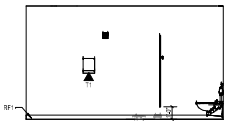
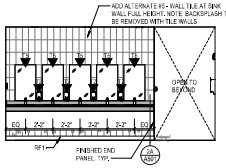


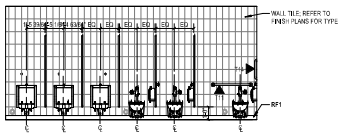
1A FIRST FLOOR TOILET ROOM 1105 - EAST
1/4" = 1'-0"



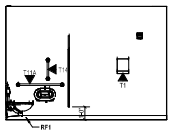
2A FIRST FLOOR TOILET ROOM 1105 - NORTH
1/4" = 1'-0"



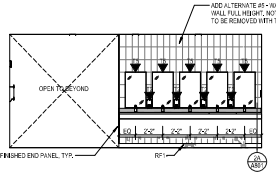
3A FIRST FLOOR TOILET ROOM 1105 - WEST
1/4" = 1'-0"



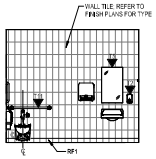
1B FIRST FLOOR TOILET ROOM 1104 - EAST
1/4" = 1'-0"



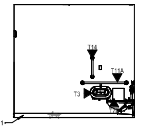
2B FIRST FLOOR TOILET ROOM 1104 - SOUTH
1/4" = 1'-0"



3B FIRST FLOOR TOILET ROOM 1104 - WEST
1/4" = 1'-0"



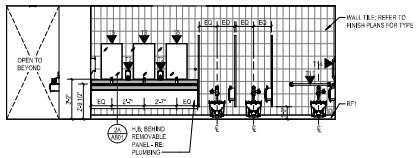
1C FIRST FLOOR TOILET ROOM 1103 - EAST
1/4" = 1'-0"



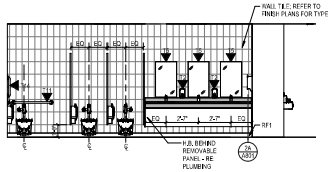
2C FIRST FLOOR TOILET ROOM 1103 - NORTH
1/4" = 1'-0"

TOILET PLAN GENERAL NOTES

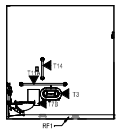
1. REFER TO DWG. **G002.2** FOR LIST OF TYPICAL ABBREVIATIONS AND TYPICAL ARCHITECTURAL GRAPHIC LEGENDS AND SYMBOLS.
2. DIMENSIONS ARE FROM FACE OF WALL TO FACE OF WALL (I.E. FACE OF GYPSUM BOARD OR MASONRY) OR FROM COLUMN CENTERLINE, UNLESS OTHERWISE NOTED. DIMENSIONS NOTED AS 'CLEAR' SHALL BE FROM FINISH FACE TO FINISH FACE, (I.E. FACE OF CERAMIC TILE TO FACE OF CERAMIC TILE).
3. REFER TO DWG. **A701** FOR TYPICAL MOUNTING LOCATIONS AND HEIGHTS FOR TOILET ACCESSORIES, CHILD-HEIGHT AND TYPICAL TOILET ROOM ELEVATIONS AND TOILET ACCESSORY SCHEDULE.
4. PROVIDE FIRE-TREATED WOOD BLOCKING OR MINIMUM 0.0312-INCH THICK STEEL FLAT STRAP AND BACKING PLATE AT, BUT NOT LIMITED TO, THE FOLLOWING LOCATIONS: TOILET ACCESSORIES, AND ALL OTHER WALL MOUNTED EQUIPMENT OR DEVICES.
5. REFER TO FINISH SCHEDULE AND FINISH PLANS FOR TILE TYPE AND LOCATIONS. REFER TO THE FINISH PLANS FOR FLOOR PATTERNS AND INSTALLATION.
6. REFER TO DWG. **A600** FOR TYPICAL PARTITION TYPES AND DETAILS INDICATED.
7. REFER TO 1ST FLOOR PLANS FOR ADDITIONAL FLOOR PLAN GENERAL NOTES AND LEGENDS



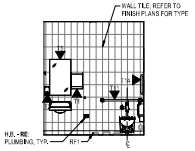
1D FIRST FLOOR TOILET ROOM 1026 - NORTH
1/4" = 1'-0"



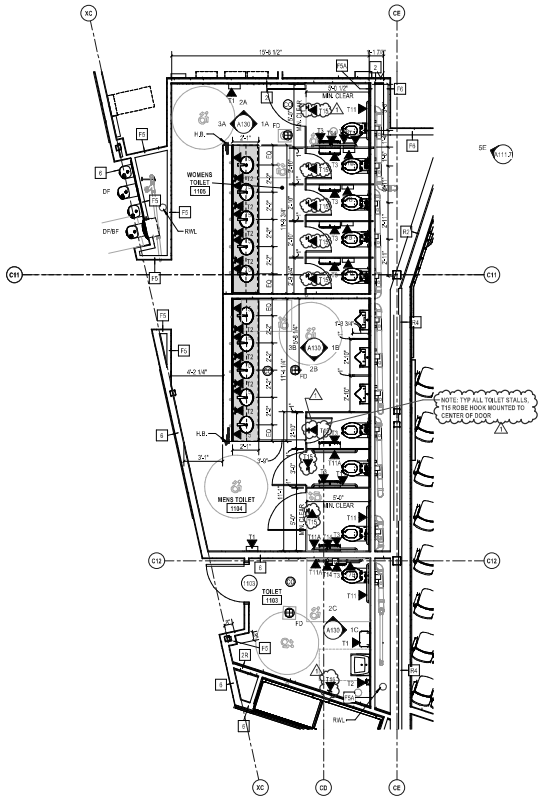
2D FIRST FLOOR TOILET ROOM 1027 - SOUTH
1/4" = 1'-0"



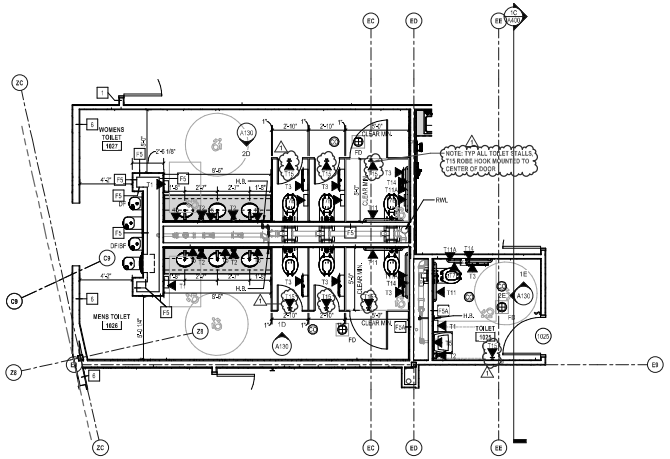
1E FIRST FLOOR TOILET ROOM 1025 - NORTH
1/4" = 1'-0"



2E FIRST FLOOR TOILET ROOM 1025 - WEST
1/4" = 1'-0"



C5 TOILET ROOM 1106/1105/1104 - FLOOR 1
1/4" = 1'-0"



E5 TOILET ROOM 1026/1027/1025 - FLOOR 1
1/4" = 1'-0"

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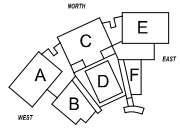

KEYPLAN

Number	Date	Issued For
1	10/30/2024	ADDENDUM NO. 4
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ENLARGED TOILET ROOM PLANS AND ELEVATIONS

Date 07/08/2024
Scale As indicated
Proj. Number 22367.00
Drawing Number A130

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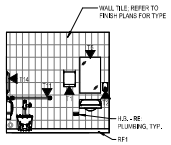
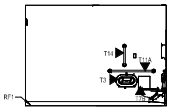
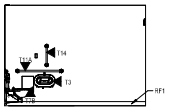


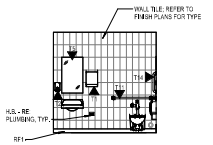
1A FIRST FLOOR STAFF TOILET ROOM 1031 - NORTH
1/4" = 1'-0"



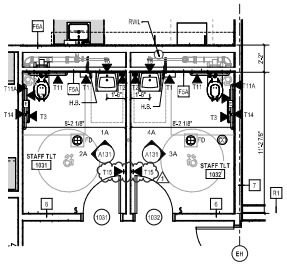
2A FIRST FLOOR STAFF TOILET ROOM 1031 - WEST
1/4" = 1'-0"



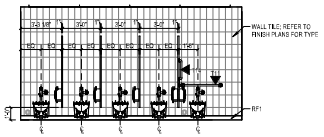
3A FIRST FLOOR STAFF TOILET ROOM 1032 - EAST
1/4" = 1'-0"



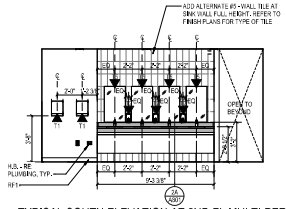
4A FIRST FLOOR STAFF TOILET ROOM 1032 - N
1/4" = 1'-0"



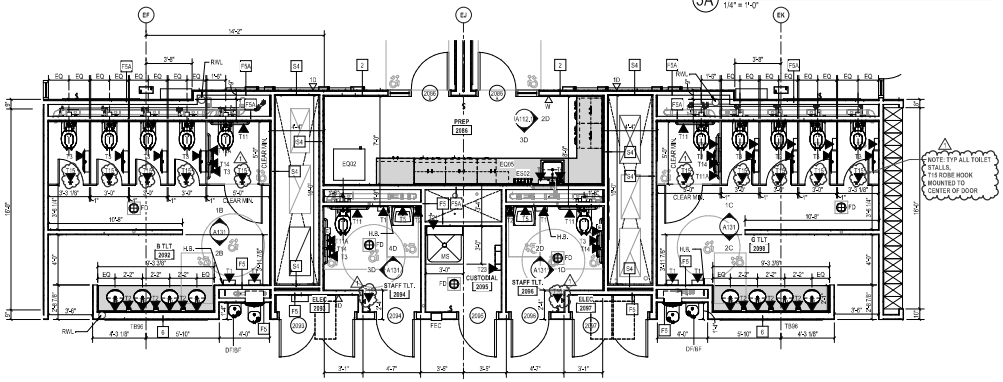
5A STAFF TOILET ROOM 1031/1032 - FLOOR 1
1/4" = 1'-0"



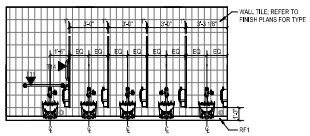
1B TYPICAL NORTH ELEVATION AT 2ND FL MULTI-PERSON BATHROOMS - 2021 2055 AND 2092
1/4" = 1'-0"



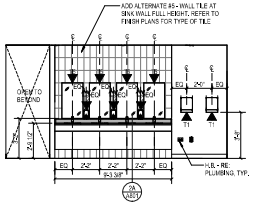
2B TYPICAL SOUTH ELEVATION AT 2ND FL MULTI-PERSON BATHROOMS - 2021 2055 AND 2092
1/4" = 1'-0"



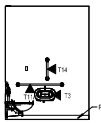
3B TYPICAL ENLARGED PLAN AT SECOND FLOOR TOILET ROOMS - SIMILAR AT ALL WINGS
1/4" = 1'-0"



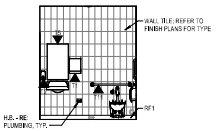
1C TYPICAL NORTH ELEVATION AT 2ND FL MULTI-PERSON BATHROOMS - 2027 2061 AND 2098
1/4" = 1'-0"



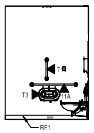
2C TYPICAL SOUTH ELEVATION AT 2ND FL MULTI-PERSON BATHROOMS - 2027 2061 AND 2098
1/4" = 1'-0"



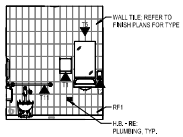
1D TYPICAL 2ND FL STAFF TOILET ROOM - EAST AT 2023 2057 AND 2094
1/4" = 1'-0"



2D TYPICAL 2ND FL STAFF TOILET ROOM - NORTH AT 2023 2057 AND 2094
1/4" = 1'-0"



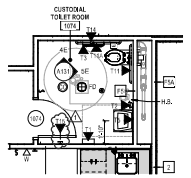
3D TYPICAL 2ND FL STAFF TOILET ROOM - EAST AT 2025 2059 AND 2096
1/4" = 1'-0"



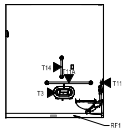
4D TYPICAL 2ND FL STAFF TOILET ROOM - NORTH AT 2025 2059 AND 2096
1/4" = 1'-0"

TOILET PLAN GENERAL NOTES

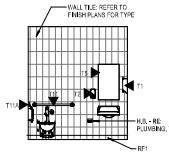
1. REFER TO DWG. G012 FOR LIST OF TYPICAL ABBREVIATIONS AND TYPICAL ARCHITECTURAL GRAPHIC LEGENDS AND SYMBOLS.
2. DIMENSIONS ARE FROM FACE OF WALL TO FACE OF WALL, (I.E. FACE OF GYPSUM BOARD OR MASONRY) OR FROM COLUMN CENTERLINE, UNLESS OTHERWISE NOTED. DIMENSIONS NOTED AS "CLEAR" SHALL BE FROM FINISH FACE TO FINISH FACE, (I.E. FACE OF CERAMIC TILE TO FACE OF CERAMIC TILE).
3. REFER TO DWG. A701 FOR TYPICAL MOUNTING LOCATIONS AND HEIGHTS FOR TOILET ACCESSORIES, CHILD-HEIGHT AND TYPICAL TOILET ROOM ELEVATIONS AND TOILET ACCESSORY SCHEDULE.
4. PROVIDE FIRE-TREATED WOOD BLOCKING OR MINIMUM 0.015-INCH THICK STEEL FLAT STRAP AND BACKING PLATE AT, BUT NOT LIMITED TO, THE FOLLOWING LOCATIONS: TOILET ACCESSORIES, AND ALL OTHER WALL MOUNTED EQUIPMENT OR DEVICES.
5. REFER TO FINISH SCHEDULE AND FINISH PLANS FOR TILE TYPE AND LOCATIONS. REFER TO THE FINISH PLANS FOR FLOOR PATTERNS AND INSTALLATION.
6. REFER TO DWG. A600 FOR TYPICAL PARTITION TYPES AND DETAILS INDICATED.
7. REFER TO 1/8" FLOOR PLANS FOR ADDITIONAL FLOOR PLAN GENERAL NOTES AND LEGENDS



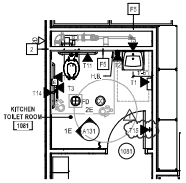
5D CUSTODIAL TOILET ROOM 1074 - FLOOR 1
1/4" = 1'-0"



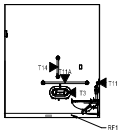
1E KITCHEN TOILET ROOM 1081 - WEST
1/4" = 1'-0"



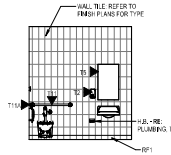
2E KITCHEN TOILET ROOM 1081 - NORTH
1/4" = 1'-0"



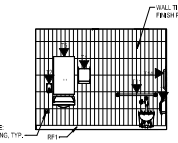
3E KITCHEN TOILET ROOM 1081 - FLOOR 1
1/4" = 1'-0"



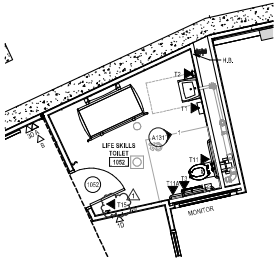
4E FIRST FLOOR CUSTODIAL TOILET ROOM 1074 - NORTH
1/4" = 1'-0"



5E FIRST FLOOR CUSTODIAL TOILET ROOM 1074 - EAST
1/4" = 1'-0"



1 INT. ELEV. - LIFE SKILLS RESTROOM - EAST
1/4" = 1'-0"



2 LIFE SKILLS TOILET ROOM 1052 - FLOOR 1
1/4" = 1'-0"

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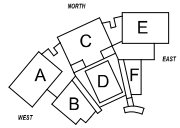

KEYPLAN

Number	Date	Issued For
1	10/30/2024	ADDENDUM NO. 4
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ENLARGED TOILET ROOM PLANS AND ELEVATIONS

Date 07/08/2024
Scale As indicated
Proj. Number 22367.00
Drawing Number **A131**

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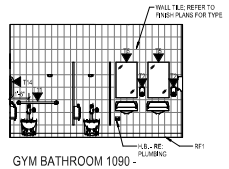
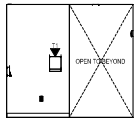
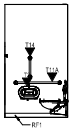


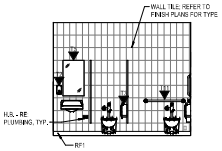
GYM BATHROOM 1090 - NORTH
1A 1/4" = 1'-0"



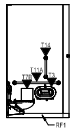
GYM TOILET ROOM 1090 - EAST
2A 1/4" = 1'-0"



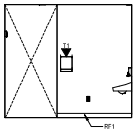
GYM TOILET ROOM 1090 - WEST
3A 1/4" = 1'-0"



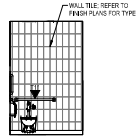
GYM TOILET 1094 - NORTH
1B 1/4" = 1'-0"



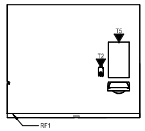
GYM TOILET ROOM 1094 - EAST
2B 1/4" = 1'-0"



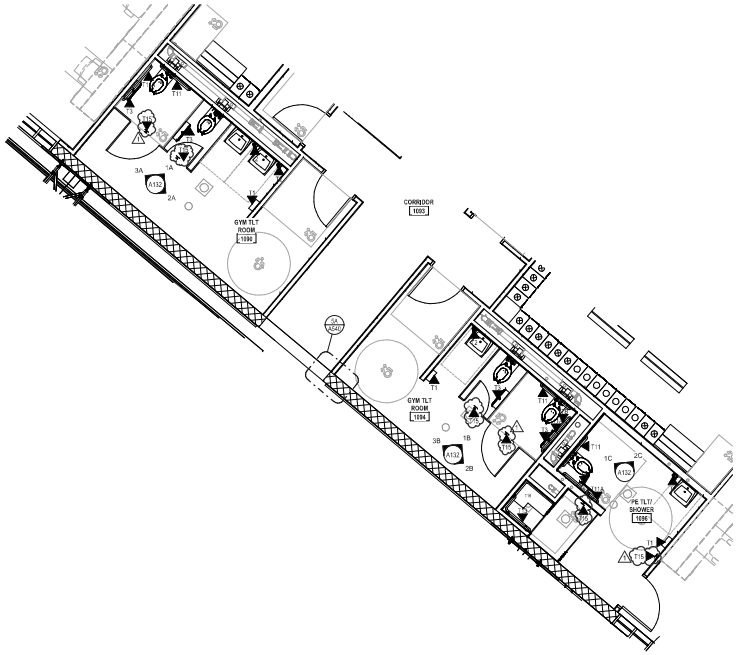
GYM TOILET ROOM 1094 - WEST
3B 1/4" = 1'-0"



GYM TOILET/SHOWER 1096 - NORTH
1C 1/4" = 1'-0"



GYM TOILET ROOM 1096 - EAST
2C 1/4" = 1'-0"



FIRST FLOOR PLAN
3C 1/4" = 1'-0"

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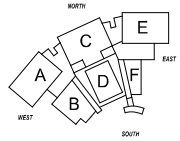

KEYPLAN

Number	Date	Issued For
1	10/30/2024	ADDENDUM NO. 4
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ENLARGED TOILET ROOM PLANS AND ELEVATIONS

Date: 07/08/2024
Scale: 1/4" = 1'-0"
Proj. Number: 22367.00
Drawing Number: A132

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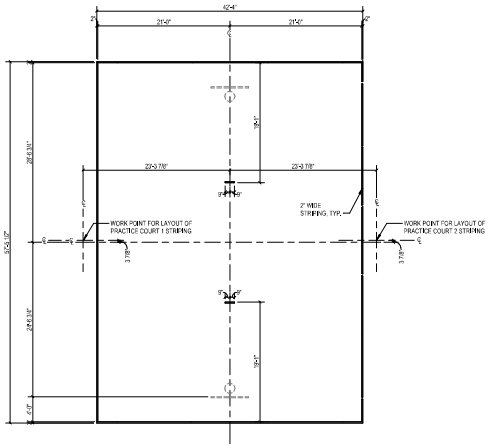
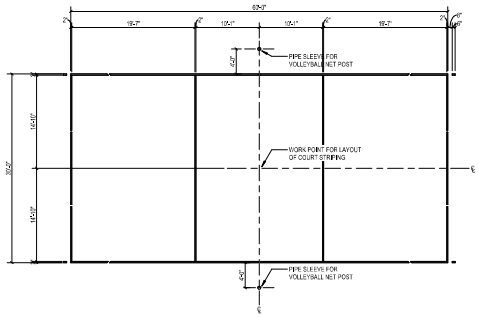
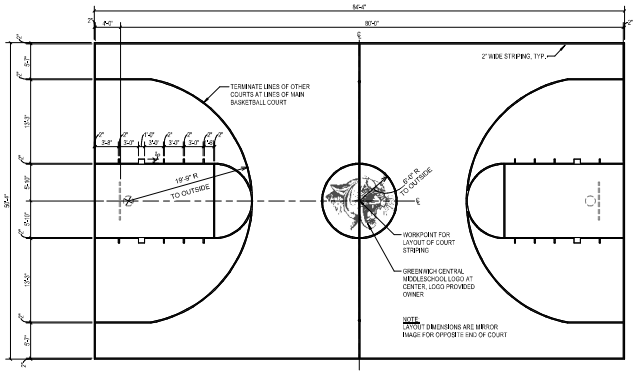


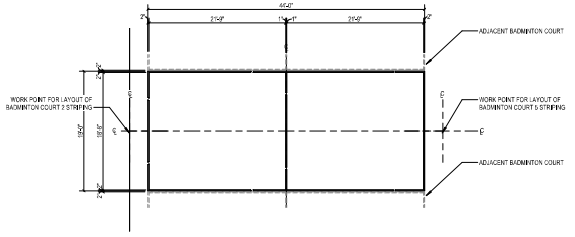
1 GYM - ENLARGED NON REGULATION BASKETBALL COURT
1/8" = 1'-0"



2 GYM - ENLARGED FULL SIZED VOLLEYBALL COURT
1/8" = 1'-0"



3 GYM - ENLARGED FULL SIZED BASKETBALL COURT
1/8" = 1'-0"



4 GYM - ENLARGED BADMINTON COURT
1/8" = 1'-0"

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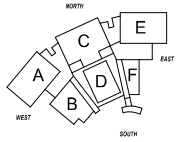

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

GYM PRACTICE COURT LAYOUT & TYPICAL COURT LINE LAYOUT

Date 07/08/2024
Scale 1/8" = 1'-0"
Proj. Number 22367.00
Drawing Number A150

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1E 1 - FIRST FLOOR RCP - PART A
1/8" = 1'-0"

CEILING PLAN GRAPHIC LEGEND

CEILING TYPES

- 2x2 ACP/ATC CEILING
- 2x4 ACP/ATC CEILING
- GYP CEILING
- EXPOSED CEILING
- 2 HR HORIZ. SHAFT
- 4" ALUM. CEILING
- ACOUSTIC-THERMAL SPRAY
- WOOD LOOK GYPSUM CEILING CLOUDS
- 2x4 ADC DIFFUSION PANEL
- 4x4 ADC DIFFUSION PANEL

LIGHT FIXTURES

- CONTINUOUS CEILING RECESSED
- CEILING RECESSED LINEAR - VARIABLE LENGTH
- 2'-X-4'CEILING RECESSED
- 2'-X-2'CEILING RECESSED
- ROUND CEILING RECESSED
- SQUARE CEILING RECESSED
- CEILING-MOUNTED PENDANT
- WALL-MOUNTED SCONCE
- CEILING-MOUNTED DI PENDANT - VARIABLE LENGTH
- CEILING-MOUNTED VERTICAL SOUND BLADE
- FEATURE CEILING-MOUNTED PENDANT
- CEILING-MOUNTED FAN

HVAC FIXTURES

- 2X2 SUPPLY DIFFUSER
- 2X2 RETURN DIFFUSER
- LINEAR RETURN DIFFUSER
- ROUND DIFFUSER

CEILING EQUIPMENT

- SPRINKLER HEAD RE: FIRE PROTECTION
- UPRIGHT SPRINKLER HEAD
- EXIT SIGN @ CEILING
- EXIT SIGN @ WALL
- SECURITY CAMERA
- OCCUPANCY SENSOR
- VACANCY SENSOR
- SPEAKER
- MICROPHONE/ MOTION DETECTOR RE: TECHNOLOGY/ SECURITY
- FIRE SPEAKER/STROBE
- PHOTOCELL
- CORD REEL - RE: 1A & 1CA211 & ELEC.
- PROJECTOR SCREEN
- ACCESS PANEL - REFER TO MEP DRAWINGS AND SPECS FOR LOCATIONS
- EXPANSION JOINT LOCATION
- NUMBERED NOTE LEGEND TAG
- VISUAL / AUDIO NOTIFICATION DEVICE
- SMOKE DETECTOR
- HEIGHT OF CEILING ABOVE FINISH FLOOR
- CEILING TYPE DESIGNATION

EXPANSION JOINT LEGEND

- EXTERIOR: WALL TO WALL
- INTERIOR: FLOOR TO WALL - **RE: 5C/A806**
- INTERIOR: WALL TO WALL (HUSH) - **RE: 5B/A806**
- INTERIOR: WALL TO WALL (CORNER) - **RE: 5A/A806**
- INTERIOR: CEILING TO WALL - GYP - **RE: 5A/A806**
- INTERIOR: CEILING TO WALL - ACP - **RE: 2B/A210**
- INTERIOR: CEILING TO CEILING - GYP - **RE: 5B/A806**
- INTERIOR: CEILING TO CEILING - ACP - **RE: 2A/A210**

CEILING PLAN KEYNOTES:

- SEE DETAIL 3E / A210
- SEE DETAIL 5E / A210
- SEE DETAIL 3D / A210
- SEE DETAIL 2E / A210
- SEE DETAIL 5E / A211
- SEE DETAIL 4C / A210
- SEE DETAIL 4C / A211
- SEE DETAIL 5F / A210
- SEE DETAIL 1A / A210
- SEE DETAIL 3C / A210
- SEE DETAIL 1B / A111.7
- SEE DETAIL 1E / A211
- SEE DETAIL 3E / A210
- SEE DETAIL 1A / A211 1C / A211
- SEE DETAIL 2D / A210

CEILING PLAN GENERAL NOTES

1. 'EXPOSED CONSTRUCTION' OR 'EXP. CONST.' INDICATES NO CEILING. EXPOSED TO DECK, PTD.
2. CENTER LIGHT FIXTURES AND OTHER DEVICES IN ACOUSTICAL PANEL 'PATTERN' UNLESS OTHERWISE INDICATED. REFER TO DETAIL BELOW.
3. CENTER ACOUSTICAL PANELS OR GRID IN SPACES UNLESS OTHERWISE INDICATED.
4. SEE SPECIFICATIONS FOR INFORMATION ON SEISMIC RESTRAINT OF CEILING SYSTEMS.
5. SEE CEILING DETAIL SHEETS FOR CEILING AND SOFFIT DETAILS.
6. SPRINKLER HEAD LOCATIONS ARE SHOWN FOR COORDINATION PURPOSES ONLY. NOT ALL SPRINKLER HEADS ARE SHOWN. FIRE PROTECTION SYSTEM INSTALLER SHALL COORDINATE SPRINKLER HEADS, IN AREAS WITHOUT SUSPENDED CEILINGS, COORDINATE LOCATIONS OF SPRINKLER HEADS WITH HVAC DUCTS, EQUIPMENT, BEAMS, COLUMNS, LIGHTS, AND ANY OTHER OBSTRUCTIONS IN ACCORDANCE WITH NFPA 13. IN AREAS WITH SUSPENDED CEILINGS, COORDINATE SPRINKLER MAIN RUNS AND SPRINKLER HEAD LOCATIONS WITH OTHER WORK TO ENSURE CEILING HEIGHTS, LIGHTING, DIFFUSER AND OTHER CEILING DEVICE LOCATIONS ARE MAINTAINED AS SHOWN OR AS REQUIRED TO COMPLY WITH APPLICABLE CODE REQUIREMENTS. ADVISE ARCHITECT OF ANY CONFLICTS WHICH MUST BE RESOLVED PRIOR TO INSTALLATION.
7. LIGHT FIXTURES, FIRE PROTECTION DEVICES AND DIFFUSERS ARE SHOWN FOR LOCATION AND COORDINATION PURPOSES ONLY. REFER TO ELECTRICAL AND HVAC DWGS. FOR ACTUAL LIGHT FIXTURE, DIFFUSER AND FIRE PROTECTION SCHEDULES.
8. REFER TO ELECTRICAL, HVAC AND FIRE PROTECTION DWGS. FOR LIGHT FIXTURES, DIFFUSERS AND FIRE PROTECTION DEVICES IN UNFINISHED AREAS OR AREAS WITH EXPOSED STRUCTURE.
9. COORDINATE ACCESS PANEL LOCATIONS WITH MECHANICAL TRADES. SUBMIT PROPOSED LOCATIONS TO ARCHITECT FOR APPROVAL. CONTRACTOR TO LOCATE SERVICEABLE MEP AND A/V/IT COMPONENTS OUTSIDE OF HARD CEILING AREAS AND IN/OR ACCESSIBLE CEILING AREAS TO THE GREATEST EXTENT POSSIBLE.
10. ALL CEILING HEIGHTS SHALL BE 10'-0" UNLESS OTHERWISE NOTED.
11. ALL SOFFIT HEIGHTS SHALL BE 10'-0" UNLESS OTHERWISE NOTED.
12. HANGING SYSTEMS FROM OVERHEAD STRUCTURE:
    A. FOR BUILDINGS WHERE THE FLOOR & ROOF CONSTRUCTION CONSISTS OF CAST IN PLACE CONCRETE SLABS/BEAMS, PRECAST CONCRETE SLABS/BEAMS, CONCRETE FILLED METAL DECKS (SUPPORTED BY STRUCTURAL STEEL FRAMING), THE FOLLOWING SYSTEMS CAN BE HUNG:
        a. CEILINGS AND SOFFITS SYSTEMS (INCLUDING HUNG PARTITION SYSTEMS).
        b. MECHANICAL, ELECTRICAL, PLUMBING, AND FIRE PROTECTION SYSTEMS AND EQUIPMENT.
        c. FOR ANY HEAVY OR LARGE SYSTEMS OR ITEMS, CONSULT WITH YOUR STRUCTURAL ENGINEER.
    B. FOR BUILDINGS WHERE THE ROOF STRUCTURE IS SIMPLE METAL ROOF DECK (NO CONCRETE FILL), THE FOLLOWING SYSTEMS CAN BE HUNG:
        a. ACOUSTIC CEILING SYSTEMS (ACT TILES, ETC.) WEIGHING LESS THAN 5 LBS/SF AND HUNG AT 4'-0" O.C. BOTH DIRECTIONS.
        b. SINGLE LAYER GYPSUM BOARD CEILING SYSTEMS WEIGHING LESS THAN 5 LBS/SF AND HUNG AT 4'-0" O.C. BOTH DIRECTIONS.
        c. DO NOT HANG ANY OTHER SYSTEM OR ITEM DIRECTLY FROM A METAL ROOF DECK UNLESS STRUCTURAL LOCK CONFIRMS THAT DECK HAS BEEN DESIGNED TO SUPPORT THESE HANGING LOADS. IN LOCATIONS WHERE PLAIN ROOF STEEL DECK (NO CONCRETE FILL) IS OVERHEAD, HANG ONLY FROM STRUCTURAL STEEL FRAMING MEMBERS OR PROVIDE SECONDARY STEEL FRAMING MEMBERS (SLOTTED CHANNEL FRAMING, I.E. "UNISTRUT", ETC.) OF ADEQUATE DESIGN SPANNING BETWEEN BUILDING STRUCTURAL STEEL FRAMING MEMBERS AS REQUIRED.
    C. FOR BUILDINGS CONSTRUCTED OF COLD-FORMED METAL FRAMING SYSTEMS. FOLLOW "SIMPLE METAL ROOF DECK(S)" ABOVE.
    D. REVIEW AND DISCUSS ALL UNUSUAL CONDITIONS WITH YOUR STRUCTURAL ENGINEER.
13. WHERE REFERENCED BY THIS NOTE, PROVIDE 1 HR. HORIZONTAL SHAFTWALL CEILING (WITH 4" DEEP 20 GA. FRAMING). INSTALL AS HIGH AS POSSIBLE TO UNDERSIDE OF STEEL FRAMING ABOVE.
14. SEE FINISH SCHEDULE FOR ALL WINDOW SHADE INFORMATION
15. FOR ACOUSTIC CONTINUITY AT TOPS OF PARTITIONS CENTERED ON OR DIRECTLY ADJACENT TO STEEL BEAMS, REFER TO SPECTIC DETAILS ON SHEET A602

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Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane,
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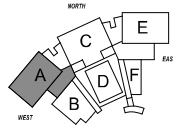

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRST FLOOR REFLECTED CEILING PLAN - PART A

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: A201A

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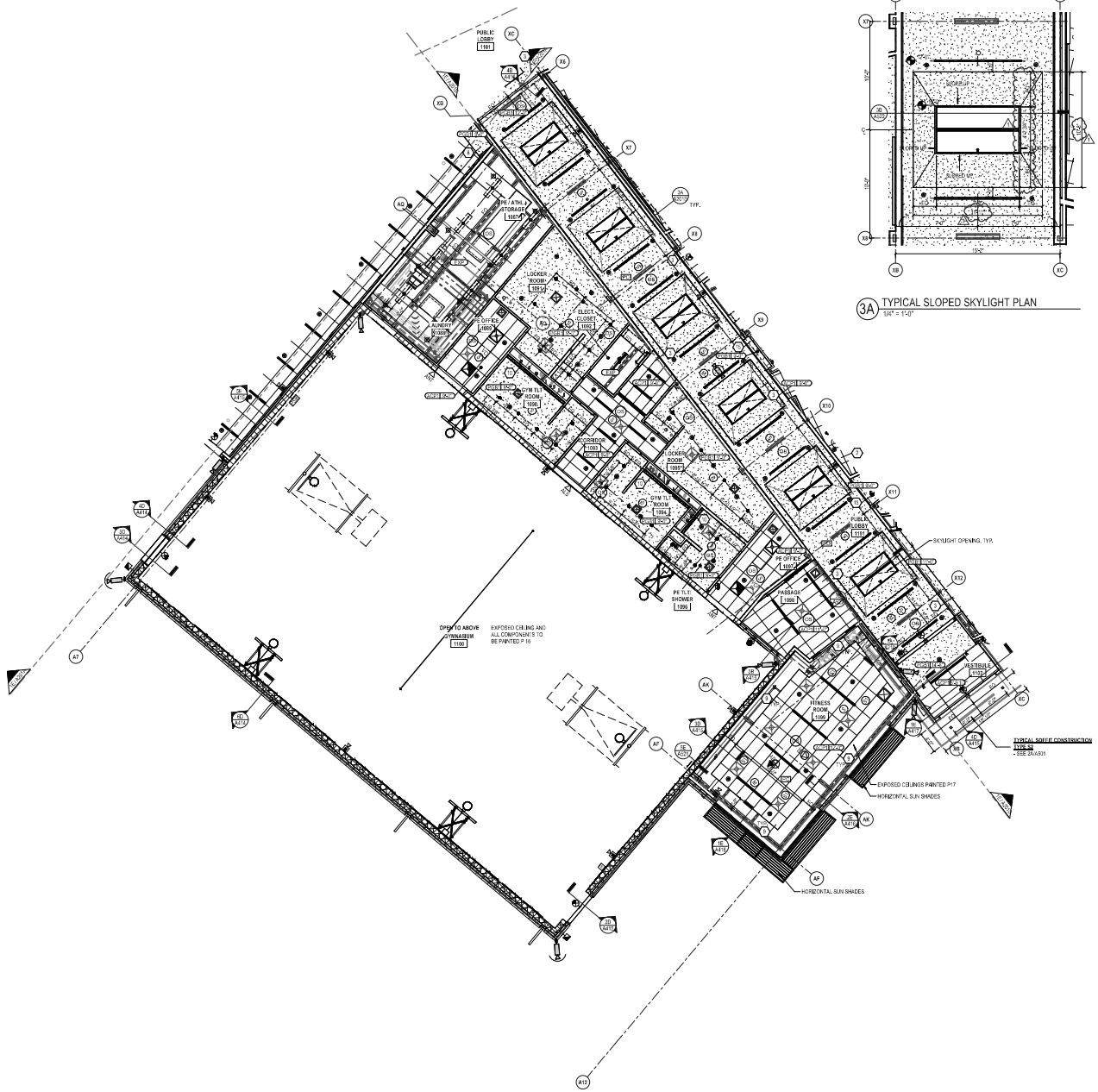

1E 1 - FIRST FLOOR RCP - PART B
1/8" = 1'-0"

3A TYPICAL SLOPED SKYLIGHT PLAN
1/4" = 1'-0"

CEILING PLAN GRAPHIC LEGEND

CEILING TYPES
- 2x2 ACOUSTIC CEILING
- 2x4 ACOUSTIC CEILING
- GYP CEILING
- EXPOSED CEILING
- 2 HR HORIZ. SHAFT
- 4" ALUM. CEILING
- ACOUSTIC THERMAL SPRAY
- WOOD LOOK GYPSUM CEILING CLOUDS
- 2x4 ADC DIFFUSION PANEL
- 4x4 ADC DIFFUSION PANEL

LIGHT FIXTURES
- CONTINUOUS CEILING RECESSED
- CEILING RECESSED LINEAR - VARIABLE LENGTH
- 2' X 4' CEILING RECESSED
- 2' X 2' CEILING RECESSED
- ROUND CEILING RECESSED
- SQUARE CEILING RECESSED
- CEILING-MOUNTED PENDANT
- WALL-MOUNTED SCONCE
- CEILING-MOUNTED DI PENDANT - VARIABLE LENGTH
- CEILING-MOUNTED VERTICAL SOUND BLADE
- FEATURE CEILING-MOUNTED PENDANT
- CEILING-MOUNTED FAN

HVAC FIXTURES
- 2X2 SUPPLY DIFFUSER
- 2X2 RETURN DIFFUSER
- LINEAR RETURN DIFFUSER
- ROUND DIFFUSER

CEILING EQUIPMENT
- SPRINKLER HEAD RE: FIRE PROTECTION
- UPRIGHT SPRINKLER HEAD
- EXIT SIGN @ CEILING
- EXIT SIGN @ WALL
- SECURITY CAMERA
- OCCUPANCY SENSOR
- VACANCY SENSOR
- SPEAKER
- MICROPHONE/ MOTION DETECTOR RE: TECHNOLOGY/ SECURITY
- FIRE SPEAKER/STROBE
- PHOTOCELL
- CORD REEL - RE: 1A & 1D/A211 & ELEC.
- PROJECTOR SCREEN
- ACCESS PANEL - REFER TO MEP DRAWINGS AND SPECS FOR LOCATIONS
- EXPANSION JOINT LOCATION
- NUMBERED NOTE LEGEND TAG
- VISUAL / AUDIO NOTIFICATION DEVICE
- SMOKE DETECTOR
- HEIGHT OF CEILING ABOVE FINISH FLOOR
- CEILING TYPE DESIGNATION

CEILING PLAN KEYNOTES:

1 SEE DETAIL 2E / A210
2 SEE DETAIL 5E / A210
3 SEE DETAIL 3D / A210
4 SEE DETAIL 2E / A210
5 SEE DETAIL 3E / A211
6 SEE DETAIL 4C / A210
7 SEE DETAIL 4C / A211
8 SEE DETAIL 5F / A210
9 SEE DETAIL 1A / A210
10 SEE DETAIL 3C / A210
11 SEE DETAIL 1B / A111.7
12 SEE DETAIL 1E / A211
13 SEE DETAIL 3E / A210
14 SEE DETAIL 1A / A211, 1C / A211
15 SEE DETAIL 2D / A210

CEILING PLAN GENERAL NOTES

1. "EXPOSED CONSTRUCTION" OR "EXP. CONST." INDICATES NO CEILING. EXPOSED TO DECK, PTD.
2. CENTER LIGHT FIXTURES AND OTHER DEVICES IN ACOUSTICAL PANEL "PATTERN" UNLESS OTHERWISE INDICATED, REFER TO DETAIL BELOW.
3. CENTER ACOUSTICAL PANELS OR GRID IN SPACES UNLESS OTHERWISE INDICATED.
4. SEE SPECIFICATIONS FOR INFORMATION ON SEISMIC RESTRAINT OF CEILING SYSTEMS.
5. SEE CEILING DETAIL SHEETS FOR CEILING AND SOFFIT DETAILS.
6. SPRINKLER HEAD LOCATIONS ARE SHOWN FOR COORDINATION PURPOSES ONLY. NOT ALL SPRINKLER HEADS ARE SHOWN. FIRE PROTECTION SYSTEM INSTALLER SHALL COORDINATE SPRINKLER HEADS. IN AREAS WITHOUT SUSPENDED CEILINGS, COORDINATE LOCATIONS OF SPRINKLER HEADS WITH HVAC DUCTS, EQUIPMENT, BEAMS, COLUMNS, LIGHTS, AND ANY OTHER OBSTRUCTION IN ACCORDANCE WITH NFPA 13. IN AREAS WITH SUSPENDED CEILINGS, COORDINATE SPRINKLER MAINS, RUNS AND SPRINKLER HEAD LOCATIONS WITH OTHER WORK TO ENSURE CEILING HEIGHTS, LIGHTING, DIFFUSER AND OTHER CEILING DEVICE LOCATIONS ARE MAINTAINED AS SHOWN OR AS REQUIRED TO COMPLY WITH APPLICABLE CODE REQUIREMENTS. ADVISE ARCHITECT OF ANY CONFLICTS WHICH MUST BE RESOLVED PRIOR TO INSTALLATION.
7. LIGHT FIXTURES, FIRE PROTECTION DEVICES AND DIFFUSERS ARE SHOWN FOR LOCATION AND COORDINATION PURPOSES ONLY. REFER TO ELECTRICAL AND HVAC DWGS. FOR ACTUAL LIGHT FIXTURE, DIFFUSER AND FIRE PROTECTION SCHEDULES.
8. REFER TO ELECTRICAL, HVAC AND FIRE PROTECTION DWGS. FOR LIGHT FIXTURES, DIFFUSERS AND FIRE PROTECTION DEVICES IN UNFINISHED AREAS OR AREAS WITH EXPOSED STRUCTURE.
9. COORDINATE ACCESS PANEL LOCATIONS WITH MECHANICAL TRADES. SUBMIT PROPOSED LOCATIONS TO ARCHITECT FOR APPROVAL. CONTRACTOR TO LOCATE SERVICEABLE MEP AND AHJ/E COMPONENTS OUTSIDE OF HARD CEILING AREAS AND INTO ACCESSIBLE CEILING AREAS TO THE GREATEST EXTENT POSSIBLE.
10. ALL CEILING HEIGHTS SHALL BE 10'-0", UNLESS OTHERWISE NOTED.
11. ALL SOFFIT HEIGHTS SHALL BE 11'-0", UNLESS OTHERWISE NOTED.
12. HANGING SYSTEMS FROM OVERHEAD STRUCTURE:
    A. FOR BUILDINGS WHERE THE F.LOOR & ROOF CONSTRUCTION CONSISTS OF CAST IN PLACE CONCRETE SLABS/BEAMS, PRECAST CONCRETE SLABS/BEAMS, CONCRETE FILLED METAL DECKS (SUPPORTED BY STRUCTURAL STEEL FRAMING), THE FOLLOWING SYSTEMS CAN BE HUNG:
        a. CEILINGS AND SOFFIT SYSTEMS (INCLUDING HUNG PARTITION SYSTEMS).
        b. MECHANICAL, ELECTRICAL, PLUMBING, AND FIRE PROTECTION SYSTEMS AND EQUIPMENT.
        c. FOR ANY HEAVY OR LARGE SYSTEMS OR ITEMS, CONSULT WITH YOUR STRUCTURAL ENGINEER.
    B. FOR BUILDINGS WHERE THE ROOF STRUCTURE IS SIMPLE METAL ROOF DECK (NO CONCRETE FILL), THE FOLLOWING SYSTEMS CAN BE HUNG:
        a. ACOUSTIC CEILING SYSTEMS (ACT TILES, ETC.) WEIGHING LESS THAN 5 LBS/SF AND HUNG AT 4'-0" O.C. BOTH DIRECTIONS.
        b. SINGLE LAYER GYPSUM BOARD CEILING SYSTEMS WEIGHING LESS THAN 5 LBS/SF AND HUNG AT 4'-0" O.C. BOTH DIRECTIONS.
        c. DO NOT HANG ANY OTHER SYSTEM OR ITEM DIRECTLY FROM PLAIN ROOF STEEL DECKS UNLESS STRUCTURAL EOR CONFIRMS THAT DECK HAS BEEN DESIGNED TO SUPPORT THESE HANGING LOADS. IN LOCATIONS WHERE PLAIN ROOF STEEL DECK (NO CONCRETE FILL) IS OVERHEAD, HANG ONLY FROM STRUCTURAL STEEL FRAMING MEMBERS OR PROVIDE SECONDARY STEEL FRAMING MEMBERS (SLOTTED CHANNEL FRAMING, I.E. "UNISTRUT", ETC.) OF ADEQUATE DESIGN (SPANNING BETWEEN BUILDING STRUCTURAL STEEL FRAMING MEMBERS) AS REQUIRED.
    C. FOR BUILDINGS CONSTRUCTED OF COLD-FORMED METAL FRAMING SYSTEMS, FOLLOW "SIMPLE METAL ROOF DECKS" ABOVE.
    D. REVIEW AND DISCUSS ALL UNUSUAL CONDITIONS WITH YOUR STRUCTURAL ENGINEER.
13. WHERE REFERENCED BY THIS NOTE, PROVIDE 5-1/8" HORIZONTAL SHAFTWALL CEILING (WITH 4" DEEP 20 GA. FRAMING). INSTALL AS HIGH AS POSSIBLE TO UNDERSIDE OF STEEL FRAMING ABOVE.
14. SEE FINISH SCHEDULE FOR ALL WINDOW SHADE INFORMATION
15. FOR ACOUSTIC CONTINUITY AT TOPS OF PARTITIONS CENTERED ON OR DIRECTLY ADJACENT TO STEEL BEAMS, REFER TO SPECTC DETAILS ON SHEET A602

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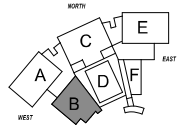

KEYPLAN

Number	Date	Issued For
1	10/30/2024	ADDENDUM NO. 4
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRST FLOOR REFLECTED CEILING PLAN - PART B

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A201B

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1E 1 - FIRST FLOOR RCP - PART C
1/8" = 1'-0"

CEILING PLAN GENERAL NOTES

1. "EXPOSED CONSTRUCTION" OR "EXP. CONST." INDICATES NO CEILING. EXPOSED TO DECK, PTD.

2. CENTER LIGHT FIXTURES AND OTHER DEVICES IN ACOUSTICAL PANEL "PATTERN" UNLESS OTHERWISE INDICATED. REFER TO DETAIL BELOW.

3. CENTER ACOUSTICAL PANELS OR GRID IN SPACES UNLESS OTHERWISE INDICATED.

4. SEE SPECIFICATIONS FOR INFORMATION ON SEISMIC RESTRAINT OF CEILING SYSTEMS.

5. SEE CEILING DETAIL SHEETS FOR CEILING AND SOFFIT DETAILS.

6. SPRINKLER HEAD LOCATIONS ARE SHOWN FOR COORDINATION PURPOSES ONLY - NOT ALL SPRINKLER HEADS ARE SHOWN. FIRE PROTECTION SYSTEM INSTALLER SHALL COORDINATE SPRINKLER HEADS. IN AREAS WITHOUT SUSPENDED CEILINGS, COORDINATE LOCATIONS OF SPRINKLER HEADS WITH HVAC DUCTS, EQUIPMENT, BEAMS, COLUMNS, LIGHTS, AND ANY OTHER OBSTRUCTIONS IN ACCORDANCE WITH NFPA 13. IN AREAS WITH SUSPENDED CEILINGS, COORDINATE SPRINKLER MAINS, RUNS AND SPRINKLER HEAD LOCATIONS WITH OTHER WORK TO INSURE CEILING HEIGHTS. LIGHTING, DIFFUSER AND OTHER CEILING DEVICE LOCATIONS ARE MAINTAINED AS SHOWN OR AS REQUIRED TO COMPLY WITH APPLICABLE CODE REQUIREMENTS. ADVISE ARCHITECT OF ANY CONFLICTS WHICH MUST BE RESOLVED PRIOR TO INSTALLATION.

7. LIGHT FIXTURES, FIRE PROTECTION DEVICES AND DIFFUSERS ARE SHOWN FOR LOCATION AND COORDINATION PURPOSES ONLY. REFER TO ELECTRICAL AND HVAC DWGS. FOR ACTUAL LIGHT FIXTURE, DIFFUSER AND FIRE PROTECTION SCHEDULES.

8. REFER TO ELECTRICAL, HVAC AND FIRE PROTECTION DWGS. FOR LIGHT FIXTURES, DIFFUSERS AND FIRE PROTECTION DEVICES IN UNFINISHED AREAS OR AREAS WITH EXPOSED STRUCTURE.

9. COORDINATE ACCESS PANEL LOCATIONS WITH MECHANICAL TRADES. SUBMIT PROPOSED LOCATIONS TO ARCHITECT FOR APPROVAL. CONTRACTOR TO LOCATE SERVICEABLE MEP AND AVIT COMPONENTS OUTSIDE OF HARD CEILING AREAS AND INTO ACCESSIBLE CEILING AREAS TO THE GREATEST EXTENT POSSIBLE.

10. ALL CEILING HEIGHTS SHALL BE 10'-0", UNLESS OTHERWISE NOTED.

11. ALL SOFFIT HEIGHTS SHALL BE 11'-0", UNLESS OTHERWISE NOTED.

12. HANGING SYSTEMS FROM OVERHEAD STRUCTURE:
   A. FOR BUILDINGS WHERE THE FLOOR & ROOF CONSTRUCTION CONSISTS OF CAST IN PLACE CONCRETE SLABS/BEAMS, PRECAST CONCRETE SLABS/BEAMS, CONCRETE FILLED METAL DECKS (SUPPORTED BY STRUCTURAL STEEL FRAMING), THE FOLLOWING SYSTEMS CAN BE HUNG:
      a. CEILINGS AND SOFFITS SYSTEMS (INCLUDING HUNG PARTITION SYSTEMS).
      b. MECHANICAL, ELECTRICAL, PLUMBING, AND FIRE PROTECTION SYSTEMS AND EQUIPMENT.
      c. FOR ANY HEAVY OR LARGE SYSTEMS OR ITEMS, CONSULT WITH YOUR STRUCTURAL ENGINEER.
   B. FOR BUILDINGS WHERE THE ROOF STRUCTURE IS SIMPLE METAL ROOF DECK (NO CONCRETE FILL), THE FOLLOWING SYSTEMS CAN BE HUNG:
      a. ACOUSTIC CEILING SYSTEMS (ACT TILES, ETC.) WEIGHING LESS THAN 5 LBS/SF AND HUNG AT 4'-0" O.C. BOTH DIRECTIONS.
      b. SINGLE LAYER GYPSUM BOARD CEILING SYSTEMS WEIGHING LESS THAN 5 LBS/SF AND HUNG AT 4'-0" O.C. BOTH DIRECTIONS.
      c. PLUMBING AND OTHER SYSTEM OR ITEM DIRECTLY FROM PLAIN ROOF STEEL DECKS (UNLESS STRUCTURAL ECOR CONFIRMS THAT DECK HAS BEEN DESIGNED TO SUPPORT THESE HANGING LOADS). IN LOCATIONS WHERE PLAIN ROOF STEEL DECK (NO CONCRETE FILL) IS OVERHEAD, HANG ONLY FROM STRUCTURAL STEEL FRAMING MEMBERS OR PROVIDE SECONDARY STEEL FRAMING MEMBERS (SLOTTED CHANNEL FRAMING, I.E. "UNISTRUT", ETC.) OF ADEQUATE DESIGN (SPANNING BETWEEN BUILDING STRUCTURAL STEEL FRAMING MEMBERS) AS REQUIRED.
   C. FOR BUILDINGS CONSTRUCTED OF COLD-FORMED METAL FRAMING SYSTEMS, FOLLOW "SIMPLE METAL ROOF DECKS" ABOVE.
   D. REVIEW AND DISCUSS ALL UNUSUAL CONDITIONS WITH YOUR STRUCTURAL ENGINEER.

13. WHERE REFERENCED BY THIS NOTE: PROVIDE 2-HR. HORIZONTAL SHAFTWALL CEILING (WITH 4" DEEP 20 GA. FRAMING). INSTALL AS HIGH AS POSSIBLE TO UNDERSIDE OF STEEL FRAMING ABOVE.

14. SEE FINISH SCHEDULE FOR ALL WINDOW SHADE INFORMATION

15. FOR ACOUSTIC CONTINUITY AT TOPS OF PARTITIONS CENTERED ON OR DIRECTLY ADJACENT TO STEEL BEAMS, REFER TO SPECTIC DETAILS ON SHEET A002

CEILING PLAN KEYNOTES:

1. SEE DETAIL 2E/A210
2. SEE DETAIL 5E/A210
3. SEE DETAIL 3D/A210
4. SEE DETAIL 2E/A210
5. SEE DETAIL 3E/A211
6. SEE DETAIL 4C/A210
7. SEE DETAIL 4C/A211
8. SEE DETAIL 5F/A210
9. SEE DETAIL 1A/A210
10. SEE DETAIL 3C/A210
11. SEE DETAIL 1B/A111.7
12. SEE DETAIL 1E/A211
13. SEE DETAIL 3E/A210
14. SEE DETAIL 1A/A211
15. SEE DETAIL 1C/A211
16. SEE DETAIL 2D/A210

EXPANSION JOINT LEGEND

- EXTERIOR: WALL TO WALL
- INTERIOR: FLOOR TO WALL - **RE: 5C/A805**
- INTERIOR: WALL TO WALL (FLUSH) - **RE: 5B/A806**
- INTERIOR: WALL TO WALL (CORNER) - **RE: 5A/A806**
- INTERIOR: CEILING TO WALL - GYP - **RE: 5A/A806**
- INTERIOR: CEILING TO WALL - ACP - **RE: 2B/A210**
- INTERIOR: CEILING TO CEILING - GYP - **RE: 5B/A806**
- INTERIOR: CEILING TO CEILING - ACP - **RE: 2A/A210**

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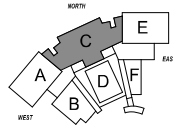

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRST FLOOR REFLECTED CEILING PLAN - PART C

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **A201C**

Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_GREENWICH_CENTRAL_MS_R23.rvt
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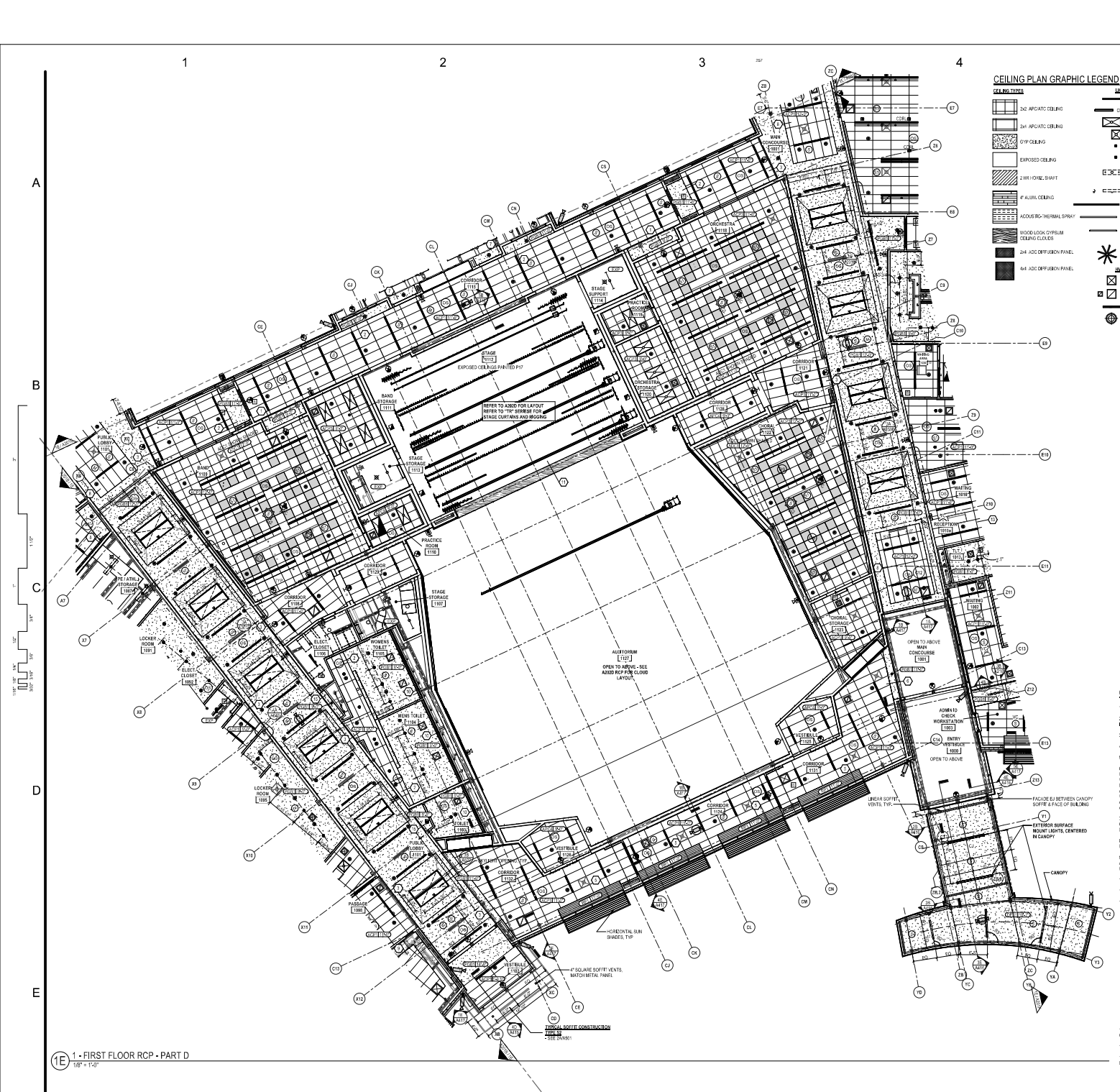
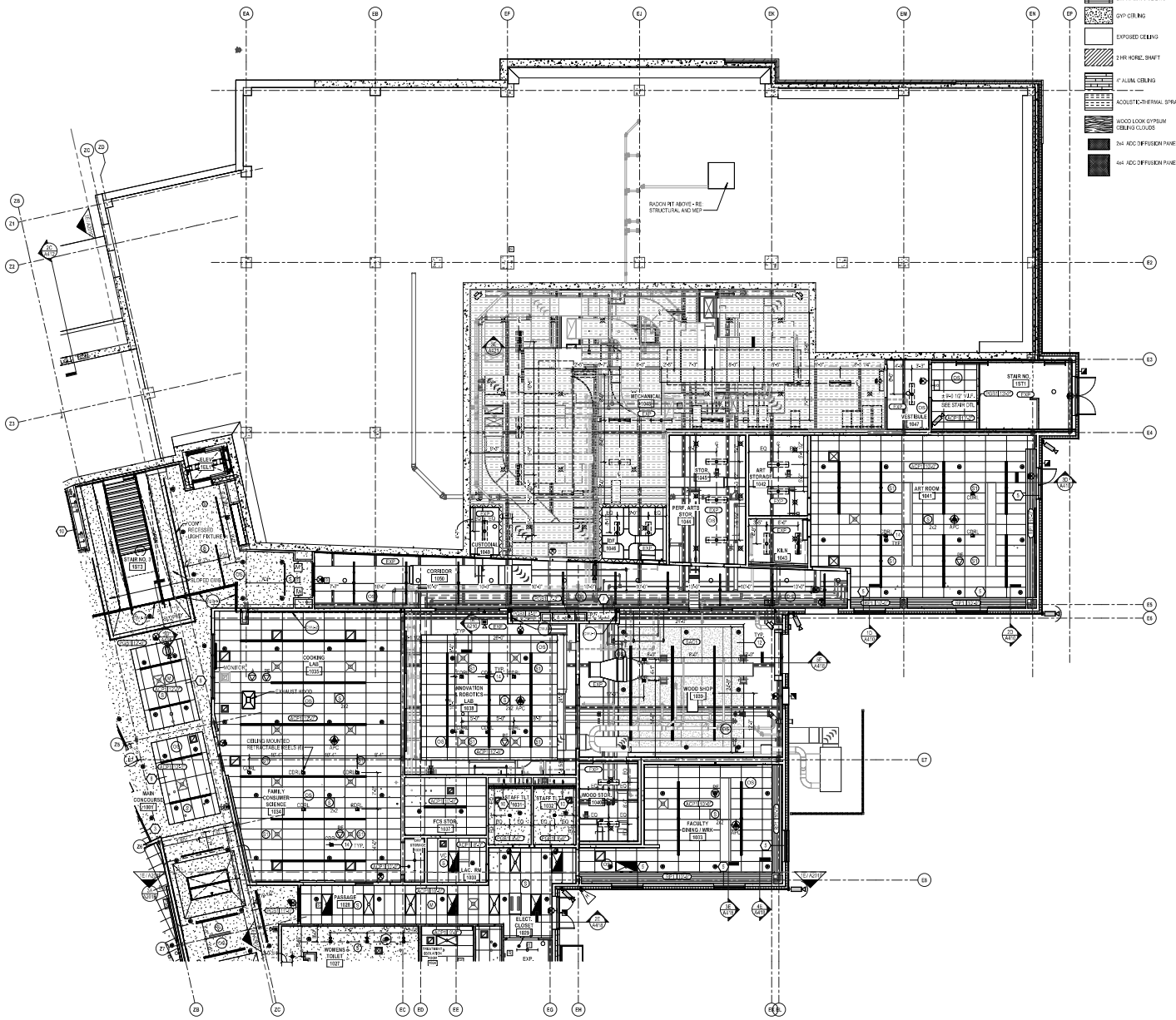

1
2
3
4
5
A
B
C
D
E
AUDITORIUM 1127
OPEN TO ABOVE - SEE A2020 RCP FOR CLOUD LAYOUT
STAGE 1112
EXPOSED CEILINGS PAINTED P17
REFER TO A2020 FOR LAYOUT REFER TO "TYP" SECTION FOR STAGE CURTAINS AND RIGGING
ORCHESTRA PIT 1116
MAIN CONCOURSE 1301
OPEN TO ABOVE MAIN CONCOURSE 1301
ADMIN TO CHECK WORKSTATION 1303
ENTRY VESTIBULE 1009
OPEN TO ABOVE
CORRIDOR 1122
HORIZONTAL SUN SHADES, TYP
4" SQUARE SOFFIT VENTS, MATCH METAL PANEL
TYPICAL SOFFIT CONSTRUCTION TYPE S2 - SEE 2/A1501
LINEAR SOFFIT VENTS, TYP.
FACADE EJ BETWEEN CANOPY SOFFIT & FACE OF BUILDING
EXTERIOR SURFACE MOUNT LIGHTS, CENTERED IN CANOPY
CANOPY
PUBLIC ENTRY 1101
BAND 1102
BAND STORAGE 1111
STAGE SUPPORT 1114
PRACTICE ROOM 1115
ORCHESTRA STORAGE 1120
CORRIDOR 1113
STAGE STORAGE 1111
PRACTICE ROOM 1118
CORRIDOR 1119
CHORAL STORAGE 1121
CORRIDOR 1123
WAITING 1010
RECEPTION 1011
SECT 1013
CORRIDOR 1124
PERFORM. STORAGE 1107
LOCKER ROOM 1191
ELECT. CLOSET 1192
ELECT CLOSET 1002
CORRIDOR 1104
WOMENS TOILET 1105
MENS TOILET 1106
CORRIDOR 1125
LOCKER ROOM 1095
LOBBY 1101
VESTIBULE 1102
VESTIBULE 1124
PASSAGE 1096
CORRIDOR 1122
VESTIBULE 1121
CORRIDOR 1125
VESTIBULE 1123
CORRIDOR 1126
WAITING 1012
CHORAL STORAGE 1123
CORRIDOR 1127
VESTIBULE 1128
CORRIDOR 1129
CORRIDOR 1130
CORRIDOR 1131
CORRIDOR 1132
CORRIDOR 1133
CORRIDOR 1134
CORRIDOR 1135
CORRIDOR 1136
CORRIDOR 1137
CORRIDOR 1138
CORRIDOR 1139
CORRIDOR 1140
CORRIDOR 1141
CORRIDOR 1142
CORRIDOR 1143
CORRIDOR 1144
CORRIDOR 1145
CORRIDOR 1146
CORRIDOR 1147
CORRIDOR



1E 1 - FIRST FLOOR RCP - PART E
1/8" = 1'-0"

CEILING PLAN GRAPHIC LEGEND

CEILING TYPES

- 2x2 ACOUSTIC CEILING
- 2x4 ACOUSTIC CEILING
- GYP CEILING
- EXPOSED CEILING
- 2 HR HORIZ. SHAFT
- 4" ALUM. CEILING
- ACOUSTIC-THERMAL SPRAY
- WOOD LOOK GYPSUM CEILING CLOUDS
- 2x4 ADC DIFFUSION PANEL
- 4x4 ADC DIFFUSION PANEL

LIGHT FIXTURES

- CONTINUOUS CEILING RECESSED
- CEILING RECESSED LINEAR - VARIABLE LENGTH
- 2' X 4' CEILING RECESSED
- 2' X 2' CEILING RECESSED
- ROUND CEILING RECESSED
- SQUARE CEILING RECESSED
- CEILING-MOUNTED PENDANT
- WALL-MOUNTED SCONCE
- CEILING-MOUNTED DIRECT/INDIRECT PENDANT - VARIABLE LENGTH
- CEILING-MOUNTED VERTICAL SOUND BLADE
- FEATURE CEILING-MOUNTED PENDANT
- CEILING-MOUNTED FAN

HVAC FIXTURES

- 2X2 SUPPLY DIFFUSER
- 2X2 RETURN DIFFUSER
- LINEAR RETURN DIFFUSER
- ROUND DIFFUSER

CEILING EQUIPMENT

- SPRINKLER HEAD RC. FIRE PROTECTION
- UPRIGHT SPRINKLER HEAD
- EXIT SIGN @ CEILING
- EXIT SIGN @ WALL
- SECURITY CAMERA
- OCCUPANCY SENSOR
- VACANCY SENSOR
- SPEAKER
- MICROPHONE/ MOTION DETECTOR RE: TECHNOLOGY/ SECURITY
- FIRE SPEAKER/STROBE
- PHOTOCELL
- CORD REEL - RE: 1A & 1C/A211 & ELEC.
- PROJECTOR SCREEN
- ACCESS PANEL - REFER TO MEP DRAWINGS AND SPECS FOR LOCATIONS
- EXPANSION JOINT LOCATION
- NUMBERED NOTE LEGEND TAG
- VISUAL / AUDIO NOTIFICATION DEVICE
- SMOKE DETECTOR
- HEIGHT OF CEILING ABOVE FINISH FLOOR
- CEILING TYPE DESIGNATION

EXPANSION JOINT LEGEND

- EXTERIOR: WALL TO WALL
- INTERIOR: FLOOR TO WALL - **RE: 5C/A806**
- INTERIOR: WALL TO WALL (FLUSH) - **RE: 5B/A806**
- INTERIOR: WALL TO WALL (CORNER) - **RE: 5A/A806**
- INTERIOR: CEILING TO WALL - GYP - **RE: 5A/A806**
- INTERIOR: CEILING TO WALL - ACP - **RE: 2B/A210**
- INTERIOR: CEILING TO CEILING - GYP - **RE: 5B/A806**
- INTERIOR: CEILING TO CEILING - ACP - **RE: 2A/A210**

CEILING PLAN KEYNOTES:

1. SEE DETAIL 2E/ A210
2. SEE DETAIL 5E/ A210
3. SEE DETAIL 5D/ A210
4. SEE DETAIL 2E/ A210
5. SEE DETAIL 3E/ A211
6. SEE DETAIL 4C/ A210
7. SEE DETAIL 4C/ A211
8. SEE DETAIL 5F/ A210
9. SEE DETAIL 1A/ A210
10. SEE DETAIL 3C/ A210
11. SEE DETAIL 1B/ A111.7
12. SEE DETAIL 1E/ A211
13. SEE DETAIL 3E/ A210
14. 1A/ A211 1C/ A211
15. SEE DETAIL 2D/ A210

CEILING PLAN GENERAL NOTES

1. "EXPOSED CONSTRUCTION" OR "EXP. CONST." INDICATES NO CEILING. EXPOSED TO DECK, PTD.

2. CENTER LIGHT FIXTURES AND OTHER DEVICES IN ACOUSTICAL PANEL "PATTERN" UNLESS OTHERWISE INDICATED. REFER TO DETAIL BELOW.

3. CENTER ACOUSTICAL PANELS OR GRID IN SPACES UNLESS OTHERWISE INDICATED.

4. SEE SPECIFICATIONS FOR INFORMATION ON SEISMIC RESTRAINT OF CEILING SYSTEMS.

5. SEE CEILING DETAIL SHEETS FOR CEILING AND SOFFIT DETAILS.

6. SPRINKLER HEAD LOCATIONS ARE SHOWN FOR COORDINATION PURPOSES ONLY. NOT ALL SPRINKLER HEADS ARE SHOWN. FIRE PROTECTION SYSTEM INSTALLER SHALL COORDINATE SPRINKLER HEADS. IN AREAS WITHOUT SUSPENDED CEILINGS, COORDINATE LOCATIONS OF SPRINKLER HEADS WITH HVAC DUCTS, EQUIPMENT, BEAMS, COLUMNS, LIGHTS, AND ANY OTHER OBSTRUCTIONS IN ACCORDANCE WITH NFPA 13. IN AREAS WITH SUSPENDED CEILINGS, COORDINATE SPRINKLER MAINS, RUNS AND SPRINKLER HEAD LOCATIONS WITH OTHER WORK TO INSURE CEILING HEIGHTS, LIGHTING, DIFFUSER AND OTHER CEILING DEVICE LOCATIONS ARE MAINTAINED AS SHOWN OR AS REQUIRED TO COMPLY WITH APPLICABLE CODE REQUIREMENTS. ADVISE ARCHITECT OF ANY CONFLICTS WHICH MUST BE RESOLVED PRIOR TO INSTALLATION.

7. LIGHT FIXTURES, FIRE PROTECTION DEVICES AND DIFFUSERS ARE SHOWN FOR LOCATION AND COORDINATION PURPOSES ONLY. REFER TO ELECTRICAL AND HVAC DWGS. FOR ACTUAL LIGHT FIXTURE, DIFFUSER AND FIRE PROTECTION SCHEDULES.

8. REFER TO ELECTRICAL, HVAC AND FIRE PROTECTION DWGS. FOR LIGHT FIXTURES, DIFFUSERS AND FIRE PROTECTION DEVICES IN UNFINISHED AREAS OR AREAS WITH EXPOSED STRUCTURE.

9. COORDINATE ACCESS PANEL LOCATIONS WITH MECHANICAL TRADES. SUBMIT PROPOSED LOCATIONS TO ARCHITECT FOR APPROVAL. CONTRACTOR TO LOCATE SERVICEABLE MEP AND AWT COMPONENTS OUTSIDE OF HARD CEILING AREAS AND/OR ACCESSIBLE CEILING AREAS TO THE GREATEST EXTENT POSSIBLE.

10. ALL CEILING HEIGHTS SHALL BE 10'-0", UNLESS OTHERWISE NOTED.

11. ALL SOFFIT HEIGHTS SHALL BE 10'-0", UNLESS OTHERWISE NOTED.

12. HANGING SYSTEMS FROM OVERHEAD STRUCTURE:
   A. FOR BUILDINGS WHERE THE FLOOR & ROOF CONSTRUCTION CONSISTS OF CAST IN PLACE CONCRETE SLABS/BEAMS, PRECAST CONCRETE SLABS/BEAMS, CONCRETE FILLED METAL DECKS (SUPPORTED BY STRUCTURAL STEEL FRAMING), THE FOLLOWING SYSTEMS CAN BE HUNG:
      a. CEILINGS AND SOFFITS SYSTEMS (INCLUDING HUNG PARTITION SYSTEMS).
      b. MECHANICAL, ELECTRICAL, PLUMBING AND FIRE PROTECTION SYSTEMS AND EQUIPMENT.
      c. FOR ANY HEAVY OR LARGE SYSTEMS OR ITEMS, CONSULT WITH YOUR STRUCTURAL ENGINEER.
   B. FOR BUILDINGS WHERE THE ROOF STRUCTURE IS SIMPLE METAL ROOF DECK (NO CONCRETE FILL), THE FOLLOWING SYSTEMS CAN BE HUNG:
      a. ACOUSTIC CEILING SYSTEMS (ACT TILES, ETC.), WEIGHING LESS THAN 5 LBS/SF AND HUNG AT 4'-0" C.C. BOTH DIRECTIONS.
      b. SINGLE LAYER GYPSUM BOARD CEILING SYSTEMS WEIGHING LESS THAN 5 LBS/SF AND HUNG AT 4'-0" C.C. BOTH DIRECTIONS.
      c. DO NOT HANG ANY OTHER SYSTEM OR ITEM DIRECTLY FROM PLAIN ROOF STEEL DECKS (UNLESS STRUCTURAL E.O.R. CONFIRMS THAT DECK HAS BEEN DESIGNED TO SUPPORT THESE HANGING LOADS). IN LOCATIONS WHERE PLAIN ROOF STEEL DECK (NO CONCRETE FILL) IS OVERHEAD, HANG ONLY FROM STRUCTURAL STEEL FRAMING MEMBERS OR PROVIDE SECONDARY STEEL FRAMING MEMBERS (SLOTTED CHANNEL FRAMING S.C., "UNISTRUT", ETC.) OF ADEQUATE DESIGN (SPANNING BETWEEN BUILDING STRUCTURAL STEEL FRAMING MEMBERS) AS REQUIRED.
   C. FOR BUILDINGS CONSTRUCTED OF COLD-FORMED METAL FRAMING SYSTEMS, FOLLOW "SIMPLE METAL ROOF DECKS" ABOVE.
   D. REVIEW AND DISCUSS ALL UNUSUAL CONDITIONS WITH YOUR STRUCTURAL ENGINEER.

13. WHERE REFERENCED BY THIS NOTE, PROVIDE 1-HR. HORIZONTAL SHAFTWALL CEILING (WITH 4" DEEP 20 GA. FRAMING). INSTALL AS HIGH AS POSSIBLE TO UNDERSIDE OF STEEL FRAMING ABOVE.

14. SEE FINISH SCHEDULE FOR ALL WINDOW SHADE INFORMATION.

15. FOR ACOUSTIC CONTINUITY AT TOPS OF PARTITIONS CENTERED ON OR DIRECTLY ADJACENT TO STEEL BEAMS, REFER TO SPECTIC DETAILS ON SHEET A602

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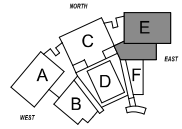
Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane,
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRST FLOOR REFLECTED CEILING PLAN - PART E

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: A201E

Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_GREENWICH_CENTRAL_MS_2022.rvt
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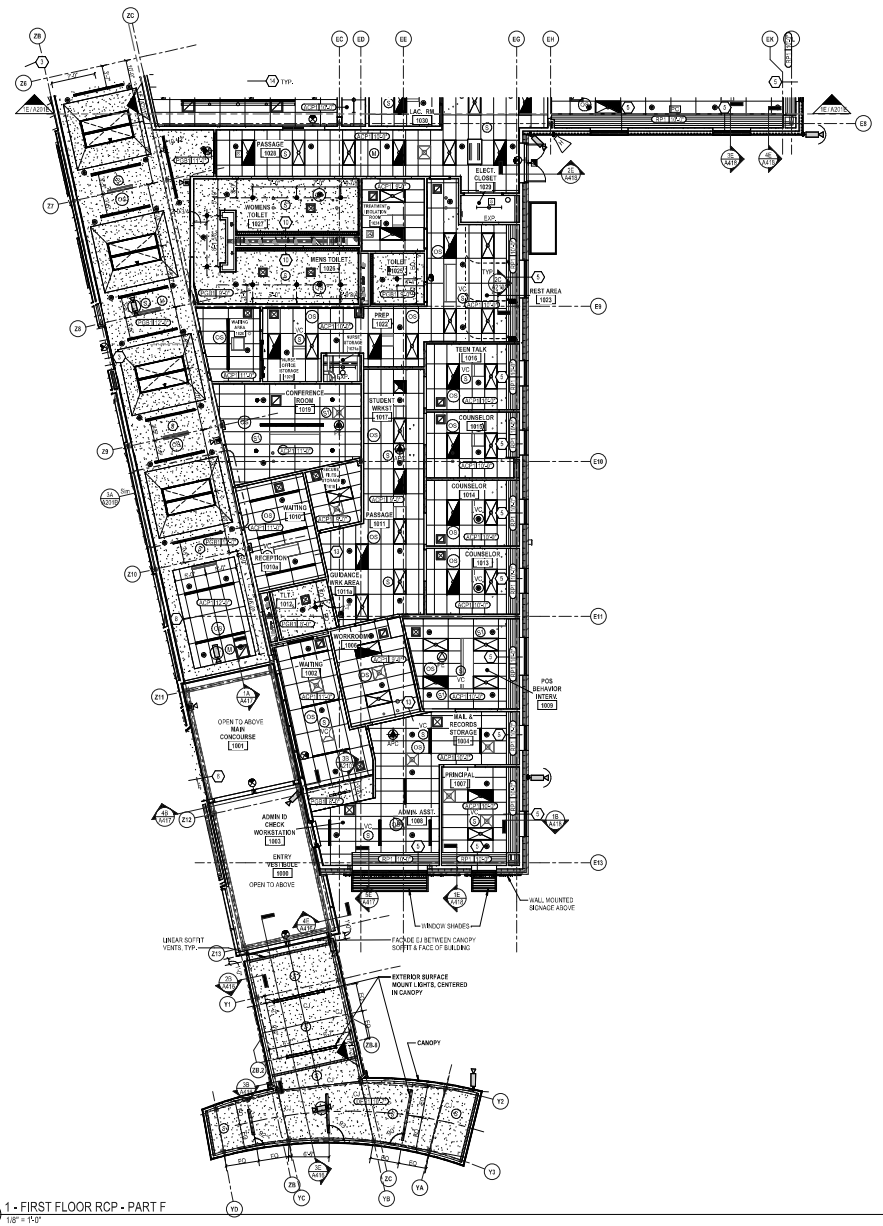

1E 1 - FIRST FLOOR RCP - PART F
1/8" = 1'-0"

CEILING PLAN GRAPHIC LEGEND

CEILING TYPES

- 2x2 ARCATC CEILING
- 2x4 ARCATC CEILING
- GYP CEILING
- EXPOSED CEILING
- 2 HR HORIZ. SHAFT
- 4" ALUM. CEILING
- ACOUSTIC-THERMAL SPRAY
- WOOD LOOK GYPSUM CEILING CLOUDS
- 2x4 ADC DIFFUSION PANEL
- 6x4 ADC DIFFUSION PANEL

LIGHT FIXTURES

- CONTINUOUS CEILING RECESSED
- CEILING RECESSED LINEAR - VARIABLE LENGTH
- 2'-X-4' CEILING RECESSED
- 2'-X-2' CEILING RECESSED
- ROUND CEILING RECESSED
- SQUARE CEILING RECESSED
- CEILING-MOUNTED PENDANT
- WALL-MOUNTED SCONCE
- CEILING-MOUNTED DI PENDANT - VARIABLE LENGTH
- CEILING-MOUNTED VERTICAL SOUND BLADE
- FEATURE CEILING-MOUNTED PENDANT
- CEILING-MOUNTED FAN

HVAC FIXTURES

- 2x2 SUPPLY DIFFUSER
- 2x2 RETURN DIFFUSER
- LINEAR RETURN DIFFUSER
- ROUND DIFFUSER

CEILING EQUIPMENT

- SPRINKLER HEAD RE: FIRE PROTECTION
- UPRIGHT SPRINKLER HEAD
- EXIT SIGN @ CEILING
- EXIT SIGN @ WALL
- SECURITY CAMERA
- OCCUPANCY SENSOR
- VACANCY SENSOR
- SPEAKER
- MICROPHONE/ MOTION DETECTOR RE: TECHNOLOGY/ SECURITY
- FIRE SPEAKER/STROBE
- PHOTOCELL
- CORD REEL - RE: 1A & 1CA211 & ELEC.
- PROJECTOR SCREEN
- ACCESS PANEL - REFER TO MEP DRAWINGS AND SPECS FOR LOCATIONS
- EXPANSION JOINT LOCATION
- NUMBERED NOTE LEGEND TAG
- VISUAL / AUDIO NOTIFICATION DEVICE
- SMOKE DETECTOR
- HEIGHT OF CEILING ABOVE FINISH FLOOR / CEILING TYPE DESIGNATION

CEILING PLAN KEYNOTES:

1. SEE DETAIL 2E / A210
2. SEE DETAIL 5E / A210
3. SEE DETAIL 3D / A210
4. SEE DETAIL 2E / A210
5. SEE DETAIL 3E / A211
6. SEE DETAIL 4C / A210
7. SEE DETAIL 4C / A211
8. SEE DETAIL 5F / A210
9. SEE DETAIL 1A / A210
10. SEE DETAIL 3C / A210
11. SEE DETAIL 1B / A111.7
12. SEE DETAIL 1E / A211
13. SEE DETAIL 3E / A210
14. SEE DETAIL 1A / A211, 1C / A211
15. SEE DETAIL 2D / A210

CEILING PLAN GENERAL NOTES

1. "EXPOSED CONSTRUCTION" OR "EXP. CONST." INDICATES NO CEILING, EXPOSED TO DECK, PTD.
2. CENTER LIGHT FIXTURES AND OTHER DEVICES IN ACOUSTICAL PANEL "PATTERN" UNLESS OTHERWISE INDICATED. REFER TO DETAIL BELOW.
3. CENTER ACOUSTICAL PANELS OR GRID IN SPACES UNLESS OTHERWISE INDICATED.
4. SEE SPECIFICATIONS FOR INFORMATION ON SEISMIC RESTRAINT OF CEILING SYSTEMS.
5. SEE CEILING DETAIL SHEETS FOR CEILING AND SOFFIT DETAILS.
6. SPRINKLER HEAD LOCATIONS ARE SHOWN FOR COORDINATION PURPOSES ONLY. NOT ALL SPRINKLER HEADS ARE SHOWN. FIRE PROTECTION SYSTEM INSTALLER SHALL COORDINATE SPRINKLER HEADS, IN AREAS WITHOUT SUSPENDED CEILINGS, COORDINATE LOCATIONS OF SPRINKLER HEADS WITH HVAC DUCTS, EQUIPMENT, BEAMS, COLUMNS, LIGHTS, AND ANY OTHER OBSTRUCTIONS IN ACCORDANCE WITH NFPA 13. IN AREAS WITH SUSPENDED CEILINGS, COORDINATE SPRINKLER MAINS, RUNS AND SPRINKLER HEAD LOCATIONS WITH OTHER WORK TO INSURE CEILING HEIGHTS, LIGHTING, DIFFUSER AND OTHER CEILING DEVICE LOCATIONS ARE MAINTAINED AS SHOWN OR AS REQUIRED TO COMPLY WITH APPLICABLE CODE REQUIREMENTS. ADVISE ARCHITECT OF ANY CONFLICTS WHICH MUST BE RESOLVED PRIOR TO INSTALLATION.
7. LIGHT FIXTURES, FIRE PROTECTION DEVICES AND DIFFUSERS ARE SHOWN FOR LOCATION AND COORDINATION PURPOSES ONLY. REFER TO ELECTRICAL AND HVAC DWGS. FOR ACTUAL LIGHT FIXTURE, DIFFUSER AND FIRE PROTECTION SCHEDULES.
8. REFER TO ELECTRICAL, HVAC AND FIRE PROTECTION DWGS. FOR LIGHT FIXTURES, DIFFUSERS AND FIRE PROTECTION DEVICES IN UNFINISHED AREAS OR AREAS WITH EXPOSED STRUCTURE.
9. COORDINATE ACCESS PANEL LOCATIONS WITH MECHANICAL TRADES; SUBMIT PROPOSED LOCATIONS TO ARCHITECT FOR APPROVAL. CONTRACTOR TO LOCATE SERVICEABLE MEP AND AVIT COMPONENTS OUTSIDE OF HARD CEILING AREAS AND INTO ACCESSIBLE CEILING AREAS TO THE GREATEST EXTENT POSSIBLE.
10. ALL CEILING HEIGHTS SHALL BE 10'-0", UNLESS OTHERWISE NOTED.
11. ALL SOFFIT HEIGHTS SHALL BE 10'-0", UNLESS OTHERWISE NOTED.
12. HANGING SYSTEMS FROM OVERHEAD STRUCTURE:
    A. FOR BUILDINGS WHERE THE FLOOR & ROOF CONSTRUCTION CONSISTS OF CAST IN PLACE CONCRETE SLABS/BEAMS, PRECAST CONCRETE SLABS/BEAMS, CONCRETE FILLED METAL DECKS (SUPPORTED BY STRUCTURAL STEEL FRAMING), THE FOLLOWING SYSTEMS CAN BE HUNG:
        a. CEILINGS AND SOFFITS SYSTEMS (INCLUDING HUNG PARTITION SYSTEMS).
        b. MECHANICAL, ELECTRICAL, PLUMBING, AND FIRE PROTECTION SYSTEMS AND EQUIPMENT.
        c. FOR ANY HEAVY OR LARGE SYSTEMS OR ITEMS, CONSULT WITH YOUR STRUCTURAL ENGINEER.
    B. FOR BUILDINGS WHERE THE ROOF STRUCTURE IS SIMPLE METAL ROOF DECK (NO CONCRETE FILL) THE FOLLOWING SYSTEMS CAN BE HUNG:
        a. ACOUSTIC CEILING SYSTEMS (ACT TILES, ETC.) WEIGHING LESS THAN 5 LBS/SF AND HUNG AT 4'-0" O.C. BOTH DIRECTIONS.
        b. SINGLE LAYER GYPSUM BOARD CEILING SYSTEMS WEIGHING LESS THAN 5 LBS/SF AND HUNG AT 4'-0" O.C. BOTH DIRECTIONS.
        c. DO NOT HANG ANY OTHER SYSTEM OR ITEM DIRECTLY FROM PLAIN ROOF STEEL DECKS UNLESS SPECIFICALLY NOTED OTHERWISE THAT DECK HAS BEEN DESIGNED TO SUPPORT THESE HANGING LOADS. IN LOCATIONS WHERE PLAIN ROOF STEEL DECK (NO CONCRETE FILL) IS OVERHEAD, HANG ONLY FROM STRUCTURAL STEEL FRAMING MEMBERS OR PROVIDE SECONDARY STEEL FRAMING MEMBERS (SLOTTED CHANNEL FRAMING, I.E. "UNISTRUT", ETC.) OF ADEQUATE DESIGN SPANNING BETWEEN BUILDING STRUCTURAL STEEL FRAMING MEMBERS AS REQUIRED.
    C. FOR BUILDINGS CONSTRUCTED OF COLD-FORMED METAL FRAMING SYSTEMS, FOLLOW "SIMPLE METAL ROOF DECKS" ABOVE.
    D. RE-VIEW AND DISCUSS ALL UNUSUAL CONDITIONS WITH YOUR STRUCTURAL ENGINEER.
13. WHERE REFERENCED BY THIS NOTE, PROVIDE 1-HR. HORIZONTAL SHAFTWALL CEILING (WITH 4" DEEP 20 GA. FRAMING), INSTALL AS HIGH AS POSSIBLE TO UNDERSIDE OF STEEL FRAMING ABOVE.
14. SEE FINISH SCHEDULE FOR ALL WINDOW SHADE INFORMATION
15. FOR ACOUSTIC CONTINUITY AT TOPS OF PARTITIONS CENTERED ON OR DIRECTLY ADJACENT TO STEEL BEAMS, REFER TO SPECTIC DETAILS ON SHEET A602

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Greenwich Public Schools

Greenwich Central Middle School

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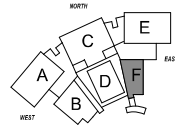
STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRST FLOOR REFLECTED CEILING PLAN - PART F

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: A201F

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1B ENLARGED STAIR RCP
1/4" = 1'-0"

1E 2 - SECOND FLOOR RCP - PART A
1/8" = 1'-0"

CEILING PLAN GRAPHIC LEGEND

CEILING TYPES
- 2x2 ACOUSTIC CEILING
- 2x4 ACOUSTIC CEILING
- GYP CEILING
- EXPOSED CEILING
- 2 HR HORIZ. SHAFT
- 4" ALUM. CEILING
- ACOUSTIC-THERMAL SPRAY
- WOOD LOOK GYPSUM CEILING CLOUDS
- 2x4 ADC DIFFUSION PANEL
- 4x4 ADC DIFFUSION PANEL

LIGHT FIXTURES
- CONTINUOUS CEILING RECESSED
- CEILING RECESSED LINEAR - VARIABLE LENGTH
- 2' X 4' CEILING RECESSED
- 2' X 2' CEILING RECESSED
- ROUND CEILING RECESSED
- SQUARE CEILING RECESSED
- CEILING-MOUNTED PENDANT
- WALL-MOUNTED SCONCE
- CEILING-MOUNTED DI PENDANT - VARIABLE LENGTH
- CEILING-MOUNTED VERTICAL SOUND BLADE
- FEATURE CEILING-MOUNTED PENDANT
- CEILING-MOUNTED FAN

HVAC FIXTURES
- 2X2 SUPPLY DIFFUSER
- 2X2 RETURN DIFFUSER
- LINEAR RETURN DIFFUSER
- ROUND DIFFUSER

CEILING EQUIPMENT
- SPRINKLER HEAD RE: FIRE PROTECTION
- UPRIGHT SPRINKLER HEAD
- EXIT SIGN @ CEILING
- EXIT SIGN @ WALL
- SECURITY CAMERA
- OCCUPANCY SENSOR
- VACANCY SENSOR
- SPEAKER
- MICROPHONE/MOTION DETECTOR RE: TECHNOLOGY/ SECURITY
- FIRE SPEAKER/STROBE
- PHOTOCELL
- CORD REEL - RE: 1A & 1C/A211 & ELEC.
- PROJECTOR SCREEN
- ACCESS PANEL - REFER TO MEP DRAWINGS AND SPECS FOR LOCATIONS
- EXPANSION JOINT LOCATION
- NUMBERED NOTE LEGEND TAG
- VISUAL / AUDIO NOTIFICATION DEVICE
- SMOKE DETECTOR
- 10'-0" HEIGHT OF CEILING ABOVE FINISH FLOOR
- CEILING TYPE DESIGNATION

EXPANSION JOINT LEGEND

- EXTERIOR: WALL TO WALL
- INTERIOR: FLOOR TO WALL - **RE: 5C/A806**
- INTERIOR: WALL TO WALL (FLUSH) - **RE: 5B/A806**
- INTERIOR: WALL TO WALL (CORNER) - **RE: 5A/A806**
- INTERIOR: CEILING TO WALL - GYP - **RE: 5A/A806**
- INTERIOR: CEILING TO WALL - ACP - **RE: 2B/A210**
- INTERIOR: CEILING TO CEILING - GYP - **RE: 5B/A806**
- INTERIOR: CEILING TO CEILING - ACP - **RE: 2A/A210**

CEILING PLAN KEYNOTES:

1. SEE DETAIL 2E/A210
2. SEE DETAIL 5E/A210
3. SEE DETAIL 3D/A210
4. SEE DETAIL 2E/A210
5. SEE DETAIL 3E/A211
6. SEE DETAIL 4C/A210
7. SEE DETAIL 4C/A211
8. SEE DETAIL 5F/A210
9. SEE DETAIL 1A/A210
10. SEE DETAIL 3C/A210
11. SEE DETAIL 1B/A111.7
12. SEE DETAIL 1E/A211
13. SEE DETAIL 3E/A210
14. SEE DETAIL 1A/A211 1C/A211
15. SEE DETAIL 2D/A210

CEILING PLAN GENERAL NOTES

1. "EXPOSED CONSTRUCTION" OR "EXP. CONST." INDICATES NO CEILING. EXPOSED TO DECK, PTD.
2. CENTER LIGHT FIXTURES AND OTHER DEVICES IN ACOUSTICAL PANEL "PATTERN" UNLESS OTHERWISE INDICATED. REFER TO DETAIL BELOW.
3. CENTER ACOUSTICAL PANELS OR GRID IN SPACES UNLESS OTHERWISE INDICATED.
4. SEE SPECIFICATIONS FOR INFORMATION ON SEISMIC RESTRAINT OF CEILING SYSTEMS.
5. SEE CEILING DETAIL SHEETS FOR CEILING AND SOFFIT DETAILS.
6. SPRINKLER HEAD LOCATIONS ARE SHOWN FOR COORDINATION PURPOSES ONLY. NOT ALL SPRINKLER HEADS ARE SHOWN. FIRE PROTECTION SYSTEM INSTALLER SHALL COORDINATE SPRINKLER HEADS, IN AREAS WITHOUT SUSPENDED CEILINGS, COORDINATE LOCATIONS OF SPRINKLER HEADS WITH HVAC DUCTS, EQUIPMENT, BEAMS, COLUMNS, LIGHTS, AND ANY OTHER OBSTRUCTIONS IN ACCORDANCE WITH NFPA 13. IN AREAS WITH SUSPENDED CEILINGS, COORDINATE SPRINKLER PIPING, RUNS AND SPRINKLER HEAD LOCATIONS WITH OTHER WORK TO INSURE CEILING HEIGHTS, LIGHTING, DIFFUSER AND OTHER CEILING DEVICE LOCATIONS ARE MAINTAINED AS SHOWN OR AS REQUIRED TO COMPLY WITH APPLICABLE CODE REQUIREMENTS. ADVISE ARCHITECT OF ANY CONFLICTS WHICH MUST BE RESOLVED PRIOR TO INSTALLATION.
7. LIGHT FIXTURES, FIRE PROTECTION DEVICES AND DIFFUSERS ARE SHOWN FOR LOCATION AND COORDINATION PURPOSES ONLY. REFER TO ELECTRICAL AND HVAC DWGS. FOR ACTUAL LIGHT FIXTURE, DIFFUSER AND FIRE PROTECTION SCHEDULES.
8. REFER TO ELECTRICAL, HVAC AND FIRE PROTECTION DWGS. FOR LIGHT FIXTURES, DIFFUSERS AND FIRE PROTECTION DEVICES IN UNFINISHED AREAS OR AREAS WITH EXPOSED STRUCTURE.
9. COORDINATE ACCESS PANEL LOCATIONS WITH MECHANICAL TRADES. SUBMIT PROPOSED LOCATIONS TO ARCHITECT FOR APPROVAL. CONTRACTOR TO LOCATE SERVICEABLE MEP AND AV/IT COMPONENTS OUTSIDE OF HARD CEILING AREAS AND INTO ACCESSIBLE CEILING AREAS TO THE GREATEST EXTENT POSSIBLE.
10. ALL CEILING HEIGHTS SHALL BE 10'-0", UNLESS OTHERWISE NOTED.
11. ALL SOFFIT HEIGHTS SHALL BE 10'-0", UNLESS OTHERWISE NOTED.
12. HANGING SYSTEMS FROM OVERHEAD STRUCTURE:
    A. FOR BUILDINGS WHERE THE FLOOR & ROOF CONSTRUCTION CONSISTS OF CAST IN PLACE CONCRETE SLABS/BEAMS, PRECAST CONCRETE SLABS/BEAMS, CONCRETE FILLED METAL DECKS (SUPPORTED BY STRUCTURAL STEEL FRAMING), THE FOLLOWING SYSTEMS CAN BE HUNG:
        a. CEILINGS AND SOFFITS SYSTEMS INCLUDING HUNG PARTITION SYSTEMS.
        b. MECHANICAL, ELECTRICAL, PLUMBING AND FIRE PROTECTION SYSTEMS AND EQUIPMENT.
        c. FOR ANY HEAVY OR LARGE SYSTEMS OR ITEMS, CONSULT WITH YOUR STRUCTURAL ENGINEER.
    B. FOR BUILDINGS WHERE THE ROOF STRUCTURE IS SIMPLE METAL ROOF DECK (NO CONCRETE FILL), THE FOLLOWING SYSTEMS CAN BE HUNG:
        a. ACOUSTIC CEILING SYSTEMS (ACT TILES, ETC.) WEIGHING LESS THAN 5 LBS/SF AND HUNG AT 4'-0" O.C., BOTH DIRECTIONS.
        b. SINGLE LAYER GYPSUM BOARD CEILING SYSTEMS WEIGHING LESS THAN 5 LBS/SF AND HUNG AT 4'-0" O.C., BOTH DIRECTIONS.
        c. DO NOT HANG ANY OTHER SYSTEM OR ITEM DIRECTLY FROM PLAIN ROOF STEEL DECKS UNLESS STRUCTURAL E.O.R. CONFIRMS THAT DECK HAS BEEN DESIGNED TO SUPPORT THESE HANGING LOADS. IN LOCATIONS WHERE PLAIN ROOF STEEL DECK (NO CONCRETE FILL) IS OVERHEAD, HANG ONLY FROM STRUCTURAL STEEL FRAMING MEMBERS OR PROVIDE SECONDARY STEEL FRAMING MEMBERS (SLOTTED CHANNEL FRAMING, I.E. "UNISTRUT", ETC.) OF ADEQUATE DESIGN (SPANNING BETWEEN BUILDING STRUCTURAL STEEL FRAMING MEMBERS) AS REQUIRED.
    C. FOR BUILDINGS CONSTRUCTED OF COLD-FORMED METAL FRAMING SYSTEMS, FOLLOW "SIMPLE METAL ROOF DECKS" ABOVE.
    D. REVIEW AND DISCUSS ALL UNUSUAL CONDITIONS WITH YOUR STRUCTURAL ENGINEER.
13. WHERE REFERENCED BY THIS NOTE, PROVIDE 1-HR. HORIZONTAL SHAFTWALL CEILING (WITH 4" DEEP 20 GA. FRAMING), INSTALL AS HIGH AS POSSIBLE TO UNDERSIDE OF STEEL FRAMING ABOVE.
14. SEE FINISH SCHEDULE FOR ALL WINDOW SHADE INFORMATION.
15. FOR ACOUSTIC CONTINUITY AT TOPS OF PARTITIONS CENTERED ON OR DIRECTLY ADJACENT TO STEEL BEAMS, REFER TO SPECTIC DETAILS ON SHEET A402.

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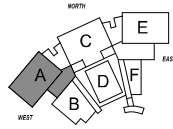
Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane,
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

SECOND FLOOR REFLECTED CEILING PLAN - PART A

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A202A

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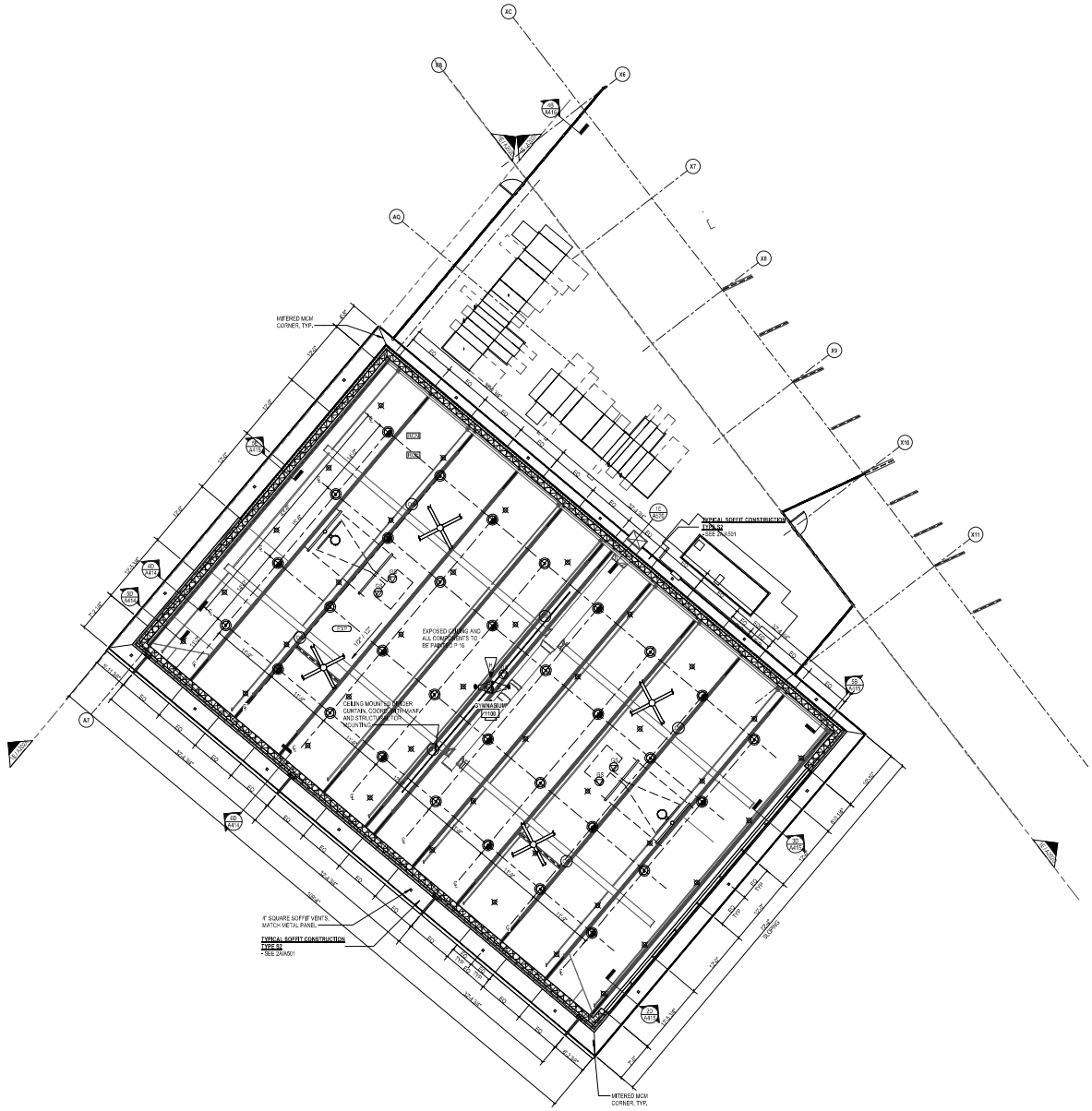

1E 2 - SECOND FLOOR RCP - PART B
1/8" = 1'-0"

CEILING PLAN GRAPHIC LEGEND

CEILING TYPES
- 2x2 ACP/ATC CEILING
- 2x4 ACP/ATC CEILING
- GYP CEILING
- EXPOSED CEILING
- 2 HR HORIZ. SHAFT
- 4" ALUM. CEILING
- ACOUSTIC-THERMAL SPRAY
- WOOD LOOK GYPSUM CEILING CLOUDS
- 2x4 ADC DIFFUSION PANEL
- 4x4 ADC DIFFUSION PANEL

LIGHT FIXTURES
- CONTINUOUS CEILING RECESSED
- CEILING RECESSED LINEAR - VARIABLE LENGTH
- 2' X 4' CEILING RECESSED
- 2' X 2' CEILING RECESSED
- ROUND CEILING RECESSED
- SQUARE CEILING RECESSED
- CEILING-MOUNTED PENDANT
- WALL-MOUNTED SCONCE
- CEILING-MOUNTED DIRECT/INDIRECT PENDANT - VARIABLE LENGTH
- CEILING-MOUNTED VERTICAL SOUND SLADE
- FEATURE CEILING-MOUNTED PENDANT
- CEILING-MOUNTED FAN

HVAC FIXTURES
- 2X2 SUPPLY DIFFUSER
- 2X2 RETURN DIFFUSER
- LINEAR RETURN DIFFUSER
- ROUND DIFFUSER

CEILING EQUIPMENT
- SPRINKLER HEAD RE: FIRE PROTECTION
- UPRIGHT SPRINKLER HEAD
- EXIT SIGN @ CEILING
- EXIT SIGN @ WALL
- SECURITY CAMERA
- OCCUPANCY SENSOR
- VACANCY SENSOR
- SPEAKER
- MICROPHONE/ MOTION DETECTOR RE: TECHNOLOGY/ SECURITY
- FIRE SPEAKER/STROBE
- PHOTOCELL
- CORD REEL - RE: 1A & 1CA211.4 ELEC.
- PROJECTOR SCREEN
- ACCESS PANEL - REFER TO MEP DRAWINGS AND SPECS FOR LOCATIONS
- EXPANSION JOINT LOCATION
- NUMBERED NOTE LEGEND TAG
- VISUAL/ AUDIO NOTIFICATION DEVICE
- SMOKE DETECTOR
- CT 10'-0" — HEIGHT OF CEILING ABOVE FINISH FLOOR / CEILING TYPE DESIGNATION

CEILING PLAN KEYNOTES:

1. SEE DETAIL 2E/ A210
2. SEE DETAIL 5E/ A210
3. SEE DETAIL 3D/ A210
4. SEE DETAIL 2E/ A210
5. SEE DETAIL 3E/ A211
6. SEE DETAIL 4C/ A210
7. SEE DETAIL 4C/ A211
8. SEE DETAIL 5F/ A210
9. SEE DETAIL 1A/ A210
10. SEE DETAIL 3C/ A210
11. SEE DETAIL 1B/ A111.7
12. SEE DETAIL 1E/ A211
13. SEE DETAIL 3E/ A210
14. SEE DETAIL 1A/ A211, 1C/ A211
15. SEE DETAIL 2D/ A210

CEILING PLAN GENERAL NOTES

1. "EXPOSED CONSTRUCTION" OR "EXP. CONST." INDICATES NO CEILING. EXPOSED TO DECK, P.T.O.

2. CENTER LIGHT FIXTURES AND OTHER DEVICES IN ACOUSTICAL PANEL "PATTERN" UNLESS OTHERWISE INDICATED. REFER TO DETAIL BELOW.

3. CENTER ACOUSTICAL PANELS OR GRID IN SPACES UNLESS OTHERWISE INDICATED.

4. SEE SPECIFICATIONS FOR INFORMATION ON SEISMIC RESTRAINT OF CEILING SYSTEMS.

5. SEE CEILING DETAIL SHEETS FOR CEILING AND SOFFIT DETAILS.

6. SPRINKLER HEAD LOCATIONS ARE SHOWN FOR COORDINATION PURPOSES ONLY. NOT ALL SPRINKLER HEADS ARE SHOWN. FIRE PROTECTION SYSTEM INSTALLER SHALL COORDINATE SPRINKLER HEADS. IN AREAS WITHOUT SUSPENDED CEILINGS, COORDINATE LOCATIONS OF SPRINKLER HEADS WITH HVAC DUCTS, EQUIPMENT, BEAMS, COLUMNS, LIGHTS, AND ANY OTHER OBSTRUCTIONS IN ACCORDANCE WITH NFPA 13. IN AREAS WITH SUSPENDED CEILINGS, COORDINATE SPRINKLER MAINS, RUNS AND SPRINKLER HEAD LOCATIONS WITH OTHER WORK TO INSURE CEILING HEIGHTS, LIGHTING, DIFFUSER AND OTHER CEILING DEVICE LOCATIONS ARE MAINTAINED AS SHOWN OR AS REQUIRED TO COMPLY WITH APPLICABLE CODE REQUIREMENTS. ADVISE ARCHITECT OF ANY CONFLICTS WHICH MUST BE RESOLVED PRIOR TO INSTALLATION.

7. LIGHT FIXTURES, FIRE PROTECTION DEVICES AND DIFFUSERS ARE SHOWN FOR LOCATION AND COORDINATION PURPOSES ONLY. REFER TO ELECTRICAL AND HVAC DWGS. FOR ACTUAL LIGHT FIXTURE, DIFFUSER AND FIRE PROTECTION SCHEDULES.

8. REFER TO ELECTRICAL, HVAC AND FIRE PROTECTION DWGS. FOR LIGHT FIXTURES, DIFFUSERS AND FIRE PROTECTION DEVICES IN UNFINISHED AREAS OR AREAS WITH EXPOSED STRUCTURE.

9. COORDINATE ACCESS PANEL LOCATIONS WITH MECHANICAL TRADES; SUBMIT PROPOSED LOCATIONS TO ARCHITECT FOR APPROVAL. CONTRACTOR TO LOCATE SERVICEABLE M&P AND AVIT COMPONENTS OUTSIDE OF HARD CEILING AREAS AND INTO ACCESSIBLE CEILING AREAS TO THE GREATEST EXTENT POSSIBLE.

10. ALL CEILING HEIGHTS SHALL BE 10'-0", UNLESS OTHERWISE NOTED.

11. ALL SOFFIT HEIGHTS SHALL BE 10'-0", UNLESS OTHERWISE NOTED.

12. HANGING SYSTEMS FROM OVERHEAD STRUCTURE:
   A. FOR BUILDINGS WHERE THE FLOOR & ROOF CONSTRUCTION CONSISTS OF CAST IN PLACE CONCRETE SLABS/BEAMS, PRECAST CONCRETE SLABS/BEAMS, CONCRETE FILLED METAL DECKS (SUPPORTED BY STRUCTURAL STEEL FRAMING), THE FOLLOWING SYSTEMS CAN BE HUNG:
      a. CEILINGS AND SOFFIT'S SYSTEMS (INCLUDING HUNG PARTITION SYSTEMS).
      b. MECHANICAL, ELECTRICAL, PLUMBING, AND FIRE PROTECTION SYSTEMS AND EQUIPMENT.
      c. FOR ANY HEAVY OR LARGE SYSTEMS OR ITEMS, CONSULT WITH YOUR STRUCTURAL ENGINEER.
   B. FOR BUILDINGS WHERE THE ROOF STRUCTURE IS SIMPLE METAL ROOF DECK (NO CONCRETE FILL). THE FOLLOWING SYSTEMS CAN BE HUNG:
      a. ACOUSTIC CEILING SYSTEMS (ACT TILES, ETC.) WEIGHING LESS THAN 5.5LBS/SF AND HUNG AT 4'-0" O.C. BOTH DIRECTIONS.
      b. SINGLE LAYER GYPSUM BOARD CEILING SYSTEMS WEIGHING LESS THAN 5.5LBS/SF AND HUNG AT 4'-2" O.C. BOTH DIRECTIONS.
      c. DO NOT HANG ANY OTHER SYSTEM OR ITEM DIRECTLY FROM FLAN ROOF STEEL DECKS UNLESS STRUCTURAL E.O.R. CONFIRMS THAT DECK HAS BEEN DESIGNED TO SUPPORT THESE HANGING LOADS. IN LOCATIONS WHERE PLAIN ROOF STEEL DECK (NO CONCRETE FILL) IS OVERHEAD, HANG ONLY FROM STRUCTURAL STEEL FRAMING MEMBERS OR PROVIDE SECONDARY STEEL FRAMING MEMBERS (SLOTTED CHANNEL FRAMING, I.E. "UNISTRUT", ETC.) OF ADEQUATE DESIGN (SPANNING BETWEEN BUILDING STRUCTURAL STEEL FRAMING MEMBERS) AS REQUIRED.
   C. FOR BUILDINGS CONSTRUCTED OF COLD-FORMED METAL FRAMING SYSTEMS, FOLLOW "SIMPLE METAL ROOF DECKS" ABOVE.
   D. REVIEW AND DISCUSS ALL UNUSUAL CONDITIONS WITH YOUR STRUCTURAL ENGINEER.

13. WHERE REFERENCED BY THIS NOTE, PROVIDE 1-HR. HORIZONTAL SHAFTWALL CEILING (WITH 4" DEEP 20 GA. FRAMING). INSTALL AS HIGH AS POSSIBLE TO UNDERSIDE OF STEEL FRAMING ABOVE.

14. SEE FINISH SCHEDULE FOR ALL WINDOW SHADE INFORMATION

15. FOR ACOUSTIC CONTINUITY AT TOPS OF PARTITIONS CENTERED ON OR DIRECTLY ADJACENT TO STEEL BEAMS, REFER TO SPECTIC DETAILS ON SHEET A602

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Greenwich Public Schools

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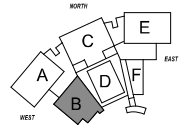

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

SECOND FLOOR REFLECTED CEILING PLAN - PART B

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: A202B

Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_GREENWICH_CENTRAL_MS_R23.rvt
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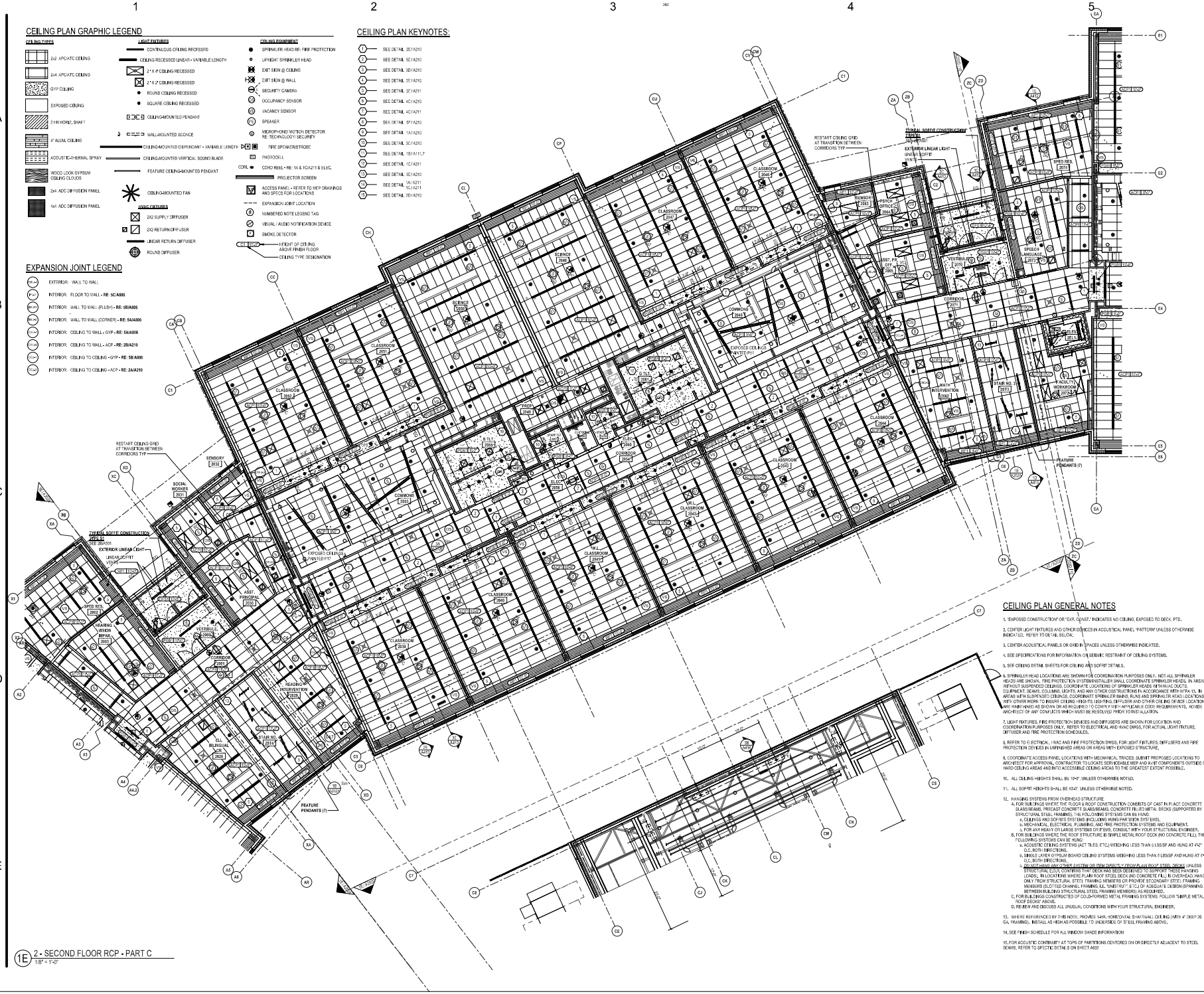
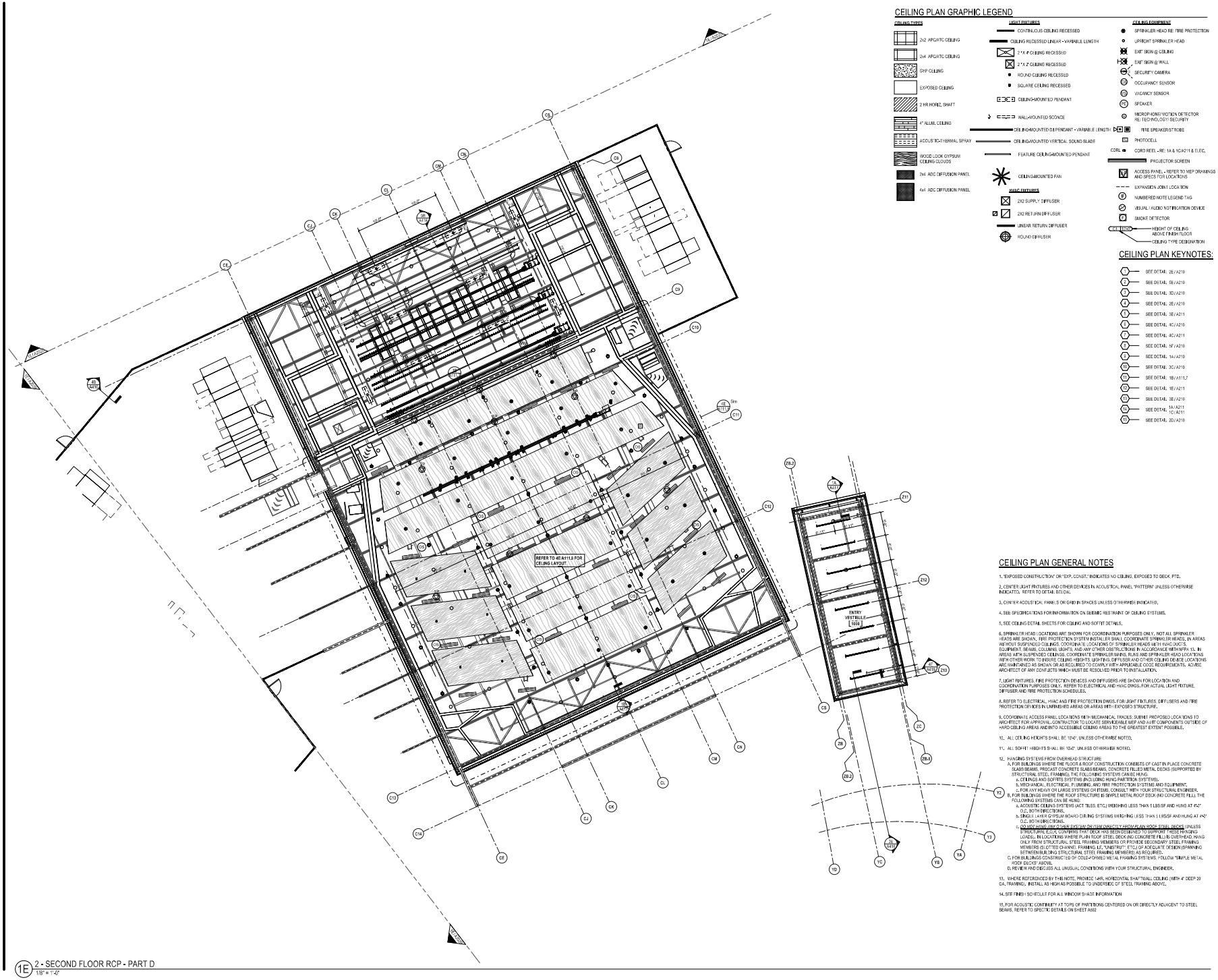

CEILING PLAN GRAPHIC LEGEND
CEILING TYPES
2x2 ACOUSTIC CEILING
2x4 ACOUSTIC CEILING
GYP CEILING
EXPOSED CEILING
2 HR HORIZ. SHAFT
4" ALUM. CEILING
ACOUSTIC-THERMAL SPRAY
WOOD LOOK GYPSUM CEILING CLOUDS
2x4 ADC DIFFUSION PANEL
4x4 ADC DIFFUSION PANEL
LIGHT FIXTURES
CONTINUOUS CEILING RECESSED
CEILING RECESSED LINEAR - VARIABLE LENGTH
2' X 2' CEILING RECESSED
2' X 2' CEILING RECESSED
ROUND CEILING RECESSED
SQUARE CEILING RECESSED
CEILING-MOUNTED PENDANT
WALL-MOUNTED SCONCE
CEILING-MOUNTED DIP/PENDANT - VARIABLE LENGTH
CEILING-MOUNTED VERTICAL SOUND BLADE
FEATURE CEILING-MOUNTED PENDANT
CEILING-MOUNTED FAN
HVAC FIXTURES
2X2 SUPPLY DIFFUSER
2X2 RETURN DIFFUSER
LINEAR RETURN DIFFUSER
ROUND DIFFUSER
CEILING EQUIPMENT
SPRINKLER HEAD RE: FIRE PROTECTION
UPRIGHT SPRINKLER HEAD
EXIT SIGN @ CEILING
EXIT SIGN @ WALL
SECURITY CAMERA
OCCUPANCY SENSOR
VACANCY SENSOR
SPEAKER
MICROPHONE/ MOTION DETECTOR RE: TECHNOLOGY/ SECURITY
FIRE SPEAKER/STROBE
PHOTOCELL
CORD REEL - RE: 1A & 1C/A211 & ELEC.
PROJECTOR SCREEN
ACCESS PANEL - REFER TO MEP DRAWINGS AND SPECS FOR LOCATIONS
EXPANSION JOINT LOCATION
NUMBERED NOTE LEGEND TAG
VISUAL / AUDIO NOTIFICATION DEVICE
SMOKE DETECTOR
HEIGHT OF CEILING ABOVE FINISH FLOOR
CEILING TYPE DESIGNATION
CEILING PLAN KEYNOTES:
SEE DETAIL 2E/A210
SEE DETAIL 5E/A210
SEE DETAIL 3D/A210
SEE DETAIL 2E/A210
SEE DETAIL 3E/A211
SEE DETAIL 4C/A210
SEE DETAIL 4C/A211
SEE DETAIL 5F/A210
SEE DETAIL 1A/A210
SEE DETAIL 3C/A210
SEE DETAIL 1B/A111,7
SEE DETAIL 1E/A211
SEE DETAIL 3E/A210
SEE DETAIL 1A/ A211 1C/ A211
SEE DETAIL 2D/A210
EXPANSION JOINT LEGEND
EXTERIOR: WALL TO WALL
INTERIOR: FLOOR TO WALL - RE: 5C/A806
INTERIOR: WALL TO WALL (FLUSH) - RE: 5B/A806
INTERIOR: WALL TO WALL (CORNER) - RE: 5A/A806
INTERIOR: CEILING TO WALL - GYP - RE: 5A/A806
INTERIOR: CEILING TO WALL - ACP - RE: 2B/A210
INTERIOR: CEILING TO CEILING - GYP - RE: 5B/A806
INTERIOR: CEILING TO CEILING - ACP - RE: 2A/A210
RESTART CEILING GRID AT TRANSITION BETWEEN CORRIDORS TYP.
TYPICAL SOFFIT CONSTRUCTION - SEE 2B/A211
EXTERIOR LINEAR LIGHT - LINEAR SOFFIT VENT
EXPOSED CEILING - PAINTED PIT
FEATURE PENDANTS (7)
CLASSROOM 2005
CLASSROOM 2007
CLASSROOM 2009
CLASSROOM 2011
CLASSROOM 2013
CLASSROOM 2015
CLASSROOM 2017
CLASSROOM 2019
CLASSROOM 2021
CLASSROOM 2023
CLASSROOM 2025
CLASSROOM 2027
CLASSROOM 2029
CLASSROOM 2031
CLASSROOM 2033
CLASSROOM 2035
CLASSROOM 2037
CLASSROOM 2039
CLASSROOM 2041
CLASSROOM 2043
CLASSROOM



1E 2 - SECOND FLOOR RCP - PART D
1/8" = 1'-0"

CEILING PLAN GRAPHIC LEGEND

CEILING TYPES
- 2x2 ACT/ATC CEILING
- 2x4 ACT/ATC CEILING
- GYP CEILING
- EXPOSED CEILING
- 2 HR HORIZ. SHAFT
- 4" ALUM. CEILING
- ACOUSTIC-THERMAL SPRAY
- WOOD LOOK GYPSUM CEILING CLOUDS
- 2x4 ADC DIFFUSION PANEL
- 4x4 ADC DIFFUSION PANEL

LIGHT FIXTURES
- CONTINUOUS CEILING RECESSED
- CEILING RECESSED LINEAR - VARIABLE LENGTH
- 2'-X'-0" CEILING RECESSED
- 2'-X'-2' CEILING RECESSED
- ROUND CEILING RECESSED
- SQUARE CEILING RECESSED
- CEILING-MOUNTED PENDANT
- WALL-MOUNTED SCONCE
- CEILING-MOUNTED DI PENDANT - VARIABLE LENGTH
- CEILING-MOUNTED VERTICAL SOUND BLADE
- FEATURE CEILING-MOUNTED PENDANT
- CEILING-MOUNTED FAN

HVAC FIXTURES
- 2X2 SUPPLY DIFFUSER
- 2X2 RETURN DIFFUSER
- LINEAR RETURN DIFFUSER
- ROUND DIFFUSER

CEILING EQUIPMENT
- SPRINKLER HEAD RE: FIRE PROTECTION
- UPRIGHT SPRINKLER HEAD
- EXIT SIGN @ CEILING
- EXIT SIGN @ WALL
- SECURITY CAMERA
- OCCUPANCY SENSOR
- VACANCY SENSOR
- SPEAKER
- MICROPHONE/ MOTION DETECTOR RE: TECHNOLOGY/ SECURITY
- FIRE SPEAKER/STROBE
- PHOTOCELL
- CORD REEL - RE: 1A & 1C/A211 & ELEC.
- PROJECTOR SCREEN
- ACCESS PANEL - REFER TO MEP DRAWINGS AND SPECS FOR LOCATIONS
- EXPANSION JOINT LOCATION
- NUMBERED NOTE LEGEND TAG
- VISUAL / AUDIO NOTIFICATION DEVICE
- SMOKE DETECTOR
- HEIGHT OF CEILING ABOVE FINISH FLOOR
- CEILING TYPE DESIGNATION

CEILING PLAN KEYNOTES:

1. SEE DETAIL 2E/A210
2. SEE DETAIL 5E/A210
3. SEE DETAIL 3D/A210
4. SEE DETAIL 2E/A210
5. SEE DETAIL 3E/A211
6. SEE DETAIL 4C/A210
7. SEE DETAIL 4C/A211
8. SEE DETAIL 5F/A210
9. SEE DETAIL 1A/A210
10. SEE DETAIL 3C/A210
11. SEE DETAIL 1B/A111.7
12. SEE DETAIL 1E/A211
13. SEE DETAIL 3E/A210
14. SEE DETAIL 1A/A211 1C/A211
15. SEE DETAIL 2D/A210

CEILING PLAN GENERAL NOTES

1. "EXPOSED CONSTRUCTION" OR "EXP. CONST." INDICATES NO CEILING. EXPOSED TO DECK. PTD.
2. CENTER LIGHT FIXTURES AND OTHER DEVICES IN ACOUSTICAL PANEL "PATTERN" UNLESS OTHERWISE INDICATED. REFER TO DETAIL BELOW.
3. CENTER ACOUSTICAL PANELS OR GRID IN SPACES UNLESS OTHERWISE INDICATED.
4. SEE SPECIFICATIONS FOR INFORMATION ON SEISMIC RESTRAINT OF CEILING SYSTEMS.
5. SEE CEILING DETAIL SHEETS FOR CEILING AND SOFFIT DETAILS.
6. SPRINKLER HEAD LOCATIONS ARE SHOWN FOR COORDINATION PURPOSES ONLY. NOT ALL SPRINKLER HEADS ARE SHOWN. FIRE PROTECTION SYSTEM INSTALLER SHALL COORDINATE SPRINKLER HEADS, IN AREAS WITHOUT SUSPENDED CEILINGS, COORDINATE LOCATIONS OF SPRINKLER HEADS WITH HVAC DUCTS, EQUIPMENT, BEAMS, COLUMNS, LIGHTS, AND ANY OTHER OBSTRUCTIONS IN ACCORDANCE WITH NFPA 13. IN AREAS WITH SUSPENDED CEILINGS, COORDINATE SPRINKLER MAINS, RUNS AND SPRINKLER HEAD LOCATIONS WITH OTHER WORK TO ENSURE CEILING HEIGHTS, LIGHTING, DIFFUSER AND OTHER CEILING DEVICE LOCATIONS ARE MAINTAINED AS SHOWN OR AS REQUIRED TO COMPLY WITH APPLICABLE CODE REQUIREMENTS. ADVISE ARCHITECT OF ANY CONFLICTS WHICH MUST BE RESOLVED PRIOR TO INSTALLATION.
7. LIGHT FIXTURES, FIRE PROTECTION DEVICES AND DIFFUSERS ARE SHOWN FOR LOCATION AND COORDINATION PURPOSES ONLY. REFER TO ELECTRICAL AND HVAC DWGS. FOR ACTUAL LIGHT FIXTURE, DIFFUSER AND FIRE PROTECTION SCHEDULES.
8. REFER TO ELECTRICAL, HVAC AND FIRE PROTECTION DWGS. FOR LIGHT FIXTURES, DIFFUSERS AND FIRE PROTECTION DEVICES IN UNFINISHED AREAS OR AREAS WITH EXPOSED STRUCTURE.
9. COORDINATE ACCESS PANEL LOCATIONS WITH MECHANICAL TRADES. SUBMIT PROPOSED LOCATIONS TO ARCHITECT FOR APPROVAL. CONTRACTOR TO LOCATE SERVICEABLE MEP AND AVIT COMPONENTS OUTSIDE OF HARD CEILING AREAS AND INTO ACCESSIBLE CEILING AREAS TO THE GREATEST EXTENT POSSIBLE.
10. ALL CEILING HEIGHTS SHALL BE 10'-0", UNLESS OTHERWISE NOTED.
11. ALL SOFFIT HEIGHTS SHALL BE 10'-0", UNLESS OTHERWISE NOTED.
12. HANGING SYSTEMS FROM OVERHEAD STRUCTURE:
    A. FOR BUILDINGS WHERE THE FLOOR & ROOF CONSTRUCTION CONSISTS OF CAST IN PLACE CONCRETE SLABS/BEAMS, PRECAST CONCRETE SLABS/BEAMS, CONCRETE FILLED METAL DECKS (SUPPORTED BY STRUCTURAL STEEL FRAMING), THE FOLLOWING SYSTEMS CAN BE HUNG:
       a. CEILINGS AND SOFFITS SYSTEMS (INCLUDING HUNG PARTITION SYSTEMS).
       b. MECHANICAL, ELECTRICAL, PLUMBING AND FIRE PROTECTION SYSTEMS AND EQUIPMENT.
       c. FOR ANY HEAVY OR LARGE SYSTEMS OR ITEMS, CONSULT WITH YOUR STRUCTURAL ENGINEER.
    B. FOR BUILDINGS WHERE THE ROOF STRUCTURE IS SIMPLE METAL ROOF DECK (NO CONCRETE FILL), THE FOLLOWING SYSTEMS CAN BE HUNG:
       a. ACOUSTIC CEILING SYSTEMS (ACT TILES, ETC.) WEIGHING LESS THAN 5 LBS/SF AND HUNG AT 4'-0" O.C. BOTH DIRECTIONS.
       b. SINGLE LAYER GYPSUM BOARD CEILING SYSTEMS WEIGHING LESS THAN 5 LBS/SF AND HUNG AT 4'-0" O.C. BOTH DIRECTIONS.
       c. DO NOT HANG ANY OTHER SYSTEM DIRECTLY FROM PLAIN ROOF STEEL DECKS UNLESS STRUCTURAL ECK CONFIRMS THAT DECK HAS BEEN DESIGNED TO SUPPORT THESE HANGING LOADS). IN LOCATIONS WHERE PLAIN ROOF STEEL DECK (NO CONCRETE FILL) IS OVERHEAD, HANG ONLY FROM STRUCTURAL STEEL FRAMING MEMBERS OR PROVIDE SECONDARY STEEL FRAMING MEMBERS (SLOTTED CHANNEL FRAMING I.E. "UNISTRUT" ETC.) OF ADEQUATE DESIGN (SPANNING BETWEEN BUILDING STRUCTURAL STEEL FRAMING MEMBERS) AS REQUIRED.
    C. FOR BUILDINGS CONSTRUCTED OF COLD-FORMED METAL FRAMING SYSTEMS, FOLLOW "SIMPLE METAL ROOF DECKS" ABOVE.
    D. REVIEW AND DISCUSS ALL UNUSUAL CONDITIONS WITH YOUR STRUCTURAL ENGINEER.
13. WHERE REFERENCED BY THIS NOTE, PROVIDE 1-HR. HORIZONTAL SHAFTWALL CEILING (WITH 4" DEEP 20 GA. FRAMING). INSTALL AS HIGH AS POSSIBLE TO UNDERSIDE OF STEEL FRAMING ABOVE.
14. SEE FINISH SCHEDULE FOR ALL WINDOW SHADE INFORMATION
15. FOR ACOUSTIC CONTINUITY AT TOPS OF PARTITIONS CENTERED ON OR DIRECTLY ADJACENT TO STEEL BEAMS, REFER TO SPECTC DETAILS ON SHEET A602

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Drawn: CP, JP
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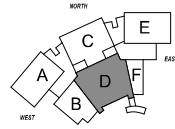
STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

SECOND FLOOR REFLECTED CEILING PLAN - PART D

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: A202D

Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_GREENWICH_CENTRAL_MS_R23.rvt
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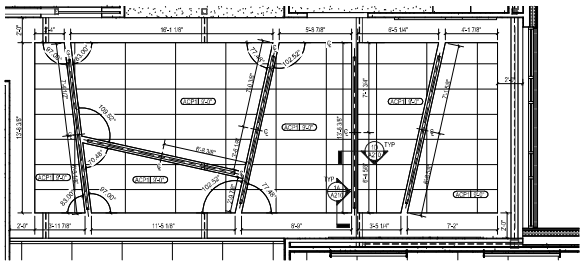
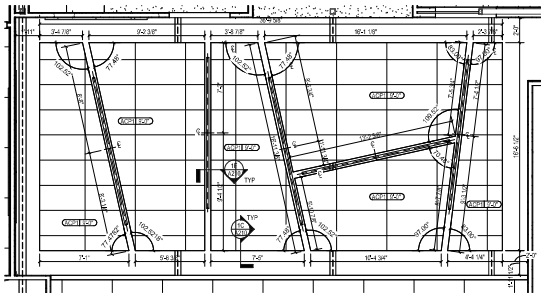


1A 2 - SECOND FLOOR RCP - Callout 1
1/4" = 1'-0"



3A 2 - SECOND FLOOR RCP - Callout 2
1/4" = 1'-0"

CEILING PLAN GRAPHIC LEGEND

CEILING TYPES
- 2x2 ACT/ATC CEILING
- 2x4 ACT/ATC CEILING
- GYP CEILING
- EXPOSED CEILING
- 2-HR HORIZ. SHAFT
- 4" ALUM. CEILING
- ACOUSTIC-THERMAL SPRAY
- WOOD LOOK GYPSUM CEILING CLOUDS
- 2x4 ADC DIFFUSION PANEL
- 4x4 ADC DIFFUSION PANEL

LIGHT FIXTURES
- CONTINUOUS CEILING RECESSED
- CEILING RECESSED LINEAR - VARIABLE LENGTH
- 2' X 4' CEILING RECESSED
- 2' X 2' CEILING RECESSED
- ROUND CEILING RECESSED
- SQUARE CEILING RECESSED
- CEILING-MOUNTED PENDANT
- WALL-MOUNTED SCONCE
- CEILING-MOUNTED D/I PENDANT - VARIABLE LENGTH
- CEILING-MOUNTED VERTICAL SOUND BLADE
- FEATURE CEILING-MOUNTED PENDANT
- CEILING-MOUNTED FAN

HVAC FIXTURES
- 2X2 SUPPLY DIFFUSER
- 2X2 RETURN DIFFUSER
- LINEAR RETURN DIFFUSER
- ROUND DIFFUSER

CEILING EQUIPMENT
- SPRINKLER HEAD RE: FIRE PROTECTION
- UPRIGHT SPRINKLER HEAD
- EXIT SIGN @ CEILING
- EXIT SIGN @ WALL
- SECURITY CAMERA
- OCCUPANCY SENSOR
- VACANCY SENSOR
- SPEAKER
- MICROPHONE/ MOTION DETECTOR RE: TECHNOLOGY/ SECURITY
- FIRE SPEAKER/STROBE
- PHOTOCELL
- CORD REEL - RE: 1A & 10A211 & ELEC.
- PROJECTOR SCREEN
- ACCESS PANEL - REFER TO MEP DRAWINGS AND SPECS FOR LOCATIONS
- EXPANSION JOINT LOCATION
- NUMBERED NOTE LEGEND TAG
- VISUAL / AUDIO NOTIFICATION DEVICE
- SMOKE DETECTOR
- HEIGHT OF CEILING ABOVE FINISH FLOOR
- CEILING TYPE DESIGNATION

EXPANSION JOINT LEGEND

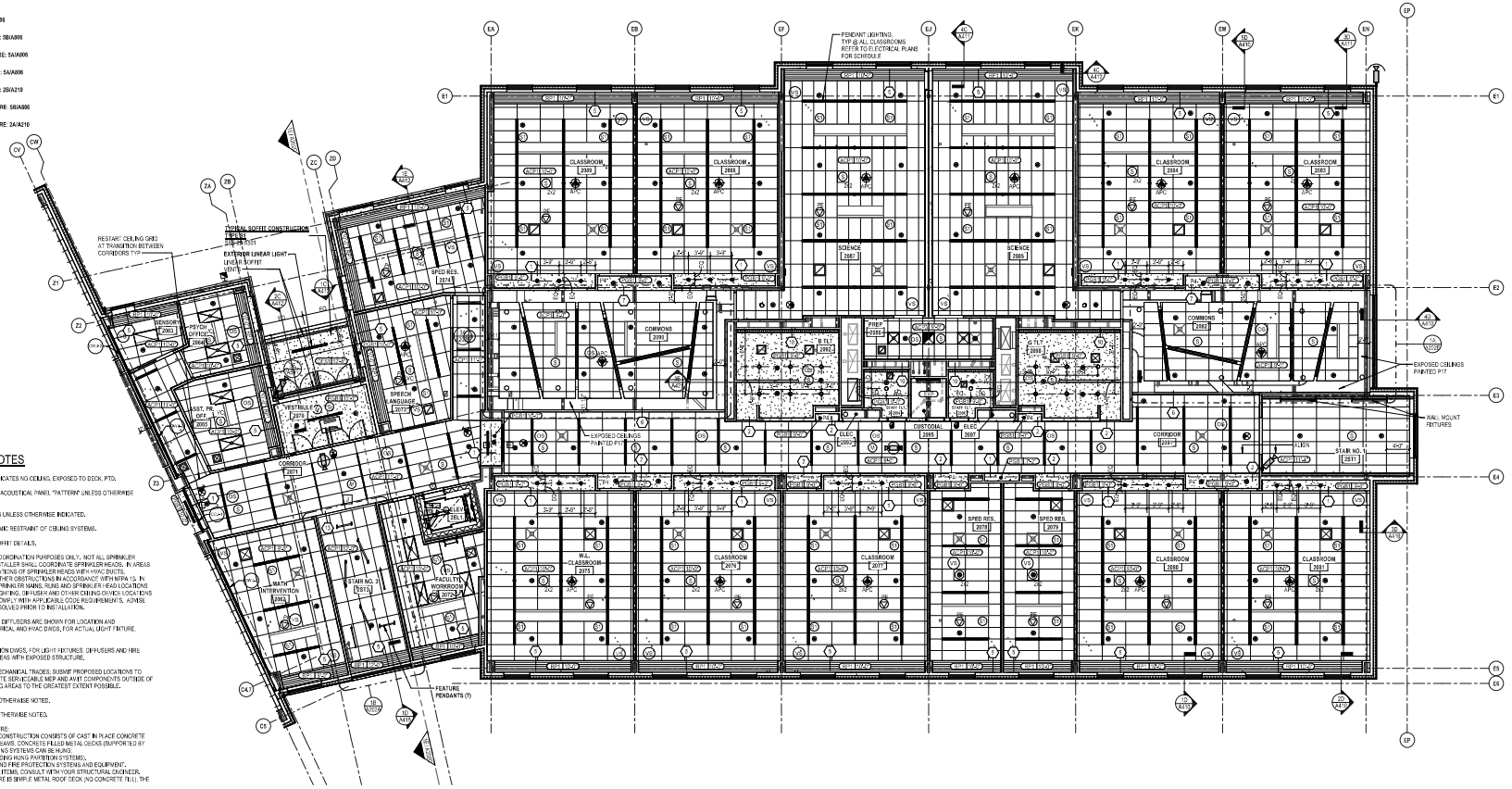
- EXTERIOR: WALL TO WALL
- INTERIOR: FLOOR TO WALL - **RE: 5C/A806**
- INTERIOR: WALL TO WALL (FLUSH) - **RE: 5B/A806**
- INTERIOR: WALL TO WALL (CORNER) - **RE: 5A/A806**
- INTERIOR: CEILING TO WALL - GYP - **RE: 5A/A806**
- INTERIOR: CEILING TO WALL - ACP - **RE: 2B/A210**
- INTERIOR: CEILING TO CEILING - GYP - **RE: 5B/A806**
- INTERIOR: CEILING TO CEILING - ACP - **RE: 2A/A210**

CEILING PLAN KEYNOTES:

1. SEE DETAIL 2E/A210
2. SEE DETAIL 5E/A210
3. SEE DETAIL 2D/A210
4. SEE DETAIL 2E/A210
5. SEE DETAIL 3E/A211
6. SEE DETAIL 4C/A210
7. SEE DETAIL 4C/A211
8. SEE DETAIL 5F/A210
9. SEE DETAIL 1A/A210
10. SEE DETAIL 3C/A210
11. SEE DETAIL 1B/A111,7
12. SEE DETAIL 1E/A211
13. SEE DETAIL 3E/A210
14. SEE DETAIL 1A/A211 1C/A211
15. SEE DETAIL 2D/A210

CEILING PLAN GENERAL NOTES

1. "EXPOSED CONSTRUCTION" OR "EXP. CONST." INDICATES NO CEILING, EXPOSED TO DECK, PTO.
2. CENTER LIGHT FIXTURES AND OTHER DEVICES IN ACOUSTICAL PANEL "PATTERN" UNLESS OTHERWISE INDICATED. REFER TO DETAIL BELOW.
3. CENTER ACOUSTICAL PANELS OR GRID IN SPACES UNLESS OTHERWISE INDICATED.
4. SEE SPECIFICATIONS FOR INFORMATION ON SEISMIC RESTRAINT OF CEILING SYSTEMS.
5. SEE CEILING DETAIL SHEETS FOR CEILING AND SOFFIT DETAILS.
6. SPRINKLER HEAD LOCATIONS ARE SHOWN FOR COORDINATION PURPOSES ONLY. NOT ALL SPRINKLER HEADS ARE SHOWN. FIRE PROTECTION SYSTEM INSTALLER SHALL COORDINATE SPRINKLER HEADS, IN AREAS WITHOUT SUSPENDED CEILINGS, COORDINATE LOCATIONS OF SPRINKLER HEADS WITH HVAC DUCTS, EQUIPMENT, BEAMS, COLUMNS, LIGHTS, AND ANY OTHER OBSTRUCTIONS IN ACCORDANCE WITH NFPA 13. IN AREAS WITH SUSPENDED CEILINGS, COORDINATE SPRINKLER MAINS, RUNS AND SPRINKLER HEAD LOCATIONS WITH OTHER WORK TO ENSURE SPRINKLER HEIGHTS, LIGHTING, DIFFUSER AND OTHER CEILING DEVICE LOCATIONS ARE MAINTAINED AS SHOWN OR AS REQUIRED TO COMPLY WITH APPLICABLE CODE REQUIREMENTS. ADVISE ARCHITECT OF ANY CONFLICTS WHICH MUST BE RESOLVED PRIOR TO INSTALLATION.
7. LIGHT FIXTURES, FIRE PROTECTION DEVICES AND DIFFUSERS ARE SHOWN FOR LOCATION AND COORDINATION PURPOSES ONLY. REFER TO ELECTRICAL AND HVAC DWGS. FOR ACTUAL LIGHT FIXTURE, DIFFUSER AND FIRE PROTECTION SCHEDULES.
8. REFER TO ELECTRICAL, HVAC AND FIRE PROTECTION DWGS. FOR LIGHT FIXTURES, DIFFUSERS AND FIRE PROTECTION DEVICES IN UNFINISHED AREAS OR AREAS WITH EXPOSED STRUCTURE.
9. COORDINATE ACCESS PANEL LOCATIONS WITH MECHANICAL TRADES. SUBMIT PROPOSED LOCATIONS TO ARCHITECT FOR APPROVAL. CONTRACTOR TO LOCATE SERVICEABLE MEP AND AVIT COMPONENTS OUTSIDE OF HARD CEILING AREAS AND INTO ACCESSIBLE CEILING AREAS TO THE GREATEST EXTENT POSSIBLE.
10. ALL CEILING HEIGHTS SHALL BE 10'-0", UNLESS OTHERWISE NOTED.
11. ALL SOFFIT HEIGHTS SHALL BE 10'-0", UNLESS OTHERWISE NOTED.
12. HANGING SYSTEMS FROM OVERHEAD STRUCTURE:
    A. FOR BUILDINGS WHERE THE FLOOR & ROOF CONSTRUCTION CONSISTS OF CAST IN PLACE CONCRETE SLABS/BEAMS, PRECAST CONCRETE SLABS/BEAMS, CONCRETE FILLED METAL DECKS (SUPPORTED BY STRUCTURAL STEEL FRAMING), THE FOLLOWING SYSTEMS CAN BE HUNG:
        a. CEILINGS AND SOFFITS SYSTEMS (INCLUDING HUNG PARTITION SYSTEMS),
        b. MECHANICAL, ELECTRICAL, PLUMBING, AND FIRE PROTECTION SYSTEMS AND EQUIPMENT,
        c. FOR ANY HEAVY OR LARGE SYSTEMS OR ITEMS, CONSULT WITH YOUR STRUCTURAL ENGINEER.
    B. FOR BUILDINGS WHERE THE ROOF STRUCTURE IS SIMPLE METAL ROOF DECK (NO CONCRETE FILL), THE FOLLOWING SYSTEMS CAN BE HUNG:
        a. ACOUSTIC CEILING SYSTEMS (ACT TILES, ETC.) WEIGHING LESS THAN 5 LBS/SF AND HUNG AT 4'-0" O.C. BOTH DIRECTIONS.
        b. SINGLE LAYER GYPSUM BOARD CEILING SYSTEMS WEIGHING LESS THAN 5 LBS/SF AND HUNG AT 4'-0" O.C. BOTH DIRECTIONS.
        c. **DO NOT HANG ANY OTHER SYSTEM OR ITEM DIRECTLY FROM PLAIN ROOF STEEL DECKS** (UNLESS STRUCTURAL ECOR CONFIRMS THAT DECK HAS BEEN DESIGNED TO SUPPORT THESE HANGING LOADS). IN LOCATIONS WHERE PLAIN ROOF STEEL DECK (NO CONCRETE FILL) IS OVERHEAD, HANG ONLY FROM STRUCTURAL STEEL FRAMING MEMBERS OR PROVIDE SECONDARY STEEL FRAMING MEMBERS (SLOTTED CHANNEL FRAMING, I.E., UNISTRUT, ETC.) OF ADEQUATE DESIGN SPANNING BETWEEN BUILDING STRUCTURAL STEEL FRAMING MEMBERS) AS REQUIRED.
    C. FOR BUILDINGS CONSTRUCTED OF COLD-FORMED METAL FRAMING SYSTEMS, FOLLOW "SIMPLE METAL ROOF DECKS" ABOVE.
    D. REVIEW AND DISCUSS ALL UNUSUAL CONDITIONS WITH YOUR STRUCTURAL ENGINEER.
13. WHERE REFERENCED BY THIS NOTE, PROVIDE 5HR. HORIZONTAL SHAFTWALL CEILING (WITH 4" DEEP 20 GA. FRAMING). INSTALL AS HIGH AS POSSIBLE TO UNDERSIDE OF STEEL FRAMING ABOVE.
14. SEE FINISH SCHEDULE FOR ALL WINDOW SHADE INFORMATION.
15. FOR ACOUSTIC CONTINUITY AT TOPS OF PARTITIONS CENTERED ON OR DIRECTLY ADJACENT TO STEEL BEAMS, REFER TO SPECTIC DETAILS ON SHEET A502



1E 2 - SECOND FLOOR RCP - PART E
1/8" = 1'-0"

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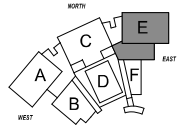
Drawn: CP, JP
Checked: JZ

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane,
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

SECOND FLOOR REFLECTED CEILING PLAN - PART E

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A202E

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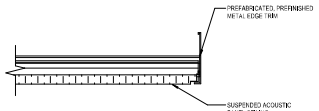
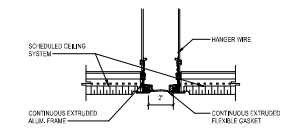
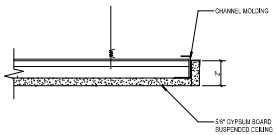


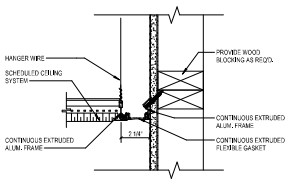
1A CEILING DETAIL AT ACOUSTIC PANEL CLOUD W/ METAL EDGE TRIM
3" = 1'-0"



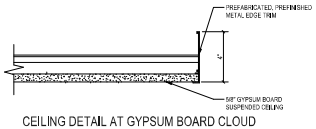
2A CEILING EJ - CCJ-2
3" = 1'-0"



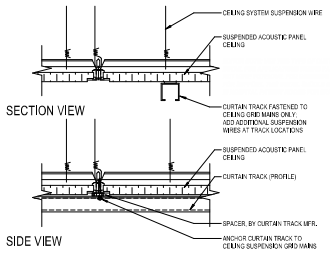
1B CEILING DETAIL AT GYPSUM BOARD CLOUD
3" = 1'-0"



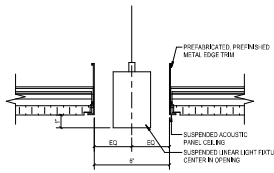
2B CEILING EJ - CWJ - 2
3" = 1'-0"



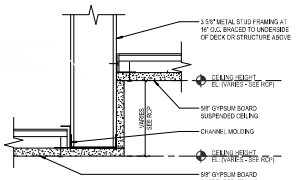
1C CEILING DETAIL AT GYPSUM BOARD CLOUD WITH METAL EDGE TRIM
3" = 1'-0"



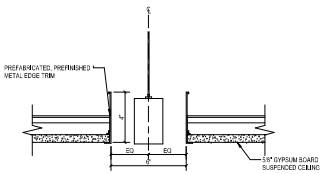
2C CEILING DETAIL AT CURTAIN TRACK (TYPE 1)
3" = 1'-0"



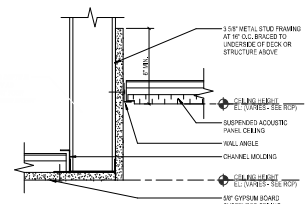
1D CEILING DETAIL AT ACOUSTIC PANEL CLOUD W/ METAL EDGE TRIM LIGHTING
3" = 1'-0"



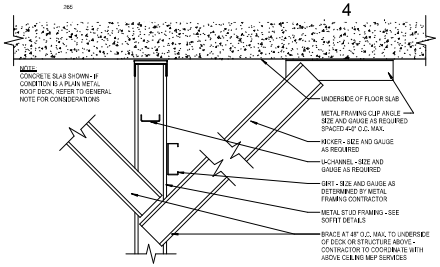
2D SOFFIT DETAIL AT GYPSUM BOARD CEILING HEIGHT TRANSITION
3" = 1'-0"



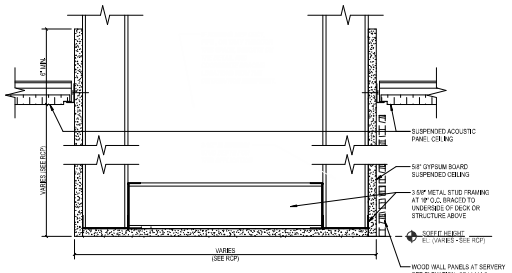
1E CEILING DETAIL AT GYPSUM BOARD CLOUD WITH METAL EDGE TRIM @ LIGHT
3" = 1'-0"



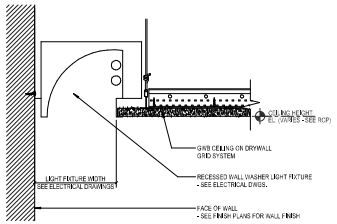
2E SOFFIT DETAIL - ACOUSTIC PANEL CEILING TO GYPSUM BOARD AT CEILING HEIGHT TRANSITION
3" = 1'-0"



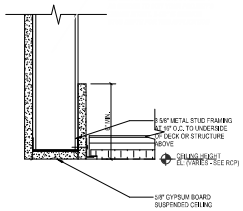
3A TYPICAL SOFFIT BRACING DETAIL
3" = 1'-0"



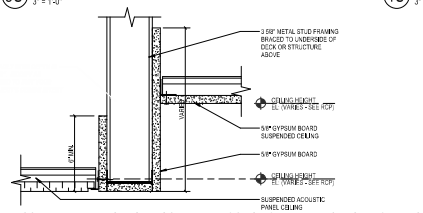
3B SOFFIT DETAIL - DUCT SOFFIT DETAIL
3" = 1'-0"



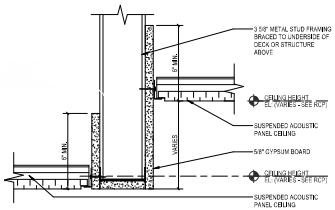
3C GWB/CEILING GRID - FIXTURE DETAILS
3" = 1'-0"



4C SOFFIT DETAIL - SINGLE STUD SOFFIT
1" = 1'-0"



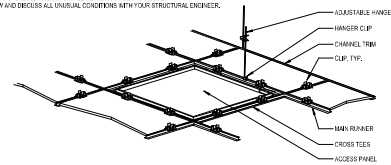
3D SOFFIT DETAIL - GYPSUM SOFFIT AT ACOUSTIC PANEL to GYPSUM CEILING CEILING HEIGHT TRANSITION
3" = 1'-0"



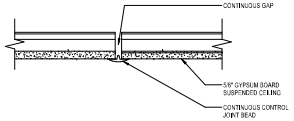
3E SOFFIT DETAIL - GYPSUM SOFFIT AT ACOUSTIC PANEL CEILING HEIGHT TRANSITION
3" = 1'-0"

GENERAL NOTE APPLICABLE TO ALL CEILING DETAILS

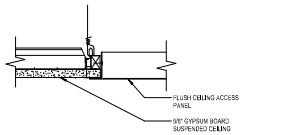
A. FOR BUILDINGS WHERE THE FLOOR & ROOF CONSTRUCTION CONSISTS OF CAST IN PLACE CONCRETE SLABS/BEAMS, PRECAST CONCRETE SLABS/BEAMS, CONCRETE FILLED METAL DECKS (SUPPORTED BY STRUCTURAL STEEL FRAMING), TIMBER FRAMING MEMBERS, OR MASS TIMBER/CLT SLABS AND BEAMS, THE FOLLOWING SYSTEMS CAN BE HUNG:
   a. CEILINGS AND SOFFITS SYSTEMS INCLUDING HUNG PARTITION SYSTEMS.
   b. MECHANICAL, ELECTRICAL, PLUMBING, AND FIRE PROTECTION SYSTEMS AND EQUIPMENT.
   c. FOR ANY HEAVY OR LARGE SYSTEMS OR ITEMS, CONSULT WITH YOUR STRUCTURAL ENGINEER.
B. FOR BUILDINGS WHERE THE ROOF STRUCTURE IS SIMPLE METAL ROOF DECK (NO CONCRETE FILL), THE FOLLOWING SYSTEMS CAN BE HUNG:
   a. ACOUSTIC CEILING SYSTEMS (ACT TILES, ETC.) WEIGHING LESS THAN 5 LBS/SF AND HUNG AT 4'-0" O.C. BOTH DIRECTIONS.
   b. SINGLE LAYER GYPSUM BOARD CEILING SYSTEMS WEIGHING LESS THAN 1 LBS/SF AND HUNG AT 4'-0" O.C. BOTH DIRECTIONS.
   c. DO NOT HANG ANY OTHER SYSTEM OR ITEM (ABSENT FROM PLAN NOTE #1) ON ROOF STRUCTURE (UNLESS STRUCTURAL E.O.R. CONFIRMS THAT DECK HAS BEEN DESIGNED TO SUPPORT THESE HANGING LOADS). IN LOCATIONS WHERE PLAIN ROOF STEEL DECK (NO CONCRETE FILL) IS OVERHEAD, HANG ONLY FROM STRUCTURAL STEEL FRAMING MEMBERS OR PROVIDE SECONDARY STEEL FRAMING MEMBERS (SLOTTED CHANNEL FRAMING, I.E. "UNISTRUT", ETC.) OF ADEQUATE DESIGN SPANNING BETWEEN BUILDING STRUCTURAL STEEL FRAMING MEMBERS), AS REQUIRED.
C. FOR BUILDINGS CONSTRUCTED OF LIGHTWEIGHT WOOD FRAMING (RESIDENTIAL STYLE FRAMING 2" NOM. THICK) AND/OR COLD-FORMED METAL FRAMING SYSTEMS, FOLLOW "SIMPLE METAL ROOF DECKS" ABOVE.
D. REVIEW AND DISCUSS ALL UNUSUAL CONDITIONS WITH YOUR STRUCTURAL ENGINEER.



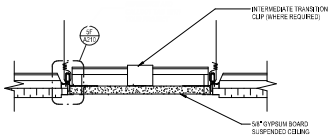
5A CEILING ACCESS PANEL DIAGRAM
3" = 1'-0"



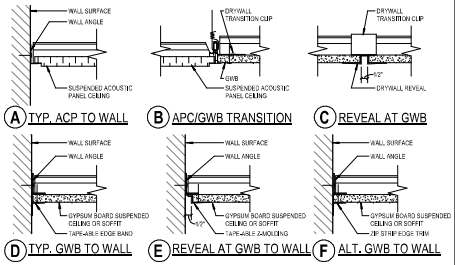
5B CEILING DETAIL AT CONTROL JOINT IN GYPSUM BOARD CEILING
3" = 1'-0"



5C CEILING DETAIL AT ACCESS PANEL
3" = 1'-0"



5E SOFFIT - FLUSH SOFFIT
3" = 1'-0"



5F TYPICAL CEILING TRANSITION DETAILS
3" = 1'-0"

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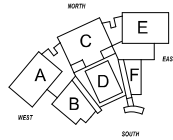
Drawn JP
Checked JZ

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/03/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

CEILING DETAILS

Date 07/08/2024
Scale As indicated
Proj. Number 22367.00
Drawing Number A210

Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_GREENWICH_CENTRAL_MS_R23.rvt
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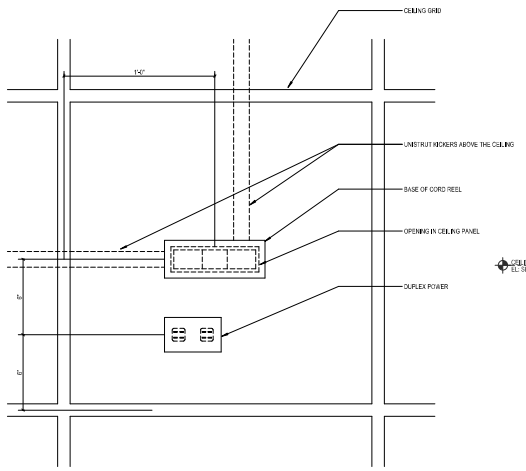
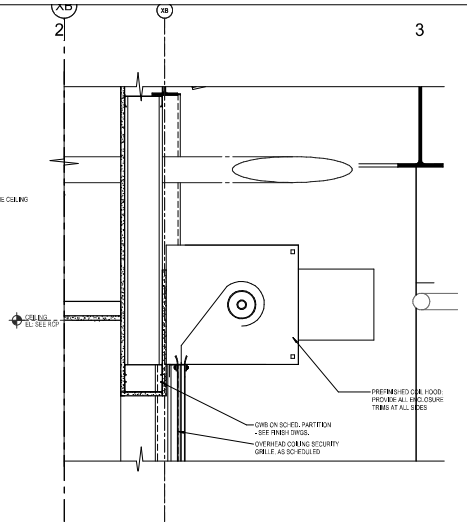
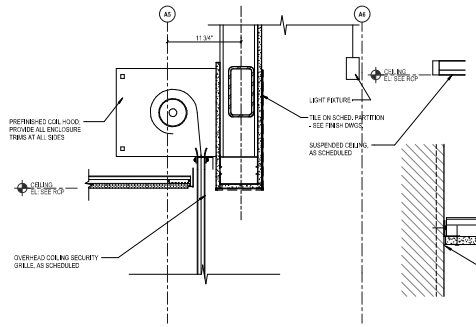


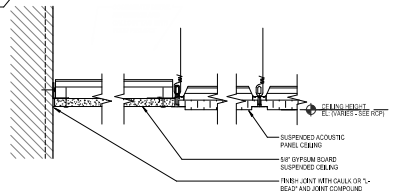
1A TYPICAL POWER CORD REEL PLAN DETAIL
3" = 1'-0"



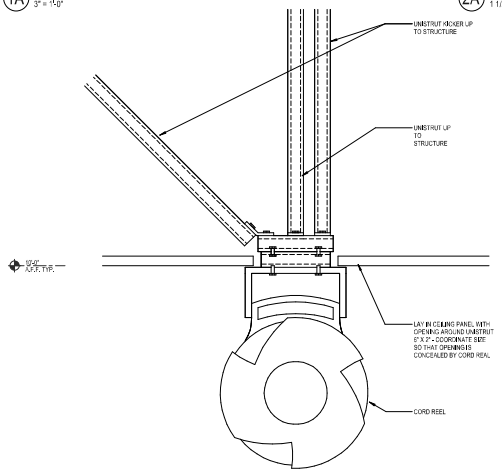
2A Section 8
1 1/2" = 1'-0"



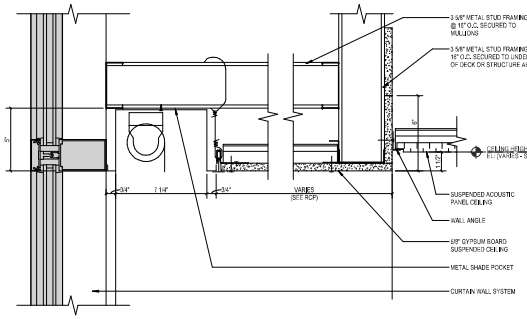
3A SECTION DETAIL @ OH GRILLE
1 1/2" = 1'-0"



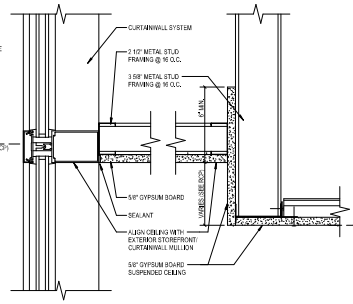
4A PERIMETER - FLUSH GYPSUM SOFFIT DETAIL
3" = 1'-0"



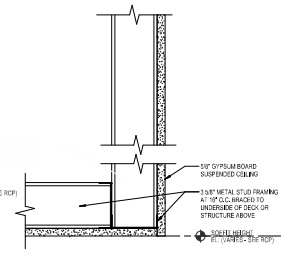
1C TYPICAL POWER CORD REEL SECTION DETAIL
3" = 1'-0"



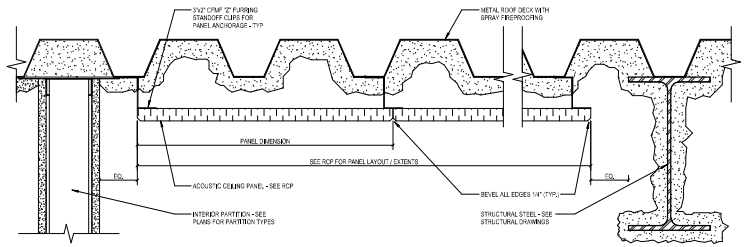
2C CEILING DETAIL - PERIMETER SHADE POCKET AT CURTAINWALL
3" = 1'-0"



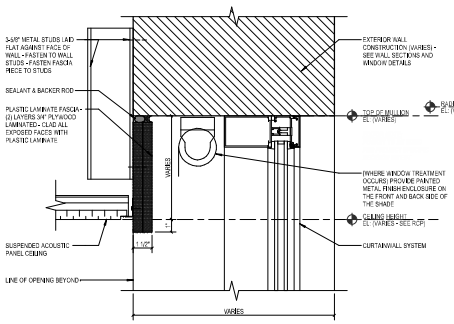
PERIMETER DETAIL @ EXTERIOR CURTAIN WALL/STOREFRONT
3" = 1'-0"



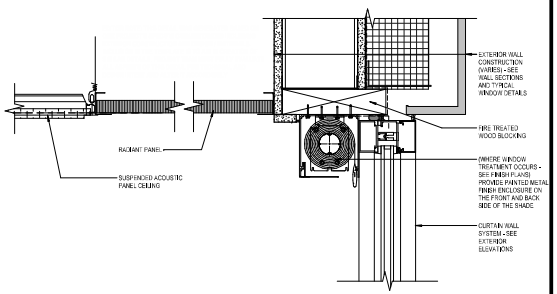
4C SOFFIT DETAIL - SOFFIT DETAIL @ CLASSROOM
3" = 1'-0"



1E CEILING DETAIL AT ACOUSTIC PANEL @ UNDERSIDE OF STRUCTURE
3" = 1'-0"



2E SOFFIT DETAIL - WINDOW SOFFIT
3" = 1'-0"



3E SOFFIT DETAIL AT CEILING RADIANT PANEL
3" = 1'-0"

GENERAL NOTE APPLICABLE TO ALL CEILING DETAILS

A. FOR BUILDINGS WHERE THE FLOOR & ROOF CONSTRUCTION CONSISTS OF CAST IN PLACE CONCRETE SLABS/BEAMS, PRECAST CONCRETE SLABS/BEAMS, CONCRETE FILLED METAL DECKS (SUPPORTED BY STRUCTURAL STEEL FRAMING), TIMBER FRAMING MEMBERS, OR MASS TIMBER/CLT SLABS AND BEAMS, THE FOLLOWING SYSTEMS CAN BE HUNG:
   a. CEILINGS AND SOFFITS SYSTEMS (INCLUDING HUNG PARTITION SYSTEMS).
   b. MECHANICAL, ELECTRICAL, PLUMBING, AND FIRE PROTECTION SYSTEMS AND EQUIPMENT.
   c. FOR ANY HEAVY OR LARGE SYSTEMS OR ITEMS, CONSULT WITH YOUR STRUCTURAL ENGINEER.
B. FOR BUILDINGS WHERE THE ROOF STRUCTURE IS SIMPLE METAL ROOF DECK (NO CONCRETE FILL), THE FOLLOWING SYSTEMS CAN BE HUNG:
   a. ACOUSTIC CEILING SYSTEMS (ACT TILES, ETC.) WEIGHING LESS THAN 5 LBS/SF AND HUNG AT 4'-0" O.C. BOTH DIRECTIONS.
   b. SINGLE LAYER GYPSUM BOARD CEILING SYSTEMS WEIGHING LESS THAN 7 LBS/SF AND HUNG AT 4'-0" O.C. BOTH DIRECTIONS.
   c. DO NOT HANG ANY OTHER SYSTEM OR ITEM DIRECTLY FROM PLAIN ROOF STEEL DECKS UNLESS STRUCTURAL E.O.R. CONFIRMS THAT DECK HAS BEEN DESIGNED TO SUPPORT THESE HANGING LOADS. IN LOCATIONS WHERE PLAIN ROOF STEEL DECK, NO CONCRETE FILL, IS OVERHEAD, HANG ONLY FROM STRUCTURAL STEEL FRAMING MEMBERS OR PROVIDE SECONDARY STEEL FRAMING MEMBERS (SLOTTED CHANNEL FRAMING, I.E. "UNISTRUT", ETC.) OF ADEQUATE DESIGN (SPANNING BETWEEN BUILDING STRUCTURAL STEEL FRAMING MEMBERS) AS REQUIRED.
C. FOR BUILDINGS CONSTRUCTED OF LIGHTWEIGHT WOOD FRAMING (RESIDENTIAL STYLE FRAMING 2" NOM. THICK) AND/OR COLD-FORMED METAL FRAMING SYSTEMS, FOLLOW "SIMPLE METAL ROOF DECKS" ABOVE.
D. REVIEW AND DISCUSS ALL UNUSUAL CONDITIONS WITH YOUR STRUCTURAL ENGINEER.

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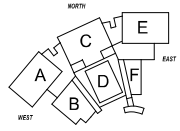

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2
1	MM/DD/YYYY	Editor Notes

CEILING DETAILS

Date 07/08/2024
Scale As indicated
Proj. Number 22367.00
Drawing Number A211

Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_GREENWICH_CENTRAL_MS_R22.rvt
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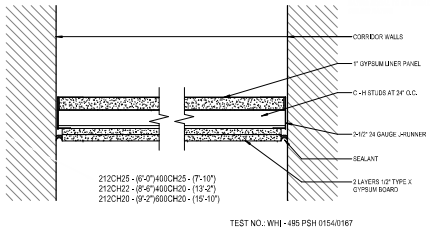
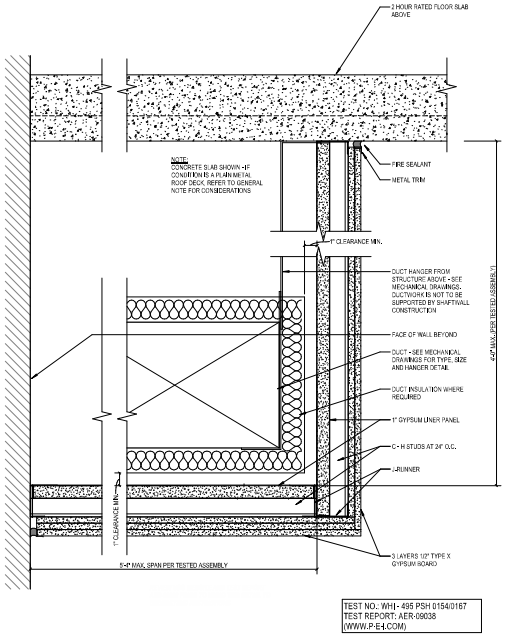
GENERAL NOTE APPLICABLE TO ALL CEILING DETAILS

A. FOR BUILDINGS WHERE THE FLOOR & ROOF CONSTRUCTION CONSISTS OF CAST IN PLACE CONCRETE SLABS/BEAMS, PRECAST CONCRETE SLABS/BEAMS, CONCRETE FILLED METAL DECKS (SUPPORTED BY STRUCTURAL STEEL FRAMING), TIMBER FRAMING MEMBERS, OR MASS TIMBER/CLT SLABS AND BEAMS, THE FOLLOWING SYSTEMS CAN BE HUNG:
   a. CEILINGS AND SOFFITS SYSTEMS INCLUDING HUNG PARTITION SYSTEMS.
   b. MECHANICAL, ELECTRICAL, PLUMBING, AND FIRE PROTECTION SYSTEMS AND EQUIPMENT.
   c. FOR ANY HEAVY OR LARGE SYSTEMS OR ITEMS, CONSULT WITH YOUR STRUCTURAL ENGINEER.
B. FOR BUILDINGS WHERE THE ROOF STRUCTURE IS SIMPLE METAL ROOF DECK (NO CONCRETE FILL), THE FOLLOWING SYSTEMS CAN BE HUNG:
   a. ACOUSTIC CEILING SYSTEMS (ACT TILES, ETC.) WEIGHING LESS THAN 5 LBS/SF AND HUNG AT 4'-0" O.C. BOTH DIRECTIONS.
   b. SINGLE LAYER GYPSUM BOARD CEILING SYSTEMS WEIGHING LESS THAN 5 LBS/SF AND HUNG AT 4'-0" O.C. BOTH DIRECTIONS.
   c. DO NOT HANG ANY OTHER SYSTEM OR ITEM (ABOVE) FROM PLAIN ROOF STEEL DECKS (UNLESS STRUCTURAL E.O.R. CONFIRMS THAT DECK HAS BEEN DESIGNED TO SUPPORT THESE HANGING LOADS). IN LOCATIONS WHERE PLAIN ROOF STEEL DECK (NO CONCRETE FILL) IS OVERHEAD, HANG ONLY FROM STRUCTURAL STEEL FRAMING MEMBERS OR PROVIDE SECONDARY STEEL FRAMING MEMBERS (SLOTTED CHANNEL FRAMING, I.E. "UNISTRUT", ETC.) OF ADEQUATE DESIGN (SPANNING BETWEEN BUILDING STRUCTURAL STEEL FRAMING MEMBERS), AS REQUIRED.
C. FOR BUILDINGS CONSTRUCTED OF LIGHTWEIGHT WOOD FRAMING (RESIDENTIAL STYLE FRAMING 2" NOM. THICK AND/OR COLD-FORMED METAL FRAMING SYSTEMS, FOLLOW "SIMPLE METAL ROOF DECKS" ABOVE.
D. REVIEW AND DISCUSS ALL UNUSUAL CONDITIONS WITH YOUR STRUCTURAL ENGINEER.



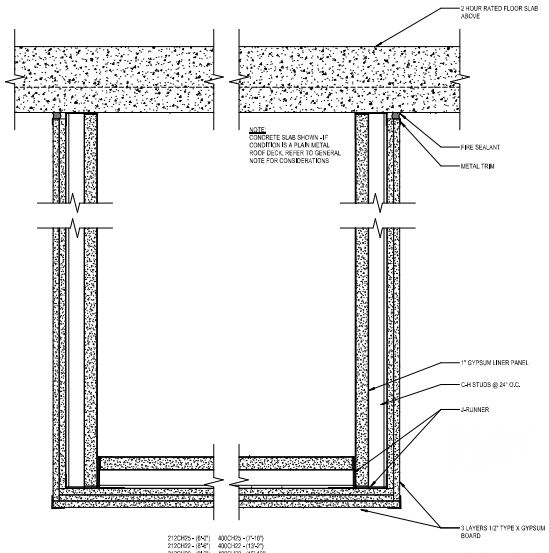
TEST NO.: WH - 495 PSH 0154/0167

3C HORIZONTAL SHAFT WALL @ CEILING - 2 HR RATED ASSEMBLY
3" = 1'-0"



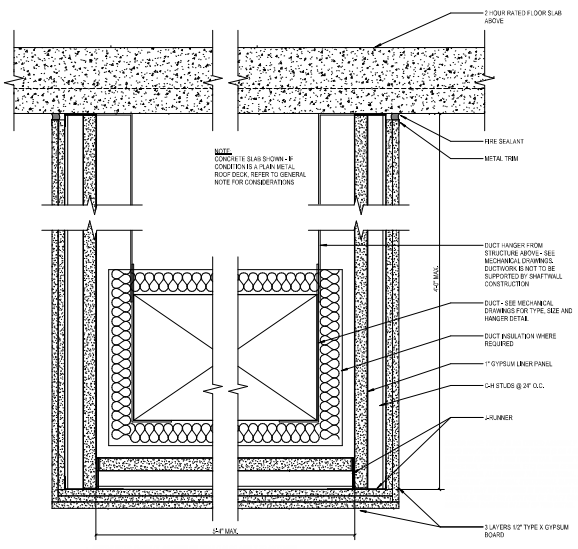
TEST NO.: WH - 495 PSH 0154/0167
TEST REPORT: AER-09038 (WWW.P-E4.COM)

4C HORIZONTAL SHAFT WALL - 2 HR RATED ASSEMBLY
3" = 1'-0"



TEST NO.: WH-495 PSH 0154/0167

3E HORIZONTAL SHAFT CEILING - 2 HR RATED ASSEMBLY
3" = 1'-0"



TEST NO.: WH-495 PSH 0154/0167

4E HORIZONTAL SHAFT WALL DUST ENCLOSING - 2 HR RATED ASSEMBLY
3" = 1'-0"

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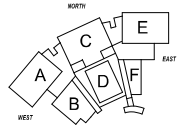

KEYPLAN

Number	Date	Issued For
1	09/30/2024 07/08/2024 MM/DD/YYYY	BIDDING PERMIT PHASE 2 Editor Notes

CEILING DETAILS - SHAFT WALL

Date: 07/08/2024
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Proj. Number: 22367.00
Drawing Number: A212

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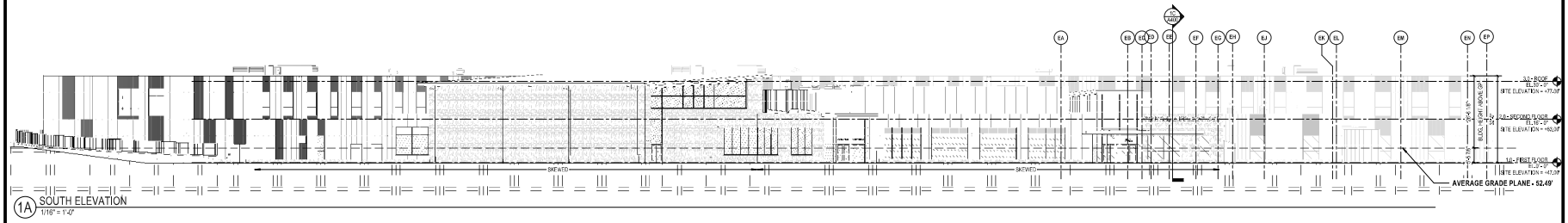
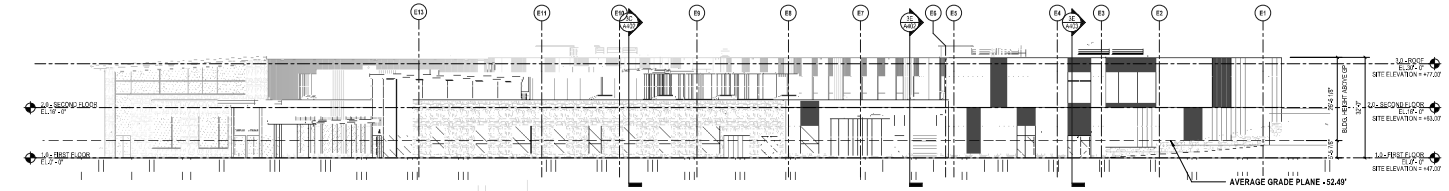
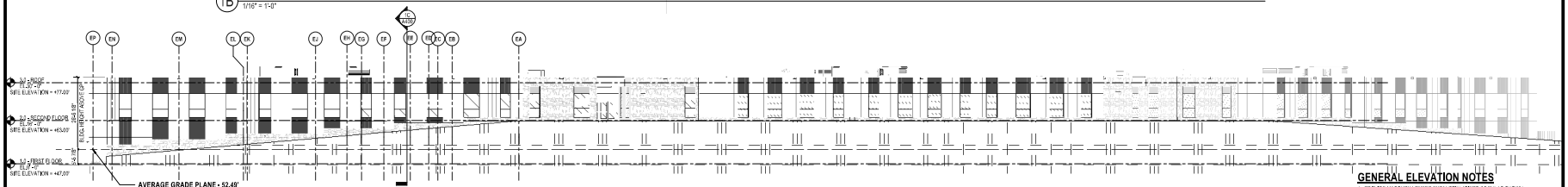


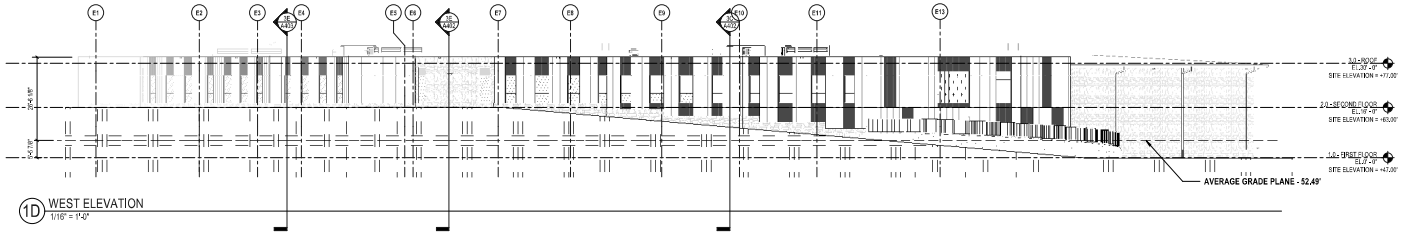
1A SOUTH ELEVATION
1/16" = 1'-0"



1B EAST ELEVATION
1/16" = 1'-0"



1C NORTH ELEVATION
1/16" = 1'-0"



1D WEST ELEVATION
1/16" = 1'-0"

GENERAL ELEVATION NOTES

1. PROVIDE MASONRY VENEER EXPANSION JOINTS (MVEJ) AS SHOWN. CONTROL JOINTS TO BE FILLED WITH MORTAR-MATCHING SEALANT, BACKER ROD AND COMPRESSIBLE FILLER, SEE EXTERIOR ELEVATIONS FOR MVEJ LOCATIONS. CONSULT ARCHITECT BEFORE ADDING OR MOVING LOCATION OF ANY MVEJ. CONSULT ARCHITECT FOR ANY CONDITION EXCEEDING 20'-0" OR EXCEEDING 10'-0" FROM CORNERS, ALL INSIDE CORNER JOINTS IN MASONRY VENEERS ARE TO BE TREATED AS A MVEJ.

2. ALL EXTERIOR WALL MOUNTED DEVICES INCLUDING BUT LIMITED TO: OVERFLOW ROOF DRAIN OUTLETS, HOSE BIBS, SECURITY CAMERAS, LIGHT FIXTURES, LOUD SPEAKERS/ HORNS AND OUTLETS SHALL BE CENTERED IN FIBER CEMENT PANELS, TYP..

ELEVATION GRAPHIC LEGEND

O.F./O.D. - OVERFLOW ROOF DRAIN OUTLET (PER PLUMBING DRAWINGS)
H.B. - HOSE BIB (PER PLUMBING DRAWINGS)
S.C. - SECURITY CAMERA (PER TECHNOLOGY DRAWINGS)
L.F. - LIGHT FIXTURE (PER ELECTRICAL DRAWINGS)
L.S. - LOUD SPEAKER (PER TECHNOLOGY DRAWINGS)
E.O. - ELECTRICAL OUTLET, GFI (PER ELECTRICAL DRAWINGS)
SB - STROBE (PER TECHNOLOGY DRAWINGS)
A.P. - ACCESS POINT (PER TECHNOLOGY DRAWINGS)
C.R. - CARD READER (PER TECHNOLOGY DRAWINGS)
F.A. - FIRE ALARM STROBE (PER ELECTRICAL DRAWINGS)

M.V.E.J. - MASONRY VENEER EXPANSION JOINT (MVEJ) - RE: 18/AS02
F.M.J. - FACADE MOVEMENT JOINT
- LOOSE LINTEL OR HUNG LINTEL - RE: A606 & A641, A642
E.J. - EXPANSION JOINT
- THROUGH WALL METAL FLASHING (AT BASE OF WALLS)
ST.F. - STOREFRONT / CURTAIN WALL TYPE RE: SHEETS A630 - A632

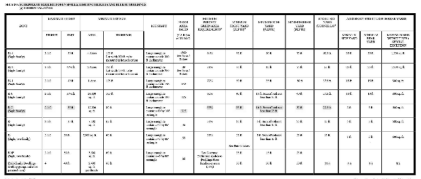
- STONE VENEER (ASHLAR PATTERN) TYPE 01A & 01B, 03 and 04
- TYP. FCP PANEL 1.5X6 (VERTICAL) EXTERIOR WALL ASSEMBLY TYPE 02A & 02B and 05

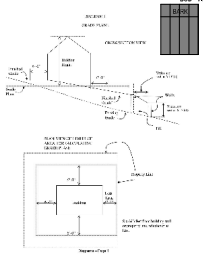
ZONING DATA TABLE

CHARACTERISTICS	REQUIREMENT	EXISTING	PROPOSED
TOTAL PARCEL ACREAGE	12,000 SQ. FT. MIN	21.72 AC (946,123 SF)	21.72 AC (946,123 SF)
ZONE:	R-12	R-12	R-12
ZONING SETBACKS:			
FRONT YARD:	35'-0"	101'-0"	596'-9"
SIDE YARD:	10 FT SUM OF BOTH NOT LESS THAN 25 FT	101' 0"	94' 3"
REAR YARD:	35'-0"	583'-8"	84'-3"
GREEN AREA	55%	78.4%	72.9%
MAXIMUM FAR:	0.3150	111,417 SF, .1178	126,500 SF, .1358
MINIMUM LOT WIDTH:	80 FEET MIN.	566'-0"	566'-0"
MAXIMUM BUILDING HEIGHT:	2 ½ STORIES, 35 FEET	24.33 FEET	2 STORIES, 26.51 FEET
CALCULATED GRADE PLANE	-	-	52.49'

SCHEDULE OF REQUIRED OPEN SPACES, LIMITING HEIGHTS AND BULK OF BUILDINGS

GREENWICH MUNICIPAL CODE





GLAZING GRAPHIC LEGEND (EXT.)

ICS - INSULATED COATED SPANDREL GLAZING (PROVIDE FRICTION FIT MINERAL WOOL INSULATION AT ALL SPANDREL GLAZING)
IG - INSULATED CLEAR GLAZING
- INSULATED SECURITY GLAZING (SCHOOL GUARD)
- INSULATED FROSTED GLAZING
- INSULATED TEMPERED SAFETY GLASS
- INSULATED BALLISTIC LEVEL 3 GLAZING
- INSULATED FROSTED SAFETY GLASS
- INSULATED LAMINATED GLAZING

REFER TO A610 FOR OTHER GLAZING TYPES

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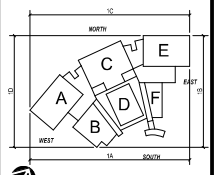

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

BUILDING ELEVATIONS

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A300

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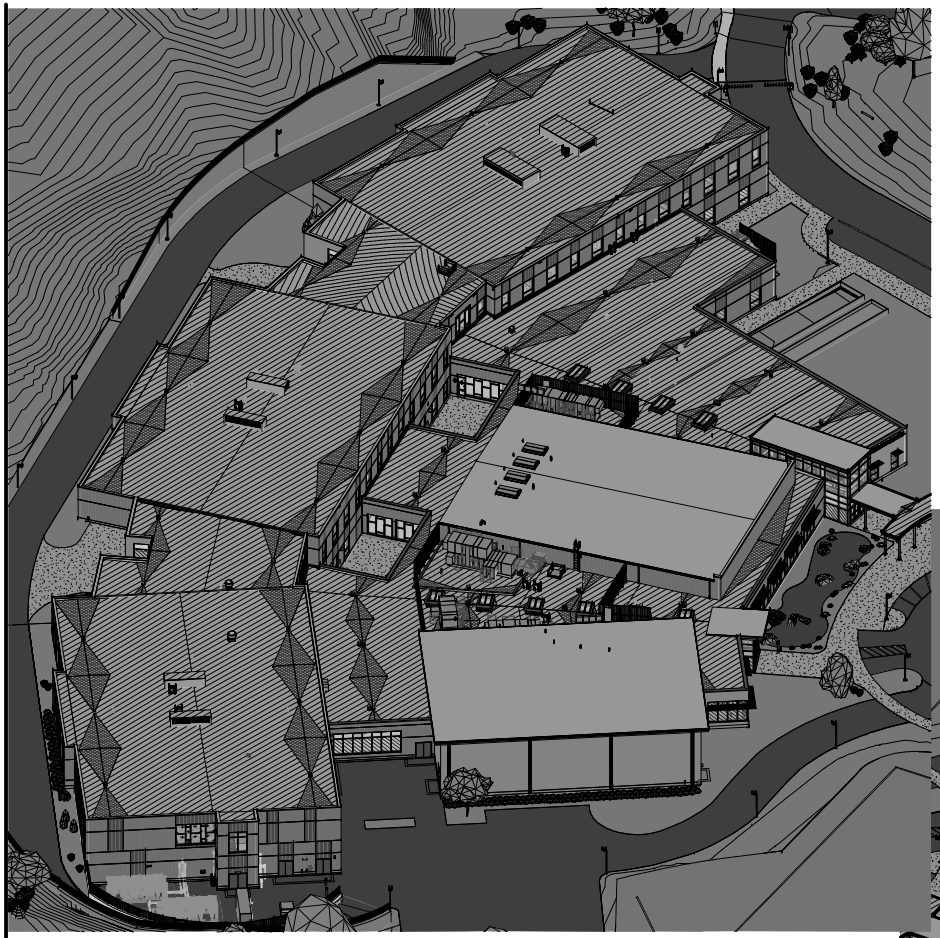

1D 3D AXON VIEW 02



4E 3D AXON VIEW 01

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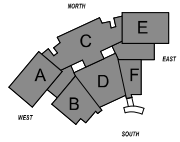

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

AXON 3D VIEWS

Date
07/08/2024
Scale
Proj. Number
22367.00

Drawing Number
A301

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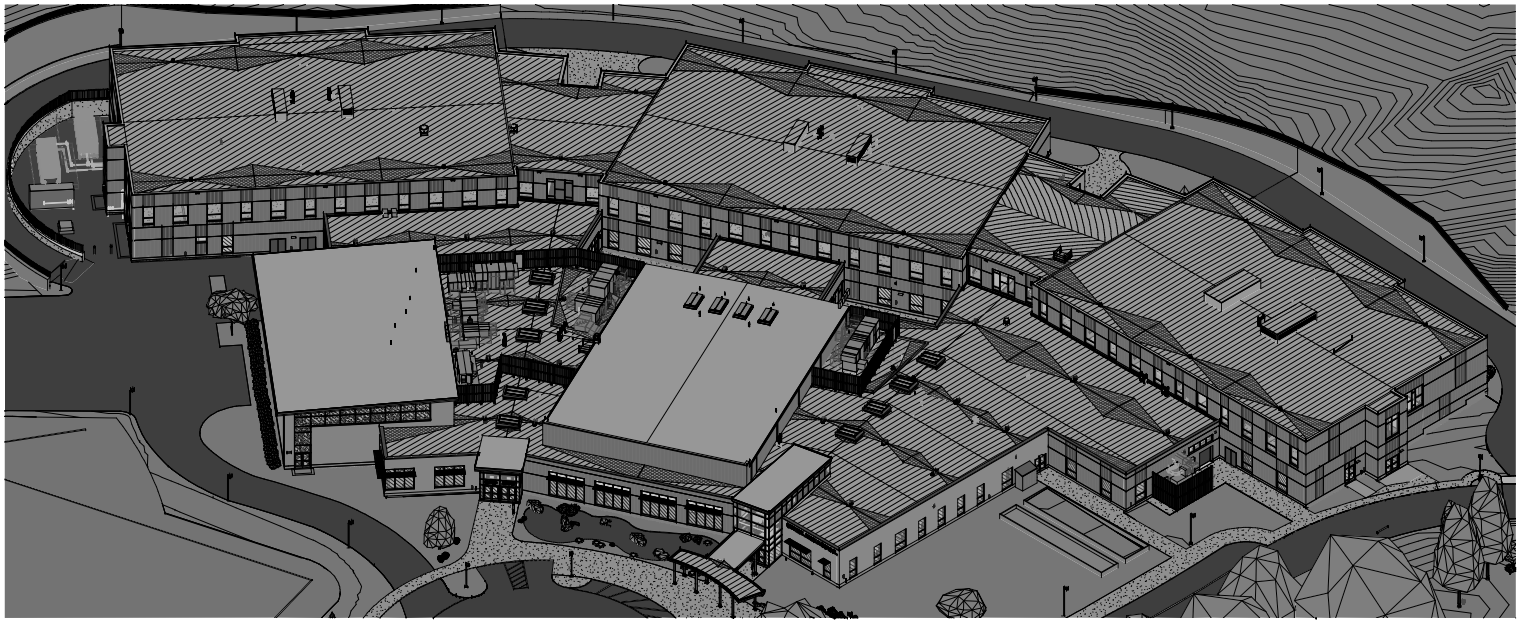
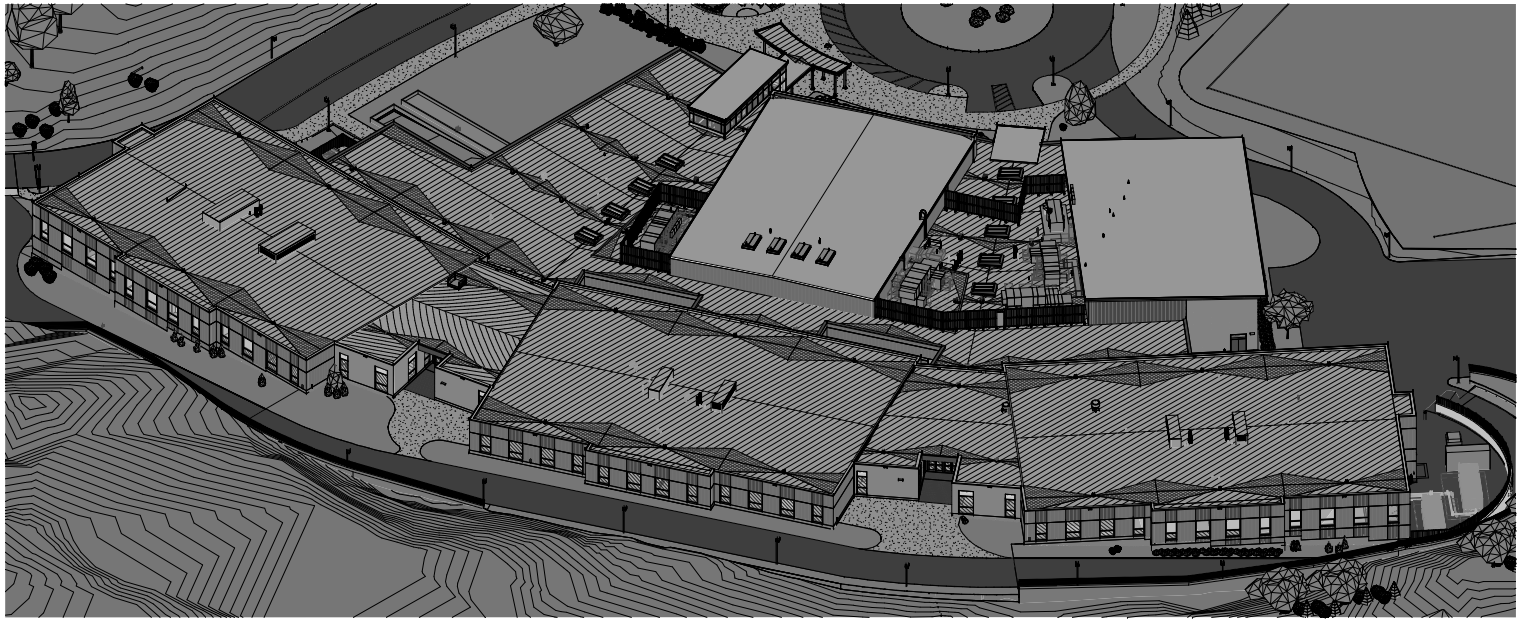


1C 3D AXON VIEW 03



1E 3D AXON VIEW 04

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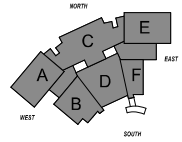

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

AXON 3D VIEWS

Date
07/08/2024
Scale
Proj. Number
22367.00

Drawing Number
A302

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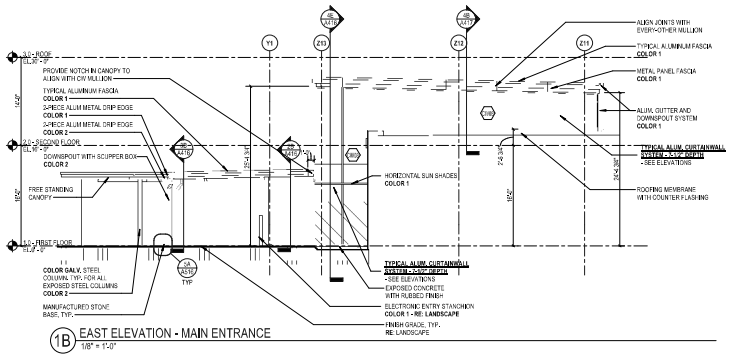
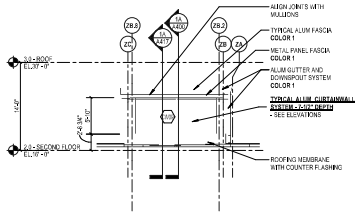
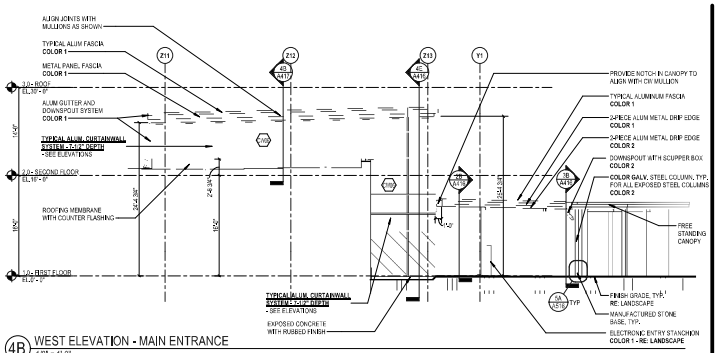


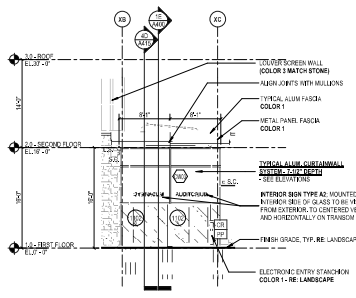
1B EAST ELEVATION - MAIN ENTRANCE
1/8" = 1'-0"



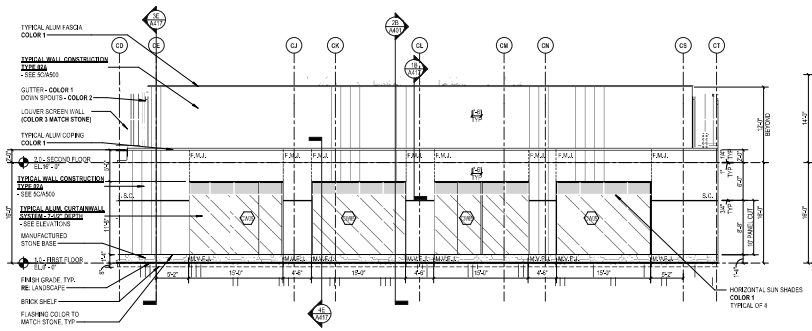
3A NORTH ELEVATION - MAIN ENTRANCE
1/8" = 1'-0"



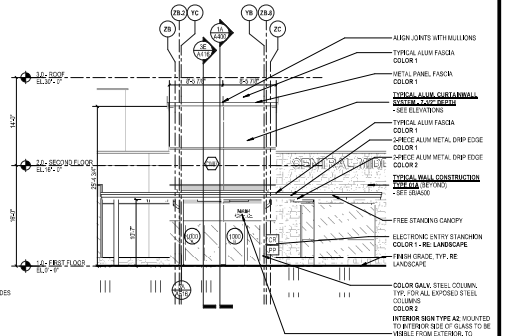
4B WEST ELEVATION - MAIN ENTRANCE
1/8" = 1'-0"



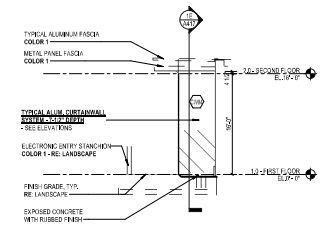
1C SOUTH ELEVATION - GYM ENTRANCE
1/8" = 1'-0"



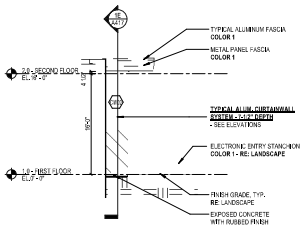
3C SOUTH ELEVATION - FRONT ENTRANCE
1/8" = 1'-0"



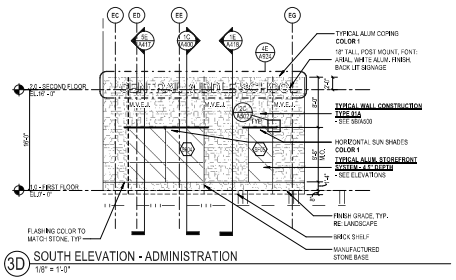
5C SOUTH ELEVATION - MAIN ENTRANCE
1/8" = 1'-0"



1D EAST ELEVATION - GYM ENTRANCE
1/8" = 1'-0"



2D WEST ELEVATION - GYM ENTRANCE
1/8" = 1'-0"



3D SOUTH ELEVATION - ADMINISTRATION
1/8" = 1'-0"

COLOR TYPES

COLOR 1 - DARK BRONZE (MATCH WINDOW MINERAL BROWN)
COLOR 2 - CEDAR (MATCH FIBER CEMENT PANEL SIDING)
COLOR 3 - LIGHT GRAY (MATCH STONE) ONLY FOR FLASHING AND ROOF SCREEN

CONTRACTOR NOTE:

ALL FIBER CEMENT PANEL DIMENSIONS ARE NOMINAL DIMENSIONS. ACTUAL DIMENSIONS MAY VARY PER MFR. STANDARDS. CONTRACTOR TO COORDINATE ACTUAL DIMENSIONS WITH OVERALL LAYOUT OF REVEALS, MOVEMENT JOINTS AND CW/ SF ROOF OPENINGS SHOWN ON A200 SERIES ELEVATIONS AND "A" SERIES DIMENSION PLANS. CONTRACTOR IS TO COORDINATE WITH GENERAL SUB-CONTRACTOR AND FIBER CEMENT PANEL SUB-CONTRACTOR TO ENSURE PROPER NOMINAL DIMENSIONAL LAYOUT.

GENERAL ELEVATION NOTES

1. PROVIDE MASONRY VENEER EXPANSION JOINTS (MVEJ) AS SHOWN. CONTROL JOINTS TO BE FILLED WITH MORTAR-MATCHING SEALANT, BACKER ROD AND COMPRESSIBLE FILLER. SEE EXTERIOR ELEVATIONS FOR MVEJ LOCATIONS. CONSULT ARCHITECT BEFORE ADDING OR MOVING LOCATION OF ANY MVEJ. CONSULT ARCHITECT FOR ANY CONDITION EXCEEDING 20'-0" OR EXCEEDING 10'-0" FROM CORNERS. ALL INSIDE CORNER JOINTS IN MASONRY VENEERS ARE TO BE TREATED AS A MVEJ

2. ALL EXTERIOR WALL MOUNTED DEVICES INCLUDING BUT LIMITED TOO OVERFLOW ROOF DRAIN OUTLETS, HOSE BIBS, SECURITY CAMERAS, LIGHT FIXTURES, LOUD SPEAKERS HORNS AND OUTLETS SHALL BE CENTERED IN FIBER CEMENT PANELS, TYP.

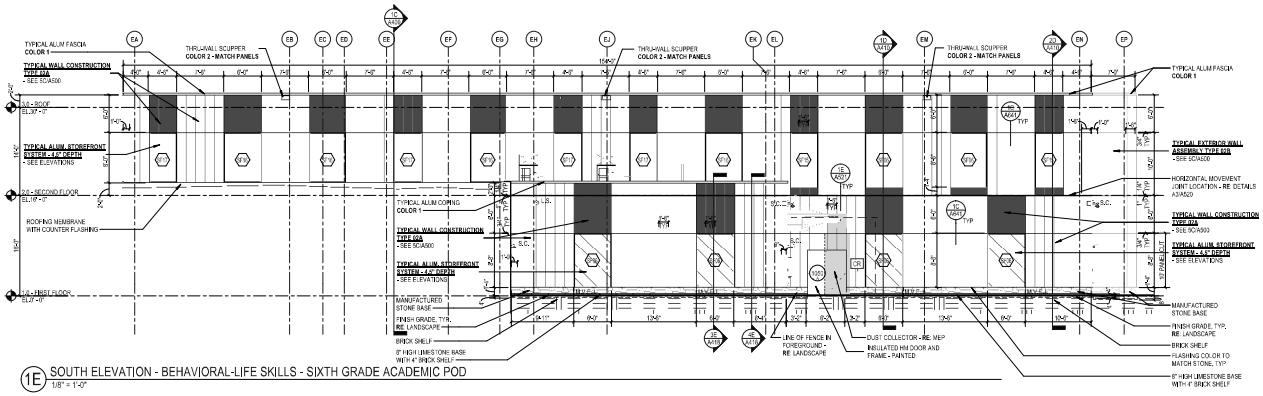
ELEVATION GRAPHIC LEGEND

ORD/D.O. - OVERFLOW ROOF DRAIN OUTLET (PER PLUMBING DRAWINGS)
H.B. - HOSE BIB (PER PLUMBING DRAWINGS)
S.C. - SECURITY CAMERA (PER TECHNOLOGY DRAWINGS)
L.F. - LIGHT FIXTURE (PER ELECTRICAL DRAWINGS)
L.S. - LOUD SPEAKER (PER TECHNOLOGY DRAWINGS)
E.O. - ELECTRICAL OUTLET, GFI (PER ELECTRICAL DRAWINGS)
SB - STROBE (PER TECHNOLOGY DRAWINGS)
AP - ACCESS PANEL (PER TECHNOLOGY DRAWINGS)
A.R. - CARD READER (PER TECHNOLOGY DRAWINGS)
F.A. - FIRE ALARM STROBE (PER ELECTRICAL DRAWINGS)
CR
M.V.E.J. - MASONRY VENEER EXPANSION JOINT (MVEJ) - RE: 19/A502
F.M.J. - FACADE MOVEMENT JOINT
- LOOSE LINTEL OR HUNG LINTEL - RE: A606 & A641, A642
E.J. - EXPANSION JOINT
- THROUGH WALL METAL FLASHING (AT BASE OF WALLS)
WT1 - STOREFRONT / CURTAIN WALL TYPE RE: SHEETS A620 - A622
- STONE VENEER (ASHLAR PATTERN) TYPE 01A & 01B, 03 and 04
BOD - WINDAGE/WOOD
BARN
CEDAR
- TYP., FCP PANEL 1.006 (VERTICAL) EXTERIOR WALL ASSEMBLY TYPE 02A & 02B and 05

GLAZING GRAPHIC LEGEND (EXT.)

IGS - INSULATED COATED SPANDREL GLAZING (PROVIDE FROSTON RT MINERAL WOOL INSULATION AT ALL SPANDREL GLAZING)
IG - INSULATED CLEAR GLAZING
- INSULATED SECURITY GLAZING (SCHOOLGUARD)
- INSULATED FROSTED GLAZING
- INSULATED TEMPERED SAFETY GLASS
- INSULATED BALLISTIC LEVEL 3 GLAZING
- INSULATED FROSTED SAFETY GLASS
- INSULATED LAMINATED GLAZING

REFER TO A610 FOR OTHER GLAZING TYPES



1E SOUTH ELEVATION - BEHAVIORAL-LIFE SKILLS - SIXTH GRADE ACADEMIC POD
1/8" = 1'-0"

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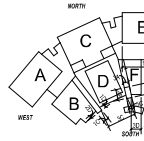
Checked: JZ

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane,
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

EXTERIOR ELEVATIONS

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: A310

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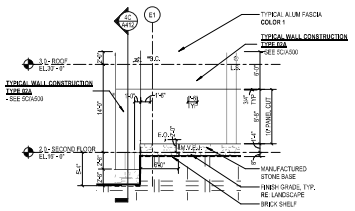
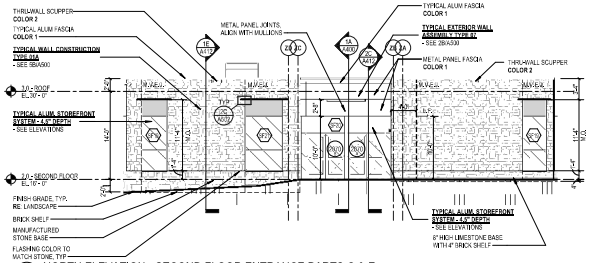
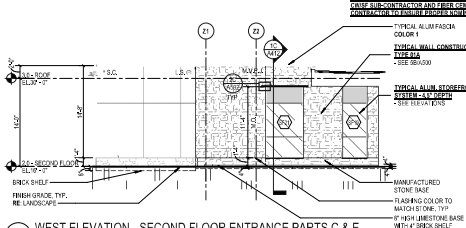


1A WEST ELEVATION - PARTIAL SIXTH GRADE ACADEMIC POD
1/8" = 1'-0"



2A NORTH ELEVATION - SECOND FLOOR ENTRANCE PARTS C & E
1/8" = 1'-0"



4A WEST ELEVATION - SECOND FLOOR ENTRANCE PARTS C & E
1/8" = 1'-0"

COLOR TYPES

COLOR 1 - DARK BRONZE (MATCH WINDOW MINERAL BROWN)
COLOR 2 - CEDAR (MATCH FIBER CEMENT PANEL SIDING)
COLOR 3 - LIGHT GRAY (MATCH STONE) ONLY FOR FLASHING AND ROOF SCREEN

CONTRACTOR NOTE:

ALL FIBER CEMENT PANEL DIMENSIONS ARE NOMINAL DIMENSIONS. ACTUAL DIMENSIONS MAY VARY PER MFR. STANDARDS. CONTRACTOR OR TO COORDINATE ACTUAL DIMENSIONS WITH OVERALL LAYOUT OF REVEAL MOVEMENT JOINTS AND/OR SF BOARD CENTERED BROWN ON ALL SIDES ELEVATIONS AND "A" SERIES DIMENSION PLANS. CONTRACTOR OR TO COORDINATE WITH CEMF SUB-CONTRACTOR. CEMF SUB-CONTRACTOR AND FIBER CEMENT PANEL SUB-CONTRACTOR TO ENSURE PROPER NOMINAL DIMENSIONAL LAYOUT.

GENERAL ELEVATION NOTES

1. PSYMOE MASONRY VENEER EXPANSION JOINTS (MVEJ) AS SHOWN. CONTROL JOINTS TO BE FILLED WITH MORTAR/MATCHING SEALANT, BACKER ROD AND COMPRESSIBLE FILLER. SEE EXTERIOR ELEVATIONS FOR MVEJ LOCATIONS. CONSULT ARCHITECT BEFORE ADDING OR MOVING LOCATION OF ANY MVEJ. CONSULT ARCHITECT FOR ANY CONDITION EXCEEDING 20'-0" OR EXCEEDING 10'-0" FROM CORNERS. ALL INSIDE CORNER JOINTS IN MASONRY VENEERS ARE TO BE TREATED AS A MVEJ.

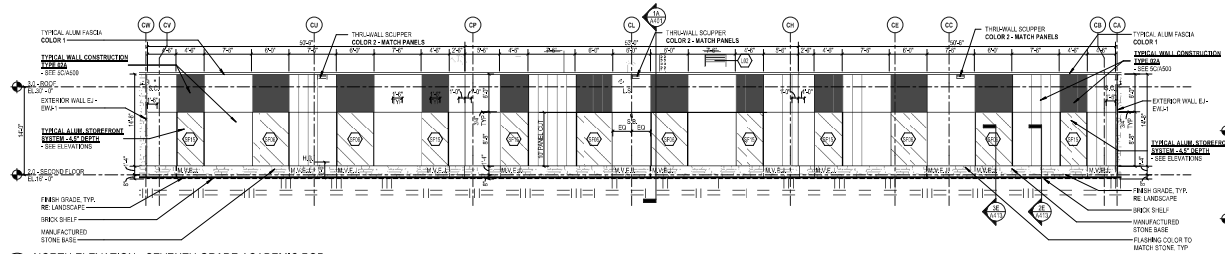
2. ALL EXTERIOR WALL MOUNTED DEVICES INCLUDING BUT LIMITED TOO; OVERFLOW ROOF DRAIN OUTLETS, HOSE BIBS, SECURITY CAMERAS, LIGHT FIXTURES, LOUD SPEAKERS, HORNS AND OUTLETS SHALL BE CENTERED IN FIBER CEMENT PANELS, TYP.

ELEVATION GRAPHIC LEGEND

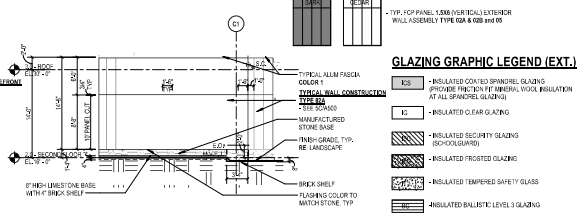
O.R./O.D. - OVERFLOW ROOF DRAIN OUTLET (PER PLUMBING DRAWINGS)
H.B. - HOSE BIB (PER PLUMBING DRAWINGS)
S.C. - SECURITY CAMERA (PER TECHNOLOGY DRAWINGS)
L.F. - LIGHT FIXTURE (PER ELECTRICAL DRAWINGS)
L.S. - LOUD SPEAKER (PER TECHNOLOGY DRAWINGS)
E.O. - ELECTRICAL OUTLET, GFI (PER ELECTRICAL DRAWINGS)
SB - STROBE (PER TECHNOLOGY DRAWINGS)
AP - ACCESS POINT (PER TECHNOLOGY DRAWINGS)
C.R. - CARD READER (PER TECHNOLOGY DRAWINGS)
F.A. - FIRE ALARM STROBE (PER ELECTRICAL DRAWINGS)
M.V.E.J. - MASONRY VENEER EXPANSION JOINT (MVEJ) - RE: 1BIA/502
FMJ - FACADE MOVEMENT JOINT
- LOOSE LINTEL OR HUNG LINTEL - RE: A606 & A641, A642
EJ - EXPANSION JOINT
- THROUGH WALL METAL FLASHING (AT BASE OF WALLS)
- STOREFRONT / CURTAIN WALL TYPE RE: SHEETS A630 - A632
- STONE VENEER (ASHLAR PATTERN) TYPE 01A & 01B, 03 and 04
WOOD - VINTAGEWOOD
- TYP. FCP PANEL 1.5X6 (VERTICAL) EXTERIOR WALL ASSEMBLY TYPE 02A & 02B and 05

GLAZING GRAPHIC LEGEND (EXT.)

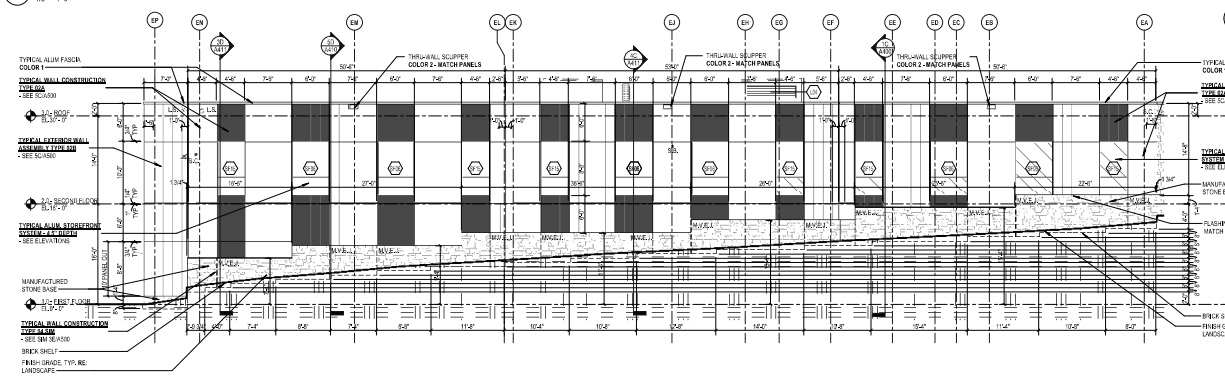
ICS - INSULATED COATED SPANDREL GLAZING (PROVIDE FINCTION FIT MINERAL WOOL INSULATION AT ALL SPANDREL GLAZING)
IG - INSULATED CLEAR GLAZING
- INSULATED SECURITY GLAZING (SCHOOLGUARD)
- INSULATED FROSTED GLAZING
- INSULATED TEMPERED SAFETY GLASS
- INSULATED BALLISTIC LEVEL 3 GLAZING
- INSULATED FROSTED SAFETY GLASS
- INSULATED LAMINATED GLAZING
REFER TO A616 FOR OTHER GLAZING TYPES



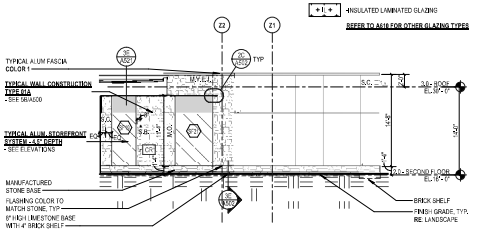
1B NORTH ELEVATION - SEVENTH GRADE ACADEMIC POD
1/8" = 1'-0"



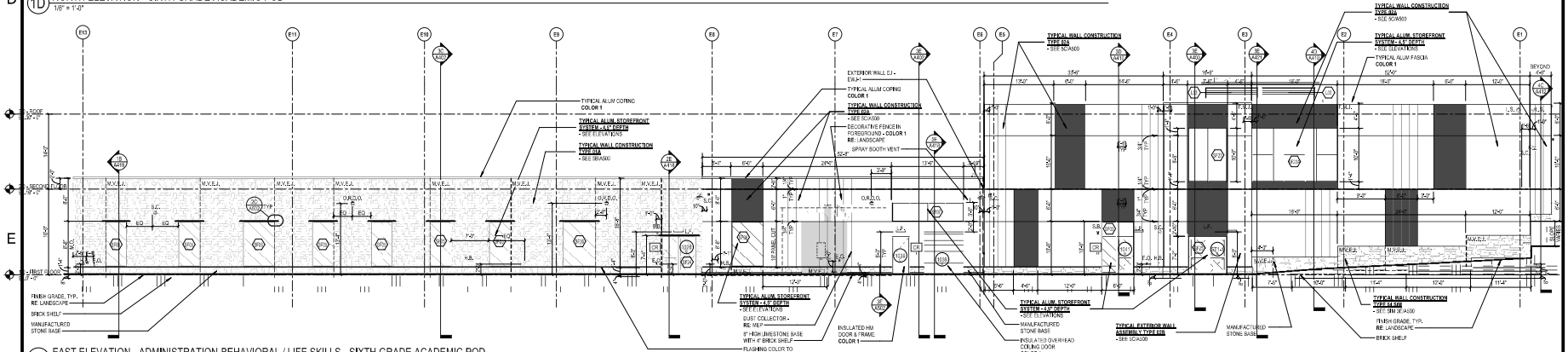
4B EAST ELEVATION - SEVENTH GRADE ACADEMIC POD
1/8" = 1'-0"



1D NORTH ELEVATION - SIXTH GRADE ACADEMIC POD
1/8" = 1'-0"



4C EAST ELEVATION - SECOND FLOOR ENTRANCE PARTS C & E
1/8" = 1'-0"



1E EAST ELEVATION - ADMINISTRATION-BEHAVIORAL / LIFE SKILLS - SIXTH GRADE ACADEMIC POD
1/8" = 1'-0"

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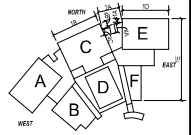
Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane,
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

EXTERIOR ELEVATIONS

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: A311

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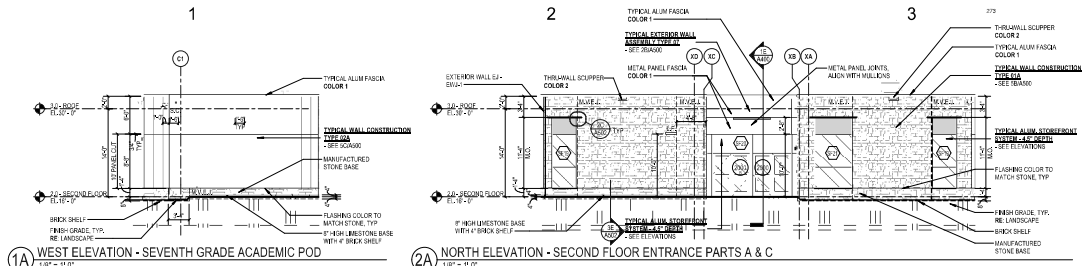
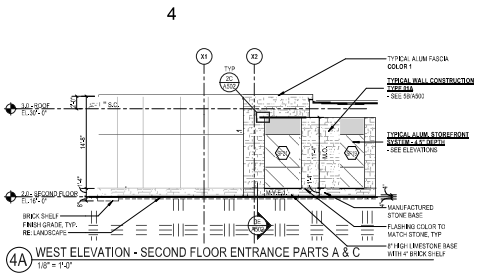
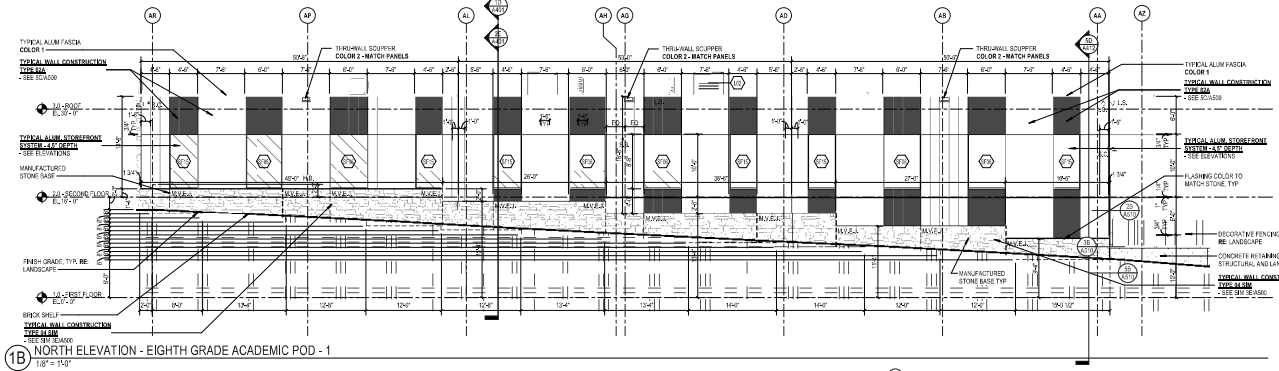


1A WEST ELEVATION - SEVENTH GRADE ACADEMIC POD
1/8" = 1'-0"

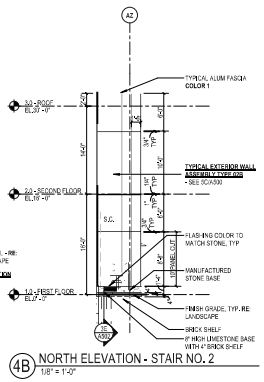
2A NORTH ELEVATION - SECOND FLOOR ENTRANCE PARTS A & C
1/8" = 1'-0"



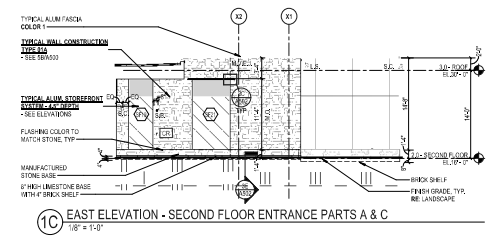
4A WEST ELEVATION - SECOND FLOOR ENTRANCE PARTS A & C
1/8" = 1'-0"



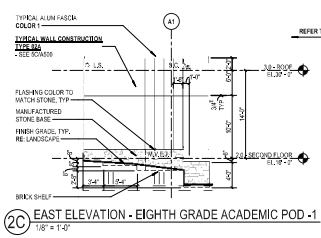
1B NORTH ELEVATION - EIGHTH GRADE ACADEMIC POD - 1
1/8" = 1'-0"



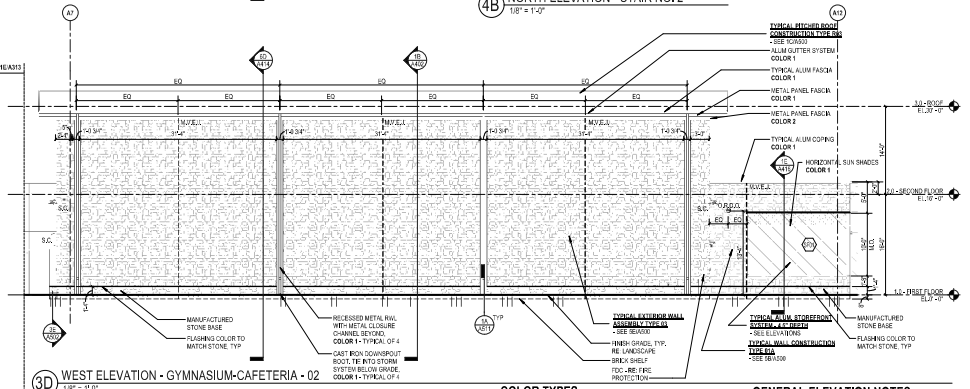
4B NORTH ELEVATION - STAIR NO. 2
1/8" = 1'-0"



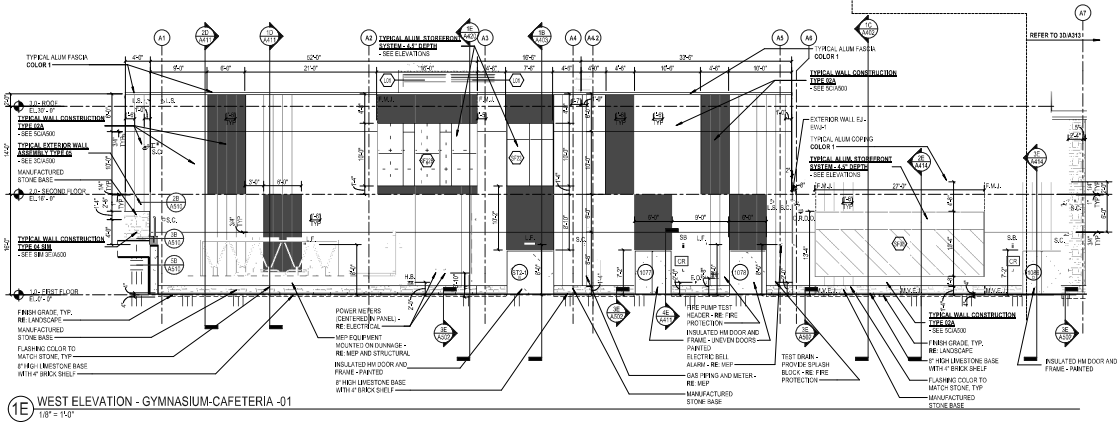
1C EAST ELEVATION - SECOND FLOOR ENTRANCE PARTS A & C
1/8" = 1'-0"



2C EAST ELEVATION - EIGHTH GRADE ACADEMIC POD -1
1/8" = 1'-0"



3D WEST ELEVATION - GYMNASIUM-CAFETERIA - 02
1/8" = 1'-0"



1E WEST ELEVATION - GYMNASIUM-CAFETERIA -01
1/8" = 1'-0"

COLOR TYPES

COLOR 1 - DARK BRONZE (MATCH WINDOW MINERAL BROWN)
COLOR 2 - CEDAR (MATCH FIBER CEMENT PANEL SIDING)
COLOR 3 - LIGHT GRAY (MATCH STONE) ONLY FOR FLASHING AND ROOF SCREEN

CONTRACTOR NOTE:

ALL FIBER CEMENT PANEL DIMENSIONS ARE NOMINAL DIMENSIONS. ACTUAL DIMENSIONS MAY VARY PER MFR'S STANDARDS. CONTRACTOR SHALL COORDINATE ACTUAL DIMENSIONS WITH OVERALL LAYOUT OF REVEALS, MOVEMENT JOINTS AND ONE OF WHICH OR MORE SHOWN ON ALL ENLARGED ELEVATIONS AND "A1" SERIES DIMENSION PLANS. CONTRACTOR SHALL COORDINATE WITH CFMF SUB-CONTRACTOR, CONFIRM DIMENSIONS OF ALL FIBER CEMENT PANEL SIZES CONTRACTOR TO ENSURE PROPER NOMINAL DIMENSIONAL LAYOUT.

GLAZING GRAPHIC LEGEND (EXT.)

- IGS - INSULATED COATED SPANDREL GLAZING (PROVIDE FRICTION FIT MINERAL WOOL INSULATION AT ALL SPANDREL GLAZING)
- IG - INSULATED CLEAR GLAZING
- INSULATED SECURITY GLAZING (SCHOOLGUARD)
- INSULATED FROSTED GLAZING
- INSULATED TEMPERED SAFETY GLASS
- INSULATED BALLISTIC LEVEL 3 GLAZING
- INSULATED FROSTED SAFETY GLASS
- INSULATED LAMINATED GLAZING

REFER TO A610 FOR OTHER GLAZING TYPES

GENERAL ELEVATION NOTES

1. PROVIDE MASONRY VENEER EXPANSION JOINTS (MVE) AS SHOWN. CONTROL JOINTS TO BE FILLED WITH MORTAR-MATCHING SEALANT, BACKER ROD AND COMPRESSIBLE FILLER. SEE EXTERIOR ELEVATIONS FOR MVEJ LOCATIONS. CONSULT ARCHITECT BEFORE ADDING OR MOVING LOCATION OF ANY MVEJ. CONSULT ARCHITECT FOR ANY CONDITION EXCEEDING 20'-0" OR EXCEEDING 16'-0" FROM CORNERS. ALL INSIDE CORNER JOINTS IN MASONRY VENEERS ARE TO BE TREATED AS A MVEJ.

2. ALL EXTERIOR WALL MOUNTED DEVICES INCLUDING BUT LIMITED TOO; OVERFLOW ROOF DRAIN OUTLETS, HOSE BIBS, SECURITY CAMERAS, LIGHT FIXTURES, LOUD SPEAKERS, HORNS AND OUTLETS SHALL BE CENTERED IN FIBER CEMENT PANELS, TYP.

ELEVATION GRAPHIC LEGEND

O.R.D.O. - OVERFLOW ROOF DRAIN OUTLET (PER PLUMBING DRAWINGS)
H.B. - HOSE BIB (PER PLUMBING DRAWINGS)
S.C. - SECURITY CAMERA (PER TECHNOLOGY DRAWINGS)
L.F. - LIGHT FIXTURE (PER ELECTRICAL DRAWINGS)
L.S. - LOUD SPEAKER (PER TECHNOLOGY DRAWINGS)
E.O. - ELECTRICAL OUTLET, GFI (PER ELECTRICAL DRAWINGS)
SB - STROBE (PER TECHNOLOGY DRAWINGS)
AP - ACCESS POINT (PER TECHNOLOGY DRAWINGS)
CR - CARD READER (PER TECHNOLOGY DRAWINGS)
F.A. - FIRE ALARM STROBE (PER ELECTRICAL DRAWINGS)
M.V.E.J. - MASONRY VENEER EXPANSION JOINT (MVEJ) - RE: 1B/A502
FMJ - FACADE MOVEMENT JOINT
LINTEL - LOOSE LINTEL OR HUNG LINTEL - RE: A606 & A641, A642
EJ - EXPANSION JOINT
FLASHING - THROUGH WALL METAL FLASHING (AT BASE OF WALLS)
MF1 - STOREFRONT / CURTAIN WALL TYPE RE: SHEETS A630 - A632
STONE VENEER (ASHLAR PATTERN) TYPE 01A & 01B, 03 and 04
BDD - VINTAGEWOOD
SIDING - TYP. FCP PANEL 1.5M8 (VERTICAL) EXTERIOR WALL ASSEMBLY TYPE 02A & 02B and 05

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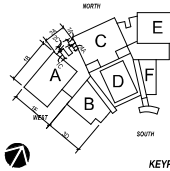
Drawn: CP, JP
Checked: JZ

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane,
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/03/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

EXTERIOR ELEVATIONS

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: A312

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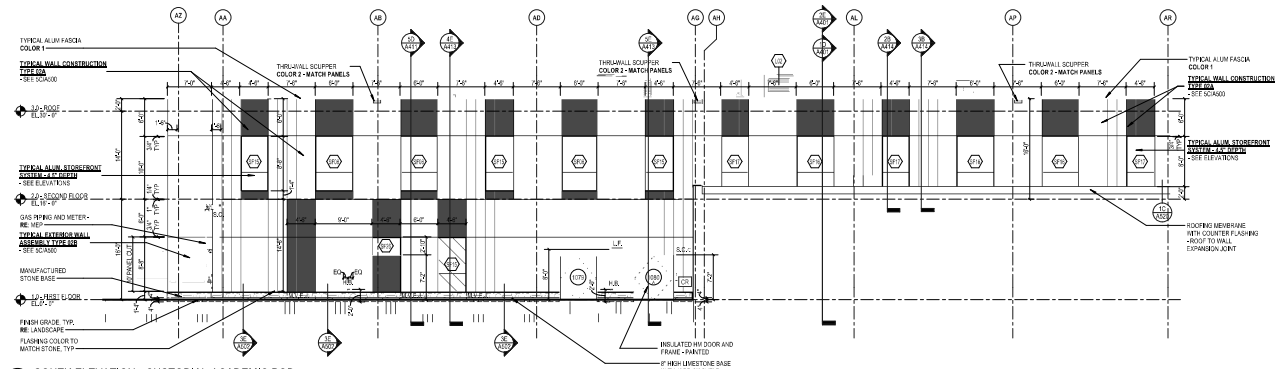
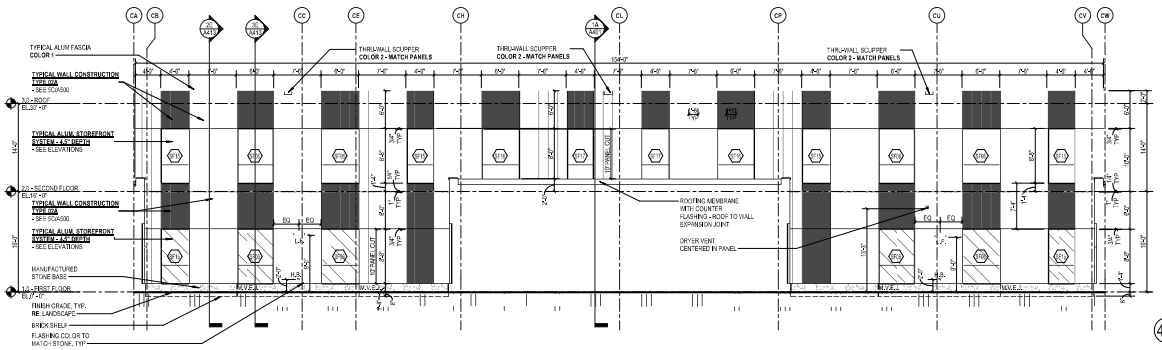
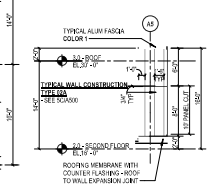


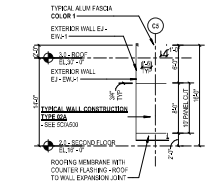
1A SOUTH ELEVATION - CUSTODIAL-ACADEMIC POD
1/8" = 1'-0"



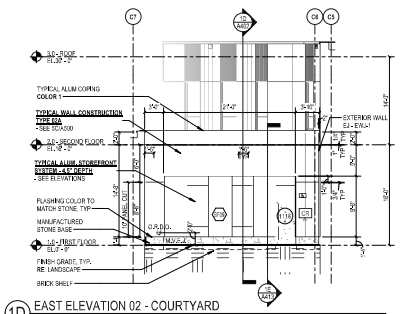
1C SOUTH ELEVATION 01 - COURTYARD-ACADEMIC POD
1/8" = 1'-0"



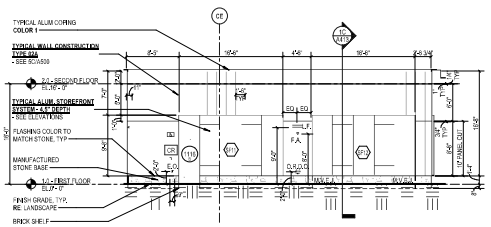
4C PARTIAL EAST ELEVATION - POD A
1/8" = 1'-0"



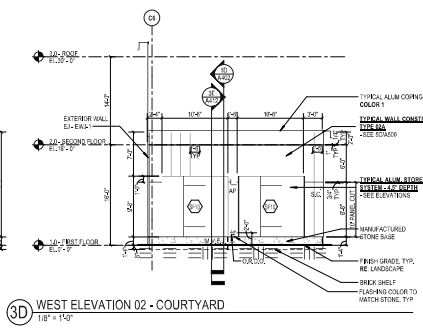
5C PARTIAL WEST ELEVATION - POD C
1/8" = 1'-0"



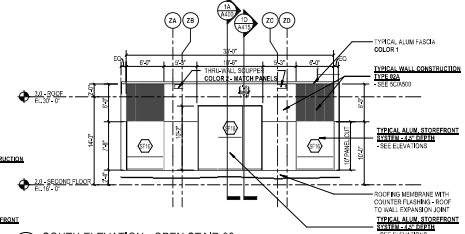
1D EAST ELEVATION 02 - COURTYARD
1/8" = 1'-0"



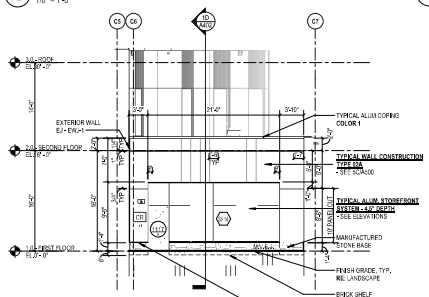
2D NORTH ELEVATION 02 - COURTYARD
1/8" = 1'-0"



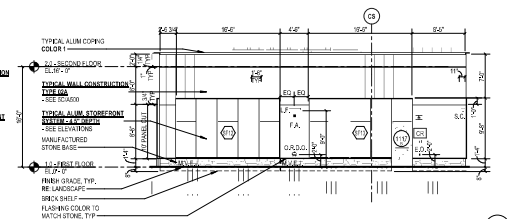
3D WEST ELEVATION 02 - COURTYARD
1/8" = 1'-0"



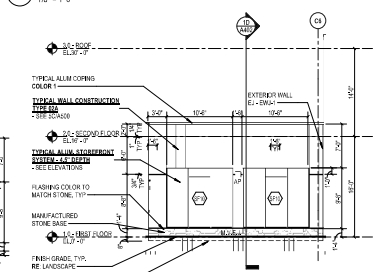
5D SOUTH ELEVATION - OPEN STAIR 03
1/8" = 1'-0"



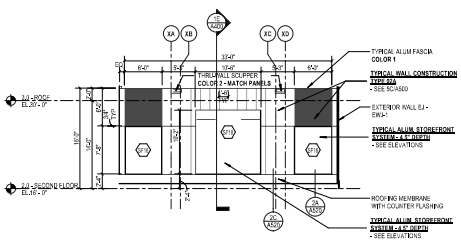
1E WEST ELEVATION - COURTYARD 2
1/8" = 1'-0"



2E NORTH ELEVATION - COURTYARD 2
1/8" = 1'-0"



3E EAST ELEVATION - COURTYARD 2
1/8" = 1'-0"



5E SOUTH ELEVATION - OPEN STAIR NO 04
1/8" = 1'-0"

COLOR TYPES

COLOR 1 - DARK BRONZE (MATCH WINDOW MINERAL BROWN)
COLOR 2 - CEDAR (MATCH FIBER CEMENT PANEL SIDING)
COLOR 3 – LIGHT GRAY (MATCH STONE) ONLY FOR FLASHING AND ROOF SCREEN

CONTRACTOR NOTE:

ALL FIBER CEMENT PANEL DIMENSIONS ARE NOMINAL DIMENSIONS. ACTUAL DIMENSIONS MAY VARY DUE TO FLASHINGS, CONTROL JOINTS, ETC. TO COORDINATE ACTUAL DIMENSIONS AND OVERALL LAYOUT OF REVEALS, MOVEMENT JOINTS AND ON/OFF ROUGH OPENINGS SHOWN ON ALL STORIES ELEVATIONS AND FLAT SHEETS (SECTION PLANS), CONTRACTOR OR TO COORDINATE WITH CMU SUB-CONTRACTOR, WHERE SUB-CONTRACTOR AND FIBER CEMENT PANEL SUB-CONTRACTOR TO ENSURE PROPER NOMINAL DIMENSIONAL LAYOUT

GLAZING GRAPHIC LEGEND (EXT.)

- KS - INSULATED COATED SPANDREL GLAZING (PROVIDE FRICTION FIT MINERAL WOOL INSULATION AT ALL SPANDREL GLAZING)
- IG - INSULATED CLEAR GLAZING
- INSULATED SECURITY GLAZING (SCHOOL/GUARD)
- INSULATED FROSTED GLAZING
- INSULATED TEMPERED SAFETY GLAZING
- BG - INSULATED BALLISTIC LEVEL 3 GLAZING
- INSULATED FROSTED SAFETY GLAZING
- INSULATED LAMINATED GLAZING

REFER TO A610 FOR OTHER GLAZING TYPES

GENERAL ELEVATION NOTES

1. PROVIDE MASONRY VENEER EXPANSION JOINTS (MVEJ) AS SHOWN. CONTROL JOINTS TO BE FILLED WITH MORTAR-MATCHING SEALANT, BACKER ROD AND COMPRESSIBLE FILLER, SEE EXTERIOR ELEVATIONS FOR MVEJ LOCATIONS. CONSULT ARCHITECT BEFORE ADDING OR MOVING LOCATION OF ANY MVEJ. CONSULT ARCHITECT FOR ANY CONDITION EXCEEDING 20'-0" OR EXCEEDING 10'-0" FROM CORNERS. ALL INSIDE CORNER JOINTS IN MASONRY VENEERS ARE TO BE TREATED AS A MVEJ.

2. ALL EXTERIOR WALL MOUNTED DEVICES INCLUDING BUT LIMITED TOO; OVERFLOW ROOF DRAIN OUTLETS, HOSE BIBS, SECURITY CAMERAS, LIGHT FIXTURES, LOUD SPEAKERS/ HORNS AND OUTLETS SHALL BE CENTERED IN FIBER CEMENT PANELS, TYP.

ELEVATION GRAPHIC LEGEND

O.R.D.O.L. - OVERFLOW ROOF DRAIN OUTLET (PER PLUMBING DRAWINGS)
H.B. - HOSE BIB (PER PLUMBING DRAWINGS)
S.C. - SECURITY CAMERA (PER TECHNOLOGY DRAWINGS)
L.F. - LIGHT FIXTURE (PER ELECTRICAL DRAWINGS)
L.S. - LOUD SPEAKER (PER TECHNOLOGY DRAWINGS)
E.O. - ELECTRICAL OUTLET, GFI (PER ELECTRICAL DRAWINGS)
SB - STROBE (PER TECHNOLOGY DRAWINGS)
AP - ACCESS POINT (PER TECHNOLOGY DRAWINGS)
C.R. - CARD READER (PER TECHNOLOGY DRAWINGS)
F.A. - FIRE ALARM STROBE (PER ELECTRICAL DRAWINGS)

M.V.E.J. - MASONRY VENEER EXPANSION JOINT (MVEJ) - RE: 1B/A502
FMJ - FACADE MOVEMENT JOINT
- LOOSE LINTEL OR HUNG LINTEL - RE: A606 & A641, A642
EJ - EXPANSION JOINT
- THROUGH WALL METAL FLASHING (AT BASE OF WALLS)
- STOREFRONT / CURTAIN WALL TYPE RE: SHEETS A630 - A632
- STONE VENEER (ASHLAR PATTERN) TYPE 01A & 01B, 03 and 04
- TYP. FCP PANEL 1.5X8 (VERTICAL) EXTERIOR WALL ASSEMBLY TYPE 02A & 02B and 05

BOD - VINTAGEWOOD

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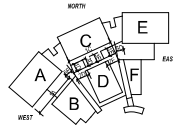
STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

EXTERIOR ELEVATIONS

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: A313

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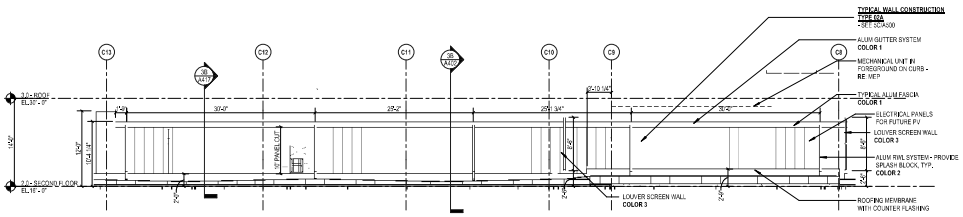
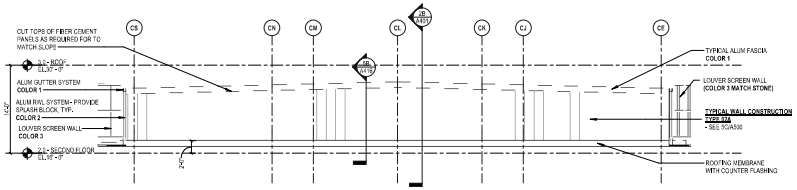
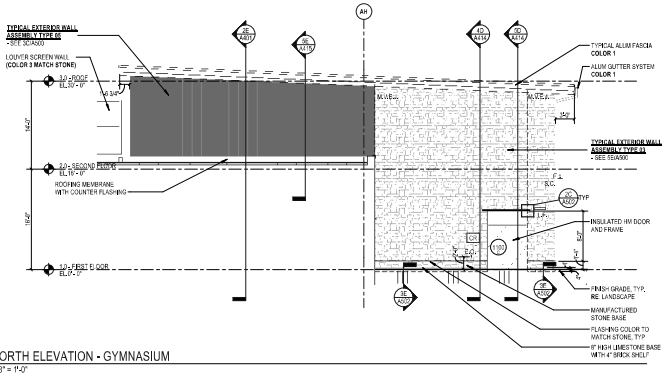


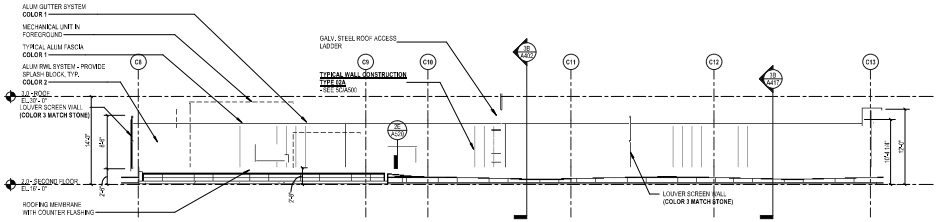
1A EAST ELEVATION - AUDITORIUM
1/8" = 1'-0"



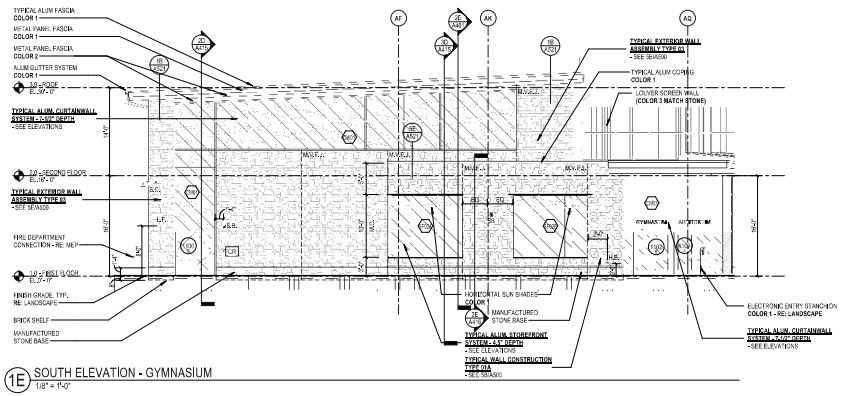
1B NORTH ELEVATION - AUDITORIUM
1/8" = 1'-0"



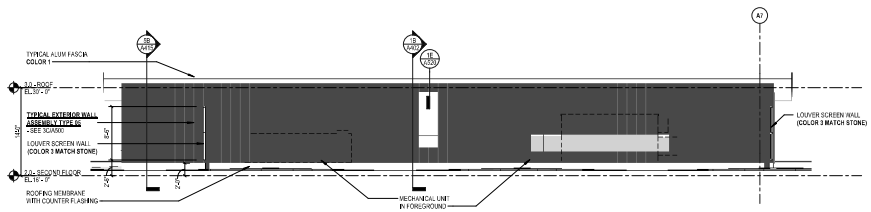
1D NORTH ELEVATION - GYMNASIUM
1/8" = 1'-0"



3D WEST ELEVATION - AUDITORIUM
1/8" = 1'-0"



1E SOUTH ELEVATION - GYMNASIUM
1/8" = 1'-0"



3E EAST ELEVATON - GYMNASIUM
1/8" = 1'-0"

COLOR TYPES

COLOR 1 - DARK BRONZE (MATCH WINDOW MINERAL BROWN)
COLOR 2 - CEDAR (MATCH FIBER CEMENT PANEL SIDING)
COLOR 3 - LIGHT GRAY (MATCH STONE) ONLY FOR FLASHING AND ROOF SCREEN

CONTRACTOR NOTE:

ALL FIBER CEMENT PANEL DIMENSIONS ARE NOMINAL DIMENSIONS. ACTUAL DIMENSIONS MAY VARY DUE TO FLASHINGS. CONTRACTOR SHALL COORDINATE ACTUAL DIMENSIONS AND LAYOUT OF REVEALS, MOVEMENT JOINTS AND ALL OF ROUGH OPENINGS SHOWN ON ALUM STORIES ELEVATIONS AND FACADE ELEVATION PLANS. CONTRACTOR SHALL COORDINATE WITH CMF SUB-CONTRACTOR, CURTAINWALL SUB-CONTRACTOR AND FIBER CEMENT PANEL SUB-CONTRACTOR TO ENSURE PROPER NOMINAL DIMENSIONAL LAYOUT

GLAZING GRAPHIC LEGEND (EXT.)

- KS - INSULATED COATED SPANDREL GLAZING (PROVIDE FRICTION FIT MINERAL WOOL INSULATION AT ALL SPANDREL GLAZING)
- IG - INSULATED CLEAR GLAZING
- INSULATED SECURITY GLAZING (SCHOOLGUARD)
- INSULATED FROSTED GLAZING
- INSULATED TEMPERED SAFETY GLASS
- BG - INSULATED BALLISTIC LEVEL 3 GLAZING
- INSULATED FROSTED SAFETY GLASS
- INSULATED LAMINATED GLAZING

REFER TO A610 FOR OTHER GLAZING TYPES

GENERAL ELEVATION NOTES

1. PROVIDE MASONRY VENEER EXPANSION JOINTS (MVEJ) AS SHOWN. CONTROL JOINTS TO BE FILLED WITH MORTAR-MATCHING SEALANT, BACKER ROD AND COMPRESSIBLE FILLER. SEE EXTERIOR ELEVATIONS FOR MVEJ LOCATIONS. CONSULT ARCHITECT BEFORE ADDING OR MOVING LOCATION OF ANY MVEJ. CONSULT ARCHITECT FOR ANY CONDITION EXCEEDING 20'-0" OR EXCEEDING 10'-0" FROM CORNERS. ALL INSIDE CORNER JOINTS IN MASONRY VENEERS ARE TO BE TREATED AS A MVEJ.

2. ALL EXTERIOR WALL MOUNTED DEVICES INCLUDING BUT LIMITED TO): OVERFLOW ROOF DRAIN OUTLETS, HOSE BIBS, SECURITY CAMERAS, LIGHT FIXTURES, LOUD SPEAKERS/ HORNS AND OUTLETS SHALL BE CENTERED IN FIBER CEMENT PANELS, TYP.

ELEVATION GRAPHIC LEGEND

O.R.D./O.F. - OVERFLOW ROOF DRAIN OUTLET (PER PLUMBING DRAWINGS)
H.B. - HOSE BIB (PER PLUMBING DRAWINGS)
S.C. - SECURITY CAMERA (PER TECHNOLOGY DRAWINGS)
L.F. - LIGHT FIXTURE (PER ELECTRICAL DRAWINGS)
L.S. - LOUD SPEAKER (PER TECHNOLOGY DRAWINGS)
E.O. - ELECTRICAL OUTLET, GFI (PER ELECTRICAL DRAWINGS)
SB - STROBE (PER TECHNOLOGY DRAWINGS)
AP - ACCESS POINT (PER TECHNOLOGY DRAWINGS)
C.R. - CARD READER (PER TECHNOLOGY DRAWINGS)
F.A. - FIRE ALARM STROBE (PER ELECTRICAL DRAWINGS)

- M.V.E.J. - MASONRY VENEER EXPANSION JOINT (MVEJ) - RE: 1B/A502
- FMJ - FACADE MOVEMENT JOINT
- LOOSE LINTEL OR HUNG LINTEL - RE: A606 & A641, A642
- EJ - EXPANSION JOINT
- THROUGH WALL METAL FLASHING (AT BASE OF WALLS)
- ST1 - STOREFRONT / CURTAIN WALL TYPE RE: SHEETS A630 - A632
- STONE VENEER (ASHLAR PATTERN) TYPE 01A & 01B, 03 and 04
- BOD - MINTABEWOOD
- TYP. FCP PANEL 1.5X8 (VERTICAL) EXTERIOR WALL ASSEMBLY TYPE 02A & 02B and 05

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Drawn: CP, JP
Checked: JZ

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane,
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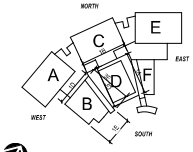
STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

EXTERIOR ELEVATIONS

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: A314

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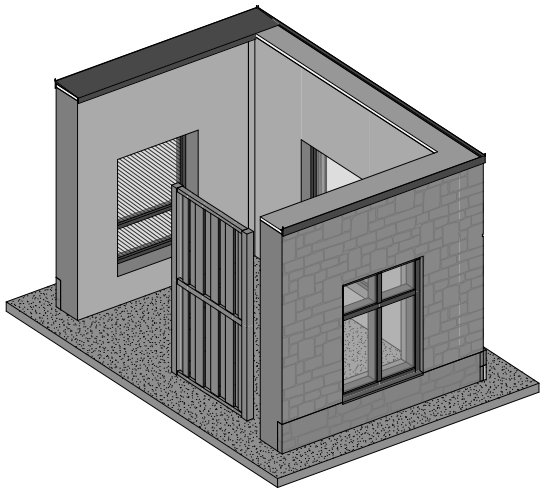
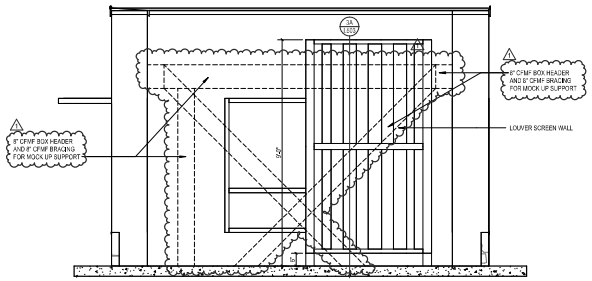
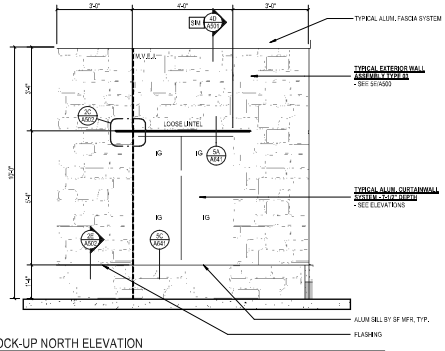
CONTRACTOR NOTE:
ALL FIBER CEMENT PANEL DIMENSIONS ARE NOMINAL DIMENSIONS. ACTUAL DIMENSIONS MAY VARY PER MFR. STANDARDS. CONTRACTOR AM TO COORDINATE ACTUAL DIMENSIONS WITH OVERALL LAYOUT OF REVEALS, MOVEMENT JOINTS AND CW OR BRIDGE OPENINGS SHOWN ON A310 SERIES ELEVATIONS AND "A" SERIES DIMENSION PLANS. PENETRATION AND CONTINUITY BY CW INSTALLATOR. CWSF SUB-CONTRACTOR AND FIBER CEMENT PANEL SUB-CONTRACTOR TO ENSURE PROPER NOMINAL DIMENSIONAL LAYOUT.



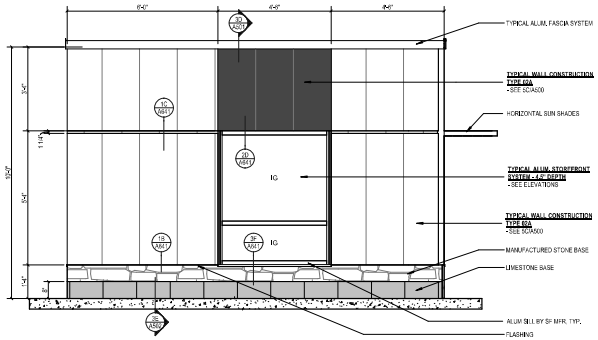
1C 3D MOCK-UP 02



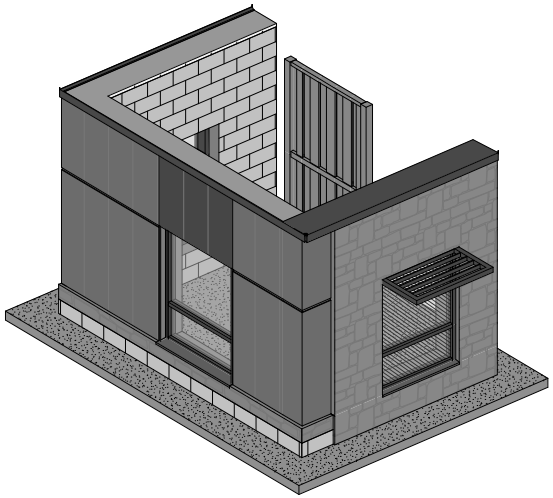
4B MOCK-UP EAST ELEVATION
1/2" = 1'-0"



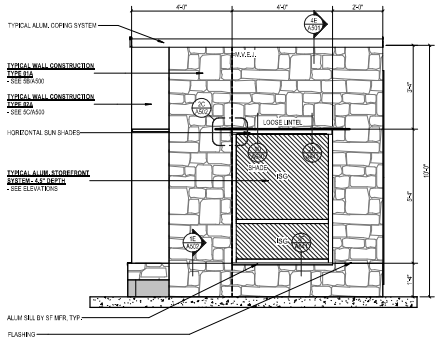
2C MOCK-UP NORTH ELEVATION
1/2" = 1'-0"



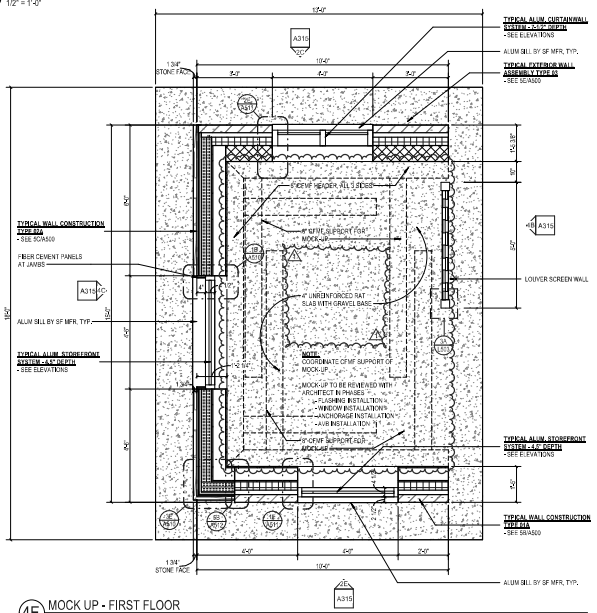
4C MOCK-UP WEST ELEVATION
1/2" = 1'-0"



1E 3D MOCK-UP 01



2E MOCK-UP SOUTH ELEVATION
1/2" = 1'-0"



4E MOCK UP - FIRST FLOOR
1/2" = 1'-0"

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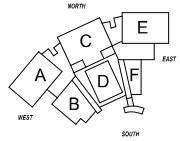

KEYPLAN

Number	Date	Issued For
1	11/05/2024	ADDENDUM NO. 6
	09/30/2024	BIDDING PERMIT

EXTERIOR STAND ALONE MOCK-UP

Date 07/08/2024
Scale As indicated
Proj. Number 22367.00
Drawing Number A315

Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_GREENWICH_CENTRAL_MS_R22.rvt
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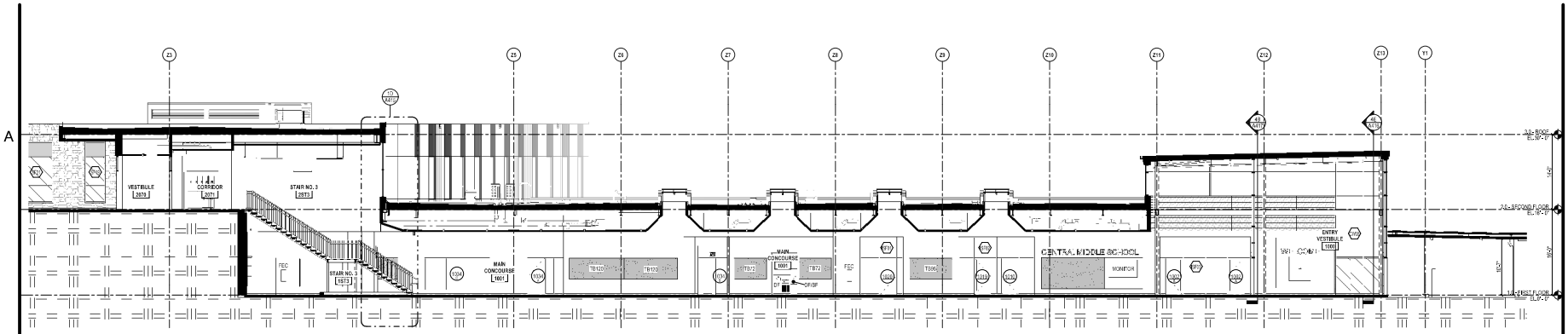
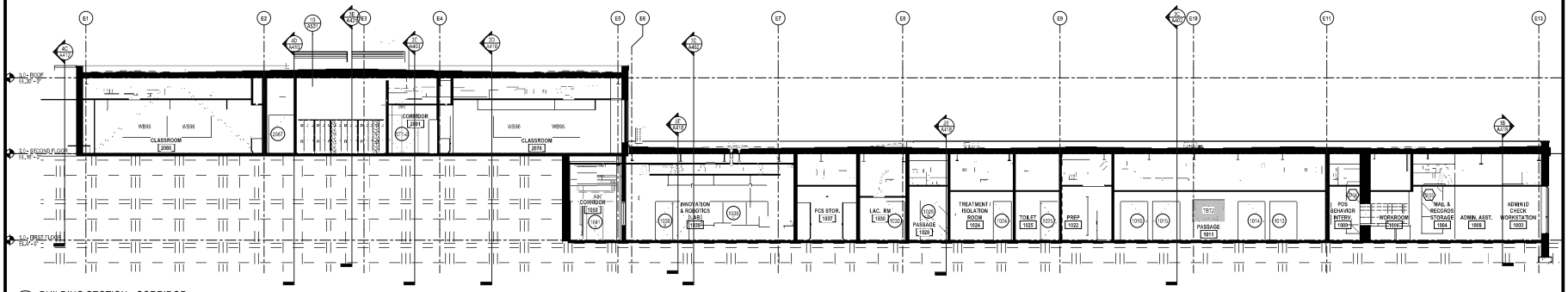
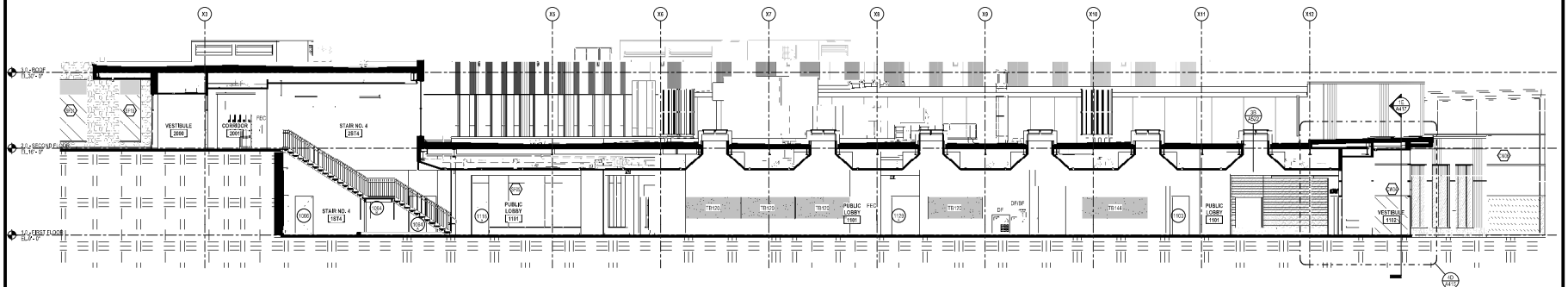


1A BUILDING SECTION - MAIN CONCOURSE
1/8" = 1'-0"



1C BUILDING SECTION - CORRIDOR
1/8" = 1'-0"



1E BUILDING SECTION - PUBLIC LOBBY
1/8" = 1'-0"

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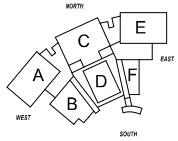

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

BUILDING SECTIONS

Date 07/08/2024
Scale 1/8" = 1'-0"
Proj. Number 22367.00
Drawing Number **A400**

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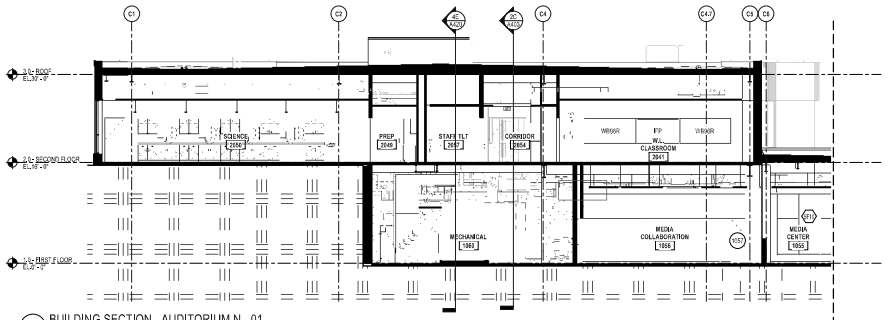
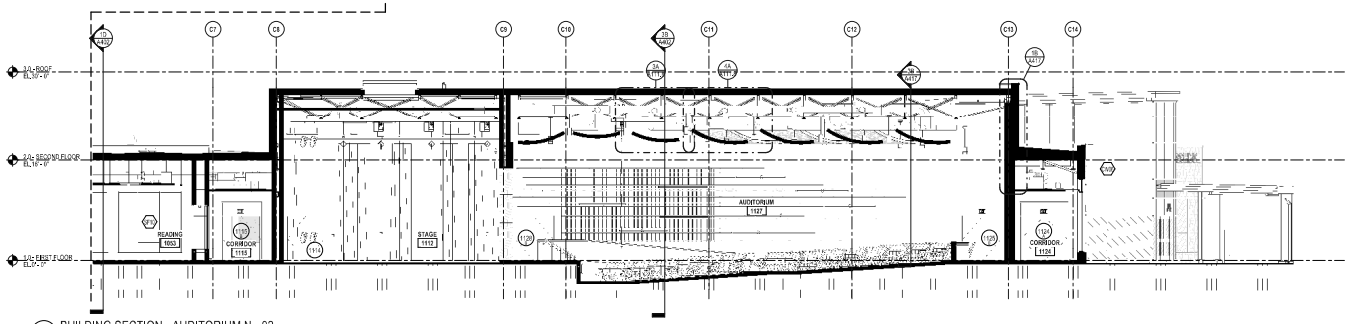
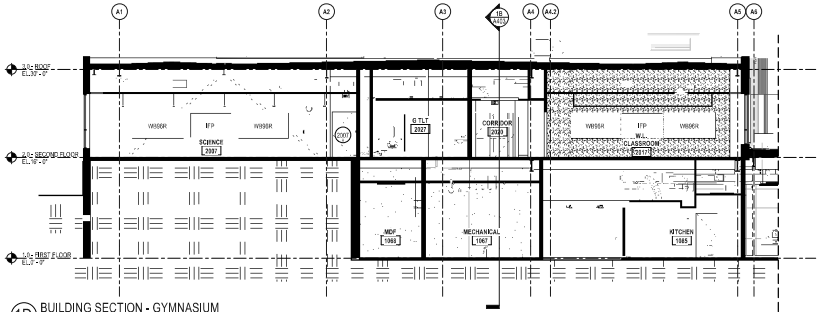


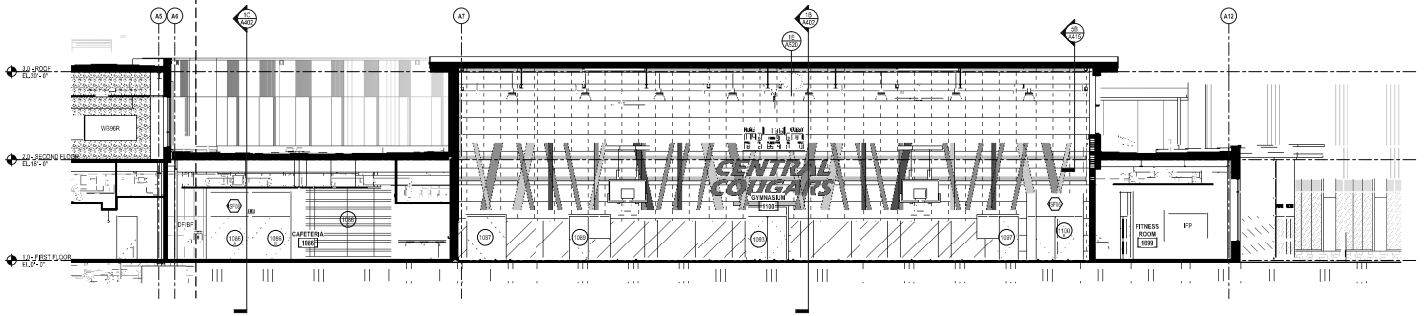
1A BUILDING SECTION - AUDITORIUM N - 01
1/8" = 1'-0"



2B BUILDING SECTION - AUDITORIUM N - 02
1/8" = 1'-0"



1D BUILDING SECTION - GYMNASIUM
1/8" = 1'-0"



2E BUILDING SECTION - GYMNASIUM
1/8" = 1'-0"

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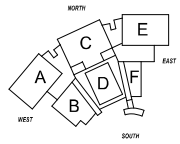

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

BUILDING SECTIONS

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: A401

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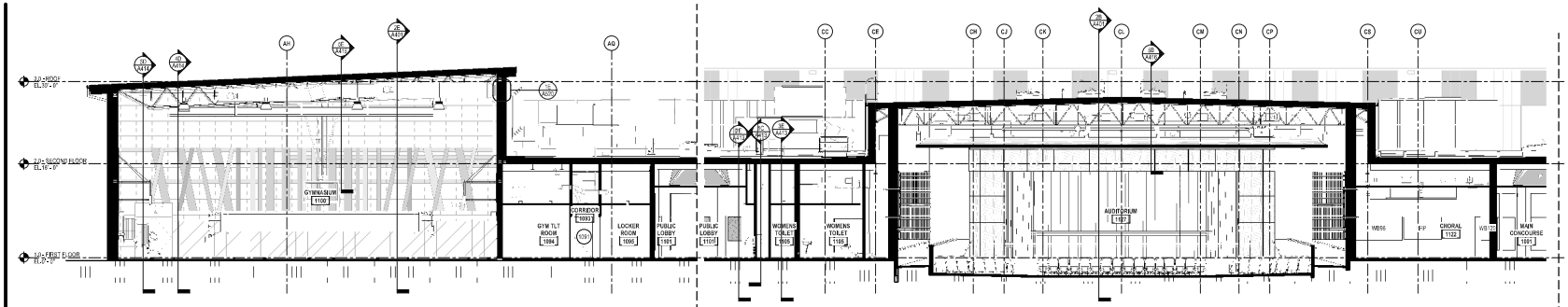
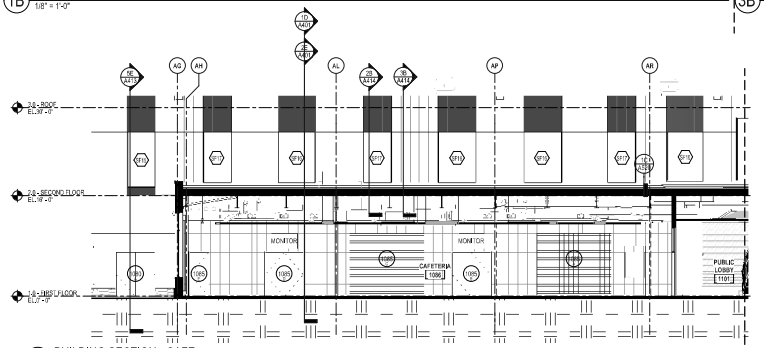
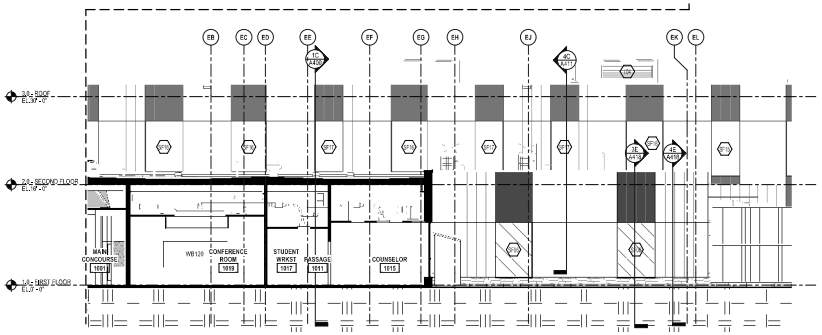


1B BUILDING SECTION - GYMNASIUM1
1/8" = 1'-0"

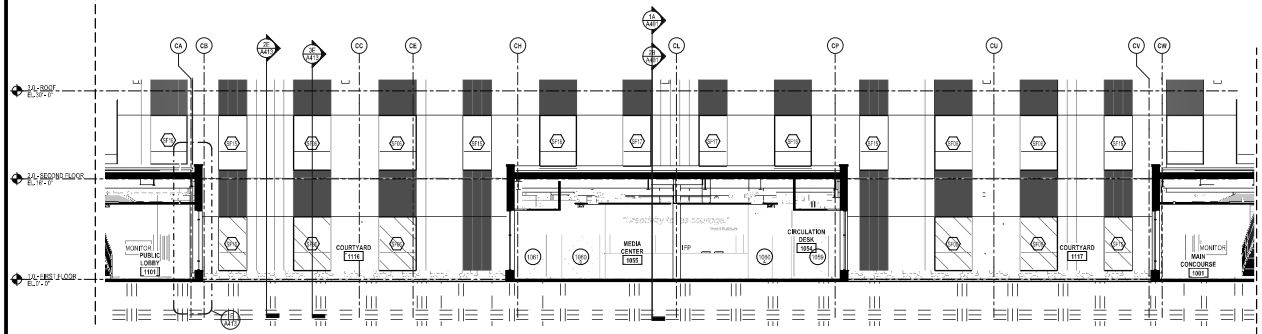
3B BUILDING SECTION AUDITORIUM
1/8" = 1'-0"



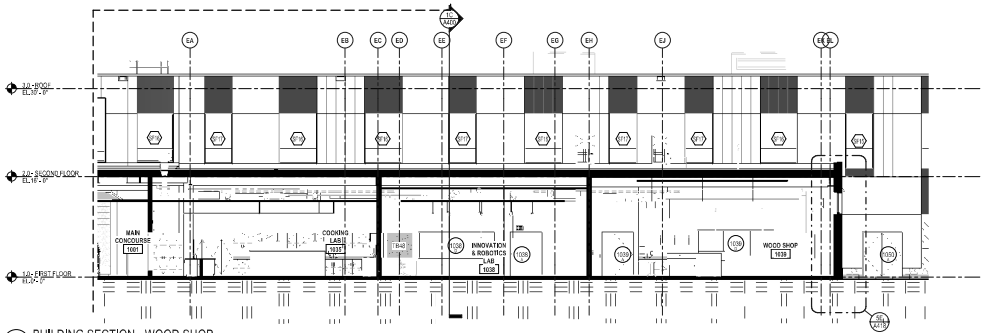
1C BUILDING SECTION - CAFE
1/8" = 1'-0"



3C BUILDING SECTION - ADMIN
1/8" = 1'-0"



1D BUILDING SECTION - COURTYARDS
1/8" = 1'-0"



3E BUILDING SECTION - WOOD SHOP
1/8" = 1'-0"

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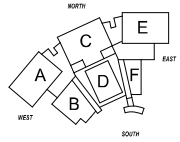

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

BUILDING SECTIONS

Date 07/08/2024
Scale 1/8" = 1'-0"
Proj. Number 22367.00
Drawing Number **A402**

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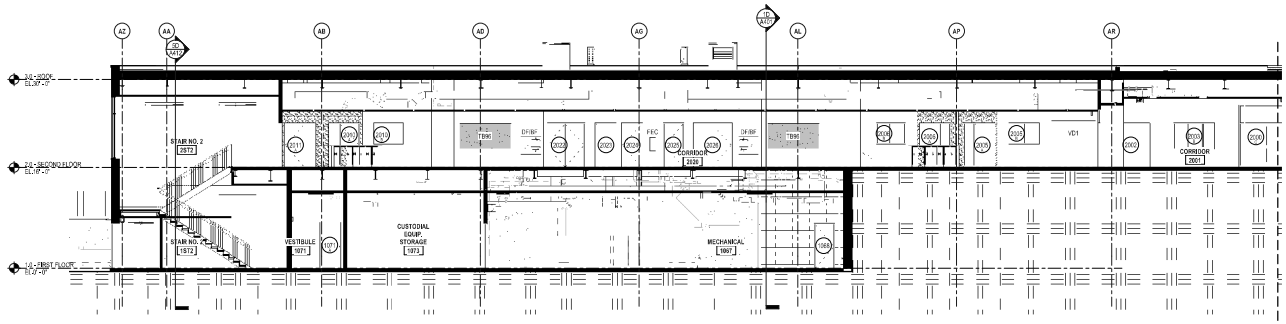
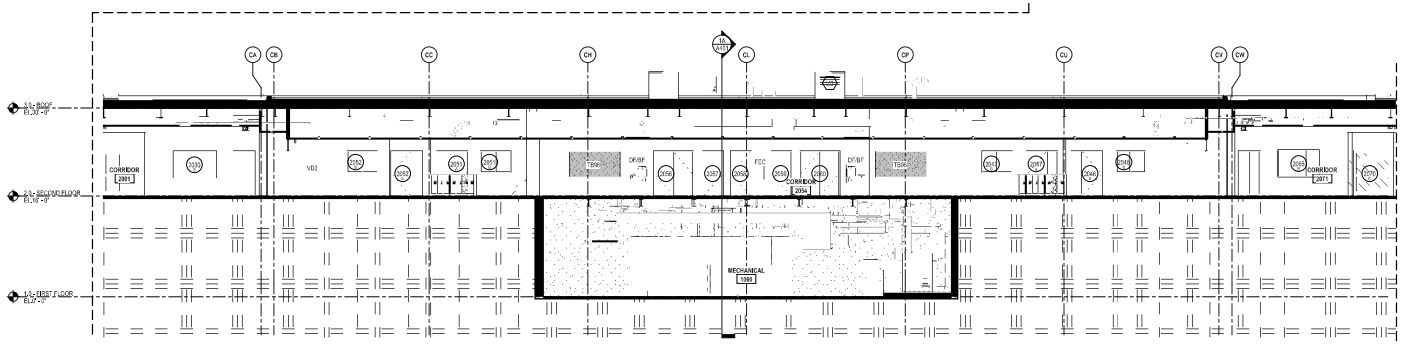
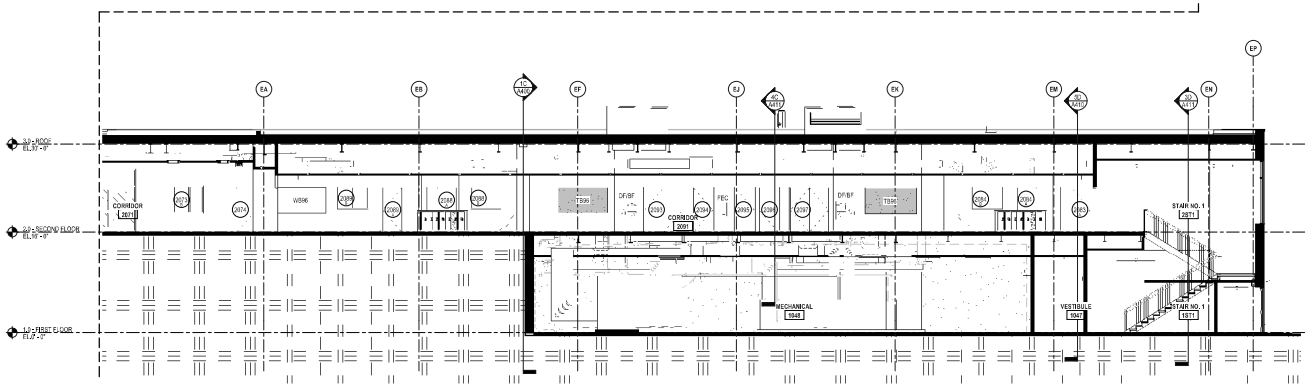


1B BUILDING SECTION - CLASSROOM POD A
1/8" = 1'-0"



2C BUILDING SECTION - CLASSROOM POD C
1/8" = 1'-0"



3E BUILDING SECTION - CLASSROOM POD E
1/8" = 1'-0"

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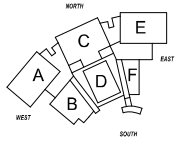
STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

BUILDING SECTIONS

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: A403

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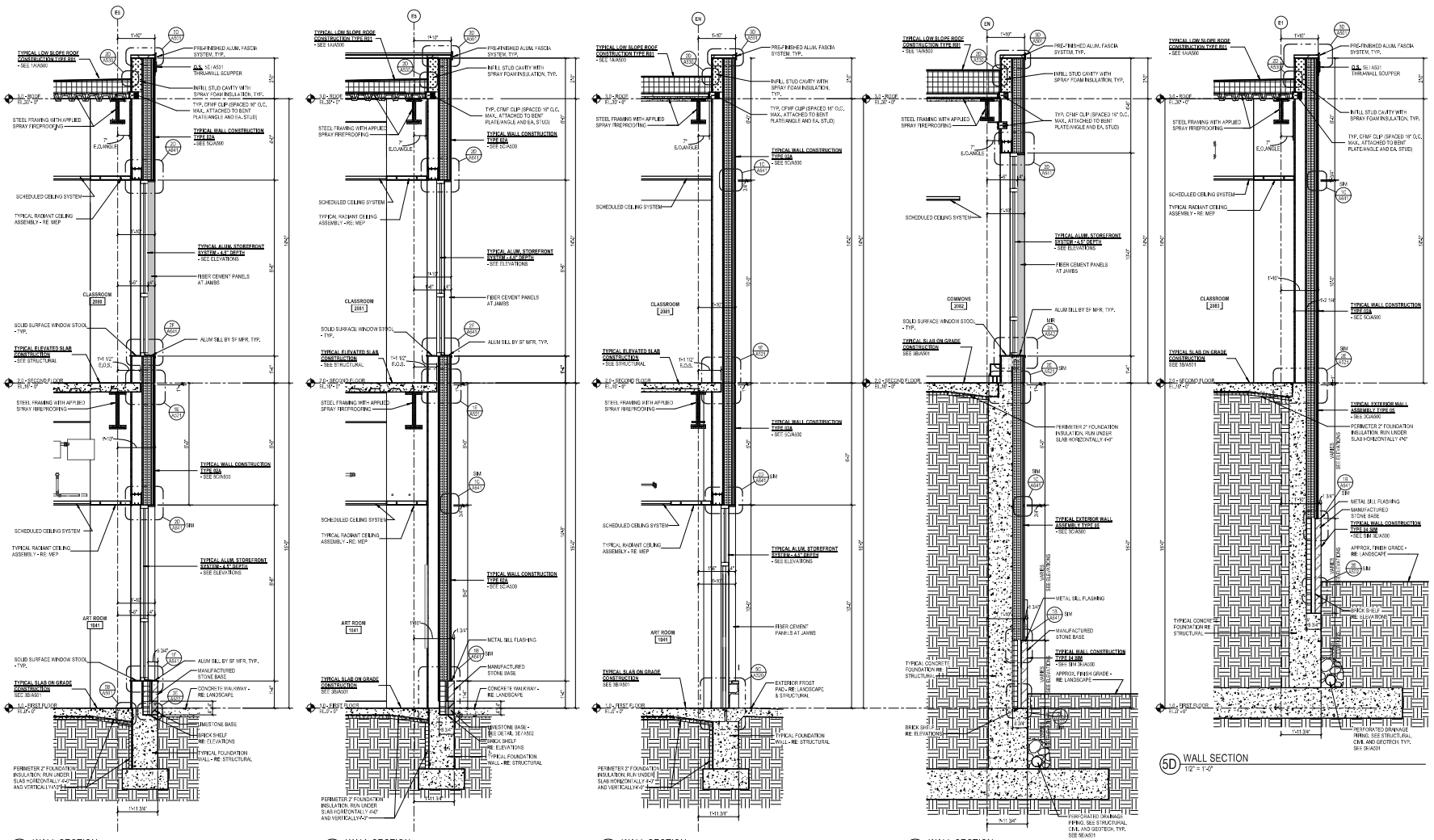

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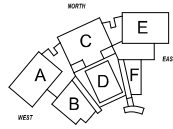

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

EXTERIOR WALL SECTIONS

Date: 07/08/2024
Scale: 1/2" = 1'-0"
Proj. Number: 22367.00
Drawing Number: A410

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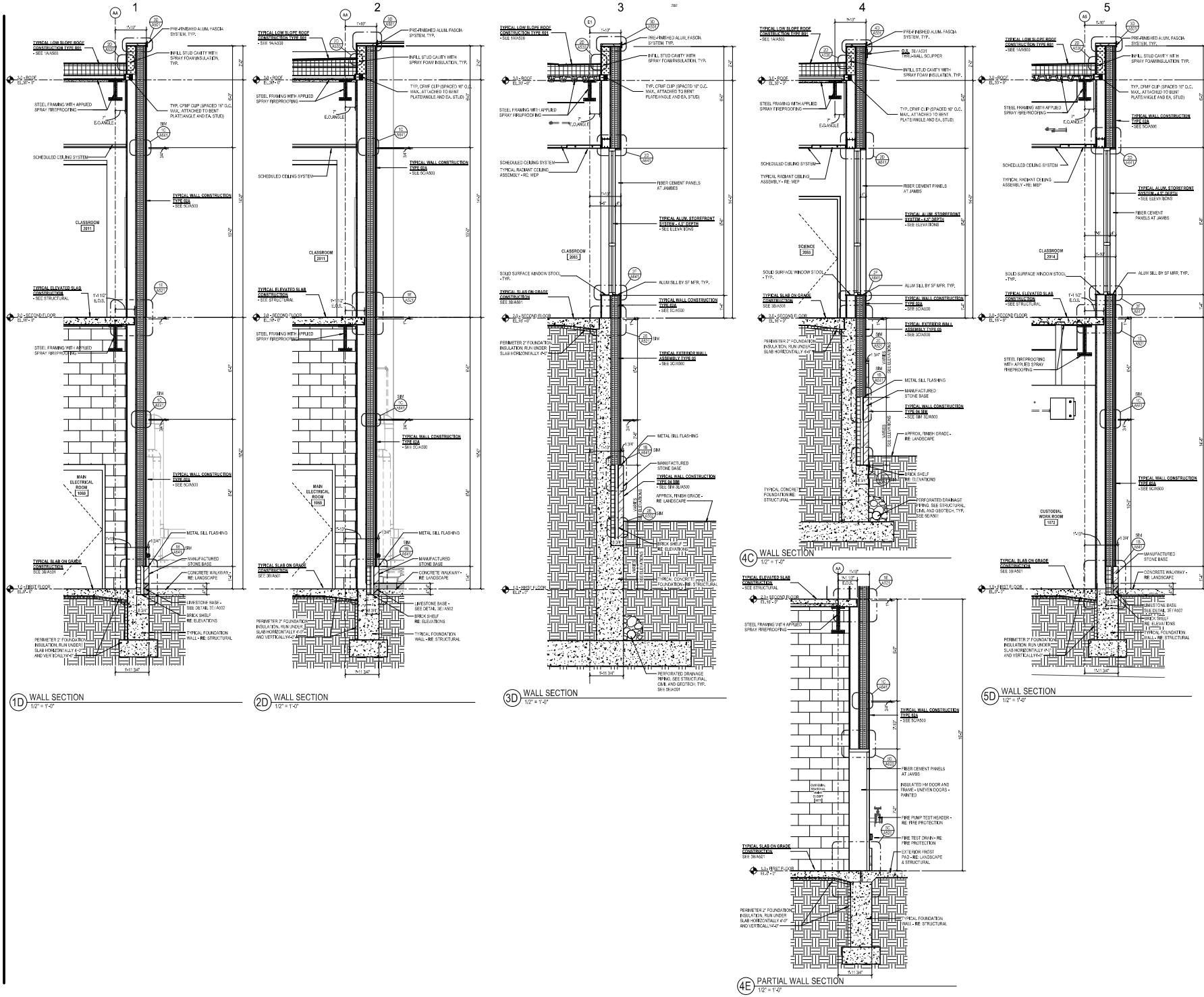

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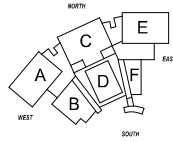

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

EXTERIOR WALL SECTIONS

Date: 07/08/2024
Scale: 1/2" = 1'-0"
Proj. Number: 22367.00
Drawing Number: A411

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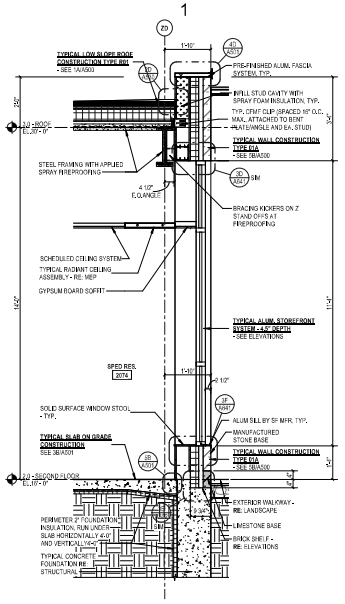
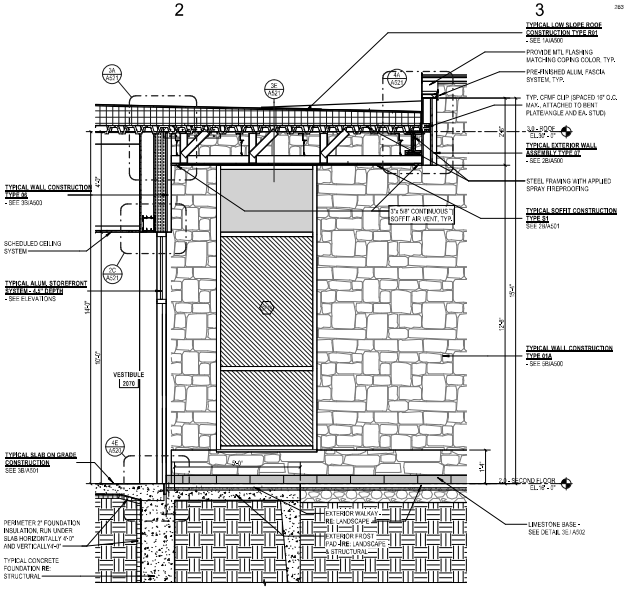
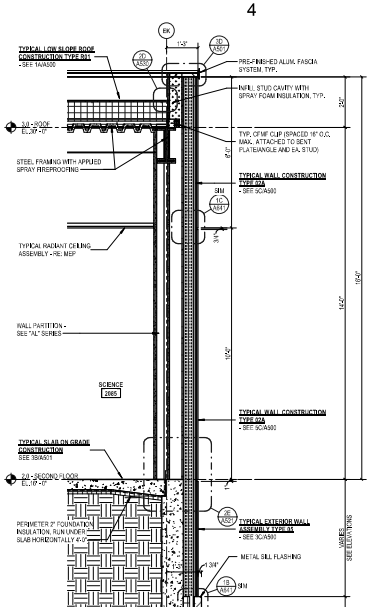


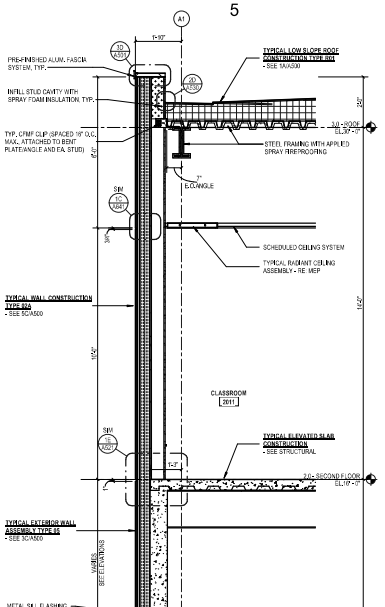
1C WALL SECTION
1/2" = 1'-0"



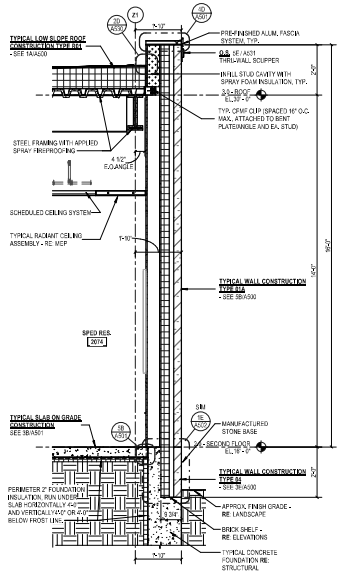
2C WALL SECTION
1/2" = 1'-0"



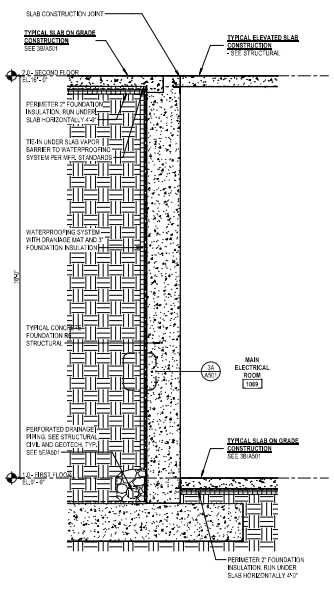
4C WALL SECTION
1/2" = 1'-0"



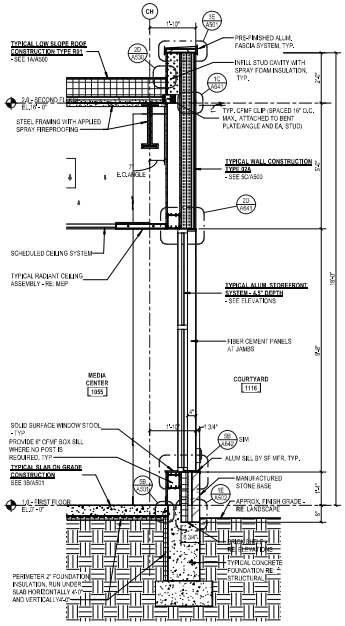
5D WALL SECTION
1/2" = 1'-0"



1E WALL SECTION
1/2" = 1'-0"



2E TYPICAL WALL SECTION AT WATERPROOFING
1/2" = 1'-0"



3E WALL SECTION
1/2" = 1'-0"

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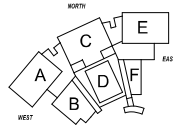

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

EXTERIOR WALL SECTIONS

Date: 07/08/2024
Scale: 1/2" = 1'-0"
Proj. Number: 22367.00
Drawing Number: A412

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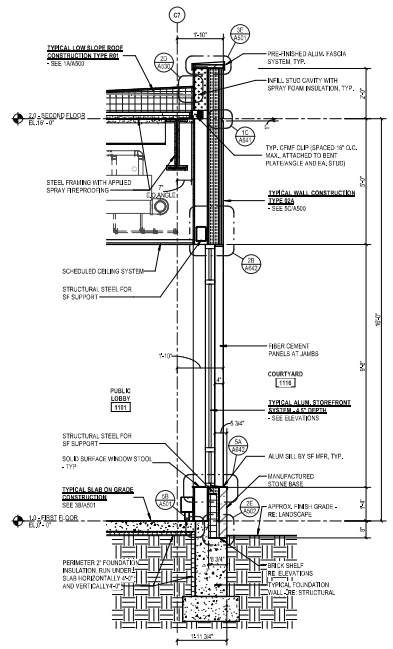
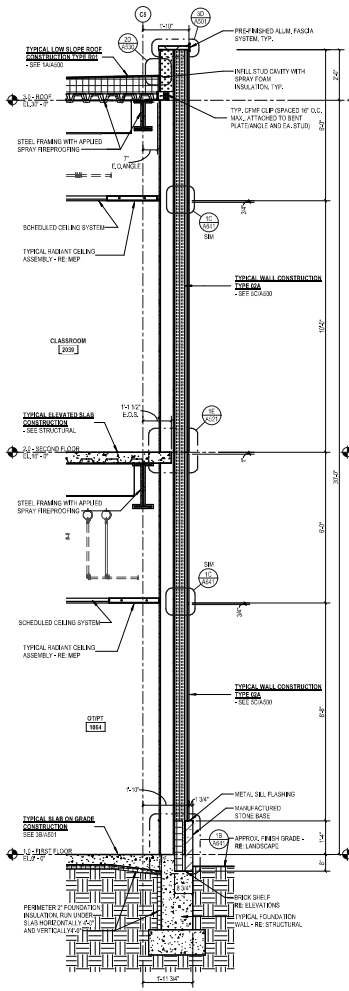
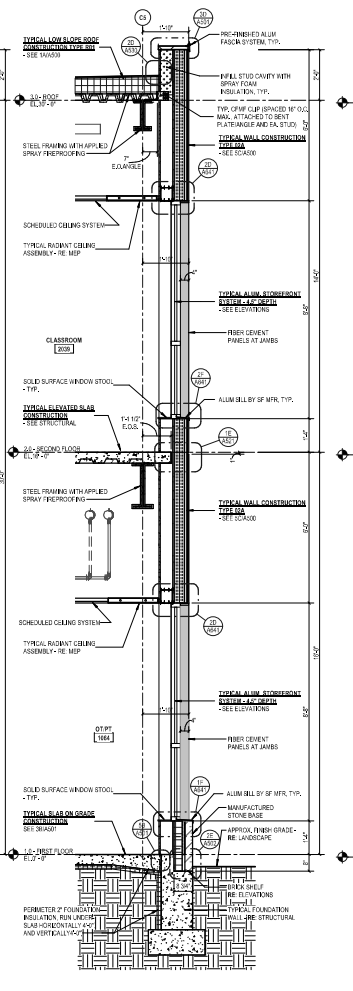


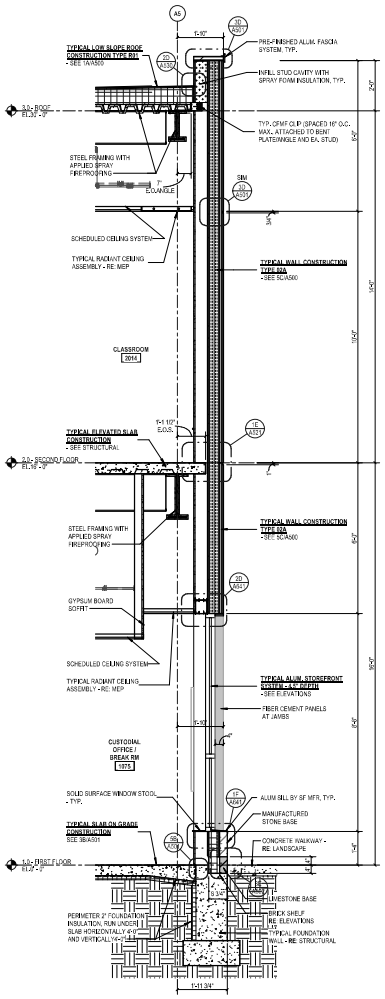
1C WALL SECTION
1/2" = 1'-0"



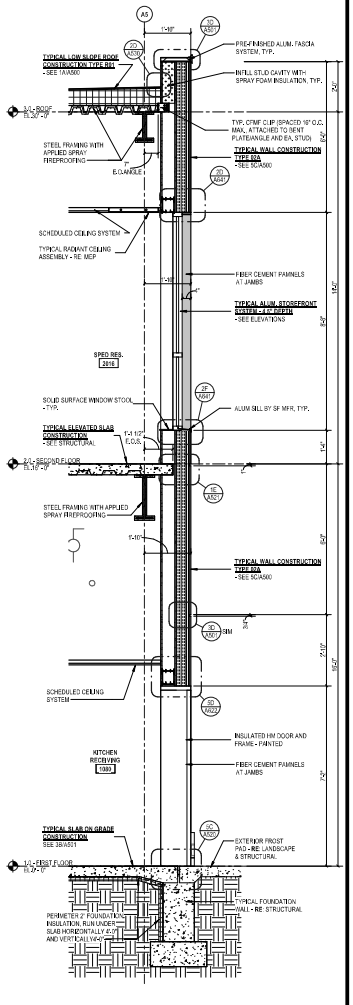
2E PARTIAL WALL SECTION
1/2" = 1'-0"



3E PARTIAL WALL SECTION
1/2" = 1'-0"



4E WALL SECTION
1/2" = 1'-0"



5E WALL SECTION
1/2" = 1'-0"

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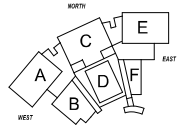
Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/03/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

EXTERIOR WALL SECTIONS

Date: 07/08/2024
Scale: 1/2" = 1'-0"
Proj. Number: 22367.00
Drawing Number: A413

Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_GREENWICH_CENTRAL_MS_R22.rvt
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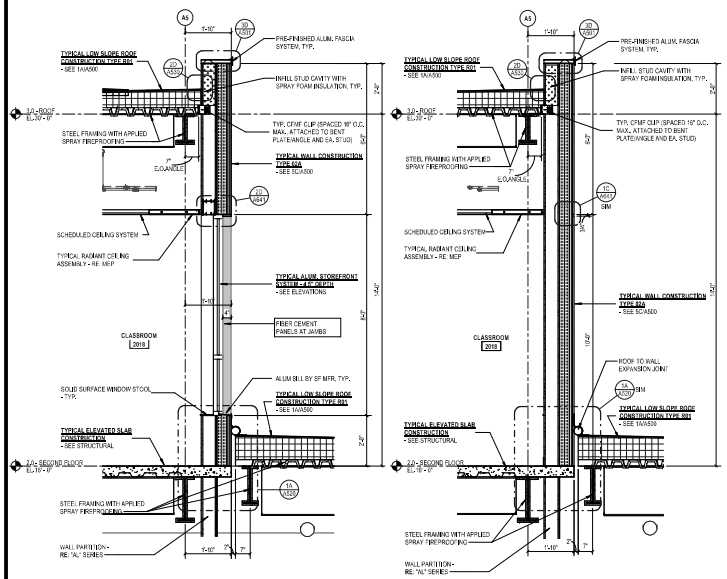
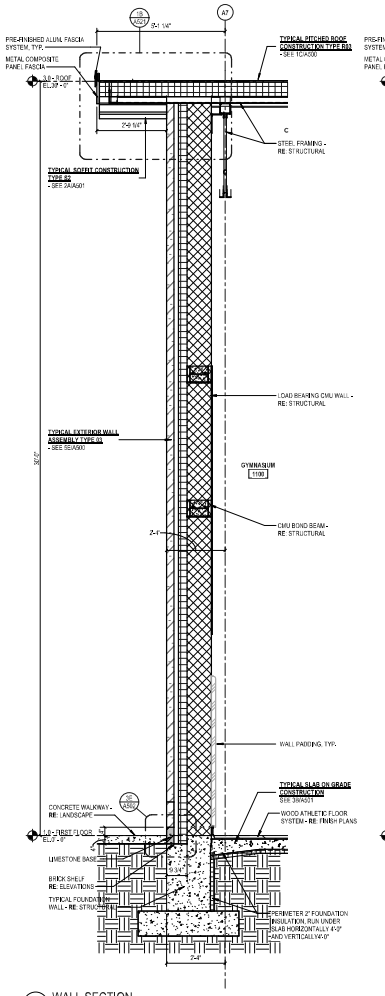
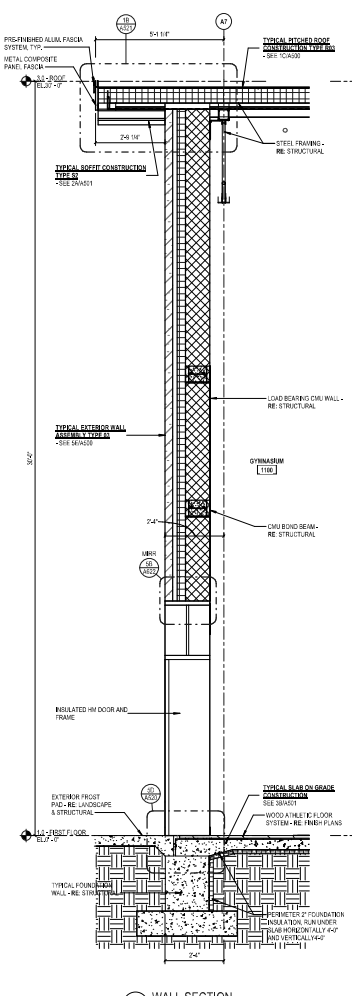


2B WALL SECTION
1/2" = 1'-0"

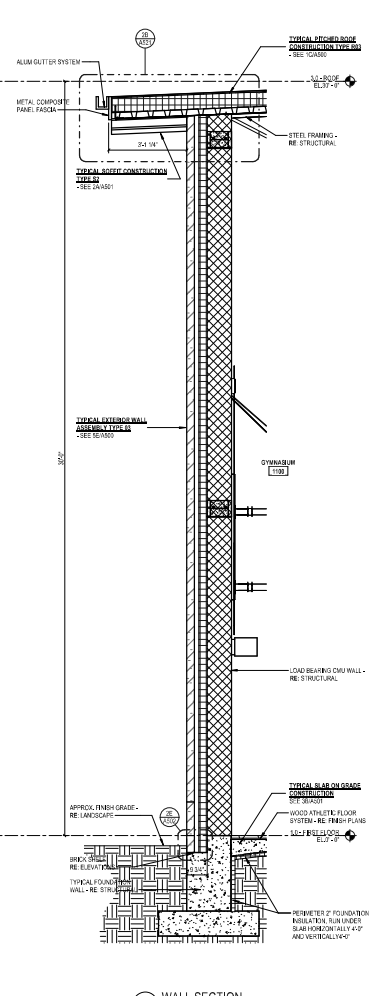
3B WALL SECTION
1/2" = 1'-0"



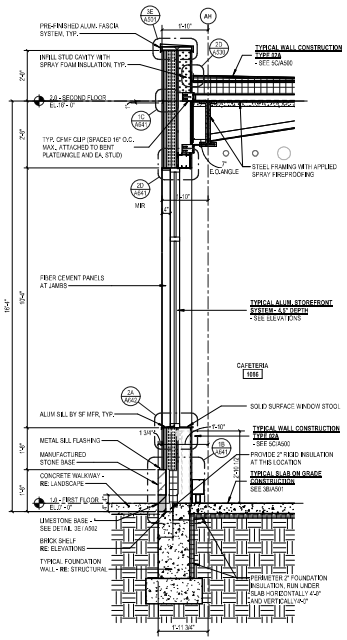
4D WALL SECTION
1/2" = 1'-0"



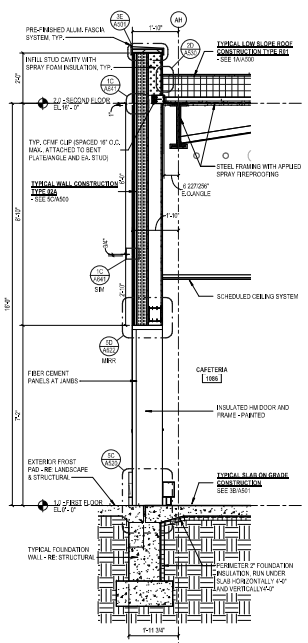
5D WALL SECTION
1/2" = 1'-0"



6D WALL SECTION
1/2" = 1'-0"



2E WALL SECTION
1/2" = 1'-0"



3E WALL SECTION
1/2" = 1'-0"

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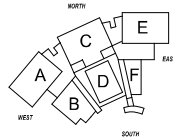

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

EXTERIOR WALL SECTIONS

Date: 07/08/2024
Scale: 1/2" = 1'-0"
Proj. Number: 22367.00
Drawing Number: A414

Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_GREENWICH_CENTRAL_MS_R22.rvt
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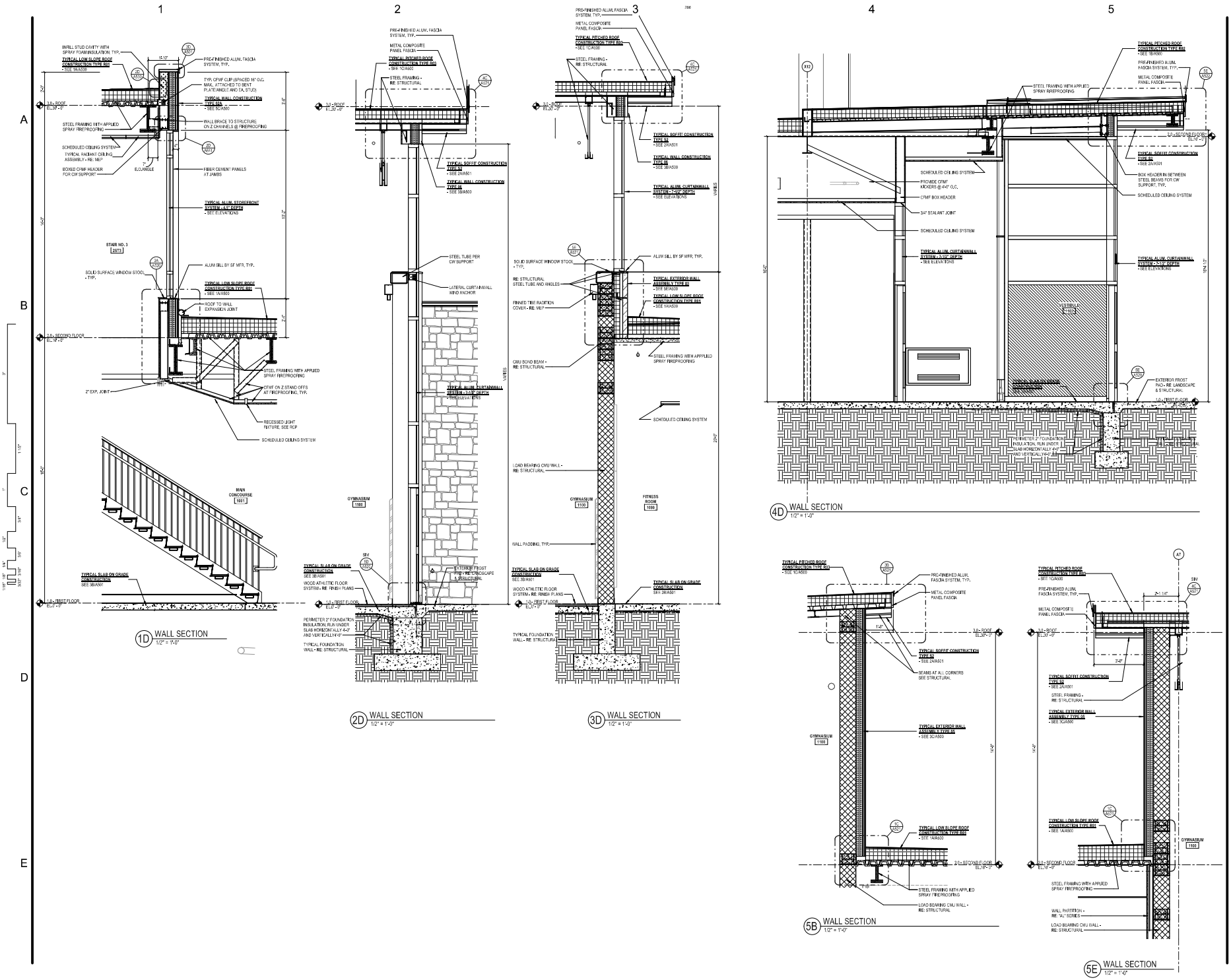

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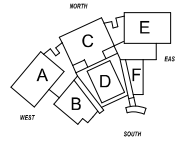

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

EXTERIOR WALL SECTIONS

Date: 07/08/2024
Scale: 1/2" = 1'-0"
Proj. Number: 22367.00
Drawing Number: A415

Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_GREENWICH_CENTRAL_MS_R23.rvt
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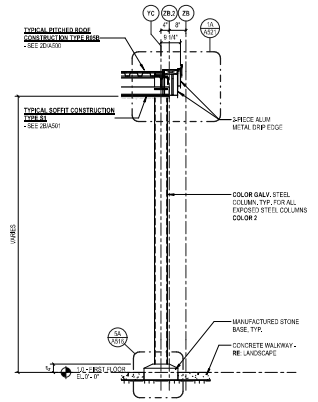
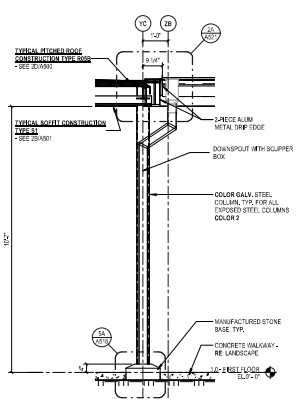
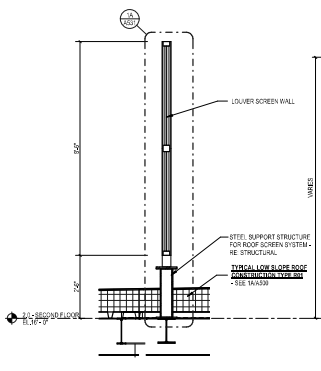


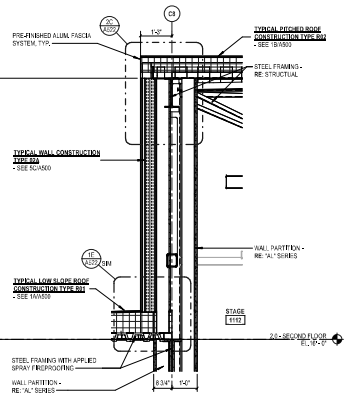
2B WALL SECTION
1/2" = 1'-0"



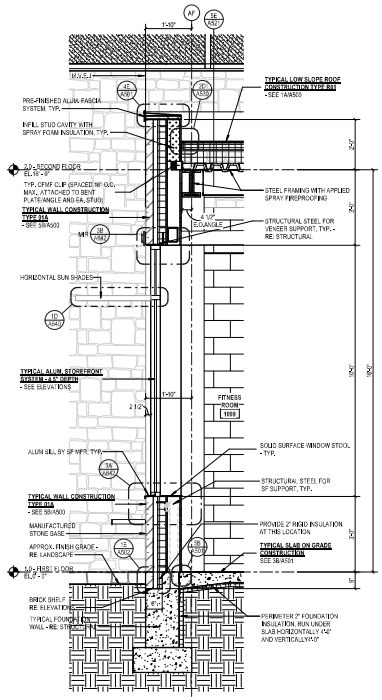
3B WALL SECTION
1/2" = 1'-0"



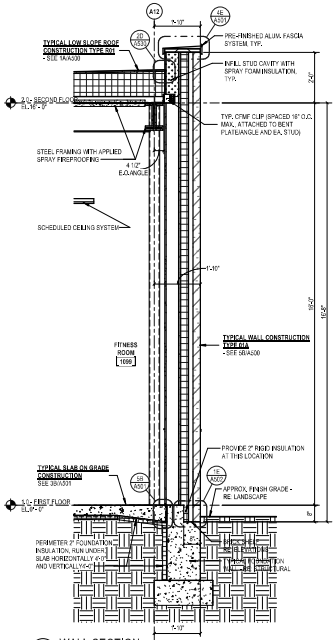
4B WALL SECTION @ ROOF SCREEN
1/2" = 1'-0"



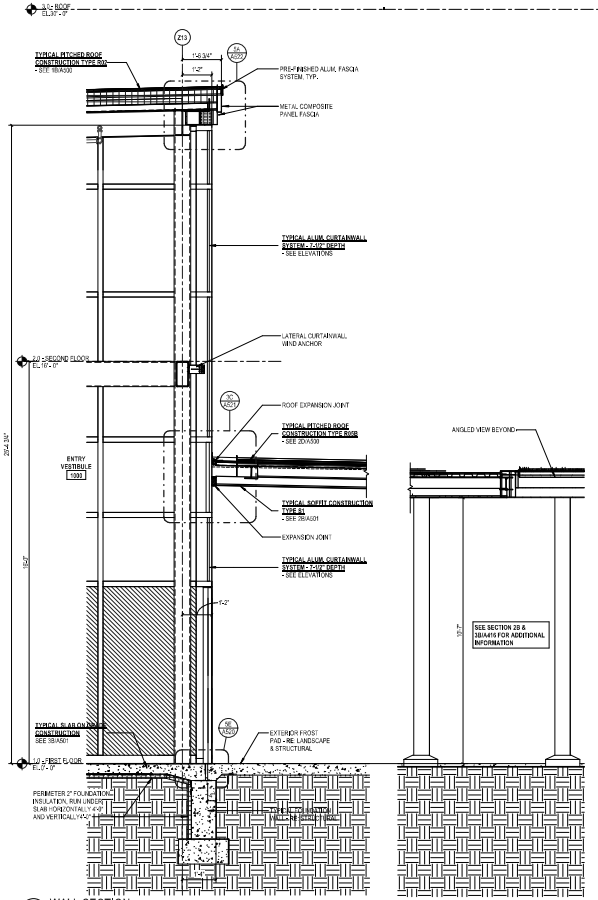
5B WALL SECTION
1/2" = 1'-0"



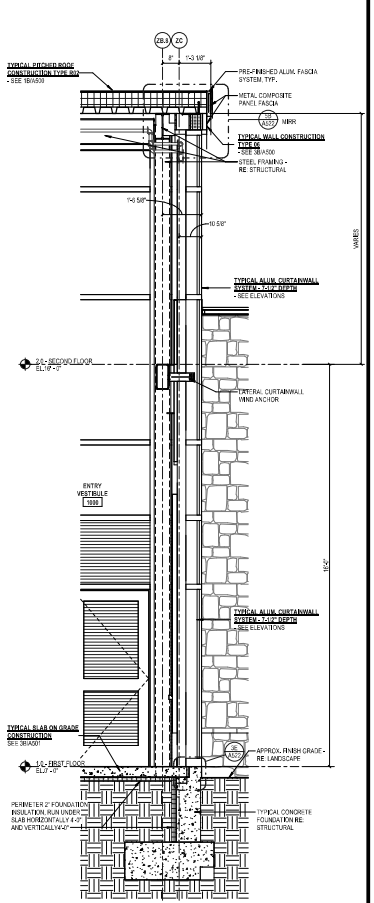
1E WALL SECTION
1/2" = 1'-0"



2E WALL SECTION
1/2" = 1'-0"



3E WALL SECTION
1/2" = 1'-0"



4E WALL SECTIONAT VESTIBULE
1/2" = 1'-0"

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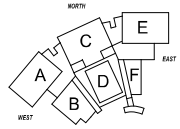

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

EXTERIOR WALL SECTIONS

Date 07/08/2024
Scale 1/2" = 1'-0"
Proj. Number 22367.00
Drawing Number **A416**

Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_GREENWICH_CENTRAL_MS_R22.rvt
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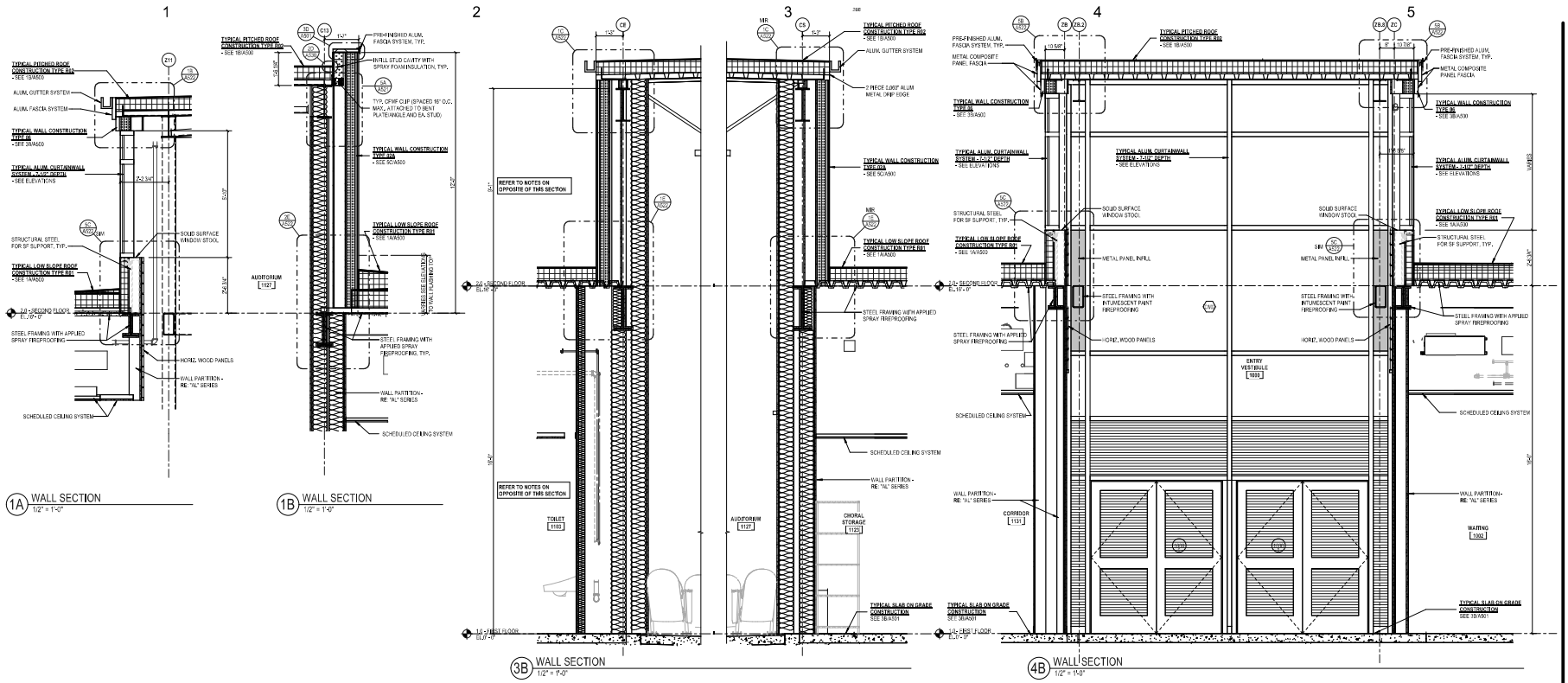

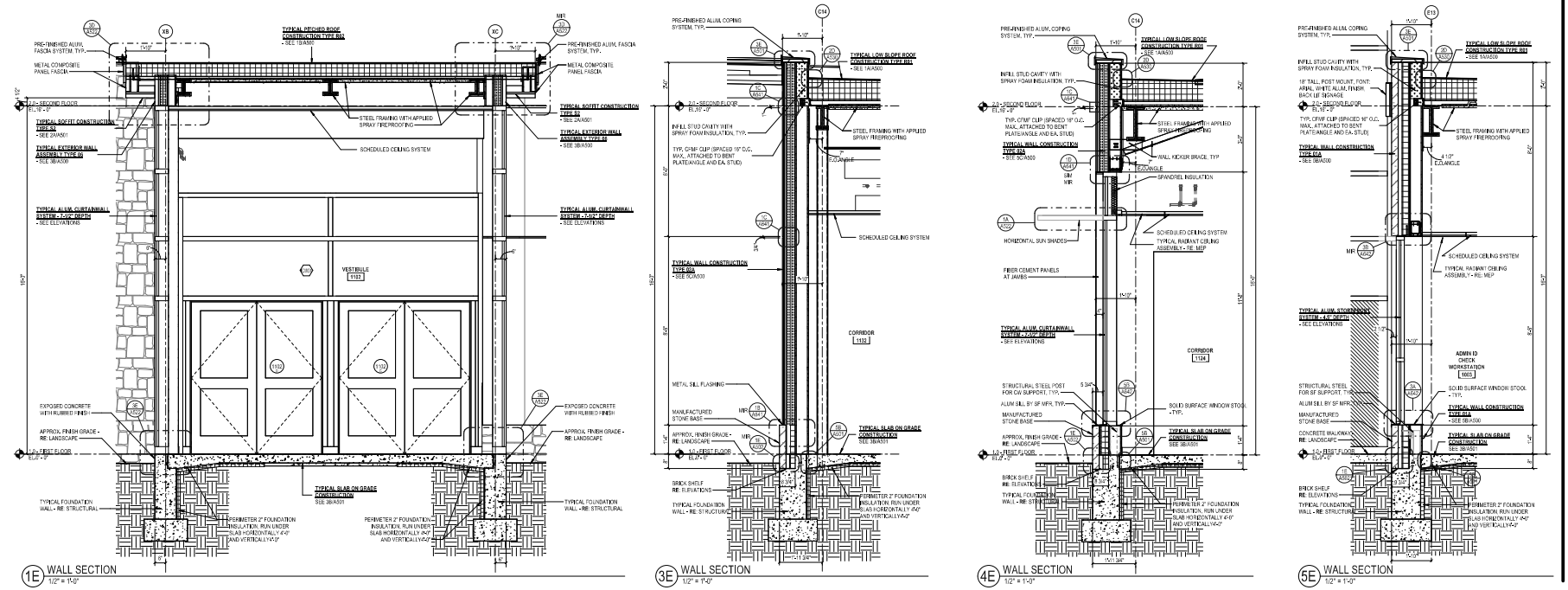

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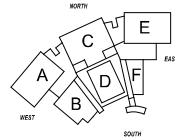

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

EXTERIOR WALL SECTIONS

Date: 07/08/2024
Scale: 1/2" = 1'-0"
Proj. Number: 22367.00
Drawing Number: A417

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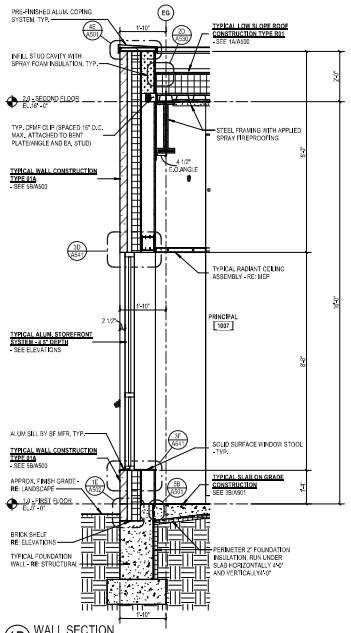
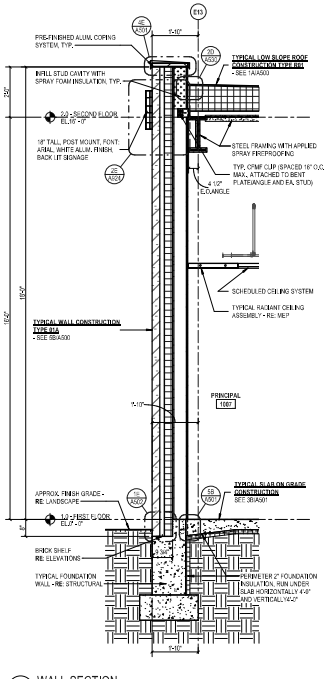
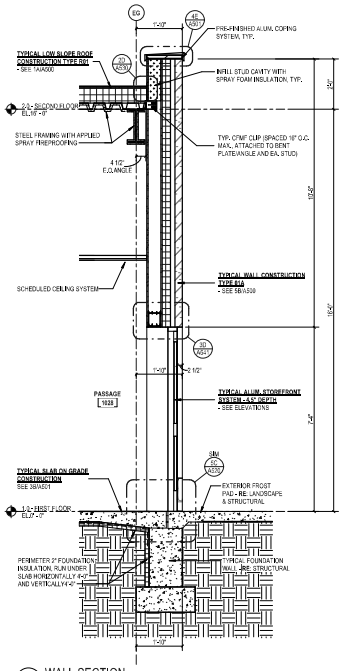


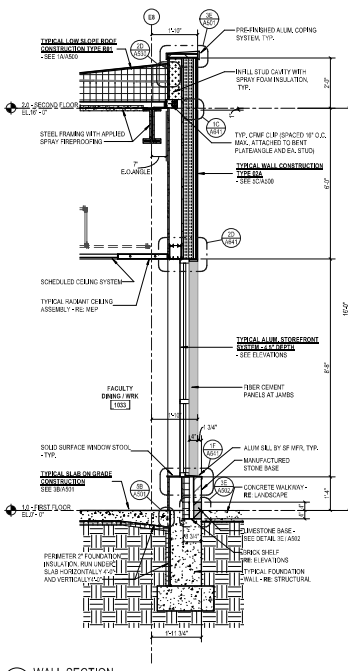
1B WALL SECTION
1/2" = 1'-0"



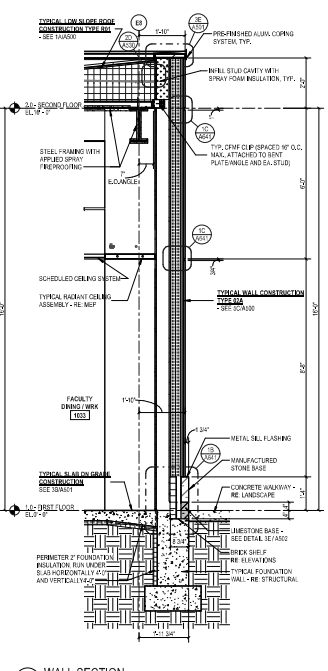
1E WALL SECTION
1/2" = 1'-0"



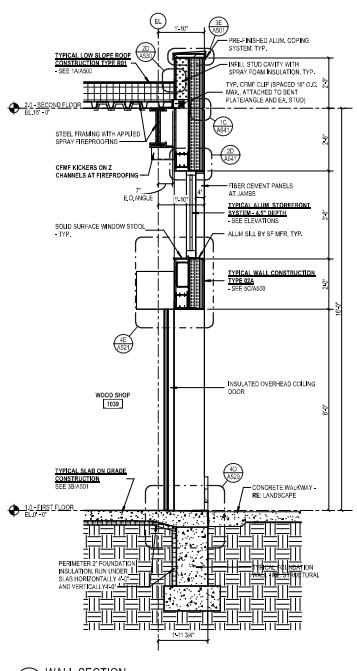
2E WALL SECTION
1/2" = 1'-0"



3E WALL SECTION
1/2" = 1'-0"



4E WALL SECTION
1/2" = 1'-0"



5E WALL SECTION
1/2" = 1'-0"

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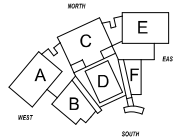

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

EXTERIOR WALL SECTIONS

Date: 07/08/2024
Scale: 1/2" = 1'-0"
Proj. Number: 22367.00
Drawing Number: A418

Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_GREENWICH_CENTRAL_MS_R22.rvt
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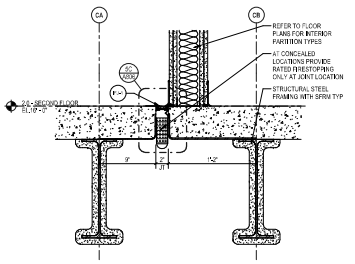
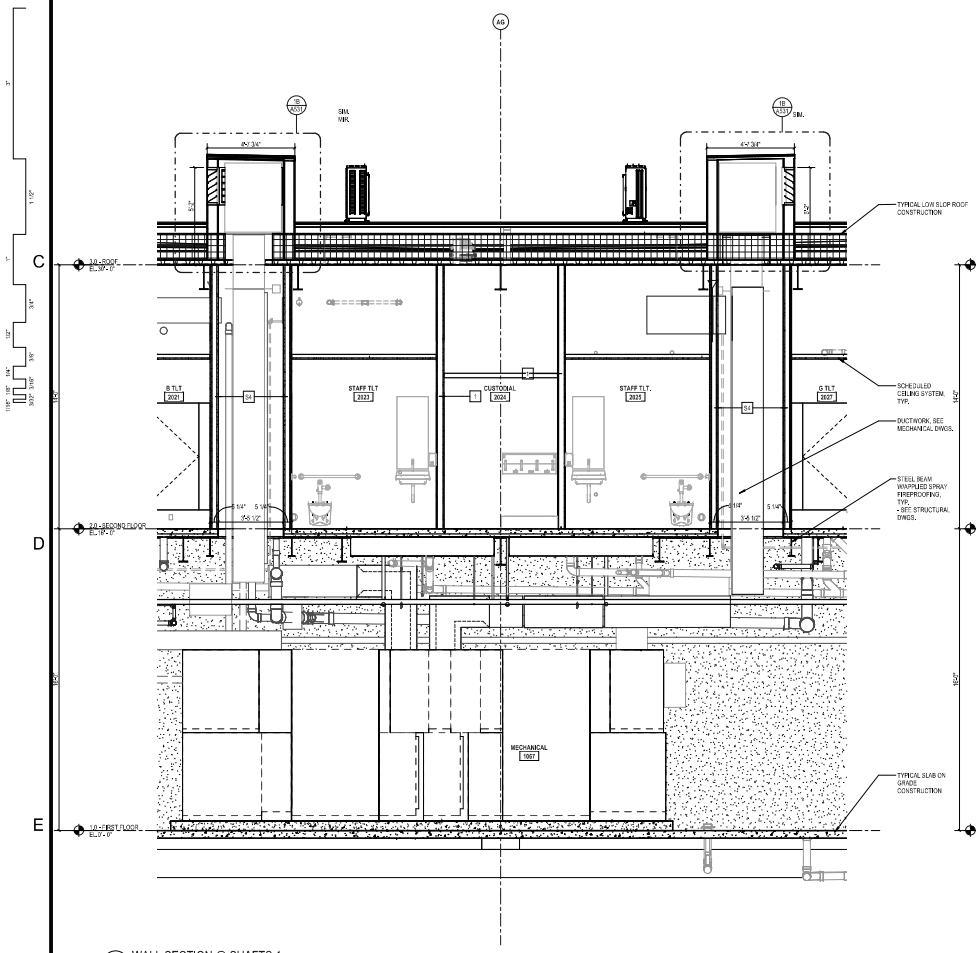
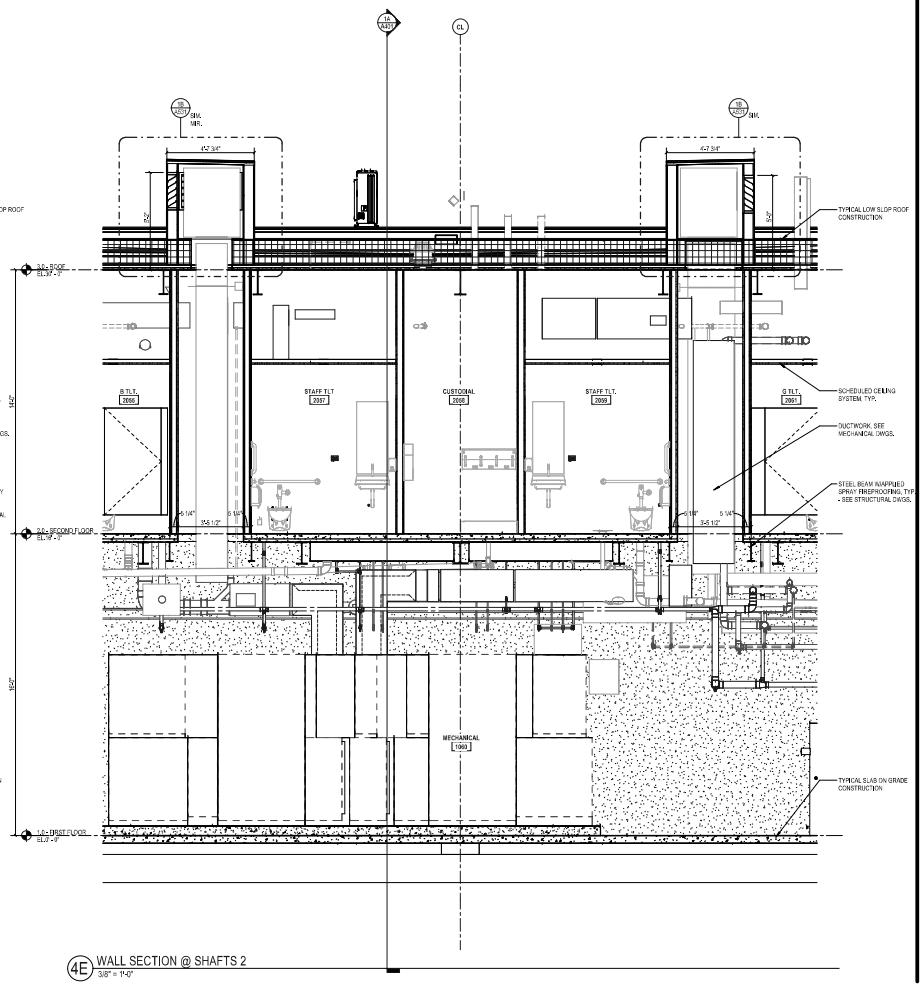


5A INTERIOR SECTION DETAIL - BUILDING EJ AT ELEVATED SLAB
1 1/2" = 1'-0"



1E WALL SECTION @ SHAFTS 1
3/8" = 1'-0"



4E WALL SECTION @ SHAFTS 2
3/8" = 1'-0"

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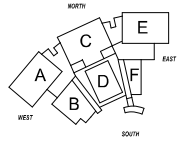


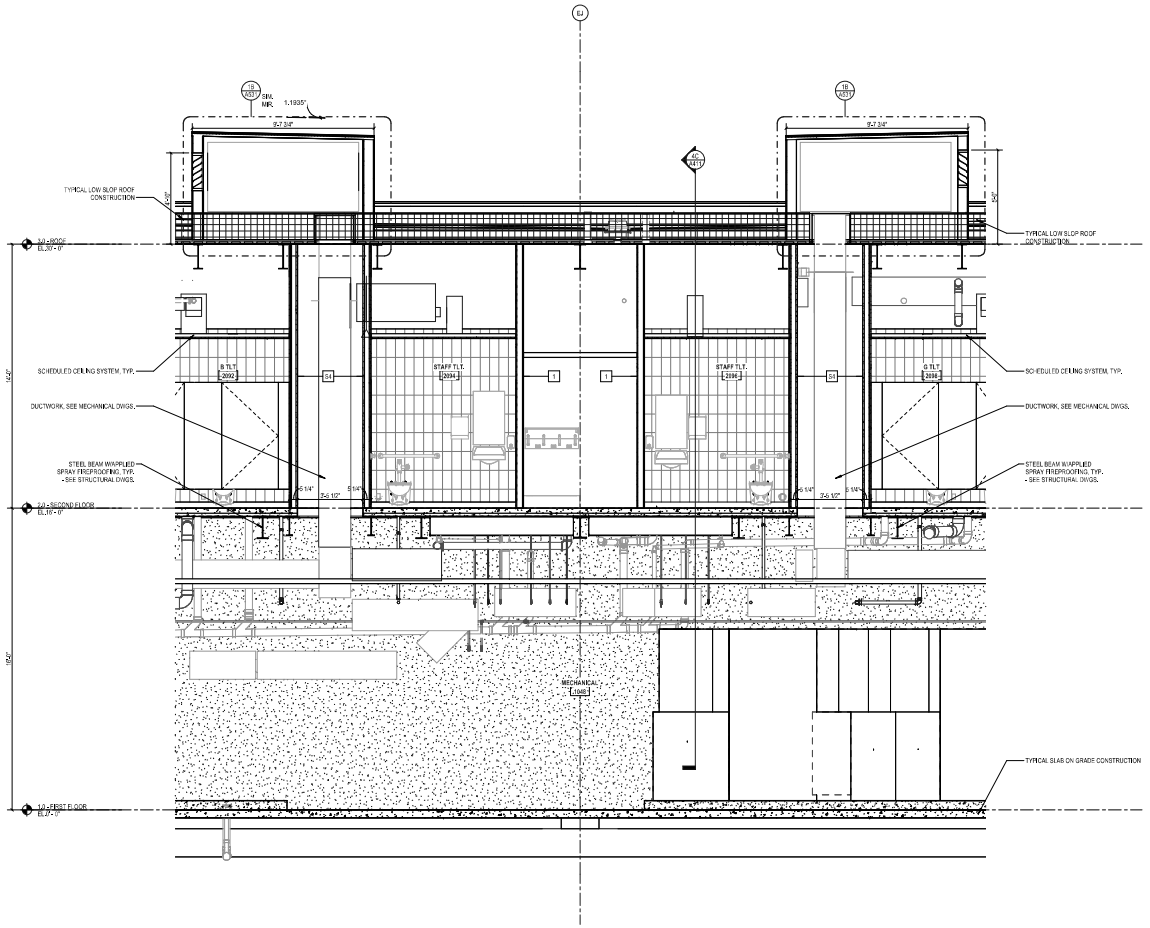
KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

INTERIOR WALL SECTIONS

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A420

Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_GREENWICH_CENTRAL_MS_R23.rvt
3/25/2024 4:13:28 PM



3E WALL SECTION @ SHAFTS 3
3/8" = 1'-0"

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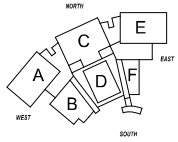

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

INTERIOR WALL SECTIONS

Date: 07/08/2024
Scale: 3/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **A421**

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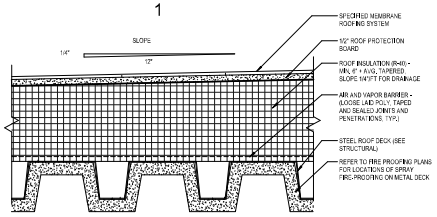
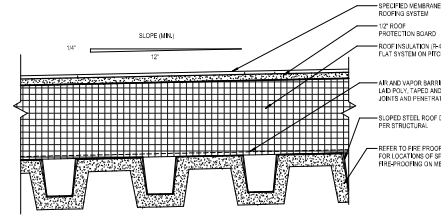
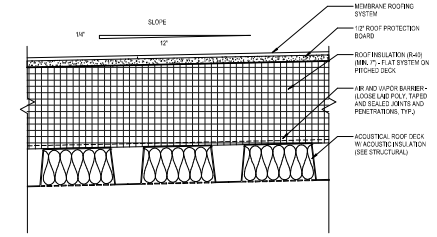
3/25/2024 4:14:09 PM



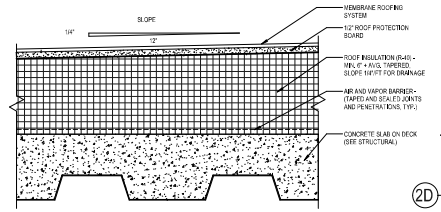
1A TYPICAL LOW SLOPE ROOF CONSTRUCTION TYPE R01
3" = 1'-0"



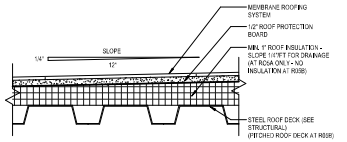
1B TYPICAL PITCHED ROOF CONSTRUCTION TYPE R02
3" = 1'-0"



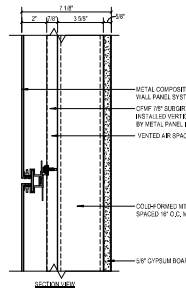
1C TYPICAL PITCHED ROOF CONSTRUCTION TYPE R03
3" = 1'-0"



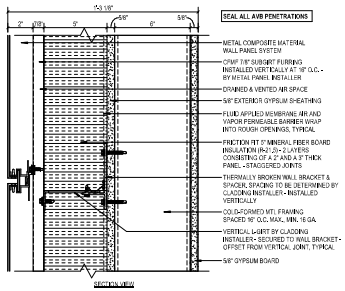
1D TYPICAL LOW SLOPE ROOF CONSTRUCTION TYPE R04 - CONCRETE DECK
3" = 1'-0"



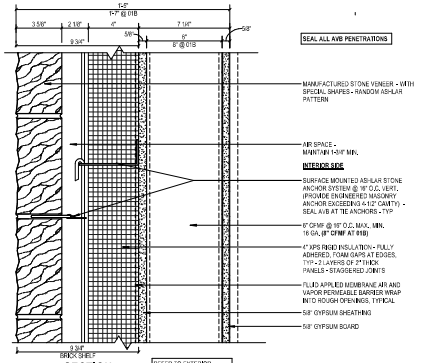
2D TYPICAL LOW SLOPE ROOF CONSTRUCTION TYPE R05A & R05B
3" = 1'-0"



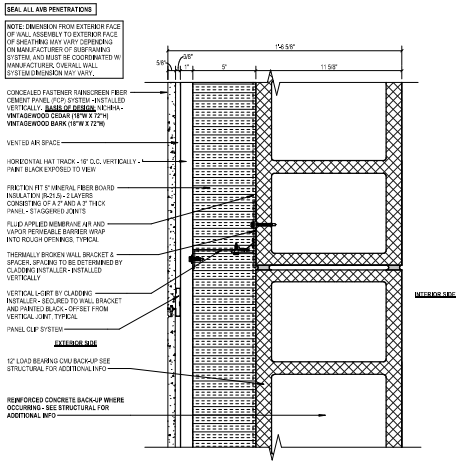
2B TYPICAL EXTERIOR WALL ASSEMBLY TYPE 07 - METAL COMPOSITE MATERIAL (MCM) PANEL ON 3_5/8" CFMF UNINSULATED
3" = 1'-0"



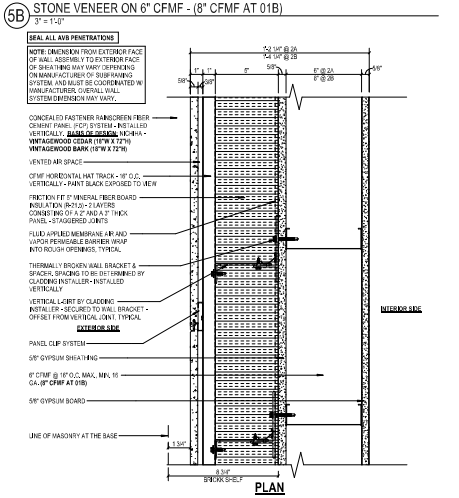
3B TYPICAL EXTERIOR WALL ASSEMBLY TYPE 06 - METAL COMPOSITE MATERIAL (MCM) PANEL ON 6" CFMF
3" = 1'-0"



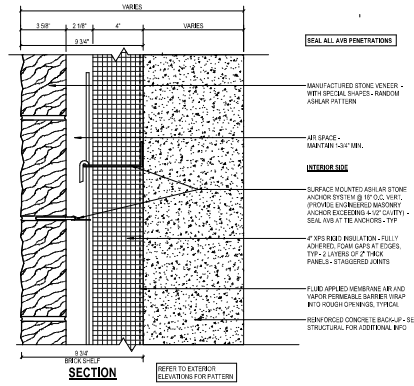
5B TYPICAL EXTERIOR WALL ASSEMBLY TYPE 01A - STONE VENEER ON 6" CFMF - (8" CFMF AT 01B)
3" = 1'-0"



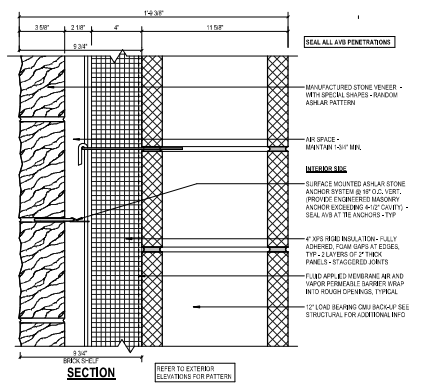
3C TYPICAL EXTERIOR WALL ASSEMBLY TYPE 05 - FCP (VERTICALLY) ON 12" CMU
3" = 1'-0"



5C TYPICAL EXTERIOR WALL ASSEMBLY TYPE 02A - FCP (VERTICALLY) ON 6" CFMF - (8" CFMF AT 02B)
3" = 1'-0"



3E TYPICAL EXTERIOR WALL ASSEMBLY TYPE 04 - STONE VENEER ON CONC
3" = 1'-0"



5E TYPICAL EXTERIOR WALL ASSEMBLY TYPE 03 - STONE VENEER ON 12" CMU
3" = 1'-0"

EXTERIOR ASSEMBLIES

WALL

STONE VENEER ON CFMF BACKUP (TYPE 01A & 01B)

	R-Value
OUTSIDE AIR FILM	0.17
4" STONE VENEER	0.20
AIR SPACE	1.00
4" XPS INSULATION	20.00
AIR/ VAPOR BARRIER	0.01
5/8" GYPSUM SHEATHING	0.56
METAL STUD/ AIR CAVITY	0.00
5/8" GYPSUM BOARD	0.56
INSIDE AIR FILM	0.68
ASSEMBLY R-VALUE TOTAL	= 23.18
ASSEMBLY U-VALUE	= 0.043
MAX U PERMITTED - IECC 2018	= **0.055**

FIBER CONCRETE PANEL RAINSCREEN VENEER ON CFMF BACKUP (TYPE 02A & 02B)

	R-Value
OUTSIDE AIR FILM	0.17
FC PANEL	0.20
AIR SPACE	0.00
5" SEMI-RIGID INSULATION	21.00
AIR/ VAPOR BARRIER	0.01
5/8" GYPSUM SHEATHING	0.56
METAL STUD/ AIR CAVITY	0.00
5/8" GYPSUM BOARD	0.56
INSIDE AIR FILM	0.68
ASSEMBLY R-VALUE TOTAL	= 23.18
ASSEMBLY U-VALUE	= 0.043
MAX U PERMITTED - IECC 2018	= **0.055**

STONE VENEER ON CMU BACKUP (TYPE 03 & 04)

	R-Value
OUTSIDE AIR FILM	0.17
4" STONE VENEER	0.20
AIR SPACE	1.00
4" XPS INSULATION	20.00
AIR/ VAPOR BARRIER	0.01
12" CMU (OR 12" CONCRETE)	2.28
INSIDE AIR FILM	0.68
ASSEMBLY R-VALUE TOTAL	= 24.44
ASSEMBLY U-VALUE	= 0.041
MAX U PERMITTED - IECC 2018	= **0.090**

FIBER CONCRETE PANEL RAINSCREEN VENEER ON CMU BACKUP (TYPE 05)

	R-Value
OUTSIDE AIR FILM	0.17
FC PANEL	0.20
AIR SPACE	0.00
5" SEMI-RIGID INSULATION	21.00
AIR/ VAPOR BARRIER	0.01
12" CMU	2.38
INSIDE AIR FILM	0.68
ASSEMBLY R-VALUE TOTAL	= 24.74
ASSEMBLY U-VALUE	= 0.040
MAX U PERMITTED - IECC 2018	= **0.090**

ROOF

MEMBRANE SYSTEM (TPO) ON R-ISO AT METAL DECK (TYPE R1)

	R-Value
OUTSIDE AIR FILM	0.17
ROOF MEMBRANE	0.00
1/2" COVER BOARD	0.45
RIGID INSULATION	
R-40 Min., Tapered, Avg. 12"	60.00
AIR/ VAPOR BARRIER	0.01
METAL ROOF DECK	0.00
INSIDE AIR FILM (HORIZONTAL)	0.61
ASSEMBLY R-VALUE TOTAL	= 60.24
ASSEMBLY U-VALUE	= 0.015
MAX U PERMITTED - IECC 2018	= **0.032**

MEMBRANE SYSTEM (TPO) ON SLOPING METAL DECK (TYPE R2)

	R-Value
OUTSIDE AIR FILM	0.17
ROOF MEMBRANE	0.00
1/2" COVER BOARD	0.45
RIGID INSULATION	
R-40 Min.	40.00
AIR/ VAPOR BARRIER	0.01
METAL ROOF DECK	0.00
INSIDE AIR FILM (HORIZONTAL)	0.61
ASSEMBLY R-VALUE TOTAL	= 41.24
ASSEMBLY U-VALUE	= 0.024
MAX U PERMITTED - IECC 2018	= **0.032**

MEMBRANE SYSTEM (TPO) ON SLOPING ACOUSTIC DECK (TYPE R3)

	R-Value
OUTSIDE AIR FILM	0.17
ROOF MEMBRANE	0.00
1/2" COVER BOARD	0.45
RIGID INSULATION	
R-40 Min.	40.00
AIR/ VAPOR BARRIER	0.01
ACOUSTIC DECK	0.00
INSIDE AIR FILM (HORIZONTAL)	0.61
ASSEMBLY R-VALUE TOTAL	= 41.24
ASSEMBLY U-VALUE	= 0.024
MAX U PERMITTED - IECC 2018	= **0.032**

MEMBRANE SYSTEM (TPO) ON FLAT CONCRETE DECK (TYPE R4)

	R-Value
OUTSIDE AIR FILM	0.17
ROOF MEMBRANE	0.00
1/2" COVER BOARD	0.45
RIGID INSULATION	
R-40 Min.,Tapered, Avg. 12"	60.00
AIR/ VAPOR BARRIER	0.01
5 1/4" COMPOSITE DECK	0.84
INSIDE AIR FILM (HORIZONTAL)	0.61
ASSEMBLY R-VALUE TOTAL	= 60.26
ASSEMBLY U-VALUE	= 0.015
MAX U PERMITTED - IECC 2018	= **0.032**

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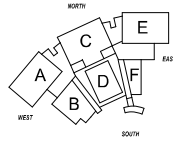
Drawn JZ
Checked JZ

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/03/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

TYPICAL EXTERIOR ASSEMBLIES

Date 07/08/2024
Scale As indicated
Proj. Number 22367.00
Drawing Number **A500**

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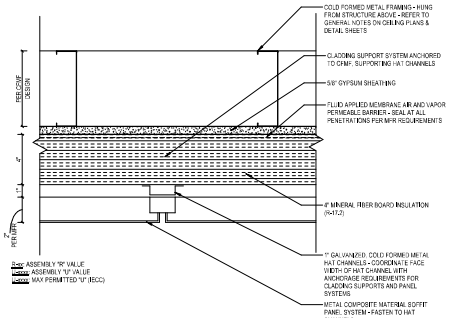
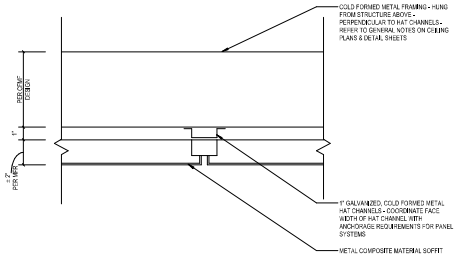
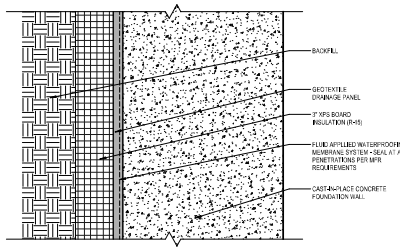


1A TYPICAL SOFFIT CONSTRUCTION AT MCM PANEL - INSULATED - TYPE S3
3" = 1'-0"

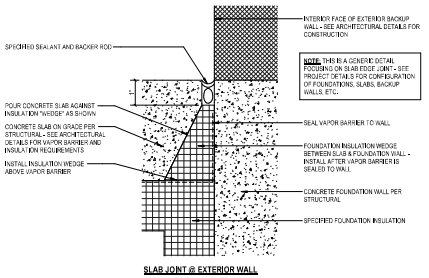


2A TYPICAL SOFFIT CONSTRUCTION AT MCM PANEL - UNINSULATED - TYPE S2
3" = 1'-0"

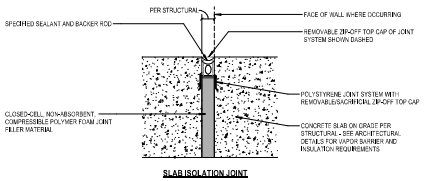


PLAN VIEW

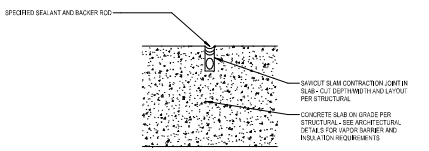
3A WALL - FOUNDATION W/ WATERPROOFING
3" = 1'-0"



SLAB JOINT @ EXTERIOR WALL

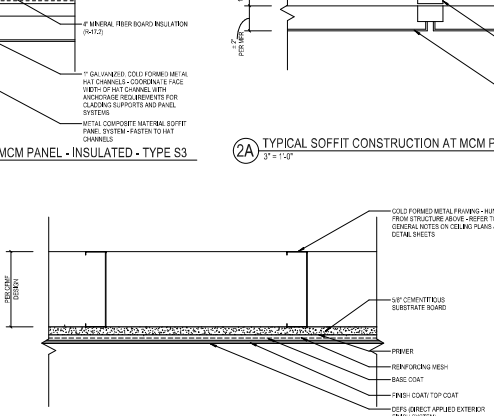


SLAB ISOLATION JOINT

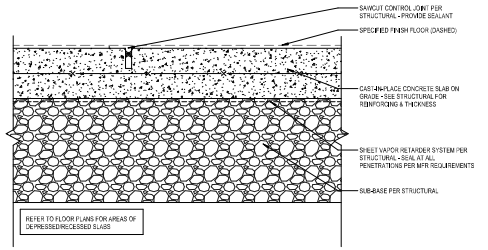


SAWCUT SLAB CONTROL JOINT

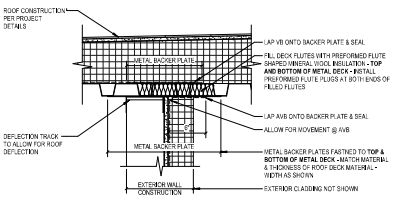
5B TYPICAL SLAB-ON-GRADE JOINTS
6" = 1'-0"



2B TYPICAL SOFFIT CONSTRUCTION AT DEFS - TYPE S1 (UNINSULATED)
3" = 1'-0"

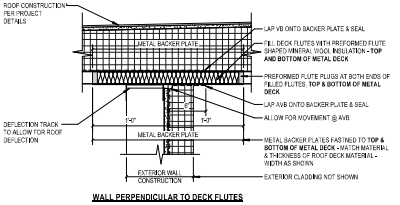


3B TYPICAL SLAB-ON-GRADE CONSTRUCTION
3" = 1'-0"



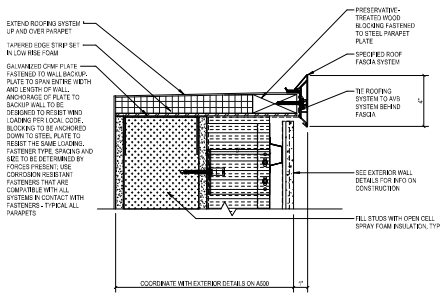
WALL PARALLEL TO DECK FLUTES

NOTE:
SEAL BACKER PLATES TO METAL DECK WITH MINIMUM 2 ROWS OF CONTINUOUS BUTYL SEALANT PARALLEL TO DECK FLUTES, TOP AND BOTTOM OF METAL DECK. CONTRACTOR TO COORDINATE INSTALLATION OF INSULATION, SEALANT, PLATES, PLUGS, ETC.

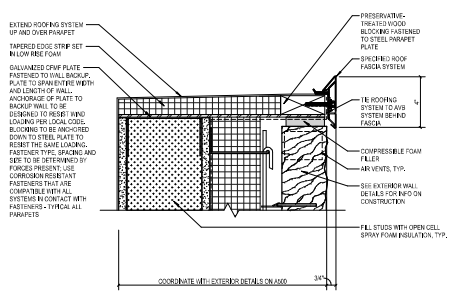


WALL PERPENDICULAR TO DECK FLUTES

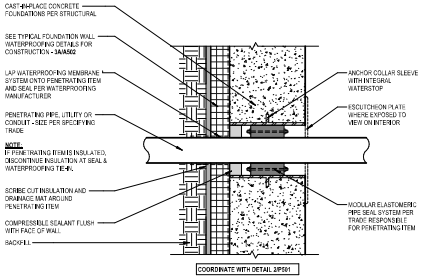
1E TYPICAL INSULATED WALL AT ROOF DECK
1 1/2" = 1'-0"



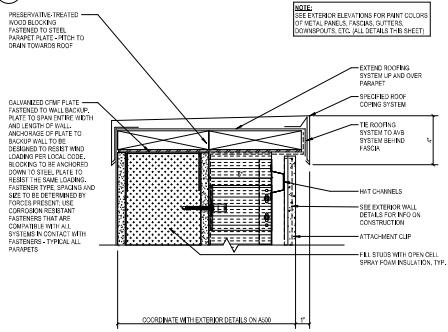
3D TYPICAL ROOF PARAPET WITH FASCIA - RAINSCREEN
3" = 1'-0"



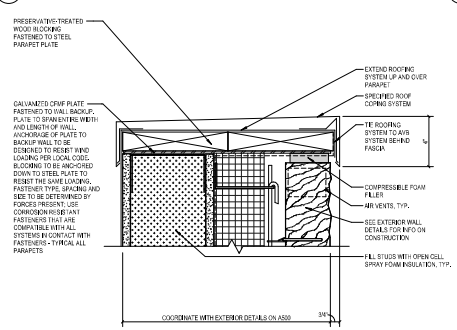
4D TYPICAL ROOF PARAPET WITH FASCIA
3" = 1'-0"



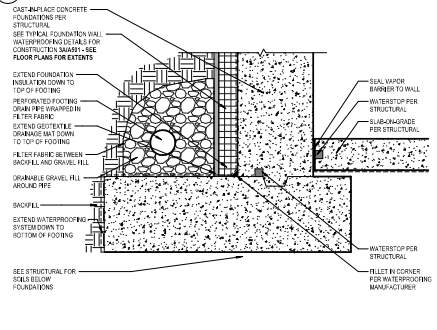
5D TYPICAL PIPE PENETRATION @ FOUNDATION WATERPROOFING DETAIL
1 1/2" = 1'-0"



3E TYPICAL ROOF PARAPET WITH COPING - RAINSCREEN
3" = 1'-0"



4E TYPICAL ROOF PARAPET WITH COPING
3" = 1'-0"



5E TYPICAL FOOTING DRAIN DETAIL
1 1/2" = 1'-0"

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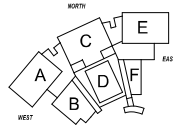
Checked: JZ

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/03/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

TYPICAL EXTERIOR DETAILS

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A501

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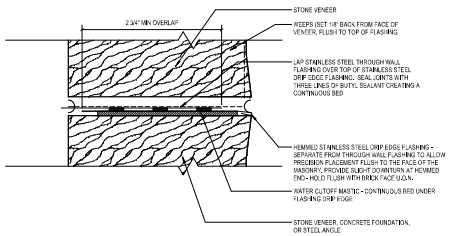
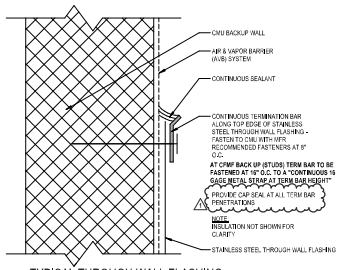
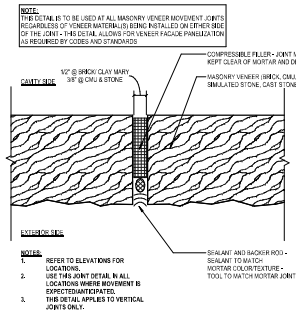


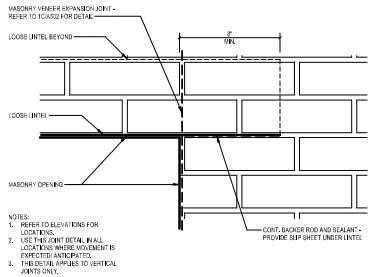
1A TYPICAL FLUSH HEMMED DRIP EDGE DETAIL
12" = 1'-0"



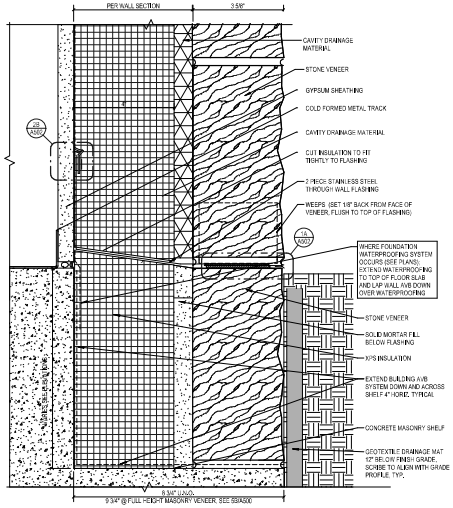
2B TYPICAL THROUGH WALL FLASHING TERMINATION/TRANSITION AT AVB
12" = 1'-0"



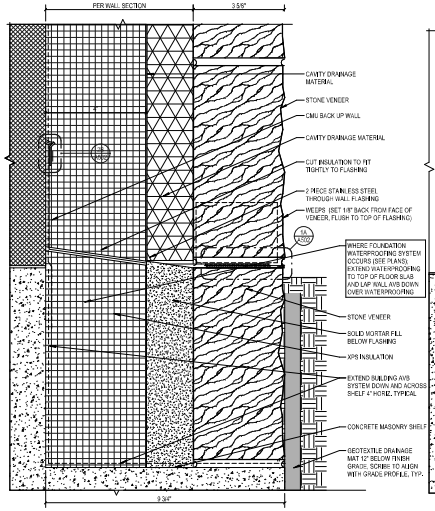
1C TYPICAL MASONRY VENEER MOVEMENT JOINT DETAIL
6" = 1'-0"



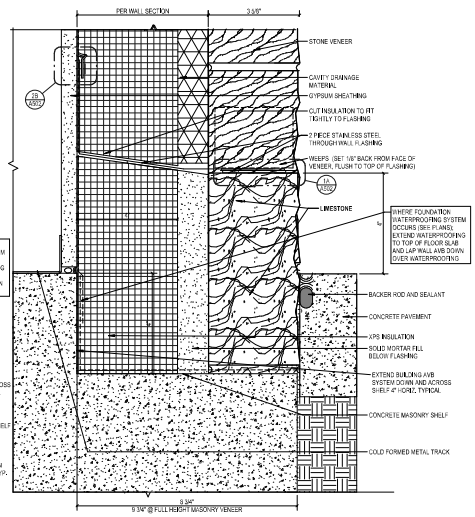
2C TYPICAL MASONRY VENEER MOVEMENT JOINT ELEVATION
3" = 1'-0"



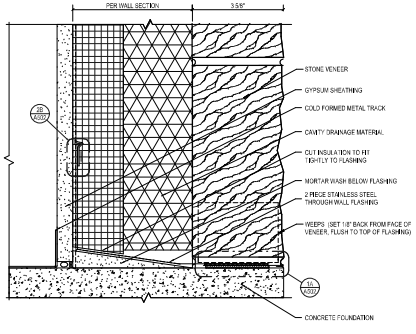
1E BASE FLASHING DETAIL AT METAL STUD BACK-UP WALL - BRICK BELOW FLASHING
6" = 1'-0"



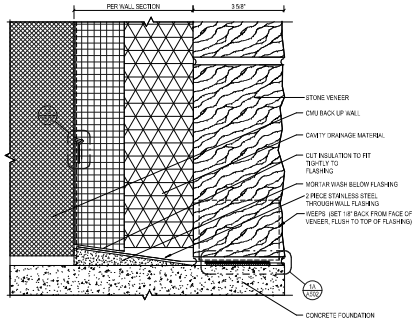
2E BASE FLASHING DETAIL AT CMU BACK-UP WALL - BRICK BELOW FLASHING
6" = 1'-0"



3E BASE FLASHING AT LIMESTONE BELOW FLASHING
6" = 1'-0"



3D TYPICAL BASE FLASHING DETAIL AT METAL STUD BACK-UP WALL
6" = 1'-0"



5E TYPICAL BASE FLASHING DETAIL AT CMU BACK-UP WALL
6" = 1'-0"

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Greenwich Public Schools

Greenwich Central Middle School

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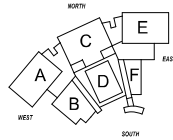

KEYPLAN

Number	Date	Issued For
1	10/30/2024	ADDENDUM NO. 4
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

EXTERIOR SECTION DETAILS OF NON-PROJECTED THROUGH WALL FLASHINGS

Date	Drawing Number
07/08/2024	A502
Scale: As indicated	
Proj. Number: 22367.00	

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Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_GREENWICH_CENTRAL_MS_R23.rvt

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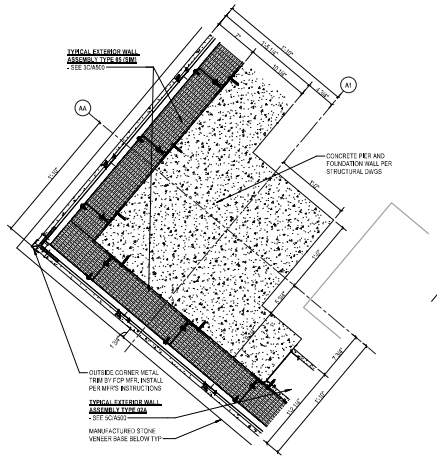
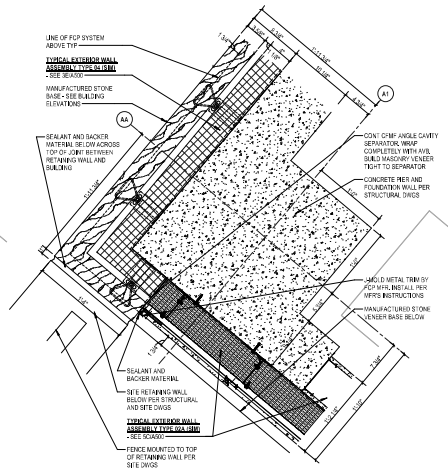
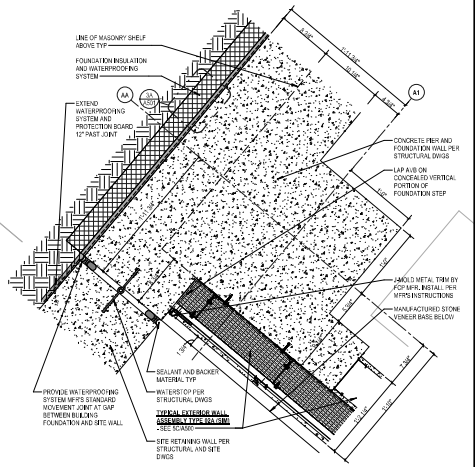


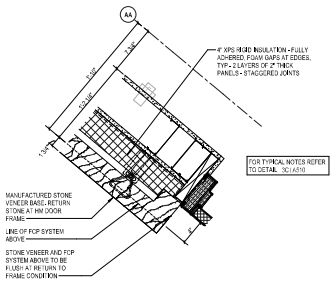
PLAN DETAIL - PART A - FIRST FLOOR @ GRID AA / A1 - FCP OUTSIDE CORNER ON CONCRETE BACKUP
2B 1 1/2" = 1'-0"



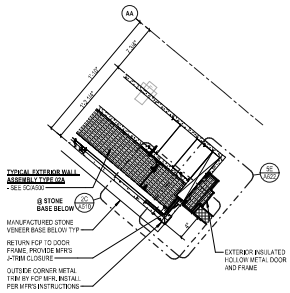
PLAN DETAIL - PART A - FIRST FLOOR @ GRID AA / A1 - ABOVE GRADE AT RETAINING WALL AND MANUFACTURERED STONE BASE
3B 1 1/2" = 1'-0"



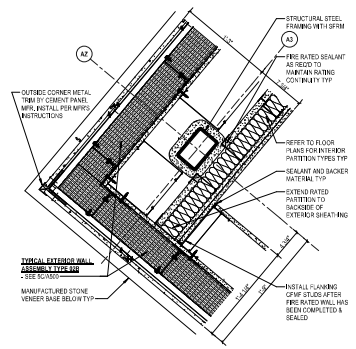
PLAN DETAIL - PART A - FIRST FLOOR @ GRID AA / A1 - BELOW GRADE AT RETAINING WALL
5B 1 1/2" = 1'-0"



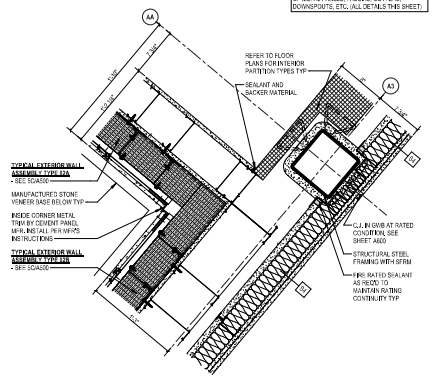
PLAN DETAIL - PART A - FIRST FLOOR @ HM DOOR FRAME JAMB IN STONE BASE
2C 1 1/2" = 1'-0"



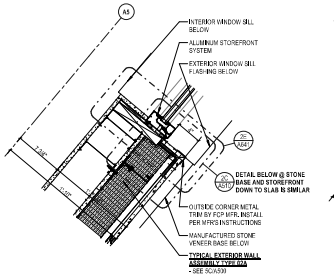
PLAN DETAIL - PART A - FIRST FLOOR @ HM DOOR FRAME JAMB IN FCP
3C 1 1/2" = 1'-0"



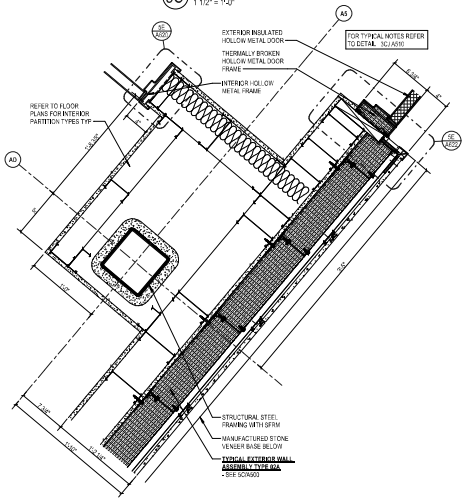
PLAN DETAIL - PART A - FIRST FLOOR @ GRID AZ / A3
3D 1 1/2" = 1'-0"



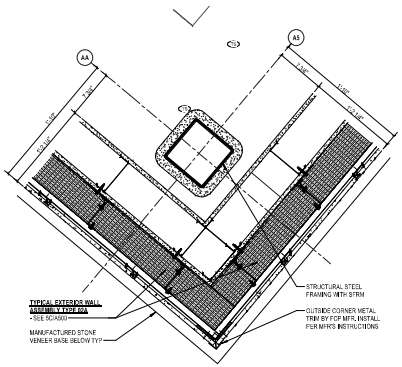
PLAN DETAIL - PART A - FIRST FLOOR @ GRID AA / A3
5D 1 1/2" = 1'-0"



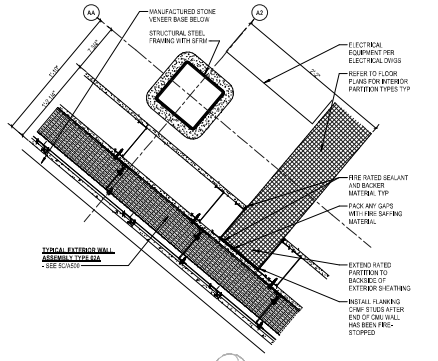
PLAN DETAIL - PART A - FIRST FLOOR @ STOREFRONT WINDOW JAMB IN FCP
1E 1 1/2" = 1'-0"



PLAN DETAIL - PART A - FIRST FLOOR AT GRID AD / A5
2E 1 1/2" = 1'-0"



PLAN DETAIL - PART A - FIRST FLOOR @ GRID AA / A5
3E 1 1/2" = 1'-0"



PLAN DETAIL - PART A - FIRST FLOOR @ GRID AA / A2
5E 1 1/2" = 1'-0"

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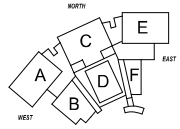

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

EXTERIOR PLAN DETAILS

Date 07/08/2024
Scale 1 1/2" = 1'-0"
Proj. Number 22367.00
Drawing Number A510

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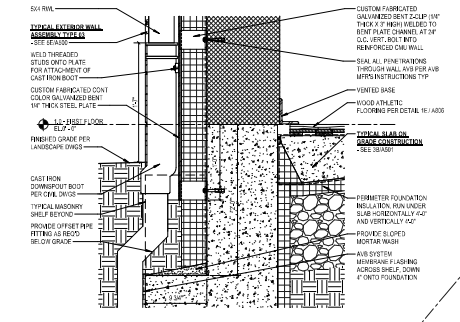
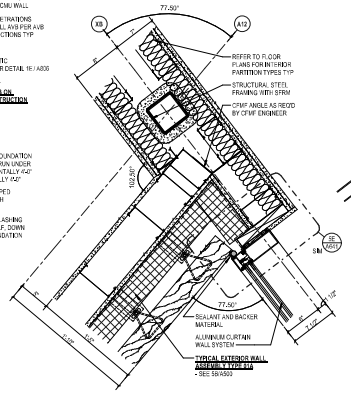
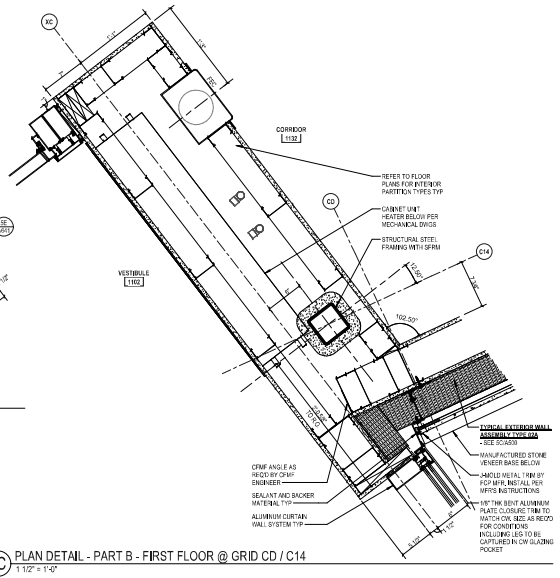


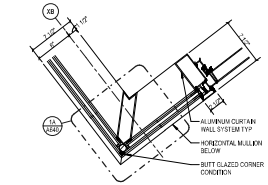
1A EXTERIOR SECTION DETAIL - FOUNDATION NOTCH AT RWL BOOT AT GRADE
1 1/2" = 1'-0"



2B PLAN DETAIL - PART B - FIRST FLOOR @ GRID XB / A12
1 1/2" = 1'-0"

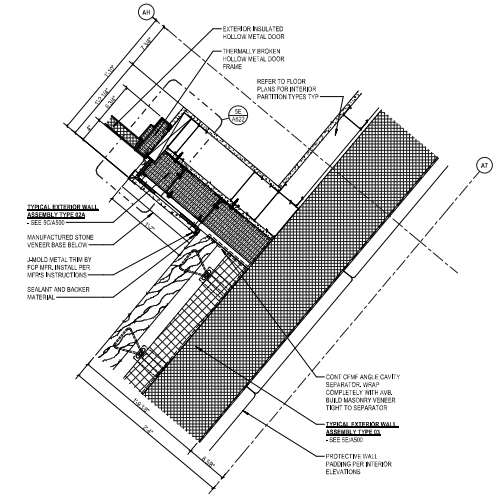


3C PLAN DETAIL - PART B - FIRST FLOOR @ GRID CD / C14
1 1/2" = 1'-0"

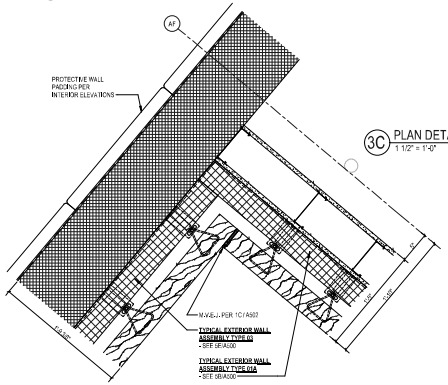


NOTE:
SEE EXTERIOR ELEVATIONS FOR PAINT COLORS OF METAL PANELS, FASCIAS, GUTTERS DOWNSPOUTS, ETC.; ALL DETAILS THIS SHEET

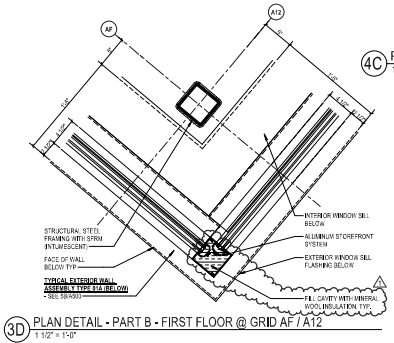
4A PLAN DETAIL - PART B - FIRST FLOOR @ VESTIBULE CORNER MULLION
1 1/2" = 1'-0"



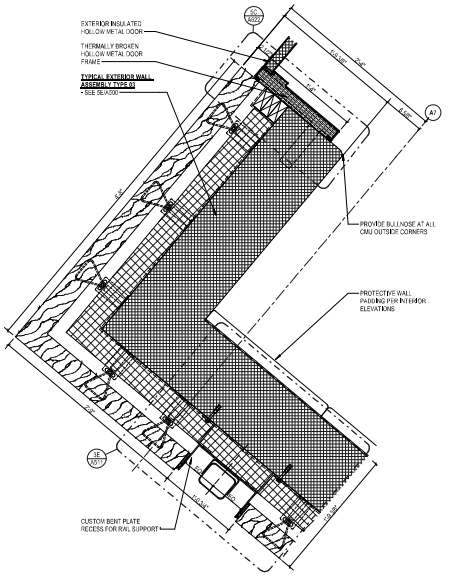
4C PLAN DETAIL - PART B - FIRST FLOOR @ GRID AH / A7
1 1/2" = 1'-0"



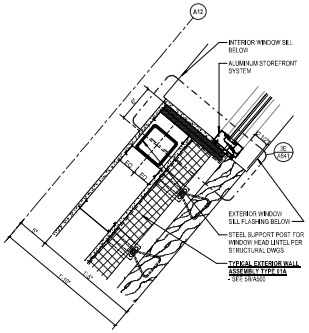
2D PLAN DETAIL - PART B - FIRST FLOOR @ GRID AF AND MASONRY VENEER INSIDE CORNER
1 1/2" = 1'-0"



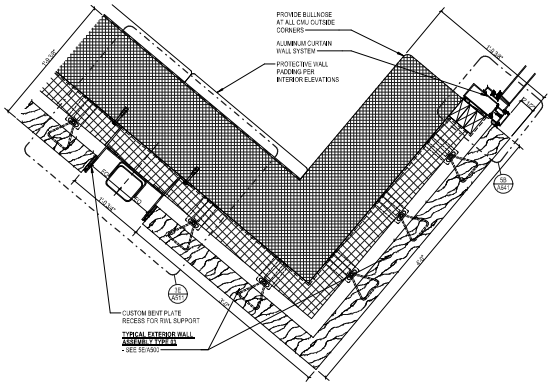
3D PLAN DETAIL - PART B - FIRST FLOOR @ GRID AF / A12
1 1/2" = 1'-0"



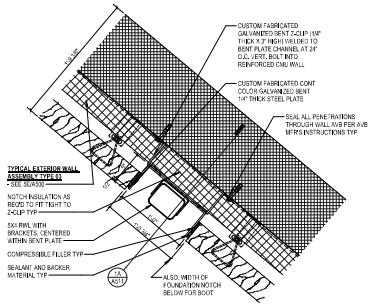
4E PLAN DETAIL - PART B - FIRST FLOOR @ GYM OUTSIDE CORNER AND HM DOOR FRAME
1 1/2" = 1'-0"



1E PLAN DETAIL - PART B - FIRST FLOOR @ STOREFRONT WINDOW JAMB IN MASONRY
1 1/2" = 1'-0"



2E PLAN DETAIL - PART B - FIRST FLOOR @ GYM OUTSIDE CORNER AND CURTAIN WALL FRAME
1 1/2" = 1'-0"



3E PLAN DETAIL - PART B - FIRST FLOOR @ RECESSED RWL IN MASONRY VENEER
1 1/2" = 1'-0"

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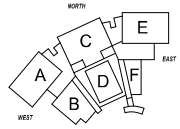

KEYPLAN

Number	Date	Issued For
1	10/30/2024	ADDENDUM NO. 4
	09/20/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

EXTERIOR PLAN DETAILS

Date: 07/08/2024
Scale: 1 1/2" = 1'-0"
Proj. Number: 22367.00
Drawing Number: A511

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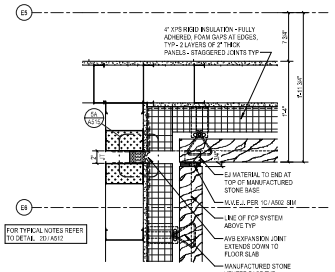
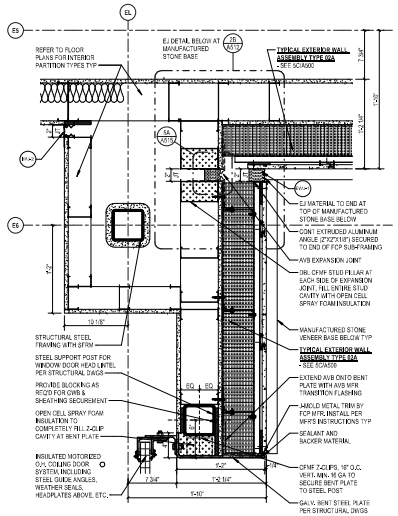


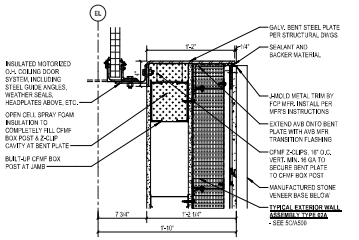
PLAN DETAIL - PART E - FIRST FLOOR @ GRID EL / E6 SHOWING EJ BELOW WITHIN MASONRY BASE

2B 1 1/2" = 1'-0"



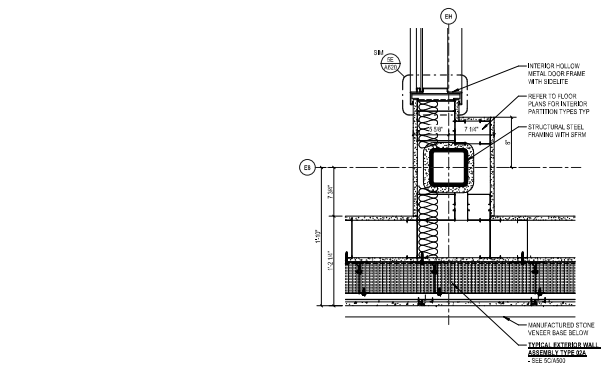
PLAN DETAIL - PART E - FIRST FLOOR @ GRID EL / E6 SHOWING EJ & O.H. DOOR JAMB

2D 1 1/2" = 1'-0"



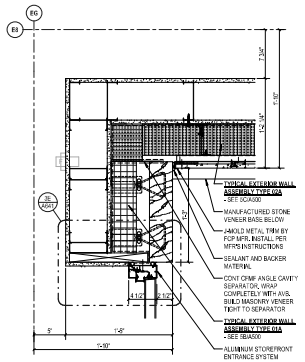
PLAN DETAIL - PART E - FIRST FLOOR @ O.H. DOOR JAMB

2E 1 1/2" = 1'-0"



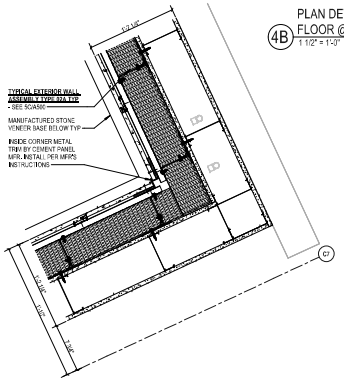
PLAN DETAIL - PART E - FIRST FLOOR @ GRID EH / E8

4B 1 1/2" = 1'-0"



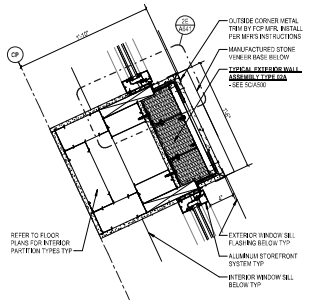
PLAN DETAIL - PART E - FIRST FLOOR @ GRID EG / E8

5B 1 1/2" = 1'-0"



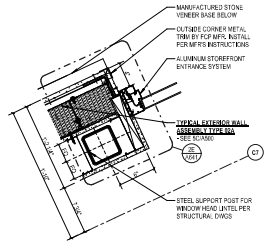
PLAN DETAIL - PART C - FIRST FLOOR @ COURTYARD INSIDE CORNER

3C 1 1/2" = 1'-0"



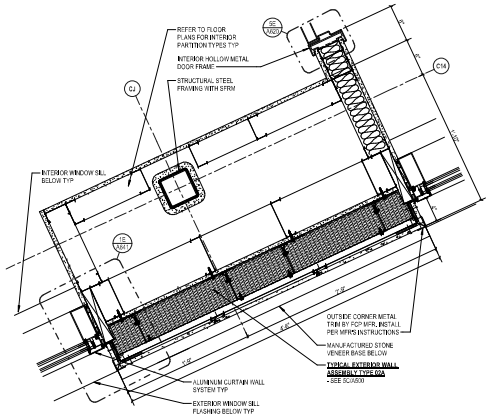
PLAN DETAIL - PART C - FIRST FLOOR @ COURTYARD WINDOW JAMB

4C 1 1/2" = 1'-0"



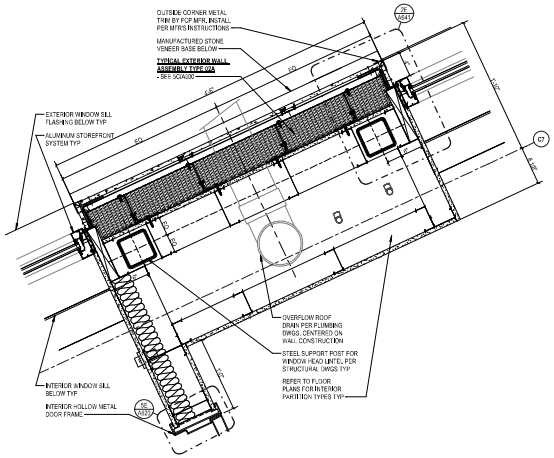
PLAN DETAIL - PART C - FIRST FLOOR @ COURTYARD ACCESS DOOR

5C 1 1/2" = 1'-0"



PLAN DETAIL - PART D - FIRST FLOOR @ GRID CJ / C14

3E 1 1/2" = 1'-0"



PLAN DETAIL - PART C - FIRST FLOOR @ COURTYAD AND CROSS CORRIDOR DOOR

4E 1 1/2" = 1'-0"

NOTE:
SEE EXTERIOR ELEVATIONS FOR PAINT COLORS OF METAL PANELS, FASCIAS, GUTTERS DOWNSPOUTS, ETC. (ALL DETAILS THIS SHEET)

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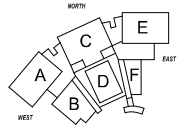

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

EXTERIOR PLAN DETAILS

Date 07/08/2024
Scale 1 1/2" = 1'-0"
Proj. Number 22367.00
Drawing Number A512

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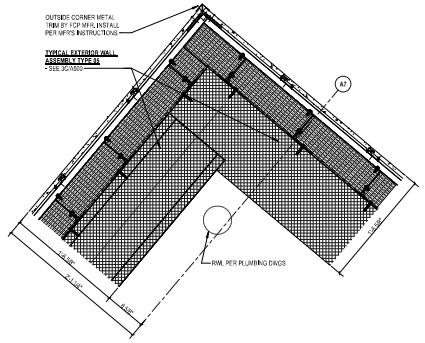
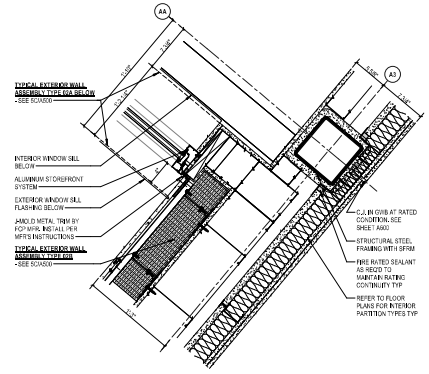


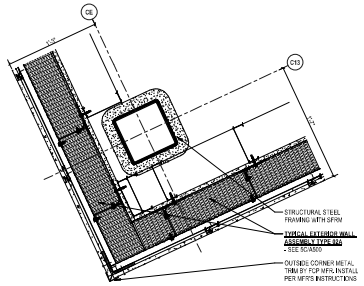
PLAN DETAIL - PART B - SECOND FLOOR @ GYM OUTSIDE CORNER OF FCP

3B 1 1/2" = 1'-0"



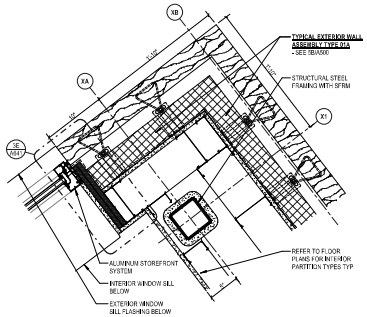
5B PLAN DETAIL - PART A - SECOND FLOOR @ GRID AA / A3

1 1/2" = 1'-0"



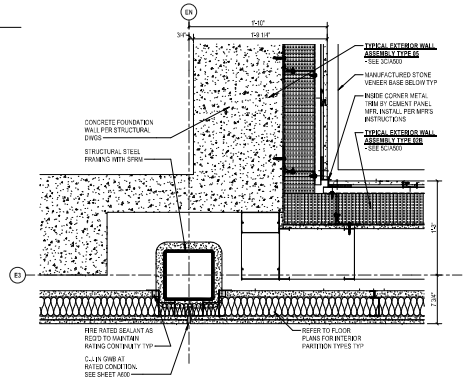
2D PLAN DETAIL - PART D - SECOND FLOOR @ GRID CE / C13

1 1/2" = 1'-0"



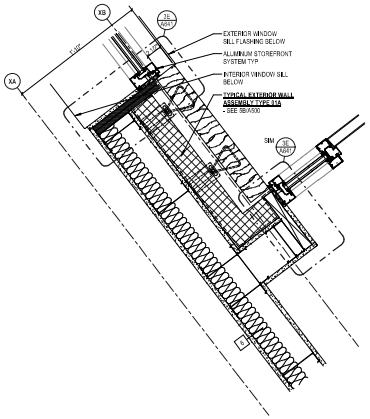
3D PLAN DETAIL - PART A - SECOND FLOOR @ GRID XA / X1

1 1/2" = 1'-0"



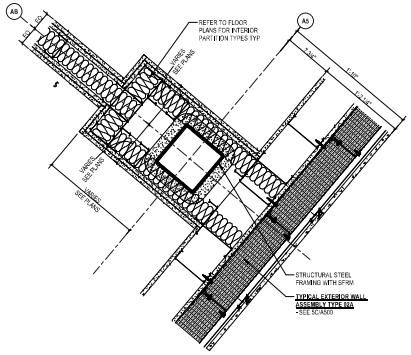
5D PLAN DETAIL - PART E - FIRST FLOOR @ GRID EN / E3

1 1/2" = 1'-0"



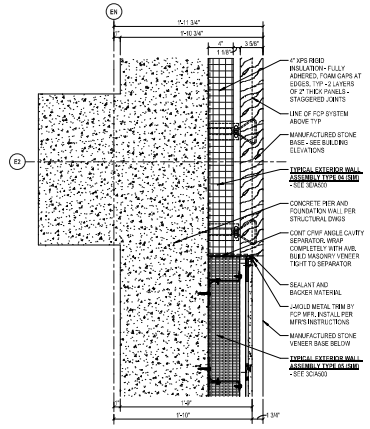
2E PLAN DETAIL - PART A - SECOND FLOOR @ VESTIBULE JAMB

1 1/2" = 1'-0"



3E PLAN DETAIL - PART A - SECOND FLOOR @ GRID AB / A5

1 1/2" = 1'-0"



PLAN DETAIL - PART E - FIRST FLOOR @ FCP AND STONE BASE VERTCAL TRANSITION

5E 1 1/2" = 1'-0"

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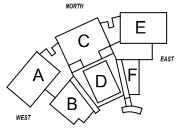


KEYPLAN

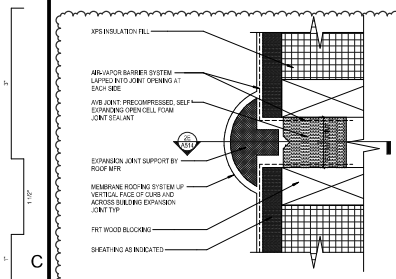
Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

EXTERIOR PLAN DETAILS

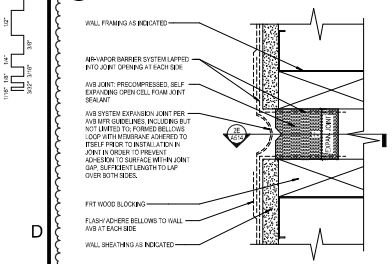
Date 07/08/2024
Scale 1 1/2" = 1'-0"
Proj. Number 22367.00
Drawing Number A513

Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_GREENWICH_CENTRAL_MS_R23.rvt
3/25/2024 4:16:27 PM

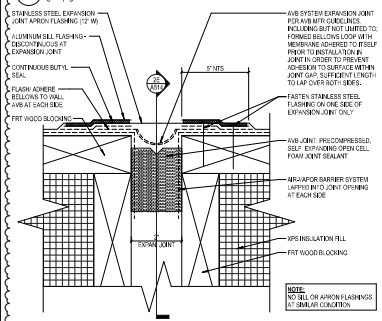
NOTE:
SEE EXTERIOR ELEVATIONS FOR PAINT COLORS OF METAL PANELS, FASCIAS, GUTTERS, DOWNSPOUTS, ETC. (ALL DETAILS THIS SHEET)



1C PLAN DETAIL - VERT. ROOF EXPANSION JOINT
6" = 1'-0"

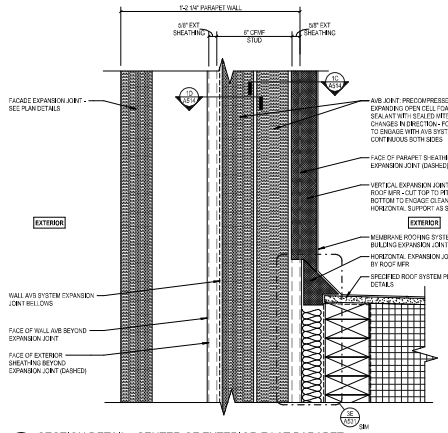


1D PLAN DETAIL - WALL AVB EXPANSION JOINT
6" = 1'-0"

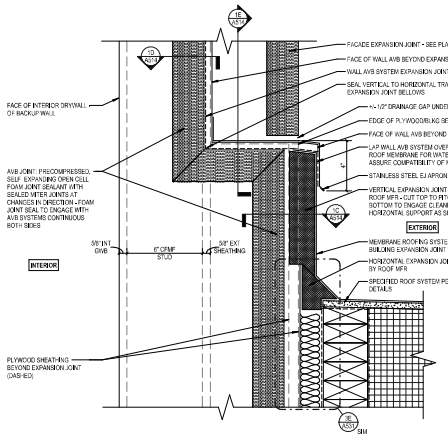


NOTE:
NO SILL OR APRON FLASHINGS AT SIMILAR CONDITION

1E SECTION DETAIL - HORIZ AVB EXPAN JT
6" = 1'-0"

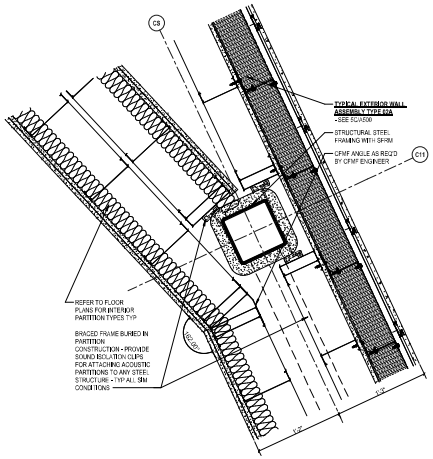


2C SECTION DETAIL - CENTER OF EXTERIOR EJ AT PARAPET
3" = 1'-0"

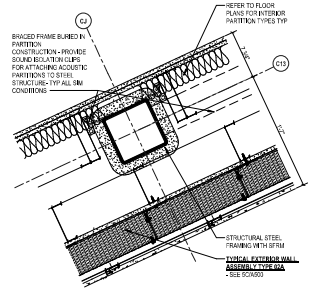


2E SECTION DETAIL - CENTER OF EXTERIOR EJ AT RISING WALL
3" = 1'-0"

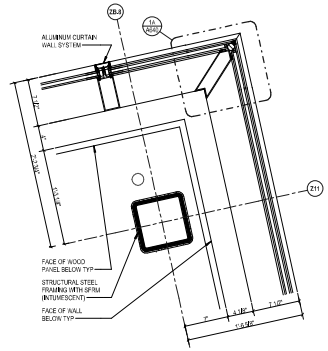
DETAIL REMOVED



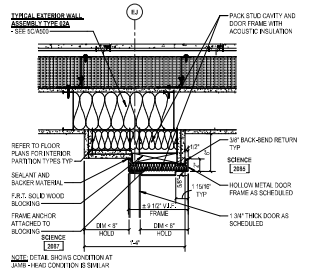
3E PLAN DETAIL - PART D - SECOND FLOOR @ GRID CS / C11
1 1/2" = 1'-0"



5B PLAN DETAIL - PART D - SECOND FLOOR @ GRID CJ / C13
1 1/2" = 1'-0"



5D PLAN DETAIL - PART D - SECOND FLOOR @ ZB.8 / Z11
1 1/2" = 1'-0"



5E PLAN DETAIL - PART E - SECOND FLOOR @ DOOR FRAME IN DOUBLE WALL
1 1/2" = 1'-0"

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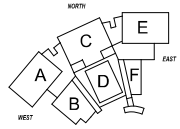

KEYPLAN

Number	Date	Issued For
1	10/23/2024	ADDENDUM NO. 3
	09/20/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

EXTERIOR PLAN & SECTION DETAILS

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A514

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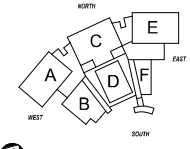

KEYPLAN

Number	Date	Issued For
1	10/23/2024	ADDENDUM NO. 3
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

EXTERIOR PLAN DETAILS

Date: 07/08/2024
Scale: 1 1/2" = 1'-0"
Proj. Number: 22367.00
Drawing Number: A515

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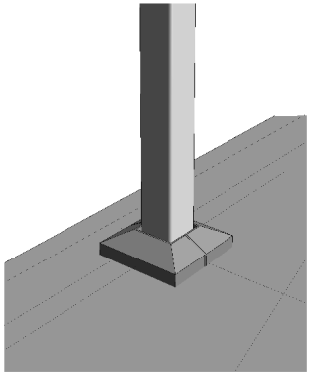
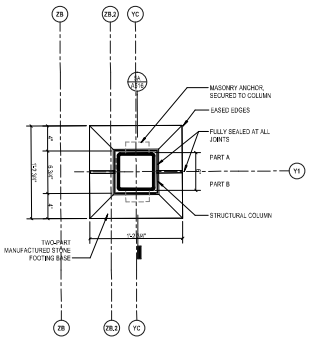
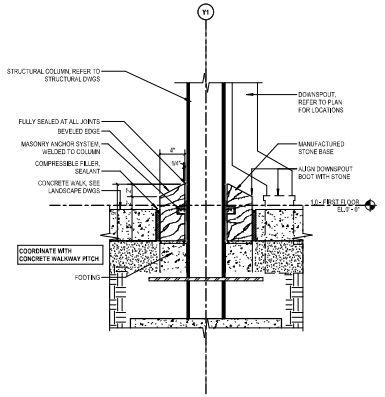


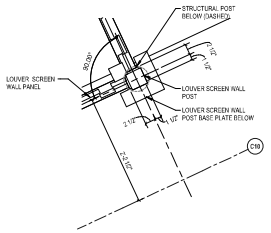
3A 3D View FOOTING



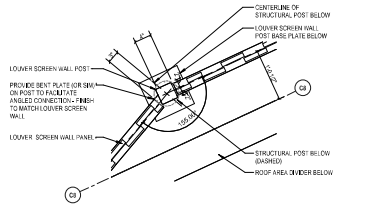
4A EXT. DETAIL - COLUMN BASE
1 1/2" = 1'-0"



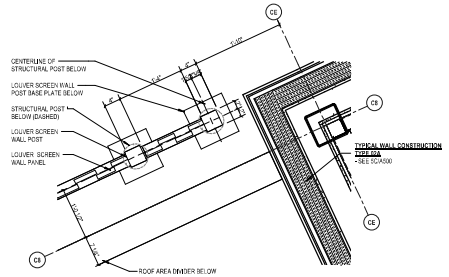
5A COLUMN BASE FOOTING DETAIL
1 1/2" = 1'-0"



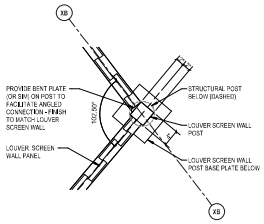
2D PLAN DETAIL - ROOF - LOUVER SCREEN WALL CORNER 3
1" = 1'-0"



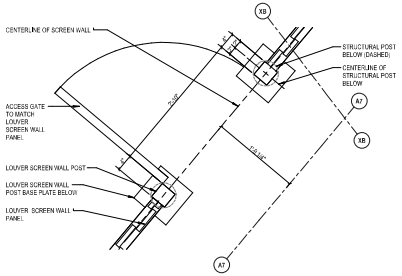
3D PLAN DETAIL - ROOF - LOUVER SCREEN WALL CORNER 1
1" = 1'-0"



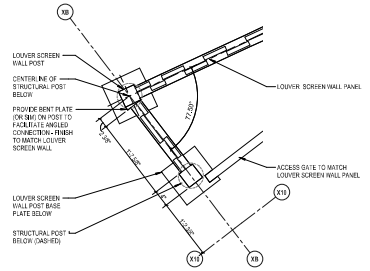
4D PLAN DETAIL - ROOF - LOUVER SCREEN WALL END
1" = 1'-0"



2E PLAN DETAIL - ROOF - LOUVER SCREEN WALL CORNER 2
1" = 1'-0"



3E PLAN DETAIL - ROOF - LOUVER SCREEN WALL GATE
1" = 1'-0"



4E PLAN DETAIL - ROOF - LOUVER SCREEN WALL CORNER @ GATE
1" = 1'-0"

NOTE:
SEE EXTERIOR ELEVATIONS FOR PAINT COLORS OF METAL PANELS, FASCIAS, GUTTERS, DOWNSPOUTS, ETC. (ALL DETAILS THIS SHEET)

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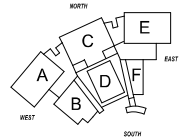

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

EXTERIOR PLAN DETAILS

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A516

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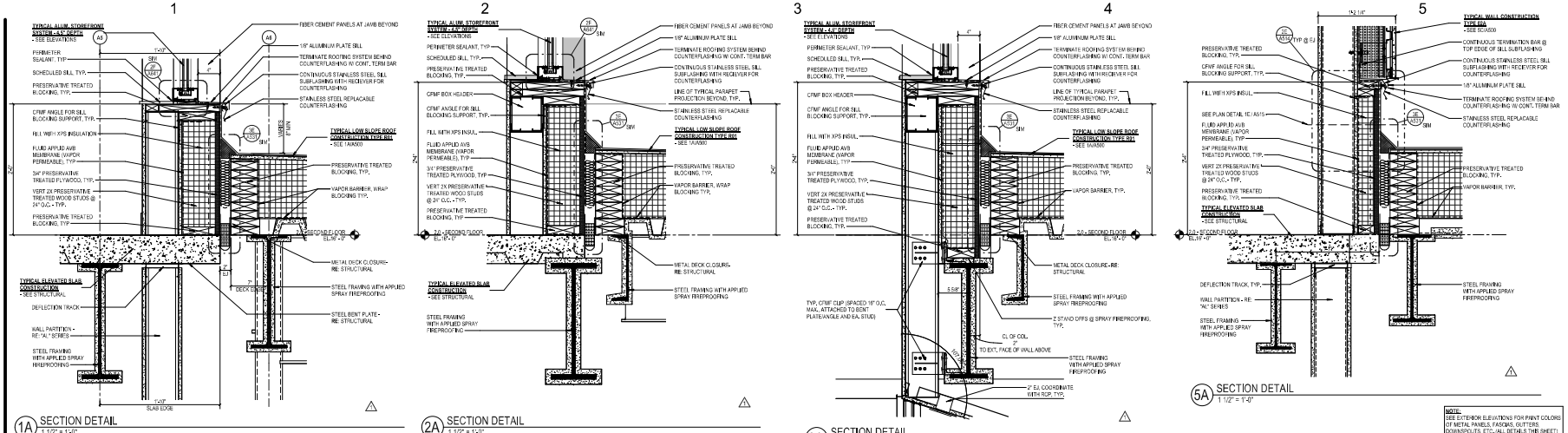

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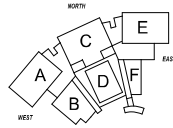

KEYPLAN

Number	Date	Issued For
2	10/30/2024	ADDENDUM NO. 4
1	10/23/2024	ADDENDUM NO. 3
	09/20/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

EXTERIOR SECTION DETAILS

Date: 07/08/2024
Scale: 1 1/2" = 1'-0"
Proj. Number: 22367.00
Drawing Number: A520

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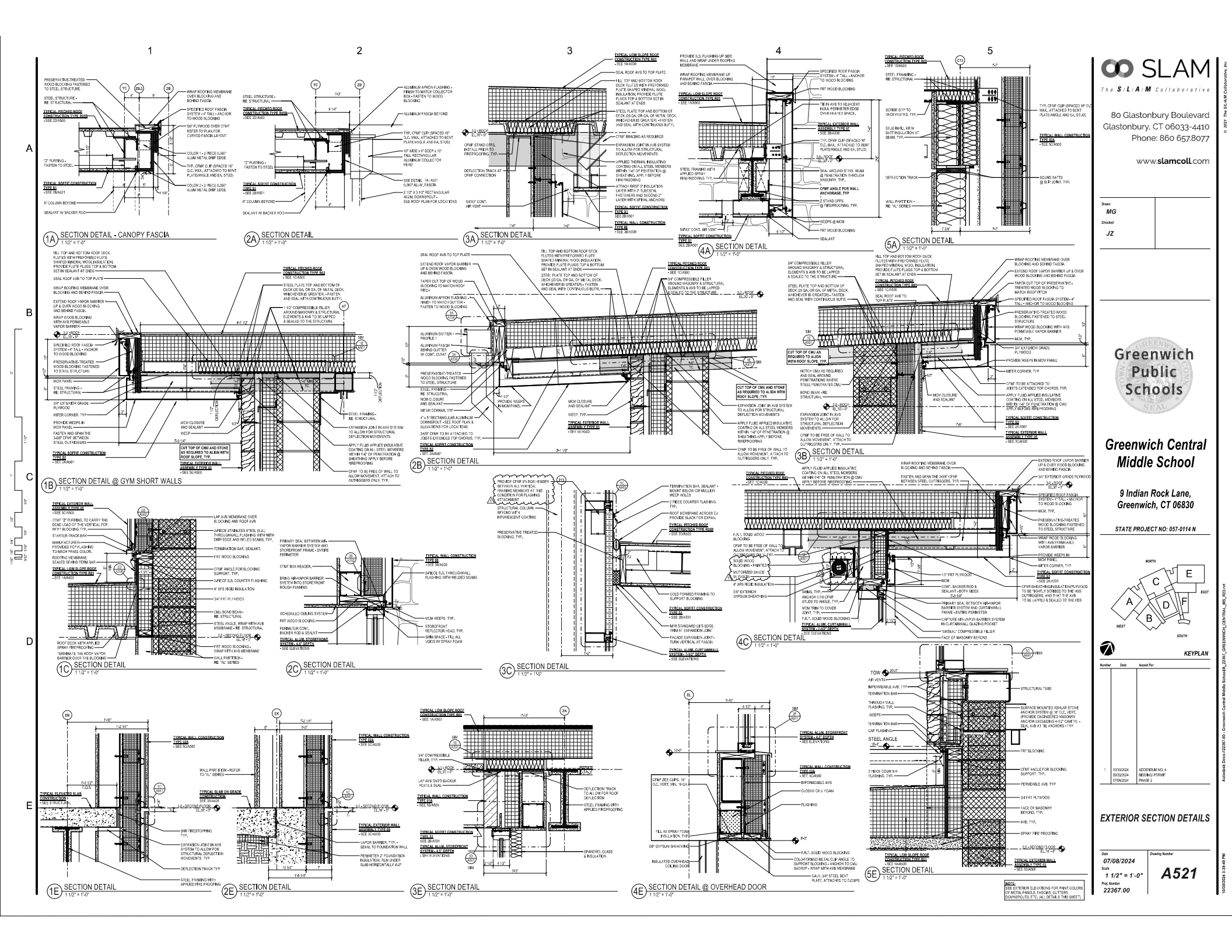

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KEYPLAN

Number	Date	Issued For
1	10/30/2024	ADDENDUM NO. 4
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

EXTERIOR SECTION DETAILS

Date 07/08/2024
Scale 1 1/2" = 1'-0"
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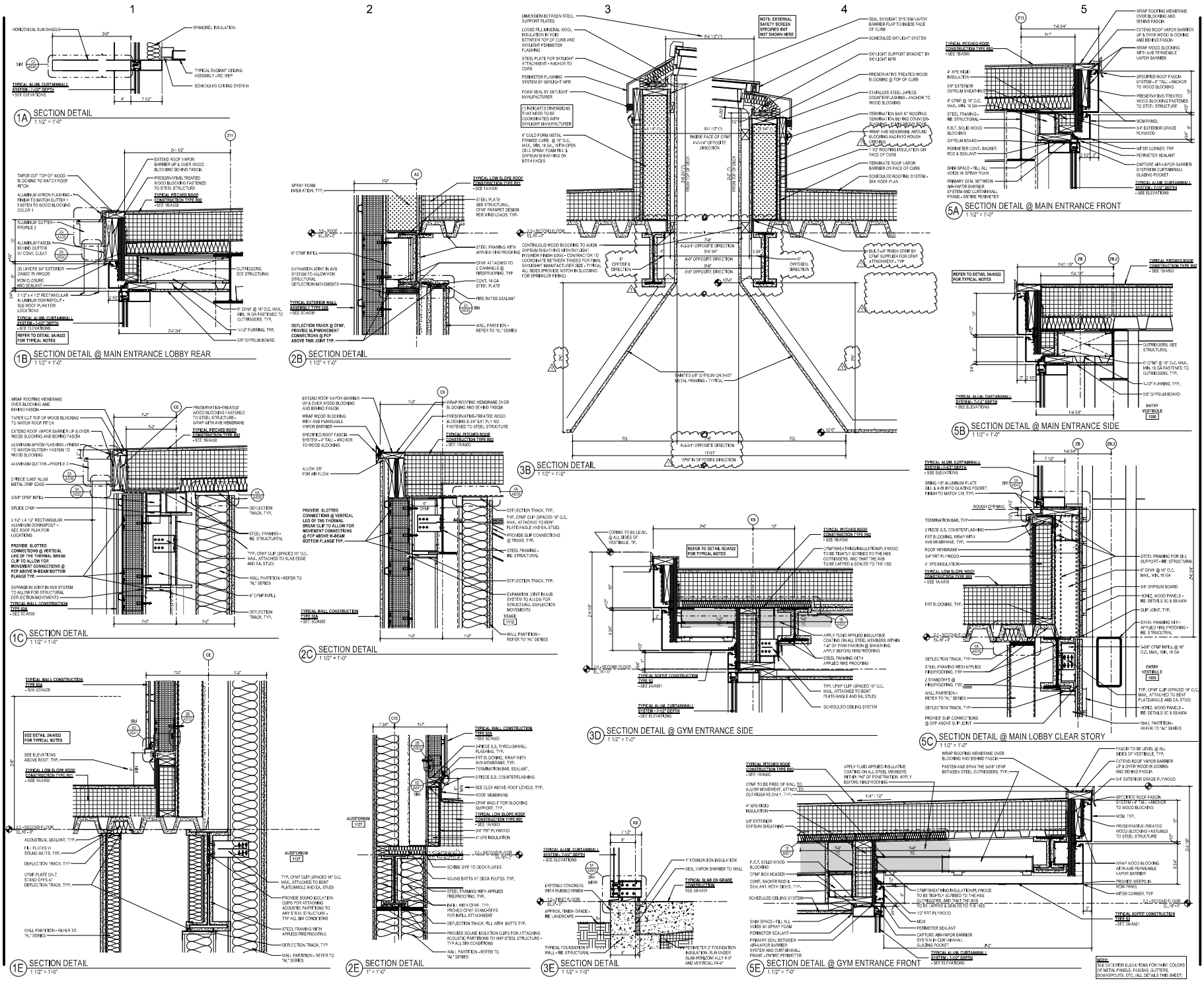

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KEYPLAN

Number	Date	Issued For
1	10/30/2024	ADDENDUM NO. 4
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

EXTERIOR SECTION DETAILS

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A522

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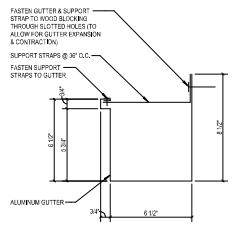
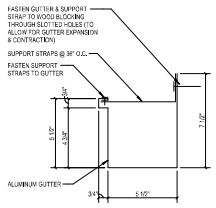
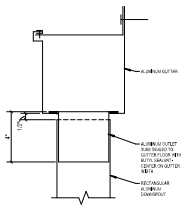


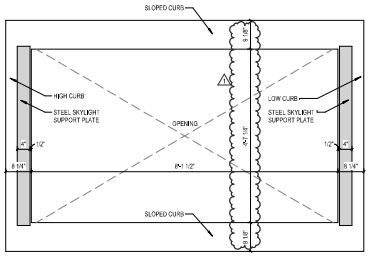
1A TYP GUTTER PROFILE 1 - 6.5"x6.5"
3" = 1'-0"



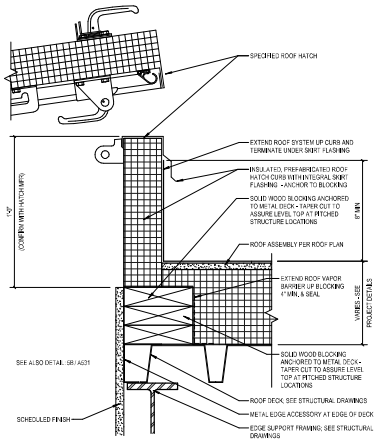
2A TYP GUTTER PROFILE 2 - 5.5"x5.5"
3" = 1'-0"



3A TYP GUTTER @ DOWNSPOUT
3" = 1'-0"

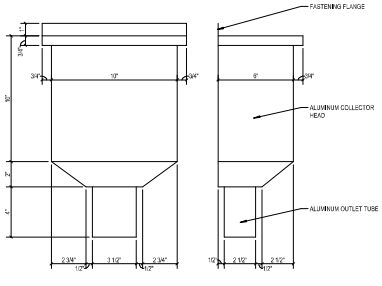


4A SKYLIGHT LAYOUT PLAN
3/4" = 1'-0"

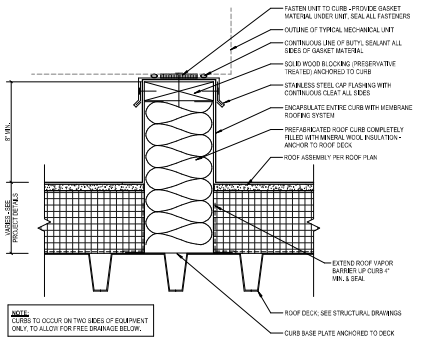


1C TYPICAL ROOF HATCH CURB - MEMBRANE ROOFING SYSTEM
3" = 1'-0"

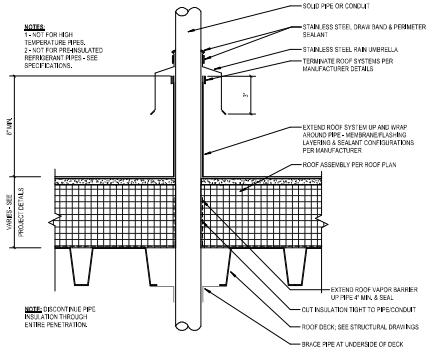
NOTE:
SEE EXTERIOR ELEVATIONS FOR PAINT COLORS OF METAL PANELS, FASCIAS, GUTTERS, DOWNSPOUTS, ETC. (ALL DETAILS THIS SHEET)



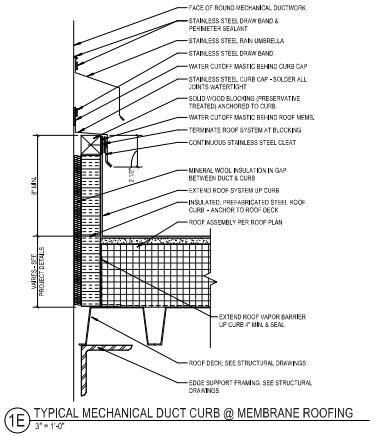
2B TYP COLLECTOR HEAD PROFILE
3" = 1'-0"



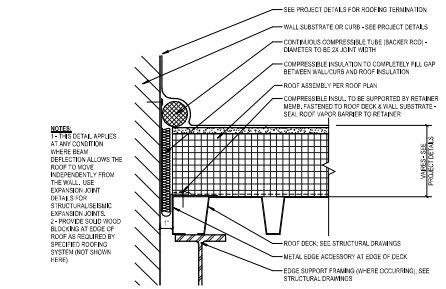
4B TYPICAL EQUIPMENT SUPPORT - MEMBRANE ROOFING
3" = 1'-0"



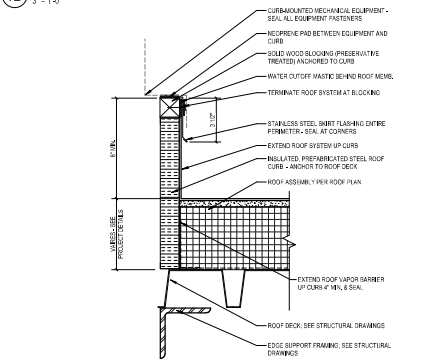
5B TYPICAL PIPE PENETRATION - FIELD FABRICATED - MEMBRANE ROOFING
3" = 1'-0"



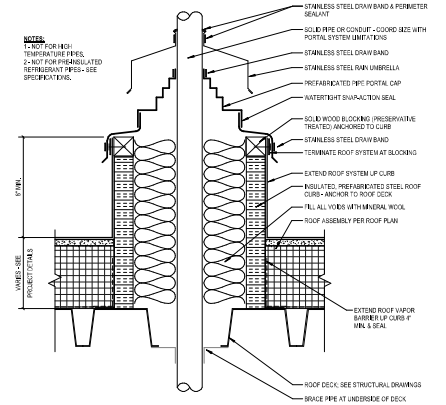
1E TYPICAL MECHANICAL DUCT CURB @ MEMBRANE ROOFING
3" = 1'-0"



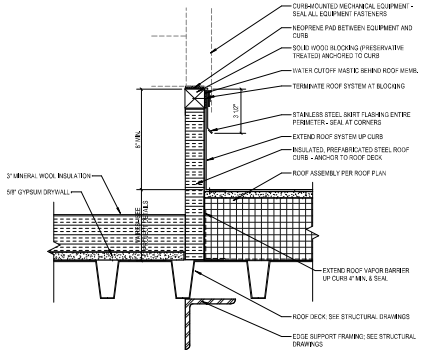
2D TYPICAL ROOF MOVEMENT JOINT @ WALL - MEMBRANE ROOFING
3" = 1'-0"



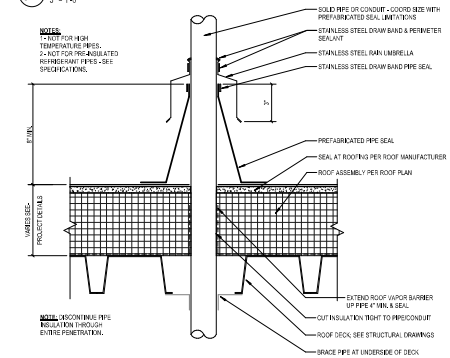
4D TYPICAL MECHANICAL FAN CURB @ MEMBRANE ROOFING
3" = 1'-0"



5D TYPICAL PIPE PENETRATION - PORTAL SYSTEM - MEMBRANE ROOFING
3" = 1'-0"



4E TYPICAL MECHANICAL UNIT CURB @ MEMBRANE ROOFING
3" = 1'-0"



5E TYPICAL PIPE PENETRATION - PREFABRICATED - MEMBRANE ROOFING
3" = 1'-0"

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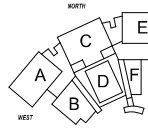
Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
1	10/30/2024	ADDENDUM NO. 4
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

TYPICAL MEMBRANE ROOFING DETAILS

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A530

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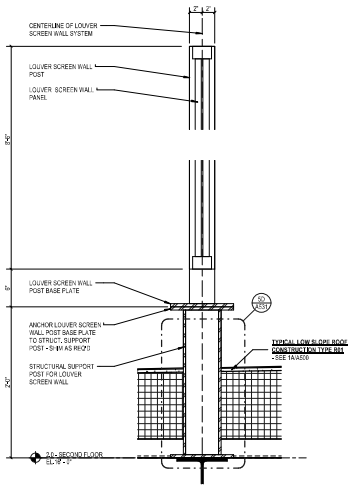

1A SECTION DETAIL - ROOF SCREEN
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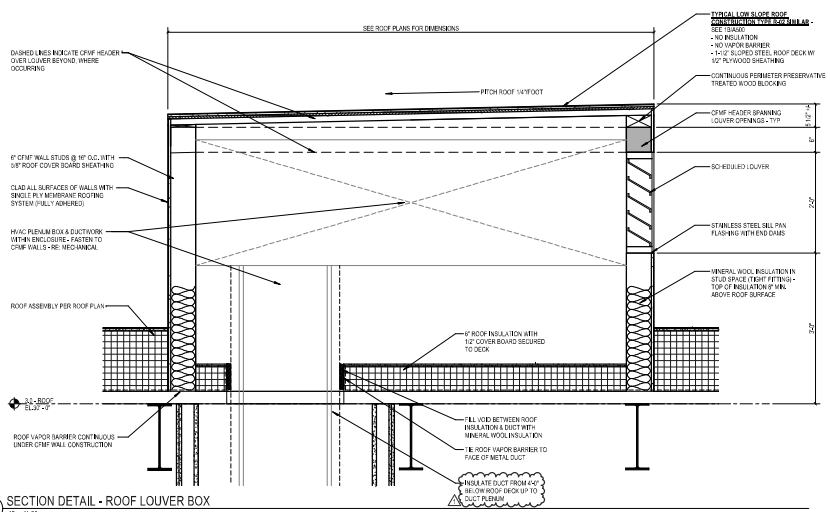
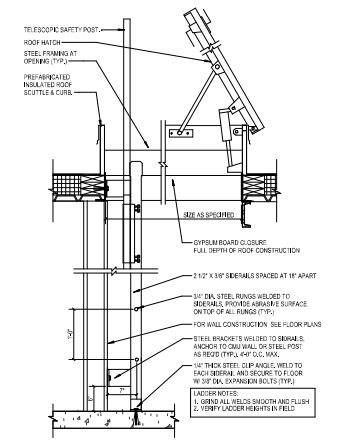
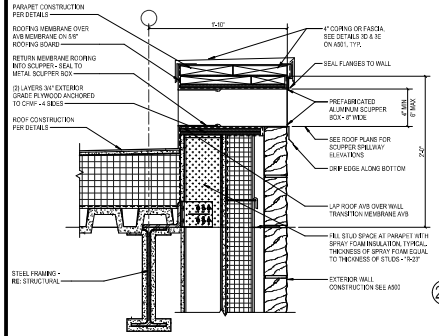


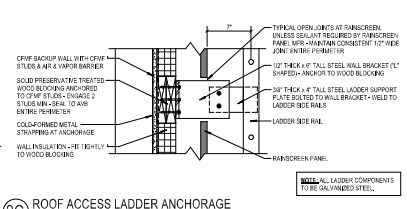
1B SECTION DETAIL - ROOF LOUVER BOX
1" = 1'-0"



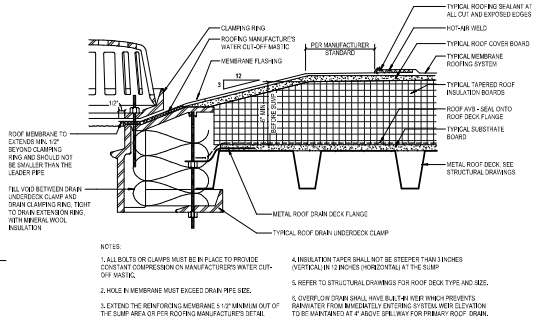
5B TYPICAL ROOF ACCESS LADDER (INTERIOR)
1" = 1'-0"



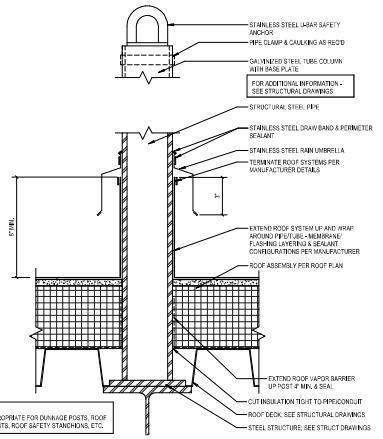
1D TYPICAL OVERFLOW SCUPPER (OS) DETAIL - MASONRY
1 1/2" = 1'-0"



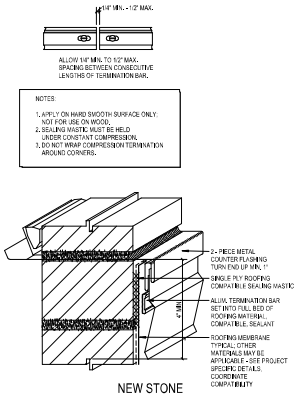
2C ROOF ACCESS LADDER ANCHORAGE
1 1/2" = 1'-0"



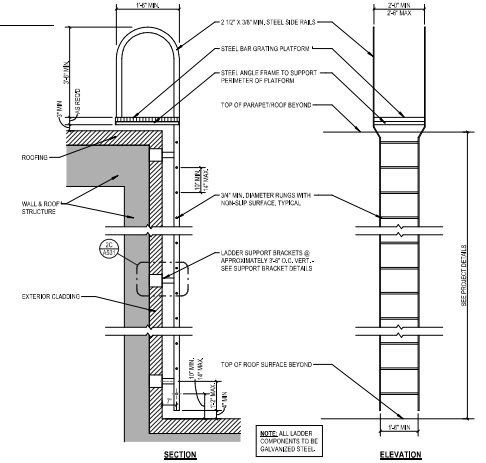
3D TYPICAL ROOF DRAIN - TPO ROOFING SYSTEM
3" = 1'-0"



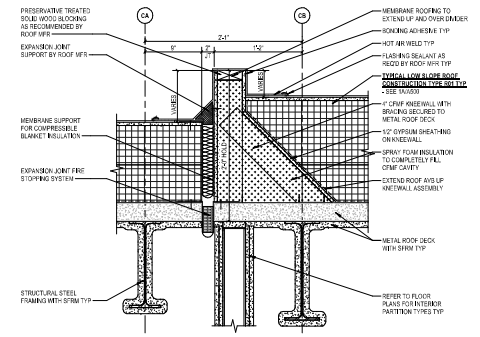
5D TYPICAL STRUCT. POST - FIELD FABRICATED - MEMBRANE ROOFING SYSTEM
3" = 1'-0"



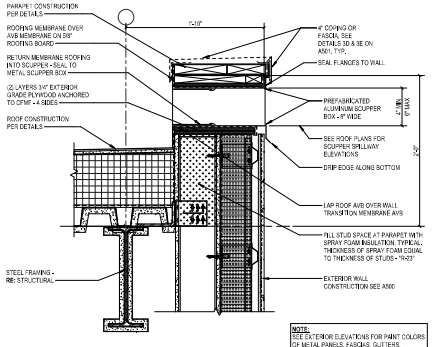
1E TYPICAL COUNTER-FLASHING DETAILS AT WALL
3" = 1'-0"



2E ROOF ACCESS LADDER
1/2" = 1'-0"



3E BUILDING EXPANSION JOINT AT ROOF
1 1/2" = 1'-0"



5E TYPICAL OVERFLOW SCUPPER (OS) DETAIL
1 1/2" = 1'-0"

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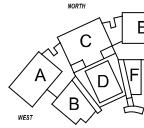

KEYPLAN

Number	Date	Issued For
1	10/30/2024	ADDENDUM NO. 4
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

TYPICAL MEMBRANE ROOFING DETAILS

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A531

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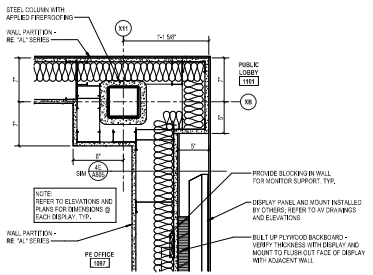
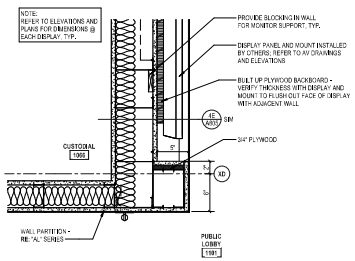
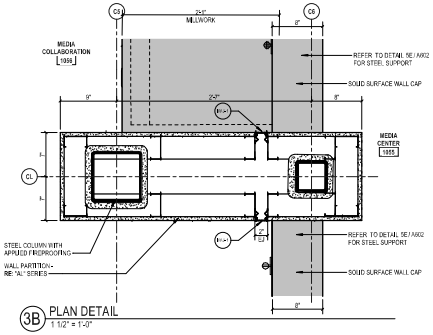


1B PLAN DETAIL
1 1/2" = 1'-0"



2B PLAN DETAIL
1 1/2" = 1'-0"



3B PLAN DETAIL
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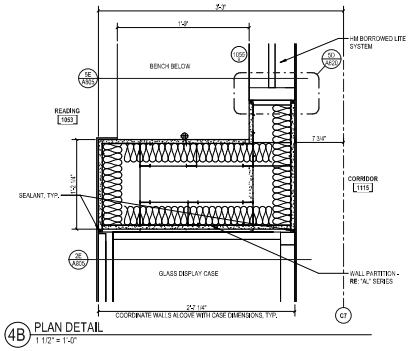

4B PLAN DETAIL
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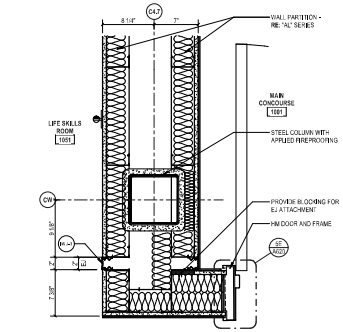
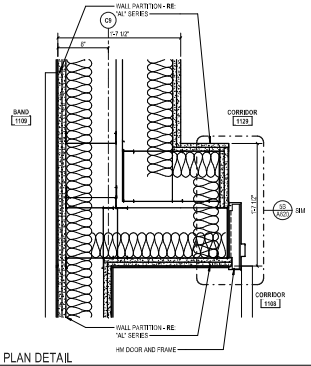


1D PLAN DETAIL
1 1/2" = 1'-0"



2D PLAN DETAIL
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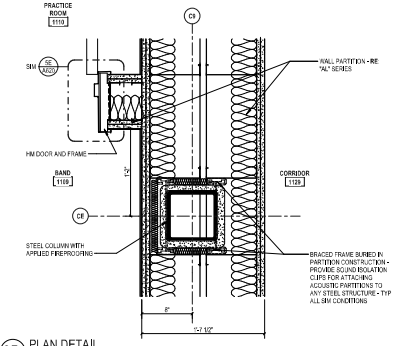

3D PLAN DETAIL
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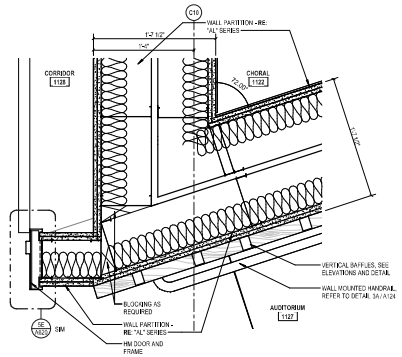
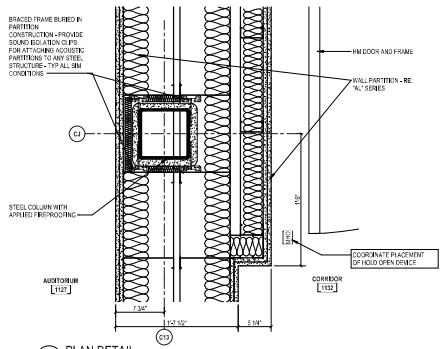


1E PLAN DETAIL
1 1/2" = 1'-0"



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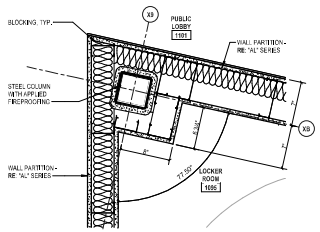

4A PLAN DETAIL
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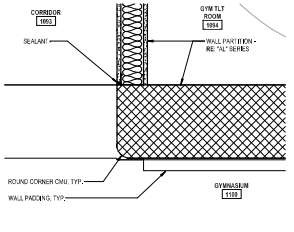

5A PLAN DETAIL
1 1/2" = 1'-0"

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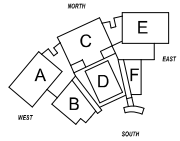

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING PERMIT

INTERIOR PLAN DETAILS

Date: 07/08/2024
Scale: 1 1/2" = 1'-0"
Proj. Number: 22367.00
Drawing Number: A540

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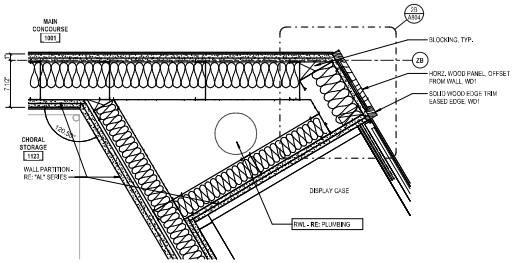

1A PLAN DETAIL
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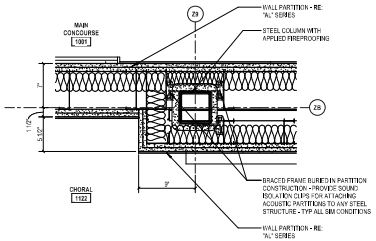

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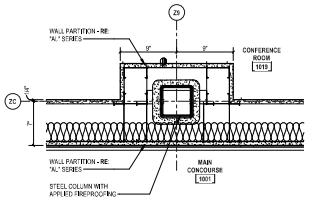

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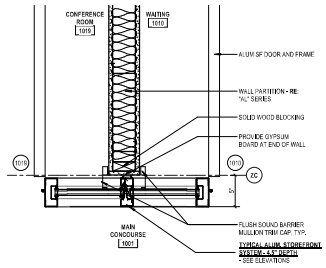
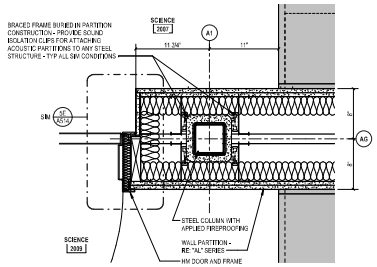


1B PLAN DETAIL
1 1/2" = 1'-0"



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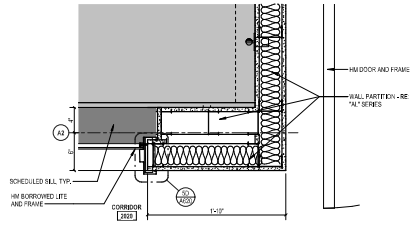

3B PLAN DETAIL
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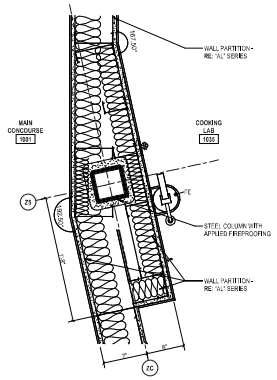

1D PLAN DETAIL
1 1/2" = 1'-0"

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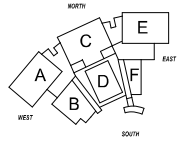

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING PERMIT

INTERIOR PLAN DETAILS

Date: 07/08/2024
Scale: 1 1/2" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **A541**

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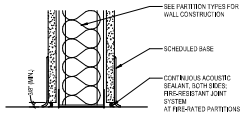
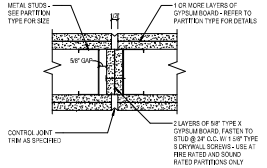
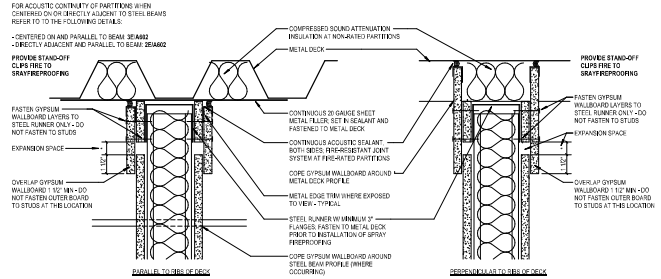


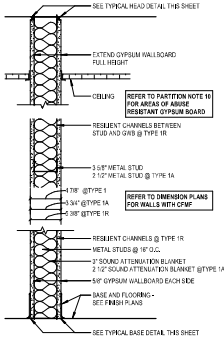
1A TYP BASE AT METAL STUD PARTITIONS
3" = 1'-0"



1B TYP CONTROL JOINT @ METAL STUD PARTITIONS
3" = 1'-0"

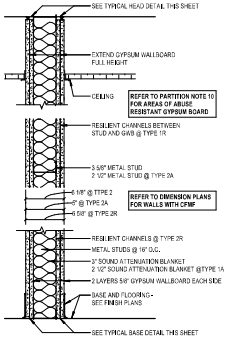


2A TYPICAL HEADS AT METAL STUD RATED PARTITIONS
3" = 1'-0"



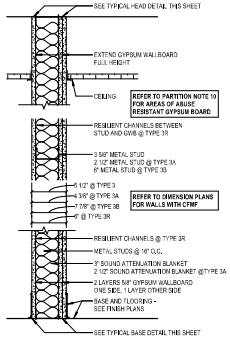
1-HOUR FIRE RATED PARTITION (UL DES # UA19) STC = 49-41

1	AS SHOWN	
1A	AS SHOWN EXCEPT WITH 2 1/2" METAL STUDS	STC = 57-59
1R	AS SHOWN EXCEPT WITH RESILIENT CHANNELS BTWN STUDS & GWB	STC = 47-50



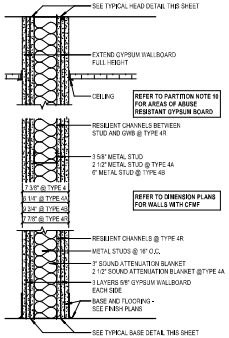
2-HOUR FIRE RATED PARTITION (UL DES # UA19) STC = 45-47

2	AS SHOWN	
2A	AS SHOWN EXCEPT WITH 2 1/2" METAL STUDS	STC = 52-53
2R	AS SHOWN EXCEPT WITH RESILIENT CHANNELS BTWN STUDS & GWB	STC = 53-61



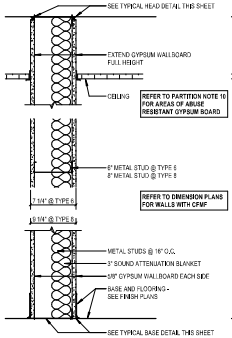
1-HOUR FIRE RATED PARTITION (UL DES # UA19) STC = 42-44

3	AS SHOWN	
3A	AS SHOWN EXCEPT WITH 2 1/2" METAL STUDS	STC = 48-52
3B	AS SHOWN EXCEPT WITH 6" METAL STUDS	STC = 43-45
3R	AS SHOWN EXCEPT WITH RESILIENT CHANNELS STAIN STUDS & GWB	STC = 53-58



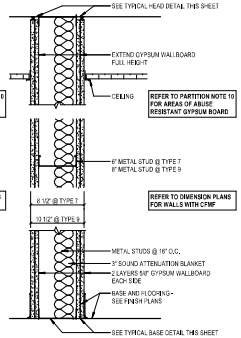
3-HOUR FIRE RATED PARTITION (UL DES # UA19) STC = 48-50

4	AS SHOWN	
4A	AS SHOWN EXCEPT WITH 2 1/2" METAL STUDS	STC = 56-60
4B	AS SHOWN EXCEPT WITH 6" METAL STUDS	STC = 49-51
4R	AS SHOWN EXCEPT WITH RESILIENT CHANNELS BTWN STUDS & GWB	STC = 60-69



5-HOUR FIRE RATED PARTITION (UL DES # UA19) STC = 43-65

6	AS SHOWN - 8" METAL STUDS	
8	AS SHOWN - 8" METAL STUDS	



3-HOUR FIRE RATED PARTITION (UL DES # UA19) STC = 46-48

7	AS SHOWN - 6" METAL STUDS	
9	AS SHOWN - 8" METAL STUDS	

4A TYPICAL HEADS AT METAL STUD PARTITIONS
3" = 1'-0"

FRAMED PARTITION NOTES

1. PARTITION TYPES ARE INDICATED ON FLOOR PLANS AS: 1 PARTITION TYPE

2. REFER TO FIRE SAFETY PLANS FOR LOCATIONS OF FIRE BARRIERS, FIRE WALLS, FIRE PARTITIONS, SMOKE BARRIERS AND SMOKE PARTITIONS, ALL FIRE AND / OR SMOKE RATED PARTITIONS, BARRIERS AND WALLS SHALL BE LABELED IN ACCESSIBLE CONCEALED FLOOR, FLOOR-CEILINGS OR ATTIC SPACES WITH PAINTED SIGNAGE 15 FEET FROM THE ENDS OF THE WALLS AND AT A SPACING NOT TO EXCEED 30 FEET BETWEEN END MARKINGS.

3. PROVIDE MOISTURE RESISTANT GWB, AT ALL TOILET ROOMS, SHOWERS, CUSTODIAL CLOSETS, SOILED UTILITY ROOMS, HOUSEKEEPING CLOSETS, MECHANICAL EQUIPMENT ROOMS AND WITHIN 10 FT OF ANY PLUMBING FIXTURE LOCATION UNLESS OTHERWISE NOTED. (EXCEPT AT TILED WALL FINISHES WHERE NOTE #4 BELOW APPLIES).

4. PROVIDE SUITABLE TILE BACKING BOARD (TYPE X @ RATED WALLS) OVER MINIMUM 6.3/12" THICK METAL STUD FRAMING BEHIND CERAMIC, PORCELAIN AND STONE TILE WALL FINISH - REFER TO FINISH SCHEDULE.

5. MATERIALS AND CONSTRUCTION OF FIRE-RATED PARTITIONS, INCLUDING TAPING AND FINISHING OF GYPSUM BOARD FOR FULL HEIGHT, SHALL BE IN ACCORDANCE WITH DESIGNATED FIRE TEST AND MANUFACTURER'S DIRECTIONS TO ACHIEVE FIRE RESISTANCE RATING INDICATED. SEAL PERIMETERS AND ALL PENETRATIONS THROUGH FIRE-RATED PARTITIONS WITH SPECIFIED FIRE RESISTANT RATED MATERIALS. REFER TO SPECIFICATIONS FOR FIRESTOPPING SYSTEM REQUIREMENTS.

6. ALL PARTITIONS SHALL BE SEALED AIRTIGHT FOR FULL HEIGHT (UNLESS NOTED OTHERWISE) INCLUDING PERIMETER & ALL PENETRATIONS. TAPE AT BOTH FACES & FINISH ALL GYPSUM BOARD JOINTS & FASTENERS.

7. SEE DOOR AND FRAME DETAILS FOR TYPICAL NOTES AND DETAILS ON FRAMING AND ANCHORING REQUIREMENTS.

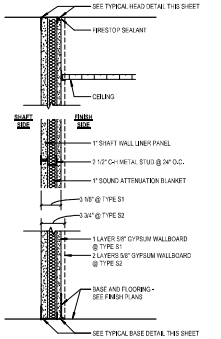
8. PROVIDE CONTROL JOINTS AT 30'-0" O.C. IN ALL PARTITIONS. REVIEW LOCATIONS WITH ARCHITECT PRIOR TO INSTALLATION. PROVIDE RATED CONTROL JOINTS IN ALL RATED PARTITIONS, REFER TO INTERIOR ELEVATIONS FOR LOCATIONS.

9. COORDINATE LOCATIONS FOR WALL-MOUNTED DEVICES (ELECTRICAL, A/V/T, SECURITY, FIRE ALARM, ETC.) - PROVIDE ADDITIONAL FRAMING AND/OR BLOCKING AS REQUIRED TO LOCATE DEVICES AS SPECIFIED IN ARCHITECTURAL AND/OR MEP DRAWINGS.

10. PROVIDE ABUSE RESISTANT GYPSUM BOARD AT ALL EXPOSED LOCATIONS 8'-0" HIGH AT ALL CORRIDORS (WITH NO LOCKERS), SPECIALTY SPACES INCLUDING AUDITORIUM, GYMNASIUM LOCKER ROOMS, MEDIA CENTER, SERVERY/ KITCHEN AND CAFETERIA, WHERE ABUSE-RESISTANT AND/OR IMPACT RESISTANT GYPSUM BOARD IS TO BE INSTALLED. ALL METAL WALL FRAMING TO HAVE A MINIMUM 0.033"/ BASE METAL THICKNESS

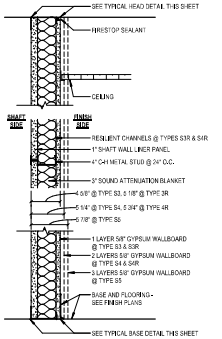
11. REFER TO A601 FOR TYPICAL METAL STUD FRAMING DETAILS

12. REFER TO DETAILS ON A602 FOR DIFFERENT TOP OF WALL DETAILS WITH STRUCTURAL STEEL.



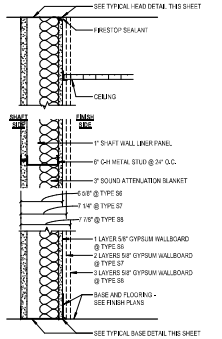
1 & 2-HOUR FIRE RATED SHAFT WALL PARTITION (UL DES # UA15) STC = 45-42

S1	AS SHOWN (1-HR FIRE RATED; 1 LAYER GWB ON FINISHED FACE)	
S2	AS SHOWN (2-HOUR FIRE RATED; 2 LAYERS GWB ON FINISHED FACE)	STC = 54-47



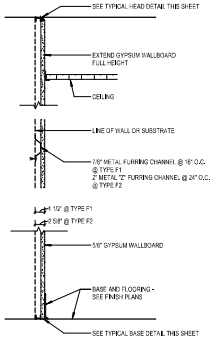
2-HOUR & 3-HOUR FIRE RATED SHAFT WALL PARTITION (UL DESIGN U415) TYPES S3R AND S4R (UL DESIGN U497A/U498) STC = 44-45

S3	AS SHOWN (1-HR FIRE RATED; 1 LAYER GWB ON FINISHED FACE)	
S3R	AS SHOWN (1-HR FIRE RATED; 1 LAYER GWB ON FINISHED FACE & WITH RESILIENT CHANNELS)	STC = 49-50
S4	AS SHOWN (2-HOUR FIRE RATED; 2 LAYERS GWB ON FINISHED FACE)	STC = 48-51
S4R	AS SHOWN (2-HOUR FIRE RATED; 2 LAYERS GWB ON FINISHED FACE & WITH RESILIENT CHANNELS)	STC = 53-61



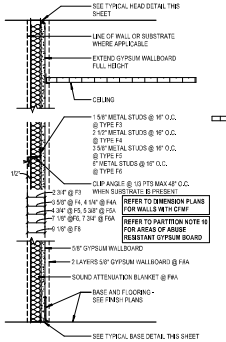
2-HOUR & 3-HOUR FIRE RATED SHAFT WALL PARTITION (UL DESIGN U415) STC = 46-48

S6	AS SHOWN (1-HR FIRE RATED; 1 LAYER GWB ON FINISHED FACE)	
S7	AS SHOWN (2-HOUR FIRE RATED; 2 LAYERS GWB ON FINISHED FACE)	STC = 55-57



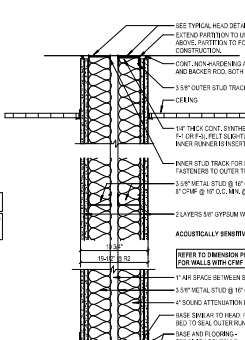
FURRING WALL PARTITION

F1	AS SHOWN - 7/8" METAL FURRING CHANNELS	
F2	AS SHOWN - 2" METAL "Z" FURRING CHANNELS	



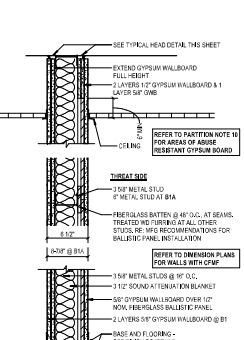
FURRING WALL PARTITION

F3	AS SHOWN - 1 5/8" METAL STUDS	
F4 F4A	AS SHOWN - 2 1/2" METAL STUDS	
F5 F5A	AS SHOWN - 3 5/8" METAL STUDS	
F6 F6A	AS SHOWN - 6" METAL STUDS	
F8	AS SHOWN - 8" METAL STUDS	



2 HOUR RATED (UL DESIGN NO. U402) SOUND RATED PARTITION STC 60

R1	AS SHOWN
R2	AS SHOWN EXCEPT 6" CFMF ON BOTH SIDES
R3	AS SHOWN EXCEPT 6" CFMF ON BOTH SIDES AND 2" AIR GAP
R4	AS SHOWN EXCEPT 6" CFMF ON BOTH SIDES, (2) LAYERS OF GYP ON ONE SIDE AND 3" AIR GAP



BALLISTIC PARTITION
BALLISTIC PROTECTION UL 752 LEVEL 3 REFER TO NOTE 2.

B1	AS SHOWN
B1A	AS SHOWN - 6" METAL STUDS
B1B	AS SHOWN - EXCEPT NO (2) LAYERS OF GYPSUM BOARD ON NON-THREAT SIDE

1E TYPICAL FRAMED PARTITION TYPES
1 1/2" = 1'-0"

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Greenwich Public Schools

Greenwich Central Middle School

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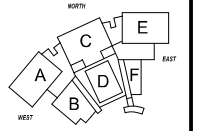

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

TYPICAL FRAMED PARTITION TYPES AND DETAILS

Date 07/08/2024
Scale As indicated
Proj. Number 22367.00
Drawing Number A600

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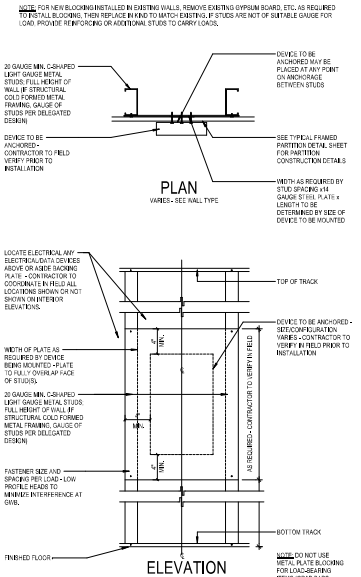
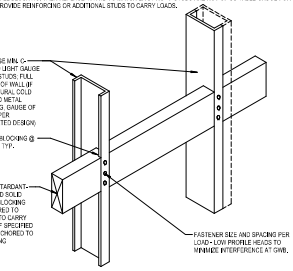
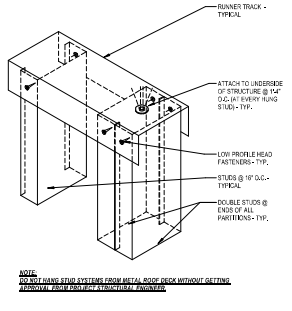


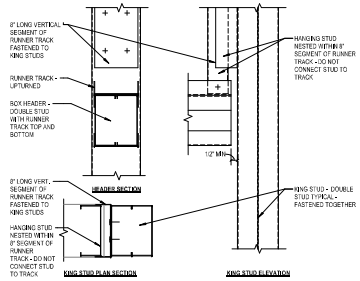
1C TYPICAL METAL BLOCKING FOR WALL MOUNTED DEVICES
1 1/2" = 1'-0"



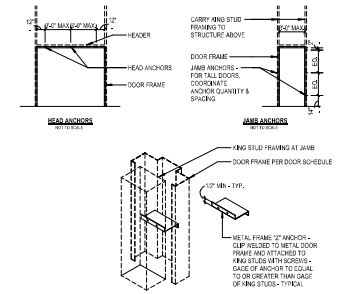
2A TYPICAL WOOD BLOCKING DETAIL
3" = 1'-0"



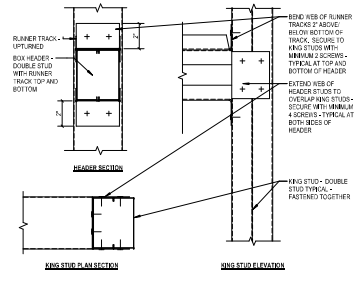
2C TYPICAL TOP TRACK STUD CONN. - HUNG STUDS
3" = 1'-0"



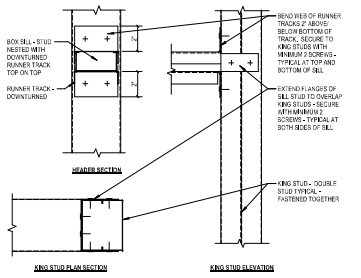
3A TYPICAL HEADER - OPENINGS GREATER THAN 8'-0" WIDE
3" = 1'-0"



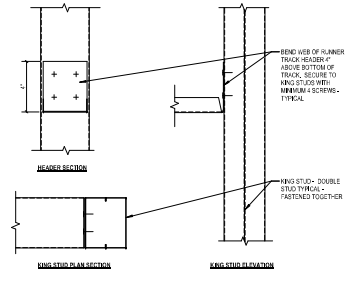
3C check - TYPICAL PARTITION DOOR FRAME ANCHORS
1 1/2" = 1'-0"



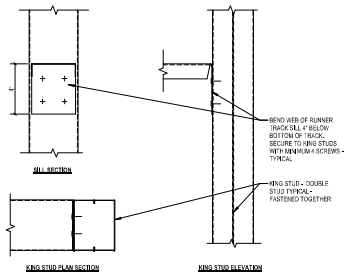
4A TYPICAL HEADER - OPENINGS BETWEEN 4'-0" & 8'-0" WIDE
3" = 1'-0"



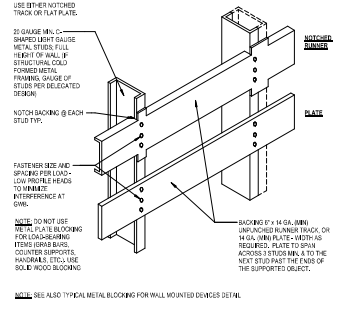
4C TYPICAL SILL- OPENINGS GREATER THAN 4'-0" WIDE
3" = 1'-0"



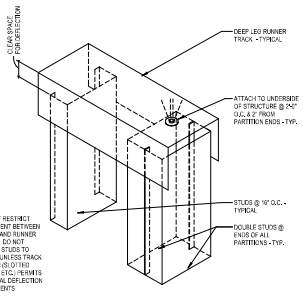
5A TYPICAL HEADER - OPENINGS LESS THAN 4'-0" WIDE
3" = 1'-0"



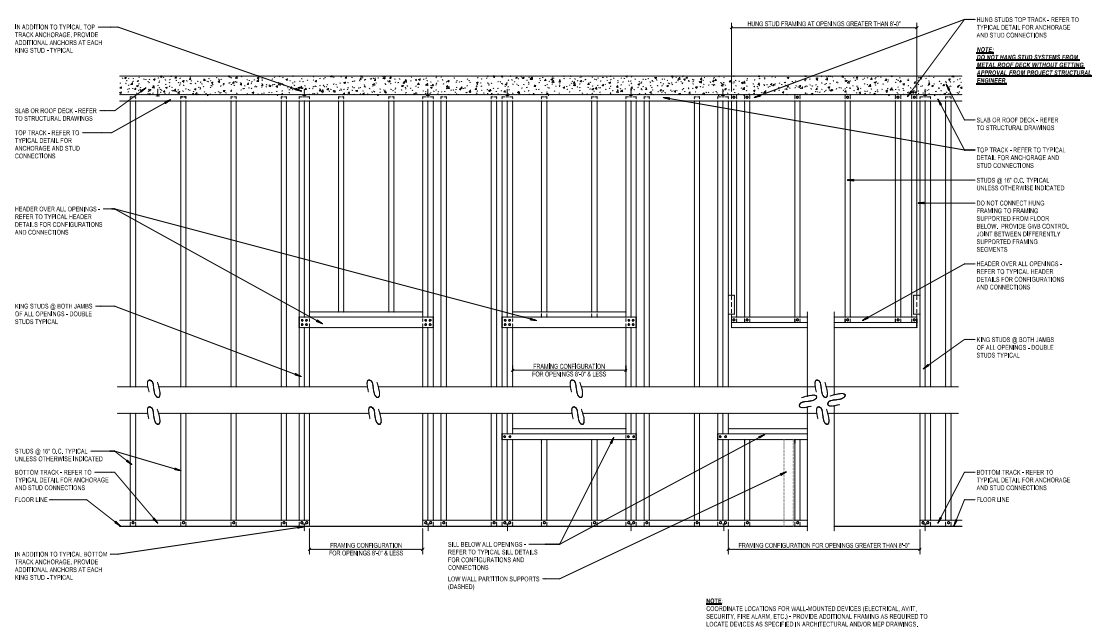
5C TYPICAL SILL- OPENINGS LESS THAN 4'-0" WIDE
3" = 1'-0"



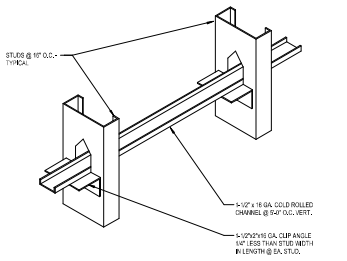
1D TYPICAL METAL BLOCKING/BACKING PLATES
3" = 1'-0"



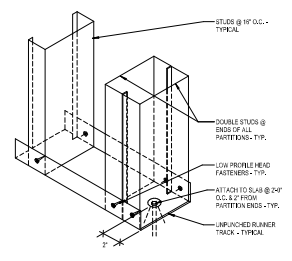
2D TYPICAL TOP TRACK STUD CONNECTIONS
3" = 1'-0"



3E TYPICAL METAL STUD FRAMING ELEVATION
3/4" = 1'-0"



1E TYPICAL STUD BRIDGING
3" = 1'-0"



2E TYPICAL BOTTOM TRACK STUD CONNECTIONS
3" = 1'-0"

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Greenwich Central Middle School

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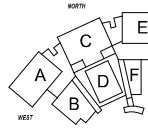

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

METAL STUD PARTITION FRAMING - TYPICAL DETAILS

Date 07/08/2024
Scale As indicated
Proj. Number 22367.00
Drawing Number A601

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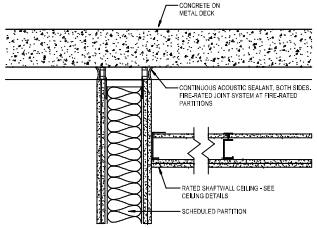
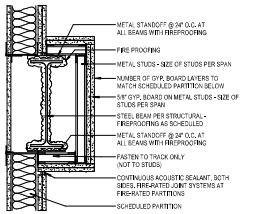
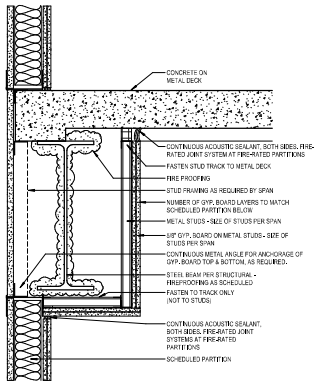


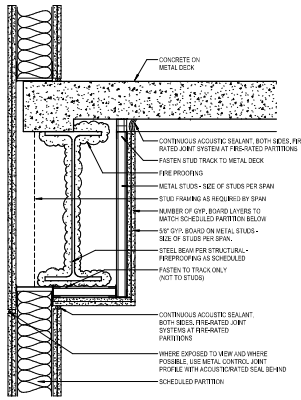
2B FULL HEIGHT RATED PARTITION @ RATED CEILING
1 1/2" = 1'-0"



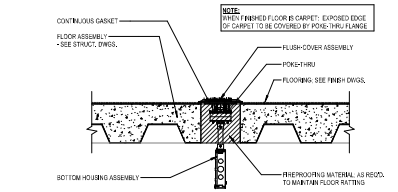
3B DETAIL AT RATED WALL SUPPORT
1 1/2" = 1'-0"



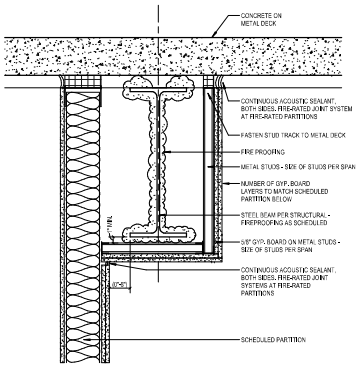
2C EDGE OF SLAB @ SHAFT
1 1/2" = 1'-0"



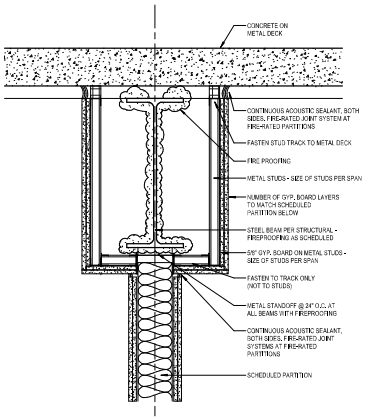
3C RATED PARTITION OFFSET DETAIL
1 1/2" = 1'-0"



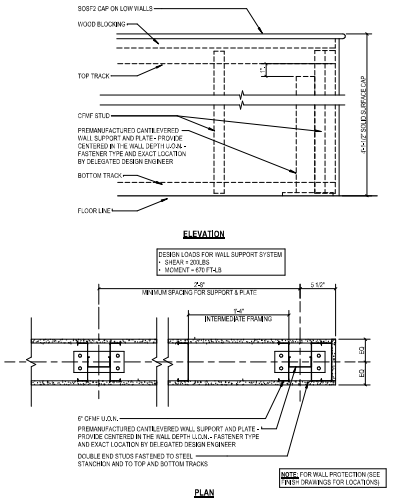
5D SECTION DETAIL AT CONCRETE / METAL DECK FLOOR POKE THRU
1 1/2" = 1'-0"



2E FULL HEIGHT PARTITION - PARALLEL TO BEAM-ASYMMETRICAL
1 1/2" = 1'-0"



3E FULL HEIGHT PARTITION - PARALLEL TO BEAM
1 1/2" = 1'-0"



5E LOW WALL PARTITION DETAIL
1 1/2" = 1'-0"

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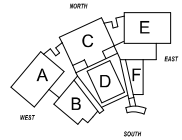
Drawn JZ
Checked JZ

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

SPECIALTY PARTITION DETAILS

Date 07/08/2024
Scale 1 1/2" = 1'-0"
Proj. Number 22367.00
Drawing Number A602

Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_GREENWICH_CENTRAL_MS_R22.rvt
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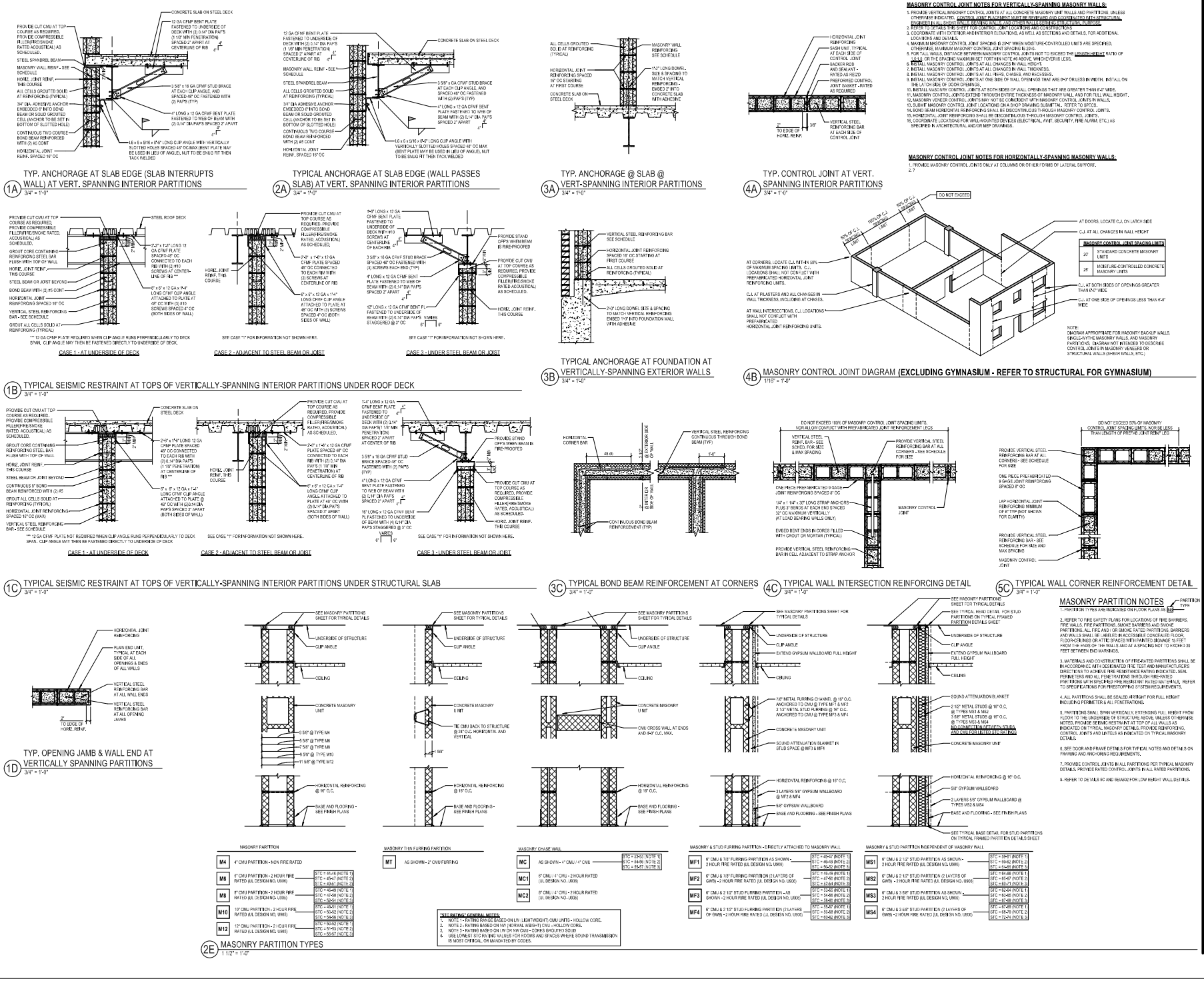
1
2
3
4
5
A
B
C
D
E
CONCRETE SLAB ON STEEL DECK
12 GA CFMF BENT PLATE FASTENED TO UNDERSIDE OF DECK WITH (2) 0.14" DIA PA'S (1 1/8" MIN PENETRATION) SPACED 2' APART AT CENTERLINE OF RIB
STEEL SPANDREL BEAM
MASONRY WALL REINF - SEE SCHEDULE
HORIZ. JOINT REINF, THIS COURSE
ALL CELLS GROUTED SOLID AT REINFORCING (TYPICAL)
3/4" DIA. ADHESIVE ANCHOR EMBEDDED 8" INTO BEAM OR SOLID GROUTED CELL (ANCHOR TO BE SET IN BOTTOM OF SLOTTED HOLE)
CONTINUOUS TWO COURSE BOND BEAM REINFORCED WITH (2) #5 CONT
HORIZONTAL JOINT REINF, SPACED 16" OC
3 5/8" x 16 GA CFMF STUD BRACE AT EACH CLIP ANGLE, AND SPACED 48" OC FASTENED WITH (2) PAPS (TYP)
4" LONG x 12 GA CFMF BENT PLATE FASTENED TO WEB OF BEAM WITH (2) 0.14" DIA PAPS SPACED 2' APART
1/8" x 6" x 5/16" x 6'-0" LONG CLIP ANGLE WITH VERTICALLY SLOTTED HOLES SPACED 48" OC MAX (BENT PLATE MAY BE USED IN LIEU OF ANGLES, NUT TO BE SNUG FIT THEN TACK WELDED
TYP. ANCHORAGE AT SLAB EDGE (SLAB INTERRUPTS WALL) AT VERT. SPANNING INTERIOR PARTITIONS
1A 3/4" = 1'-0"
12 GA CFMF BENT PLATE FASTENED TO UNDERSIDE OF DECK WITH (2) 0.14" DIA PA'S (1 1/8" MIN PENETRATION) SPACED 2' APART AT CENTERLINE OF RIB
CONCRETE SLAB ON STEEL DECK
MASONRY WALL REINF - SEE SCHEDULE
STEEL SPANDREL BEAM
ALL CELLS GROUTED SOLID AT REINFORCING (TYPICAL)
3/4" DIA ADHESIVE ANCHOR EMBEDDED 8" INTO BOND BEAM OR SOLID GROUTED CELL (ANCHOR TO BE SET IN BOTTOM OF SLOTTED HOLE)
CONTINUOUS TWO COURSE BOND BEAM REINFORCED WITH (2) #5 CONT
HORIZONTAL JOINT REINF, SPACED 16" OC
3 5/8" x 16 GA CFMF STUD BRACE AT EACH CLIP ANGLE, AND SPACED 48" OC FASTENED WITH (2) PAPS (TYP)
4" LONG x 12 GA CFMF BENT PLATE FASTENED TO WEB OF BEAM WITH (2) 0.14" DIA PAPS SPACED 2' APART
1/8" x 6" x 5/16" x 6'-0" LONG CLIP ANGLE WITH VERTICALLY SLOTTED HOLES SPACED 48" OC MAX (BENT PLATE MAY BE USED IN LIEU OF ANGLES, NUT TO BE SNUG FIT THEN TACK WELDED
TYPICAL ANCHORAGE AT SLAB EDGE (WALL PASSES SLAB) AT VERT. SPANNING INTERIOR PARTITIONS
2A 3/4" = 1'-0"
ALL CELLS GROUTED SOLID AT REINFORCING (TYPICAL)
HORIZONTAL JOINT REINFORCING SPACED 16" OC STARTING AT FIRST COURSE
CONCRETE SLAB ON STEEL DECK
MASONRY WALL REINFORCING SEE SCHEDULE
#4 LONG DOWEL, SIDE & SPACING TO MATCH VERTICAL REINFORCING - EMBED 2" INTO CONCRETE SLAB WITH ADHESIVE
1" LONG x 12 GA CFMF BENT PLATE FASTENED TO WEB OF BEAM WITH (2) 0.14" DIA PAPS SPACED 2' APART
1/8" x 6" x 5/16" x 6'-0" LONG CLIP ANGLE WITH VERTICALLY SLOTTED HOLES SPACED 48" OC MAX (BENT PLATE MAY BE USED IN LIEU OF ANGLES, NUT TO BE SNUG FIT THEN TACK WELDED
TYP. ANCHORAGE @ SLAB @ VERT-SPANNING INTERIOR PARTITIONS
3A 3/4" = 1'-0"
HORIZONTAL JOINT REINFORCING SASH UNIT - TYPICAL AT EACH SIDE OF CONTROL JOINT
BACKER ROD AND SEALANT - RATED AS REQ'D
PREFORMED CONTROL JOINT GASKET - RATED AS REQUIRED
VERTICAL STEEL REINFORCING BAR AT EACH SIDE OF CONTROL JOINT
2" TO EDGE OF HORIZ. REINF.
3/8"
TYP. CONTROL JOINT AT VERT. SPANNING INTERIOR PARTITIONS
4A 3/4" = 1'-0"
MASONRY CONTROL JOINT NOTES FOR VERTICALLY-SPANNING MASONRY WALLS:
1. PROVIDE VERTICAL MASONRY CONTROL JOINTS AT ALL CONCRETE MASONRY UNIT WALLS AND PARTITIONS, UNLESS OTHERWISE INDICATED. CONTROL JOINT PLACEMENT MUST BE REVIEWED AND COORDINATED WITH STRUCTURAL ENGINEER OF RECORD (SEOR) WHERE WALLS ARE DESIGNED AS PART OF THE LATERAL FORCE RESISTING STRUCTURAL SYSTEM.
2. REFER TO DETAILS THIS SHEET FOR CONTROL JOINT LOCATIONS AND CONSTRUCTION.
3. COORDINATE WITH EXTERIOR AND INTERIOR ELEVATIONS, AS WELL AS SECTIONS AND DETAILS, FOR ADDITIONAL LOCATIONS AND DETAILS.
4. MAXIMUM MASONRY CONTROL JOINT SPACING IS 25'-0" WHEN MOISTURE-CONTROLLED UNITS ARE SPECIFIED. OTHERWISE, MAXIMUM MASONRY CONTROL JOINT SPACING IS 20'-0".
5. FOR TALL WALLS, DISTANCE BETWEEN MASONRY CONTROL JOINTS NOT TO EXCEED THE LENGTH-HEIGHT RATIO OF 3:1 OR THE SPACING MAXIMUM SET FORTH IN NOTE #4 ABOVE, WHICHEVER IS LESS.
6. INSTALL MASONRY CONTROL JOINTS AT ALL CHANGES IN WALL HEIGHT.
7. INSTALL MASONRY CONTROL JOINTS AT ALL CHANGES IN WALL THICKNESS.
8. INSTALL MASONRY CONTROL JOINTS AT ALL PIERS, CHASES, AND RECESSES.
9. INSTALL MASONRY CONTROL JOINTS AT ONE SIDE OF WALL OPENINGS THAT ARE 6'-0" OR LESS IN WIDTH. INSTALL ON THE LATCH SIDE OF DOOR OPENINGS.
10. INSTALL MASONRY CONTROL JOINTS AT BOTH SIDES OF WALL OPENINGS THAT ARE GREATER THAN 6'-0" WIDE.
11. MASONRY CONTROL JOINTS EXTEND THROUGH ENTIRE THICKNESS OF MASONRY WALL AND FOR FULL WALL HEIGHT.
12. MASONRY VENEER CONTROL JOINTS MAY NOT BE CONSISTENT WITH MASONRY CONTROL JOINTS IN WALLS.
13. SUBMIT MASONRY CONTROL JOINT LOCATIONS ON A SHOP DRAWING SUBMITTAL. REFER TO SPEC'S.
14. BOND BEAM HORIZONTAL REINFORCING SHALL BE DISCONTINUOUS THROUGH MASONRY CONTROL JOINTS.
15. HORIZONTAL JOINT REINFORCING SHALL BE DISCONTINUOUS THROUGH MASONRY CONTROL JOINTS.
16. COORDINATE LOCATIONS FOR WALL-MOUNTED DEVICES (ELECTRICAL, AV/IT, SECURITY, FIRE ALARM, ETC.) AS SPECIFIED IN ARCHITECTURAL AND/OR MEP DRAWINGS.
MASONRY CONTROL JOINT NOTES FOR HORIZONTALLY-SPANNING MASONRY WALLS:
1. PROVIDE MASONRY CONTROL JOINTS ONLY AT COLUMNS OR OTHER FORMS OF LATERAL SUPPORT.
2. ?
DO NOT EXCEED
50% OF C.J. SPACING LIMIT
50% OF C.J. SPACING LIMIT
50% OF C.J. SPACING LIMIT
AT DOORS, LOCATE C.J. ON LATCH SIDE
C.J. AT ALL CHANGES IN WALL HEIGHT
MASONRY CONTROL JOINT SPACING LIMITS
20 STANDARD CONCRETE MASONRY UNITS
25 MOISTURE-CONTROLLED CONCRETE MASONRY UNITS
C.J. AT BOTH SIDES OF OPENINGS GREATER THAN 6'-0" WIDE
C.J. AT ONE SIDE OF OPENINGS LESS THAN 6'-0" WIDE
AT CORNERS, LOCATE C.J. WITHIN 50% OF MAXIMUM SPACING LIMITS. C.J. LOCATIONS SHALL NOT CONFLICT WITH PREFABRICATED HORIZONTAL JOINT REINFORCING LIMITS.
C.J. AT PILASTERS AND ALL CHANGES IN WALL THICKNESS, INCLUDING AT CHASES.
AT WALL INTERSECTIONS, C.J. LOCATIONS SHALL NOT CONFLICT WITH PREFABRICATED HORIZONTAL JOINT REINFORCING LIMITS.
NOTE:
DIAGRAM APPROPRIATE FOR MASONRY BACKUP WALLS, SINGLE-WYTHE MASONRY WALLS, AND MASONRY PARTITIONS. DIAGRAM NOT INTENDED TO DESCRIBE CONTROL JOINTS IN MASONRY VENEERS OR STRUCTURAL WALLS (SHEAR WALLS, ETC.)
MASONRY CONTROL JOINT DIAGRAM (EXCLUDING GYMNASIUM - REFER TO STRUCTURAL FOR GYMNASIUM)
4B 1/16" = 1'-0"
PROVIDE CUT CMU AT TOP COURSE AS REQUIRED, PROVIDE COMPRESSIBLE FILLER/FIRE/SMOKE RATED, ACOUSTICAL) AS SCHEDULED,
GROUT CORE CONTAINING REINFORCING STEEL BAR FLUSH WITH TOP OF WALL
HORIZ. JOINT REINF., THIS COURSE
STEEL BEAM OR JOIST BEYOND
BOND BEAM WITH (2) #5 CONT
HORIZONTAL JOINT REINFORCING SPACED 16" OC
VERTICAL STEEL REINFORCING BAR - SEE SCHEDULE
GROUT ALL CELLS SOLID AT REINFORCING (TYPICAL)
STEEL ROOF DECK
2'-4" x 14" LONG 12 GA CFMF PLATE SPACED 48" OC CONNECTED TO EACH RIB WITH (2) #10 SCREWS AT CENTER-LINE OF RIB ***
6" x 6" x 12 GA x 14" LONG CFMF CLIP ANGLE ATTACHED TO PLATE AT 48" OC WITH (2) #10 SCREWS SPACED 4" OC (BOTH SIDES OF WALL)
*** 12 GA CFMF PLATE REQUIRED WHEN CLIP ANGLE RUNS PERPENDICULARLY TO DECK SPAN. CLIP ANGLE MAY THEN BE FASTENED DIRECTLY TO UNDERSIDE OF DECK.
CASE 1 - AT UNDERSIDE OF DECK
PROVIDE CUT CMU AT TOP COURSE AS REQUIRED, PROVIDE COMPRESSIBLE FILLER/FIRE/SMOKE RATED, ACOUSTICAL) AS SCHEDULED,
2'-4" x 14" x 12 GA CFMF PLATE SPACED 48" OC CONNECTED TO EACH RIB WITH (2) #10 SCREWS AT CENTERLINE OF RIB
6" x 6" x 12 GA x 14" LONG CFMF CLIP ANGLE ATTACHED TO PLATE AT 48" OC WITH (2) #10 SCREWS SPACED 4" OC (BOTH SIDES OF WALL)
HORIZ. JOINT REINF, THIS COURSE
SEE CASE "1" FOR INFORMATION NOT SHOWN HERE.
CASE 2 - ADJACENT TO STEEL BEAM OR JOIST
9"-0" LONG x 12 GA CFMF BENT PLATE FASTENED TO UNDERSIDE OF DECK WITH #10 SCREWS AT 4" CENTERLINE OF EACH RIB
3 5/8" x 16 GA CFMF STUD BRACE SPACED 48" OC FASTENED WITH (3) SCREWS EACH END (TYP)
4" LONG x 12 GA CFMF BENT PLATE FASTENED TO WEB OF BEAM WITH (2) 0.14" DIA PAPS SPACED 2" APART
12" LONG x 12 GA CFMF BENT PL. FASTENED TO UNDERSIDE OF BEAM WITH (2) 0.14" DIA PAPS STAGGERED @ 3" OC
PROVIDE STAND OFFS WHEN BEAM IS FIRE-PROOFED
PROVIDE CUT CMU AT TOP COURSE AS REQUIRED, PROVIDE COMPRESSIBLE FILLER/FIRE/SMOKE RATED ACOUSTICAL) AS SCHEDULED.
HORIZ. JOINT REINF, THIS COURSE
SEE CASE "1" FOR INFORMATION NOT SHOWN HERE.
CASE 3 - UNDER STEEL BEAM OR JOIST
TYPICAL SEISMIC RESTRAINT AT TOPS OF VERTICALLY-SPANNING INTERIOR PARTITIONS UNDER ROOF DECK
1B 3/4" = 1'-0"
PROVIDE CUT CMU AT TOP COURSE AS REQUIRED, PROVIDE COMPRESSIBLE FILLER/FIRE/SMOKE RATED, ACOUSTICAL) AS SCHEDULED,
GROUT CORE CONTAINING REINFORCING STEEL BAR FLUSH WITH TOP OF WALL
HORIZ. JOINT REINF., THIS COURSE
STEEL BEAM OR JOIST BEYOND
CONTINUOUS 9" BOND BEAM REINFORCED WITH (2) #5
GROUT ALL CELLS SOLID AT REINFORCING (TYPICAL)
HORIZONTAL JOINT REINFORCING SPACED 16" OC (MAX)
VERTICAL STEEL REINFORCING BAR - SEE SCHEDULE
CONCRETE SLAB ON STEEL DECK
2'-4" x 14" LONG 12 GA CFMF PLATE SPACED 48" OC CONNECTED TO EACH RIB WITH (2) 0.14" DIA PA'S (1 1/8" MIN PENETRATION) AT CENTERLINE OF RIB ***
6" x 6" x 12 GA x 14" LONG CFMF CLIP ANGLE ATTACHED TO PLATE @ 48" OC WITH (2) 0.14" DIA PAPS (BOTH SIDES OF WALL)
*** 12 GA CFMF PLATE NOT REQUIRED WHEN CLIP ANGLE RUNS PERPENDICULARLY TO DECK SPAN. CLIP ANGLE MAY THEN BE FASTENED DIRECTLY TO UNDERSIDE OF DECK
CASE 1 - AT UNDERSIDE OF DECK
PROVIDE CUT CMU AT TOP COURSE AS REQUIRED, PROVIDE COMPRESSIBLE FILLER/FIRE/SMOKE RATED, ACOUSTICAL) AS SCHEDULED,
2'-4" x 14" x 12 GA CFMF PLATE SPACED 48" OC CONNECTED TO EACH RIB WITH (2) 0.14" DIA PA'S (1 1/8" MIN PENETRATION) AT CENTERLINE OF RIB
6" x 6" x 12 GA x 14" LONG CFMF CLIP ANGLE ATTACHED TO PLATE AT 48" OC WITH (2) 0.14" DIA PAPS SPACED 2' APART (BOTH SIDES OF WALL)
HORIZ. JOINT REINF, THIS COURSE
SEE CASE "1" FOR INFORMATION NOT SHOWN HERE.
CASE 2 - ADJACENT TO STEEL BEAM OR JOIST
15-4" LONG x 12 GA CFMF BENT PLATE FASTENED TO UNDERSIDE OF DECK WITH (2) 0.14" DIA PA'S (1 1/8" MIN PENETRATION) SPACED 2' APART AT CENTER OF RIB
3 5/8" x 16 GA CFMF STUD BRACE SPACED 48" OC FASTENED WITH (2) PAPS (TYP)
4" LONG x 12 GA CFMF BENT PLATE FASTENED TO WEB OF BEAM WITH (2) 0.14" DIA PAPS SPACED 2" APART
16" LONG x 12 GA CFMF BENT PL FASTENED TO UNDERSIDE OF BEAM WITH (4) 0.14" DIA PAPS STAGGERED @ 3" OC
PROVIDE STAND OFFS WHEN BEAM IS FIRE-PROOFED
PROVIDE CUT CMU AT TOP COURSE AS REQUIRED, PROVIDE COMPRESSIBLE FILLER/FIRE/SMOKE RATED, ACOUSTICAL) AS SCHEDULED.
HORIZ. JOINT REINF, THIS COURSE
SEE CASE "1" FOR INFORMATION NOT SHOWN HERE.
CASE 3 - UNDER STEEL BEAM OR JOIST
TYPICAL ANCHORAGE AT FOUNDATION AT VERTICALLY-SPANNING EXTERIOR WALLS
3B 3/4" = 1'-0"
HORIZONTAL CORNER BAR
48 db
VERTICAL STEEL REINFORCING CONTINUOUS THROUGH BOND BEAM (TYP.)
CONTINUOUS BOND BEAM REINFORCEMENT (TYP)
TYPICAL BOND BEAM REINFORCEMENT AT CORNERS
3C 3/4" = 1'-0"
DO NOT EXCEED 100% OF MASONRY CONTROL JOINT SPACING LIMITS, NOR ALLOW CONFLICT WITH PREFABRICATED JOINT REINFORCEMENT LEGS
VERTICAL STEEL REINF., BAR - SEE SCHED. FOR SIZE & MAX SPACING
PROVIDE VERTICAL STEEL REINFORCING BAR AT ALL CORNERS - SEE SCHEDULE FOR SIZE
ONE PIECE PREFABRICATED 9 GAGE JOINT REINFORCING SPACED 8" OC
1/4" x 1 1/4" x 30" LONG STRAP ANCHORS PLUS 3" BENDS AT EACH END SPACED 32" OC MAXIMUM VERTICALLY (AT LOAD BEARING WALLS ONLY)
EMBED BENT ENDS IN CORES FILLED WITH GROUT OR MORTAR (TYPICAL)
PROVIDE VERTICAL STEEL REINFORCING BAR IN CELL ADJACENT TO STRAP ANCHOR
MASONRY CONTROL JOINT
TYPICAL WALL INTERSECTION REINFORCING DETAIL
4C 3/4" = 1'-0"
DO NOT EXCEED 50% OF MASONRY CONTROL JOINT SPACING LIMITS, NOR BE LESS THAN LENGTH OF PREFAB JOINT REINF. LEG
PROVIDE VERTICAL STEEL REINFORCING BAR AT ALL CORNERS - SEE SCHEDULE FOR SIZE
ONE PIECE PREFABRICATED 9 GAGE JOINT REINFORCING SPACED 8" OC
LAP HORIZONTAL JOINT REINFORCING MINIMUM OF 6" TYP (NOT SHOWN FOR CLARITY)
PROVIDE VERTICAL STEEL REINFORCING BAR - SEE SCHEDULE FOR SIZE AND MAX SPACING
MASONRY CONTROL JOINT
TYPICAL WALL CORNER REINFORCEMENT DETAIL
5C 3/4" = 1'-0"
HORIZONTAL JOINT REINFORCING
PLAIN END UNIT, TYPICAL AT EACH SIDE OF ALL OPENINGS & ENDS OF ALL WALLS
VERTICAL STEEL REINFORCING BAR AT ALL WALL ENDS
VERTICAL STEEL REINFORCING BAR AT ALL OPENING JAMBS
2" TO EDGE OF HORIZ. REINF.
TYP. OPENING JAMB & WALL END AT VERTICALLY SPANNING PARTITIONS
1D 3/4" = 1'-0"
SEE MASONRY PARTITIONS SHEET FOR TYPICAL DETAILS
UNDERSIDE OF STRUCTURE
CLIP ANGLE
CEILING
CONCRETE MASONRY UNIT
5 5/8" @ TYPE M4
5 5/8" @ TYPE M6
5 5/8" @ TYPE M8
5 5/8" @ TYPE M10
11 5/8" @ TYPE M12
HORIZONTAL REINFORCING @ 16" O.C.
BASE AND FLOORING - SEE FINISH PLANS
TIE CMU BACK TO STRUCTURE @ 24" O.C. HORIZONTAL AND VERTICAL
5/8"
CMU CROSS WALL AT ENDS AND 4'-0" O.C. MAX.
EXTEND GYPSUM WALLBOARD FULL HEIGHT
7/8" METAL FURRING CHANNEL @ 16" O.C. ANCHORED TO CMU @ TYPE MF1 & MF2
2 1/2" METAL STUD FURRING @ 16" O.C. ANCHORED TO CMU @ TYPE MF3 & MF4
SOUND ATTENUATION BLANKET IN STUD SPACE @ MF3 & MF4
2 LAYERS 5/8" GYPSUM WALLBOARD @ MF3 & MF4
5/8" GYPSUM WALLBOARD
2 LAYERS 5/8" GYPSUM WALLBOARD @ TYPES MS3 & MS4
SEE TYPICAL BASE DETAIL FOR STUD PARTITIONS ON TYPICAL FRAMED PARTITION DETAILS SHEET
MASONRY PARTITION NOTES
PARTITION TYPE
1. PARTITION TYPES ARE INDICATED ON FLOOR PLANS AS M#
SEE TYPICAL HEAD DETAIL FOR STUD PARTITIONS ON TYPICAL FRAMED PARTITION DETAILS SHEET
2. REFER TO FIRE SAFETY PLANS FOR LOCATIONS OF FIRE BARRIERS, FIRE WALLS, FIRE PARTITIONS, SMOKE BARRIERS AND SMOKE PARTITIONS. ALL FIRE AND / OR SMOKE RATED PARTITIONS, BARRIERS AND WALLS SHALL BE LABELED IN ACCESSIBLE CONCEALED FLOOR, FLOOR-CEILING OR ATTIC SPACES WITH PAINTED SIGNAGE 15 FEET FROM THE ENDS OF THE WALLS AND AT A SPACING NOT TO EXCEED 30 FEET BETWEEN END MARKINGS.
3. MATERIALS AND CONSTRUCTION OF FIRE-RATED PARTITIONS SHALL BE IN ACCORDANCE WITH DESIGNATED TYPE TEST AND MANUFACTURER'S DIRECTIONS TO ACHIEVE FIRE RESISTANCE RATING INDICATED. SEAL PENETRATIONS AND FILL FIRE RATIONS THROUGH FIRE-RATED PARTITIONS WITH SPECIFIED FIRE RESISTANT RATED MATERIALS. REFER TO SPECIFICATIONS FOR FIRESTOPPING SYSTEM REQUIREMENTS.
4. ALL PARTITIONS SHALL BE SEALED AIRTIGHT FOR FULL HEIGHT INCLUDING PERIMETER & ALL PENETRATIONS.
5. PARTITIONS SHALL SPAN VERTICALLY, EXTENDING FULL HEIGHT FROM FLOOR TO THE UNDERSIDE OF STRUCTURE ABOVE, UNLESS OTHERWISE NOTED. PROVIDE SEISMIC RESTRAINT AT TOP OF ALL WALLS AS INDICATED ON TYPICAL MASONRY DETAILS. PROVIDE REINFORCING, CONTROL JOINTS AND LINTELS AS INDICATED ON TYPICAL MASONRY DETAILS.
6. SEE DOOR AND FRAME DETAILS FOR TYPICAL NOTES AND DETAILS ON FRAMING AND ANCHORING REQUIREMENTS.
7. PROVIDE CONTROL JOINTS IN ALL PARTITIONS PER TYPICAL MASONRY DETAILS. PROVIDE RATED CONTROL JOINTS IN ALL RATED PARTITIONS.
8. REFER TO DETAILS 5C AND 6E/A602 FOR LOW HEIGHT WALL DETAILS.
MASONRY PARTITION
M4 4" CMU PARTITION - NON FIRE RATED
M6 6" CMU PARTITION - 2 HOUR FIRE RATED (UL DESIGN NO. U906)
M8 8" CMU PARTITION - 2 HOUR FIRE RATED (UL DESIGN NO. U905)
M10 10" CMU PARTITION - 2 HOUR FIRE RATED (UL DESIGN NO. U905)
M12 12" CMU PARTITION - 2 HOUR FIRE RATED (UL DESIGN NO. U905)
STC = 49-46 (NOTE 1)
STC = 45-47 (NOTE 2)
STC = 45-47 (NOTE 3)
STC = 45-49 (NOTE 1)
STC = 47-50 (NOTE 2)
STC = 52-54 (NOTE 3)
STC = 48-51 (NOTE 1)
STC = 51-53 (NOTE 2)
STC = 54-56 (NOTE 3)
STC = 50-52 (NOTE 1)
STC = 51-53 (NOTE 2)
STC = 55-57 (NOTE 3)
MASONRY THIN FURRING PARTITION
MT AS SHOWN - 2" CMU FURRING
STC = 33-50 (NOTE 1)
STC = 34-50 (NOTE 2)
STC = 55-57 (NOTE 3)
MASONRY CHASE WALL
MC AS SHOWN - 4" CMU / 4" CMU
MC1 6" CMU / 4" CMU - 2 HOUR RATED (UL DESIGN NO. U909)
MC2 8" CMU / 4" CMU - 2 HOUR RATED (UL DESIGN NO. U910)
MASONRY & STUD FURRING PARTITION - DIRECTLY ATTACHED TO MASONRY WALL
MF1 6" CMU & 7/8" FURRING PARTITION AS SHOWN - 2 HOUR FIRE RATED (UL DESIGN NO. U909)
MF2 6" CMU & 7/8" FURRING PARTITION (3 LAYERS OF GWB) - 2 HOUR FIRE RATED (UL DESIGN NO. U909)
MF3 6" CMU & 2 1/2" STUD FURRING PARTITION - AS SHOWN - 2 HOUR FIRE RATED (UL DESIGN NO. U909)
MF4 6" CMU & 2 1/2" STUD FURRING PARTITION (2 LAYERS OF GWB) - 2 HOUR FIRE RATED (UL DESIGN NO. U909)
STC = 49-51 (NOTE 1)
STC = 51-53 (NOTE 2)
STC = 54-56 (NOTE 3)
STC = 45-47 (NOTE 1)
STC = 47-50 (NOTE 2)
STC = 52-54 (NOTE 3)
STC = 53-55 (NOTE 1)
STC = 54-56 (NOTE 2)
STC = 55-57 (NOTE 3)
STC = 49-51 (NOTE 1)
STC = 51-53 (NOTE 2)
STC = 54-56 (NOTE 3)
MASONRY & STUD PARTITION INDEPENDENT OF MASONRY WALL
MS1 6" CMU & 2 1/2" STUD PARTITION AS SHOWN - 2 HOUR FIRE RATED (UL DESIGN NO. U909)
MS2 6" CMU & 2 1/2" STUD PARTITION (2 LAYERS OF GWB) - 2 HOUR FIRE RATED (UL DESIGN NO. U909)
MS3 6" CMU & 3 5/8" STUD PARTITION AS SHOWN - 2 HOUR FIRE RATED (UL DESIGN NO. U909)
MS4 6" CMU & 3 5/8" STUD PARTITION (2 LAYERS OF GWB) - 2 HOUR FIRE RATED (UL DESIGN NO. U909)
STC = 49-51 (NOTE 1)
STC = 51-53 (NOTE 2)
STC = 54-56 (NOTE 3)
STC = 45-47 (NOTE 1)
STC = 47-50 (NOTE 2)
STC = 52-54 (NOTE 3)
STC = 53-55 (NOTE 1)
STC = 54-56 (NOTE 2)
STC = 55-57 (NOTE 3)
STC = 49-51 (NOTE 1)
STC = 51-53 (NOTE 2)
STC = 54-56 (NOTE 3)
"STC RATING" GENERAL NOTES:
1. NOTE 1 - RATING RANGE BASED ON LW (LIGHTWEIGHT) CMU UNITS - HOLLOW CORE.
2. NOTE 2 - RATING BASED ON NW (NORMAL WEIGHT) CMU - HOLLOW CORE.
3. NOTE 3 - RATING BASED ON LW OR NW CMU - CORES GROUTED SOLID
4. USE LOWEST STC RATING VALUES FOR HOOKS AND SPACES WHERE SOUND TRANSMISSION IS MOST CRITICAL, OR MANDATED BY CODES.
MASONRY PARTITION TYPES
2E 1 1/2" = 1'-0"
NORTH
EAST
SOUTH
WEST
A
B
C
D
E
F
KEYPLAN
Number
Date
Issued For
05/31/2024
BIDDING PERMIT
07/08/2024
PHASE 2
TYPICAL MASONRY PARTITION TYPES AND DETAILS
Date
07/08/2024
Scale
As indicated
Proj. Number
22367.00
Drawing Number
A605
Drawn
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MASONRY LINTEL SCHEDULE FOR NON-LOAD BEARING WALLS

CONCRETE MASONRY UNIT WALLS UP TO 4'-0" OPENINGS

WALL THICKNESS	LINTEL SIZE	REINFORCEMENT	BRG. LEN.	SCHEMATIC SECTIONS (N.T.S.)
8"	WALL THICKNESS x 8" DEEP LINTEL	1 - #5 BOTTOM	8"	
8" TO 12"	WALL THICKNESS x 16" DEEP LINTEL	2 - #5 BOTTOM	8"	

6" CMU | 8" CMU | 10" CMU | 12" CMU

CONCRETE MASONRY UNIT WALLS 4'-1" TO 6'-8" OPENINGS

WALL THICKNESS	LINTEL SIZE	REINFORCEMENT	BRG. LEN.	SCHEMATIC SECTIONS (N.T.S.)
6"	WALL THICKNESS x 16" DEEP LINTEL	1 - #5 BOTTOM	8"	
8" TO 12"	WALL THICKNESS x 16" DEEP LINTEL	2 - #5 BOTTOM	8"	

6" CMU | 8" CMU | 10" CMU | 12" CMU

CONCRETE MASONRY UNIT WALLS 6'-9" TO 8'-0" OPENINGS

WALL THICKNESS	LINTEL SIZE	REINFORCEMENT	BRG. LEN.	SCHEMATIC SECTIONS (N.T.S.)
6"	WALL THICKNESS x 24" DEEP LINTEL	2-#5 BOTTOM 1-#5 TOP	8"	
8" TO 12"	WALL THICKNESS x 24" DEEP LINTEL	2 - #5 BOTTOM 1-#5 TOP	8"	

6" CMU | 8" CMU | 10" CMU | 12" CMU

3C MASONRY LINTEL SCHEDULE FOR NON LOAD BEARING WALLS
3" = 1'-0"

STEEL LINTEL SCHEDULE - NON-LOAD BEARING WALLS

4", 8" AND 12" CONCRETE MASONRY UNIT WALLS

OPENING SIZE	STEEL LINTEL SIZE	BRG. LEN.	SCHEMATIC SECTIONS (N.T.S.)
UP TO 4'-0"	L 3 1/2 x 3 1/2 x 5/16	8"	
4'-1" TO 6'-0"	L 4 x 3 1/2 x 5/16 LLV	8"	
6'-1" TO 8'-0"	L 5 x 3 1/2 x 5/16 LLV	8"	
8'-1" TO 10'-0"	W 8 x 15 + PL 5/16	1/2 SPAN	

4" CMU USE 1 | 8" CMU USE 2 | 12" CMU USE 3 | WB+PL

6" CONCRETE MASONRY UNIT WALLS

OPENING SIZE	STEEL LINTEL SIZE	BRG. LEN.	SCHEMATIC SECTIONS (N.T.S.)
UP TO 6'-0"	WT 5x6.5	8"	
6'-1" to 10'-0"	WT 5x6.5	1/2 SPAN	

6" CMU

10" CONCRETE MASONRY UNIT WALLS

OPENING SIZE	STEEL LINTEL SIZE	BRG. LEN.	SCHEMATIC SECTIONS (N.T.S.)
UP TO 6'-0"	L 4 x 3 x 5/16 LLV	8"	
6'-1" TO 8'-0"	L 5 x 3 x 5/16 LLV	8"	
8'-1" TO 10'-0"	W 8 x 15 + PL 5/16	1/2 SPAN	

10" CMU USE 3 | WB+PL

EXTERIOR BRICK VENEER

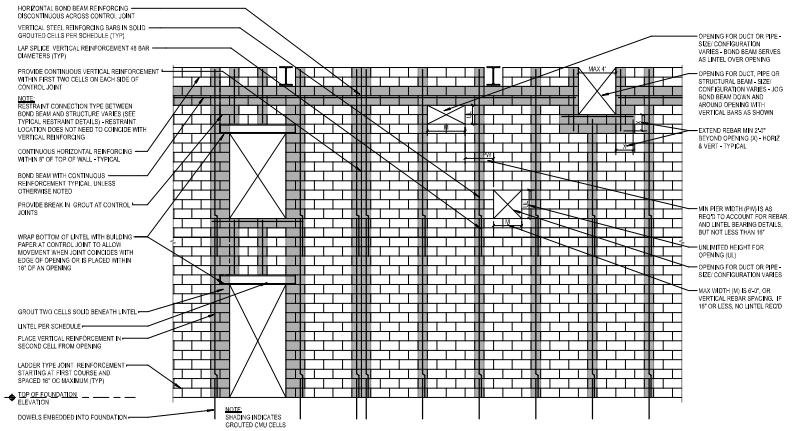
OPENING SIZE	STEEL LINTEL SIZE	BRG. LEN.	SCHEMATIC SECTIONS (N.T.S.)
UP TO 6'-0"	L 4" x 4" x 5/16" - LLV	8"	
6'-1" TO 8'-0"	L 4" x 4" x 1/2"... L 3" x 3" x 5/16"	1/2 SPAN	

BRICK VENEER

LINTEL NOTES:

1. FABRICATE LOOSE STRUCTURAL STEEL LINTELS FROM SHAPES AND SIZES INDICATED FOR ALL OPENINGS AND RECESSES IN MASONRY WALLS.
2. WELD ADJOINING MEMBERS TOGETHER TO FORM SINGLE UNIT.
3. GALVANIZE STEEL LINTELS LOCATED IN EXTERIOR WALLS.
4. RETURN BRICK VENEER INTO WALL CAVITY TO PROVIDE FULL BEARING UNDER LINTELS.

5C STEEL LINTEL SCHEDULE FOR NON LOAD BEARING WALLS
3/4" = 1'-0"



3E TYPICAL REINFORCED MASONRY WALL ELEVATION (VERTICALLY-SPANNING WALLS)
3/4" = 1'-0"

MASONRY WALL VERTICAL REINFORCING SCHEDULE

EXTERIOR WALLS	
	REFER TO S602 FOR ALL REINFORCING FOR GYMNASIUM SHEAR WALLS
INTERIOR WALLS	
ALL	1-#5 WITHIN 16" OF EACH SIDE OF OPENINGS, WITHIN 8" OF EACH OF SIDE OF CONTROL JOINTS, AT CORNERS, AT WALL INTERSECTIONS WITHIN 8" OF END OF WALLS. ADD #5 AT 4'-0" OC AT STAIRWELLS, EXIT DISCHARGES, EXITS AND ELEVATOR SHAFT UNLESS OTHERWISE NOTED.

REINFORCING NOTES:

1. GROUT ALL CELLS CONTAINING REINFORCING STEEL.
2. PLACE REINFORCING STEEL AT CENTER OF CELL UNLESS OTHERWISE NOTED.
3. COMPLY WITH REQUIREMENTS OF ACI 530.1/ASCE 6/TMS 602 FOR PLACING REINFORCEMENT, LOCATING CLEANOUTS, AND GROUTING CELLS.
4. REFER TO SPECIFICATIONS, GENERAL NOTES, AND TYPICAL DETAILS FOR ADDITIONAL REQUIREMENTS.
5. PROVIDE 2-#7 VERTICAL REINF BARS AT EACH END OF SHEARWALLS INDICATED IN STRUCTURAL DWGS. REINFORCE REMAINING SHEARWALL AREA ACCORDING TO TYPICAL MASONRY WALL VERTICAL REINFORCING SCHEDULE.

5E MASONRY WALL VERTICAL REINFORCING SCHEDULE
3/4" = 1'-0"

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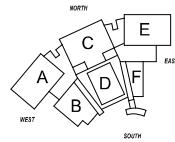

KEYPLAN

Number	Date	Issued For
1	09/30/2024 07/08/2024 MM/DD/YYYY	BIDDING PERMIT PHASE 2 Editor Notes

TYPICAL MASONRY PARTITION DETAILS

Date: 07/08/2024
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DOOR TYPE DESIGNATIONS



B BI-FOLD
BL BI-FOLD, FULL LOUVER PANELS
BPL BI-FOLD, PANELED WITH HALF LOUVER

F FLUSH
FG FULL GLASS

G HALF GLASS
GL HALF GLASS WITH LOUVER

L LOUVERED (BOTTOM ONLY)
LL LOUVERED (TOP & BOTTOM)
LT LOUVERED (TOP ONLY)

N NARROW LITE
NL NARROW LITE WITH LOUVER

P(#) PANELED (NUMBER OF PANELS)

V VISION LITE
VL VISION LITE WITH LOUVER

NS NARROW STILE (ALUMINUM)
NSR NARROW STILE (ALUMINUM) WITH MIDDLE RAIL
MS MEDIUM STILE (ALUMINUM)
MSR MEDIUM STILE (ALUMINUM) WITH MIDDLE RAIL
WS WIDE STILE (ALUMINUM)
WSR WIDE STILE (ALUMINUM) WITH MIDDLE RAIL

FRAME TYPE DESIGNATIONS



A DOOR OPENING
AF DOOR OPENING WITH FULL HEIGHT SIDELITE
AS DOOR OPENING WITH SIDELITE
AT DOOR OPENING WITH TRANSOM
ATF DOOR OPENING WITH TRANSOM AND FULL HT. SIDELITE
ATP DOOR OPENING WITH TRANSOM PANEL

B BORROWED LITE
BF FULL HEIGHT BORROWED LITE
BT FULL HEIGHT BORROWED LITE
BTF FULL HEIGHT BORROWED LITE WITH TRANSOM

C CASED OPENING
DA DOUBLE ACTING OR EMERGENCY EGRESS
DE DOUBLE EGRESS

DOOR / FRAME MATERIAL

AL ALUMINUM
GL GLASS
HM HOLLOW METAL
PL PLASTIC LAMINATE VENEER
SS STAINLESS STEEL
WD WOOD, WOOD VENEER
FCP FIBER CEMENT PANELS
STL STEEL

GLASS MATERIAL

ICS INSULATED COATED SPANDREL GLASS
IG INSULATED GLASS
ISG INSULATED SECURITY GLAZING (SCHOOLGUARD)
IT INSULATED TEMPERED SAFETY GLASS
IFG INSULATED GLASS (FROSTED)
IFSG INSULATED FROSTED SAFETY GLASS
IL INSULATED LAMINATED GLASS
TS TEMPERED SAFETY GLASS
LS-1 STC 36 RATED ACOUSTIC LAMINATED SAFETY GLASS (1/4" LAMINATED)
LS-2 STC 40 RATED ACOUSTIC LAMINATED SAFETY GLASS (5/8" LAMINATED)
LS-3 STC 45 RATED ACOUSTIC LAMINATED SAFETY GLASS (1/4" LAMINATED - 2" AIR SPACE - 1/4" TEMPERED)
LS-4 STC 50 RATED ACOUSTIC LAMINATED SAFETY GLASS (1/2" LAMINATED - 2" AIR SPACE - 1/2" TEMPERED)
SG-1 SECURITY GLAZING (SCHOOLGUARD)
BG BULLET RESISTANT GLAZING, LEVEL 3
FR FIRE PROTECTION RATED GLASS

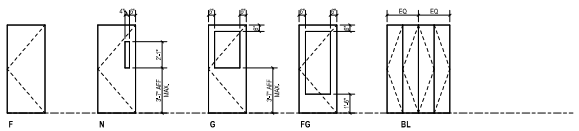
GENERAL DOOR NOTES

1. ALL DOORS ARE 1 3/4" THICKNESS, UNLESS OTHERWISE NOTED.
2. ALL WOOD DOORS ARE SOLID CORE UNLESS OTHERWISE INDICATED EXCEPT ALL BI-FOLD AND POCKET DOORS ARE HOLLOW CORE UNLESS OTHERWISE INDICATED.
3. ALL INTERIOR GLASS IS 1/4" AND ALL INSULATED GLASS IS 1" UNLESS OTHERWISE INDICATED.
4. ALL EXTERIOR HOLLOW METAL DOORS ARE INSULATED.
5. REFER TO HARDWARE SCHEDULE ATTACHED TO DIVISION 8, SECTION "FINISH HARDWARE" FOR HARDWARE SET DESCRIPTIONS.
6. REFER TO TYPICAL PARTITION DETAILS, DRAWING A60A0X FOR FRAME THROAT REQUIREMENTS UNLESS OTHERWISE INDICATED ON DOOR SCHEDULE.
7. REFER TO DOOR AND FRAME TYPES, DRAWING A610 FOR FRAME PROFILES.
8. REFER TO DOOR DETAILS, DRAWING A60A0X FOR TYPICAL JAMB DETAILS. HEADS ARE SIMILAR TO JAMBS SHOWN UNLESS OTHERWISE INDICATED.
9. ALL DOORS TO HAVE STANDARD 5/8" UNDERCUT UNLESS OTHERWISE INDICATED OR REQUIRED TO RECEIVE SCHEDULED THRESHOLD.
10. REFER TO WALL AND ARRS FOR SILL TYPE/SHOLD TRANSITION DETAILS, UNLESS OTHERWISE INDICATED.
11. 20, 45, 60, 90, ETC.- INDICATES FIRE RATING IN MINUTES.
12. TRANSOM GLASS TO BE TYPE TS OR LS-2. SIDELITE GLASS TO BE TYPE SG-2, UNLESS OTHERWISE INDICATED
13. AT OPENING FRAMES WITH STC 45 RATING OR HIGHER AND NOT GROUTED SOLID, FILL ENTIRE FRAME WITH 12 LB DENSITY ACOUSTIC INSULATION.
13. REFER TO INTERIOR ELEVATIONS FOR FRAME ELEVATIONS AND DIMENSIONS.
14. REFER TO EXTERIOR ELEVATION AND WALL SECTION FOR ADDITIONAL DETAILS.
15. REFER TO PLAN DETAIL FOR ADDITIONAL INFORMATION.

REMARKS NOTATION

RE-1: PUSH PLATE OPERATED AUTOMATIC DOOR
RE-2: DOUBLE ACTION SWING (NO STOPS AT FRAME)
RE-3: DOUBLE EGRESS FRAME AND DOOR
RE-4: NOT USED
RE-5: MAGNETIC HOLD OPEN
RE-6: POCKET DOOR
RE-7: WEATHERSTRIP / LIGHT SEAL
RE-8: INSULATED DOOR
RE-9: PROVIDE GALVANIZED DOOR AND FRAME
RE-10: BALLISTIC LEVEL 3 ALUMINUM FRAMES
RE-11: WIRE MESH DOOR AND FRAME.
RE-12: INSULATED OVERHEAD COILING DOOR AND STEEL FRAME.
RE-13: OVER-HEAD COILING COUNTER DOOR AND EXTRUDED ALUMINUM FRAME.
RE-14: FREEZER / COOLER DOOR, FRAME AND HARDWARE BY FREEZER / COOLER MANUFACTURER.
RE-15: PROVIDE PERIMETER SMOKE SEALS.
RE-16: PROVIDE PERIMETER ACOUSTIC SEALS AND AUTOMATIC DOOR BOTTOM, ASTRAGAL AT DOUBLE DOORS
RE-17: PROVIDE PERIMETER ACOUSTIC SMOKE SEALS AND AUTOMATIC DOOR BOTTOM, ASTRACAL AT DOUBLE DOORS
RE-18: DOOR SHALL SWING 180 DEGREES (REFER TO PLANS FOR NUMBER OF LEAVES)
RE-19: ACOUSTIC DOOR AND FRAME OR WINDOW SYSTEM, SEE SPECIFICATION.
RE-20: NEW DOOR AND FRAME IN EXISTING WALL CONSTRUCTION, FIELD VERIFY FRAME THROAT SIZE REQUIRED.
RE-21: OPENING REQUIRES STC 36 RATING.
RE-22: OPENING REQUIRES STC 40 RATING.
RE-23: OPENING REQUIRES STC 45 RATING.
RE-24: OPENING REQUIRES STC 47 RATING.
RE-25: OPENING REQUIRES BALLISTIC RESISTANT LEVEL 3.
RE-26: REFER TO DRAWING A630-A632 FOR ALUMINUM FRAME ELEVATIONS AND DETAIL REFERENCES. ALUMINUM DOOR MANUFACTURER SHALL VERIFY DOOR DIMENSIONS BASED UPON APPROVED SYSTEM STANDARDS.
RE-27: ELECTRIC MOTOR OPERATION
RE-28: CARD READER AT THIS OPENING, REQUEST TO EXIT.
RE-29: PROVIDE GLAZING TYPE SG-1 FOR MIN. 7'-0" HIGH, REFER TO FRAME TYPES.
RE-30: TRANSACTION WINDOW
RE-31: FULL HEIGHT ROLLING COILING SHUTTER
RE-32: NO EXTERIOR HARDWARE
RE-33: PROVIDE PEEP HOLE AND DOOR BELL
RE-34: PROVIDE GLAZING TYPE SG-1 FOR MIN. 7'-0" HIGH, REFER TO FRAME TYPES.
RE-35: BORROWED LITE
RE-36: OPENING REQUIRES STC 35 RATING.
RE-37: PROVIDE GLAZING TYPE SG-2 FOR MIN. 7'-0" HIGH, REFER TO FRAME TYPES.
RE-38: OPENING REQUIRES STC 38 RATING.
RE-39: PROVIDE GLAZING TYPE SG-2 AT SIDELITES AND LS-2 AT TRANSOM.
RE-40: SLIDING TRANSACTION WINDOW
RE-41: PROVIDE GLAZING TYPE SG-2 AT SIDELITES AND TS AT TRANSOM.
RE-42: UNEVEN DOORS

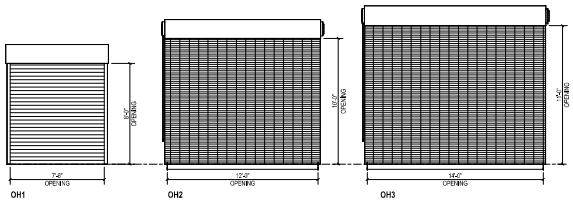
WOOD AND HOLLOW METAL DOORS



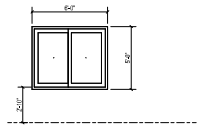
ALUMINUM DOORS



BWSR - (BULLET RESISTANT)

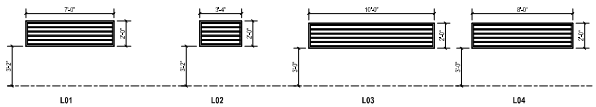


ALUMINUM WINDOWS



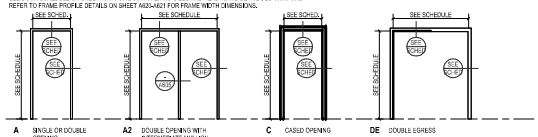
W01 2-PANE SLIDING WINDOW (NURSE'S OFFICE)

EXTERIOR LOUVERS



FRAMES

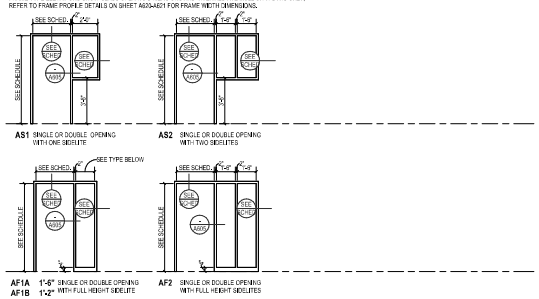
SEE DOOR SCHEDULE ON SHEET A611 FOR DOOR OPENING SIZES AND HEAD / JAMB DETAIL DESIGNATIONS.
REFER TO FRAME PROFILE DETAILS ON SHEET A620-A621 FOR FRAME WIDTH DIMENSIONS.



A SINGLE OR DOUBLE OPENING
DA DOUBLE ACTING
A2 DOUBLE OPENING WITH INTERMEDIATE MULLION (REMOVABLE)
C CASED OPENING
DE DOUBLE EGRESS

FRAMES WITH SIDELITES

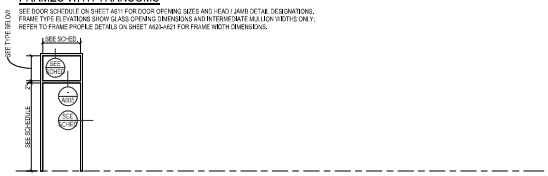
SEE DOOR SCHEDULE ON SHEET A611 FOR DOOR OPENING SIZES AND HEAD / JAMB DETAIL DESIGNATIONS.
FRAME TYPE ELEVATIONS SHOW GLASS OPENING DIMENSIONS AND INTERMEDIATE MULLION WIDTHS ONLY.
REFER TO FRAME PROFILE DETAILS ON SHEET A620-A621 FOR FRAME WIDTH DIMENSIONS.



AS1 SINGLE OR DOUBLE OPENING WITH ONE SIDELITE
AS2 SINGLE OR DOUBLE OPENING WITH TWO SIDELITES
AF1A 1'-6" SINGLE OR DOUBLE OPENING
AF1B 1'-2" WITH FULL HEIGHT SIDELITE
AF2 SINGLE OR DOUBLE OPENING WITH FULL HEIGHT SIDELITES

FRAMES WITH TRANSOMS

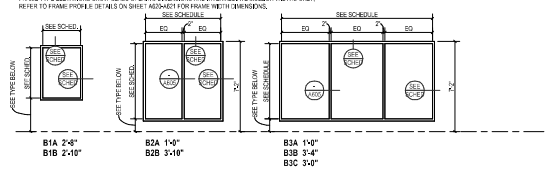
SEE DOOR SCHEDULE ON SHEET A611 FOR DOOR OPENING SIZES AND HEAD / JAMB DETAIL DESIGNATIONS.
FRAME TYPE ELEVATIONS SHOW GLASS OPENING DIMENSIONS AND INTERMEDIATE MULLION WIDTHS ONLY.
REFER TO FRAME PROFILE DETAILS ON SHEET A620-A621 FOR FRAME WIDTH DIMENSIONS.



AT1A 2'-0" SINGLE OPENING
AT1B 1'-8" WITH TRANSOM
AT1C 1'-4"

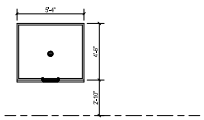
BORROWED LITES

SEE DOOR SCHEDULE ON SHEET A611 FOR DOOR OPENING SIZES AND HEAD / JAMB DETAIL DESIGNATIONS.
FRAME TYPE ELEVATIONS SHOW GLASS OPENING DIMENSIONS AND INTERMEDIATE MULLION WIDTHS ONLY.
REFER TO FRAME PROFILE DETAILS ON SHEET A620-A621 FOR FRAME WIDTH DIMENSIONS.



B1A 2'-8"
B1B 2'-10"
B2A 1'-9"
B2B 3'-10"
B3A 1'-0"
B3B 3'-4"
B3C 3'-0"

BULLET RESISTANT ALUMINUM PASS THRU WINDOW



PT BALLISTIC WINDOW SYSTEM, SPEAK-THRU FRAME. METAL TRANSACTION SURFACE WITH DEAL TRAY

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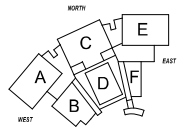

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

DOOR AND FRAME TYPES

Date 07/08/2024
Scale 1/4" = 1'-0"
Proj. Number 22367.00
Drawing Number A610

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DOOR AND FRAME SCHEDULE

REFER TO FINISH PLANS AND A605 FOR THRESHOLD TRANSITIONS DETAILS. U.N.O.

Bldg	Room No.	Oprg	DOOR OPENING SIZE Width A	Width B	Height	Thk	Type	Material	FRAME Frame Type	Material	DETAIL Jamb	Head	Sill	STC	Glazing	Hardware Set	Fire Rating (Mins)	Comments	Rev No.
1/2- FIRST FLOOR																			
	1001	A	3'-0"	3'-0"	7'-0"	2"	WSR	AL	CW07A	AL					BG	3.0		RE-1, 7, 8, 28, 29	
	1002	B	3'-0"	3'-0"	7'-0"	2"	WSR	AL	CW07A	AL					BG	2.0		RE-1, 7, 8, 28, 28, 29	
	1002	C	3'-0"	3'-0"	7'-0"	2"	SWSR	AL	ICW02	AL					BG	9.0		RE-1, 10, 25, 26, 28	
	1002	D	3'-0"	3'-0"	7'-0"	2"	SWSR	AL	ICW02	AL					BG	9.0		RE-1, 10, 25, 26, 28	
	1002	A	3'-0"		7'-0"	1 3/4"	WSR	AL	ISP10	AL					TS	13.0		RE-4, 26	
	1002	B	3'-0"		7'-0"	1 3/4"	WSR	AL	ISP10	AL					TS	13.0		RE-4, 26	
	1003		4'-0"		4'-0"		PT		PT	BR					BG			RE-4, 25, 30	
	1004		3'-0"		7'-0"	1 3/4"	N	WD	A	HM	SEA620	SEA620			TS	38.0		RE-4	
	1005		3'-0"		7'-0"	1 3/4"	N	WD	A	HM	SEA620	SEA620			TS	41.0		RE-16, 22	
	1007		3'-0"		7'-0"	1 3/4"	F	WD	AF1A	HM	SE & SDA620	SE & SDA620		33 & 40	LS-2	35.0		RE-16, 21 SIDELITE RS-22	
	1009		3'-0"		7'-0"	1 3/4"	F	WD	AF1A	HM	SE & SDW620	SE & SDA620		33 & 40	LS-2	38.0		RE-16, 21 SIDELITE RS-22	
	1010		3'-0"		7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEA620			TS	13.0		RE-26	
	1012		3'-0"		7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEA620				43.0			
	1013		3'-0"		7'-0"	1 3/4"	F	WD	AF1A	HM	SE & SDW620	SE & SDA620		33 & 40	LS-2	38.0		RE-16, 21 SIDELITE RS-22	
	1014		3'-0"		7'-0"	1 3/4"	F	WD	AF1A	HM	SE & SDW620	SE & SDA620		33 & 40	LS-2	38.0		RE-16, 21 SIDELITE RS-22	
	1015		3'-0"		7'-0"	1 3/4"	F	WD	AF1A	HM	SE & SDW620	SE & SDA620		33 & 40	LS-2	38.0		RE-16, 21 SIDELITE RS-22	
	1016		3'-0"		7'-0"	1 3/4"	F	WD	AF1A	HM	SE & SDW620	SE & SDA620		33 & 40	LS-2	38.0		RE-16, 21 SIDELITE RS-22	
	1018		3'-0"		7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEA620			TS	33.0		RE-15	
	1019		3'-0"		7'-0"	1 3/4"	WSR	AL	ISP02	AL					TS	13.0		RS-26	
	1020		3'-0"		7'-0"	1 3/4"	WSR	AL	ISP01	AL					TS	13.0		RE-26	
	1021		3'-0"		7'-0"	1 3/4"	N	WD	A	HM	SEA620	SEA620			TS	38.0			
	1022		3'-0"	2'-6"	7'-0"	1 3/4"	BL	WD	A	HM	SEA620	SEA620				44.0			
	1023		3'-0"		7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEA620				38.0		RE-18	
	1024		3'-0"		7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEA620				38.0			
	1025		3'-0"		7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEA620				43.0			
	1026	A	3'-0"	3'-0"	7'-0"	1 3/4"	F	WD	AT1A	HM	SEA620	SEA620			TS	25.0		RE-5	
	1026	B	3'-0"	3'-0"	7'-0"	2"	WSR	AL	ISP24	AL					BG	5.0		RE-7, 8, 28, 28, 29	
	1028		3'-0"	3'-0"	7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEA620				50.0		RE-15	
	1030		3'-0"		7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEA620				43.0			
	1031		3'-0"		7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEA620				43.0			
	1032		3'-0"		7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEA620				43.0			
	1033		3'-0"		7'-0"	1 3/4"	F	WD	AF1A	HM	SE & SDW620	SE & SDA620			TS	39.0		RE-16, 21 SIDELITE RS-22	
	1034	A	3'-0"		7'-0"	1 3/4"	F	WD	AF2	HM	SE & SDW620	SE & SDA620		33, 40	LS-2	38.0		RE-16, 21 SIDELITE RS-22	
	1034	B	3'-0"		7'-0"	1 3/4"	F	WD	AF2	HM	SE & SDW620	SE & SDA620		33, 40	LS-2	39.0		RE-16, 21 SIDELITE RS-22	
	1034	C	12'-0"		8'-0"				BSA	HM	SDW620	SDA620		40	LS-2			RE-22, 35	
	1036		3'-0"	3'-6"	7'-0"	1 3/4"	BL	WD	A	HM	SEA620	SEA620				44.0			
	1038	A	3'-0"		7'-0"	1 3/4"	F	WD	AF1A	HM	SE & SDW620	SE & SDA620		33, 40	LS-2	38.0		RE-16, 21 SIDELITE RS-22	
	1038	B	3'-0"		7'-0"	1 3/4"	F	WD	A2	HM	SE & SDW620	SE & SDA620		40	LS-2	38.0		RE-22	
	1038	C	12'-0"		4'-0"				BSB	HM	SDW620	SDV1620		45	LS-3			RE-15, 23, 35	
	1038	D	12'-0"		4'-0"				BSB	HM	SDW620	SDV1620			TS			RE-36	
	1039	A	3'-0"		7'-0"	1 3/4"	F	WD	AF1A	HM	SE & SDW620	SE & SDA620		40, 45	LS-2	38.0		RE-16, 22 - SIDELITE RE-23	
	1039	B	7'-6"		8'-0"		CH-1	STL	CH01	STL	ZUA621/HS12	4EA621				46.0		RS-12	
	1039	C	3'-0"		7'-0"	1 3/4"	F	HM	A	HM	SEA622	SDA622	SCA620			6.0		RE-7, 8, 9, 28	
	1039	D	12'-0"		4'-0"				BSB	HM	SDW620	SDV1620		45	LS-3			RE-15, 23, 35	
	1040		3'-0"	3'-6"	7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEA620				31.0		RS-15	
	1041	A	3'-0"		7'-0"	1 3/4"	F	WD	AF1A	HM	SE & SDW620	SE & SDA620		40, 45	LS-2	38.0		RE-16, 22 - SIDELITE RE-23	
	1041	B	12'-0"		4'-0"				BHG	AL					BG	1.0		RS-7, 28, 29, 30	
	1041	C	6'-0"		6'-0"				B2	HM	6DA620	SDA620		45	LS-3			RE-15, 23, 35	
	1042		3'-0"		7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEA620				39.0		RS-15	
	1043		3'-0"		7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEA620				39.0		RS-15	
	1044		3'-0"	3'-6"	7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEV1620				29.0		RE-15, 18	
	1046		3'-0"		7'-0"	1 3/4"	F	WD	A	HM	2EA620	2EV1620				33.0		RE-15, 18	
	1047		3'-0"	3'-6"	7'-0"	1 3/4"	F	WD	A2	HM	2EA620	2EV1620				34.0	90	RE-7, 18, 21	
	1048		3'-0"		7'-0"	1 3/4"	F	WD	A	HM	2EA620	2EV1620		40		17.0	90	RE-15, 18, 22	
	1049		3'-0"		7'-0"	1 3/4"	F	WD	A	HM	2EA620	2EV1620				33.0		RE-15, 18	
	1050	A	3'-0"		7'-0"	1 3/4"	F	WD	A2	HM	2EA622	2DA622	SCA620			7.0		RE-7, 8, 9, 28	
	1050	B	3'-0"	3'-6"	7'-0"	1 3/4"	F	WD	AT1A	HM	SEA620	SEV1620			TS	25.0		RE-5	
	1051	A	3'-0"		7'-0"	1 3/4"	F	WD	AF1A	HM	SE & SDW620	SE & SDA620		33, 40	LS-2	38.0		RE-16, 21 SIDELITE RS-22	
	1051	B	6'-0"		4'-0"				B3C	HM	6DW620	SDV1620		40	LS-2			RE-22, 35	
	1052		3'-0"		7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEA620				43.0			
	1055	A	3'-0"		7'-0"	1 3/4"	WSR	AL	ISP34	AL				33, 45	LS-3	13.0		RS-16, 21, 26 SIDELITE RS-23, 28	
	1055	B	12'-0"		4'-0"				B1A	HM	6DA620	SDV1620		45	LS-3			RE-23, 35	
	1055	C	12'-0"		6'-0"				B1A	HM	6DW620	SDV1620		45	LS-3			RE-23, 35	
	1055	D	12'-0"	3'-6"	7'-0"	1 3/4"	WSR	AL	ISP16	AL				33, 45	LS-3	17.0		RE-16, 21, 26 SIDELITE RE-23, 28	
	1057		3'-0"		7'-0"	1 3/4"	F	WD	AF1A	HM	SE & SDW620	SE & SDA620		33	LS-2	38.0		RE-16, 21 SIDELITE RE-23	
	1059		3'-0"		7'-0"	1 3/4"	F	WD	AF2	HM	SE & SDW620	SE & SDA620		40, 45	LS-2	40.0		RE-16, 22 SIDELITE RE-23	
	1060	A	3'-0"	3'-6"	7'-0"	1 3/4"	F	WD	A2	HM	SE & SDW620	SE & SDA620		40		27.0	90	RE-7, 22	
	1060	B	3'-0"	3'-6"	7'-0"	1 3/4"	F	WD	A2	HM	SE & SDW620	SE & SDA620		40		22.0	90	RE-7, 22	
	1061		3'-0"		7'-0"	1 3/4"	F	WD	AF2	HM	SE & SDW620	SE & SDA620		40, 45	LS-2	40.0		RE-16, 22 SIDELITE RE-23	
	1062		3'-0"		7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEA620		40		40.0		RE-15, 21 SIDELITE RE-23	
	1063		3'-0"		7'-0"	1 3/4"	F	WD	AF1A	HM	SE & SDW620	SE & SDA620		33, 45	LS-2	38.0		RE-16, 22 SIDELITE RE-23	
	1064	A	3'-0"		7'-0"	1 3/4"	F	WD	AF1A	HM	SE & SDW620	SE & SDA620		33, 40	LS-2			RE-16, 21 SIDELITE RE-22	
	1064	B	6'-0"		4'-0"				B3C	HM	6DW620	SDV1620		40	LS-2			RE-22, 35	
	1065		3'-0"	3'-6"	7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEV1620				31.0		RS-15	
	1066		3'-0"		7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEA620				33.0		RS-15	
	1068		3'-0"		7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEA620				33.0		RE-15	
	1069		3'-0"		7'-0"	1 3/4"	F	HM	A	HM	3EA620	2DV1620				16.0	90	RE-15	
	1070		3'-0"	3'-6"	7'-0"	1 3/4"	F	HM	A	HM	3EA620	2DV1620				32.0	90	RS-15	
	1071	A	3'-0"		7'-0"	1 3/4"	F	HM	A	HM	3EA620	2DV1620				27.0	90	RS-15	
	1071	B	3'-0"		7'-0"	1 3/4"	F	HM	A	HM	3EA620	2DV1620				16.0		RE-15	
	1072		3'-0"	3'-6"	7'-0"	1 3/4"	F	HM	A	HM	3EA620	2DV1620				29.0		RS-15	
	1073	A	3'-0"		7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEA620				33.0		RS-15	
	1073	B	3'-0"		7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEV1620				33.0	90	RS-15	
	1074		3'-0"		7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEA620				43.0			
	1075	A	3'-0"		7'-0"	1 3/4"	N	WD	A	HM	SEA620	SEV1620			TS	38.0			
	1075	B	3'-0"		7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEV1620				38.0	90	RS-15	
	1077		3'-0"	3'-6"	7'-0"	1 3/4"	F	HM	A2	HM	SEA622	SDA622	SCA620			6.0		RE-7, 8, 9, 28, 42	
	1078		3'-0"	3'-6"	7'-0"	1 3/4"	F	HM	A2	HM	SEA622	SDV1622	SCA620			6.0		RE-7, 8, 9, 42	
	1079		3'-0"	3'-6"	7'-0"	1 3/4"	F	HM	A2	HM	SEA622	SDV1622	SCA620			6.0		RE-2, 8, 9	
	1080	A	3'-0"		7'-0"	1 3/4"	F	HM	A2	HM	SEA622	SDA622	SCA620			7.0		RE-7, 8, 9, 28	
	1080	B	3'-0"		7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEV1620		40		38.0	90	RE-7, 22	
	1081		3'-0"		7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEV1620				43.0			
	1082		3'-0"		7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEV1620				43.0		RE-15	
	1083		3'-0"		7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEA620				34.0		RE-15	
	1084		3'-0"		7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEA620				31.0		RS-15	
	1084	A	3'-0"		7'-0"	1 3/4"	F	WD	AF1A	HM	SE & SDW620	SE & SDA620			TS	35.0			
	1084	B	3'-0"		7'-0"	1 3/4"	F	WD	BYB	HM	3DW620	3DV1620			TS			RS-30	
	1085	A	12'-0"		8'-0"		CH-2	AL	CH0	AL	2BA621	1AA2211				45.0		RE-27, 31	
	1085	B	3'-0"	3'-6"	7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEV1620				27.0			
	1085	C	12'-0"		8'-0"		CH-2	AL	CH0	AL	2BA621	1AA2211				45.0		RE-27, 31	
	1085	D	3'-0"	3'-6"	7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEV1620				27.0			
	1085	E	3'-0"	3'-6"	7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEV1620				38.0			
	1086	A	3'-0"	3'-6"	7'-0"	2"	WSR	AL	ISP08	AL					TS	11.0		RS-30	
	1086	B	3'-0"	3'-6"	7'-0"	2"	WSR	AL	ISP08	AL					TS	11.0		RS-30	
	1088	C	14'-0"		11'-0"		CH-3	AL	CH0	AL	1BA620	2AA2211				45.0		RE-27, 31	
	1088	D	3'-0"	3'-6"	7'-0"	1 3/4"	F	WD	A2	HM	4EA620	2DV1620	1EA606			7.0		RE-7, 8, 9	
	1089		3'-0"		7'-0"	1 3/4"	F	WD	A	HM	4EA620	2DV1620	1EA606			33.0		RE-15	
	1089		3'-0"	3'-6"	7'-0"	1 3/4"	F	WD	AS2	HM	4EA620	2DV1620	1EA606		LS-2	35.0		RE-15	
	1090		3'-0"		7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEA620				42.0			
	1091		3'-0"		7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEA620				42.0			
	1092		3'-0"		7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEA620				34.0		RS-15	
	1093		3'-0"	3'-6"	7'-0"	1 3/4"	F	WD	ATIC	HM	SEA620	SEV1620			LS-2	18.0			
	1094		3'-0"		7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEV1620				42.0			
	1095		3'-0"		7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEA620				42.0			
	1096		3'-0"		7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEA620				43.0			
	1097		3'-0"		7'-0"	1 3/4"	F	WD	AS2	HM	4EA620	2DV1620	1EA606		LS-2	35.0			
	1099		3'-0"	3'-6"	7'-0"	1 3/4"	WSR	AL	ISP06	AL					LS-2	14.0			
	1100	A	3'-0"	3'-6"	7'-0"	1 3/4"	WSR	AL	ISP06	AL			1EA606		LS-2	12.0			
	1100	B	7'-0 7/8"	3'-0 7/8"	7'-0"	2"	WSR	AL	CW01	AL					IFSG	5.0		RE-7, 8, 28, 29	
	1100	C	3'-0"	3'-6"	7'-0"	1 3/4"	F	HM	A	HM	9CWA622	5BVA622	5CVA620		IT	7.0		RE-7, 8, 9, 28	
	1102	A	3'-0"	3'-6"	7'-0"	2"	WSR	AL	CW03	AL					ISG	5.0		RE-1, 7, 8, 28, 29	
	1102	B	3'-0"	3'-6"	7'-0"	2"	WSR	AL	CW03	AL					ISG	5.0		RE-1, 7, 8, 28, 29	
	1102	C	3'-0"	3'-6"	7'-0"	2"	WSR	AL	ICW01	AL					SG-1	5.0		RE-1, 26, 28, 29	
	1102	D	3'-0"	3'-6"	7'-0"	2"	WSR	AL	ICW01	AL					SG-1	5.0		RE-1, 26, 29	
	1103		3'-0"		7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEA620				43.0			
	1104		3'-0"		7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEV1620				33.0		RS-15	
	1107		3'-0"	3'-6"	7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEA620				37.0	45	RS-15	
	1109	A	3'-0"	3'-6"	7'-0"	1 3/4"	F	WD	A2	HM	SEA620	SEV1620		40		20.0		RE-15, 22	
	1109	B	3'-0"	3'-6"	7'-0"	1 3/4"	F	WD	A2	HM	SEA620	SEV1620		40		19.0		RE-15, 22	
	1109	C	12'-0"		4'-0"				B3C	HM	6DW620	SDV1620		45	LS-3			RE-23, 35	
	1110		3'-0"		7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEA620		40		40.0		RE-15, 22	
	1111		3'-0"	3'-6"	7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEV1620				39.0		RS-15	
	1112	A	3'-0"	3'-6"	7'-0"	1 3/4"	F	WD	A2	HM	SEA620	SEV1620		40		19.0		RE-15, RE-22	
	1112	B	3'-0"	3'-6"	7'-0"	1 3/4"	F	WD	A2	HM	SEA620	SEV1620		40		19.0		RE-15, RE-22	
	1113		3'-0"		7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEV1620				37.0	45	RS-15	
	1114		3'-0"		7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEV1620				37.0	45	RS-15	
	1115	A	3'-0"		7'-0"	1 3/4"	F	WD	ATIA	HM	SEA620	SEV1620			TS	25.0		RE-5	
	1115	B	3'-0"	3'-6"	7'-0"	1 3/4"	F	WD	ATIA	HM	SEA620	SEV1620			TS	25.0		RE-5	
	1116	A	3'-0"		7'-0"	2"	WSR	AL	SF09	AL					IG	6.0		RE-7, 8, 28, 28	
	1116	B	3'-0"		7'-0"	2"	WSR	AL	SF11	AL					IG	6.0		RE-7, 8, 28, 28	
	1117	A	3'-0"		7'-0"	2"	WSR	AL	SF14	AL					IG	6.0		RE-7, 8, 28, 28	
	1117	B	3'-0"		7'-0"	2"	WSR	AL	SF13	AL					IG	6.0		RE-7, 8, 28, 28	

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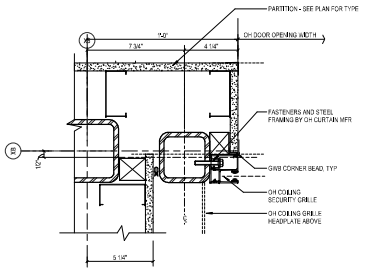
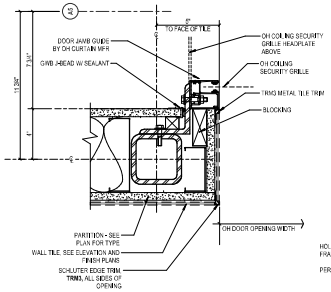
DOOR AND FRAME SCHEDULE

REFER TO FINISH PLANS AND A605 FOR THRESHOLD TRANSITION DETAILS. U.N.O.

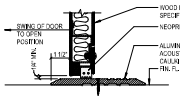
Bldg	Room No.	Oprg	DOOR OPENING SIZE Width A	Width B	Height	Thk	Type	Material	FRAME Frame Type	Material	DETAIL Jamb	Head	Sill	STC	Glazing	Hardware Set	Fire Rating (Mins)	Comments	Rev No.
	1118	A	3'-0"	3'-6"	7'-0"	1 3/4"	F	WD	A2	HM	SEA620	SEA620		40		23.0		RE-16, 22	
	1118	B	3'-0"	3'-6"	7'-0"	1 3/4"	F	WD	A2	HM	SEA620	SEV1620		40		21.0		RE-16, 22	
	1118	C	12'-0"		4'-0"				BSC	HM	6DW620	SDV1620		45	LS-3			RE-23, 35	
	1119		3'-0"		7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEA620		40		40.0		RE-16, 22	
	1120		3'-0"	3'-6"	7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEV1620				31.0		RS-15	
	1122		3'-0"		7'-0"	1 3/4"	F	WD	AF1A	HM	SE & SDW620	SE & SDA620		40, 45	LS-3	40.0		RE-16, 22 SIDELITE RE-23	
	1123		3'-0"		7'-0"	1 3/4"	F	WD	A	HM	SEA620	SEA620				39.0		RE-15	
	1124	A	3'-0"	3'-6"	7'-0"	1 3/4"	F	WD	AT1	HM	SEA620	SEV1620			TS	25.0		RE-5	
	1124	B	3'-0"	3'-6"	7'-0"	1 3/4"	F	WD	AT1	HM	SEA620	SEA620			TS	23.0		RE-5	
	1125	A	3'-0"	3'-6"	7'-0"	1 3/4"	F	WD	A2	HM	SEA620	SEV1620		40		23.0		RE-16, 22	
	1125	B	3'-0"	3'-6"	7'-0"	1 3/4"	F	WD	A2	HM	SEA620	SEA620		40		28.0		RE-16, 22	
	1126	A	3'-0"	3'-6"	7'-0"	1 3/4"	F	WD	A2	HM	SEA620	SEV1620		40		20.0		RE-16, 22	
	1126	B	3'-0"	3'-6"	7'-0"	1 3/4"	F	WD	A2	HM	SEA620	SEV1620		40		28.0		RE-16, 22	
	1128	A	3'-0"	3'-6"	7'-0"	1 3/4"	F	WD	A2	HM	SEA620	SEA620		40		23.0		RE-16, 22	
	1128	B	3'-0"	3'-6"	7'-0"	1 3/4"	F	WD	A2	HM	SEA620	SEV1620		40		23.0		RE-16, 22	
	1129	A	3'-0"	3'-6"	7'-0"	1 3/4"	F	WD	A2	HM	3DA620	3DV1620		40		23.0		RE-16, 22	
	1129	B	3'-0"	3'-6"	7'-0"	1 3/4"	F	WD	A2	HM	SEA620	SEA620		40		23.0		RE-16, 22	
	ST-1	A	3'-0"	3'-6"	7'-0"	1 3/4"	F	HM	A2	HM	SEA620	SEV1620				24.0	90	RE-15, 18	
	ST-1	B	3'-0"	3'-6"	7'-0"	2"	WSR	AL	SF25	AL					RIG	5.0		RE-7, 8, 28, 29	
	ST-1	A	3'-0"	3'-6"	7'-0"	1 3/4"	F	HM	A	HM	2SA620	2EV1620				27.0	90	RE-15	
	ST-1	B	3'-0"	3'-6"	7'-0"	1 3/4"	F	HM	A2	HM	6SA622	5DA622	5CA620			8.0		RE-7, 8, 9	
2/- SECOND FLOOR																			
	2000	A	3'-0"	3'-6"	7'-0"	2"	WSR	AL	SF20	AL					RIG	5.0		RE-7, 8, 28, 29	
	2000	B	3'-0"	3'-6"	7'-0"	2"	WSR	AL	SF20	AL					BA	5.0		RE-7, 8, 28, 29	
	2000	C	3'-0"	3'-6"	7'-0"	2"	WSR	AL	BF01	AL					RIG	15.0		RE-7, 8, 28, 29	
	2000	D	3'-0"	3'-6"	7'-0"	2"	WSR	AL	BF01	AL					RIG	15.0		RE-7, 8, 28, 29	
	2002		3'-0"		7'-0"	1 3/4"	F	WD	AF1A	HM	SE & SDW620	SE & SDA620		30, 40	LS-2	38.0		RE-16, 21 SIDELITE RE-22	
	2003	A	3'-0"		7'-0"	1 3/4"	F	WD	AF1A	HM	SE & SDW620	SE & SDA620		30, 40	LS-2	38.0		RE-16, 21 SIDELITE RE-22	
	2003	B	6'-0"		4'-0"				BSC	HM	6DW620	SDV1620		40	LS-2			RE-22, 35	
	2005	A	3'-0"		7'-0"	1 3/4"	F	WD	AF1A	HM	SE & SDW620	SE & SDA620		30, 40	LS-2	43.0		RE-16, 21 SIDELITE RE-22	
	2005	B	6'-0"		4'-0"				BSB	HM	6DW620	SDV1620		40	LS-2			RE-22, 35	
	2006	A	3'-0"		7'-0"	1 3/4"	F	WD	AF1A	HM	SE & SDW620	SE & SDA620		30, 40	LS-2	38.0		RE-16, 21 SIDELITE RE-22	
	2006	B	6'-0"		7'-0"				BSB	HM	9DW620	SDV1620		40	LS-2			RE-22, 35	
	2007	A	3'-0"		7'-0"	1 3/4"	F	WD	AF1B	HM	SE & SDW620	SE & SDA620		30, 40	LS-2	43.0		RE-16, 21 SIDELITE RE-22	
	2007	B	3'-0"		7'-0"	1 3/4"	F	WD	A	HM	3SA620	SEV1614		40		38.0		RE-16, 22	
	2008	A	3'-0"		7'-0"	1 3/4"	F	WD	AF1A	HM	SE & SDW620	SE & SDA620			TS	38.0			
	2008	B	3'-0"		7'-0"	1 3/4"	F	WD	AF1A	HM	SE & SDW620	SE & SDA620			TS	38.0			
	2009	A	3'-0"		7'-0"	1 3/4"	F	WD	AF1B	HM	SE & SDW620	SE & SDA620		30, 40	LS-2	40.0		RE-16, 21 SIDELITE RE-22	
	2010	A	3'-0"		7'-0"	1 3/4"	F	WD	AF1A	HM	SE & SDW620	SE & SDA620		30, 40	LS-2	40.0		RE-16, 21 SIDELITE RE-22	
	2010	B	6'-0"		2'-6"				BSB	HM	9DW620	SDV1622		40	LS-2			RE-22, 35	
	2011	A	3'-0"		7'-0"	1 3/4"	F	WD	AF1A	HM	SE & SDW620	SE & SDA620		30, 40	LS-2	38.0		RE-16, 21 SIDELITE RE-22	
	2011	B	6'-0"		2'-6"				BSB	HM	9DW620	SDV1622		40	LS-2			RE-22, 35	
	2013		3'-0"		7'-0"	1 3/4"	F	WD	AF1A	HM	SE & SDW620	SE & SDA620		30, 40	LS-2	43.0		RE-16, 21 SIDELITE RE-22	
	2014	A	3'-0"		7'-0"	1 3/4"	F	WD	AF1A	HM	SE & SDW620	SE & SDA620		30, 40	LS-2	39.0		RE-16, 21 SIDELITE RE-22	
	2014	B	6'-0"		2'-6"



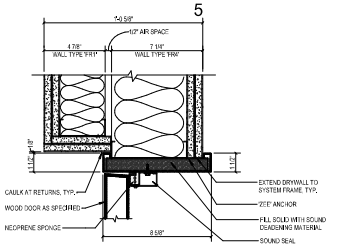
1B O.H. COILING GRILLE JAMB
3" = 1'-0"



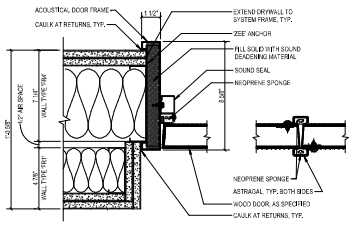
2B O.H. COILING GRILLE JAMB TILE
3" = 1'-0"



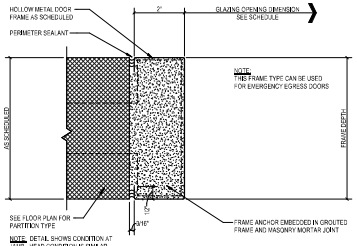
4B SILL @ WOOD DOOR
3" = 1'-0"



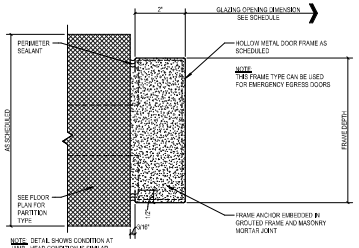
5A HEAD @ WOOD DOOR IN ACOUSTIC WALL
3" = 1'-0"



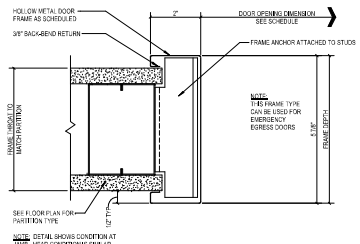
5B JAMB @ WOOD DOOR IN ACOUSTIC WALL
3" = 1'-0"



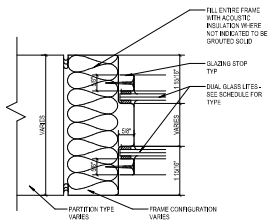
3C TYP HM CASED OPENING JAMB @ MASONRY FLUSH
6" = 1'-0"



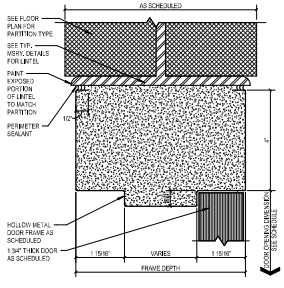
4C TYP HM CASED OPENING JAMB @ MASONRY BUTTED
6" = 1'-0"



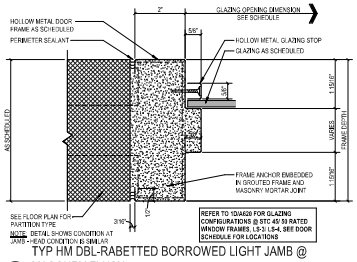
5C TYP HM CASED OPENING JAMB @ GWB WRAPPED
6" = 1'-0"



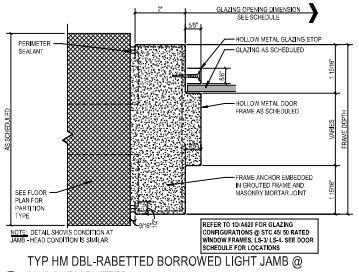
1D GLAZING CONFIGURATION @ STC 45 WINDOWS
6" = 1'-0"



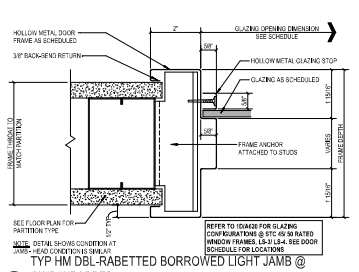
2D TYP HM DBL-RABETTED HEAD @ MASONRY BUTTED
6" = 1'-0"



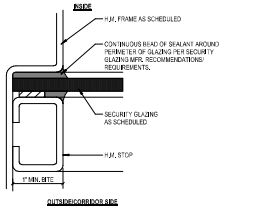
TYP HM DBL-RABETTED BORROWED LIGHT JAMB @ MASONRY FLUSH
6" = 1'-0"



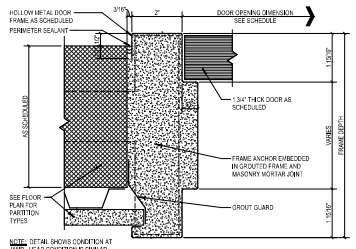
TYP HM DBL-RABETTED BORROWED LIGHT JAMB @ MASONRY BUTTED
6" = 1'-0"



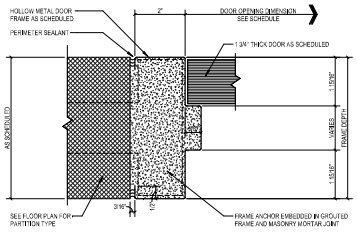
TYP HM DBL-RABETTED BORROWED LIGHT JAMB @ GWB WRAPPED
6" = 1'-0"



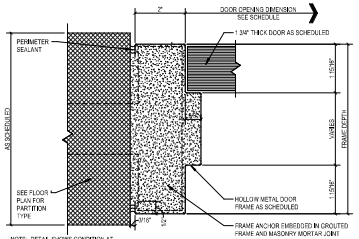
TYPICAL DETAIL @ SECURITY GLAZING AT H.M. FRAMING LOCATIONS
1E 12" = 1'-0"



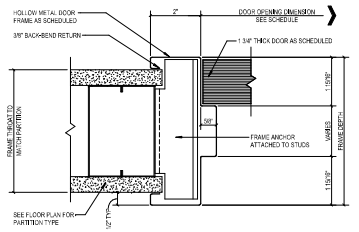
2E TYP HM DBL-RABETTED JAMB @ MSRY W/ GWB WRAPPED
6" = 1'-0"



3E TYP HM DBL-RABETTED JAMB @ MASONRY FLUSH
6" = 1'-0"



4E TYP HM DBL-RABETTED JAMB @ MASONRY BUTTED
6" = 1'-0"



5E TYP HM DBL-RABETTED JAMB @ GWB WRAPPED
6" = 1'-0"

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Glastonbury, CT 06033-4410
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www.slamcoll.com

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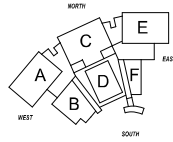
Drawn JZ
Checked JZ

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

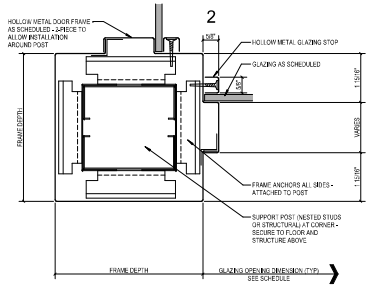
Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

TYPICAL HOLLOW METAL DOOR FRAME DETAILS

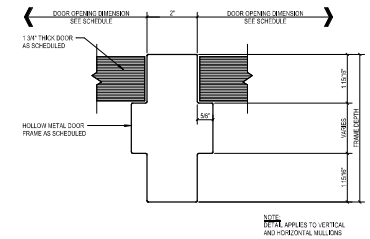
Date 07/08/2024
Scale As indicated
Proj. Number 22367.00
Drawing Number A620

Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_GREENWICH_CENTRAL_MS_R22.rvt

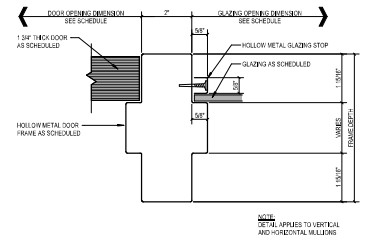
3/5/2024 4:23:51 PM



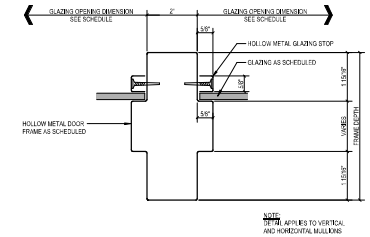
2A TYP HM BORROWED LIGHT JAMB INTERSECTION "L"
6" = 1'-0"



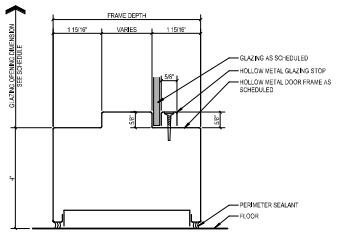
2B TYP HM BORROWED LIGHT MULLION - DOOR TO DOOR
6" = 1'-0"



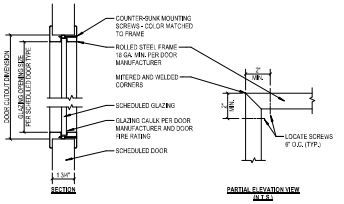
2C TYP HM BORROWED LIGHT MULLION - DOOR TO GLASS
6" = 1'-0"



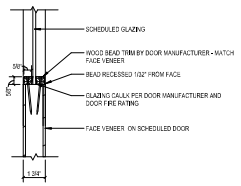
2D TYP HM BORROWED LIGHT MULLION - GLASS TO GLASS
6" = 1'-0"



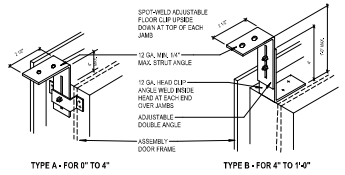
2E TYP HM BORROWED LIGHT MULLION AT FLOOR
6" = 1'-0"

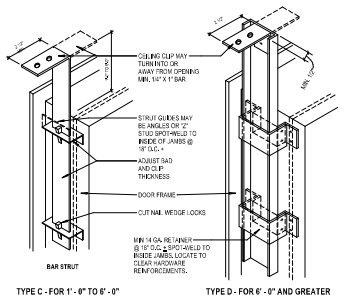


3D TYPICAL VISION LITE FRAME IN H.M. OR WOOD DOOR
3" = 1'-0"



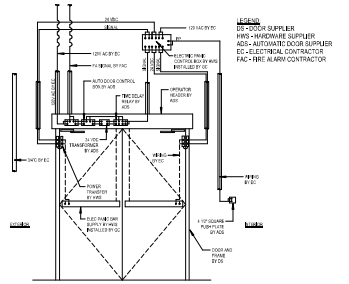
3E TYP VISION LITE FRAME IN WOOD DOOR
3" = 1'-0"



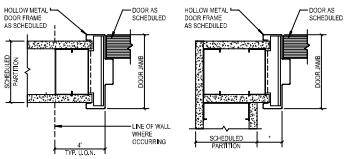


PROVIDE JAMB REINFORCEMENT FOR ALL DOORS 3'-0" IN WIDTH AND LARGER; ALL LEAD LINED, AND ALL HEAVY DOORS.

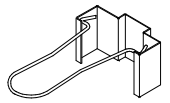
4B TYP JAMB REINFORCEMENT ANCHOR DETAIL
3" = 1'-0"

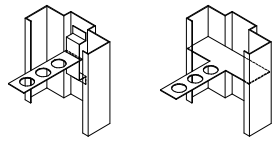


4C TYP DOOR WIRING DIAGRAM
1/2" = 1'-0"

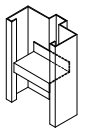


4E TYP HM FRAME RELATIONSHIPS AT STUD PARTITIONS
3" = 1'-0"

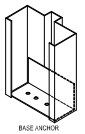




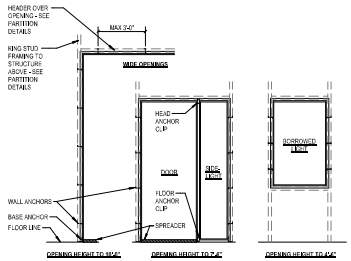
ANCHORS FOR MASONRY PARTITIONS



ANCHORS FOR METAL STUD PARTITIONS



BASE ANCHORS



NOTES:
1) PROVIDE MIN. FOURING ANCHORS FOR OPENINGS TO 7'-6" TALL. PROVIDE MIN. FIVE (5) ANCHORS FOR OPENINGS UP TO 10'-0" TALL. ON BORROWED LITES WITH RAISED ABOVE FLOOR LINE, PROVIDE MIN. THREE (3) ANCHORS PER JAMB. PROVIDE MULLION BASE ANCHORS AT MIDPOINT OF SILL FOR OPENINGS GREATER THAN 7'-6" WIDE.
2) LOCATE WALL ANCHORS INSIDE THE HOLLOW METAL FRAMES, POSITION CLIPS AS FOLLOWS
- ON HINGE JAMB, IMMEDIATELY ABOVE EACH HINGE REINFORCEMENT AND JUST BELOW TOP HINGE REINFORCEMENT.
- ON STRIKE JAMB, DIRECTLY OPPOSITE CLIPS ON HINGE JAMB.
- ON BORROWED LIGHTS, SPACE EVENLY.
3) SECURE THE FRAME TO THE FLOOR WITH TWO (2) FASTENERS THRU THE BASE ANCHOR CLIP ON EACH JAMB WELD FLOOR CLIPS TO JAMBS. PROVIDE SPREADER AT FLOOR LINE ON ALL DOOR FRAMES. PROVIDE HEAD & FLOOR ANCHOR CLIPS AT THE CENTER MULLION OF FRAMES WITH SIDELITES.

5E TYP HM FRAME ANCHORS
3" = 1'-0"

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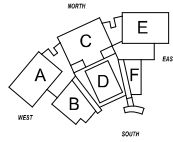
Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

TYPICAL HOLLOW METAL DOOR & FRAME DETAILS

Date 07/08/2024
Scale As indicated
Proj. Number 22367.00
Drawing Number A621

Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_GREENWICH_CENTRAL_MS_R22.rvt
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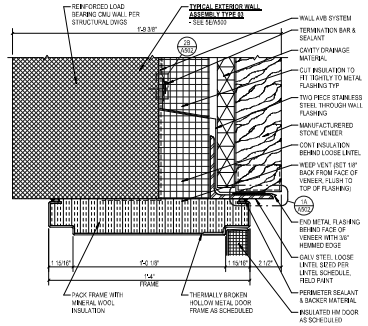
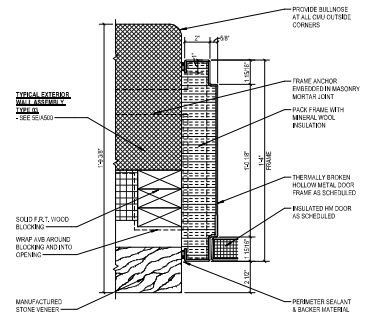


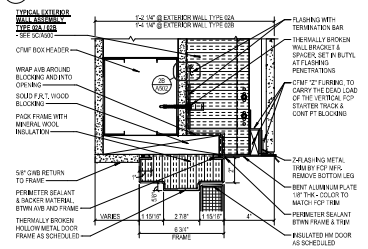
TYPICAL HEAD DETAIL AT EXTERIOR HM FRAME AT STONE VENEER

5B 3" = 1'-0"



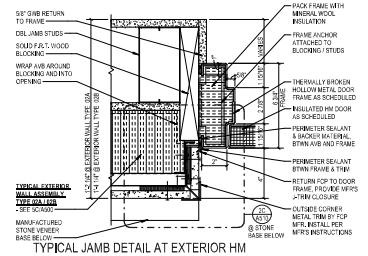
TYPICAL JAMB DETAIL AT EXTERIOR HM FRAME AT STONE VENEER

5C 3" = 1'-0"



TYPICAL HEAD DETAIL AT EXTERIOR HM FRAME AT FCP CLADDING

5D 3" = 1'-0"



TYPICAL JAMB DETAIL AT EXTERIOR HM FRAME AT FCP CLADDING

5E 3" = 1'-0"

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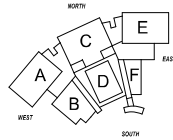

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

TYPICAL HOLLOW METAL DOOR & FRAME DETAILS

Date: 07/08/2024
Scale: 3" = 1'-0"
Proj. Number: 22367.00
Drawing Number: A622

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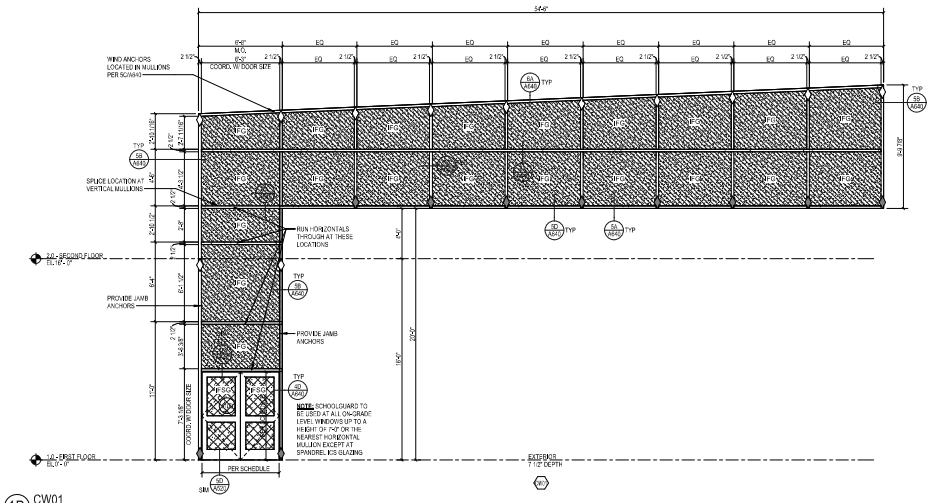
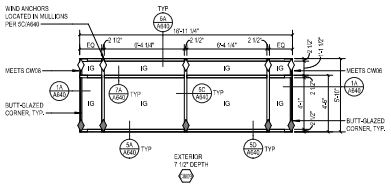
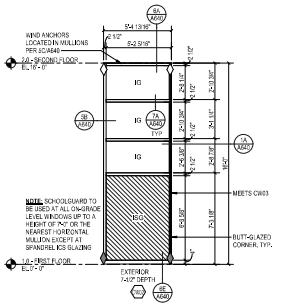


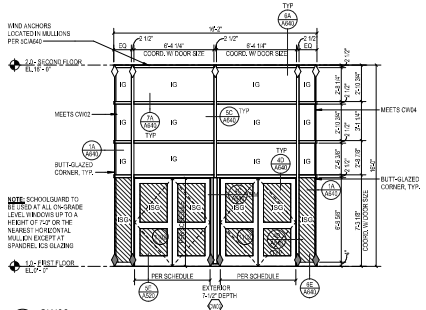
1B CW01
1/4" = 1'-0"



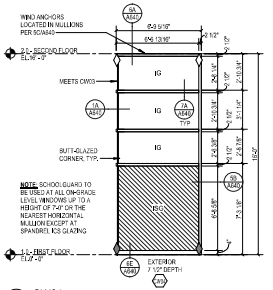
4B CW09
1/4" = 1'-0"



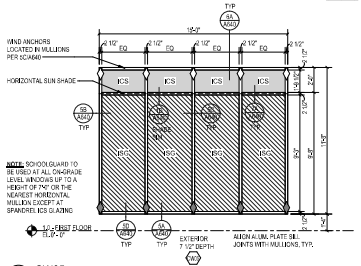
1C CW02
1/4" = 1'-0"



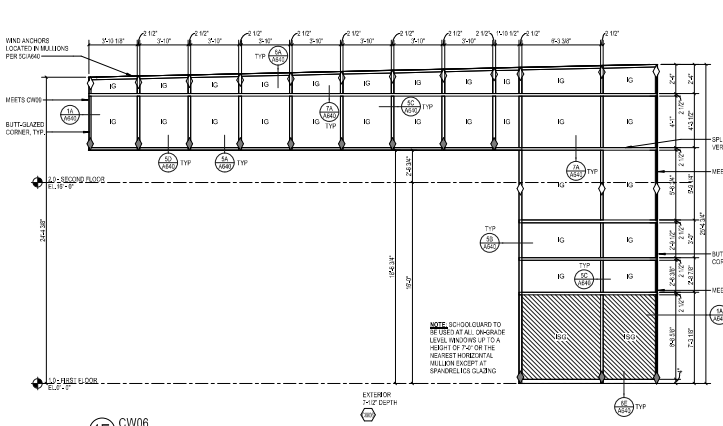
2C CW03
1/4" = 1'-0"



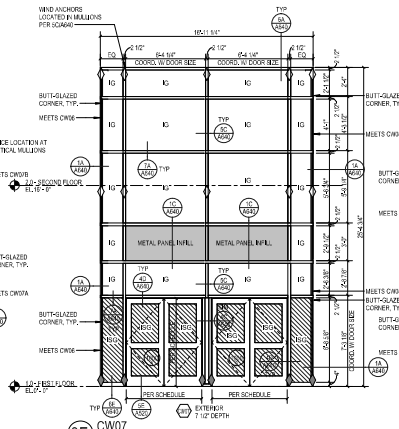
3C CW04
1/4" = 1'-0"



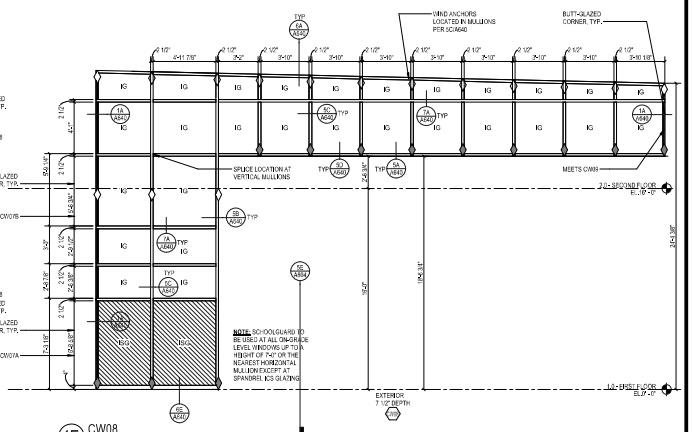
4C CW05
1/4" = 1'-0"



1E CW06
1/4" = 1'-0"



3E CW07
1/4" = 1'-0"



4E CW08
1/4" = 1'-0"

CONTRACTOR NOTE:

ALL FREE CEVENT PANEL DIMENSIONS ARE NOMINAL DIMENSIONS. WITH A TRADITIONAL MILLAGE FOR MUL STANDARDS, CONTRACTOR OW TO COORDINATE ACTUAL DIMENSIONS WITH OVERALL LAYOUT OF REVEALS, MOVEMENT JOINTS AND ORS OF BRICK OPENINGS SHOWN ON A/A5 SERIES PLAN/ELEVATIONS AND "A" SERIES DIMENSION PLANS. CONTRACTOR, OW TO COORDINATE WITH CWF SUBCONTRACTOR. CWF SUBCONTRACTOR AND FIBER CEMENT PANEL SUB-CONTRACTOR TO ENSURE PROPER NOMINAL DIMENSIONAL LAYOUT.

LEGEND

- CURTAINWALL WINDLOAD ANCHOR
- CURTAINWALL DEADLOAD ANCHOR
- IG-1 GLASS TYPE - SEE A610

GENERAL NOTES

1. OVERALL FRAME DIMENSIONS ARE NOMINAL FRAME DIMENSIONS. COORDINATE ACTUAL FRAME DIMENSIONS - THEY MUST BE CALCULATED BASED ON ROUGH OPENING/MASONRY OPENING SIZES AND PERIMETER SEALANT/SHIM SIZES SHOWN IN TYPICAL ALUMINUM FRAME DETAILS. COORDINATE ALSO WITH ALUMINUM PLATE TRIM PROFILES WHERE OCCURRING.
2. FRAME DEPTH DIMENSIONS PROVIDED ARE BASIS OF DESIGN. DELEGATED DESIGN ENGINEER RESPONSIBLE FOR ANY STEEL REINFORCEMENT OR HEAVY-WALL FRAMES NEEDED TO MEET WINDLOADING CRITERIA. FRAME DEPTHS ARE NOT TO BE INCREASED WITHOUT SPECIFIC PERMISSION BY ARCHITECT.
3. ALL FRAMES DEADLOAD IN BUILDING STRUCTURE (FOUNDATION, SLAB, STEEL FRAMING, CFMF STUD FRAMING, ETC.) UNLESS OTHERWISE NOTED.
4. REFER TO SHEET A640 FOR TYPICAL ALUMINUM FRAME DETAILS. REFER TO WALL SECTIONS, PLAN DETAILS, ENLARGED SECTION DETAILS REFERENCED ELSEWHERE IN THIS PROJECT FOR SPECIFIC WINDOW / WALL ARRANGEMENT.
5. REFER TO DETAIL A640 FOR VERTICAL CURTAINWALL MULLION NOTCH AT HEAD AND SILL HORIZONTAL CURTAINWALL MULLIONS TO FACILITATE THE ANB TRANSITION INTO GLAZING POCKET. TYPICAL WHERE VERTICAL CURTAINWALL MULLIONS INTERSECT HEAD AND SILL HORIZONTAL MULLIONS.
6. ALIGN ALUM. PLATE SILL JOINTS WITH VERTICAL MULLIONS, TYP.

GLAZING GRAPHIC LEGEND (EXT.)

- ICS - INSULATED COATED SPANDREL GLAZING PROVIDE FIBERGLASS BATT MINERAL WOOL INSULATION AT ALL SPANDREL GLAZING)
- IG - INSULATED CLEAR GLAZING
- INSULATED SECURITY GLAZING (SCHOOL GUARD)
- INSULATED FROSTED GLAZING
- INSULATED TEMPERED SAFETY GLASS
- INSULATED BALLISTIC LEVEL 3 GLAZING
- INSULATED FROSTED SAFETY GLASS
- INSULATED LAMINATED GLAZING

REFER TO A610 FOR OTHER GLAZING TYPES

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Greenwich Public Schools

Greenwich Central Middle School

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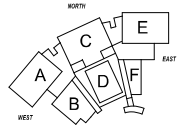
STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ALUMINUM FRAME ELEVATIONS - CURTAIN WALLS

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A630

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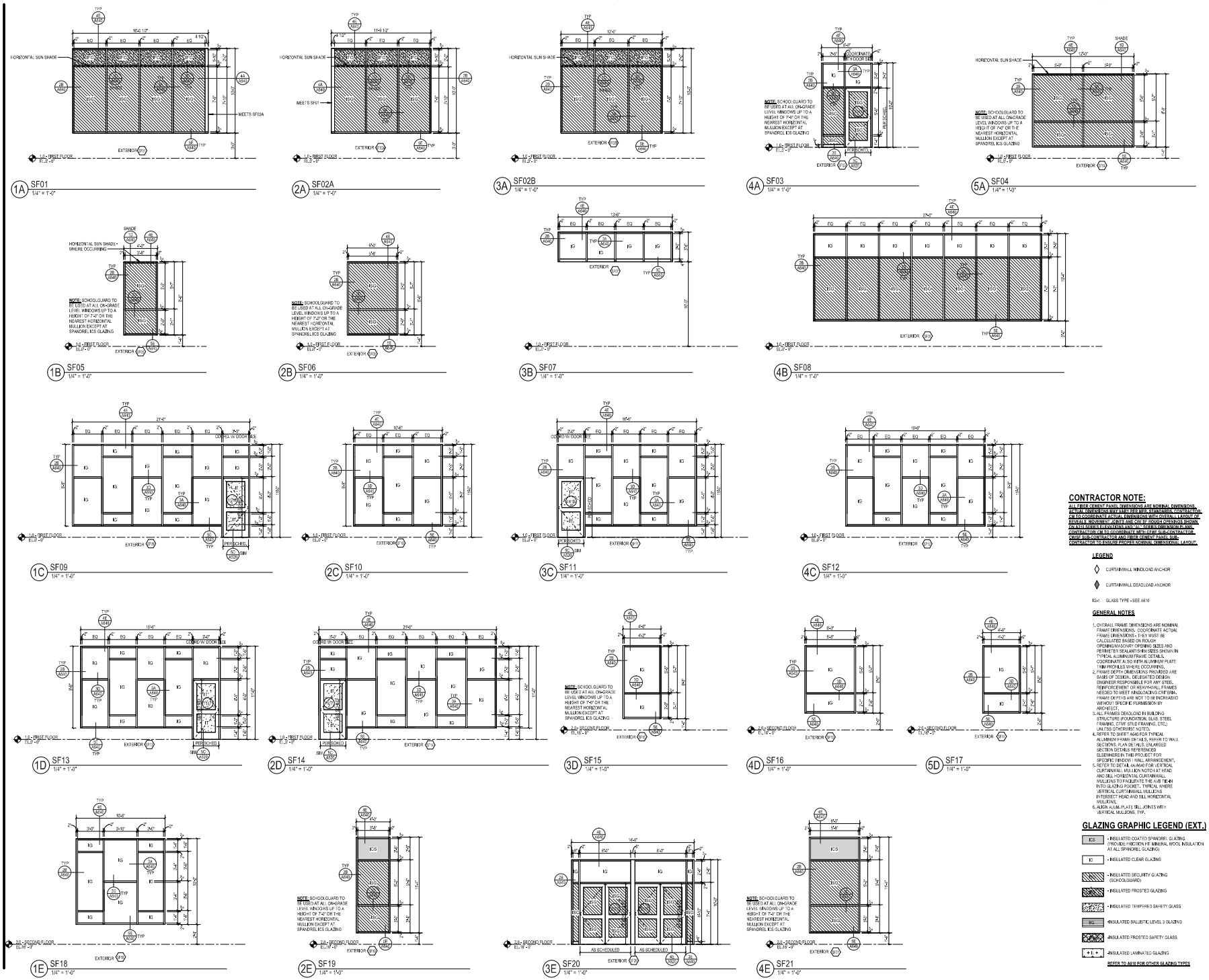

CONTRACTOR NOTE:

ALL FIBER CEMENT PANEL DIMENSIONS ARE NOMINAL DIMENSIONS. ACTUAL DIMENSIONS MAY VARY PER MFR STANDARDS. CONTRACTOR SHALL COORDINATE ACTUAL DIMENSIONS WITH OVERALL LAYOUT OF REVEALS, EQUIPMENT, JOINTS AND CUT OF BOARDS AS SHOWN. AS ANY VARIETY OF OPTIONS AND VARIATIONS IN PANEL CONFIGURATION ARE POSSIBLE, CONTRACTOR IS TO COORDINATE WITH FIRST SUB-CONTRACTOR. CURTAIN WALL SUB-CONTRACTOR AND FIBER CEMENT PANEL SUB-CONTRACTOR TO ENSURE PROPER NOMINAL DIMENSIONAL LAYOUT.

LEGEND

- CURTAINWALL WINDLOAD ANCHOR
- CURTAINWALL DEADLOAD ANCHOR
- IG-1 GLASS TYPE - SEE A610

GENERAL NOTES

1. OVERALL FRAME DIMENSIONS ARE NOMINAL FRAME DIMENSIONS. COORDINATE ACTUAL FRAME DIMENSIONS - THEY MUST BE CALCULATED BASED ON ROUGH OPENING/MASONRY OPENING SIZES AND PERIMETER SEALANT/GAPS SIDES SHOWN IN TYPICAL ALUMINUM FRAME DETAILS. COORDINATE ALSO WITH ALUMINUM PLATE TRIM PROFILES WHERE OCCURRING.
2. FRAME DEPTH DIMENSIONS PROVIDED ARE BASIS OF DESIGN. DELEGATED DESIGN ENGINEER RESPONSIBLE FOR ANY STEEL REINFORCEMENT OR HEAVY-WALL FRAMES NEEDED TO MEET WINDLOADING CRITERIA. FRAME DEPTHS ARE NOT TO BE INCREASED WITHOUT SPECIFIC PERMISSION BY ARCHITECT.
3. ALL FRAMES DEADLOAD IN BUILDING STRUCTURE (FOUNDATION, SLAB, STEEL FRAMING, CFMF STUD FRAMING, ETC.) UNLESS OTHERWISE NOTED.
4. REFER TO SHEET A640 FOR TYPICAL ALUMINUM FRAME DETAILS. REFER TO WALL SECTIONS, PLAN DETAILS, ENLARGED SECTION DETAILS REFERENCED ELSEWHERE IN THIS PROJECT FOR SPECIFIC WINDOW / WALL ARRANGEMENT.
5. REFER TO DETAIL 4A/A640 FOR VERTICAL CURTAINWALL MULLION NOTCH AT HEAD AND SILL HORIZONTAL CURTAINWALL MULLIONS TO FACILITATE THE AUTOCLAVE INTO GLAZING POCKET. TYPICAL WHERE VERTICAL CURTAINWALL MULLIONS INTERSECT HEAD AND SILL HORIZONTAL MULLIONS.
6. ALIGN ALUM. PLATE SILL JOINTS WITH VERTICAL MULLIONS, TYP.

GLAZING GRAPHIC LEGEND (EXT.)

- ICS - INSULATED COATED SPANDREL GLAZING (PROVIDE FRICTION FIT MINERAL WOOL INSULATION AT ALL SPANDREL GLAZING)
- IG - INSULATED CLEAR GLAZING
- INSULATED SECURITY GLAZING (SCHOOLGUARD)
- INSULATED FROSTED GLAZING
- INSULATED TEMPERED SAFETY GLASS
- INSULATED BALLISTIC LEVEL 3 GLAZING
- INSULATED FROSTED SAFETY GLASS
- INSULATED LAMINATED GLAZING

REFER TO A610 FOR OTHER GLAZING TYPES

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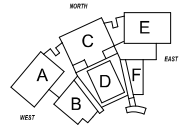

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ALUMINUM FRAME ELEVATIONS - STOREFRONTS

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A631

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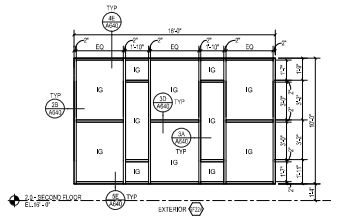
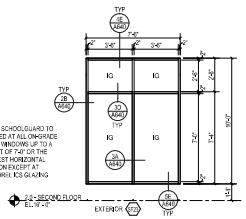
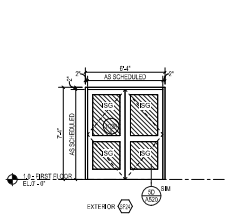


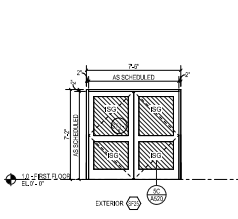
1A SF22A, SF22B
1/4" = 1'-0"
NOTE: SF22B TO HAVE LAMINATE GLAZING



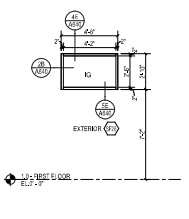
2A SF23
1/4" = 1'-0"



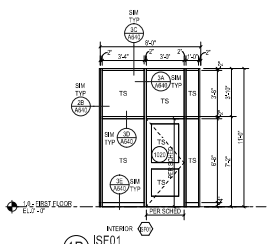
3A SF24
1/4" = 1'-0"



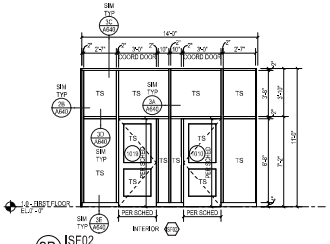
4A SF25
1/4" = 1'-0"



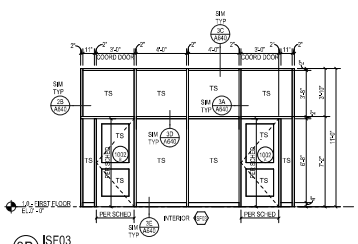
5A SF26
1/4" = 1'-0"



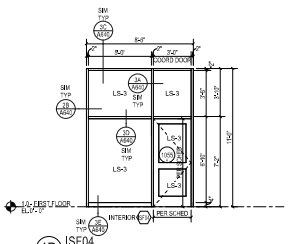
1B ISF01
1/4" = 1'-0"



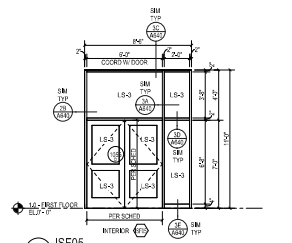
2B ISF02
1/4" = 1'-0"



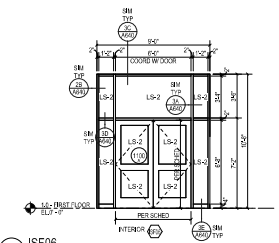
3B ISF03
1/4" = 1'-0"



4B ISF04
1/4" = 1'-0"



1C ISF05
1/4" = 1'-0"



2C ISF06
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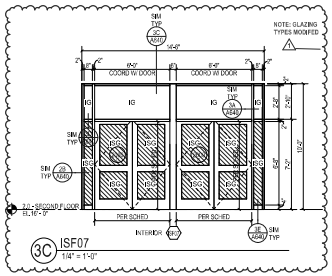

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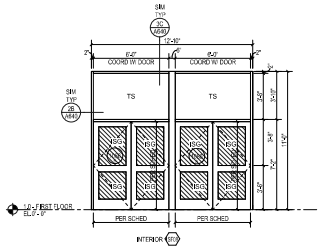
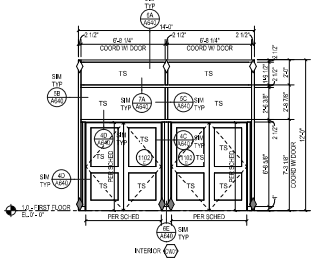
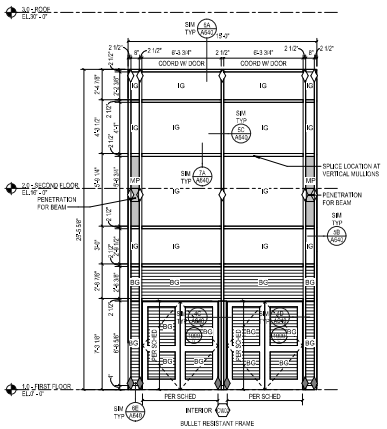


1E ISF08
1/4" = 1'-0"



2E ICW01
1/4" = 1'-0"



3E ICW02
1/4" = 1'-0"

LEGEND

- CURTAINWALL WINDLOAD ANCHOR
- CURTAINWALL DEADLOAD ANCHOR
- IG-1 GLASS TYPE - SEE A610

GENERAL NOTES

1. OVERALL FRAME DIMENSIONS ARE NOMINAL FRAME DIMENSIONS. COORDINATE ACTUAL FRAME DIMENSIONS - THEY MUST BE CALCULATED BASED ON ROUGH OPENING/MASONRY OPENING SIZES AND PERIMETER SEALANT/SHIM SIZES SHOWN IN TYPICAL ALUMINUM FRAME DETAILS. COORDINATE ALSO WITH ALUMINUM PLATE TRIM PROFILES WHERE OCCURRING.
2. FRAME DEPTH DIMENSIONS PROVIDED ARE BASIS OF DESIGN. DELEGATED DESIGN ENGINEER RESPONSIBLE FOR ANY STEEL REINFORCEMENT OR HEAVY-WALL FRAMES NEEDED TO MEET WIND LOADING CRITERIA. FRAME DEPTHS ARE NOT TO BE INCREASED WITHOUT SPECIFIC PERMISSION BY ARCHITECT.
3. ALL FRAMES DEADLOAD IN BUILDING STRUCTURE (FOUNDATION, SLAB, STEEL FRAMING, CFMF STUD FRAMING, ETC.) UNLESS OTHERWISE NOTED.
4. REFER TO SHEET A640 FOR TYPICAL ALUMINUM FRAME DETAILS. REFER TO WALL SECTIONS, PLAN DETAILS, ENLARGED SECTION DETAILS REFERENCED ELSEWHERE IN THIS PROJECT FOR SPECIFIC WINDOW / WALL ARRANGEMENT.
5. REFER TO DETAIL 6A/A640 FOR VERTICAL CURTAINWALL MULLION NOTCH AT HEAD AND SILL HORIZONTAL CURTAINWALL MULLIONS TO FACILITATE THE AVB TRAIN INTO GLAZING POCKET, TYPICAL WHERE VERTICAL CURTAINWALL MULLIONS INTERSECT HEAD AND SILL HORIZONTAL MULLIONS.
6. ALIGN ALUM. PLATE SILL JOINTS WITH VERTICAL MULLIONS, TYP.

GLAZING GRAPHIC LEGEND (EXT.)

- ICG - INSULATED COATED SPANDREL GLAZING (PROVIDE FRICTION FIT MINERAL WOOL INSULATION AT ALL SPANDREL GLAZING)
- IG - INSULATED CLEAR GLAZING
- INSULATED SECURITY GLAZING (SCHOOLGUARD)
- INSULATED FROSTED GLAZING
- INSULATED TEMPERED SAFETY GLASS
- INSULATED BALLISTIC LEVEL 3 GLAZING
- INSULATED FROSTED SAFETY GLASS
- INSULATED LAMINATED GLAZING

REFER TO A615 FOR OTHER GLAZING TYPES

CONTRACTOR NOTE:

ALL FIBER CEMENT PANEL DIMENSIONS ARE NOMINAL DIMENSIONS. ACTUAL DIMENSIONS MAY VARY PER MFR. STANDARDS. CONTRACTOR TO FIELD COORDINATE ACTUAL DIMENSIONS WITH OVERALL LAYOUT OF REVEALS, MOVEMENT JOINTS AND CAN BE ADJUSTED AS SHOWN IN A610 SERIES ELEVATIONS AND "AL" SERIES DIMENSION PLANS. COORDINATE W/ TO COORDINATE W/ RECENT SUBCONTRACTOR JOINT SUBCONTRACTOR AND OTHER CEMENT PANEL SUBCONTRACTOR TO ENSURE PROPER NOMINAL DIMENSIONAL LAYOUT.

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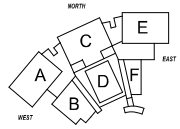
Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane,
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
1	10/30/2024	ADDENDUM NO. 4
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ALUMINUM FRAME ELEVATIONS - CURTAIN WALLS AND STOREFRONTS

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A632

Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_GREENWICH_CENTRAL_MS_R22.rvt
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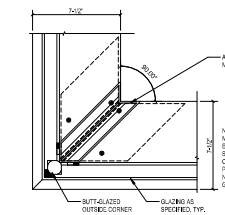
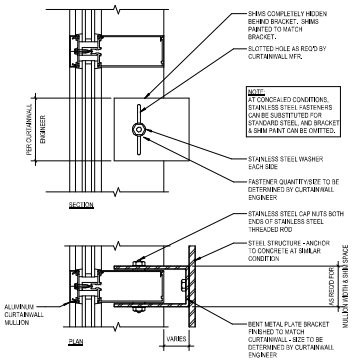
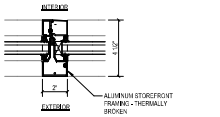


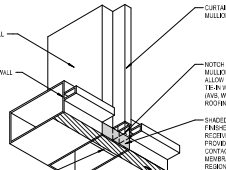
1A CW BUTT-GLAZED CORNER DETAIL - 90 DEGREES
3" = 1'-0"



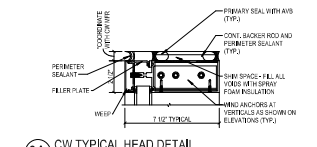
2A TYPICAL CURTAINWALL WINDLOAD ANCHOR
3" = 1'-0"



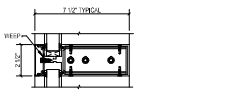
3A STOREFRONT TYPICAL VERTICAL MULLION
3" = 1'-0"



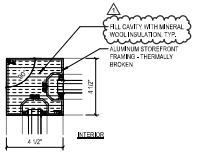
5A TYPICAL CURTAINWALL SILL JOINERY (HEAD SIM)
3" = 1'-0"



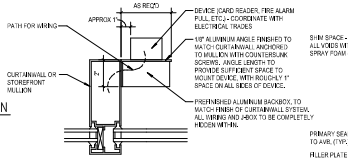
6A CW TYPICAL HEAD DETAIL
3" = 1'-0"



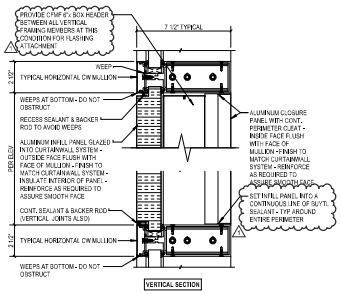
7A CW TYPICAL HORIZONTAL MULLION DETAIL
3" = 1'-0"



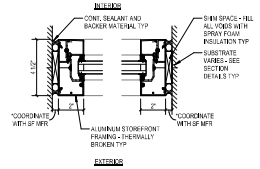
4A STOREFRONT 90 DEGREE OUTSIDE CORNER MULLION
3" = 1'-0"



5B CW TYPICAL JAMB DETAIL
3" = 1'-0"



1C CW TYPICAL METAL INFILL PANEL DETAIL
3" = 1'-0"



2B STOREFRONT TYPICAL JAMB
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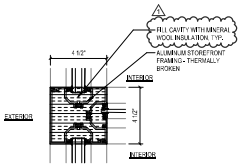
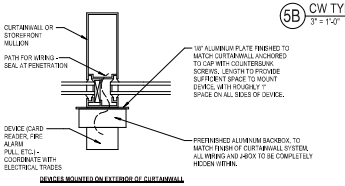
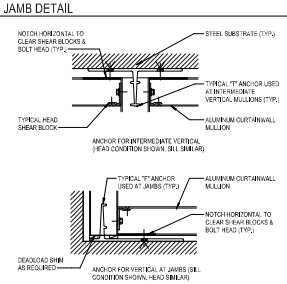


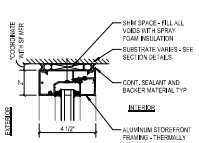
3B STOREFRONT 90 DEGREE CORNER 3-WAY
3" = 1'-0"



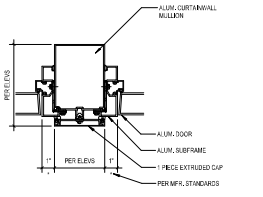
4B TYPICAL CURTAINWALL MULLION WITH DEVICE
3" = 1'-0"



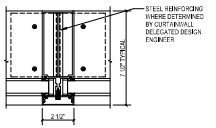
6C TYP WIND ANCHOR IN MULLION DETAIL
3" = 1'-0"



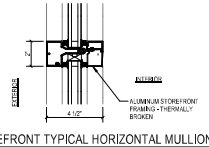
3C STOREFRONT TYPICAL HEAD
3" = 1'-0"



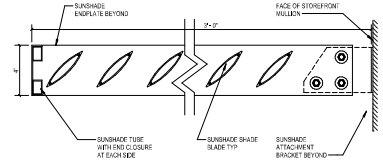
4C TYPICAL CURTAINWALL MULLION BTWN DOORS
3" = 1'-0"



5C CW TYPICAL VERTICAL MULLION DETAIL
3" = 1'-0"



3D STOREFRONT TYPICAL HORIZONTAL MULLION
3" = 1'-0"



1D STOREFRONT HORIZONTAL SUNSHADE
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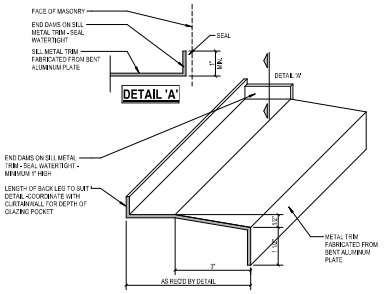
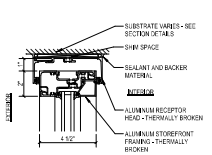
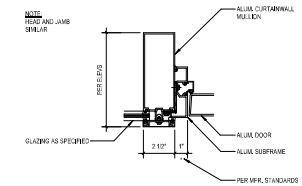


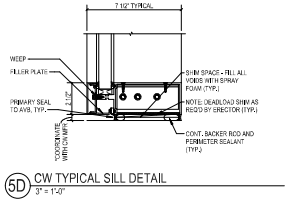
2D TYPICAL SILL METAL TRIM DETAIL - MASONRY
6" = 1'-0"



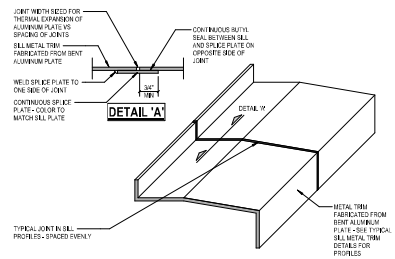
4E TYPICAL STOREFRONT RECEPTOR HEAD
3" = 1'-0" NOTE TYP. AT ALL SECOND FLOOR STOREFRONTS



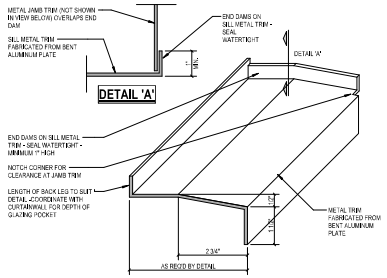
4D TYPICAL CURTAINWALL MULLION @ DOOR
3" = 1'-0"



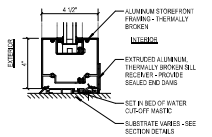
5D CW TYPICAL SILL DETAIL
3" = 1'-0"



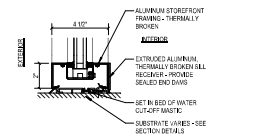
1E TYPICAL SILL METAL TRIM JOINT DETAIL
6" = 1'-0"



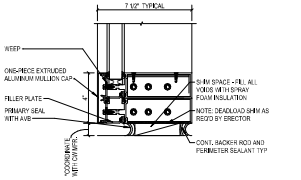
2E TYPICAL SILL METAL TRIM DETAIL - FORMED METAL PANEL SYSTEM
6" = 1'-0"



3E TYPICAL STOREFRONT EXTERIOR SILL - 4" HEIGHT
3" = 1'-0"



5E TYPICAL STOREFRONT EXTERIOR SILL - 2" HEIGHT
3" = 1'-0"



6E CW TYPICAL SILL DETAIL - 4" HEIGHT
3" = 1'-0"

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Greenwich Public Schools

Greenwich Central Middle School

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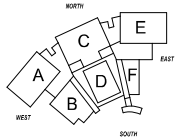
STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
1	10/30/2024	ADDENDUM NO. 4
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

TYPICAL ALUMINUM FRAME DETAILS

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A640

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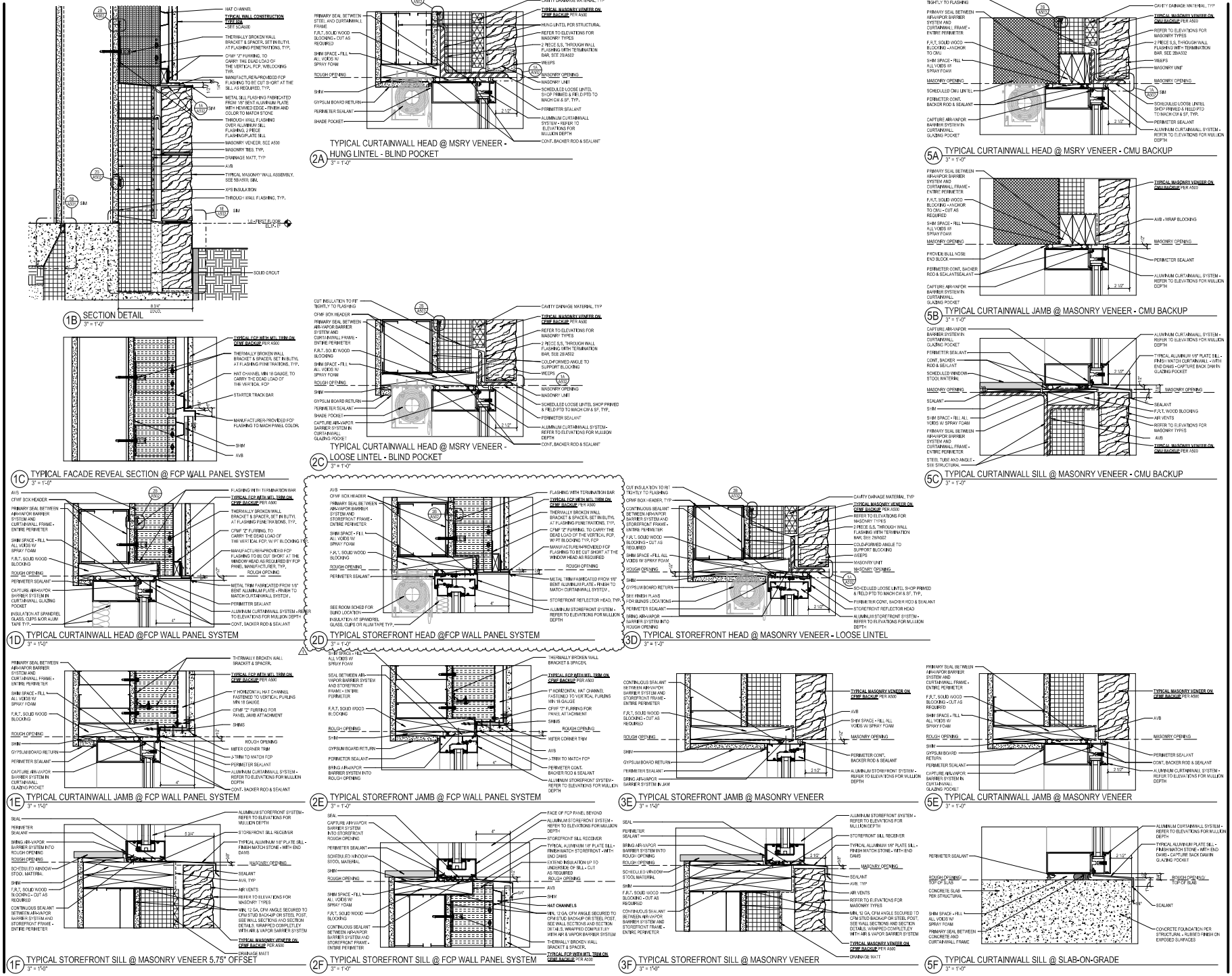

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Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N

NORTH
EAST
SOUTH
WEST

KEYPLAN

Number	Date	Issued For
1	10/10/2024	ADDENDUM NO. 1
	09/20/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ALUMINUM FRAME WINDOW DETAILS

Date: 07/08/2024
Scale: 3" = 1'-0"
Proj. Number: 22367.00
Drawing Number: A641

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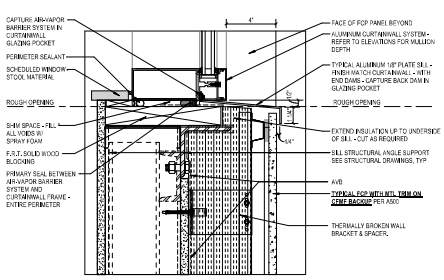
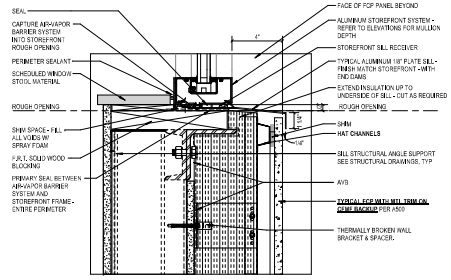
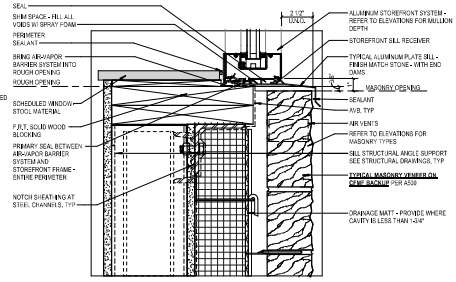


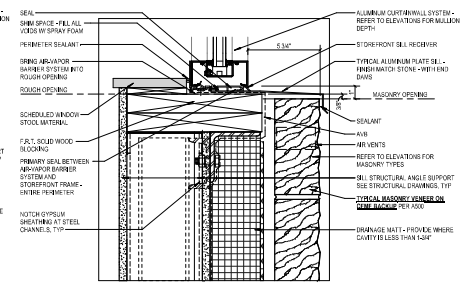
1A TYPICAL CURTAINWALL SILL @ FCP WALL PANEL SYSTEM - STL. ANGLE
3" = 1'-0"



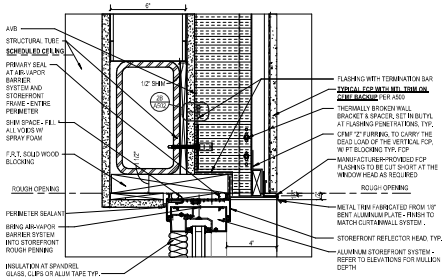
2A TYPICAL STOREFRONT SILL @ FCP WALL PANEL SYSTEM STL ANGLE
3" = 1'-0"



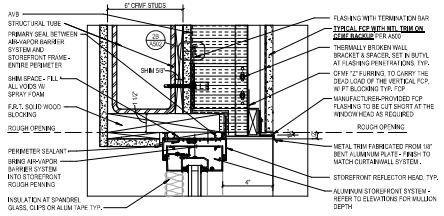
3A TYPICAL STOREFRONT SILL @ MASONRY VENEER STL ANGLE
3" = 1'-0"



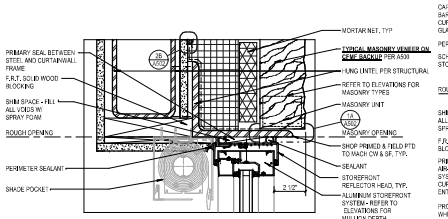
5A TYPICAL CURTAINWALL SILL @ MASONRY VENEER STL ANGLE
3" = 1'-0"



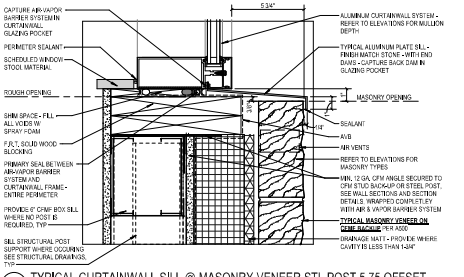
1B TYPICAL STOREFRONT HEAD @FCP WALL PANEL SYSTEM WIDE STL TUBE
3" = 1'-0"



2B TYPICAL STOREFRONT HEAD @FCP WALL PANEL SYSTEM STL TUBE
3" = 1'-0"



3B TYPICAL STOREFRONT HEAD @ MSRY VENEER - HUNG LINTEL
3" = 1'-0"



5B TYPICAL CURTAINWALL SILL @ MASONRY VENEER STL POST 5.75 OFFSET
3" = 1'-0"

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Drawn: MG
Checked: JZ

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

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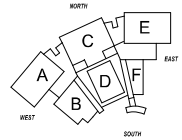

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ALUMINUM FRAME SECTION DETAILS

Date: 07/08/2024
Scale: 3" = 1'-0"
Proj. Number: 22367.00
Drawing Number: A642

Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_GREENWICH_CENTRAL_MS_R23.rvt
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CONTRACTOR NOTE:
WHERE WALL MOUNTED ELECTRICAL/AV/IT/SECURITY/LIFE SAFETY DEVICES ARE LOCATED AT DIFFERENT ELEVATIONS, BUT IN CLOSE PROXIMITY TO ONE ANOTHER, ALIGN THESE DEVICES VERTICALLY ABOUT THEIR CENTERLINE WHERE POSSIBLE - REVIEW WITH ARCHITECT AS NEEDED PRIOR TO FINAL ROUGH-IN - SEE EXAMPLE BELOW

TACKBOARD, MARKERBOARD OR CHALKBOARD (VERIFY SIZES & LOCATIONS WITH DRAWINGS AND / OR SCHEDULES) | WALL-MOUNTED BENCH | ACCESS DOOR | ELEVATION TYPICAL THIS OF ELECTRIC WATER COOLER | SECTION | PHONE | SURFACE MOUNTED PUBLIC TELEPHONE | CARD READER AT DOOR, LATCH SIDE | TYPICAL DEVICE ARRANGEMENT AT TYPICAL ROOM DOOR | EXAMPLE - TYPICAL VERTICAL DEVICE ARRANGEMENT ON WALL | WALL CLOCK | ELEVATOR HALL DEVICES | TYP. ELECTRICAL/DATA OUTLETS | TV JACK, CABLE OUTLET MONITOR OUTLET, CLOCK OUTLET | ELECTRICAL SWITCH, NURSE CALL, CANCEL SWITCH, FIRE ALARM CONTROL/PUSH PLATE, THERMOSTAT/ HUMIDISTAT (ADJUSTABLE TYPE) | THERMOSTAT/ HUMIDISTAT (SENSING TYPE) | EMERGENCY CALL BUTTON WITH PULL CORD | FE | FEC | COMBINATION FIRE EXTINGUISHER/BLANKET CABINET | FIRE ALARM SIGNAL AND PULL STATION - ALIGN UNITS | ELECTRICAL COMMUNICATIONS PANELBOARD

GENERAL

ELECTRICAL

T1 SURFACE MOUNTED PAPER TOWEL DISPENSER (NIC) | T2 SOAP DISPENSER (NIC) | T2A HAND SANITIZER (NIC) | T3 TOILET PAPER DISPENSER (NIC) | T4 FRAMELESS MIRROR UNIT | T5 FRAMELESS MIRROR UNIT | T6 FULL-LENGTH MIRROR | T7 RECESSED-SANITARY NAPKIN DISPOSAL (NIC) T7A | T8 RECESSED SANITARY NAPKIN DISPENSER (NIC) T8A | T9 SURFACE MOUNTED WASTE RECEPTACLE | T10 SEMI-ACCESSED WASTE RECEPTACLE | T10A RECESSED PAPER TOWEL AND WASTE RECEPTACLE | T11 36" GRAB BAR T11A 42" GRAB BAR | T12 24" GRAB BAR T12A 30" GRAB BAR | T13 (42" X 31" (NOM.) L SHAPE SHOWER GRAB BAR | T14 18" GRAB BAR | T15 SINGLE ROBE/CLOTHES HOOK | T16 SHOWER SEAT (FRONT ELEV.) | T17 SHOWER SOAP DISH | T18 SPECIMEN PASS-THRU | T19 SHOWER CURTAIN ROD AND CURTAIN | T20 S.S. SHELF 9" DEEP AT SCRUB SINKS 8" DEEP AT JANITOR CLOSETS 12" DEEP AT OPERATING ROOMS | T21 S.S. UTILITY SHELF WITH MOP/BROOM HOLDERS | T22 RECESSED BABY CHANGING STATION | T23 CHEMICAL DISPENSER

TOILET ACCESSORIES

BIO HAZARD WASTE NEEDLE RECEPTACLE | NARCOTICS LOCKER | LEAD APRON RACK | EMERGENCY EYEWASH SHOWER | TEST TUBE DRYING RACK | GOGGLE CABINET

SPECIALTY EQUIPMENT

NOTE:
SEE A601 FOR BLOCKING DETAIL FOR WALL MOUNTED DEVICES

NOTE:
ALL DIMENSIONS INDICATED ARE TO FACE OF FINISH MATERIAL (i.e. CERAMIC TILE)

4B WALL SPECIALTY DESIGNATIONS
1/4" = 1'-0"
NOTE: COORDINATE WALL PROTECTION WITH FIRE PROTECTION PANELS, DOORS, ACCESS DOORS, UTILITIES, ETC.

1B TYPICAL MOUNTING HEIGHTS
1/4" = 1'-0"

1C TYPICAL TOILET ROOM WALL HUNG LAV. ELEVATION
1/4" = 1'-0"

2C TYPICAL WALL HUNG TOILET ELEVATION
1/4" = 1'-0"

1. COORDINATE HEIGHT OF WATER CLOSET FLUSHOMETER WITH MOUNTING HEIGHT OF REAR GRAB BAR TO PROVIDE CLEARANCE FOR SERVING OF VALVES WITHOUT REQUIRING REMOVAL OF GRAB BAR.
2. REFER TO ELEVATION 6/2A701 AND/OR 7/2A701 FOR MOUNTING HEIGHTS OF REAR AND SIDE GRAB BARS TO ACCOMMODATE INSTALLATION OF SWING AWAY AND/OR SWING UP GRAB BAR, WHERE OCCURRING.

3C TYPICAL TOILET / URINAL STALL ELEVATION
1/4" = 1'-0"

4C TYPICAL HC SHOWER ELEVATIONS
1/4" = 1'-0"

5C TYPICAL LAVATORY COUNTER ELEVATION
1/4" = 1'-0"

1D TYPICAL ACCESSIBLE COMPARTMENT DOOR
1/4" = 1'-0"

4D EXIT SIGNS
1/4" = 1'-0"

1E TYPICAL OFFSET DRAIN ACCESSIBLE SINK LAYOUT DETAILS
1/2" = 1'-0"

2E TYPICAL FIXTURE PLAN CLEARANCES
1/4" = 1'-0"

3E TYPICAL H.C. MANEUVERING CLEARANCES AT DOORS
1/4" = 1'-0"

5E FAUCET CONTROL DIAGRAMS FOR ENHANCED REACHED RANGE
3/4" = 1'-0"

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Greenwich Public Schools

Greenwich Central Middle School

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NORTH / EAST / WEST / SOUTH

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

TYPICAL MOUNTING HEIGHTS

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
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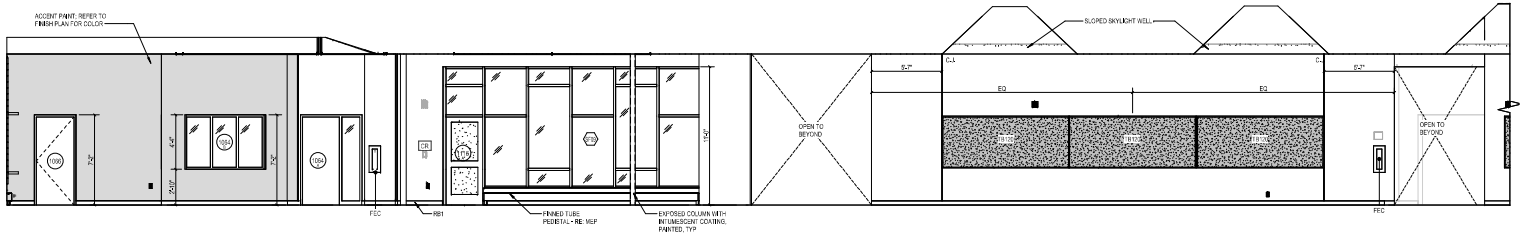
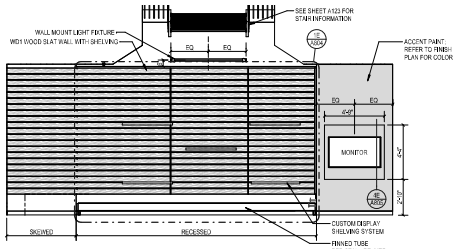
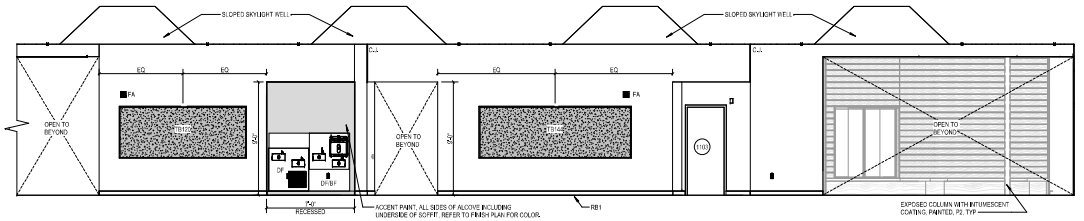


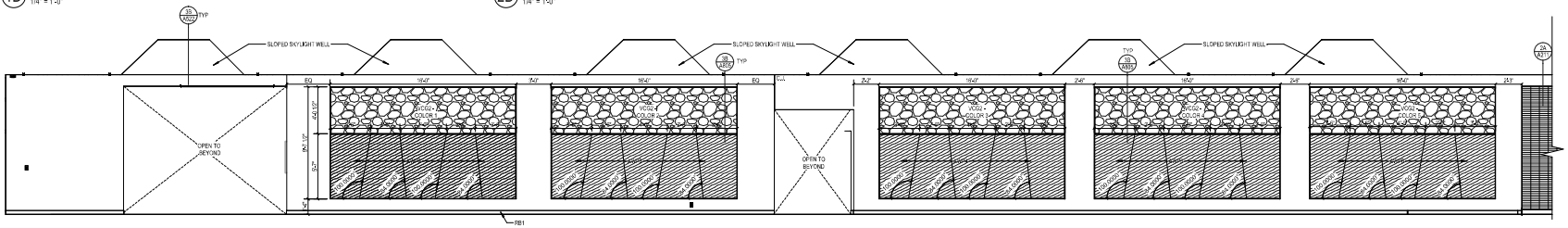
1A INT. ELEV. - PUBLIC LOBBY 1101 - EAST - PART A
1/4" = 1'-0"



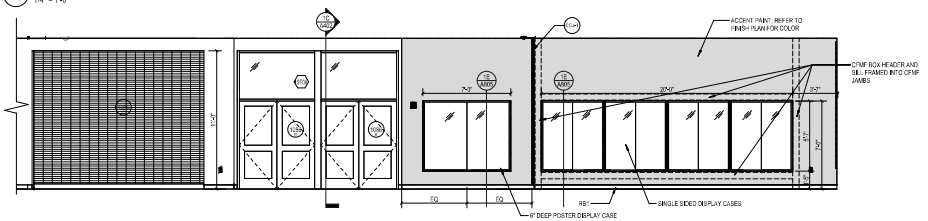
1B INT. ELEV. - PUBLIC LOBBY - NORTH
1/4" = 1'-0"



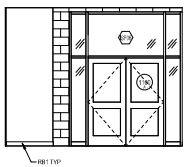
2B INT. ELEV. - PUBLIC LOBBY - EAST - PART B
1/4" = 1'-0"



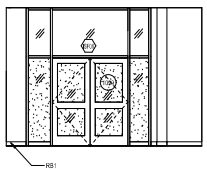
1C INT. ELEV. - PUBLIC LOBBY - WEST - PART A
1/4" = 1'-0"



1D INT. ELEV. - PUBLIC LOBBY - WEST - PART C
1/4" = 1'-0"



1E INT. ELEV. - GYM ENTRY
1/4" = 1'-0"



2E INT. ELEV. - FITNESS ENTRY
1/4" = 1'-0"

INTERIOR ELEVATION GRAPHIC LEGEND

FINISH LEGEND

- P1: NO GRAPHIC PATTERN SHOWN - FIELD THROUGHOUT UNLESS OTHERWISE NOTED
- P1-P12 ACCENT PAINT LOCATIONS SHOW AS; REFER TO FINISH PLANS FOR TYPE.
- P8, P13, DARK ACCENT PAINT S SHOWN AS; REFER TO FINISH PLANS TAGS FOR TYPE
- AWP1-5 & 12 ACOUSTIC PANELS SHOWN AS; REFER TO ELEVATIONS FOR TYPE
- AWP11 ACOUSTIC PANELS SHOWN AS;
- VCG1-VCG5 CUSTOM GRAPHIC SHOWS AS; REFER TO FINISH PLANS FOR TYPE.
- WWP1 SHOWN AS;
- WP2 SHOWN AS;
- TACKBOARD SHOWN AS;
- LOCKER ACCENT COLOR 1 (GRAY) SHOWN AS;
- LOCKER ACCENT COLOR 2 3 & 4 SHOWN AS
- ACCENT COLOR 2 AT RIGHT SIDE POD LOCKERS TO MATCH P10
- ACCENT COLOR 3 AT CENTER POD LOCKERS TO MATCH P11
- ACCENT COLOR 4 AT LEFT SIDE POD LOCKERS TO MATCH P12
- PAPER TOWEL DISPENSER
- SOAP DISPENSER
- CLOCK

INTERIOR ELEVATION GENERAL NOTES:

1. SEE SHEET A705 FOR TYPICAL MOUNTING HEIGHTS OF ACCESSORIES, WALL MOUNTED EQUIPMENT & DEVICES & TYPICAL TOILET/ SHOWER ELEVATIONS
2. SEE FURNITURE PLANS, FINISH PLANS & ENLARGED FLOOR PLANS FOR ALL W-WTBOARD, TACKBOARD AND SHELVING LOCATIONS. PROVIDE BLOCKING FOR ALL INTERACTIVE W-TBOARDS STACK BOARDS AND PER DETAIL 5/A1602. COORDINATE LOCATIONS WITH ELECTRICAL AND FURNITURE DRAWINGS.
3. WHERE ACCENT PAINT COLOR IS ON A WALL WITH CASEWORK ANY EXPOSED WALL BELOW CASEWORK IS TO BE PAINTED ACCENT COLOR INDICATED AS WELL.
4. EXPOSED OUTER EDGE OF ANY WALLCOVERING, TO RECEIVE TRIM, AS SHOWN IN 1B/A605.
5. REFER TO EQUIPMENT SCHEDULES ON A912 FOR EXTENT OF EQUIPMENT INFO FOR TAGGED EQUIPMENT.
6. REFER TO FINISH PLANS FOR EXTENT OF ACCENT PAINT COLORS AND LOCATIONS OF SPECIALTY WALL FINISHES.
7. REFER TO FINISH PRODUCT LIST FOR PRODUCT INFO ON ALL TAGGED FINISHES. REFER TO FINISH GENERAL NOTES FOR ADDITIONAL INFORMATION.
8. REFER TO A604 FOR LOCKER ELEVATIONS AND DETAILS. PROVIDE FLAT TOPS AT LOCKERS WITH NO SOFFIT, TYPICAL
9. WHERE WHITEBOARD ARE SHOWN NEXT TO DWB THEY ARE TO BE MOUNTED AS CLOSELY AS POSSIBLE TO THE WB.
10. WHERE WHITEBOARD AND/OR TACKBOARDS ARE SHOWN NEXT TO EACH OTHER THEY ARE TO BE INSTALLED WITH OUTER FRAME TOUCHING.

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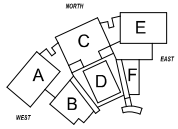

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

INTERIOR ELEVATIONS - PUBLIC LOBBY

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A702

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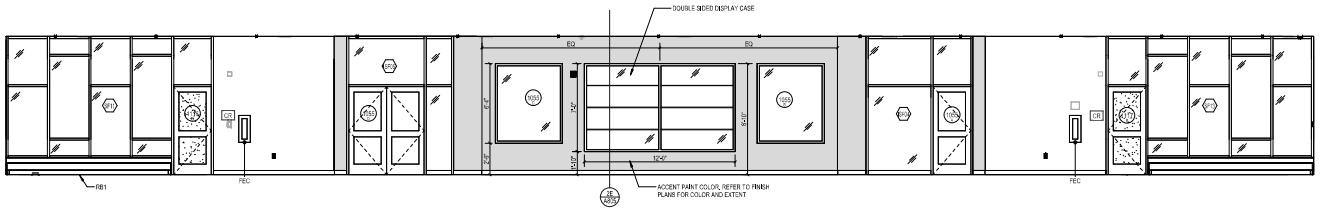
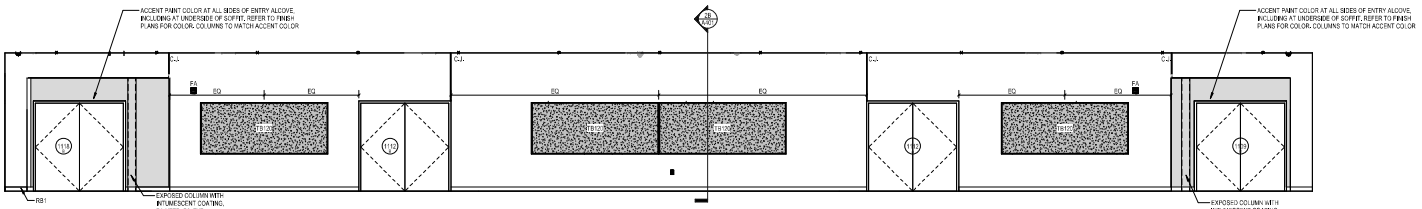
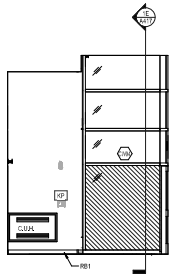


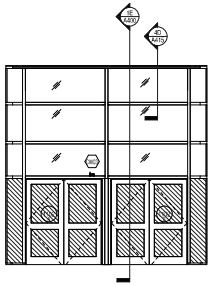
1A INT. ELEV. - CORRIDOR 115 - NORTH
1/4" = 1'-0"



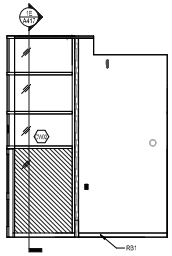
1B INT. ELEV. - CORRIDOR 115 - SOUTH
1/4" = 1'-0"



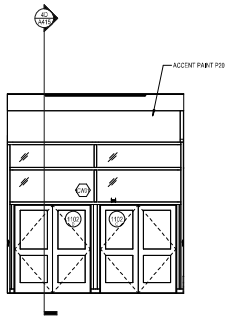
1D INT. ELEV. - VESTIBULE 1102 E
1/4" = 1'-0"



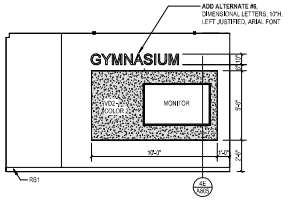
2D INT. ELEV. - VESTIBULE 1102 S
1/4" = 1'-0"



3D INT. ELEV. - VESTIBULE 1102 W
1/4" = 1'-0"



4D INT. ELEV. VESTIBULE 1102 N
1/4" = 1'-0"



1E INT. ELEV. - MAIN GYM ENTRY
1/4" = 1'-0"

INTERIOR ELEVATION GENERAL NOTES:

1. SEE SHEET A701 FOR TYPICAL MOUNTING HEIGHTS OF ACCESSORIES, WALL MOUNTED EQUIPMENT & DEVICES & TYPICAL TOILET/ SHOWER ELEVATIONS
2. SEE FURNITURE PLANS, FINISH PLANS & ENLARGED FLOOR PLANS FOR ALL WHITEBOARD, TACKBOARD AND SHELVING LOCATIONS. PROVIDE BLOCKING FOR ALL INTERACTIVE WHITEBOARDS ATTACH BOARDS AND PER DETAIL 5B/A402. COORDINATE LOCATIONS WITH ELECTRICAL AND FURNITURE DRAWINGS.
3. WHERE ACCENT PAINT COLOR IS ON A WALL WITH CASEWORK ANY EXPOSED WALL BELOW CASEWORK IS TO BE PAINTED ACCENT COLOR INDICATED AS WELL.
4. EXPOSED OUTER EDGE OF ANY WALLCOVERING, TO RECEIVE TRIM, AS SHOWN IN 1B/A805.
5. REFER TO EQUIPMENT SCHEDULES ON A912 FOR EXTENT OF EQUIPMENT INFO FOR TAGGED EQUIPMENT.
6. REFER TO FINISH PLANS FOR EXTENT OF ACCENT PAINT COLORS AND LOCATIONS OF SPECIALTY WALL FINISHES.
7. REFER TO FINISH PRODUCT LIST FOR PRODUCT INFO ON ALL TAGGED FINISHES. REFER TO FINISH GENERAL NOTES FOR ADDITIONAL INFORMATION.
8. REFER TO A804 FOR LOCKER ELEVATIONS AND DETAILS. PROVIDE FLAT TOPS AT LOCKERS WITH NO SOFFIT, TYPICAL.
9. WHERE WHITEBOARD ARE SHOWN NEXT TO FWB THEY ARE TO BE MOUNTED AS CLOSELY AS POSSIBLE TO THE FWB.
10. WHERE WHITEBOARD AND/OR TACKBOARDS ARE SHOWN NEXT TO EACH OTHER THEY ARE TO BE INSTALLED WITH OUTER FRAME TOUCHING.

INTERIOR ELEVATION GRAPHIC LEGEND

FINISH LEGEND

- P1: NO GRAPHIC PATTERN SHOWN - FIELD THROUGHOUT UNLESS OTHERWISE NOTED
- P3-P12 ACCENT PAINT LOCATIONS SHOW AS; REFER TO FINISH PLANS FOR TYPE.
- P8, P13: DARK ACCENT PAINTS SHOWN AS; REFER TO FINISH PLANS TAGS FOR TYPE
- AWP1-10 & 12 ACOUSTIC PANELS SHOWN AS; REFER TO ELEVATIONS FOR TYPE
- AWP11 ACOUSTIC PANELS SHOWN AS:
- VCD1/VCD3 CUSTOM GRAPHIC SHOW AS; REFER TO FINISH PLANS FOR TYPE.
- WWP1 SHOWN AS:
- WP3 SHOWN AS:
- TACKBOARD SHOWN AS:
- LOCKER ACCENT COLOR 1 (GRAY) SHOWN AS
- LOCKER ACCENT COLOR 2, 3 & 4 SHOWN AS
  - ACCENT COLOR 2 AT RIGHT SIDE POD LOCKERS TO MATCH P10
  - ACCENT COLOR 3 AT CENTER POD LOCKERS TO MATCH P11
  - ACCENT COLOR 4 AT LEFT SIDE POD LOCKERS TO MATCH P12
- PAPER TOWEL DISPENSER
- SOAP DISPENSER
- CLOCK

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Greenwich Public Schools

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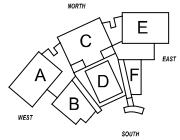

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

INTERIOR ELEVATIONS - FIRST FLOOR

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A703

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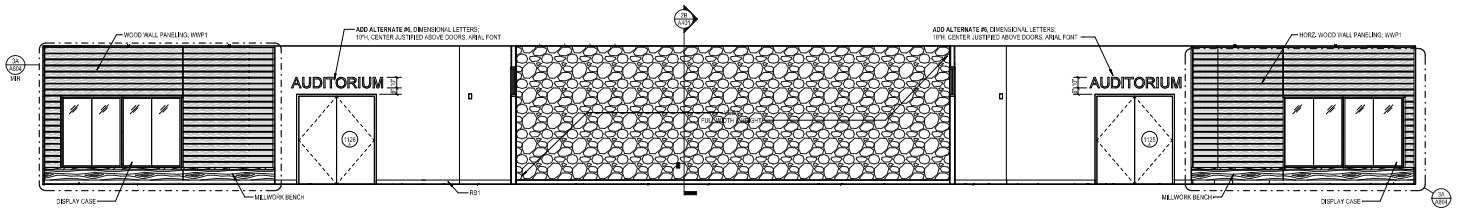
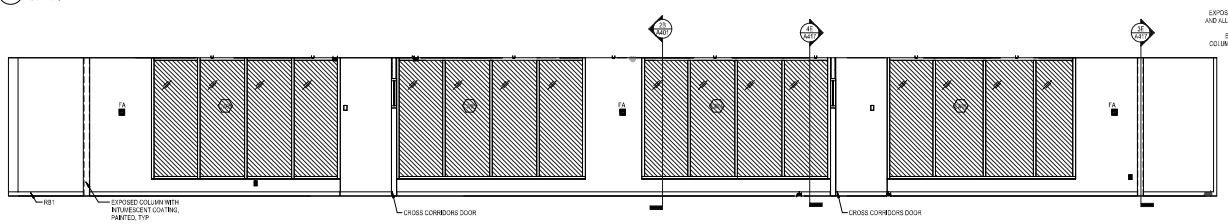
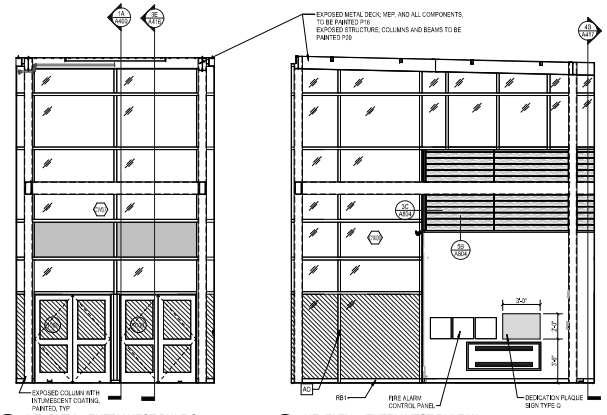


1A INT. ELEV. - AUDITORIUM CORRIDOR - NORTH
1/4" = 1'-0"

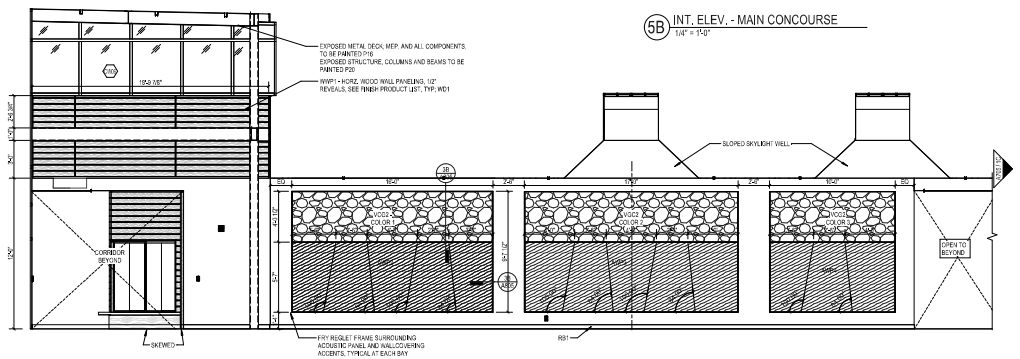


1B INT. ELEV. - AUDITORIUM CORRIDOR - SOUTH
1/4" = 1'-0"

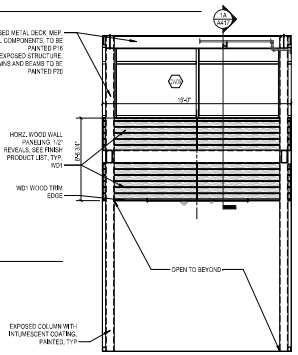


1C INT. ELEV. - ENTRY VESTIBULE S
1/4" = 1'-0"

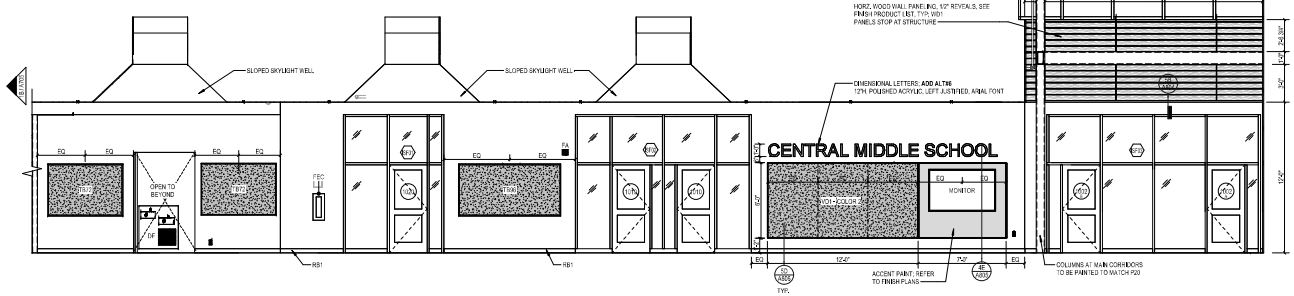
2C INT. ELEV. - ENTRY VESTIBULE W
1/4" = 1'-0"



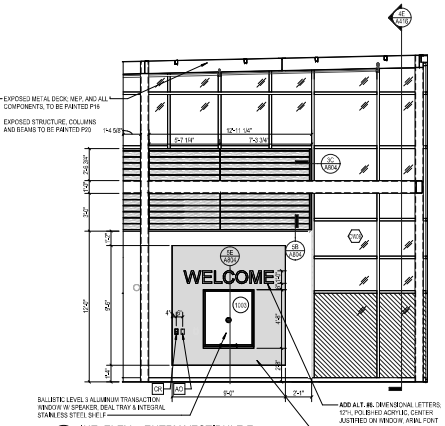
3C INT. ELEV. - MAIN CONCORSE - SOUTHWEST B
1/4" = 1'-0"



5B INT. ELEV. - MAIN CONCOURSE
1/4" = 1'-0"



1E INT. ELEV. - MAIN CONCORSE - NORTHEAST B
1/4" = 1'-0"



5E INT. ELEV. - ENTRY VESTIBULE E
1/4" = 1'-0"

INTERIOR ELEVATION GENERAL NOTES:

1. SEE SHEET A701 FOR TYPICAL MOUNTING HEIGHTS OF ACCESSORIES, WALL MOUNTED EQUIPMENT & DEVICES & TYPICAL TOILET/SHOWER ELEVATIONS
2. SEE FURNITURE PLANS, FINISH PLANS & ENLARGED FLOOR PLANS FOR ALL WHITEBOARD, TACKBOARD AND SHELVING LOCATIONS. PROVIDE BLOCKING FOR ALL INTERACTIVE WHITEBOARDS ATTACK BOARDS AND PER DETAIL 9/A4A702. COORDINATE LOCATIONS WITH ELECTRICAL AND FURNITURE DRAWINGS.
3. WHERE ACCENT PAINT COLOR IS ON A WALL WITH CASEWORK ANY EXPOSED WALL BELOW CASEWORK IS TO BE PAINTED ACCENT COLOR INDICATED AS WELL.
4. EXPOSED OUTER EDGE OF ANY WALLCOVERING, TO RECEIVE TRIM, AS SHOWN IN 1B/A305.
5. REFER TO EQUIPMENT SCHEDULES ON A812 FOR EXTENT OF EQUIPMENT INFO FOR TAGGED EQUIPMENT.
6. REFER TO FINISH PLANS FOR EXTENT OF ACCENT PAINT COLORS AND LOCATIONS OF SPECIALTY WALL FINISHES.
7. REFER TO FINISH PRODUCT LIST FOR PRODUCT INFO ON ALL TAGGED FINISHES. REFER TO FINISH GENERAL NOTES FOR ADDITIONAL INFORMATION.
8. REFER TO A604 FOR LOCKER ELEVATIONS AND DETAILS. PROVIDE FLAT TOPS AT LOCKERS WITH NO SOFFIT, TYPICAL.
9. WHERE WHITEBOARD ARE SHOWN NEXT TO FWB THEY ARE TO BE MOUNTED AS CLOSELY AS POSSIBLE TO THE FWB.
10. WHERE WHITEBOARD AND/OR TACKBOARDS ARE SHOWN NEXT TO EACH OTHER THEY ARE TO BE INSTALLED WITH OUTER FRAME TOUCHING.

INTERIOR ELEVATION GRAPHIC LEGEND

FINISH LEGEND

P1: NO GRAPHIC PATTERN SHOWN - FIELD THROUGHOUT UNLESS OTHERWISE NOTED

P5-P12 ACCENT PAINT LOCATIONS SHOWN AS; REFER TO FINISH PLANS FOR TYPE.

P8, P13: DARK ACCENT PAINTS SHOWN AS; REFER TO FINISH PLANS TAGS FOR TYPE

AWP1-10 & 12 ACOUSTIC PANELS SHOWN AS; REFER TO ELEVATIONS FOR TYPE.

AWP11 ACOUSTIC PANELS SHOWN AS;

VCG1-VCG9 CUSTOM GRAPHIC SHOWN AS; REFER TO FINISH PLANS FOR TYPE.

WWP1 SHOWN AS;

WP2 SHOWN AS;

TACKBOARD SHOWN AS;

LOCKER ACCENT COLOR 1 (GRAY) SHOWN AS

LOCKER ACCENT COLOR 2, 3 & 4 SHOWN AS

- ACCENT COLOR 2 AT RIGHT SIDE POD LOCKERS TO MATCH P10
- ACCENT COLOR 3 AT CENTER POD LOCKERS TO MATCH P11
- ACCENT COLOR 4 AT LEFT SIDE POD LOCKERS TO MATCH P12

PAPER TOWEL DISPENSER

SOAP DISPENSER

CLOCK

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Drawn: AHS, CP
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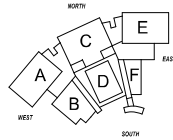
Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

INTERIOR ELEVATIONS - MAIN CONCOURSE

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A704

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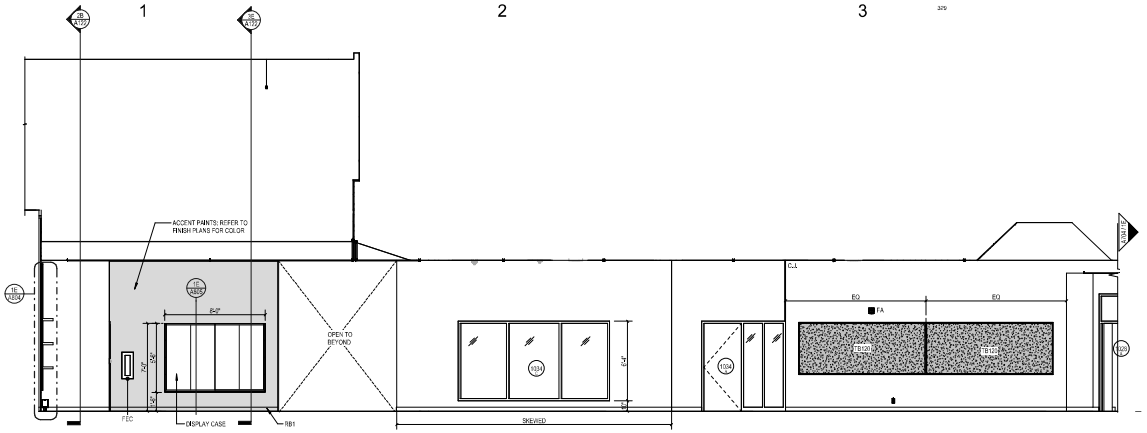
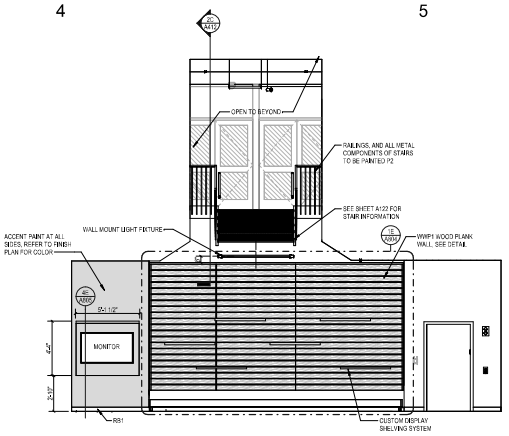
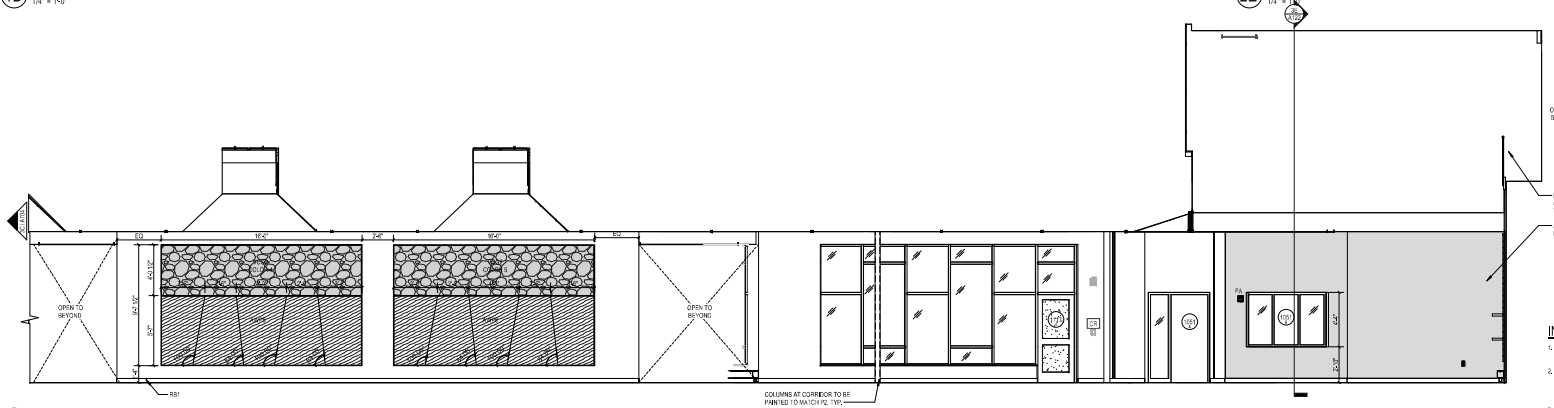


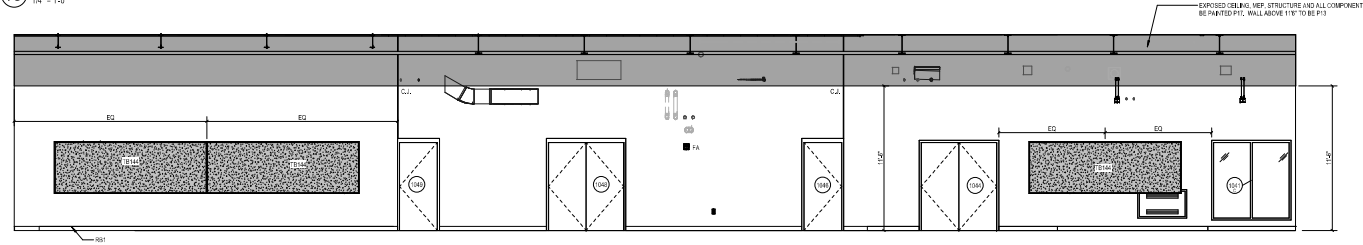
1B INT. ELEV. - MAIN CONCORSE - NORTHEAST A
1/4" = 1'-0"



2E INT. ELEV. - MAIN CONCOURSE STAIR - NORTH
1/4" = 1'-0"



1C INT. ELEV. - MAIN CONCORSE - SOUTHWEST A
1/4" = 1'-0"



1D INT. ELEV. - CORRIDOR 1049 - NORTH
1/4" = 1'-0"



4D INT. ELEV. - ART ROOM DOOR - EAST
1/4" = 1'-0"

1E INT. ELEV. - CORRIDOR 1049 - SOUTH
1/4" = 1'-0"

INTERIOR ELEVATION GENERAL NOTES:

1. SEE SHEET A701 FOR TYPICAL MOUNTING HEIGHTS OF ACCESSORIES, WALL MOUNTED EQUIPMENT & DEVICES & TYPICAL TOILET/ SHOWER ELEVATIONS
2. SEE FURNITURE PLANS, FINISH PLANS & ENLARGED FLOOR PLANS FOR ALL WHITEBOARD, TACKBOARD AND SHELVING LOCATIONS. PROVIDE BLOCKING FOR ALL INTERACTIVE WHITEBOARDS &TACK BOARDS AND PER DETAIL 5/A602. COORDINATE LOCATIONS WITH ELECTRICAL AND FURNITURE DRAWINGS.
3. WHERE ACCENT PAINT COLOR IS ON A WALL WITH CASEWORK ANY EXPOSED WALL BELOW CASEWORK IS TO BE PAINTED ACCENT COLOR INDICATED AS WELL.
4. EXPOSED OUTER EDGE OF ANY WALLCOVERING, TO RECEIVE TRIM, AS SHOWN IN DRAWING.
5. REFER TO EQUIPMENT SCHEDULES ON A912 FOR EXTENT OF EQUIPMENT INFO FOR TAGGED EQUIPMENT.
6. REFER TO FINISH PLANS FOR EXTENT OF ACCENT PAINT COLORS AND LOCATIONS OF SPECIALTY WALL FINISHES.
7. REFER TO FINISH PRODUCT LIST FOR PRODUCT INFO ON ALL TAGGED FINISHES. REFER TO FINISH GENERAL NOTES FOR ADDITIONAL INFORMATION.
8. REFER TO A914 FOR LOCKER ELEVATIONS AND DETAILS, PROVIDE FLAT TOPS AT LOCKERS WITH NO SOFFIT, TYPICAL.
9. WHERE WHITEBOARD ARE SHOWN NEXT TO IWB THEY ARE TO BE MOUNTED AS CLOSELY AS POSSIBLE TO THE IWB.
10. WHERE WHITEBOARD AND/OR TACKBOARDS ARE SHOWN NEXT TO EACH OTHER THEY ARE TO BE INSTALLED WITH OUTER RIMS TOUCHING.

INTERIOR ELEVATION GRAPHIC LEGEND

FINISH LEGEND

- P1 NO GRAIN 45 PATTERN SHOWN - FIELD THROUGHOUT UNLESS OTHERWISE NOTED
- P3-P12 ACCENT PAINT LOCATIONS SHOWN AS; REFER TO FINISH PLANS FOR TYPE.
- P8, P13, DARK ACCENT PAINTS SHOWN AS; REFER TO FINISH PLANS TAGS FOR TYPE
- AWP1-10 & 12 ACOUSTIC PANELS SHOWN AS; REFER TO ELEVATIONS FOR TYPE
- AWP11 ACOUSTIC PANELS SHOWN AS;
- VGS1-4/GS8 CUSTOM GRAPHIC SHOWN AS; REFER TO FINISH PLANS FOR TYPE.
- WWP1 SHOWN AS;
- WP2 SHOWN AS;
- TACKBOARD SHOWN AS;

LOCKER ACCENT COLOR 1 (GRAY) SHOWN AS

LOCKER ACCENT COLOR 2, 3 & 4 SHOWN AS

- ACCENT COLOR 2 AT RIGHT SIDE POD LOCKERS TO MATCH P10
- ACCENT COLOR 3 AT CENTER POD LOCKERS TO MATCH P11
- ACCENT COLOR 4 AT LEFT SIDE POD LOCKERS TO MATCH P12

PAPER TOWEL DISPENSER
SOAP DISPENSER
CLOCK

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Greenwich Public Schools

Greenwich Central Middle School

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STATE PROJECT NO: 057-0114 N

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

INTERIOR ELEVATIONS - MAIN CONCOURSE

Date: 07/08/2024
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Drawing Number: A705

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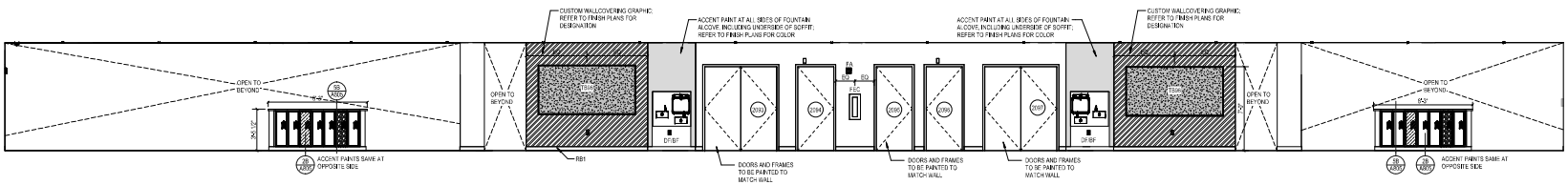
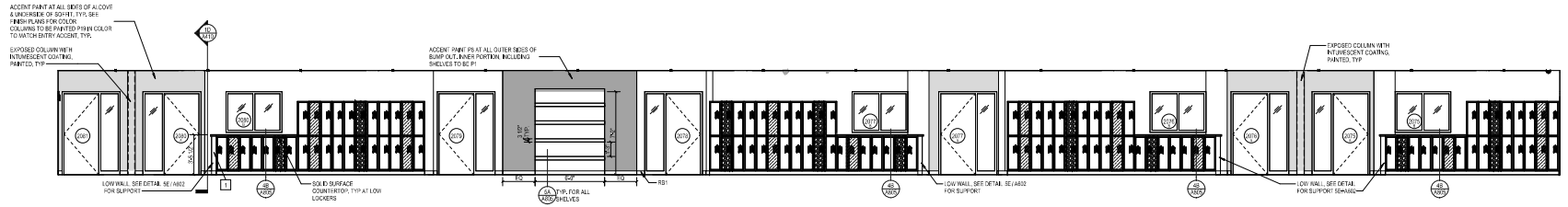
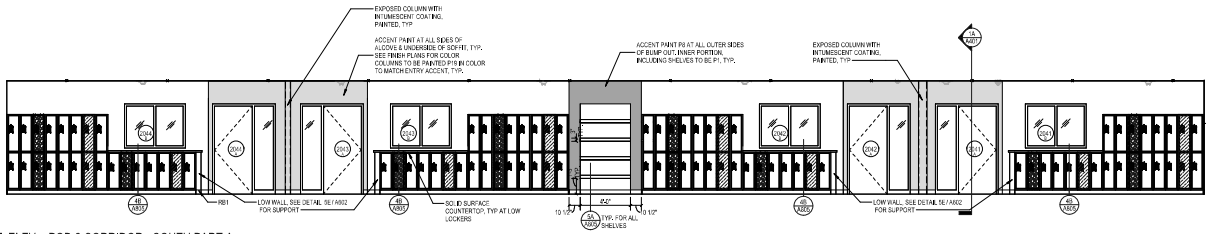


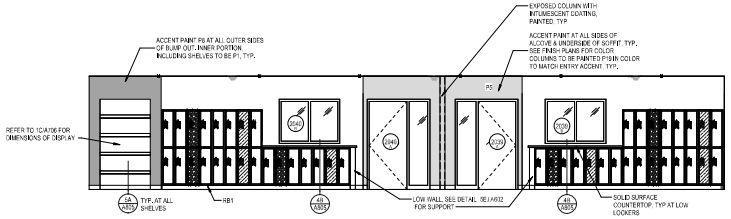
1A INT. ELEV. - TYPICAL CLASSROOM POD CORRIDOR - NORTH
1/4" = 1'-0"



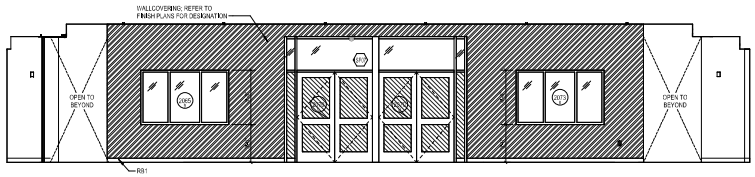
1B INT. ELEV. - TYPICAL CLASSROOM POD CORRIDOR - SOUTH
1/4" = 1'-0"



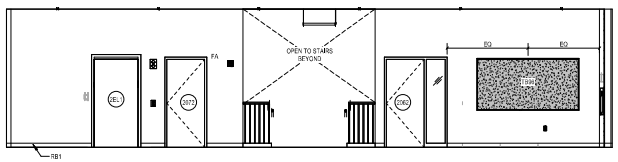
1C INT. ELEV. - POD 2 CORRIDOR - SOUTH PART A
1/4" = 1'-0"



1D INT. ELEV. - POD 2 CORRIDOR - SOUTH PART B
1/4" = 1'-0"



1E INT. ELEV. - TYPICAL ELEVATION AT CORRIDOR 2001 AND 2071 - NORTH
1/4" = 1'-0"



3E INT. ELEV. - TYPICAL ELEVATION AT CORRIDOR 2001 AND 2071 - SOUTH
1/4" = 1'-0"

INTERIOR ELEVATION GRAPHIC LEGEND

FINISH LEGEND

- P1 NO GRAPHIC PATTERN SHOWN - FIELD T-ROUGHOUT UNLESS OTHERWISE NOTED
- P3-P12 ACCENT PAINT LOCATIONS SHOWAS; REFER TO FINISH PLANS FOR TYPE.
- P6, P13: DARK ACCENT PAINTS SHOWN AS; REFER TO FINISH PLANS TAGS FOR TYPE
- AWP1-6 & 12 ACOUSTIC PANELS SHOWN AS; REFER TO ELEVATIONS FOR TYPE
- AWP11 ACOUSTIC PANELS SHOWN AS;
- VCG1-VCG3 CUSTOM GRAPHIC SHOW AS; REFER TO FINISH PLANS FOR TYPE.
- WWP1 SHOWN AS;
- WP3 SHOWN AS;
- TACKBOARD SHOWN AS;
- LOCKER ACCENT COLOR 1 (GRAY) SHOWN AS;
- LOCKER ACCENT COLOR 2, 3 & 4 SHOWN AS
  - ACCENT COLOR 2 AT HIGH SIDE POD LOCKERS TO MATCH P10
  - ACCENT COLOR 3 AT CENTER POD LOCKERS TO MATCH P11
  - ACCENT COLOR 4 AT LEFT SIDE POD LOCKERS TO MATCH P12
- PAPER TOWEL DISPENSER
- SOAP DISPENSER
- CLOCK

INTERIOR ELEVATION GENERAL NOTES:

1. SEE SHEET A001 FOR TYPICAL MOUNTING HEIGHTS OF ACCESSORIES, WALL MOUNTED EQUIPMENT & DEVICES & TYPICAL TOILET/ SHOWER ELEVATIONS
2. SEE FURNITURE PLANS, FINISH PLANS & ENLARGED FLOOR PLANS FOR ALL WHITEBOARD, TACKBOARD AND SHELVING LOCATIONS. PROVIDE BLOCKING FOR ALL INTERACTIVE WHITEBOARDS &TACK BOARDS AND PER DETAIL 5/A6402. COORDINATE LOCATIONS WITH ELECTRICAL AND FURNITURE DRAWINGS.
3. WHERE ACCENT PAINT COLOR IS ON A WALL WITH CASEWORK ANY EXPOSED WALL BELOW CASEWORK IS TO BE PAINTED ACCENT COLOR INDICATED AS WELL.
4. EXPOSED OUTER EDGE OF ANY WALLCOVERING TO RECEIVE TRIM, AS SHOWN IN 1B/A805.
5. REFER TO EQUIPMENT SCHEDULES ON A902 FOR EXTENT OF EQUIPMENT INFO FOR TAGGED EQUIPMENT.
6. REFER TO FINISH PLANS FOR EXTENT OF ACCENT PAINT COLORS AND LOCATIONS OF SPECIALTY WALL FINISHES.
7. REFER TO FINISH PRODUCT LIST FOR PRODUCT INFO ON ALL TAGGED FINISHES. REFER TO FINISH GENERAL NOTES FOR ADDITIONAL INFORMATION.
8. REFER TO A906 FOR LOCKER ELEVATIONS AND DETAILS. PROVIDE FLAT TOPS AT LOCKERS WITH NO SOFFIT, TYPICAL.
9. WHERE WHITEBOARD ARE SHOWN NEXT TO WB THEY ARE TO BE MOUNTED AS CLOSELY AS POSSIBLE TO THE WB.
10. WHERE WHITEBOARD AND/OR TACKBOARDS ARE SHOWN NEXT TO EACH OTHER THEY ARE TO BE INSTALLED WITH OUTER FRAME TOUCHING.

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Greenwich Public Schools

Greenwich Central Middle School

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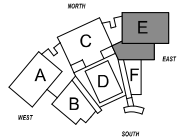

KEYPLAN

Number	Date	Issued For
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	07/08/2024	PHASE 2

2ND FLOOR ELEVATIONS - CORRIDORS

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A706

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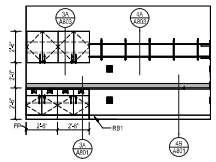
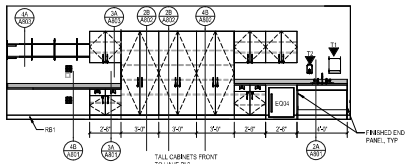
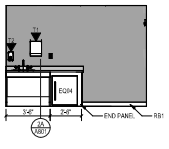


1A INT. ELEV. - IT WORKROOM - NORTH
1/4" = 1'-0"



2A INT. ELEV. - IT WORKROOM - EAST
1/4" = 1'-0"



3A INT. ELEV. - LACTATION ROOM - NORTH
1/4" = 1'-0"

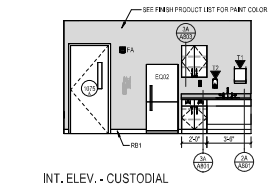
INTERIOR ELEVATION GENERAL NOTES:

1. SEE SHEET A701 FOR TYPICAL MOUNTING HEIGHTS OF ACCESSORIES, WALL MOUNTED EQUIPMENT & DEVICES & TYPICAL TOILET/ SHOWER ELEVATIONS
2. SEE FURNITURE PLANS, FINISH PLANS & ENLARGED FLOOR PLANS FOR ALL WHITEBOARD, TACKBOARD AND SHELVING LOCATIONS. PROVIDE BLOCKING FOR ALL INTERACTIVE WHITEBOARDS (STACK BOARDS AND PERCEPTAL **SBA402**. COORDINATE LOCATIONS WITH ELECTRICAL AND FURNITURE DRAWINGS.
3. WHERE ACCENT PAINT COLOR IS ON A WALL WITH CASEWORK, ANY EXPOSED WALL BELOW CASEWORK IS TO BE PAINTED ACCENT COLOR INDICATED AS WELL.
4. EXPOSED OUTER EDGE OF ANY WALLCOVERING, TO RECEIVE TRIM, AS SHOWN IN **TBA800.**
5. REFER TO EQUIPMENT SCHEDULES ON A912 FOR EXTENT OF EQUIPMENT INFO FOR TAGGED EQUIPMENT.
6. REFER TO FINISH PLANS FOR EXTENT OF ACCENT PAINT COLORS AND LOCATIONS OF SPECIALTY WALL FINISHES.
7. REFER TO FINISH PRODUCT LIST FOR PRODUCT INFO ON ALL TAGGED FINISHES. REFER TO FINISH GENERAL NOTES FOR ADDITIONAL INFORMATION.
8. REFER TO A906 FOR LOCKER ELEVATIONS AND DETAILS. PROVIDE FLAT TOPS AT LOCKERS WITH NO SOFFIT, TYPICAL.
9. WHERE WHITEBOARD ARE SHOWN NEXT TO IWS THEY ARE TO BE MOUNTED AS CLOSELY AS POSSIBLE TO THE IWS.
10. WHERE WHITEBOARD AND/OR TACKBOARDS ARE SHOWN NEXT TO EACH OTHER THEY ARE TO BE INSTALLED WITH OUTER FRAME TOUCHING.

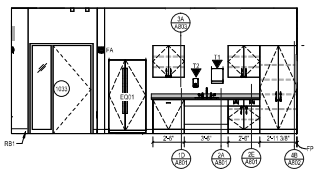
INTERIOR ELEVATION GRAPHIC LEGEND

FINISH LEGEND

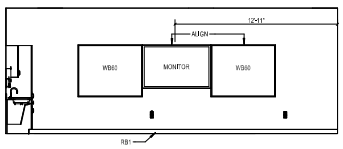
- P1: NO GRAPHIC PATTERN SHOWN - FIELD THROUGHOUT UNLESS OTHERWISE NOTED
- P3-P12 ACCENT PAINT LOCATIONS SHOW AS: REFER TO FINISH PLANS FOR TYPE.
- P8, P13: DARK ACCENT PAINTS SHOWN AS: REFER TO FINISH PLANS TAGS FOR TYPE
- AWP1-10 & 12 ACOUSTIC PANELS SHOWN AS: REFER TO ELEVATIONS FOR TYPE
- AWP11 ACOUSTIC PANELS SHOWN AS:
- VCG1-VCG8 CUSTOM GRAPHIC SHOW AS: REFER TO FINISH PLANS FOR TYPE.
- WP01 SHOWN AS:
- WP2 SHOWN AS:
- TACKBOARD SHOWN AS:
- LOCKER ACCENT COLOR 1 (GRAY) SHOWN AS
- LOCKER ACCENT COLOR 2, 3 & 4 SHOWN AS
  - ACCENT COLOR 2 AT RIGHT SIDE POD LOCKERS TO MATCH P10
  - ACCENT COLOR 3 AT CENTER POD LOCKERS TO MATCH P11
  - ACCENT COLOR 4 AT LEFT SIDE POD LOCKERS TO MATCH P12
- PAPER TOWEL DISPENSER
- SOAP DISPENSER
- CLOCK



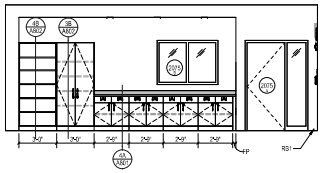
1B INT. ELEV. - CUSTODIAL OFFICE/BREAK ROOM - NORTH
1/4" = 1'-0"



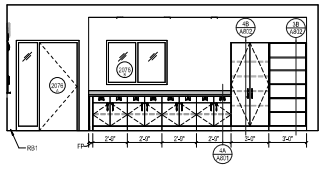
2B INT. ELEV. - FACULTY DINING - WEST
1/4" = 1'-0"



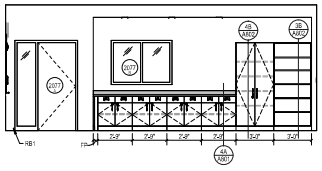
3B INT. ELEV. - FACULTY DINING - NORTH
1/4" = 1'-0"



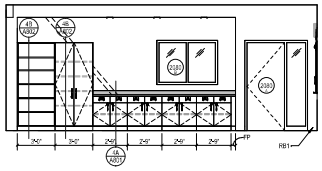
1C INT. ELEV. - CLASSROOM 2075 CASEWORK
1/4" = 1'-0"



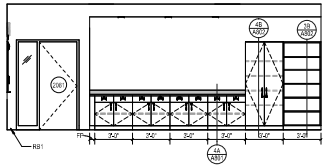
2C INT. ELEV. - CLASSROOM 2076 CASEWORK
1/4" = 1'-0"



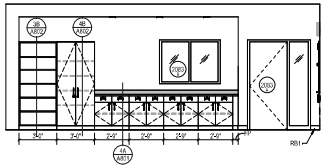
3C INT. ELEV. - CLASSROOM 2077 CASEWORK
1/4" = 1'-0"



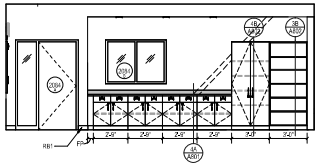
4C INT. ELEV. - CLASSROOM 2080 CASEWORK
1/4" = 1'-0"



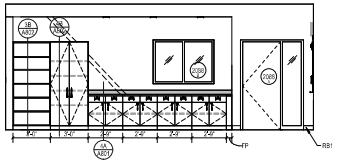
1D INT. ELEV. - CLASSROOM 2081 CASEWORK
1/4" = 1'-0"



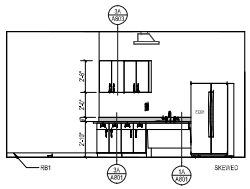
2D INT. ELEV. - CLASSROOM 2083 CASEWORK
1/4" = 1'-0"



3D INT. ELEV. - CLASSROOM 2084 CASEWORK
1/4" = 1'-0"



4D INT. ELEV. - CLASSROOM 2088 CASEWORK
1/4" = 1'-0"



1E INT. ELEV. - FACULTY WORKROOM - EAST
1/4" = 1'-0"

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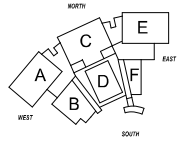
Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

INTERIOR ELEVATIONS

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A707

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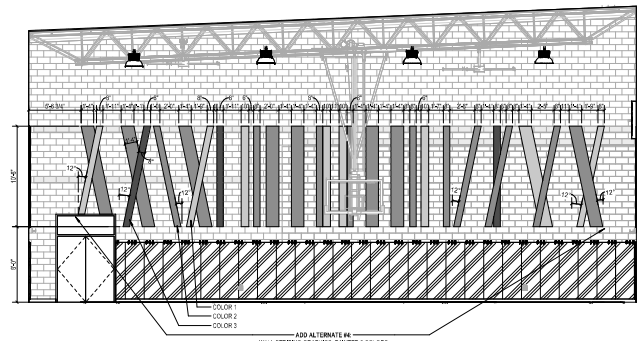
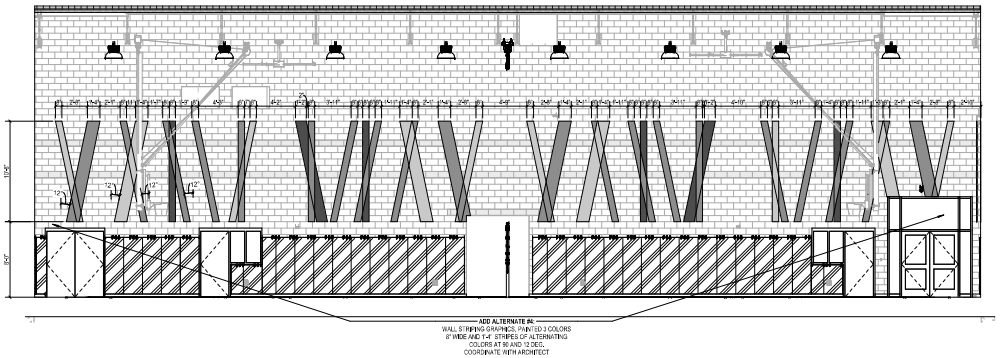
3/25/2024 4:51:23 PM

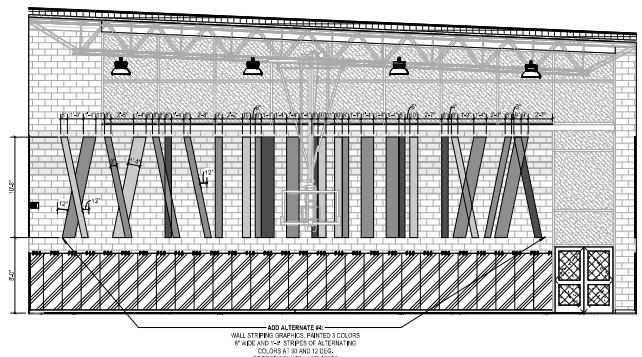
ELEVATIONS SHOWN HERE ARE TO SHOW CUSTOM GRAPHIC DETAIL ONLY . REFER TO A111.4 FOR FULL INTERIOR ELEVATIONS.



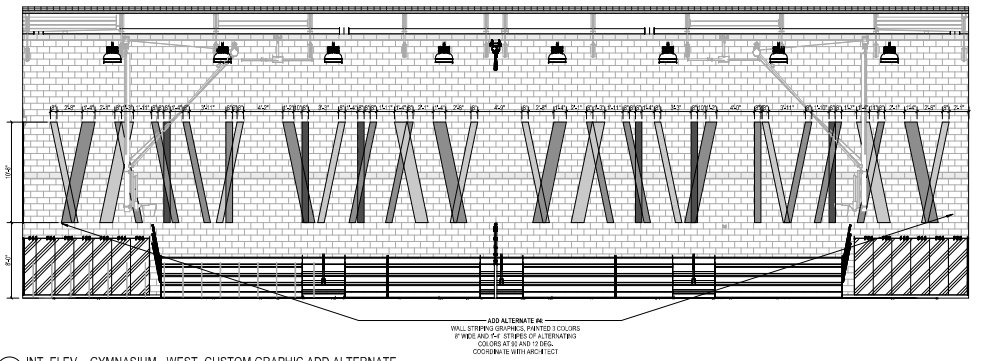
1B INT. ELEV. - GYMNASIUM - NORTH -CUSTOM GRAPHIC ADD ALTERNATE
3/16" = 1'-0"



3B INT. ELEV. - GYMNASIUM - EAST - CUSTOM GRAPHIC ADD ALTERNATE
3/16" = 1'-0"



1D INT. ELEV. - GYMNASIUM - SOUTH - CUSTOM GRAPHIC ADD ALTERNATE
3/16" = 1'-0"



3D INT. ELEV. - GYMNASIUM - WEST- CUSTOM GRAPHIC ADD ALTERNATE
3/16" = 1'-0"

INTERIOR ELEVATION GRAPHIC LEGEND

FINISH LEGEND

P1 NO GRAPHIC PATTERN SHOWN - FIELD THROUGHOUT UNLESS OTHERWISE NOTED

P1-P12 ACCENT PAINT LOCATIONS SHOW AS; REFER TO FINISH PLANS FOR TYPE.

P8, P13; DARK ACCENT PAINTS SHOWN AS; REFER TO FINISH PLANS TAGS FOR TYPE

AWP1-10 & 12 ACOUSTIC PANELS SHOWN AS; REFER TO ELEVATIONS FOR TYPE

AWP11 ACOUSTIC PANELS SHOWN AS;

VCG1-VCG3 CUSTOM GRAPHIC SHOW AS; REFER TO FINISH PLANS FOR TYPE.

WWP1 SHOWN AS;

WP2 SHOWN AS;

TACKBOARD SHOWN AS;

LOCKER ACCENT COLOR 1 (GRAY) SHOWN AS

LOCKER ACCENT COLOR 2, 3 & 4 SHOWN AS

- ACCENT COLOR 2 AT RIGHT SIDE POD LOCKERS TO MATCH P10
- ACCENT COLOR 3 AT CENTER POD LOCKERS TO MATCH P11
- ACCENT COLOR 4 AT LEFT SIDE POD LOCKERS TO MATCH P12

PAPER TOWEL DISPENSER

SOAP DISPENSER

CLOCK

GYMNASIUM GRAPHIC ELEVATION COLOR LEGEND

COLOR 1 SHOWN AS;

COLOR 2 SHOWN AS;

COLOR 3 SHOWN AS;

THIS APPLIES TO SHEET A708 ONLY

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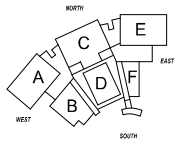

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

INTERIOR ELEVATIONS - GYMNASIUM - CUSTOM GRAPHIC DESIGN

Date
07/08/2024
Scale
As indicated
Proj. Number
22367.00

Drawing Number
A708

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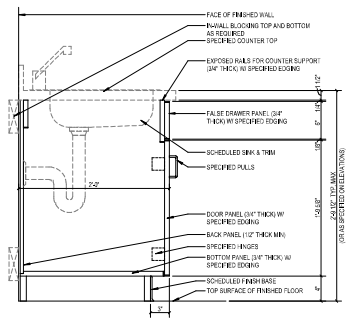
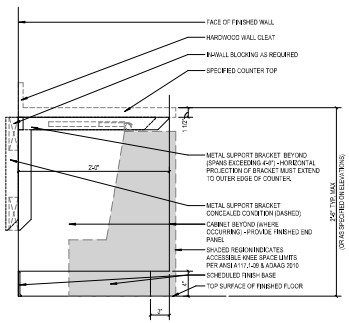
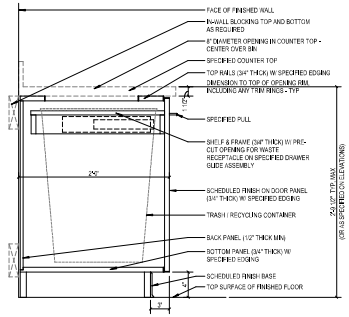


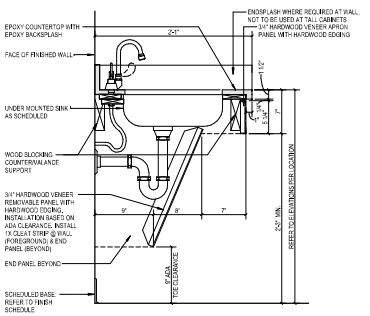
1A TYPICAL BASE CABINET - DOOR AND SINK
1 1/2" = 1'-0"



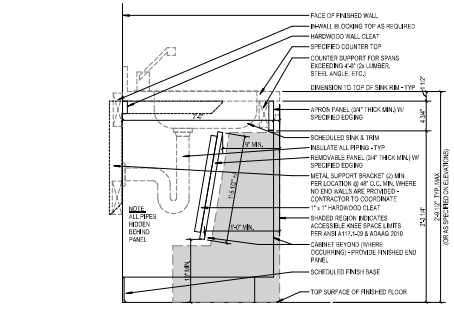
1B TYPICAL BASE - COUNTER WITH KNEE SPACE
1 1/2" = 1'-0"



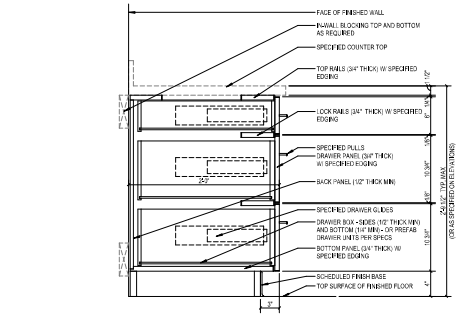
1D TYPICAL BASE CABINET - SINGLE WASTE DISPOSAL
1 1/2" = 1'-0"



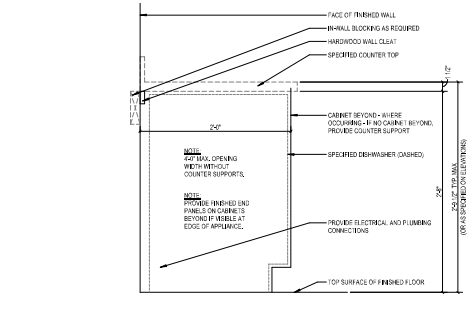
1E SCIENCE LAB - ACCESSIBLE SINK IN EPOXY COUNTERTOP
1 1/2" = 1'-0"



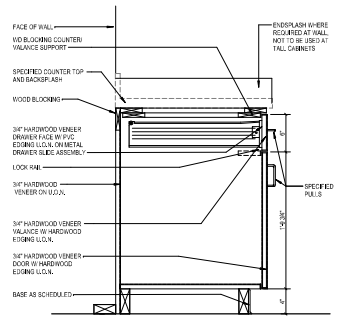
2A TYPICAL BASE - SINK COUNTER W/ REMOVABLE PANEL
1 1/2" = 1'-0"



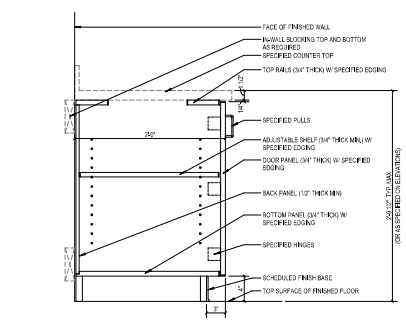
2B TYPICAL BASE CABINET - 3 BOX DRAWERS
1 1/2" = 1'-0"



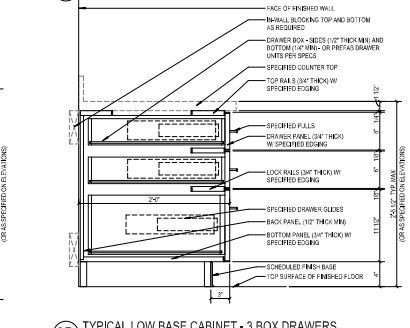
2D TYPICAL BASE CABINET - DISHWASHER
1 1/2" = 1'-0"



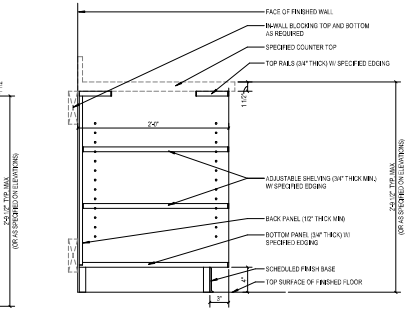
2E SCIENCE LAB - BASE CABINET WITH DRAWER
1 1/2" = 1'-0"



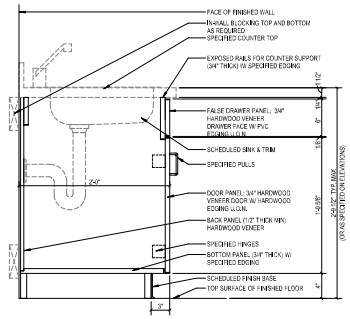
3A TYPICAL BASE CABINET - DOOR
1 1/2" = 1'-0"



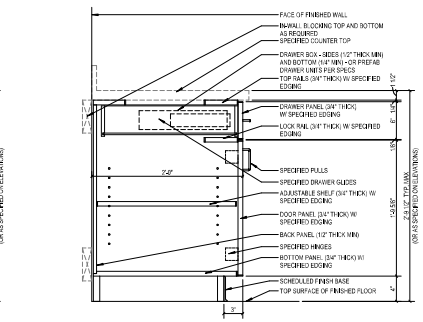
3B TYPICAL LOW BASE CABINET - 3 BOX DRAWERS
1 1/2" = 1'-0"



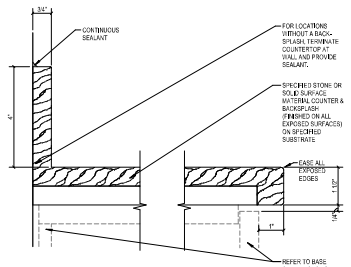
3D TYPICAL BASE CABINET - OPEN SHELVING
1 1/2" = 1'-0"



3E SCIENCE LAB - BASE CABINET - DOOR AND SINK
1 1/2" = 1'-0"



4A TYPICAL BASE CABINET - BOX DRAWER AND DOOR
1 1/2" = 1'-0"



4B TYPICAL COUNTERTOP - SOLID SURFACE / STONE
6" = 1'-0"

GENERAL CASEWORK NOTES

1. REFER TO SPECIFICATIONS FOR MINIMUM CASEWORK STANDARDS OF CONSTRUCTION AND HARDWARE REQUIREMENTS.
2. SEE FINISH PLANS FOR CABINET AND COUNTERTOP MATERIAL, PRODUCT & COLOR SPECIFICATION.
3. ALL CABINETS TO BE ANCHORED TO IN-WALL BLOCKING. SPECIFIC LOCATIONS FOR BLOCKING TO BE COORDINATED WITH CASEWORK FABRICATOR/INSTALLER.
4. FILLER PANELS - PROVIDE 1" (MIN.) FILLERS BETWEEN CABINETS & ADJACENT PERPENDICULAR WALLS AS NECESSARY. PROVIDE 1 1/2" (MIN.) FILLERS AT DRAWER UNITS. COORDINATE SPECIAL FILLER SIZES WITH SPECIFIED DOOR HARDWARE, ADJACENT CASEWORK AND/OR APPLIANCES AS REQUIRED. ALL FILLERS TO BE SCRIBED TO FINISHED WALL SURFACE, OR ADJACENT CONSTRUCTION. BASE CABINET FILLERS TO HAVE TOE-KICK PROFILE MATCHING ADJACENT BASE CABINETS.
5. PROVIDE FINISHED END PANELS AT ALL EXPOSED ENDS OF UPPER AND LOWER CABINETS.
6. THE INSIDE OF ANY CASEWORK VISIBLE FROM THE OUTSIDE SHALL HAVE P.LAM TO MATCH THE PLAM AS SPECIFIED FOR THAT AREA.
7. DO NOT EXTEND INTERMEDIATE SIDERAILS AT UNDERSIDE OF WALL CABINETS TO ALLOW FOR CONTINUOUS STRING OF LIGHT FIXTURES.
8. ALL DOORS AND DRAWERS TO HAVE RUBBER BUMPERS INSTALLED BETWEEN CABINET FACE AND INSIDE FACE OF DOOR/DRAWER.
9. EXTEND ALL COUNTERTOPS TO FINISHED WALL SURFACE AND SCRIBE. COUNTERTOP END SPLASHES TO BE PROVIDED AS INDICATED ON DRAWINGS. WHERE NO END SPLASH IS INDICATED, PROVIDE COUNTERTOP OVERHANG OF 1/2" WITH FINISHED EDGES, FOR SOLID SURFACES, STONE, AND WOOD, PROVIDE EASED/ROUNDED EDGES.
10. ALL COUNTERS WITH SINKS SHALL BE CONTINUOUS SOLID SURFACE. SEE FINISH PLANS FOR COLOR & MATERIAL SELECTION.
11. COUNTERTOPS THAT EXCEED 8'-0" BETWEEN SUPPORTS (SUCH AS BASE CABINETS AND WALLS) SHALL HAVE INTERMEDIATE SUPPORTS AS DETAILED.
12. ALL OUTSIDE CORNERS ON COUNTERTOPS SHALL BE EASED WITH 1" (MIN) RADIUS.
13. VERIFY SINK BASE(S) WITH SINK(S) SPECIFIED.
14. PROVIDE LOCKS FOR ALL CABINET DOORS AND DRAWERS, UNLESS OTHERWISE NOTED. CYLINDERS FOR CABINET DRAWERS AND DOORS SHALL BE KEYED ALIKE WITHIN EACH SPACE, AND MASTER KEYED THROUGHOUT THE PROJECT, UNLESS OTHERWISE NOTED. COORDINATE SPECIFIC LOCKING ARRANGEMENTS WITH OWNER.
15. PROVIDE GROMMETS IN OPEN COUNTER WORKSTATIONS AND RECEPTION DESKS AT 36" O.C. OR ONE PER COMPUTER STATION, WHICHEVER IS GREATER.
16. COORDINATE ALL ELECTRICAL DEVICES AND ASSOCIATED EQUIPMENT W/ CASEWORK. SEE EQUIPMENT AND/OR FURNITURE PLANS AND ELECTRICAL DWGS.
17. SOME ITEMS REQUIRE UTILITY CONNECTIONS, INCLUDING ITEMS IN OTHER PROJECT PHASES AND OWNER-INSTALLED ITEMS. SEE MEP & A/V/IT DRAWINGS AND REFER TO EQUIPMENT MANUALS FOR COMPLETE COORDINATION. COORDINATE WITH OWNER AND OTHER PROJECT PHASES FOR WORK NOT INCLUDED IN THIS DOCUMENT PACKAGE.

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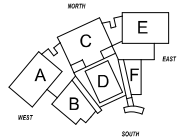
STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

CASEWORK - TYPICAL DETAILS & GENERAL NOTES

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A801

Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_GREENWICH_CENTRAL_MS_R22.rvt
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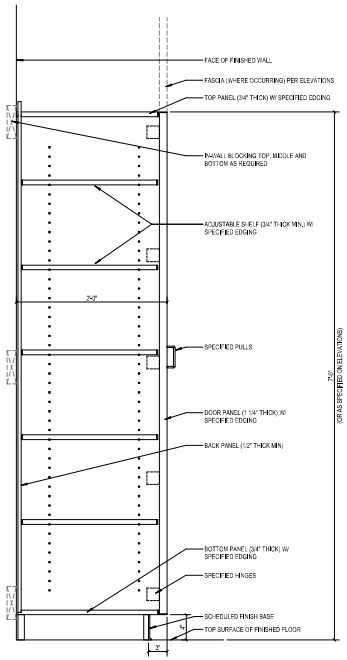
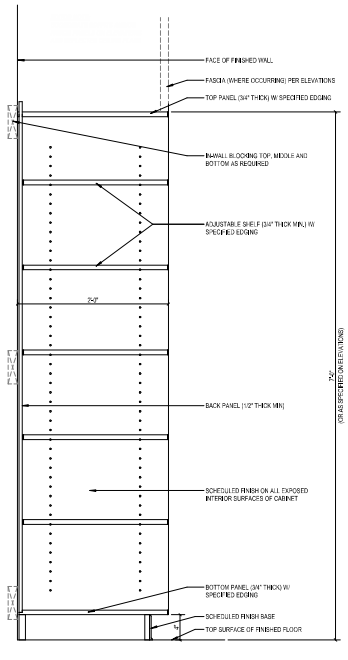
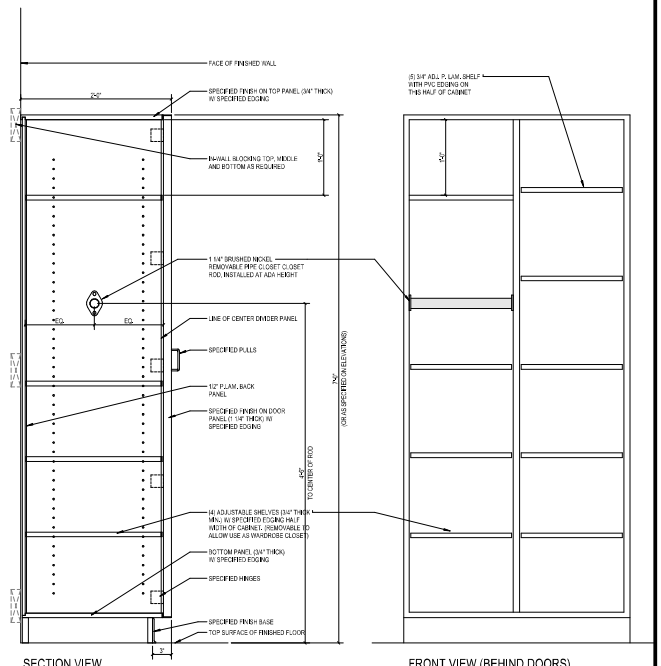


2B TYPICAL TALL CABINET - DOOR & SHELVES
1 1/2" = 1'-0"



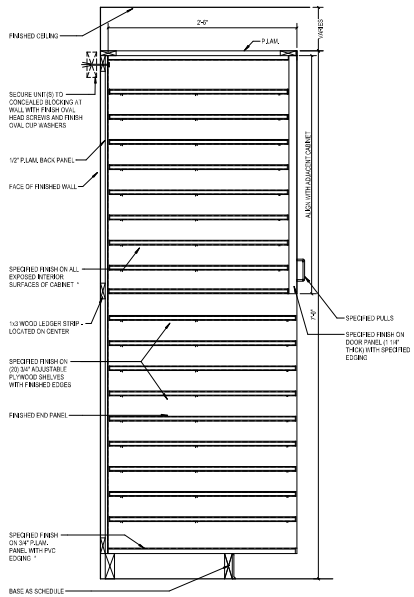
3B TYPICAL TALL CABINET - OPEN SHELVING
1 1/2" = 1'-0"



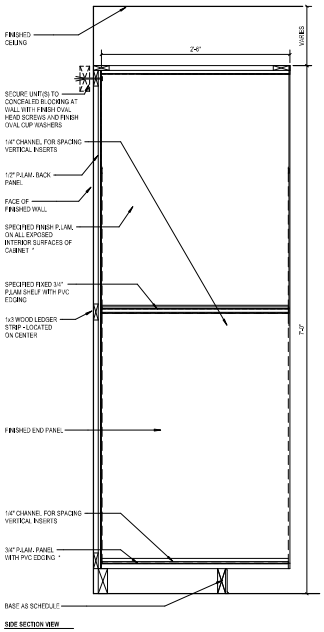
SECTION VIEW

FRONT VIEW (BEHIND DOORS)

4B TYPICAL TALL CABINET - WARDROBE COMBO
1 1/2" = 1'-0"

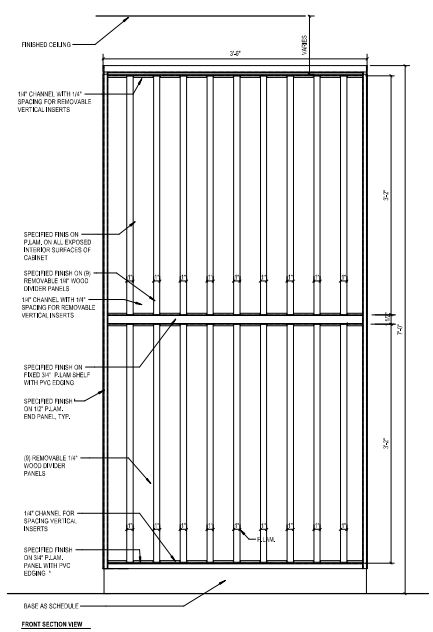


1E ART CABINET - HORZONTAL STORAGE
1 1/2" = 1'-0"



SIDE SECTION VIEW

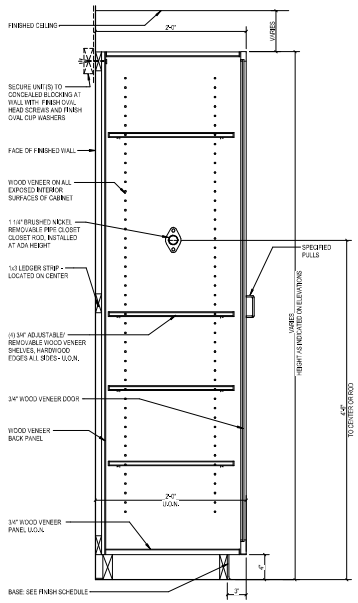
2E ART CABINET - VERTICAL STORAGE
1 1/2" = 1'-0"



FRONT SECTION VIEW

4E SCIENCE LAB - TALL STORAGE CABINET WOOD
1 1/2" = 1'-0"

FRONT ELEVATION SIM. TO 4B/A802



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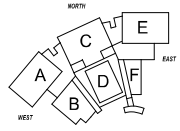
Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

CASEWORK - TYPICAL DETAILS

Date 07/08/2024
Scale 1 1/2" = 1'-0"
Proj. Number 22367.00
Drawing Number **A802**

Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_GREENWICH_CENTRAL_MS_R23.rvt
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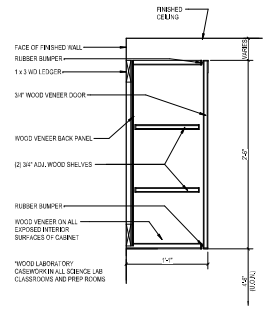
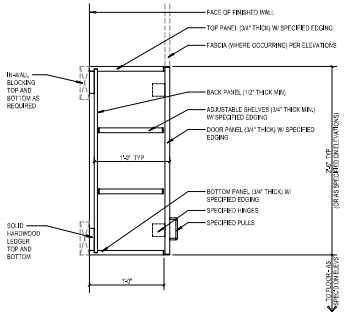
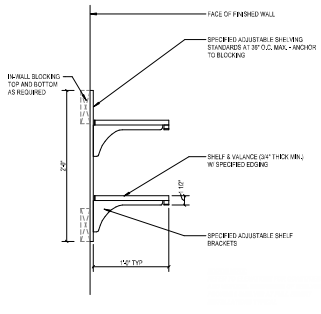


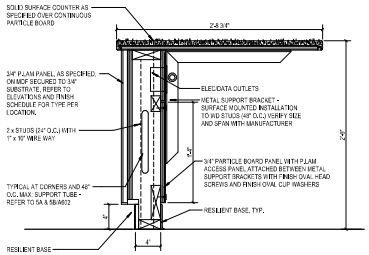
1A SCIENCE - WALL CABINET - DOOR
1 1/2" = 1'-0"



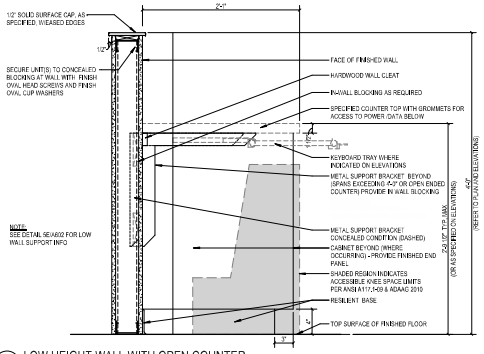
3A TYPICAL WALL CABINET - DOOR
1 1/2" = 1'-0"



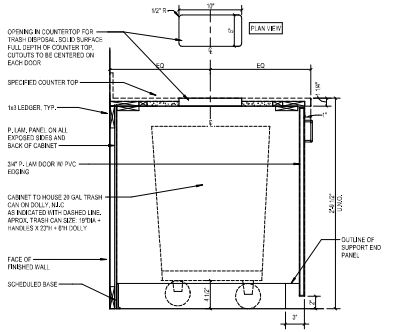
4A TYPICAL FLOATING SHELVES
1 1/2" = 1'-0"



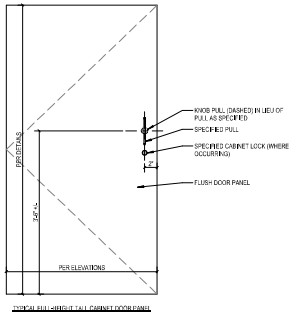
1C RECEPTION DESK - OPEN COUNTER
1 1/2" = 1'-0"



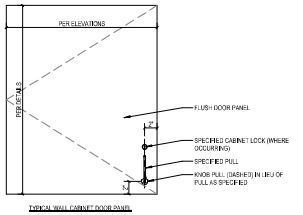
2C LOW HEIGHT WALL WITH OPEN COUNTER
1 1/2" = 1'-0"



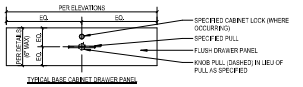
3C BASE CABINET FOR CAFETERIA GARBAGE BINS
1 1/2" = 1'-0"



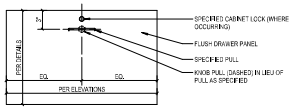
TYPICAL FULL HEIGHT TALL CABINET DOOR PANEL



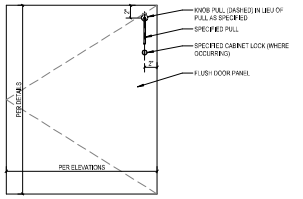
TYPICAL WALL CABINET DOOR PANEL



TYPICAL BASE CABINET DRAWER PANEL

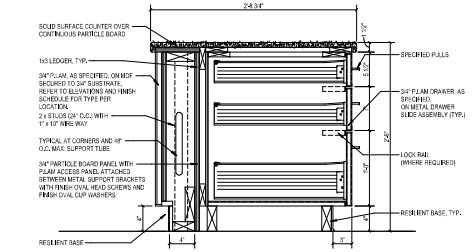


TYPICAL BASE CABINET DEEP DRAWER PANEL

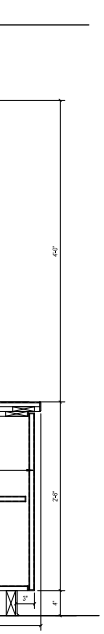


TYPICAL BASE CABINET DOOR PANEL

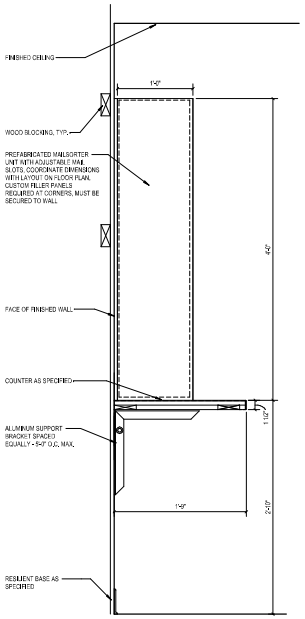
4E TYPICAL CABINET DOOR & DRAWER PANEL ELEVATIONS FOR HARDWARE PLACEMENT
1 1/2" = 1'-0"



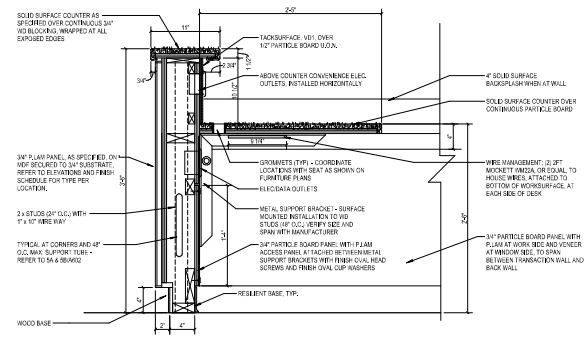
1D RECEPTION DESK - WORK COUNTER WITH STORAGE
1 1/2" = 1'-0"



2E MAIL SORTER WITH STORAGE
1 1/2" = 1'-0"



3E MAIL SORTER WITH OPEN COUNTER
1 1/2" = 1'-0"



1E RECEPTION DESK - OPEN WORK COUNTER AND TRANSATION COUNTER
1 1/2" = 1'-0"

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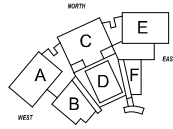

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

CASEWORK - TYPICAL DETAILS

Date 07/08/2024
Scale 1 1/2" = 1'-0"
Proj. Number 22367.00
Drawing Number A803

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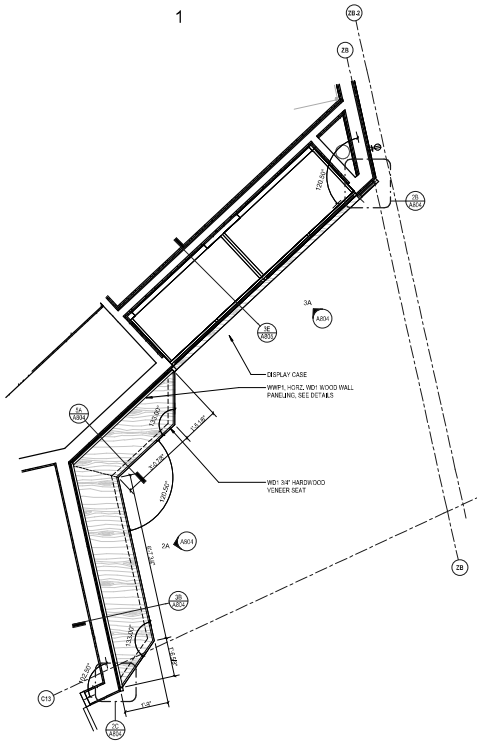
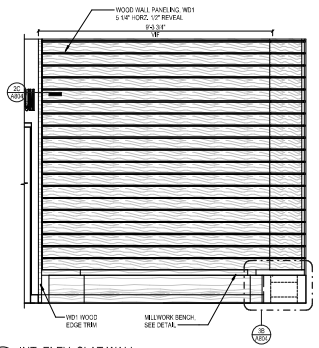
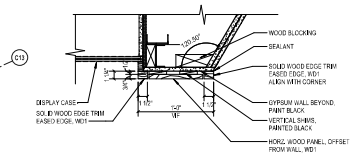


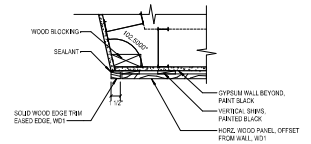
1C 1 - FIRST FLOOR PLAN - D - Callout 1
1/2" = 1'-0"



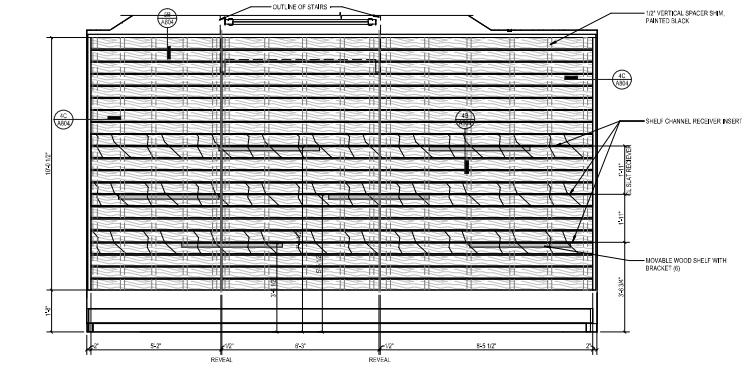
2A INT. ELEV. SLAT WALL
1/2" = 1'-0"



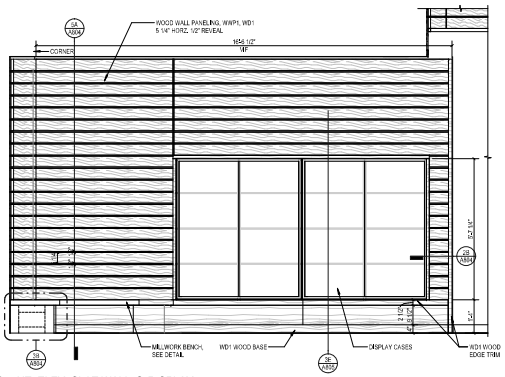
2B MILLWORK - SLAT WALL @ DISPLAY CASE
1 1/2" = 1'-0"



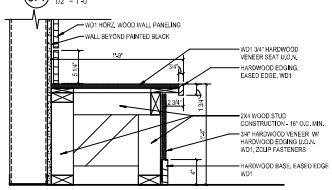
2C MILLWORK - SLAT WALL @ ANGLE
1 1/2" = 1'-0"



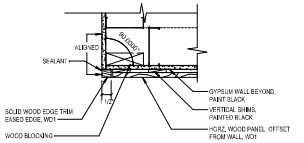
1E SLAT WALL ELEVATION
1/2" = 1'-0"



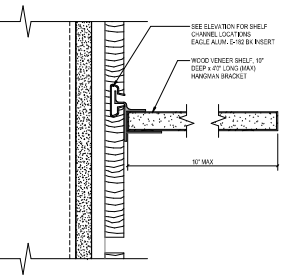
3A INT. ELEV. SLAT WALL @ DISPLAY
1/2" = 1'-0"



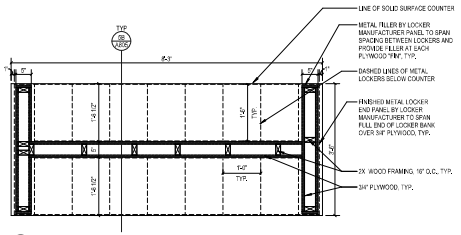
3B MILLWORK BENCH DETAIL @ WALL
1 1/2" = 1'-0"



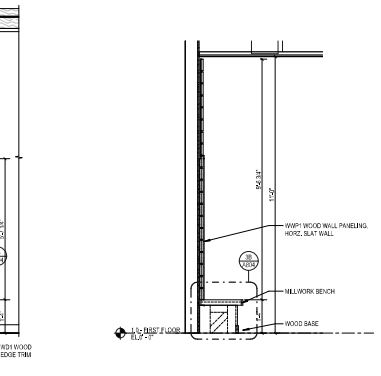
3C MILLWORK - SLAT WALL @ OUTSIDE CORNER
1 1/2" = 1'-0"



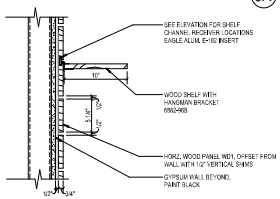
2E MILLWORK - SLAT WALL @ SHELF DETAIL
6" = 1'-0"



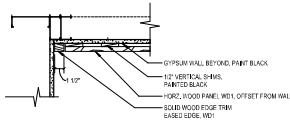
3E LOCKER SUPPORT PLAN DETAIL
3/4" = 1'-0"



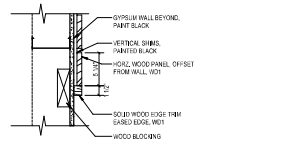
5A INT. SECTION @ SLAT WALL
1/2" = 1'-0"



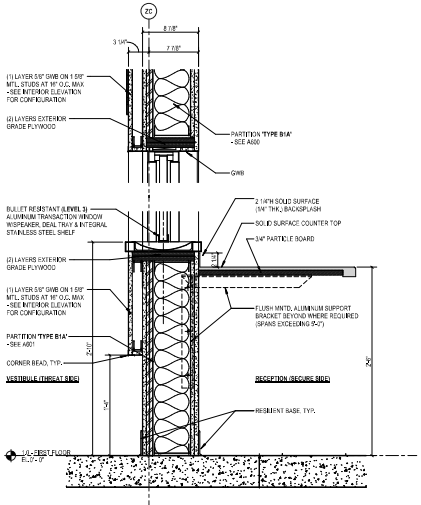
4B MILLWORK - SLAT WALL @ SHELF
1 1/2" = 1'-0"



4C MILLWORK - SLAT WALL @ INSIDE CORNER
1 1/2" = 1'-0"



5B MILLWORK - SLAT WALL @ END
1 1/2" = 1'-0"



5E INTERIOR SECTION - AT RECEPTION WINDOW
1 1/2" = 1'-0"

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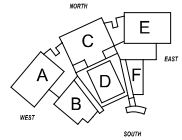

KEYPLAN

Number	Date	Issued For
1	05/03/2024 07/08/2024 MM/DD/YYYY	BIDDING PERMIT PHASE 2 Editor Notes

INTERIOR DETAILS

Date 07/08/2024
Scale As indicated
Proj. Number 22367.00
Drawing Number A804

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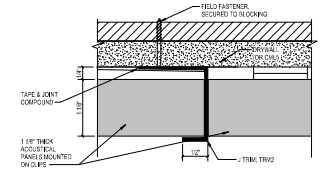
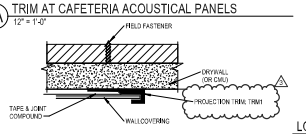


TO BE USED WITH ACOUSTICAL PANELS AS NOTED IN FINISH PRODUCT LIST AND ELEVATIONS

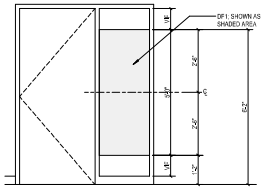
1A TRIM AT CAFETERIA ACOUSTICAL PANELS
12" = 1'-0"



TO BE USED WHERE EDGE OF WALLCOVERING IS EXPOSED

1B TYPICAL EXPOSED EDGE TRIM AT WALLCOVERING
12" = 1'-0"

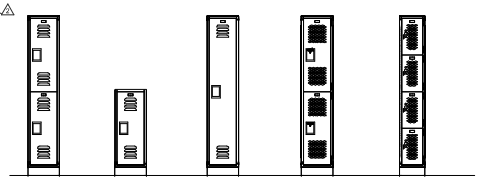
NOTE:
TYPICAL DECORATIVE FILM INSTALLATION AT SIDELITES, TO BE INSTALLED ON THE INTERIOR SIDE (NOT CORRIDOR SIDE) OF EACH ROOM, CENTERED VERTICALLY ON THE SIDELITE. DIMENSIONS TO BE VIF.



1C TYPICAL DECORATIVE FILM INSTALL
1/2" = 1'-0"

LOCKER TYPE ELEVATION LEGEND:

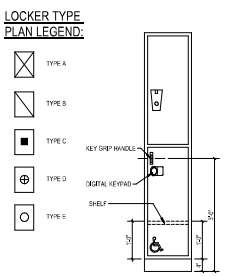
NOTES:
PROVIDE 4" ZEE BASE AT ALL LOCKER LOCATIONS
PROVIDE FLAT TOPS AT ALL LOCKERS THROUGHOUT
REFER TO ELEVATIONS FOR ACCENT PAINT COLOR DESIGNATIONS FOR 2ND FLOOR LOCKERS



TYPE A	TYPE B	TYPE C	TYPE D	TYPE E
12"W X 18"D X 72"h - DOUBLE TIER - METAL LOCKER (TYP. STUDENT)	12"W X 18"D X 48"h - SINGLE TIER - S.S COUNTER ON TOP (TYP. STUDENT)	12"W X 18"D X 72"h - SINGLE TIER - METAL LOCKER (TYP. OSTEOPATH)	12"W X 18"D X 72"h - DOUBLE TIER - METAL LOCKER (PE/ATHLETICS LOCKER RM.)	12"W X 18"D X 72"h - FOUR TIER - METAL LOCKER (PE/ATHLETICS LOCKER RM.)

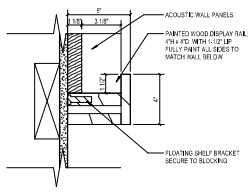
LOCKER TYPE LEGEND
1/2" = 1'-0"

LOCKER TYPE PLAN LEGEND:

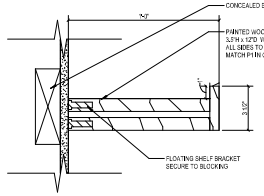


NOTE: PROVIDE AT 5% OF EACH LOCKER TYPE; SEE INTERIOR ELEVATIONS FOR LOCATIONS

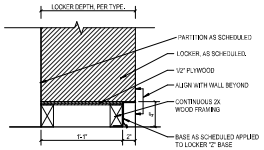
3A ADA LOCKER
3/4" = 1'-0"



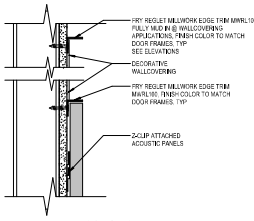
4A MILLWORK - WOOD RAIL
3" = 1'-0"



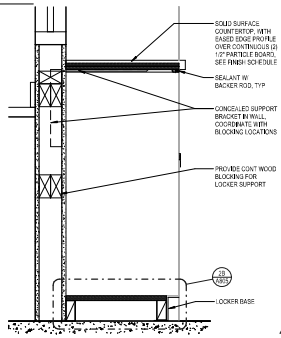
5A MILLWORK - DISPLAY SHELF
3" = 1'-0"



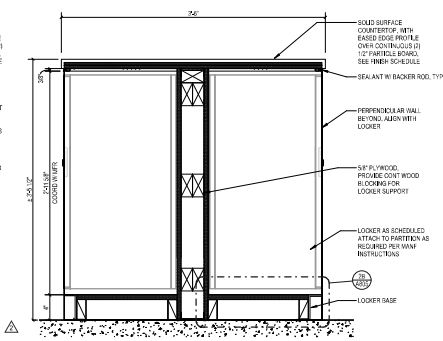
2B LOCKER BASE
1 1/2" = 1'-0"



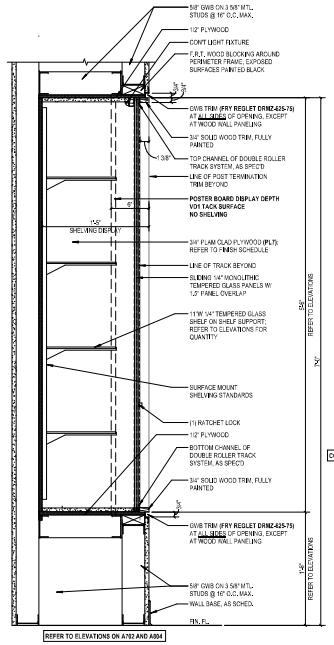
3B INT. DETAIL - ACOUSTIC WALL PANEL
3" = 1'-0"



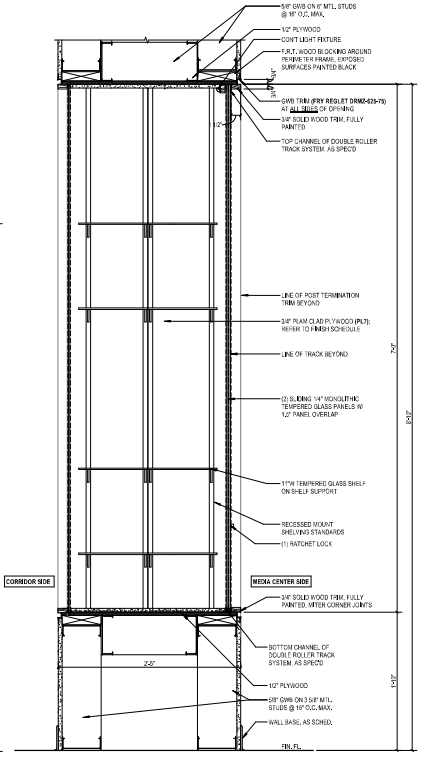
4B LOCKERS AT LOW COUNTER
1 1/2" = 1'-0"



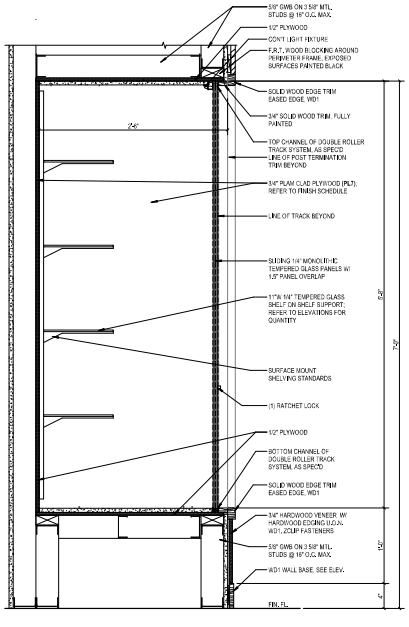
5B LOCKERS AT LOW WALL AND COUNTERTOP
1 1/2" = 1'-0"



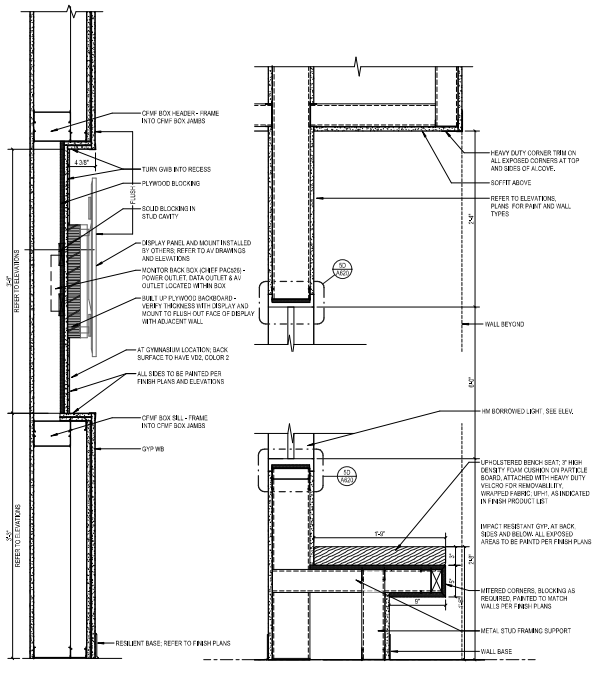
1E RECESSED DISPLAY CASE
1 1/2" = 1'-0"



2E RECESSED DISPLAY CASE DBL SIDED SECTION DETAIL
1 1/2" = 1'-0"



3E RECESSED DISPLAY CASE SINGLE SIDED
1 1/2" = 1'-0"



4E RECESSED MONITOR
1 1/2" = 1'-0"

5E BUILT-IN BENCH SEAT
1 1/2" = 1'-0"

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Greenwich Central Middle School

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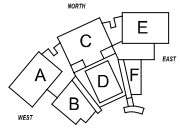

KEYPLAN

Number	Date	Issued For
3	11/05/2024	ADDENDUM NO. 5
2	10/30/2024	ADDENDUM NO. 4
1	10/16/2024	ADDENDUM NO. 2
	09/20/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

INTERIOR DETAILS

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A805

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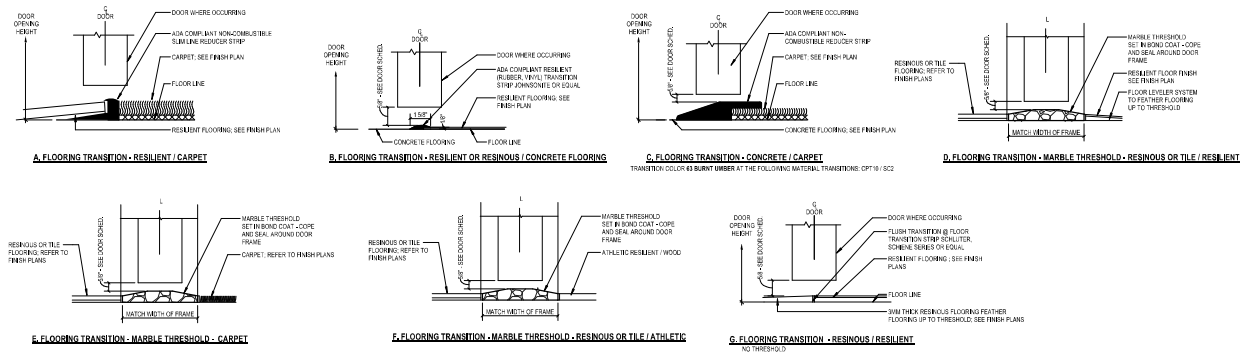
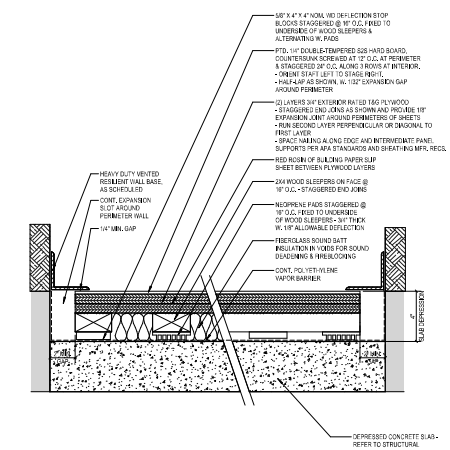
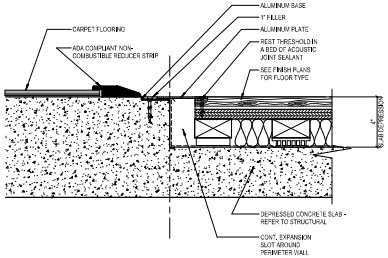


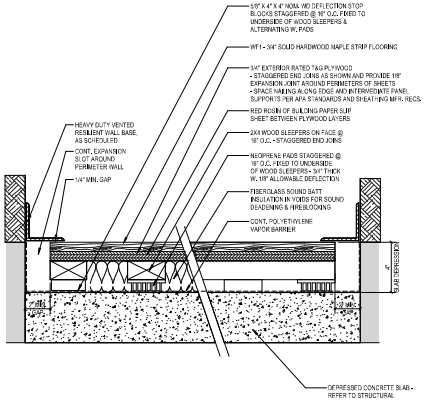
2B FLOORING TRANSITIONS
3" = 1'-0"



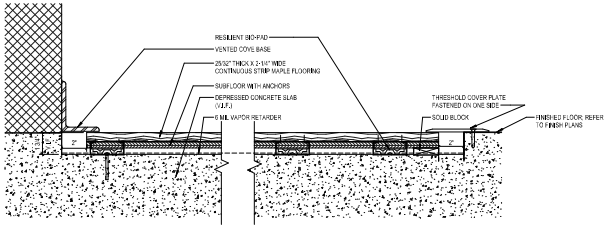
1D MASONITE FLOORING AT STAGE
3" = 1'-0"



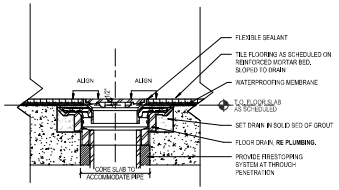
2D WOOD FLOORING AT STAGE - TRANSITION TO CARPET
3" = 1'-0"



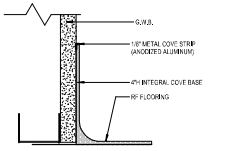
3D WOOD FLOORING AT STAGE
3" = 1'-0"



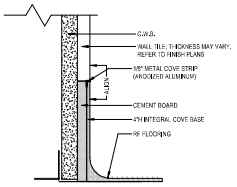
1E WOOD ATHLETIC FLOORING AT GYM
3" = 1'-0"



3E SECTION AT FLOOR DRAIN
3" = 1'-0"

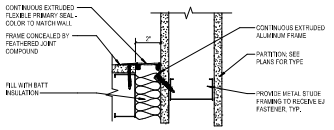


RF FLOORING WITH INTEGRAL BASE

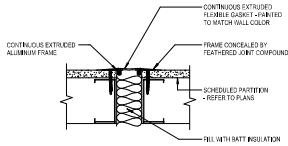


RF FLOORING WITH INTEGRAL BASE WITH WALL TILE ABOVE

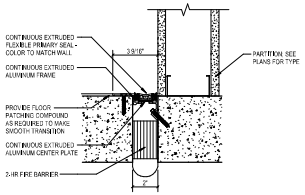
4E RESINOUS BASE DETAILS
6" = 1'-0"



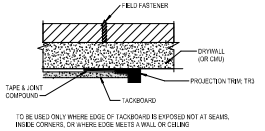
5A WALL EJ - IWJ-2 CORNER
3" = 1'-0"



5B WALL EJ - IWJ-1
3" = 1'-0"

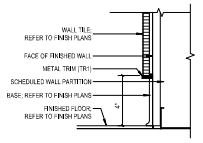


5C FLOOR EJ - IFJ-1
3" = 1'-0"



TO BE USED ONLY WHERE EDGE OF TACKBOARD IS EXPOSED NOT AT SEAMS, INSIDE CORNERS, OR WHERE EDGE MEETS A WALL OR CEILING

TYPICAL EXPOSED EDGE TRIM AT EXPOSED EDGE OF TACKBOARD ROLLGOODS
12" = 1'-0"



5E TYPICAL TRIM WHERE WALL TILE IS INSTALLED WITH LVT FLOOR
3" = 1'-0"

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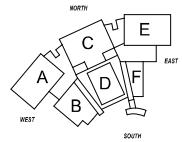

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

INTERIOR DETAILS

Date 07/08/2024
Scale As indicated
Proj. Number 22367.00
Drawing Number A806

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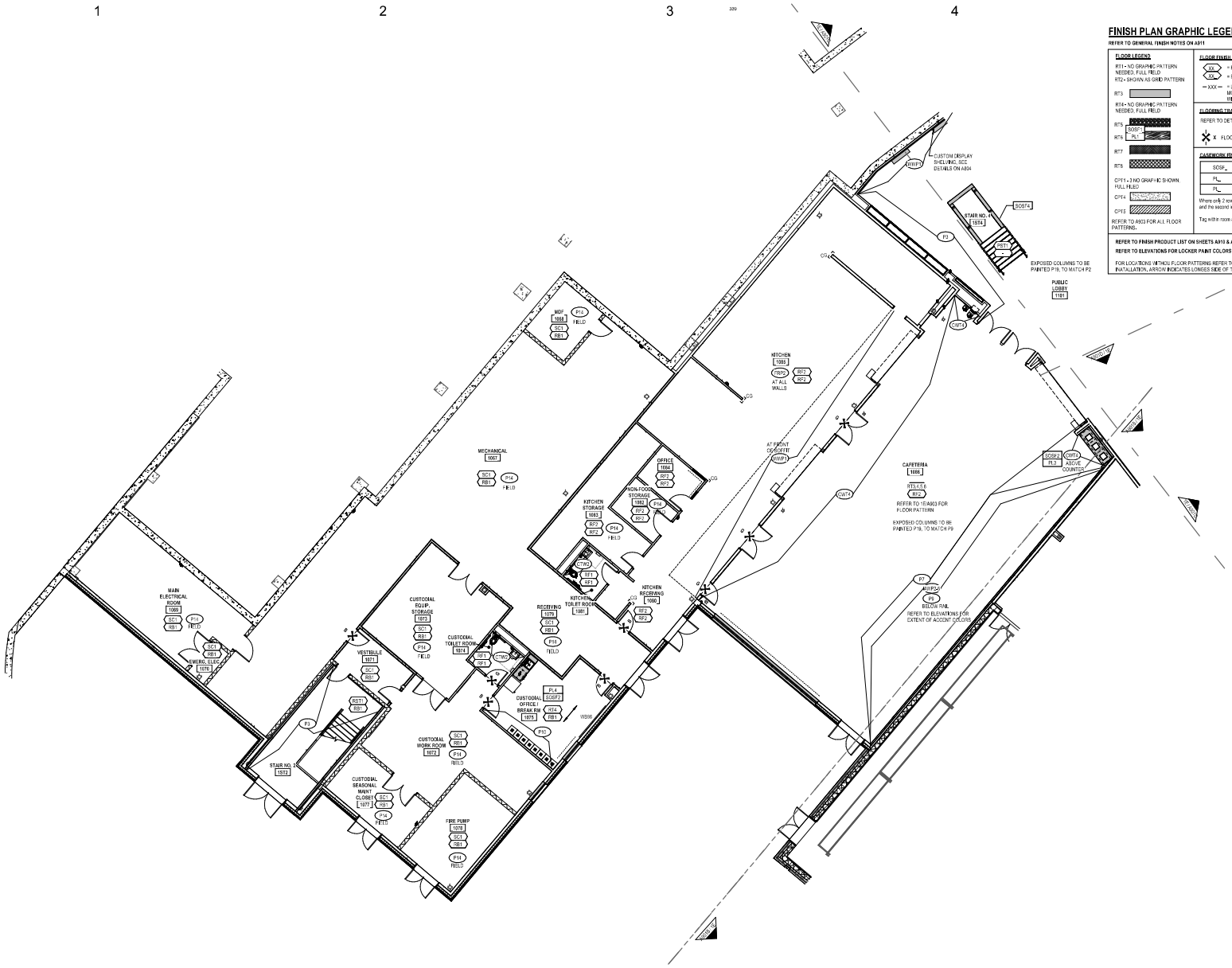

1E FIRST FLOOR FINISH PLAN - PART A
1/8" = 1'-0"

FINISH PLAN GRAPHIC LEGEND

REFER TO GENERAL FINISH NOTES ON A911

FLOOR LEGEND

RT1 - NO GRAPHIC PATTERN NEEDED, FULL FIELD
RT2 - SHOWN AS GRID PATTERN
RT3
RT4 - NO GRAPHIC PATTERN NEEDED, FULL FIELD
RT5 SOSF1
RT6 PL1
RT7
RT8
CPT1 - 3 NO GRAPHIC SHOWN, FULL FILED
CPT4
CPT5
REFER TO A903 FOR ALL FLOOR PATTERNS.

FLOOR FINISH TAGS ON PLANS

XX = FLOORING
XX = BASE
XXX = LOCATION OF BASE WHERE MORE THAN ONE TYPE WITHIN SPACE

FLOORING TRANSITION DETAIL LEGEND

REFER TO DETAILS 26/A806
X FLOORING TRANSITION

CASEWORK FINISH TAGS ON PLANS

SOSF_ = COUNTERS
PL_ = BASE & TALL CABINETS
PL_ = TALL CABINET DOORS (IF DIFFERENT THAN BASE)

Where only 2 rows are shown the first indicates all components of cabinets and the second indicates the counter.

Tag with in room applies to all casework within space, UNO.

WALL FINISH LEGEND

XX WALL MATERIAL OTHER THAN STANDARD PAINT COLOR

ROLLER WINDOW SHADE LOCATIONS

RS1 MANUAL SHOWN AS AT EXTERIOR AND INTERIOR WINDOWS
RS2 AT GYM ONLY

REFER TO FINISH PRODUCT LIST ON SHEETS A910 & A911 FOR COMPLETE LIST OF PRODUCT REFERENCED HERE.

REFER TO ELEVATIONS FOR LOCKER PAINT COLORS

FOR LOCATIONS WITHOU FLOOR PATTERNS REFER TO FINISH PLANS FOR ARROW INDICATING DIRECTION OF TILE INATALLATION. ARROW INDICATES LONGES SIDE OF TILE OR PLANKS.

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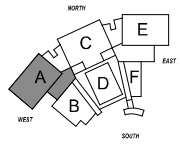

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRST FLOOR FINISH PLAN - PART A

Date 07/08/2024
Scale As indicated
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Drawing Number A901A

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FINISH PLAN GRAPHIC LEGEND

REFER TO GENERAL FINISH NOTES ON A911

FLOOR LEGEND

RT1 - NO GRAPHIC PATTERN NEEDED. FULL FIELD
RT2 - SHOWN AS GRID PATTERN
RT3
RT4 - NO GRAPHIC PATTERN NEEDED. FULL FIELD
RT5
RT6
RT7
RT8
CPT1 - 3 NO GRAPHIC SHOWN. FULL FIELD
CPT4
CPT5
REFER TO A903 FOR ALL FLOOR PATTERNS.

FLOOR FINISH TAGS ON PLANS

XX = FLOORING
XX = BASE
XXX = LOCATION OF BASE WHERE MORE THAN ONE TYPE WITHIN SPACE

WALL FINISH LEGEND

XX WALL MATERIAL OTHER THAN STANDARD PAINT COLOR

FLOORING TRANSITION DETAIL LEGEND

REFER TO DETAILS 28 / A906
X FLOORING TRANSITION

ROLLER WINDOW SHADE LOCATIONS

RS1 MANUAL SHOWN AS AT EXTERIOR AND INTERIOR WINDOWS
RS2 AT GYM ONLY

CASEWORK FINISH TAGS ON PLANS

SOSF_ = COUNTERS
PL_ = BASE & TALL CABINETS
PL_ = TALL CABINET DOORS (IF DIFFERENT THAN BASE)

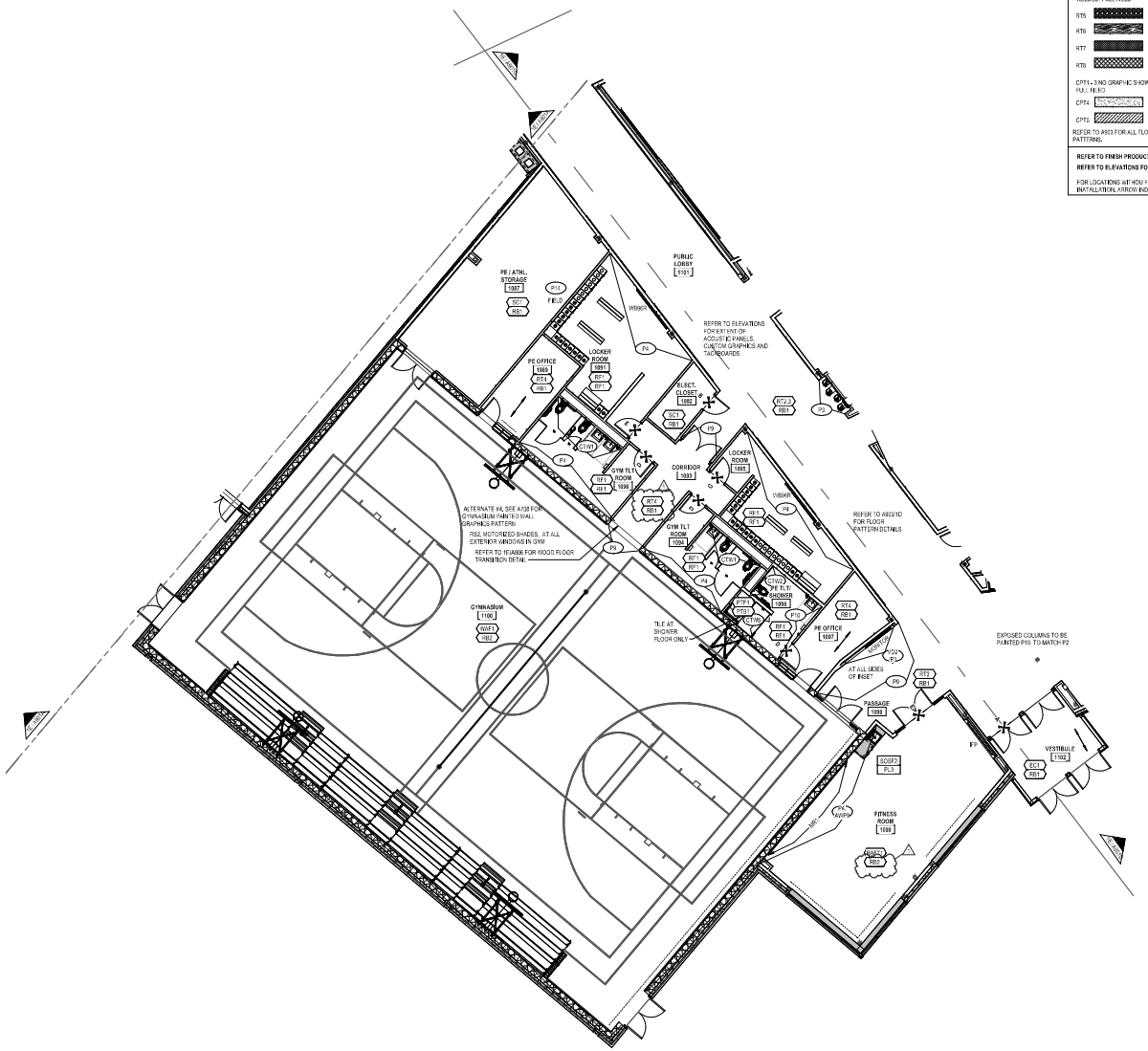
Where only 2 rows are shown the first indicates all components of cabinets and the second indicates the counter.

Tag within room applies to all casework within space, UNO.

REFER TO FINISH PRODUCT LIST ON SHEETS A910 & A911 FOR COMPLETE LIST OF PRODUCT REFERENCED HERE.

REFER TO ELEVATIONS FOR LOCKER PAINT COLORS

FOR LOCATIONS WITHOU FLOOR PATTERNS REFER TO FINISH PLANS FOR ARROW INDICATING DIRECTION OF TILE INATALLATION. ARROW INDICATES LONGES SIDE OF TILE OR PLANKS.



1E FIRST FLOOR PLAN - PART B
1/8" = 1'-0"

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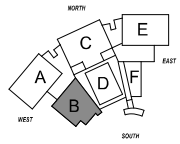

KEYPLAN

Number	Date	Issued For
1	11/08/2024	ADDENDUM NO. 6
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRST FLOOR FINISH PLAN - PART B

Date
07/08/2024
Scale
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Proj. Number
22367.00

Drawing Number
A901B

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FINISH PLAN GRAPHIC LEGEND

REFER TO GENERAL FINISH NOTES ON A911

FLOOR LEGEND

RT1 - NO GRAPHIC PATTERN NEEDED, FULL FIELD
RT2 - SHOWN AS GRID PATTERN
RT3
RT4 - NO GRAPHIC PATTERN NEEDED, FULL FIELD
RT5
RT6
RT7
RT8
CPT1 - 3 NO GRAPHIC SHOWN, FULL FILED
CPT4
CPT5
REFER TO A903 FOR ALL FLOOR PATTERNS.

FLOOR FINISH TAGS ON PLANS

XX = FLOORING
XX = BASE
XXX = LOCATION OF BASE WHERE MORE THAN ONE TYPE WITHIN SPACE

FLOORING TRANSITION DETAIL LEGEND

REFER TO DETAILS 2B/A856
X FLOORING TRANSITION

CASEWORK FINISH TAGS ON PLANS

SOSF_ = COUNTERS
PL_ = BASE & TALL CABINETS
PL_ = TALL CABINET DOORS (IF DIFFERENT THAN BASE)

Where only 2 rows are shown the first indicates all components of cabinets and the second indicates the counter.

Tag within room applies to all casework within space, UNO.

WALL FINISH LEGEND

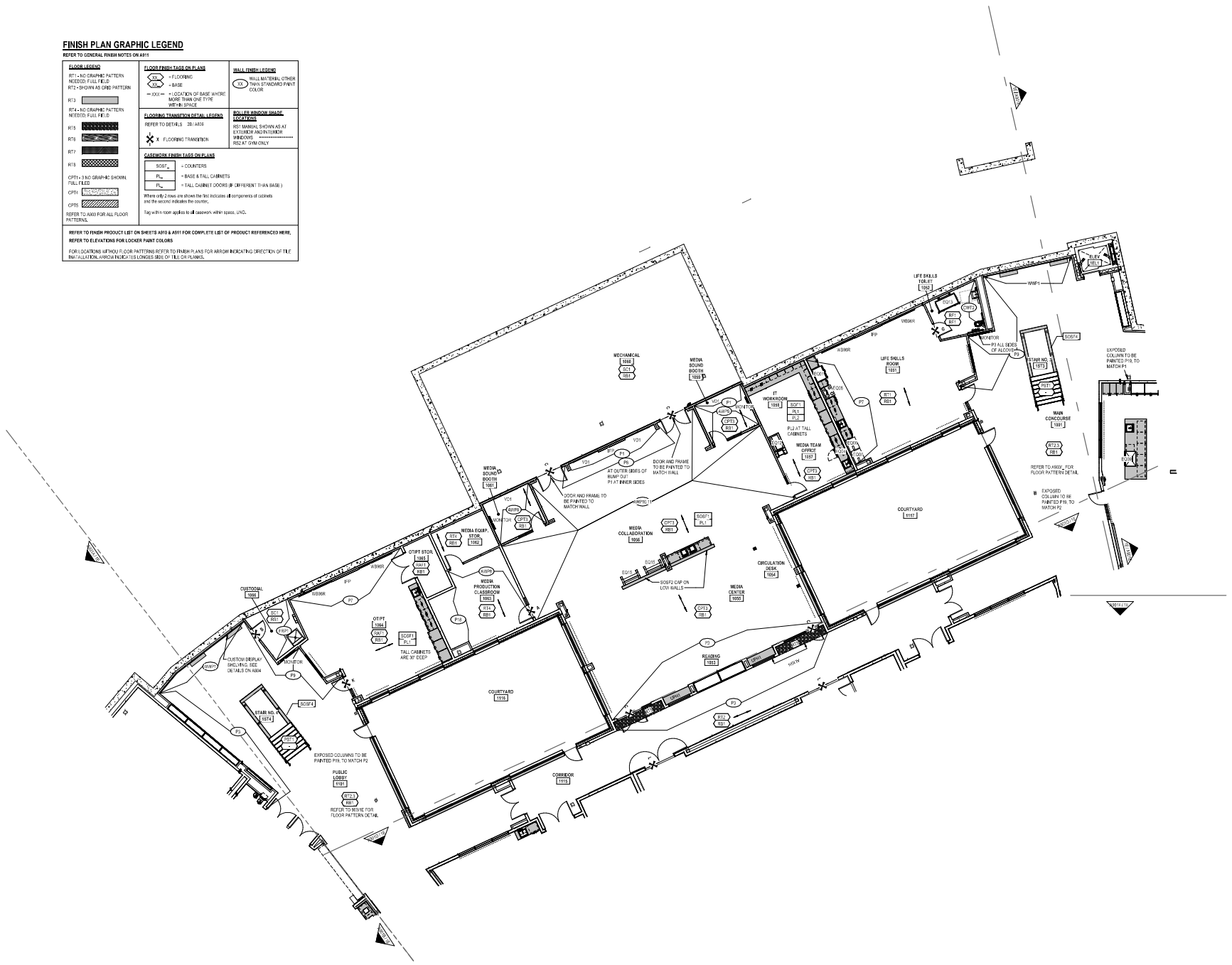
XX WALL MATERIAL OTHER THAN STANDARD PAINT COLOR

ROLLER WINDOW SHADE LOCATIONS

RS1 MANUAL SHOWN AS AT EXTERIOR AND INTERIOR WINDOWS
RS2 AT GYM ONLY

REFER TO FINISH PRODUCT LIST ON SHEETS A910 & A911 FOR COMPLETE LIST OF PRODUCT REFERENCED HERE, REFER TO ELEVATIONS FOR LOCKER PAINT COLORS

FOR LOCATIONS WITHOUT FLOOR PATTERNS REFER TO FINISH PLANS FOR ARROW INDICATING DIRECTION OF TILE INSTALLATION. ARROW INDICATES LONGES SIDE OF TILE OR PLANKS.



1E FIRST FLOOR FINISH PLAN - PART C
1/8" = 1'-0"

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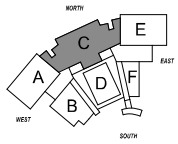
STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRST FLOOR FINISH PLAN - PART C

Date: 07/08/2024
Scale: As indicated
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Drawing Number: A901C

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FINISH PLAN GRAPHIC LEGEND

REFER TO GENERAL FINISH NOTES ON A911

FLOOR LEGEND

RT1 - NO GRAPHIC PATTERN NEEDED, FULL FIELD

RT2 - SHOWN AS GRID PATTERN

RT3

RT4 - NO GRAPHIC PATTERN NEEDED, FULL FIELD

RT5

RT6

RT7

RT8

CPT1 - 3 NO GRAPHIC SHOWN, FULL FILED

CPT4

CPT5

REFER TO A903 FOR ALL FLOOR PATTERNS.

FLOOR FINISH TAGS ON PLANS

XX = FLOORING

XX = BASE

— XXX — = LOCATION OF BASE WHERE MORE THAN ONE TYPE WITHIN SPACE

FLOORING TRANSITION DETAIL LEGEND

REFER TO DETAILS 2/9/A906

X = FLOORING TRANSITION

CASEWORK FINISH TAGS ON PLANS

SCSF_ = COUNTERS

PL_ = BASE & TALL CABINETS

PL_ = TALL CABINET DOORS (IF DIFFERENT THAN BASE)

Where only 2 rows are shown the first indicates all components of cabinets and the second indicates the counter.

Tag within room applies to all casework within space, U.N.O.

WALL FINISH LEGEND

XX = WALL MATERIAL OTHER THAN STANDARD PAINT COLOR

ROLLER WINDOW SHADE LOCATION

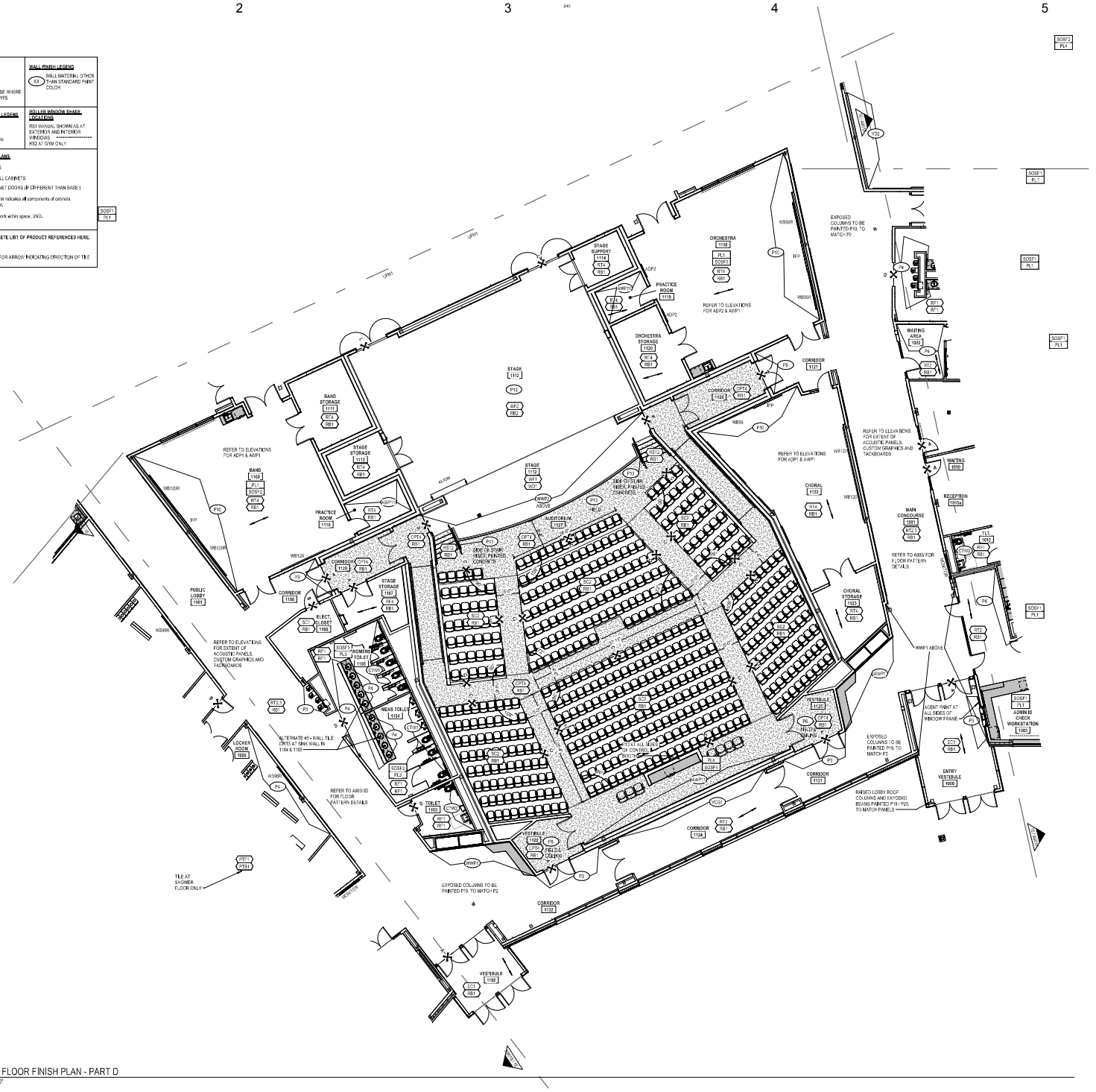
RS1 MANUAL SHOWN AS AT EXTERIOR AND INTERIOR WINDOWS

RS2 AT GYM ONLY

REFER TO FINISH PRODUCT LIST ON SHEETS A910 & A911 FOR COMPLETE LIST OF PRODUCT REFERENCED HERE.

REFER TO ELEVATIONS FOR LOCKER PAINT COLORS

FOR LOCATIONS WITHOUT FLOOR PATTERNS REFER TO FINISH PLANS FOR ARROW INDICATING DIRECTION OF TILE INSTALLATION, ARROW INDICATES LONGER SIDE OF TILE OR PLANKS.



1E FIRST FLOOR FINISH PLAN - PART D

1/8" = 1'-0"

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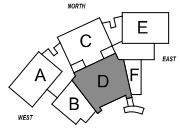

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRST FLOOR FINISH PLAN - PART D

Date: 07/08/2024

Scale: As indicated

Proj. Number: 22367.00

Drawing Number: **A901D**

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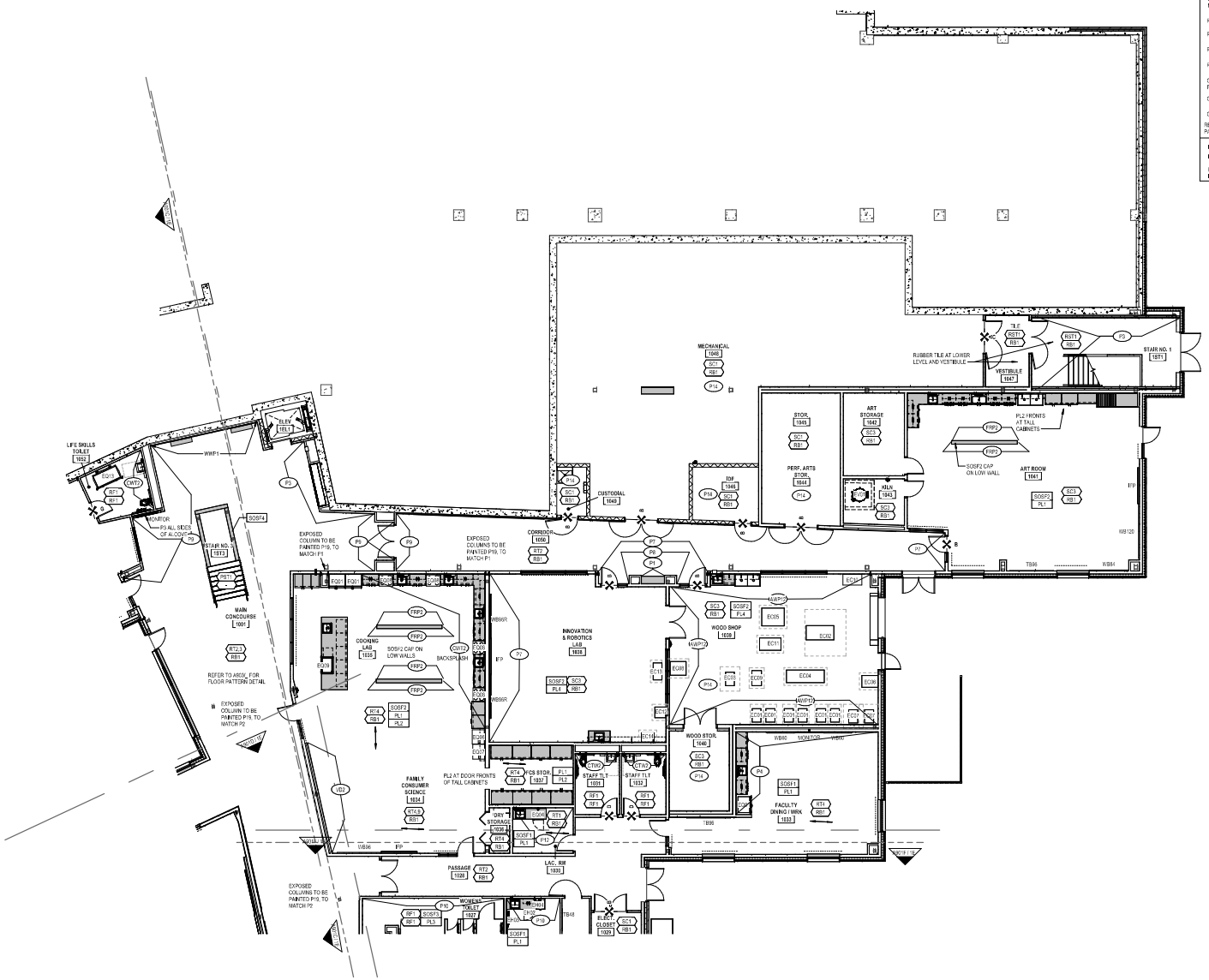

1E FIRST FLOOR FINISH PLAN - PART E
1/8" = 1'-0"

FINISH PLAN GRAPHIC LEGEND

REFER TO GENERAL FINISH NOTES ON A911

FLOOR LEGEND

RT1 - NO GRAPHIC PATTERN NEEDED, FULL FIELD
RT2 - SHOWN AS GRID PATTERN
RT3
RT4 - NO GRAPHIC PATTERN NEEDED, FULL FIELD
RT5
RT6
RT7
RT8
CPT1 - 3 NO GRAPHIC SHOWN, FULL FILED
CPT4
CPT5
REFER TO A903 FOR ALL FLOOR PATTERNS.

FLOOR FINISH TAGS ON PLANS

XX = FLOORING
XX = BASE
—XXX— = LOCATION OF BASE WHERE MORE THAN ONE TYPE WITHIN SPACE

WALL FINISH LEGEND

XX = WALL MATERIAL OTHER THAN STANDARD PAINT COLOR

FLOORING TRANSITION DETAIL LEGEND

REFER TO DETAILS 2B / AR06
X = FLOORING TRANSITION

ROLLER WINDOW SHADE LOCATIONS

RS1 MANUAL SHOWN AS AT EXTERIOR AND INTERIOR WINDOWS
RS2 AT GYM ONLY

CASEWORK FINISH TAGS ON PLANS

SOSF_ = COUNTERS
PL_ = BASE & TALL CABINETS
PL_ = TALL CABINET DOORS (IF DIFFERENT THAN BASE)

Where only 2 rows are shown the first indicates all components of cabinets and the second indicates the counter.

Tag within room applies to all casework within space, UNO.

REFER TO FINISH PRODUCT LIST ON SHEETS A910 & A911 FOR COMPLETE LIST OF PRODUCT REFERENCED HERE. REFER TO ELEVATIONS FOR LOCKER PAINT COLORS

FOR LOCATIONS WITHOU FLOOR PATTERNS REFER TO FINISH PLANS FOR ARROW INDICATING DIRECTION OF TILE INSTALLATION, ARROW INDICATES LONGES SIDE OF TILE OR PLANKS.

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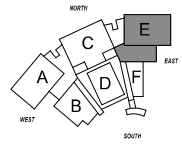
STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRST FLOOR FINISH PLAN - PART E

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: **A901E**

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1E FIRST FLOOR FINISH PLAN - PART F
1/8" = 1'-0"

FINISH PLAN GRAPHIC LEGEND

REFER TO GENERAL FINISH NOTES ON A911

FLOOR LEGEND

RT1 - NO GRAPHIC PATTERN NEEDED, FULL FIELD
RT2 - SHOWN AS GRID PATTERN
RT3
RT4 - NO GRAPHIC PATTERN NEEDED, FULL FIELD
RT5
RT6
RT7
RT8
CPT1 - 3 NO GRAPHIC SHOWN, FULL TILED
CPT4
CPT5
REFER TO A903 FOR ALL FLOOR PATTERNS.

FLOOR FINISH TAGS ON PLANS

XX = FLOORING
XX = BASE
XXX = LOCATION OF BASE WHERE MORE THAN ONE TYPE WITHIN SPACE

WALL FINISH LEGEND

XX WALL MATERIAL OTHER THAN STANDARD PAINT COLOR

FLOORING TRANSITION DETAIL LEGEND

REFER TO DETAILS 3B1/A806
X FLOORING TRANSITION

ROLLER WINDOW SHADE LOCATIONS

RS1 MANUAL SHOWN AS AT EXTERIOR AND INTERIOR WINDOWS
RS2 AT GYM ONLY

CASEWORK ITEMS TAGS ON PLANS

SOS?_ = COUNTERS
PL_ = BASE & TALL CABINETS
PL_ = TALL CABINET DOORS (IF DIFFERENT THAN BASE)

Where only 2 rows are shown the first indicates all components of cabinets and the second indicates the counter.
Tag within room applies to all casework within space, U.N.O.

REFER TO FINISH PRODUCT LIST ON SHEETS A910 & A911 FOR COMPLETE LIST OF PRODUCT REFERENCED HERE.
REFER TO ELEVATIONS FOR LOCKER PAINT COLORS

FOR LOCATIONS WITHOUT FLOOR PATTERNS REFER TO FINISH PLANS FOR ARROW INDICATING DIRECTION OF TILE INSTALLATION. ARROW INDICATES LONGES SIDE OF TILE OR PLANKS.

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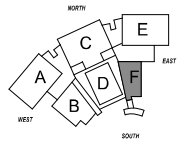

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRST FLOOR FINISH PLAN - PART F

Date 07/08/2024
Scale As indicated
Proj. Number 22367.00
Drawing Number **A901F**

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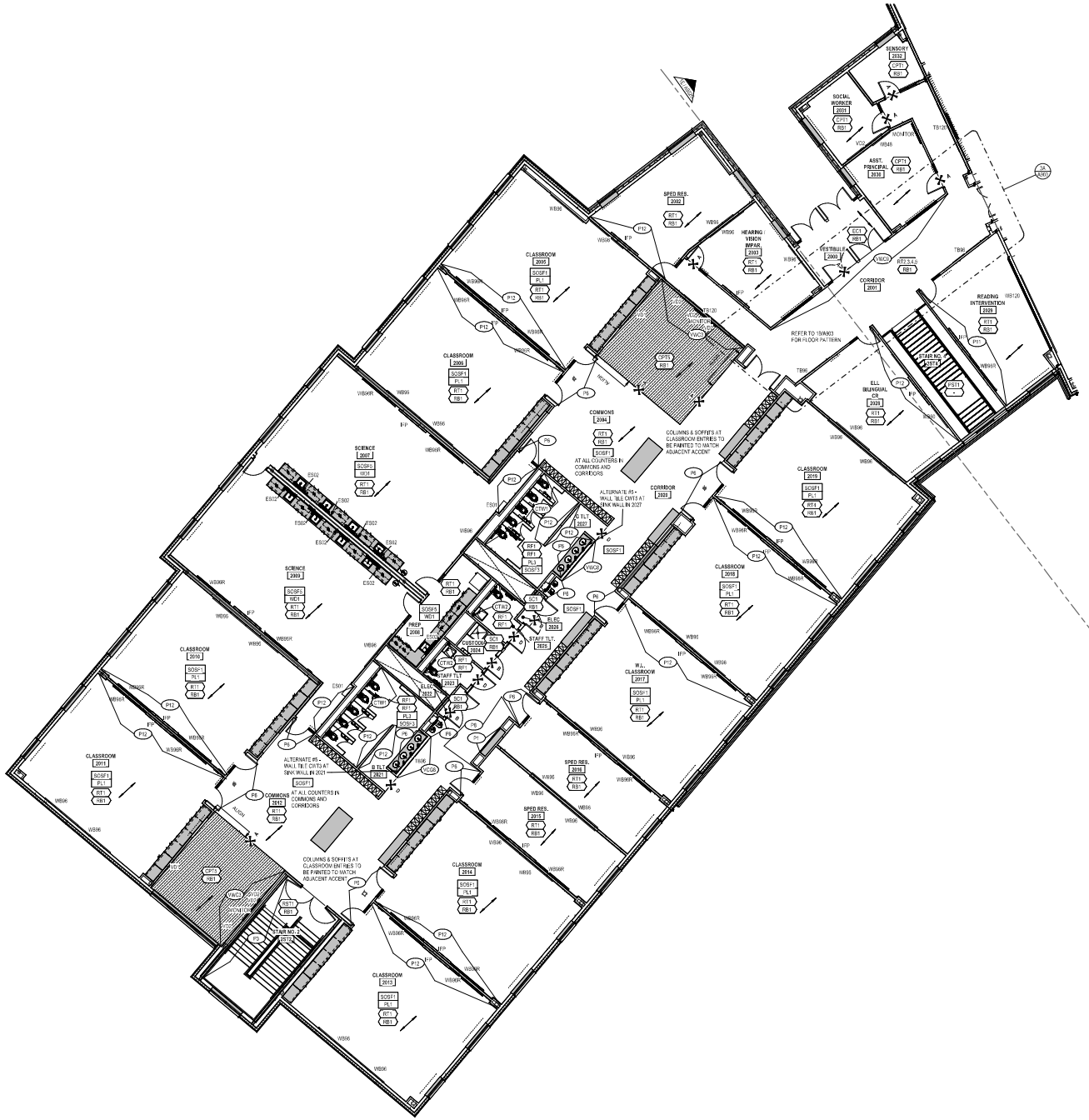

1E SECOND FLOOR FINISH PLAN - PART A
1/8" = 1'-0"

FINISH PLAN GRAPHIC LEGEND

REFER TO GENERAL FINISH NOTES ON A911

FLOOR LEGEND

RT1 - NO GRAPHIC PATTERN NEEDED, FULL FIELD
RT2 - SHOWN AS GRID PATTERN
RT3
RT4 - NO GRAPHIC PATTERN NEEDED, FULL FIELD
RT5
RT6
RT7
RT8
CPT1 - 3 NO GRAPHIC SHOWN, FULL FIELD
CPT4
CPT5
REFER TO A903 FOR ALL FLOOR PATTERNS.

FLOOR FINISH TAGS ON PLANS

XX = FLOORING
XX = BASE
XXX = LOCATION OF BASE WHERE MORE THAN ONE TYPE WITHIN SPACE

FLOORING TRANSITION DETAIL LEGEND

REFER TO DETAILS: 2B/A806
X FLOORING TRANSITION

WALL FINISH LEGEND

XX WALL MATERIAL OTHER THAN STANDARD PAINT COLOR

ROLLER WINDOW SHADE LOCATIONS

RS1 MANUAL SHOWN AS AT EXTERIOR AND INTERIOR WINDOWS
RS2 AT GYM ONLY

CASEWORK FINISH TAGS ON PLANS

SCSF_ = COUNTERS
PL_ = BASE & TALL CABINETS
PL_ = TALL CABINET DOORS (IF DIFFERENT THAN BASE)

Where only 2 zones are shown the first indicates all components of cabinets and the second indicates the counter.

Tag within room applies to all casework within space, UNO.

REFER TO FINISH PRODUCT LIST ON SHEETS A910 & A911 FOR COMPLETE LIST OF PRODUCT REFERENCED HERE.
REFER TO ELEVATIONS FOR LOCKER PAINT COLORS

FOR LOCATIONS WITHOU FLOOR PATTERNS REFER TO FINISH PLANS FOR ARROW INDICATING DIRECTION OF TILE INSTALLATION. ARROW INDICATES LONGES SIDE OF TILE OR PLANKS.

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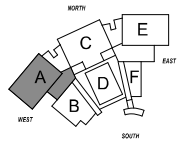

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

SECOND FLOOR FINISH PLAN - PART A

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: **A902A**

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FINISH PLAN GRAPHIC LEGEND

REFER TO GENERAL FINISH NOTES ON A911

FLOOR LEGEND

RT1 - NO GRAPHIC PATTERN NEEDED, FULL FIELD

RT2 - SHOWN AS GRID PATTERN

RT3

RT4 - NO GRAPHIC PATTERN NEEDED, FULL FIELD

RT5

RT6

RT7

RT8

CPT1 - 3 NO GRAPHIC SHOWN, FULL FILED

CPT4 (NOT USED AT GCMS)

CPT5

REFER TO A9IG FOR ALL FLOOR PATTERNS.

FLOOR FINISH TAGS ON PLANS

XX = FLOORING

XX = BASE

— XXX — = LOCATION OF BASE WHERE MORE THAN ONE TYPE WITHIN SPACE

FLOORING TRANSITION DETAIL LEGEND

REFER TO DETAIL 5 2/A911

X FLOORING TRANSITION

CASEWORK FINISH TAGS ON PLANS

SCSF_ = COUNTERS

PL_ = BASE & TALL CABINETS

PL_ = TALL CABINET DOORS (IF DIFFERENT THAN BASE)

Where only 2 rows are shown the first indicates all components of cabinets and the second indicates the counter.

Tag within room applies to all casework within space. (NIC).

WALL FINISH LEGEND

XX = WALL MATERIAL OTHER THAN STANDARD PAINT COLOR

ROLLER WINDOW SHADE LOCATIONS

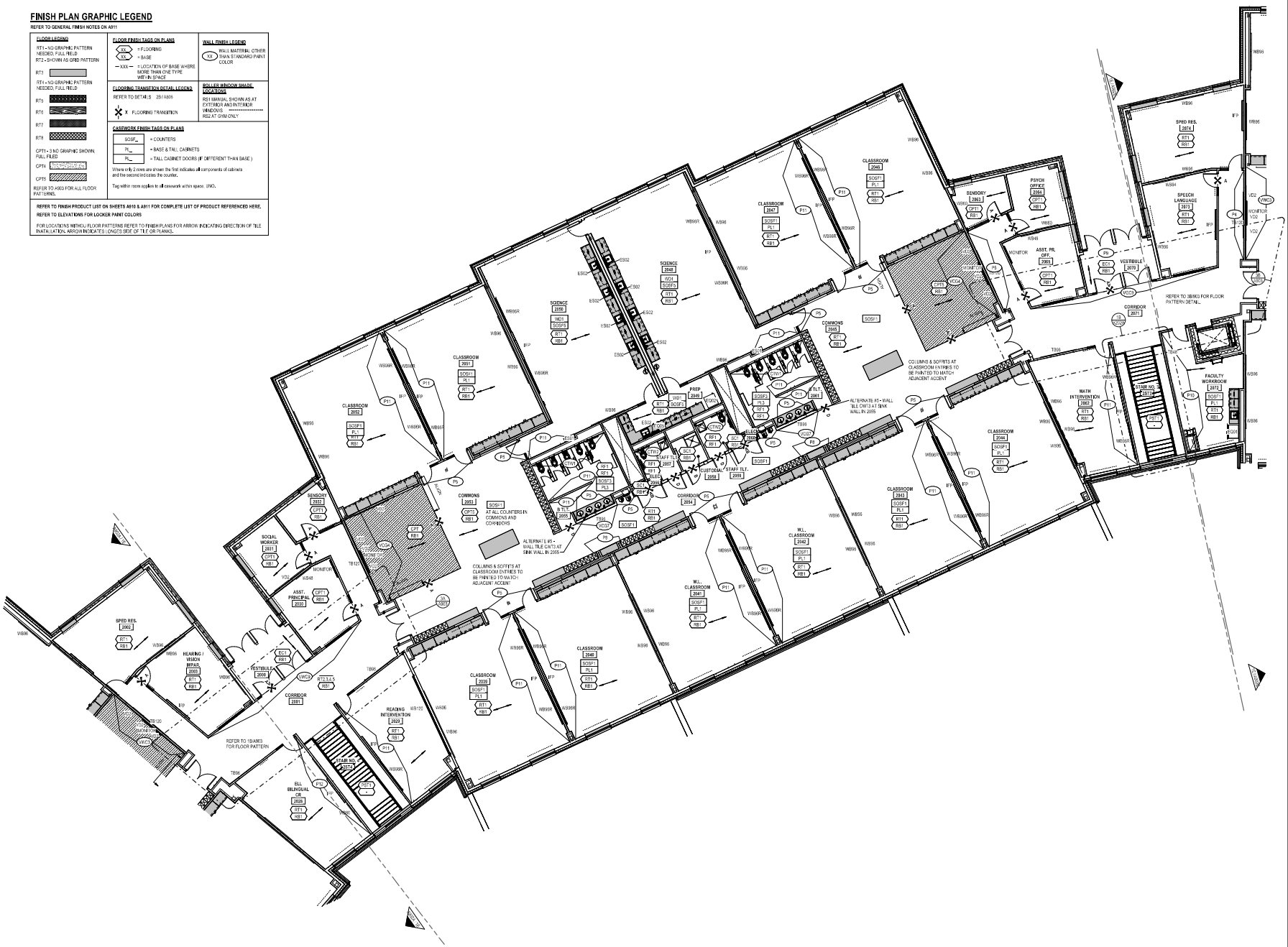
RS1 MANUAL, SHOWN AS AT EXTERIOR AND INTERIOR WINDOWS

RS2 AT GYM ONLY

REFER TO FINISH PRODUCT LIST ON SHEETS A916 & A911 FOR COMPLETE LIST OF PRODUCT REFERENCED HERE.

REFER TO ELEVATIONS FOR LOCKER PAINT COLORS

FOR LOCATIONS WITHOUT FLOOR PATTERNS REFER TO FINISH PLANS FOR ARROW INDICATING DIRECTION OF TILE INSTALLATION. ARROW INDICATES LONGER SIDE OF TILE OR PLANKS.



1E SECOND FLOOR FINISH PLAN - PART C
1/8" = 1'-0"

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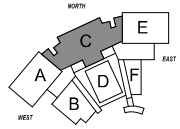

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

SECOND FLOOR FINISH PLAN - PART C

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A902C

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FINISH PLAN GRAPHIC LEGEND

REFER TO GENERAL FINISH NOTES ON A011

FLOOR LEGEND

RT1 - NO GRAPHIC PATTERN NEEDED, FULL FIELD
RT2 - SHOWN AS GRID PATTERN
RT3
RT4 - NO GRAPHIC PATTERN NEEDED, FULL FIELD
RT5
RT6
RT7
RT8
CPT1 - 3 NO GRAPHIC SHOWN, FULL FILED
CPT4
CPT5
REFER TO A903 FOR ALL FLOOR PATTERNS.

FLOOR FINISH TAGS ON PLANS

XX = FLOORING
XX = BASE
— XXX — = LOCATION OF BASE WHERE MORE THAN ONE TYPE WITHIN SPACE

FLOORING TRANSITION DETAIL LEGEND

REFER TO DETAILS 25/A905
X = FLOORING TRANSITION

CASEWORK FINISH TAGS ON PLANS

SCSF_ = COUNTERS
PL_ = BASE & TALL CABINETS
PL_ = TALL CABINET DOORS (IF DIFFERENT THAN BASE)

Where only 2 rows are shown the first indicates all components of cabinets and the second indicates the counter.

Tag within room applies to all casework within space. UNO.

WALL FINISH LEGEND

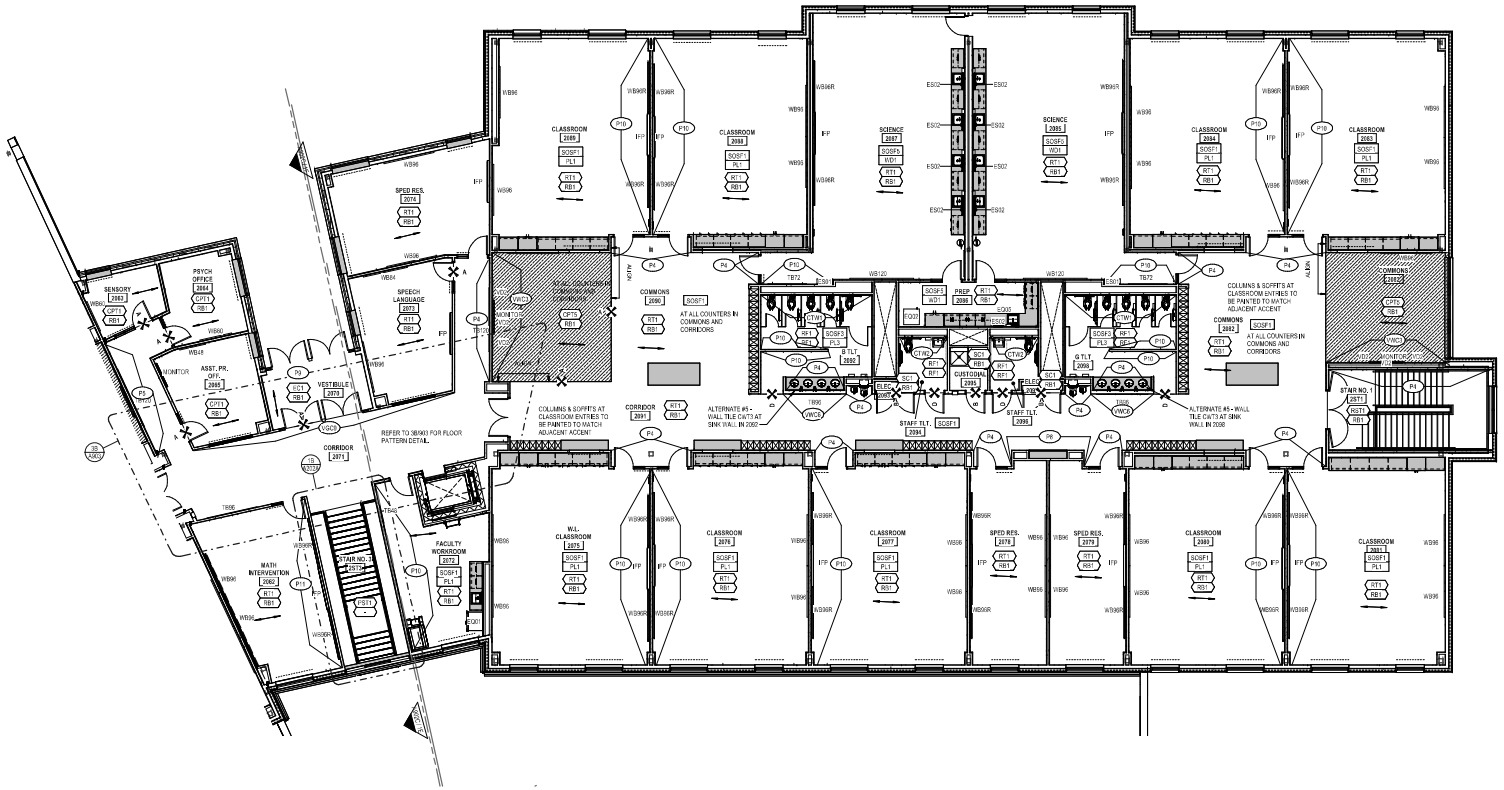
XX = WALL MATERIAL OTHER THAN STANDARD PAINT COLOR

ROLLER WINDOW SHADE LOCATIONS

RS1 MANUAL, SHOWN AS AT EXTERIOR AND INTERIOR WINDOWS
RS2 AT GYM ONLY

REFER TO FINISH PRODUCT LIST ON SHEETS A910 & A911 FOR COMPLETE LIST OF PRODUCT REFERENCED HERE.
REFER TO ELEVATIONS FOR LOCKER PAINT COLORS

FOR LOCATIONS WITHOUT FLOOR PATTERNS REFER TO FINISH PLANS FOR ARROW INDICATING DIRECTION OF TILE INSTALLATION. ARROW INDICATES LONGEST SIDE OF TILE OR PLANKS.



1E SECOND FLOOR FINISH PLAN - PART E
1/8" = 1'-0"

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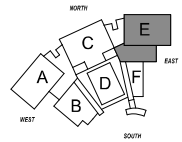

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

SECOND FLOOR FINISH PLAN - PART E

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: **A902E**

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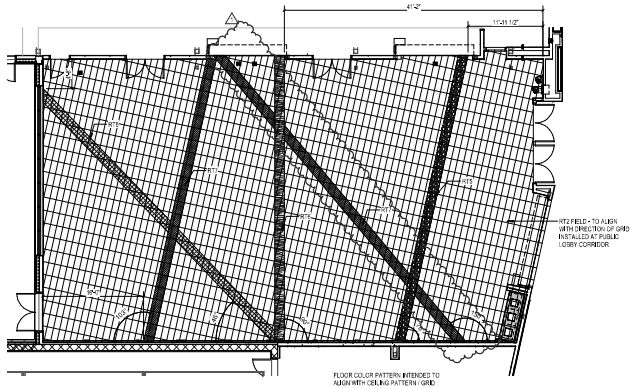
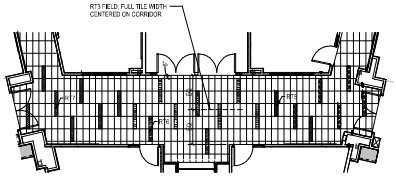
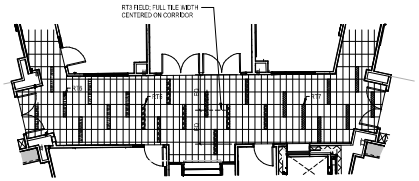


1B CAFETERIA FLOOR PATTERN DETAIL
1/8" = 1'-0"



3A CORRIDOR 2001 FLOOR PATTERN DETAIL
1/8" = 1'-0"



3B CORRIDOR 2071 - FLOOR PATTERN PLAN
1/8" = 1'-0"

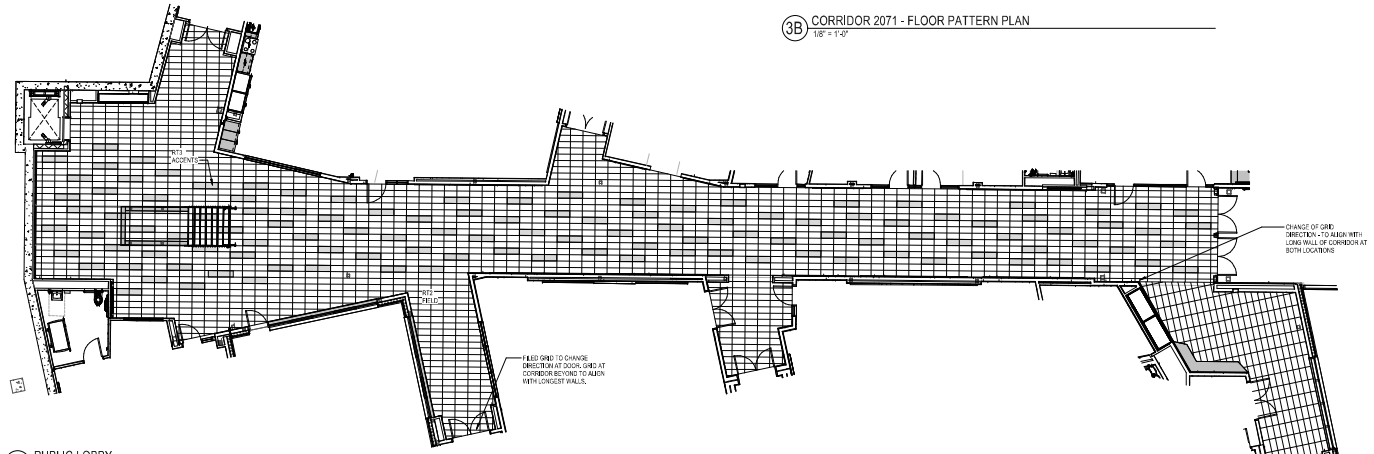
FLOOR PATTERN GRAPHIC LEGEND

RT LEGEND:
RT1 - NO GRAPHIC PATTERN NEEDED, FULL FIELD
RT2 - SHOWN AS GRID PATTERN
RT3
RT4 AND GRAPHIC PATTERN NEEDED, FULL FIELD
RT5
RT6
RT7
RT8

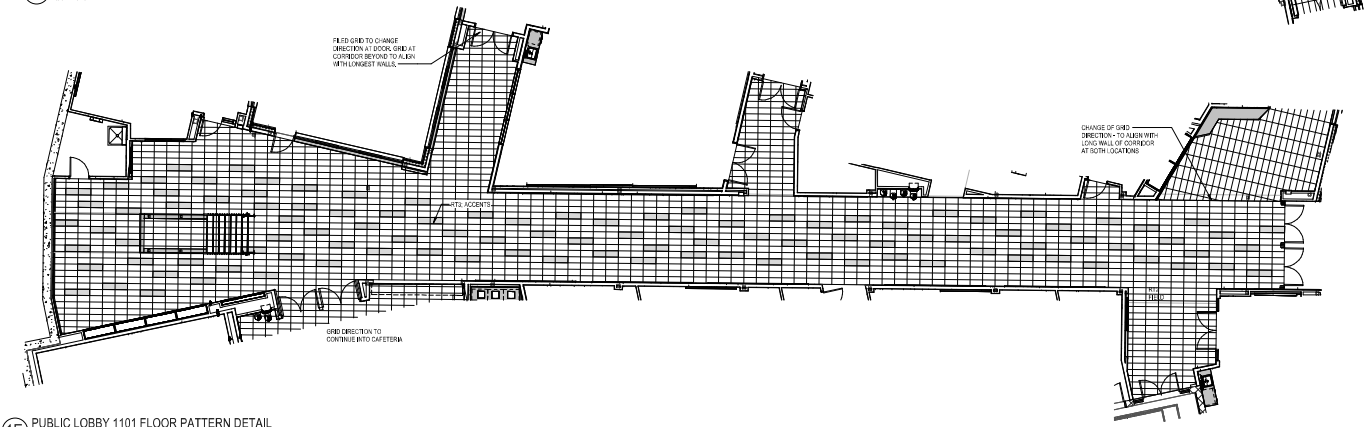
* THESE HATCH PATTERNS ONLY APPLY TO THE FLOOR PATTERN PLANS.

FOR LOCATIONS NOT SHOWN HERE REFER TO FINISH PLANS WHERE ARROW INDICATES DIRECTION OF TILE INSTALLATION. ARROW INDICATES LONGER SIDE OF TILE OR PLANKS.

REFER TO FINISH PRODUCT LIST ON SHEETS A610 & A611 FOR COMPLETE LIST OF PRODUCT REFERENCED HERE.



1D PUBLIC LOBBY
1/8" = 1'-0"



1E PUBLIC LOBBY 1101 FLOOR PATTERN DETAIL
1/8" = 1'-0"

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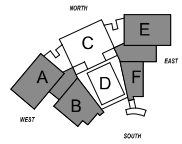

KEYPLAN

Number	Date	Issued For
1	11/06/2024	ADDENDUM NO. 6
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FLOOR PATTERN DETAILS

Date: 07/08/2024
Scale: As indicated
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Drawing Number: A903

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FINISH PRODUCT LIST

FINISH TYPE DIVISION	REFERENCE I.D.	MANUFACTURER	DESCRIPTION	SIZE	COLOR/PATTERN	TYPICAL LOCATION (refer to Finish Plans)	REMARKS	MANUFACTURER CONTACT INFORMATION
FLOORING								
CPT • Tile Carpeting • Division 09 Section "Tile Carpeting"	CPT1	Shaw	Cross Weave 6t, 57326, multi-level loop pattern loop, 100% Solution Dyed, EcoSolution Q100 Nylon, "SSP" Soil Protection, Bcomm Backing, glue-down install, limited lifetime warranty	9" x 36"	Vibrant Tegas 25486	Offices, Admin Areas	Installed in monolithic pattern in direction as indicated on Finish Plans	Rick Gordon, Shaw richard.gordon@shawinc.com (866) 205-4789
	CPT2	Shaw	Chromazone 6t, 57343, multi-level loop pattern loop, 100% Solution Dyed, EcoSolution Q100 Nylon, "SSP" Soil Protection, Bcomm Backing, glue-down install, limited lifetime warranty	18" x 36"	Indigo Charcoal	Conference Room	Installed in Ashlar pattern in direction as indicated on Finish Plans	Rick Gordon, Shaw richard.gordon@shawinc.com (866) 205-4789
	CPT3	Shaw	Turn It In, 51299, multi-level loop pattern loop, 100% Solution Dyed, EcoSolution Q100 Nylon, "SSP" Soil Protection, Bcomm Backing, glue-down install, limited lifetime warranty	12" x 48"	Shuttergy 04068	Media Center	Installed in Ashlar pattern in direction as indicated on Finish Plans	Rick Gordon, Shaw richard.gordon@shawinc.com (866) 205-4789
	CPT4	Shaw	Free Point 21113 multi-level loop pattern loop, 100% Solution Dyed, EcoSolution Q100 Nylon, "SSP" Soil Protection, Bcomm Backing, glue-down install, limited lifetime warranty	18" x 36"	Ink	Auditorium	Installed in monolithic pattern in direction as indicated on Finish Plans	Rick Gordon, Shaw richard.gordon@shawinc.com (866) 205-4789
	CPT5	Interface	Driftwood 1369404SA5AX00, multi-level loop pattern loop, 100% Solution Dyed, Type 6,6 nylon, Glasbac(R) tile backing, Intercept & Protect soil protection, 51% recycled	18" x 36"	Palm 104854	Learning Commons	Installed in monolithic pattern in direction as indicated on Finish Plans	Rick Gordon, Shaw richard.gordon@shawinc.com (866) 205-4789
EC • Entrance Carpet • Division 09 Section "Tile Carpeting"	EC1	Shaw Contract	Floral 61058, Entry Carpet Tile, multi-level loop pattern loop, 100% Solution Dyed, EcoSolution Q100 Nylon, "SSP" Soil Protection, Bcomm Backing, glue-down install, limited lifetime warranty	24" x 24"	Lava	Entry Vestibule	Installed in monolithic pattern in direction as indicated on Finish Plans	Rick Gordon, Shaw richard.gordon@shawinc.com (866) 205-4789
PTF • Porcelain Tile Flooring • Division 09 Section "Tiling"	PTF1	Dalile	Keystones porcelain unglazed mosaics, thru-color mounted on a sheet	2" x 2"	Desert Gray 0014	Installed at shower floors	Install with PTB2	Lisa Cupello, lcupello@creativematerialscorp.com, (516) 710-4709
PBS • Porcelain Base Tread • Division 09 Section "Tiling"	PBS1	Creative Materials	Mesa, Core Collection Terra, Porcelain tile to be used at stair tread with Bullnose nosing with abrasive components, TS59+C+AK, matching tile at landing	36cm x 66cm	24thr Anthracite Smooth	At both open stairs	Refer to stair tread detail	Lisa Cupello, lcupello@creativematerialscorp.com, (516) 710-4709
RAVT • Resilient Athletic Floor Tile • Division 09 Section "Resilient Athletic Flooring"	RAT1	Gerflor	Taraflex, Multi-Color 6.2, 2-Mils complex, Double density CXP HCH+ foam backing, 100% pure vinyl wear layer	0.+1"w, 0.2mm thick	Maple	C2.07	Installed in direction as indicated on Finish Plans	Nikki Riley nikki.riley@gerflorusa.com, (877)437-3567
RAVT • Resilient Athletic Floor Tile • Division 09 Section "Resilient Athletic Flooring"	RAT1	To Market	Atmosphere, Metropolis Collection, Acrylux, Through-body colored tile, Straight edge	23" x 23" 12mm	TM901 Hot Rod	Fitness Room	Installed in standard grid	Judy Stoeckle, To Market judy@tomkk.com, (800) 8364774
RF • Resilience Flooring • Division 09 Section "Tiled Applied Flooring"	RF1	Stonhard	Stonguard MG Waterproof Flooring System, Decorative quartz slip resistant broadcast system. Stonpond MG 2 urethane elastomeric waterproof membrane. Stonshield urethane cement, stonshield aggregate, stonkote CK high performance clear epoxy sealer, medium texture	1/8" thick 4"h base	Reddstone	Toilet Rooms, Locker Rooms	Top of base to receive 1/8" metal cove strip (door anodized finish), refer to details	Carl Vose cvose@stonhard.com, 929-274-5521
	RF2	Stonhard	Stonshield RFA, durable slip resistant surface, stonshield RFB base. Stonshield underseal, Stonshield aggregate, Stonkote CK4 clear Epoxy Sealer, medium texture	3/16" thick 4"h base	Malt	Kitchen/Servery	Top of base to receive 1/8" metal cove strip (door anodized finish), refer to details	Carl Vose cvose@stonhard.com, 929-274-5521
RST • Resilient Stair Treads and Accessories • Division 09 Section "Resilient Flooring"	RST1	Mannington	Colorpoint, Color Spec, Stair Tread and Riser System with matching lip at landings, hammered finish, contrasting rubber insert at nosing		Agate Gray 027 with black insert	Enclosed egress Stairs		Kevin O'Bryan, Mannington kevin_o'bryan@mannington.com, (866) 217-1613
	RST2	Mannington	Colorspec, Color Spec, Stair Tread and Riser System with matching lip at landings, hammered finish, contrasting rubber insert at nosing		Black Brown with light color insert	Stairs to stage at Auditorium		Kevin O'Bryan, Mannington kevin_o'bryan@mannington.com, (866) 217-1613
RFT • Resilient Tile • Division 09 Section "Resilient Tile Flooring"	RT1	Mannington	Simkin Collection, Wood, Class II Heavy tile, 20 mil wear layer, Quantum Guard Ultra wear protection, beveled edge, 2% rapidly renewable content, 15 yr max warranty, no wax required	6" x 36" x 2.2mm	Northern Maple Natural	Field of Classrooms, Learning Commons, Classroom Corridors, Classrooms, Lactation, Life Skills and where noted on finish plans.		Kevin O'Bryan, Mannington kevin_o'bryan@mannington.com, (866) 217-1613
	RT2	Mannington	Amtico Stone, Class II Heavy tile, 20 mil wear layer, Quantum Guard Ultra wear protection, square unbeveled edge, 2% rapidly renewable content, 15 yr max warranty, no wax required	12" x 24" x 2.2mm	Slate Volcanic	Field at First Floor Corridors		Kevin O'Bryan, Mannington kevin_o'bryan@mannington.com, (866) 217-1613
	RT3	Mannington	Amtico Stone, Class II Heavy tile, 20 mil wear layer, Quantum Guard Ultra wear protection, square unbeveled edge, 2% rapidly renewable content, 15 yr max warranty, no wax required	12" x 24" x 2.2mm	Slate Rock	Accent at First Floor Corridors		Kevin O'Bryan, Mannington kevin_o'bryan@mannington.com, (866) 217-1613
	RT4	Mannington	Color Anchor Collection, Brick, Class II Heavy tile, 20 mil wear layer, Quantum Guard Ultra wear protection, square unbeveled edge, 2% rapidly renewable content, 15 yr warranty, no wax required	6" x 36" x 2.2mm	Stonehenge	Field at FCS, Health Suite, Faculty Dining, Video Production, Lactation, Main Office workroom, Behavioral Classroom, Band, Orchestra and Choral, Custodial Breakroom		Kevin O'Bryan, Mannington kevin_o'bryan@mannington.com, (866) 217-1613
	RT5	Mannington	Color Anchor Collection, Brick, Class II Heavy tile, 20 mil wear layer, Quantum Guard Ultra wear protection, square unbeveled edge, 2% rapidly renewable content, 15 yr warranty, no wax required	6" x 36" x 2.2mm	Submit Blue	Accent as noted on Finish Plans (duo)		Kevin O'Bryan, Mannington kevin_o'bryan@mannington.com, (866) 217-1613
	RT6	Mannington	Color Anchor Collection, Brick, Class II Heavy tile, 20 mil wear layer, Quantum Guard Ultra wear protection, square unbeveled edge, 2% rapidly renewable content, 15 yr warranty, no wax required	6" x 36" x 2.2mm	Lagoon	Accent as noted on Finish Plans (teal)		Kevin O'Bryan, Mannington kevin_o'bryan@mannington.com, (866) 217-1613
	RT7	Mannington	Color Anchor Collection, Brick, Class II Heavy tile, 20 mil wear layer, Quantum Guard Ultra wear protection, square unbeveled edge, 2% rapidly renewable content, 15 yr warranty, no wax required	6" x 36" x 2.2mm	Monstera	Accent as noted on Finish Plans (green)		Kevin O'Bryan, Mannington kevin_o'bryan@mannington.com, (866) 217-1613
	RT8	Mannington	Color Anchor Collection, Brick, Class II Heavy tile, 20 mil wear layer, Quantum Guard Ultra wear protection, square unbeveled edge, 2% rapidly renewable content, 15 yr warranty, no wax required	6" x 36" x 2.2mm	Granny Smith	Accent as noted on Finish Plans (light green)		Kevin O'Bryan, Mannington kevin_o'bryan@mannington.com, (866) 217-1613
SC • Sealed Concrete • Division 03 Section "Concrete Floor Finishes"	SC1	-	Clear Finish Sealer	-	-	SOH spaces as noted on the Finish Plans, storage, receiving, loading dock and as noted on Finish Plans		-
	SC2	Sherwin Williams	Armorseal 9100, Water based Epoxy Floor Coating, chemical and abrasion resistant	-	-	At Auditorium at seating areas		Heather N Bourgeois heather.j.bourgeois@shermwin.com, (317) 429-1408
	SC3	Sherwin Williams	Armorseal 9100, Water based Epoxy Floor Coating, chemical and abrasion resistant	-	-	Wood Shop classroom, Art Rooms, innovation Room		Heather N Bourgeois heather.j.bourgeois@shermwin.com, (317) 429-1408
WAF • Wood Athletic Flooring • Division 09 Section "Wood Athletic Flooring"	WAF1	Robbins	Bio-Channel SR, Soft Backing, Anchored Construction, Continuous Pre-Cut & Pre-Assembled Hardwood Subfloor, Zero G Block Pad, Low Profile, and Polyethylene Vapor Barrier	1-3/4" Thick	Northern Hardwood Maple, Grade 2 or better with flat cut grain, clear high gloss finish	Gymnasium		Phil Erdogan, Dalton Hardwood Floors, 336-254-7766, perdogan@daltonvalley.com
WF • Wood Flooring • Division 06 Section "Wood Strip and Plank Flooring" and "Rough Carpentry"	WF1		Wood Strip Flooring, Northern Hard Maple, kiln dried, tongue and groove, Select Grade	3/4" Thick, 2-1/2"W Planks, Random Lengths, 4" depression required at slab	Clear Coat Finish	Front Stage at Auditorium (Refer to Plans Plans for extent of new and existing floor to remain)	Installed with Wood Base	-
	WF2	Parcel Processing	High Density Fiberboard, Primed, S2S Smooth on Two Sides	1/4" Thick	To be painted to match P13	Stage	Installed with riveted Base	-
BASE								
PTB • Porcelain Tile Flooring • Division 09 Section "Tiling"	PTB1	Dalile	Keystones porcelain unglazed mosaic trim MBSA, thru-color mounted on a sheet	2 rows 2" x 2" and 1 row C-633 curved	Desert Gray 0014	Installed at shower floors	Install with PTF1	
RB • Resilient Wall Base • Division 09 Section "Resilient Flooring"	RB1	Burke / Mannington	Premium TS Rubber Wall Base - Cove	4"H x 1/8" 120' Coil	Black Brown	Typical Throughout, U,W,X		Kevin O'Bryan, Mannington kevin_o'bryan@mannington.com, (866) 217-1613
	RB2	Johnsonite / Tarkett	Vinyled Rubber Wall Base - Cove	4"H x 6"r Toe	Black	Gymnasium, Stage, Fitness Center		Kevin O'Bryan, Mannington kevin_o'bryan@mannington.com, (866) 217-1613
WB • Wood Base • Division 06 Section "Finish Carpentry"	WB1	-	To Match W 01	4"h	Stained to match wood	with WWP1 at Auditorium		-
WALLS								
ADP • Acoustic Diffusion Panel • Division 09 Section "Panel Sound Reflective Panel"	ADP1	Kinetics	Geometric Sound Diffusers, Radius 6Tower, WallMounted, 6.125" foamy-molded plastic, Fabric facing, Class A fire rated, A-Clip and angle bracket mounting	Dia. x 6"h x 3"	White	Band & Choral as indicated on elevations		Matthew Garner, Vibration Products, mgarner@kinetics.mwebsolution.com, 55+466-5222
	ADP2	Kinetics	Geometric Sound Diffusers, Radius 6Tower, WallMounted, 6.125" foamy-molded plastic, Fabric facing, Class A fire rated, A-Clip and angle bracket mounting	Dia. x 6"h x 6.75"	White	Orchestra as indicated on elevations		Matthew Garner, Vibration Products, mgarner@kinetics.mwebsolution.com, 55+466-5222

FINISH PRODUCT LIST

FINISH TYPE DIVISION	REFERENCE I.D.	MANUFACTURER	DESCRIPTION	SIZE	COLOR/PATTERN	TYPICAL LOCATION (refer to Finish Plans)	REMARKS	MANUFACTURER CONTACT INFORMATION
AWP • Acoustic Wall Panel • Division 09 Sound Absorbing Wall and Ceiling Units	AWP1	Kinetics	Tuned Absorber/Diffuser (TAD) Panels, 3-1/8" Thick, Fabric Wrapped, square tuned, wall mounting, to include acoustical performance with room-designed test pattern, recessed edges, TAD Panels performance test report template between the Woodpass and the fabric, Class A, NRC 25+, square edge, attached with J-bar	Refer to Elevations for sizes	Carnegie, Xorel, Fractal Embrace, 6261-46753	Music, Choral and Orchestra		Matthew Garner, Vibration Products, mgarner@kinetics.mwebsolution.com, 55+466-5222
	AWP2	Conwed	Respond IR, IR1SR, Fabric wrapped Direct+Attach Impact Resistant Wall Panels, 1-1/8" thick, 1.15 NRC, Fire Rated Class A, Resin hardened Square Edge, J-bar Mounting, Acoustic Wrapped Wall Panels, Square resin edge, Z85 NRC, wall mounted with J-clip	1.125" thick, refer to elevations	Carnegie, Xorel, Meteor, 6427-2330	Cafeteria and at Main Corridors (blue)	To be installed with TRIM2 at edge where color changes	Kristi Holmes Young, ADR Architectural Design Resources, kristi@a-d-r.com, (781) 837-4700
	AWP5	Conwed	Respond IR, IR1SR, Fabric wrapped Direct+Attach Impact Resistant Wall Panels, 1-1/8" thick, 1.15 NRC, Fire Rated Class A, Resin hardened Square Edge, J-bar Mounting, Acoustic Wrapped Wall Panels, Square resin edge, Z85 NRC, wall mounted with J-clip	1.125" thick, refer to elevations	Carnegie, Xorel, Meteor, 6427-2739	Cafeteria and at Main Corridors (teal)	To be installed with TRIM2 at edge where color changes	Kristi Holmes Young, ADR Architectural Design Resources, kristi@a-d-r.com, (781) 837-4700
	AWP4	Conwed	Respond IR, IR1SR, Fabric wrapped Direct+Attach Impact Resistant Wall Panels, 1-1/8" thick, 1.15 NRC, Fire Rated Class A, Resin hardened Square Edge, J-bar Mounting, Acoustic Wrapped Wall Panels, Square resin edge, Z85 NRC, wall mounted with J-clip	1.125" thick, refer to elevations	Carnegie, Xorel, Meteor, 6427-2309	Cafeteria and at Main Corridors (green)	To be installed with TRIM2 at edge where color changes	Kristi Holmes Young, ADR Architectural Design Resources, kristi@a-d-r.com, (781) 837-4700
	AWP5	Conwed	Respond IR, IR1SR, Fabric wrapped Direct+Attach Impact Resistant Wall Panels, 1-1/8" thick, 1.15 NRC, Fire Rated Class A, Resin hardened Square Edge, J-bar Mounting, Acoustic Wrapped Wall Panels, Square resin edge, Z85 NRC, wall mounted with J-clip	1.125" thick, refer to elevations	Carnegie, Xorel, Meteor, 6427-2293	Cafeteria and at Main Corridors (med green)	To be installed with TRIM2 at edge where color changes	Kristi Holmes Young, ADR Architectural Design Resources, kristi@a-d-r.com, (781) 837-4700
	AWP6	Conwed	Respond IR, IR1SR, Fabric wrapped Direct+Attach Impact Resistant Wall Panels, 1-1/8" thick, 1.15 NRC, Fire Rated Class A, Resin hardened Square Edge, J-bar Mounting, Acoustic Wrapped Wall Panels, Square resin edge, Z85 NRC, wall mounted with J-clip	1.125" thick, refer to elevations	Carnegie, Xorel, Meteor, 6427-2307	Cafeteria and at Main Corridors (forest)	To be installed with TRIM2 at edge where color changes	Kristi Holmes Young, ADR Architectural Design Resources, kristi@a-d-r.com, (781) 837-4700
	AWP7	Conwed	Respond IR, IR1SR, Fabric wrapped Direct+Attach Impact Resistant Wall Panels, 1-1/8" thick, 1.15 NRC, Fire Rated Class A, Resin hardened Square Edge, J-bar Mounting, Acoustic Wrapped Wall Panels, Square resin edge, Z85 NRC, wall mounted with J-clip	1.125" thick, refer to elevations	Carnegie, Xorel, Meteor, 6427-2305	Main Corridors (yellow)	To be installed with TRIM2 at edge where color changes	Kristi Holmes Young, ADR Architectural Design Resources, kristi@a-d-r.com, (781) 837-4700
	AWP8	Conwed	Respond IR, IR1SR, Fabric wrapped Direct+Attach Impact Resistant Wall Panels, 1-1/8" thick, 1.15 NRC, Fire Rated Class A, Resin hardened Square Edge, J-bar Mounting, Acoustic Wrapped Wall Panels, Square resin edge, Z85 NRC, wall mounted with J-clip	1.125" thick, refer to elevations	Carnegie, Xorel, Sahara Matte, 6427-417	Full height and width of walls at Practice Room's and Small Group Rooms where noted on finish plans.	Minimal beveling to be used	Kristi Holmes Young, ADR Architectural Design Resources, kristi@a-d-r.com, (781) 837-4700
	AWP9	Conwed	Respond HI, Fabric wrapped Direct+Attach High Impact Resistant Wall Panels, 1-1/8" thick, 1.15 NRC, Fire Rated Class A, Resin hardened Square Edge, J-bar Mounting, Acoustic Wrapped Wall Panels, Square resin edge, Z85 NRC, wall mounted with J-clip	1.125" thick, refer to elevations	Carnegie, Xorel, Meteor, 6427-2329	Fitness Center (blue)		Kristi Holmes Young, ADR Architectural Design Resources, kristi@a-d-r.com, (781) 837-4700
	AWP10	MDC Wall	Zintra Acoustic Solutions, Percilla, 100% Polyester, pattern layer on backer, NRC .25, Customized for size and pattern, To be installed horizontally with pattern horizontal as well, Direct mounted mechanically	9" thick, 44"h, length to fit as shown on elevations	Cocoa as field Color with rose as dots	Media Center		Trent Decker, tdecker@mdcwall.com, (800) 627-4060
	AWP11	Conwed	Respond IR, IR1SR, Fabric wrapped Direct+Attach Impact Resistant Wall Panels, 1-1/8" thick, 1.15 NRC, Fire Rated Class A, Resin hardened Square Edge, J-bar Mounting, Acoustic Wrapped Wall Panels, Square resin edge, Z85 NRC, wall mounted with J-clip	3" thick, refer to elevations	Carnegie, Xorel, Sine	Back wall of Auditorium and at upper portion of wall at Media Center		Kristi Holmes Young, ADR Architectural Design Resources, kristi@a-d-r.com, (781) 837-4700
	AWP12	Armstrong	Tectum Panels PB, Commercial Wood Fiber Sound absorbing wall panels with plain beveled, border trim, 24 NRC, comes square, direct mounting CeilX, all edges beveled, Class A Fire Rated	96" x 60" refer to elevations for variations due to wall dimensions	Painted to match wall Color (P1)	At Wood Shop		Julie D. Wilson, jdwilson@armstrongceilings.com, Mobile: (800) 606-1232
CTW • Ceramic Tile Wall • Division 09 Section "Tiling"	CWT1	Creative Materials	Mosa Metallic Change, Ceramic wall tile with gloss and matte finish	10"cm x 30"cm	34000 Silver Grey	Toilet Wall at multi-person bathrooms	Installed in a vertically in stacked pattern	Lisa Cupello, lcupello@creativematerialscorp.com, (516) 710-4709
	CTW2	Creative Materials	Omni Color Palette, glazed ceramic wall tile, glossy finish	4" x 16"	Soft Lilac	Toilet Wall at first floor single person bathrooms	Installed in a vertically in stacked pattern	Lisa Cupello, lcupello@creativematerialscorp.com, (516) 710-4709
	CTW3	Creative Materials	Omni Color Palette, glazed ceramic wall tile, glossy finish	4" x 12"	White Ice	Backsplash at FCS and ADD ALT #5, Installed at sink walls in all vestibule bathrooms on second floor	Installed in a herringbone stacked pattern at backsplash and as a vertically in stacked pattern at shower	Lisa Cupello, lcupello@creativematerialscorp.com, (516) 710-4709
	CTW4	Creative Materials	Mosa Metallic Change, Ceramic wall tile with gloss and matte finish	10"cm x 30"cm	White	Cafeteria Servery Wall and at Trash area	Installed in a vertically in stacked pattern	Lisa Cupello, lcupello@creativematerialscorp.com, (516) 710-4709
	CTW5	American Olean	Color Story Wall, glazed ceramic wall tile, glossy finish	4" x 16"	Cobalt	ADD ALT #5, Installed at sink walls in multi-person bathrooms at 1004 & 1105	Installed in a vertically in stacked pattern	
DP • Decorative Plan • Division 09 Section "Painting"	DP1	Solpa	Customized Construction Gradient Design Wooden Tile, Wall Feather Gradient SA-WOOD, Can design or scheme to white at corner to clear or top, tile to be applied to full extent of plane with gradient starting at 70% and ending at 30%, level 3 privacy opaqueness at center of glass film	Custom size to match backsplash full height and width of wall	007 N	Office Stations, Storefront at Health Suite and Conference Room	Refer to detail 1/CA805	Jeffery Lantz, JM_lantz@msn.com, 917-497-2033
FRP • Fiberglass Reinforced Panels • Division 09 "Fiberglass Reinforced Panelling"	FRP1	Marlite	Fiberglass Reinforced Plastic panels with smooth surface, Class A Fire Rated	4' x 8' sheets	Bright White	Kitchen/Servery All Walls	Use Manufactures recommended Trims, connectors and corners	Jaime McDowell, Marlite, jmcdowell@marlite.com, (330) 264-7627
	FRP2	Marlite	Fiberglass Reinforced Plastic panels with smooth surface, Class A Fire Rated	4' x 8' sheets	Light Grey	Custodial Closets, Custodial Suite	Use Manufactures recommended Trims, connectors and corners	Jaime McDowell, Marlite, jmcdowell@marlite.com, (330) 264-7627
EPC • Eight-Performance Coatings • Division 09 Section "Acoustic Finishes"	EPC1	International Cellulose Corp.	R+13, Spray-applied thermal and acoustical insulation, made of 85% recycled natural fibers, resistant to fungus and mildew, NJ7470	1.2" thick	Standard light grey at Mechanical rooms, Custom color to match ceiling color; P17 at Wood Shop	At exposed ceilings in Wood Shop and Mechanical Rooms, 1045, 1060, 1207		
P • Interior Painting • Division 09 Section "Interior Painting"	P1	Benjamin Moore	SCUFF-X 499, high performance one coat latex, washable, scrub resistant, scuff resistant,anti-microbial, with Gennex color technology, satin finish		OC151 White	Field Throughout Unless Otherwise Noted, hand rails, painted portion of stairs		Allyson Smith, Benjamin Moore allysonsmith@benjaminmoore.com, (203) 553-8654
	P2	Benjamin Moore	Epoxy Semi-Gloss Finish		To match PPG 1010-7 Zombie	Trim / Frames Throughout, Stringers, metal railings and underside of stairs through out, columns where noted, Kitchen/Servery		Allyson Smith, Benjamin Moore allysonsmith@benjaminmoore.com, (203) 553-8654
	P3	Benjamin Moore	SCUFF-X 499, high performance one coat latex, washable, scrub resistant, scuff resistant,anti-microbial, with Gennex color technology, satin finish		To match PPG 1164-7 Brilliant Blue	Ext Blue Accent (OC-98, School Color) Toilet Rooms Sink Wall, Inside of front Auditorium Corridor, Fitness Room		Allyson Smith, Benjamin Moore allysonsmith@benjaminmoore.com, (203) 553-8654
	P4	Benjamin Moore	SCUFF-X 499, high performance one coat latex, washable, scrub resistant, scuff resistant,anti-microbial, with Gennex color technology, satin finish		To match PPG 1156-4 Breezy Blues	Blue Accent Right Learning Commons Accent, Waiting Areas		Allyson Smith, Benjamin Moore allysonsmith@benjaminmoore.com, (203) 553-8654
	P5	Benjamin Moore	SCUFF-X 499, high performance one coat latex, washable, scrub resistant, scuff resistant,anti-microbial, with Gennex color technology, satin finish		To match PPG 1130-5 Moss Ring	Green Accent Middle Learning Commons Accent		Allyson Smith, Benjamin Moore allysonsmith@benjaminmoore.com, (203) 553-8654
	P6	Benjamin Moore	SCUFF-X 499, high performance one coat latex, washable, scrub resistant, scuff resistant,anti-microbial, with Gennex color technology, satin finish		To match PPG 1151-4 Adventure	Teal Accent Left Learning Commons Accent		Allyson Smith, Benjamin Moore allysonsmith@benjaminmoore.com, (203) 553-8654
	P7	Benjamin Moore	SCUFF-X 499, high performance one coat latex, washable, scrub resistant, scuff resistant,anti-microbial, with Gennex color technology, satin finish		To match PPG 1217-6 Mystic Mist	Yellow Accent Corridor, Innovation & Robotics, OT/PT, Life Skills, Cafeteria Soffit		Allyson Smith, Benjamin Moore allysonsmith@benjaminmoore.com, (203) 553-8654
	P8	Benjamin Moore	SCUFF-X 499, high performance one coat latex, washable, scrub resistant, scuff resistant,anti-microbial, with Gennex color technology, satin finish		To match Sherwin Williams 7069 Iron Ore	Dark Gray Accent Stage Vestibule, Columns in Cant		Allyson Smith, Benjamin Moore allysonsmith@benjaminmoore.com, (203) 553-8654
	P9	Benjamin Moore	SCUFF-X 499, high performance one coat latex, washable, scrub resistant, scuff resistant,anti-microbial, with Gennex color technology, satin finish		To match PPG 1070-4 Up in Smoke	Gray Accent Main Corridors, Media Production Classroom, Passage		Allyson Smith, Benjamin Moore allysonsmith@benjaminmoore.com, (203) 553-8654
	P10	Benjamin Moore	SCUFF-X 499, high performance one coat latex, washable, scrub resistant, scuff resistant,anti-microbial, with Gennex color technology, satin finish		To match PPG 1133-6 Smoking Violet	Light Mute Accent Canteen/ Room, Nurse Prac Room, Custodial Breakroom, Right Pod Classroom Accent	Accent paint color at right classrooms wing, accent color for lockers at right classroom wing	Allyson Smith, Benjamin Moore allysonsmith@benjaminmoore.com, (203) 553-8654
	P11	Benjamin Moore	SCUFF-X 499, high performance one coat latex, washable, scrub resistant, scuff resistant,anti-microbial, with Gennex color technology, satin finish		To match PPG 1139-2 Pear Cactus	Light Green Accent Student Workstation, Middle Pod Classroom Accent	Accent paint color at center classroom wing, accent color for lockers at left classroom wing	Allyson Smith, Benjamin Moore allysonsmith@benjaminmoore.com, (203) 553-8654

SLAM
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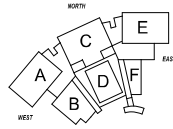
Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
1	11/06/2024	ADDENDUM NO. 6
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FINISH PRODUCT LIST - PART A

Date: 07/08/2024
Scale:
Proj. Number: 22367.00
Drawing Number: A910

Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_GREENWICH_CENTRAL_MS_2022.rvt

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FINISH PRODUCT LIST CONTAINED;

FINISH PRODUCT LIST

FINISH TYPE DIVISION	REFERENCE LOL	MANUFACTURER	DESCRIPTION	SIZE	COLOR/PATTERN	TYPICAL LOCATION (refer to Finish Plans)	REMARKS	MANUFACTURER CONTACT INFORMATION
P - Interior Painting - Division 09 Section "Interior Painting"	P12	Benjamin Moore	SCUFF-X-158, high performance one coat latex, washable, scrub resistant, scuff resistant,one-x-eco-brand, with Gennex color technology, satin finish		To match PPG 1154-5 Aqua Blue	Light Teal Accent Location Room: Left Pod Classroom Accent	Accent paint color at left classroom wing, accent color for lockers at center classroom wing	Allyson Smith, Benjamin Moore allyson.smith@benjaminmoore.com, (203) 501-6541
	P11	Benjamin Moore	SCUFF-X-158, high performance one coat latex, washable, scrub resistant, scuff resistant,one-x-eco-brand, with Gennex color technology, satin finish		To match PPG 1015-7 Zombie	Field at Auditorium Stage; Media Production and upper portion of walls where there is exposed ceiling as noted in elevations		Allyson Smith, Benjamin Moore allyson.smith@benjaminmoore.com, (203) 501-6541
	P14	Benjamin Moore	SCUFF-X-158, high performance one coat latex, washable, scrub resistant, scuff resistant,one-x-eco-brand, with Gennex color technology, satin finish		To match PPG 1010-3 Solstice	BCR Utility room field color Wood Shop, Storage Rooms		Allyson Smith, Benjamin Moore allyson.smith@benjaminmoore.com, (203) 501-6541
	P15	Benjamin Moore	Epoxy Semi-Gloss Finish		To match PPG 1165-7 Brilliant Blue	Duct and Graphic Letters at Gym		Allyson Smith, Benjamin Moore allyson.smith@benjaminmoore.com, (203) 501-6541
	P16	Benjamin Moore	Latex, Matte Finish		Super White	PUB partition ceilings, ceiling at stairs, exposed ceiling and all components unless otherwise noted on RCPs		Allyson Smith, Benjamin Moore allyson.smith@benjaminmoore.com, (203) 501-6541
	P17	Sherwin Williams	Pro Industrial Waterborne Acrylic Dry Fall, Matte finish		Color to Match PPG Zombie 1015-7 (Black)	Exposed ceilings at Stage, Learning Commons, Cafeteria, Wood Shop, Media Center, Fitness Center, and secondary worklabs.	To be used over cementitious fireproofing	Antoine Telford, PPG atelford@ppg.com Mobile (917) 685-0059
	P18	Rosco	VIDEO PAINT, vinyl acrylic, matte finish		Chroma key Green 5711	Media Production accent wall		
	P19	Sherwin Williams	Finalar FX-5080 Fluorescent Paint, smooth paint-like finish, impact resistant		White	To be used at exposed columns	Will be painted to match the adjacent wall (accent colors at classroom door entries) or as otherwise noted on the finish plans	Heather R Bourgeois heather.r.bourgeois@sherwin.com, (617) 426-1458
	P20	Benjamin Moore	SCUFF-X-158, high performance one coat latex, washable, scrub resistant, scuff resistant,one-x-eco-brand, with Gennex color technology, satin finish		TBD	Color to match Nichetta panels	At trim adjacent to panels	
VCG - Vinyl Custom Graphics - Division 10 Section "Wall Coverings"	VCG1	Level Digital Wallcovering	COM Custom Graphics, Mystical Substrate DD05, 28oz Commercial Grade Printable Type II Vinyl, Polycotton Woven Backing, Color to be Custom Selected from Level's Color Card	See finish plans and elevations for extent		Installed at Corridor to Auditorium		Nancy Royer, Surface Materials, nancy@surfacematerials.com,
	VCG2	Level Digital Wallcovering	COM Custom Graphics, Mystical Substrate DD05, 28oz Commercial Grade Printable Type II Vinyl, Polycotton Woven Backing, Color to be Custom Selected from Level's Color Card	See finish plans and elevations for extent		Installed at Main Concourse /Corridors		Nancy Royer, Surface Materials, nancy@surfacematerials.com,
	VCG3	Level Digital Wallcovering	COM Custom Graphics, Mystical Substrate DD05, 28oz Commercial Grade Printable Type II Vinyl, Polycotton Woven Backing, Color to be Custom Selected from Level's Color Card	See finish plans and elevations for extent		Installed at right pod learning commons		Nancy Royer, Surface Materials, nancy@surfacematerials.com,
	VCG4	Level Digital Wallcovering	COM Custom Graphics, Mystical Substrate DD05, 28oz Commercial Grade Printable Type II Vinyl, Polycotton Woven Backing, Color to be Custom Selected from Level's Color Card	See finish plans and elevations for extent		Installed at middle pod learning commons		Nancy Royer, Surface Materials, nancy@surfacematerials.com,
	VCG5	Level Digital Wallcovering	COM Custom Graphics, Mystical Substrate DD05, 28oz Commercial Grade Printable Type II Vinyl, Polycotton Woven Backing, Color to be Custom Selected from Level's Color Card	See finish plans and elevations for extent		Installed at left pod learning commons		Nancy Royer, Surface Materials, nancy@surfacematerials.com,
	VCG6	Level Digital Wallcovering	COM Custom Graphics, Mystical Substrate DD05, 28oz Commercial Grade Printable Type II Vinyl, Polycotton Woven Backing, Color to be Custom Selected from Level's Color Card	See finish plans and elevations for extent	Gray and white custom design/ pattern	Corridor 2091		Nancy Royer, Surface Materials, nancy@surfacematerials.com,
	VCG7	Level Digital Wallcovering	COM Custom Graphics, Mystical Substrate DD05, 28oz Commercial Grade Printable Type II Vinyl, Polycotton Woven Backing, Color to be Custom Selected from Level's Color Card	See finish plans and elevations for extent	Gray and white custom pattern	Corridor 2334		Nancy Royer, Surface Materials, nancy@surfacematerials.com,
	VCG8	Level Digital Wallcovering	COM Custom Graphics, Mystical Substrate DD05, 28oz Commercial Grade Printable Type II Vinyl, Polycotton Woven Backing, Color to be Custom Selected from Level's Color Card	See finish plans and elevations for extent	Gray and white custom design/ pattern	Corridor 2391		Nancy Royer, Surface Materials, nancy@surfacematerials.com,
	VCG9	Level Digital Wallcovering	Thicket, LS2803 Quatrecentoil colors, Mystical Substrate DD05, 28oz Commercial Grade Printable Type II Vinyl, Polycotton Woven Backing, Color to be Custom Selected from Level's Color Card	See finish plans and elevations for extent	Gray and white custom colors	Corridor 2001 and 2071		Nancy Royer, Surface Materials, nancy@surfacematerials.com,
WWP1 - Wood Wall Panels - Division 06 Section "Wood Panelling" and "Interior Wall Panelling"	WWP1		Solid maple (millwork), white, flat cut, clear finish (to match WD1)		Refer to elevations	Custom color; sample to be provided by architect	Auditorium Entry Lobbies at Display Cases, SI upper portion of walls at servery and at display area under main stairs, as noted on Finish Plans and Elevations	
	WWP2	Armstrong	Woodworks: Custom sizes, Wall Installation, (skin cut white maple veneer, reducing matching edge, Class A fire rating for walls.		Refer to elevations for custom sizes	Custom color; sample to be provided by architect	Proscenium, at Auditorium	
CEILINGS								
ADC - Acoustic Diffusion Ceilings - Division 09 Section "Fixed Sound Reflective Panels"	ADC1	Kinetics	Generatrix 3D Metal Panels, Sound Reflectors, Mix of Wedge, Outside Wedge and Inside Wedge on both aluminium, .016" EXL, ORG, High Recycled Content (of 90%, Class A Fire Rated	2'-x 2' x 3.25"	Flat White with white grid	Music Rooms inset in APC1 grid as shown in RCP	Refer to RCP for Layout, installed in random directions	Cathy Murphy, cxmurphy@aeg.com
APC - Acoustical Panel Ceilings - Division 09 Section "Acoustical Ceilings"	APC1	USG	Mars Ceiling Panels, 89098, High NRC, FLB Edge, .28 NRC, 35 CAC, 9/16" DXL, Grid, 70% Recycled Content, Class A Fire Rated	24" x 48"	Flat White with white grid	Classrooms, Corridors, Offices, Open Areas, and as shown on the RCPs, and where indicated on RCPs	High NRC required for acoustics	Cathy Murphy, cxmurphy@aeg.com
	APC2	USG	Mars Half Hole Ceiling Panels, 89299 High NRC, FLB Edge, .28 NRC, 35 CAC, 9/16" DXL, Grid, 70% Recycled Content, Class A Fire Rated	24" x 48"	Flat White with white grid	Kitchen Servery and adjacent spaces, Culinary/ FCS, Health Suite, and as noted on RCPs	High NRC required for acoustics	Cathy Murphy, cxmurphy@aeg.com
	APC3	USG	Mars Ceiling Panels, 89106, High NRC, FLB Edge, .65 NRC, 35 CAC, 9/16" DXL, Grid, 70% Recycled Content, Class A Fire Rated	24" x 24"	Flat White with white grid	In music classrooms in coordination with ADC1	High NRC required for acoustics	Cathy Murphy, cxmurphy@aeg.com
	APC4	USG	Mars Ceiling Panels, 89108, High NRC, FLB Edge, .65 NRC, 35 CAC, 9/16" DXL, Grid, 70% Recycled Content, Class A Fire Rated	24" x 48"	Flat Black with Black grid	Theater Entry vestibules, Media Production		Cathy Murphy, cxmurphy@aeg.com
PGB - Painted Gypsum Board Ceiling - Division 09 Section "Interior Painting"	PGB1	-	Painted Gypsum Board Ceiling, Latex Matte Finish	-	To be painted P16 in Latex Matte Finish	Throughout except where noted on RCP where accent colors are to be installed		-
SAC - Sound Absorbing Ceiling - Division 09 Section "Sound Absorbing Wall and Ceiling Units"	SAC1	Armstrong Ceilings	Tectum, 2" Scored Absorbing Ceiling Panels, Direct Mounting, • CS5, Bevel Edge	2' x 4' x 2"	Painted to match P17 (black)	Wood Strip, mounted to deck	Refer to RCPs for Extent	Sandra Hooyn, Armstrong Ceilings, SKHooyn@armstrongceilings.com, (860) 490-4604
WWC - Wood Woodworking - Division 09 Section "Wall Coverings"	WWC	Surface Materials	Sentinel, Veneer wallcovering, maple, white, flat cut	122mm thick	Clear finish	Installed on curved ceiling panels at auditorium	To wrap all side of suspended ceiling gyp panels - refer to RCPs	Nancy Royer, Surface Materials, nancy@surfacematerials.com,
CASEWORK								
PL - Plastic Laminate - Division 06 Section "Architectural Wood Casework"	PL1	Wilsonart	High Pressure Laminate, Matte Finish	-	Fusion Maple 7906-60	Cabinets/Casework as noted on finish Plans	Vertical Grain Orientation	Carla Dosso, Comply, carla@comply4u.com, Mobile (860) 669-7640
	PL2	Formica	Thin-Color High Pressure Plastic Laminate, Writeable and Magnetic	-	Bright White	Doors at all cabinets in art spaces, Family Consumer Science, OTP, IT wallroom and as noted on finish plans	Edging to be standard white	Jean Marie Remick, Formica, jeanmarie.remick@fsmr.fsi.com, (617) 212-4146
	PL3	Wilsonart	High Pressure Laminate, Fine Velvet Finish	-	Pearl Alloy Linearly Finish 5907K-33	Toilet Room Valances, Fitness Room, Cabinets and as noted on finish plans		Carla Dosso, Comply, carla@comply4u.com, Mobile (860) 669-7640
	PL4	Arborite	High Pressure Laminate	-	Kalami Neutral P124 CA	Cabinets at Wood Shop, Innovation Lab & Auditorium Control Desk		
	PL5 ⚠1	Wilsonart	High Pressure Laminate, Matte Finish	-	Fusion Maple 7906-60	Sewery Equipment		Carla Dosso, Comply, carla@comply4u.com, Mobile (860) 669-7640
	PL6	Wilsonart	High Pressure Laminate	-	Pearl Alloy Linearly Finish 5907K-33	Elevator walls		Carla Dosso, Comply, carla@comply4u.com, Mobile (860) 669-7640
	PL7 ⚠1	Formica	Specialty High Pressure Plastic Laminate, Magnetic, Writable Whiteboard surface, stain resistant	-	Crystal White	As notes of interior of 3D display cases		Carla Dosso, Comply, carla@comply4u.com, Mobile (860) 669-7640
SOSF - Soft Surface - Division 06 Section "Soft Surfacing Fabrications"	SOSF1	Durat	Solid Surface	-	D9130-24 White (with pEarl surface)	Typical at Classroom, Admin areas, Health suite, Casework, Locker Tops and as noted in Finish Plans		Carla Dosso, Comply, carla@comply4u.com, Mobile (860) 669-7640
	SOSF2	Durat	Solid Surface	-	D9140-24 medium Grey (with colorful specs)	Art Room, Fitness room, Family Consumer, Wood Shop and Innovation.		Carla Dosso, Comply, carla@comply4u.com, Mobile (860) 669-7640
	SOSF3	Formica	Solid Surface, Everform	-	Sea Glass 555	Multi-Person Bathroom counters		Jean Marie Remick, Formica, jeanmarie.remick@fsmr.fsi.com, (617) 212-4146
	SOSF4	Corian	Solid Surface	-	Deep Cloud	Window Sills and Cane Detection at open stairs		Donna Lalonde, Jacobs Phipard, donna.lalonde@jacobsphipard.com (508) 533-1200

FINISH PRODUCT LIST

FINISH TYPE DIVISION	REFERENCE LOL	MANUFACTURER	DESCRIPTION	SIZE	COLOR/PATTERN	TYPICAL LOCATION (refer to Finish Plans)	REMARKS	MANUFACTURER CONTACT INFORMATION
SOSP - Solid Surface - Division 06 Section "Solid Surfacing Fabrications"	SOSP5	Durian	Epoxy		Graphite	Science Classrooms & Prep Spaces		Phoebe Hunt, Durian, Phunt@durian.com, 715-479-5528
WD - Wood - Division 06 Section "Interior Architectural Woodwork"	WD1	-	Species: White Maple, Stain Grade, Plain Sliced	-		Doors, millwork at main entries and wood throughout		-
WS - Wood Stain - Division 09 "Painting"	WS1	-	Custom Color on WD1		To match PL1	General		-
VISUAL DISPLAY								
VCI - Visual Display - Division 10 Section "Visual Display Units"	VCI1	Ceiva	Magnetic dry erase markerboard, optically clear, shatter proof, glossy finish	Sizes: 72"w x 48"h at Media Center and Group Rooms 48"w x 84"h in Learning Commons	White	Media Center, 2nd Floor Learning Commons		James Rutnik, NB Surfaces, jamesRutnik@nbsurfaces.com, (414) 678-1342
	VCI2	Forbo	Skilken Board Rail goods - unframed, direct glued, with	Sizes as Indicated on Elevations	Color 1: Mushroom Color 2 at Gym entrance: Blueberry	Basketballs at Admin, Security, Washrooms, back of 3D display case and as noted on plans and elevations	Exposed edge to have trim as indicated in detail _	Chuck Banik, Forbo, 800-833-4941, CharlieJBanik@forbo.com
TB - Tackboard - Division 10 Section "Visual Display Units"	TB_	Forbo	Prefabricated framed tackboard utilizing Forbo cork with aluminum trim	48"H with Width As Indicated on Elevations		As noted on Finish Plans		Chris Riley, chrisriley@forbo.com, 866-930-4314
WB - Whiteboard - Division 10 Section "Visual Display Units"	WB_	Egan	Egan Visrite Surface, Factory Prefabricated Porcelain Whiteboard with low luster finish surface ability to project on it, magnetic, stain and scratch resistant surface (including permanent marker), no ghosting, NO marker tray, The following room are to have staff lines for music; Choral, Band and Orchestra	Refer to schedule on sheet A911 for sizes, Standard height is 48" - width is indicated in tag.	White with Aluminum frame	At all teaching spaces, Learning Commons, Media Center, Admin Areas, Conf Rooms, where indicated on finish plans and elevations	Whiteboards are tagged on elevations and finish plans the first # indicates with the second height # not 48"), 6"= 48"h indicates there is to be a marker rail.	Kevin Toth+Sorensen, kevin@contractourcraig.com 617-468-3512
	WB_R	Egan	Egan Visrite Surface, Factory Prefabricated Porcelain Whiteboard with integrated full length marker tray rail, low luster finish surface ability to project on it, magnetic, stain and scratch resistant surface (including permanent marker), no ghosting, NO marker tray, The following room are to have staff lines for music; Choral, Band and Orchestra	Refer to schedule on sheet A911 for sizes, Standard height is 48" - width is indicated in tag.	White with Aluminum frame	At trackings wall @ teaching spaces, Learning Commons, Media Center, Admin Areas, Conf Rooms, where indicated on finish plans and elevations	Whiteboards are tagged on elevations and finish plans the first # indicates with the second height # not 48"), 6"= 48"h indicates there is to be a marker rail.	Kevin Toth+Sorensen, kevin@contractourcraig.com 617-468-3512
MISC.								
BTP - Bathroom Toilet Partition - Division 10 Section "Plastic Toilet Compartments"	BTP	Scranton Products	Alsey Riders, High density polyethylene (HDPE), waterproof, non-absorbent, and graffiti-resistant textured surface, Floor mounted overhead-braced toilet compartments, Recycled Content, Post Consumer: 100 percent	72"h		Blueberry, Orange post texture	Multi-Person Bathroom	800-445-1148, Fax 800-274-1981, Email request info (info@scrantonproducts.com)
OC - Outside Curtain - Division 10 Section "Outside Curtains and Trees"	OC1	Architex	Ko 0901	72"w	Ocean Mist	Nurse Resting Rooms		Lisa Dahlkvist, Architex, lisadahlkvist@architex-40.com, (978) 688-2078
FH - Fabric - Division 06 Section "Architectural Wood Casework"	UPH1	Architex	24/7 Performance, Drizzle, 100% Vinyl, 230,000 double rubs, polyester backing	-	Ocean View	Seat at bench at Media Center		
	UPH2	Pallas	Structure Collection, Definition, polyester, Cryptin Finish, 100 double rubs, liquid-cleanable		Lapis	Seats at Auditorium		
RS - Roller Shades - Section 12 Section "Window Shades"	RS1	ReScape Acreedo	Manual Roller Shades: Shade Cloth, Ambient Renew, 1% openness, 15ch oz, 65% REPREVEN® Recycled Polyester, PVC-free, must be same color on both sides, ct NRC	Refer to documents for window sizing	White Smoke	Typical for windows in all Occupied Rooms (excluding Classrooms), and Building and Site and windows to corridors, Conference Rooms, LOBOs, Refer to Finish Plans for Locations	Align breaks in shades with mullions when possible	
	RS2	ReScape Acreedo	Motorized Roller Shades: Shade Cloth, Ambient Renew, 1% openness, 15ch oz, 65% REPREVEN® Recycled Polyester, PVC-free, must be same color on both sides, ct NRC	Refer to documents for window sizing	White Smoke	At Gymnasium	Align breaks in shades with mullions when possible	
MR - Athletic Mirror - Division 08 Section "Mirrors"	MR1		6.0 mm annealed monolithic glass mirrors with safety vinyl backing in lieu of the specified MirroFlex product., Install mirrors w/ horizontal mastic beads at 6" OC and T&B adhesive.		Ocean View	DTPT and Fitness Center		
TR - Metal Trim - Remove Spec Section for Products Trim are used with Elite Wall Covering, Wood Display, Etc.	TRM1	Fry Reglet	Wallcovering Trim Base and Termination: WC1811125-717	1.9" x 12"	Aluminum	At all exposed edge of wallcovering and wall protection/ all goods	Refer to detail 18/A605	Nancy Royer, Surface Materials, nancy@surfacematerials.com, Mobile (203) 605-1481
	TRM2	Fry Reglet	J-Channel Lap	1.9" x 12"	Aluminum	Installed at acoustical panels in corridors where color changes	Refer to detail 18/A605	Nancy Royer, Surface Materials, nancy@surfacematerials.com, Mobile (203) 605-1481
	TRM3	Fry Reglet	CHANNEL-375	1.9" x 12"	Aluminum	At all exposed edge of backboard/ goods (VG2)	Refer to detail 6/DM403	Nancy Royer, Surface Materials, nancy@surfacematerials.com,
	TRM4	Schluter Systems	Quadec	As required	Aluminum	At all outer edges where tile meets tile		
	TRM5	Schluter Systems	Reno	As required	Aluminum	At all exposed edge of wall tile		

2 - FINISH NOTES

2.1 Related Documents

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

2.2 Summary

A. This Section contains finish nomenclature with regard to project finishes.
B. Related Sections are listed in the Finish Product List.
C. Finishes for purchased and prefinished items such as Visual Display Boards, Metal Lockers, Operable Partitions, Fire-protection Specialties, Postal Specialties, Unit Kitchens, Toilet Compartments, Toilet Accessories, Residential Appliances, Foodservice Equipment, Medical Equipment, Manufactured Casework and like items are specified in their respective Sections. Refer to Table of Contents.

2.3 Abbreviations

A. Abbreviations for specific finishes are listed in the Finish Product List. Other Abbreviations include:
EXT Existing to Remain
EXP Exposed
UON Unless Otherwise Noticed
NIC Not In Contract

2.4 General Notes Applicable to the Entire Project

GENERAL

1. NORTH IS AS INDICATED ON THE DRAWINGS
2. REFER TO FINISH PRODUCT LIST FOR DEFINITION OF MATERIALS AND SUBSTRATES.
3. REFER TO FINISH PLANS FOR LOCATIONS OF FINISHES BY ROOM.
4. REFER TO INTERIOR ELEVATIONS FOR LOCATION OF WALL TILE, WALLCOVERING, ACCENT PAINT LOCATIONS, WAINSCOT, WALL PROTECTION AND SPECIALTY DESIGNS.
5. REFER TO RELATED SPECIFICATION SECTION FOR SPECIFIC INFORMATION REGARDING PRODUCT INSTALLATION, HANDLING, MAINTENANCE, DATA REQUIREMENTS, SUBMITTALS AND OTHER PERTINENT INFORMATION.
6. IF ANY DISCREPANCIES OCCUR BETWEEN FINISH PRODUCT LIST, FINISH PLAN AND SPECIFICATIONS THE ARCHITECT AND/OR INTERIOR DESIGNER MUST BE CONSULTED REGARDING DIRECTION OF DESIGN INTENT PRIOR TO ORDERING AND INSTALLATION OF ANY OF THE PRODUCTS IN QUESTION.
7. REFER TO SPECIFICATIONS FOR ALTERNATE MANUFACTURERS.
8. IMAGES FOR DIGITAL WALL COVERINGS ARE TO BE SELECTED BY ARCHITECT. ARCHITECT TO WORK DIRECTLY WITH MANUFACTURER TO CUSTOMIZE IMAGE FOR DESIGN PURPOSES AS WELL AS REQUIREMENTS FOR SCALING IMAGE TO SIZE AS INDICATED ON INTERIOR ELEVATIONS. DRAWINGS MUST APPROVE WITH IMAGE PRIOR TO INSTALLATION.
9. WOOD STAIN COLORS ARE TO BE CUSTOM TO MATCH ARCHITECTS SAMPLES. SAMPLES TO BE PROVIDED UPON REQUEST.
10. VENTS, GRILLES, ACCESS PANELS, PLUG STRIPS, CABINET UNIT HEATERS, FIRE EXTINGUISHER CABINETS, RADIATORS, ELECTRICAL PANEL BOARDS, DIFFUSERS (IN OCCUPIED AREAS), TO MATCH WALL CEILING ON WHICH THEY ARE INSTALLED.

STAIRS / ELEVATORS

1. ENCLOSED STAIRS SHALL HAVE: STRINGER PAINTED P2, RAILINGS PAINTED TO MATCH P2, HANDRAILS PAINTED TO MATCH P3
2. STAIRS WITHIN AUDITORIUM SHALL BE: STRINGER: P2, RAILINGS: P2, HANDRAILS WITHIN AUDITORIUM SHALL BE: PAINTED TO MATCH P25.
3. ELEVATORS: FLOORING: RUBBER TILE TO MATCH RST1 (SAME AS USED AT STAIR LANDINGS), WALLS: WILSONART PLASTIC LAMINATE, SATIN STAINLESS #4/#8 PVC

FLOORS

1. REFER TO A903 FOR FLOOR FINISH EXTENT OF FLOOR PATTERNS.
2. IN LOCATIONS WHERE THERE IS AN OPEN SPACE BELOW A MILLWORK COUNTER THE FLOORING IS TO CONTINUE INTO THAT OPENING.
3. DIRECTION OF FLOORING INSTALLATION IS AS INDICATED ON FINISH PLANS WITH ARROWS, ARROWS INDICATE DIRECTION OF LINEAR PATTERN AND/OR DIRECTION OF LONGEST SIDE OF TILE.
4. FLOORING TRANSITIONS
   A. AT TRANSITIONS BETWEEN CARPET AND OTHER FLOOR FINISHES, PROVIDE APPROPRIATE TRANSITION STRIP PER SPECIFICATIONS, TO BE APPROVED BY ARCHITECT.
   B. LOCATE TRANSITIONS IN FLOOR FINISH UNDER CENTERLINE OF DOOR UNO.
   C. REFER TO INTERIOR DETAIL SHEET A605 FOR EXTENT OF FLOORING TRANSITIONS.
   D. ALL TRANSITION STRIPS MUST MEET ADA REQUIREMENTS, REFER TO THRESHOLD TAGS ON FINISH PLANS FOR LOCATIONS OF TRANSITION TYPES
5. METAL TRANSITION STRIPS FINISH: BRUSHED STAINLESS STEEL
6. RUBBER TRANSITION STRIPS: TO BE SELECTED FROM MANUFACTURER'S FULL RANGE OF COLORS BY LOCATION TO COORDINATE WITH ADJACENT FLOORING.
7. CUT FLOOR TILE AS REQUIRED TO SLOPE TOWARDS FLOOR DRAINS.

WALLS

1. TYPICAL FIELD COLOR AT ALL WALLS TO BE P1 UNLESS OTHERWISE NOTED ON FINISH PRODUCT LIST, OR ON FINISH PLANS AND ELEVATIONS.
2. ALL COLUMNS ARE TO BE PAINTED, REFER TO FINISH PLANS FOR COLOR.
3. REFER TO ARCHITECTURAL FLOOR PLANS FOR LOCATION OF CORNER GUARDS.
4. USE EPOXY PAINT ON ALL WALLS AT WET AREAS, JANITOR CLOSETS, RECEIVING AREAS, OUTDOOR STORAGE AND AS INDICATED IN FINISH PRODUCT LIST & SPECS.
5. ALL WALLCOVERING, WALL PROTECTIONS AND TACKBOARDS THAT HAVE AN EXPOSED EDGE, NOT ENDING AT AN INSIDE CORNER, MUST HAVE A TRIM EDGE. REFER TO FINISH PRODUCT LIST FOR TYPES.
6. AT TILED WALL LOCATIONS ALL EXPOSED TILE EDGES AND OUTSIDE TILED CORNERS TO RECEIVE TRIM PIECE. REFER TO FINISH PRODUCT LIST FOR TYPE.
7. ALL WALLS OF SHOWERS TO BE TILED FULL HEIGHT ABOVE SHOWER BASE WITH METAL TRIM AT EXPOSED TILE EDGES (TR1).
8. WHERE COLUMNS ARE EXPOSED, TYPICAL WALL BASE, RB1 IS TO BE APPLIED.

BASE

1. PROVIDE RB1 AT ALL FLOORING LOCATIONS EXCEPT AT GYMNASIUM, STAGE AND BACK OF STAGE, WHERE VENTED BASE IS REQUIRED.
2. PROVIDE INTEGRAL COVE BASE AT ALL EPOXY FLOOR LOCATIONS.

CEILINGS

1. REFER TO REFLECTED CEILING PLANS FOR CEILING HEIGHTS AND EXTENT OF CEILING TYPES.
2. ALL EXPOSED CEILINGS TO BE PAINTED, INCLUDING PLUMBING, STRUCTURAL AND MECHANICAL PAINT COLOR IS AS INDICATED ON FINISH PRODUCT LIST, CEILING PLANS AND ELEVATIONS.
3. GYP. CEILINGS TO BE PAINTED P16, UNLESS OTHERWISE NOTED AS AN ACCENT COLOR.
4. WHERE PREPROPPING SPRAYS IS LOCATED ON EXPOSED BEAMS IT IS TO BE PAINTED THE SAME COLOR AS THE ADJACENT WALL.

DOORS

1. ALL WOOD DOORS TO BE FINISH: WS1
2. ALL HM DOORS AND FRAMES TO BE PAINTED P2, UNO, HM PAINT FINISH SHALL BE SEMI-GLOSS, UNO.

CASEWORK

1. REFER TO CASEWORK FINISH TAGS ON FINISH PLANS.
2. LABORATORY CASEWORK, AS IDENTIFIED IN LABORATORY CASEWORK SPEC: WOOD CASEWORK: PLAIN SLICED VERTICAL MAPLE. CUSTOMIZED STAIN TO MATCH WS1. FRONT STYLE: CLASSIC, PULLS: ROUNDED, ALUM/CHROME. DOOR HINGES: ALUM/CHROME. WORKTOP SURFACE: SOSP5 PER FINISH PRODUCT LIST. FUME HOODS: METAL CASE BASE/BULKHEAD: WHITE
3. ALL WINDOW STOOLS TO BE SOSF4, UNLESS OTHERWISE NOTED.

Finishes for Miscellaneous Items

1. Toilet Compartments: Hiney Riders, Color: Blueberry , Texture: Orange Peel
2. Display Cases: Metal Trim (Refer to details), P3.1 where noted with glass front and shelves, Plastic Laminate back and side panels to match PL2.
3. Fire Extinguisher Cabinets: Painted to match P1
4. Metal Lockers
   a. General Lockers: Basis of Design, Penco, Canvas 064, Interior and any exposed sides of locker to match exterior paint color,
   b. Color Accent Lockers at Right Side Classroom Pod: Custom Color to Match P10, interior of locker any exposed sides to match exterior paint color,
   c. Color Accent Lockers at Center Classroom Pod: Custom Color to Match P11, interior of locker any exposed sides to match exterior paint color,
   d. Color Accent Lockers at Left Side Classroom Pods: Custom Color to Match P12, interior of locker any exposed sides to match exterior paint color,
   e. Athletic Rooms: Basis of Design, Penco 052 Reflex Blue, To be selected from manufacturer's full range, interior of locker to match exterior paint color, Plinth top and exposed sides to match exterior paint color,
   f. Custodial Room: Basis of Design, Penco 052 Reflex Blue, To be selected from manufacturer's full range, interior of locker to match exterior paint color, Plinth top and exposed sides to match exterior paint color.
5. Dividing Curtain at Gym: Blue
6. Wall Pads at Gym: Blue
7. Telescopic Seating at Gym
   A. Stacks: Polymer, Basis of Design - Hussey Blue 301
   B. Railings, Understructure, Painted components: Black
   C. End Curtain: Blue to match seats
8. Residential Appliances: Gray Fingerprint Proof
9. Stage Drapes/Curtains: ST01 - 4M Fabrics Prestige, Navy, Lining to be black, Travelers are to be black, Cyclorama at stage is to be White
10. Unit Ventilators: Painted to match P1
11. Convection Covers: Painted to match P1
12. Switch plate/Outlet Covers: White cover with white outlet face/switches at white walls, Stainless with grey outlet face/switches at walls with accent paint, wall covering and other non-standard treatments.
13. Exterior Signage:
   A. Color for "Central": Blue to match P3
   B. Color for Address: TBD
14. Front Auditorium Seating:
   A. Molded polymer components/Basis of Design - Hussey, Graphite,
   B. Metal components/Basis of Design - Hussey, Graphite
   C. Upholstery: Refer to UPH's on Finish Product List
   D. End Panel: Tapered end panel to match PL1
   E. Arm Caps: Polymer arms: Basis of Design - Hussey, Graphite

SLAM
the SLAM Collaborative
80 Glastonbury Boulevard
Glastonbury, CT 06033-4410
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www.slamcoll.com

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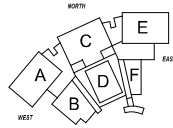
Drawn: AHS
Checked: JZ

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
2	11/06/2024	ADDENDUM NO. 6
1	10/16/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FINISH PRODUCT LIST -PART B AND FINISH NOTES

Date: 07/08/2024
Scale: 12" = 1'-0"
Proj. Number: 22367.00
Drawing Number: A911

Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_GREENWICH_CENTRAL_MS_R23.rvt
11/6/2024 1:24:33 PM

SPECIALTY EQUIPMENT - PRODUCT INFORMATION

	DESCRIPTION	QUANTITY	NEW OR EXISTING	POWER	PURCHASE / INSTALL	PRODUCT/BASIS OF DESIGN	REMARKS
CONSTRUCTION/ENGINEERING							
EQ01	SCROLL SAW	6	E	Y	O/C	DeWalt, DW788, 20" variable speed scroll saw, 26 in, 1.3 amps	
EQ02	TABLE SAW	1	E	Y	O/C	Sawstop, PCS17 - 175HP, 120v, 15amp	
EQ03	BAND SAW	1	E	Y	O/C	Powermatic, 874315, 14", PWBS-1791218K, 1-1/2HP, 1PH, 115/230	
EQ04	JOINTER	1	E	Y	O/C	Powermatic 943649, 8" Helical Cutterhead, PJM-8610088K, Motor 1Ph, 2HP, 230V, 9amp, 4550rpm, 1mm dust collector	
EQ05	CNC MACHINE	1	E	Y	O/C	Inventables, X-Carve CNC Machine	
EQ06	DISC SANDER	1	E	Y	O/C	Rockler, Powermatic 66-20 20" Disc Sander, 3HP 230,460V, PM4-1791264	
EQ07	DRILL PRESS	2	E	Y	O/C	Powermatic, PM2800B, 18", 1HP, 1ph, 115/230 volt, 15amps	
EQ08	CHOP SAW	1	E	Y	O/C	Makita, 10" Dual-Bevel Sliding Compound Miter Saw with Laser, LS1018L, 120v 15amps	
EQ09	DRUM SANDER	1	E	Y	O/C	Powermatic, 27", 4291812, PWBJ1792044 Motor 5Ph, 7.5HP, 115V	
EQ10	SPRAY BOOTH	1	N	Y	C/C	Sentry, Portable Spray Booth, SS-WX42SH, 115/1/60, 2 amps, 220V/50, .75 amps	VENTING REQUIRED
EQ11	PLANER	1	E	Y	O/C	Powermatic, 858264, PM5-1791213, 19-H, 16"Planer Helical, 3 HP, 1PH, 230V	
EQ12	3D PRINTER	1	E	Y	O/C	DeltaLabs Emblaser 2	
EQ13	LASER ENGRAVER	1	E	Y	O/C	Ahrig HH	
EQ14	LASER CUTTER	1	E	Y	O/C	Glowforge Pro	
GENERAL							
EQ01	REFRIGERATOR - COUNTER DEPTH	5	N	Y	C/C	Frigidaire, Gallery GRFQ2833AF, Counter Depth, Energy Star, ADA Compliant, no waterline	PLUMBING REQUIRED
EQ02	BASIC REFRIGERATOR	6	N	Y	C/C	Frigidaire, Gallery GRFQ2833AF, Energy Star, ADA Compliant	NO PLUMBING REQUIRED
EQ03	RANGE HOOD	5			C/C	Broan-NuTone, Glacier Collection, Recirculating	
EQ04	UNDER COUNTER FRIDGE	2	N	Y	C/C	Summit, ASDS2413, Trashy Star, ADA Compliant	
EQ05	DISHWASHER	5	N	Y	C/C	Frigidaire, FFID2426TS, Energy Star, ADA Compliant	PLUMBING REQUIRED
EQ06	CLOTHING WASHER	3	N	Y	C/C	GE GFW550SSNSPN	PLUMBING REQUIRED
EQ07	CLOTHING DRYER	3	N	Y	C/C	GE GFD55GSNWSPN	VENTING REQUIRED
EQ08	RANGE	5	N	Y	C/C	GE, JB655T	
EQ09	INSTRUCTOR'S RANGE	1	N	Y	C/C	Frigidaire, Gallery FGIF3036TF, Stainless Steel, induction freestanding, ADA compliant	
EQ10	INSTRUCTOR'S RANGE EXHAUST HOOD	1	N	Y	C/C	Broan, NB36S10U, Box canopy Island Hood Recirculating Exhaust with Extension	Ceiling mounted
EQ11	MAIL SORTER	4	N	N	C/C	Hamilton Sorter, S342624S, 36"w x 42"h x 12"d, 24 slots, with (3) additional shelves	
EQ12	COPIER / PRINTER	4	N	Y	O/O	N/A - PROVIDED BY OWNER	Power and data required
EQ13	CHANGING TABLE	1	N	Y	C/C	Mac-Kwikly, Pressalift 3300 - RS552215301 (Adult), motorized	Power required
EQ14	LASER PRINTER	2	E	Y	O/O		
EQ15	PLOTTER	2	E	Y	O/O		
HEALTH							
EH01	MEDICINE CABINET	1	N	N	C/C	McKesson Narcotic Double Key Lock Wall Cabinet, #489769, Color: White	WALL MOUNTED
EH02	MEDICAL UNDER COUNTER FRIDGE	1	N	Y	C/C	Summit, CP3716WDA, Energy Star, ADA Compliant	
EH03	GPT SCOPE	1	N	Y	C/C	Midmark, 7779-000PREBP	WALL MOUNTED
EH04	SHARPS CONTAINER	1	N	N	C/C	McKesson Provant Wall Cabinet with Glove Box, 855131	WALL MOUNTED
SCIENCE							
ES01	GOOGLE CABINET	6	N	N	C/C	Diversified Woodcraft, ESCT-11LM	
ES02	DRYING RACK	29	<varies>	N	C/C	<varies>	
VISUAL ART							
EV01	KILN	1	N	Y	C/C	L&L Kiln, eQuadPro Series, E23T-QP3-P, 031615-OCH-F	HARDWIRED

SPECIALTY EQUIPMENT - LOCATION SCHEDULE

ID TAG	DESCRIPTION	ROOM NUMBER	ROOM NAME	QUANTITY
CONSTRUCTION /ENGINEERING				
EQ01	SCROLL SAW	1039	WOOD SHOP	6
EQ02	TABLE SAW	1039	WOOD SHOP	1
EQ03	BAND SAW	1039	WOOD SHOP	1
EQ04	JOINTER	1039	WOOD SHOP	1
EQ05	CNC MACHINE	1039	WOOD SHOP	1
EQ06	DISC SANDER	1039	WOOD SHOP	1
EQ07	DRILL PRESS	1039	WOOD SHOP	2
EQ08	CHOP SAW	1039	WOOD SHOP	1
EQ09	DRUM SANDER	1039	WOOD SHOP	1
EQ10	SPRAY BOOTH	1039	WOOD SHOP	1
EQ11	PLANER	1039	WOOD SHOP	1
EQ12	3D PRINTER	1038	INNOVATION & ROBOTICS LAB	1
EQ13	LASER ENGRAVER	1038	INNOVATION & ROBOTICS LAB	1
EQ14	LASER CUTTER	1038	INNOVATION & ROBOTICS LAB	1
GENERAL				
EQ01	REFRIGERATOR - COUNTER DEPTH	1033	FACULTY DINING / WRK	1
EQ01	REFRIGERATOR - COUNTER DEPTH	1035	COOKING LAB	2
EQ01	REFRIGERATOR - COUNTER DEPTH	1051	LIFE SKILLS ROOM	1
EQ01	REFRIGERATOR - COUNTER DEPTH	2072	FACULTY WORKROOM	1
EQ02	BASIC REFRIGERATOR	1036	WORKROOM	1
EQ02	BASIC REFRIGERATOR	1022	PREP	1
EQ02	BASIC REFRIGERATOR	1075	CUSTODIAL OFFICE / BREAK RM	1
EQ02	BASIC REFRIGERATOR	2038	PREP	1
EQ02	BASIC REFRIGERATOR	2049	PREP	1
EQ02	BASIC REFRIGERATOR	2066	PREP	1
EQ03	RANGE HOOD	1035	COOKING LAB	4
EQ03	RANGE HOOD	1051	LIFE SKILLS ROOM	1
EQ04	UNDER COUNTER FRIDGE	1030	LAC. RM.	1
EQ04	UNDER COUNTER FRIDGE	1057	MEDIA TEAM OFFICE	1
EQ05	DISHWASHER	1035	COOKING LAB	1
EQ05	DISHWASHER	1051	LIFE SKILLS ROOM	1
EQ05	DISHWASHER	2038	PREP	1
EQ05	DISHWASHER	2049	PREP	1
EQ05	DISHWASHER	2066	PREP	1
EQ06	CLOTHING WASHER	1034	FAMILY CONSUMER SCIENCE	1
EQ06	CLOTHING WASHER	1051	LIFE SKILLS ROOM	1
EQ06	CLOTHING WASHER	1065	LAUNDRY	1
EQ07	CLOTHING DRYER	1034	FAMILY CONSUMER SCIENCE	1
EQ07	CLOTHING DRYER	1051	LIFE SKILLS ROOM	1
EQ07	CLOTHING DRYER	1065	LAUNDRY	1
EQ08	RANGE	1035	COOKING LAB	4
EQ08	RANGE	1051	LIFE SKILLS ROOM	1
EQ09	INSTRUCTOR'S RANGE	1035	COOKING LAB	1
EQ10	INSTRUCTOR'S RANGE EXHAUST HOOD	1035	COOKING LAB	1
EQ11	MAIL SORTER	1036	WORKROOM	4
EQ12	COPIER / PRINTER	1034	MAIL & RECORDS STORAGE	1
EQ12	COPIER / PRINTER	1033	FACULTY DINING / WRK	1
EQ12	COPIER / PRINTER	1057	MEDIA TEAM OFFICE	1
EQ12	COPIER / PRINTER	2072	FACULTY WORKROOM	1
EQ13	CHANGING TABLE	1052	LIFT SKILLS TOILET	1
EQ14	LASER PRINTER	1055	MEDIA CENTER	2
EQ15	PLOTTER	1055	MEDIA CENTER	2
HEALTH				
EH01	MEDICINE CABINET	1024	TREATMENT / ISOLATION ROOM	1
EH02	MEDICAL UNDER COUNTER FRIDGE	1024	TREATMENT / ISOLATION ROOM	1
EH03	GPT SCOPE	1024	TREATMENT / ISOLATION ROOM	1
EH04	SHARPS CONTAINER	1024	TREATMENT / ISOLATION ROOM	1
SCIENCE				
ES01	GOOGLE CABINET	2007	SCIENCE	1
ES01	GOOGLE CABINET	2009	SCIENCE	1
ES01	GOOGLE CABINET	2048	SCIENCE	1
ES01	GOOGLE CABINET	2050	SCIENCE	1
ES01	GOOGLE CABINET	2065	SCIENCE	1
ES01	GOOGLE CABINET	2067	SCIENCE	1
ES02	DRYING RACK	2007	SCIENCE	4
ES02	DRYING RACK	2008	PREP	1
ES02	DRYING RACK	2009	SCIENCE	6
ES02	DRYING RACK	2048	SCIENCE	4
ES02	DRYING RACK	2049	PREP	1
ES02	DRYING RACK	2050	SCIENCE	4
ES02	DRYING RACK	2065	SCIENCE	4
ES02	DRYING RACK	2066	PREP	1
ES02	DRYING RACK	2067	SCIENCE	4
VISUAL ART				
EV01	KILN	1043	KILN	1

TACKBOARD SCHEDULE

ID TAG	DESCRIPTION	QUANTITY	Room: Number	Room: Name
TB48	TB 48"w x 48"h	1	1072	CUSTODIAL WORK ROOM
TB48	TB 48"w x 48"h	1	1020	WAITING AREA
TB48	TB 48"w x 48"h	1	1023	REST AREA
TB48	TB 48"w x 48"h	1	1023	REST AREA
TB48	TB 48"w x 48"h	1	2072	FACULTY WORKROOM
TB48	TB 48"w x 48"h	1	2007	SCIENCE
TB48	TB 48"w x 48"h	1	2095	SCIENCE
TB48	TB 48"w x 48"h	1	1038	INNOVATION & ROBOTICS LAB
TB72	TB 72"w x 48"h	1	2007	SCIENCE
TB72	TB 72"w x 48"h	1	2095	SCIENCE
TB72	TB 72"w x 48"h	1	1011	PASSAGE
TB72	TB 72"w x 48"h	1	1001	MAIN CONCOURSE
TB72	TB 72"w x 48"h	1	1001	MAIN CONCOURSE
TB96	TB 96"w x 48"h	1	1041	ART ROOM
TB96	TB 96"w x 48"h	1	1033	FACULTY DINING / WRK.
TB96	TB 96"w x 48"h	1	2091	CORRIDOR
TB96	TB 96"w x 48"h	1	2004	CORRIDOR
TB96	TB 96"w x 48"h	1	2054	CORRIDOR
TB96	TB 96"w x 48"h	1	2020	CORRIDOR
TB96	TB 96"w x 48"h	1	2020	CORRIDOR
TB96	TB 96"w x 48"h	1	2001	CORRIDOR
TB96	TB 96"w x 48"h	1	2001	CORRIDOR
TB120	TB 120"w x 48"h	1	1115	CORRIDOR
TB120	TB 120"w x 48"h	1	1115	CORRIDOR
TB120	TB 120"w x 48"h	1	1115	CORRIDOR
TB120	TB 120"w x 48"h	1	1115	CORRIDOR
TB120	TB 120"w x 48"h	1	2071	CORRIDOR
TB120	TB 120"w x 48"h	1	2071	CORRIDOR
TB120	TB 120"w x 48"h	1	2001	CORRIDOR
TB120	TB 120"w x 48"h	1	2001	CORRIDOR
TB120	TB 120"w x 48"h	1	1101	PUBLIC LOBBY
TB120	TB 120"w x 48"h	1	1101	PUBLIC LOBBY
TB120	TB 120"w x 48"h	1	1101	PUBLIC LOBBY
TB120	TB 120"w x 48"h	1	1101	PUBLIC LOBBY
TB120	TB 120"w x 48"h	1		
TB120	TB 120"w x 48"h	1		
TB144	TB 144"w x 48"h	1	1030	CORRIDOR
TB144	TB 144"w x 48"h	1	1030	CORRIDOR
TB144	TB 144"w x 48"h	1	1030	CORRIDOR
TB144	TB 144"w x 48"h	1	1101	PUBLIC LOBBY

WHITEBOARD TOTALS

ID TAG	DESCRIPTION	QTY
WB48	48" Wide x 48" High	2
WB60	60" Wide x 48" High	14
WB84	84" Wide x 48" High	2
WB96	96" Wide x 48" High	84
WB96R	96" Wide x 48" High With Rail	88
WB120	120" Wide x 48" High	9
WB120R	120" Wide x 48" High With Rail	2

ASSEMBLED WHITEBOARD - LOCATION BY TYPE

ID TAG	DESCRIPTION	QUANTITY	Room: Number	Room: Name
WB48	48" Wide x 48" High	1	2065	ASST. PIK. OFF.
WB48	48" Wide x 48" High	1	2030	ASST. PRINCIPAL
WB60	60" Wide x 48" High	1	1033	FACULTY DINING / WRK
WB60	60" Wide x 48" High	1	1072	CUSTODIAL WORK ROOM
WB60	60" Wide x 48" High	1	1023	REST AREA
WB60	60" Wide x 48" High	1	1015	COUNSELOR
WB60	60" Wide x 48" High	1	1014	COUNSELOR
WB60	60" Wide x 48" High	1	1016	TEEN TALK
WB60	60" Wide x 48" High	1	1013	COUNSELOR
WB60	60" Wide x 48" High	1	1007	PRINCIPAL
WB60	60" Wide x 48" High	1	1003	POS BEHAVIOR INTERV.
WB60	60" Wide x 48" High	1	1101	PUBLIC LOBBY
WB60	60" Wide x 48" High	1	1033	FACULTY DINING / WRK
WB60	60" Wide x 48" High	1	2064	PSYCH OFFICE
WB60	60" Wide x 48" High	1	2003	SENSORY
WB60	60" Wide x 48" High	1	1101	PUBLIC LOBBY
WB84	84" Wide x 48" High	1	1011	ART ROOM
WB84	84" Wide x 48" High	1	2073	SPEECH LANGUAGE
WB96	96" Wide x 48" High	1	2088	CLASSROOM
WB96	96" Wide x 48" High	1	2089	CLASSROOM
WB96	96" Wide x 48" High	1	2089	CLASSROOM
WB96	96" Wide x 48" High	1	2092	COMMONS
WB96	96" Wide x 48" High	1	2084	CLASSROOM
WB96	96" Wide x 48" High	1	1034	FAMILY CONSUMER SCIENCE
WB96	96" Wide x 48" High	1	2062	MATH INTERVENTION
WB96	96" Wide x 48" High	1	2035	ISL. BILINGUAL CR
WB96	96" Wide x 48" High	1	2083	CLASSROOM
WB96	96" Wide x 48" High	1	2083	CLASSROOM
WB96	96" Wide x 48" High	1	1075	CUSTODIAL OFFICE / BREAK RM
WB96	96" Wide x 48" High	1	2074	SPED RES.
WB96	96" Wide x 48" High	1	2062	MATH INTERVENTION
WB96	96" Wide x 48" High	1	2044	CLASSROOM
WB96	96" Wide x 48" High	1	2044	CLASSROOM
WB96	96" Wide x 48" High	1	2043	CLASSROOM
WB96	96" Wide x 48" High	1	2043	CLASSROOM
WB96	96" Wide x 48" High	1	2042	W.L. CLASSROOM
WB96	96" Wide x 48" High	1	2042	W.L. CLASSROOM
WB96	96" Wide x 48" High	1	2041	W.L. CLASSROOM
WB96	96" Wide x 48" High	1	2041	W.L. CLASSROOM
WB96	96" Wide x 48" High	1	2040	CLASSROOM
WB96	96" Wide x 48" High	1	2039	CLASSROOM
WB96	96" Wide x 48" High	1	2039	CLASSROOM
WB96	96" Wide x 48" High	1	2052	CLASSROOM
WB96	96" Wide x 48" High	1	2052	CLASSROOM
WB96	96" Wide x 48" High	1	2048	SCIENCE
WB96	96" Wide x 48" High	1	2050	SCIENCE
WB96	96" Wide x 48" High	1	1011	PASSAGE
WB96	96" Wide x 48" High	1	2046	CLASSROOM
WB96	96" Wide x 48" High	1	2046	CLASSROOM
WB96	96" Wide x 48" High	1	2078	SPED RES.
WB96	96" Wide x 48" High	1	2078	SPED RES.
WB96	96" Wide x 48" High	1	2079	SPED RES.
WB96	96" Wide x 48" High	1	2079	SPED RES.
WB96	96" Wide x 48" High	1	2076	CLASSROOM
WB96	96" Wide x 48" High	1	2077	CLASSROOM
WB96	96" Wide x 48" High	1	2077	CLASSROOM
WB96	96" Wide x 48" High	1	2080	CLASSROOM
WB96	96" Wide x 48" High	1	2080	CLASSROOM
WB96	96" Wide x 48" High	1	2081	CLASSROOM
WB96	96" Wide x 48" High	1	2081	CLASSROOM
WB96	96" Wide x 48" High	1	2082	CLASSROOM
WB96	96" Wide x 48" High	1	2082	CLASSROOM
WB96	96" Wide x 48" High	1	2083	CLASSROOM
WB96	96" Wide x 48" High	1	2083	CLASSROOM
WB96	96" Wide x 48" High	1	2084	CLASSROOM
WB96	96" Wide x 48" High	1	2084	CLASSROOM
WB96	96" Wide x 48" High	1	2047	CLASSROOM
WB96	96" Wide x 48" High	1	2047	CLASSROOM
WB96	96" Wide x 48" High	1	2051	CLASSROOM
WB96	96" Wide x 48" High	1	2051	CLASSROOM
WB96	96" Wide x 48" High	1	2073	SPEECH LANGUAGE
WB96	96" Wide x 48" High	1	2074	SPED RES.
WB96	96" Wide x 48" High	1	2017	W.L. CLASSROOM
WB96	96" Wide x 48" High	1	2017	W.L. CLASSROOM
WB96	96" Wide x 48" High	1	2011	CLASSROOM
WB96	96" Wide x 48" High	1	2084	CLASSROOM
WB96	96" Wide x 48" High	1	2084	CLASSROOM
WB96	96" Wide x 48" High	1	2047	CLASSROOM
WB96	96" Wide x 48" High	1	2051	CLASSROOM
WB96	96" Wide x 48" High	1	2010	CLASSROOM
WB96	96" Wide x 48" High	1	2062	MATH INTERVENTION

ASSEMBLED WHITEBOARD - LOCATION BY TYPE

ID TAG	DESCRIPTION	QUANTITY	Room: Number	Room: Name
WB96	96" Wide x 48" High	1	2006	CLASSROOM
WB96	96" Wide x 48" High	1	2055	CLASSROOM
WB96	96" Wide x 48" High	1	2057	CLASSROOM
WB96	96" Wide x 48" High	1	2006	CLASSROOM
WB96	96" Wide x 48" High	1	2005	CLASSROOM
WB96	96" Wide x 48" High	1	2055	CLASSROOM
WB96	96" Wide x 48" High	1	2060	COMMONS
WB96	96" Wide x 48" High	1	2007	SCIENCE
WB96R	96" Wide x 48" High With Rail	1	1038	INNOVATION & ROBOTICS LAB
WB96R	96" Wide x 48" High With Rail	1	1038	INNOVATION & ROBOTICS LAB
WB96R	96" Wide x 48" High With Rail	1	2088	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2089	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2089	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2088	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2083	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	1118	ORCHESTRA
WB96R	96" Wide x 48" High With Rail	1	1118	ORCHESTRA
WB96R	96" Wide x 48" High With Rail	1	1051	LIFE SKILLS ROOM
WB96R	96" Wide x 48" High With Rail	1	1051	LIFE SKILLS ROOM
WB96R	96" Wide x 48" High With Rail	1	2047	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2051	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2005	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2010	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2017	W.L. CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2041	W.L. CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2043	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2075	W.L. CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2077	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2080	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2081	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2013	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2013	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2014	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2014	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2015	SPED RES.
WB96R	96" Wide x 48" High With Rail	1	2015	SPED RES.
WB96R	96" Wide x 48" High With Rail	1	2016	SPED RES.
WB96R	96" Wide x 48" High With Rail	1	2016	SPED RES.
WB96R	96" Wide x 48" High With Rail	1	2017	W.L. CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2018	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2019	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2019	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2039	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2040	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2040	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2041	W.L. CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2042	W.L. CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2042	W.L. CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2043	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2044	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2044	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2047	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2051	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2005	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2006	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2006	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2010	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2075	W.L. CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2076	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2077	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2078	SPED RES.
WB96R	96" Wide x 48" High With Rail	1	2078	SPED RES.
WB96R	96" Wide x 48" High With Rail	1	2079	SPED RES.
WB96R	96" Wide x 48" High With Rail	1	2079	SPED RES.
WB96R	96" Wide x 48" High With Rail	1	2076	SPED RES.
WB96R	96" Wide x 48" High With Rail	1	2080	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2081	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2052	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2052	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2011	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2011	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2073	W.L. CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2087	SCIENCE
WB96R	96" Wide x 48" High With Rail	1	2084	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2083	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2076	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	1101	PUBLIC LOBBY
WB96R	96" Wide x 48" High With Rail	1	2046	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	2046	CLASSROOM
WB96R	96" Wide x 48" High With Rail	1	1064	GT/PT
WB96R	96" Wide x 48" High With Rail	1	2065	SCIENCE
WB96R	96" Wide x 48" High With Rail	1	2055	SCIENCE
WB96R	96" Wide x 48" High With Rail	1	2048	SCIENCE
WB96R	96" Wide x 48" High With Rail	1	2048	SCIENCE
WB96R	96" Wide x 48" High With Rail	1	2050	SCIENCE
WB96R	96" Wide x 48" High With Rail	1	2050	SCIENCE
WB96R	96" Wide x 48" High With Rail	1	2006	SCIENCE
WB96R	96" Wide x 48" High With Rail	1	2006	SCIENCE
WB96R	96" Wide x 48" High With Rail	1	2007	SCIENCE
WB96R	96" Wide x 48" High With Rail	1	2007	SCIENCE
WB96R	96" Wide x 48" High With Rail	1	1064	GT/PT
WB96R	96" Wide x 48" High With Rail	1	1091	LOCKER ROOM
WB96R	96" Wide x 48" High With Rail	1	1095	LOCKER ROOM
WB96R	96" Wide x 48" High With Rail	1	2062	MATH INTERVENTION
WB96R	96" Wide x 48" High With Rail	1	2062	MATH INTERVENTION

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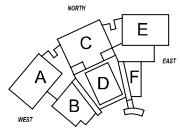
Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane,
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
1	11/06/2024	ADDENDUM NO. 6
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

SPECIALTY EQUIPMENT LIST

Date: 07/08/2024
Scale:
Proj. Number: 22367.00
Drawing Number: A912

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SIGNAGE SCHEDULE

Architectural Room Number	Architectural Room Name	Location - Door No.	Sign Type	Permanent Room Number	Signage Message	Pictogram	Comments	Rev. No.
1EL1	ELEV	1EL1	F		IN CASE OF FIRE USE STAIRS	F		
1EL1	ELEV	1EL1	F1		1			
1ST1	STAIR NO. 1	ST1-1B	E2		EXIT			
1ST1	STAIR NO. 1	ST1-1A	C		STAIR 1			
1ST2	STAIR NO. 2	ST2-1B	E2		EXIT	D		
2EL1	ELEV	2EL1	F		IN CASE OF FIRE USE STAIRS			
2EL1	ELEV	2EL1	F1		2			
2ST1	STAIR NO. 1	ST1-2A	C		STAIR 1			
2ST1	STAIR NO. 1	ST1-2	E		EXIT			
2ST2	STAIR NO. 2	ST2-2	C		STAIR 2			
2ST2	STAIR NO. 2	ST2-2	E		EXIT			
1000	ENTRY VESTIBULE	1000D	F		WELCOME			
1000	ENTRY VESTIBULE	1000B	A2		MAIN OFFICE		Installed on transom glass	
1001	MAIN CONCOURSE	1034A	E1		EXIT		A, R	
1001	MAIN CONCOURSE	1131	E2		EXIT		A, L	
1001	MAIN CONCOURSE	1026	E1		EXIT		A, L	
1001	MAIN CONCOURSE	1050B	E1		EXIT		A, L	
1001	MAIN CONCOURSE	1001	F					
1002	WAITING	1002B	A1		MAIN OFFICE			
1002	WAITING	1002A	A1		MAIN OFFICE			
1004	MAIL & RECORDS STORAGE	1004	A		STORAGE			
1006	WORKROOM	1005	A		OFFICE			
1007	PRINCIPAL	1007	B1		OFFICE			
1008	POS BEHAVIOR INTERV.	1009	B1		CLASSROOM			
1010	WAITING	1010	A1		GUIDANCE SUITE			
1011	PASSAGE	1008	A		GUIDANCE SUITE			
1012	TLT.	1012	D		RESTROOM		B, C, D	
1013	COUNSELOR	1013	B1		OFFICE			
1014	COUNSELOR	1014	B1		OFFICE			
1015	COUNSELOR	1015	B1		OFFICE			
1016	TEEN TALK	1016	B1		OFFICE			
1018	SECURE FILES STORAGE	1018	A		STORAGE			
1019	CONFERENCE ROOM	1019	A1		CONFERENCE ROOM			
1020	WAITING AREA	1020	A1		HEALTH SUITE			
1021	NURSE OFFICE, STORAGE	1021	B		NURSE			
1023	REST AREA	1023	A		HEALTH SUITE			
1024	TREATMENT, ISOLATION ROOM	1024	A		EXAM ROOM			
1025	TOILET	1025	D		RESTROOM		B, C, D	
1026	MENS TOILET	1026	D5		RESTROOM			
1027	WOMENS TOILET	1027	D4		RESTROOM			
1028	PASSAGE	1028	E2		EXIT			
1029	PASSAGE	1023	E2		EXIT			
1029	ELECT. CLOSET	1029	A		ELECTRICAL CLOSET			
1030	LAC, RM	1030	A		WELLNESS ROOM			
1031	STAFF TLT	1031	D		FACULTY RESTROOM		B, C, D	
1032	STAFF TLT	1032	D		FACULTY RESTROOM		B, C, D	
1033	FACULTY DINING / WRK	1033	A1		FACULTY DINING			
1034	FAMILY CONSUMER SCIENCE	1034A	B1		FAMILY CONSUMER SCIENCE			
1034	FAMILY CONSUMER SCIENCE	1034B	B1		FAMILY CONSUMER SCIENCE			
1037	FCS STOR.	1037	A		STORAGE			
1038	INNOVATION & ROBOTICS LAB	1038A	B1		INNOVATION & ROBOTICS LAB			
1039	WOOD SHOP	1039A	B1		WOOD SHOP			
1039	WOOD SHOP	1039B	A		WOOD SHOP			
1040	WOOD STOR.	1040	A		STORAGE			
1041	ART ROOM	1041A	A1		ART ROOM			
1042	ART STORAGE	1042	A		STORAGE			
1043	KILN	1043	A		KILN			
1044	PERF. ARTS STOR.	1044	A		STORAGE			
1045	IDF	1045	A		IDF			
1047	VESTIBULE	1047	E2		TO EXIT	D		
1047	VESTIBULE	ST1-1A	A		MECHINCAL			
1048	MECHANICAL	1045	A		MECHANICAL			
1048	MECHANICAL	1047	A		MECHANICAL			
1049	CUSTODIAL	1049	A		CUSTODIAL			
1050	CORRIDOR	1050A	E2		EXIT	D		
1050	CORRIDOR	1050	E1		EXIT		A, R	
1050	CORRIDOR	1039A	P		WOOD SHOP & INNOVATION LAB			
1050	CORRIDOR	1041A	P		ART			
1050	CORRIDOR	1050B	A		CORRIDOR 1050			
1051	LIFE SKILLS ROOM	1051	A1		LIFE SKILLS			
1052	LIFE SKILLS TOILET	1052	D		RESTROOM		B, C, D	
1055	MEDIA CENTER	1055A	A1		MEDIA CENTER			
1055	MEDIA CENTER	1035	A1		MEDIA CENTER			
1056	MEDIA COLLABORATION	1060A	S		Specialty Quote per allowance			
1056	MEDIA COLLABORATION	1060A	N		CO DETECTOR IS LOCATED IN THIS ROOM.IF ALARM IS SOUNDING DO NOT ENTER WITHOUT PROPER PROTECTION			
1056	MEDIA COLLABORATION	1060B	N		CO DETECTOR IS LOCATED IN THIS ROOM.IF ALARM IS SOUNDING DO NOT ENTER WITHOUT PROPER PROTECTION			
1057	MEDIA TEAM OFFICE	1057	B1		OFFICE			
1059	MEDIA SOUND BOOTH	1059	A1		MEDIA SOUND BOOTH			
1060	MECHANICAL	1060B	A		MECHANICAL			
1060	MECHANICAL	1060A	A		MECHANICAL			
1061	MEDIA SOUND BOOTH	1061	A1		MEDIA SOUND BOOTH			
1062	MEDIA EQUIP. STOR.	1062	A		STORAGE			
1063	MEDIA PRODUCTION CLASSROOM	1063	A1		MEDIA PRODUCTION CLASSROOM			
1064	OT/PT	1064	B1		OT/PT			
1065	OT/PT STOR.	1065	A		STORAGE			
1066	CUSTODIAL	1066	A		CUSTODIAL			
1067	MECHANICAL	1071A	E2		EXIT	D		
1067	MECHANICAL	1071A	A		EXIT			
1068	MDF	1068	A		MDF			
1069	MAIN ELECTRICAL ROOM	1069	A		ELECTRICAL			
1070	EMERG. ELEC	1070	A		EMERGENCY ELECTRICAL ROOM			
1071	VESTIBULE	ST2-1	C		STAIR 1		L1	
1071	VESTIBULE	1071A	C		TO THE STAIRS			
1071	VESTIBULE	1071B	C		STAIR 2			
1072	CUSTODIAL WORK ROOM	1071	A		CUSTODIAL WORK ROOM			
1072	CUSTODIAL WORK ROOM	1072	A		CUSTODIAL WORK ROOM			
1073	CUSTODIAL EQUIP. STORAGE	1073	A		STORAGE			
1073	CUSTODIAL EQUIP. STORAGE	1073B	A		STORAGE			
1074	CUSTODIAL TOILET ROOM	1074	D		RESTROOM		B, C, D	
1075	CUSTODIAL OFFICE / BREAK RM.	1075A	A		CUSTODIAL BREAK ROOM			
1076	CUSTODIAL STAFF LOCKERS	1075B	A		WATER SERVICE PUMP			
1079	RECEIVING	1079	E2		EXIT	D		
1079	RECEIVING	1075B	A		CUSTODIAL BREAK ROOM			
1079	RECEIVING	1060B	A		WATER SERVICE PUMP			
1080	KITCHEN RECEIVING	1080A	E2		EXIT	D		
1080	KITCHEN RECEIVING	1060B	A		RECEIVING			
1081	KITCHEN TOILET ROOM	1081	D		RESTROOM		B, C, D	
1082	NON-FOOD STORAGE	1082	A		STORAGE			
1083	KITCHEN STORAGE	1083	A		STORAGE			
1084	OFFICE	1084	B1		OFFICE			
1085	CAFETERIA	1085E	A		CAFETERIA			
1085	CAFETERIA	1085C	A		CAFETERIA			
1085	CAFETERIA	1085	E2		CAFETERIA	D		
1085	CAFETERIA	1085A	A		CAFETERIA			
1085	CAFETERIA	1085E	G		OCCUPANT LOAD			
1086	CAFETERIA	1085	F		REFER TO ELEVATION 1EA/111.1			
1087	PE / ATH.; STORAGE	1091	A		STORAGE			
1090	PE OFFICE	1090	B1		OFFICE			
1090	GYM TLT ROOM	1090	D		GYM RESTROOM		B, C, D	
1091	LOCKER ROOM	1091	A		LOCKER ROOM			
1092	ELECT. CLOSET	1092	A		ELECTRICAL CLOSET			
1093	CORRIDOR	1093	A		GYMNASIUM			
1094	GYM TLT ROOM	1094	D		GYM RESTROOM		B, C, D	
1095	LOCKER ROOM	1095	A		LOCKER ROOM			
1096	PE TLT; SHOWER	1096	D3		GYM RESTROOM		B, C, D	
1097	PE OFFICE	1097	B1		OFFICE			
1098	FITNESS ROOM	1098	A1		FITNESS ROOM			

SIGNAGE SCHEDULE

Architectural Room Number	Architectural Room Name	Location - Door No.	Sign Type	Permanent Room Number	Signage Message	Pictogram	Comments	Rev. No.
1100	GYMNASIUM	1100A	A1		GYMNASIUM			
1100	GYMNASIUM	1093	E2		EXIT	D		
1100	GYMNASIUM	1093C	E2		TO EXIT	D		
1100	GYMNASIUM	1100	G		OCCUPANT LOAD			
1100	GYMNASIUM	1100	M		ASSISTED LEARNING DEVICE			
1100	GYMNASIUM	1067	M		ASSISTED LEARNING DEVICE			
1100	GYMNASIUM	1100B	J		SPRINKLER CONTROL VALVE			
1101	PUBLIC LOBBY	1061	P		GYMNASIUM			
1101	PUBLIC LOBBY	1102C	E2		EXIT	D		
1101	PUBLIC LOBBY	1060	P		GYM			
1101	PUBLIC LOBBY	1101	E1		EXIT	A, R		
1101	PUBLIC LOBBY	1101	E1		EXIT	A, R		
1101	PUBLIC LOBBY	1102c	A		VESTIBULE			
1102	VESTIBULE	1102A	A2		AUDITORIUM		Installed on transom glass	
1102	VESTIBULE	1102B	A2		GYMNASIUM		Installed on transom glass	
1103	TOILET	1103	D		RESTROOM	B, C, D		
1105	WOMENS TOILET	1105	D4		RESTROOM	L		
1105	WOMENS TOILET	1104	D5		RESTROOM	B, C, D, R		
1106	ELECT. CLOSET	1106	A		ELECTRICAL CLOSET			
1107	STAGE STORAGE	1107	A		STORAGE			
1109	BAND	1109	B		BAND ROOM			
1109	BAND	1109B	B		BAND ROOM			
1110	PRACTICE ROOM	1110	A		PRIVATE ROOM			
1111	BAND STORAGE	1111	A		STORAGE			
1113	STAGE STORAGE	1113	A		STORAGE			
1114	STAGE SUPPORT	1114	A		STORAGE			
1115	CORRIDOR	1112	E1		EXIT	A, R		
1115	CORRIDOR	1112B	E1		EXIT	A, L		
1116	COURTYARD	1116A	A1		COURTYARD			
1116	COURTYARD	1116	A1		COURTYARD			
1117	COURTYARD	1117A	A		COURTYARD			
1117	COURTYARD	1117B	A		COURTYARD			
1118	ORCHESTRA	1118A	B		ORCHESTRA ROOM			
1118	ORCHESTRA	1118B	B		ORCHESTRA ROOM			
1119	PRACTICE ROOM	1119	A		PRIVATE ROOM			
1120	ORCHESTRA STORAGE	1120	A		STORAGE			
1122	CHORAL	1122	B1		CHORAL ROOM			
1123	CHORAL STORAGE	1123	A		STORAGE			
1125	VESTIBULE	1125A	A		AUDITORIUM			
1126	VESTIBULE	1126A	A		AUDITORIUM			
1127	AUDITORIUM	1126B	M		ASSISTED LEARNING DEVICE	H		
1127	AUDITORIUM	1125B	M		ASSISTED LEARNING DEVICE	H		
1127	AUDITORIUM	1127	A		AUDITORIUM			
1127	AUDITORIUM	1126	A		AUDITORIUM			
1127	AUDITORIUM	1126B	G		OCCUPANT LOAD			
1127	AUDITORIUM	1125B	A		AUDITORIUM			
1127	AUDITORIUM	1126B	A		AUDITORIUM			
1128	CORRIDOR	1126A	A		AUDITORIUM			
1129	CORRIDOR	1126A	A		AUDITORIUM			
1131	CORRIDOR	1000C	Q		DEDICATION PLAQUE		REFER TO SPECS	
1131	CORRIDOR	1131	P		AUDITORIUM			
1131	CORRIDOR	1131	E1		EXIT	A, L		
1132	CORRIDOR	1132	P		AUDITORIUM			
1132	CORRIDOR	1132	E1		EXIT	A, R		
1001	CORRIDOR	2000	E2		EXIT	D		
2001	CORRIDOR	2000	A		VESTIBULE			
2002	SPED RES.	2002	B1		CLASSROOM			
2002	SPED RES.	2002	A2		2002			
2003	HEARING IMPAIR./OPAL	2003	B1		CLASSROOM			
2005	CLASSROOM	2005	B1		CLASSROOM			
2005	CLASSROOM	2005	A2		2005			
2006	CLASSROOM	2006	A2		2006			
2006	CLASSROOM	2006	B1		CLASSROOM			
2006	CLASSROOM	2006	A2		2006			
2006	CLASSROOM	2006	A2		2006			
2007	SCIENCE	2007A	B1		SCIENCE CLASSROOM			
2007	SCIENCE	2007B	A		SCIENCE CLASSROOM			
2007	SCIENCE	2007	A2		2007			
2007	SCIENCE	2007	A2		2007			
2008	PREP	2008A	A1		PREP ROOM			
2008	PREP	2008B	A1		PREP ROOM			
2009	SCIENCE	2009	B1		SCIENCE CLASSROOM			
2009	SCIENCE	2009	A		SCIENCE CLASSROOM			
2009	SCIENCE	2009	A2		2009			
2009	SCIENCE	2009	A2		2009			
2010	CLASSROOM	2010	B1		CLASSROOM			
2010	CLASSROOM	2010	A2		2010			
2010	CLASSROOM	2010	A2		2010			
2011	CLASSROOM	2011	B1		CLASSROOM			
2011	CLASSROOM	2011	A2		2011			
2011	CLASSROOM	2011	A2		2011			
2013	CLASSROOM	2013	B1		CLASSROOM			
2013	CLASSROOM	2013	A2		2013			
2013	CLASSROOM	2013	A2		2013			
2014	CLASSROOM	2014	B1		CLASSROOM			
2014	CLASSROOM	2014	A2		2014			
2014	CLASSROOM	2014	A2		2014			
2015	SPED RES.	2015	B1		CLASSROOM			
2015	SPED RES.	2015	A2		2015			
2016	SPED RES.	2016	B1		CLASSROOM			
2016	SPED RES.	2016	A2		2016			
2017	AVL CLASSROOM	2017	B1		CLASSROOM			
2017	AVL CLASSROOM	2017	A2		2017			
2017	AVL CLASSROOM	2017	A2		2017			
2018	CLASSROOM	2018	B1		CLASSROOM			
2018	CLASSROOM	2018	A2		2018			
2018	CLASSROOM	2018	A2		2018			
2019	CLASSROOM	2019	B1		CLASSROOM			
2019	CLASSROOM	2019	A2		2019			
2019	CLASSROOM	2019	A2		2019			
2020	CORRIDOR	2000	A		CORRIDOR 2020			
2020	CORRIDOR	2054B	E2		CORRIDOR 2054			
2021	B.TLT.	2025	D4		GIRLS RESTROOM	B, D		
2022	ELEC	2003	A		CUSTODIAL			
2023	STAFF TLT	2028	D		RESTROOM	B, C, D		
2024	CUSTODIAL	2027	A		CUSTODIAL			
2025	STAFF TLT.	2026	D		RESTROOM	B, C, D		
2026	ELEC	2022	A		CUSTODIAL			
2027	G.TLT.	2027	D5		RESTROOM	C, D		
2028	ELL BILINGUAL CR	2028	B1		CLASSROOM			
2028	ELL BILINGUAL CR	2017	A2		2028			
2029	READING INTERVENTION	2029	B1		CLASSROOM			
2029	READING INTERVENTION	2029	A2		2029			
2030	ASST. PRINCIPAL	2030	B1		OFFICE			
2031	SOCIAL WORKER	2031	B1		OFFICE			
2032	SENIORS	2032	A1		SENIORS ROOM			
2039	CLASSROOM	2039	B1		CLASSROOM			
2039	CLASSROOM	2039	A2		2039			
2039	CLASSROOM	2039	A2		2039			
2040	CLASSROOM	2040	B1		CLASSROOM			
2040	CLASSROOM	2040	A2		2040			
2040	CLASSROOM	2040	A2		2040			
2041	AVL CLASSROOM	2041	B1		CLASSROOM			
2041	AVL CLASSROOM	2041	A2		2041			
2041	AVL CLASSROOM	2041	A2		2041			
2043	AVL CLASSROOM	2043	B1		CLASSROOM			
2042	AVL CLASSROOM	2042	B1		CLASSROOM			
2042	AVL CLASSROOM	2042	A2		2042			
2042	AVL CLASSROOM	2042	A2		2042			
2043	CLASSROOM	2043	B1		CLASSROOM			
2043	CLASSROOM	2043	A2		2043			
2043	CLASSROOM	2043	A2		2043			
2044	CLASSROOM	2044	B1		CLASSROOM			
2044	CLASSROOM	2044	A2		2044			
2044	CLASSROOM	2044	A2		2044			
2045	CLASSROOM	2045	B1		CLASSROOM			
2046	CLASSROOM	2046	A2		2046			
2046	CLASSROOM	2046	A2		2046			
2047	CLASSROOM	2047	B1		CLASSROOM			
2047	CLASSROOM	2047	A2		2047			

SIGNAGE SCHEDULE

Architectural Room Number	Architectural Room Name	Location - Door No.	Sign Type	Permanent Room Number	Signage Message	Pictogram	Comments	Rev. No.
2047	CLASSROOM	2047	A2		2047			
2048	SCIENCE	2048A	B1		SCIENCE CLASSROOM			
2048	SCIENCE	2048B	A		SCIENCE CLASSROOM			
2048	SCIENCE	2048	A2		2048			
2048	SCIENCE	2048	A2		2048			
2049	PREP	2049A	A1		PREP ROOM			
2049	PREP	2049B	A1		PREP ROOM			
2050	SCIENCE	2050	B1		SCIENCE CLASSROOM			
2050	SCIENCE	2048B	A		SCIENCE CLASSROOM			
2050	SCIENCE	2050	A2		2050			
2050	SCIENCE	2050	A2		2050			
2051	CLASSROOM	2051	B1		CLASSROOM			
2051	CLASSROOM	2051	A2		2051			
2051	CLASSROOM	2051	A2		2051			
2052	CLASSROOM	2052	B1		CLASSROOM			
2052	CLASSROOM	2052	A2		2052			
2052	CLASSROOM	2052	A2		2052			
2054	CORRIDOR	2054B	A		CORRIDOR 2054			
2054	CORRIDOR	2054A	A		CORRIDOR 2054			
2054	CORRIDOR	2054B	E2		CORRIDOR 2054			
2054	CORRIDOR	2054B	E2		CORRIDOR 2054			
2055	B.TLT.	2055	D5		BOYS RESTROOM	C, D		
2056	ELEC	2056	A		ELECTRICAL CLOSET			
2057	STAFF TLT	2061	D		RESTROOM	B, C, D		
2058	CUSTODIAL	2063	A		CUSTODIAL			
2059	STAFF TLT.	2059	D		RESTROOM	B, C, D		
2060	ELEC	2055	A		ELECTRICAL CLOSET			
2061	G.TLT.	2055	D4		GIRLS RESTROOM	B, D		
2062	MATH INTERVENTION	2062	B1		CLASSROOM			
2063	SENSORY	2061	B1		SENSORY ROOM			
2064	PSYCH OFFICE	2064	B1		OFFICE			
2065	ASST. PR. OFF.	2065	B1		OFFICE			
2071	CORRIDOR	2071	E2		EXIT	D		
2071	CORRIDOR	2072C	A		VESTIBULE			
2072	FACULTY WORKROOM	2072	A		FACULTY WORKROOM AND STORAGE			
2073	SPEECH LANGUAGE	2073	B1		CLASSROOM			
2073	SPEECH LANGUAGE	2073	A2		2073			
2074	SPED RES.	2074	B1		CLASSROOM			
2074	SPED RES.	2074	A2		2074			
2074	SPED RES.	2074	A2		2074			
2075	WL. CLASSROOM	2075	B1		CLASSROOM			
2075	WL. CLASSROOM	2075	A2		2075			
2075	WL. CLASSROOM	2075	A2		2075			
2076	CLASSROOM	2076	B1		CLASSROOM			
2076	CLASSROOM	2076	A2		2076			
2076	CLASSROOM	2076	A2		2076			
2077	CLASSROOM	2077	B1		CLASSROOM			
2077	CLASSROOM	2077	A2		2077			
2077	CLASSROOM	207	A2		2077			
2078	SPED RES.	2078	B1		CLASSROOM			
2078	SPED RES.	2078	A2		2078			
2079	SPED RES.	2079	B1		CLASSROOM			
2079	SPED RES.	2079	A2		2079			
2080	CLASSROOM	2080	B1		CLASSROOM			
2080	CLASSROOM	2080	A2		2080			
2080	CLASSROOM	2080	A2		2080			
2081	CLASSROOM	2081	B1		CLASSROOM			
2081	CLASSROOM	2081	A2		2081			
2081	CLASSROOM	2081	A2		2081			
2083	CLASSROOM	2083	B1		CLASSROOM			
2083	CLASSROOM	2083	A2		2083			
2083	CLASSROOM	2083	A2		2083			
2084	CLASSROOM	2084	B1		CLASSROOM			
2084	CLASSROOM	2084	A2		2084			
2084	CLASSROOM	2084	A2		2084			
2085	SCIENCE	2085	B1		SCIENCE CLASSROOM			
2085	SCIENCE	2085	A		SCIENCE CLASSROOM			
2085	SCIENCE	2085	A2		2085			
2085	SCIENCE	2085	A2		2085			
2086	PREP	2086A	A1		SCIENCE CLASSROOM			
2086	PREP	2086B	A1		SCIENCE CLASSROOM			
2087	SCIENCE	2087	B1		SCIENCE CLASSROOM			
2087	SCIENCE	2087	A		SCIENCE CLASSROOM			
2087	SCIENCE	2087	A2		2087			
2087	SCIENCE	2087	A2		2087			
2088	CLASSROOM	2088	B1		CLASSROOM			
2088	CLASSROOM	2088	A2		2088			
2088	CLASSROOM	2088	A2		2088			
2089	CLASSROOM	2089	B1		CLASSROOM			
2089	CLASSROOM	2089	A2		2089			
2089	CLASSROOM	2089	A2		2089			
2090	CORRIDOR	2090	A		CORRIDOR 2061			
2091	CORRIDOR	2054B	E2		CORRIDOR 2054			
2092	B.TLT.	2092	D5		BOYS RESTROOM	C, D		
2093	ELEC	2093	A		ELECTRICAL CLOSET			
2094	STAFF TLT.	2096	D		RESTROOM	B, C, D		
2095	CUSTODIAL	2097	A		CUSTODIAL			
2096	STAFF TLT.	2098	D		RESTROOM	B, C, D		
2097	ELEC	2092	A		ELECTRICAL CLOSET			
2098	G.TLT.	2095	D4		GIRLS RESTROOM	B, D		

SCHEDULE OF SIGN TYPES

Type	Size	Description	Detail Location
A	6.5"h x 8"w	Room Identification	1A/A923
A1	6.5"h x 8"w	Room Identification installed on glass	1A/A923
A2	7" x TBD	Room Identification Decal installed on exterior windows	3A/A923
B	6.5"h x 8"w	Room Identification with Changeable Message Strip	2A/A923
C	8"h x 8"w	Stair Identification with Pictogram (C)	2B/A923
D	9"h x 8"w	Unisex Toilet Identification with Pictogram (B,C & D)	1D/A923
D1	9"h x 8"w	Toilet Identification with Pictogram (B & D)	2D/A923
D2	9"h x 8"w	Toilet Identification with Pictogram (C & D)	2D/A923
D3	9"h x 7 1/4"w	Shower Identification with Pictogram (B,C & D)	4D/A923
D4	1' 5.5"h x 6"w	Toilet Identification with Pictogram (B & D) w/ Arrow	2D/A923
D5	1' 5.5"h x 6"w	Toilet Identification with Pictogram (C & D) w/ Arrow	3D/A923
E	3"h x 6"w	Exit	3B/A923
E1	3"h x 6"w	Exit with Pictogram (A)	4C/A923
E2	8"h x 6"w	Accessible Exit with Pictogram (D)	4B/A923
E3	3"h x 6"w	No Exit	5B/A923
F	8"h x 8"w	In case of Fire at Elevator (F)	1E/A923
F1	4"h x 4"w	Floor Number at Elevator	4A/A923
G	5"h x 8"w	Occupant Load	2E/A923
J	3"h x 9.27"w	Sprinkler Control Valve	5E/A924
M	8"h x 6"w	Assistive Listening Device with Pictogram (H)	1B/A923
N	7 5/8"h x 8"w	CO Detector Signage	3E/A923
P	Varies	Dimensional Pin Letters	6E/A923
Q	24"h x 36"w	Dedication Plaque	Refer to Specs
S	Varies	Decorative Decal	1D/A111.9

SCHEDULE OF PICTOGRAMS

Type	Description
A	Directional Arrow - Direction indicated as follows: (U) = Up; (L) = Left; (R) = Right; (D) = Down
B	Female
C	Male
D	International Symbol of Accessibility
E	Symbol of Stairs
F	Symbol of Burning Stairs
G	International Symbol of Accessibility with Shower
H	Assistive Listening Symbol
I	Star

SIGNAGE SCHEDULE NOTES

General Notes Applicable to the entire project:

1. Signage Fabricator is responsible for the verification and coordination of all signage copy with Owner prior to fabrication.
2. All necessary artwork shall be provided/produced by the Signage Fabricator.
3. For the purposes of this schedule it is assumed that the Permanent Room Number will be 4 numeric characters in length, with the possibility of a fourth letter character.
4. Refer to Architectural floor plans for architectural room name, number and door number.
5. Signage Fabricator is responsible for providing up to twenty four (24) signs, as required in the mechanical/electrical drawings, to denote mock fire safety equipment.
6. Signage Symbol on Signage Plans is represented by a Hexagon. Hexagon symbol represents the approximate sign installation location.
7. Refer to the Signage Plans by Floor for the approximate location of each sign.
8. Signs must be fabricated according to current codes requirements regardless of design indicated on Sign Type sheets.
9. Signs must be installed according to current codes regardless of where symbol is shown on plans.
10. All signs that will be located on a glass surface must have a back plate provided.
11. Where discrepancies occur fabricator/installer must consult with architect and obtain approval from architect prior to fabricating or installing any sign in question.
12. Typical background color of signs is to match paint color P15, unless otherwise noted.
13. Typical text color is to be: White, unless otherwise noted.
14. Background of Sign Type A2, window decals, is to be black.
15. Font as indicated on Sign Type sheet A920, per sign type.
16. Sign Type A2 is to be installed on the interior side of exterior windows in occupied rooms, at the lower right hand corner, approx 4" above window sills.
17. Client must review and approve all sign types, room number, messages and artwork prior to placing order and/or fabrication.
18. Sign Type S is a self adhesive decal that will have a quote as shown on elevations of the room in which it resides. There is not detail for this included in the sign type sheets.
19. A decal that states "This is a no smoking facility" is to be applied at each exterior entry.
20. **FOR EXTERIOR SIGNAGE AND LETTERING SEE SHEET A924**

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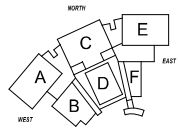


KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

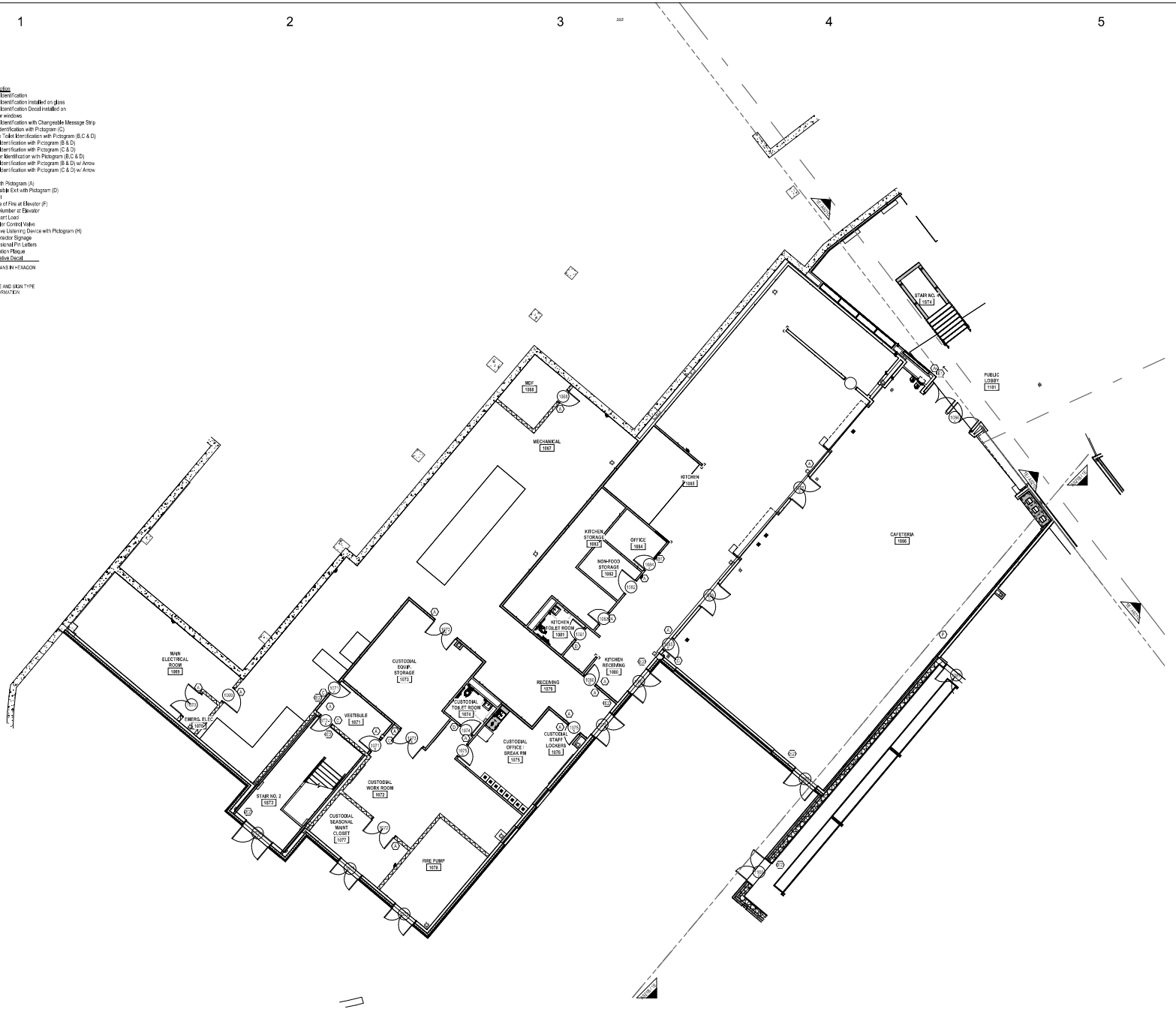
**SIGNAGE SCHEDULE

SIGNAGE LEGEND

Type	Description	
Type	Size	Description
A	6.5"h x 8"w	Room Identification
A1	6.5"h x 8"w	Room Identification installed on glass
A2	7" x TBD	Room Identification Decal installed on exterior windows
B	6.5"h x 8"w	Room Identification with Changeable Message Strip
C	8"h x 6"w	Stair Identification with Pictogram (C)
D	9"h x 6"w	Unisex Toilet Identification with Pictogram (B,C & D)
D1	9"h x 6"w	Toilet Identification with Pictogram (B & D)
D2	9"h x 6"w	Toilet Identification with Pictogram (C & D)
D3	9"h x 7 1/4"w	Shower Identification with Pictogram (B,C & D)
D4	1' 5/8"h x 6"w	Toilet Identification with Pictogram (B & D) w/ Arrow
D5	1' 5/8"h x 6"w	Toilet Identification with Pictogram (C & D) w/ Arrow
E	3"h x 6"w	Exit
E1	3"h x 6"w	Exit with Pictogram (A)
E2	8"h x 6"w	Accessible Exit with Pictogram (D)
E3	3"h x 8"w	No Exit
F	8"h x 8"w	In case of Fire at Elevator (F)
F1	4"h x 4"w	Floor Number at Elevator
G	5"h x 8"w	Occupant Load
J	3"h x 9.5"w	Sprinkler Control Valve
M	8"h x 6"w	Assistive Listening Device with Pictogram (H)
N	7 5/8"h x 8"w	CO Detector Signage
P	Varies	Dimensional Pin Letters
Q	24"h x 36"w	Dedication Plaque
S	Varies	Decorative Decal

SIGN TAGS ARE SHOWN ON PLANS IN HEXAGON AT APPROXIMATE LOCATION

REFER TO SIGNAGE SCHEDULE AND SIGN TYPE SHEETS FOR ADDITIONAL INFORMATION



1E 1 - FIRST FLOOR SIGNAGE PLAN - PART A
1/8" = 1'-0"

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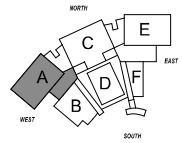

KEYPLAN

Number	Date	Issued For
	05/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRST FLOOR SIGNAGE PLAN - PART A

Date
07/08/2024
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22367.00

Drawing Number
A921A

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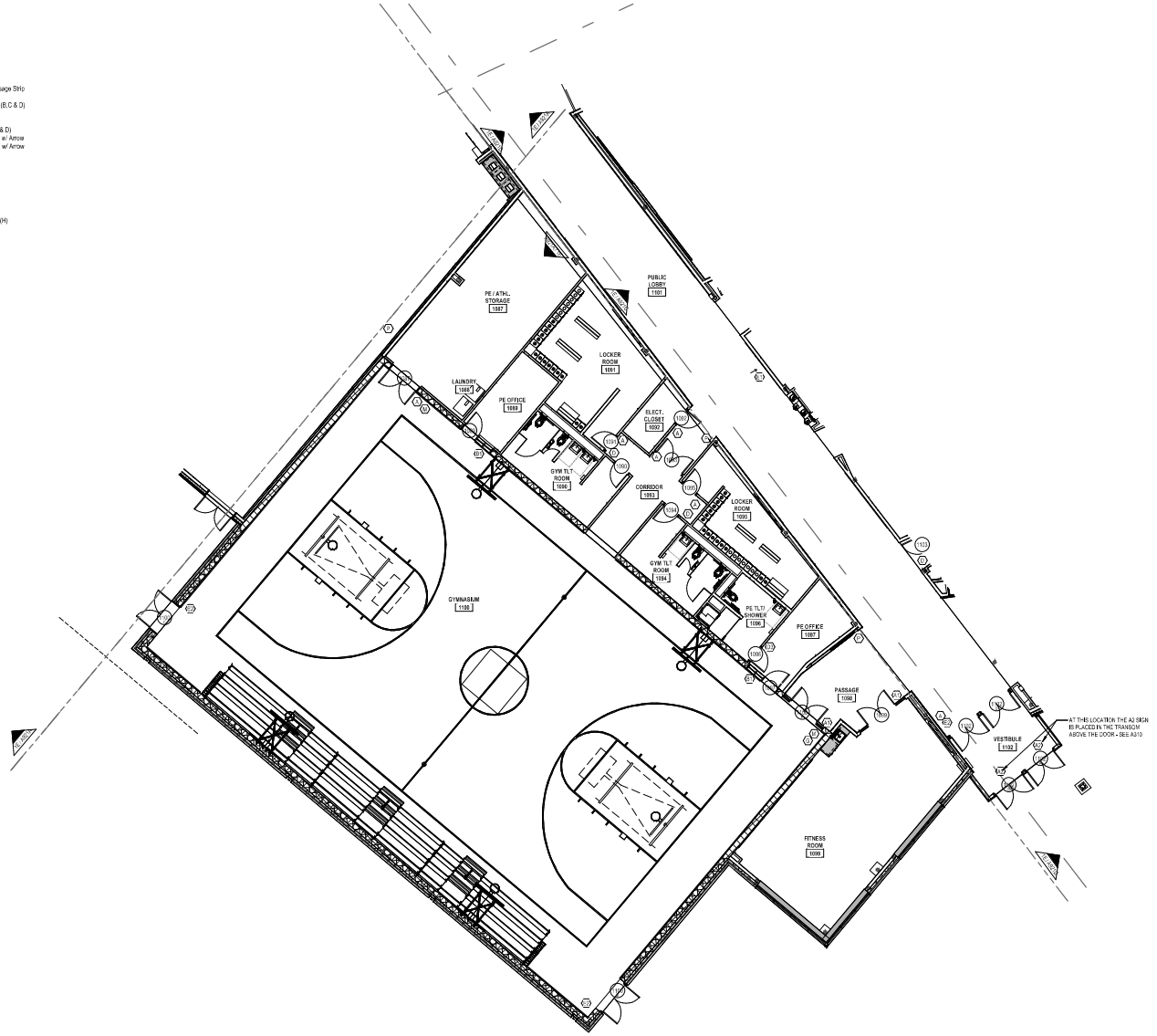
SIGNAGE LEGEND

Type Type	Description Size	Description
A	6.5"h x 8"w	Room Identification
A1	6.5"h x 8"w	Room Identification: Installed on glass
A2	7" x TBD	Room Identification: Decal installed on exterior windows
B	6.5"h x 8"w	Room Identification with Changeable Message Strip
C	8"h x 8"w	Stair Identification with Pictogram (C)
D	9"h x 8"w	Unisex Toilet Identification with Pictogram (B,C & D)
D1	9"h x 8"w	Toilet Identification with Pictogram (B & D)
D2	9"h x 8"w	Toilet Identification with Pictogram (C & D)
D3	9"h x 7 1/4"w	Shower Identification with Pictogram (B,C & D)
D4	1'-5.0"h x 6"w	Toilet Identification with Pictogram (B & D) w/ Arrow
D5	1'-5.6"h x 6"w	Toilet Identification with Pictogram (C & D) w/ Arrow
E	3"h x 6"w	Exit
E1	3"h x 6"w	Exit with Pictogram (A)
E2	8"h x 6"w	Accessible Exit with Pictogram (D)
E3	3"h x 8"w	No Exit
F	8"h x 8"w	In case of Fire at Elevator (F)
F1	4"h x 4"w	Floor Number at Elevator
G	5"h x 8"w	Occupant Load
I	3"h x 8.5"w	Sprinkler Control Valve
M	8"h x 8"w	Assistive Listening Device with Pictogram (H)
N	7 5/8"h x 8"w	CO Detector Signage
P	Varies	Dimensional Pin Letters
Q	24"h x 36"w	Dedication Plaque
S	Varies	Decorative Decal

SIGN TAGS ARE SHOWN ON PLANS IN HEXAGON AT APPROXIMATE LOCATION

REFER TO SIGNAGE SCHEDULE AND SIGN TYPE SHEETS FOR ADDITIONAL INFORMATION



1E 1- FIRST FLOOR SIGNAGE PLAN - PART B
1/8" = 1'-0"

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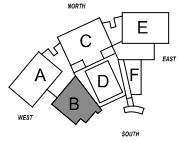

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRST FLOOR SIGNAGE PLAN - PART B

Date: 07/08/2024
Scale: As indicated
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Drawing Number: **A921B**

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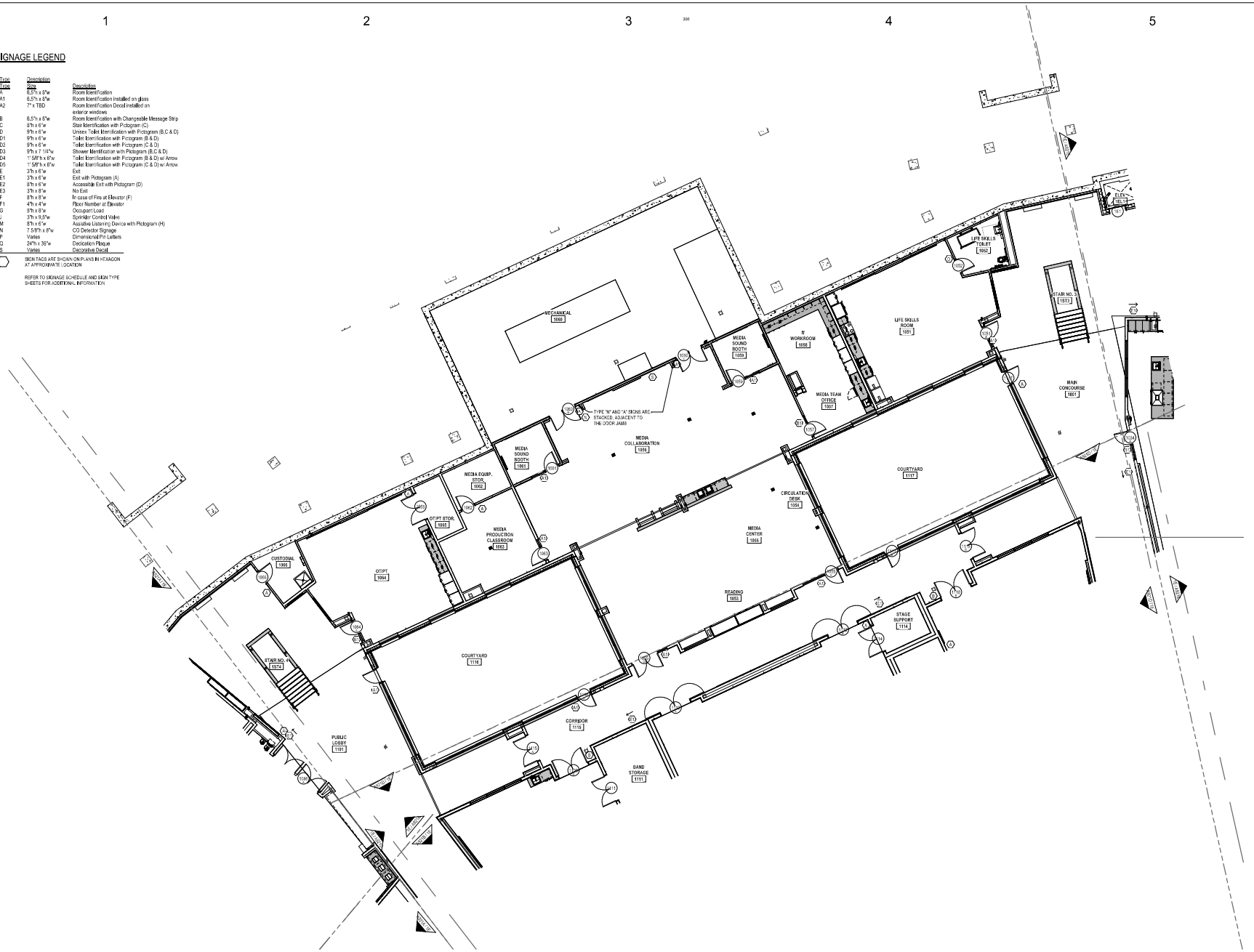
SIGNAGE LEGEND

Type	Description Size	Description
A	6.5"h x 8"w	Room Identification
A1	6.5"h x 8"w	Room Identification installed on glass
A2	7" x TBD	Room Identification Decal installed on exterior windows
B	6.5"h x 8"w	Room Identification with Changeable Message Strip
C	8"h x 6"w	Stair Identification with Pictogram (C)
D	9"h x 6"w	Unisex Toilet Identification with Pictogram (B,C & D)
D1	9"h x 6"w	Toilet Identification with Pictogram (B & D)
D2	9"h x 6"w	Toilet Identification with Pictogram (C & D)
D3	9"h x 7 1/4"w	Shower Identification w/ Pictogram (B,C & D)
D4	1' 5/8"h x 8"w	Toilet Identification with Pictogram (B & D) w/ Arrow
D5	1' 5/8"h x 8"w	Toilet Identification with Pictogram (C & D) w/ Arrow
E	3"h x 6"w	Exit
E1	3"h x 6"w	Exit with Pictogram (A)
E2	8"h x 6"w	Accessible Exit with Pictogram (D)
E3	3"h x 6"w	No Exit
F	8"h x 8"w	In case of Fire at Elevator (F)
F1	4"h x 4"w	Floor Number at Elevator
G	8"h x 8"w	Occupant Load
J	3"h x 9.5"w	Sprinkler Control Valve
M	8"h x 6"w	Assistive Listening Device with Pictogram (H)
N	7 5/8"h x 8"w	CO Detector Signage
P	Varies	Dimensional Pin Letters
Q	24"h x 36"w	Dedication Plaque
S	Varies	Decorative Decal

SIGN TAGS ARE SHOWN ON PLANS IN HEXAGON AT APPROXIMATE LOCATION

REFER TO SIGNAGE SCHEDULE AND SIGN TYPE SHEETS FOR ADDITIONAL INFORMATION



1E 1- FIRST FLOOR SIGNAGE PLAN - PART C
1/8" = 1'-0"

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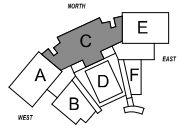

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRST FLOOR SIGNAGE PLAN - PART C

Date 07/08/2024
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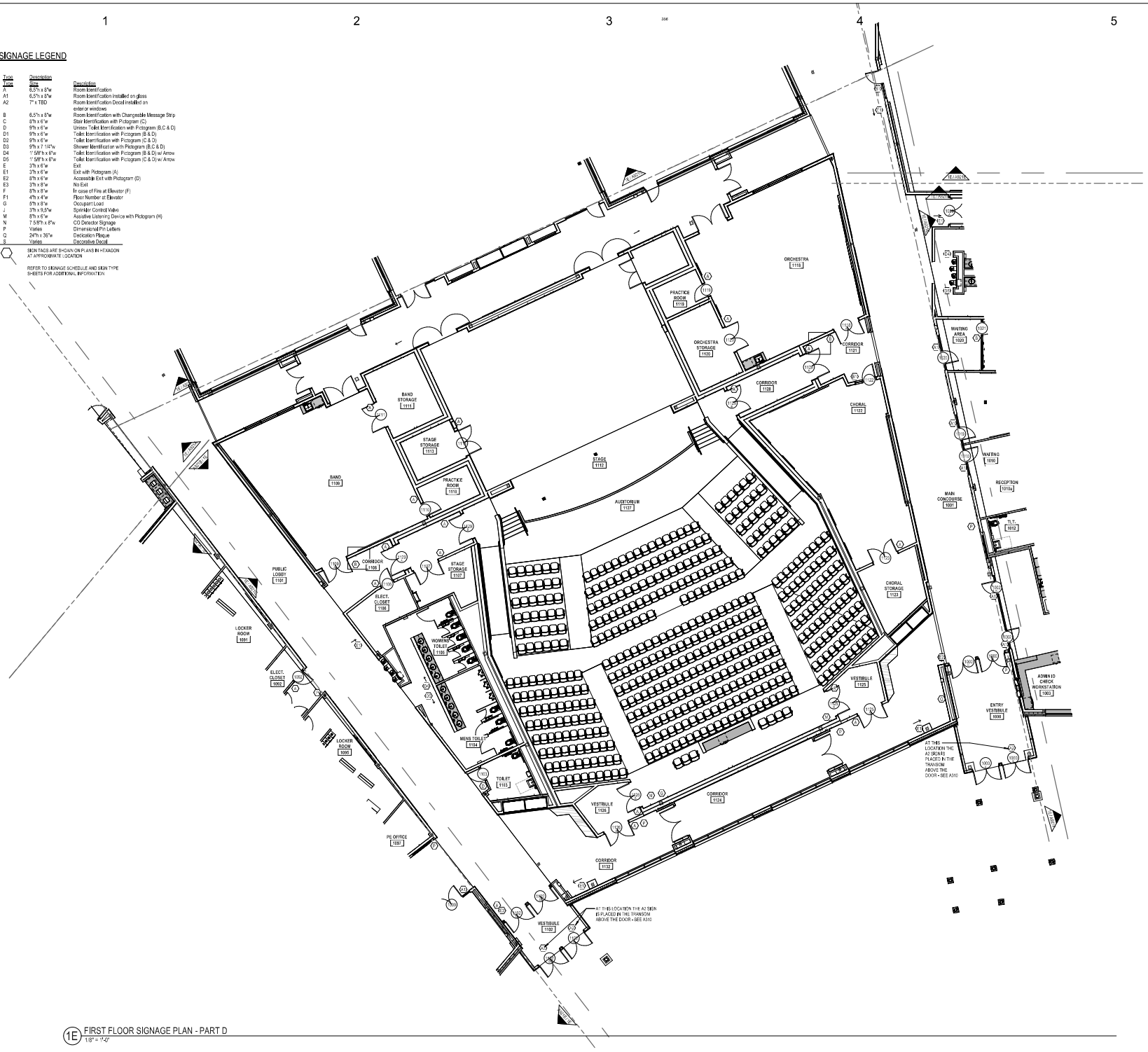
SIGNAGE LEGEND

Type	Description	
Type	Size	Description
A	6.5"h x 8"w	Room Identification
A1	6.5"h x 8"w	Room Identification installed on glass
A2	7" x TBD	Room Identification Decal installed on exterior windows
B	6.5"h x 8"w	Room Identification with Changeable Message Strip
C	8"h x 6"w	Stair Identification with Pictogram (C)
D	9"h x 6"w	Unisex Toilet Identification with Pictogram (B,C & D)
D1	9"h x 6"w	Toilet Identification with Pictogram (B & D)
D2	9"h x 6"w	Toilet Identification with Pictogram (C & D)
D3	9"h x 7 1/4"w	Shower Identification with Pictogram (B,C & D)
D4	1' 0/8"h x 8"w	Toilet Identification with Pictogram (B & D) w/ Arrow
D5	1' 5/8"h x 8"w	Toilet Identification with Pictogram (C & D) w/ Arrow
E	3"h x 6"w	Exit
E1	3"h x 6"w	Exit with Pictogram (A)
E2	8"h x 6"w	Accessible Exit with Pictogram (D)
E3	3"h x 6"w	No Exit
F	8"h x 8"w	In case of Fire at Elevator (F)
F1	4"h x 4"w	Floor Number at Elevator
G	8"h x 8"w	Occupant Load
J	3"h x 9.5"w	Sprinkler Control Valve
M	8"h x 6"w	Assistive Listening Device with Pictogram (H)
N	7 5/8"h x 8"w	CO Detector Signage
P	Varies	Dimensional Pin Letters
Q	24"h x 36"w	Dedication Plaque
S	Varies	Decorative Decal

SIGN TAGS ARE SHOWN ON PLANS IN HEXAGON AT APPROXIMATE LOCATION

REFER TO SIGNAGE SCHEDULE AND SIGN TYPE SHEETS FOR ADDITIONAL INFORMATION



1E FIRST FLOOR SIGNAGE PLAN - PART D
1/8" = 1'-0"

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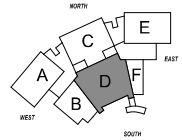

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRST FLOOR SIGNAGE PLAN - PART D

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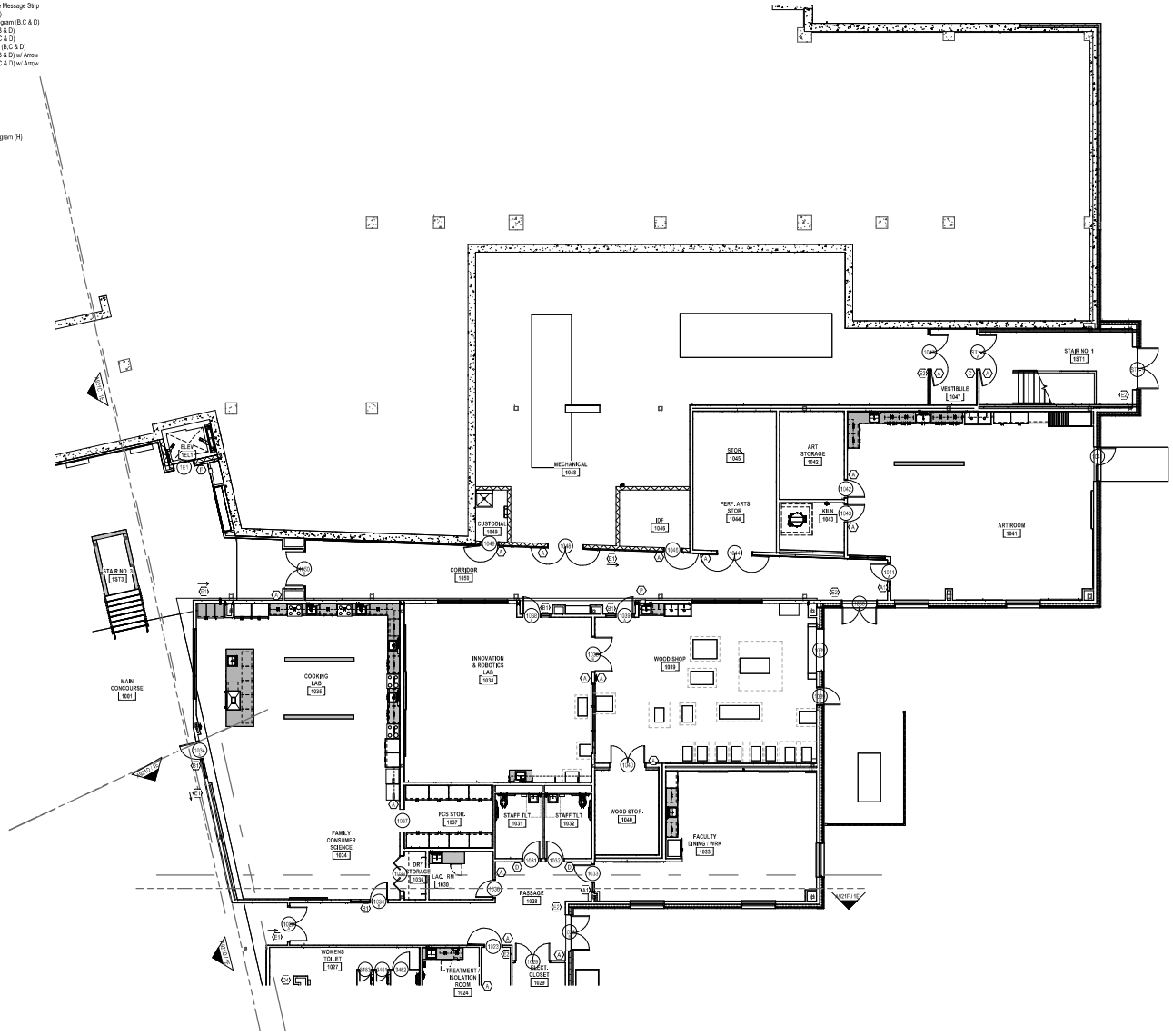
SIGNAGE LEGEND

Type	Description Size	Description
A	6.5"h x 8"w	Room Identification
A1	6.5"h x 8"w	Room Identification installed on glass
A2	7" x TBD	Room Identification Decal installed on exterior windows
B	6.5"h x 8"w	Room Identification with Changeable Message Strip
C	8"h x 6"w	Stair Identification with Pictogram (C)
D	9"h x 6"w	Unisex Toilet Identification with Pictogram (B,C & D)
D1	9"h x 6"w	Toilet Identification with Pictogram (B & D)
D2	9"h x 6"w	Toilet Identification with Pictogram (C & D)
D3	9"h x 7 1/4"w	Shower Identification with Pictogram (B,C & D)
D4	1' 0/8"h x 8"w	Toilet Identification with Pictogram (B & D) w/ Arrow
D5	1' 5/8"h x 8"w	Toilet Identification with Pictogram (C & D) w/ Arrow
E	3"h x 6"w	Exit
E1	3"h x 6"w	Exit with Pictogram (A)
E2	8"h x 6"w	Accessible Exit with Pictogram (D)
E3	3"h x 6"w	No Exit
F	8"h x 8"w	In case of Fire at Elevator (F)
F1	4"h x 4"w	Floor Number at Elevator
G	8"h x 8"w	Occupant Load
J	3"h x 9.5"w	Sprinkler Control Valve
M	8"h x 6"w	Assistive Listening Device with Pictogram (H)
N	7 5/8"h x 8"w	CO Detector Signage
P	Varies	Dimensional Pin Letters
Q	24"h x 36"w	Dedication Plaque
S	Varies	Decorative Decal

SIGN TAGS ARE SHOWN ON PLANS IN HEXAGON AT APPROXIMATE LOCATION

REFER TO SIGNAGE SCHEDULE AND SIGN TYPE SHEETS FOR ADDITIONAL INFORMATION



1E 1- FIRST FLOOR SIGNAGE PLAN - PART E
1/8" = 1'-0"

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Greenwich Central Middle School

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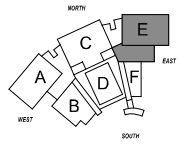
STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRST FLOOR SIGNAGE PLAN - PART E

Date 07/08/2024
Scale As indicated
Proj. Number 22367.00
Drawing Number A921E

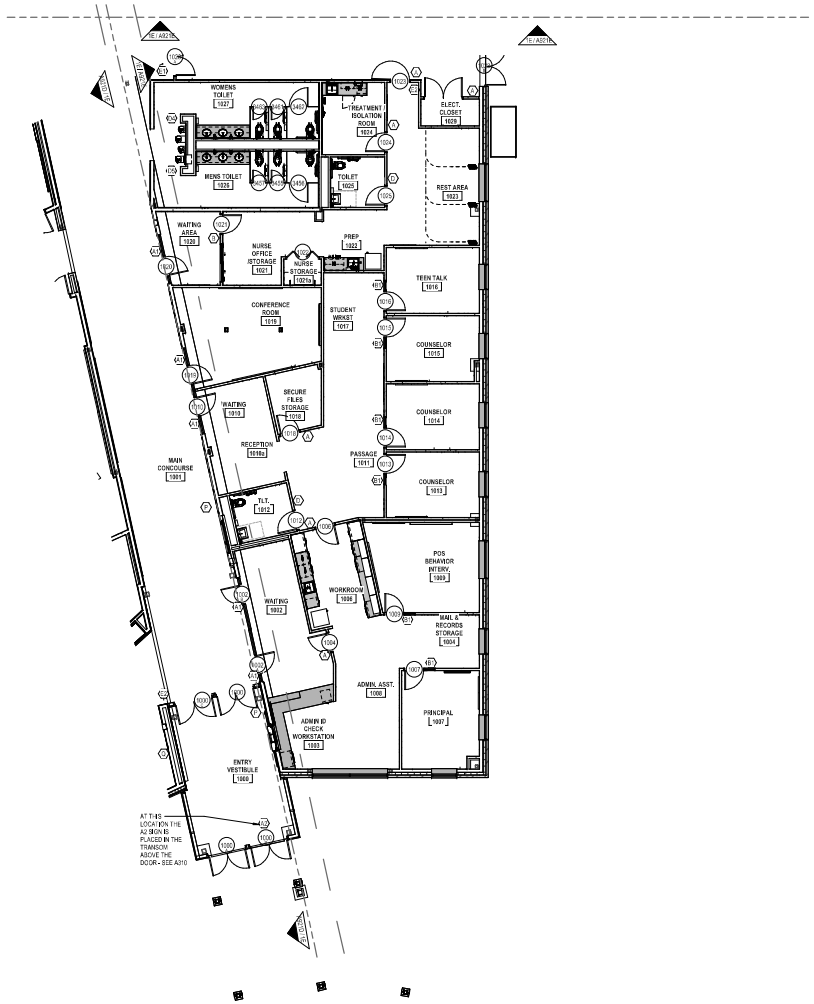
Autodesk Docs://22367.00 - Greenwich Central Middle School/A_22367_GREENWICH_CENTRAL_MS_R22.rvt
3/25/2024 1:00:03 PM

SIGNAGE LEGEND

Type	Description Size	Description
A	6.5"h x 8"w	Room Identification
A1	6.5"h x 8"w	Room Identification installed on glass
A2	7" x TBD	Room Identification Decal installed on exterior windows
B	6.5"h x 8"w	Room Identification with Changeable Message Strip
C	8"h x 6"w	Stair Identification with Pictogram (C)
D	9"h x 6"w	Unisex Toilet Identification with Pictogram (B,C & D)
D1	9"h x 6"w	Toilet Identification with Pictogram (B & D)
D2	9"h x 6"w	Toilet Identification with Pictogram (C & D)
D3	9"h x 7 1/4"w	Shower Identification with Pictogram (B,C & D)
D4	1' 5/8"h x 8"w	Toilet Identification with Pictogram (B & D) w/ Arrow
D5	1' 5/8"h x 8"w	Toilet Identification with Pictogram (C & D) w/ Arrow
E	3"h x 6"w	Exit
E1	3"h x 6"w	Exit with Pictogram (A)
E2	8"h x 6"w	Accessible Exit with Pictogram (D)
E3	3"h x 6"w	No Exit
F	8"h x 8"w	In case of Fire at Elevator (F)
F1	4"h x 4"w	Floor Number at Elevator
G	8"h x 8"w	Occupant Load
J	3"h x 9.5"w	Sprinkler Control Valve
M	8"h x 6"w	Assistive Listening Device with Pictogram (H)
N	7 5/8"h x 8"w	CO Detector Signage
P	Varies	Dimensional Pin Letters
Q	24"h x 36"w	Dedication Plaque
S	Varies	Decorative Decal

SIGN TAGS ARE SHOWN ON PLANS IN HEXAGON AT APPROXIMATE LOCATION

REFER TO SIGNAGE SCHEDULE AND SIGN TYPE SHEETS FOR ADDITIONAL INFORMATION



1E FIRST FLOOR SIGNAGE PLAN - PART F
1/8" = 1'-0"

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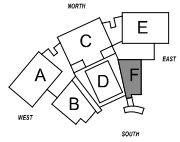

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRST FLOOR SIGNAGE PLAN - PART F

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: **A921F**

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1E SECOND FLOOR SIGNAGE PLAN - PART A
1/8" = 1'-0"

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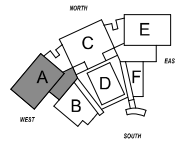

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

SECOND FLOOR SIGNAGE PLAN - PART A

Date 07/08/2024
Scale 1/8" = 1'-0"
Proj. Number 22367.00
Drawing Number **A922A**

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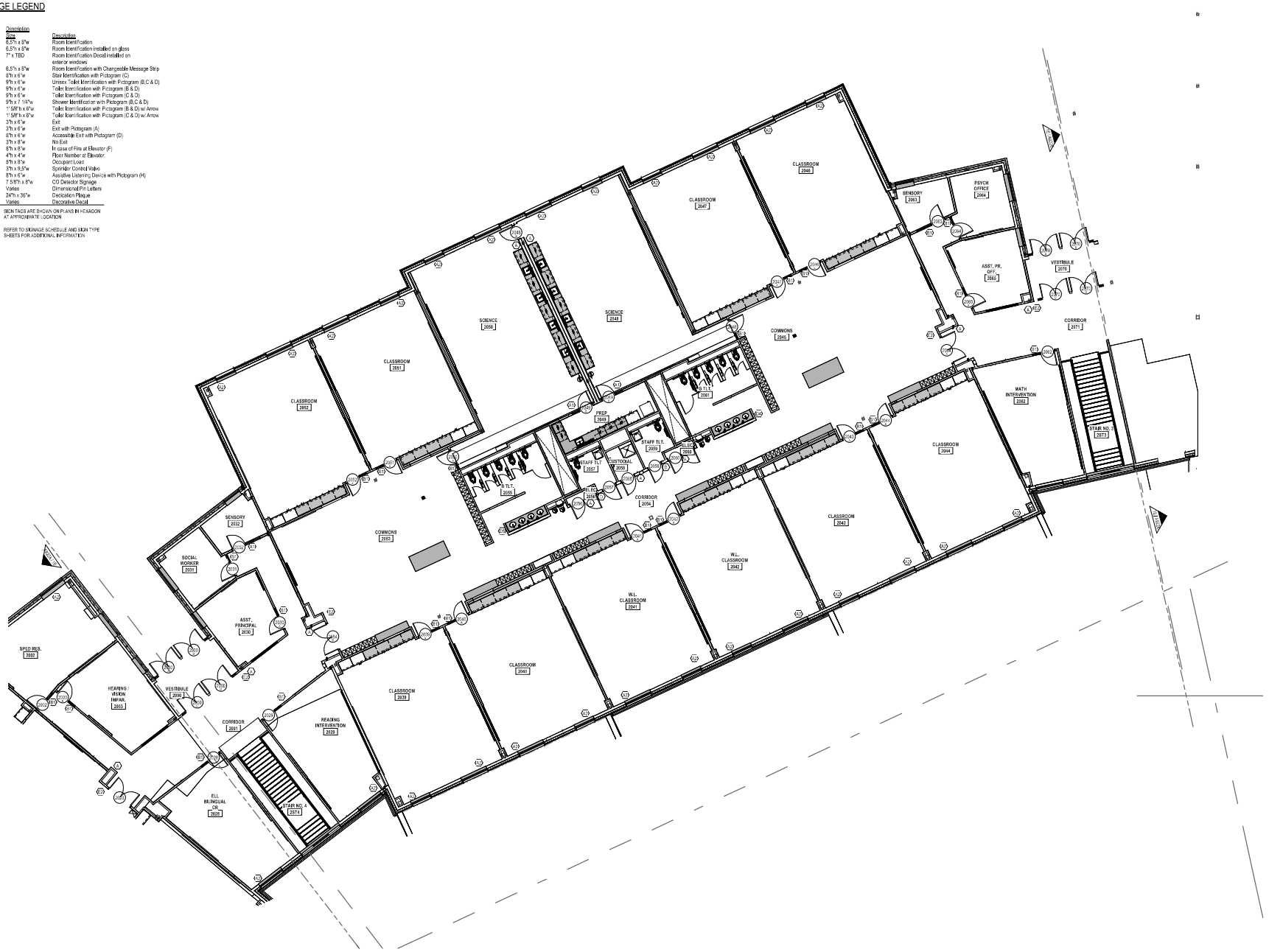
5/29/2024 1:01:43 PM

SIGNAGE LEGEND

Type	Description Size	Description
A	6.5"h x 8"w	Room Identification
A1	6.5"h x 8"w	Room Identification installed on glass
A2	7" x TBD	Room Identification Decal installed on exterior windows
B	6.5"h x 8"w	Room Identification with Changeable Message Strip
C	8"h x 6"w	Stair Identification with Pictogram (C)
D	9"h x 6"w	Unisex Toilet Identification with Pictogram (B,C & D)
D1	9"h x 6"w	Toilet Identification with Pictogram (B & D)
D2	9"h x 6"w	Toilet Identification with Pictogram (C & D)
D3	9"h x 7 1/4"w	Shower Identification with Pictogram (B,C & D)
D4	1'-5/8"h x 8"w	Toilet Identification with Pictogram (B & D) w/ Arrow
D5	1'-5/8"h x 8"w	Toilet Identification with Pictogram (C & D) w/ Arrow
E	3"h x 6"w	Exit
E1	3"h x 6"w	Exit with Pictogram (A)
E2	8"h x 6"w	Accessible Exit with Pictogram (D)
E3	3"h x 6"w	No Exit
F	8"h x 8"w	In case of Fire at Elevator (F)
F1	4"h x 4"w	Floor Number at Elevator
G	8"h x 8"w	Occupant Load
J	3"h x 9.5"w	Sprinkler Control Valve
M	8"h x 6"w	Assistive Listening Device with Pictogram (H)
N	7 5/8"h x 8"w	CO Detector Signage
P	Varies	Dimensional Pin Letters
Q	24"h x 36"w	Dedication Plaque
S	Varies	Decorative Decal

SIGN TAGS ARE SHOWN ON PLANS IN HEXAGON AT APPROXIMATE LOCATION

REFER TO SIGNAGE SCHEDULE AND SIGN TYPE SHEETS FOR ADDITIONAL INFORMATION



1E SECOND SIGNAGE PLAN - PART C
1/8" = 1'-0"

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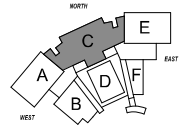

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

SECOND FLOOR SIGNAGE PLAN - PART C

Date 07/08/2024
Scale As indicated
Proj. Number 22367.00
Drawing Number A922C

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SIGNAGE LEGEND

Type	Description	
Type	Size	Description
A	6.5"h x 8"w	Room Identification
A1	6.5"h x 8"w	Room Identification installed on glass
A2	7" x TBD	Room Identification Decal installed on exterior windows
B	6.5"h x 8"w	Room Identification with Changeable Message Strip
C	8"h x 6"w	Stair Identification with Pictogram (C)
D	9"h x 6"w	Unisex Toilet Identification with Pictogram (B,C & D)
D1	9"h x 6"w	Toilet Identification with Pictogram (B & D)
D2	9"h x 6"w	Toilet Identification with Pictogram (C & D)
D3	9"h x 7 1/4"w	Shower Identification with Pictogram (B,C & D)
D4	1' 0/8"h x 8"w	Toilet Identification with Pictogram (B & D) w/ Arrow
D5	1' 5/8"h x 8"w	Toilet Identification with Pictogram (C & D) w/ Arrow
E	3"h x 6"w	Exit
E1	3"h x 6"w	Exit with Pictogram (A)
E2	8"h x 6"w	Accessible Exit with Pictogram (D)
E3	3"h x 6"w	No Exit
F	8"h x 8"w	In case of Fire at Elevator (F)
F1	4"h x 4"w	Floor Number at Elevator
G	8"h x 8"w	Occupant Load
J	3"h x 9.5"w	Sprinkler Control Valve
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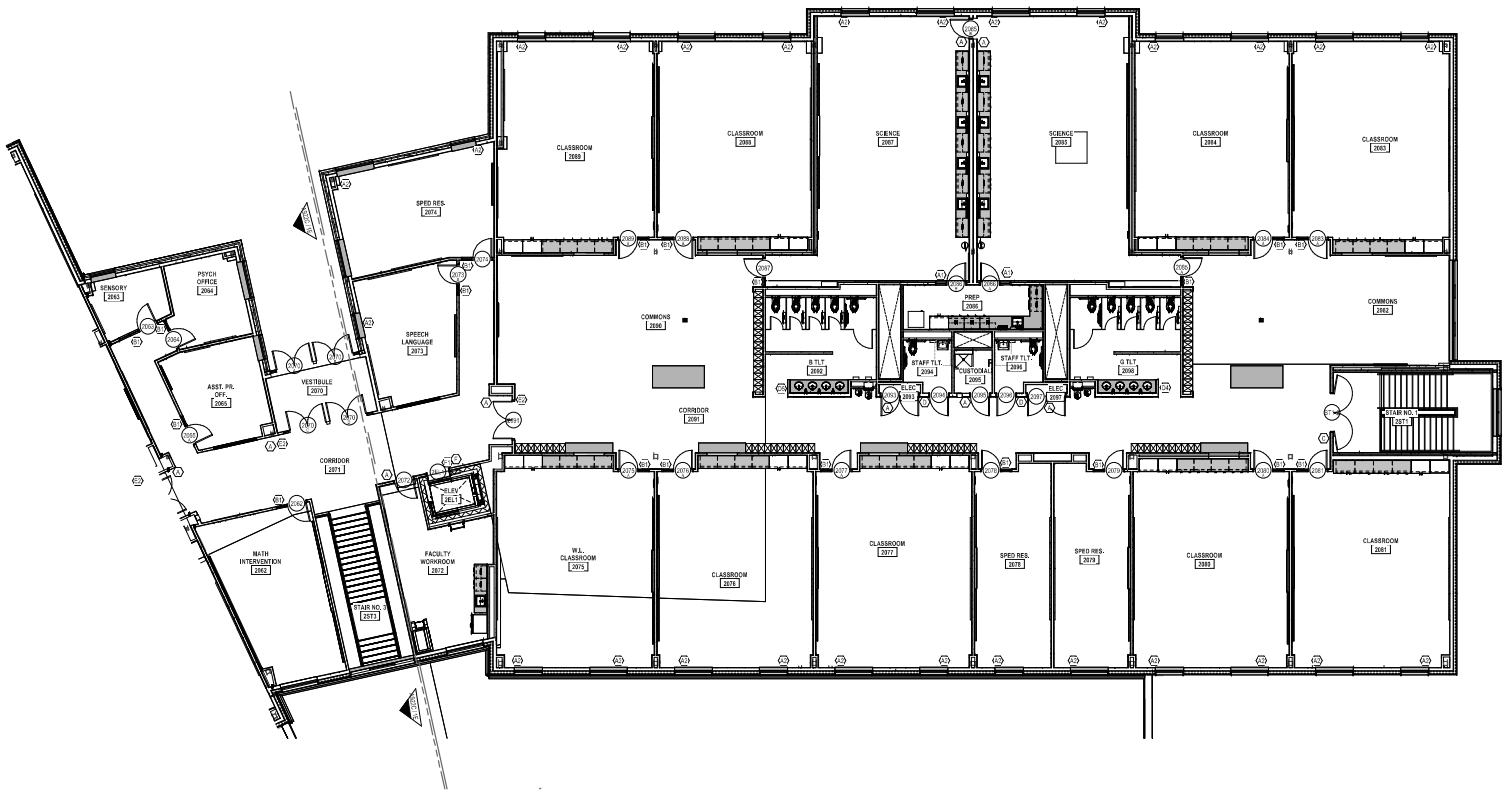
Q	24"h x 36"w	Dedication Plaque
S	Varies	Decorative Decal

SIGN TAGS ARE SHOWN ON PLANS IN HEXAGON AT APPROXIMATE LOCATION

REFER TO SIGNAGE SCHEDULE AND SIGN TYPE SHEETS FOR ADDITIONAL INFORMATION



1E 2 - SECOND FLOOR SIGNAGE PLAN - PART E
1/8" = 1'-0"

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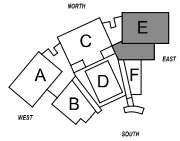

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

SECOND FLOOR SIGNAGE PLAN - PART E

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: **A922E**

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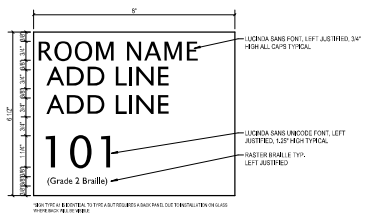
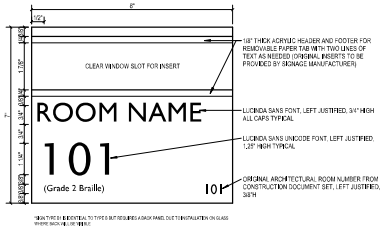
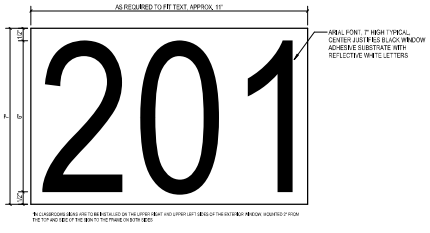


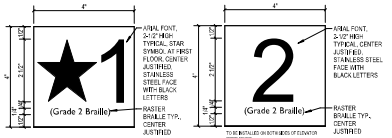
1A SIGN TYPE A (AND A1) - ROOM IDENTIFICATION
6" = 1'-0"



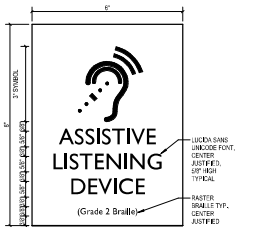
2A SIGN TYPE B (AND B1) - ROOM IDENTIFICATION WITH MESSAGE TAB
6" = 1'-0"



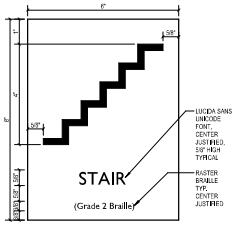
3A SIGN TYPE A2 - ROOM IDENTIFICATION DECAL INSTALLED ON EXTERIOR WINDOW
6" = 1'-0"



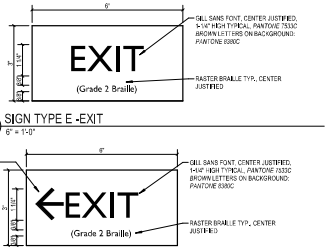
4A SIGN TYPE F1 - ELEVATOR FLOOR NUMBER
6" = 1'-0"



1B SIGN TYPE M - ASSISTIVE LISTENING DEVICE
6" = 1'-0"

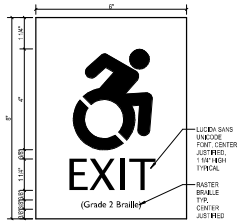


2B SIGN TYPE C - STAIR
6" = 1'-0"

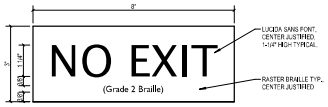


3B SIGN TYPE E -EXIT
6" = 1'-0"

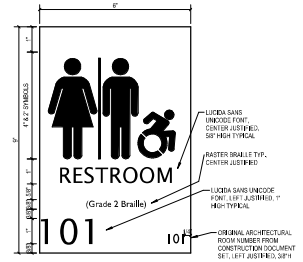
3C SIGN TYPE E1- EXIT WITH ARROW
6" = 1'-0"



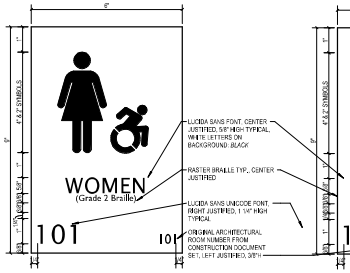
4B SIGN TYPE E2 - HANDICAPPED EXIT
6" = 1'-0"



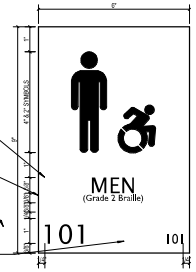
5B SIGN TYPE E3 - NO EXIT
6" = 1'-0"
NOT USING



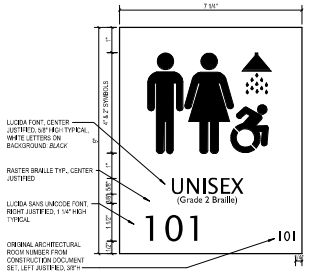
1D SIGN TYPE D - RESTROOM (UNISEX)
6" = 1'-0"



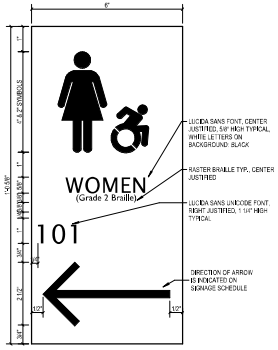
2D SIGN TYPE D1 - RESTROOM (WOMEN)
6" = 1'-0"



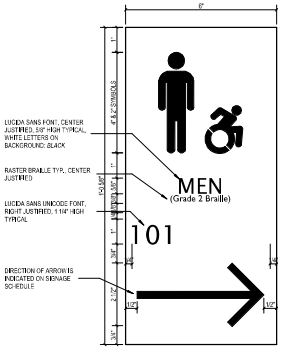
3D SIGN TYPE D2 - RESTROOM (MEN)
6" = 1'-0"



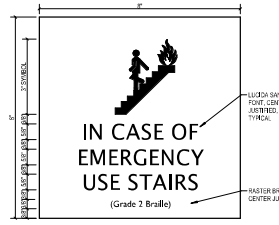
4D SIGN TYPE D3 - SHOWER (UNISEX)1
6" = 1'-0"



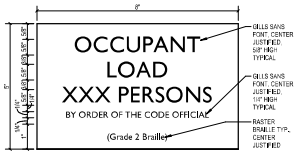
5D SIGN TYPE D4 - RESTROOM (WOMEN) WITH ARROW
6" = 1'-0"



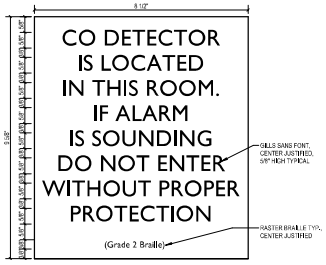
6D SIGN TYPE D5 - RESTROOM (MEN) WITH ARROW
6" = 1'-0"



1E SIGN TYPE F - ELEVATOR
6" = 1'-0"



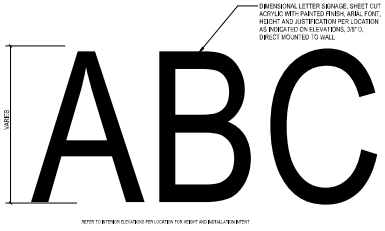
2E SIGN TYPE G - OCCUPANT LOAD
6" = 1'-0"



3E SIGN TYPES N - CO DETECTOR
6" = 1'-0"



5E SIGN TYPES J - STANDPIPE CONTROL VALVE
6" = 1'-0"



6E SIGN TYPE P - PIN LETTERS
6" = 1'-0"

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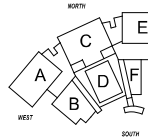

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

SIGN TYPES

Date 07/08/2024
Scale 6" = 1'-0"
Proj. Number 22367.00
Drawing Number A923

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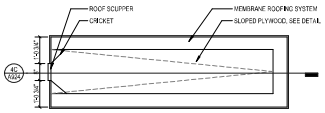
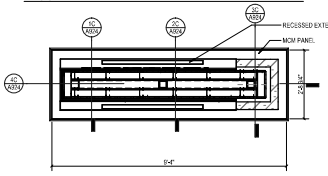
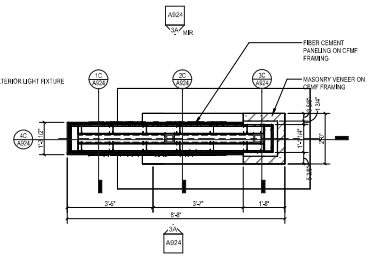


ROOF PLAN



1A TYPE R- STREET SIGNAGE REFLECTED CEILING PLAN
1/2" = 1'-0"



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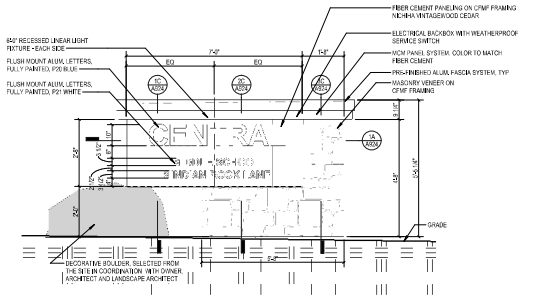
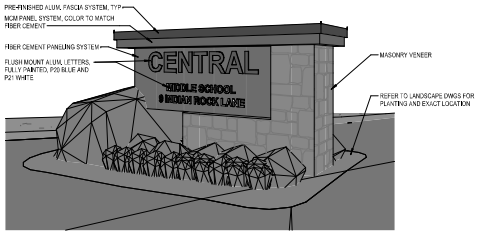
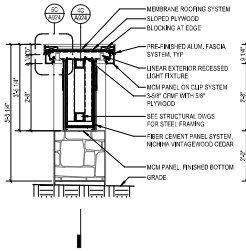


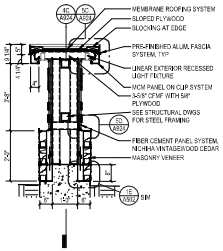
3A TYPE R - STREET SIGNAGE ELEVATION
1/2" = 1'-0"



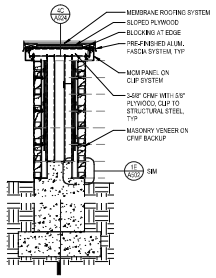
4A TYPE R - STREET FRONT SIGNAGE



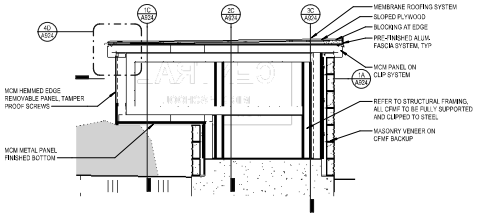
1C STREET SIGNAGE SECTION A
1/2" = 1'-0"



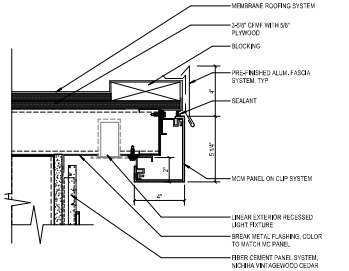
2C SIGNAGE SECTION B
1/2" = 1'-0"



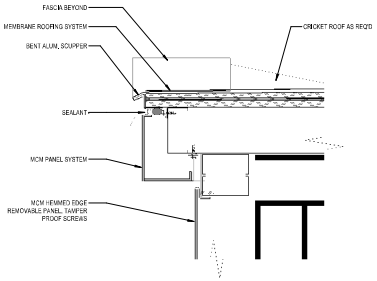
3C SIGNAGE SECTION C
1/2" = 1'-0"



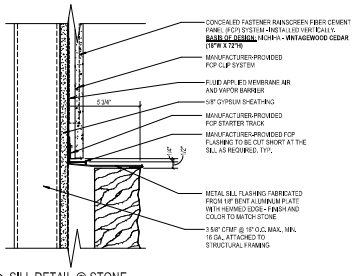
4C SIGNAGE SECTION D
1/2" = 1'-0"



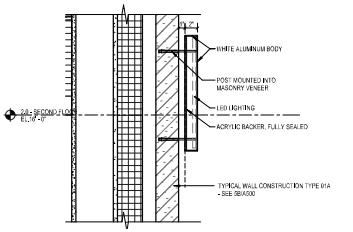
5C SIGNAGE SECTION DETAIL @ FASCIA
3" = 1'-0"



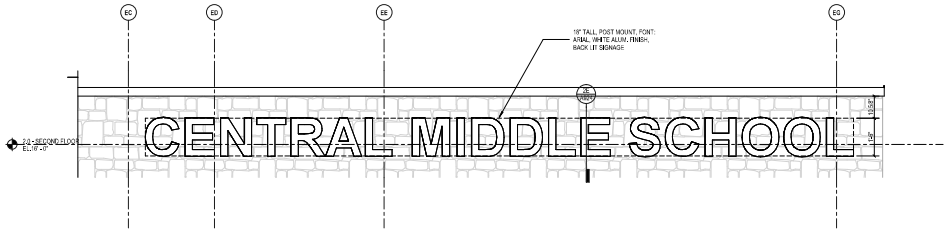
4D SIGNAGE SECTION DETAIL @ SCUPPER
3" = 1'-0"



5D SILL DETAIL @ STONE
3" = 1'-0"



2E TYPE S - SIGNAGE DETAIL
1 1/2" = 1'-0"



4E TYPE S - BUILDING MOUNTED SIGNAGE
1/2" = 1'-0"

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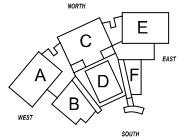

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

EXTERIOR SIGN TYPES

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: A924

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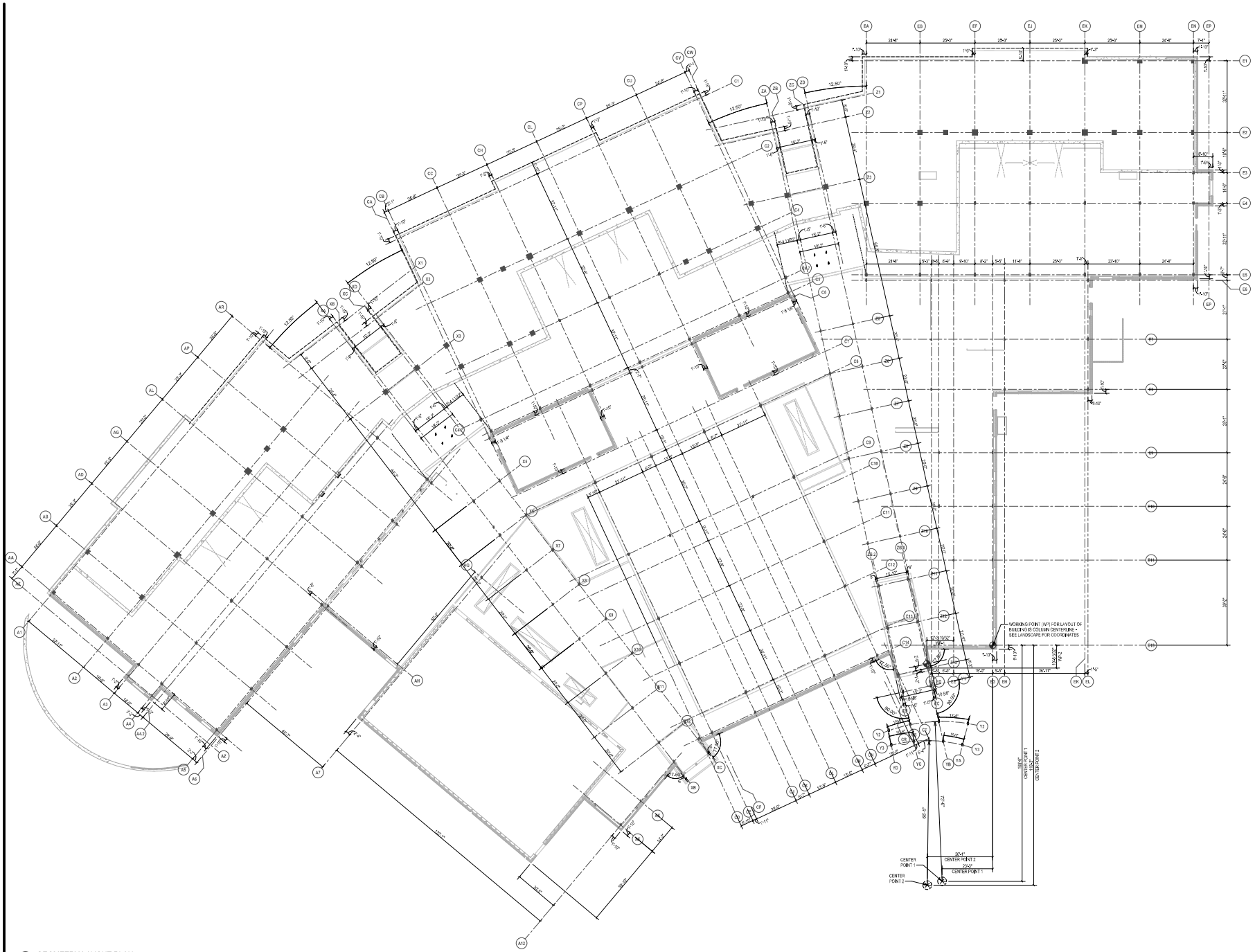

1E GEOMETRY LAYOUT PLAN
1/16" = 1'-0"

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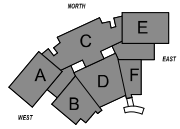

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

GEOMETRY LAYOUT PLAN

Date 07/08/2024
Scale 1/16" = 1'-0"
Proj. Number 22367.00
Drawing Number AL000

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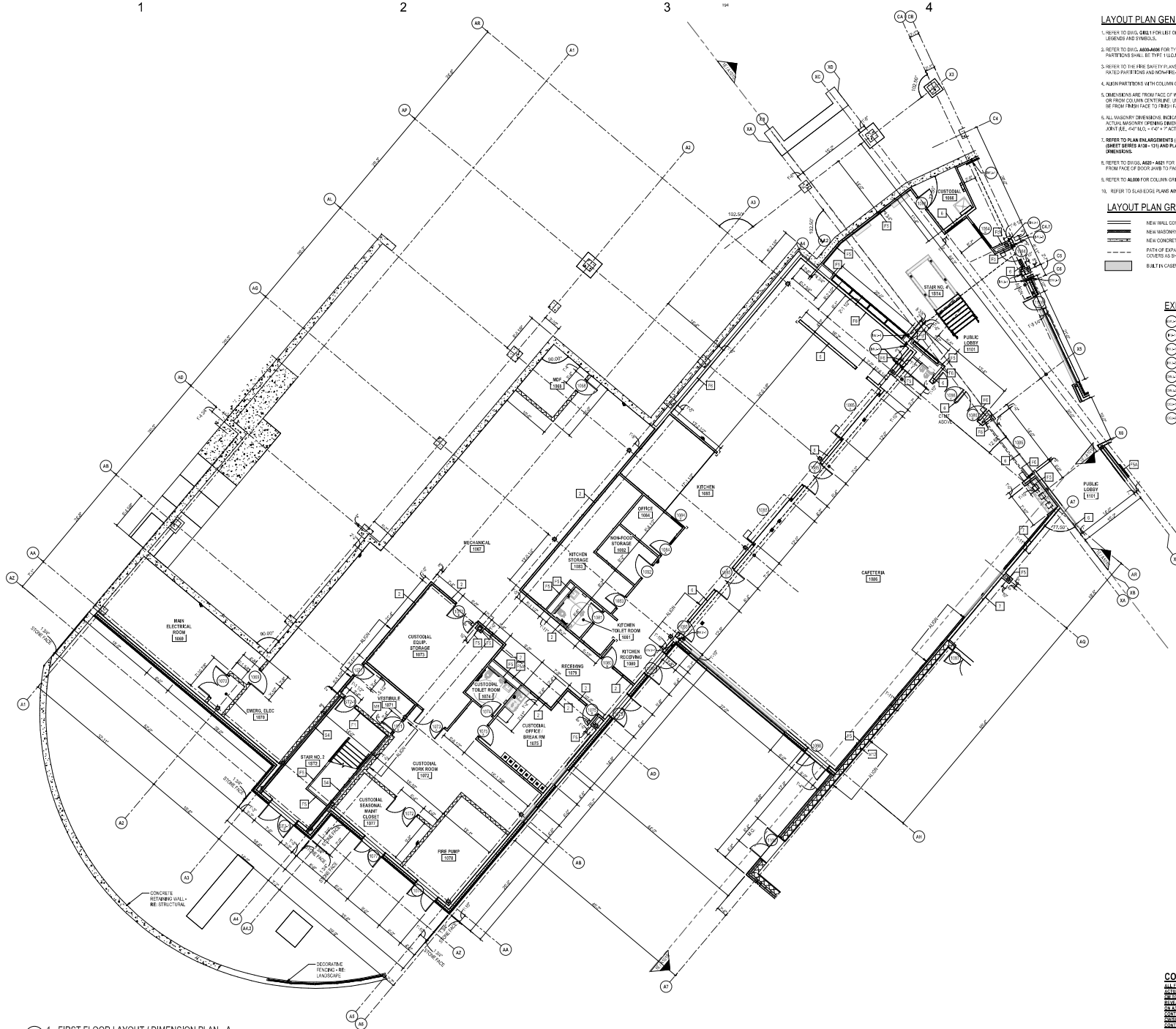

1E 1 - FIRST FLOOR LAYOUT / DIMENSION PLAN - A
1/8" = 1'-0"

LAYOUT PLAN GENERAL NOTES

1. REFER TO DWG. **G102.1** FOR LIST OF TYPICAL ABBREVIATIONS AND TYPICAL ARCHITECTURAL GRAPHIC LEGENDS AND SYMBOLS.
2. REFER TO DWG. **A600-A606** FOR TYPICAL PARTITION TYPES AND DETAILS INDICATED. 1A ALL PARTITIONS SHALL BE TYPE 1 U.O.N. ALL MASONRY PARTITIONS SHALL BE TYPE M8 U.O.N.
3. REFER TO THE FIRE SAFETY PLANS **GC01-GC-02, GC11 - GC13** FOR LOCATIONS OF FIRE-RESISTANCE RATED PARTITIONS AND NON-FIRE-RESISTANCE RATED SMOKE PARTITIONS AND FIREPROOFING.
4. ALIGN PARTITIONS WITH COLUMN OR MULLION CENTERLINE, UNLESS OTHERWISE NOTED.
5. DIMENSIONS ARE FROM FACE OF WALL TO FACE OF WALL. (I.E. FACE OF GYPSUM BOARD OR MASONRY) OR FROM COLUMN CENTERLINE, UNLESS OTHERWISE NOTED. DIMENSIONS NOTED AS "CLEAR" SHALL BE FROM FINISH FACE TO FINISH FACE. (i.e. FACE OF CERAMIC TILE TO FACE OF CERAMIC TILE).
6. ALL MASONRY DIMENSIONS INDICATED "M.O." ARE NOMINAL DIMENSIONS. UNLESS OTHERWISE NOTED, ACTUAL MASONRY OPENING DIMENSION = NOMINAL MASONRY OPENING DIMENSION + ONE MORTAR JOINT (I.E., 4'-0" M.O. = 4'-0" + ½" ACTUAL OPENING DIMENSION).
7. **REFER TO PLAN ENLARGEMENTS (SHEET SERIES A111 - A112), ENLARGED TOILET ROOM PLANS (SHEET SERIES A130 - 131) AND PLAN DETAIL SHEETS (SHEET SERIES A910 - A917) FOR ADDITIONAL DIMENSIONS.**
8. REFER TO DWGS. **A620 - A621** FOR DOOR AND FRAME DETAILS. PROVIDE MINIMUM **6-INCH** CLEARANCE FROM FACE OF DOOR JAMB TO FACE OF ADJACENT WALL, UNLESS OTHERWISE NOTED.
9. REFER TO **AL000** FOR COLUMN GRID DIMENSION LAYOUT.
10. REFER TO SLAB EDGE PLANS **A091 - A093** FOR SLAB EDGE DIMENSIONS.

LAYOUT PLAN GRAPHIC LEGEND

- NEW WALL CONSTRUCTION
- NEW MASONRY CONSTRUCTION
- NEW CONCRETE CONSTRUCTION
- PATH OF EXPANSION JOINT -PROVIDE EXPANSION JOINT COVERS AS SHOWN ON "AL" SERIES AND A200 SERIES
- BUILT IN CASEWORK

EXPANSION JOINT LEGEND

- EXTERIOR: WALL TO WALL
- INTERIOR: FLOOR TO WALL - **RE: 5C/A806**
- INTERIOR: WALL TO WALL (FLUSH) - **RE: 5B/A806**
- INTERIOR: WALL TO WALL (CORNER) - **RE: 5A/A806**
- INTERIOR: CEILING TO WALL - GYP - **RE: 5A/A806**
- INTERIOR: CEILING TO WALL - ACP - **RE: 2B/A210**
- INTERIOR: CEILING TO CEILING - GYP - **RE: 5B/A806**
- INTERIOR: CEILING TO CEILING - ACP - **RE: 2A/A210**

CONTRACTOR NOTE:

ALL FIBER CEMENT PANEL DIMENSIONS ARE NOMINAL DIMENSIONS. ACTUAL DIMENSIONS MAY VARY PER MFR. STANDARDS. CONTRACTOR(S) MUST COORDINATE ACTUAL DIMENSIONS WITH OVERALL LAYOUT OF REVEALS, MOVEMENT JOINTS AND O/N RE ROUGH OPENINGS SHOWN ON A210 SERIES ELEVATIONS AND "AL" SERIES EXPANSION PLANS. CONTRACTOR(S) TO COORDINATE WITH CMF SUB-CONTRACTOR. FIELD VERIFICATION OF ACTUAL CONDITIONS AND FINAL SUB-CONTRACTOR TO ENSURE PROPER NOMINAL DIMENSIONAL LAYOUT.

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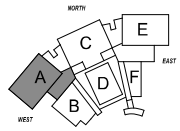

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRST FLOOR LAYOUT PLAN - PART A

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **AL101A**

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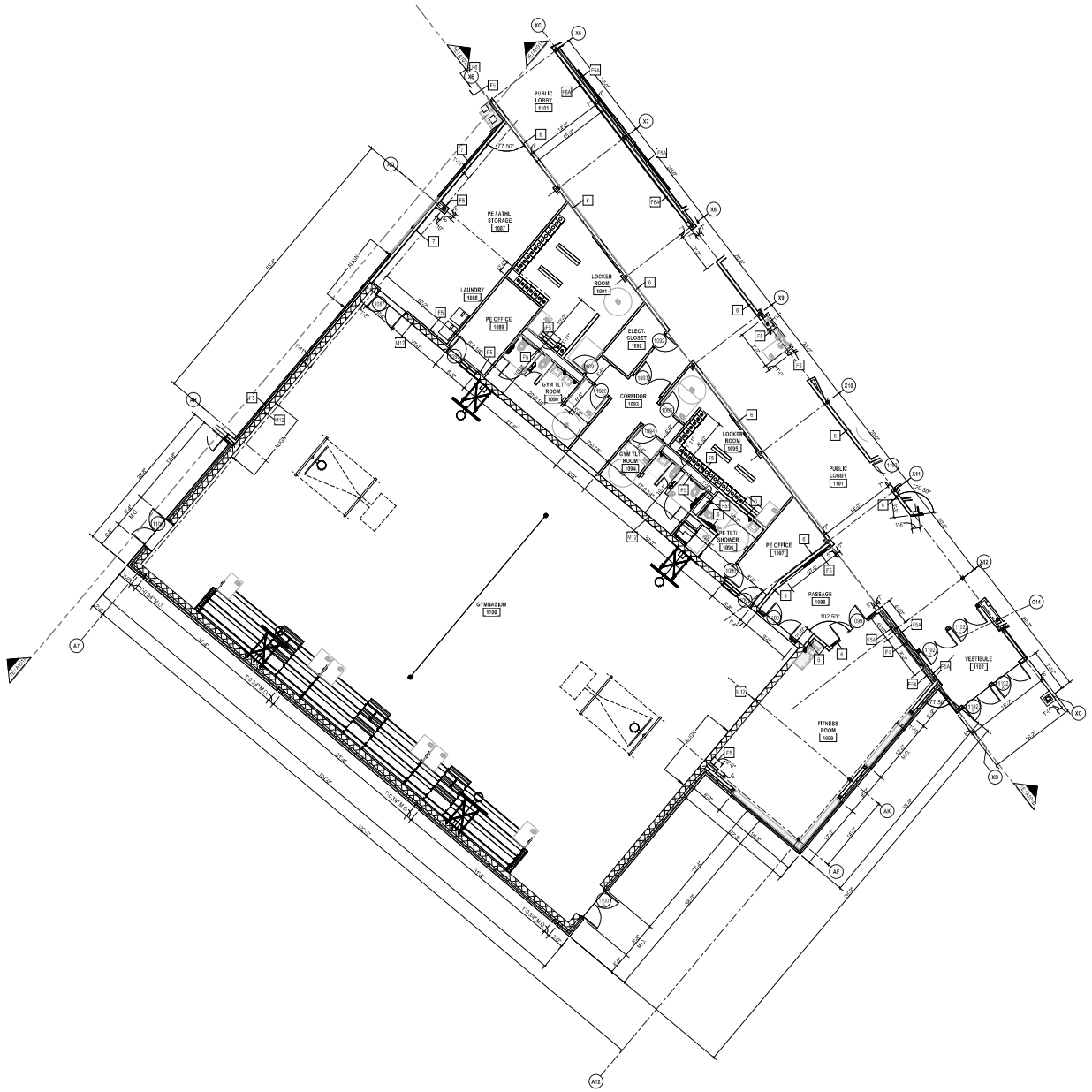

1E 1 - FIRST FLOOR LAYOUT / DIMENSION PLAN - B
1/8" = 1'-0"

LAYOUT PLAN GENERAL NOTES

1. REFER TO DWG. **G102.1** FOR LIST OF TYPICAL ABBREVIATIONS AND TYPICAL ARCHITECTURAL GRAPHIC LEGENDS AND SYMBOLS.
2. REFER TO DWG. **A600-A606** FOR TYPICAL PARTITION TYPES AND DETAILS INDICATED. 1A ALL PARTITIONS SHALL BE TYPE 1 U.O.N. ALL MASONRY PARTITIONS SHALL BE TYPE M9 U.O.N.
3. REFER TO THE FIRE SAFETY PLANS **GC01-GC-02**, **GC11 - GC13** FOR LOCATIONS OF FIRE-RESISTANCE RATED PARTITIONS AND NON-FIRE-RESISTANCE RATED SMOKE PARTITIONS AND FIREPROOFING.
4. ALIGN PARTITIONS WITH COLUMN OR MULLION CENTERLINE, UNLESS OTHERWISE NOTED.
5. DIMENSIONS ARE FROM FACE OF WALL TO FACE OF WALL, (I.E. FACE OF GYPSUM BOARD OR MASONRY) OR FROM COLUMN CENTERLINE, UNLESS OTHERWISE NOTED. DIMENSIONS NOTED AS "CLEAR" SHALL BE FROM FINISH FACE TO FINISH FACE, (i.e. FACE OF CERAMIC TILE TO FACE OF CERAMIC TILE).
6. ALL MASONRY DIMENSIONS INDICATED "M.O." ARE NOMINAL DIMENSIONS, UNLESS OTHERWISE NOTED. ACTUAL MASONRY OPENING DIMENSION = NOMINAL MASONRY OPENING DIMENSION + ONE MORTAR JOINT (I.E., 4'-0" M.O. = 4'-0" + ½" ACTUAL OPENING DIMENSION).
7. **REFER TO PLAN ENLARGEMENTS (SHEET SERIES A111.1 - A112), ENLARGED TOILET ROOM PLANS (SHEET SERIES A130 - 131) AND PLAN DETAIL SHEETS (SHEET SERIES A310 - A317) FOR ADDITIONAL DIMENSIONS.**
8. REFER TO DWGS. **A620 - A621** FOR DOOR AND FRAME DETAILS. PROVIDE MINIMUM **6-INCH** CLEARANCE FROM FACE OF DOOR JAMB TO FACE OF ADJACENT WALL, UNLESS OTHERWISE NOTED.
9. REFER TO **AL000** FOR COLUMN GRID DIMENSION LAYOUT
10. REFER TO SLAB EDGE PLANS **A091 - A093** FOR SLAB EDGE DIMENSIONS.

LAYOUT PLAN GRAPHIC LEGEND

- NEW WALL CONSTRUCTION
- NEW MASONRY CONSTRUCTION
- NEW CONCRETE CONSTRUCTION
- PATH OF EXPANSION JOINT -PROVIDE EXPANSION JOINT COVERS AS SHOWN ON "AL" SERIES AND A209 SERIES
- BUILT IN CASEWORK

EXPANSION JOINT LEGEND

- EXTERIOR: WALL TO WALL
- INTERIOR: FLOOR TO WALL - **RE: 5C/A806**
- INTERIOR: WALL TO WALL (FLUSH) - **RE: 5B/A806**
- INTERIOR: WALL TO WALL (CORNER) - **RE: 5A/A806**
- INTERIOR: CEILING TO WALL - GYP - **RE: 5A/A806**
- INTERIOR: CEILING TO WALL - ACP - **RE: 2B/A210**
- INTERIOR: CEILING TO CEILING - GYP - **RE: 5B/A806**
- INTERIOR: CEILING TO CEILING - ACP - **RE: 2A/A210**

CONTRACTOR NOTE:
ALL FIBER CEMENT PANEL DIMENSIONS ARE NOMINAL DIMENSIONS. ACTUAL DIMENSIONS MAY VARY PER MFR. STANDARDS. CONTRACTOR/ INSTALLER SHALL COORDINATE ACTUAL DIMENSIONS WITH OVERALL LAYOUT OF REVEALS, MOVEMENT JOINTS AND CUTS AT RIGID OPENINGS SHOWN ON A210 SERIES ELEVATIONS AND "AL" SERIES EXPANSION PLANS. CONTRACTOR/CM TO COORDINATE WITH CPMF SUB-CONTRACTOR. PANEL & SUB-CONSTRUCTION TO BEGIN FROM FIRST PANEL. SUB-CONTRACTOR TO ENSURE PROPER NOMINAL DIMENSIONAL LAYOUT.

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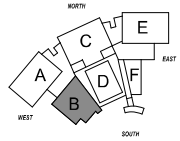

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRST FLOOR LAYOUT PLAN - PART B

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: AL101B

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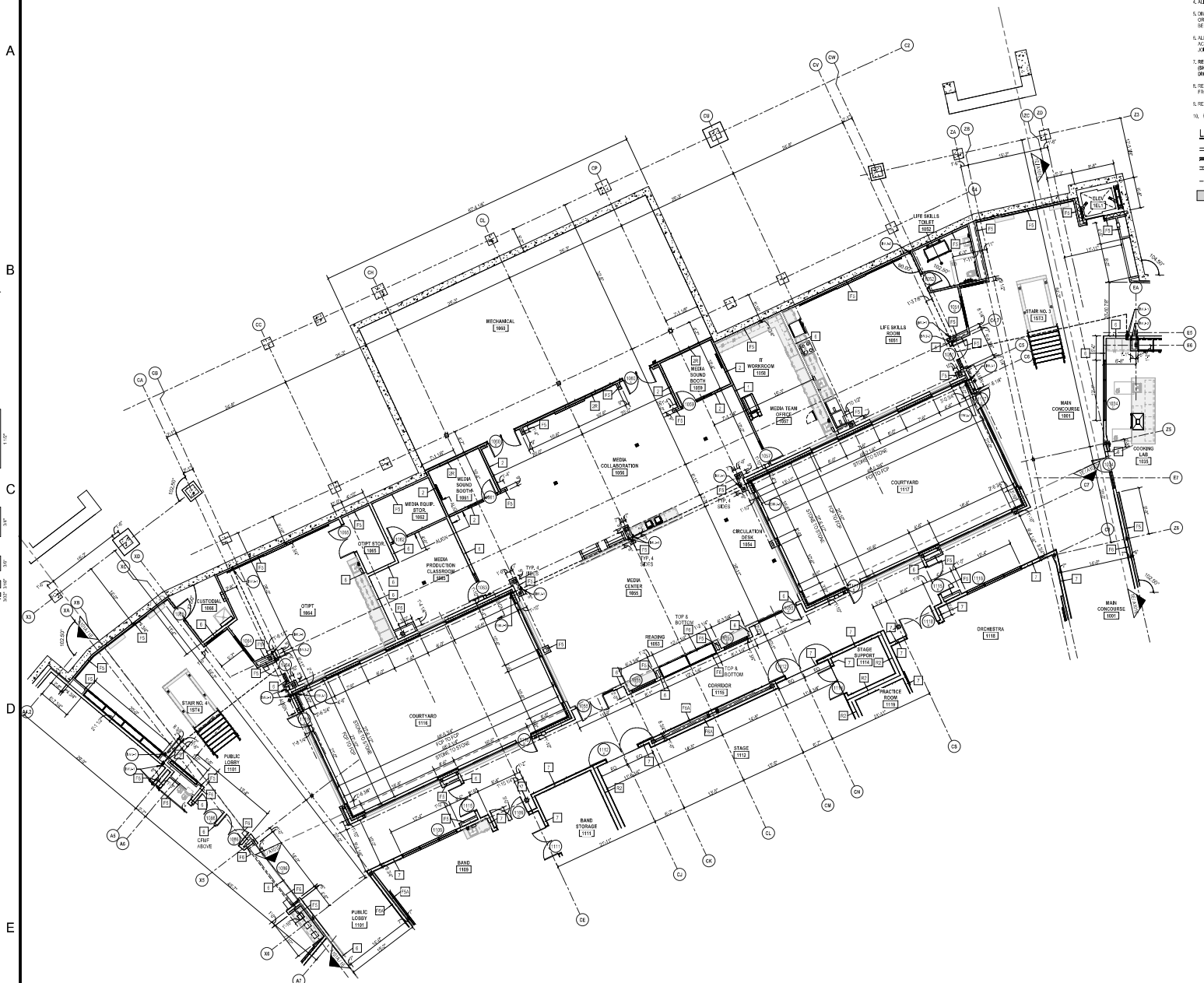

1E 1 - FIRST FLOOR LAYOUT / DIMENSION PLAN - C
1/8" = 1'-0"

LAYOUT PLAN GENERAL NOTES

1. REFER TO DWG. **G102.1** FOR LIST OF TYPICAL ABBREVIATIONS AND TYPICAL ARCHITECTURAL GRAPHIC LEGENDS AND SYMBOLS.
2. REFER TO DWG. **A600-A606** FOR TYPICAL PARTITION TYPES AND DETAILS INDICATED. 1A ALL PARTITIONS SHALL BE TYPE 1 U.O.N. ALL MASONRY PARTITIONS SHALL BE TYPE M8 U.O.N.
3. REFER TO THE FIRE SAFETY PLANS **G031-G032 - G033** FOR LOCATIONS OF FIRE-RESISTANCE RATED PARTITIONS AND NON-FIRE-RESISTANCE RATED SMOKE PARTITIONS AND FIREPROOFING.
4. ALIGN PARTITIONS WITH COLUMN OR MULLION CENTERLINE, UNLESS OTHERWISE NOTED.
5. DIMENSIONS ARE FROM FACE OF WALL TO FACE OF WALL. (I.E. FACE OF GYPSUM BOARD OR MASONRY) OR FROM COLUMN CENTERLINE, UNLESS OTHERWISE NOTED. DIMENSIONS NOTED AS "CLEAR" SHALL BE FROM FINISH FACE TO FINISH FACE. (i.e. FACE OF CERAMIC TILE TO FACE OF CERAMIC TILE).
6. ALL MASONRY DIMENSIONS INDICATED "M.O." ARE NOMINAL DIMENSIONS, UNLESS OTHERWISE NOTED. ACTUAL MASONRY OPENING DIMENSION = NOMINAL MASONRY OPENING DIMENSION + ONE MORTAR JOINT (I.E., 4'-0" M.O. = 4'-0" + 1/2" ACTUAL OPENING DIMENSION).
7. **REFER TO PLAN ENLARGEMENTS (SHEET SERIES A111.1 - A112), ENLARGED TOILET ROOM PLANS (SHEET SERIES A130 - 131) AND PLAN DETAIL SHEETS (SHEET SERIES A310 - A317) FOR ADDITIONAL DIMENSIONS.**
8. REFER TO DWGS. **A620 - A621** FOR DOOR AND FRAME DETAILS. PROVIDE MINIMUM 4-INCH CLEARANCE FROM FACE OF DOOR JAMB TO FACE OF ADJACENT WALL, UNLESS OTHERWISE NOTED.
9. REFER TO **AL000** FOR COLUMN GRID DIMENSION LAYOUT
10. REFER TO SLAB EDGE PLANS **A091 - A093** FOR SLAB EDGE DIMENSIONS.

LAYOUT PLAN GRAPHIC LEGEND

- NEW WALL CONSTRUCTION
- NEW MASONRY CONSTRUCTION
- NEW CONCRETE CONSTRUCTION
- PATH OF EXPANSION JOINT - PROVIDE EXPANSION JOINT COVERS AS SHOWN ON "AL" SERIES AND A200 SERIES
- BUILT IN CASEWORK

EXPANSION JOINT LEGEND

- EXTERIOR: WALL TO WALL
- INTERIOR: FLOOR TO WALL - **RE: 5C/A806**
- INTERIOR: WALL TO WALL (FLUSH) - **RE: 5B/A806**
- INTERIOR: WALL TO WALL (CORNER) - **RE: 5A/A806**
- INTERIOR: CEILING TO WALL - GYP - **RE: 5A/A806**
- INTERIOR: CEILING TO WALL - ACP - **RE: 2B/A210**
- INTERIOR: CEILING TO CEILING - GYP - **RE: 5B/A806**
- INTERIOR: CEILING TO CEILING - ACP - **RE: 2A/A210**

CONTRACTOR NOTE:

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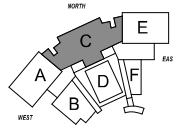

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRST FLOOR LAYOUT PLAN - PART C

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: AL101C

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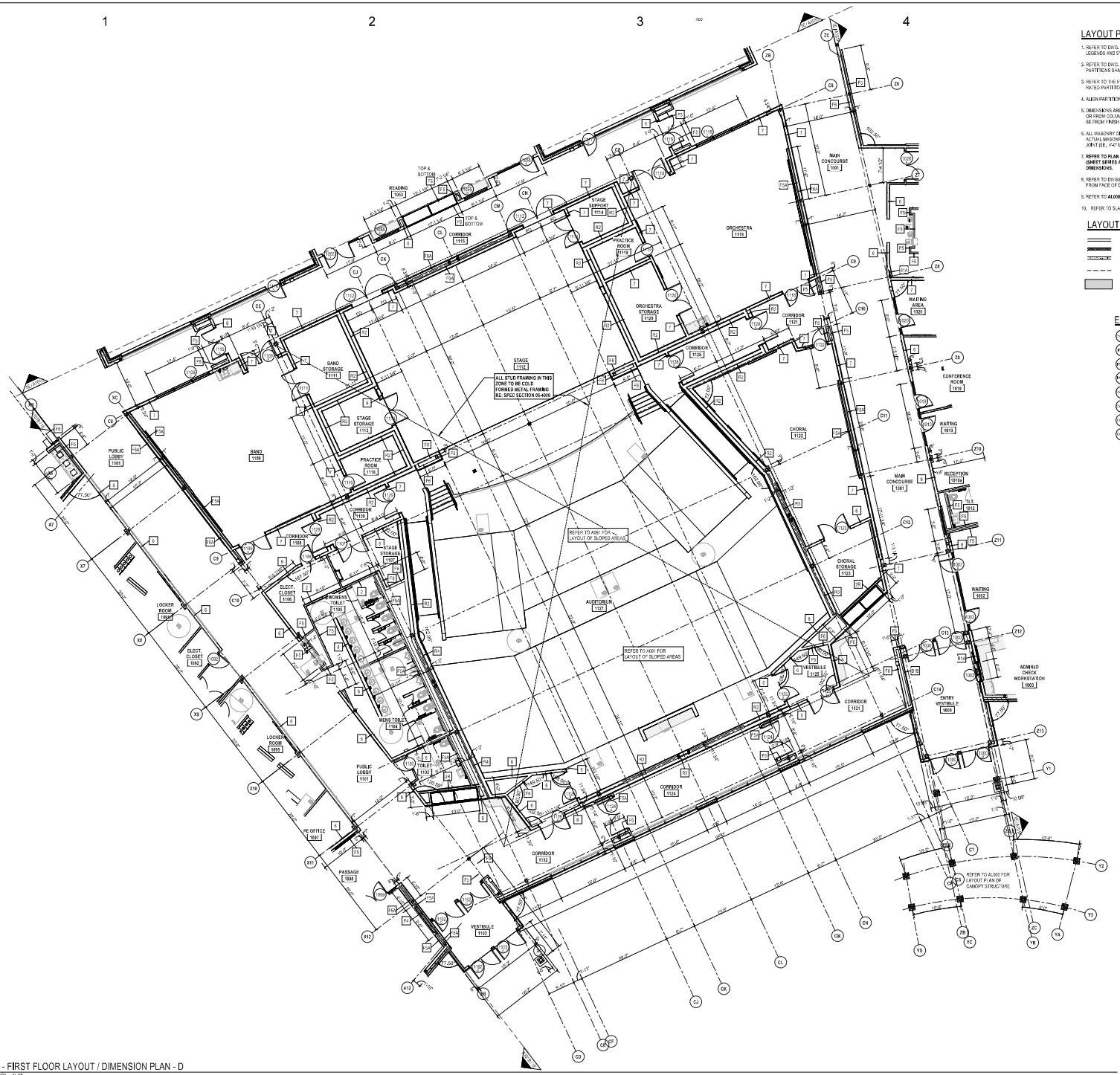

1E 1 - FIRST FLOOR LAYOUT / DIMENSION PLAN - D
1/8" = 1'-0"

LAYOUT PLAN GENERAL NOTES

1. REFER TO DWG. **G102.1** FOR LIST OF TYPICAL ABBREVIATIONS AND TYPICAL ARCHITECTURAL GRAPHIC LEGENDS AND SYMBOLS.
2. REFER TO DWG. **A600-A606** FOR TYPICAL PARTITION TYPES AND DETAILS INDICATED. 1A ALL PARTITIONS SHALL BE TYPE 1 U.O.N. ALL MASONRY PARTITIONS SHALL BE TYPE M8 U.O.N.
3. REFER TO THE FIRE SAFETY PLANS **GC01-GC-02**, **GC11 - GC13** FOR LOCATIONS OF FIRE-RESISTANCE RATED PARTITIONS AND NON-FIRE-RESISTANCE RATED SMOKE PARTITIONS AND FIREPROOFING.
4. ALIGN PARTITIONS WITH COLUMN OR MULLION CENTERLINE, UNLESS OTHERWISE NOTED.
5. DIMENSIONS ARE FROM FACE OF WALL TO FACE OF WALL. (I.E. FACE OF GYPSUM BOARD OR MASONRY) OR FROM COLUMN CENTERLINE, UNLESS OTHERWISE NOTED. DIMENSIONS NOTED AS "CLEAR" SHALL BE FROM FINISH FACE TO FINISH FACE. (i.e. FACE OF CERAMIC TILE TO FACE OF CERAMIC TILE).
6. ALL MASONRY DIMENSIONS INDICATED "M.O." ARE NOMINAL DIMENSIONS. UNLESS OTHERWISE NOTED, ACTUAL MASONRY OPENING DIMENSION = NOMINAL MASONRY OPENING DIMENSION + ONE MORTAR JOINT (I.E., 4'-0" M.O. = 4'-0" + 1" ACTUAL OPENING DIMENSION).
7. **REFER TO PLAN ENLARGEMENTS (SHEET SERIES A11.1 - A11.2), ENLARGED TOILET ROOM PLANS (SHEET SERIES A13a - 13f) AND PLAN DETAIL SHEETS (SHEET SERIES A31b - A31f) FOR ADDITIONAL DIMENSIONS.**
8. REFER TO DWGS. **A620 - A621** FOR DOOR AND FRAME DETAILS. PROVIDE MINIMUM **6"-INCH** CLEARANCE FROM FACE OF DOOR JAMB TO FACE OF ADJACENT WALL, UNLESS OTHERWISE NOTED.
9. REFER TO **A1.000** FOR COLUMN GRID DIMENSION LAYOUT
10. REFER TO SLAB EDGE PLANS **A091 - A093** FOR SLAB EDGE DIMENSIONS.

LAYOUT PLAN GRAPHIC LEGEND

- NEW WALL CONSTRUCTION
- NEW MASONRY CONSTRUCTION
- NEW CONCRETE CONSTRUCTION
- PATH OF EXPANSION JOINT -PROVIDE EXPANSION JOINT COVERS AS SHOWN ON "AL" SERIES AND A200 SERIES
- BUILT IN CASEWORK

EXPANSION JOINT LEGEND

- EXTERIOR: WALL TO WALL
- INTERIOR: FLOOR TO WALL - **RE: 5C/A606**
- INTERIOR: WALL TO WALL (FLUSH) - **RE: 5B/A606**
- INTERIOR: WALL TO WALL (CORNER) - **RE: 5A/A606**
- INTERIOR: CEILING TO WALL - GYP - **RE: 5A/A606**
- INTERIOR: CEILING TO WALL - ACP - **RE: 2B/A210**
- INTERIOR: CEILING TO CEILING - GYP - **RE: 5B/A606**
- INTERIOR: CEILING TO CEILING - ACP - **RE: 2A/A210**

CONTRACTOR NOTE:
ALL FIBER CEMENT PANEL DIMENSIONS ARE NOMINAL DIMENSIONS. ACTUAL DIMENSIONS MAY VARY PER MFR. STANDARDS. CONTRACTOR(S) MUST COORDINATE ACTUAL DIMENSIONS WITH OVERALL LAYOUT OF REVEALS, MOVEMENT JOINTS AND O/N RE ROUGH OPENINGS SHOWN ON A300 SERIES ELEVATIONS AND "AL" SERIES EXPANSION PLANS. CONTRACTOR(S) TO COORDINATE WITH CMF SUB-CONTRACTOR. FIELD VERIFICATION OF ACTUAL CONDITIONS PRIOR TO CONSTRUCTION BY CONTRACTOR TO ENSURE PROPER NOMINAL DIMENSIONAL LAYOUT.

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Greenwich Central Middle School

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Greenwich, CT 06830

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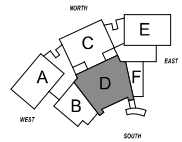

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRST FLOOR LAYOUT PLAN - PART D

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: AL101D

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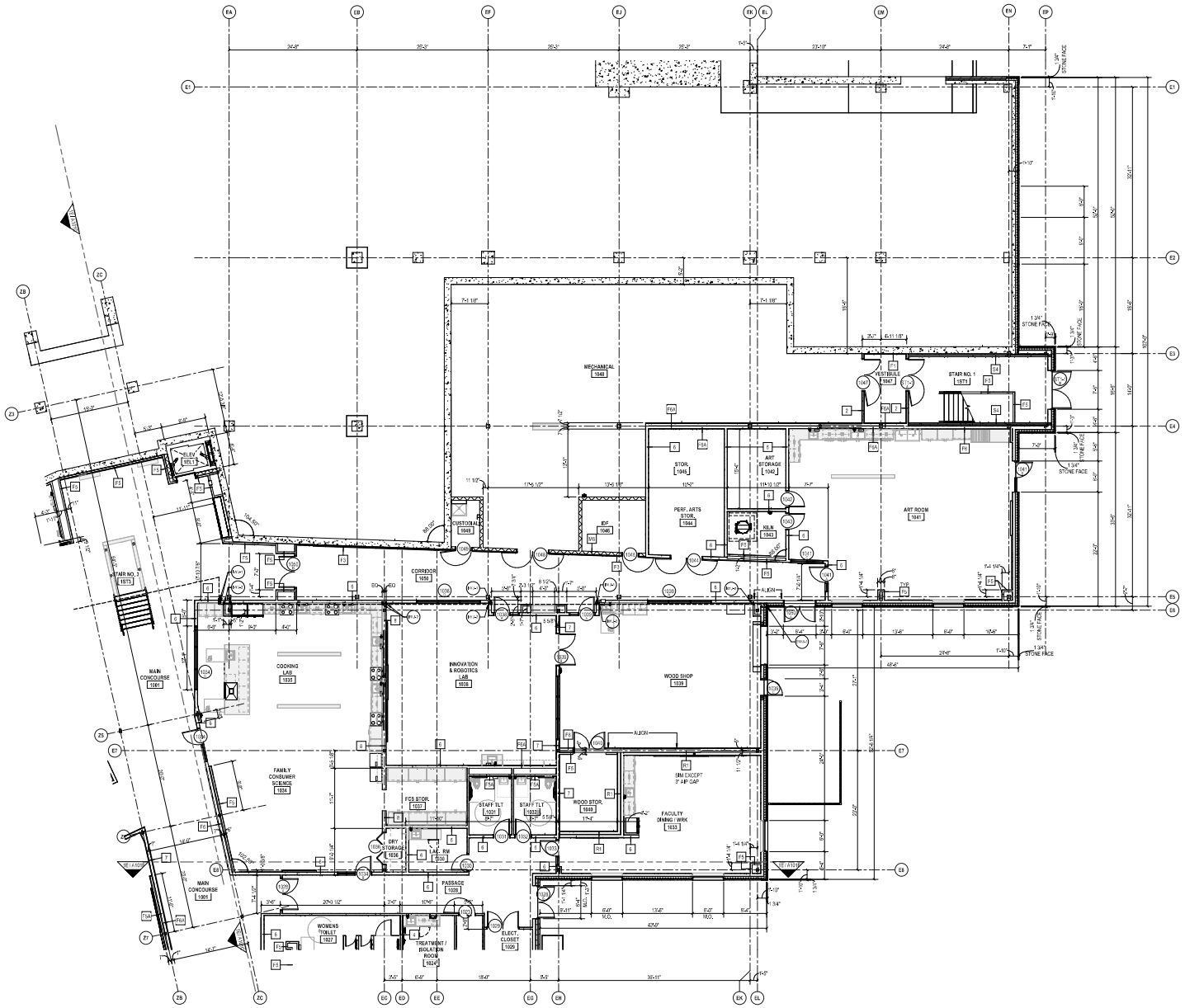

1E 1 - FIRST FLOOR LAYOUT / DIMENSION PLAN - E
1/8" = 1'-0"

LAYOUT PLAN GENERAL NOTES

1. REFER TO DWG. G102.1 FOR LIST OF TYPICAL ABBREVIATIONS AND TYPICAL ARCHITECTURAL GRAPHIC LEGENDS AND SYMBOLS.
2. REFER TO DWG. A600-A606 FOR TYPICAL PARTITION TYPES AND DETAILS INDICATED. 1A ALL PARTITIONS SHALL BE TYP2 1 U.O.N. ALL MASONRY PARTITIONS SHALL BE TYP2 MB U.O.N.
3. REFER TO THE FIRE SAFETY PLANS G031-G0-02, G071 - G073 FOR LOCATIONS OF FIRE-RESISTANCE RATED PARTITIONS AND NON-FIRE-RESISTANCE RATED SMOKE PARTITIONS AND FIREPROOFING.
4. ALIGN PARTITIONS WITH COLUMN OR MULLION CENTERLINE, UNLESS OTHERWISE NOTED.
5. DIMENSIONS ARE FROM FACE OF WALL TO FACE OF WALL, (I.E. FACE OF GYPSUM BOARD OR MASONRY) OR FROM COLUMN CENTERLINE, UNLESS OTHERWISE NOTED. DIMENSIONS NOTED AS "CLEAR" SHALL BE FROM FINISH FACE TO FINISH FACE, (I.E. FACE OF CERAMIC TILE TO FACE OF CERAMIC TILE).
6. ALL MASONRY DIMENSIONS INDICATED "M.O." ARE NOMINAL DIMENSIONS UNLESS OTHERWISE NOTED. ACTUAL MASONRY OPENING DIMENSION = NOMINAL MASONRY OPENING DIMENSION + ONE MORTAR JOINT (I.E., 4'-0" M.O. + 1/2" + 1/2" = 4'-1" ACTUAL OPENING DIMENSION).
7. **REFER TO PLAN ENLARGEMENTS (SHEET SERIES A111.1 - A112.), ENLARGED TOILET ROOM PLANS (SHEET SERIES A130 - 131) AND PLAN DETAIL SHEETS (SHEET SERIES A310 - A317) FOR ADDITIONAL DIMENSIONS.**
8. REFER TO DWGS. **A620 - A621** FOR DOOR AND FRAME DETAILS. PROVIDE MINIMUM **6"** INCH CLEARANCE FROM FACE OF DOOR JAMB TO FACE OF ADJACENT WALL, UNLESS OTHERWISE NOTED.
9. REFER TO **A1.000** FOR COLUMN GRID DIMENSION LAYOUT
10. REFER TO SLAB EDGE PLANS **A091 - A093** FOR SLAB EDGE DIMENSIONS.

LAYOUT PLAN GRAPHIC LEGEND

- NEW WALL CONSTRUCTION
- NEW MASONRY CONSTRUCTION
- NEW CONCRETE CONSTRUCTION
- PATH OF EXPANSION JOINT -PROVIDE EXPANSION JOINT COVERS AS SHOWN ON "AL" SERIES AND A209 SERIES
- BUILT IN CASEWORK

EXPANSION JOINT LEGEND

- EXTERIOR: WALL TO WALL
- INTERIOR: FLOOR TO WALL - **RE: 5C/A606**
- INTERIOR: WALL TO WALL (FLUSH) - **RE: 5B/A606**
- INTERIOR: WALL TO WALL (CORNER) - **RE: 5A/A606**
- INTERIOR: CEILING TO WALL - GYP - **RE: 5A/A606**
- INTERIOR: CEILING TO WALL - ACP - **RE: 2B/A210**
- INTERIOR: CEILING TO CEILING - GYP - **RE: 5B/A606**
- INTERIOR: CEILING TO CEILING - ACP - **RE: 2A/A210**

CONTRACTOR NOTE:
ALL FIBER CEMENT PANEL DIMENSIONS ARE NOMINAL DIMENSIONS. ACTUAL DIMENSIONS MAY VARY PER MFR. STANDARDS. CONTRACTOR(S) MUST COORDINATE ACTUAL DIMENSIONS WITH OVERALL LAYOUT OF REVEALS, MOVEMENT JOINTS AND O/N RE ROUGH OPENINGS SHOWN ON A210 SERIES ELEVATIONS AND "AL" SERIES EXPANSION PLANS. CONTRACTOR(S) TO COORDINATE WITH CMF SUB-CONTRACTOR. PRIOR TO INSTALLATION OF ANY FIBER CEMENT PANEL, IT IS CONTRACTOR TO ENSURE PROPER NOMINAL DIMENSIONAL LAYOUT.

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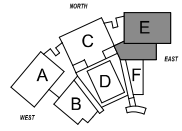

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRST FLOOR LAYOUT PLAN - PART E

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **AL101E**

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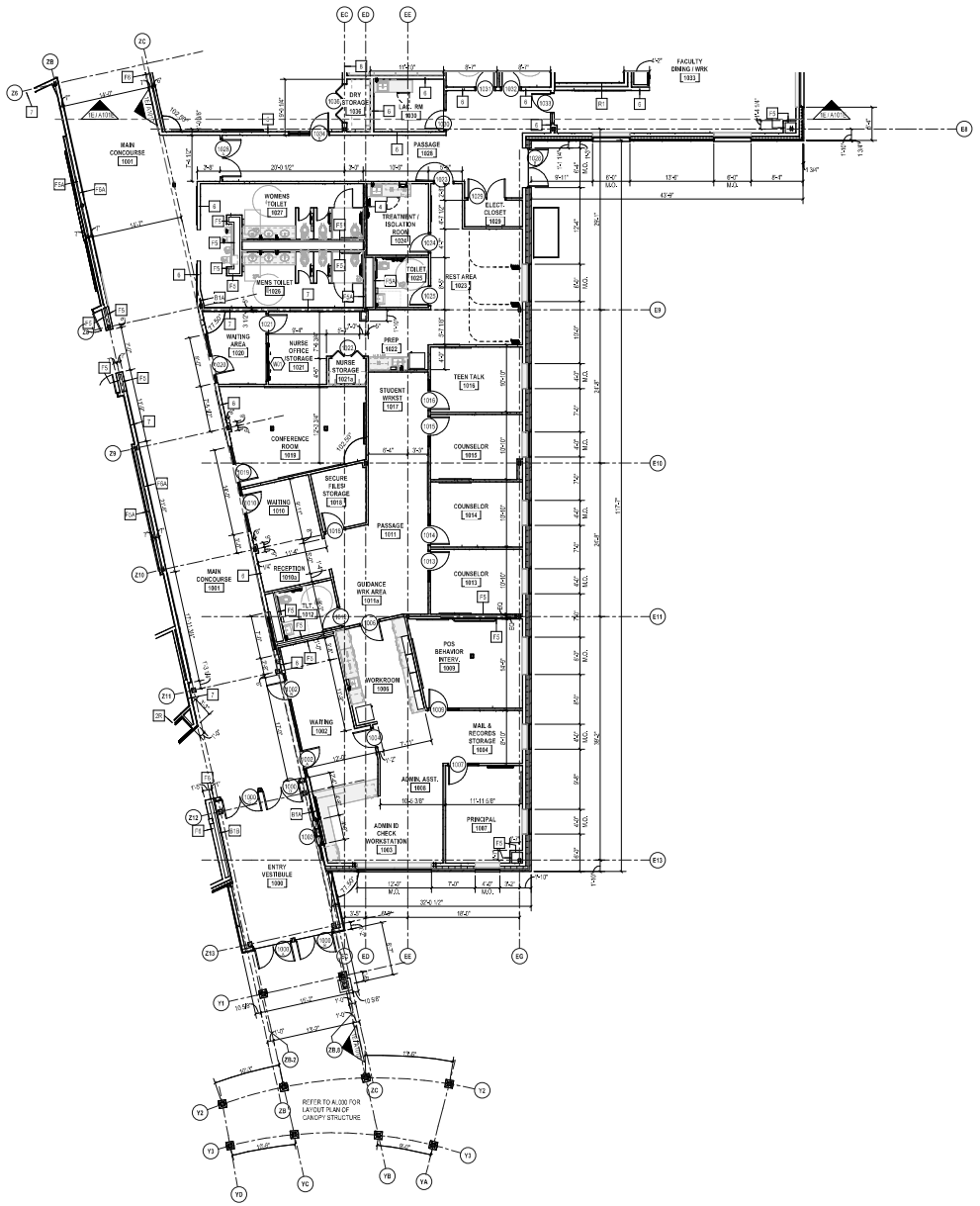

1E 1 - FIRST FLOOR LAYOUT / DIMENSION PLAN - F
1/8" = 1'-0"

LAYOUT PLAN GENERAL NOTES

1. REFER TO DWG. G102.1 FOR LIST OF TYPICAL ABBREVIATIONS AND TYPICAL ARCHITECTURAL GRAPHIC LEGENDS AND SYMBOLS.
2. REFER TO DWG. A600-A606 FOR TYPICAL PARTITION TYPES AND DETAILS INDICATED. 1A ALL PARTITIONS SHALL BE TYPE 1 U.O.N. ALL MASONRY PARTITIONS SHALL BE TYPE MB U.O.N.
3. REFER TO THE FIRE SAFETY PLANS G031-G0-02, G031 - G013 FOR LOCATIONS OF FIRE-RESISTANCE RATED PARTITIONS AND NON-FIRE-RESISTANCE RATED SMOKE PARTITIONS AND FIREPROOFING.
4. ALIGN PARTITIONS WITH COLUMN OR MULLION CENTERLINE, UNLESS OTHERWISE NOTED.
5. DIMENSIONS ARE FROM FACE OF WALL TO FACE OF WALL, (I.E. FACE OF GYPSUM BOARD OR MASONRY) OR FROM COLUMN CENTERLINE, UNLESS OTHERWISE NOTED. DIMENSIONS NOTED AS "CLEAR" SHALL BE FROM FINISH FACE TO FINISH FACE, (I.E. FACE OF CERAMIC TILE TO FACE OF CERAMIC TILE).
6. ALL MASONRY DIMENSIONS INDICATED "M.O." ARE NOMINAL DIMENSIONS UNLESS OTHERWISE NOTED. ACTUAL MASONRY OPENING DIMENSION = NOMINAL MASONRY OPENING DIMENSION + ONE MORTAR JOINT (I.E., 4'-0" M.O. = 4'-0" + ½" ACTUAL OPENING DIMENSION).
7. **REFER TO PLAN ENLARGEMENTS (SHEET SERIES A111.1 - A112), ENLARGED TOILET ROOM PLANS (SHEET SERIES A130 - 131) AND PLAN DETAIL SHEETS (SHEET SERIES A310 - A317) FOR ADDITIONAL DIMENSIONS.**
8. REFER TO DWGS. **A620 - A621** FOR DOOR AND FRAME DETAILS. PROVIDE MINIMUM **6-INCH** CLEARANCE FROM FACE OF DOOR JAMB TO FACE OF ADJACENT WALL, UNLESS OTHERWISE NOTED.
9. REFER TO **AL000** FOR COLUMN GRID DIMENSION LAYOUT
10. REFER TO SLAB EDGE PLANS **A091 - A093** FOR SLAB EDGE DIMENSIONS.

LAYOUT PLAN GRAPHIC LEGEND

- NEW WALL CONSTRUCTION
- NEW MASONRY CONSTRUCTION
- NEW CONCRETE CONSTRUCTION
- PATH OF EXPANSION JOINT -PROVIDE EXPANSION JOINT COVERS AS SHOWN ON "AL" SERIES AND A200 SERIES
- BUILT IN CASEWORK

EXPANSION JOINT LEGEND

- EXTERIOR: WALL TO WALL
- INTERIOR: FLOOR TO WALL - **RE: 5C/A806**
- INTERIOR: WALL TO WALL (FLUSH) - **RE: 5B/A806**
- INTERIOR: WALL TO WALL (CORNER) - **RE: 5A/A806**
- INTERIOR: CEILING TO WALL - GYP - **RE: 5A/A806**
- INTERIOR: CEILING TO WALL - ACP - **RE: 2B/A210**
- INTERIOR: CEILING TO CEILING - GYP - **RE: 5B/A806**
- INTERIOR: CEILING TO CEILING - ACP - **RE: 2A/A210**

CONTRACTOR NOTE:
ALL FIBER CEMENT PANEL DIMENSIONS ARE NOMINAL DIMENSIONS. ACTUAL DIMENSIONS MAY VARY PER MFR. STANDARDS. CONTRACTOR(S) MUST COORDINATE ACTUAL DIMENSIONS WITH OVERALL LAYOUT OF REVEALS, MOVEMENT JOINTS AND CNC RE-ROUGH OPENINGS SHOWN ON A210 SERIES ELEVATIONS AND "AL" SERIES EXPANSION PLANS. CONTRACTOR/CM TO COORDINATE WITH CPMF SUB-CONTRACTOR. PRIOR TO FABRICATION OF ANY FIBER CEMENT PANEL, SUB-CONTRACTOR TO ENSURE PROPER NOMINAL DIMENSIONAL LAYOUT.

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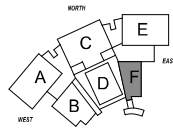

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRST FLOOR LAYOUT PLAN - PART F

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: AL101F

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1E SECOND FLOOR PLAN - A
1/8" = 1'-0"

LAYOUT PLAN GENERAL NOTES

1. REFER TO DWG. **G002.1** FOR LIST OF TYPICAL ABBREVIATIONS AND TYPICAL ARCHITECTURAL GRAPHIC LEGENDS AND SYMBOLS.
2. REFER TO DWG. **A000-A006** FOR TYPICAL PARTITION TYPES AND DETAILS INDICATED. 1A ALL PARTITIONS SHALL BE TYPE 1 U.O.N. ALL MASONRY PARTITIONS SHALL BE TYPE M8 U.O.N.
3. REFER TO THE FIRE SAFETY PLANS **G031-G0-02, G011 - G013** FOR LOCATIONS OF FIRE-RESISTANCE RATED PARTITIONS AND NON-FIRE-RESISTANCE RATED SMOKE PARTITIONS AND FIREPROOFING.
4. ALIGN PARTITIONS WITH COLUMN OR MULLION CENTERLINE, UNLESS OTHERWISE NOTED.
5. DIMENSIONS ARE FROM FACE OF WALL TO FACE OF WALL. (I.E. FACE OF GYPSUM BOARD OR MASONRY) OR FROM COLUMN CENTERLINE, UNLESS OTHERWISE NOTED. DIMENSIONS NOTED AS "CLEAR" SHALL BE FROM FINISH FACE TO FINISH FACE. (i.e. FACE OF CERAMIC TILE TO FACE OF CERAMIC TILE).
6. ALL MASONRY DIMENSIONS, INDICATED "M.O.", ARE NOMINAL DIMENSIONS, UNLESS OTHERWISE NOTED. ACTUAL MASONRY OPENING DIMENSION = NOMINAL MASONRY OPENING DIMENSION + ONE MORTAR JOINT (I.E., 4'-0" M.O. = 4'-0" + 7" ACTUAL OPENING DIMENSION).
7. **REFER TO PLAN ENLARGEMENTS (SHEET SERIES A111.1 - A112.2), ENLARGED TOILET ROOM PLANS (SHEET SERIES A130 - 131) AND PLAN DETAIL SHEETS (SHEET SERIES A310 - A317) FOR ADDITIONAL DIMENSIONS.**
8. REFER TO DWGS. **A020 - A021** FOR DOOR AND FRAME DETAILS. PROVIDE MINIMUM 6-INCH CLEARANCE FROM FACE OF DOOR JAMB TO FACE OF ADJACENT WALL, UNLESS OTHERWISE NOTED.
9. REFER TO **AL000** FOR COLUMN GRID DIMENSION LAYOUT
10. REFER TO SLAB EDGE PLANS **A091 - A093** FOR SLAB EDGE DIMENSIONS.

LAYOUT PLAN GRAPHIC LEGEND

- NEW WALL CONSTRUCTION
- NEW MASONRY CONSTRUCTION
- NEW CONCRETE CONSTRUCTION
- PATH OF EXPANSION JOINT - PROVIDE EXPANSION JOINT COVERS AS SHOWN ON "AL" SERIES AND A200 SERIES
- BUILT IN CASEWORK

EXPANSION JOINT LEGEND

EXTERIOR:	WALL TO WALL
INTERIOR:	FLOOR TO WALL - **RE: 5C/A006**
INTERIOR:	WALL TO WALL (FLUSH) - **RE: 5B/A006**
INTERIOR:	WALL TO WALL (CORNER) - **RE: 5A/A006**
INTERIOR:	CEILING TO WALL - GYP - **RE: 5A/A006**
INTERIOR:	CEILING TO WALL - ACP - **RE: 2B/A210**
INTERIOR:	CEILING TO CEILING - GYP - **RE: 5B/A006**
INTERIOR:	CEILING TO CEILING - ACP - **RE: 2A/A210**

CONTRACTOR NOTE:

ALL FIBER CEMENT PANEL DIMENSIONS ARE NOMINAL DIMENSIONS. ACTUAL DIMENSIONS MAY VARY PER MFR. STANDARDS. CONTRACTOR/ CM TO COORDINATE ACTUAL DIMENSIONS WITH OVERALL LAYOUT OF REVEALS, MOVEMENT JOINTS AND ON SIT BOUGH OPENINGS SHOWN ON A210 SERIES ELEVATIONS AND "AL" SERIES DIMENSION PLANS. CONTRACTOR/CM TO COORDINATE WITH CEMF SUB-CONTRACTOR, CMSF SUB-CONTRACTOR AND FIBER CEMENT PANEL SUB-CONTRACTOR TO ENSURE PROPER NOMINAL DIMENSIONAL LAYOUT.

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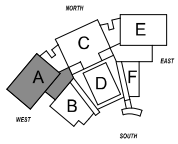

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

SECOND FLOOR LAYOUT PLAN - PART A

Date
07/08/2024

Scale
1/8" = 1'-0"

Proj. Number
22367.00

Drawing Number
AL102A

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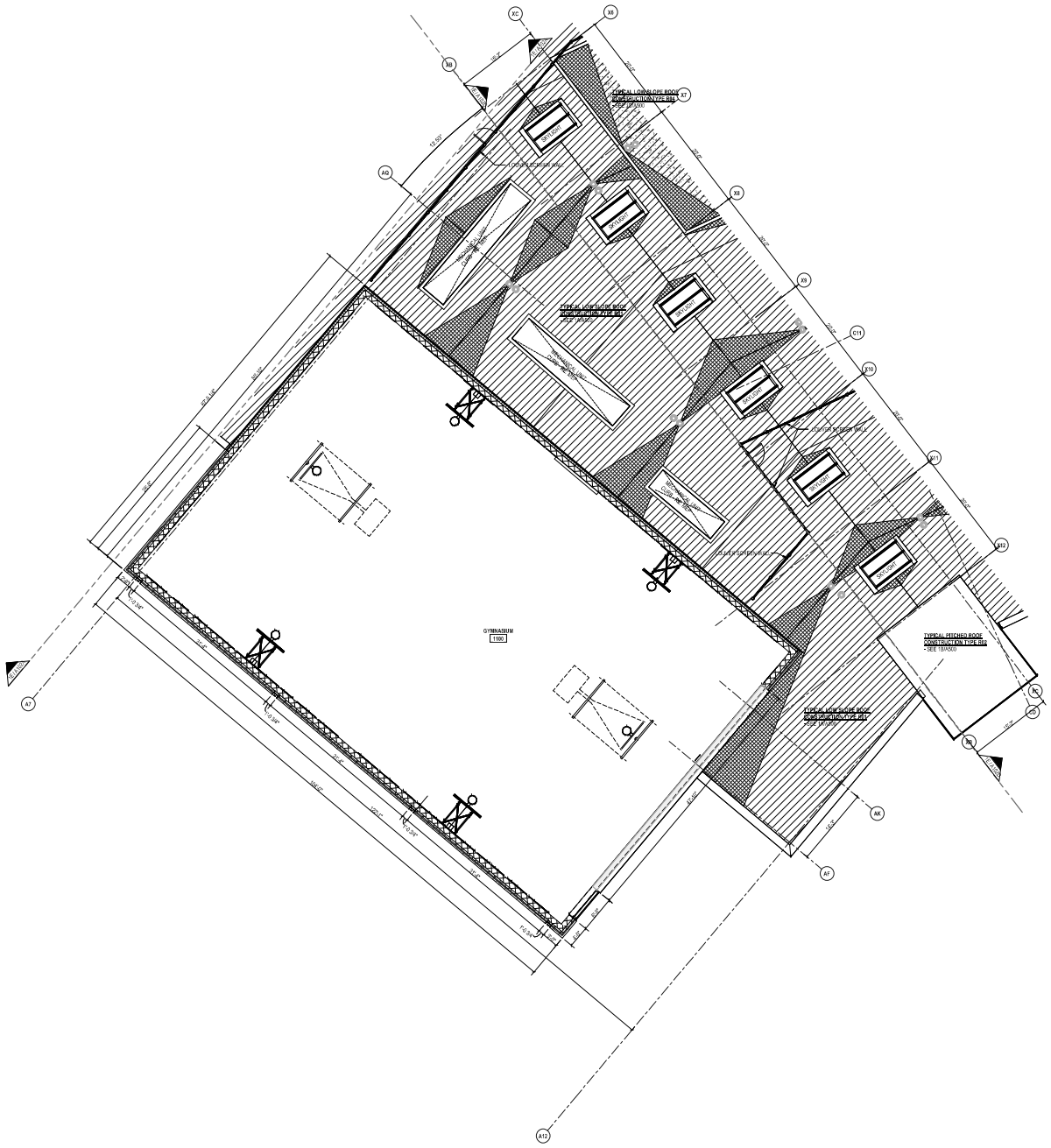

1E SECOND FLOOR PLAN - A
1/8" = 1'-0"

LAYOUT PLAN GENERAL NOTES

1. REFER TO DWG. **G102.1** FOR LIST OF TYPICAL ABBREVIATIONS AND TYPICAL ARCHITECTURAL GRAPHIC LEGENDS AND SYMBOLS.
2. REFER TO DWG. **A600-A606** FOR TYPICAL PARTITION TYPES AND DETAILS INDICATED. [1A] ALL PARTITIONS SHALL BE TYPE 1 U.O.N. ALL MASONRY PARTITIONS SHALL BE TYPE M9 U.O.N.
3. REFER TO THE FIRE SAFETY PLANS **GC01-GC-02**, **GC11 - GC13** FOR LOCATIONS OF FIRE-RESISTANCE RATED PARTITIONS AND NON-FIRE-RESISTANCE RATED SMOKE PARTITIONS AND FIREPROOFING.
4. ALIGN PARTITIONS WITH COLUMN OR MULLION CENTERLINE, UNLESS OTHERWISE NOTED.
5. DIMENSIONS ARE FROM FACE OF WALL TO FACE OF WALL. (I.E. FACE OF GYPSUM BOARD OR MASONRY) OR FROM COLUMN CENTERLINE, UNLESS OTHERWISE NOTED. DIMENSIONS NOTED AS "CLEAR" SHALL BE FROM FINISH FACE TO FINISH FACE. (i.e. FACE OF CERAMIC TILE TO FACE OF CERAMIC TILE).
6. ALL MASONRY DIMENSIONS INDICATED "M.O." ARE NOMINAL DIMENSIONS. UNLESS OTHERWISE NOTED, ACTUAL MASONRY OPENING DIMENSION = NOMINAL MASONRY OPENING DIMENSION + ONE MORTAR JOINT (I.E., 4'-0" M.O. = 4'-0" + ½" ACTUAL OPENING DIMENSION).
7. **REFER TO PLAN ENLARGEMENTS (SHEET SERIES A111.1 - A112), ENLARGED TOILET ROOM PLANS (SHEET SERIES A130 - 131) AND PLAN DETAIL SHEETS (SHEET SERIES A910 - A917) FOR ADDITIONAL DIMENSIONS.**
8. REFER TO DWGS. **A620 - A621** FOR DOOR AND FRAMES DETAILS. PROVIDE MINIMUM **6-INCH** CLEARANCE FROM FACE OF DOOR JAMB TO FACE OF ADJACENT WALL, UNLESS OTHERWISE NOTED.
9. REFER TO **AL000** FOR COLUMN GRID DIMENSION LAYOUT
10. REFER TO SLAB EDGE PLANS **A091 - A093** FOR SLAB EDGE DIMENSIONS.

LAYOUT PLAN GRAPHIC LEGEND

- NEW WALL CONSTRUCTION
- NEW MASONRY CONSTRUCTION
- NEW CONCRETE CONSTRUCTION
- PATH OF EXPANSION JOINT -PROVIDE EXPANSION JOINT COVERS AS SHOWN ON "AL" SERIES AND A200 SERIES
- BUILT IN CASEWORK

EXPANSION JOINT LEGEND

- EXTERIOR: WALL TO WALL
- INTERIOR: FLOOR TO WALL - **RE: 6C/A606**
- INTERIOR: WALL TO WALL (FLUSH) - **RE: 5B/A606**
- INTERIOR: WALL TO WALL (CORNER) - **RE: 5A/A606**
- INTERIOR: CEILING TO WALL - GYP - **RE: 5A/A606**
- INTERIOR: CEILING TO WALL - ACP - **RE: 2B/A210**
- INTERIOR: CEILING TO CEILING - GYP - **RE: 5B/A606**
- INTERIOR: CEILING TO CEILING - ACP - **RE: 2A/A210**

CONTRACTOR NOTE:
ALL FIBER CEMENT PANEL DIMENSIONS ARE NOMINAL DIMENSIONS. ACTUAL DIMENSIONS MAY VARY PER MFR. STANDARDS. CONTRACTOR(S) MUST COORDINATE ACTUAL DIMENSIONS WITH OVERALL LAYOUT OF REVEALS, MOVEMENT JOINTS AND CAN BE BROKEN OPENINGS SHOWN ON A210 SERIES ELEVATIONS AND "AL" SERIES EXPANSION PLANS. CONTRACTOR/CM TO COORDINATE WITH CPMF SUB-CONTRACTOR. PRIOR TO ANY CONSTRUCTION. ANY DISCREPANCY FOUND BY CONTRACTOR TO ENSURE PROPER NOMINAL DIMENSIONAL LAYOUT.

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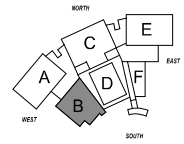

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

SECOND FLOOR LAYOUT PLAN - PART B

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **AL102B**

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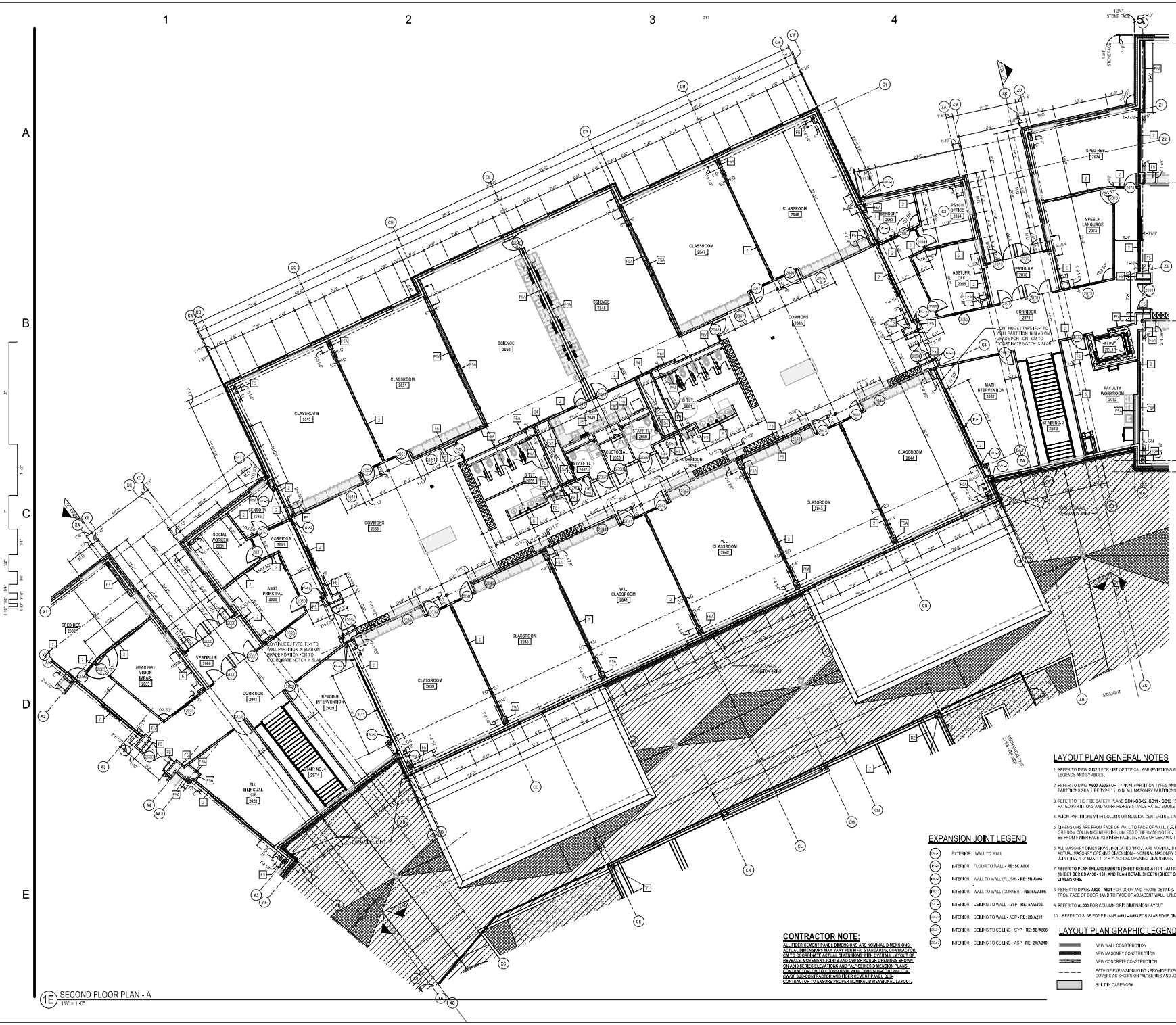

1E SECOND FLOOR PLAN - A
1/8" = 1'-0"

CONTRACTOR NOTE:

ALL FIBER CEMENT PANEL DIMENSIONS ARE NOMINAL DIMENSIONS. ACTUAL DIMENSIONS MAY VARY PER MFR. STANDARDS. CONTRACTOR TO FIELD CONFIRM ALL PANEL DIMENSIONS AND LAYOUT OF REVEAL & MOVEMENT JOINTS AND TAKE INTO CONSIDERATION ALL ADJACENT SERIES DIMENSIONS AND ALL SERIES SUBDIVISIONS. COORDINATION BY HORIZONTALITY BETWEEN CONTRACTORS, KNOW SUB-CONTRACTOR AND FIBER CEMENT PANEL SUB-CONTRACTOR TO ENSURE PROPER NOMINAL DIMENSIONAL LAYOUT.

EXPANSION JOINT LEGEND

W-A	EXTERIOR: WALL TO WALL	
F-W	INTERIOR: FLOOR TO WALL -	RE: 5C/A806
W-W	INTERIOR: WALL TO WALL (FLUSH) -	RE: 5B/A806
W-W	INTERIOR: WALL TO WALL (CORNER) -	RE: 5A/A806
C-W	INTERIOR: CEILING TO WALL - GYP -	RE: 5A/A806
C-W	INTERIOR: CEILING TO WALL - ACP -	RE: 2B/A210
C-C	INTERIOR: CEILING TO CEILING - GYP -	RE: 5B/A806
C-C	INTERIOR: CEILING TO CEILING - ACP -	RE: 2A/A210

LAYOUT PLAN GENERAL NOTES

1. REFER TO DWG. G102.1 FOR LIST OF TYPICAL ABBREVIATIONS AND TYPICAL ARCHITECTURAL GRAPHIC LEGENDS AND SYMBOLS.
2. REFER TO DWG. A600-A606 FOR TYPICAL PARTITION TYPES AND DETAILS INDICATED. ALL PARTITIONS SHALL BE TYPE 1 U.O.N. ALL MASONRY PARTITIONS SHALL BE TYPE M1 U.O.N.
3. REFER TO THE FIRE SAFETY PLANS G031-GC-02, GC11 - GC13 FOR LOCATIONS OF FIRE-RESISTANCE RATED PARTITIONS AND NON-FIRE-RESISTANCE RATED SMOKE PARTITIONS AND FIREPROOFING.
4. ALIGN PARTITIONS WITH COLUMN OR MULLION CENTERLINE, UNLESS OTHERWISE NOTED.
5. DIMENSIONS ARE FROM FACE OF WALL TO FACE OF WALL, (I.E. FACE OF GYPSUM BOARD OR MASONRY) OR FROM COLUMN CENTERLINE, UNLESS OTHERWISE NOTED. DIMENSIONS NOTED AS "CLEAR" SHALL BE FROM FINISH FACE TO FINISH FACE, (IE. FACE OF CERAMIC TILE TO FACE OF CERAMIC TILE).
6. ALL MASONRY DIMENSIONS, INDICATED "M.O.", ARE NOMINAL DIMENSIONS, UNLESS OTHERWISE NOTED. ACTUAL MASONRY OPENING DIMENSION = NOMINAL MASONRY OPENING DIMENSION + ONE MORTAR JOINT (I.E., 4'-0" M.O. = 4'-0" + 3/8" ACTUAL OPENING DIMENSION).
7. **REFER TO PLAN ENLARGEMENTS (SHEET SERIES A111.1 - A112.2), ENLARGED TOILET ROOM PLANS (SHEET SERIES A130 - 131) AND PLAN DETAIL SHEETS (SHEET SERIES A510 - A517) FOR ADDITIONAL DIMENSIONS.**
8. REFER TO DWGS. A620 - A621 FOR DOOR AND FRAME DETAILS. PROVIDE MINIMUM 6-INCH CLEARANCE FROM FACE OF DOOR (AWAY FROM FACE OF ADJACENT WALL, UNLESS OTHERWISE NOTED.
9. REFER TO A1.000 FOR COLUMN GRID DIMENSION LAYOUT
10. REFER TO SLAB EDGE PLANS A091 - A093 FOR SLAB EDGE DIMENSIONS.

LAYOUT PLAN GRAPHIC LEGEND

- NEW WALL CONSTRUCTION
- NEW MASONRY CONSTRUCTION
- NEW CONCRETE CONSTRUCTION
- PATH OF EXPANSION JOINT - PROVIDE EXPANSION JOINT COVERS AS SHOWN ON "AL" SERIES AND A209 SERIES
- BUILT-IN CASEWORK

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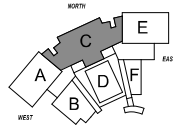

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

SECOND FLOOR LAYOUT PLAN - PART C

Date: 07/08/2024
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Drawing Number: AL102C

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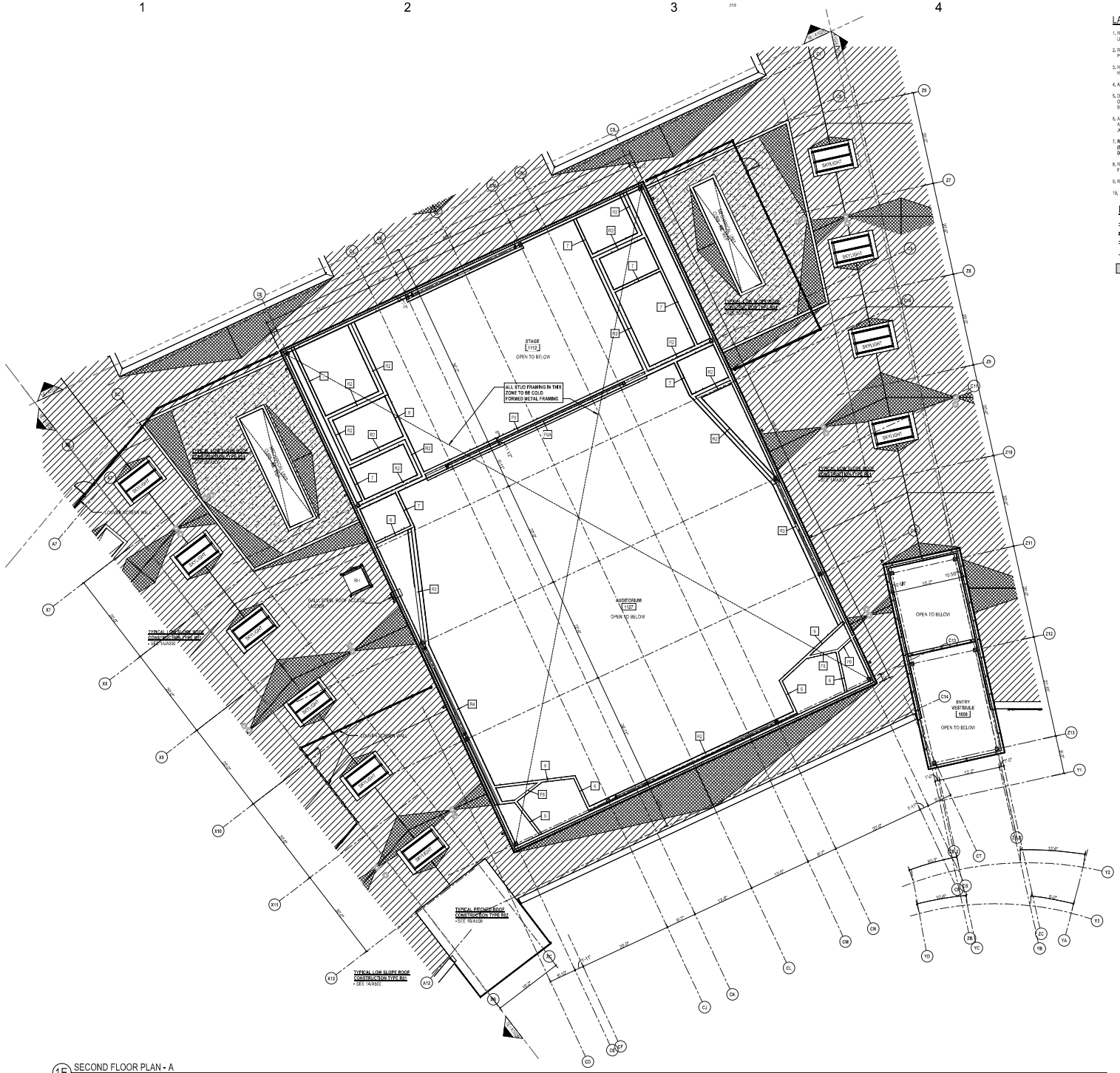

1E SECOND FLOOR PLAN - A
1/8" = 1'-0"

LAYOUT PLAN GENERAL NOTES

1. REFER TO DWG. **G102.1** FOR LIST OF TYPICAL ABBREVIATIONS AND TYPICAL ARCHITECTURAL GRAPHIC LEGENDS AND SYMBOLS.
2. REFER TO DWG. **A600-A606** FOR TYPICAL PARTITION TYPES AND DETAILS INDICATED. 1A ALL PARTITIONS SHALL BE TYPE 1 U.O.N. ALL MASONRY PARTITIONS SHALL BE TYPE M1 U.O.N.
3. REFER TO THE FIRE SAFETY PLANS **GC01-GC-02 - GC11 - GC13** FOR LOCATIONS OF FIRE-RESISTANCE RATED PARTITIONS AND NON-FIRE-RESISTANCE RATED SMOKE PARTITIONS AND FIREPROOFING.
4. ALIGN PARTITIONS WITH COLUMN OR MULLION CENTERLINE, UNLESS OTHERWISE NOTED.
5. DIMENSIONS ARE FROM FACE OF WALL TO FACE OF WALL, (I.E. FACE OF GYPSUM BOARD OR MASONRY) OR FROM COLUMN CENTERLINE, UNLESS OTHERWISE NOTED. DIMENSIONS NOTED AS "CLEAR" SHALL BE FROM FINISH FACE TO FINISH FACE, (i.e. FACE OF CERAMIC TILE TO FACE OF CERAMIC TILE).
6. ALL MASONRY DIMENSIONS INDICATED "M.O." ARE NOMINAL DIMENSIONS, UNLESS OTHERWISE NOTED. ACTUAL MASONRY OPENING DIMENSION = NOMINAL MASONRY OPENING DIMENSION + ONE MORTAR JOINT (I.E., 4'-0" M.O. = 4'-0" + 1" ACTUAL OPENING DIMENSION).
7. **REFER TO PLAN ENLARGEMENTS (SHEET SERIES A111.1 - A112), ENLARGED TOILET ROOM PLANS (SHEET SERIES A130 - 131) AND PLAN DETAIL SHEETS (SHEET SERIES A310 - A317) FOR ADDITIONAL DIMENSIONS.**
8. REFER TO DWGS. **A620 - A621** FOR DOOR AND FRAME DETAILS. PROVIDE MINIMUM **6-INCH** CLEARANCE FROM FACE OF DOOR JAMB TO FACE OF ADJACENT WALL, UNLESS OTHERWISE NOTED.
9. REFER TO **AL000** FOR COLUMN GRID DIMENSION LAYOUT
10. REFER TO SLAB EDGE PLANS **A091 - A093** FOR SLAB EDGE DIMENSIONS.

LAYOUT PLAN GRAPHIC LEGEND

- NEW WALL CONSTRUCTION
- NEW MASONRY CONSTRUCTION
- NEW CONCRETE CONSTRUCTION
- PATH OF EXPANSION JOINT -PROVIDE EXPANSION JOINT COVERS AS SHOWN ON "AL" SERIES AND A200 SERIES
- BUILT IN CASEWORK

EXPANSION JOINT LEGEND

- EXTERIOR: WALL TO WALL
- INTERIOR: FLOOR TO WALL - **RE: 6C/A606**
- INTERIOR: WALL TO WALL (FLUSH) - **RE: 5B/A606**
- INTERIOR: WALL TO WALL (CORNER) - **RE: 5A/A606**
- INTERIOR: CEILING TO WALL - GYP - **RE: 5A/A606**
- INTERIOR: CEILING TO WALL - ACP - **RE: 2B/A210**
- INTERIOR: CEILING TO CEILING - GYP - **RE: 5B/A606**
- INTERIOR: CEILING TO CEILING - ACP - **RE: 2A/A210**

CONTRACTOR NOTE:
ALL FIBER CEMENT PANEL DIMENSIONS ARE NOMINAL DIMENSIONS. ACTUAL DIMENSIONS MAY VARY PER MFR. STANDARDS. CONTRACTOR SHALL COORDINATE ACTUAL DIMENSIONS WITH OVERALL LAYOUT OF REVEALS, MOVEMENT JOINTS AND CAN BE SHIFTED OPENINGS SHOWN ON A210 SERIES ELEVATIONS AND "AL" SERIES EXPANSION PLANS. CONTRACTOR/CM TO COORDINATE WITH CPMF SUB-CONTRACTOR. PRIOR TO CONSTRUCTION OF ANY CEMENT PANEL SUB-CONTRACTOR TO ENSURE PROPER NOMINAL DIMENSIONAL LAYOUT.

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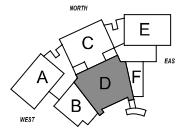

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SECOND FLOOR LAYOUT PLAN - PART D

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **AL102D**

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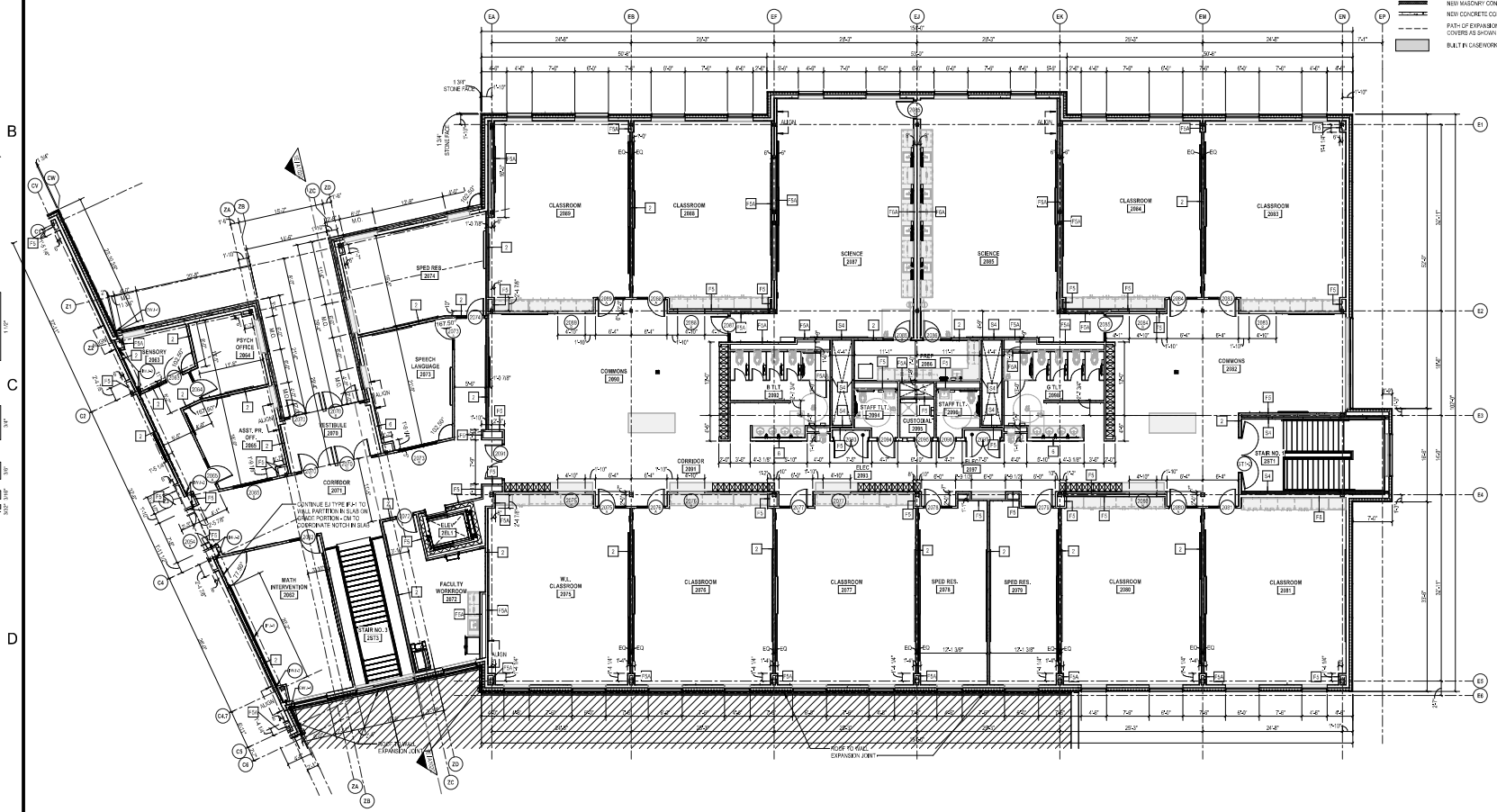

1E SECOND FLOOR PLAN - A
1/8" = 1'-0"

EXPANSION JOINT LEGEND

EW	EXTERIOR: WALL TO WALL
IF	INTERIOR: FLOOR TO WALL - **RE: 5C/A806**
IW	INTERIOR: WALL TO WALL (FLUSH) - **RE: 6B/A806**
IW	INTERIOR: WALL TO WALL (CORNER) - **RE: 5A/A806**
IC	INTERIOR: CEILING TO WALL - GYP - **RE: 5A/A806**
IC	INTERIOR: CEILING TO WALL - ACP - **RE: 2B/A210**
CC	INTERIOR: CEILING TO CEILING - GYP - **RE: 5B/A806**
CC	INTERIOR: CEILING TO CEILING - ACP - **RE: 2A/A210**

LAYOUT PLAN GENERAL NOTES

1. REFER TO DWG. **G102.1** FOR LIST OF TYPICAL ABBREVIATIONS AND TYPICAL ARCHITECTURAL GRAPHIC LEGENDS AND SYMBOLS.
2. REFER TO DWG. **A600-A606** FOR TYPICAL PARTITION TYPES AND DETAILS INDICATED. 1A ALL PARTITIONS SHALL BE TYPE 1 U.O.N. ALL MASONRY PARTITIONS SHALL BE TYPE M1 U.O.N.
3. REFER TO THE FIRE SAFETY PLANS **G031-G/C-02, G/C11 - G/C13** FOR LOCATIONS OF FIRE-RESISTANCE RATED PARTITIONS AND NON-FIRE-RESISTANCE RATED SMOKE PARTITIONS AND FIREPROOFING.
4. ALIGN PARTITIONS WITH COLUMN OR MULLION CENTERLINE, UNLESS OTHERWISE NOTED.
5. DIMENSIONS ARE FROM FACE OF WALL TO FACE OF WALL. (EX. FACE OF GYPSUM BOARD OR MASONRY) OR FROM COLUMN CENTERLINE, UNLESS OTHERWISE NOTED. DIMENSIONS NOTED AS "CLEAR" SHALL BE FROM FINISH FACE TO FINISH FACE. (ex. FACE OF CERAMIC TILE TO FACE OF CERAMIC TILE).
6. ALL MASONRY DIMENSIONS INDICATED "M.O." ARE NOMINAL DIMENSIONS UNLESS OTHERWISE NOTED. ACTUAL MASONRY OPENING DIMENSION = NOMINAL MASONRY OPENING DIMENSION + ONE MORTAR JOINT (I.E., 4'-0" M.O. = 4'-0" + 1" ACTUAL OPENING DIMENSION).
7. **REFER TO PLAN ENLARGEMENTS (SHEET SERIES A111.1 - A112.2), ENLARGED TOILET ROOM PLANS (SHEET SERIES A130 - 131) AND PLAN DETAIL SHEETS (SHEET SERIES A310 - A317) FOR ADDITIONAL DIMENSIONS.**
8. REFER TO DWGS. **A620 - A621** FOR DOOR AND FRAME DETAILS. PROVIDE MINIMUM **6-INCH** CLEARANCE FROM FACE OF DOOR JAMB TO FACE OF ADJACENT WALL, UNLESS OTHERWISE NOTED.
9. REFER TO **A1.000** FOR COLUMN GRID DIMENSION LAYOUT
10. REFER TO SLAB EDGE PLANS **A091 - A093** FOR SLAB EDGE DIMENSIONS.

LAYOUT PLAN GRAPHIC LEGEND

- NEW WALL CONSTRUCTION
- NEW MASONRY CONSTRUCTION
- NEW CONCRETE CONSTRUCTION
- PATH OF EXPANSION JOINT - PROVIDE EXPANSION JOINT COVERS AS SHOWN ON "AL" SERIES AND A200 SERIES
- BUILT IN CASEWORK

CONTRACTOR NOTE:
ALL FIBER CEMENT PANEL DIMENSIONS ARE NOMINAL DIMENSIONS. ACTUAL DIMENSIONS MAY VARY PER MFR. STANDARDS. CONTRACTOR(S) MUST COORDINATE ACTUAL DIMENSIONS WITH OVERALL LAYOUT OF REVEALS, MOVEMENT JOINTS AND CNS SETBACK OPENINGS SHOWN ON A210 SERIES ELEVATIONS AND "AL" SERIES EXPANSION PLANS. CONTRACTOR/CM TO COORDINATE WITH CFMF SUB-CONTRACTOR PRIOR TO FABRICATION AND INSTALLATION OF CFMF PANEL SUB-CONTRACTOR TO ENSURE PROPER NOMINAL DIMENSIONAL LAYOUT.

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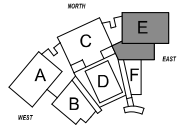

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	07/08/2024	PHASE 2

SECOND FLOOR LAYOUT PLAN - PART E

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **AL102E**

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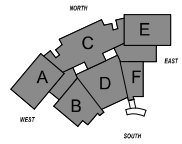

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	07/08/2024	PHASE 2

OVERAL FIRST FLOOR FURNITURE PLAN

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1E FIRST FLOOR FURNITURE PLAN - PART A
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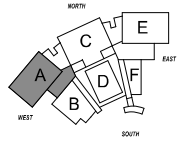

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FIRST FLOOR FURNITURE PLAN - PART A

Date
07/08/2024
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Drawing Number
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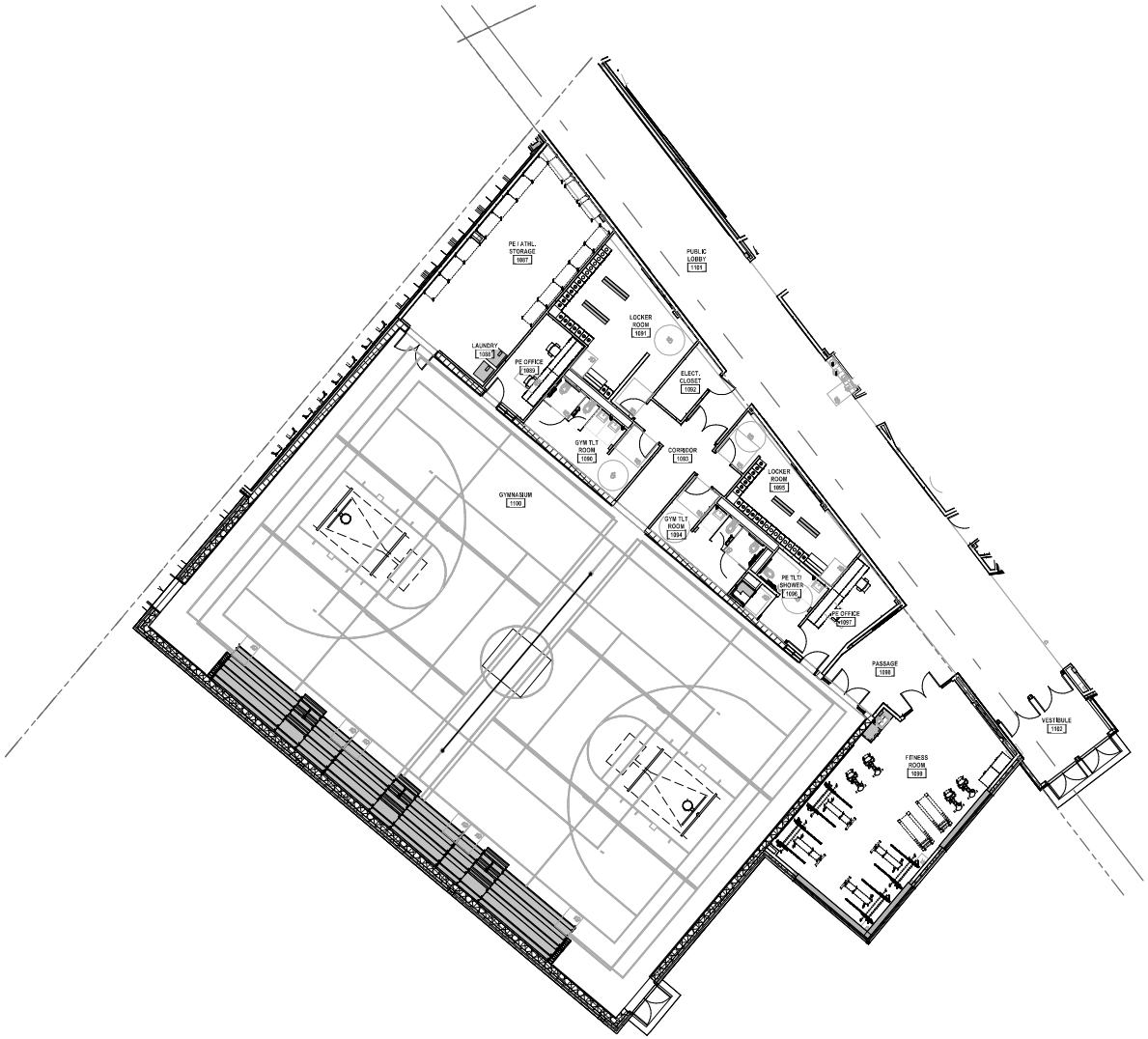

1E FIRST FLOOR FURNITURE PLAN - PART B
1/8" = 1'-0"

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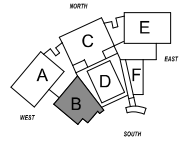

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FIRST FLOOR FURNITURE PLAN - PART B

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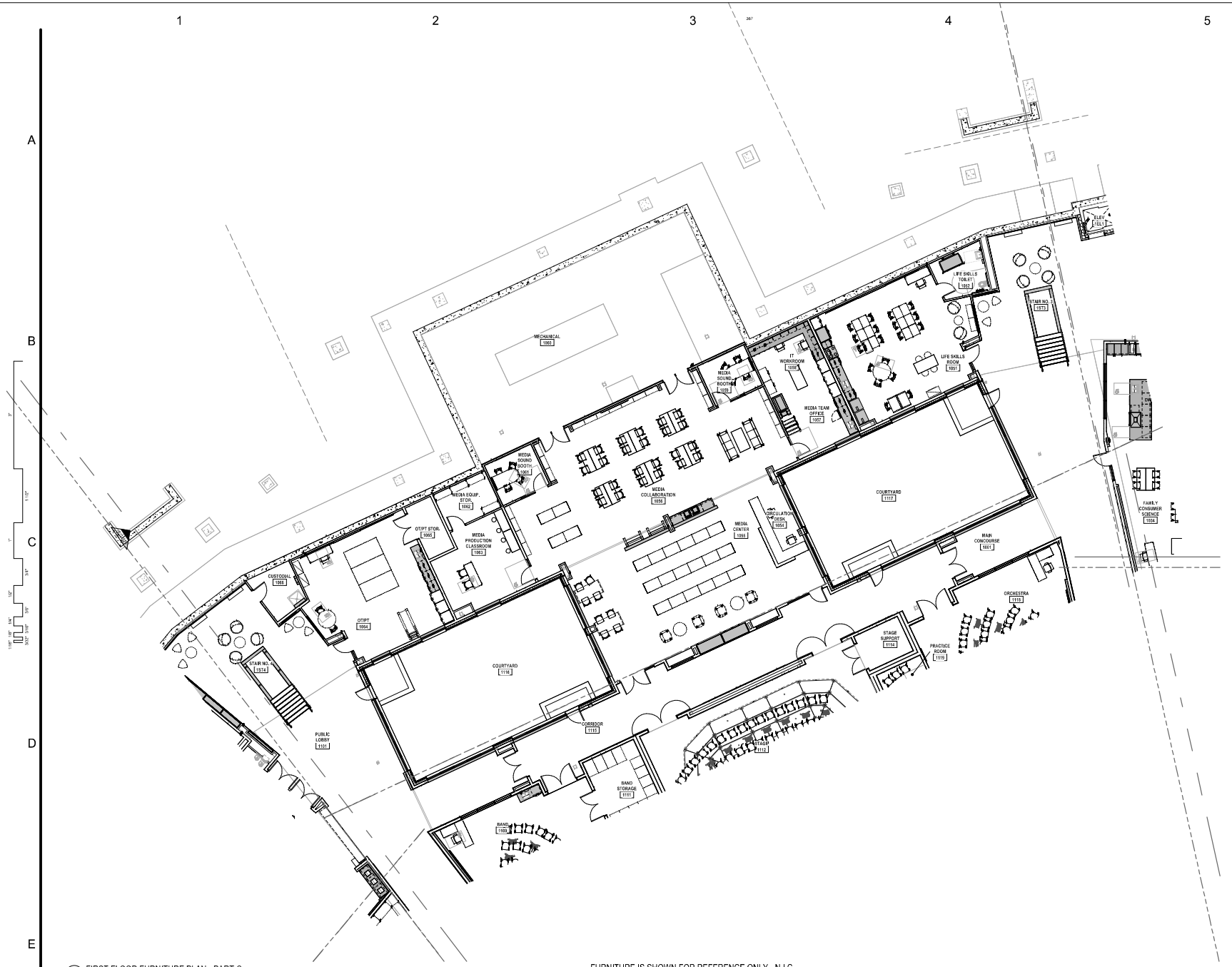

1E FIRST FLOOR FURNITURE PLAN - PART C
1/8" = 1'-0"

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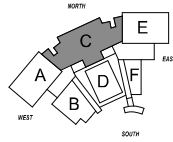

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FIRST FLOOR FURNITURE PLAN - PART C

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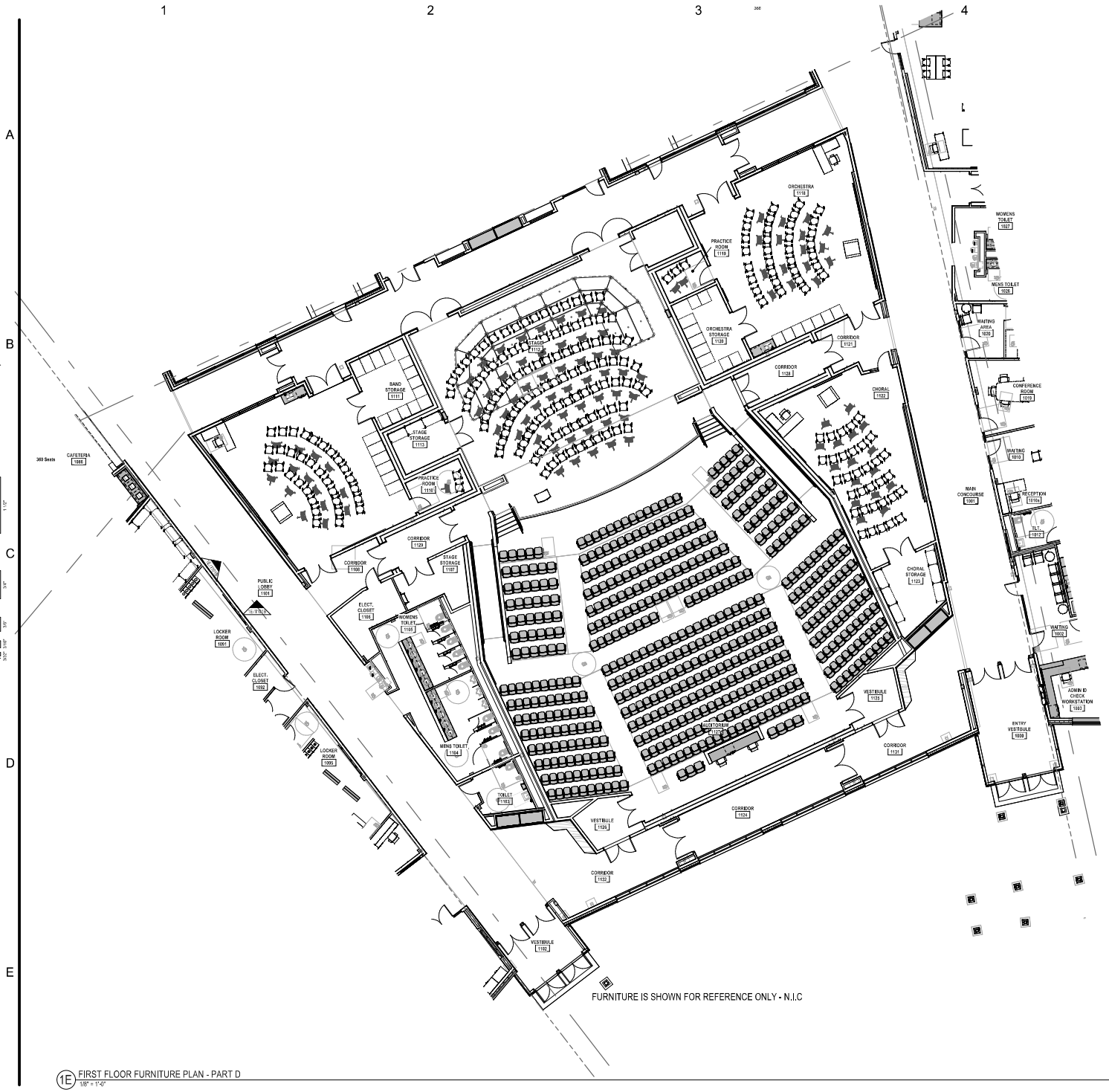

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1E FIRST FLOOR FURNITURE PLAN - PART D
1/8" = 1'-0"

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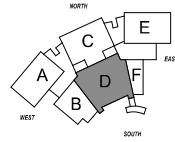

KEYPLAN

Number	Date	Issued For
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	07/08/2024	PHASE 2

FIRST FLOOR FURNITURE - PART D

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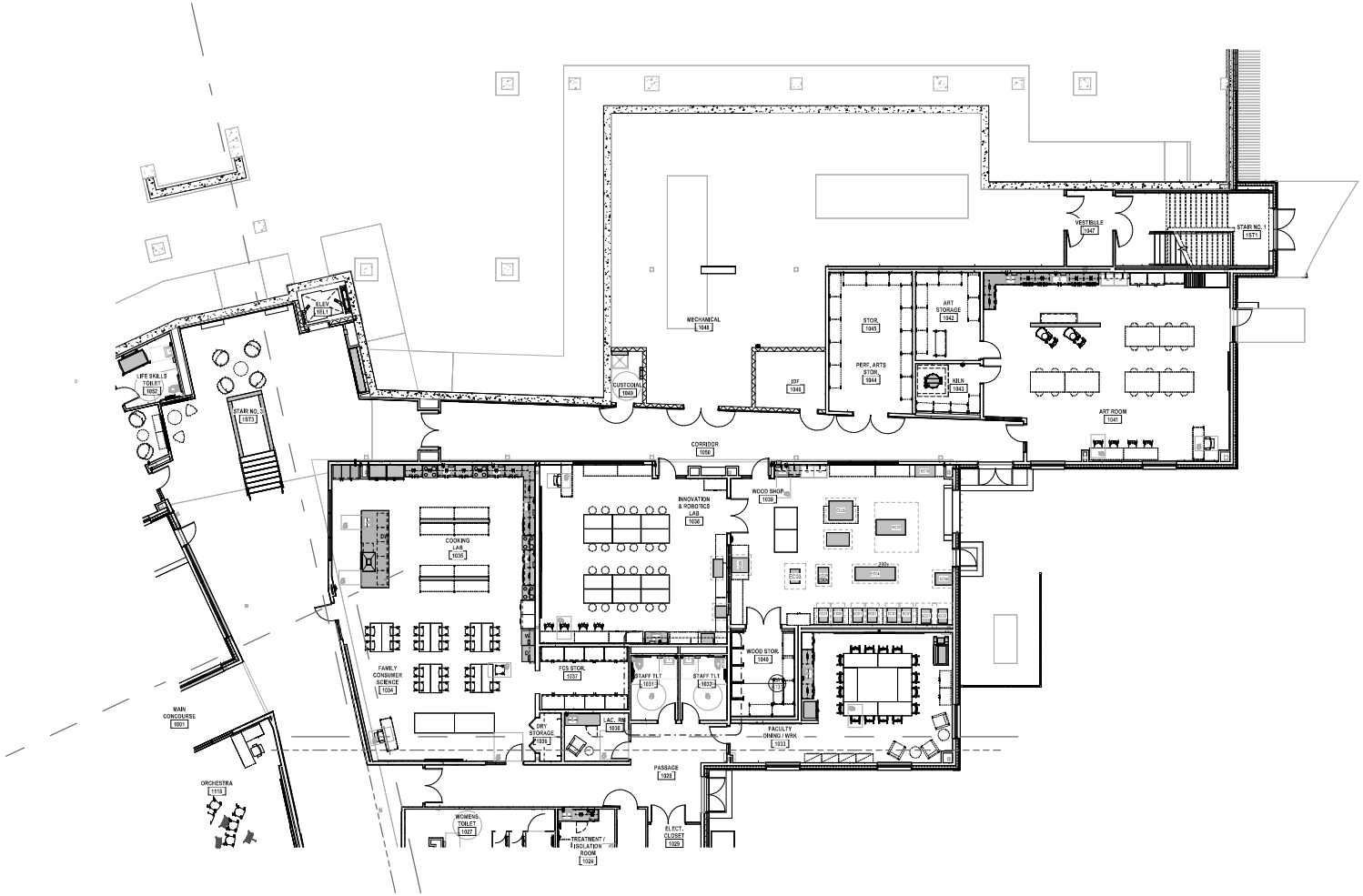

1E FIRST FLOOR FURNITURE PLAN - PART E
1/8" = 1'-0"

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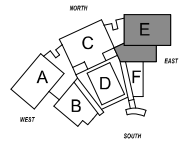

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRST FLOOR FURNITURE PLAN - PART E

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: I101E

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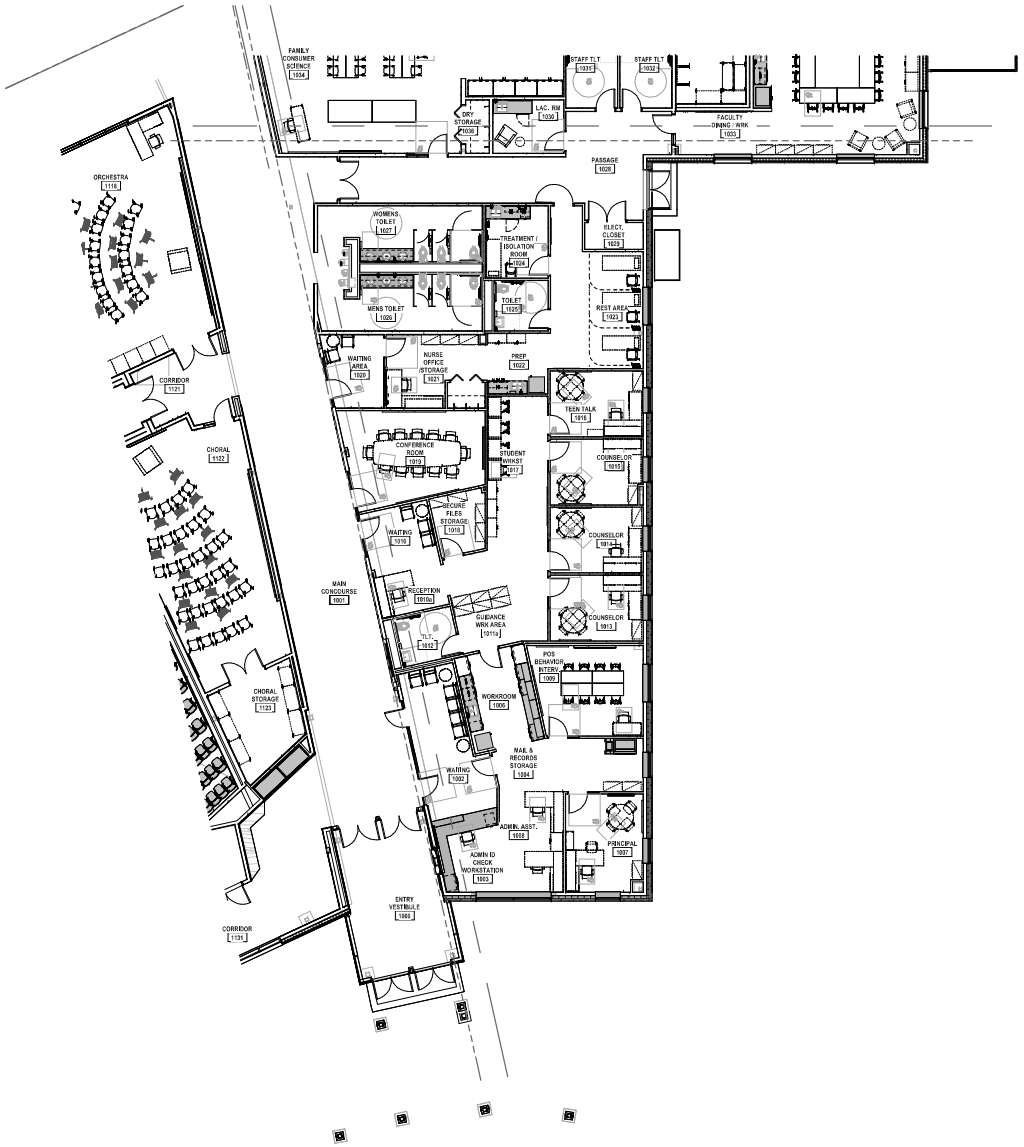

1E FIRST FLOOR FURNITURE PLAN - PART F
1/8" = 1'-0"

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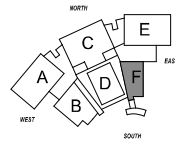

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRST FLOOR FURNITURE PLAN - PART F

Date 07/08/2024
Scale 1/8" = 1'-0"
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1 OVERALL FIRST FLOOR PLAN
1/16" = 1'-0"

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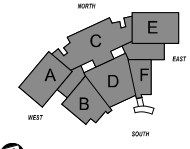

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

OVERALL 2ND FLOOR FURNITURE PLAN

Date: 07/08/2024
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1E SECOND FLOOR FURNITURE PLAN - PART A
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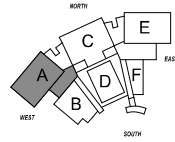

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Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
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2ND FLOOR FURNITURE PLAN - PART A

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1 OVERALL FIRST FLOOR PLAN
1/8" = 1'-0"

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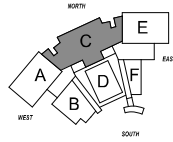

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

2ND FLOOR FURNITURE PLAN - PART C

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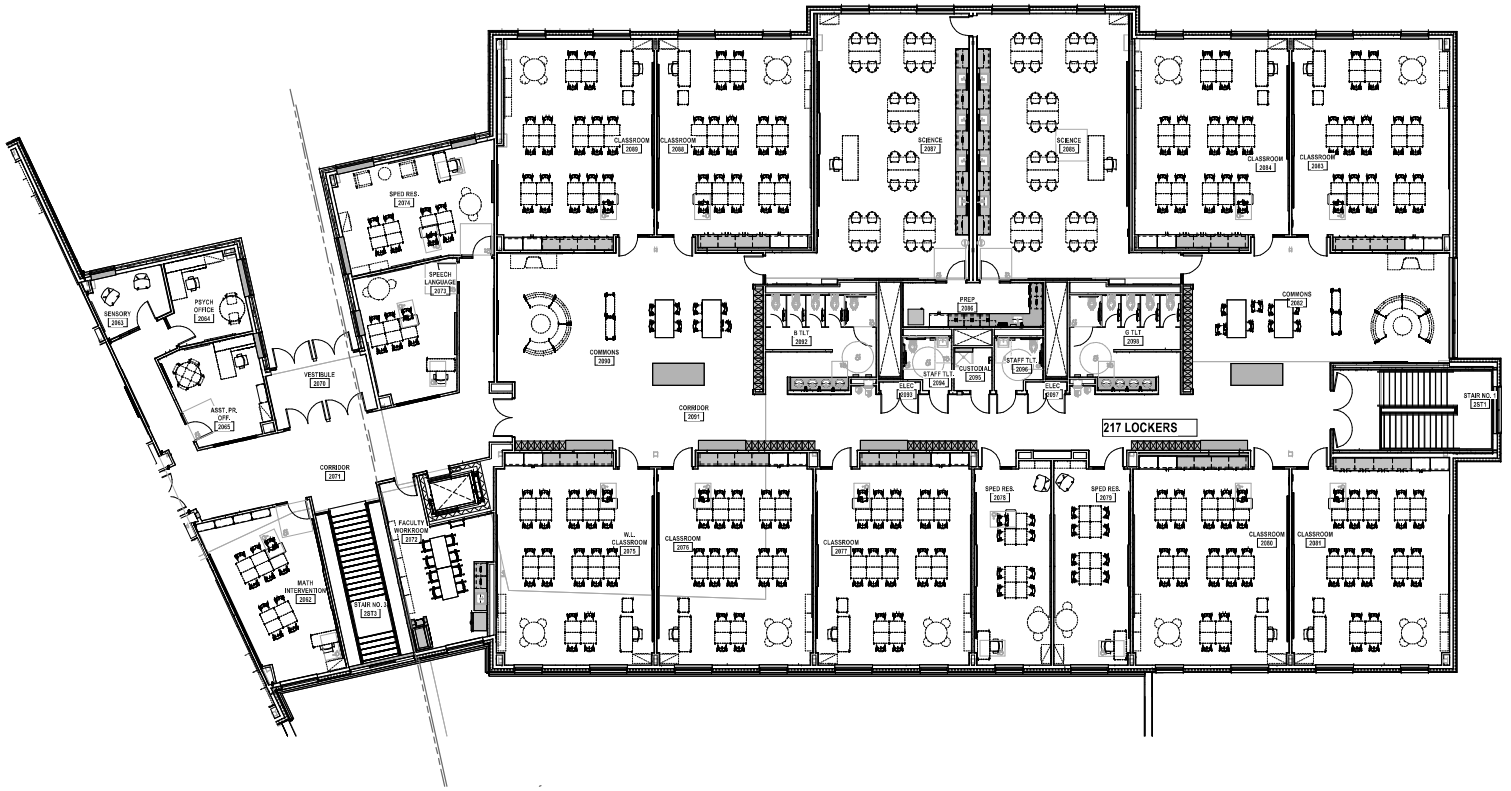

1E SECOND FLOOR FURNITURE PLAN - PART E
1/8" = 1'-0"

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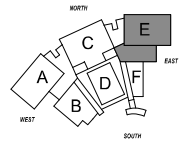

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	07/08/2024	PHASE 2

2ND FLOOR FURNITURE PLAN - PART E

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SCHEDULE OF FOODSERVICE EQUIPMENT & CONNECTIONS

Item	Qty	Description	Plumbing	Electrical	Mechanical / Equipment Remarks
1	1	Mop Sink Cabinet	1/2" H&CW; 2" W (stub-up)		Requires wall blocking by Division 06 in non-masonry walls
2	1	-Spare Number-			
4	1	Clothes Washer	1/2" H&CW; Standpipe W	20 A circuit - 120/1 - C&P	
5	1	Clothes Dryer		30 A circuit - 120/240/1 - C&P (NEMA 14-30P)	4" diameter dryer vent
6	4	Staff Locker, Two-Tier			Requires wall blocking by Division 06 in non-masonry walls
7	1	-Spare Number-			
8	1	-Spare Number-			
9	19	Storage Shelving, Five-Tier			
10	8	Dunnage Rack			
11	1	Walk-in Cooler		1.1 KW - 120/1 (lights, temp. monitor/alarm, etc); Low voltage wiring from temperature monitor to BMS	Requires floor recess by Division 03
12	1	Walk-in Freezer		1.3 KW - 120/1 (lights, temp. monitor/alarm, etc); Low voltage wiring from temperature monitor to BMS; 20 A circuit - 120/1 DS (drain line heater)	Requires floor recess by Division 03
13a	1	Cooler Condensing Unit		4.7 A - 0.5 HP - 208/3	Located on Roof per Detail 1/FS111
13b	1	Cooler Evaporator Coil	1" IW (by KEC) to FD	1.8 A - 120/1; Low voltage wiring from evaporator coil controller to BMS	Remote refrigeration from Item 13a
13c	1	Freezer Condensing Unit		8.7 A - 2.5 HP - 208/3	Located on Roof per Detail 1/FS111
13d	1	Freezer Evaporator Coil	1" IW (by KEC) to FD	9.1 A - 208/1; Low voltage wiring from evaporator coil controller to BMS	Remote refrigeration from Item 13c
14	10	Mobile Shelving Unit, Four-Tier			
15	4	Dunnage Rack, Mobile			
16	1	-Spare Number-			
17	1	Accessible Hand Sink	1/2" H&CW; 1-1/2" W		Requires wall blocking by Division 06 in non-masonry walls
18	3	Hand Sink	1/2" H&CW; 1-1/2" W		Requires wall blocking by Division 06 in non-masonry walls
19	4	Waste Bin (by Owner)			
20	1	Floor Pan & Grate	4" W conn 7" BFF		Requires floor recess by Division 03
21	1	Ice Maker with Bin	3/8" filtered CW (from Item 22); 1/2" & 3/4" IW to Item 20	11.5 A - 120/1	
22	1	Water Filter Assembly	3/8" CW		Requires wall blocking by Division 06 in non-masonry walls
23	4	Pan Rack, Mobile			
24	1	-Spare Number-			
26	1	Convection Oven Double	3/4" G @ 100 MBTU (from Item 32)	(2) 8 A - 120/1 - C&P (from Item 32)	
28	1	Convection Oven Double	3/4" G @ 100 MBTU (from Item 32)	(2) 8 A - 120/1 - C&P (from Item 32)	
27	1	Ten-Pan Steamer	3/4" G @ 100 MBTU (from Item 32); 3/8" filtered CW (from Item 32); 1/2" CW (from Item 32); 2" IW to FS	3.5 A - 120/1 (from Item 32)	
29	1	Four-Burner Range with Oven	3/4" G @ 143 MBTU (from Item 32)	0.1 A - 120/1 - C&P (from Item 32)	
29	1	Griddle with Mobile Stand	3/4" G @ 85 MBTU (from Item 32)	0.5 A - 120/1 - C&P (from Item 32)	
30	1	Water Filter Assembly	3/4" CW (from Item 32)		
31	2	Stainless Steel Wall Flashing			
32	1	Utility Distribution System	2" G @ 526 MBTU (1,450 MBTU capacity); 3/4" HW; 3/4" CW	50 A circuit - 120/208/3	All electrical connectors and flexible water & gas connectors to associated equipment provided with system by KEC. (Field connections by Related Trades)
33	1	Exhaust Ventilator		Power to lights from Item 35	EXH: 1,750 CFM thru a 14" diameter collar @ -0.612" SP; Coordinate support (by Division 05) from structure above for hood hangers by KEC
34	1	Exhaust Ventilator		Power to lights from Item 35	EXH: 1,668 CFM thru a 14" diameter collar @ -0.681" SP; Coordinate support (by Division 05) from structure above for hood hangers by KEC
35	1	Ventilator Thermostatic Auto-Start Control System		15 A circuit - 120/1 (see Note E-35/FS121)	Control for Item 33 & 34; System processor mounted in hood cabinet
35a	1	Ventilator Control Interface Screen		Cable from Item 35	Cable supplied with system
35b	1	Room Temperature Sensor		Wiring from Item 35	
36	1	Fire Suppression System		120/1; 24vac for connection to building alarm system & equipment shutdown	Protection for Items 33 & 34; Mounted in hood cabinet
36a	1	Fire Extinguisher (K Class)			Requires wall blocking by Division 06 in non-masonry walls
37	1	-Spare Number-			
38	1	-Spare Number-			
39	2	Mobile Work Table			
40	2	Waste Barrel (by Owner)			
41	1	Cook's Work Table with Overshelf		(3) 20 A circuit - 120/1 mounted DR by KEC (stub-up)	
42	1	Accessible Prep Station Table with Sink	1/2" H&CW (stub-up); 1-1/2" IW to FS	(3) 20 A circuit - 120/1 (stub-up) mounted DR by KEC	
43	2	Mobile Equipment Stand			
44	1	Automatic Slicer		5 A - 120/1 - C&P (from mounted DR at Item 41)	
45	1	Twenty-Quart Mixer		6 A - 120/1 - C&P (from mounted DR at Item 42)	
46	1	-Spare Number-			
47	1	-Spare Number-			
48	1	Food Processor		12 A - 120/1 - C&P	
49	1	Prep Table with Sinks	1/2" H&CW; (2) 2" IW to FS	20 A circuit - 120/1 wall mounted convenience DR	
50	1	Wall Shelf			Requires wall blocking by Division 06 in non-masonry walls
51	3	Mobile Hot Food Holding Cabinet, Pass-Thru		13.8 A - 120/1 - C&P (from Item 52)	
52	3	Drop Cord with Inline GFCI		20 A circuit - 120/1	Provided by KEC, mounted and wired by Division 26; Includes inline GFCI
53	2	Mobile Work Table			
54	1	Refrigerator, Pass-Thru		6.5 A - 120/1 - C&P	
55	1	Refrigerator, Pass-Thru		6.5 A - 120/1 - C&P	
56	4	Utility Cart			
57	1	Refrigerator, Pass-Thru		6.9 A - 120/1 - C&P	
58	1	Mobile Work Table			
59	1	-Spare Number-			
60	1	-Spare Number-			
61	1	FUTURE: Serving Counter		(3) 20 A circuit - 120/1 (stub-up) (cover for future)	
62	1	Refrigerated Self-Service Grab & Go Case		15.3 A - 120/1 - C&P (from mounted NEMA L5-20R at Item 64)	
63	4	Hot Food Well, Drop-In (mounted in group)	1" IW to FS (per group)	3.6 KW - 208/1 (total per group) (stub-up)	
64	1	Serving Counter		(3) 20 A circuit - 120/1 (stub-up) mounted DR by KEC; 20 A circuit - 120/1 mounted NEMA L5-20P by KEC	
64a	1	Full-Service Glass Food Protector Case			
64b	1	Two-Tier Self-Serve Glass Food Protector Case			
65	2	Fill Faucet	1/2" HW (stub-up)		
66	1	Cold Well, Drop-In	1" IW to FS	3.8 A - 120/1 - C&P (from mounted DR at Item 64)	
67	1	Milk Cooler		3 A - 120/1 - C&P (from mounted DR at Item 64)	
68	1	Cold Well, Drop-In	1" IW to FS	3.8 A - 120/1 - C&P (from mounted DR at Item 69)	
69	1	Serving Counter		(2) 20 A circuit - 120/1 (stub-up) mounted DR by KEC; 20 A circuit - 120/1 mounted NEMA L5-20P by KEC	
69a	1	Full-Service Glass Food Protector Case			
69b	1	Two-Tier Self-Serve Glass Food Protector Case			
70	4	Hot Food Well, Drop-In (mounted in group)	1" IW to FS (per group)	3.6 KW - 208/1 (total per group) (stub-up)	
71	1	Refrigerated Self-Service Grab & Go Case		15.3 A - 120/1 - C&P (from mounted NEMA L5-20R at Item 69)	
72	1	Two-Tier Heated Shelf		15.1 A - 120/1 - C&P (from mounted DR at Item 73)	
73	1	Serving Counter		(3) 20 A circuit - 120/1 (stub-up) mounted DR by KEC	
74	1	Novelty Ice Cream Display Freezer (by Owner's Vendor)		4.8 A - 120/1 - C&P (from mounted DR at Item 73)	
75	1	-Spare Number-			
76	1	-Spare Number-			
77	1	FUTURE Mobile Cashier Stand		120/1 - C&P; Data Cable	
78	1	FUTURE Cashier Terminal (by Owner)		120/1 - C&P; Data Cable	
79	1	Worktop Glass Door Display Refrigerator		2.5 A - 120/1 - C&P; 20 A circuit - 120/1 wall mounted convenience DR	
80	2	Mobile Cashier Stand			
81	3	Cashier Terminal (by Owner)		120/1 - C&P (floor receptacle); Data Cable (floor receptacle	
82	2	Mobile Condiment Counter			
83	1	Mobile Cashier Stand			
84	1	-Spare Number-			
85	1	-Spare Number-			
86	1	Roll-Down Shutter			Requires wall blocking by Division 06 in non-masonry walls
87	1	Soiled Ware Table with Integral Pass-Thru Window Frame	2" W		
88	1	Hose Reel Assembly	1/2" H&CW		Requires wall blocking by Division 06 in non-masonry walls
89	1	Warewasher, Rack Conveyor	1/2" HW (from Item 91); 1/2" CW (drain tempering); 2" IW to FS	68 A - 480/3	EXH: 200 & 400 CFM thru (2) 4" x 16" vents @ 0.25" SP; Includes drain water tempering system
90	2	Stainless Steel Vent Ducts			Ducts extend from warewasher to 3" above finished ceiling
91	1	Water Filter Assembly	1/2" HW		Requires wall blocking by Division 06 in non-masonry walls
92	1	Clean Ware Table			
93	1	Three-Compartment Sink	(3) 3/4" H&CW; (3) 2" IW manifold to FS		
94	1	Wall Shelf			Requires wall blocking by Division 06 in non-masonry walls
95	4	Mobile Shelving Unit, Four-Tier			

SCHEDULE NOTES

1) UTILITIES SHOWN IN THESE SCHEDULES ARE SPECIFIC TO THE PRIME MANUFACTURER LISTED IN THE WRITTEN SPECIFICATION SECTION 114000. IF EQUIPMENT FROM AN ALTERNATE MANUFACTURER IS PROVIDED, IT IS THE RESPONSIBILITY OF THE KITCHEN EQUIPMENT CONTRACTOR TO COORDINATE AND SUBMIT TO THE PROJECT DESIGN TEAM FOR REVIEW.

2) UTILITIES LISTED ON THIS SCHEDULE FOR OWNER FURNISHED OR VENDOR SUPPLIED EQUIPMENT ARE ESTIMATES ASSUMED FOR ENGINEERING PURPOSES ONLY. IT IS THE RESPONSIBILITY OF THE OWNER TO PROVIDE EQUIPMENT CUT SHEETS OF THIS EQUIPMENT TO CRABTREE-MCGRATH ASSOCIATES PRIOR TO CONSTRUCTION.

3) INSTALLING SUB-CONTRACTORS MUST NOTIFY CRABTREE-MCGRATH ASSOCIATES IF A UTILITY REQUIREMENT LISTED ON THIS EQUIPMENT SCHEDULE IS NOT AVAILABLE.

4) REFER TO THE ABBREVIATIONS NOTES PROVIDED ON THIS SHEET FOR CLARIFICATION OF ABBREVIATIONS USED WITHIN THIS EQUIPMENT SCHEDULE.

Abbreviations used:

A	Amperes	EXH	Exhaust	IW	Indirect waste
AFF	Above finished floor	FD	Floor drain	K/C	Kitchen Equip. Contractor
BFF	Below finished floor	FFD	Funnel floor drain	KW	Kilowatt
BTU	Branch to connection	FHW	Fahrenheit hot water	MBTU	BTU per hour/1000
C&P	Cord & plug provided	FS	Floor sink	MUA	Make-up air
CFM	Cubic feet per minute	G	Gas	PC	Plumbing Contractor
CR	Condensate return	GC	General Contractor	QD	Quick disconnect
CW	Cold water	GI	Grease interceptor	SP	Static pressure (W.G)
DFA	Drop from above	HP	Horsepower	SR	Single receptacle
DR	Duplex receptacle	HW	Hot water	SS	Steam supply
EC	Electrical contractor	H&CW	Hot & cold water	W	Waste (direct connection)

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KEYPLAN

Number	Date	Issued For
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	07/08/2024	PHASE 2

FOODSERVICE EQUIPMENT SCHEDULE

Date: 07/08/2024
Scale:
Proj. Number: 22367.00
Drawing Number: FS001

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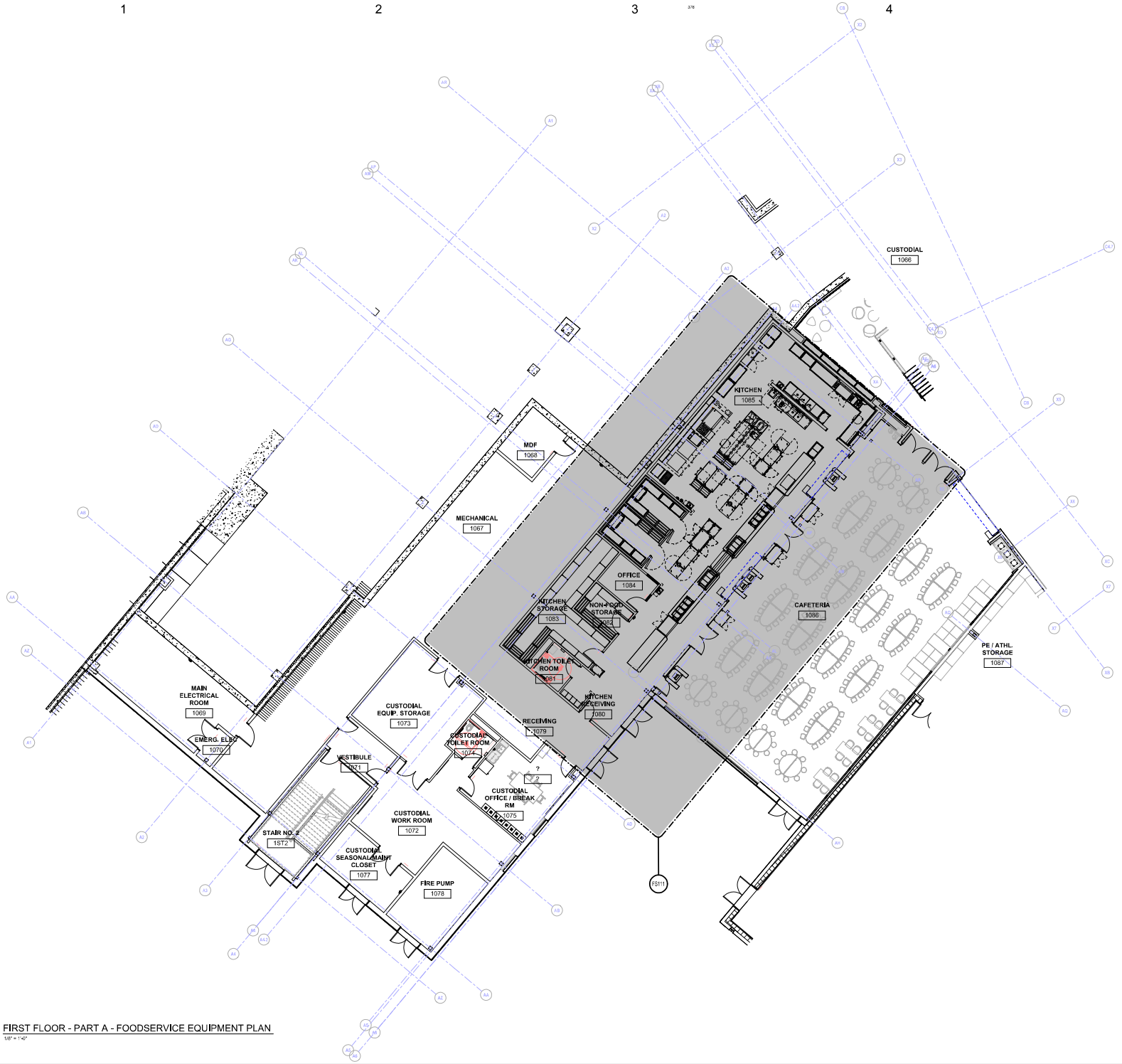

FIRST FLOOR - PART A - FOODSERVICE EQUIPMENT PLAN

1/8" = 1'-0"

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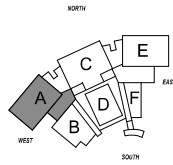

KEYPLAN

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FIRST FLOOR - PART A - FOODSERVICE EQUIPMENT PLAN

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
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Drawing Number
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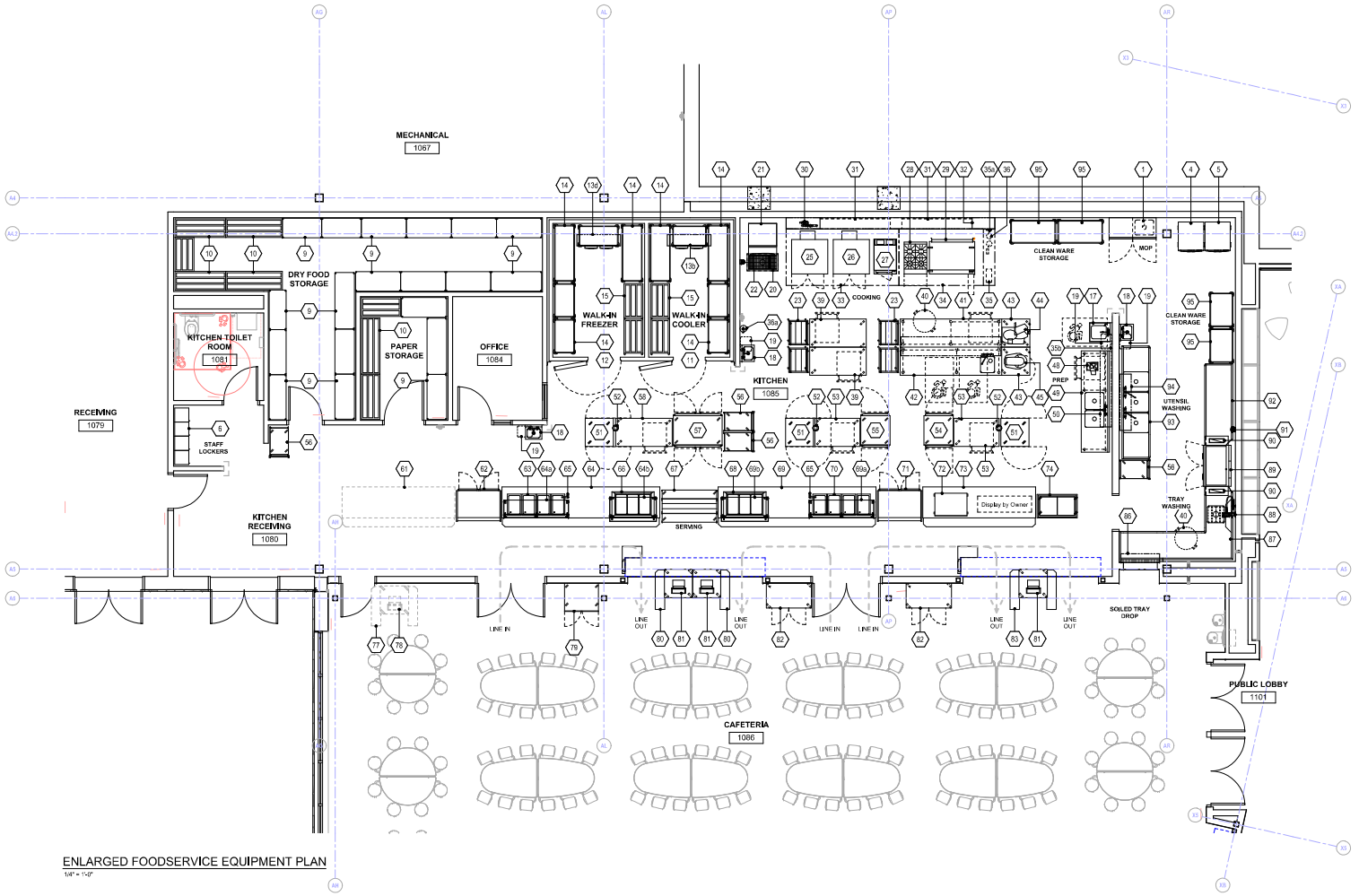
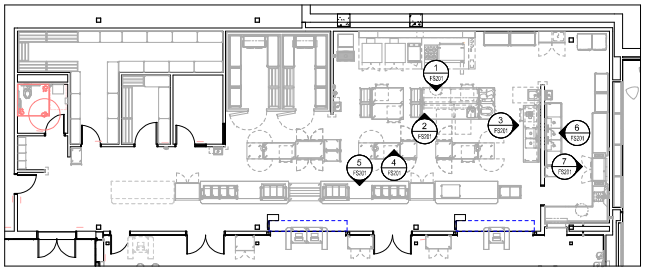
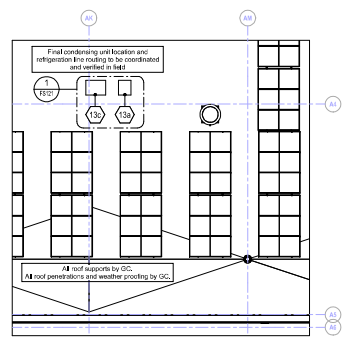


ENLARGED FOODSERVICE EQUIPMENT PLAN
1/4" = 1'-0"



Elevation Key Plan
1/8" = 1'-0"



1 FS111 Detail - Remote Condensing Unit Roof Plan
1/8" = 1'-0"

PLAN NOTES

1) IT IS THE RESPONSIBILITY OF THE KITCHEN EQUIPMENT CONTRACTOR TO FIELD VERIFY THE DELIVERY PATH OF ALL EQUIPMENT WITHIN THEIR SCOPE WITH BUILDING CONDITIONS PRIOR TO ORDERING TO CONFIRM ALL EQUIPMENT FITS WITHIN THE DESIGNATED SPACE AS LOCATED ON PLANS.

2) KITCHEN EQUIPMENT CONTRACTOR SHALL COORDINATE WITH THE GENERAL CONTRACTOR AS NECESSARY FOR OPENINGS IN BUILDING, WALL LEAVE OUTS, DOOR WIDTHS AND HEADER HEIGHTS REQUIRED FOR DELIVERY AND INSTALLATION MEANS.

3) FINISHES TO ALL WALLS, FLOORS AND CEILINGS ARE TO BE PROVIDED BY THE GENERAL CONTRACTOR AS SPECIFIED BY THE PROJECT ARCHITECT TO MEET THE REQUIREMENTS OF THE LOCAL HEALTH DEPARTMENT.

4) REVISIONS TO THESE PLANS DUE TO FIELD CONDITIONS MUST BE SUBMITTED TO THE PROJECT DESIGN TEAM FOR REVIEW AND APPROVAL PRIOR TO PROCEEDING WITH CONSTRUCTION.

5) FLOORING MATERIAL SPECIFIED BY THE ARCHITECT MUST BE PROVIDED WITH A COVED BASE AT ALL WALLS TO INCLUDE THE INTERIOR AND EXTERIOR OF WALK-IN REFRIGERATED ROOMS.

6) ALL FOODSERVICE EQUIPMENT AND CUSTOM FABRICATED ITEMS MUST MEET THE STANDARDS OF THE NATIONAL SANITATION FOUNDATION AND SHALL BE LABELED ACCORDINGLY.

Abbreviations used:

A	Amperes	EXH	Exhaust	IW	Indirect waste
AFF	Above finished floor	FD	Floor drain	KEC	Kitchen Equip. Contractor
BFF	Below finished floor	FFD	Funnel floor drain	KW	Kilowatt
BTC	Branch to connection	FHW	Fahrenheit hot water	MBTU	BTU per hour/1000
C&P	Cord & plug provided	FS	Floor sink	MUA	Make-up air
CFM	Cubic feet per minute	G	Gas	PC	Plumbing Contractor
CR	Condensate return	GC	General Contractor	QD	Quick disconnect
CW	Cold water	GI	Grease interceptor	SP	Static pressure (WG)
DFA	Drop from above	HP	Horsepower	SR	Single receptacle
DR	Duplex receptacle	HW	Hot water	SS	Steam supply
EC	Electrical contractor	H&CW	Hot & cold water	W	Waste (direct connection)

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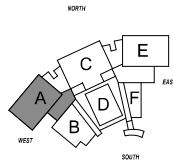

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

FOODSERVICE EQUIPMENT PLAN

Date 07/08/2024
Scale As indicated
Proj. Number 22367.00
Drawing Number FS111

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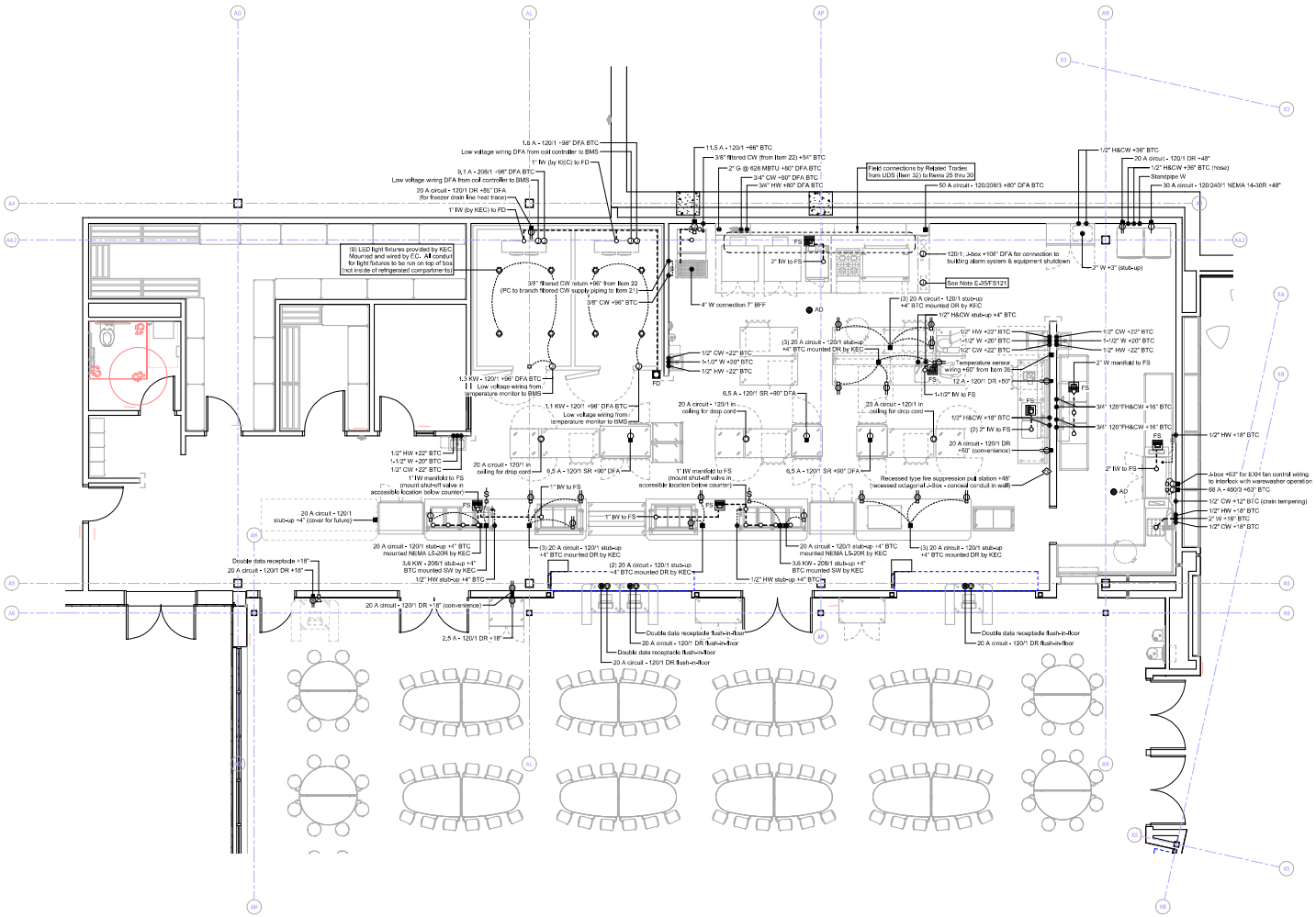
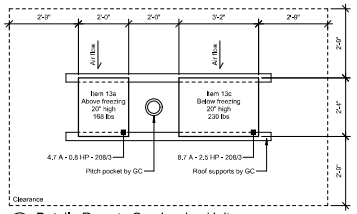


FOODSERVICE EQUIPMENT ROUGH-IN PLAN

1/4" = 1'-0"

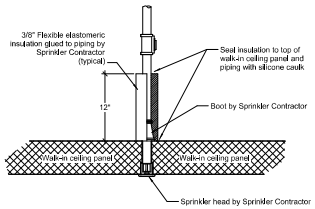
Mount on roof (per Detail 1/FS111)

Maximum refrigeration line run = 100' (including a 55' maximum vertical run)



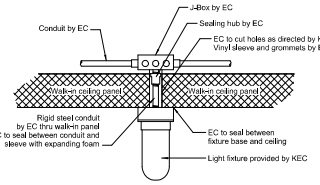
1 FS121 Detail - Remote Condensing Units

NTS



Typical Detail - Refrigerated Room Fire Sprinkler

NTS



Notes:
1. All light fixture to be furnished by KEC
2. Mounting light fixtures, all conduit and interwiring by EC
3. All conduit to be on exterior of walk-in by EC
4. All penetrations thru walk-in panels to be thoroughly sealed by EC

Typical Detail - Refrigerated Room Light Fixture

NTS

Note E-35

15 A circuit - 120/1 DFA for conn to ventilator control & hood lights at items 33 & 34; Microswitch wiring from fire suppression system (Item 35);
EC to provide CAT5 connection to remote touch screen (Item 35a - cable supplied with system);
EC to provide wiring on/off signal wiring to EHX fan;
MC/ATC to provide wiring to lamp sensors at hoods;
MC/ATC to provide wiring to room temp sensor (Item 35b);
MC/ATC to provide wiring from building management system remote control

ELECTRICAL ROUGH-IN LEGEND	
	DUPLEX RECEPTACLE
	DUPLEX RECEPTACLE (TABLE MOUNTED)
	SINPLEX RECEPTACLE
	SIMPLEX RECEPTACLE (TABLE MOUNTED)
	SPECIAL PURPOSE RECEPTACLE
	FLOOR RECEPTACLE
	JUNCTION BOX
	DROP CORD
	ELECTRICAL CONDUIT
	FIELD CONNECTION
	SWITCH
	LIGHT FIXTURE
	FIRE PULL STATION
	FIELD WIRING

PLUMBING ROUGH-IN LEGEND	
	HOT WATER
	COLD WATER
	WASTE - DIRECT CONNECTED
	WASTE - INDIRECT
	GAS
	AREA FD (SUGGESTED LOCATION)
	FLOOR DRAIN
	FUNNEL FLOOR DRAIN
	FLOOR SINK
	FLOOR SINK (3/4 GRATE)
	FLOOR SINK (1/2 GRATE)
	FIELD CONNECTION
	FIELD PIPING (WASTE)
	FIELD PIPING (WATER)

ELECTRICAL NOTES

1) DIMENSIONS ON THIS PLAN ARE PROVIDED FOR DESIGN INTENT. IT IS THE RESPONSIBILITY OF THE KITCHEN EQUIPMENT CONTRACTOR TO VERIFY AND COORDINATE ALL DIMENSIONS AND HEIGHTS LISTED IN THE FIELD WITH THE EQUIPMENT BEING PROVIDED.

2) ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR ALL FINAL CONNECTIONS TO EQUIPMENT THAT REQUIRES A BRANCH TO CONNECTION (BTC), OR WHERE INTER-WIRING IS INDICATED ON THE PLAN IN A DASHED LINE.

3) ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR REVIEWING ALL MANUFACTURER'S SHOP DRAWINGS AND EQUIPMENT CUT SHEETS SUBMITTED TO CONFIRM SCOPE REQUIREMENTS AND EXPECTATIONS.

4) ELECTRICAL PANELS PROVIDED SHALL BE DESIGNED WITH A MINIMUM OF 20% SPARE CAPACITY FOR FUTURE EXPANSION UNLESS OTHERWISE APPROVED BY THE OWNER.

5) ELECTRICAL CONTRACTOR TO INSTALL DROP CORDS AS LOCATED ON PLANS WITH THE CORD ADJUSTED TO HANG 78" ABOVE FINISH FLOOR. PLASTIC WIRE TIES ARE NOT ACCEPTABLE FOR THIS WORK. DROP CORDS MUST BE PROVIDED WITH STRAIN RELIEF.

6) ELECTRICAL CONNECTIONS ON THIS PLAN ARE PROVIDED AS IT RELATES SPECIFICALLY TO FOOD SERVICE EQUIPMENT. CONVENIENCE OUTLETS ARE PROVIDED IN SPECIFIC LOCATIONS AS REQUESTED BY OWNER. IT IS THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR TO PROVIDE AND INSTALL ANY OTHER ELECTRICAL OUTLETS AS REQUIRED TO MEET CODE REQUIREMENTS BY LOCAL AUTHORITY HAVING JURISDICTION.

7) WALK-IN REFRIGERATED ROOM LIGHT FIXTURES ARE TO BE PROVIDED BY THE KITCHEN EQUIPMENT CONTRACTOR. LIGHTS ARE TO BE MOUNTED AND INSTALLED BY THE ELECTRICAL CONTRACTOR.

8) IT IS THE RESPONSIBILITY OF THE KITCHEN EQUIPMENT CONTRACTOR TO CONFIRM WITH THE WALK-IN REFRIGERATED ROOM MANUFACTURER THAT THE QUANTITY AND LOCATIONS OF THE LIGHTING LAYOUT WILL MEET 20 FOOT CANDLES OF LIGHT AT A DISTANCE OF 30" ABOVE FINISH FLOOR AS REQUIRED IN WALK-IN REFRIGERATED ROOMS BY THE NATIONAL FOOD CODE.

9) DRAIN PIPING WITHIN A WALK-IN FREEZER SHALL BE PROVIDED WITH A DRAIN LINE HEATER AND INSULATION. FINAL CONNECTION OF THE DRAIN LINE HEATER MUST BE PROVIDED BY THE ELECTRICAL CONTRACTOR.

10) ELECTRICAL CONTRACTOR TO INSTALL UTILITIES CONCEALED IN WALLS AND STUB-OUT AT TERMINATION POINTS.

11) ELECTRICAL CONTRACTOR TO PROVIDE AND INSTALL WIRING BETWEEN EXHAUST VENTILATORS, AND ASSOCIATED FAN SYSTEMS, CONTROL PANELS, MAGNETIC STARTERS, FIRE SUPPRESSION SYSTEMS, PULL STATIONS AND SWITCHES AS REQUIRED.

12) CONTROL AND POWER WIRING BETWEEN CONTROL PANELS AND GARBAGE DISPOSALS, WASTE PULPERS, TROUGH COLLECTORS ETC. ARE TO BE PROVIDED AND INSTALLED BY THE ELECTRICAL CONTRACTOR.

13) ELECTRICAL CONTRACTOR MUST PROVIDE ELECTRICAL POWER TO ANY COOKING EQUIPMENT THROUGH A SHUNT TRIP SYSTEM.

14) FOOD PREPARATION AREAS MUST BE PROVIDED WITH 50 FOOT CANDLES OF LIGHTING AS REQUIRED BY THE NATIONAL FOOD CODE.

15) ELECTRICAL CONTRACTOR MUST VERIFY REMOTE FIRE SUPPRESSION PULL STATION LOCATIONS WITH THE LOCAL FIRE INSPECTOR PRIOR TO INSTALLATION.

16) FOODSERVICE EQUIPMENT CAN NOT BLOCK ACCESS TO GFI RECEPTACLES. CRABTREE-MCGRATH ASSOCIATES STRONGLY RECOMMENDS THAT THE ELECTRICAL CONTRACTOR PROVIDE GFI PROTECTION AT THE CIRCUIT BREAKER PANEL. THIS WILL ALSO LIMIT NUISANCE TRIPPING THAT IS COMMON WITH COMMERCIAL FOODSERVICE EQUIPMENT.

PLUMBING NOTES

1) DIMENSIONS ON THIS PLAN ARE PROVIDED FOR DESIGN INTENT. IT IS THE RESPONSIBILITY OF THE KITCHEN EQUIPMENT CONTRACTOR TO VERIFY AND COORDINATE ALL DIMENSIONS AND HEIGHTS LISTED IN THE FIELD WITH THE EQUIPMENT BEING PROVIDED.

2) PLUMBING CONTRACTOR IS RESPONSIBLE FOR ALL FINAL CONNECTIONS TO EQUIPMENT THAT REQUIRE A BRANCH TO CONNECTION (BTC), OR WHERE PLUMBING INTERCONNECTION IS INDICATED ON THE PLAN WITH A DASHED LINE.

3) PLUMBING CONTRACTOR IS RESPONSIBLE FOR REVIEWING ALL MANUFACTURER'S SHOP DRAWINGS AND EQUIPMENT CUT SHEETS SUBMITTED TO CONFIRM SCOPE REQUIREMENTS AND INSTALLATION EXPECTATIONS.

4) ALL FLOOR SINKS AND DRAINS MUST BE PROVIDED AND INSTALLED BY THE PLUMBING CONTRACTOR. AREA DRAINS, IF LOCATED LOCATED ON THESE PLANS, ARE TO BE CONSIDERED RECOMMENDED AREAS. IT IS THE RESPONSIBILITY OF THE PLUMBING CONTRACTOR TO CONFIRM QUANTITIES AND LOCATIONS OF AREA DRAINS WITH THE LOCAL AUTHORITY HAVING JURISDICTION.

5) FLOOR SINKS LOCATED UNDER COUNTERS WITH LIMITED ACCESSIBILITY MUST BE INSTALLED 50% EXPOSED AND EASILY ACCESSIBLE FOR CLEANING. IF A FLOOR SINK CAN NOT BE INSTALLED 50% EXPOSED, THE UNDER SHELF OF THE CABINET MUST BE FULLY REMOVABLE OR BE PROVIDED WITH AN ACCESS PANEL LARGE ENOUGH TO REMOVE THE DRAIN GRATE FOR CLEANING.

6) CONDENSATE DRAIN LINES FROM WALK-IN REFRIGERATED ROOM EVAPORATOR COILS SHALL BE INSTALLED BY THE KITCHEN EQUIPMENT CONTRACTOR. DRAIN LINES MUST BE COPPER AND INSTALLED 1" OFF THE WALLS WITH A MINIMUM PITCH OF 1/2" PER FOOT. KITCHEN EQUIPMENT CONTRACTOR TO PROVIDE AND INSTALL A COPPER UNION WITHIN 24" OF THE CONNECTION TO THE EVAPORATOR COIL. FOR INSTALLATION OF DRAIN LINES IN A FREEZER, THE DRAIN SHALL EXIT THE FREEZER AT THE EARLIEST DISTANCE POSSIBLE. DRAIN PENETRATIONS THROUGH THE WALK-IN REFRIGERATED ROOM WALL PANEL MUST BE APPROPRIATELY SEALED TO INCLUDE A VAPOR SEAL AND PROVIDED WITH CHROME ESCUTCHEON PLATES AT ALL EXPOSED POINTS WHERE PIPING PENETRATES THE WALL. DRAINS MUST BE "P" TRAPPED OUTSIDE OF THE REFRIGERATED ROOM WALL TO AVOID ENTRANCE OF WARM AIR AND TERMINATED 1" ABOVE THE FLOOR DRAIN OR AS REQUIRED BY LOCAL CODE.

7) PLUMBING CONTRACTOR TO INSTALL UTILITIES CONCEALED IN WALLS AND STUB-OUT AT TERMINATION POINTS. PLEASE NOTE THAT NOT ALL JURISDICTIONS ALLOW GAS LINES TO BE CONCEALED IN WALL. IT IS THE RESPONSIBILITY OF THE PLUMBING CONTRACTOR TO VERIFY AND CONFIRM PRIOR TO INSTALLATION.

8) PLUMBING CONTRACTOR IS RESPONSIBLE FOR INSTALLATION OF ALL DRAINS, FAUCETS, PIPING TRAPS, VALVES, SHUT-OFFS, GAUGES, WATER PRESSURE REDUCERS, REGULATORS AND BACKFLOW PREVENTION, ETC. AS REQUIRED BY LOCAL AUTHORITY HAVING JURISDICTION.

9) IT IS THE RESPONSIBILITY OF THE PLUMBING CONTRACTOR TO FLUSH ALL WATER LINES PRIOR TO FINAL CONNECTION TO FOODSERVICE EQUIPMENT.

10) A MAIN SHUT-OFF GAS VALVE MUST BE INSTALLED BY THE PLUMBING CONTRACTOR LOCATED TO MEET THE REQUIREMENTS OF THE PLUMBING CODE.

11) GAS SUPPLY TO ALL COOKING EQUIPMENT MUST BE PROVIDED WITH AN ELECTRIC OR MECHANICAL SHUT-OFF VALVE. KITCHEN EQUIPMENT CONTRACTOR SHALL FURNISH THE VALVE AND INSTALLATION PERFORMED BY THE PLUMBING CONTRACTOR. VALVE SHALL BE TIED INTO THE FIRE PROTECTION SYSTEM FOR AUTOMATIC SHUT-OFF.

12) THE PLUMBING CONTRACTOR IS RESPONSIBLE FOR LOCATION OF GREASE TRAPS AS REQUIRED BY LOCAL AUTHORITY HAVING JURISDICTION. GREASE TRAPS MUST BE LOCATED IN A MANNER THAT DOES NOT INTERFERE WITH FOODSERVICE EQUIPMENT LAYOUT.

Abbreviations used:

A	Amperes	EXH	Exhaust	IW	Indirect waste
AFF	Above finished floor	FD	Floor drain	KEC	Kitchen Equip. Contractor
BFF	Below finished floor	FFD	Funnel floor drain	KW	Kilowatt
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DR	Duplex receptacle	HW	Hot water	SS	Steam supply
EC	Electrical contractor	H&CW	Hot & cold water	W	Waste (direct connection)

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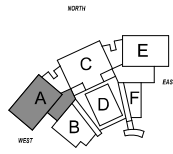

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

FOODSERVICE EQUIPMENT ROUGH-IN PLAN

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: FS121

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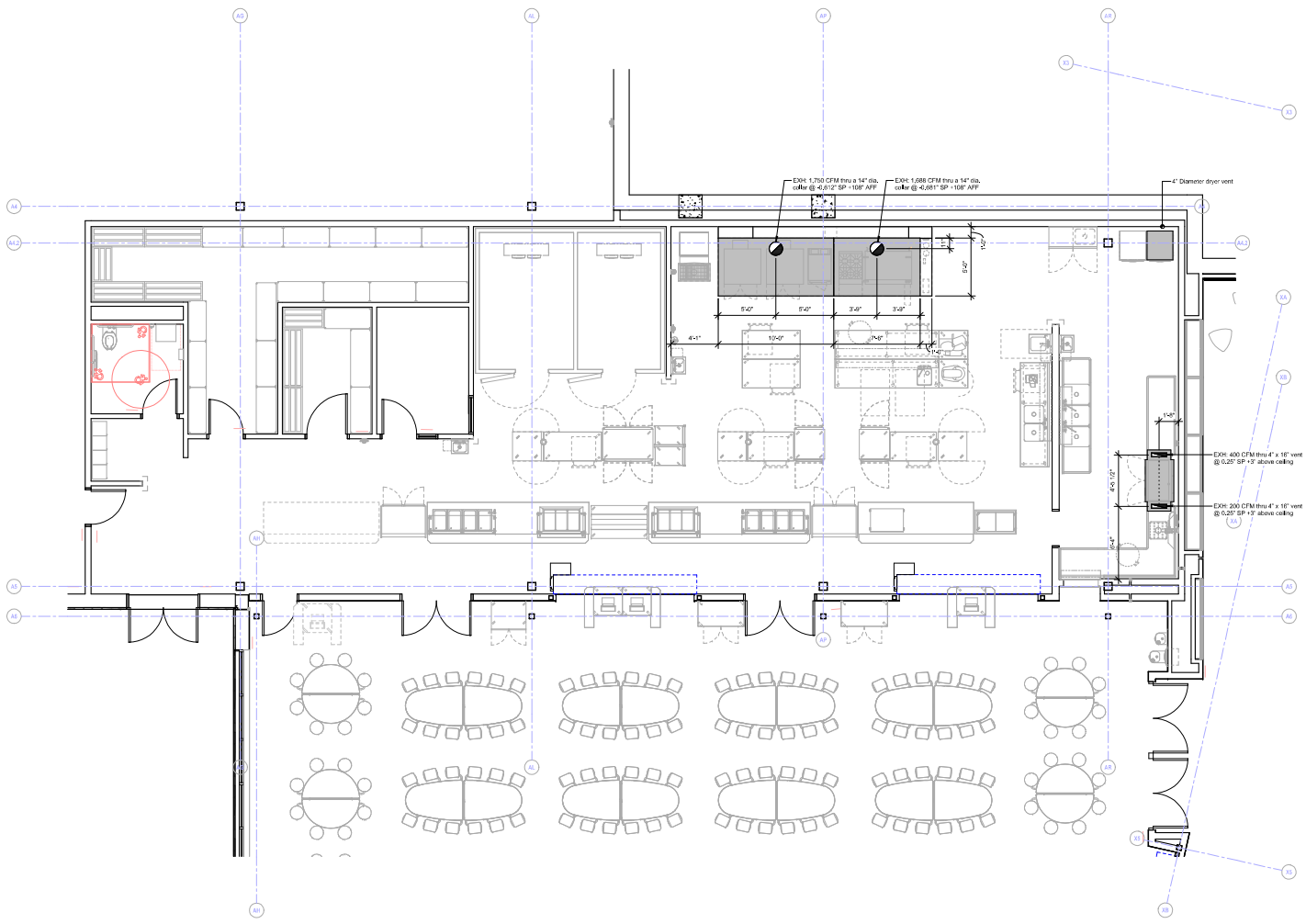

FOODSERVICE EQUIPMENT VENTILATION ROUGH-IN PLAN

1/4" = 1'-0"

Abbreviations used:					
A	Amperes	EXH	Exhaust	IW	Indirect waste
AFF	Above finished floor	FD	Floor drain	KEC	Kitchen Equip. Contractor
BFF	Below finished floor	FFD	Funnel floor drain	KW	Kilowatt
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DR	Duplex receptacle	HW	Hot water	SS	Steam supply
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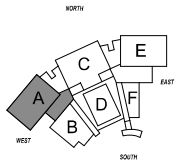

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

FOODSERVICE EQUIPMENT VENTILATION ROUGH-IN PLAN

Date: 07/08/2024
Scale: 1/4" = 1'-0"
Proj. Number: 22367.00
Drawing Number: FS131

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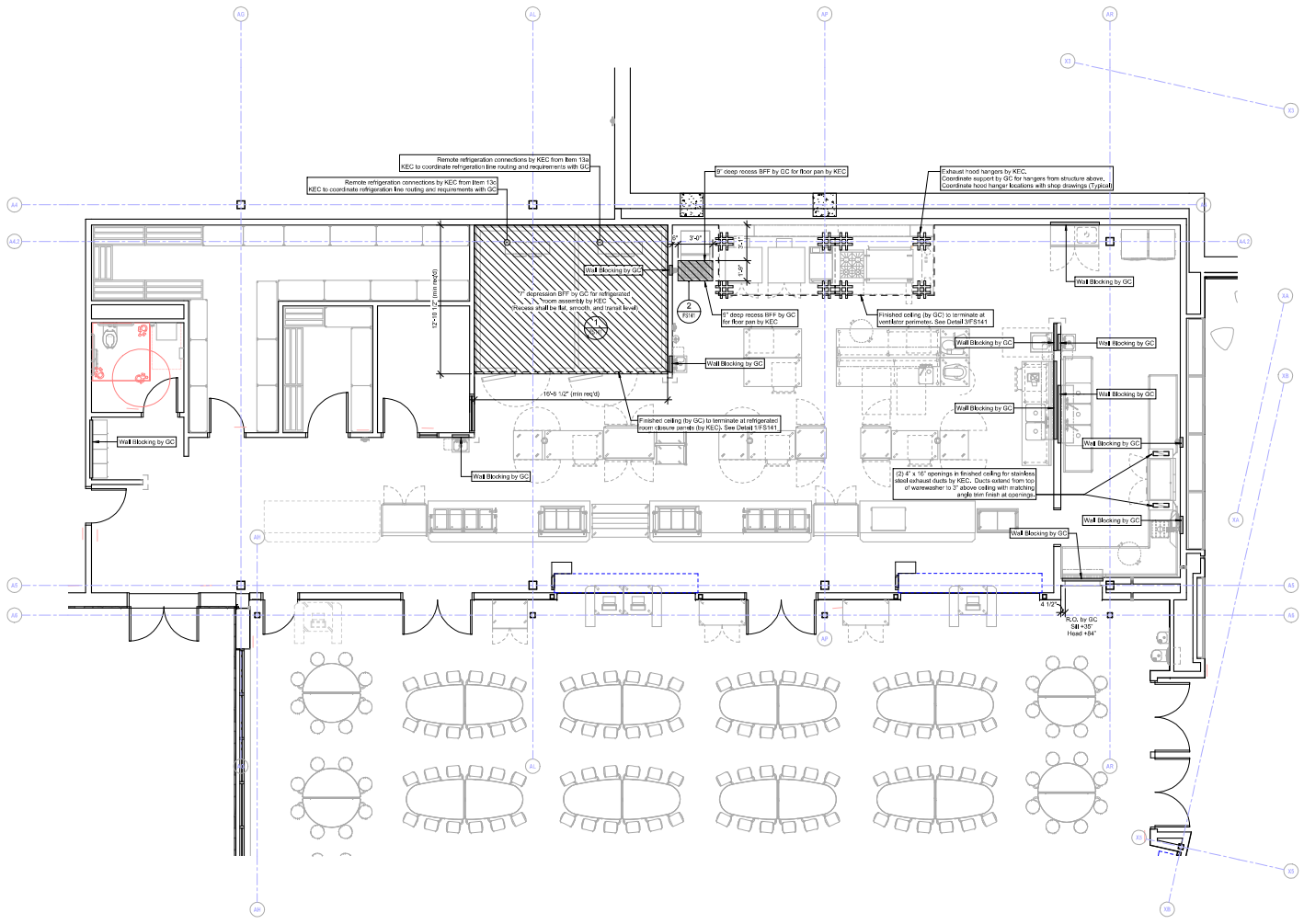
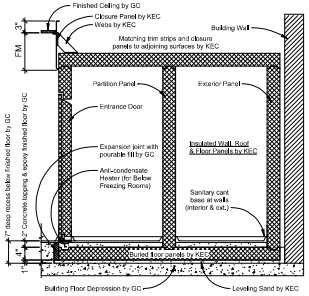
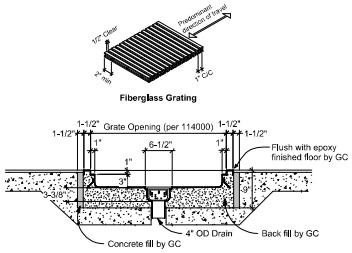


FOODSERVICE EQUIPMENT SPECIAL CONDITIONS PLAN

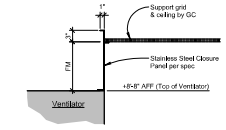
1/4" = 1'-0"



1 FS141 Detail - Refrigerated Rooms NTS



2 FS141 Section - Floor Pan & Grate NTS



3 FS141 Detail - Ventilator Ceiling Closure NTS

SPECIAL CONDITIONS NOTES

1) DIMENSIONS ON THIS PLAN ARE PROVIDED FOR DESIGN INTENT. IT IS THE RESPONSIBILITY OF THE KITCHEN EQUIPMENT CONTRACTOR TO VERIFY AND COORDINATE ALL DIMENSIONS AND HEIGHTS LISTED IN THE FIELD WITH THE EQUIPMENT BEING PROVIDED.

2) WALK-IN REFRIGERATED ROOM SLAB DEPRESSIONS MUST BE SMOOTH AND LEVEL, SIZED AS SHOWN ON PLAN.

3) THE GENERAL CONTRACTOR IS RESPONSIBLE FOR PROVIDING WALL BLOCKING AS INDICATED FOR SUPPORTING WALL MOUNTED EQUIPMENT. KITCHEN EQUIPMENT CONTRACTOR SHALL VERIFY AND COORDINATE ALL LOCATIONS AND HEIGHTS PROVIDED IN THE FIELD.

4) WALL FLASHING, WHERE SPECIFIED, MUST BE A MINIMUM OF 30 GAUGE STAINLESS STEEL, PROVIDED AND INSTALLED BY THE KITCHEN EQUIPMENT CONTRACTOR. STAINLESS STEEL TO BE CUT IN THE LARGEST SHEETS POSSIBLE TO MINIMIZE JOINTS. ALL SEAMS TO BE COVERED WITH BATTEN STRIPS AND CAP STRIPS PROVIDED AT FLASHING ENDS. PROVIDE CAREFULLY PUNCHED HOLES AT SERVICE LOCATIONS. ALL WALL FLASHING DIMENSIONS MUST BE FIELD VERIFIED BY THE KITCHEN EQUIPMENT CONTRACTOR PRIOR TO FABRICATION.

5) CORNER GUARDS, WHERE SPECIFIED, MUST BE A MINIMUM OF 14 GAUGE STAINLESS STEEL PROVIDED AND INSTALLED BY THE KITCHEN EQUIPMENT CONTRACTOR. BREAK LONG EDGES SO THAT THE GUARDS "HUG" THE WALL AND SECURE TO THE WALL WITH A SUITABLE ADHESIVE. ALL CORNER GUARD DIMENSIONS AND ANGLES MUST BE FIELD VERIFIED BY THE KITCHEN EQUIPMENT CONTRACTOR PRIOR TO FABRICATION.

6) KITCHEN EQUIPMENT CONTRACTOR IS RESPONSIBLE FOR THE INSTALLATION OF THE REMOTE REFRIGERATION LINE RUNS AND COORDINATION OF THE COMPLETE REMOTE REFRIGERATION SYSTEM WITH THE GENERAL CONTRACTOR.

7) EXHAUST HOODS MUST BE HUNG AND MOUNTED WITH THE BOTTOM OF THE HOOD AT 6'-6" ABOVE FINISH FLOOR. HVAC CONTRACTOR IS RESPONSIBLE FOR FINAL CONNECTIONS FROM THE EXHAUST HOOD COLLAR TO THE DUCTWORK. FINAL CONNECTIONS SHALL BE FULLY WELDED AND LIQUID TIGHT.

8) HVAC CONTRACTOR TO PROVIDE AND INSTALL ALL FANS, DUCTWORK AND CURBS AS REQUIRED FOR A COMPLETE AND FUNCTIONING VENTILATIO SYSTEM. START-UP AND AIR BALANCING OF THESE SYSTEMS MUST BE COMPLETED BY THE HVAC CONTRACTOR.

Abbreviations used:

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DR	Duplex receptacle	HW	Hot water	SS	Steam supply
EC	Electrical contractor	H&CW	Hot & cold water	W	Waste (direct connection)

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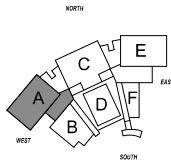

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

FOODSERVICE EQUIPMENT SPECIAL CONDITIONS PLAN

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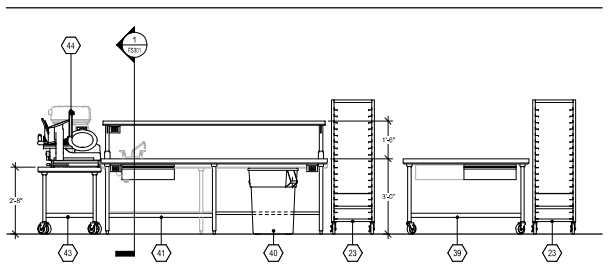
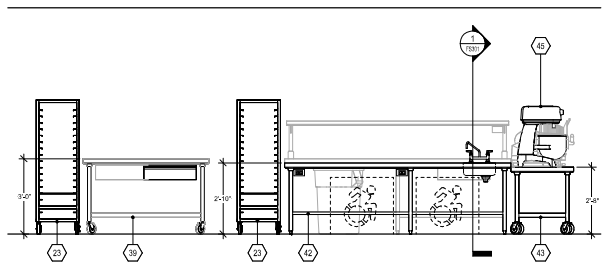
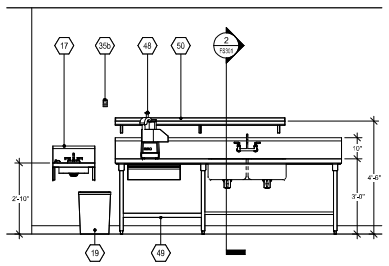


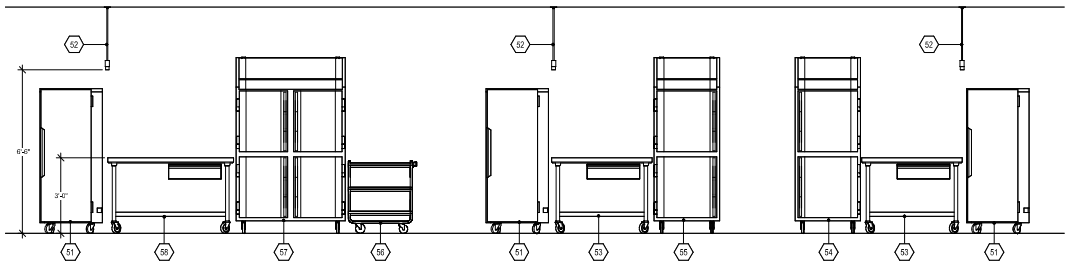
1 Elevation - Cook's Work Tables
1/2" = 1'-0"



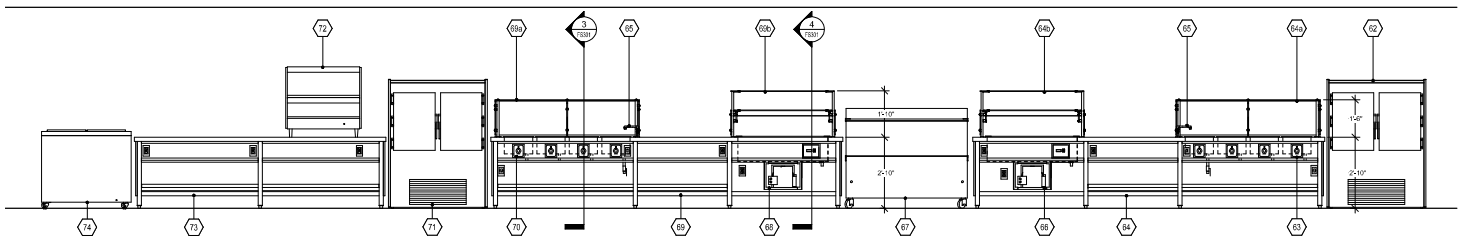
2 Elevation - Work Tables
1/2" = 1'-0"



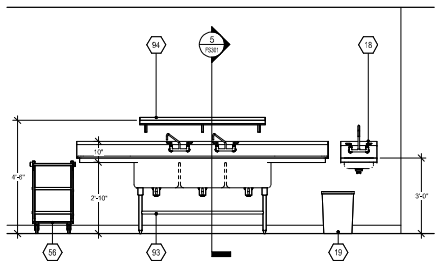
3 Elevation - Prep Table
1/2" = 1'-0"



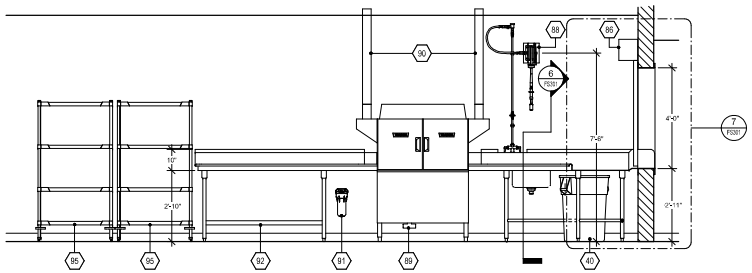
4 Elevation - Servery Support
1/2" = 1'-0"



5 Elevation - Serving Counters
1/2" = 1'-0"



6 Elevation - Three-Compartment Sink
1/2" = 1'-0"



7 Elevation - Tray Washing
1/2" = 1'-0"

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Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane,
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

FOODSERVICE EQUIPMENT ELEVATIONS

Date
07/08/2024
Scale
1/2" = 1'-0"
Proj. Number
22367.00

Drawing Number
FS201

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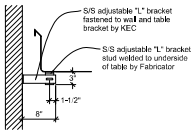
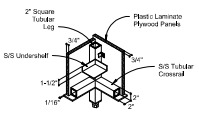
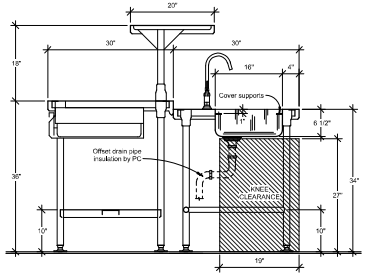


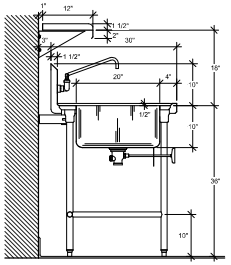
Section - Typical Wall Bracket
NTS



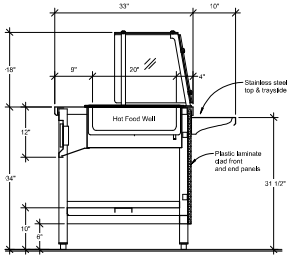
Detail - Serving Counter Corner
NTS



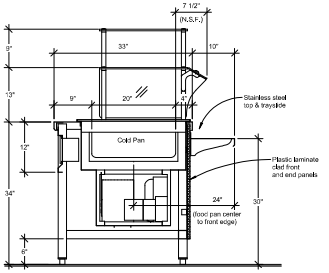
1 FS01 Section - Accessible Prep Station @ Sink
1" = 1'-0"



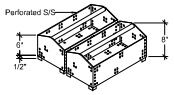
2 FS01 Section - Prep Table @ Sink
1" = 1'-0"



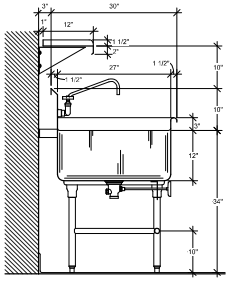
3 FS01 Section - Serving Counter @ Hot Well
1" = 1'-0"



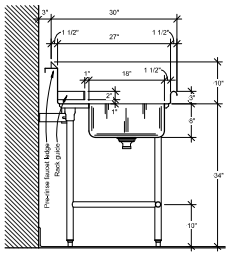
4 FS01 Section - Serving Counter @ Cold Pan
1" = 1'-0"



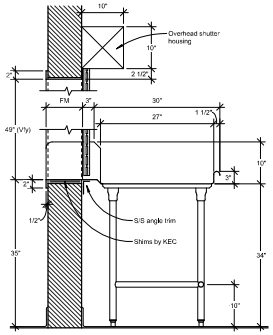
Detail - Scrap Baskets
NTS



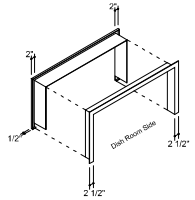
5 FS01 Section - Three-Compartment Sink
1" = 1'-0"



6 FS01 Section - Soiled Ware Table @ Scrap Sink
1" = 1'-0"



7 FS01 Section - Soiled Ware Table @ Pass Window
1" = 1'-0"



Detail - Pass Window Frame
NTS

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Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

FOODSERVICE EQUIPMENT DETAILS

Date: 07/08/2024
Scale: 1" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **FS301**

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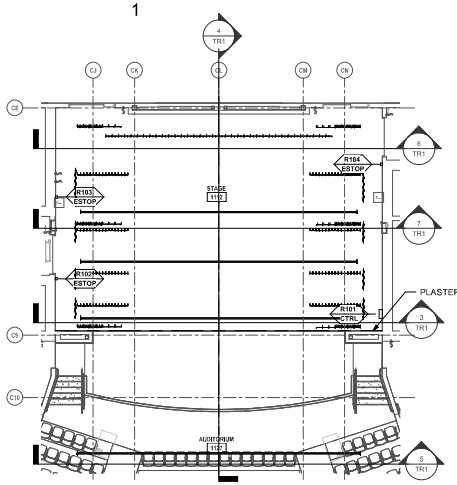
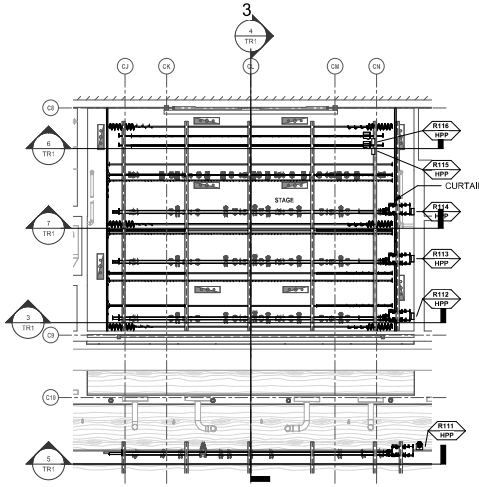
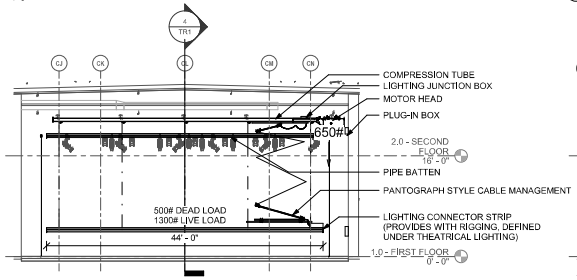


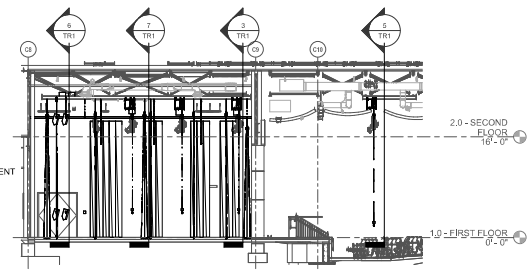
1 STAGE LEVEL PLAN
1/8" = 1'-0"



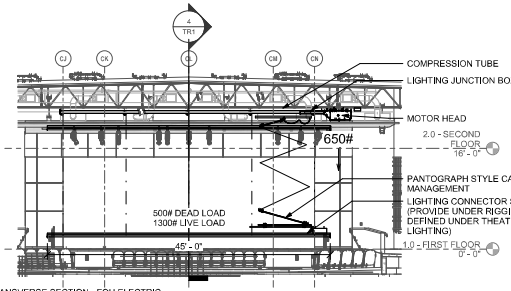
2 UPPER LEVEL RIGGING PLAN
1/8" = 1'-0"



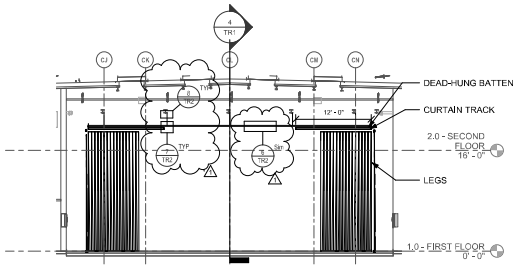
3 TRANSVERSE SECTION - STAGE ELECTRIC BATTEN
1/8" = 1'-0"



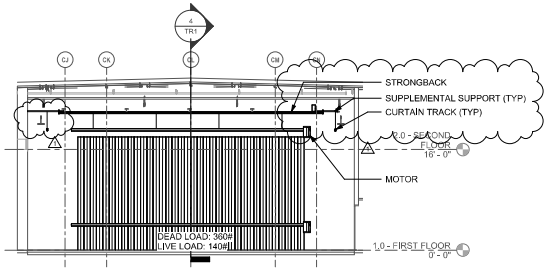
4 CENTERLINE SECTION - STAGE
1/8" = 1'-0"



5 TRANSVERSE SECTION - FOH ELECTRIC
1/8" = 1'-0"



7 TRANSVERSE SECTION - LEGS
1/8" = 1'-0"



6 TRANSVERSE SECTION - GENERAL PURPOSE BATTEN
1/8" = 1'-0"

LINESET SCHEDULE

SET NUMBER	DISTANCE FROM PLASTER	USAGE	WEIGHT (DEAD)	CAPACITY (LIVE)	HORSE. POWER	PIPE LENGTH	COMMENTS
0	19' - 6"	FOH ELECTRIC	750 lb	1,300 lb	2	45' - 0"	INTEGRATED CONNECTOR STRIP
1	0' - 8"	MAIN TRAVELER	300 lb	0 lb		45' - 0"	
2	2' - 0"	1 ELECTRIC	750 lb	1,300 lb	2	44' - 0"	INTEGRATED CONNECTOR STRIP
3	4' - 0"	TRACKED LEGS	250 lb	0 lb		45' - 0"	
4	8' - 0"	BORDER	150 lb	0 lb		45' - 0"	
5	10' - 0"	TRACKED LEGS	250 lb	0 lb		45' - 0"	
6	11' - 0"	2 ELECTRIC	750 lb	1,300 lb	2	44' - 0"	INTEGRATED CONNECTOR STRIP
7	15' - 6"	BORDER	150 lb	0 lb		45' - 0"	
8	16' - 0"	TRACKED LEGS	250 lb	0 lb		45' - 0"	
9	17' - 0"	MID-STAGE TRAVELER	250 lb	0 lb		45' - 0"	
10	18' - 11"	3 ELECTRIC	750 lb	1,300 lb	2	44' - 0"	INTEGRATED CONNECTOR STRIP
11	23' - 11"	BORDER	150 lb	0 lb		45' - 0"	
12	24' - 10"	TRACKED LEGS	250 lb	0 lb		45' - 0"	
13	26' - 6"	4 ELECTRIC	150 lb	1,200 lb		45' - 0"	DEAD HUNG, PROVIDE WITH CONNECTOR STRIP
14	29' - 6"	GENERAL PURPOSE	400 lb	150 lb	1	38' - 0"	
15	31' - 0"	CYCLORAMA	400 lb	150 lb	1	38' - 0"	
16	32' - 6"	UPSTAGE TRAVELER	300 lb	0 lb		45' - 0"	

PROVIDE LIGHTING CONNECTOR STRIPS, JUNCTION BOXES, FLEXIBLE CABLES, AND WORK LIGHTS FOR MOTORIZED HOISTS AND DEAD-HUNG ELECTRIC.
REFER TO ELECTRICAL DRAWINGS AND SPECIFICATIONS FOR CONNECTOR STRIPS AND WORK LIGHTS.

DRAPERY SCHEDULE

DESCRIPTION	PANEL HEIGHT	PANEL WIDTH	FULLNESS	COLOR	COMMENTS
CYCLORAMA	18' - 0"	36' - 0"	0%	WHITE	
MAIN TRAVELER	17' - 0"	24' - 0"	100%	PER ARCHITECT	PER PANEL, TYPE OF 2
LEGS	19' - 0"	8' - 0"	0%	BLACK	PER PANEL, TYPE OF 2
BORDER	6' - 8"	45' - 0"	0%	BLACK	
LEGS	19' - 0"	8' - 0"	0%	BLACK	PER PANEL, TYPE OF 2
BORDER	6' - 8"	45' - 0"	0%	BLACK	
LEGS	19' - 0"	8' - 0"	0%	BLACK	PER PANEL, TYPE OF 2
BORDER	6' - 8"	45' - 0"	0%	BLACK	
LEGS	19' - 0"	8' - 0"	0%	BLACK	PER PANEL, TYPE OF 2
UPSTAGE TRAVELER	19' - 0"	24' - 0"	100%	BLACK	PER PANEL, TYPE OF 2
MID-STAGE TRAVELER	19' - 0"	24' - 0"	100%	BLACK	PER PANEL, TYPE OF 2
SIDE MASKING PANEL	18' - 6"	3' - 0"	0%	BLACK	
SIDE MASKING PANEL	18' - 6"	3' - 0"	0%	BLACK	
SIDE MASKING PANEL	18' - 6"	3' - 0"	0%	BLACK	
SIDE MASKING PANEL	18' - 6"	3' - 0"	0%	BLACK	
SIDE MASKING PANEL	18' - 6"	3' - 0"	0%	BLACK	
SIDE MASKING PANEL	18' - 6"	3' - 0"	0%	BLACK	
SIDE MASKING PANEL - UPSTAGE	18' - 6"	5' - 0"	0%	BLACK	
SIDE MASKING PANEL - UPSTAGE	18' - 6"	5' - 0"	0%	BLACK	

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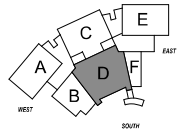
Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane,
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
1	11/06/2024	ADDENDUM NO. 3
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

THEATRICAL RIGGING

Date 06/07/2024
Scale 1/8" = 1'-0"
Proj. Number 22367.00
Drawing Number TR1

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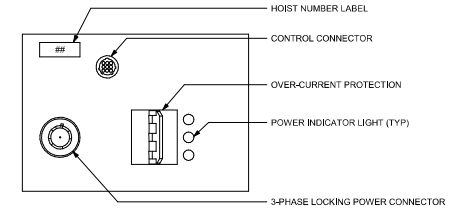
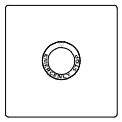
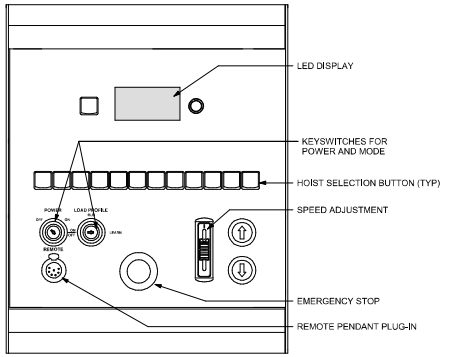
Autodesk Docs://22367.00 - Greenwich Central Middle School/TH_22367_GREENWICH_CENTRAL_MS_R22.rvt
11/6/2024 3:15:29 AM



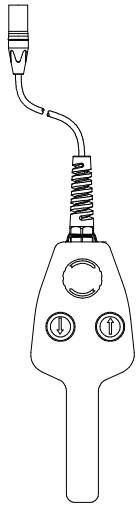
2 DETAIL - HPP MOTOR CONNECTION POINT (TYP ONE PER MOTOR)
6" = 1'-0"



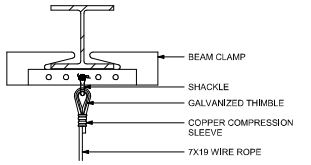
3 DEVICE DETAIL - ESTOP
6" = 1'-0"



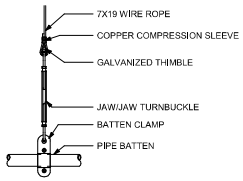
4 HOIST CONTROL PANEL
6" = 1'-0"



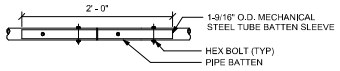
5 DEVICE DETAIL - REMOTE PENDANT
6" = 1'-0"



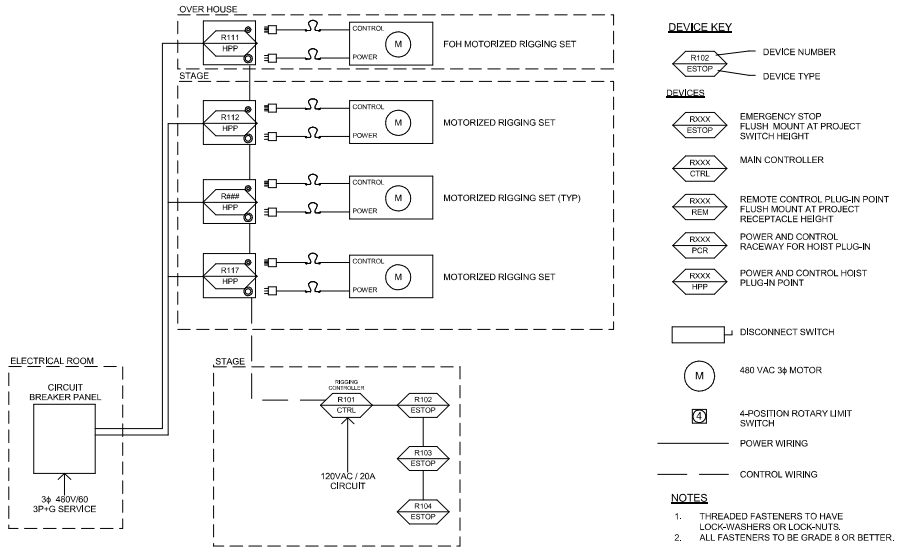
8 DETAIL - DEAD HUNG BATTEN BEAM SUPPORT TERMINATION
3" = 1'-0"



7 DETAIL - BATTEN TERMINATION (TYP)
1 1/2" = 1'-0"



6 DETAIL - BATTEN SLEEVE (TYP)
1 1/2" = 1'-0"



1 THEATRICAL RIGGING RISER
NTS

DEVICE KEY

R102 ESTOP — DEVICE NUMBER / DEVICE TYPE

DEVICES

- RXXX ESTOP — EMERGENCY STOP FLUSH MOUNT AT PROJECT SWITCH HEIGHT
- RXXX CTRL — MAIN CONTROLLER
- RXXX REM — REMOTE CONTROL PLUG-IN POINT FLUSH MOUNT AT PROJECT RECEPTACLE HEIGHT
- RXXX PCR — POWER AND CONTROL RACEWAY FOR HOIST PLUG-IN
- RXXX HPP — POWER AND CONTROL HOIST PLUG-IN POINT
- DISCONNECT SWITCH
- M — 480 VAC 3ϕ MOTOR
- 4-POSITION ROTARY LIMIT SWITCH
- POWER WIRING
- CONTROL WIRING

NOTES

1. THREADED FASTENERS TO HAVE LOCK-WASHERS OR LOCK-NUTS.
2. ALL FASTENERS TO BE GRADE 8 OR BETTER.

THEATRICAL RIGGING DEVICE SCHEDULE

DEVICE ID	DEVICE TYPE	DESCRIPTION	LOCATION	MOUNTING HEIGHT	COMMENTS
R101	CTRL	HOIST CONTROLLER	STAGE	PROJECT SWITCH HEIGHT	
R102	ESTOP	EMERGENCY STOP	STAGE	PROJECT SWITCH HEIGHT	
R103	ESTOP	EMERGENCY STOP	STAGE	PROJECT SWITCH HEIGHT	
R104	ESTOP	EMERGENCY STOP	STAGE	PROJECT SWITCH HEIGHT	
R111	HPP	HOIST PLUG-IN POINT	FOH HOIST	AT MOTOR HEAD	
R112	HPP	HOIST PLUG-IN POINT	1 ELECTRIC	AT MOTOR HEAD	
R113	HPP	HOIST PLUG-IN POINT	2 ELECTRIC	AT MOTOR HEAD	
R114	HPP	HOIST PLUG-IN POINT	3 ELECTRIC	AT MOTOR HEAD	
R115	HPP	HOIST PLUG-IN POINT	DROP	AT MOTOR HEAD	
R116	HPP	HOIST PLUG-IN POINT	CYC	AT MOTOR HEAD	

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Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

THEATRICAL RIGGING RISER AND SCHEDULES

Date 06/07/2024
Scale As indicated
Proj. Number 22367.00
Drawing Number TR2

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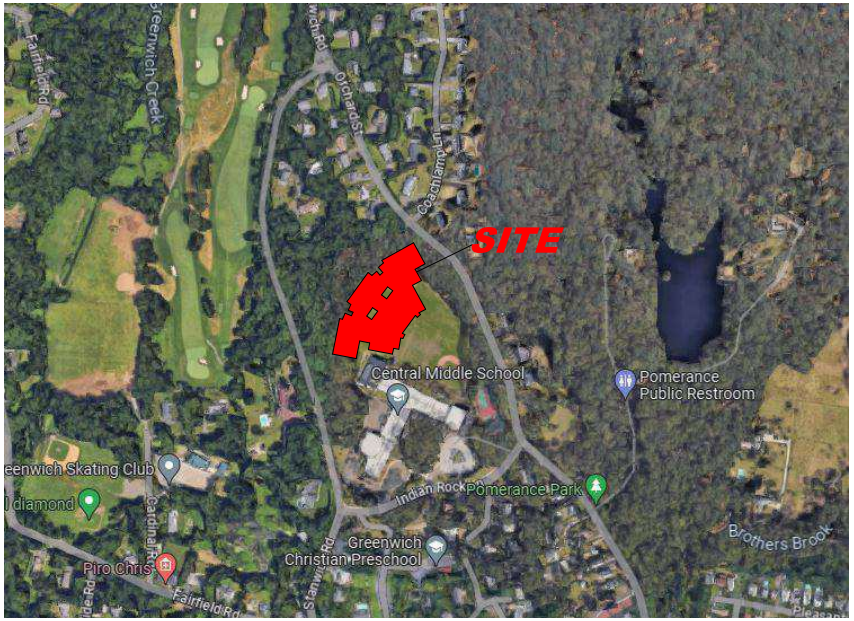

Greenwich Public Schools

GREENWICH CENTRAL MIDDLE SCHOOL

9 Indian Rock Lane, Greenwich, CT

State Project No: 057-0114 N

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290 Greenwich Ave, Greenwich, CT

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- P100B PLUMBING FIRST FLOOR UNDERSLAB PLAN - PART B
- P100C PLUMBING FIRST FLOOR UNDERSLAB PLAN - PART C
- P100D PLUMBING FIRST FLOOR UNDERSLAB PLAN - PART D
- P100E PLUMBING FIRST FLOOR UNDERSLAB PLAN - PART E
- P100F PLUMBING FIRST FLOOR UNDERSLAB PLAN - PART F
- P101A PLUMBING FIRST FLOOR PLAN - PART A
- P101B PLUMBING FIRST FLOOR PLAN - PART B
- P101C PLUMBING FIRST FLOOR PLAN - PART C
- P101D PLUMBING FIRST FLOOR PLAN - PART D
- P101E PLUMBING FIRST FLOOR PLAN - PART E
- P101F PLUMBING FIRST FLOOR PLAN - PART F
- P102 PLUMBING SECOND FLOOR OVERALL PLAN
- P102A PLUMBING SECOND FLOOR PLAN - PART A
- P102B PLUMBING SECOND FLOOR PLAN - PART B
- P102C PLUMBING SECOND FLOOR PLAN - PART C
- P102D PLUMBING SECOND FLOOR PLAN - PART D
- P102E PLUMBING SECOND FLOOR PLAN - PART E
- P103A PLUMBING ROOF PLAN - PART A
- P103B PLUMBING ROOF PLAN - PART B
- P103C PLUMBING ROOF PLAN - PART C
- P103D PLUMBING ROOF PLAN - PART D
- P103E PLUMBING ROOF PLAN - PART E
- P103F PLUMBING ROOF PLAN - PART F
- P400 PLUMBING ENLARGED VIEWS - KITCHEN
- P401 PLUMBING ENLARGED VIEWS
- P402 PLUMBING ENLARGED VIEWS
- P403 PLUMBING ENLARGED VIEWS
- P404 PLUMBING ENLARGED VIEWS
- P405 PLUMBING ENLARGED VIEWS
- P500 PLUMBING DETAILS
- P501 PLUMBING DETAILS
- P600 PLUMBING SCHEDULES AND DIAGRAMS
- P601 PLUMBING SCHEDULES AND DIAGRAMS

[65] MECHANICAL
- MEP0000 MEP DEMOLITION ABBREVIATIONS, NOTES, AND SYMBOLS
- MEP0001 MEP DEMO PLAN VIEW
- M0-00 MECHANICAL ABBREVIATIONS, NOTES AND SYMBOLS
- M001 OVERALL MECHANICAL FIRST FLOOR PLAN
- M101A MECHANICAL FIRST FLOOR PLAN - PART A
- M101B MECHANICAL FIRST FLOOR PLAN - PART B
- M101C MECHANICAL FIRST FLOOR PLAN - PART C
- M101D MECHANICAL FIRST FLOOR PLAN - PART D
- M101E MECHANICAL FIRST FLOOR PLAN - PART E
- M101F MECHANICAL FIRST FLOOR PLAN - PART F
- M002 OVERALL MECHANICAL SECOND FLOOR PLAN
- M102A MECHANICAL SECOND FLOOR PLAN - PART A
- M102B MECHANICAL SECOND FLOOR PLAN - PART B
- M102C MECHANICAL SECOND FLOOR PLAN - PART C
- M102D MECHANICAL SECOND FLOOR PLAN - PART D
- M102E MECHANICAL SECOND FLOOR PLAN - PART E
- M003 OVERALL MECHANICAL ROOF PLAN
- M103A MECHANICAL ROOF PLAN - PART A
- M103B MECHANICAL ROOF PLAN - PART B
- M103C MECHANICAL ROOF PLAN - PART C
- M103D MECHANICAL ROOF PLAN - PART D
- M103E MECHANICAL ROOF PLAN - PART E
- M103F MECHANICAL ROOF PLAN - PART F
- MP101A MECHANICAL PIPING FIRST FLOOR PLAN - PART A
- MP101B MECHANICAL PIPING FIRST FLOOR PLAN - PART B
- MP101C MECHANICAL PIPING FIRST FLOOR PLAN - PART C
- MP101D MECHANICAL PIPING FIRST FLOOR PLAN - PART D
- MP101E MECHANICAL PIPING FIRST FLOOR PLAN - PART E
- MP101F MECHANICAL PIPING FIRST FLOOR PLAN - PART F
- MP102A MECHANICAL PIPING SECOND FLOOR PLAN - PART A
- MP102B MECHANICAL PIPING SECOND FLOOR PLAN - PART B
- MP102C MECHANICAL PIPING SECOND FLOOR PLAN - PART C
- MP102D MECHANICAL PIPING SECOND FLOOR PLAN - PART D
- MP102E MECHANICAL PIPING SECOND FLOOR PLAN - PART E
- M500 MECHANICAL DETAILS
- M501 MECHANICAL DETAILS
- M502 MECHANICAL DETAILS
- M503 MECHANICAL DETAILS
- M504 MECHANICAL DETAILS
- M505 MECHANICAL DETAILS
- M600 MECHANICAL SCHEDULES
- M601 MECHANICAL SCHEDULES
- M602 MECHANICAL SCHEDULES
- M700 MECHANICAL CONTROLS DIAGRAMS
- M701 MECHANICAL CONTROLS DIAGRAMS

[70] ELECTRICAL
- E000 ELECTRICAL ABBREVIATIONS, NOTES AND SYMBOLS
- EL001 ELECTRICAL LIGHTING FIRST FLOOR OVERALL PLAN
- EL101A ELECTRICAL LIGHTING FIRST FLOOR PLAN - PART A
- EL101B ELECTRICAL LIGHTING FIRST FLOOR PLAN - PART B
- EL101C ELECTRICAL LIGHTING FIRST FLOOR PLAN - PART C
- EL101D ELECTRICAL LIGHTING FIRST FLOOR PLAN - PART D
- EL101E ELECTRICAL LIGHTING FIRST FLOOR PLAN - PART E
- EL101F ELECTRICAL LIGHTING FIRST FLOOR PLAN - PART F
- EL002 ELECTRICAL LIGHTING SECOND FLOOR OVERALL PLAN
- EL102A ELECTRICAL LIGHTING SECOND FLOOR PLAN - PART A
- EL102B ELECTRICAL LIGHTING SECOND FLOOR PLAN - PART B
- EL102C ELECTRICAL LIGHTING SECOND FLOOR PLAN - PART C
- EL102D ELECTRICAL LIGHTING SECOND FLOOR PLAN - PART D
- EL102E ELECTRICAL LIGHTING SECOND FLOOR PLAN - PART E
- EP001 ELECTRICAL POWER FIRST FLOOR OVERALL PLAN
- EP101A ELECTRICAL POWER FIRST FLOOR PLAN - PART A
- EP101B ELECTRICAL POWER FIRST FLOOR PLAN - PART B
- EP101C ELECTRICAL POWER FIRST FLOOR PLAN - PART C
- EP101D ELECTRICAL POWER FIRST FLOOR PLAN - PART D
- EP101E ELECTRICAL POWER FIRST FLOOR PLAN - PART E
- EP101F ELECTRICAL POWER FIRST FLOOR PLAN - PART F
- EP002 ELECTRICAL POWER SECOND FLOOR OVERALL PLAN
- EP102A ELECTRICAL POWER SECOND FLOOR PLAN - PART A
- EP102B ELECTRICAL POWER SECOND FLOOR PLAN - PART B
- EP102C ELECTRICAL POWER SECOND FLOOR PLAN - PART C
- EP102D ELECTRICAL POWER SECOND FLOOR PLAN - PART D
- EP102E ELECTRICAL POWER SECOND FLOOR PLAN - PART E
- EP003 ELECTRICAL POWER ROOF OVERALL PLAN
- EP103A ELECTRICAL POWER ROOF PLAN - PART A
- EP103B ELECTRICAL POWER ROOF PLAN - PART B
- EP103C ELECTRICAL POWER ROOF PLAN - PART C
- EP103D ELECTRICAL POWER ROOF PLAN - PART D
- EP103E ELECTRICAL POWER ROOF PLAN - PART E
- EP103F ELECTRICAL POWER ROOF PLAN - PART F
- E400 ELECTRICAL ENLARGED PLANS - KITCHEN
- E401 ELECTRICAL ENLARGED PLANS - AUDITORIUM
- E402 ELECTRICAL ENLARGED PLANS - ELEVATORS
- E500 ELECTRICAL DETAILS
- E501 ELECTRICAL DETAILS
- E502 ELECTRICAL DETAILS
- E503 ELECTRICAL DETAILS
- E504 ELECTRICAL DETAILS
- E600 ELECTRICAL SCHEDULES AND DIAGRAMS
- E601 ELECTRICAL SCHEDULES AND DIAGRAMS
- E602 ELECTRICAL PANEL SCHEDULES
- E603 ELECTRICAL PANEL SCHEDULES
- E604 ELECTRICAL PANEL SCHEDULES
- E605 ELECTRICAL PANEL SCHEDULES
- E606 ELECTRICAL PANEL SCHEDULES
- E607 ELECTRICAL PANEL SCHEDULES
- E700 ELECTRICAL RISER DIAGRAM
- E701 FIRE ALARM RISER DIAGRAM

VOLUME 3 CONTINUED

[80] Technology
- T000 TECHNOLOGY SYMBOL LEGEND & GENERAL NOTES
- T001 TECHNOLOGY OVERALL FIRST FLOOR PLAN CABLING DELINIATION PLAN
- T002 TECHNOLOGY OVERALL SECOND FLOOR PLAN CABLE DELINIATION PLAN
- T101A TECHNOLOGY FIRST FLOOR PLAN A
- T101B TECHNOLOGY FIRST FLOOR PLAN B
- T101C TECHNOLOGY FIRST FLOOR PLAN C
- T101D TECHNOLOGY FIRST FLOOR PLAN D
- T101E TECHNOLOGY FIRST FLOOR PLAN E
- T101F TECHNOLOGY FIRST FLOOR PLAN F
- T102A TECHNOLOGY SECOND FLOOR PLAN A
- T102B TECHNOLOGY SECOND FLOOR PLAN B
- T102C TECHNOLOGY SECOND FLOOR PLAN C
- T102D TECHNOLOGY SECOND FLOOR PLAN D
- T102E TECHNOLOGY SECOND FLOOR PLAN E
- T201 TECHNOLOGY MDF 1000 DETAILS
- T202 TECHNOLOGY IDF 1046 & 1023 DETAILS
- T301 TECHNOLOGY DETAILS
- T302 TECHNOLOGY DETAILS
- T400 TECHNOLOGY WIRING DIAGRAM

[87] Audio Visual
- TA000 AUDIO VISUAL SYMBOL LEGEND & GENERAL NOTES
- TA101A AUDIO VISUAL FIRST FLOOR PLAN A
- TA101B AUDIO VISUAL FIRST FLOOR PLAN B
- TA101C AUDIO VISUAL FIRST FLOOR PLAN C
- TA101D AUDIO VISUAL FIRST FLOOR PLA

ABBREVIATIONS

@	AT
A.B.	ANCHOR BOLT
A/C	AIR CONDITIONING
ACOUST	ACOUSTICAL
AC.T.	ACOUSTIC TILE
ACT	ACTUAL
ACP	ACOUSTIC CEILING PANEL
A.D.	AREA DRAIN
ADDL	ADDITIONAL
ADJ	ADJUSTABLE / ADJUST
A.F.F.	ABOVE FINISHED FLOOR
AGGR	AGGREGATE
A.H.U.	AIR HANDLING UNIT
ALT	ALTERNATE
ALUM	ALUMINUM
ANOD	ANODIZED
APPROX	APPROXIMATE
ARCH	ARCHITECTURAL
ASPH	ASPHALT
A.T.	ASPHALT TILE
L	ANGLE
B.C.	BRICK COURSE
BC	BOTTOM OF CURB
BD	BOARD
B.E.J.	BRICK (BLOCK) EXPANSION JOINT
B.F.	BOTTOM OF FOOTING
BITUM	BITUMINOUS
BLDG	BUILDING
BLK	BLOCK
BLKG	BLOCKING
BM	BEAM
B.M.	BENCH MARK
BOT	BOTTOM
B.P.	BOTTOM OF POCKET
B.P.L.	BEARING PLATE / BASE PLATE
BRK	BRICK
B.S.	BOTH SIDES
B.U.R.	BUILT UP ROOFING
BW	BOTTOM OF WALL
B.W.W.	BOTH WAYS WALL
CAB	CABINET
C.B.	CATCH BASIN
CEM	CEMENT
CER	CERAMIC
C.F.M.F.	COLD FORMED METAL FRAMING
C.H.	CABINET HEATER
CHBD	CHALKBOARD
C.I.	CAST IRON
C.J.	CONTROL JOINT
C.L.G. HT.	CEILING HEIGHT
CLO	CLOSET
CLR	CLEAR
CLRM	CLASSROOM
C.M.U.	CONCRETE MASONRY UNIT
CMP	COMPOSITE METAL PANEL
CNTR	COUNTER
C.O.	CLEAN OUT
COL	COLUMN
COMP	COMPACTED / COMPOSITION
CONC	CONCRETE
CONF	CONFERENCE
CONN	CONNECTION
CONST	CONSTRUCTION
CONT	CONTINUOUS
C.J.J.	CONTRACT JOINT LINE
CONTR	CONTRACTOR
CONV	CONVECTOR
COORD	COORDINATE
CORR	CORRIDOR
C.P.	CONTROL PANEL
CPT	CARPET
C.R.	CEILING REGISTER
C.T.	CERAMIC TILE
CTR	CENTER
C.U.H.	CABINET UNIT HEATER
C.Y.	CUBIC YARD
DBL	DOUBLE
DEPT	DEPARTMENT
DET	DETAIL
D.F.	DRINKING FOUNTAIN
DIA	DIAMETER
DIM	DIMENSION
DISP	DISPENSER
DIV	DIVISION
D.L.	DEAD LOAD
DN	DOWN
D.O.	DOOR OPENING
DR	DOOR
DS	DOWNSPOUT
D.S.P.	DRY STAND PIPE
DWG	DRAWING
DWL	DOWEL
E	EAST
EA	EACH
E.B.F.	EXISTING BOTTOM OF FOOTING
E.C.	EXPOSED CONSTRUCTION
E.I.F.S.	EXTERIOR INSULATION & FINISH SYSTEM
E.J.	EXPANSION JOINT
E.J.C.	EXPANSION JOINT COVER
EL	ELEVATION
ELEC	ELECTRICAL
ELEV	ELEVATOR
EMER	EMERGENCY
ENCL	ENCLOSURE
ENGR	ENGINEER
E.P.	ELECTRICAL PANEL
EQ	EQUAL
EQUIP	EQUIPMENT
E.W.	EACH WAY
E.W.C.	ELECTRIC WATER COOLER
EXH	EXHAUST
EXIST	EXISTING
EXP	EXPANSION
EXPD	EXPANDED
EXPO	EXPOSED
EXT	EXTERIOR
F.A.	FIRE ALARM
F.A.P.	FIRE ALARM PANEL
F.B.	FOOTING BREAK
F.BRK	FACE BRICK
FCP	FIBER CEMENT PANEL
F.D.	FLOOR DRAIN
FDN	FOUNDATION
F.E.	FIRE EXTINGUISHER
F.E.C.	FIRE EXTINGUISHER CABINET (WITH EXTINGUISHER PROVIDED)
F.F.	FACTORY FINISH
F.H.	FIRE HYDRANT
F.H.C.	FIRE HOSE CABINET
FIN	FINISH
FIN FL.	FINISHED FLOOR
FIXT	FIXTURE
FL	FLOOR
FLASH	FLASHING
FLEX	FLEXIBLE
FLUOR	FLUORESCENT
F.O.C.	FACE OF CONCRETE
F.O.F.	FACE OF FINISH
F.O.G.	FACE OF GYPSUM BOARD
F.O.M.	FACE OF MASONRY
F.O.S.	FACE OF STUD
FPD	FLAT PANEL DISPLAY
FPFG	FIREPROOFING
F.R.	FIRE RATED
F.R.T	FIRE RETARDANT TREATED
FS	FULL SIZE
FT	FOOT OR FEET
F.T.R.	FINNED TUBE RADIATION
FUR	FURRING
FUT	FUTURE
F.W.C.	FABRIC WALL COVERING
GA	GAUGE
GALV	GALVANIZED
G.B.	GRAB BAR
G.C.	GENERAL CONTRACTOR
G.	GLASS
GLZ	GLAZE
GND	GROUND
GRD	GRADE
GWB	GYPSUM WALL BOARD
GYP BD	GYPSUM BOARD / GYPSUM BOARD UNIT
H.B.	HOSE BIBB
HC	HANDICAPPED
H.C.	HOLLOW CORE
HD	HEAD
H.P.	HIGH POINT
HRD	HARDWOOD
HDW	HARDWARE
H.M.	HOLLOW METAL
HOR	HORIZONTAL
HTG	HEATING
HT	HEIGHT
HYD	HYDRANT
H&V	HEATING AND VENTILATING
H.U.	HEATING UNIT

I.D.	INSIDE DIAMETER
I.F.	INSIDE FACE
INCAND	INCANDESCENT
INCL	INCLUDE
INSUL	INSULATION
INT	INTERIOR
INV	INVERT
I.P.S.	IRON PIPE SIZE
JAN	JANITOR
JST	JOIST
JT	JOINT
K	KITCHEN
LAM	LAMINATED
LAV	LAVATORY
LOKR	LOCKER
L.F.	LINEAR FOOT
L.L.	LIVE LOAD
L.P.	LOW POINT
LT	LIGHT
MAS	MASONRY
MATL	MATERIAL
MAX	MAXIMUM
M.C.	MASONRY COURSE
MECH	MECHANICAL
MEMB	MEMBRANE
MET	METAL
MET.T.P.	METAL TOILET PARTITION
MEZZ	MEZZANINE
MFR	MANUFACTURER
MH	MANHOLE
MIN	MINIMUM
MIR	MIRROR
MISC	MISCELLANEOUS
M.O.	MASONRY OPENING
MTD	MOUNTED
M.U.	MASONRY UNIT
MULL	MULLION
N	NORTH
N.I.C.	NOT IN CONTRACT
NO.	NUMBER
NOM	NOMINAL
N.R.C.	NOISE REDUCTION COEFFICIENT
N.T.S.	NOT TO SCALE
O/A	OUTSIDE AIR
O.C.	ON CENTER
O.D.	OUTSIDE DIAMETER
O.F.	OUTSIDE FACE
OFF	OFFICE
OH	OVERHEAD
OPNG	OPENING
OPP	OPPOSITE
O.H.	OPPOSITE HAND
OZ	OUNCE
PART	PARTITION
PL	PLATE
PLAM	PLASTIC LAMINATE
PLS	PLASTER
PLYWD	PLYWOOD
PR	PAIR
PREFAB	PREFABRICATED
PROJ	PROJECTION
PROP	PROPERTY
PTD	PAINTED
P.T.D.	PAPER TOWEL DISPENSER
Q.T.	QUARRY TILE
R	RISER (RADIUS)
R/A	RETURN AIR
RAD	RADIATION
R.B.	RESILIENT BASE
R.D.	ROOF DRAIN
RECPT	RECEPTACLE
REF	REFERENCE
REFL	REFLECTED/ REFLECTIVE
REFR	REFRIGERATOR
REG	REGISTER
REINF	REINFORCING
REQ'D	REQUIRED
RES	RESILIENT
RET	RETAINING
REV	REVISION
RM	ROOM
R.O.	ROUGH OPENING
R.O.W.	RIGHT OF WAY
R.T.	RUBBER TILE
RV	ROOF VENT
R.W.L.	RAIN WATER LEADER
S	SOUTH
S.C.	SOLID CORE
S.C.D.	SEAT COVER DISPENSER
SCHED	SCHEDULE
S.D.	SOAP DISPENSER
SEC	SECTION
S.F.	SQUARE FOOT
SPRM	SPRAY APPLIED FIRE-RESISTIVE MATERIAL
S.G.F.T.	STRUCTURAL GLAZED FACING TILE
SH	SHELF
SHR	SHOWER
SHT	SHEET
SIM	SIMILAR
S.N.D.	SANITARY NAPKIN DISPENSER
S.N.R.	SANITARY NAPKIN RECEPTACLE
SPEC	SPECIFICATIONS
SPKLR	SPRINKLER
S.P.R.	SINGLE PLY ROOF
SQ	SQUARE
S.S	SOLID SURFACE
S.SK.	SERVICE SINK
S.STL.	STAINLESS STEEL
STA	STATION
STD	STANDARD
ST. FT.	STEP FOOTING
STIFF	STIFFENERS
STL	STEEL
STOR	STORAGE
S. TR.	SOUND TRANSMISSION
STRUCT	STRUCTURAL
SURF	SURFACE
SUSP	SUSPENDED
SYM	SYMMETRICAL
T	TREAD
T & B	TOP AND BOTTOM
TB	TACKBOARD
T.B.	TOWEL BAR
T.C.	TOP OF CURB
TEL	TELEPHONE
TEMP	TEMPERED
TERR	TERRAZZO
T.F.	TOP OF FOUNDATION
T. & G.	TONGUE AND GROOVE
THK	THICK
THRES	THRESHOLD
TIP	TOP OF PAVEMENT
T.P.D.	TOILET PAPER DISPENSER
TPR	TOP OF PIER
TS	TOP OF SLAB
TSH	TOP OF SHELF
TSTL	TOP OF STEEL
T.W.	TOP OF WALL
TYP	TYPICAL
U.H.	UNIT HEATER
U.L.	UNDERWRITER'S LABORATORY
UNFIN	UNFINISHED
U.N.O.	UNLESS NOTED OTHERWISE
UR	URINAL
U.V.	UNIT VENTILATOR
V.B.	VINYL BASE
V.C.T.	VINYL COMPOSITION TILE
VERT	VERTICAL
VEST	VESTIBULE
V.F.	VINYL FABRIC
V.G.	VERTICAL GRAIN
V.I.F.	VERIFY IN FIELD
VOL	VOLUME
V.W.C.	VINYL WALLCOVERING
W	WEST
W	WITH
W.C.	WATER CLOSET
WD	WOOD
WND	WINDOW
W/O	WITHOUT
WP	WATERPROOF
W.P.T.	WORKING POINT
W.S.	WALL SLEEVE
WSCT	WAINSCOT
WT	WEIGHT
WWF	WELDED WIRE FABRIC

GRAPHIC LEGEND

EARTHWORK
- EARTH
- POROUS FILL / GRAVEL

STONE
- NATURAL STONE

CONCRETE
- CAST IN PLACE CONCRETE
- CAST STONE
- ARCHITECTURAL PRECAST CONCRETE

MASONRY
- BRICK
- GLAZED BRICK / S.G.F.T.
- CONCRETE MASONRY UNIT
- GLAZED CONCRETE MASONRY UNIT
- MANUFACTURED STONE MASONRY UNIT
- MORTAR / GROUT
- SAND / PLASTER

METAL
- STEEL
- ALUMINUM

WOOD
- ROUGH LUMBER (CONTINUOUS)
- ROUGH LUMBER (INTERMITTENT)
- FINISH WOOD
- PLYWOOD
- PARTICLE BOARD / MDF

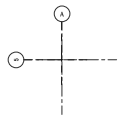
INSULATION
- RIGID INSULATION
- SEMI-RIGID INSULATION
- SPRAY FOAM INSULATION
- BLANKET INSULATION
- FIRE SAFING

MISCELLANEOUS
- GYPSUM BOARD
- ACOUSTIC TILE
- SOLID SURFACE

WALL DESIGNATION
- NEW
- EXISTING
- EXISTING TO BE REMOVED

DOOR DESIGNATION
- NEW
- EXISTING
- EXISTING TO BE REMOVED

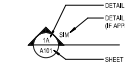
GRID LINES AND HEADS



DETAIL / DRAWING TITLE

1E TITLE 1/8" = 1'-0"

SECTION INDICATOR



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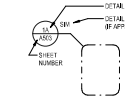
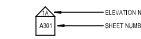


EXTERIOR ELEVATION TAG



INTERIOR ELEVATION TAG



ROOM TAG



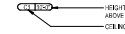
REVISION INDICATOR



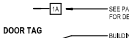
CEILING HEIGHT TAG



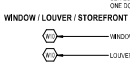
WALL TAG



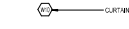
DOOR TAG



WINDOW / LOUVER / STOREFRONT / CURTAIN WALL TAG



EQUIPMENT TAG



TOILET ACCESSORY TAG

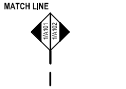


ELEVATION DATUM MARK



DEMOLITION KEYNOTE

MATCH LINE



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Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane,
Greenwich, CT 06830

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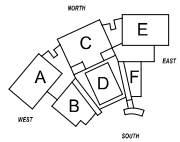

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING PERMIT

GENERAL INFORMATION

Date 07/08/2024
Scale 12" = 1'-0"
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BACKFLOW PREVENTION SCHEDULE

TAG	MANUFACTURER	MODEL #	HAZARD CLASS	DESCRIPTION	COMPONENTS AND ACCESSORIES	APPLICATION	APPLICABLE STANDARDS	REMARKS
BFP-1	WATTS	LF757DCDA	NON-HEALTH HAZARD	DOUBLE CHECK VALVE ASSEMBLY, LEAD FREE, EPOXY COATED CAST IRON BRONZE 009Z3G STAINLESS STEELBODY, CONTINUOUS PRESSURE, TESTABLE	TWO CHECK VALVES, TWO SHUTOFF VALVES, FOUR TEST COCKS, STRAINER, AND RUBBER CHECK DISC	BACKSIPHONAGE & BACKPRESSURE, FIRE SPRINKLER SYSTEMS, FOOD PROCESSING, STEAM KETTLES SIZES 2-1/2-10"	ASSE 1015 & NSF 61-G	#1

REMARKS:
1. INSTALL IN ACCORDANCE WITH THE WATER AUTHORITY REQUIREMENTS.

COMMERCIAL SPRINKLER HEAD SCHEDULE

SYMBOL	K-FACTOR	STANDARD OR QUICK RESPONSE (QR)	UPRIGHT	PENDENT	RECESSED	CONCEALED	HORIZONTAL SIDEWALL	WITH GUARD	ABOVE CEILING	DRY	INSTITUTIONAL	EXTENDED COVERAGE	LIQUIDTED	PAINTED/COATED	MANUFACTURER & MODEL	MAXIMUM LISTED COVERAGE AREA L x W (FT)	MINIMUM REQUIRED PRESSURE (PSI)	GENERAL LOCATION OF SPRINKLER HEADS (REFER TO DRAWINGS FOR ACTUAL LOCATIONS)	NOTE: "ALL FINISHES ARE SUBJECT TO APPROVAL BY ARCHITECT." FINISH	CLASSIFICATION
●	5.6	QR				•							•	•	VIKING MODEL# VK462	15 x 15	7 PSI	SPACES & CORRIDORS WITH HUNG CEILINGS	COVER PLATE FACTORY-PAINTED WHITE.	LIGHT & ORDINARY HAZARD
$●_C$	5.6	QR				•							•	•	VIKING MODEL# VK462	15 x 15	7 PSI	SPACES & CORRIDORS WITH CLOUD CEILINGS	COVER PLATE FACTORY-PAINTED TO MATCH COLOR OF CLOUD	LIGHT & ORDINARY HAZARD
$●_D$	5.6	QR		•						•			•	•	VIKING MODEL# VK176	15 x 15	7 PSI	KITCHEN FREEZER & COOLER	BRASS	LIGHT & ORDINARY HAZARD
○	5.6	QR	•										•	•	VIKING MODEL# VK300	15 x 15	7 PSI	SPACES & CORRIDORS WITHOUT HUNG CEILINGS	BRASS	LIGHT & ORDINARY HAZARD
$○_A$	5.6	QR	•							•			•	•	VIKING MODEL# VK300	15 x 15	7 PSI	SPACES & CORRIDORS WITH CLOUD CEILINGS	BRASS	LIGHT & ORDINARY HAZARD
⊠	5.6	QR	•					•					•	•	VIKING MODEL# VK300	15 x 15	7 PSI	SPACES & CORRIDORS WITHOUT HUNG CEILINGS	BRASS	LIGHT & ORDINARY HAZARD
$⊠_B$	5.6	QR	•					•		•			•	•	VIKING MODEL# VK164	15 x 15	7 PSI	PARKING GARAGE	BRASS	LIGHT & ORDINARY HAZARD
$⊠_{TC}$	5.6	QR	•					•					•	•	VIKING MODEL# VK310 INTERMEDIATE TEMPERATURE RATING	15 x 15	7 PSI	SKYLIGHT	BRASS	LIGHT & ORDINARY HAZARD
▽	5.6	QR					•						•	•	VIKING MODEL# VK305	15 x 15	7 PSI	ELECTRICAL, MDF & IDF CLOSETS	BRASS	LIGHT & ORDINARY HAZARD
$▽^{EC}$	8.0	QR					•					•	•	•	VIKING MODEL# VK630	28 x 14	15 PSI	VESTIBULES	BRASS	LIGHT & ORDINARY HAZARD
$▽^{D}$	5.6	QR			•		•			•			•	•	VIKING MODEL# VK182	15 x 15	7 PSI	BELOW OVERHANGS	BRASS	LIGHT & ORDINARY HAZARD

NOTES:
1. ALL TYPES OF SPRINKLER HEADS SHALL BE INSTALLED AS PER MANUFACTURER'S RECOMMENDATIONS.
2. PROVIDED SPRINKLER GUARDS IN MECHANICAL ROOMS, ELECTRICAL & TELECOM (E.T.) CLOSETS, UPS ROOMS AND ALL ROOMS WHERE SPRINKLERS MAY BE SUBJECT TO ACCIDENTAL DAMAGE.
3. ALL SPRINKLER HEADS THROUGHOUT SHALL BE OF ORDINARY TEMPERATURE RATING (135 - 170 DEG. F.), WITH THE FOLLOWING EXCEPTIONS:
   A. SPECIFIED IN TABLE BELOW AS INTERMEDIATE OR HIGH TEMPERATURE RATING.
   B. SPRINKLER HEADS LOCATED CLOSE TO KITCHEN EQUIPMENT, HEATERS, OR LOW-PRESSURE BLOW-OFF VALVE SHALL BE OF THE TEMPERATURE RATING AS REQUIRED BY APPLICABLE EDITION OF NFPA - 13, DRAWINGS, PREPARED BY THE FIRE PROTECTION CONTRACTOR SHALL BE COORDINATED WITH THE HVAC CONTRACTOR AND ALL HVAC EQUIPMENT WHICH CAN AFFECT THE RATING OF THE SPRINKLER HEADS. SPRINKLER HEADS SHALL BE CLEARLY IDENTIFIED ON THE SHOP DRAWINGS PRIOR TO SUBMISSION FOR APPROVAL.
4. ALL SPRINKLER HEAD SYMBOLS NOT SHOWN ON PLANS, REFER TO "GENERAL LOCATION" COLUMN FOR ESTIMATING.
5. SPRINKLER SELECTIONS ARE BASED ON PRODUCTS MANUFACTURED BY VIKING. RELIABLE AND/OR TYCO PRODUCTS SHALL BE CONSIDERED APPROVED EQUAL PRODUCTS AND ARE SUBJECT TO THE APPROVAL OF THE ENGINEER AND ARCHITECT.
6. SPRINKLER CONTRACTOR SHALL COORDINATE THE LOCATIONS OF SPRINKLER HEADS WITH STRUCTURAL ELEMENTS AND HVAC DUCTWORK.

FIRE PUMP SCHEDULE - ELECTRIC

SYMBOL	MANUFACTURER/ MODEL NUMBER	TYPE	LOCATION	SYSTEM SERVING	MEDIA	POWER	FLOW RATE (GPM)	HEAD (PSI)	PUMP EFF (%)	HP	RPM	WEIGHT LBS	REMARKS
FP-1	ARMSTRONG PUMP ES 6x4x11.5FM	ES	FIRE SERVICE ROOM	FIRE PROTECTION	W	460V 3PH	400	40	-	25	1800	855	1, 2
JP-1	ARMSTRONG PUMP 4700 VMD4011YB	JP	FIRE SERVICE ROOM	FIRE PROTECTION	W	460V 3PH	7.5	115	-	1.5	3600	84	3

TYPE:
JP = JOCKEY PUMP
ES = END SUCTION

MEDIA:
W = WATER

REMARKS:
1. SOFT START
2. FIRETROL FP CONTROL WITH TRANSFER SWITCH, LED VISUAL INDICATOR, PUMP OPERATING, WEEKLY TEST TIMER, DIGITAL PRESSURE RECORDING, USB HOST CONTROLLER AND MODEM.
3. JOCKEY CONTROLLER WITH MIN RUN TIMER, FIRETROL FIRE PUMP CONTROLLER, FUSED DISCONNECT SWITCH. JOCKEY PUMPS SHALL BE FURNISHED AND INSTALLED AS PART OF FIRE PUMP PACKAGE

GENERAL NOTES:
THE PUMPS FURNISHED FOR FIRE PROTECTION SERVICE SHALL BE SUPPLIED WITH SPECIFIED DRIVERS, CONTROLS AND PUMP ACCESSORY ITEMS BY THE PUMP MANUFACTURER, THE PUMP DRIVER AND CONTROL SHALL BE FOR FIRE PROTECTION SERVICE. THE PUMPING EQUIPMENT SHALL BE INSTALLED AS RECOMMENDED IN THE NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) 20, STANDARD FOR THE INSTALLATION OF CENTRIFUGAL FIRE PUMPS.

- THE FIRE PUMP SHALL BE DESIGNED TO DELIVER 1000 US GPM AT A TOTAL DIFFERENTIAL PRESSURE OF 105 PSI.
- THE FIRE PUMP SHALL ALSO BE CAPABLE OF DELIVERING NOT LESS THAN 150% OF RATED FLOW AT NOT LESS THAN 65% OF RATED HEAD.
- THE PUMP SHALL BE ARMSTRONG PUMP COMPANY AS SPECIFIED AND SHALL BE FURNISHED WITH DRIVER, CONTROLLERS AND ACCESSORIES AS INDICATED.
- PUMP MANUFACTURER SHALL HAVE UNIT RESPONSIBILITY FOR THE PROPER OPERATION OF THE COMPLETE UNIT ASSEMBLY AS INDICATED BY FIELD ACCEPTANCES TESTS.

HEAT TRACE SCHEDULE

SYMBOL	APPLICATION	MANUFACTURER/ MODEL NUMBER	PIPE SIZE	HEAT LOSS (W/FT)	AMBIENT TEMPERATURE (°F)	PIPE TEMPERATURE (°F)	INSULATION K-FACTOR BTU•IN/HR•FT²•°F	INSULATION THICKNESS	MAXIMUM ALLOWABLE CABLE LENGTH (FT)	ELECTRICAL DATA V/W/A	NOTES
HT-3	FREEZE PROTECTION	RAYCHEM 5XLE-CR	1"	5	0	40	0.224	1.5"	414	208V/20A	ALL

NOTES:
1. REFER TO FLOOR PLANS FOR PIPE SIZE.
2. PROVIDE SINGLE-POINT HEAT-TRACING CONTROL SYSTEM 465.
3. INSTALL PER MANUFACTURER'S GUIDELINES.
4. REFER TO MANUFACTURER'S GUIDELINES FOR PIPE INSULATION REQUIREMENTS.
5. CABLE SHALL BE INSTALLED BY A LICENSED PLUMBING CONTRACTOR WITH FINAL ELECTRICAL CONNECTIONS PERFORMED BY THE ELECTRICAL SUBCONTRACTOR. INSTALLATION TRAINING PROVIDED BY AUTHORIZED MANUFACTURER'S REPRESENTATIVE MUST BE COMPLETED PRIOR TO WORK MOBILIZATION. SYSTEM MUST INCLUDE PIPE INSULATION THAT FOLLOWS MANUFACTURER'S INSTRUCTIONS FOR CORRECT PERFORMANCE.
6. THE HEATING CABLE IS PERMANENTLY SECURED TO METAL PIPES WITH GT-66 GLASS TAPE, OR TO PLASTIC PIPES USING AT-150 ALUMINUM TAPE.
7. ALL HEATING CABLE SPLICES OR TEES ARE MADE ABOVEGROUND, NO BURIED OR IN-CONDUIT SPLICES OR TEES ARE ALLOWED. THE POWER CONNECTION AND END SEAL ARE MADE IN UL LISTED AND CSA CERTIFIED JUNCTION BOXES ABOVE GRADE.
8. THE HEATING CABLE IS PROTECTED FROM THE FIRE TO THE POWER CONNECTION BOX IN UL LISTED AND CSA CERTIFIED CONDUIT (MINIMUM 24-INCH DIAMETER) SUITABLE FOR THE LOCATION.
9. INSULATE WITH WATERPROOF THERMAL INSULATION WITH FIRE-RETARDANT.
10. TEST INSTALLATION IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATION, INCLUDING, RESISTANCE TESTING WITH 2500 VDC MEGOHMMETER AND CAPACITANCE TESTING.
11. PROVIDE DETAILED CIRCUIT LAYOUT WITH SUBMITTALS.
12. REGISTER INSTALLATION WITH MANUFACTURER FOR 10 YR WARRANTY.
13. PROVIDE SUPERVISED CONTROLLER WITH ALARM RELAY CONNECTED TO THE FIRE CONTROL PANEL. REFER TO FIRE ALARM PLANS. MONITOR FOR HI ALARM, LOW ALARM, LOSS OF POWER, AND GFI TRIP.

PIPING LEGEND

SYMBOL	DESCRIPTION
FP-STP	STANDPIPE PIPING
FP-TH	FIRE PUMP TEST HEADER PIPING
FP-TDC	FIRE DEPARTMENT CONNECTION
FP-TDC	FIRE DEPARTMENT CONNECTION BELOW GROUND
FP-DRN	DRAIN PIPING
FP-WET	SPRINKLER MAIN (WET)
	PIPE RISE
	PIPE DROP
	PIPE TEE TOWARDS (UP IN PLAN)
	PIPE TEE AWAY (DOWN IN PLAN)
	PIPE DROP AND RUN
	DIRECTION OF FLOW
	BLIND FLANGE
	END CAP
	REDUCER (ECCENTRIC)
	REDUCER (CONCENTRIC)
	FLEXIBLE CONNECTION

VALVE AND SYMBOL LEGEND

SYMBOL	DESCRIPTION
	BALL VALVE
	BALL VALVE WITH HOSE BIBS, CAP & CHAIN (DRAIN VALVES)
	BUTTERFLY VALVE
	GATE VALVE
	OS&Y VALVE
	PRESSURE REDUCING VALVE
	CHECK VALVE
	STRAINER W/BALL VALVE, HOSE BIBB & CAP
	SAFETY RELIEF VALVE
	FLOW SWITCH
	PRESSURE GAUGE
	THERMOMETER
	DOUBLE CHECK VALVE ASSEMBLY
	ALARM BELL
	"WET" ALARM VALVE RISER
	ANGLE VALVE
	SIGHT GLASS
	FIRE DEPARTMENT CONNECTION
	FLUSH MOUNTED FIRE PUMP TEST HEADER
	POST MOUNTED FIRE DEPARTMENT CONNECTION
TS	TAMPER SWITCH
PS	PRESSURE SWITCH
ATS	AUTOMATIC TRANSFER SWITCH
FPC	FIRE PUMP CONTROLLER
JPC	JOCKEY PUMP CONTROLLER
HVC	HOSE VALVE CABINET

SPRINKLER SYSTEM NOTES

1. THESE GENERAL NOTES ARE APPLICABLE TO ALL FIRE PROTECTION DRAWINGS.
2. DRAWINGS ARE DIAGRAMMATIC AND SHOW THE GENERAL INTENT OF WORK. SEE DETAILS, RISERS, AND SPECIFICATIONS FOR ADDITIONAL INFORMATION.
3. THE DRAWINGS INDICATE A SUGGESTED SPRINKLER HEAD LAYOUT AND THAT EACH AREA IS COVERED BY SPRINKLER PROTECTION AS REQUIRED BY ALL APPLICABLE CT BUILDING AND FIRE CODES. THE SPRINKLER QUANTITIES SHALL NOT BE COUNTED AS A TAKE-OFF OR AS EXACT LOCATIONS. EXACT SPACING, DENSITY, AND LOCATION REQUIREMENTS SHALL BE AS DICTATED BY NFPA 13. FINAL LOCATIONS OF SPRINKLER HEADS SHALL BE COORDINATED WITH THE ARCHITECT.
4. FLOW DATA PERFORMED ON 02/12/2024 AT A HYDRANT LOCATED AT STANWICH RD WAS RECORDED AS FOLLOWS:
   A. STATIC PRESSURE: 110 PSI
   B. RESIDUAL PRESSURE: 90 PSI
   C. FLOW RATE: 1065 GPM
5. THIS FLOW DATA SHALL BE USED AS A GUIDE BY THE CONTRACTOR. THE CONTRACTOR SHALL PERFORM AN ADDITIONAL FLOW TEST TO VERIFY THIS INFORMATION. INFORMATION FROM THE CONTRACTOR'S FLOW TEST SHALL BE USED FOR HYDRAULIC CALCULATIONS.
6. FIRE PROTECTION CONTRACTOR SHALL PROVIDE HYDRAULIC CALCULATIONS. HYDRAULIC CALCULATIONS SHALL INCLUDE A SAFETY FACTOR OF 10 %. COMBINED INSIDE AND OUTSIDE HOSE STREAM ALLOWANCE FOR HYDRAULIC CALCULATIONS SHALL BE 250 GPM.
7. THE CONTENT OF THESE DRAWINGS IS INTENDED TO SATISFY THE BUILDING CODE REQUIREMENTS FOR CONSTRUCTION DOCUMENTS. WHEN STAMPED AND SEALED BY THE ENGINEER OF RECORD, THEY ARE INTENDED TO BE USED AS PART OF THE BUILDING PERMIT APPLICATION ONLY.
8. FIRE SUPPRESSION SYSTEM SHOP DRAWINGS SHALL BE SUBMITTED FOR REVIEW AND APPROVED PRIOR TO CONSTRUCTION. PROVIDE A COMPLETE SHOP DRAWING SUBMITTAL INCLUSIVE OF ALL INFORMATION REQUIRED BY STATE BUILDING CODE, NFPA 13 AND THE CONSTRUCTION DOCUMENTS.
9. PREPARE A COMPLETE RECORD SUBMITTAL INCLUSIVE OF ALL FIELD CHANGES AND ALL INFORMATION REQUIRED BY THE STATE BUILDING CODE AND CONSTRUCTION DOCUMENTS.
10. SHOP DRAWINGS AND RECORD DRAWING SUBMITTALS SHALL BE PREPARED BY THE CONTRACTORS QUALIFIED DESIGNER AND SHALL INDICATE THE DESIGNERS NICET CERTIFICATION NUMBER OR PROFESSIONAL ENGINEERING SEAL AND SIGNATURE.
11. THE ENGINEER OF RECORD WILL NOT SIGN AND SEAL SHOP DRAWINGS OR RECORD DRAWINGS PREPARED BY THE CONTRACTOR, WHERE THE AUTHORITY HAVING JURISDICTION REQUIRES SHOP DRAWING OR RECORD DRAWING SUBMITTALS TO BE SIGNED AND SEALED BY A PROFESSIONAL ENGINEER, THE SUBMITTALS SHALL BE PREPARED BY A QUALIFIED PROFESSIONAL ENGINEER RETAINED BY THE CONTRACTOR.
12. THE SHOP DRAWINGS, SUPPLEMENTAL CALCULATIONS AND MATERIAL SUBMITTALS SHALL BE REVIEWED AND APPROVED BY THE ENGINEER OF RECORD PRIOR TO SUBMITTAL TO THE STATE DIVISION OF ENGINEERING AND BUILDINGS.
13. INSTALLATION OF SPRINKLERS SHALL BE BASED ON THE DESIGN CRITERIA BELOW

AREA	OCCUPANCY CLASSIFICATION	DENSITY (GPM/SF)	AREA OF APPLICATION (SF)
MECHANICAL ROOM	ORDINARY HAZARD GROUP 1	0.15	1500
STORAGE ROOMS	ORDINARY HAZARD GROUP 1	0.15	1500
STAGE	ORDINARY HAZARD GROUP 2	0.20	1500
WOOD SHOP	ORDINARY HAZARD GROUP 2	0.20	1500
REMAINDER OF THE BUILDING	LIGHT HAZARD	0.10	1500
KITCHEN	ORDINARY HAZARD GROUP 1	0.15	1500

FIRE PROTECTION ABBREVIATIONS

ABBREVIATION	DESCRIPTION
AFF	ABOVE FINISHED FLOOR
ATS	AUTOMATIC TRANSFER SWITCH
CR	CORROSION RESISTANT
D	DRY
DCV	DOUBLE CHECK VALVE
EC	EXTENDED COVERAGE
ELEV	ELEVATION
FA	FIRE ALARM
FACP	FIRE ALARM CONTROL PANEL
FD	FIRE DEPARTMENT
FDC	FIRE DEPARTMENT CONNECTION
FHV	FIRE HOSE VALVE
FP	FIRE PROTECTION
FPC	FIRE PUMP CONTROLLER
FPM	FEET PER MINUTE
FS	FLOW SWITCH
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
HD	TOTAL DEVELOPED HEAD
HTC	HIGH TEMPERATURE CLASSIFICATION
HVC	HOSE VALVE CABINET
ITC	INTERMEDIATE TEMPERATURE CLASSIFICATION
JP	JOCKEY PUMP
JPC	JOCKEY PUMP CONTROLLER
N.C.	NORMALLY CLOSED
N.O.	NORMALLY OPEN
NTS	NOT TO SCALE
OS&Y	OUTSIDE SCREW AND YOLK
PA	PREACTION
PAC	PREACTION ALARM VALVE CABINET
PD	PRESSURE DROP
PIV	PRESSURE INDICATOR VALVE
PRV	PRESSURE REDUCING VALVE
PS	PRESSURE SWITCH
PSI	POUNDS PER SQUARE INCH
RPBP	REDUCED PRESSURE BACKFLOW PREVENTER
RPM	REVOLUTIONS PER MINUTE
SS	SUPERVISORY SWITCH
TS	TAMPER SWITCH
TYP	TYPICAL
V	VOLTS
VEL	VELOCITY
WG	WIRE GUARD

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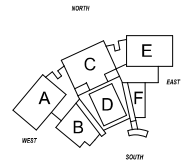

KEYPLAN

Number	Date	Issued For
2	10/23/2024	ADDENDUM NO.3
1	10/16/2024	ADDENDUM NO.2
	09/30/2024	BID/PERMIT
	07/08/2024	PHASE 3

FIRE PROTECTION ABBREVIATIONS, NOTES AND SYMBOLS

Date 07/08/2024
Scale As indicated
Proj. Number 22367.00
Drawing Number **FP000**

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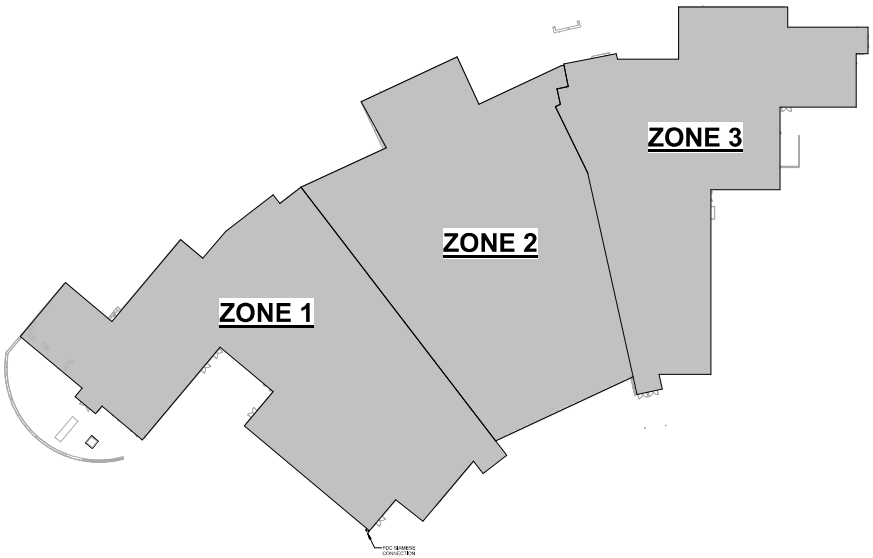
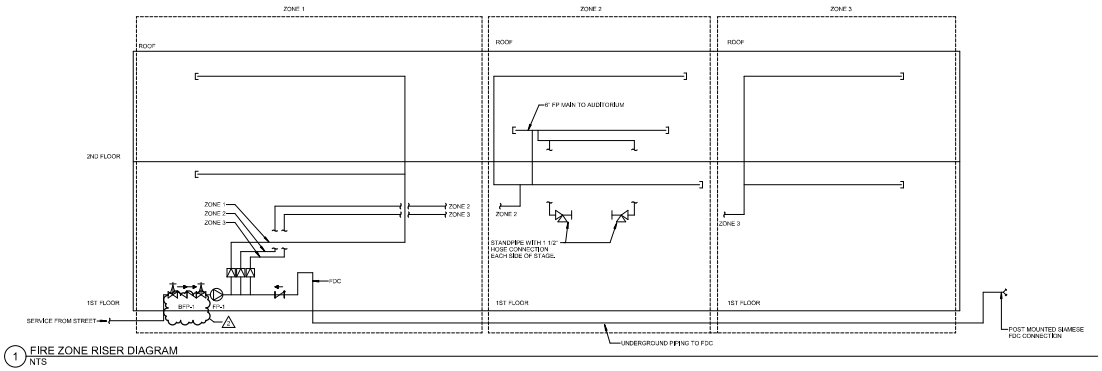


2 FIRE PROTECTION FIRST FLOOR ZONING PLAN
1/32" = 1'-0"



1 FIRE ZONE RISER DIAGRAM
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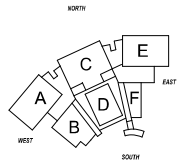

KEYPLAN

Number	Date	Issued For
2	10/23/2024	ADDENDUM NO. 3
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

FIRE PROTECTION ZONING PLAN

Date
07/08/2024
Scale
As indicated
Proj. Number
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Drawing Number
FP001

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KEYNOTES - FIRE PROTECTION	
Key Value	Keynote Text
FP1	6" FP SERVICE FROM THE STREET, REFER TO FIRE SERVICE DETAIL.
FP2	ELECTRIC FIRE PUMP, REFER TO FIRE PUMP DETAIL.
FP5	PROVIDE UPRIGHT SPRINKLERS WITH GUARD BELOW STAIRWELL AND STAIR LANDINGS TO PROVIDE COMPLETE COVERAGE PER NFPA 13. SPRINKLERS TO BE SUPPLIED FROM MAIN ON EACH RESPECTIVE FLOOR.
FP6	PROVIDE UPRIGHT SPRINKLERS ABOVE CLOUD CEILING AND CONCEALED PENDANT SPRINKLERS IN CLOUD CEILING - TYPICAL FOR ALL SPRINKLERS IN CAFETERIA AREA. MATCH CONCEALED SPRINKLER PLATE WITH FINISH COLOR OF CLOUD CEILING.
FP14	FIRE PUMP TEST HEADER CONNECTION, REFER TO FIRE PUMP TEST HEADER DETAIL.
FP20	WET SPRINKLER PIPE SHALL NOT BE ROUTED DIRECTLY ABOVE ELECTRICAL PANELS.
FP22	PROVIDE FLEXIBLE COUPLINGS WHERE PIPES CONNECT AT ANGLES NOT EQUAL TO 45 OR 90 DEGREES, PENETRATE WALLS AT 90 DEGREES WHENEVER POSSIBLE (TYPICAL).



1 FIRE PROTECTION FIRST FLOOR PLAN - A
1/8" = 1'-0"

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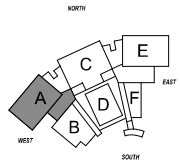

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1	10/16/2024	ADDENDUM NO. 2
	09/30/2024	BID/PERMIT
	07/08/2024	PHASE 3

FIRE PROTECTION FIRST FLOOR PLAN - PART A

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **FP101A**

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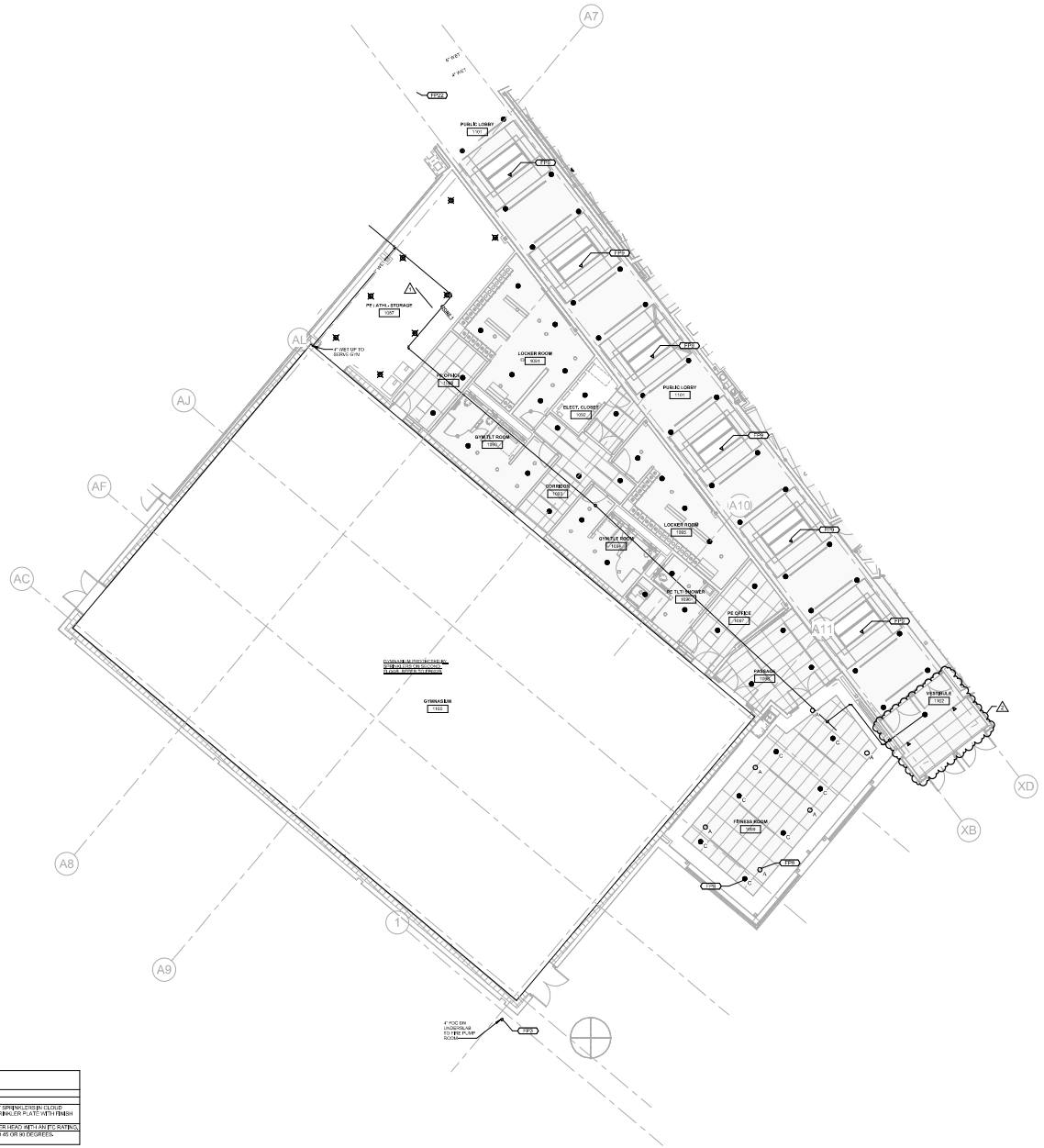
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1081
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FP12
FP13
FP14
FP15
FP16
FP17
FP18
FP19
FP20
FP21
4" WET
4" WET
4" WET UP TO SERVE GYM
4" WET
4" WET
4" WET

KEYNOTES - ELECTRICAL SITE UTILITY	
Key Value	Keynote Text
FP6	PROVIDE UPRIGHT SPRINKLERS WITH GUARD BELOW STAIRWELL AND STAIR LANDINGS TO PROVIDE COMPLETE COVERAGE PER NFPA 13. SPRINKLERS TO BE SUPPLIED FROM MAIN ON EACH RESPECTIVE FLOOR.
FP9	REFER TO A1FP9A FOR SKYLIGHT UNDERWALL SPRINKLER HEAD. PROVIDE SPRINKLER HEAD WITH AN ITC RATING.
FP10	PROVIDE UPRIGHT SPRINKLERS ABOVE CLOUD CEILING AND CONCEALED PENDANT SPRINKLERS IN CLOUD CEILING, TYPICAL FOR ALL SPRINKLERS IN MEDIA CENTER, MATCH CONCEALED SPRINKLER PLATES WITH FINISH COLOR OF CLOUD CEILING.
FP18	PROVIDE UPRIGHT SPRINKLER WITH GUARD UNDER OBSTRUCTIONS AND DUCTWORK OVER 48" (4' W WIDTH AS PER NFPA 13, TYPICAL OF ALL SPRINKLERS IN MECHANICAL ROOMS
FP22	PROVIDE FLEXIBLE COUPLINGS WHERE PIPES CONNECT AT ANGLES NOT EQUAL TO 45 OR 90 DEGREES. PENETRATE WALLS AT 90 DEGREES WHENEVER POSSIBLE (TYPICAL).



1 FIRE PROTECTION FIRST FLOOR PLAN - C
1/8" = 1'-0"

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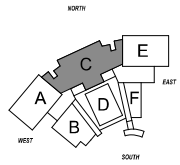

KEYPLAN

Number	Date	Issued For
2	10/23/2024	ADDENDUM NO.3
1	10/16/2024	ADDENDUM NO.2
	09/30/2024	BID/PERMIT
	07/08/2024	PHASE 3

FIRE PROTECTION FIRST FLOOR PLAN - PART C

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **FP101C**

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KEYNOTES - FIRE PROTECTION	
Key Value	Keynote Text
FP9	REFER TO #VFP400 FOR SKYLIGHT SIDEWALL SPRINKLER HEAD. PROVIDE SPRINKLER HEAD WITH AN ITC RATING.
FP21	COORDINATE SPRINKLER LAYOUT WITH DUCTWORK TO COORDINATE AROUND OBSTRUCTIONS PER NFPA 13.
FP22	PROVIDE FLEXIBLE COUPLINGS WHERE PIPES CONNECT AT ANGLES NOT EQUAL TO 45 OR 90 DEGREES. PENETRATE WALLS AT 90 DEGREES WHENEVER POSSIBLE (TYPICAL).

1 FIRE PROTECTION FIRST FLOOR PLAN - D
1/8" = 1'-0"

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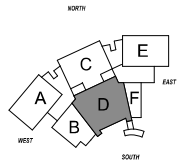

KEYPLAN

Number	Date	Issued For
2	10/23/2024	ADDENDUM NO. 3
1	10/18/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

FIRE PROTECTION FIRST FLOOR PLAN - PART D

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
22367.00

Drawing Number
FP101D

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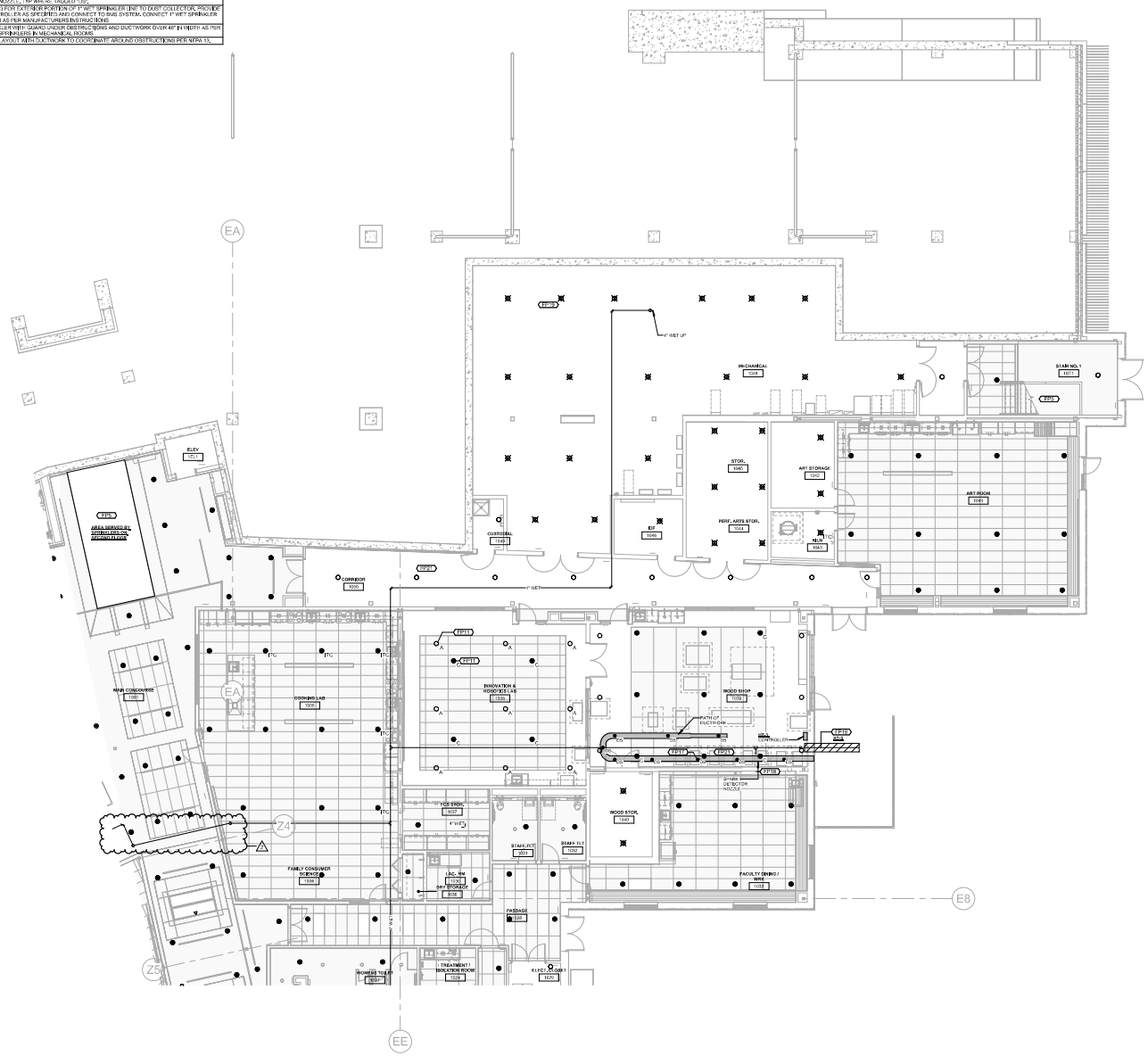
10/23/2024 9:01:00 AM

KEYNOTES - FIRE PROTECTION	
Key Value	Keynote Text
FP9	PROVIDE UPRIGHT SPRINKLERS WITH GUARD BELOW STAIRWELL AND STAIR LANDINGS TO PROVIDE COMPLETE COVERAGE PER NFPA 13. SPRINKLERS TO BE SUPPLIED FROM MAIN ON EACH RESPECTIVE FLOOR.
FP11	PROVIDE UPRIGHT SPRINKLERS ABOVE CLOUD CEILING AND CONCEALED PENDANT SPRINKLERS IN CLOUD CEILING, TYPICAL. FOR ALL SPRINKLERS IN WOOD SHOP, MATCH CONCEALED SPRINKLER PLATE WITH FINISH COLOR OF CLOUD.
FP16	2" WET FP PIPE SHALL CONNECT TO SPARK DETECTOR NOZZLE. SPARK DETECTOR NOZZLE BY DIV 23
FP17	QUICK RESPONSE PENDANT SPRINKLER WITH CORROSION RESISTANT FINISH INSIDE DUST COLLECTION DUCTWORK 6" OR LARGER, PROVIDE ALL SPRINKLERS IN DUCTWORK WITH CELLOPHANE BAGS. PROVIDE MIN 19 GPM AT 50 PSI FOR EACH NOZZLE. TYP WHERE TAGGED TO.
FP18	PROVIDE HEAT TRACE FTI-1 FOR EXTERIOR PORTION OF 1" WET SPRINKLER LINE TO DUST COLLECTOR. PROVIDE INSULATION AND I/P CONTROLLER AS SPECIFIED AND CONNECT TO BMS SYSTEM. CONNECT 1" WET SPRINKLER LINE TO DUST COLLECTOR AS PER MANUFACTURERS INSTRUCTIONS
FP19	PROVIDE UPRIGHT SPRINKLER WITH GUARD UNDER OBSTRUCTIONS AND DUCTWORK OVER 48" IN WIDTH AS PER NFPA 13, TYPICAL OF ALL SPRINKLERS IN MECHANICAL ROOMS
FP21	COORDINATE SPRINKLER LAYOUT WITH DUCTWORK TO COORDINATE AROUND OBSTRUCTIONS PER NFPA 13.



2 FIRE PROTECTION FIRST FLOOR PLAN - E
1/8" = 1'-0"

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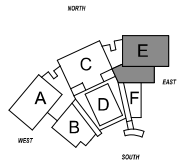

KEYPLAN

Number	Date	Issued For
2	10/23/2024	ADDENDUM NO.3
	09/30/2024	BID/PERMIT
	07/08/2024	PHASE 3

FIRE PROTECTION FIRST FLOOR PLAN PART - E

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **FP101E**

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2 FIRE PROTECTION FIRST FLOOR PLAN - F
1/8" = 1'-0"

KEYNOTES - FIRE PROTECTION

Key Value	Keynote Text
FP22	PROVIDE FLEXIBLE COUPLINGS WHERE PIPES CONNECT AT ANGLES NOT EQUAL TO 45 OR 90 DEGREES, PENETRATE WALLS AT 90 DEGREES WHENEVER POSSIBLE (TYP.ALL)

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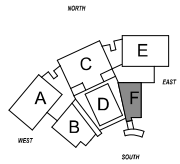

KEYPLAN

Number	Date	Issued For
1	10/16/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRE PROTECTION FIRST FLOOR PLAN - PART F

Date 07/08/2024
Scale 1/8" = 1'-0"
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KEYNOTES - FIRE PROTECTION	
Key Value	Keynote Text
FP1	PROTECT UPRIGHT SPRINKLERS WITH GUARD TO COVER STAIRWELL AND STAIR LANDINGS TO PROVIDE COMPLETE COVERAGE PER NFPA 13. SPRINKLERS TO BE SUPPLIED FROM MAIN CH EACH RESPECTIVE FLOOR.
FP12	PROVIDE UPRIGHT SPRINKLERS ABOVE CLOUD CEILING AND CONCEALED PENDANT SPRINKLERS IN CLOUD CEILING, TYPICAL FOR ALL SPRINKLERS IN CONVENING, MATCH CONCEALED SPRINKLER PLATE WITH FINISH.
FP20	PROVIDE FIRESTOP SYSTEM WHERE PIPES CONNECT AT ANGLES NOT EQUAL TO 45 OR 90 DEGREES. PENETRATE WALLS AT 90 DEGREES WHENEVER POSSIBLE, TYPICAL.

1 FIRE PROTECTION SECOND FLOOR PLAN - A
1/8" = 1'-0"

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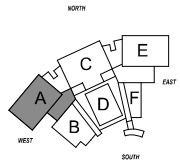

KEYPLAN

Number	Date	Issued For
1	10/16/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

FIRE PROTECTION SECOND FLOOR PLAN - PART A

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **FP102A**

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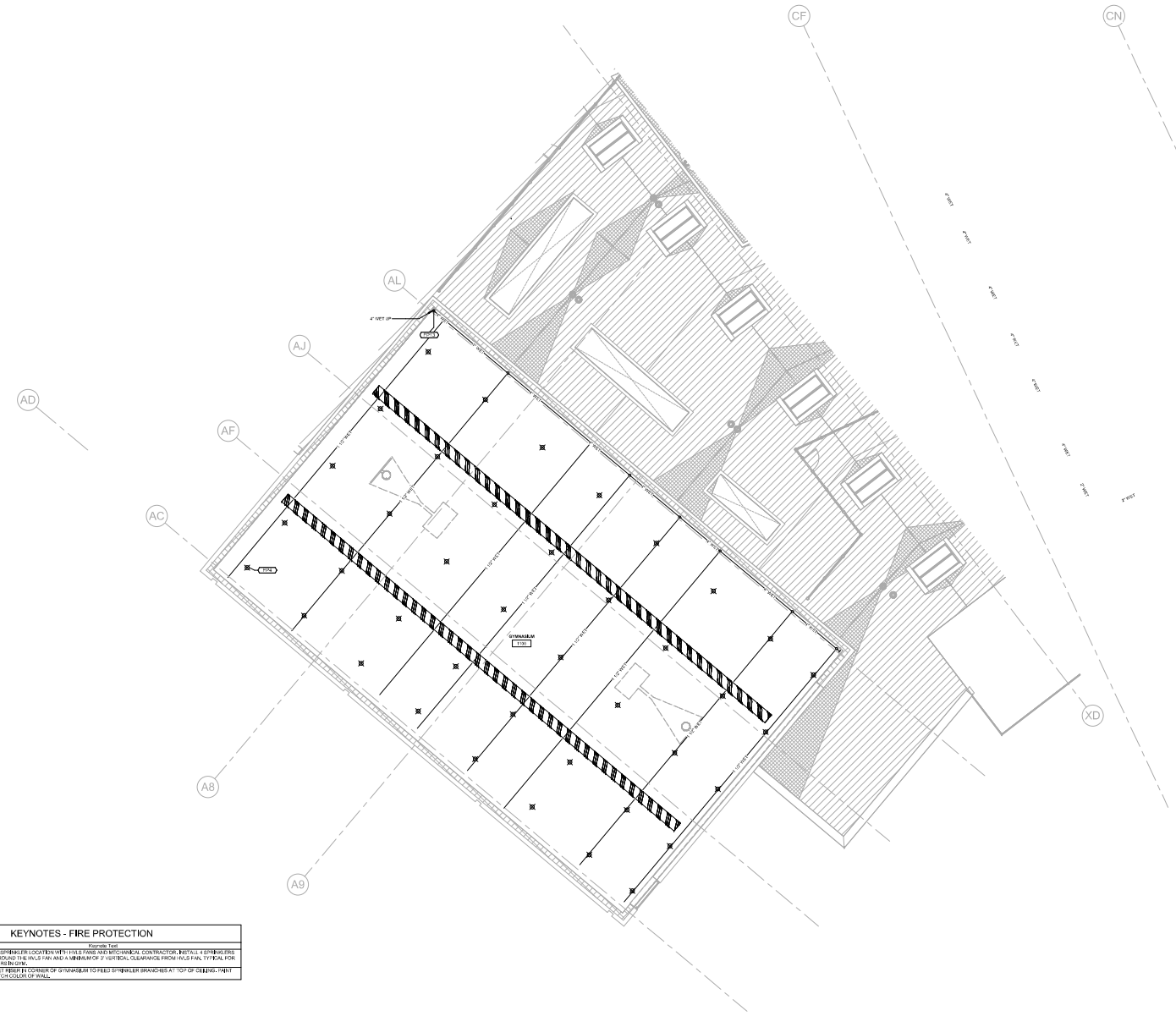

KEYNOTES - FIRE PROTECTION	
Key Value	Keynote Text
FP4	COORDINATE SPRINKLER LOCATION WITH HVLS FANS AND MECHANICAL CONTRACTOR. INSTALL 4 SPRINKLERS CENTERED AROUND THE HVLS FAN AND A MINIMUM OF 3' VERTICAL CLEARANCE FROM HVLS FAN. TYPICAL FOR ALL SPRINKLERS IN GYM.
FP13	INSTALL 4" WET RISER IN CORNER OF GYMNASIUM TO FEED SPRINKLER BRANCHES AT TOP OF CEILING. PAINT RISER TO MATCH COLOR OF WALL.

1 FIRE PROTECTION SECOND FLOOR PLAN - B
1/8" = 1'-0"

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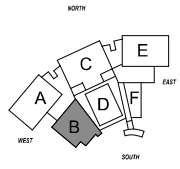

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRE PROTECTION SECOND FLOOR PLAN - PART B

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
22367.00

Drawing Number
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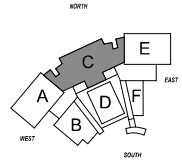

KEYPLAN

Number	Date	Issued For
1	10/16/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

FIRE PROTECTION SECOND FLOOR PLAN - PART C

Date	Drawing Number
07/08/2024	FP102C
Scale: 1/8" = 1'-0"	
Proj. Number: 22367.00	

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1 FIRE PROTECTION SECOND FLOOR PLAN - D
1/8" = 1'-0"

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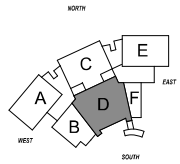

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRE PROTECTION SECOND FLOOR PLAN - PART D

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **FP102D**

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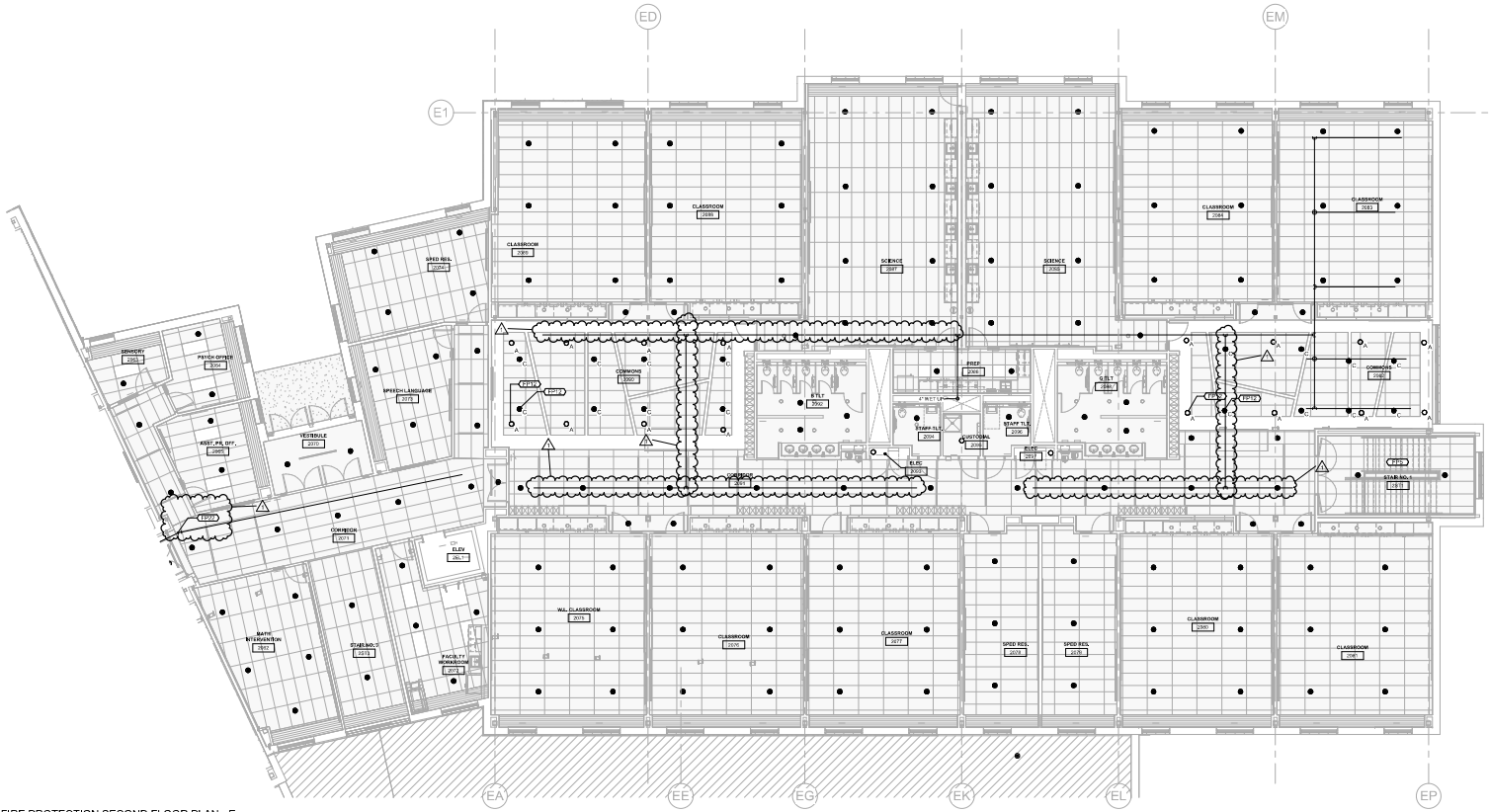

1 FIRE PROTECTION SECOND FLOOR PLAN - E
1/8" = 1'-0"

KEYNOTES - FIRE PROTECTION

Key Value	Keynote Text
FP5	PROVIDE UPRIGHT SPRINKLERS WITH GUARD BELOW STAIRWELL AND STAIR LANDINGS TO PROVIDE COMPLETE COVERAGE PER NFPA 13. SPRINKLERS TO BE SUPPLIED FROM MAIN ON EACH RESPECTIVE FLOOR.
FP12	PROVIDE UPRIGHT SPRINKLERS ABOVE CLOUD CEILING AND CONCEALED PENDANT SPRINKLERS IN CLOUD CEILING, TYPICAL FOR ALL SPRINKLERS IN COMMONS, MATCH CONCEALED SPRINKLER PLATE WITH TRIM+ FINISH OF CEILING.
FP22	PROVIDE FLEXIBLE COUPLINGS WHERE PIPES CONNECT AT ANGLES NOT EQUAL TO 45 OR 90 DEGREES. PENETRATE WALLS AT 90 DEGREES WHENEVER POSSIBLE (TYPICAL).

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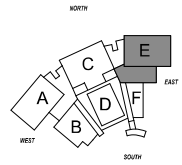

KEYPLAN

Number	Date	Issued For
1	10/16/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRE PROTECTION SECOND FLOOR PLAN - PART E

Date 07/08/2024
Scale 1/8" = 1'-0"
Proj. Number 22367.00
Drawing Number **FP102E**

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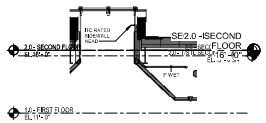
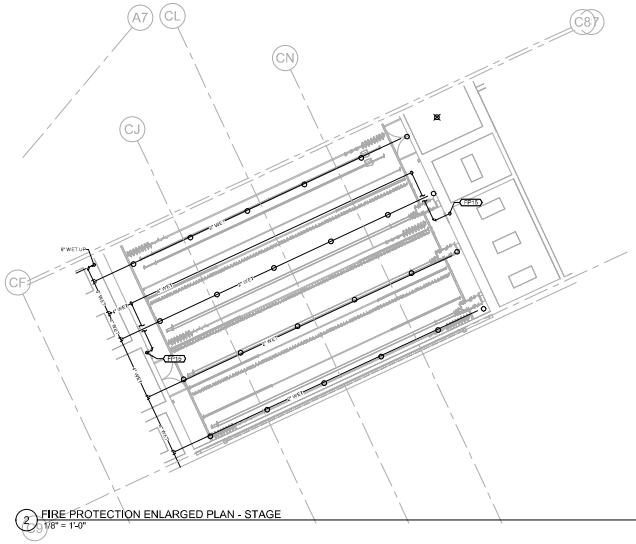


1 SKYLIGHT SPRINKLER DETAIL - TYPICAL
1/4" = 1'-0"



2 FIRE PROTECTION ENLARGED PLAN - STAGE
1/8" = 1'-0"

KEYNOTES - FIRE PROTECTION	
Key Value	Keynote Text
FP15	4" STANDPIPE DOWN TO HOSE CABINET VALVE. REFER STANDPIPE DETAIL.

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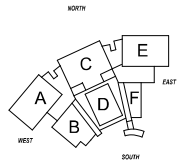

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRE PROTECTION ENLARGED PLANS

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: FP400

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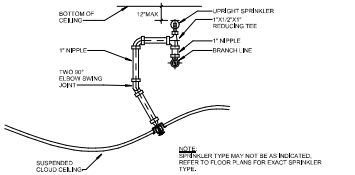
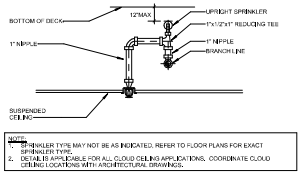
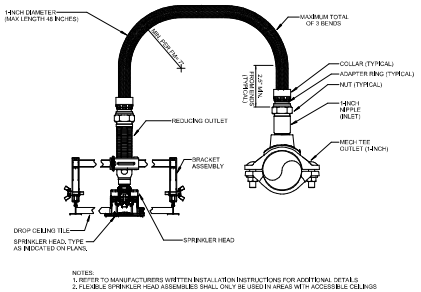


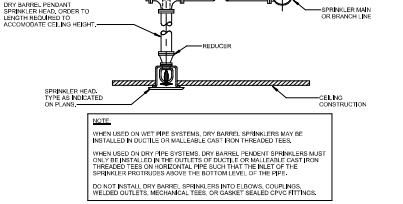
9 SPRINKLER ABOVE AND BELOW CEILING DETAIL - AUDITORIUM
NTS



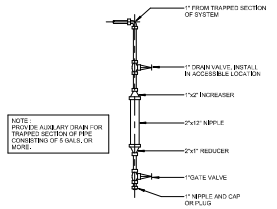
8 SPRINKLER ABOVE AND BELOW SUSPENDED CEILING - CLOUDS
NTS



7 FLEXIBLE HOSE SPRINKLER ASSEMBLY
NTS



10 SIDE TAP DETAIL - DRY BARREL SPRINKLER HEAD
NTS



6 AUXILARY DRAIN
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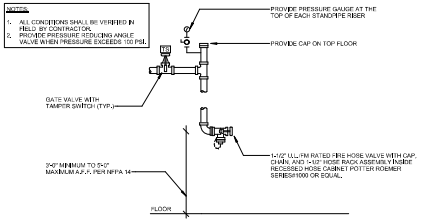

5 STANDPIPE DETAIL
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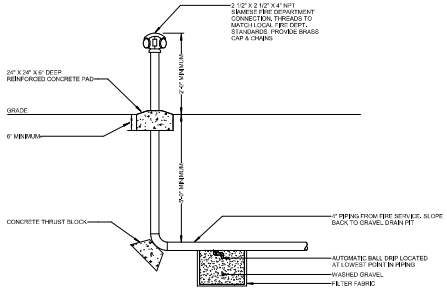
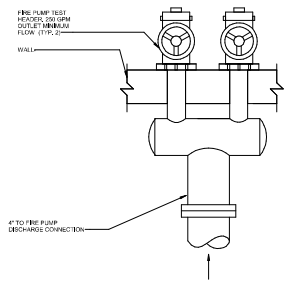
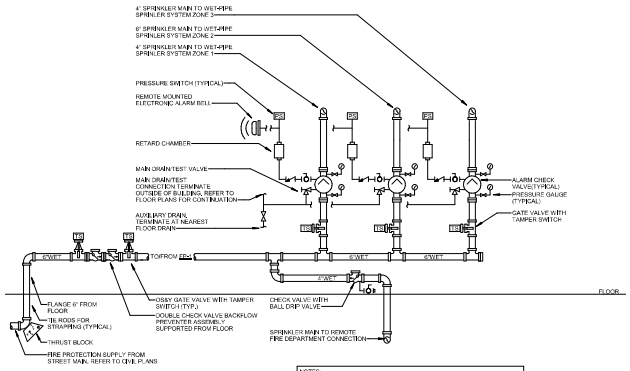


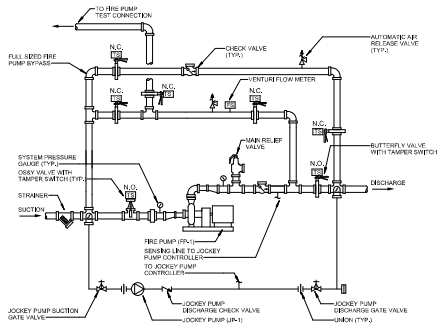
4 GRADE MOUNTED FIRE DEPARTMENT CONNECTION
1/8" = 1'-0"



3 FIRE PUMP TEST HEADER DETAIL
1/8" = 1'-0"



2 FIRE PROTECTION SERVICE (2 WET)
NTS



1 FIRE PUMP DETAIL
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Greenwich Central Middle School

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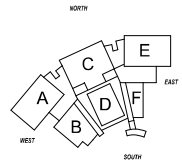

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

FIRE PROTECTION DETAILS

Date 07/08/2024
Scale As indicated
Proj. Number 22367.00
Drawing Number FP500

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PLUMBING PIPING LEGEND

SYMBOL	DESCRIPTION
	COLD WATER
	HOT WATER
	HOT WATER RECIRCULATION
—SAN—	SANITARY DRAIN/WASTE ABOVE FLOOR
—SAN—	SANITARY DRAIN/WASTE BELOW FLOOR
	VENT
—IW—	INDIRECT WASTE
—STM—	STORM ABOVE FLOOR (PRIMARY)
—STM—	STORM BURIED (PRIMARY)
—SST—	STORM ABOVE FLOOR (SECONDARY)
	NATURAL GAS
—GW—	GREASE WASTE
—GW—	GREASE WASTE BELOW FLOOR
—TW—	TEMPERED WATER (85°F)
	PIPE RISE
	PIPE DROP
	PIPE TEE TOWARDS (UP IN PLAN)
	PIPE TEE AWAY (DOWN IN PLAN)
	PIPE DROP AND RUN
	DIRECTION OF FLOW
	PIPE TRAP
	DIRT LEG
CO	CLEANOUT
	UNION OR FLANGE
	BLIND FLANGE
	END CAP
	REDUCER

GENERAL ABBREVIATIONS

AD	ACCESS DOOR
ADJ	ADJUSTABLE
AFF	ABOVE FINISHED FLOOR
ALT	ALTERNATE
AHJ	AUTHORITY HAVING JURISDICTION
AP	ACCESS PANEL
AV	ACID VENT
AVTR	ACID VENT THRU ROOF
AW	ACID WASTE
BAS	BUILDING AUTOMATION SYSTEM
BTU	BRITISH THERMAL UNIT
BTUH	BTU / HOUR
BOF	BOTTOM OF PIPE
CD	CONDENSATE DRAIN
CFH	CUBIC FEET PER HOUR
CI	CAST IRON
CO	CLEANOUT
CW	COLD WATER
DIA	DIAMETER
DN	DOWN
DSN	DOWN SPOUT NOZZLE
DW	DIRECT WASTE
ELEC	ELECTRICAL
ET	EXPANSION TANK
EWS	EMERGENCY EYEWASH/SHOWER
°F	DEGREES FAHRENHEIT
FCO	FLOOR CLEANOUT
FFE	FINISHED FLOOR ELEVATION
FGCO	FINISHED GRADE CLEANOUT
FS	FLOW SENSORS
FLD	FLOOR DRAIN
FS	FLOOR SINK
FT	FEET
FT WG	FEET HEAD
G	GAS
GALL	GALLONS
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GSV	GAS SOLENOID VALVE
GW	GREASE WASTE
GV	GAS VENT
HB	HOSE BIB
HW	HOT WATER
HD	HEAD
HP	HORSEPOWER
HZ	HERTZ
HWR	HOT WATER RECIRCULATION
INT	INTERCEPTOR
INV ELEV	INVERT ELEVATION
IW	INDIRECT WASTE
KW	KILOWATT
LAV	LAVATORY
MAX	MAXIMUM
MECH	MECHANICAL
MBH	THOUSAND BTU PER HOUR
MCA	MINIMUM CIRCUIT AMPACITY
MIN	MINIMUM
NIC	NOT IN CONTRACT
NG	NATURAL GAS
NTS	NOT TO SCALE
OD	OUTSIDE DIAM.
OW	OIL WASTE
PCD	PUMPED CONDENSATE DRAIN
PLBG	PLUMBING
PSIG	POUNDS PER SQUARE INCH GAUGE
QTY	QUANTITY
RD	ROOF DRAIN
RPBP	REDUCED PRESSURE BACKFLOW PREVENTER
RTU	ROOFTOP UNIT
SAN	SANITARY
SQFT / SF	SQUARE FEET
SS	SOIL STACK
ST	STORM
SST	SECONDARY STORM
TEMP	TEMPERATURE
TW	TEMPERED WATER
TYP	TYPICAL
V	VENT
VS	VENT STACK
VTR	VENT THRU ROOF
W	WASTE
W/HYD	WALL HYDRANT
WS	WASTE STACK
W&V	WASTE AND VENT

VALVE AND SYMBOL LEGEND

SYMBOL	DESCRIPTION
	BALL VALVE
	BALL VALVE WITH HOSE BIBB, CAP & CHAIN (DRAIN VALVES)
	BUTTERFLY VALVE
	GLOBE VALVE
	GATE VALVE
	OS&Y VALVE
	PLUG VALVE
	PRESSURE REDUCING VALVE
	CHECK VALVE
	Y-PATTERN STRAINER
	SOLENOID VALVE
	AUTOMATIC CONTROL VALVE, MODULATING ACTUATOR
	AUTOMATIC CONTROL VALVE, TWO POSITION ACTUATOR
	THREE WAY AUTOMATIC CONTROL VALVE, MODULATING ACTUATOR
	THREE WAY AUTOMATIC CONTROL VALVE, TWO POSITION ACTUATOR
	COMBINATION SHUT OFF/BALANCING VALVE (CIRCUIT SETTER)
	SAFETY RELIEF VALVE
	PRESSURE GAUGE
	THERMOMETER
	DOUBLE CHECK VALVE ASSEMBLY
	REDUCED PRESSURE BACKFLOW PREVENTER ASSEMBLY AND DRAIN
	GATE VALVE IN ROAD CURB BOX
	BACKWATER VALVE
	PUMP
M	WATER METER
	FLOOR DRAIN / FLOOR SINK / AREA DRAIN WITH P-TRAP
	ROOF / OVERFLOW DRAIN
TP	TRAP PRIMER
GM	GAS METER
	WATER HAMMER ARRESTOR
	VENT THRU ROOF
	ADA ACCESSIBLE FIXTURE

GENERAL NOTES

GENERAL

1. GENERAL NOTES, SYMBOLS AND DETAILS ARE APPLICABLE TO DRAWINGS WITHIN DIVISION 22.
2. DRAWINGS ARE DIAGRAMMATIC AND ARE INTENDED TO INDICATE CAPACITY, SIZE, APPROXIMATE LOCATION AND GENERAL ARRANGEMENT. DETERMINE LOCATIONS OF SYSTEMS AND COMPONENTS IN FIELD.
3. COORDINATE CONCRETE PADS AND STEEL PLATFORMS REQUIRED FOR PLUMBING WORK.
4. COORDINATE ROOF AND WALL PENETRATIONS WITH WORK OF OTHER SECTIONS AND WITH FLASHING REQUIREMENTS. COORDINATE SLAB PENETRATIONS WITH WORK OF OTHER SECTIONS.
5. RUN PIPING CONCEALED, UNLESS SPECIFIED OTHERWISE, AND CLEAR OF CEILING INSERTS.
6. COORDINATE WORK OF THIS SECTION WITH THAT OF OTHER SECTIONS AND WITH ALL TRADES INVOLVED.
7. NOT ALL ACCESS DOORS HAVE BEEN SHOWN ON THE PLANS. PROVIDE ACCESS PANELS THROUGH BUILDING ASSEMBLIES TO SERVICE AND MAINTAIN EQUIPMENT UNLESS SUCH EQUIPMENT IS INSTALLED IN EXPOSED LOCATIONS OR ABOVE LAY-IN CEILINGS. COORDINATE THE LOCATION OF ACCESS DOORS AND PANELS AND VERIFY THE QUANTITY, SIZE, AND LOCATIONS AFTER THE SYSTEMS AND EQUIPMENT REQUIRING ACCESS HAVE BEEN INSTALLED AND PRIOR TO THE CLOSURE OF THE AFFECTED CEILINGS AND BUILDING ASSEMBLIES. SUBMIT ACCESS PANEL LOCATIONS FOR REVIEW.
8. AT SUBSTANTIAL COMPLETION, THE FOLLOWING ITEMS, NEW OR EXISTING, SHALL BE FULLY AND REASONABLY ACCESSIBLE: CONTROL BOXES, JUNCTION BOXES, VALVES, OCC CONTROL BOXES, ELECTRICAL PANELS, CLEAN OUTS, DISCONNECT SWITCHES AND ELEMENTS OF EQUIPMENT REQUIRING MAINTENANCE. "FULLY AND REASONABLY ACCESSIBLE" SHALL BE DEFINED AS BEING ABLE TO ACCESS THE ITEM WITHOUT CUTTING, REMOVING OR POWERED EQUIPMENT AND CAPABLE OF BEING ACCESSED OR SERVICED WITHOUT REMOVING, MOVING OR OBSTRUCTING OTHER COMPONENTS OF THE WORK. PROVIDE MANUFACTURER'S RECOMMENDED CLEARANCE FOR ALL EQUIPMENT.
9. VERIFY EQUIPMENT CONNECTIONS WITH MANUFACTURER'S CERTIFIED DRAWINGS. VERIFY AND PROVIDE FITTINGS TO TRANSITION TO FURNISHED EQUIPMENT. FIELD VERIFY AND COORDINATE DIMENSIONS BEFORE FABRICATION.
10. INSTALL FOOD SERVICE AND/OR KITCHEN EQUIPMENT PLUMBING ACCESSORIES FURNISHED UNDER DIVISION 11, INCLUDING BUT NOT LIMITED TO: FAUCETS, VACUUM BREAKERS SOLENOIDS, PRESSURE REDUCING VALVES, GAS SUPPLY HOSES, DRAINS, SINK TAILPIECES, AND OTHER PLUMBING TRIM SUPPLIED WITH EQUIPMENT IN ACCORDANCE WITH THE KITCHEN DESIGN DOCUMENTS.
11. INSTALL LABORATORY EQUIPMENT ACCESSORIES INCLUDING BUT NOT LIMITED TO: SINKS, FAUCETS, TRAPS, TAILPIECES, GAS COCKS, EMERGENCY SAFETY EQUIPMENT, VACUUM BREAKERS, AND OTHER PLUMBING TRIM SUPPLIED WITH EQUIPMENT IN ACCORDANCE WITH THE LABORATORY DESIGN DOCUMENTS.
12. IN COMPLIANCE WITH THE FEDERAL SAFE DRINKING WATER ACT (SDWA), THE CONTRACTOR SHALL NOT PROVIDE ANY COMPONENTS IN THE DOMESTIC WATER SYSTEM THAT CONTAIN MORE THAN 0.25% LEAD ON ANY WETTED PARTS. THE CONTRACTOR SHALL PROVIDE THE LEAD FREE EQUIVALENT OF ANY EQUIPMENT SPECIFIED AND PROVIDE A LETTER CERTIFYING THAT ALL PLUMBING PRODUCTS PROVIDED MEET THIS REGULATION.
13. PLUMBING WORK SHALL BE DONE IN ACCORDANCE WITH THE STATE PLUMBING AND FUEL GAS CODE. COORDINATE WITH THE INSPECTOR FOR ALL PLUMBING INSPECTIONS.
14. IN THE EVENT THAT THERE ARE DISCREPANCIES BETWEEN PIPE SIZES SHOWN ON THE PLANS, DETAILS AND DIAGRAMS, THE LARGER PIPE SIZE SHALL BE PROVIDED.

PIPING SYSTEM SPECIFIC NOTES:

1. PROVIDE ESCUTCHEONS AT EXPOSED PIPE PENETRATIONS OF CEILINGS AND WALLS
2. TOPS OF FLOOR DRAINS SHALL BE FLUSH WITH FINISHED FLOOR.
3. PROVIDE SHUT-OFF VALVES ON BRANCH PIPING AND ON SUPPLIES TO INDIVIDUAL FIXTURES AND EQUIPMENT.
4. SUPPORT PIPING FROM STRUCTURE. PROVIDE CLAMPS, OFFSETS, EXPANSION JOINTS, ANCHORS AND GUIDES AS NECESSARY TO PREVENT STRESS ON PIPING.
5. PROVIDE DRAIN WITH BALL VALVE, HOSE END VACUUM BREAKER, CAP AND CHAIN AT DOMESTIC WATER LOW POINTS AND PITCH PIPING TO DRAIN.
6. PROVIDE ACCESSIBLE CLEANOUTS AT THE BASE OF STACKS.
7. PLUMBING PIPING AND DRAINS SHALL BE PROTECTED FROM DEBRIS AND KEPT CLEAR OF BLOCKAGE DURING CONSTRUCTION.
8. PROVIDE DIELECTRIC FITTINGS WHEN JOINING PIPES OF DISSIMILAR METALS.
9. PROVIDE OFFSETS IN PIPING AROUND OBSTRUCTIONS.

NATURAL GAS NOTES:

1. OBTAIN APPLICABLE PERMITS FOR THE WORK.
2. PROVIDE DRIP POCKET AT THE BOTTOM OF GAS RISERS.
3. GAS PIPING TO COMPLY WITH STATE AND LOCAL CODES.
4. GAS PIPING AND SAFETY DEVICES SHALL CONFORM TO THE REQUIREMENTS OF NFPA 54 AND SHALL BE SUBJECT TO THE INSPECTION AND APPROVAL OF THE STATE REGULATORY BOARD.
5. PROVIDE GAS COCK VALVE AT EACH BRANCH RUNOUT FROM THE MAIN RISER SERVING GAS OUTLETS AND AT INDIVIDUAL GAS FIXTURES.
6. GAS PIPING SHALL BE TESTED IN ACCORDANCE WITH APPLICABLE CODES, AND APPROVED BY THE LOCAL PLUMBING INSPECTOR. IF INSPECTION AND TEST SHOWS DEFECTS, DEFECTIVE WORK AND MATERIAL SHALL BE REPLACED AND INSPECTION AND TEST SHALL BE REDONE.

PENETRATIONS NOTES:

1. PROVIDE FIRE STOPPING AND SMOKE BARRIER SEALING OF PENETRATIONS THROUGH FIRE WALLS OR SMOKE BARRIERS INCLUDING BOTH EMPTY OPENINGS AND OPENINGS CONTAINING CABLES, PIPES, DUCTS, CONDUITS AND OTHER PENETRATING ITEMS. REFER TO ARCHITECTURAL FLOOR PLANS AND CODE SHEETS FOR WALL RATINGS. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

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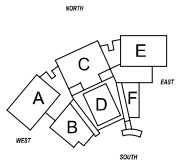

KEYPLAN

Number	Date	Issued For
	06/07/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

PLUMBING ABBREVIATIONS, NOTES AND SYMBOLS

Date: 07/08/2024
Scale: 12" = 1'-0"
Proj. Number: 22367.00

Drawing Number: P000

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1 PLUMBING FIRST FLOOR PLAN - OVERALL
1/16" = 1'-0"

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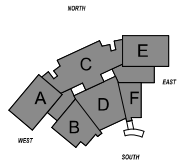

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

PLUMBING FIRST FLOOR OVERALL PLAN

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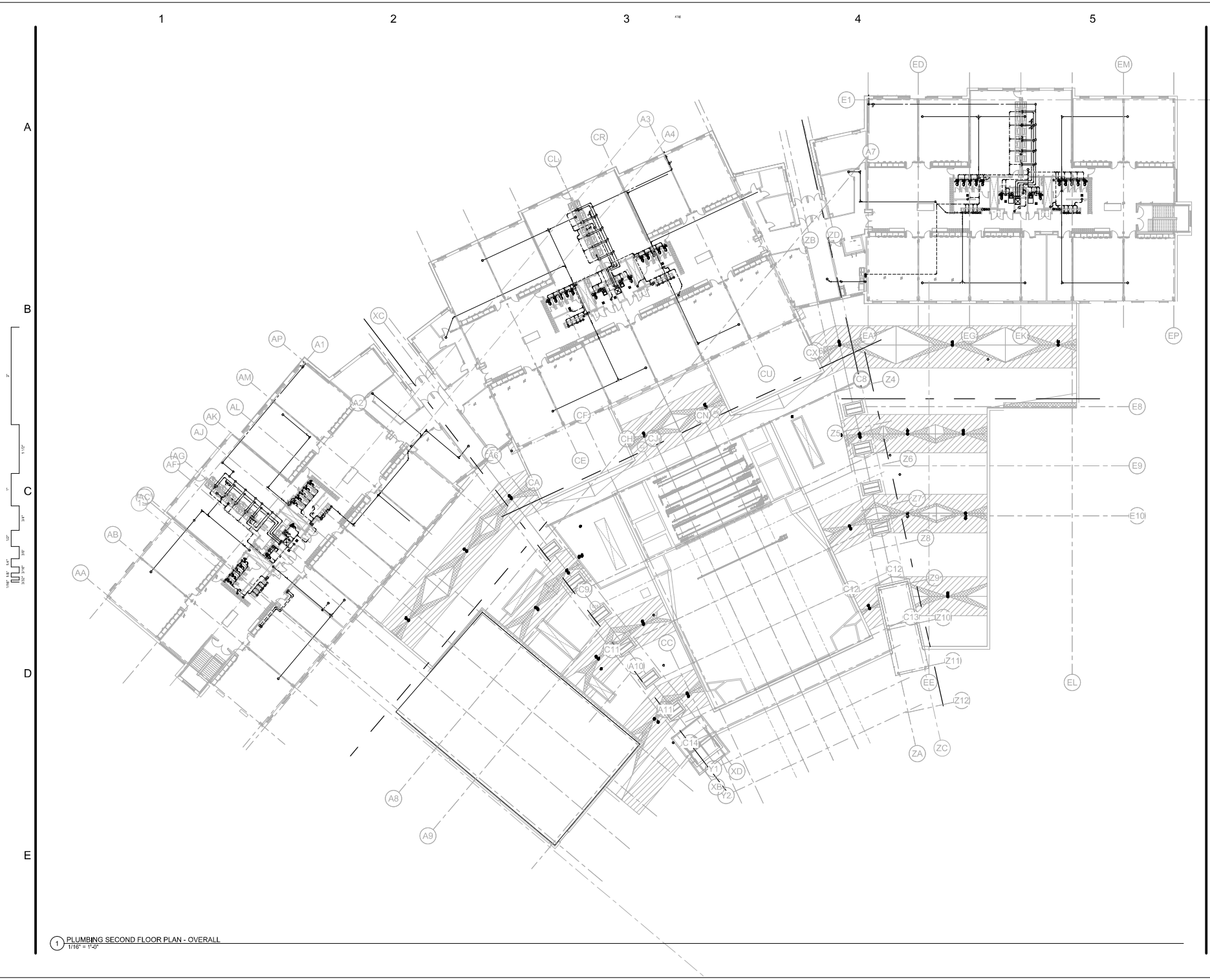

1 PLUMBING SECOND FLOOR PLAN - OVERALL
1/16" = 1'-0"

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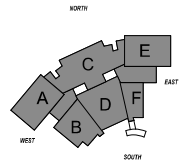

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

PLUMBING SECOND FLOOR OVERALL PLAN

Date
07/08/2024
Scale
1/16" = 1'-0"
Proj. Number
22367.00

Drawing Number
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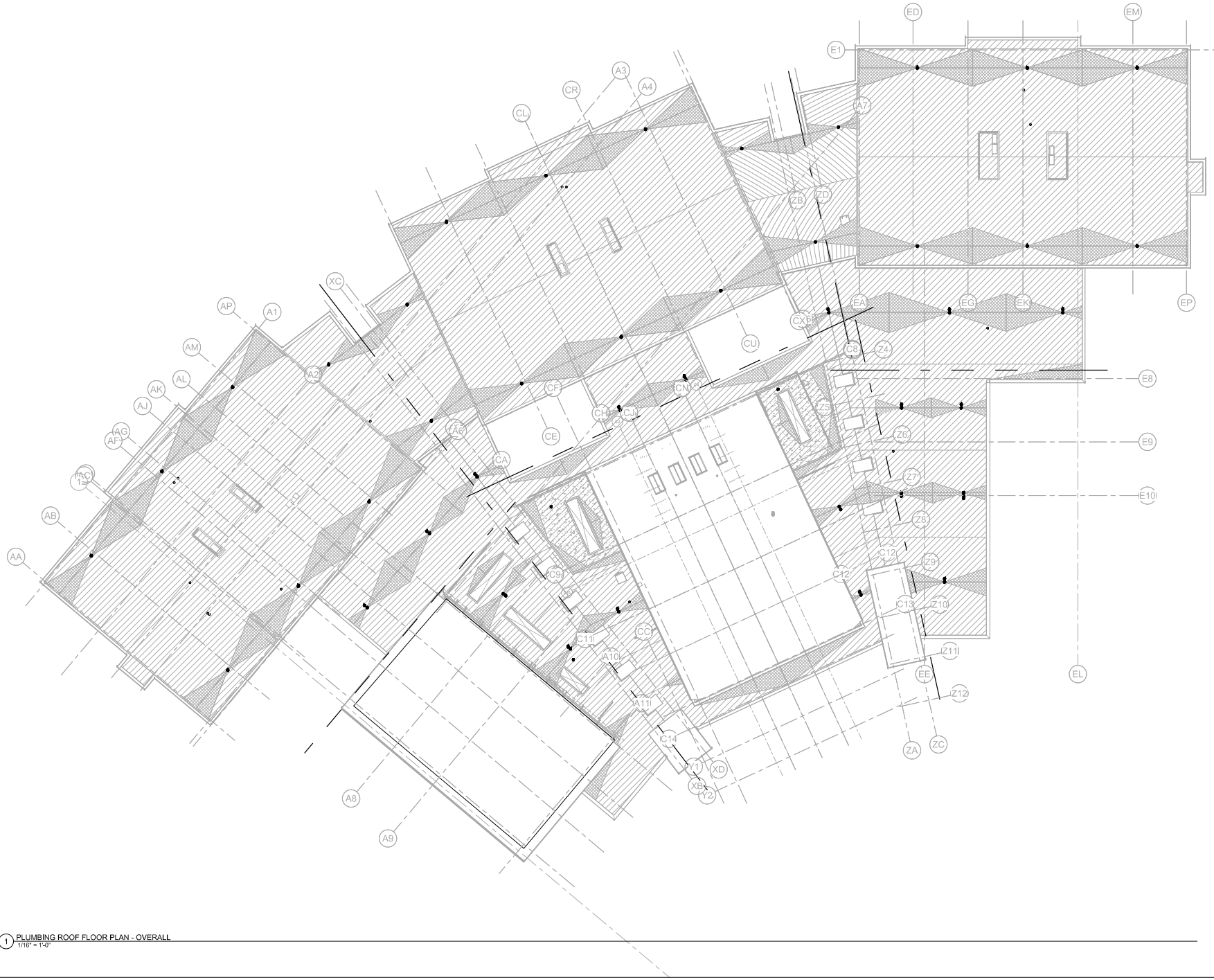

1 PLUMBING ROOF FLOOR PLAN - OVERALL
1/16" = 1'-0"

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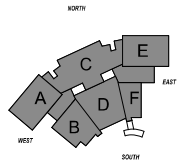

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

PLUMBING ROOF OVERALL PLAN

Date: 07/08/2024
Scale: 1/16" = 1'-0"
Proj. Number: 22367.00
Drawing Number: P003

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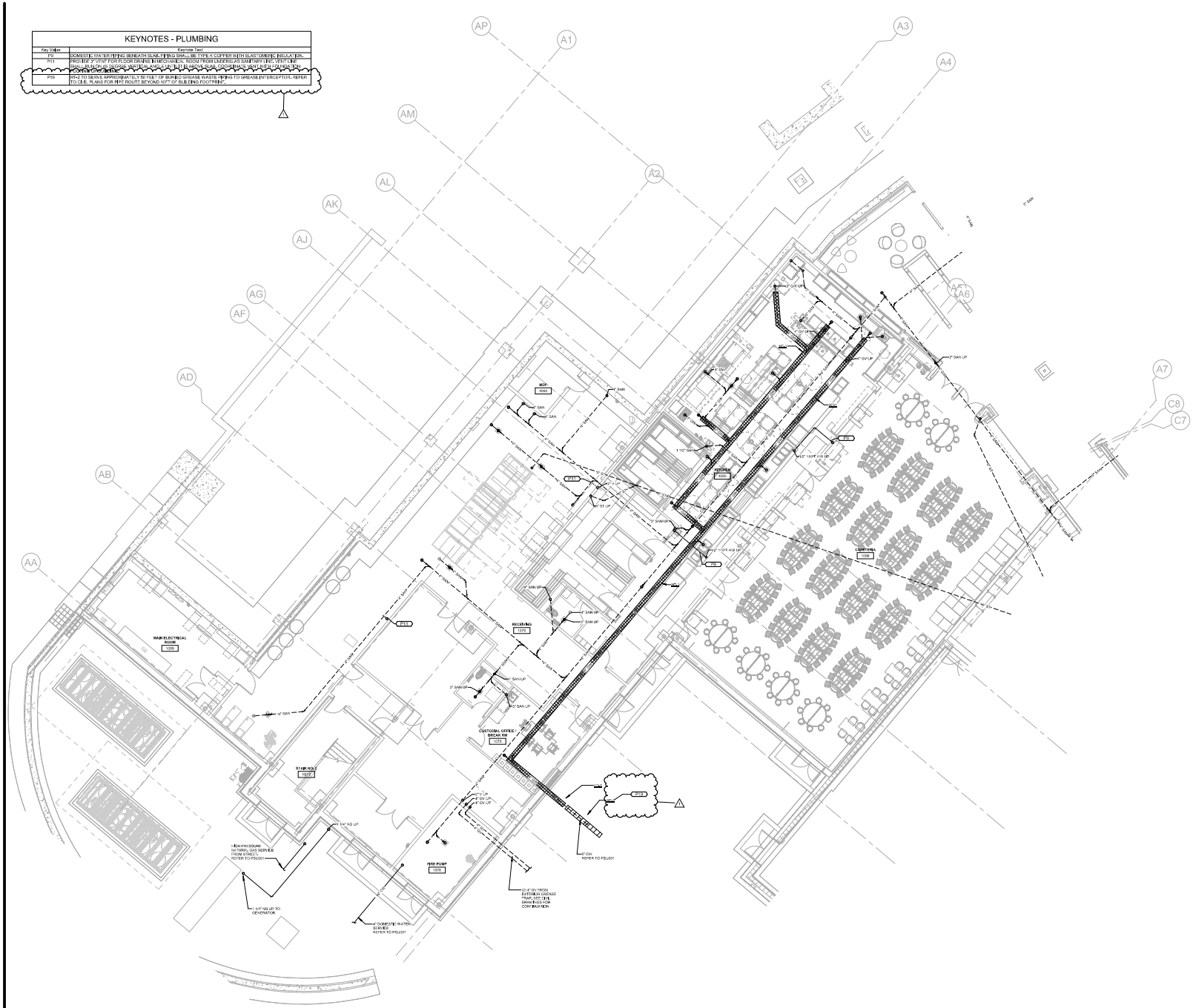
KEYNOTES - PLUMBING

Key Value	Keynote Text
P9	DOMESTIC WATER PIPING BENEATH SLAB. PIPING SHALL BE TYPE K COPPER WITH ELASTOMERIC INSULATION.
P11	PROVIDE 3" VENT FOR FLOOR DRAINS IN MECHANICAL ROOM FROM UNDERSLAB SANITARY LINE. VENT LINE SHALL RUN ON AS GROSSE VERTICAL ANGLE AS THE BEAM SLAB. COORDINATE VENT WITH FOUNDATION.
P19	HT-2 TO SERVE APPROXIMATELY 50 FEET OF BURIED GREASE WASTE PIPING TO GREASE INTERCEPTOR. REFER TO CIVIL PLANS FOR PIPE ROUTE BEYOND 10FT OF BUILDING FOOTPRINT.



1 PLUMBING FIRST FLOOR UNDERSLAB PLAN - A
1/8" = 1'-0"

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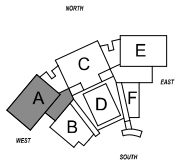

KEYPLAN

Number	Date	Issued For
1	10/16/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

PLUMBING FIRST FLOOR UNDERSLAB PLAN - PART A

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
22367.00

Drawing Number
P100A

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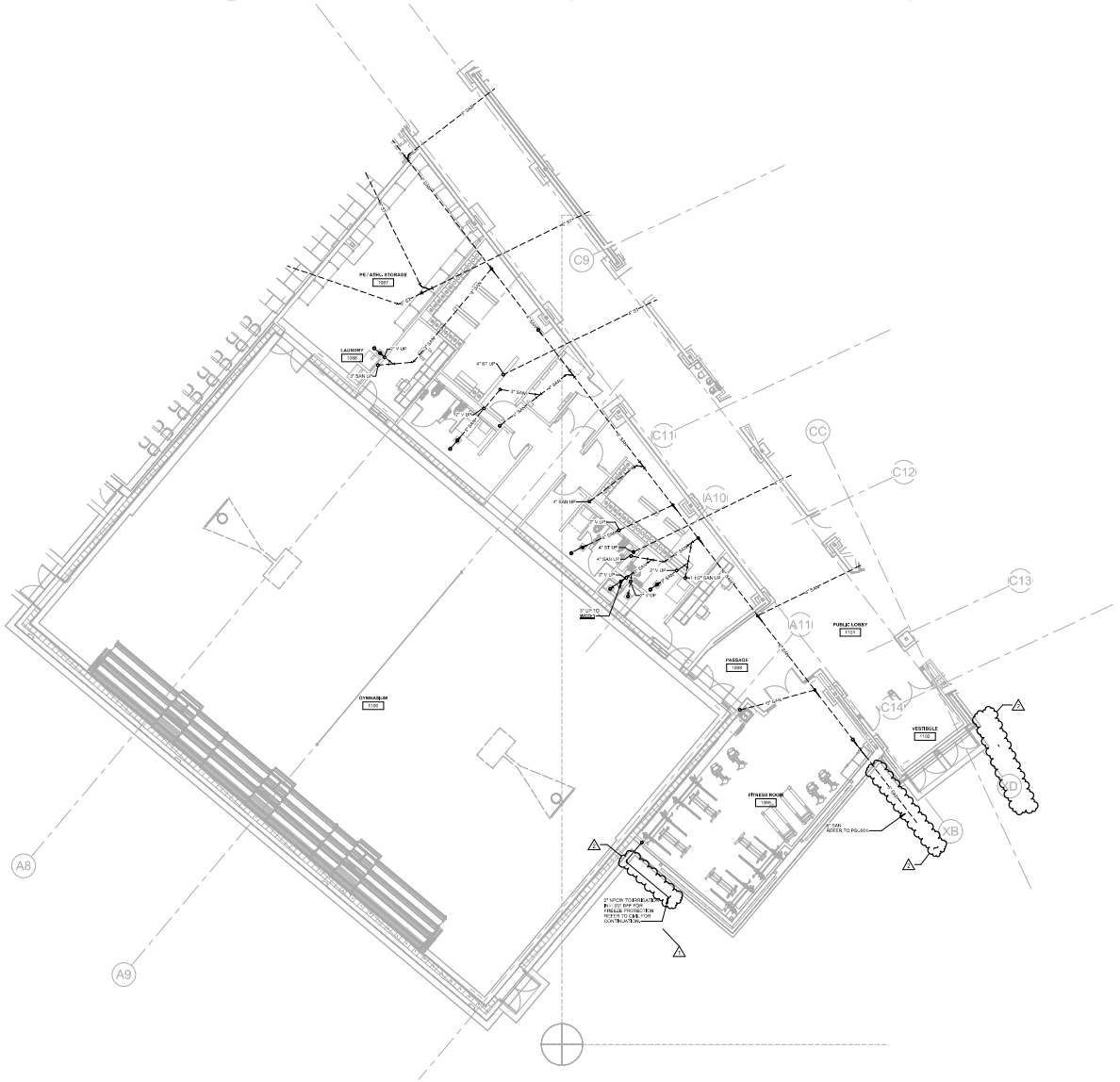

1 PLUMBING FIRST FLOOR UNDERSLAB PLAN - B
1/8" = 1'-0"

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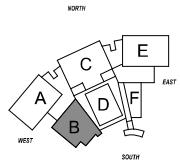

KEYPLAN

Number	Date	Issued For
2	10/23/2024	ADDENDUM NO. 3
1	10/18/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

PLUMBING FIRST FLOOR UNDERSLAB PLAN - PART B

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
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P100B

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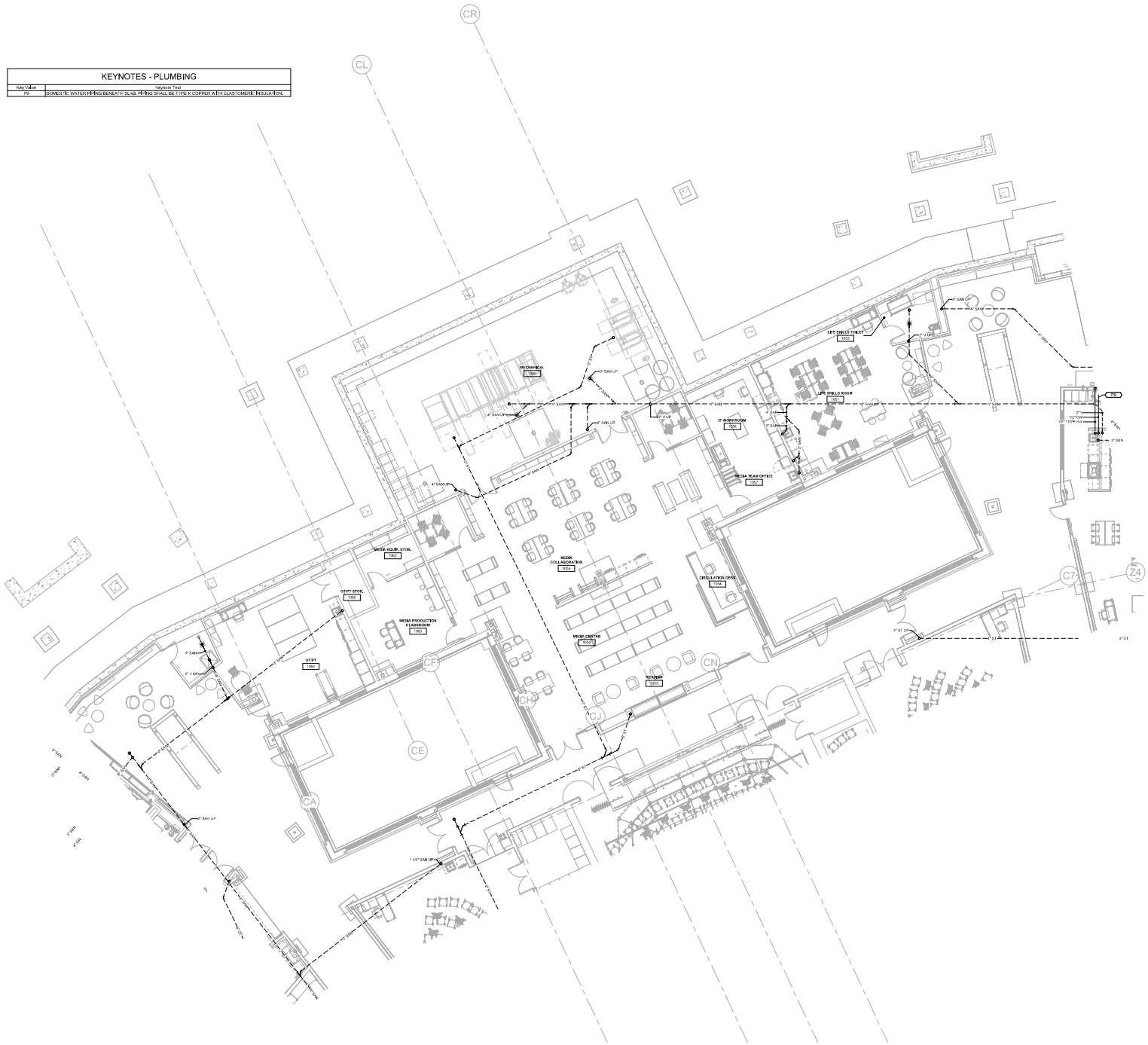
KEYNOTES - PLUMBING	
Key Value	Keynote Text
PS	DOMESTIC WATER PIPING BENEATH SLAB, PIPING SHALL BE TYPE K COPPER WITH ELASTOMERIC INSULATION.



1 PLUMBING FIRST FLOOR UNDERSLAB PLAN - C
1/8" = 1'-0"

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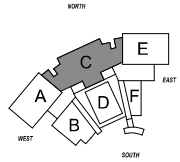

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

PLUMBING FIRST FLOOR UNDERSLAB PLAN - PART C

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **P100C**

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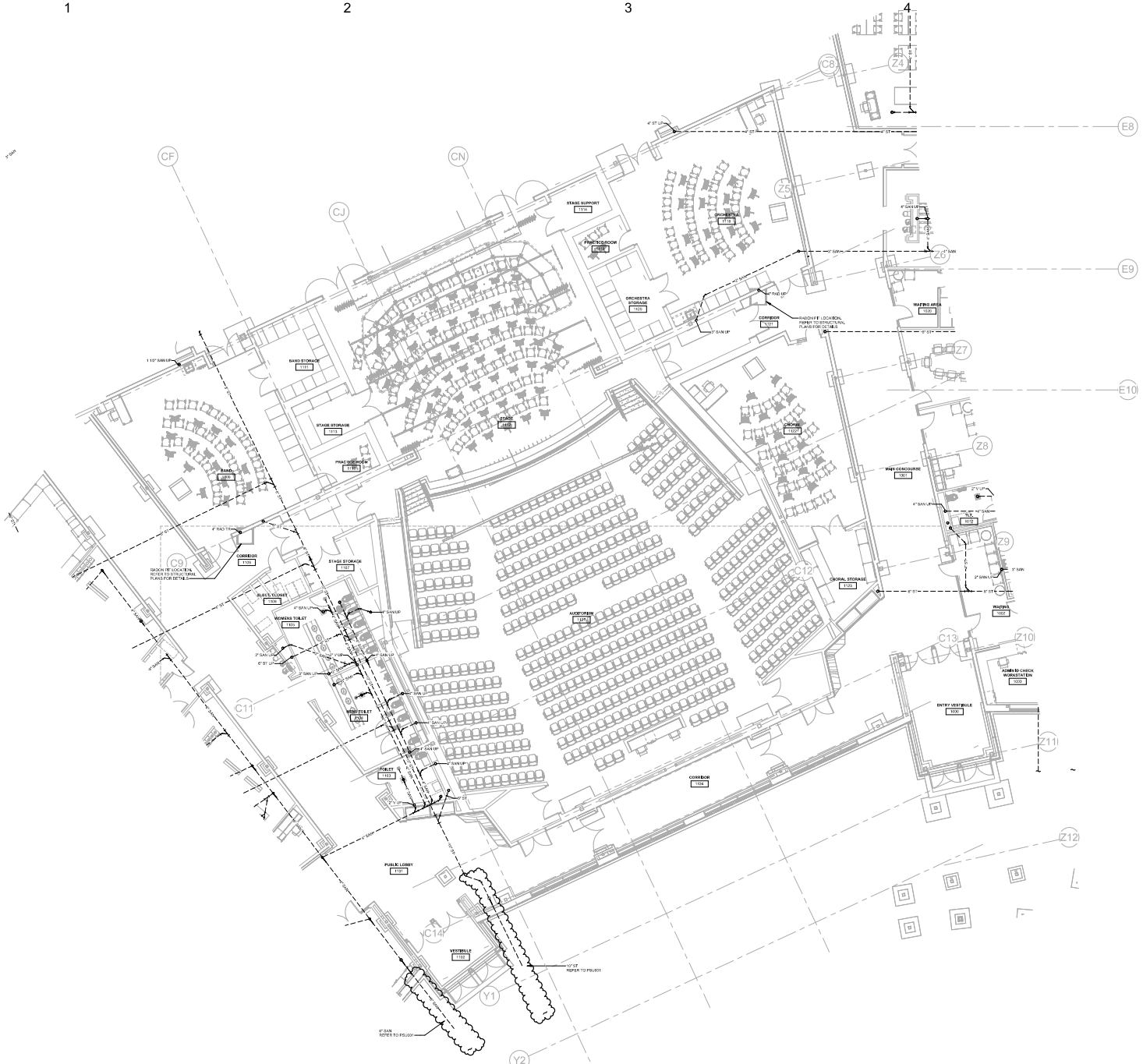

1 PLUMBING FIRST FLOOR UNDERSLAB PLAN - D
1/8" = 1'-0"

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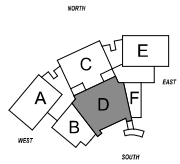

KEYPLAN

Number	Date	Issued For
2	10/23/2024	ADDENDUM NO.3
	09/30/2024	BID/PERMIT
	07/08/2024	PHASE 3

PLUMBING FIRST FLOOR UNDERSLAB PLAN - PART D

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: P100D

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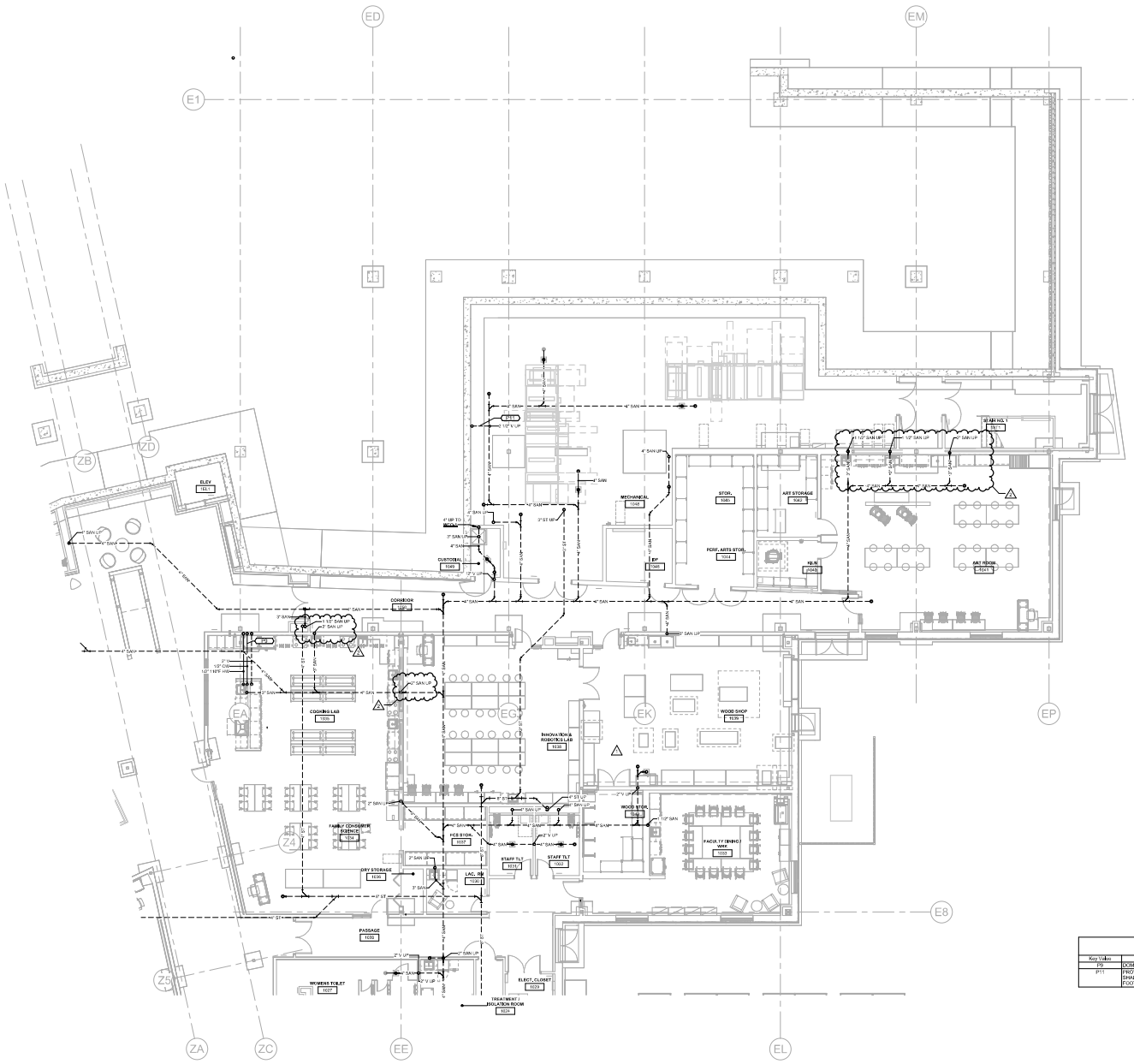

1 PLUMBING FIRST FLOOR UNDERSLAB PLAN - E
1/8" = 1'-0"

KEYNOTES - PLUMBING

Key Value	Keynote Text
P9	DOMESTIC WATER PIPING BENEATH SLAB, PIPING SHALL BE TYPE K COPPER WITH ELASTOMERIC INSULATION.
P11	PROVIDE 3" VENT FOR FLOOR DRAINS IN MECHANICAL ROOM FROM UNDERSLAB SANITARY LINE. VENT LINE SHALL RUN ON 45 DEGREE VERTICAL ANGLE UNTIL IT IS ABOVE SLAB. COORDINATE VENT WITH FOUNDATION FOOTING OF BUILDING.

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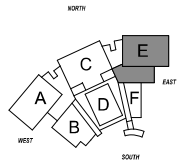

KEYPLAN

Number	Date	Issued For
2	10/23/2024	ADDENDUM NO. 3
1	10/18/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

PLUMBING FIRST FLOOR UNDERSLAB PLAN - PART E

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
22367.00

Drawing Number
P100E

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1 PLUMBING FIRST FLOOR UNDERSLAB PLAN - F
1/8" = 1'-0"

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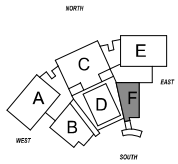

KEYPLAN

Number	Date	Issued For
2	10/23/2024	ADDENDUM NO.3
	09/30/2024	BID/PERMIT
	07/08/2024	PHASE 3

PLUMBING FIRST FLOOR UNDERSLAB PLAN - PART F

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: P100F

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KEYNOTES - PLUMBING	
Key Value	Keynote Text
P3	PROVIDE 3" CW TO MECHANICAL EQUIPMENT FOR MAKE UP WATER. PROVIDE BACKFLOW PREVENTER UPSTREAM OF MECHANICAL EQUIPMENT, REFER TO MECHANICAL PLANS FOR CONTINUATION.
P5	PROVIDE RPZ ON DOMESTIC WATER SERVICE LINE. INSTALL AS PER WATER COMPANYS REGULATIONS. REFER TO DOMESTIC WATER SERVICE DETAIL.
P7	PROVIDE 4" RADON VENT PROV RADON PIT UP THROUGH ROOF. PROVIDE WITH ACCESS PANEL FOR RADON MANOMETER AND TEST PORT.
P14	PROVIDE WALL CLEANOUT AT THE BASE OF WASTE STACKS. COORDINATE HEIGHT OF WALL CLEANOUT WITH ARCHITECT. TYPICAL OF ALL SANITARY AND STORM STACKS.
P20	PROVIDE FLEXIBLE COUPLINGS WHERE PIPES CONNECT AT ANGLES NOT EQUAL TO 45 OR 90 DEGREES. PENETRATE WALLS AT 90 DEGREE ANGLES WHENEVER POSSIBLE (TYPICAL).

1 PLUMBING FIRST FLOOR PLAN - A
1/8" = 1'-0"

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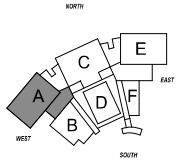

KEYPLAN

Number	Date	Issued For
2	10/23/2024	ADDENDUM NO.3
1	10/16/2024	ADDENDUM NO.2
	09/30/2024	BID/PERMIT
	07/08/2024	PHASE 3

PLUMBING FIRST FLOOR PLAN - PART A

Date	Drawing Number
07/08/2024	P101A
Scale: 1/8" = 1'-0"	
Proj. Number: 22367.00	

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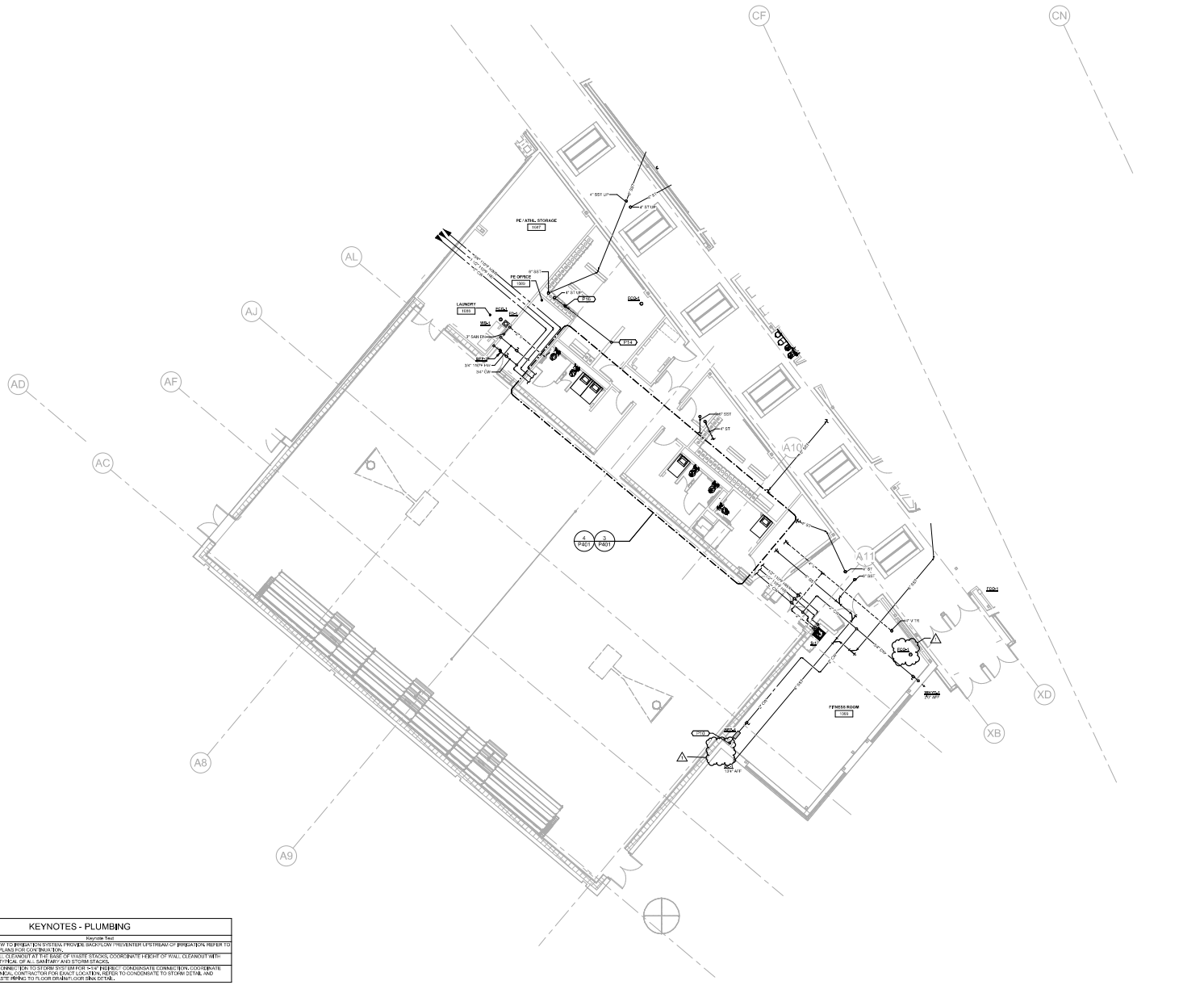
10/23/2024 9:21:17 AM



KEYNOTES - PLUMBING	
Key Value	Keynote Text
P10	PROVIDE 3" CW TO IRRIGATION SYSTEM, PROVIDE BACKFLOW PREVENTER UPSTREAM OF IRRIGATION. REFER TO LANDSCAPE PLANS FOR CONTINUATION.
P14	PROVIDE WALL CLEANOUT AT THE BASE OF WASTE STACKS, COORDINATE HEIGHT OF WALL CLEANOUT WITH ARCHITECT. TYPICAL OF ALL SANITARY AND STORM STACKS.
P16	PROVIDE 3" CONNECTION TO STORM SYSTEM FOR 1-1/4" INDIRECT CONDENSATE CONNECTION. COORDINATE WITH MECHANICAL CONTRACTOR FOR EXACT LOCATION, REFER TO CONDENSATE TO STORM DETAIL AND INDIRECT WASTE PIPING TO FLOOR DRAIN/FLOOR SINK DETAIL.

1 PLUMBING FIRST FLOOR PLAN - B
1/8" = 1'-0"

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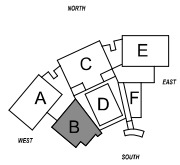

KEYPLAN

Number	Date	Issued For
1	10/16/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

PLUMBING FIRST FLOOR PLAN - PART B

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **P101B**

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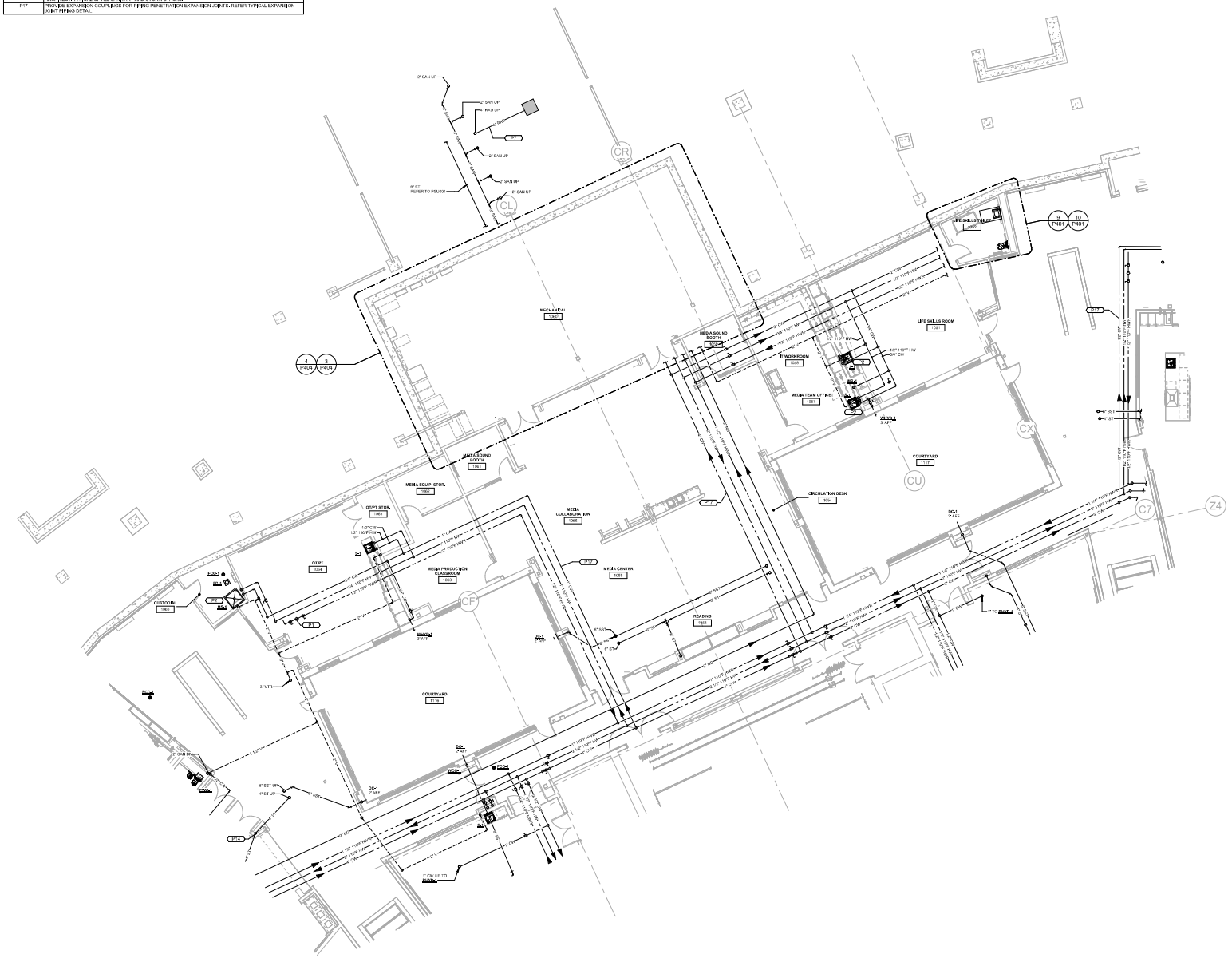
10/16/2024 10:32:25 AM

KEYNOTES - PLUMBING	
Key Value	Keynote Text
P1	BALANCE VALVE LOCATED ABOVE ACCESSIBLE CEILING SET TO 0.5 GPM
P2	PROVIDE SUPPLY, WASTE, AND VENT CONNECTIONS TO PLUMBING FIXTURES ACCORDING TO PLUMBING FIXTURE CONNECTION SCHEDULE.
P7	PROVIDE 4" RADON VENT FROM RADON PIT UP THROUGH ROOF. PROVIDE WITH ACCESS PANEL FOR RADON MANOMETER AND TEST PORT.
P14	PROVIDE WALL CLEANOUT AT THE BASE OF WASTE STACKS. COORDINATE HEIGHT OF WALL CLEANOUT WITH ARCHITECT. TYPICAL OF ALL SANITARY AND STORM STACKS.
P17	PROVIDE EXPANSION COUPLINGS FOR PIPING PENETRATION EXPANSION JOINTS. REFER TYPICAL EXPANSION JOINT PIPING DETAIL.



1 PLUMBING FIRST FLOOR PLAN - C
1/8" = 1'-0"

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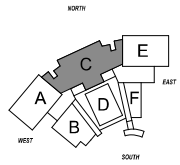

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

PLUMBING FIRST FLOOR PLAN - PART C

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
22367.00

Drawing Number
P101C

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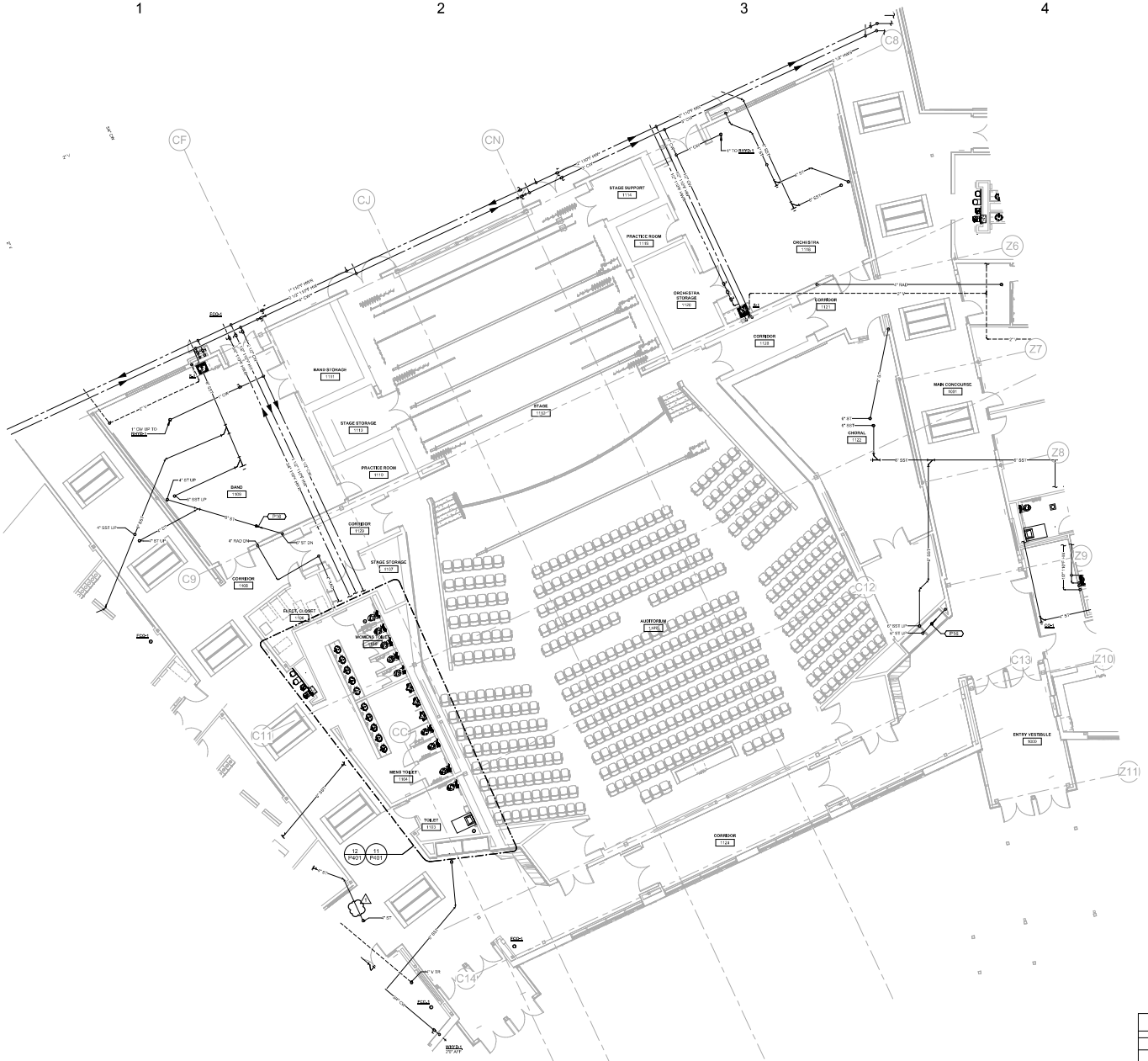

KEYNOTES - PLUMBING	
Key Value	Keynote Text
P2	PROVIDE SUPPLY, WASTE, AND VENT CONNECTIONS TO PLUMBING FIXTURES ACCORDING TO PLUMBING FIXTURE CONNECTION SCHEDULE.
P1B	PROVIDE 3" CONNECTION TO STORM SYSTEM FOR 1-1/4" INDIRECT CONDENSATE CONNECTION. COORDINATE WITH MECHANICAL CONTRACTOR FOR EXACT LOCATION. REFER TO CONDENSATE TO STORM DETAIL AND INDIRECT WASTE PIPING TO FLOOR DRAIN/FLOOR SINK DETAIL.

1 PLUMBING FIRST FLOOR PLAN - D
1/8" = 1'-0"

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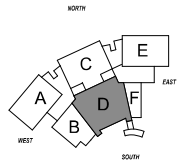

KEYPLAN

Number	Date	Issued For
1	10/16/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

PLUMBING FIRST FLOOR PLAN - PART D

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **P101D**

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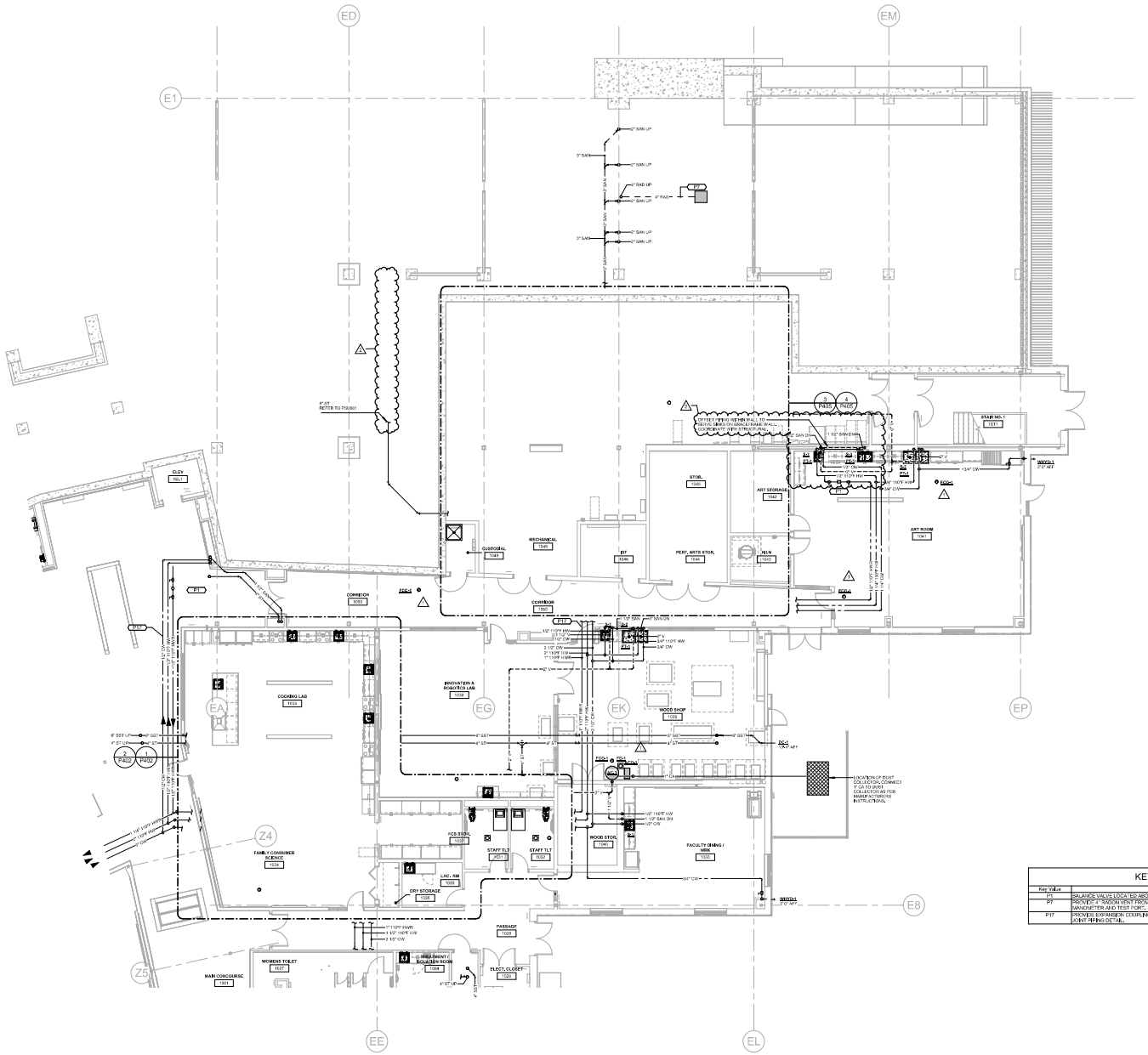

1 PLUMBING FIRST FLOOR PLAN - E
1/8" = 1'-0"

KEYNOTES - PLUMBING

Key Value	Keynote Text
P1	BALANCE VALVE LOCATED ABOVE ACCESSIBLE CEILING SET TO 0.5 GPM
P2	PROVIDE 4" RADON VENT FROM RADON PIT UP THROUGH ROOF. PROVIDE WITH ACCESS PANEL FOR RADON MANOMETER AND TEST PORT.
P17	PROVIDE EXPANSION COUPLINGS FOR PIPING PENETRATION EXPANSION JOINTS. REFER TYPICAL EXPANSION JOINT PIPING DETAIL.

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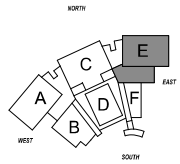

KEYPLAN

Number	Date	Issued For
2	10/23/2024	ADDENDUM NO. 3
1	10/18/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

PLUMBING FIRST FLOOR PLAN - PART E

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
22367.00

Drawing Number
P101E

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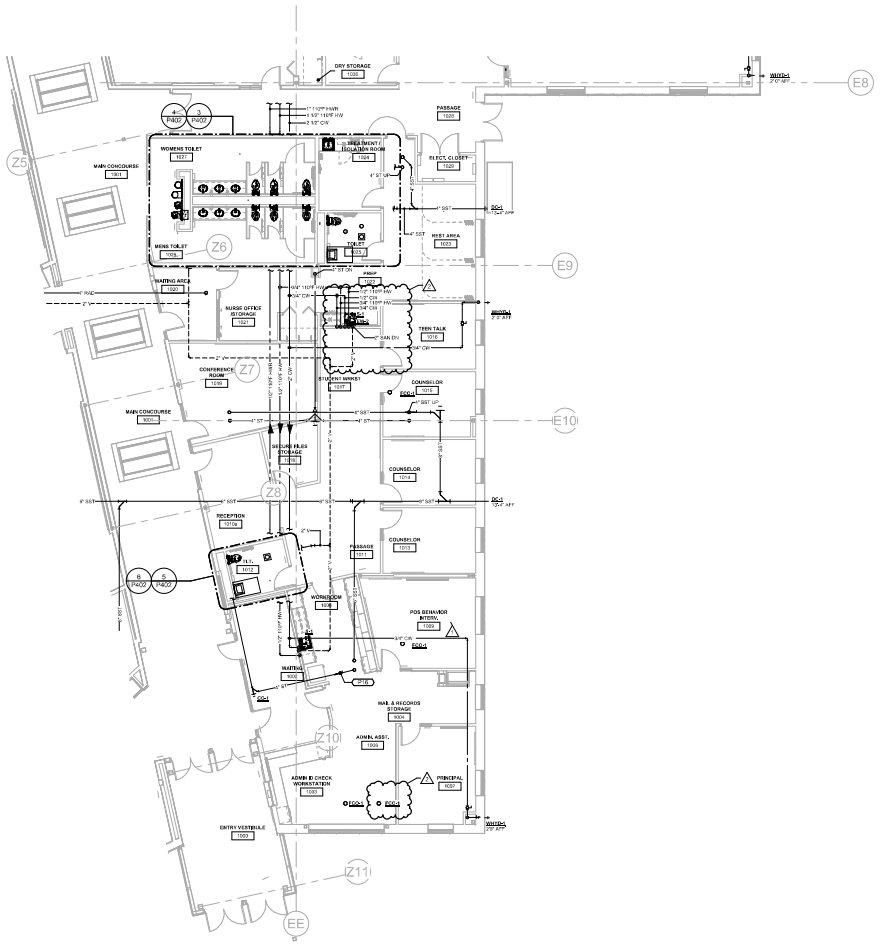
10/23/2024 9:33:00 AM



1 PLUMBING FIRST FLOOR PLAN - F
1/8" = 1'-0"

KEYNOTES - PLUMBING	
Key Value	Keynote Text
P16	PROVIDE P CONNECTION TO STORM SYSTEM FOR "CAP INDIRECT CONDENSATE CONNECTION, COORDINATE WITH MECHANICAL CONTRACTOR FOR EXACT LOCATION. REFER TO CONDENSATE TO STORM DETAIL AND INDIRECT WASTE PIPING TO FLOOR DRAIN/FLOOR SINK DETAIL.

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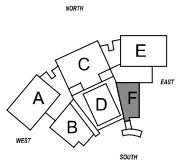

KEYPLAN

Number	Date	Issued For
2	10/23/2024	ADDENDUM NO.3
1	10/16/2024	ADDENDUM NO.2
	09/30/2024	BID/PERMIT
	07/08/2024	PHASE 3

PLUMBING FIRST FLOOR PLAN - PART F

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: P101F

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10/23/2024 9:23:09 AM

KEYNOTES - PLUMBING	
Key Value	Keynote Text
P1	BALANCE VALVE LOCATED ABOVE ACCESSIBLE CEILING SET TO 0.5 GPM
P2	PROVIDE SUPPLY, WASTE, AND VENT CONNECTIONS TO PLUMBING FIXTURES ACCORDING TO PLUMBING FIXTURE CONNECTION SCHEDULE.
P17	PROVIDE EXPANSION COUPLINGS FOR PIPING PENETRATION EXPANSION JOINTS, REFER TYPICAL EXPANSION JOINT PIPING DETAIL.



1 PLUMBING SECOND FLOOR PLAN - A
1/8" = 1'-0"

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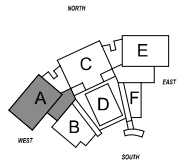

KEYPLAN

Number	Date	Issued For
1	10/16/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

PLUMBING SECOND FLOOR PLAN -PART A

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: P102A

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10/15/2024 10:33:02 AM

KEYNOTES - PLUMBING	
Key Value	Keynote Text
P1	BALANCE VALVE LOCATED ABOVE ACCESSIBLE CEILING SET TO 0.5 GPM
P17	PROVIDE EXPANSION COUPLINGS FOR PIPING PENETRATION EXPANSION JOINTS. REFER TYPICAL EXPANSION JOINT PIPING DETAIL.



1 PLUMBING SECOND FLOOR PLAN - C
1/8" = 1'-0"

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Greenwich Central Middle School

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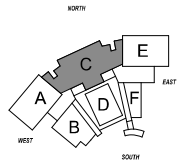

KEYPLAN

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PLUMBING SECOND FLOOR PLAN - PART C

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **P102C**

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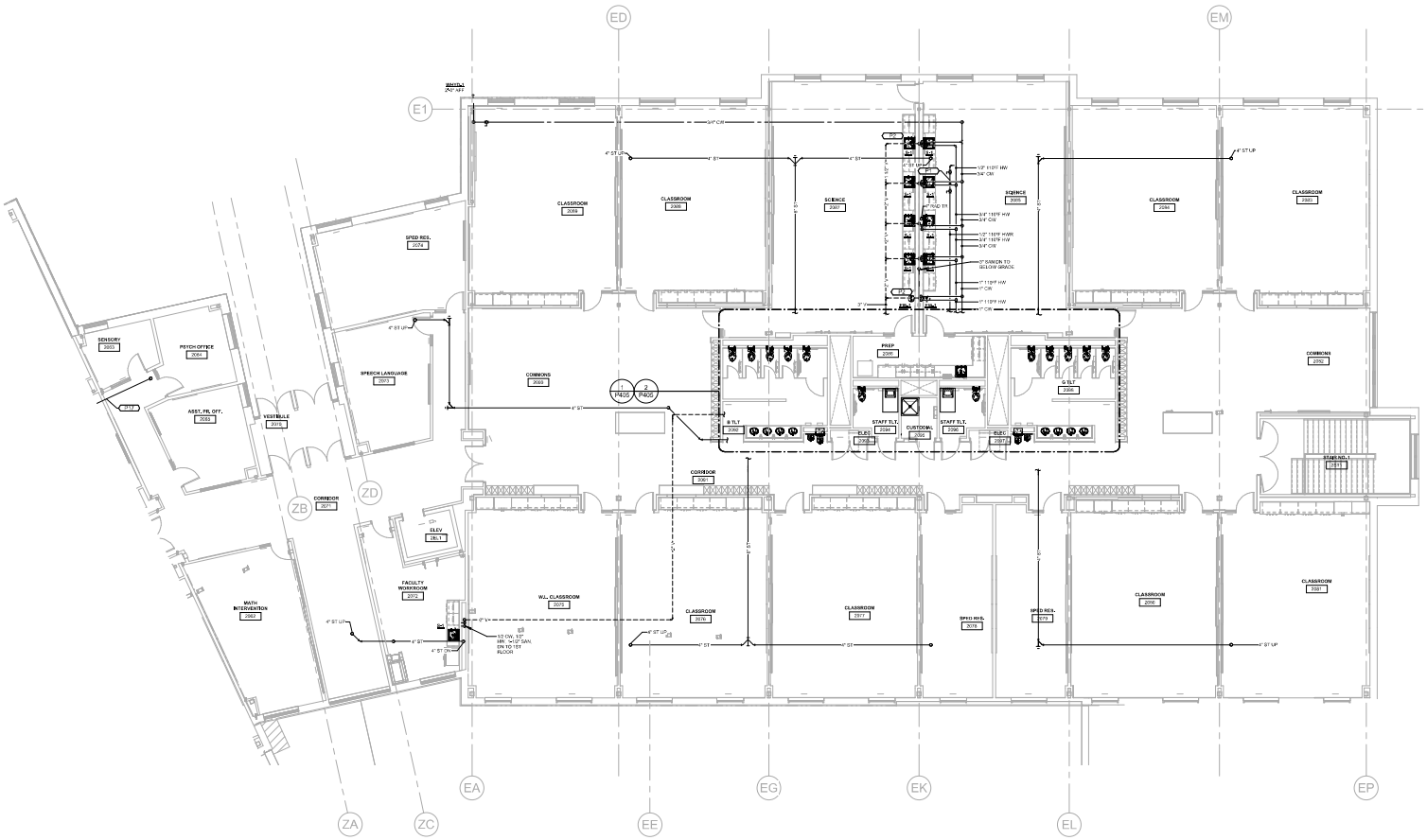

1 PLUMBING SECOND FLOOR PLAN - E
1/8" = 1'-0"

KEYNOTES - PLUMBING	
Key Value	Keynote Text
P1	BALANCE VALVE LOCATED ABOVE ACCESSIBLE CEILING SET TO 0.5 GPM
P2	PROVIDE SUPPLY, WASTE, AND VENT CONNECTIONS TO PLUMBING FIXTURES ACCORDING TO PLUMBING FIXTURE CONNECTION SCHEDULE.
P17	PROVIDE EXPANSION COUPLINGS FOR PIPING PENETRATION EXPANSION JOINTS. REFER TYPICAL EXPANSION JOINT PIPING DETAIL.

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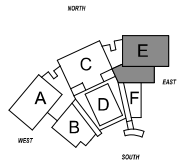

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

PLUMBING SECOND FLOOR PLAN - PART E

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **P102E**

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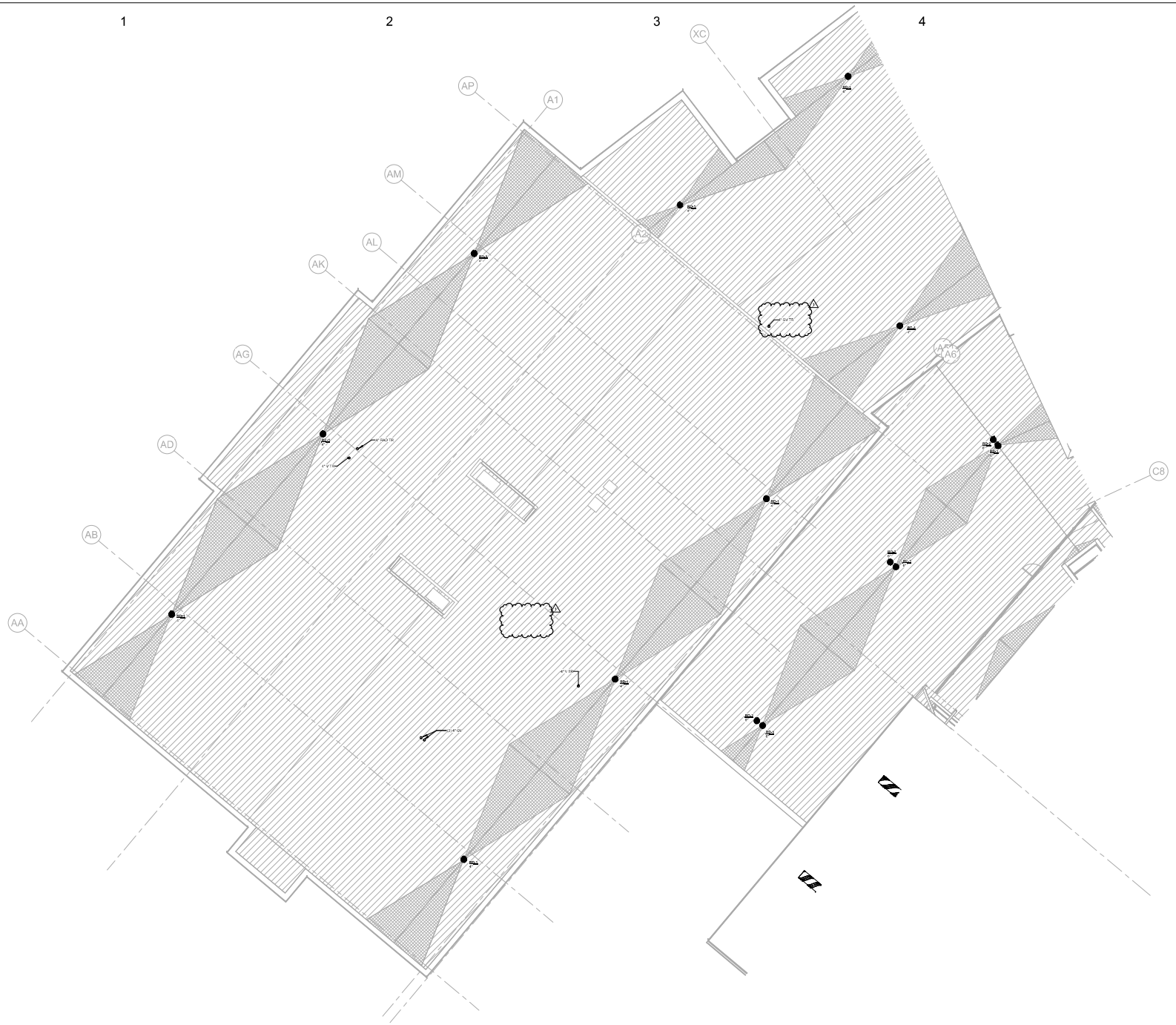

1 PLUMBING ROOF FLOOR PLAN - A
1/8" = 1'-0"

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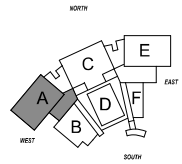

KEYPLAN

Number	Date	Issued For
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	09/30/2024	BIDDING PERMIT
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PLUMBING ROOF PLAN - PART A

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **P103A**

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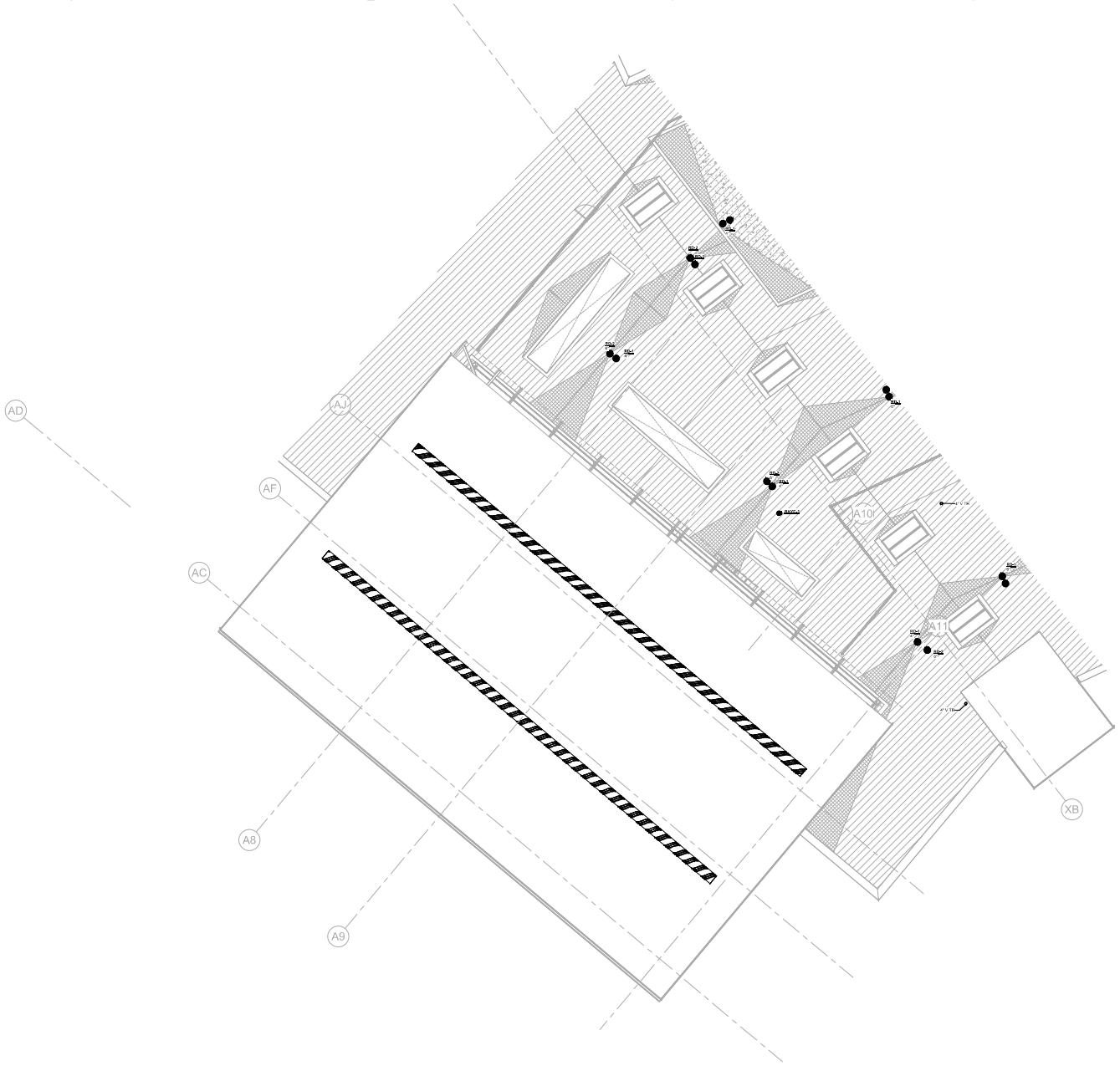

1 PLUMBING ROOF FLOOR PLAN - B
1/8" = 1'-0"

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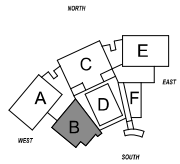

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

PLUMBING ROOF PLAN - PART B

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **P103B**

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1 PLUMBING ROOF FLOOR PLAN - C
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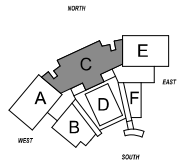

KEYPLAN

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	07/08/2024	PHASE 2

PLUMBING ROOF PLAN - PART C

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: P103C

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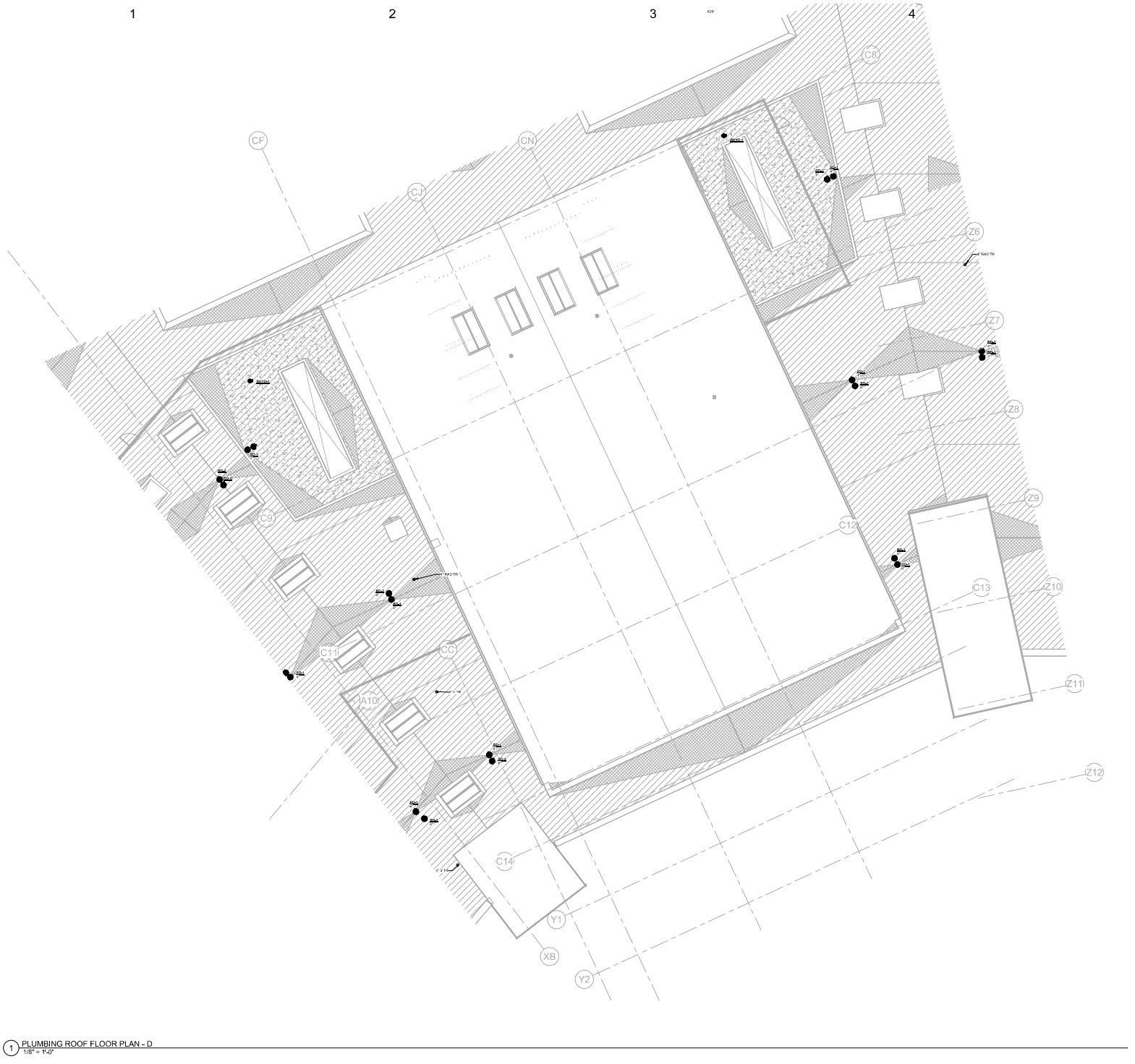

1 PLUMBING ROOF FLOOR PLAN - D
1/8" = 1'-0"

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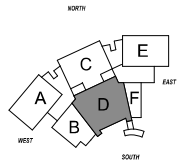

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

PLUMBING ROOF PLAN - PART D

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **P103D**

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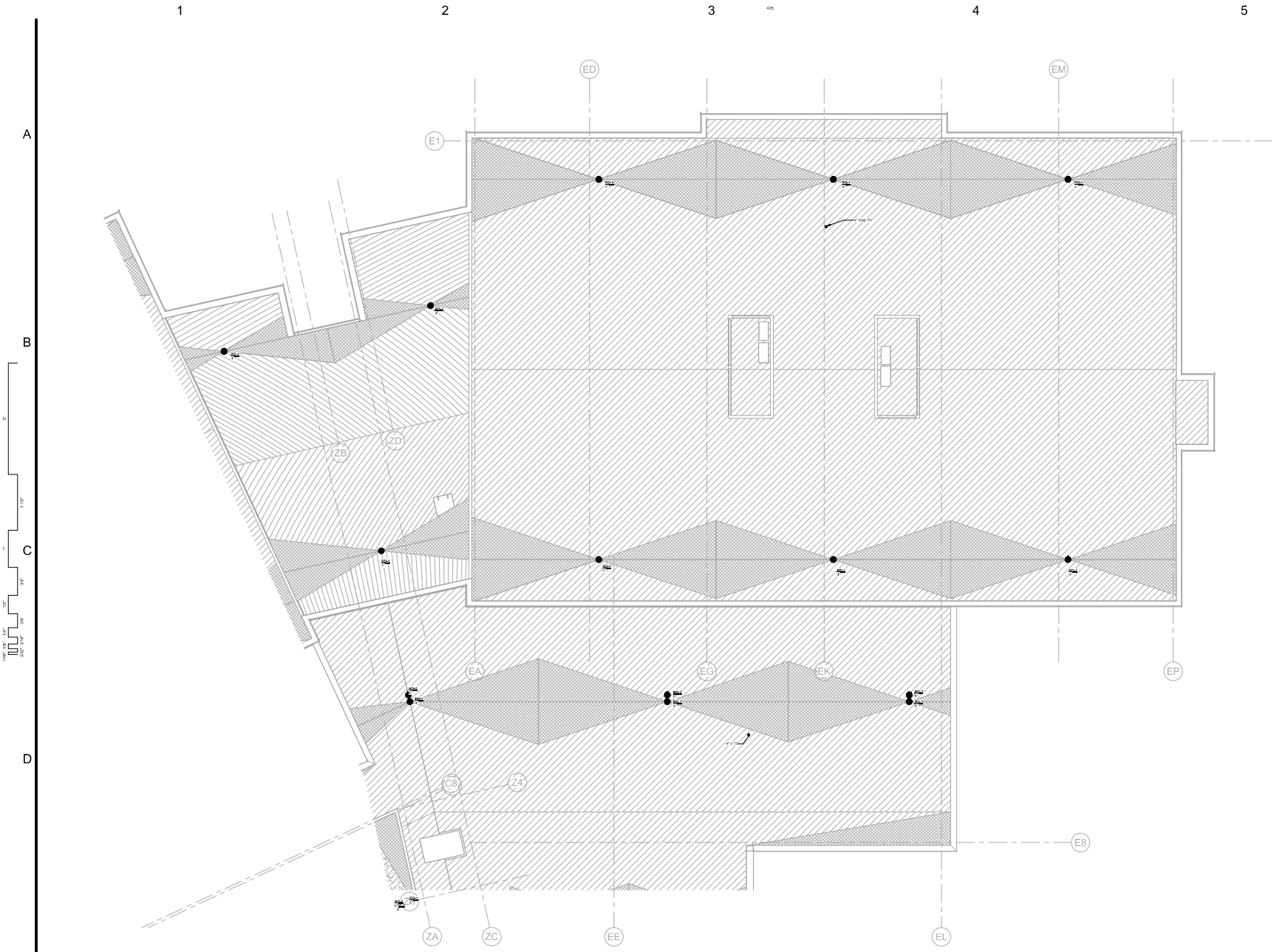

1 PLUMBING ROOF FLOOR PLAN - E
1/8" = 1'-0"

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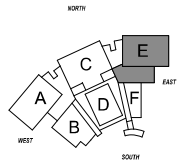

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

PLUMBING ROOF PLAN - PART E

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
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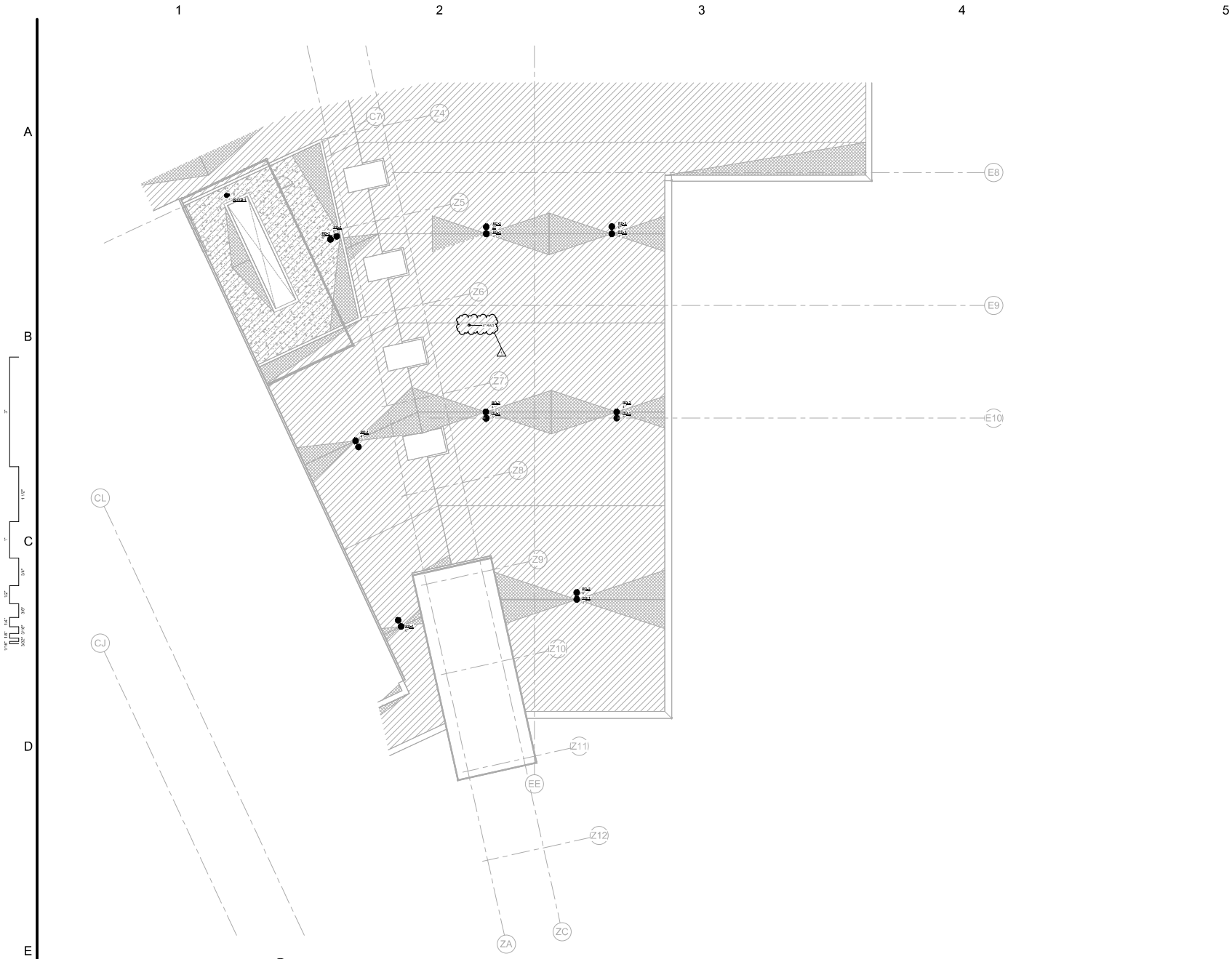

1 PLUMBING ROOF FLOOR PLAN - F
1/8" = 1'-0"

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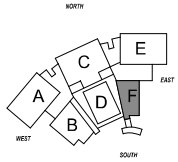

KEYPLAN

Number	Date	Issued For
1	10/16/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

PLUMBING ROOF PLAN - PART F

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
22367.00

Drawing Number
P103F

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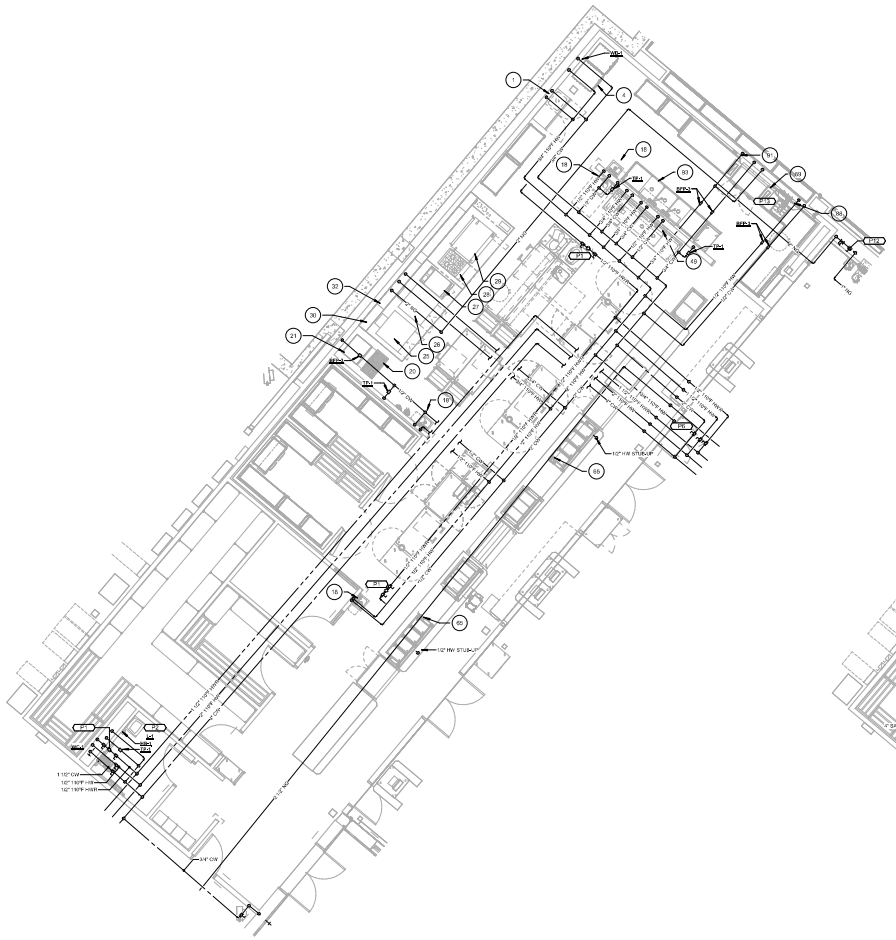
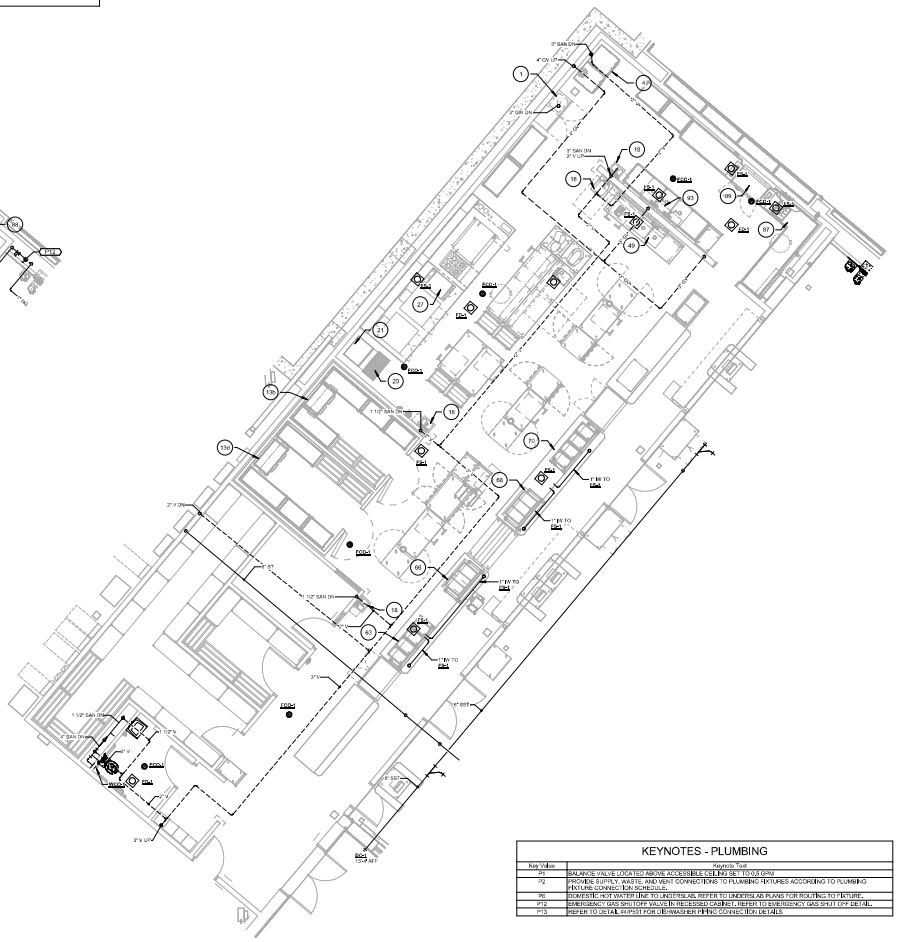
FOOD SERVICE EQUIPMENT SCHEDULE			
ITEM	QTY	DESCRIPTION	PLUMBING CONNECTION
1	1	MOP SINK AND SERVICE FAUCET	1/2" CW, 1/2" HW, 2" SAN
4	1	CLOTHES WASHER	1/2" CW, 1/2" HW, 2" SAN STANDPIPE
13b	1	COOLER EVAPORATOR COIL	1" IW TO FS
13d	1	FREEZER EVAPORATOR COIL	1" IW TO FS
18	4	HAND SINK	1/2" CW, 1/2" HW, 1 1/2" SAN
20	1	FLOOR PAN AND GRATE	4" SAN 7" BFF
21	1	ICE MAKER WITH BIN	3/8" CW FROM **ITEM 22** 1/2" AND 3/4" IW TO FS
22	1	WATER FILTER ASSEMBLY	3/8" CW
25	1	CONVECTION OVEN, DOUBLE	3/4" NG FROM **ITEM 32**, 100 MBH
26	1	CONVECTION OVEN, DOUBLE	3/4" NG FROM **ITEM 32**, 100 MBH
27	1	TEN PAN STEAMER	3/4" NG FROM **ITEM 32**, 100 MBH, 3/8" FILTERED WATER, 1/2" CW, 2" IW TO FS, PROVIDE WITH **BFP-3** ON CW LINE
28	1	FOUR BURNER RANGE WITH OVEN	3/4" NG FROM **ITEM 32**, 243 MBH
29	1	GRIDDLE WITH MOBILE STAND	3/4" NG FROM **ITEM 32**, 85 MBH

FOOD SERVICE EQUIPMENT SCHEDULE (CONT'D)			
ITEM	QTY	DESCRIPTION	PLUMBING CONNECTION
30	1	WATER FILTER ASSEMBLY	3/4" CW FROM **ITEM 32**
32	1	UTILITY DISTRIBUTION SYSTEM	2" NG, 628 MBH, 3/4" CW, 3/4" HW
49	1	PREP TABLE WITH SINKS	1/2" CW, 1/2" HW, (2) 2" IW TO FS
63	1	HOT FOOD WELL, DROP IN	1" IW TO FS
65	2	FILL FAUCET	1/2" HW
66	1	COLD WELL, DROP IN	1" IW TO FS
68	1	COLD WELL, DROP IN	1" IW TO FS
70	4	HOT FOOD WELL, DROP IN	1" IW
87	1	SOILED WARE TABLE	2" W
88	1	HOSE REEL ASSEMBLY	1/2" CW, 1/2" HW
89	1	WAREWASHER, RACK CONVEYOR	1/2" CW, 1/2" HW FROM **ITEM 91**, 2" IW TO FS
91	1	WATER FILTER ASSEMBLY	3/4" HW
93	1	3-COMPARTMENT SINK	(2) 3/4" 120 DEG HW, (2) 3/4" CW, (3) 2" IW MANIFOLD TO FS



1 PLUMBING ENLARGED PLAN - KITCHEN SUPPLY
3/16" = 1'-0"



KEYNOTES - PLUMBING	
Key Value	Keynote Text
P1	BALANCE VALVE LOCATED ABOVE ACCESSIBLE CEILING SET TO 0.5 GPM
P2	PROVIDE SUPPLY, WASTE, AND VENT CONNECTIONS TO PLUMBING FIXTURES ACCORDING TO PLUMBING FIXTURE CONNECTION SCHEDULE.
P6	DOMESTIC HOT WATER LINE TO UNDERSLAB, REFER TO UNDERSLAB PLANS FOR ROUTING TO FIXTURE.
P12	EMERGENCY GAS SHUTOFF VALVE IN RECESSED CABINET, REFER TO EMERGENCY GAS SHUT OFF DETAIL.
P13	REFER TO DETAIL P4/P5T FOR DISHWASHER PIPING CONNECTION DETAILS

2 PLUMBING ENLARGED PLAN - KITCHEN WASTE & VENT
3/16" = 1'-0"

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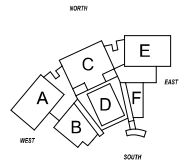

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
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PLUMBING ENLARGED VIEWS - KITCHEN

Date: 07/08/2024
Scale: 3/16" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **P400**

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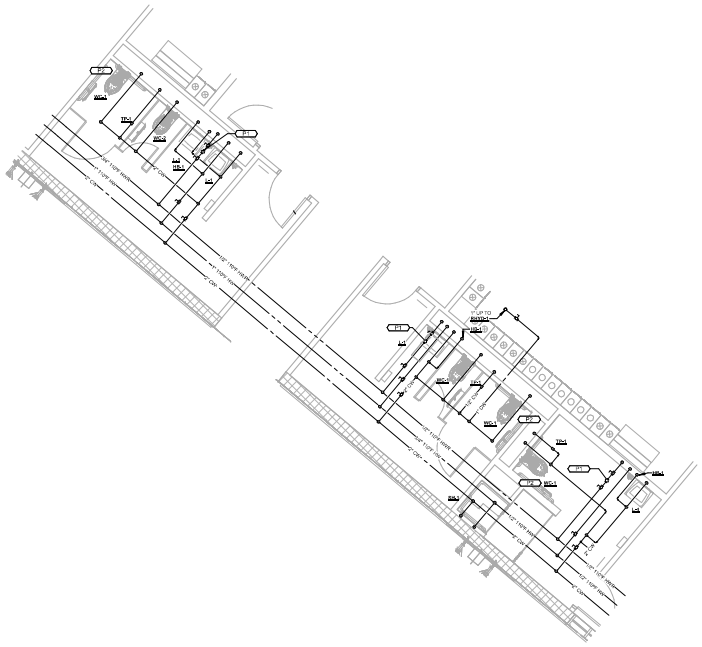
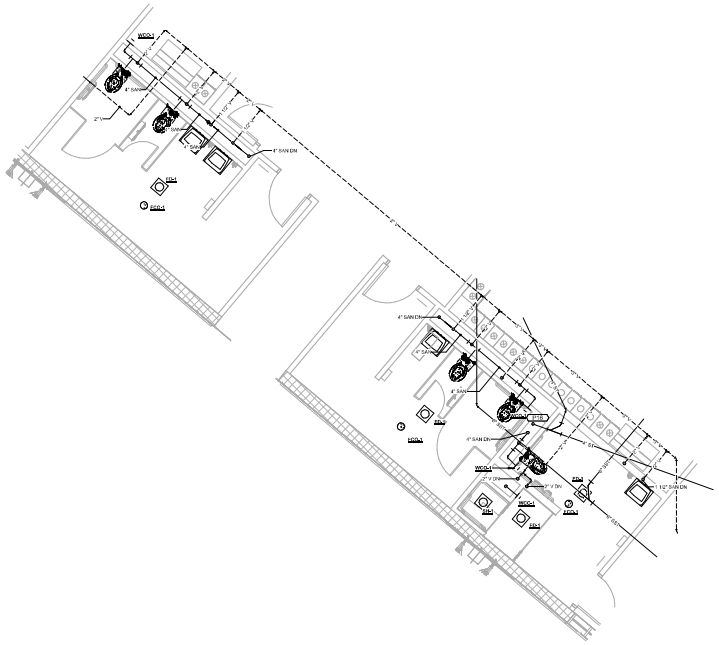
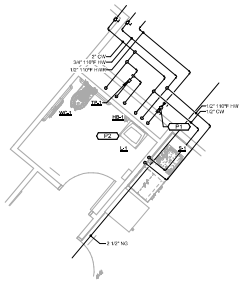
KEYNOTES - PLUMBING	
Key Value	Keynote Text
P1	BALANCE VALVE LOCATED ABOVE ACCESSIBLE CEILING SET TO 0.5 GPM
P2	PROVIDE SUPPLY, WASTE, AND VENT CONNECTIONS TO PLUMBING FIXTURES ACCORDING TO PLUMBING FIXTURE CONNECTION SCHEDULE.
P15	1" VAL TO SERVE GROUP OF LAVS, REFER TO RECIRCULATION AT PUBLIC LAVATORIES DETAIL.
P16	PROVIDE 3" CONNECTION TO STORM SYSTEM FOR 1-1/4" INDIRECT CONDENSATE CONNECTION. COORDINATE WITH MECHANICAL CONTRACTOR FOR EXACT LOCATION. REFER TO CONDENSATE TO STORM DETAIL AND INDIRECT WASTE PIPING TO FLOOR DRAIN/FLOOR SINK DETAIL.



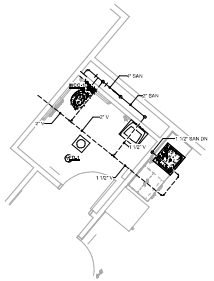
3 PLUMBING ENLARGED PLAN - 1B TOILET ROOMS SUPPLY
1/4" = 1'-0"



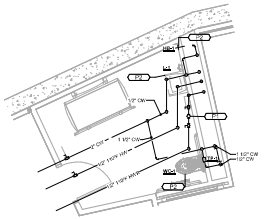
4 PLUMBING ENLARGED PLAN - 1B TOILET ROOMS WASTE & VENT
1/4" = 1'-0"



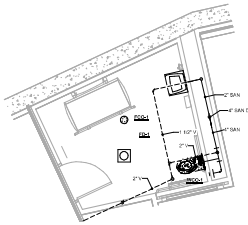
1 PLUMBING ENLARGED PLAN - 1A CUST. TLT. RM 1071 SUPPLY
1/4" = 1'-0"



2 PLUMBING ENLARGED PLAN - 1A CUST. TLT. RM 1071 WASTE & VENT
1/4" = 1'-0"



9 PLUMBING ENLARGED PLAN - 1C LIFE SKILLS TLT 1051 SUPPLY
1/4" = 1'-0"



10 PLUMBING ENLARGED PLAN - 1C LIFE SKILLS TLT 1051 WASTE & VENT
1/4" = 1'-0"



11 PLUMBING ENLARGED PLAN - 1D TLT RMS 192/193/194 SUPPLY
3/16" = 1'-0"



12 PLUMBING ENLARGED PLAN - 1D TLT RMS 192/193/194 WASTE & VENT
3/16" = 1'-0"

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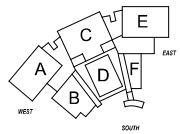


KEYPLAN

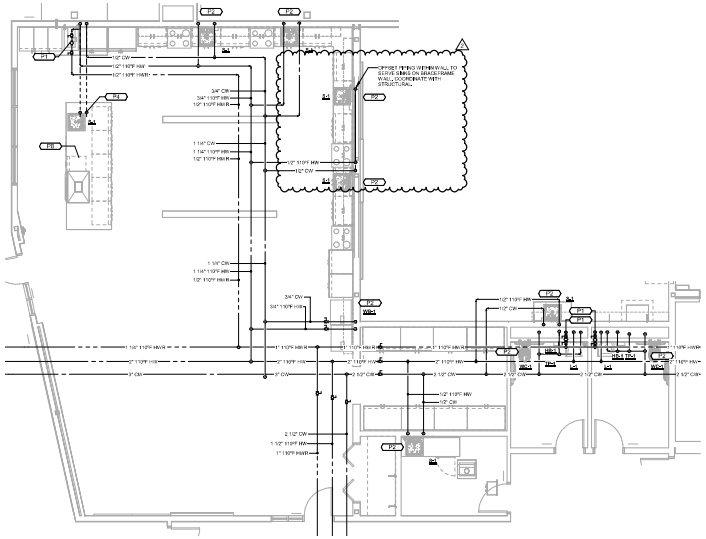
Number	Date	Issued For
1	10/16/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

PLUMBING ENLARGED VIEWS

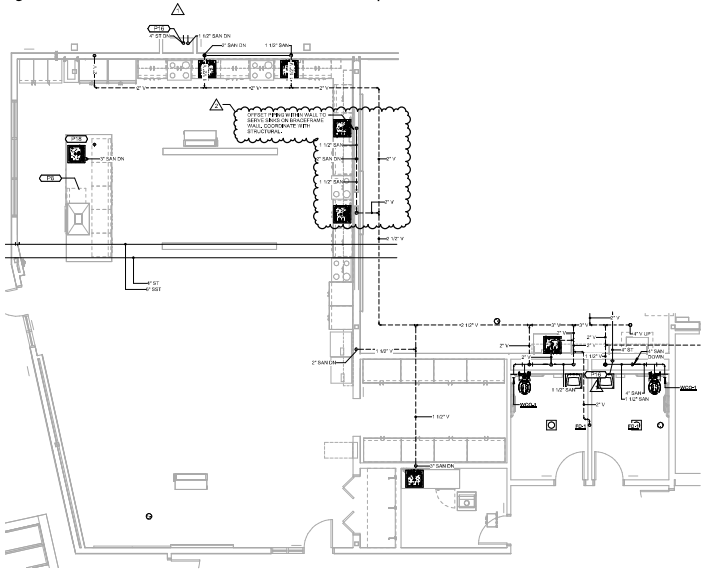
Date 07/08/2024
Scale As indicated
Proj. Number 22367.00

Drawing Number **P401**

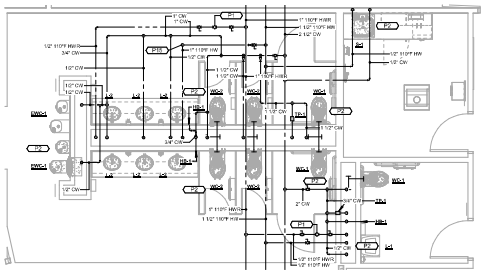
Autodesk Docs://22367.01 - Greenwich Central Middle School/P22-23/2305-MEP Central - Greenwich Central Middle School.rvt
10/16/2024 10:35:38 AM



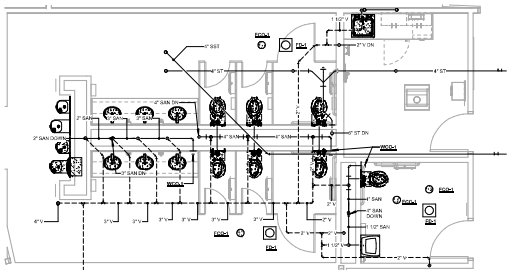
1 PLUMBING ENLARGED PLAN - 1E FAM CON SCI 1034 SUPPLY
3/16" = 1'-0"



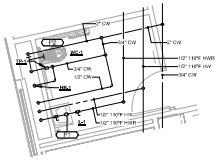
2 PLUMBING ENLARGED PLAN - 1E FAM CON SCI 1034 WASTE & VENT
3/16" = 1'-0"



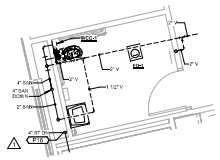
3 PLUMBING ENLARGED PLAN - 1F TLT ROOM 1026 SUPPLY
1/4" = 1'-0"



4 PLUMBING ENLARGED PLAN - 1F TLT ROOM 1026 WASTE & VENT
1/4" = 1'-0"



5 PLUMBING ENLARGED PLAN - 1F TLT RM 1012 SUPPLY
1/4" = 1'-0"



6 PLUMBING ENLARGED PLAN - 1F TLT RM 1012 WASTE & VENT
1/4" = 1'-0"

KEYNOTES - PLUMBING	
Key Value	Keynote Text
P1	BALANCE VALVE LOCATED ABOVE ACCESSIBLE CEILING SET TO 0.5 GPM
P2	PROVIDE SUPPLY, WASTE, AND VENT CONNECTIONS TO PLUMBING FIXTURES ACCORDING TO PLUMBING FIXTURE CONNECTION SCHEDULE.
P4	ELKAY SINK SHALL BE CONNECTED TO CW AND HW THROUGH BELOW SLAB PIPING. VENT SHALL BE THROUGH A COMBINATION WASTE AND VENT WITH OTHER SINKS IN COOKING LAB. SEE SHEET P1002 FOR PIPING.
P5	SEE WATER SUPPLY FROM SINK TO FEED DISHWASHER. SANITARY FROM DISHWASHER SHALL DISCHARGE INTO SINK WASTE STACK. REFER TO PLUMBING FIXTURE CONNECTION SCHEDULE.
P15	1" HW TO SERVE GROUP OF LAVS. REFER TO RECIRCULATION AT PUBLIC LAVATORIES DETAIL.
P16	PROVIDE 3" CONNECTION TO STORM SYSTEM FOR 1-1/4" INDIRECT CONDENSATE CONNECTION. COORDINATE WITH MECHANICAL CONTRACTOR FOR EXACT LOCATION. REFER TO CONDENSATE TO STORM DETAIL AND INDIRECT WASTE PIPING TO FLOOR DRAIN/FLOOR SINK DETAIL.
P18	REFER TO TOILAND SINK DETAIL FOR VENTING SANITARY AND VENT PIPING.

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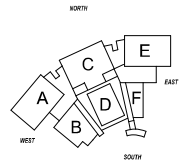

KEYPLAN

Number	Date	Issued For
2	10/23/2024	ADDENDUM NO.3
1	10/16/2024	ADDENDUM NO.2
	09/30/2024	BID/PERMIT
	07/08/2024	PHASE 3

PLUMBING ENLARGED VIEWS

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: **P402**

Autodesk Docs://22367.00 - Greenwich Central Middle School/P22367.00-GreenwichCentralMiddleSchool-MEP Central - Greenwich Central Middle School.rvt
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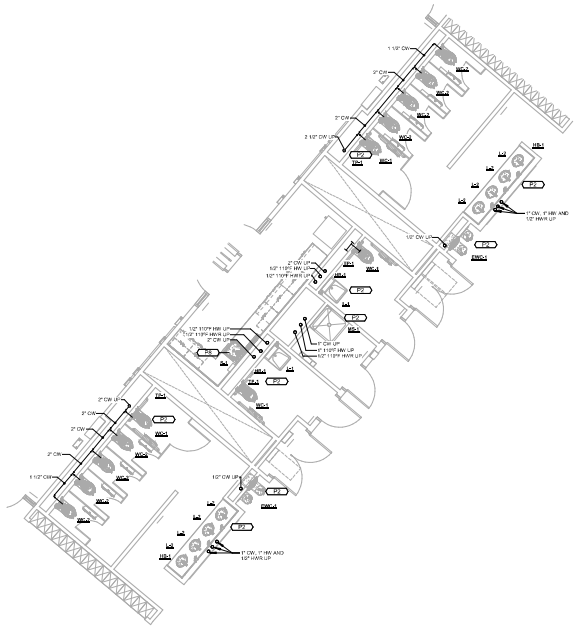
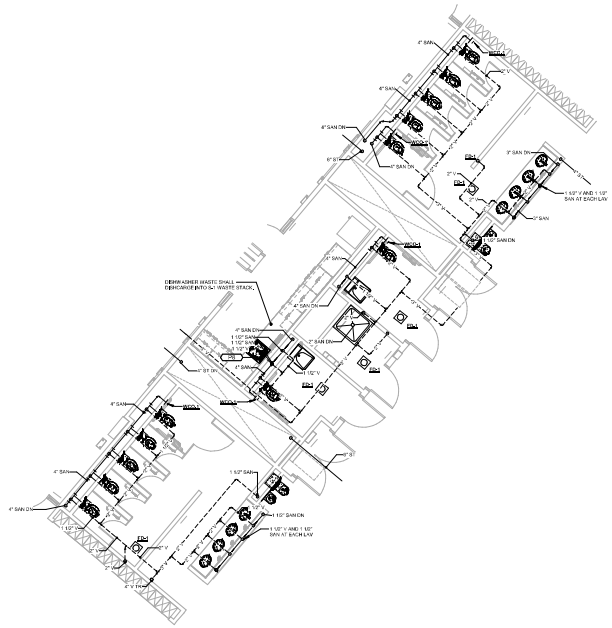
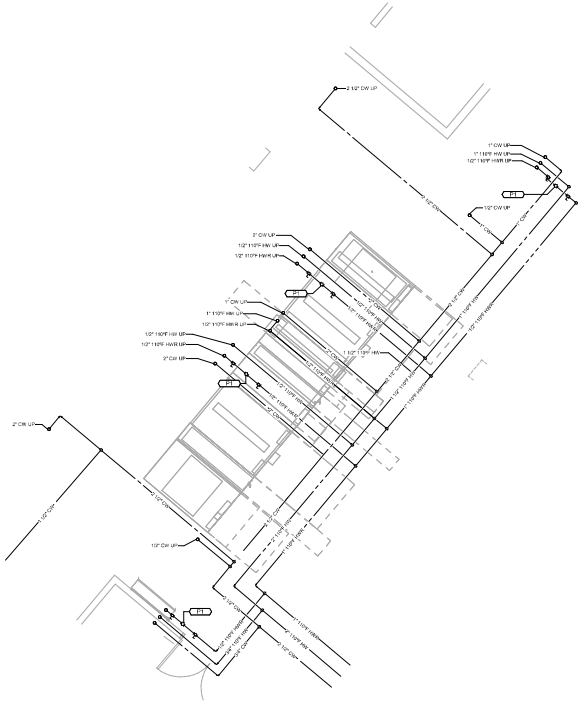


1 PLUMBING ENLARGED PLAN - 2A TOILET ROOMS SUPPLY
3/16" = 1'-0"

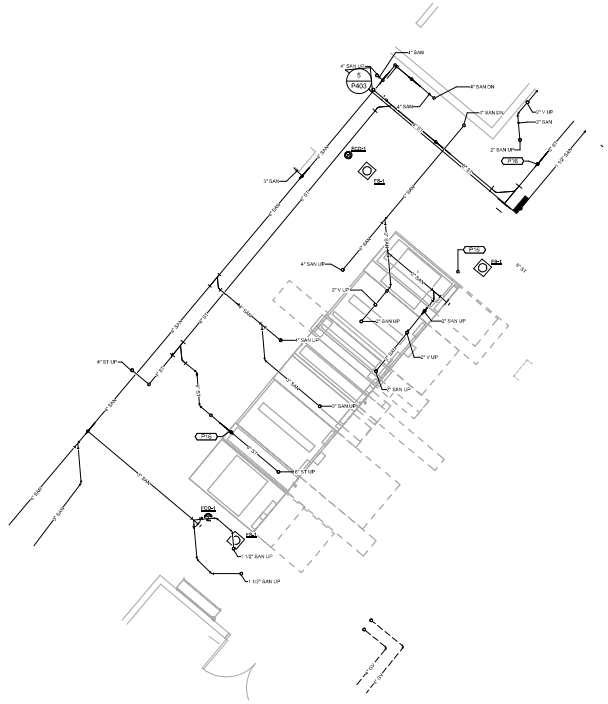


2 PLUMBING ENLARGED PLAN - 2A TOILET ROOMS WASTE
3/16" = 1'-0"

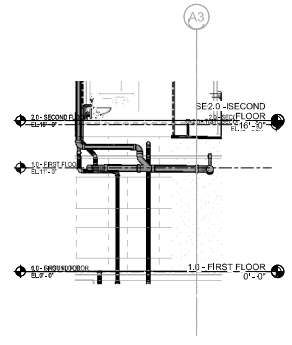
KEYNOTES - PLUMBING	
Key Value	Keynote Text
P1	BALANCE VALVE LOCATED ABOVE ACCESSIBLE CEILING SET TO 1.5 GPM
P2	PROVIDE SUPPLY, WASTE, AND VENT CONNECTIONS TO PLUMBING FIXTURES ACCORDING TO PLUMBING FIXTURE CONNECTION SCHEDULE.
P8	USE WATER SUPPLY FROM SINK TO FEED DISHWASHER. SANITARY FROM DISHWASHER SHALL DISCHARGE INTO SINK WASTE STACK. REFER TO PLUMBING FIXTURE CONNECTION SCHEDULE.
P16	PROVIDE 3" CONNECTION TO STORM SYSTEM FOR 1-1/4" INDIRECT CONDENSATE CONNECTION. COORDINATE WITH MECHANICAL CONTRACTOR FOR EXACT LOCATION. REFER TO CONDENSATE TO STORM DETAIL AND INDIRECT WAST PIPING TO FLOOR DRAIN/FLOOR SINK DETAIL.



3 PLUMBING ENLARGED PLAN - 1A MECHANICAL ROOM SUPPLY
1/4" = 1'-0"



4 PLUMBING ENLARGED PLAN - 1A MECHANICAL ROOM WASTE
1/4" = 1'-0"



5 STORM DRAIN ELEVATION - 1A MECHANICAL ROOM
3/16" = 1'-0"

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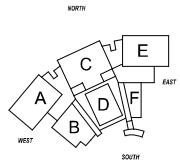


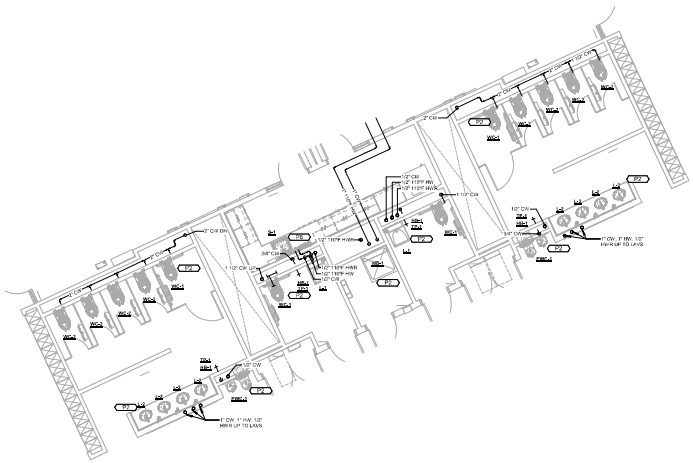
KEYPLAN

Number	Date	Issued For
	09/20/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

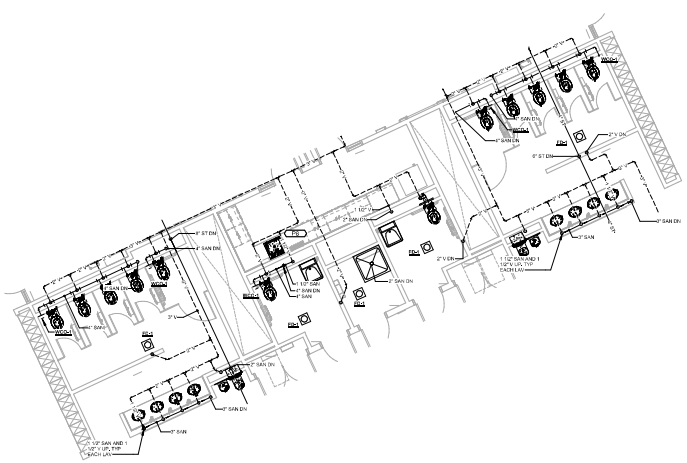
PLUMBING ENLARGED VIEWS

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: P403

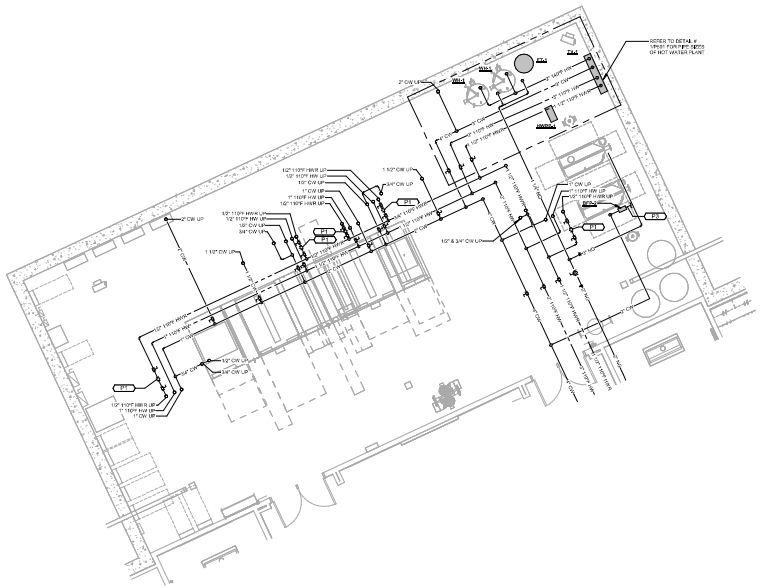
Autodesk Docs://22367.00 - Greenwich Central Middle School/P22-282005-MEP Central - Greenwich Central Middle School.rvt
9/26/2024 10:26:04 AM



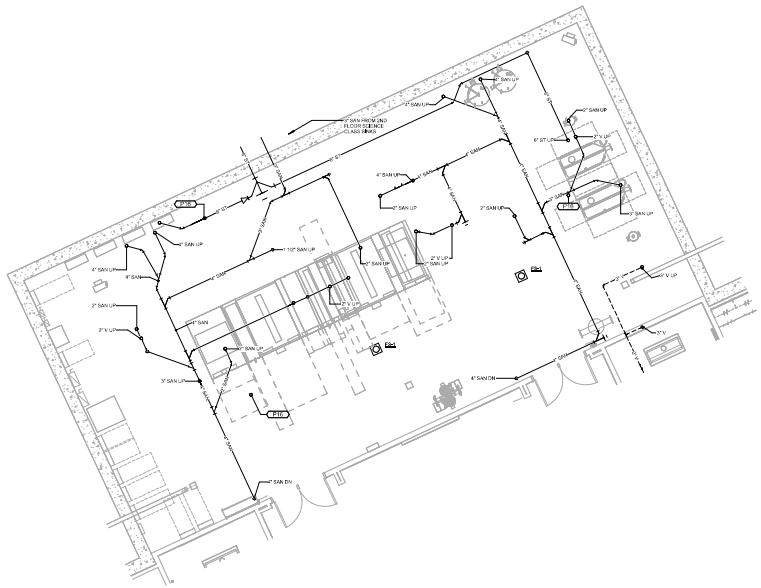
1 PLUMBING ENLARGED PLAN - 2C TLT ROOM SUPPLY
3/16" = 1'-0"



2 PLUMBING ENLARGED PLAN - 2C TLT ROOM WASTE & VENT
3/16" = 1'-0"



3 PLUMBING ENLARGED PLAN - 1C MECHANICAL ROOM 1055 SUPPLY
3/16" = 1'-0"



4 PLUMBING ENLARGED PLAN - 1C MECHANICAL ROOM 1055 WASTE
3/16" = 1'-0"

KEYNOTES - PLUMBING	
Key Value	Keynote Text
P1	BALANCE VALVE LOCATED ABOVE ACCESSIBLE CEILING SET TO 0.5 GPM
P2	PROVIDE SUPPLY, WASTE, AND VENT CONNECTIONS TO PLUMBING FIXTURES ACCORDING TO PLUMBING FIXTURE CONNECTION SCHEDULE.
P3	PROVIDE 2" CW TO MECHANICAL EQUIPMENT FOR MAKE UP WATER, PROVIDE BACKFLOW PREVENTER UPSTREAM OF MECHANICAL EQUIPMENT, REFER TO MECHANICAL PLANS FOR CONTINUATION.
P6	USE WATER SUPPLY FROM SINK TO FEED DISHWASHER, SANITARY FROM DISHWASHER SHALL DISCHARGE INTO SINK WASTE STACK, REFER TO PLUMBING FIXTURE CONNECTION SCHEDULE.
P16	PROVIDE 3" CONNECTION TO STORM SYSTEM FOR 1-1/4" INDIRECT CONDENSATE CONNECTION, COORDINATE WITH MECHANICAL CONTRACTOR FOR EXACT LOCATION, REFER TO CONDENSATE TO STORM DETAIL AND INDIRECT WAST PIPING TO FLOOR DRAIN/FLOOR SINK DETAIL.

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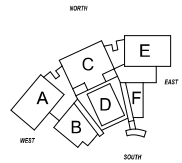

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

PLUMBING ENLARGED VIEWS

Date: 07/08/2024
Scale: 3/16" = 1'-0"
Proj. Number: 22367.00
Drawing Number: P404

Autodesk Docs://22367.00 - Greenwich Central Middle School/P22-22367-MEP Central - Greenwich Central Middle School.rvt
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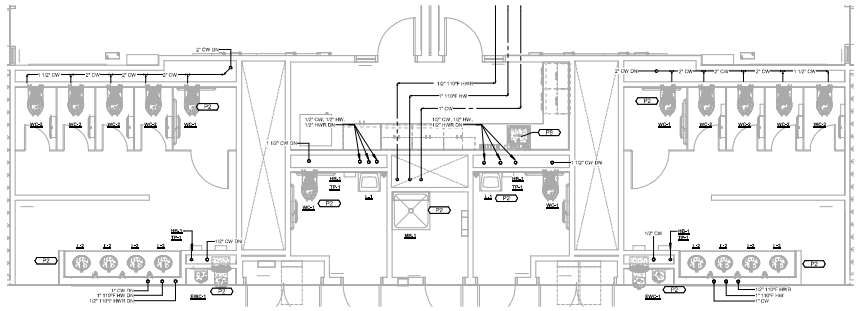
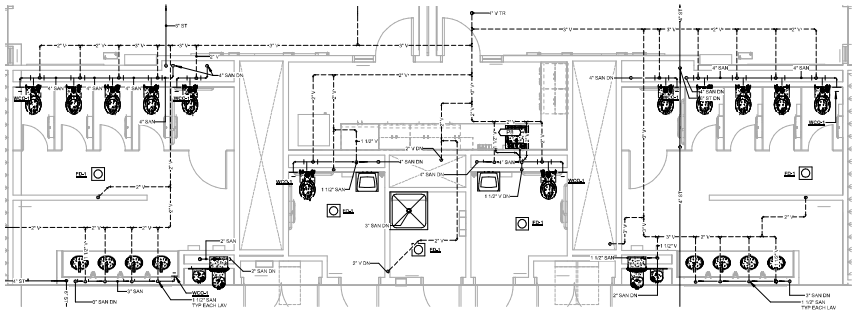
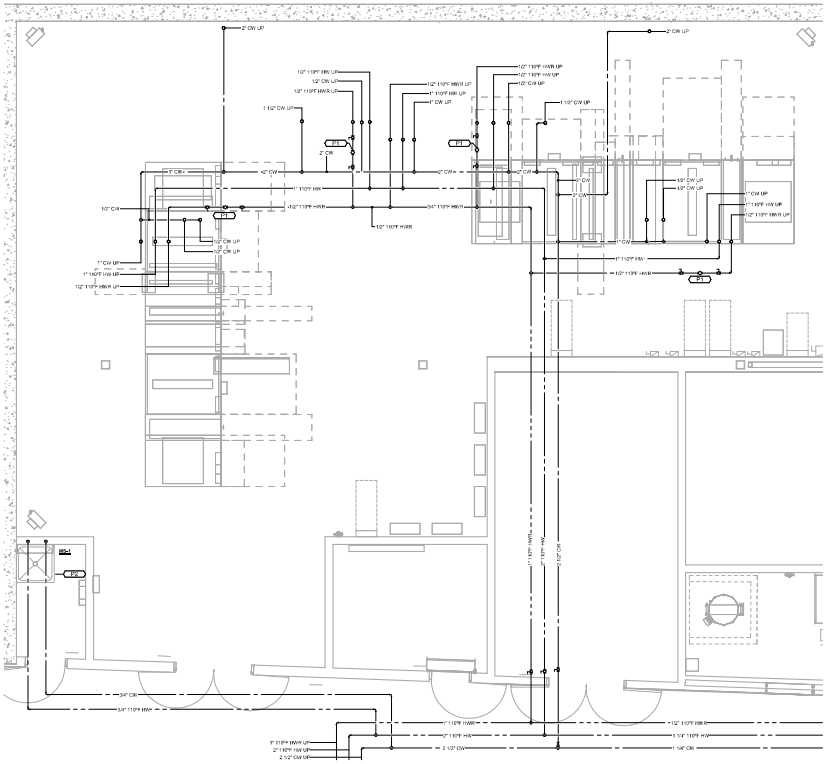


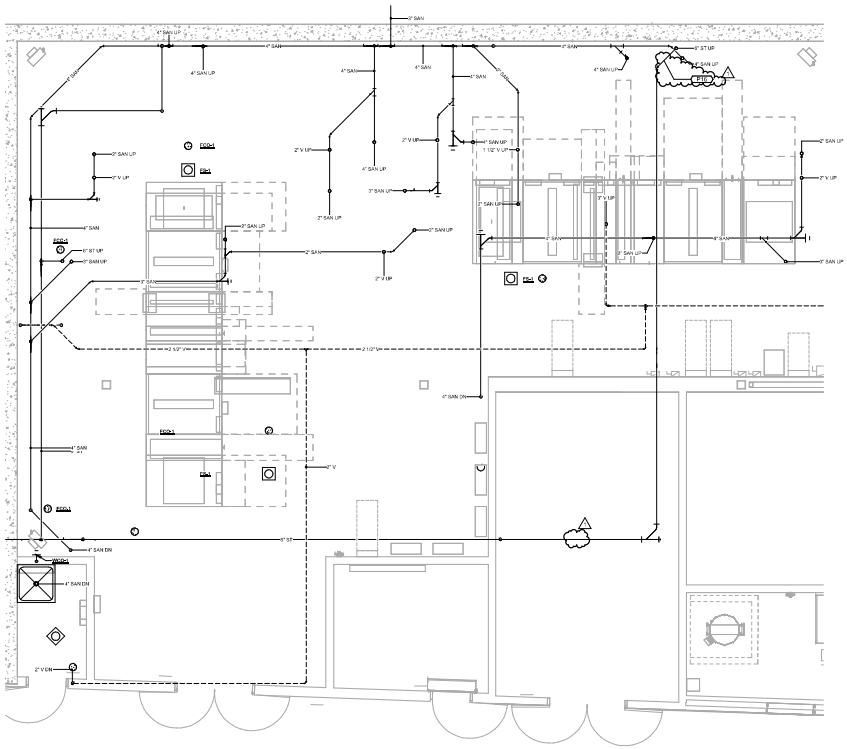
1 PLUMBING ENLARGED PLAN - 2E TLT ROOM SUPPLY
1/4" = 1'-0"



2 PLUMBING ENLARGED PLAN - 2E TLT ROOM WASTE & VENT
1/4" = 1'-0"



3 PLUMBING ENLARGED PLAN - 1E MECHANICAL ROOM SUPPLY
1/4" = 1'-0"



4 PLUMBING ENLARGED PLAN - 1E MECHANICAL ROOM WASTE & VENT
1/4" = 1'-0"

KEYNOTES - PLUMBING

Key Value	Keynote Text
P1	BALANCE VALVE LOCATED ABOVE ACCESSIBLE CEILING SET TO 0.5 GPM
P2	PROVIDE SUPPLY, WASTE, AND VENT CONNECTIONS TO PLUMBING FIXTURES ACCORDING TO PLUMBING FIXTURE CONNECTION SCHEDULE.
P8	USE WATER SUPPLY FROM SINK TO FEED DISHWASHER, SANITARY FROM DISHWASHER SHALL DISCHARGE INTO SINK WASTE STACK, REFER TO PLUMBING FIXTURE CONNECTION SCHEDULE.
P16	PROVIDE 3" CONNECTION TO STORM SYSTEM FOR 1-1/4" INDIRECT CONDENSATE CONNECTION. COORDINATE WITH MECHANICAL CONTRACTOR FOR EXACT LOCATION, REFER TO CONDENSATE TO STORM DETAIL AND INDIRECT WASTE PIPING TO FLOOR DRAIN/FLOOR SINK DETAIL.

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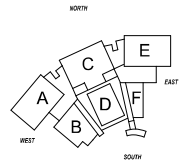

KEYPLAN

Number	Date	Issued For
1	10/16/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

PLUMBING ENLARGED VIEWS

Date
07/08/2024
Scale
1/4" = 1'-0"
Proj. Number
22367.00

Drawing Number
P405

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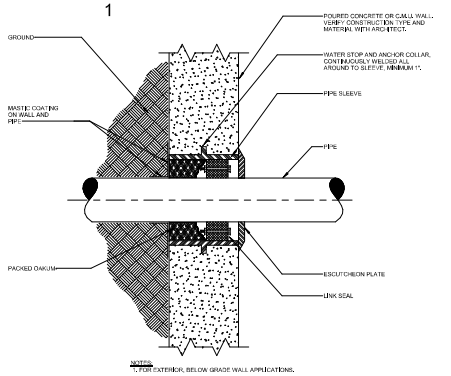
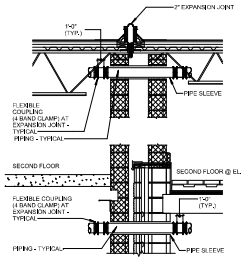


10 TYPICAL EXTERIOR BELOW GRADE PIPE SLEEVE INSTALLATION DETAIL
NTS



9 TYPICAL EXPANSION JOINT PIPING DETAIL
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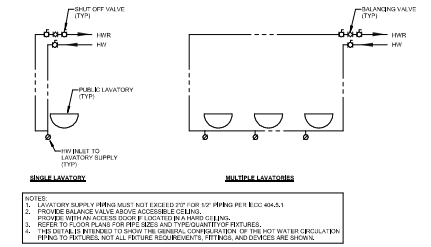

8 RECIRCULATION AT PUBLIC LAVATORIES
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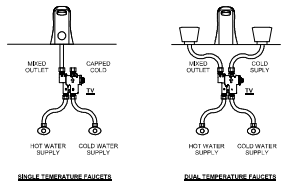

7 LAVATORY MIXING VALVE DETAIL
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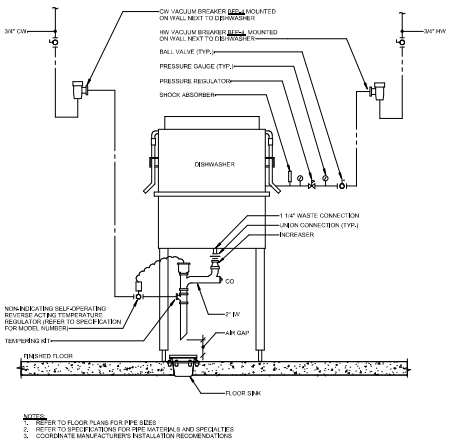
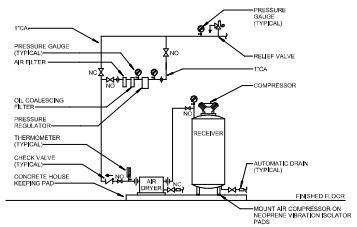
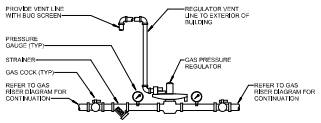


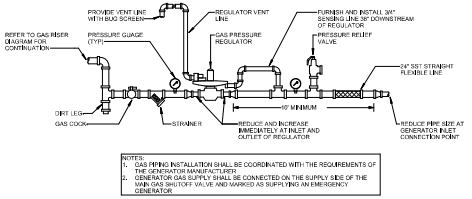
6 DISHWASHER DETAIL1
NTS



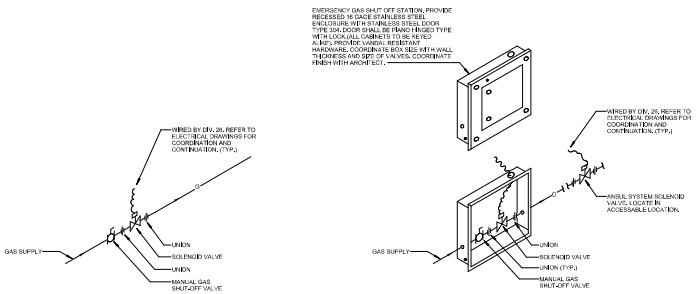
5 COMPRESSED AIR SYSTEM PIPING DETAIL
1/8" = 1'-0"



4 TYPICAL GAS CONNECTION TO EQUIPMENT DETAIL
NTS



3 TYPICAL GAS CONNECTION TO GENERATOR DETAIL
NTS



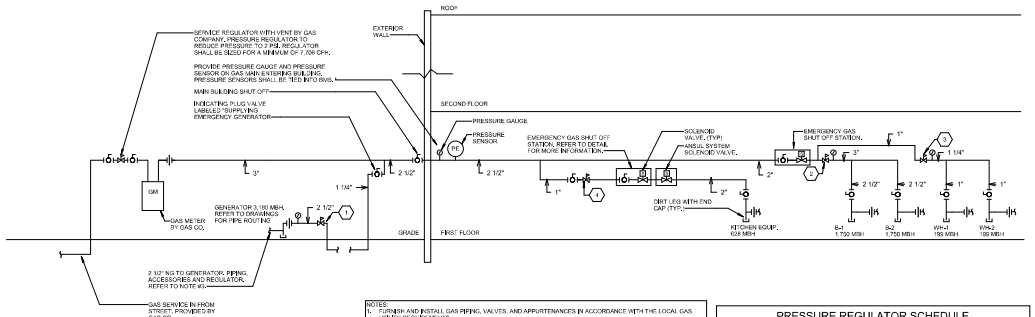
NOTES
1. MANUAL SHUTOFF VALVE AND SOLENOID VALVE FOR EMERGENCY GAS SHUTOFF FURNISHED INSTALLED BY DIV.22. WIRED TO SHUTOFF SYSTEM BY DIV.26. VALVE SHALL BE ASCO 120V NORMALLY CLOSED TYPE.

MECH ROOM APPLICATION

NOTES
1. COORDINATE FINAL LOCATION AND MOUNTING HEIGHT OF GAS SUPPLY VALVE STATION WITH ARCHITECT.
2. MANUAL SHUTOFF VALVE, SOLENOID VALVE AND RECESSED ENCLOSURE FOR EMERGENCY GAS SHUTOFF FURNISHED INSTALLED BY DIV.22. WIRED TO SHUTOFF SYSTEM BY DIV.26. VALVE SHALL BE ASCO 120V NORMALLY CLOSED TYPE.

KITCHEN APPLICATION

2 EMERGENCY GAS SHUT OFF DETAIL
NTS



1 NATURAL GAS RISER
NTS

NOTES:
1. FURNISH AND INSTALL GAS PIPING, VALVES, AND APPURTENANCES IN ACCORDANCE WITH THE LOCAL GAS UTILITY REQUIREMENTS.
2. ALL GAS REGULATORS SHALL HAVE A MINIMUM OF 10 PIPE DIAMETERS OF STRAIGHT PIPE DOWNSTREAM OF REGULATOR.
3. GENERATOR REGULTOR SHALL HAVE 10FT OF STRAIGHT PIPE DOWNSTREAM OF THE REGULATOR PRIOR TO CONNECTING TO GENERATOR.
4. PROVIDE GAS CONNECTION TO ALL GAS FIRED EQUIPMENT.
5. PROVIDE SOLENOID VALVE AND RECESSED ENCLOSURE FOR EMERGENCY GAS SHUTOFF FOR KITCHENS AND SCIENCE LABS. SOLENOID VALVE SHALL BE FURNISHED INSTALLED BY DIV.22. WIRED TO SHUTOFF SYSTEM BY DIV.26. VALVE SHALL BE 120VAC NORMALLY CLOSED TYPE, ENCLOSURE SHALL BE ACCESSIBLE. REFER TO MOUNTING HEIGHT OF ENCLOSURE ON ARCHITECTURAL DRAWINGS.

PRESSURE REGULATOR SCHEDULE

SYMBOL	EQUIPMENT	REGULATOR TYPE	MANUFACTURER	MODEL NUMBER	INLET PRESSURE	OUTLET PRESSURE
1	GENERATOR	LINE	ROOTS	814R SERIES	2 PSI	11 W.C.
2	BOILER	LINE	KARL DUNGS	FRS SERIES	2 PSI	11 W.C.
3	WATER HEATER	LINE	KARL DUNGS	FRS SERIES	2 PSI	11 W.C.
4	KITCHEN	LINE	KARL DUNGS	FRS SERIES	2 PSI	11 W.C.

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Greenwich Public Schools

Greenwich Central Middle School

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STATE PROJECT NO: 057-0114 N

NORTH
EAST
SOUTH
WEST

KEYPLAN

Number	Date	Issued For
	03/07/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

PLUMBING DETAILS

Date: 07/08/2024
Scale: NTS
Proj. Number: 22367.00
Drawing Number: P500

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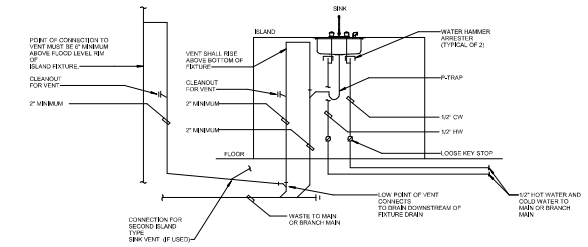
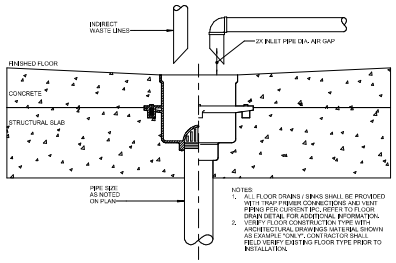
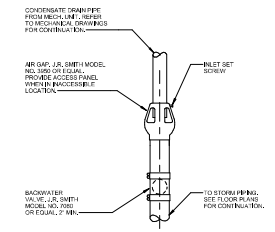


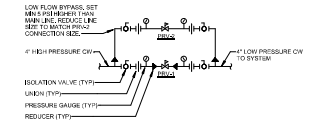
10 DETAIL ISLAND SINK
NTS



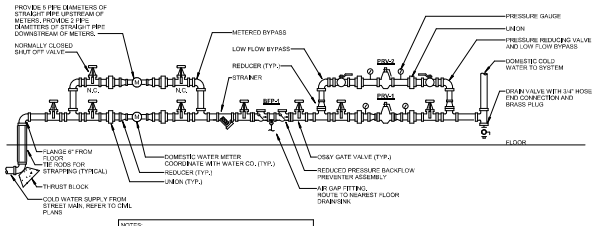
9 TYPICAL INDIRECT WASTE PIPING TO FROOR DRAIN/FLOOR SINK DETAIL
NTS



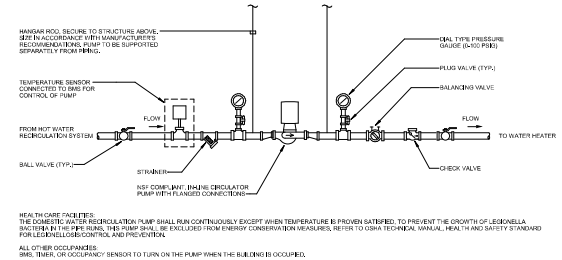
8 CONDENSATE TO STORM DETAIL
NTS



7 PRESSURE REDUCING VALVE STATION
NTS



6 DOMESTIC WATER SERVICE DETAILS
NTS



5 HOT WATER RECIRCULATING PUMP DETAIL
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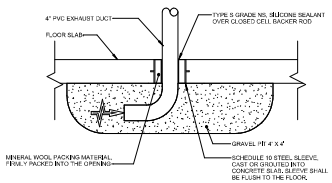
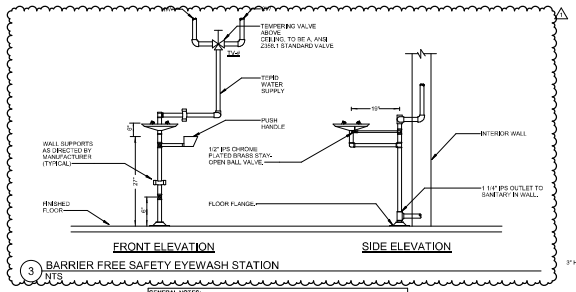
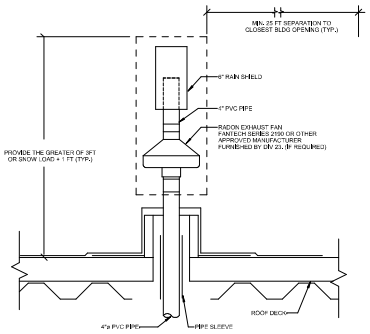


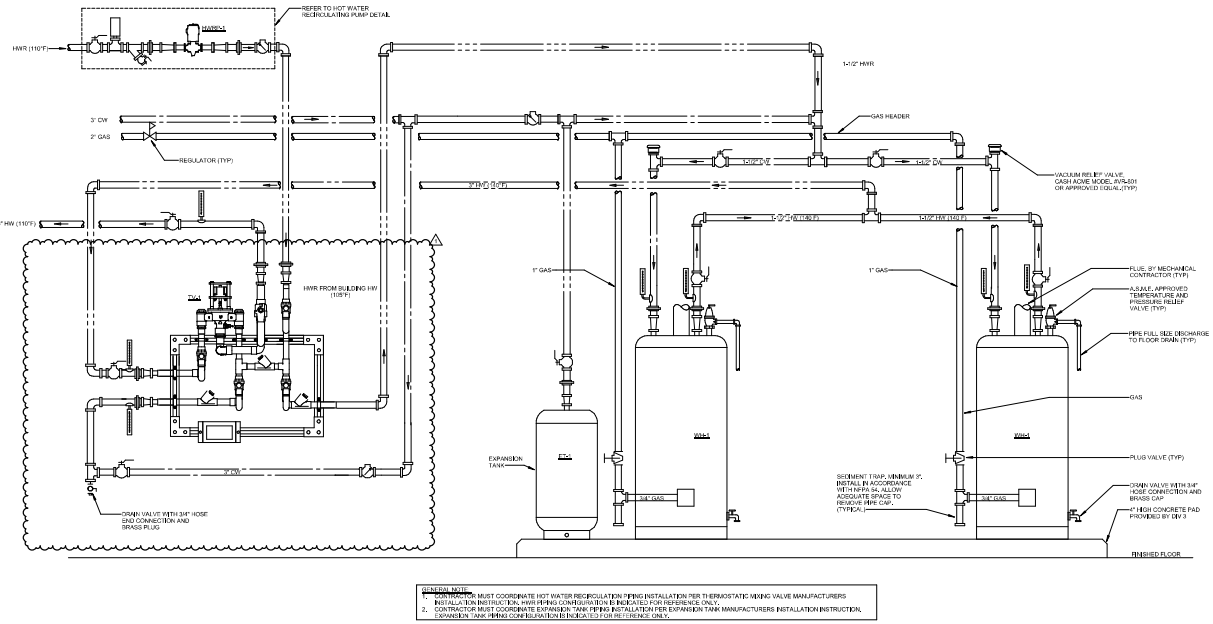
4 RADON COLLECTION TRENCH PENETRATION
NTS



3 BARRIER FREE SAFETY EYEWASH STATION
NTS



2 RADON THROUGH ROOF DETAIL
NTS



GENERAL NOTE:
1. CONTRACTOR MUST COORDINATE HOT WATER RECIRCULATION PIPING INSTALLATION PER THERMOSTATIC MIXING VALVE MANUFACTURERS INSTALLATION INSTRUCTION. HWR PIPING CONFIGURATION IS INDICATED FOR REFERENCE ONLY.
2. CONTRACTOR MUST COORDINATE EXPANSION TANK PIPING INSTALLATION PER EXPANSION TANK MANUFACTURERS INSTALLATION INSTRUCTION. EXPANSION TANK PIPING CONFIGURATION IS INDICATED FOR REFERENCE ONLY.

1 WATER HEATER DETAIL (DIGITAL MIXING VALVE)
1/8" = 1'-0"

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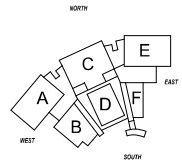

KEYPLAN

Number	Date	Issued For
1	10/16/2024	ADDENDUM NO. 2
	09/20/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

PLUMBING DETAILS

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Scale: As indicated
Proj. Number: 22367.00
Drawing Number: P501

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PLUMBING FIXTURE SCHEDULE

SYMBOL	MANUFACTURER/ MODEL NUMBER	DESCRIPTION OF FIXTURE	TRIM AND ACCESSORIES	REMARKS	SYMBOL	MANUFACTURER/ MODEL NUMBER	DESCRIPTION OF FIXTURE	TRIM AND ACCESSORIES	REMARKS
EW-1	BRADLEY MODEL # S19-222B	EYEWASH: WALL MOUNTED, HANDLE-OPERATED, EYE WASH UNIT.	1/2"NPT STAY OPEN VALVE. "NAVIGATOR" S19-2000 EFXB THERMOSTATIC MIXING VALVE IN ACCESS PANEL. BRADLEY MODEL S27-300 DUAL CHECK BACKFLOW PREVENTER MOUNTED TO SPRAY HANDLE. PROVIDE ACCESS PANEL FOR MIXING VALVE AND SUPPLY CONNECTIONS. COORDINATE WITH ARCHITECT ON LOCATIONS.	#4,10	SK1	ELKAY "DEPENDABILT" MODEL # 2126CR3-4X	SINK: SINGLE BOWL, DROP-IN, 18 GAUGE TYPE 304 SST, CENTER DRAIN. BOWL SIZE: (1) 20" X 20" X 12"	"T&S BRASS MODEL B-0231 FAUCET, 8" WALL MOUNT MIXING FAUCET WITH QUARTER TURN CARTRIDGES AND SPRING CHECKS, 12" SWING NOZZLE. PROVIDE WITH SPLASH MOUNT AND LK98FC DRAIN FITTING.	#2,4,6,7
EW-2	BRADLEY MODEL # S19-270E	EYEWASH: DECK MOUNTED, SWING ACTIVATED EYE WASH UNIT.	1/2"NPT STAY OPEN VALVE. "NAVIGATOR" S19-2000 EFXB THERMOSTATIC MIXING VALVE UNDER COUNTER TOP. BRADLEY MODEL S27-300 DUAL CHECK BACKFLOW PREVENTER MOUNTED TO SPRAY HANDLE.	#4,10	SK2	ELKAY "LUSTERTONE" MODEL # DLR3122180	ART ROOM SINK: ACCESSIBLE, SINGLE BOWL, DROP-IN, 18 GAUGE TYPE 304 SST, CENTER DRAIN. BOWL SIZE: (1) 31" X 20" X 10-1/8"	CHICAGO FAUCETS MODEL #895-317GN2ACABCP, 1.5 GPM, 4" RIGID CENTERS, SWING GOOSENECK SPOUT, PROVIDE WITH ELKAY #LK40-2S DRAIN FITTING	#2,4,7,8
BWC-1	ELKAY MODEL # EDFP217WSX	FREEZING COUNTER & WATER FILTER DRINKING: ACCESSIBLE FILTERED BI-LEVEL, DOUBLE BOWL, IS IN WALL MOUNT, SST, REFRIGERATED, ELECTRONIC ACTIVATION BOTTLE FILLER	MODEL# "LZWS-CDP217", WITH FILTER, LOWER PANEL AND REFRIGERATION, 8CHR CHILLER AND MPW3210 FRAME. WATERSENTRY PLUS 6009-SAL CAPACITY FILTER, MOUNTING FRAMES, CANE APRONS WHERE REQUIRED AND VANDAL RESISTANT BUBBLERS	#3,4,7,9	BF-1	SYMMONS "DURO" 36B54-0321-ACCY-S-TRM	SHOWER: 1.5 GPM HEAD, POLISHED CHROME, HAND SHOWER.	PROVIDE WITH 30" SLIDE BAR, 60" FLEXIBLE METAL HOSE.	#1,3,4,7
MS-1	FIAT MODEL # MSB36	MOP BASIN SINK: TERRAZZO MOP BASIN, 36" X 36" X 6" WITH 6" DROP FRONT, 8STH TROJAN, DRAIN BODY, SST CURB CAPS.	CHICAGO 897-ACF WALL MOUNTED 8" BODY FAUCET, 3/4", THREADED MALE NOSE OUTLET, PAIL HOOK, WALL BRACE AND VACUUM BREAKER SPOUT, 18 GAUGE STAINLESS STEEL STRAINER, WALL GUARD, MOP HANGER, HOSE AND BRACKET. PROVIDE ADJACENT TO SERVICE FAUCET, ONE CHICAGO #950299CP WASH DOWN AND SILL FAUCET WITH VACUUM BREAKER INSPOUT, HOSE END THREAD. PROVIDE EWC-1 ADJACENT TO SINK	#4	UR1	AMERICAN STANDARD "WASHBROOK" MODEL #6590.001	URINAL: ACCESSIBLE, WALL HUNG, VITREOUS CHINA, 3/4" TOP SPUD, 0.125 GPF	SLOAN MODEL 186-0.125, 3/4" TOP SPUD, 0.125 GPF FLUSHOMETER. JR SMITH SERIES #063 URINAL SUPPORT.	#1,3,4,5,7
L-1	AMERICAN STANDARD "CRESTWAY" MODEL # 0476.001EC	LAVATORY: ACCESSIBLE, WALL HUNG, SINGLE BOWL, VITREOUS CHINA, CENTER-HOLE ONLY LAVATORY	DELTA "TECK" #987T104, SINGLE HANDLE METERING LAVATORY FAUCET, 0.5 GPM, POLISHED CHROME FINISHED, VANDAL RESISTANT ADA KNOB HANDLE. PROVIDE DRAIN AND OFFSET TAILPIECE #LKAD-17A, JR SMITH SERIES 700 CONCEALED SUPPORT. PROVIDE POINT OF USE MIXING VALVE TVX2 TIGHT TO BOTTOM OF LAV.	#1,2,3,4,7	WC-1	AMERICAN STANDARD "ALPHALIA" MODEL #3351.101	WATER CLOSET: ACCESSIBLE, WALL HUNG, ELONGATED BOWL, VITREOUS CHINA, 1-1/2" TOP SPUD	SLOAN MODEL #111-1.28 FLUSHOMETER WITH INTEGRAL STOP AND VACUUM BREAKER, 1.28 GPF. AMERICAN STANDARD #3501.100 HEAVY DUTY OPEN FRONT LESS COVER SEAT. JR SMITH SERIES 0200 WATER CLOSET SUPPORT.	#1,3,4,5,7
L-2	AMERICAN STANDARD "OVALYN" MODEL # 0401300.020	LAVATORY: ACCESSIBLE, UNDERMOUNT, SINGLE BOWL, VITREOUS CHINA, CENTER-HOLE ONLY, LAVATORY	DELTA "TECK" #987T104, SINGLE HANDLE METERING LAVATORY FAUCET, 0.5 GPM, POLISHED CHROME FINISHED, VANDAL RESISTANT ADA KNOB HANDLE. PROVIDE DRAIN AND OFFSET TAILPIECE #LKAD-17A, JR SMITH SERIES 700 CONCEALED SUPPORT. PROVIDE POINT OF USE MIXING VALVE TVX2 TIGHT TO BOTTOM OF LAV.	#1,2,3,4,7	WC-2	AMERICAN STANDARD "FLOWISE" MODEL #3351.101	WATER CLOSET: ACCESSIBLE WALL HUNG, ELONGATED BOWL, VITREOUS CHINA, 1-1/2" TOP SPUD	SLOAN MODEL #111-1.28 FLUSHOMETER WITH INTEGRAL STOP AND VACUUM BREAKER, 1.28 GPF. AMERICAN STANDARD #3501.100 HEAVY DUTY OPEN FRONT LESS COVER SEAT. JR SMITH SERIES 0200 WATER CLOSET SUPPORT.	#1,4,5,7
SK-1	ELKAY "LUSTERTONE" MODEL # LRAD191955	CLASSROOM SINK: ACCESSIBLE, DROPIN, 3-HOLE FAUCET, 18 GAUGE TYPE 304 SST, SINGLE BOWL. OFFSET DRAIN REAR CENTER. BOWL SIZE: 19" X 18" X 5 1/2"	CHICAGO FAUCETS MODEL #895-317GN2AFCABCP, 1.5 GPM, 4" RIGID CENTERS, SWING GOOSENECK SPOUT, PROVIDE WITH ELKAY #LK40-2S DRAIN FITTING	#2,3,4,5,7					

REMARKS:
1. FIXTURE SHALL BE WHITE UNLESS SPECIFIED OTHERWISE BY THE ARCHITECT.
2. INSTALL TRUEBRO INC. MODEL #102, HANDI-LAV-GUARD PROTECTOR ON THE HOT, COLD, AND DRAIN PIPING UNDER FIXTURE.
3. FIXTURES AND TRIM AS NOTED SHALL BE "ACCESSIBLE" AND SHALL BE INSTALLED TO ADA / ANSI A117 AND FEDERAL 504 REQUIREMENTS.
4. PROVIDE ISOLATION VALVES AT THE PIPE CONNECTIONS.
5. PROVIDE WATER HAMMER ARRESTORS AT THE PIPE CONNECTIONS. LOCATE ABOVE AN ACCESSIBLE CEILING OR IN WALL WITH ACCESS PANEL.
6. PROVIDE SINK WITH OFFSET DRAIN TO LEFT OR RIGHT AND BACK OF BOWL FOR ADA COMPLIANCY, ANSI A117 AND FEDERAL 504 REQUIREMENTS SEE ARCHITECTURAL DRAWINGS FOR DRAIN LOCATIONS.
7. REFER TO ARCHITECTURAL DRAWINGS FOR FIXTURE MOUNTING HEIGHTS.
8. PROVIDE WITH ACID RESISTANT GRID DRAIN ASSEMBLY.
9. BUBBLER ACTIVATION SHALL BE REMOTE PUSH BUTTON IN FRONT OF CASEWORK. PUSH BUTTON SHALL REQUIRE NO MORE THAN 5 LBS. FORCE FOR ACTIVATION.
10. PROVIDE BOTH CW AND HW CONNECTIONS TO TEMPERING VALVE. PROVIDE TEPID WATER SUPPLY TO EMERGENCY FIXTURE WITH CW BYPASS.

PLUMBING SPECIALTIES SCHEDULE

SYMBOL	MANUFACTURER/ MODEL NUMBER	DESCRIPTION	COMPONENTS AND ACCESSORIES	MOUNTING HEIGHT	REMARKS	SYMBOL	MANUFACTURER/ MODEL NUMBER	DESCRIPTION	COMPONENTS AND ACCESSORIES	MOUNTING HEIGHT	REMARKS
FD-1	JR SMITH MODEL # 4420C	FLANGED: CAST IRON STRAINER WITH CAST BRONZE TAPER THREAD PLUG	VANDAL PROOF	-	#6, 7	BWH-1	WOODFORD MODEL # SR-HA8	BACKFLOW PREVENTER, DUAL CHECK: BACKFLOW PREVENTOR, FREEZELESS, CAST IRON SUPPORT AND DECK FLANGE	3/4" INLET CONNECTION. NO DRAIN LINE REQUIRED. PROVIDE W/ NAMEPLATE STATING "DISCONNECT HOSE CONNECTION AFTER USE TO PREVENT FREEZING WITHIN ENCLOSURE"	OUTLET AT NOMINAL 20" ABOVE ROOF	#4
RD-1	JR SMITH MODEL # 1775	ROOF/DECK DRAIN: STAINLESS STEEL DOMED DOWNSPOUT COVER WITH SECURING FLANGE AND HINGED COVER	VANDAL PROOF	REFER TO PLANS	#6	RD-2	JR SMITH MODEL # 1010	ROOF DRAIN: CAST IRON BODY, FLASHING CLAMP, GRAVEL STOP, CAST IRON DOME	UNDERDECK CLAMP, VANDAL PROOF DOME, SUMP RECEIVER, EXTENSION SLEEVE FOR ROOF INSULATION	-	#6
FD-2	JR SMITH MODEL # 4020 SERIES	FLOOR DRAIN: CAST IRON BODY, ROUND ADJUSTABLE SCORIATED POLISHED BRONZE TOP, FLANGE GASKET INSIDE CAULK OUTSIDE	VANDAL PROOF, BRONZE PLUG, FLASHING CLAMP FOR CARPETED FLOORS, COORDINATE ACCESSORIES WITH ARCHITECTURAL FLOORING	-	#6, 7, 8	RD-3	JR SMITH MODEL # 1070Y	OVERFLOW DRAIN: CAST IRON BODY, FLASHING CLAMP, GRAVEL STOP, CAST IRON DOME, 3-1/2" OVERFLOW STANDPIPE	UNDERDECK CLAMP, VANDAL PROOF DOME, SUMP RECEIVER, EXTENSION SLEEVE FOR ROOF INSULATION	-	#6
FD-3	JR SMITH MODEL # 2010 SERIES	FLOOR DRAIN: CAST IRON BODY, ROUND ADJUSTABLE NICKEL BRONZE STRAINER. STRAINER SHALL BE SQUARE IN ROOMS WITH TILE FLOOR, ROUND IN ROOMS WITH OTHER FLOOR TYPES.	VANDAL PROOF GRATE, FLASHING COLLAR, SEDIMENT BUCKET. PROVIDE WITH TRAP PRIMER: TP-1	-	#6	TP-1	PRECISION PLUMBING "PRIME-RITE" MODEL # PR-500	TRAP PRIMER: PRESSURE DROP ACTUATED TRAP PRIMER VALVE, INTERNAL VACUUM BREAKER AND BACKFLOW PREVENTER UNIT, 1/2" INLET AND OUTLET	DISTRIBUTION UNITS: MODEL #DU-X AS REQUIRED FOR THE NUMBER OF FLOOR DRAINS SHOWN ON THE DRAWINGS	-	#2, 4
FD-4	JR SMITH MODEL # 2010 SERIES	FLOOR DRAIN: 6" DEEP RECEPTOR, NICKEL BRONZE TOP, SEDIMENT BUCKET, FLASHING CLAMP	6-1/2" SQUARE NICKEL BRONZE TOP WITH 1/2 VANDAL PROOF GRATE. PROVIDE WITH TRAP PRIMER: TP-1	-	#6	TV-1	LEONARD "PROTONI" MODEL # PMV-150-LF-01-0.5	CENTRAL THERMOSTATIC MIXING VALVE, ENHANCED DENTAL MIXING VALVE, TEMPERATURE REGULATORS, 1-1/4" INLETS, 1-1/2" OUTLET, 1" HWR PIPING, 70 GPM @ 10PSI PRESSURE DROP COORDINATE WITH ARCHT'L	PROVIDE WITH BRONZE BODY, INLET CHECK STOPS, 110F OUTLET TEMPERATURE. PROVIDE WITH ENHANCED CONTROLLER FOR BMS CONNECTION	MAX 5'-0" ABOVE FINISHED FLOOR	#4, 6
HB-1	WOODFORD MODEL # B24	HOSE BIB: VACUUM BREAKER, PROVIDE WITH LOOSE KEY HANDLE, CHROME FINISH	3/4" CW THREADED HOSE CONNECTION	18" ABOVE FINISHED FLOOR	#3, 4	TV-2	LEONARD MODEL # 170LF-H-BRKT	SHORT LINE THERMOSTATIC MIXING VALVE, THERMOSTAT, INLETS, 3/8" OUTLETS, 1/2" OUTLET, 1.7 GPM @ 5 PSI PRESSURE DROP, CONTROLLABLE DOWN TO 0.35 GPM	BRONZE BODY, INLET CHECK STOPS, 120F OUTLET TEMPERATURE	TIGHT TO BOTTOM OF LAV/COUNTER	#4, 5
IM-1	GUY GRAY MODEL # 66164	ICE MAKER BOX: STAINLESS STEEL ICE MAKER BOX WITH QUARTER TURN BALL VALVE	PROVIDE WITH WTR-3	MAX 60" ABOVE FINISHED FLOOR	#4	WR-1	WATTS "INTELLI-FLOW" SERIES MODEL # ADC-W/B-M1	WASHING MACHINE WATER SUPPLY CONTROL VALVE: AUTOMATIC SHUTOFF WITH LEAK SENSOR, 1/2" INLETS, 3/4" OUTLETS, RECESSED WALL MOUNTING	SERIES ADC-LS LEAK SENSOR	MAX 4'-0" ABOVE FINISHED FLOOR	#4
FD-1	JR SMITH MODEL # 8715	FLASHER (RAIN) HEAD, INTERCEPTOR: CAST IRON WITH GALVANIZED SUB-COAT, WHITE DUCO FINISH, SEDIMENT STRAINER WITH REMOVABLE SST SCREENS AND CAST IRON COVER	PROVIDE ADJACENT TO SINK FIXTURE	ALLOW 14-1/2" ABOVE INTERCEPTOR FOR REMOVAL OF STRAINER	#8	WCO-1	JR SMITH MODEL # 4402C-U	WALL CLEANOUT: MIDO CAST IRON, SPIGOT FERRULE CAST BRONZE THREAD PLUG, CLEANOUT FINISH SHALL MATCH ARCHITECTURAL FINISHES	VANDAL PROOF. COORDINATE LOCATIONS WITH ARCHITECT.	-	#1, 9
						WH/CO-1	WOODFORD MODEL # B65	WALL HYDRANT: FREEZELESS, INTEGRAL VACUUM BREAKER, 3/4" INLET, SQUARE BOX WITH SCREWED COVER, PROVIDE WITH LOOSE TEE KEY, COVER FINISH SHALL MATCH ARCHITECTURAL FINISHES	3/4" CW THREADED HOSE CONNECTION	18" ABOVE GRADE	#3, 4

REMARKS:
1. INSTALL SIZED PER LOAD (WSFU) RECOMMENDED BY PDI & MANUFACTURER.
2. TRAP PRIMER SHALL BE INSTALLED A MINIMUM OF 1'-0" ABOVE FINISHED FLOOR FOR EVERY 20'-0" OF PRIMER LINE.
3. PROVIDE EACH HYDRANT WITH A LOOSE KEY. CONTRACTOR SHALL VERIFY WALL THICKNESS.
4. PROVIDE ISOLATION VALVES AT THE SUPPLY PIPE CONNECTIONS.
5. PROVIDE AN AIR GAP FITTING ON THE DRAIN LINE. MOUNT AT A SUFFICIENT HEIGHT TO ALLOW PROPER DRAINAGE. DRAIN SHALL BE ROUTED TO FLOOR SINK.
6. UNLESS OTHERWISE INDICATED, SHALL BE FULL SIZE OF PIPE SERVED, REFER TO FLOOR PLANS FOR SIZES.
7. PROVIDE CLEANOUT AT ALL HORIZONTAL TURNS GREATER THAN 45 DEGREES FOR ALL STORM AND SANITARY PIPING.
8. PROVIDE FLOOR CLEANOUT FOR ALL BURIED STORM AND SANITARY PIPING, NOT MORE THAN 100'-0" APART.
9. PROVIDE WALL CLEANOUT AT BASE OF ALL SANITARY AND STORM STACKS, FURNISH WITH ACCESS DOOR OR COVER.
10. NUMBER OF OUTLETS DETERMINED IN THE FIELD BY CONTRACTOR. FURNISH AND INSTALL OUTLET PIPING FROM TRAP PRIMER ASSEMBLY TO FLOOR RECEPTOR TRAP PRIMING CONNECTION.

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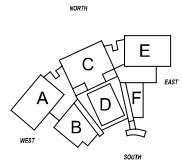
STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

PLUMBING SCHEDULES AND DIAGRAMS

Date: 07/08/2024
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BACKFLOW PREVENTION SCHEDULE

TAG	MANUFACTURER	MODEL #	HAZARD CLASS	DESCRIPTION	COMPONENTS AND ACCESSORIES	APPLICATION	APPLICABLE STANDARDS	REMARKS
BFP-1	WATTS	LF-909-QT	HEALTH HAZARD	REDUCED PRESSURE ZONE ASSEMBLIES STAINLESS STEEL/EPOXY COATED DUCTILE IRON BODY, CONTINUOUS PRESSURE, TESTABLE, 250 GPM @ 8 PSI PRESSURE DROP	TWO ISOLATION VALVES, RELIEF VALVE, FOUR TEST COCKS, TWO BUTTERFLY VALVES, FLOOD SENSOR	MAIN SUPPLY LINE SIZES 3-1/2"-10"	ASSE 1013 & NSF 61-G	#1,2,4
BFP-2	WATTS	LF909	HEALTH HAZARD	REDUCED PRESSURE ZONE ASSEMBLIES CAST COPPER SILICONE/EPOXY COATED CAST BRONZE ASTM B 584 BODY, CONTINUOUS PRESSURE, TESTABLE, 25 GPM @ 10 PSI PRESSURE DROP	RELIEF VALVE, TWO CHECK VALVES, TWO QUARTER-TURN SHUTOFF BALL VALVES, FOUR TEST COCKS, AND STRAINER	BACKSIPHONAGE & BACKPRESSURE, MAKEUP WATER LINES TO MECHANICAL EQUIPMENT SIZES 3/4"-2"	ASSE 1013 & NSF 61-G & NSF 372	#1,2,4
BFP-3	WATTS	LF007	NON-HEALTH HAZARD	DOUBLE CHECK VALVE ASSEMBLIES CAST COPPER SILICONE/EPOXY COATED CAST IRON/ BRONZE C89836/ STAINLESS STEEL/BODY, CONTINUOUS PRESSURE, TESTABLE, 9 GPM @ 5 PSI PRESSURE DROP	TWO CHECK VALVES, TWO SHUTOFF VALVES, FOUR TEST COCKS, STRAINER, AND RUBBER CHECK DISC	WASHER BOX, DISHWASHING MACHINE, STEAM KETTLES SIZES 1/2"-1"	ASSE 1015 & NSF 61-G	#4
BFP-4	WATTS	LF288A	NON-HEALTH HAZARD	ATMOSPHERIC VACUUM BREAKER BRONZE/BRASS BODY, INTERMITTENT PRESSURE, 10 GPM @ 5 PSI PRESSURE DROP	DISK FLOAT WITH SILICONE DISK, AND UNION	IRRIGATION SYSTEM SIZES 1/4"-3"	ASSE 1001 & NSF 372	#3

REMARKS:
1. INCLUDE AIR GAP & INDIRECT WASTE LINE TO NEAREST FLOOR SINK OR FLOOR DRAIN.
2. PROVIDE WITH SENSOR FOR FLOOD DETECTION FROM RELIEF VALVE.
3. MOUNT 6" ABOVE HIGHEST POINT OF DOWN STREAM PIPING.
4. INSTALL IN ACCORDANCE WITH THE WATER AUTHORITY REQUIREMENTS.

PRESSURE REDUCING VALVE SCHEDULE

SYMBOL	MANUFACTURER/ MODEL NUMBER	SIZE (IN)	MINIMUM FLOW (GPM)	DESIGN FLOW (GPM)	SYSTEM SERVED	INLET PRESSURE (PSI)	SET OUTLET PRESSURE (PSI)	MIN OUTLET PRESSURE (PSI)	REMARKS
PRV-1	WATTS #LF-44115	3"	13	250	MAIN SUPPLY	100 PSI	75 PSI	70 PSI	#1,2,3
PRV-2	WATTS #LF223-3/4P	1"	-	10	MAIN SUPPLY	100 PSI	80 PSI	75 psi	#1,2,3,4

REMARKS:
1. VALVE SHALL BE LEAD FREE CONSTRUCTION FOR DOMESTIC WATER USE
2. PROVIDE FLANGED CONNECTION FOR SIZES 2" AND LARGER.
3. SINGLE CHAMBER FULL PORT
4. LOW FLOW PRV SHALL BE SET MIN 5 PSI HIGHER THAN HIGH FLOW PRV

AIR COMPRESSOR SCHEDULE

SYMBOL	MANUFACTURER/ MODEL NUMBER	TYPE	LOCATION	SERVING	CAPACITY CFM AT PSIG	MAX PRESSURE PSIG	WEIGHT	CAPACITY GALLONS	ELEC DATA H/P-VOLTS-PH	REMARKS
AC-1	INGERSOLL RAND #2475N5-P	RECIPROCATING AIR	WOOD SHOP	DUST COLLECTOR	17.2 CFM @ 90 PSI	175	597 LBS	80 VERTICAL	5/230V/3PH	#1,2,3,4,6

REMARKS:
1. ELECTRIC DRIVE
2. COMPLIANT TO OSHA AND UL STANDARDS
3. PROVIDE AIR DRYER
4. PROVIDE CONDENSATE SEPARATOR INGERSOLL RAND MODEL PSG-15

AIR DRYER SCHEDULE

SYMBOL	MANUFACTURER/ MODEL NUMBER	TYPE	LOCATION	SERVING	CAPACITY CFM AT PSIG	MAX PRESSURE PSIG	WEIGHT	FLA	ELEC DATA KW-VOLTS-PH	REMARKS
AD-1	INGERSOLL RAND #D56IN	CYCLING	WOOD SHOP	DUST COLLECTOR	35 CFM @ 100 PSI	175	77	-	1.2/120V/1PH	#1,2

REMARKS:
1. ELECTRIC DRIVE WITH POWER CORD
2. COMPLIANT TO OSHA AND UL STANDARDS

HEAT TRACE SCHEDULE

SYMBOL	APPLICATION	MANUFACTURER/ MODEL NUMBER	PIPE SIZE	HEAT LOSS (W/FT)	AMBIENT TEMPERATURE (°F)	PIPE TEMPERATURE (°F)	INSULATION K-FACTOR BTU-INH/HR-FT²-°F	INSULATION THICKNESS	MAXIMUM ALLOWABLE CABLE LENGTH (FT)	ELECTRICAL DATA V/P/HA	NOTES
HT-1	GREASE LIQUIDATION	RAYCHEM 12XLE2-CT	6"	12	50	110	0.224	2"	346	208V/30A	ALL
HT-2	GREASE LIQUIDATION	RAYCHEM 12XLE2-CT	6"	12	50	110	0.224	2"	346	208V/30A	ALL

NOTES:
1. PROVIDE SINGLE-POINT HEAT-TRACING CONTROL SYSTEM CSHG, REFER TO FLOOR PLANS FOR LOCATION.
2. INSTALL PER MANUFACTURERS GUIDELINES.
3. REFER TO FLOOR PLANS FOR PIPE SIZES.
4. REFER TO MANUFACTURERS GUIDELINES FOR PIPE INSULATION REQUIREMENTS.
5. CABLE SHALL BE INSTALLED IN ACCORDANCE PLUMBING CONTRACTOR WITH FINAL ELECTRICAL CONNECTIONS PERFORMED BY THE ELECTRICAL SUBCONTRACTOR. INSTALLATION FOLLOWING MANUFACTURER'S INSTRUCTIONS. MANUFACTURER'S REPRESENTATIVE MUST BE COMPLETED PRIOR TO WORK MOBILIZATION. SYSTEM MUST INCLUDE PIPE INSULATION THAT FOLLOWS MANUFACTURER'S INSTRUCTIONS FOR CORRECT PERFORMANCE.
6. THE HEATING CABLE IS PERMANENTLY SECURED TO METAL PIPES WITH GT-66 GLASS TAPE, OR TO PLASTIC PIPES USING AT-180 ALUMINUM TAPE.
7. THE HEATING CABLE MUST HAVE A FLUOROPOLYMER OUTER JACKET (-CT).
8. THE PIPELINE IS BURIED AT LEAST 3-FEET DEEP.
9. ALL HEATING CABLE SPLICES OR TEES ARE MADE ABOVEGROUND, NO BURIED OR IN-CONDUIT SPLICES OR TEES ARE ALLOWED. THE POWER CONNECTION AND END SEAL ARE MADE IN UL LISTED AND CSA CERTIFIED JUNCTION BOXES ABOVE GRADE.
10. THE HEATING CABLE IS PROTECTED FROM THE PIPE TO THE POWER CONNECTION BOX IN UL LISTED AND CSA CERTIFIED CONDUIT (MINIMUM 2-INCH DIAMETER) SUITABLE FOR THE LOCATION.
11. CLOSED-CELL WATERPROOF THERMAL INSULATION WITH FIRE-RETARDANT.
12. TEST INSTALLATION IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATION, INCLUDING: RESISTANCE TESTING WITH 2500 VDC MEGOHMMETER AND CAPACITANCE TESTING.
13. PROVIDE DETAILED CIRCUIT LAYOUT WITH SUBMITTALS.
14. REGISTER INSTALLATION WITH MANUFACTURER FOR 10 YR WARRANTY.

WATER HAMMER ARRESTOR SCHEDULE

MANUFACTURER/ MODEL NUMBER	SIZE N.P.T.	OVER ALL LENGTH	PRECHARGED PSI(AIR)	FIXTURE UNITS	REMARKS
PPP MODEL #SC-100	1/2"	5"	60	1-11	ALL
PPP MODEL #SC-750	3/4"	8"	60	12-32	ALL
PPP MODEL# SC-1000	1"	8 3/4"	60	33-60	ALL
PPP MODEL# SC-1250	1 1/4"	8 3/4"	60	61-113	ALL
PPP MODEL# SC-1500	1 1/2"	10 1/4"	60	114-154	ALL
PPP MODEL# SC-2000	2"	10 7/8"	60	155-330	ALL

NOTES:
1. LOCATE WATER HAMMER ARRESTORS AS CLOSE AS POSSIBLE TO SHOCK SOURCE.
2. INSTALL PER ALL MANUFACTURERS WRITTEN INSTALLATION INSTRUCTIONS.
3. LOCATE IN AN ACCESSIBLE LOCATION, PROVIDE ACCESS AS REQUIRED.
4. FIXTURE UNITS SHALL BE BASED ON THE LATEST ADOPTED VERSION OF THE INTERNATIONAL PLUMBING CODE.
5. WATER HAMMER ARRESTORS SHALL BE PROVIDED WHERE QUICK-CLOSING VALVES ARE UTILIZED.
6. PROVIDE WATER-HAMMER ARRESTORS AT CLOTHES WASHING MACHINES
7. PROVIDE WATER-HAMMER ARRESTORS PER GROUP OF WATER CLOSETS AND PER GROUP OF URINALS. WHERE GROUP DOES NOT EXIST PROVIDE WATER HAMMER ARRESTOR AT SINGLE WATER CLOSET.

PLUMBING FIXTURE CONNECTION SCHEDULE

FIXTURE TYPE	WASTE CONNECTION	VENT CONNECTION	COLD WATER CONNECTION	HOT WATER CONNECTION	TEMPED WATER
DRINKING FOUNTAIN (2 BOWL)	1 1/2" (2)	1 1/2" (2)	1/2" (2)	-	-
EMERGENCY EYEWASH	-	-	1/2"	1/2"	1/2"
JANITORS MOP BASIN	2"	1 1/2"	1/2"	1/2"	-
LAVATORY	1 1/2"	1 1/2"	1/2"	1/2"	-
SINK	1 1/2"	1 1/2"	1/2"	1/2"	-
UTILITY SINK	2	1 1/2"	3/4"	3/4"	-
URINAL	2"	1 1/2"	3/4"	-	-
WATER CLOSET (FLUSH VALVE)	4"	2"	1"	-	-
HOSE BIB (OWNER)	-	-	1/2"	-	-

NOTES:
1. REFER TO ARCHITECTURAL DRAWINGS FOR ALL PLUMBING FIXTURE MOUNTING HEIGHTS.
2. ALL PIPE TRAPS AT SINKS AND LAVATORIES SHALL BE CHROME PLATED BRASS.

PUMP SCHEDULE

SYMBOL	MANUFACTURER/ MODEL NUMBER	TYPE	LOCATION	SYSTEM SERVED	CAPACITY	CAPACITY FT OF HEAD	FLUID TEMP (F°)	ELEC. DATA	REMARKS
HWRP-1	GRUNDFOS MAGNA MODEL # 32-120	IL	MECHANICAL ROOM	DOMESTIC H/W RECIRC H/W	21 GPM	32.0	110°F	115 V / 1/4 HP	1

NOTES:
IL = IN-LINE PUMP
SP = SUBMERSIBLE PUMP

REMARKS:
1. PUMP SHALL BE STAINLESS STEEL FOR DOMESTIC WATER USE

GAS FIRED WATER HEATER SCHEDULE

SYMBOL	MANUFACTURER/ MODEL NUMBER	TYPE	LOCATION	FUEL TYPE	BTUH INPUT	STORAGE CAP. (GAL)	RECOVERY IN GPH AT 100°F RISE	ELEC. DATA VOLT-PH-AMP	REMARKS
WH-1	PVI CONQUEST (N) 100H-DCI	S	MECHANICAL ROOM	GAS	199,000	100	233	120V/1-PH	ALL

REMARKS:
1. WATER HEATER SHALL BE PROVIDED WITH A MAXIMUM OF 14"W.C. GAS PRESSURE.
2. WATER HEATER SHALL BE PROVIDED WITH ELECTRONIC IGNITION.
3. PROVIDE WITH NEUTRALIZATION KIT.
4. PROVIDE WITH BACNET CONNECTIVITY.

S= STORAGE

PLUMBING EXPANSION TANK SCHEDULE

SYMBOL	MANUFACTURER/ MODEL NUMBER	TYPE/ CONFIG	LOCATION	TANK VOLUME (GAL)	MAX. ACCEPTANCE VOLUME (GAL)	SIZE (DIA x H)	REMARKS
EPT-1	AMTROL MODEL ST-12V-CXD	D/V	MECHANICAL ROOM - AREA C	23.2	11.3	15 x 33	1

TYPE: D = COMPRESSION D-A = DIAPHRAGM
CONFIG: H = HORIZONTAL V = VERTICAL

REMARKS:
1. TANK SHALL BE ASME CONSTRUCTION

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The S:L:A:M Collaborative
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Glastonbury, CT 06033-4410
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Greenwich Public Schools

Greenwich Central Middle School

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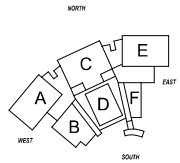
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
1	10/16/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

PLUMBING SCHEDULES AND DIAGRAMS

Date 07/08/2024
Scale 1/8" = 1'-0"
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PIPING LEGEND

SYMBOL - SINGLE LINE	DESCRIPTION
	SUPPLY PIPING
	RETURN PIPING
	ELBOW UP
	ELBOW DOWN
	TEE TOWARDS (UP IN PLAN)
	TEE AWAY (DOWN IN PLAN)
	DROP AND RUN
	DIRECTION OF FLOW
	DIRT LEG
	CLEANOUT
	BLIND FLANGE
	END CAP
	REDUCER (ECCENTRIC-FLAT ON BOTTOM OR FLAT ON TOP)
	REDUCER (CONCENTRIC)
HWS	HEATING HOT WATER SUPPLY
HWR	HEATING HOT WATER RETURN
COND	CONDENSATE PIPING
CHWS	CHILLED WATER SUPPLY
CHWR	CHILLED WATER RETURN
MCHWS	MEDIUM TEMPERATURE CHILLED WATER SUPPLY
MCHWR	MEDIUM TEMPERATURE CHILLED WATER RETURN
CD	CONDENSATE DRAIN
RS	REFRIGERANT SUCTION
RL	REFRIGERANT LIQUID
RG	REFRIGERANT GAS

DUCTWORK LEGEND

SYMBOL	DESCRIPTION
12x6	RECTANGULAR DUCTWORK
12"ø	ROUND DUCTWORK
12x6	OVAL DUCTWORK
12x6	DUCTWORK SHOWN SINGLE LINE
	ACOUSTICALLY LINED DUCTWORK
	ACOUSTICALLY LINED DUCTWORK (SINGLE LINE)
	RECTANGULAR SUPPLY DUCTWORK TOWARDS (UP IN PLAN)
	ROUND SUPPLY DUCTWORK TOWARDS (UP IN PLAN)
	RECTANGULAR SUPPLY DUCTWORK AWAY (DOWN IN PLAN)
	ROUND SUPPLY DUCTWORK AWAY (DOWN IN PLAN)
	RECTANGULAR RETURN DUCTWORK TOWARDS (UP IN PLAN)
	ROUND RETURN DUCTWORK TOWARDS (UP IN PLAN)
	RECTANGULAR RETURN DUCTWORK AWAY (DOWN IN PLAN)
	ROUND RETURN DUCTWORK AWAY (DOWN IN PLAN)
	RECTANGULAR EXHAUST DUCTWORK TOWARDS (UP IN PLAN)
	ROUND EXHAUST DUCTWORK TOWARDS (UP IN PLAN)
	RECTANGULAR EXHAUST DUCTWORK AWAY (DOWN IN PLAN)
	ROUND EXHAUST DUCTWORK AWAY (DOWN IN PLAN)
	FLEXIBLE DUCT
	OPEN ENDED DUCT WITH WIRE MESH SCREEN
	CAPPED DUCT
	DUCT TRANSITION

AIR DEVICE LEGEND

SYMBOL	DESCRIPTION
	SUPPLY DIFFUSER
	RETURN GRILLE OR REGISTER
	EXHAUST GRILLE OR REGISTER
	SIDEWALL SUPPLY GRILLE
	SIDEWALL RETURN OR EXHAUST GRILLE OR REGISTER
	SUPPLY DIFFUSER (BLOW INDICATED)
	LINEAR DIFFUSER
	CHILLED BEAM

DAMPER LEGEND

SYMBOL	DESCRIPTION
	MANUAL VOLUME DAMPER
FD	FIRE DAMPER W/ACCESS DOOR
MD	MOTORIZED CONTROL DAMPER W/ACCESS DOOR
SD	SMOKE DAMPER W/SMOKE DETECTOR AND ACCESS DOOR
FSD	COMBINATION FIRE/SMOKE DAMPER W/SMOKE DETECTOR AND ACCESS DOOR
BD	BACKDRAFT DAMPER

SENSOR LEGEND

SYMBOL	DESCRIPTION
T	TEMPERATURE
C	CARBON DIOXIDE
CO	CARBON MONOXIDE
H	HUMIDITY
T/H/C	COMBINATION TEMPERATURE/ HUMIDITY/CO2
DS	DUCT SMOKE DETECTOR

CONTROLS GENERAL NOTES

1. GENERAL
   - A. SEQUENCES OUTLINED SHALL BE PERFORMED BY DIRECT DIGITAL CONTROL FIELD PANELS (DDCP'S) AND LOCALLY MOUNTED DIRECT DIGITAL UNIT CONTROLLERS CONNECTED TO A CENTRAL BUILDING AUTOMATION SYSTEM. UNLESS OTHERWISE SPECIFIED, SYSTEM ARCHITECTURE SHALL BE BASED ON A PEER-TO-PEER DISTRIBUTED CONTROL SYSTEM NETWORK, SYSTEM SHALL INTEGRATE OPEN COMMUNICATION PROTOCOL CONTROLLERS, ALL DDCP AND LOCAL CONTROLLERS SHALL BE CAPABLE OF INDEPENDENT OPERATION REGARDLESS OF THE STATUS OF THE BAS WORKSTATION.
   - B. BMS (BUILDING MANAGEMENT SYSTEM), BAS (BUILDING AUTOMATION SYSTEM) AND DDC (DIRECT DIGITAL CONTROLS) MAY BE USED INTERCHANGEABLY AND SHARE THE SAME MEANING.
   - C. ADDRESS IDENTIFIERS FOR POINTS AND VARIABLES SHALL BE COORDINATED WITH OWNER.
   - D. ABILITY TO REVIEW MEASURED DATA, CONTROL SETPOINTS AND FUNCTIONS SHALL BE PROVIDED AT BAS WORKSTATION AND ON LAPTOP SERVICE TOOL.
   - E. COORDINATE SENSOR LOCATIONS WITH DUCTWORK AND PIPING SHOP DRAWINGS AND INDICATE PROPOSED LOCATIONS ON SUBMITTALS. PROVIDE MANUFACTURER'S RECOMMENDED UPSTREAM AND DOWNSTREAM PIPE OR DUCT DIAMETERS FOR FLOW SENSING ELEMENTS.
   - F. PROVIDE COMMUNICATIONS INTERFACE INCLUDING SOFTWARE BETWEEN THE BAS AND EACH EQUIPMENT MANUFACTURER SUPPLIED CONTROL PANEL. BAS SHALL BE CAPABLE OF READING AND DISPLAYING ALL DATA USED BY THE EQUIPMENT MANUFACTURER CONTROL PANEL. SOFTWARE INTERFACE SHALL BE THROUGH LONMARK OR BACNET COMPLIANT PROTOCOL WHERE THE BAS IS REQUIRED TO CONTROL THE OPERATION OF THE EQUIPMENT, PROVIDE COMPLETE INPUT AND OUTPUT INTERFACE.
   - G. FAIL SAFE POSITIONS INDICATED ARE POSITIONS THAT DEVICES WILL GO TO WHEN THE ASSOCIATED EQUIPMENT IS DE-ENERGIZED.
   - H. PROVIDE ADEQUATE DAMPING BY ADJUSTING CONTROL LOOPS TO PREVENT HUNTING, MAXIMUM RESPONSE TIME SHALL BE 30 SECONDS, CONTROL LOOPS SHALL BE TUNED TO PROVIDE FOR STABLE OPERATION OF THE CONTROL DEVICE. LOOP TUNING MAY BE REQUIRED TO BE PERFORMED MULTIPLE TIMES DURING MULTIPLE CONTROL SCENARIOS.
   - I. CONTROL DEVICES SHALL BE INSTALLED IN SUCH A WAY TO BE ACCESSIBLE FOR MAINTENANCE AND REPAIR.
   - J. DAMPER END SWITCHES SHALL BE INTERLOCKED VIA HARDWIRE TO THE START/STOP FUNCTION OF ITS ASSOCIATED FAN.
2. WIRING
   - A. PROVIDE CONTROLS, LOW VOLTAGE CONTROL WIRING, HARDWARE POINTS (ANALOG IN, ANALOG OUT, BINARY IN, BINARY OUT) AND ACCESSORIES AS REQUIRED TO PERFORM THE CONTROL SEQUENCES INDICATED. ADDITIONALLY, PROVIDE HARDWARE POINTS INDICATED REGARDLESS THAT SUCH POINTS MAY NOT BE REQUIRED TO PERFORM THE CONTROL SEQUENCES INDICATED.
   - B. POWER WIRING SHALL COMPLY WITH REQUIREMENTS OF DIVISION 26 SECTIONS.
   - C. PROVIDE NORMAL, STANDBY AND EMERGENCY POWER WIRING TO CONTROL DEVICES, INCLUDING CONTROL PANELS, WORKSTATION AND HOST COMPUTERS.
   - D. ELECTRICAL CIRCUITS FOR CONTROLS SHALL BE DEDICATED ONLY TO THE BUILDING AUTOMATION CONTROLS, FEEDING FROM DEDICATED BREAKERS, INCLUDING DEDICATED CIRCUIT BREAKERS TO THE POINT OF USE SHALL BE PROVIDED.
3. SAFETIES:
   - A. SAFETY DEVICES SUCH AS FREEZESTATS, SMOKE DETECTION, AND HIGH STATIC PRESSURE SWITCHES SHALL BE MANUAL RESET AND SHALL PERFORM ASSOCIATED SHUTDOWN/ALARM ACTIONS IN HARDWIRING. SOFTWARE SHALL NOT BE USED TO EXCLUSIVELY PERFORM ANY SHUTDOWN/FAILSAFE ACTIONS FROM SAFETY DEVICES. FOR EXAMPLE, FREEZESTATS SHALL SHUT OFF FAN, FULLY OPEN COIL VALVE, AND CLOSE OUTSIDE AIR DAMPER VIA HARDWIRING WITHOUT RELYING ON ANY SOFTWARE FUNCTIONS. SOFTWARE SHUTDOWN/FAILSAFE SHALL BE PROVIDED AS A REDUNDANT BACKUP TO THE REQUIRED HARDWIRED SHUTDOWNS.
   - B. DEVICES SUCH AS CUH AND UH SHALL OPERATE ON A SOFT PERMISSIVE ONLY ALLOWING FANS TO START AND CONTROL VALVES TO OPEN WITH SYSTEM IN HEATING MODE. USE OF AQUASTATS IS NOT ACCEPTABLE.
   - C. SAFETY DEVICES SHALL FUNCTION AND SHUT DOWN THE ASSOCIATED EQUIPMENT WHEN IN MANUAL SWITCHES ARE IN BOTH THE HAND AND AUTO POSITIONS.
4. ALARMS:
   - A. REFER TO SEQUENCES FOR ALARM FUNCTIONS, WHENEVER AN ALARM IS INITIATED, THE BAS SHALL RETAIN IN MEMORY THE READING AND SETPOINT OF EACH ASSOCIATED DEVICE TO HELP THE OPERATOR IN ISOLATING THE CAUSE OF THE ALARM.
   - B. IF ANY DDCP OR EQUIPMENT MANUFACTURER'S CONTROL PANEL LOSES COMMUNICATION WITH THE BAS NETWORK, AN ALARM SHALL BE INITIATED AT THE BAS INDICATING THE LOCATION OF THE FAULT.
   - C. WHENEVER A PIECE OF EQUIPMENT IS TAKEN OFFLINE FOR MAINTENANCE, ALARMS RELATED TO THIS PIECE OF EQUIPMENT SHALL BE TEMPORARILY DISABLED.
5. ROOM SENSORS
   - A. FOR REGULARLY OCCUPIED SPACES, PROVIDE WALL MOUNTED ROOM SENSORS WITH INTEGRAL LCD DISPLAY AND USER INTERFACE TO DISPLAY AND ADJUST SETPOINT, MODE AND STATUS.
   - B. FOR CORRIDORS, RESTROOMS, VESTIBULES, STORAGE ROOMS, JANITOR CLOSETS, ELECTRICAL CLOSETS, DATA CLOSETS/ROOMS AND MECHANICAL ROOMS, PROVIDE WALL MOUNTED, BRUSHED CHROME, WALL PLATE TYPE SENSORS.
6. SETPOINTS:
   - A. SETPOINTS AND TIME DELAYS SHALL BE ADJUSTABLE BY THE OPERATOR THROUGH THE BAS WORKSTATION AND THROUGH LAPTOP SERVICE TOOL CONNECTED TO DDCP'S AND CONTROLLERS WITHOUT HARDWARE OR SOFTWARE REVISIONS, UNLESS OTHERWISE NOTED. ROOM TEMPERATURE SETPOINTS SHALL BE ADJUSTABLE AT THE LOCAL ROOM TEMPERATURE SENSOR.
   - B. INITIAL SPACE TEMPERATURE SETPOINTS SHALL BE AS FOLLOWS:
     - a. OFFICES, CIRCULATION SPACES & TOILET ROOMS:

OCCUPIED COOLING	75 DEGREES F
OCCUPIED HEATING	72 DEGREES F
UNOCCUPIED COOLING	80 DEGREES F
UNOCCUPIED HEATING	65 DEGREES F

     - b. UTILITY ROOMS (ELECTRICAL ROOMS, MECH. ROOMS & PENTHOUSES):

COOLING OR VENTILATION	85 DEGREES F (24 HOURS)
HEATING	60 DEGREES F MIN (24 HOURS)

7. OCCUPANCY SCHEDULES:
   - A. OCCUPANCY SCHEDULES SHALL BE USER-PROGRAMMABLE THROUGH THE BAS AND BE CAPABLE OF SCHEDULING BY AREA, ZONE, GROUPS OF ZONES, INDIVIDUALLY CONTROLLED EQUIPMENT AND GROUPS OF INDIVIDUALLY CONTROLLED EQUIPMENT. EACH SCHEDULE SHALL PROVIDE BEGINNING AND ENDING DATES AND TIMES (HOURS/MINUTES).
   - B. WHERE THERE ARE NO OCCUPANCY SENSORS IN THE SAME SPACE AS A TEMPERATURE SENSOR, TEMPERATURE SETPOINTS SHALL BE PROVIDED WITH MOVEMENT TYPE OCCUPIED OVERRIDE BUTTONS. UPON ACTIVATION OF THE OCCUPIED OVERRIDE BUTTON, THE SPACE WILL GO TO OCCUPIED MODE FOR A SPECIFIED PERIOD OF TIME, SET OVERRIDE TIME AT 3 HOURS INITIALLY (CONFIGURABLE).
   - C. WHERE OCCUPANCY SENSORS (REFER TO ELECTRICAL POWER DRAWINGS FOR OCCUPANCY SENSOR QUANTITIES AND LOCATIONS) ARE LOCATED IN THE SAME SPACE AS A TEMPERATURE SENSOR, THE AUXILIARY CONTACTS OF THE OCCUPANCY SENSORS SHALL BE CONNECTED TO THE BMS FOR OCCUPIED OVERRIDE PURPOSES.
   - D. INITIAL OCCUPANCY SCHEDULES SHALL BE AS FOLLOWS:
     - a. OCCUPIED: 8:00 AM TO 6:00 PM MON. THRU FRI.
     - UNOCCUPIED: ALL OTHER TIME PERIODS
8. HISTORIES, TRENDS AND REPORTS
   - A. THE BAS SHALL RETAIN IN MEMORY 5 MINUTES OF TREND DATA (OR LAST 5 READINGS WHICHEVER IS LONGER) FOR EACH CONTROL POINT OR VARIABLE, RESOLUTION OF THIS SHALL NOT EXCEED ONE READING PER 15 SECOND INTERVAL.
   - B. BAS SHALL RETAIN ONE YEAR (ROLLING) OF DATA FOR CONTROL POINTS IN TEN MINUTE INTERVALS.
   - C. USER SHALL BE ABLE TO SELECT TABULAR OR GRAPHICAL OUTPUT OF DATA. GRAPHIC DATA SHALL BE AVAILABLE IN USER SELECTABLE COLOR OR BLACK AND WHITE VERSIONS.
   - D. TABULAR DATA SHALL BE MADE AVAILABLE IN COMMA SEPARATED VALUES OR IN FORMAT COMPATIBLE WITH MICROSOFT EXCEL SOFTWARE.
   - E. WHENEVER A UNIT IS SHUT DOWN BECAUSE OF ONE OF ITS SAFETIES, THE BAS SHALL RETAIN IN MEMORY THE READING AND SETPOINT OF EACH ASSOCIATED DEVICE TO HELP THE OPERATOR IN ISOLATING THE CAUSE OF THE SHUT DOWN.

EQUIPMENT ABBREVIATIONS

AC	AIR CONDITIONING UNIT
ACCU	AIR COOLED CONDENSING UNIT
AH	AIR HANDLER
AHU	AIR HANDLING UNIT
AS	AIR SEPARATOR
ASHP	AIR SOURCE HEAT PUMP
B	BOILER
CUH	CABINET UNIT HEATER
CH	CHILLER
CB	CHILLED BEAM
CHWC	CHILLED WATER COIL
CHWP	CHILLED WATER PUMP
CP	CONDENSATE PUMP
CWP	CONDENSER WATER PUMP
CU	CONDENSING UNIT
CV	CONVECTOR
DEF	DEDICATED EXHAUST FAN
DOAS	DEDICATED OUTDOOR AIR SYSTEM
ERV	ENERGY RECOVERY VENTILATOR
EF	EXHAUST FAN
ES	EXHAUST GRILLE
ET	EXPANSION TANK
F	FAN
FCU	FAN COIL UNIT
GMU	GLYCOL MAKEUP UNIT
HX	HEAT EXCHANGER
HWC	HOT WATER COIL
HWP	HOT WATER PUMP
KEF	KITCHEN EXHAUST FAN
LD	LINEAR BAR GRILLE
LS	LINEAR SLOT DIFFUSER
MAU	MAKE UP AIR UNIT
PHX	PLATE AND FRAME HEAT EXCHANGER
PMP	PUMP
R	RADIATION
RHC	REHEAT COIL
RF	RETURN FAN OR RELIEF FAN
RP	RADIANT PANEL
RTU	ROOFTOP UNIT
SA	SOUND ATTENUATOR
SD	SUPPLY DIFFUSER
SG	SUPPLY GRILLE
TEF	TOILET EXHAUST FAN
UH	UNIT HEATER

TAG SYMBOLS

DIFFUSER TAG	TYPE — NECK SIZE / LINEAR LENGTH; A — B; ARROW (CFM)
VAV TAG WITH SYSTEM INDEX	TYPE — SYSTEM INDEX; A — VAV-1; INSTANCE; ARROW (MINIMAX CFM)
RADIATION / RADIANT PANEL TAG	TYPE — LENGTH OF ELEMENT; A — 6'-0"; B — 1'-0"
EQUIPMENT	TAG-#;

AIR SYSTEM GENERAL NOTES

1. REFER TO SPECIFICATIONS FOR DUCTWORK CONSTRUCTION CLASSES, SEAL, AND LEAKAGE CLASSES.
2. EXTERIOR LOUVERS ARE INDICATED FOR LOCATION ONLY, DETAILED DESCRIPTIONS ARE PROVIDED IN ARCHITECTURAL DRAWINGS AND SPECIFICATIONS.
3. DUCT SMOKE DETECTORS SHALL BE FURNISHED AND WIRED TO THE FIRE ALARM SYSTEM BY THE ELECTRICAL CONTRACTOR AND MOUNTED WITHIN THE DUCTWORK BY THE MECHANICAL CONTRACTOR. ASSOCIATED FAN SYSTEM SHALL SHUT DOWN UPON DETECTION OF SMOKE.
4. PROVIDE UL FIRE DAMPERS OR SMOKE/FIRE DAMPERS AND ASSOCIATED ACCESS PANELS WHERE SHOWN ON DRAWINGS IN COMPLIANCE WITH NFPA 90A. FOR DUCTS THAT PENETRATE FIRE WALLS, FLOORS AND PARTITIONS PROVIDE SLEEVES WHERE PENETRATIONS ARE NOT PERPENDICULAR TO SURFACE PENETRATED.
5. REFER TO REFLECTED CEILING PLANS FOR LOCATIONS OF AIR TERMINAL DEVICES.
6. INTERNAL AIR FLOW DIMENSIONS ARE SHOWN FOR DUCTS. INCREASE SHEETMETAL SIZE FOR LINER IF APPLICABLE.
7. DIFFUSER SIZES SHOWN ARE NECK SIZES. REGISTER AND GRILLE SIZE ARE NOMINAL, ROUND RUN OUTS TO DIFFUSERS SHALL BE THE SAME NOMINAL SIZE AS THE SCHEDULED NECK SIZE, UNLESS NOTED AS LARGER. DUCT TRANSITIONS SHALL BE PROVIDED AS NECESSARY AT INLET TO DIFFUSER.
8. PROVIDE FLEXIBLE CONNECTIONS ON DUCTS CONNECTING TO FANS AND AIR HANDLING UNITS UNLESS INTERNALLY ISOLATED.
9. THE INSIDE OF DUCTWORK VISIBLE THROUGH A GRILLE OR DIFFUSER SHALL BE PAINTED FLAT BLACK.
10. OPEN ENDED DUCTS SHALL BE PROVIDED WITH A 1/4" MESH ALUMINUM OR GALVANIZED SCREEN (60% FREE AREA MINIMUM).
11. ELBOWS IN DUCT SYSTEMS SHALL BE FULL RADIUS (CENTERLINE RADIUS = 1.5 DUCT WIDTH) WHERE SPACE PERMITS, WHERE LIMITED CLEARANCE OCCURS, PROVIDE SHORT RADIUS ELBOWS WITH FULL LENGTH SPLITTER VANES PER SMACNA. OR MITERED ELBOW WITH TURNING VANES PER SMACNA.
12. PROVIDE CLEANOUTS IN KITCHEN EXHAUST DUCTS AT CHANGES IN DIRECTION AND BASES OF RISERS, AND EVERY 12 FEET IN STRAIGHT RUNS.
13. NOT ALL MANUAL DAMPERS ARE SHOWN ON THE DRAWINGS. PROVIDE MANUAL ADJUSTABLE DAMPERS ON EACH LOW PRESSURE SUPPLY, RETURN, AND EXHAUST DUCT TAKE OFF AND AT TRAP OFFS TO REGISTERS, GRILLES, DIFFUSERS, AND DED, AS REQUIRED FOR PROPER BALANCE OF SYSTEM. PROVIDE CABLE OPERATED DAMPERS WHERE MANUAL DAMPER IS INACCESSIBLE.
14. WHERE DUCTS PENETRATE WALLS WITH SOUND ISOLATION PERFORMANCE RATINGS, PROVIDE DUCT SLEEVE SIZED TO PROVIDE 1/4" GAP BETWEEN THE SLEEVE AND DUCT. FILL THE GAP WITH FIBEROUS MATERIAL AND SEAL AIRTIGHT WITH NON-HARDENING ACOUSTIC SEALANT
15. KITCHEN COORDINATE REQUIREMENTS WITH KITCHEN EQUIPMENT VENDOR AND FOOD SERVICE DRAWINGS. PROVIDE DUCTWORK AND ACCESSORIES FOR DISHWASHER HOOD AND GREASE HOOD, GREASE DUCT AND DISHWASHER EXHAUST SHALL PITCH BACK TO HOOD

GENERAL ABBREVIATIONS

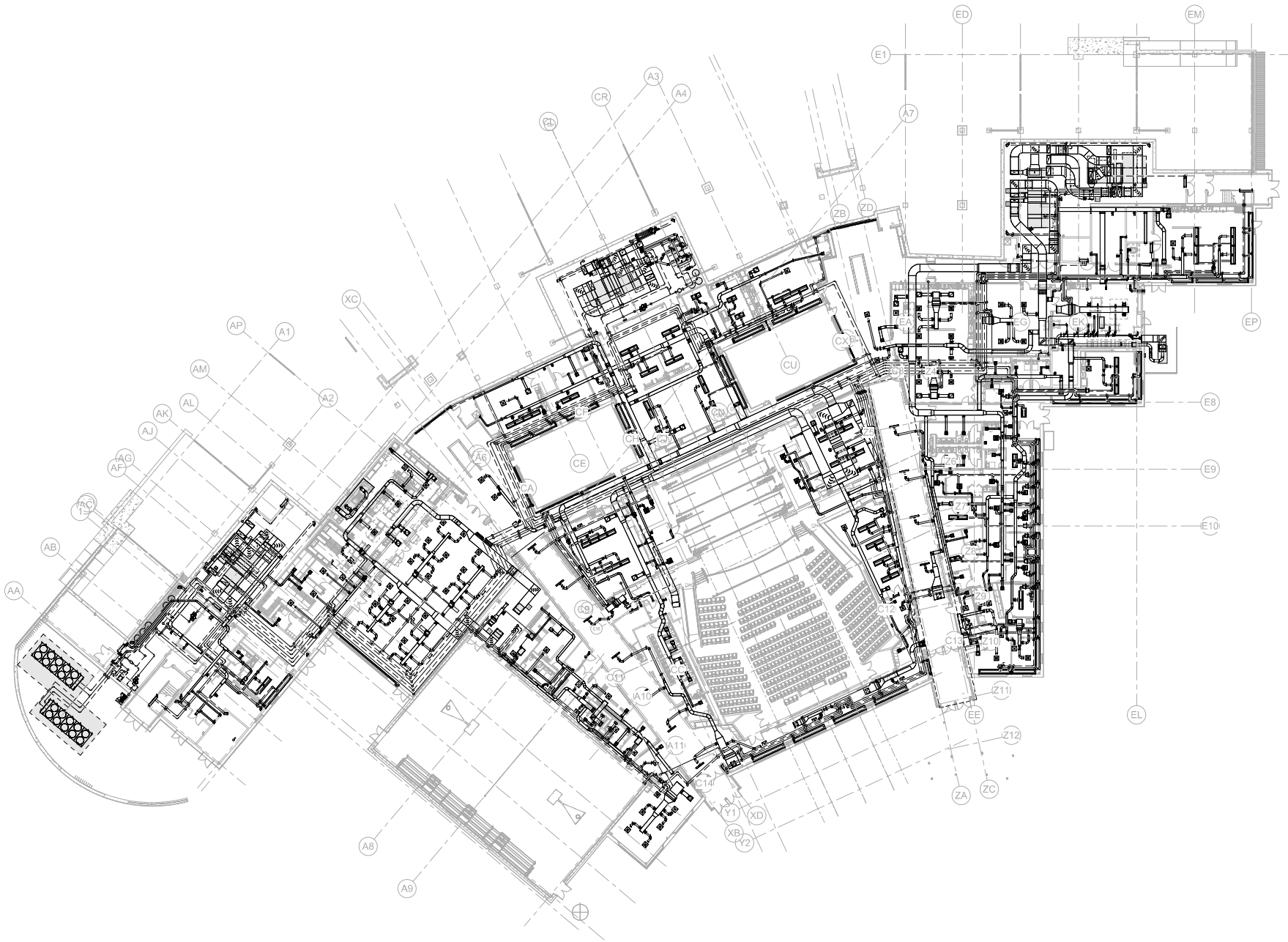
AD	ACCESS DOOR
ADJ	ADJUSTABLE
AFF	ABOVE FINISHED FLOOR
ALT	ALTERNATE
AHJ	AUTHORITY HAVING JURISDICTION
AP	ACCESS PANEL
ARV	AIR RELIEF VALVE
APD	AIR PRESSURE DROP
AWT	AVERAGE WATER TEMPERATURE
BAS	BUILDING AUTOMATION SYSTEM
BF	BYPASS FEEDER
BHP	BRAKE HORSEPOWER
BMS	BUILDING MANAGEMENT SYSTEM
BTU	BRITISH THERMAL UNIT
BTUH	BTU / HOUR
BOD	BOTTOM OF DUCT
BOP	BOTTOM OF PIPE
CAP	CAPACITY
COP	COEFFICIENT OF PERFORMANCE
CHWS	CHILLED WATER SUPPLY
CHWR	CHILLED WATER RETURN
CFM	CUBIC FEET PER MINUTE
CFS	CUBIC FEET
dB	DECIBELS
DB	DRY BULB TEMPERATURE
DDC	DIRECT DIGITAL CONTROL
DIA	DIAMETER
DN	DOWN
DX	DIRECT EXPANSION
EA	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE (DRY BULB)
EDB	ENTERING DRY BULB
EER	ENERGY EFFICIENCY RATIO
ELEC	ELECTRICAL
ESP	EXTERNAL STATIC PRESSURE
EWB	ENTERING WET BULB
EWT	ENTERING WATER TEMPERATURE
EF	EXCENTRIC FAN REINHEIT
FD	FIRE DAMPER
FT	FEET
FT WG	FEET WATER GAUGE
FLA	FULL LOAD AMPS
FPM	FEET PER MINUTE
FSD	COMBINATION FIRE SMOKE DAMPER
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GRD	GRILLE, REGISTER, DIFFUSER
HD	HEAD
HP	HORSEPOWER
HSPF	HEATING SEASON PERFORMANCE FACTOR
HZ	HERTZ
HVAC	HEATING, VENTILATION AND AIR CONDITIONING
HWR	HOT WATER RETURN
HWS	HOT WATER SUPPLY
IN	INCHES
IN WG	INCHES WATER GAUGE
IPLV	INTEGRATED PART LOAD VALUE
KW	KILOWATTS
L	LOUVER
LAT	LEAVING AIR TEMPERATURE
LDB	LEAVING DRY BULB
LWB	LEAVING WET BULB
LWT	LEAVING WATER TEMPERATURE
MAX	MAXIMUM
MECH	MECHANICAL
MBH	THOUSANDS OF BTU / HOUR
MCA	MINIMUM CIRCUIT AMPACITY
MIN	MINIMUM
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
OAT	OUTSIDE AIR TEMPERATURE
OD	OUTSIDE DIAMETER
OED	OPEN ENDED DUCT
P	PUMP
PH	PHASE
PLBG	PLUMBING
PRV	PRESSURE REDUCING VALVE
PSIG	POUNDS PER SQUARE INCH GAUGE
QTY	QUANTITY
RA	RETURN AIR
RPM	REVOLUTIONS PER MINUTE
RPZ	REDUCED PRESSURE ZONE BACKFLOW PREVENTER
RV	RADON VENT
SA	SUPPLY AIR
SEER	SEASONAL ENERGY EFFICIENCY RATIO
SG	SIGHT GLASS
SP	STATIC PRESSURE
SPD	STATIC PRESSURE DROP
SS	STAINLESS STEEL
SST	SATURATED SUCTION PRESSURE
SQFT / SF	SQUARE FEET
TEMP	TEMPERATURE
TSP	TOTAL STATIC PRESSURE
TSTAT	THERMOSTAT
TYP	TYPICAL
UON	UNLESS OTHERWISE INDICED
VAV	VARIABLE AIR VOLUME
VFD	VARIABLE FREQUENCY DRIVE
VTR	VENT THRU ROOF
W	WITH
W/O	WITHOUT
WB	WET BULB
WC	WATER COLUMN
WG	WATER GAUGE
WMS	WIRE MESH SCREEN
WPD	WATER PRESSURE DROP

GENERAL NOTES

1. GENERAL NOTES, SYMBOLS AND DETAILS ARE APPLICABLE TO DRAWINGS WITHIN DIVISION 23.
2. PROVIDE ALL MATERIALS AND EQUIPMENT AND PERFORM ALL LABOR REQUIRED TO INSTALL COMPLETE AND OPERABLE MECHANICAL SYSTEMS AS INDICATED ON THE DRAWINGS, AS SPECIFIED, AND AS REQUIRED BY CODES.
3. DRAWINGS ARE DIAGRAMMATIC AND ARE INTENDED TO INDICATE CAPACITY, SIZE, APPROXIMATE LOCATION AND GENERAL ARRANGEMENT. COORDINATE LOCATIONS OF SYSTEMS AND COMPONENTS.
4. COORDINATE ROOF AND WALL PENETRATIONS WITH WORK OF OTHER SECTIONS AND WITH FLASHING REQUIREMENTS. COORDINATE SLAB PENETRATIONS WITH WORK OF OTHER SECTIONS.
5. RUN DUCTS AND PIPING CONCEALED, UNLESS SPECIFIED OTHERWISE NOTED.
6. INSTALL SENSORS (TEMPERATURE, HUMIDITY, CO2, THERMOSTATS) AT LOCATIONS SHOWN ON PLANS OR AS DIRECTED BY ARCHITECT, MOUNTING HEIGHT AFF SHALL COMPLY WITH ADA AND SHALL BE MOUNTED LEVEL WITH ADJACENT SWITCHES OR LIGHT SWITCHES.
7. COORDINATE WORK OF THIS SECTION WITH THAT OF OTHER SECTIONS AND WITH ALL TRADES INVOLVED. PROVIDE OFFSETS IN PIPING AND DUCTS (INCLUDING DIVIDED DUCTS) AND TRANSITIONS AROUND OBSTRUCTIONS.
8. NOT ALL ACCESS DOORS HAVE BEEN SHOWN ON THE PLANS. PROVIDE ACCESS PANELS THROUGH BUILDING ASSEMBLIES TO SERVICE AND MAINTAIN EQUIPMENT UNLESS SUCH EQUIPMENT IS INSTALLED IN EXPOSED LOCATIONS OR ABOVE LAY-IN CEILINGS. COORDINATE THE LOCATION OF ACCESS DOORS AND PANELS AND VERIFY THE QUANTITY, SIZE, AND LOCATIONS WITH THE SYSTEMS AND EQUIPMENT REQUIRING ACCESS HAVE BEEN INSTALLED AND PRIOR TO THE CLOSURE OF THE AFFECTED BUILDINGS AND BUILDING ASSEMBLIES. SUBMIT ACCESS PANEL LOCATIONS FOR REVIEW.
9. AT SUBSTANTIAL COMPLETION, THE FOLLOWING ITEMS, NEW OR EXISTING, SHALL BE FULLY AND REASONABLY ACCESSIBLE: HVAC CONTROL BOXES, JUNCTION BOXES, VALVES, DDC CONTROL BOXES, ELECTRICAL PANELS, FILTERS, BELTS, WATER COILS, DISCONNECT SWITCHES AND ELEMENTS OF EQUIPMENT REQUIRING MAINTENANCE. FULLY AND REASONABLY ACCESSIBLE SHALL BE DEFINED AS NATIONAL ELECTRIC CODE REQUIRED CLEARANCE FOR POWERED EQUIPMENT AND CAPABLE OF BEING ACCESSED OR SERVICED WITHOUT REMOVING, MODIFYING OR DISTORTING OTHER COMPONENTS OF THE WORK. PROVIDE MANUFACTURER'S RECOMMENDED CLEARANCE FOR ALL EQUIPMENT.
10. SUPPORT EQUIPMENT, PIPING, AND DUCTWORK FROM BUILDING STRUCTURE OR WITH STEEL SUPPORTS AND PLATFORMS AS REQUIRED. PROVIDE VIBRATION ISOLATION FOR ROTATING EQUIPMENT, DUCTWORK, AND PIPING IN ACCORDANCE WITH THE SPECIFICATIONS.
11. ROOF CURB AND RAIL HEIGHTS INDICATED ARE THE DIMENSIONS BETWEEN THE ROOF SURFACE AND THE TOPS OF THE CURBS AND RAILS. WHERE THE ROOF IS PITCHED, CONSTRUCT CURBS AND RAILS SUCH THAT THE BOTTOM PITCHES WITH THE ROOF AND THE TOP IS LEVEL.
12. CONTROL WIRING METHODS SHALL COMPLY WITH NEC, AND DIVISION 26 SPECIFICATIONS.
13. VERIFY EQUIPMENT CONNECTIONS WITH MANUFACTURER'S DRAWINGS. VERIFY AND PROVIDE FITTINGS TO TRANSITION TO FURNISHED EQUIPMENT. FIELD VERIFY AND COORDINATE DIMENSIONS BEFORE FABRICATION.
14. PERFORM PRESSURE AND LEAKAGE TESTS BEFORE INSULATING DUCTWORK AND PIPING
15. COORDINATE AND PROVIDE HOUSEKEEPING PADS FOR FLOOR-MOUNTED MECHANICAL EQUIPMENT. HOUSEKEEPING PADS SHALL BE REINFORCED CONCRETE WITH 4" CHAMFERED EDGES, 6" THICK, WITH MINIMUM CLEARANCE OF 6" FROM EQUIPMENT BASE TO EDGE OF PAD, INCREASE DEPTH WHERE REQUIRED FOR PROPER INSTALLATION OF EQUIPMENT, INCLUDING BUT NOT LIMITED TO CONDENSING BOILERS (TO ALLOW PROPER INSTALLATION OF NEUTRALIZATION EQUIPMENT AND GRAVITY DISCHARGE TO FLOOR DRAIN OR CONDENSATE PUMP) AND AHU (TO ALLOW INSTALLATION OF CONDENSATE TRAP).
16. MAINTAIN 6'-0" CLEARANCE TO THE UNDERSIDE OF PIPES, DUCTS, CONDUITS, SUSPENDED EQUIPMENT, ETC., THROUGHOUT ROUTES IN MECHANICAL ROOMS, MAINTAIN 3'-0" WIDE MEANS OF EGRESS IN MECHANICAL ROOMS.
17. MISCELLANEOUS STEEL REQUIRED TO ENSURE PROPER INSTALLATION AND, AS SHOWN IN THE DETAILS FOR PIPING, DUCTWORK, AND EQUIPMENT, SHALL BE FURNISHED BY THE MECHANICAL CONTRACTOR.
18. AIR CONDITIONING CONDENSATE DRAIN LINES FROM EACH AIR HANDLING UNIT AND ROOFTOP UNIT SHALL BE PIPED FULL SIZE OF THE UNIT DRAIN OUTLET WITH P-TRAP. P TRAP ARRANGEMENT SHALL BE BASED ON THE UNIT (NEGATIVE OR POSITIVE PRESSURE).
19. INSTALL UNITS WITH CLEARANCE FOR SERVICE AS REQUIRED BY THE MANUFACTURER.

HYDRONIC PIPING GENERAL NOTES

1. PROVIDE ALL MATERIALS AND EQUIPMENT AND PERFORM ALL LABOR REQUIRED TO INSTALL COMPLETE AND OPERABLE PIPING SYSTEMS AS INDICATED ON THE DRAWINGS, AS SPECIFIED, AND AS REQUIRED BY CODES.
2. INSTALL PIPING SO ALL VALVES, STRAINERS, UNIONS, TRAPS, FLANGES, AND OTHER APPURTENANCES REQUIRING ACCESS ARE ACCESSIBLE.
3. PIPE CONDENSATE DRAIN LINES FULL SIZE OF THE UNIT DRAIN OUTLET, WITH "P" TRAP, CONNECTED TO BUILDING DRAINAGE SYSTEM WITH AIR GAP. SIZE DEPTH OF TRAP FOR ASSOCIATED AIR PRESSURE DIFFERENTIAL.
4. PROVIDE AIR VENTS AT ALL HIGH POINTS.
5. INSTALL DRAIN VALVES WITH HOSE CONNECTIONS AT ALL LOW POINTS.
6. PROVIDE HOSE END CAPS WITH CHAINS ON ALL DRAIN VALVES.
7. THE FINAL SENSOR/THERMOSTAT LOCATION SHALL BE APPROVED BY THE ARCHITECT/ENGINEER.
8. DRAWINGS ARE DIAGRAMMATIC AND SHOW THE GENERAL INTENT OF THE WORK. THE CONTRACTOR SHALL COORDINATE WITH OTHER TRADES BEFORE WORK BEGINS.
9. ON EXTERIOR WALLS, PIPES SHALL RUN ON THE WARM SIDE OF THE INSULATION.
10. THIS CONTRACTOR SHALL PROVIDE PIPING EXPANSION LOOPS. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.
11. THIS CONTRACTOR SHALL PROVIDE PIPING EXPANSION AND OR SEISMIC EXPANSION JOINTS AT ALL LOCATIONS WHERE PIPES CROSS EXPANSION OR SEISMIC JOINTS. COORDINATE WITH ARCHITECTURAL DRAWINGS FOR LOCATIONS.
12. REFER TO SPECIFICATION FOR THROUGH PENETRATION FIRE STOP SYSTEMS FOR SEALING PENETRATIONS THROUGH FIRE-RATED CONSTRUCTION REQUIREMENTS.
13. PROVIDE ACOUSTIC SOUND SEALANT MATERIAL FOR PIPING THAT PENETRATES SPACES LIKE CLASSROOMS, OFFICES, AND CONFERENCE ROOMS.
14. UNLESS OTHERWISE NOTED, ALL HEATING WATER PIPING TO UNITS SHALL BE MIN. 3/4" SIZE.
15. VALVES SHALL BE INSTALLED SO THAT THE VALVE REMAINS IN SERVICE WHEN EQUIPMENT OR PIPING ON THE EQUIPMENT SIDE OF THE VALVE IS REMOVED.
16. BALANCING VALVES AND BUTTERFLY VALVES SHALL BE PROVIDED WITH POSITION INDICATORS AND MAXIMUM ADJUSTABLE STOP MEMORY STOP



1 OVERALL MECHANICAL FIRST FLOOR PLAN
1/16" = 1'-0"

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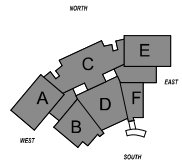

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

OVERALL MECHANICAL FIRST FLOOR PLAN

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1 MECHANICAL OVERALL SECOND FLOOR PLAN
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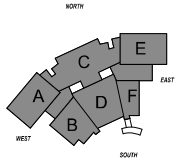

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

OVERALL MECHANICAL SECOND FLOOR PLAN

Date
07/08/2024
Scale
1/16" = 1'-0"
Proj. Number
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Drawing Number
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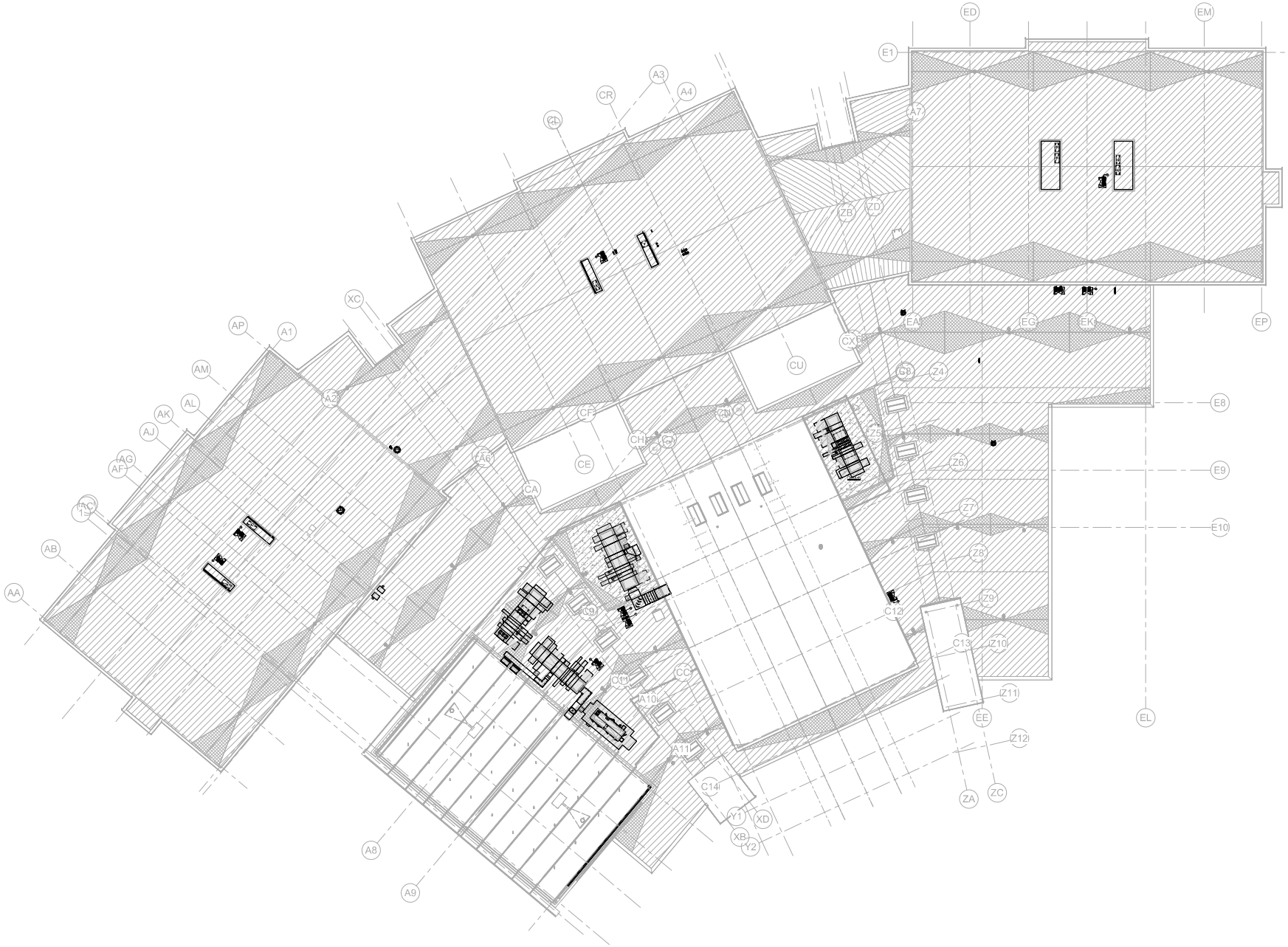

1 MECHANICAL OVERALL ROOF PLAN
1/16" = 1'-0"

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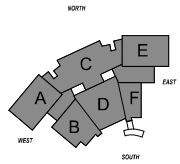

KEYPLAN

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	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

OVERALL MECHANICAL ROOF PLAN

Date: 07/08/2024
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KEYNOTES - MECHANICAL	
Key Value	Keynote Text
M2	MOTORIZED DAMPER INTERLOCKED WITH KHEF-1 OPERATION. REFER TO SEQUENCE FOR ADDITIONAL INFORMATION.
M7	MOUNT DEF-1 ABOVE THE CEILING IN LOCATION SHOWN. ROUTE 4" EXHAUST DUCTWORK DOWN TO DRYER CONNECTION AND 4" EXHAUST DUCT UP THROUGH ROOF.



1 MECHANICAL DUCTWORK FIRST FLOOR PLAN - A
1/8" = 1'-0"

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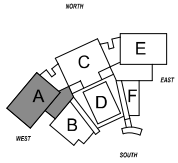

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Number	Date	Issued For
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

MECHANICAL FIRST FLOOR PLAN - PART A

Date: 07/08/2024
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Drawing Number: M101A

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REFER TO MECHANICAL DRAWING M100B FOR DUCTWORK SERVING THIS AREA
GYMNASIUM
1100
LOCKER ROOM
1005
LOCKER ROOM
1006
GAURTLUP
GAURTLUP
GAURTLUP
PE OFFICE
1089
PE OFFICE
1090
PE ATHL STORAGE
1087
PE TLT/ SHOWER
1036
GYM HVLS FAN CONTROLLER
GAURTLUP
GAURTLUP
GAURTLUP



1 MECHANICAL DUCTWORK FIRST FLOOR PLAN - C
1/8" = 1'-0"

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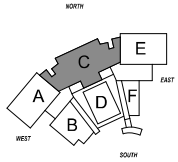

KEYPLAN

Number	Date	Issued For
1	10/16/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

MECHANICAL FIRST FLOOR PLAN - PART C

Date
07/08/2024
Scale
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Proj. Number
22367.00

Drawing Number
M101C

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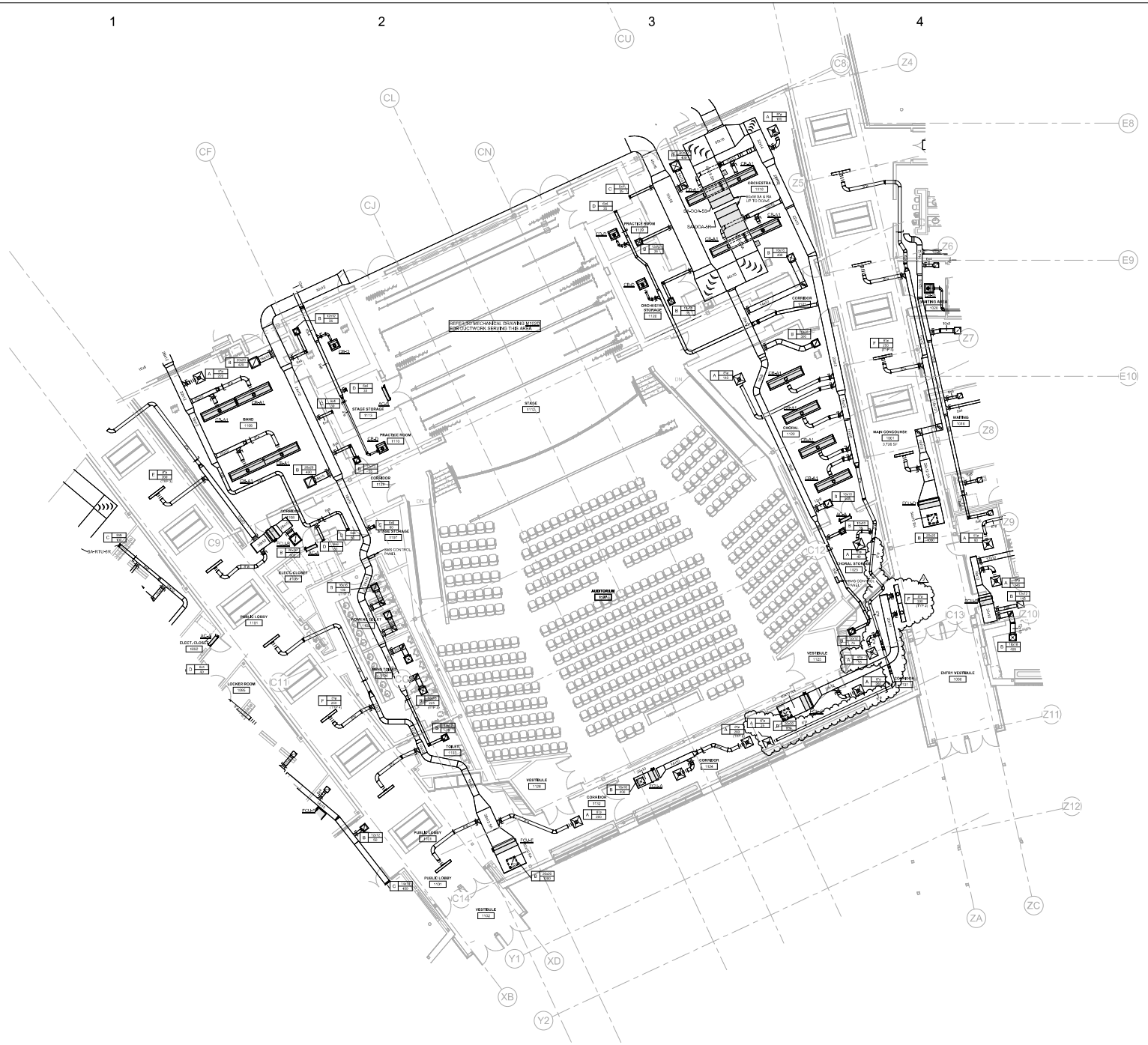

1 MECHANICAL DUCTWORK FIRST FLOOR PLAN - D
1/8" = 1'-0"

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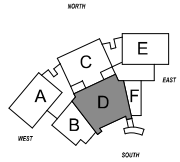

KEYPLAN

Number	Date	Issued For
2	10/23/2024	ADDENDUM NO. 3
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

MECHANICAL FIRST FLOOR PLAN - PART D

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
22367.00

Drawing Number
M101D

10/23/2024 8:56:01 AM

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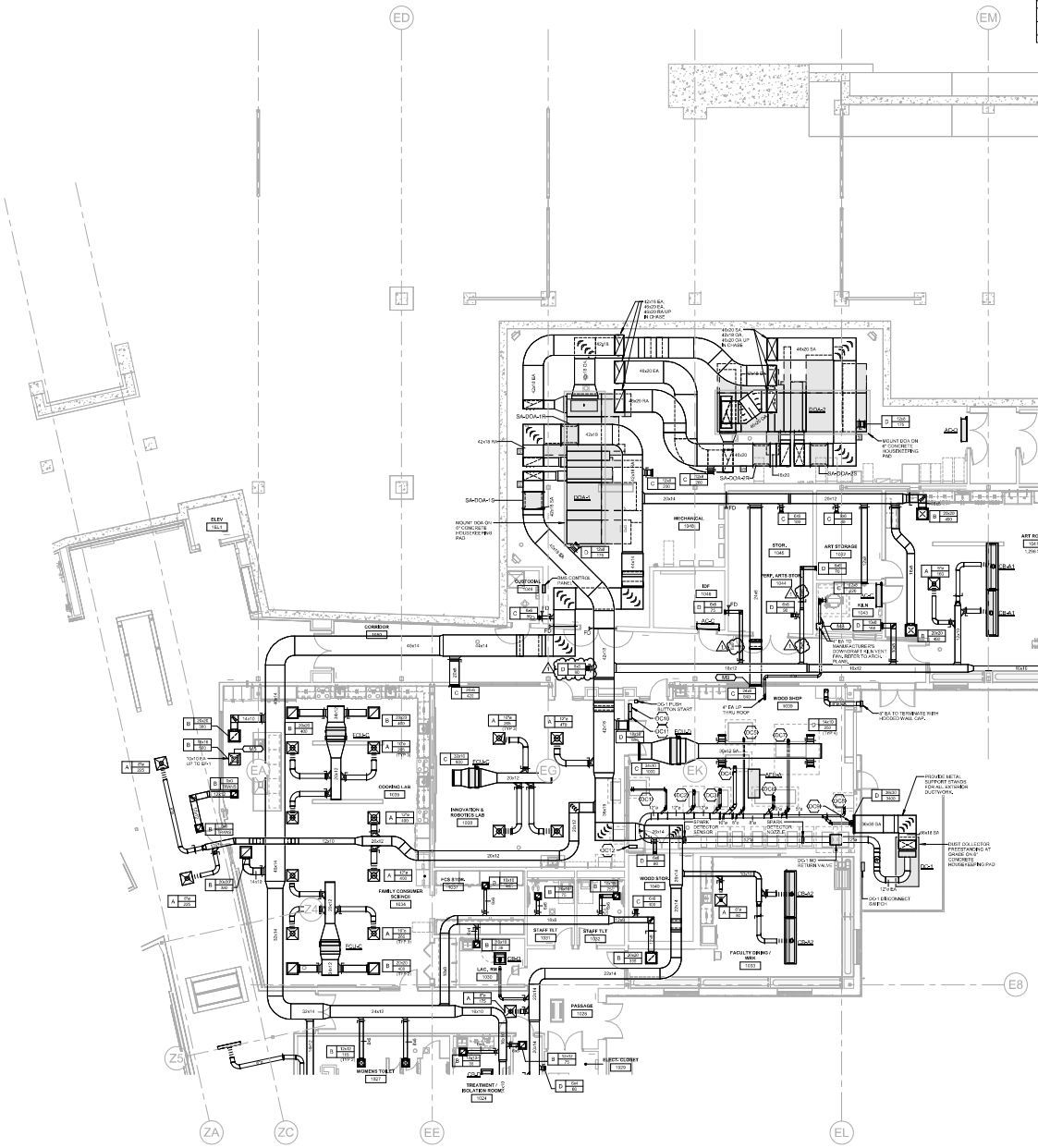

1 MECHANICAL DUCTWORK FIRST FLOOR PLAN - E
1/8" = 1'-0"

KEYNOTES - MECHANICAL	
Key Value	Keynote Text
M5	PROVIDE A WALL MOUNTED SWITCH WITHIN THE COOKING LAB CLASSROOM FOR EXHAUST FAN EF-1 START/STOP. REFER TO SEQUENCE FOR MORE INFORMATION.
M6	PROVIDE ALL POINTS OF CONTROL AND CONTROLS WIRING BETWEEN THE KILN CONTROLLER AND DOWNDRAFT EXHAUST FAN FOR A SYNCHRONIZED OPERATION.
M9	PROVIDE FILTERED RETURN GRILLE SERVING THE WOOD SHOP.

DUST COLLECTION EQUIP. KEY NOTES	
DC1	2-1/2" BRANCH CONNECTION TO CHOP SAW, 150 CFM
DC2	4" BRANCH CONNECTION TO BAND SAW, 300 CFM
DC3	4" BRANCH CONNECTION TO DRUM SANDER, 600 CFM
DC4	6" BRANCH CONNECTION TO PLANER, 800 CFM
DC5	2-1/2" BRANCH CONNECTION TO CNC MACHINE, 150 CFM
DC6	4" BRANCH CONNECTION TO JOINER, 450 CFM
DC7	4" BRANCH CONNECTION TO TABLE SAW, 250 CFM
DC8	4" BRANCH CONNECTION TO DISC SANDER, 600 CFM
DC9	4" BRANCH CONNECTION TO FLOOR SWEEP.
DC10	DC-1 VFD, STARTER, AND CONTROLLER.
DC11	DC-1 SPARK DETECTION CONTROLLER.
DC12	DC-1 NO-RETURN VALVE CONTROLLER.

DUST COLLECTION GENERAL NOTES
1. PROVIDE ADJUSTABLE BLAST GATE WITH LOCKING SCREW INSTALLED AT 6'-0" ABOVE FINISHED FLOOR IN ALL EXHAUST BRANCH DUCTS.
2. PROVIDE 4" DIAMETER EXHAUST AIR BRANCH DUCTS TO ALL FLOOR SWEEPS WITH BLAST GATE INSTALLED AT 6'-0" ABOVE FINISHED FLOOR. PROVIDE SIGN NEXT TO EACH ON WALL: "KEEP BLAST GATE CLOSED WHEN NOT IN USE."
3. TERMINATE BRANCH DUCT DROPS TO EQUIPMENT AT 8'-0" AFF. PROVIDE MAXIMUM 6'-0" OF HIGH PRESSURE FLEXIBLE DUCTWORK FOR CONNECTION TO EQUIPMENT.
4. PROVIDE REDUCER/TRANSITION CONNECTION AT EACH PIECE OF EQUIPMENT.
5. PROVIDE A MINIMUM OF 4'-2" OF STRAIGHT DUCT BEFORE AND AFTER THE NO RETURN VALVE.
6. PROVIDE A MINIMUM OF 30'-0" OF BRANCH-FREE DUCTWORK MAIN BETWEEN THE SPARK DETECTOR NOZZLE AND SENSOR. PROVIDE NO LESS THAN 4'-0" OF STRAIGHT DUCT RUN BEFORE AND AFTER THE NOZZLE AND SENSOR.
7. PROVIDE STAINLESS STEEL METAL SUPPORT STANDS FOR ALL EXTERIOR DUCTWORK AND EQUIPMENT.
8. PROVIDE 10 GAUGE HEAVY METAL DUCTWORK FOR ALL DUCTWORK BETWEEN THE NO RETURN VALVE AND DUST COLLECTOR.
9. COORDINATE FINAL DUST COLLECTION POINTS WITH APPROVED EQUIPMENT SHOP DRAWINGS. EXISTING EQUIPMENT CONNECTORS, AND FINAL EQUIPMENT LAYOUT APPROVED BY THE ARCHITECT AND OWNER. LOCATIONS AND ORIENTATIONS OF EQUIPMENT ARE SUBJECT TO CHANGE.
10. PROVIDE MANUFACTURER'S RECOMMENDED HEPA FILTER ON THE RECIRCULATING DUCTWORK EXTERIOR OF THE BUILDING.

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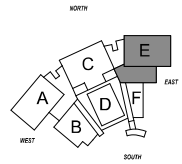

KEYPLAN

Number	Date	Issued For
1	10/16/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

MECHANICAL FIRST FLOOR PLAN - PART E

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: **M101E**

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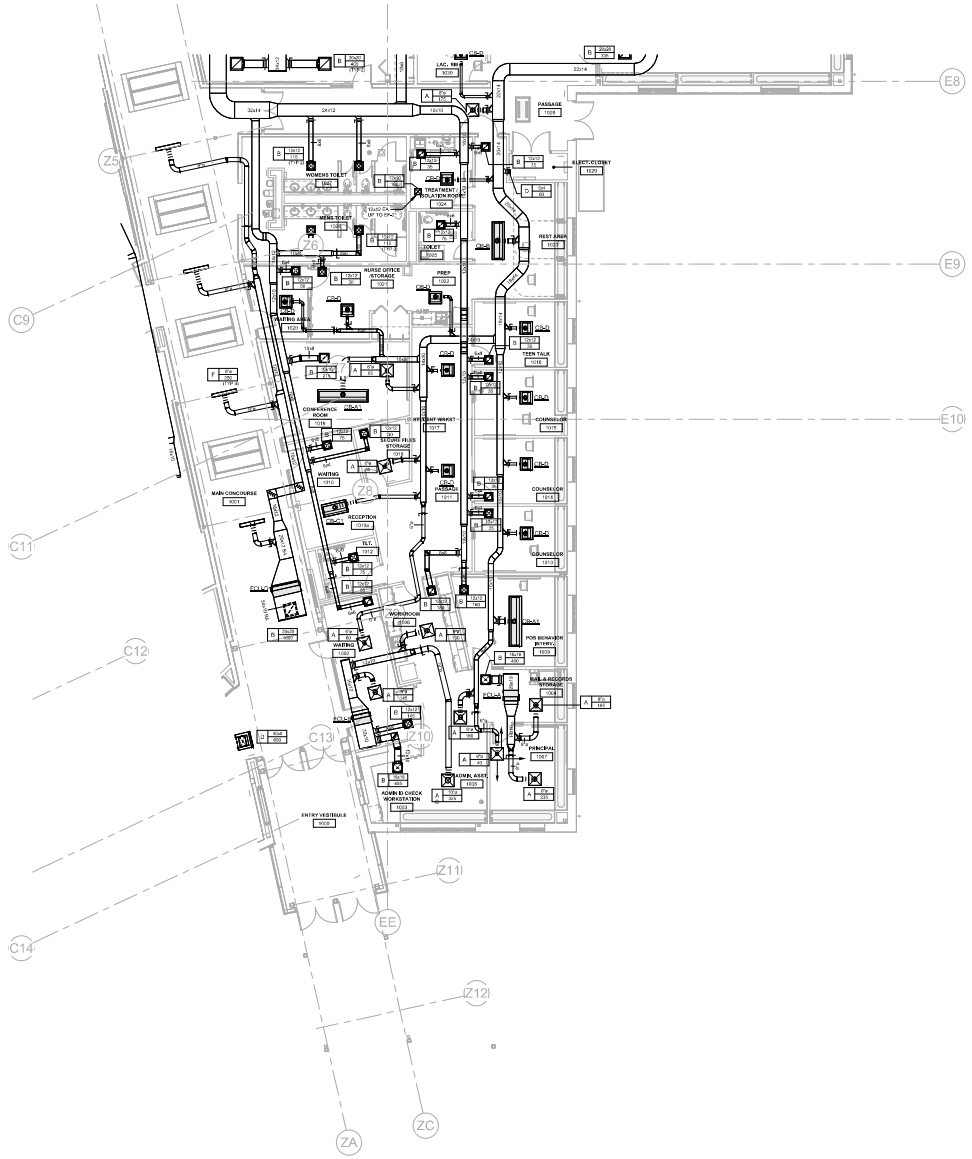

1 MECHANICAL DUCTWORK FIRST FLOOR PLAN - F
1/8" = 1'-0"

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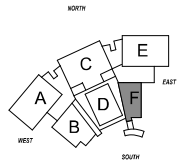

KEYPLAN

Number	Date	Issued For
	05/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

MECHANICAL FIRST FLOOR PLAN - PART F

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
22367.00

Drawing Number
M101F

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9/26/2024 10:33:51 AM



1 MECHANICAL DUCTWORK SECOND FLOOR OVERALL PLAN - A
1/8" = 1'-0"

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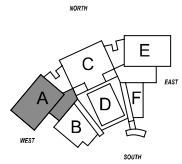

KEYPLAN

Number	Date	Issued For
2	10/23/2024	ADDENDUM NO. 3
	09/20/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

MECHANICAL SECOND FLOOR PLAN - PART A

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: M102A

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10/23/2024 8:58:34 AM



1 MECHANICAL DUCTWORK SECOND FLOOR OVERALL PLAN - B
1/8" = 1'-0"

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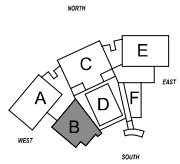

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

MECHANICAL SECOND FLOOR PLAN - PART B

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
22367.00

Drawing Number
M102B

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1 MECHANICAL DUCTWORK SECOND FLOOR OVERALL PLAN - C
1/8" = 1'-0"

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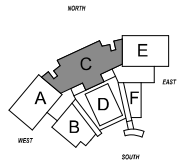

KEYPLAN

Number	Date	Issued For
	09/03/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

MECHANICAL SECOND FLOOR PLAN - PART C

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
22367.00

Drawing Number
M102C

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1 MECHANICAL DUCTWORK SECOND FLOOR OVERALL PLAN - D
1/8" = 1'-0"

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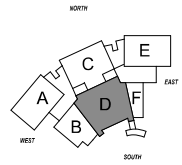

KEYPLAN

Number	Date	Issued For
	05/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

MECHANICAL SECOND FLOOR PLAN - PART D

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
22367.00

Drawing Number
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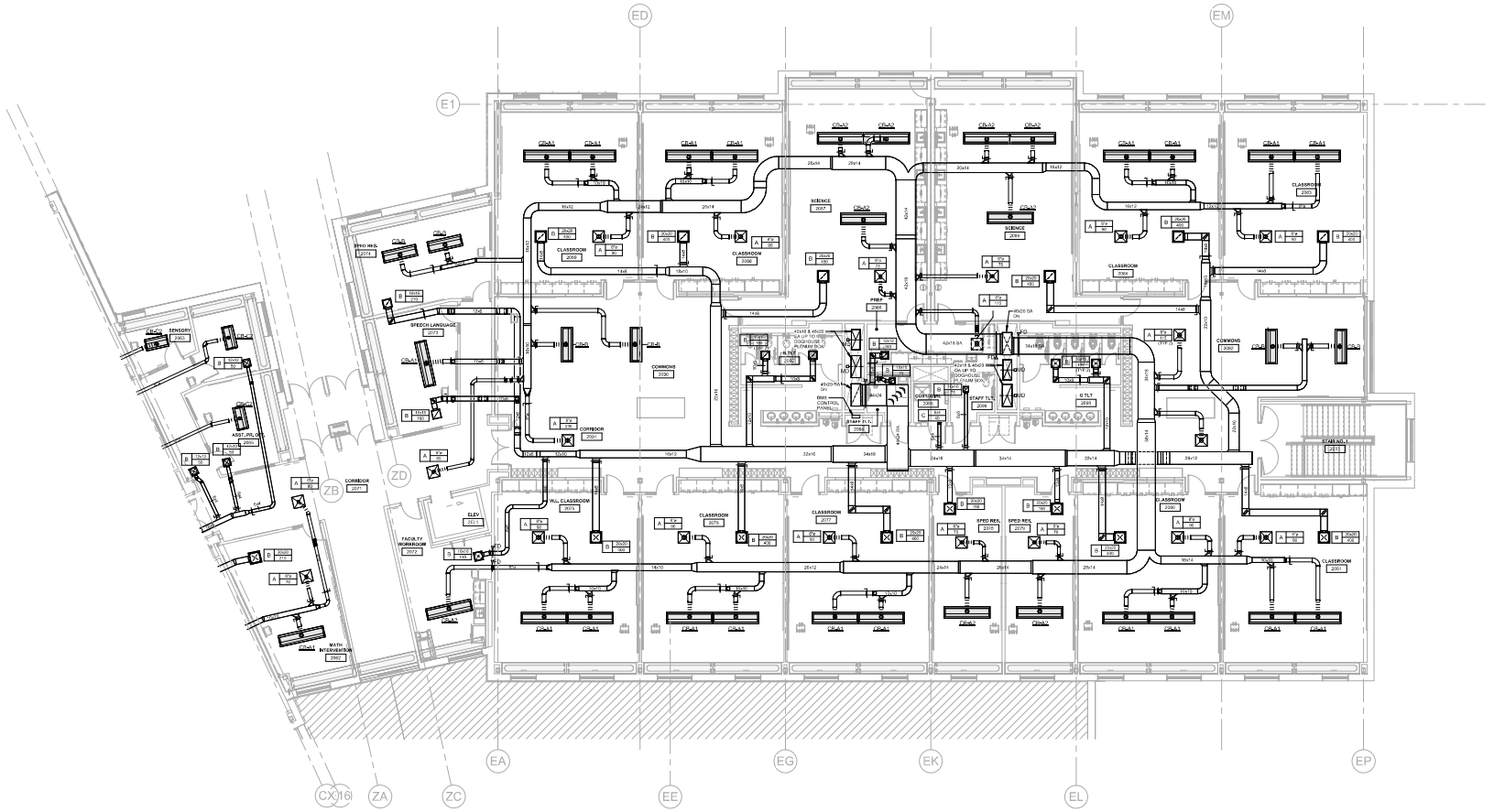

1 MECHANICAL DUCTWORK SECOND FLOOR OVERALL PLAN - E
1/8" = 1'-0"

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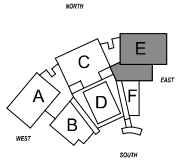

KEYPLAN

Number	Date	Issued For
	05/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

MECHANICAL SECOND FLOOR PLAN - PART E

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
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Drawing Number
M102E

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9/26/2024 10:34:23 AM

KEYNOTES - MECHANICAL	
Key Value	Keynote Text
M4	WALKIN REFRIGERATOR & FREEZER CONDENSING UNITS TO BE MOUNTED ON ROOF. MOUNT A MINIMUM OF 14" ABOVE THE ROOF AND ANCHOR SUPPORT STANDS TO THE ROOF STRUCTURAL SUPPORTS. ROUTE REFRIGERANT TO AND FROM THE WALKIN UNITS AND VERIFY EXACT ROUTING IN FIELD. REFER TO THE FOOD SERVICE CONSULTANT DRAWINGS FOR REFRIGERANT SIZE AND ROUTING DETAILS.
M10	PROVIDE INSULATION AND CURB PROOF PENETRATING THE ROOF UP TO THE ATTACHMENT TO THE PLENUM BOX AND FOR A MINIMUM OF 4'-0" BELOW THE ROOF DECK INTERIOR OF THE BUILDING. REFER TO SPECIFICATIONS FOR INSULATION REQUIREMENTS.



1 MECHANICAL ROOF FLOOR PLAN - A
1/8" = 1'-0"

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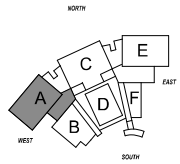

KEYPLAN

Number	Date	Issued For
3	10/30/2024	ADDENDUM NO. 4
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

MECHANICAL ROOF PLAN - PART A

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
22367.00

Drawing Number
M103A

10/30/2024 11:02:00 AM

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KEYNOTES - MECHANICAL
Key Value
Keynote Text
M11
PROVIDE DUCT SLEEVE WHERE DUCT PENETRATES THE EXTERIOR WALL.
1
2
3
4
5
A
B
C
D
E
AL
AJ
AD
AF
AC
A8
A9
A10
A11
XB
XD
MAINTAIN A MINIMUM OF 30" CLEAR BETWEEN EQUIPMENT, EXTERIOR WALLS/CURBS AND SURFACES/STRUCTURES/BEDS AS A WALKING PATH TO THE UNIT.
RISER: DN TO ROOF
RISER: DN TO ROOF
RISER: DN TO ROOF

KEYNOTES - MECHANICAL	
Key Value	Keynote Text
M10	PROVIDE INSULATION ON DUCT WORK PENETRATING THE ROOF UP TO THE ATTACHMENT TO THE PLENUM BOX AND FOR A MINIMUM OF 4'-0" BELOW THE ROOF DECK INTERIOR OF THE BUILDING. REFER TO SPECIFICATIONS FOR INSULATION REQUIREMENTS.
M11	PROVIDE DUCT SLEEVE WHERE DUCT PENETRATES THE EXTERIOR WALL.



1 MECHANICAL ROOF FLOOR PLAN - C
1/8" = 1'-0"

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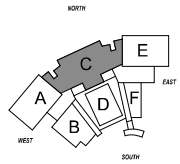

KEYPLAN

Number	Date	Issued For
3	10/30/2024	ADDENDUM NO. 4
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

MECHANICAL ROOF PLAN - PART C

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: M103C

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KEYNOTES - MECHANICAL
Key Value
Keynote Text
M11
PROVIDE DUCT SLEEVE WHERE DUCT PENETRATES THE EXTERIOR WALL.
M11
M11
SANTUOS
RTU-1
RTU-2
RTU-3
RTU-4
RTU-5
RTU-6
RTU-7
RTU-8
RTU-9
RTU-10
RTU-11
RTU-12
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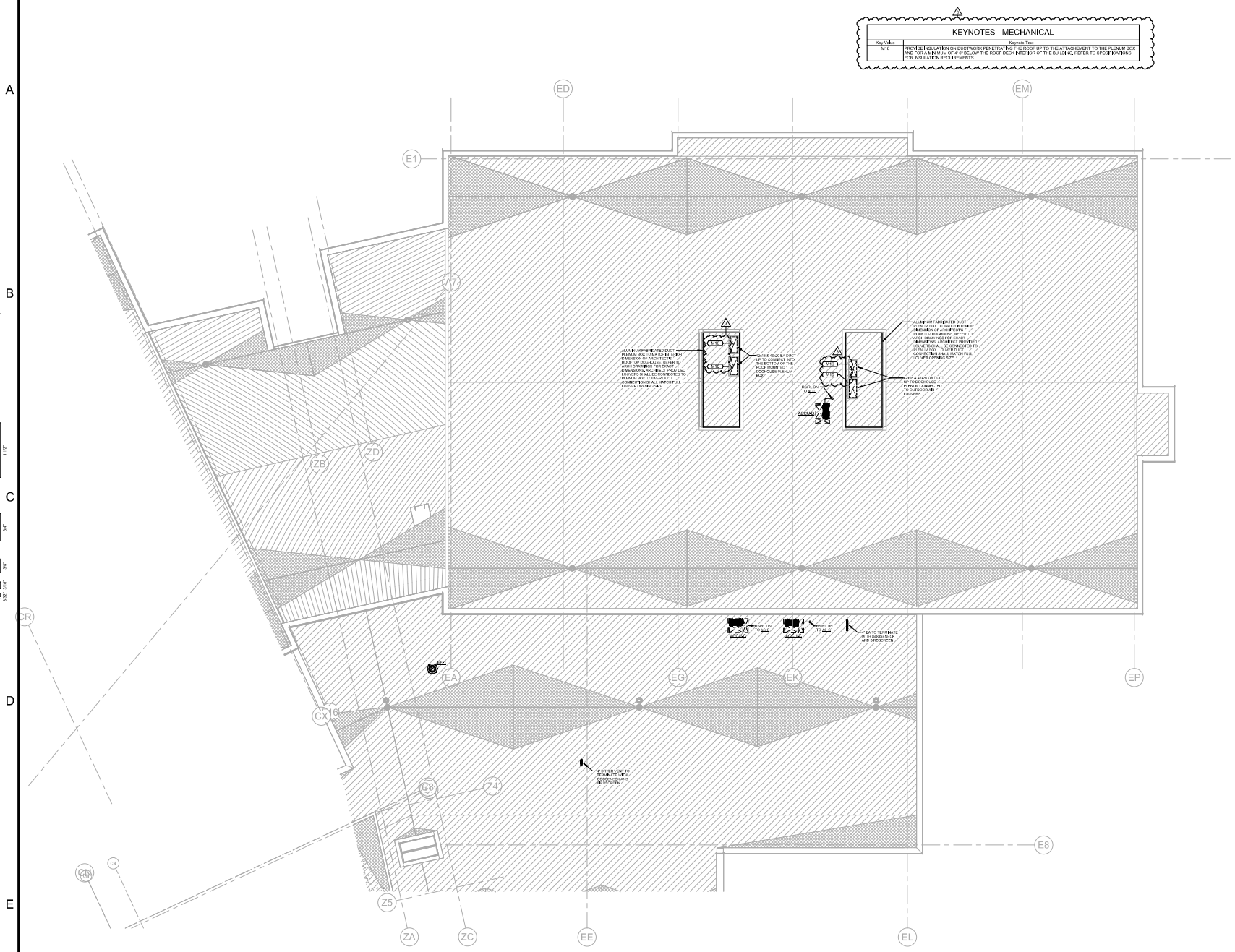
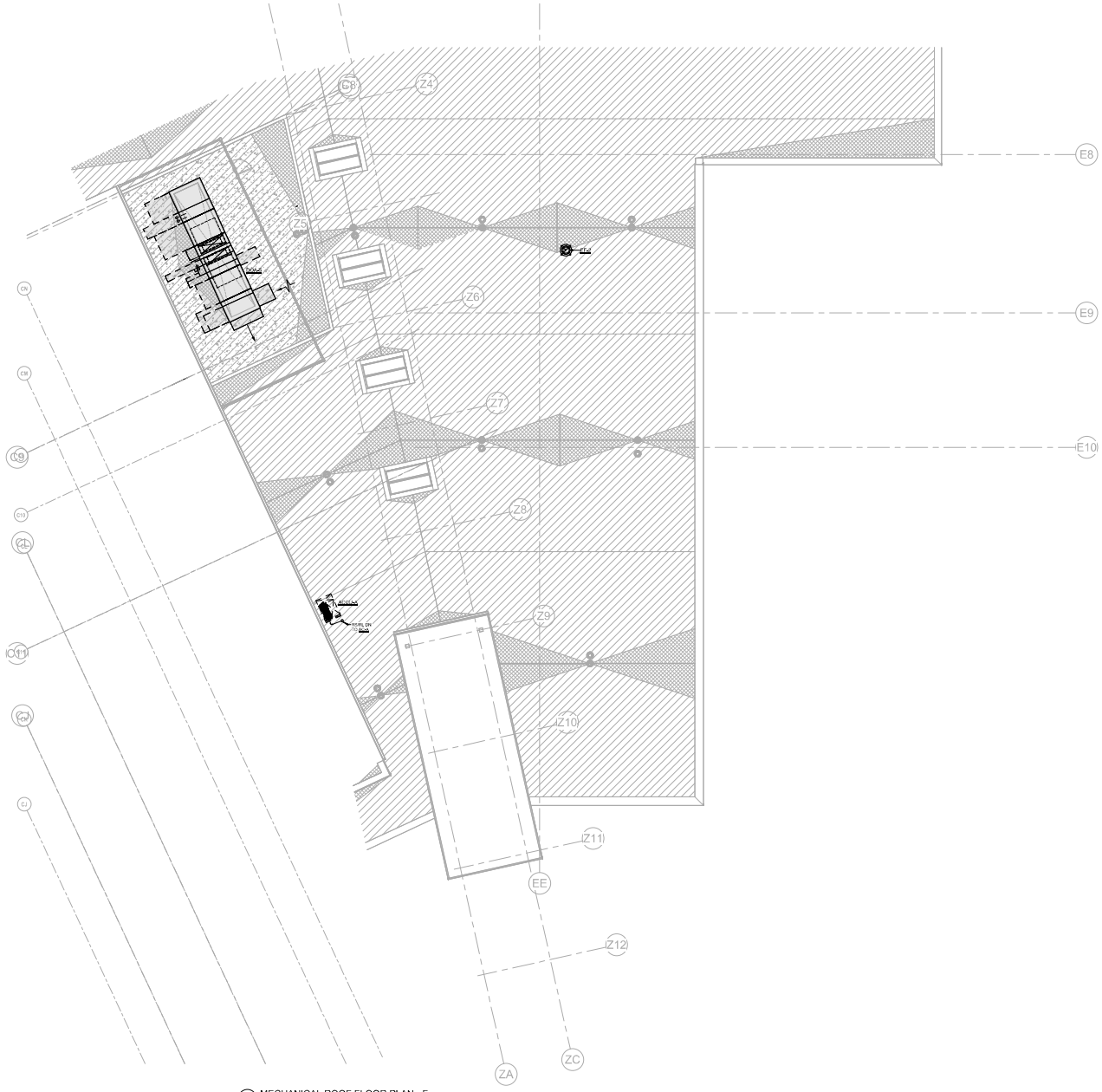
RTU-40


KEYNOTES - MECHANICAL
Key Values
Keynote Text
M10
PROVIDE INSULATION ON DUCTWORK PENETRATING THE ROOF UP TO THE ATTACHMENT TO THE PLENUM BOX AND FOR A MINIMUM OF 4'-0" BELOW THE ROOF DECK INTERIOR OF THE BUILDING, REFER TO SPECIFICATIONS FOR INSULATION REQUIREMENTS.
ED
EM
E1
A7
ZB
ZD
CR
EA
EG
EK
EP
CX16
Z4
E8
Z5
ZA
ZC
EE
EL
CN
ON
ALUMINUM PAINTED DUCT PLENUM BOX TO MATCH INTERIOR DIMENSION OF ARCHITECTS ROOFTOP DOGHOUSE. REFER TO ARCH DRAWINGS FOR EXACT DIMENSIONS, ARCHITECT PROVIDED LOUVERS SHALL BE CONNECTED TO PLENUM BOX, LOUVER DUCT CONNECTION SHALL MATCH FULL LOUVER OPENING SIZE.
M10
M10
M10
M10
60X16 & 46X20 DUCT UP TO CONNECT INTO THE BOTTOM OF THE ROOF MOUNTED DOGHOUSE PLENUM BOX
ALUMINUM FABRICATED DUCT PLENUM BOX TO MATCH INTERIOR DIMENSION OF ARCHITECTS ROOFTOP DOGHOUSE. REFER TO ARCH DRAWINGS FOR EXACT DIMENSIONS, ARCHITECT PROVIDED LOUVERS SHALL BE CONNECTED TO PLENUM BOX, LOUVER DUCT CONNECTION SHALL MATCH FULL LOUVER OPENING SIZE.
M10
M10
M10
M10
60X16 & 46X20 OR DUCT SIZE UP TO CONNECT INTO PLENUM CONNECTED TO ROOFTOP MOUNTED LOUVERS.
RISE IN TO 10
RISE IN TO 10
RISE IN TO 10


Z4
Z5
Z6
Z7
Z8
Z9
Z10
Z11
Z12
ZA
ZC
EE
E8
E9
E10
CN
CM
C9
C10
C11
CJ
CR
RTU-1
RTU-2
RTU-3
RTU-4
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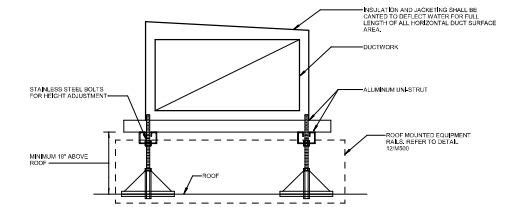
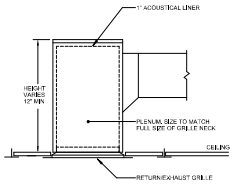
RTU-40



9 ROOF MOUNTED DUCT SUPPORT DETAIL
NTS



4 TYPICAL RETURN AIR / EXHAUST AIR GRILLE PLENUM DETAIL
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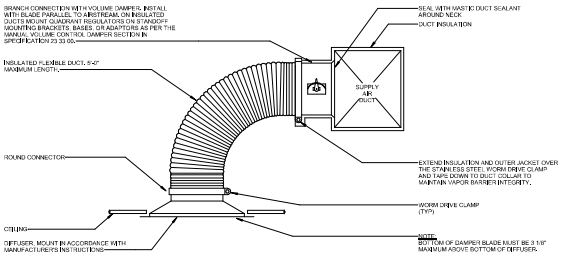
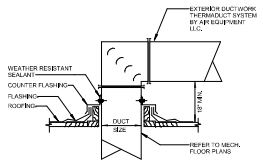


1 DIFFUSER WITH FLEX DUCT DETAIL
NTS



10 EXTERIOR DUCT ROOF PENETRATION DETAIL
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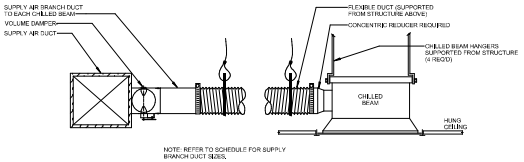

5 CHILLED BEAM DUCT CONNECTION DETAIL
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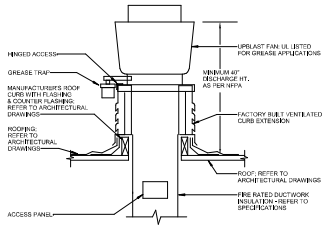

11 UPBLAST FAN DETAIL FOR KITCHEN EXHAUST (KHEF-1)
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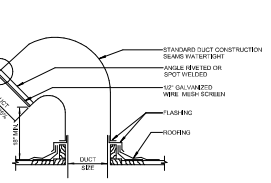

6 GOOSE NECK DETAIL
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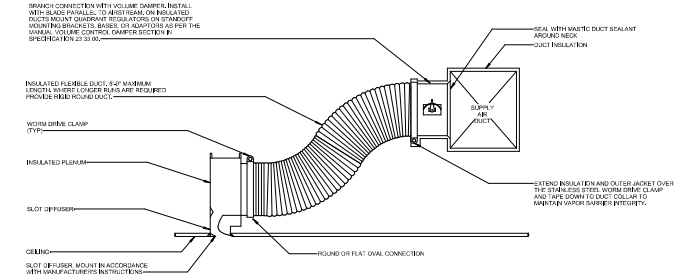

2 DIFFUSER WITH FLEX DUCT DETAIL
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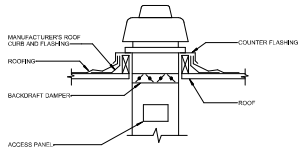
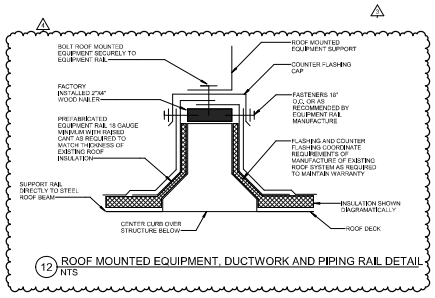
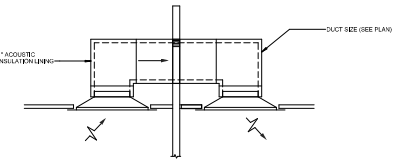


7 ROOF MOUNTED FAN DETAIL
NTS



12 ROOF MOUNTED EQUIPMENT, DUCTWORK AND PIPING RAIL DETAIL
NTS



13 TRANSFER DUCT DETAIL
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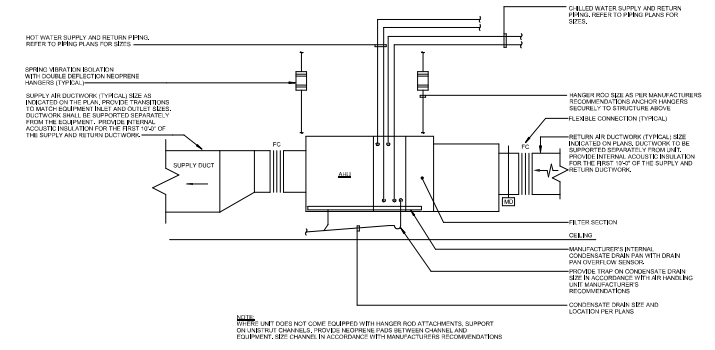

8 HORIZONTAL / SUSPENDED AIR HANDLING UNIT DETAIL
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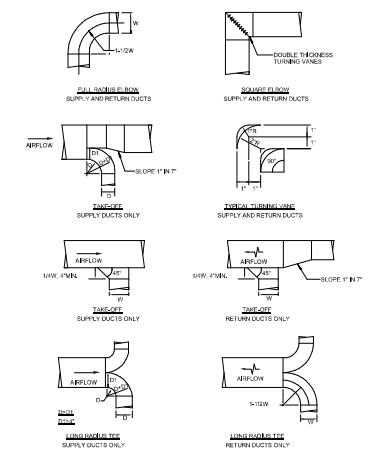


3 TYPICAL DUCT DETAILS
NTS

SLAM
The S|L|A|M Collaborative
80 Glastonbury Boulevard
Glastonbury, CT 06033-4410
Phone: 860 657.8077
www.slamcoll.com

Drawn: LAE
Checked: BH

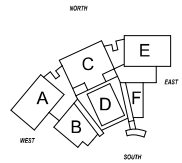
CES Consulting Engineering Services, Inc.
811 Middle Street
Middletown CT 06457
860.632.1682
ceseng.com
CES #2023068.00

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
4	11/06/2024	ADDENDUM NO. 6
3	10/30/2024	ADDENDUM NO. 4
	09/20/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

MECHANICAL DETAILS

Date: 07/08/2024
Scale: NTS
Proj. Number: 22367.00
Drawing Number: M500

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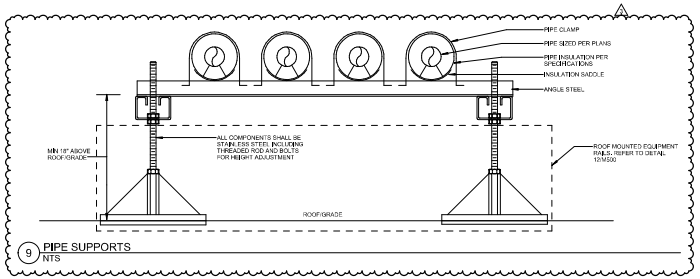

9 PIPE SUPPORTS
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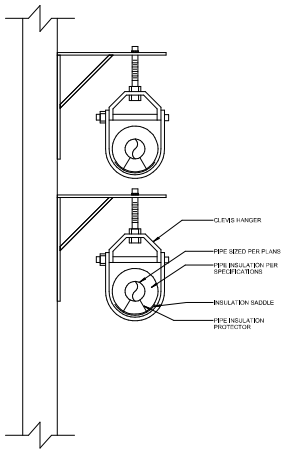

10 DETAIL - PIPE HANGING DETAIL - WALL
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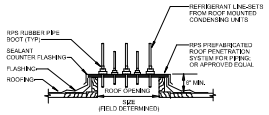

11 PIPE PENETRATION DETAIL - THROUGH ROOF
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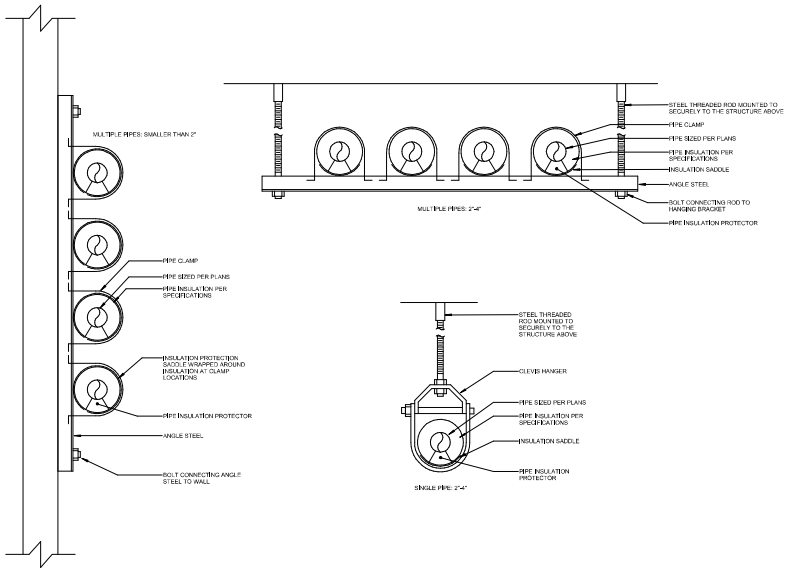

12 PIPE HANGER DETAIL
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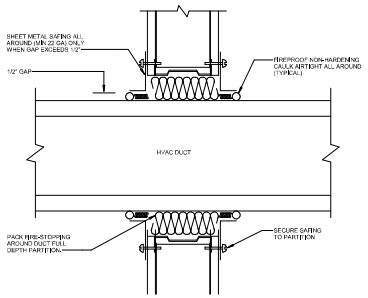

5 DUCT PENETRATION OF WALL/SLAB DETAIL
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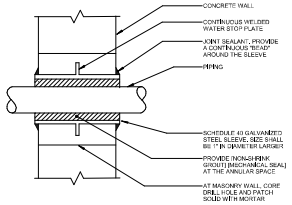

6 FOUNDATION WALL PENETRATION DETAIL
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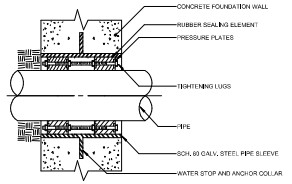

7 PIPE THROUGH EXTERIOR WALL DETAIL
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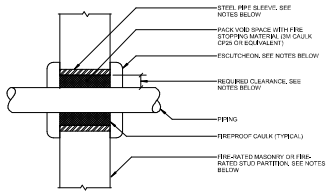
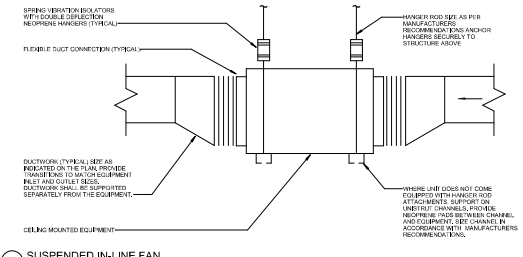


NOTES:
1. PIPE SLEEVES
   A. PIPE SLEEVES THROUGH FIRE-RATED MASONRY PARTITIONS OR FOUNDATION WALLS SHALL BE SCHEDULE 40 BLACK STEEL WITH MAXIMUM OF 1/2" CLEARANCE BETWEEN SLEEVE AND PIPE. SLEEVE SHALL BE EQUAL IN LENGTH TO DEPTH OF PARTITION OR WALL.
   B. PIPE SLEEVES THROUGH FIRE-RATED STUD PARTITIONS SHALL BE #18 GAUGE GALVANIZED STEEL WITH MAXIMUM OF 1" CLEARANCE BETWEEN SLEEVE AND PIPE. SLEEVE SHALL BE EQUAL IN LENGTH TO DEPTH OF PARTITION.
2. ESCUTCHEONS
   A. ESCUTCHEONS IN FINISHED SPACES SHALL BE ANODIZED ALUMINUM OR CHROME-PLATED BRASS.
   B. ESCUTCHEONS IN UNFINISHED SPACES SHALL BE PLAIN BRASS, ALUMINUM, GALVANIZED STEEL OR CAST IRON.
   C. ESCUTCHEONS SHALL BE HELD IN PLACE BY INTERNAL SPRING TENSION OR SET SCREW.

8 PIPE PENETRATION OF FIRE-RATED WALL DETAIL
NTS



1 SUSPENDED IN-LINE FAN
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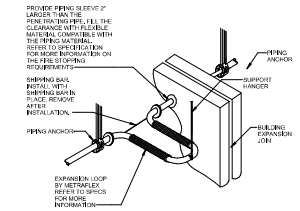
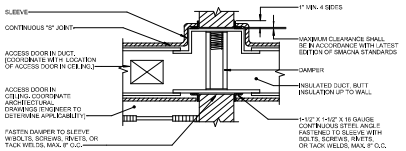


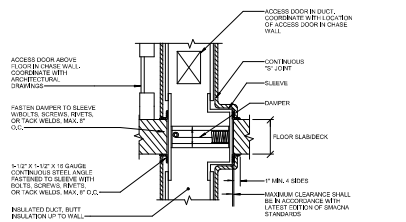
2 TYPICAL SEISMIC SEPARATION JOINT PIPING DETAIL (COPPER PIPING)
NTS



NOTES:
1. DAMPER STYLE & SLEEVE CONFIGURATION IS GOVERNED BY MAINTAINING A MAX. .05 STATIC PRESSURE @ 2800 F.P.M. FACE VELOCITY.
2. DEPTH OF DAMPER TO BE COORDINATED WITH WALL THICKNESS.
3. INSTALLATIONS & MATERIALS PER UL 555.

FIRE DAMPER NOTE
PROVIDE FIRE DAMPERS (COMBINATION FIRE AND SMOKE DAMPERS) (AND SMOKE DAMPERS) AT ALL LOCATIONS WHERE DUCTS AND OUTLETS PASS THROUGH FIRE RATED COMPONENTS. WHERE INDICATED ON CONTRACT DOCUMENTS, AND WHERE REQUIRED BY AUTHORITIES HAVING JURISDICTION. INSTALL WITH REQUIRED PERIMETER MOUNTING ANGLES, SLEEVES, BREAKAWAY DUCT CONNECTIONS, CORROSION RESISTANT SPRINGS, BEARINGS, BUSHINGS AND HINGES.

3 FIRE DAMPER DETAIL - HORIZONTAL
NTS



NOTES:
1. DAMPER STYLE & SLEEVE CONFIGURATION IS GOVERNED BY MAINTAINING A MAX. .05 STATIC PRESSURE @ 2800 F.P.M. FACE VELOCITY.
2. DEPTH OF DAMPER TO BE COORDINATED WITH WALL THICKNESS.
3. INSTALLATIONS & MATERIALS PER UL 555.

FIRE DAMPER NOTE
PROVIDE FIRE DAMPERS (COMBINATION FIRE AND SMOKE DAMPERS) (AND SMOKE DAMPERS) AT ALL LOCATIONS WHERE DUCTS AND OUTLETS PASS THROUGH FIRE RATED COMPONENTS. WHERE INDICATED ON CONTRACT DOCUMENTS, AND WHERE REQUIRED BY AUTHORITIES HAVING JURISDICTION. INSTALL WITH REQUIRED PERIMETER MOUNTING ANGLES, SLEEVES, BREAKAWAY DUCT CONNECTIONS, CORROSION RESISTANT SPRINGS, BEARINGS, BUSHINGS AND HINGES.

4 FIRE DAMPER DETAIL - VERTICAL
NTS

SLAM
S / L / A / M Architects, Landscape Architects & Engineers, P.C.
80 Glastonbury Boulevard
Glastonbury, CT 06033-4410
Phone: 860 657.8077
www.slamcoll.com

Drawn: LAE
Checked: BH

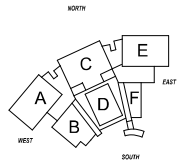
CES Consulting Engineering Services, Inc.
811 Middle Street
Middletown CT 06457
860.632.1682
ceseng.com
CES #2023066.00

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
3	10/30/2024	ADDENDUM NO. 4
	09/20/2024	BID/SUPERMIT
	07/08/2024	PHASE 2

MECHANICAL DETAILS

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: M501

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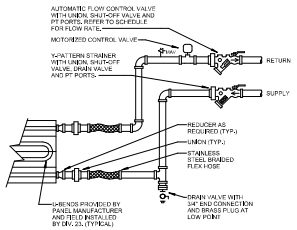
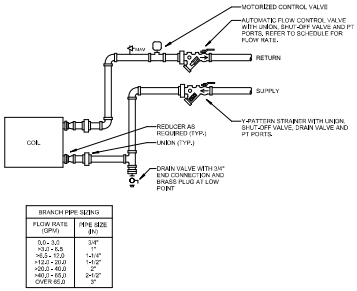
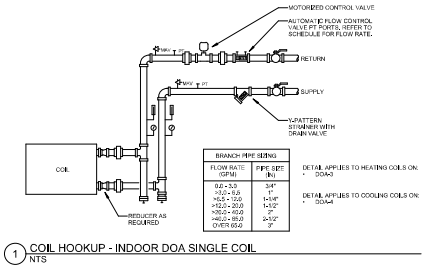


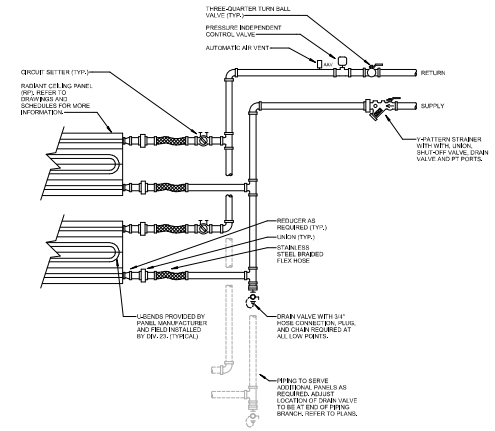
8 COIL HOOKUP - RADIANT CEILING PANEL
12" = 1'-0"



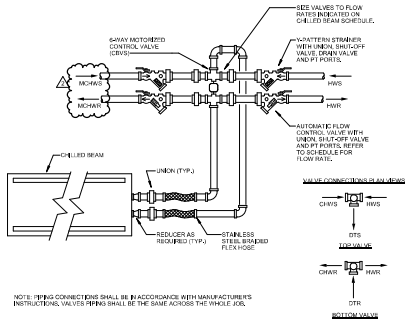
5 COIL HOOKUP - TERMINAL UNIT COIL PIPING 2-WAY
NTS



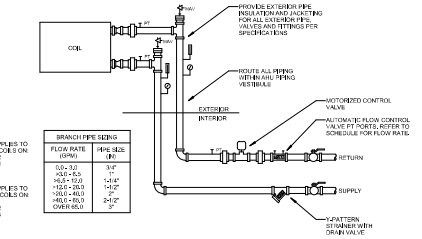
1 COIL HOOKUP - INDOOR DOA SINGLE COIL
NTS



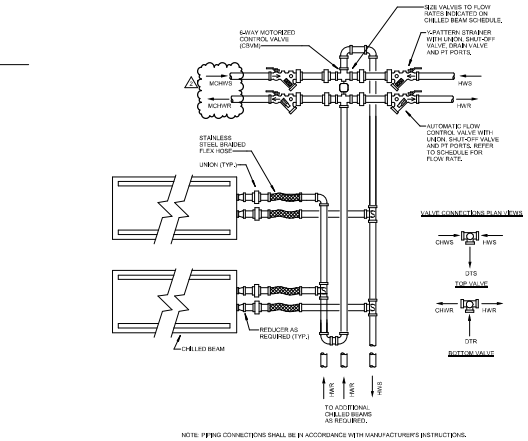
9 RADIANT CEILING PANEL - MULTIPLE PANELS
12" = 1'-0"



6 COIL HOOKUP - CHILLED BEAM 6-WAY SINGLE
12" = 1'-0"



3 COIL HOOKUP - RTU SINGLE COIL
NTS



7 COIL HOOKUP - CHILLED BEAM 6-WAY MULTIPLE
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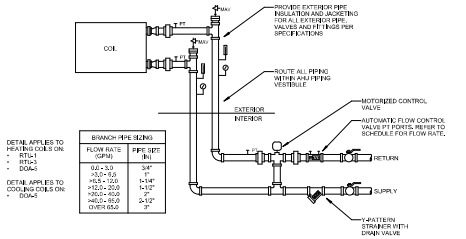

4 COIL HOOKUP - RTU SINGLE COIL - 3-WAY VALVE PIPING
NTS

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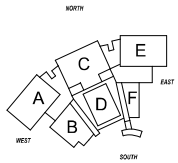
CES #2023095.00

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
2	10/23/2024	ADDENDUM NO. 3
	09/20/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

MECHANICAL DETAILS

Date: 07/08/2024
Scale: NTS
Proj. Number: 22367.00
Drawing Number: M502

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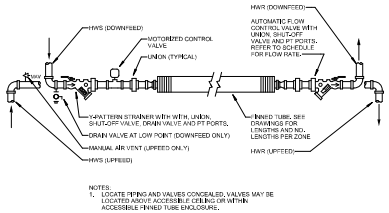
10/23/2024 8:58:34 AM

VALVES AND PIPE ACCESSORIES LEGEND

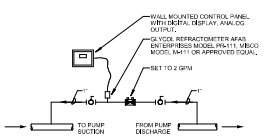
SYMBOL - SINGLE LINE	DESCRIPTION
	BALL VALVE
	BALL VALVE WITH HOSE BIBB, CAP & CHAIN (DRAIN VALVES)
	BUTTERFLY VALVE
	GLOBE VALVE
	GATE VALVE
	OS&Y VALVE
	PLUG VALVE
	PRESSURE REDUCING VALVE
	CHECK VALVE
	Y-PATTERN STRAINER
	Y-PATTERN STRAINER W/BALL VALVE, HOSE BIBB & CAP
	FLOAT OPERATED VALVE
	VALVE WITH TWO POSITION ACTUATOR
	SOLENOID VALVE
	AUTOMATIC CONTROL VALVE, MODULATING ACTUATOR
	AUTOMATIC CONTROL VALVE, TWO POSITION ACTUATOR
	THREE WAY AUTOMATIC CONTROL VALVE, MODULATING ACTUATOR
	THREE WAY AUTOMATIC CONTROL VALVE, TWO POSITION ACTUATOR
	AUTOMATIC FLOW CONTROL VALVE (PRESSURE INDEPENDENT)
	MANUAL BALANCING VALVE (CIRCUIT SETTER)
	SAFETY RELIEF VALVE
	PRESSURE GAUGE
	THERMOMETER
T	PRESSURE/TEMPERATURE WELL
MAV	AUTOMATIC AIR VENT WITH ISOLATION VALVE
MAV	MANUAL AIR VENT
	UNION OR FLANGE (AS INDICATED BY PIPE SIZE - SEE SPEC.)
	FLEXIBLE CONNECTION
E	EXPANSION JOINT
	PIPE GUIDE
	ANCHOR

SYMBOL - DOUBLE LINE	DESCRIPTION
	QUARTER TURN VALVE (REFER TO SPECIFICATIONS FOR TYPE)
	GLOBE VALVE
	ANGLE VALVE
	GATE VALVE
	OS&Y VALVE
	CHECK VALVE (SWING / SILENT NON-SLAM)
	STRAINER (STANDARD / COMBO W/ SHUT OFF)
	AUTO FLOW CONTROL VALVE (STANDARD / COMBO W/ SHUT OFF)
	CIRCUIT SETTER (STANDARD / COMBO W/ SHUT-OFF)
	MOTORIZED CONTROL VALVE (TWO WAY / THREE WAY)
	PRESSURE RELIEF VALVE
	FLEX CONNECTION (STAINLESS STEEL BRAIDED)
	FLEX CONNECTION (STAINLESS STEEL BRAIDED FLEX-HOSE)
	FLEX CONNECTION (SINGLE SPHERE / TWIN SPHERE)

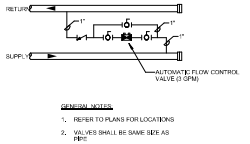


NOTES:
1. LOCATE PIPING AND VALVES CONCEALED. VALVES MAY BE LOCATED ABOVE ACCESSIBLE CEILING OR WITHIN ACCESSIBLE FINNED TUBE ENCLOSURE.

5 FINNED TUBE RADIATOR - 1 TIER
NTS

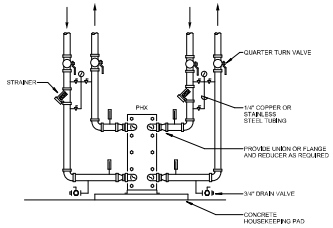


1 GLYCOL REFRACTOMETER
NTS

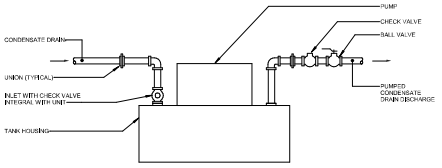


GENERAL NOTES:
1. REFER TO PLANS FOR LOCATIONS
2. VALVES SHALL BE SAME SIZE AS PIPE

2 END OF MAIN BYPASS
NTS



3 HEAT EXCHANGER - PLATE AND FRAME
NTS



4 AUTOMATIC CONDENSATE DRAIN PUMP PIPING DIAGRAM
NTS

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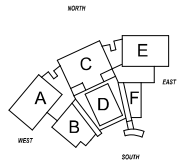
CES #2023068.00

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

MECHANICAL DETAILS

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: M503

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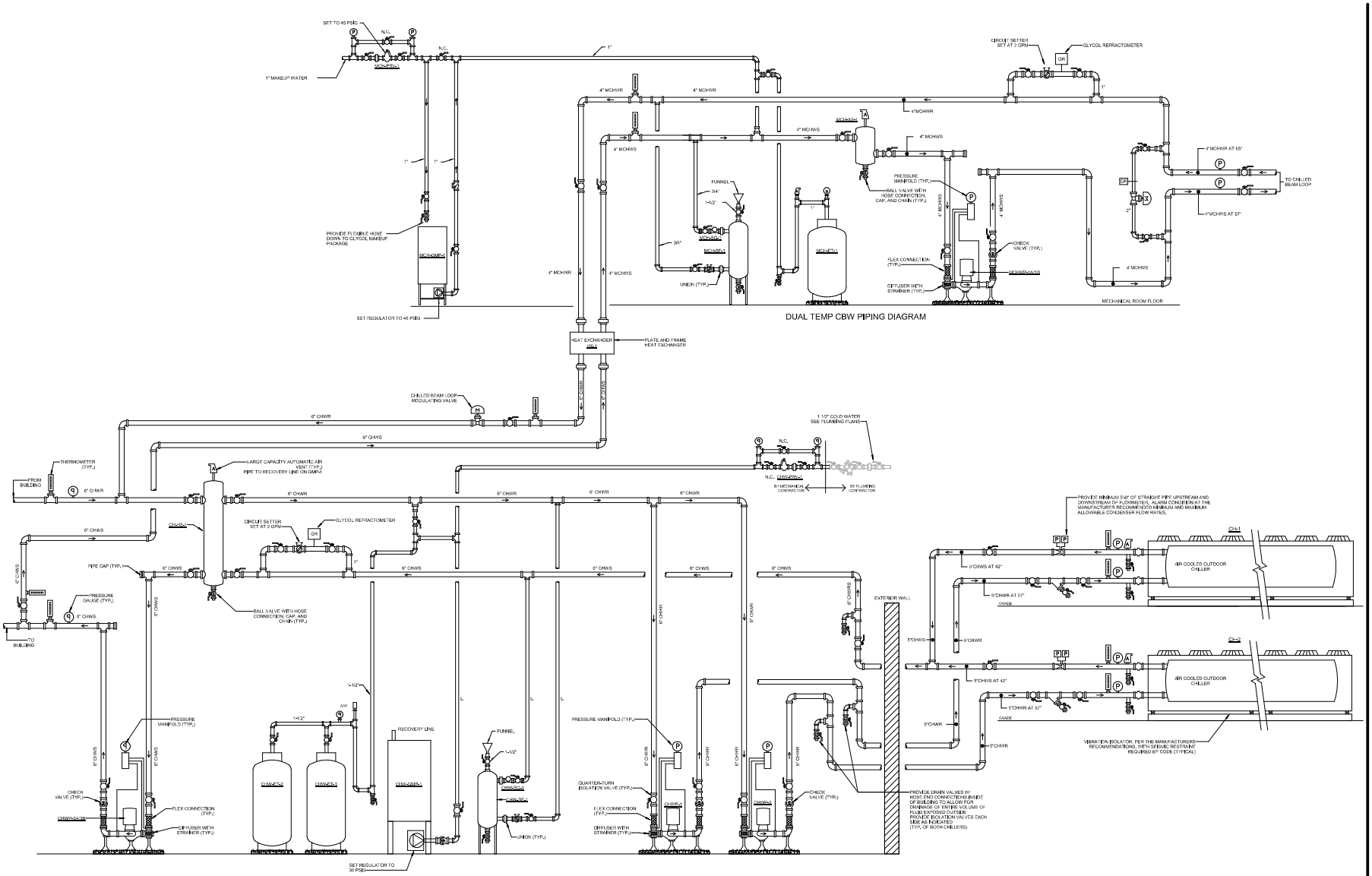

1 PRIMARY SECONDARY CHW PIPING DIAGRAM AND MEDIUM TEMPERATURE CHILLED WATER PIPING DIAGRAM
NTS

CHILLER/EVAPORATOR HYDRONIC SYSTEM EQUIPMENT AND ACCESSORIES

GENERAL			DESCRIPTION	REMARKS
MODEL	MANUFACTURER	MODEL		
CHW-AIS-1	SPIROTHERM	VOX600FAM	AIR ELIMINATOR, DIRT SEPARATOR, HYDRAULIC SEPARATOR, LOW LOSS HEADER, 6".	-
MCH-AIS-1	ARMSTRONG	VAS-4	AIR SEPARATOR, INTEGRAL AIR VENT, STRAINER, 4" 125 PSIG ASME, 350 F MAX WORKING TEMP.	-
CHW-BF-1 MCH-BF-1	WINGERT	HP-10-ASME-C	BYPASS FEEDER, 10 GALLON, FLAT OR DOME BOTTOM, ASME CONSTRUCTION, LEGS, 200 PSIG AT 200°F, INCLUDE FUNNEL	-
CHW-ET-1 CHW-ET-2 MCH-ET-1	WESSELS	NLAP-560	EXPANSION TANK, REPLACEABLE BUTYL BLADDER TYPE, ASME CONSTRUCTION, 147 GALLON TOTAL, 147 GALLON ACCEPTANCE	-
CHW-GMP-1 MCH-GMP-1	WESSELS	GMP-13100	SEE GLYCOL MAKE-UP PACKAGE SCHEDULE	-
CHW-PRV-1 MCH-PRV-1	CALEFFI	5350 SERIES	PRESSURE REDUCING VALVE, 1-1/2", INTEGRAL THERMAL EXPANSION BYPASS, LOW PRESSURE RANGE (10 PSIG - 35 PSIG)	-
CHW-SG-1 MCH-SG-1	JOHN ERNST	138P	SIGHT GLASS, 2", BRONZE BODY, PADDLEWHEEL INDICATOR, 125 PSIG @ 200°F	-
MCH-SRV-1	BELL & GOSSETT	760-75	SAFETY RELIEF VALVE, 3/4", ASME, 75 PSIG.	-

GLYCOL MAKE-UP PACKAGE SCHEDULE

TAG	MODEL	TANK VOLUME (GAL)	PUMP CAPACITY		MOTOR DATA			REMARKS
			FLOW (GPM)	PRESSURE (PSIG)	HP	VOLTS	PHASE	
CHW-GMP-1	WESSELS GMP-13050	50	1.8	32	1/3	120	1	ALL
MCH-GMP-1	WESSELS GMP-13050	50	1.8	32	1/3	120	1	ALL

REMARKS:
1. PROVIDE WITH MOTOR STARTER, DISCONNECT SWITCH, REMOTE PRESSURE SENSOR AND CONTROLS.

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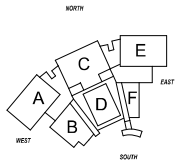
Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

MECHANICAL DETAILS

Date: 07/08/2024
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Proj. Number: 22367.00

Drawing Number: **M504**

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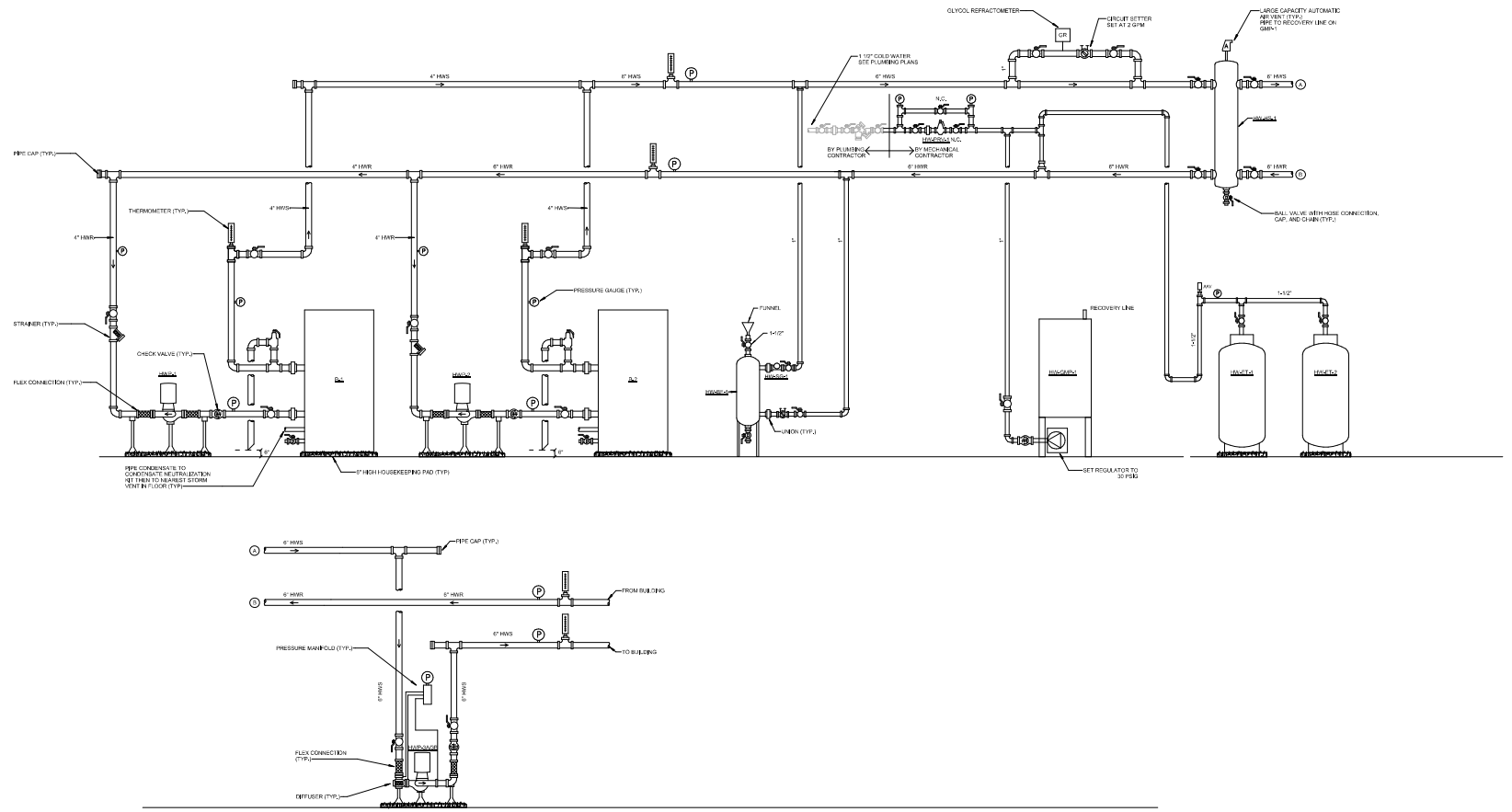

HOT WATER HYDRONIC SYSTEM EQUIPMENT AND ACCESSORIES				
GENERAL			DESCRIPTION	REMARKS
MODEL	MANUFACTURER	MODEL		
HW-AS-1	SPIROTHERM	VDX600FAM	AIR ELIMINATOR, DIRT SEPARATOR, HYDRAULIC SEPARATOR, LOW LOSS HEADER, 6",	-
HW-BF-1	WINGERT	WA-10-ASME-C	BYPASS FEEDER, 10 GALLON, FLAT GR DOME BOTTOM, ASME CONSTRUCTION, LEGS, 200 PSIG AT 200°F, INCLUDE FUNNEL	-
HW-ET-1,2	WESSELS	NJAP-415	EXPANSION TANK, REPLACEABLE BUTYL BLADDER TYPE, ASME CONSTRUCTION, 215 GALLON, 215 GALLON ACCEPTANCE	-
HW-PRV-1	CALEFFI	5350 SERIES	PRESSURE REDUCING VALVE, 1-1/2", INTEGRAL THERMAL EXPANSION BYPASS, LOW PRESSURE RANGE (10 PSIG - 35 PSIG)	-
HW-SG-1	JOHN ERNST	138P	SIGHT GLASS, 2", BRONZE BODY, PADDLEWHEEL INDICATOR, 125 PSIG @ 200°F	-

GLYCOL MAKE-UP PACKAGE SCHEDULE								
TAG	MODEL	TANK VOLUME (GAL)	PUMP CAPACITY		MOTOR DATA			REMARKS
			FLOW (GPM)	PRESSURE (PSIG)	HP	VOLTS	PHASE	
HW-GMP-1	WESSELS GMP-1(250)	50	1.8	32	1/3	120	1	ALL
REMARKS: 1. PROVIDE WITH MOTOR STARTER, DISCONNECT SWITCH, REMOTE PRESSURE SENSOR AND CONTROLS.								

1 BOILERS HOT WATER PIPING DIAGRAM
NTS

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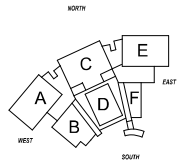

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

MECHANICAL DETAILS

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Drawing Number: M505

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DEDICATED OUTDOOR AIR UNIT SCHEDULE PART 1

GENERAL			PHYSICAL	OUTSIDE AIR		SUPPLY FAN						EXHAUST FAN							HOT WATER HEATING COIL (30% PROPYLENE GLYCOL)									CHILLED WATER COOLING COIL (30% PROPYLENE GLYCOL)												REMARKS			
							STATIC PRESS (IN.W.G)						STATIC PRESS (IN.W.G)								AIR DATA			HOT WATER DATA					AIR DATA				CHILLED WATER DATA								
TAG	MANUFACTURER	MODEL	WEIGHT (LBS)	L x W x H (IN.)	CFM	%	AIRFLOW (CFM)	EXTERNAL	TOTAL W/DIRTY FILTERS	WHEEL DIA. (IN)	RPM	BHP	MOTOR HP	TOTAL AIRFLOW (CFM)	EXTERNAL	TOTAL W/DIRTY FILTERS	FAN QTY.	ROWS	COLUMNS	WHEEL DIA. (IN)	RPM	BHP EACH FAN	MOTOR HP EACH FAN	TOTAL MBH	FACE VELOC. (FPM)	EAT (°F)	LAT (°F)	P.D. (IN.W.G)	GPM	EWT (°F)	LWT (°F)	PD (FT)	TOTAL MBH	SENS. MBH	FACE VELOC. (FPM)	EAT (°F) DB	EAT (°F) WB	LAT (°F) DB	LAT (°F) WB	P.D. (IN.W.G)	GPM	EWT (°F)	LWT (°F)	PD (FT)	TYPE	RATINGS	FEATURES	INSTALL
DOA-1	TRANE	CSAA017	8,500	310x72x102	6,000	100	6,000	2.0	5.59	22.25	2214	10.927	15	6,000	2.0	3.51	1	1	1	22.25	1852	5.114	7.5	223.44	375	53.34	65	0.124	15.62	130	100	0.87	329.18	176.23	427	73.67	69.37	69.79	69.8	0.846	47.48	42	57	9.04	1	ALL	1-12	1, 3-8
DOA-2	TRANE	CSAA021	9,800	311x80x109	7,500	100	7,500	2.50	7.10	22.25	2261	13.976	20	7,500	2.0	3.75	1	1	1	24.50	1942	7.199	10	287.32	376	51.17	65	0.121	20.34	130	100	1.15	415.21	223.13	417	74.14	69.65	69.70	69.6	0.809	59.94	42	57	10.42	1	ALL	1-12	1, 3-8
DOA-3	TRANE	CSAA021	9,800	311x80x109	7,500	100	7,500	2.50	7.32	22.25	2313	14.997	20	7,500	2.0	3.82	1	1	1	24.50	1568	7.545	10	303.12	391	50.66	65	0.134	21.46	130	100	1.25	432.22	234.04	433	74.70	69.89	69	69.9	0.849	62.34	42	57	11.24	1	ALL	1-12	1, 3-8
DOA-4	TRANE	CSAA021	9,800	308x80x109	8,500	100	8,500	2.50	7.68	22.25	2436	17.554	20	8,500	2.0	3.99	1	1	1	24.50	1791	8.742	10	341.17	446	49.41	65	0.303	24.15	130	100	0.46	481.25	261.26	468	75.53	67.29	50	49.8	1.109	69.41	42	57	13.83	1	ALL	1-12	1, 3-8
DOA-5	TRANE	CSAA017	9,100	314x72x105	7,000	100	7,000	2.50	8.17	22.25	2498	15.124	20	7,000	2.0	3.89	1	1	1	22.25	1791	6.993	10	275.59	436	50.29	65	0.195	19.51	130	100	1.15	395.99	215.29	493	75.31	67.17	50	49.8	1.225	57.03	42	57	12.84	2	ALL	ALL	2-7, 9

REMARKS - TYPE

1. 100% OUTSIDE AIR UNIT WITH ROTARY TYPE TOTAL ENERGY RECOVERY WHEEL (ENTHALPY) AND ISOTHERMAL TYPE THREE DESICCANT WHEEL, DUAL WHEEL UNIT, INDOOR MOUNTED.
2. 100% OUTSIDE AIR UNIT WITH ROTARY TYPE TOTAL ENERGY RECOVERY WHEEL (ENTHALPY) AND ISOTHERMAL TYPE THREE DESICCANT WHEEL, DUAL WHEEL UNIT, ROOFTOP MOUNTED.

REMARKS - RATINGS

1. DESIGN COOLING FOR DOB = 80°F, OWB =70.3°F AND DESIGN FOR DEHUMIDIFICATION AT ODB = 80.1° AND OWB = 75.7°
2. DESIGN HEATING FOR ODB = 5°F AND OWB = 4.9°F
3. AIR HANDLING PERFORMANCE DATA IN ACCORDANCE WITH AHRI 430.
4. UL LISTED

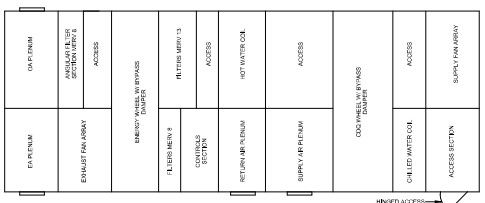
REMARKS - FEATURES

1. G90 GALVANIZED 18 GAUGE CASE WITH 22 GAUGE INNER WALL AND 2" THICK INJECTED FOAM. INSULATED ACCESS DOORS WITH HINGES AND ROLLER CAM HANDLES TO PROVIDE ACCESS TO ALL COILS, FILTERS, WHEELS AND FANS.
2. MODULATING LOW LEAKAGE EXHAUST AIR BYPASS DAMPER WITH ACTUATORS FOR BYPASS OF ENERGY WHEEL.
3. MODULATING LOW LEAKAGE RECIRCULATION AIR DAMPER WITH ACTUATORS.
4. HOT WATER HEATING COIL WITH GALVANIZED STEEL DRAIN PAN. CHILLED WATER COOLING COIL WITH STAINLESS STEEL DRAIN PAN.
5. PREMIUM EFFICIENCY MOTORS. AIRFOIL WHEEL DIRECT DRIVE SUPPLY AIR BLOWER WITH VARIABLE FREQUENCY DRIVE WITH BYPASS AND SHAFT GROUNDING (PROVIDED BY UNIT MANUFACTURER).
6. AIRFOIL WHEEL DIRECT DRIVE EXHAUST AIR BLOWER WITH VARIABLE FREQUENCY DRIVE WITH BYPASS AND SHAFT GROUNDING (PROVIDED BY UNIT MANUFACTURER).
7. 2" SPRING VIBRATION ISOLATED BASES FOR SUPPLY AIR AND EXHAUST AIR BLOWERS.
8. PROVIDE WITH MARINE LIGHTS AND INTEGRAL POWER RECEPTACLE.
9. 2" THICK PLEATED DISPOSABLE MERV 8 OUTSIDE AIR AND EXHAUST AIR FILTERS AND MERV 13 SUPPLY AIR FILTERS.
10. COPPER TUBE, ALUMINUM FINNED HOT WATER & CHILLED WATER COILS. 30% PROPYLENE GLYCOL.
11. EXTENDED GREASE LINES, FLEXIBLE DUCT CONNECTIONS
12. PROVIDE CUSTOM PAINT COLOR, COLOR TO BE CHOSEN BY THE ARCHITECT.
13. HOT WATER AND CHILLED WATER SUPPLY AND RETURN FED FROM BELOW THROUGH BASE.

REMARKS - INSTALL

1. INDOOR UNIT TO BE INSTALLED ON A 6" TALL CONCRETE HOUSEKEEPING PAD AND 6" UNIT BASE.
2. ROOF MOUNTED ON AN 18" TALL VIBRATION ISOLATION CURB AND 6" UNIT BASE. ROOF CURB SHALL BE WIND LOAD RATED, PROVIDE STAMPED CALCULATIONS BY PROFESSIONAL ENGINEER LICENSED IN STATE OF CT.
3. END DEVICES AND UNIT CONTROLLER SHALL BE SUPPLIED AND FIELD MOUNTED BY THE ATC.
4. ATC CONTRACTOR SHALL PROVIDE AIRFLOW MONITORING STATION TO MEASURE OUTSIDE AIR PER UNIT. OUTSIDE AIRFLOW MEASUREMENTS SHALL BE DISPLAYED AT OPERATOR WORKSTATION, ETTRON OR EQUAL.
5. PROVIDE INDIVIDUAL POWER CONNECTION TO EACH MOTOR.
6. COOLING COIL SHALL BE PROVIDED WITH STAINLESS STEEL DRAIN PANS.
7. REFER TO SOUND ATTENUATOR SCHEDULE FOR SOUND ATTENUATOR SIZES.
8. PROVIDE ½" CONDENSATE DRAIN CONNECTION(S) WITH TRAP. DRAIN TO BE PUMPED AND TERMINATE WITH INDIRECT CONNECTION TO THE NEAREST STORM PIPE.
9. PROVIDE ¾" CONDENSATE DRAIN CONNECTION(S) WITH TRAP. DRAIN TO TERMINATE 2'-4" ABOVE ROOF WITH A 45 DEGREE MITER CUT. DRAIN TO TERMINATE PAST CURB TO PREVENT CURB FROM DUST DAMAGE. KEEP VERTICAL CONDESATE LINE A MINIMUM OF 3" AWAY FROM CURB.

SEE PART 2



DOA SIDE VIEW (TYP.)

DEDICATED OUTDOOR AIR UNIT SCHEDULE PART 2

		ENERGY RECOVERY WHEEL								DESICCANT WHEEL									ELECTRICAL								
		SUPPLY AIR DATA - WINTER				SUPPLY AIR DATA - SUMMER						FIRST PASS				SECOND PASS										
		EAT(°F)		LAT(°F)		EAT(°F)		LAT(°F)		MAX PD (IN.WC)	% EFFICIENCY	EAT(°F)		LAT(°F)		EAT(°F)		LAT(°F)		MAX PD (IN.WC)	PURGE AIR (CFM)	MCA CIRCUIT 1 (SF)	MCA CIRCUIT 2 (EF)	MCA CIRCUIT 3 (WHEEL)	MCA CIRCUIT 4 (CCG)	FLA CIRCUIT 1 (SF)	FLA CIRCUIT 2 (EF)	FLA CIRCUIT 3 (WHEEL)	FLA CIRCUIT 4 (CCG)	VOLTAGE	PHASE
TAG	TYPE	DB	WB	DB	WB	DB	WB	DB	WB			DB	WB	DB	WB	DB	WB	DB	WB												
DOA-1	ENTHALPY	5.0	4.5	52.34	42.48	91.0	73.0	78.70	65.85	0.61	318.22	154.38	71.5	70.2	76.70	65.85	71.83	66.10	0.71	49.70	49.60	54.97	46.36	0.75	N/A	26.25	13.75	1.85	0.37	21.0	11.00	1.52	0.34	480	3
DOA-2	ENTHALPY	5.0	4.5	51.17	41.74	91.0	73.0	77.02	66.03	0.25	383.84	186.11	70.1	69.4	77.02	66.08	72.33	66.25	0.78	49.70	49.60	54.39	46.14	0.73	N/A	33.75	26.25	1.85	0.37	27.00	21.00	1.52	0.34	480	3
DOA-3	ENTHALPY	5.0	4.5	50.66	41.41	91.0	73.0	77.16	66.19	0.08	394.17	194.27	69.3	68.7	77.16	66.17	72.87	66.49	0.81	50.0	49.90	54.29	46.33	0.76	N/A	33.75	26.25	1.85	0.37	27.00	21.00	1.52	0.34	480	3
DOA-4	ENTHALPY	5.0	4.5	49.41	40.89	91.0	73.0	77.21	66.29	0.74	416.26	206.74	67.8	66.9	77.51	66.37	73.07	66.80	0.89	50.0	49.90	53.91	46.04	0.83	N/A	33.75	17.50	1.85	0.37	27.00	14.00	1.52	0.34	480	3
DOA-5	ENTHALPY	5.0	4.5	50.29	41.18	91.0	73.0	77.27	66.16	0.71	350.38	172.81	68.8	68.0	77.27	66.22	73.46	66.76	0.89	50.0	49.90	53.80	46.03	0.83	N/A	33.75	17.50	1.85	0.37	27.00	14.00	1.52	0.34	480	3

SEE PART 1

ROOFTOP UNIT SCHEDULE PART 1

GENERAL			PHYSICAL	OUTSIDE AIR		SUPPLY FAN						RETURN FAN ARRAY												HOT WATER HEATING COIL (30% PROPYLENE GLYCOL)									CHILLED WATER COOLING COIL (30% PROPYLENE GLYCOL)												REMARKS			
							STATIC PRESS (IN.W.G)						STATIC PRESS (IN.W.G)			PHYSICAL									AIR DATA			HOT WATER DATA					AIR DATA				CHILLED WATER DATA								
TAG	MANUFACTURER	MODEL	WEIGHT (LBS)	L x W x H (IN)	CFM	%	AIRFLOW (CFM)	EXTERNAL	TOTAL W/DIRTY FILTERS	WHEEL DIA. (IN)	RPM	BHP	MOTOR HP	TOTAL AIRFLOW (CFM)	EXTERNAL	TOTAL W/DIRTY FILTERS	FAN QTY.	ROWS	COLUMNS	WHEEL DIA. (IN)	RPM	BHP EACH FAN	MOTOR HP	TOTAL MBH	FACE VELOC. (FPM)	EAT (°F)	LAT (°F)	P.D. (IN.W.G)	GPM	EWT (°F)	LWT (°F)	PD (FT)	TOTAL MBH	SENS. MBH	FACE VELOC. (FPM)	EAT (°F) DB	EAT (°F) WB	LAT (°F) DB	LAT (°F) WB	P.D. (IN.W.G)	GPM	EWT (°F)	LWT (°F)	PD (FT)	TYPE	RATINGS	FEATURES	INSTALL
RTU-1	TRANE	CSAA014	6,800	308 x 72 x 90	2,700	45	6,000	2.0	4.9	22.25	1940	7.1	10	6,000	2.0	3.97	1	1	1	20	2077	6.1	7.5	186.8	480	62.25	90	0.166	12.97	130	100	0.55	187	143	457	76.62	65.16	55	54.90	0.63	24.61	42	57	0.88	1	ALL	ALL	ALL
RTU-2	TRANE	CSAA025	9,800	324 x 80 x 130	3,700	35	10,500	2.5	5.0	27.0	1716	11.8	15	10,500	2.5	4.5	1	1	1	24.50	2032	12.1	15.0	294.3	420	64.16	90	0.126	19.67	130	100	0.82	341	245	436	76.22	64.88	55	54.09	0.39	45.27	42	57	3.51	1	ALL	ALL	ALL
RTU-3	TRANE	CSAA017	7,300	311 x 72 x 105	4,700	67	7,000	2.5	5.3	22.25	2121	9.2	10	7,500	2.5	4.25	1	1	1	22.25	2011	7.7	10	242.1	417	59.11	90	0.14	16.19	130	100	0.87	248	174	448	77.49	66.76	55	54.20	0.45	32.66	42	57	2.86	1	ALL	ALL	ALL

REMARKS - TYPE

1. ROOF MOUNTED, OUTDOOR, CENTRAL STATION, VARIABLE VOLUME, ENERGY RECOVERY

REMARKS - RATINGS

1. AIR-HANDLING PERFORMANCE DATA IN ACCORDANCE WITH AFI 430
2. DESIGN COOLING FOR ODB = 95°F, OWB =72.9°F
3. DESIGN HEATING FOR ODB = 5°F AND OWB = 4.9°F

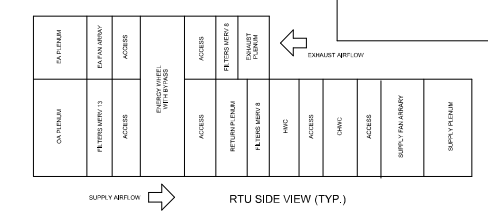
REMARKS - FEATURES

1. G40 GALVANIZED 18 GAUGE CASE WITH 22 GAUGE INNER WALL AND 2" THICK INJECTED FOAM. INSULATED ACCESS DOORS WITH HINGES AND ROLLER CAM HANDLES TO PROVIDE ACCESS TO ALL COILS, FILTERS, WHEELS AND FANS.
2. MODULATING LOW LEAKAGE EXHAUST AIR BYPASS DAMPER WITH ACTUATORS FOR BYPASS OF ENERGY WHEEL.
3. MODULATING LOW LEAKAGE RECIRCULATION AIR DAMPER WITH ACTUATORS.
4. HOT WATER HEATING COIL WITH GALVANIZED STEEL DRAIN PAN. CHILLED WATER COOLING COIL WITH STAINLESS STEEL DRAIN PAN.
5. PREMIUM EFFICIENCY MOTORS. AIRFOIL WHEEL DIRECT DRIVE SUPPLY AIR BLOWER WITH VARIABLE FREQUENCY DRIVE WITH BYPASS AND SHAFT GROUNDING (PROVIDED BY UNIT MANUFACTURER).
6. AIRFOIL WHEEL DIRECT DRIVE EXHAUST AIR BLOWER WITH VARIABLE FREQUENCY DRIVE WITH BYPASS AND SHAFT GROUNDING (PROVIDED BY UNIT MANUFACTURER).
7. 2" SPRING VIBRATION ISOLATED BASES FOR SUPPLY AIR AND EXHAUST AIR BLOWERS.
8. PROVIDE WITH MARINE LIGHTS AND INTEGRAL POWER RECEPTACLE.
9. 2" THICK PLEATED DISPOSABLE MERV 8 OUTSIDE AIR AND EXHAUST AIR FILTERS AND MERV 13 SUPPLY AIR FILTERS.
10. COPPER TUBE, ALUMINUM FINNED HOT WATER & CHILLED WATER COILS. 30% PROPYLENE GLYCOL.
11. EXTENDED GREASE LINES, FLEXIBLE DUCT CONNECTIONS
12. PROVIDE CUSTOM PAINT COLOR, COLOR TO BE CHOSEN BY THE ARCHITECT.
13. HOT WATER AND CHILLED WATER SUPPLY AND RETURN FED FROM BELOW THROUGH BASE.

REMARKS - INSTALL

1. ROOF MOUNTED ON AN 18" TALL VIBRATION ISOLATION CURB AND 6" UNIT BASE. ROOF CURB SHALL BE WIND LOAD RATED, PROVIDE STAMPED CALCULATIONS BY PROFESSIONAL ENGINEER LICENSED IN STATE OF CT.
2. END DEVICES AND UNIT CONTROLLER SHALL BE SUPPLIED AND FIELD MOUNTED BY THE ATC.
3. ATC CONTRACTOR SHALL PROVIDE AIRFLOW MONITORING STATION TO MEASURE OUTSIDE AIR PER UNIT. OUTSIDE AIRFLOW MEASUREMENTS SHALL BE DISPLAYED AT OPERATOR WORKSTATION, ETTRON OR EQUAL.
4. PROVIDE INDIVIDUAL POWER CONNECTION TO EACH MOTOR.
5. COOLING COIL SHALL BE PROVIDED WITH STAINLESS STEEL DRAIN PANS.
6. REFER TO SOUND ATTENUATOR SCHEDULE FOR SOUND ATTENUATOR SIZES.
7. PROVIDE 1" CONDENSATE DRAIN CONNECTIONS WITH TRAP. DRAIN TO TERMINATE 2'-4" ABOVE ROOF WITH A 45 DEGREE MITER CUT. DRAIN TO TERMINATE PAST CURB TO PREVENT CURB FROM DUST DAMAGE. KEEP VERTICAL CONDESATE LINE A MINIMUM OF 3" AWAY FROM CURB.

SEE PART 2



RTU SIDE VIEW (TYP.)

ROOFTOP UNIT SCHEDULE PART 2

		ENERGY RECOVERY								ELECTRICAL									
		SUPPLY AIR DATA - WINTER				SUPPLY AIR DATA - SUMMER				RECOVERED MBH		% EFFICIENCY		MCA CIRCUIT 1 (SF)	MCA CIRCUIT 2 (EF)	MCA CIRCUIT 3 (WHEEL)	MCA CIRCUIT 4 (LIGHTS)	MCA CIRCUIT 5 (RECEPT)	FLA CIRCUIT 1 (SF)	FLA CIRCUIT 2 (EF)	FLA CIRCUIT 3 (WHEEL)	FLA CIRCUIT 4 (LIGHTS)	FLA CIRCUIT 5 (RECEPT)	VOLTAGE	PHASE
TAG	TYPE	EAT(°F)		LAT(°F)		EAT(°F)		LAT(°F)																	
		DB	WB	DB	WB	DB	WB	DB	WB	WHEEL	SUMMER	WHEEL	SUMMER												
RTU-1	ENTHALPY	5	4.5	62.25	48.61	90	73	76.62	63.16	0.66	141.75	63.49	73.4	72.3	17.50	13.75	0.35	3.26	16.00	14.00	11.00	0.44	2.61	8.00	480	3
RTU-2	ENTHALPY	5	4.5	64.16	49.72	90	73	76.22	64.88	0.93	194.9	87.1	74.1	73.0	26.25	26.25	0.35	3.26	16.00	21.00	21.00	0.44	2.61	8.00	480	3
RTU-3	ENTHALPY	5	4.5	59.11	48.12	90	72	77.49	65.76	0.67	252.4	111.7	72.8	71.8	17.50	17.50	1.63	3.26	16.00	14.00	14.00	1.30	2.61	8.00	480	3

SEE PART 1

HEAT RECOVERY VENTILATOR SCHEDULE (PART 1)

GENERAL			PHYSICAL	OUTSIDE AIR		SUPPLY FAN						EXHAUST FAN							HOT WATER HEATING COIL (30% PROPYLENE GLYCOL)									CHILLED WATER COOLING COIL (30% PROPYLENE GLYCOL)															
							STATIC PRESS (IN.W.G)						STATIC PRESS (IN.W.G)							AIR DATA			HOT WATER DATA					AIR DATA				CHILLED WATER DATA								
TAG	MANUFACTURER	MODEL	WEIGHT (LBS)	L x W x H (IN.)	CFM	%	TOTAL AIRFLOW (CFM)	EXTERNAL	TOTAL W/DIRTY FILTERS	WHEEL DIA. (IN)	RPM	BHP	MOTOR HP	TOTAL AIRFLOW (CFM)	EXTERNAL	TOTAL W/DIRTY FILTERS	WHEEL DIA. (IN)	RPM	BHP	MOTOR HP	TOTAL MBH	FACE VELOC. (FPM)	EAT (°F)	LAT (°F)	P.D. (IN.W.G)	GPM	EWT (°F)	LWT (°F)	PD (FT)	TOTAL MBH	SENS. MBH	FACE VELOC. (FPM)	EAT (°F) DB	EAT (°F) WB	LAT (°F) DB	LAT (°F) WB	P.D. (IN.W.G)	GPM	EWT (°F)	LWT (°F)	PD (FT)
HRV-1	XETEX	XETEX AVENTUS	4,600	190x63x81	1,700	100	1,700	1.0	2.40	N/A	2,310	1.11	1.5	1,700	1.00	2.50	N/A	2,193	0.97	1.5	72	251	52.3	91.2	0.06	5.0	130	100	0.0	64	45	251	78.1	66.8	54.8	54.6	0.28	5.1	42	57	17

REMARKS - TYPE

1. 100% OUTDOOR AIR ROOFTOP AIR HANDLING UNIT WITH SENSIBLE PLATE HEAT EXCHANGER

REMARKS - RATINGS

1. CORE EFFECTIVENESS IN ACCORDANCE WITH AHRI 1060
2. COIL PERFORMANCE IN ACCORDANCE WITH AHRI STANDARDS.
3. COIL PERFORMANCE BASED ON 30% PROPYLENE GLYCOL SOLUTION.
4. AIR HANDLING PERFORMANCE DATA IN ACCORDANCE WITH AHRI 430.

REMARKS - FEATURES

1. SINGLE POINT POWER CONNECTION.
2. MODULATING LOW LEAKAGE EXHAUST AIR BYPASS DAMPER WITH ACTUATORS FOR BYPASS OF SENSIBLE CORE.
3. MODULATING LOW LEAKAGE RECIRCULATION AIR DAMPER WITH ACTUATORS.
4. HEATING COIL WITH GALVANIZED STEEL DRAIN PAN. COOLING COIL WITH STAINLESS STEEL DRAIN PAN.
5. 10" HIGH VIBRATION ISOLATION ROOF CURB AND 6" UNIT BASE RAIL.
6. PREMIUM EFFICIENCY MOTORS. AIRFOIL WHEEL DIRECT DRIVE SUPPLY AIR BLOWER WITH VARIABLE FREQUENCY DRIVE WITH BYPASS (PROVIDED BY UNIT MANUFACTURER).
7. AIRFOIL WHEEL DIRECT DRIVE EXHAUST AIR BLOWER WITH VARIABLE FREQUENCY DRIVE WITH BYPASS (PROVIDED BY UNIT MANUFACTURER).
8. 2" SPRING VIBRATION ISOLATED BASES FOR SUPPLY AIR AND EXHAUST AIR BLOWERS.
9. PROVIDE WITH MARINE LIGHTS AND INTEGRAL POWER RECEPTACLE.

SEE PART 2

HEAT RECOVERY VENTILATOR SCHEDULE (PART 2)

	ENERGY RECOVERY											ELECTRICAL				REMARKS			
		SUPPLY AIR DATA - WINTER				SUPPLY AIR DATA - SUMMER				MAX PD (IN.WC)	RECOVERED MBH	% EFFICIENCY							
TAG	TYPE	EAT(°F)		LAT(°F)		EAT(°F)		LAT(°F)						MCA	MOCP	VOLTAGE	PHASE	TYPE	RATINGS	FEATURES	INSTALL
		DB	WB	DB	WB	DB	WB	DB	WB		WHEEL	SUMMER	WHEEL	SUMMER								
HRV-1	METAL CORE	5.0	4.5	50.3	45.1	90.0	73.0	76.1	66.8	0.26	134.71	239.19	67.9	64.4	9.7	14.0	480	3	1	ALL	ALL	ALL

REMARKS - INSTALL

1. END DEVICES AND UNIT CONTROLLER SHALL BE SUPPLIED AND FIELD MOUNTED BY ATC.
2. 2" THICK PLEATED DISPOSABLE MERV 8 OUTSIDE AIR AND EXHAUST AIR FILTERS AND MERV 13 SUPPLY AIR DISPOSABLE CARTRIDGE FILTERS.

SEE PART 1

BOILER SCHEDULE

SYMBOL	MANUFACTURER/ MODEL NUMBER	MEDIA	GROSS OUTPUT (MBH)	GROSS INPUT (MBH)	EWT/LWT (°F)	FUEL DATA		WATER CONTENT (GALS)	OPERATING WEIGHT (LBS)	BURNER DATA				FLOW (GPM)	MIN. FLOW (GPM)	PRESSURE DROP (FT H20)	REMARKS
						TYPE	RATE (MBH)			MCA	FLA	VOLTS	PHASE				
B-1	LOCHINVAR CREST FB-1751	PPG	1,684	1,750	100/130	NG	1,750	106	2,460	13	10	120	1	130	25	11	ALL
B-2	LOCHINVAR CREST FB-1751	PPG	1,684	1,750	100/130	NG	1,750	106	2,460	13	10	120	1	130	25	11	ALL

REMARKS:
1. BURNER FIRING SHALL BE MODULATING WITH A 10:1 TURN DOWN RATIO.
2. PROVIDE WITH ELECTRONIC SPARK IGNITION.
3. ON/OFF BOILER CONTROL CONTROLLED BY VARIABLE SPEED CONSTANT FLOW PUMPS.
4. PROVIDE 10" WC GAS PRESSURE, COORDINATE WITH MANUFACTURER REQUIREMENTS.
5. COMPLIES WITH CT GAP GUIDELINES.
6. PROVIDE WITH MANUFACTURER'S CONTROLLER WITH NATIVE BACNET COMMUNICATION.
7. PROVIDE WITH 75 PSIG RELIEF VALVE.
8. INSTALL ON 6" CONCRETE HOUSEKEEPING PAD.

TYPE:
NG = NATURAL GAS

MEDIA:
HW = HOT WATER
PPG = 30% PROPYLENE GLYCOL/WATER SOLUTION.

AIR COOLED CHILLER SCHEDULE

SYMBOL	MANUFACTURER/ MODEL NUMBER	MEDIA	REFRIGERANT	AHRI NPLV,IP EER	AHRI FLV,IP EER	NOM. CAPACITY (TONS)	DESIGN FLOW (GPM)	MIN. FLOW (GPM)	EWT (°F)	LWT (°F)	PD (FT H2O)	AMBIENT AIR TEMP (°F)	ELECTRICAL DATA				OPERATING WEIGHT (LBS)	MODULATION DOWN TO	REMARKS
													MCA	MOCP	VOLTS	PHASE			
CH-1	TRANE ACR	PPG	R-513A	11.136	20.095	180	254	140	57	42	13.84	95	345.28	450.00	460	3	13,500	15%	ALL
CH-2	TRANE ACR	PPG	R-513A	11.136	20.095	180	254	140	57	42	13.84	95	345.28	450.00	460	3	13,500	15%	ALL

REMARKS:
1. COMMUNICATION INTERFACE TO BMS VIA BACNET.
2. SINGLE POINT POWER WITH NON-FUSED DISCONNECT.
3. PROVIDE WITH FACTORY AUTHORIZED START-UP.
4. PROVIDE WITH FLOW SWITCH.
5. MOUNT ON 6" CONCRETE HOUSEKEEPING PAD WITH 6" UNIT BASE.
6. INTEGRAL VFDS FOR EACH COMPRESSOR.
7. PROVIDE WITH CONVENIENCE OUTLET.
8. PROVIDE EACH COMPRESSOR WITH A MUFFLER AND ALL FANS SHALL BE LOW NOISE.
9. PROVIDE WITH A NOBLE CONTROL SOUNDBOX ON EACH COMPRESSOR AND INSULATING SOUND ATTENUATION ON EACH REFRIGERANT CIRCUIT.

MEDIA:
PPG = 30% PROPYLENE GLYCOL/WATER SOLUTION

UNIT ACOUSTICS	
A-WEIGHTED	SOUND POWER
100%	97
75%	93
50%	87
25%	87

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Greenwich Central Middle School

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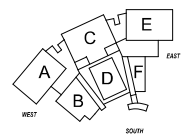
STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

MECHANICAL SCHEDULES

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: M600

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FINNED TUBE/PANEL RADIATOR SCHEDULE

SYMBOL	MANUFACTURER/ MODEL NUMBER	CAPACITY BTU/HLF	EWT (°F)	LWT (°F)	FLOW GPM	ENCLOSURE HEIGHT	MOUNTING HEIGHT TO BOTTOM	NO. OF TUBES	PIPE SIZE	FLOW RATE (GPM)	REMARKS
R-1	RUNTAL RZR-2	900	130	110	SEE PLANS	5.75"	3"	2	SEE PLANS	1.0	5-4 & 7
R-2	RUNTAL RZR-2	675	130	110	SEE PLANS	5.90"	18"-0"	2	SEE PLANS	3.75	1, 2, 3, 5, 6, & 7

REMARKS:
1. PROVIDE TRIM PIECES AS REQUIRED FOR A COMPLETE WALL TO WALL INSTALLATION. TRIM SHALL COMPLETELY ENCLOSE ALL PIPING, FITTINGS AND VALVES.
2. PROVIDE WITH STANDARD POWDER COATED FINISH, FINISH COLOR TO BE SELECTED BY ARCHITECT FROM STANDARD COLOR CHART.
3. PROVIDE ALL REQUIRED MOUNTING HARDWARE.
4. UNIT SHALL BE FLOOR MOUNTED PEDESTAL TYPE.
5. VALVES SHALL BE CONCEALED ABOVE CEILING TYP., ADAPT TO CONCEAL ALL REFER TO PIPING DETAILS
6. UNIT SHALL BE WALL MOUNTED TYPE, PROVIDE WITH WALL MOUNTING BRACKETS.
7. COORDINATE AND VERIFY EXACT LENGTH OF ELEMENT FOR WALL TO WALL INSTALLATION PRIOR TO ORDERING.

HYDRONIC RADIANT CEILING PANEL SCHEDULE

GENERAL			PHYSICAL				PERFORMANCE		REMARKS			
			DIMENSIONS		TUBING							
TAG	MANUFACTURER	MODEL	WIDTH (IN)	LENGTH (IN)	SIZE (IN)	PASSES (NO.)	FLOW (GPM)	CAPACITY (BTU/HLF)	TYPE	RATINGS	FEATURES	INSTALL
RP-1	AIRTITE	AR-X	24	SEE PLANS	1/2	4	0.50	145	1	ALL	ALL	ALL

REMARKS - TYPE
1. EXTRUDED ALUMINUM LINEAR PANEL

REMARKS - RATINGS
1. 120°F MEAN FLUID TEMPERATURE, 70°F SPACE TEMPERATURE, 67°F AVERAGE UNHEATED SURFACE TEMPERATURE, 30% PPG WATER

REMARKS - FEATURES
1. LAY-IN T-BAR CEILING MOUNT, MINIMUM 0.072"R INTERLOCKING EXTRUDED ALUMINUM PANELS WITH INTEGRAL TUBE SADDLES, STEEL CROSS BRACES, TYPE L COPPER TUBING LEFTED INTO SADDLES WITH PANEL INTERCONNECTORS, RETURN BENDS, MOUNTING HARDWARE, AND ACCESSORIES REQUIRED FOR A COMPLETE INSTALLATION.
2. PROVIDE MOUNTING ACCESSORIES INCLUDING OVERLAPPING FINISH TRIM AT ENDS (AND SIDES IF NECESSARY) THAT ALLOWS FOR EXPANSION AND CONTRACTION OF THE CEILING PANEL WITHOUT ADVERSE AFFECT ON THE ADJACENT ARCHITECTURAL FINISHES OR SHADOW LINES. PANEL LENGTH THAT DOES NOT SHOW GAPS IN THE CEILING WHERE PANELS ARE INSTALLED.

REMARKS - INSTALL
1. SEE DETAILS 5/M002 AND 9/M002
2. PROVIDE 1" BATT INSULATION WITH FOIL FACE OVER THE ENTIRE TOP SURFACE, EXCEPT 1" THICK RIGID INSULATION AT GAPS AT JOISTS AND BEAMS.
3. FOR LENGTHS OVER 10' PROVIDE TWO PANELS ABUT TING AT A T-BAR. TWO PANELS WITH A T-BAR RUNNER ALIGNED WITH THE CEILING T-BAR RUNNERS. THE TWO LENGTHS MAY NOT BE EQUAL. SEE REMARKS - FEATURES FOR CUTTING TO LENGTH IN THE FIELD.
4. REFER TO TYPING DETAILS FOR INSTALLATION REQUIREMENTS.
5. PROVIDE WALL TO WALL INSTALLATION, COORDINATE AROUND COLUMNS AND ARCHITECTURAL LAYOUT.
6. VERIFY LENGTHS PRIOR TO ORDERING PANELS.
7. PROVIDE FILLER PANELS WHERE REQUIRED TO INFILL AROUND COLUMN ENCLOSURES, ETC., REFER TO PLANS FOR LOCATIONS

FAN SCHEDULE

GENERAL					PHYS.	PERFORMANCE						ELECTRICAL			REMARKS			
SYMBOL	MANUFACTURER	MODEL	LOCATION	SERVICE	WEIGHT (LBS)	CFM	SP (IN WG)	BHP	SONES	PLUME HEIGHT (FT)	FAN RPM	HP	VOLTS	PHASE	TYPE	RATINGS	FEATURES	INSTALL
AHE-1	COOK	195VH17D	ROOF	KITCHEN HOOD GREASE EXHAUST	355	3,000	2.0	1.98	20	N/A	1725	3	208	3	1	ALL	3 & 4	1,2 & 4
AWE-1	COOK	160RH17D	ROOF	DISHWASHER HOOD EXHAUST	125	600	1.25	0.27	9.0	N/A	1725	1/2	115	1	1	ALL	1 & 5	1 & 3
EF-1	COOK	100GT7TEC	ROOF	GENERAL EXHAUST	70	500	0.25	N/A	6.6	N/A	1725	1/4	115	1	2	ALL	1 & 5	1 & 6
DRE-1	FANTECH	DEDPV-709	KITCHEN	DRYER EXHAUST	13.3	75	0.25	N/A	N/A	N/A	2832	N/A	120	1	3	ALL	6 - 9	1 & 5
EF-2	COOK	70GT/DEC	ROOF	GENERAL EXHAUST	17	190	0.20	N/A	N/A	N/A	1300	N/A	115	1	2	ALL	1 & 5	1 & 6

REMARKS - TYPE:
1. ROOF MOUNTED DIRECT DRIVE CENTRIFUGAL UPBLAST
2. ROOF MOUNTED BELT DRIVE CENTRIFUGAL DOWNBLAST
3. INLINE EXHAUST VENTILATOR

REMARKS - RATINGS:
1. AMCA AIR & SOUND CERTIFIED
2. AIR PERFORMANCE IN ACCORDANCE WITH AMCA 210.
3. SOUND PERFORMANCE IN ACCORDANCE WITH AMCA 300.
4. UL LISTED.
5. FAN PERFORMANCE INCLUDES MEDIUM GAME LOSS.

REMARKS - FEATURES:
1. PROVIDE EC MOTOR WITH FAN MOUNTED SPEED ADJUSTMENT DIAL.
2. PROVIDE FACTORY NEMA 1 PRE-WIRED DISCONNECT.
3. PROVIDE ULTRA LISTED POWER VENTILATOR FOR RESTAURANT EXHAUST WITH GREASE TERMINATOR, HINGED BASE, NEMA 3 PRE-WIRE DISCONNECT, AND MOTOR SPEED CONTROLLER.
4. PROVIDE WITH BACKDRAFT DAMPER, MOTORIZED BACKDRAFT DAMPER, AND NEMA 1 PRE-WIRED DISCONNECT.
5. PRESSURE SENSING SWITCH
6. GALVANIZED STEEL LEWAREOOF HOUSING
7. IP44 ENCLOSURE CLASS MOTOR
8. CIRCULAR INLET AND OUTLET, PROVIDE WITH LINT TRAP

REMARKS - INSTALL:
1. FAN SHALL BE CONTROLLED BY BMS, COORDINATE WITH ATC.
2. FAN SHALL BE INTERLOCKED WITH HOOD OPERATION.
3. PROVIDE CONTROL INTERFACE WITH DISHWASHER OPERATION.
4. FAN SHALL BE INTERLOCKED WITH DRYER OPERATION.
5. FAN SHALL BE INTERLOCKED WITH ON/OFF SWITCH IN ASSOCIATED ROOM.

SPLIT SYSTEM AC UNIT - INDOOR AIR HANDLER SCHEDULE

SYMBOL	MANUFACTURER	MODEL	TYPE	LOCATION	NOM. TONS	FAN	CAPACITIES		REFRIGERANT PIPING FROM CONDENSER TO AIR HANDLER		ELECTRICAL			SOUND PRESSURE (DBA)	REMARKS
						CFM (LOW-HIGH)	COOLING (BTUH)	HEATING (BTUH)	LIQUID	GAS	W	VOLTS	PHASE		
AC-A	MITSUBISHI	PKA-A12LA1	WALL	VARIES	1.0	150-297	12,000	N/A	1/4	1/2	30	208	1	48	ALL
AC-B	MITSUBISHI	PKA-A15LA1	WALL	VARIES	1.5	265-450	18,000	N/A	1/4	1/2	30	208	1	48	ALL
AC-C	MITSUBISHI	PKA-A24KA8	WALL	VARIES	2.0	630-775	24,000	N/A	3/8	5/8	69	208	1	45	ALL
AC-D	MITSUBISHI	PKA-A36KA7	WALL	VARIES	2.5	630-775	30,000	N/A	3/8	5/8	69	208	1	45	ALL

REMARKS:
1. PROVIDE DRAIN PAN CONDENSATE SENSOR MITSUBISHI MODEL: PCDSE. UNIT SHALL SHUT DOWN BEFORE OVERFLOW CAN OCCUR.
2. COOLING MBH AT 75°F EDB, 70°F EWB, 65°F DOB
3. HEATING MBH AT 70°F EDB, 60°F DOB
4. PROVIDE WITH INTEGRAL CONDENSATE PUMP TO BE POWERED BY THE SPLIT SYSTEM AC UNIT. REFER TO MANUFACTURER'S REQUIREMENTS.
5. PROVIDE WITH MAXBLUE CONDENSATE PUMP TO BE POWERED BY THE SPLIT SYSTEM AC UNIT. REFER TO MANUFACTURER'S REQUIREMENTS.
6. PROVIDE WITH CONDENSATE PUMP FASCIA KIT.
7. INDOOR UNIT IS POWERED BY THE OUTDOOR UNIT.
8. INSTALL CONDENSATE PUMP TO BE WALL MOUNTED WITH KIT COVER FOR EASY ACCESS.

SPLIT SYSTEM OUTDOOR UNIT SCHEDULE

SYMBOL	MANUFACTURER	MODEL	LOCATION	NOMINAL TONS	CAPACITIES		ELECTRICAL			SOUND PRESSURE (DBA)	WEIGHT (LBS)	REMARKS	UNITS SERVED
					COOLING (BTUH)	HEATING (BTUH)	MCA	VOLTS	PHASE				
ACCU-A	MITSUBISHI	PUY-A12NKA7	ROOF	1.0	12,000	N/A	11	208	1	46	93	ALL	AC-A
ACCU-B	MITSUBISHI	PUY-A18NKA7	ROOF	1.5	18,000	N/A	11	208	1	46	100	ALL	AC-B
ACCU-C	MITSUBISHI	PUY-A24NHA7	ROOF	2.0	24,000	N/A	19	208	1	47	151	ALL	AC-C
ACCU-D	MITSUBISHI	PUY-A30NHA7	ROOF	2.5	30,000	N/A	19	208	1	47	151	ALL	AC-D

REMARKS:
1. COOLING ONLY, R410A REFRIGERANT, COOLING MIN AT 75°F EDB, 63°F DOB
2. ROUTE REFRIGERANT PIPING FROM CONDENSING UNIT TO ASSOCIATED EVAPORATOR UNIT. COORDINATE EXACT ROUTING IN FIELD. REFRIGERANT PIPE SIZE BY EQUIPMENT MANUFACTURER
3. PROVIDE DIRECT ADAPTABILITY OF COMMUNICATION INTERFACE THROUGH THE BMS.
4. PROVIDE SMACNA SEISMIC RESTRAINT ON ABOVE ROOF UNITS. REFER TO MANUFACTURERS INSTALLATIONS INSTRUCTIONS.
5. PROVIDE WITH HARMONICALLY SPECIFIED SCROLL COMPRESSOR.
6. SOUND PRESSURE LEVELS PER ISO STANDARD 1996.
7. PROVIDE WITH SNOW HAIL GUARD.

SPLIT SYSTEM COOLING UNIT GENERAL NOTES

1. UNLESS OTHERWISE INDICATED, CONDENSATE PIPING IS 3/4". PROVIDE A MINIMUM 2" WATER SEAL TRAP AT THE CONNECTION TO THE AIR HANDLING UNIT.
2. CONDENSATE PIPING SHALL BE COPPER AND SHALL BE INSULATED WITH 1" THICK INSULATION, REFER TO SPECIFICATIONS.
3. MOUNT EACH MODULE ROOF REFRIGERANT UNIT ON TWO ROOF RAILS, SIMILAR TO THYCURB MODEL, TEMS, GALVANIZED STEEL, 18" HIGH. ATTACH RAILS TO THE DECK STRUCTURE, THEN ROOF AND FLASH WATERTIGHT.
4. PROVIDE SPLIT SYSTEM REFRIGERANT PIPING AND CONTROL WIRING BETWEEN THE INDOOR UNIT AND THE OUTDOOR UNIT.
5. LINES SHALL BE PROJECTED WITH R-410A REFRIGERANT.
6. PROVIDE WITH BASINET IN TERRACE.

HVLS FAN SCHEDULE

GENERAL			PHYSICAL			ELECTRICAL				
SYMBOL	MANUFACTURER	MODEL	SIZE	WEIGHT (LBS)	NUMBER OF BLADES	MAXIMUM RPM	VOLTS	PHASE	AMPS	REMARKS
CF-A	HUNTER	ECO II	8'	90	4	156	240	1	6.5	ALL

REMARKS
1. PROVIDE WITH ONE WALL MOUNTED TOUCHSCREEN INTERFACE PER ROOM.
2. PROVIDE ALL EXTENSION PIECES NECESSARY FOR COMPLETE INSTALLATION
3. PROVIDE WITH GEARLESS, BRUSHLESS, VARIABLE SPEED, DIRECT DRIVE MOTOR
4. PROVIDE WITH ONBOARD MICROPROCESSOR CONTROLS WITH BMS INTEGRATION.
5. COLOR AND FINISH SHALL BE SELECTED BY ARCHITECT.
6. FAN SHALL BE SHUTDOWN IN EVENT OF FIRE ALARM ACTUATION. COORDINATE WITH DIV. 26.

FAN COIL UNIT SCHEDULE

SYMBOL	MANUFACTURER MODEL NUMBER	TYPE	NOM. TONS	CFM	ESP (IN. W.C.)	COOLING PERFORMANCE									HOT WATER HEATING PERFORMANCE						ELECTRICAL					REMARKS
						COOLING CAP (MBH)	SENSIBLE CAP (MBH)	EAT DB (°F)	EAT WB (°F)	LAT DB (°F)	LAT WB (°F)	FLOW RATE (GPM)	WATER PD (FT)	CHWS (°F)	CHWR (°F)	ROWS	HEATING CAP (MBH)	EAT (°F)	LAT (°F)	FLOW RATE (GPM)	WATER PD (FT)	HWS (°F)	HWR (°F)	VOLTS	PHASE	HP	MCA	FLA	
FCU-A	IEC HPY06	DC	1.0	400	0.30	11.0	9.2	75.0	63.0	54.0	53.5	1.5	0.8	42	57.0	6	9.78	70	92.1	0.65	0.3	130	100	115	1	1/2	4.625	3.7	ALL
FCU-B	IEC HPY08	DC	1.5	600	0.30	17.4	14.1	75.0	63.0	53.8	53.0	2.3	1.3	42	57.0	6	15.0	70	93.5	1.0	0.6	130	100	115	1	1/2	5.375	4.3	ALL
FCU-C	IEC HPY10	DC	2.0	800	0.30	24.3	19.3	75.0	63.0	53.0	52.5	3.2	2.5	42	57.0	6	20.9	70	93.7	1.4	1.1	130	100	115	1	1/2	6.0	5.4	ALL
FCU-D	IEC HPY12	DC	2.5	1,000	0.30	31.6	24.7	75.0	63.0	52.5	51.9	4.2	4.2	42	57.0	6	28.7	70	94.2	1.8	1.8	130	100	115	1	1/2	7.425	6.8	ALL
FCU-E	IEC HPY14	DC	3.0	1,200	0.30	35.2	28.3	75.0	63.0	53.5	52.9	4.7	1.9	42	57.0	6	32.5	70	94.9	2.2	2.7	130	100	115	1	1/2	10.0	8.9	ALL
FCU-F	IEC CSY03	CR	0.50	230	N/A	6.6	5.1	75.0	63.0	54.3	53.0	1.3	4.2	42	57.0	4	2.6	70	80.3	0.50	0.10	130	100	115	1	0.14	1.875	1.5	ALL

TYPE:
DC = DUCTED CONCEALED
CR = CEILING RECESSED

REMARKS:
1. FANS SHALL HAVE EC MOTORS.
2. PROVIDE WITH LOW PROFILE, PLENUM RATED, TANK TYPE CONDENSATE PUMP, 1/30 HP, 115V, 1 PH, 60HZ, 70 GPH AT 5 FT. W.G. LITTLE GIANT VCCA-20-? OR APPROVED EQUAL. PROVIDE WHERE ONLY WHERE GRAVITY DRAINAGE CANNOT BE MAINTAINED ABOVE THE CEILING. COORDINATE ELECTRICAL REQUIREMENTS WITH DIVISION 26.
3. PROVIDE CONTROL INTERFACE WITH BMS, COORDINATE CONTROLS WITH ATC.
4. RIGHT-HAND OR LEFT-HAND ACCESS, AND SAME SIDE ELECTRIC, COIL, AND CONTROL ACCESS
5. STAINLESS STEEL DRAIN PAN WITH EXTERNAL INSULATION
6. PROVIDE DRAIN PAN CONDENSATE SENSOR. UNIT SHALL SHUT DOWN BEFORE OVERFLOW CAN OCCUR.

VARIABLE AIR VOLUME (VAV) TERMINAL UNIT SCHEDULE

GENERAL			PHYS.	PERFORMANCE										REMARKS			
							SOUND LEVEL		HOT WATER COIL								
TAG	MANUFACTURER	MODEL	INLET SIZE (IN)	DESIGN AIRFLOW (CFM)	MIN. AIRFLOW (CFM)	MAX AIR PRESS. DROP. (IN.WG)	SOUND SOURCE	MAX NC	HEATING CFM	MBH	LAT (°F)	GPM	LWT (°F)	MAX WPD (FT WG)	TYPE	RATINGS	FEATURES	INSTALL
VAV-A	TRANE	VCWF06	6	350	125	0.50	RADIATED	25	350	11.6	85.0	1.0	103.5	10.0	ALL	ALL	ALL	ALL
							DISCHARGE	25										
VAV-B	TRANE	VCWF14	14	1,280	500	0.50	RADIATED	25	1,280	41.0	85.0	3.0	101.1	10.0	ALL	ALL	ALL	ALL
							DISCHARGE	25										
VAV-C	TRANE	VCWF14	14	1,500	500	0.50	RADIATED	25	1,500	48.8	85.0	3.5	100.8	10.0	ALL	ALL	ALL	ALL
							DISCHARGE	25										

REMARKS - TYPE
1. AIR ONLY (NOT FAN POWERED) PRESSURE INDEPENDENT, 2-ROW HOT WATER COIL

REMARKS - RATINGS
1. PERFORMANCE CERTIFIED IN ACCORDANCE WITH AHRI 880
2. HOT WATER COIL PERFORMANCE AT 55°F ENT. 120°F ENT. 30% PROPYLENE GLYCOL SOLUTION.
3. SOUND POWER LEVELS ARE PER ARI 885-98/08. AT 1.0" INLET STATIC PRESSURE AND 1.0" DOWNSTREAM PRESSURE

REMARKS - FEATURES
1. 1" FIBERGLASS LINER.
2. ROUND INLET AND OUTLET.
3. INLET TEMPERATURE SENSOR.
4. ACCESS PANEL.
5. PROVIDE WITH 24 VOLT CONTROLS WIRING BY THE MECHANICAL CONTRACTOR (A TRANSFORMER IS NOT ACCEPTABLE)

REMARKS - INSTALL
1. UNLESS OTHERWISE INDICATED, UNSIZED DISCHARGE DUCTWORK SHALL BE THE SAME SIZE (INSIDE CLEAR) AS THE UNIT COIL DUCT CONNECTION.
2. PROVIDE A MIN. OF 3 INLET DIAMETERS OF STRAIGHT DUCT, SAME SIZE AS VAV INLET, UPSTREAM OF TERMINAL.
3. PROVIDE A MIN. OF 5' OF STRAIGHT DUCT, DOWNSTREAM OF TERMINAL PRIOR TO ANY FITTINGS OR TAKEOFFS.
4. THE FIRST 5'-0" (MINIMUM) OF DUCTWORK DOWNSTREAM OF THE UNIT SHALL BE PROVIDED WITH 1" THICK ACOUSTICAL LINING.
5. SELECT AUTOMATIC BALANCING VALVE FOR GPM INDICATED OR NEXT HIGHER SIZE.

DUST COLLECTOR SCHEDULE

GENERAL			PHYSICAL		FAN DATA						PRIMARY FILTER			ELECTRICAL		
TAG	MANUFACTURER	MODEL	WEIGHT (LBS)	L x W x H (IN.)	TYPE	CFM	EXT SP (IN.)	RPM	MOTOR HP	DRIVE TYPE	DESCRIPTION	EFFICIENCY AT 10 µM	FILTER SHAKER MOTOR HP	DUST STORAGE	VOLTAGE	PHASE	REMARKS
DC-1	DONALDSON	DFE 2-8	2,300	102x48x144	DONFLOW	3,400	10	1,800	10	DIRECT	CARTRIDGE STYLE	99.5%	N/A	50 GAL. DRUM	460	3	ALL

REMARKS:
1. PROVIDE WITH EXHAUST BLOWER WITH INVERTOR DUTY MOTOR, VFD IN NEMA 12 ENCLOSURE, AND DISCHARGE SILENCER (POINTED AWAY FROM BUILDING) WITH SUPPORT BRACKET.
2. PROVIDE WITH UNIT MOUNTED EXPLOSION VENT (POINTED AWAY FROM BUILDING). REMOTE MOUNTED START/STOP PUSH BUTTON AND NEMA 3R DISCONNECT SWITCH.
3. PROVIDE WITH FIRE RETARDANT FILTERS AND AN ALUMINUM FAN WHEEL.
4. NFPA REINFORCED SEALED DRUM KIT.
5. NFPA 12 ANSI PASSIVE BACKDRAFT DAMPER WITH ACCUMULATION AND MECH-SWITCH SENSORS.
6. NFPA 12 ANSI ACTIVE BACKDRAFT DAMPER WITH CONTROL PANEL AND MOUNTING KIT.
7. PROVIDE WITH SPARK DETECTION AND EXTINGUISHMENT SYSTEM (MANSERT EK AK104 OR APPROVED EQUAL).
8. COMPRESSOR AIR PULSE-JET FILTER CLEANING.
9. CONTROL WIRING PROVIDED BY THE MECHANICAL CONTROLS CONTRACTOR.
10. PROVIDE MANUFACTURERS 2x2 99.5% EFFICIENT ASHRAE 95 AUTO LOCK FILTER DUCT MOUNTED TO THE SA SIDE DUCTWORK

CABINET UNIT HEATER & UNIT HEATER SCHEDULE

SYMBOL	MANUFACTURER MODEL NUMBER	TYPE	DIMENSIONS (LWH-IN)	CFM	HOT WATER HEATING PERFORMANCE				ELECTRICAL				REMARKS
					HEATING CAP (MBH)	FLOW RATE (GPM)	WATER PD (FT)	HWS (°F)	HWR (°F)	VOLTS	PHASE	HP	FLA	
CUH-M1	ZEHNDER RITTLING RFRC-20	RFRC	40x27x10	220	10.8	2.50	0.20	130	100	120	1	1/4	1.33	ALL
CUH-A2	ZEHNDER RITTLING RFRC-40	RFRC	45x77x10	300	14.8	3.50	1.50	130	100	120	1	1/4	1.33	ALL
CUH-B1	ZEHNDER RITTLING RFWH-33	W	45x160x27	300	14.8	3.50	1.50	130	100	120	1	1/4	1.33	ALL
CUH-B2	ZEHNDER RITTLING RFWH-36	W	65x77x10	620	30.0	6.50	5.00	130	100	120	1	1/4	2.21	ALL
CUH-B3	ZEHNDER RITTLING RFWH-36	W	70x77x10	810	38.5	7.50	2.20	130	100	120	1	(2) 1/4	3.16	ALL
UH-A1	ZEHNDER RITTLING RH-18	UH	17x12x15	400	5.8	1.00	0.40	130	100	120	1	1/30	0.70	1 THRU 3
UH-A2	ZEHNDER RITTLING RH-24	UH	17x12x15	450	7.5	1.50	0.55	130	100	120	1	1/30	0.70	1 THRU 3
UH-A3	ZEHNDER RITTLING RH-33	UH	20x13x19	630	10.8	2.00	0.10	130	100	120	1	1/15	0.72	1 THRU 3
UH-M	ZEHNDER RITTLING RH-47	UH	20x13x19	730	14.6	3.00	0.20	130	100	120	1	1/15	0.72	1 THRU 3

TYPE:
UH = SUSPENDED UNIT HEATER
RFRC = FULLY RECESSED CEILING MOUNT - FACE SUPPLY AND RETURN
W = RECESSED WALL MOUNT - FACE SUPPLY AND RETURN - INVERTED FLOW

REMARKS:
1. PROVIDE CONTROL INTERFACE WITH BMS, COORDINATE CONTROLS WITH ATC.
2. PERFORMANCE BASED ON 30% PROPYLENE GLYCOL SOLUTION, AND 70°F SPACE TEMPERATURE.
3. PROVIDE WITH DISCONNECT SWITCH.
4. PROVIDE 2-ROW HEATING COIL.
5. PROVIDE WITH 1" DISPOSABLE PANEL FILTER.
6. PROVIDE WITH RECESSED WALL OR CEILING INSTALLATION KIT.
7. FINISH COLOR SHALL BE SELECTED BY THE ARCHITECT FROM THE STANDARD COLOR CHART.

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Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N

NORTH
EAST
SOUTH
WEST

KEYPLAN

Number	Date	Issued For
4	11/06/2024	ADDENDUM NO. 6
1	10/16/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

MECHANICAL SCHEDULES

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: M601

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DIFFUSER AND REGISTER SCHEDULE

SYMBOL	MANUFACTURER/ MODEL NUMBER	DUTY	TYPE	BORDER TYPE	CONSTRUCTION			REMARKS
					OBD	FRAME	BLADES	
A	TITUS OMNI	SUPPLY	SP	LAY-IN	NONE	STEEL	STEEL	1,6,7,8,9,10
B	TITUS 50R	RETURN/ EXHAUST	EG	LAY-IN	NONE	STEEL	STEEL	2,7,8
C	TITUS 350RL	RETURN/ EXHAUST	SD	SURFACE	NONE	STEEL	STEEL	4,6,7,8
D	TITUS 350RL	SUPPLY	DD	SURFACE	NONE	STEEL	STEEL	3,7,8
E	TITUS FL-154/IT	SUPPLY	LS	LAY-IN/ SURFACE	NONE	STEEL	STEEL	11,14,16,17,19
F	TITUS FL-154/IT	SUPPLY	LS	LAY-IN/ SURFACE	NONE	STEEL	STEEL	12,14,16,17,19
G	TITUS MA-2R	RETURN/ EXHAUST	LS	SURFACE	NONE	STEEL	STEEL	13,15,16,17
H	TITUS PERFORMS	SUPPLY	RP	SURFACE	NONE	STEEL	STEEL	5,7,8

TYPES:
SP - SQUARE PLAQUE
EG - 1/2" x 1/2" x 1/2" EGGCRATE
LF - LOUVERED FACE
LS - LINEAR SLOT
DD - DOUBLE DEFLECTION, BLADES PARALLEL TO LONG DIMENSION.
RP - ROUND PLAQUE
SD - SINGLE DEFLECTION, BLADE PARALLEL TO LONG DIMENSION.

INDICATES UNIT TYPE
A 12X12 350
INDICATES NECK SIZE
INDICATES UNIT CFM CAPACITY

1. PERFORMANCE DATA LISTED IS AT MAX AIRFLOW.
2. BORDER TYPES SHALL BE COMPATIBLE WITH THE CEILING TYPE FOR THE ROOM IN WHICH IT IS LOCATED. CONTRACTOR SHALL REVIEW THE ARCHITECTURAL REFLECTED CEILING PLANS FOR SPECIFIC CEILING TYPES IN EACH SPACE.
3. PROVIDE WHITE FINISH UNLESS OTHERWISE NOTED. FINISHES, COLOR, AND BORDER TYPES SHALL BE APPROVED BY THE ARCHITECT.
4. REFER TO PLANS FOR LOCATION, AIR QUANTITIES, TYPE, AND BLOW PATTERN OF EACH DEVICE.

REMARKS:
1. SQUARE PLAQUE DIFFUSER, ADJUSTABLE INDUCTION, 360-DEGREE DISCHARGE PATTERN.
2. SQUARE EGGCRATE GRILLE, LAY-IN OR SURFACE MOUNT.
3. SUPPLY GRILLE, ADJUSTABLE DOUBLE DEFLECTION BLADES, 3/4" BLADE SPACING. FRONT BLADES PARALLEL TO LONG DIMENSION.
4. LOUVERED GRILLE WITH 35-DEGREE FIXED BLADES, 3/4" SPACING, BLADES PARALLEL TO LONG DIMENSION.
5. ROUND PLAQUE DIFFUSER, ADJUSTABLE INDUCTION, 360-DEGREE DISCHARGE PATTERN.
6. PROVIDE HEAVY DUTY TYPE GRILLE WHERE INSTALLED IN THE GYMNASIUM.
7. PROVIDE ALUMINUM CONSTRUCTION FOR DEVICES INSTALLED IN HIGH MOISTURE AREAS INCLUDING TOILET ROOMS, SHOWER ROOMS, KITCHEN, ETC.
8. PROVIDE HARD DUCT CONNECTION WHERE DIFFUSER IS NOT INSTALLED IN A CEILING.
9. PROVIDE DIFFUSERS WITH CORRELATION SYSTEMS FOR 1, 2 OR 3-WAY DISCHARGE FLOW INDICATED BY SUPPLY ARROWS ON THE PLAN.
10. FOR 4" AND 6" ROUND CONNECTIONS PROVIDE A 12"x12" FACE SIZE. FOR ALL OTHER CONNECTIONS PROVIDE THE MANUFACTURER'S RECOMMENDED FACE SIZE.
11. PROVIDE AS 1/2" LINEAR SLOT WITH (2) 1/2" SLOTS.
12. PROVIDE AS 1"x3" LINEAR SLOT WITH (2) 1-3" SLOTS.
13. PROVIDE AS 1"x2" LINEAR SLOT WITH (4) 1/2" SLOTS.
14. ADJUSTABLE THROW PATTERS.
15. VERTICAL DISCHARGE THROW.
16. PROVIDE CABLE OPERATED DAMPER WITH REMOTE ACTUATOR FOR VOLUME DAMPERS LOCATED ABOVE GYP AND INACCESSIBLE CEILINGS.
17. PROVIDE OPPOSED BLADE DAMPER FOR SIDE SUPPLY.
18. PROVIDE WITH STEP-DOWN WHERE INDICATED ON PLANS.

DUCT SILENCER SCHEDULE

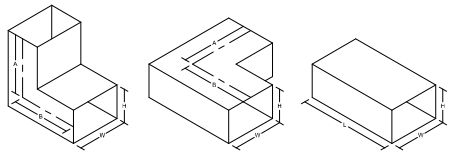
TAG	MANUFACTURER	MODEL	LOCATION	SERVICE	PHYSICAL: ROUND DIAMETER "D" (IN)	PHYSICAL: RECTANGULAR WIDTH "W" (IN)	PHYSICAL: RECTANGULAR HEIGHT "H" (IN)	PHYSICAL: LENGTH "L" (IN)	PERFORMANCE: AIRFLOW CFM	AREA (SQ FT)	FPM	DIRECTION	APD (IN W.G)	DYNAMIC INSERTION LOSS (dB) BY OCTAVE BAND (Hz): 63	125	250	500	1000	2000	4000	8000	REMARKS: TYPE	RATINGS	FEATURES
SA-DOA-1S	VIBRO-ACOUSTICS	RD-MW-AY31617	MECHANICAL 1048	DOA-1 SUPPLY	N/A	44	20	36	6,000	N/A	982	SUPPLY	0.16	3	8	11	18	21	16	11	8	2	ALL	ALL
SA-DOA-1R	VIBRO-ACOUSTICS	RD-MW-AY31617	MECHANICAL 1048	DOA-1 RETURN	N/A	44	20	36	6,000	N/A	982	RETURN	0.16	5	9	14	12	15	9	10	8	2	ALL	ALL
SA-DOA-2S	VIBRO-ACOUSTICS	RD-MW-AY31617	MECHANICAL 1048	DOA-2 SUPPLY	N/A	48	22	36	7,500	N/A	1023	SUPPLY	0.19	5	10	14	12	12	9	9	8	2	ALL	ALL
SA-DOA-2R	VIBRO-ACOUSTICS	RD-LW-AY31617	MECHANICAL 1048	DOA-2 RETURN	N/A	48	22	36	7,500	N/A	1023	RETURN	0.27	6	12	17	14	14	11	10	9	2	ALL	ALL
SA-DOA-3S	VIBRO-ACOUSTICS	RED-IN-AY31617	MECHANICAL 1060	DOA-3 SUPPLY	N/A	48	22	60	7,800	N/A	1064	SUPPLY	0.20	9	9	12	16	19	22	18	14	1	ALL	ALL
SA-DOA-3R	VIBRO-ACOUSTICS	RED-IN-AY31617	MECHANICAL 1060	DOA-3 RETURN	N/A	48	22	72	7,800	N/A	1064	RETURN	0.18	9	12	11	20	18	21	18	14	1	ALL	ALL
SA-DOA-4S	VIBRO-ACOUSTICS	RED-MW-AY31617	MECHANICAL 1067	DOA-4 SUPPLY	N/A	52	22	72	8,500	N/A	980	SUPPLY	0.17	6	10	12	29	29	30	24	20	1	ALL	ALL
SA-DOA-4R	VIBRO-ACOUSTICS	RED-MW-AY31617	MECHANICAL 1067	DOA-4 RETURN	N/A	52	22	72	8,500	N/A	980	RETURN	0.23	10	12	11	21	20	22	19	13	1	ALL	ALL
SA-DOA-5S	VIBRO-ACOUSTICS	RED-MW-AY31617	ORCHESTRA 1116	DOA-5 SUPPLY	N/A	62	20	72	7,000	N/A	813	SUPPLY	0.20	8	11	13	22	23	26	21	17	1	ALL	ALL
SA-DOA-5R	VIBRO-ACOUSTICS	RED-IN-AY31617	ORCHESTRA 1116	DOA-5 RETURN	N/A	62	20	84	7,000	N/A	813	RETURN	0.23	9	12	18	30	28	29	21	19	1	ALL	ALL
SA-RTU-1S	VIBRO-ACOUSTICS	RED-MW-AY31617	ROOF	RTU-1 SUPPLY	N/A	38	24	60	6,000	N/A	947	SUPPLY	0.24	9	11	13	23	21	23	20	15	1	ALL	ALL
SA-RTU-1R	VIBRO-ACOUSTICS	RED-MW-AY31617	ROOF	RTU-1 RETURN	N/A	26	34	60	6,000	N/A	1059	RETURN	0.24	12	14	10	21	17	18	18	13	1	ALL	ALL
SA-RTU-2S	VIBRO-ACOUSTICS	RED-IN-AY31617	ROOF	RTU-2 SUPPLY	N/A	58	30	72	10,500	N/A	869	SUPPLY	0.15	5	10	18	20	21	16	14	12	2	ALL	ALL
SA-RTU-2R	VIBRO-ACOUSTICS	RD-MW-AY31617	ROOF	RTU-2 RETURN	N/A	56	32	60	10,500	N/A	844	RETURN	0.16	4	7	12	15	15	13	11	9	2	ALL	ALL
SA-RTU-3S	VIBRO-ACOUSTICS	RED-MW-AY31617	PE/ ATHL. STORAGE 1067	RTU-3 SUPPLY	N/A	44	20	60	7,000	N/A	1145	SUPPLY	0.35	5	7	12	16	31	37	23	21	1	ALL	ALL
SA-RTU-3R	VIBRO-ACOUSTICS	RED-MW-AY31617	PE/ ATHL. STORAGE 1067	RTU-3 RETURN	N/A	44	20	60	7,000	N/A	1145	RETURN	0.27	6	8	14	19	31	27	24	19	1	ALL	ALL

REMARKS - TYPE
1. RECTANGULAR ELBOW, GLASS FIBER MEDIA
2. RECTANGULAR IN-LINE, GLASS FIBER MEDIA

REMARKS - RATINGS
1. AIR PRESSURE DROP (APD) AND ACOUSTICAL DATA ARE IN ACCORDANCE TO ASTM E477

REMARKS - FEATURES
1. ACOUSTIC MEDIA SHALL COMPLY WITH UL 181 AND ASHRAE 62A, SHALL BE 100% NATURAL COTTON FIBERS TREATED WITH AN EPA RATED NON-TOXIC BORATE SOLUTION, "FLASH DRIED" TO PROVIDE RESISTANCE TO MOLD, MILDEW, AND FUNGI, SHALL BE PACKED TO A MINIMUM COMPRESSION OF 15% DURING SILENCER ASSEMBLY, AND SHALL NOT CAUSE OR ACCELERATE CORROSION OF ALUMINUM OR STEEL. GLASS FIBER AND ROCK WOOL ARE NOT ACCEPTABLE SUBSTITUTES FOR THE ACOUSTIC MEDIA.
2. HOUSING SHALL BE SUCH THAT 'A' + 'B' + 'L' AND SUCH THAT THE SILENCER FITS AS INTENDED; 'A' & 'B' ADJUSTABLE IN THE FIELD.
3. 'LENGTH' SHOWN FOR ELBOW IS ENCES EL CENTERLINE LENGTH.
4. APR PRESSURE DROP + SILENCER PRESSURE DROP PER ASTM E477-13 + SYSTEM EFFECT FOR NEARBY DUCT ELEMENTS.
5. CONTRACTOR SHALL PROVIDE CONSULTANT PRESSURE DROP CALCULATIONS WITH PE STAMP INCLUDING SYSTEM EFFECTS.
6. CONTRACTOR SHALL PROVIDE CONSULTANT ACOUSTICAL CALCULATIONS WITH PE STAMP DEMONSTRATING THE RESULTANT DUCTBORNE FAN SOUND LEVEL IN THE OCCUPIED SPACES MEET PROJECT BACKGROUND NOISE REQUIREMENTS.
7. PROVIDE NOISE CALCULATIONS FROM MANUFACTURER DEMONSTRATING THE RESULTANT SOUND LEVEL IN THE OCCUPIED SPACES MEET PROJECT BACKGROUND NOISE REQUIREMENTS.

CONFIGURATION



ACTIVE CHILLED BEAM SCHEDULE

SYMBOL	MANUFACTURER MODEL NUMBER	DIMENSIONS (L x W)	DISCHARGE PATTERN	AIR INLET (IN)	PRIMARY AIRFLOW (CFM)	TOTAL AIRFLOW (CFM)	COOLING PERFORMANCE: TOTAL COOLING CAPACITY (BTU/H)	PRIMARY AIR SENSIBLE CAPACITY (BTU/H)	PRIMARY AIR LATENT CAPACITY (BTU/H)	BEAM SENSIBLE COOLING CAPACITY (BTU/H)	FLOW RATE (GPM)	PRESSURE DROP (FT)	PRIMARY AIR CONDITIONS (DB/WB °F)	EWT/LWT (°F)	SUPPLY AIR TEMPERATURE (°F)	HEATING PERFORMANCE: TOTAL HEATING CAPACITY (BTU/H)	BEAM HEATING CAPACITY (BTU/H)	PRIMARY AIR HEATING CAPACITY (BTU/H)	FLOW RATE (GPM)	PRESSURE DROP (FT)	PRIMARY AIR CONDITIONS (DB °F)	EWT/LWT (°F)	SUPPLY AIR TEMPERATURE (°F)	PRIMARY AIR INLET (INCH)	MEDIA	REMARKS
CB-A1	DADANCO MODEL # ACB40	6' x 2'	2 WAY	8	175	755	12,184	3,802	2,672	9,512	1.5	2.6	55.0/53.0	57/64.6	63.4	11,739	8,952	2,807	0.75	0.7	60	130/98.7	84.3	6 - ELLIPTICAL	30% PPG	ALL
CB-A2	DADANCO MODEL # ACB40	6' x 2'	2 WAY	8	140	649	10,828	3,269	2,191	8,439	1.4	2.3	55.0/53.0	57/64.4	63.0	10,981	8,229	2,752	0.70	0.6	60	130/98.7	85.5	6 - ELLIPTICAL	30% PPG	ALL
CB-B	DADANCO MODEL # ACB40	6' x 2'	2 WAY	8	120	511	8,468	2,002	1,878	6,590	1.1	1.5	55.0/53.0	57/63.9	63.1	8,862	7,667	1,196	0.60	1.6	60	130/94.8	86.9	6 - ELLIPTICAL	30% PPG	ALL
CB-C1	DADANCO MODEL # ACB40	4' x 2'	2 WAY	6	80	327	5,472	1,868	1,252	4,220	0.70	2.3	55.0/53.0	57/63.7	63.1	6,966	6,358	608	0.50	1.1	60	130/102.2	86.6	6 - ROUND	30% PPG	ALL
CB-C2	DADANCO MODEL # ACB40	4' x 2'	2 WAY	6	60	279	4,663	1,401	939	3,621	0.70	2.3	55.0/53.0	57/63.3	63.0	6,626	6,189	437	0.50	1.1	60	130/103.6	91.8	6 - ROUND	30% PPG	ALL
CB-D	DADANCO MODEL # ACB40	2' x 2'	2 WAY	4	40	153	2,703	467	313	2,077	0.90	0.80	55.0/53.0	57/61.8	62.5	3,812	3,346	466	0.90	0.70	60	130/114.8	92.9	4 - ROUND	30% PPG	ALL

NOTES:
A. EACH CHILLED BEAM SHALL BE TWO (2) PIPE CONFIGURATION FOR A SINGLE COIL RECEIVING CHILLED WATER OR HOT WATER. COIL PERFORMANCE FOR COOLING AND HEATING SHOWN.
B. COOLING CAPACITY BASED ON INDOOR DESIGN CONDITIONS OF 75°F DB / 50% RH
C. HEATING CAPACITY BASED ON INDOOR DESIGN CONDITIONS OF 70°F DB.
D. COORDINATE BEAM MOUNTING WITH CEILING BEING INSTALLED PROVIDE ALL NECESSARY TRIM PIECES FOR FLUSH MOUNTING IN SUSPENDED CEILING.
E. PROVIDE COANDA WING TRIM ACCESSORY FOR MOUNTING WHERE INSTALLED WITHOUT A CEILING, CONFIRM WITH ARCHITECTURAL REFLECTED CEILING PLAN.

REMARKS:
1. PROVIDE NPT PIPING CONNECTION TO CHILLED BEAM.
2. PROVIDE WITH BEAM PLENUM DUCT PRESSURE TAPS AND CFM PERFORMANCE CHART FOR BALANCING LOCATE ON BEAM HOUSING.
3. COORDINATE BEAM FRAME WITH CEILING TYPE TO ENSURE THERE IS NO GAPS AROUND BEAM WHEN SET IN CEILING GRID
4. CHILLED BEAMS SHALL BE EXPOSED TYPE WHEN NOT LOCATED IN HARD OR DROPPED CEILINGS, COORDINATE EXACT LOCATIONS WITH ARCHITECTURAL REFLECTED CEILING PLANS.
5. COLOR OF CHILLED BEAMS SHALL BE COORDINATED WITH ARCHITECT.
6. PROVIDE HARD DUCT CONNECTION WHERE BEAMS ARE EXPOSED WITHOUT BEING LOCATED IN A CEILING.
7. PROVIDE 3/4" FLEX PIPE CONNECTION WHERE PIPING CONNECTS TO EACH BEAM.
8. PROVIDE 6-WAY VALVE CONNECTIONS (CBVS = CHILLED BEAM VALVE SINGLE, CBMV = CHILLED BEAM VALVE MULTIPLE).

MEDIA:
HW = HOT WATER
PPG = 30% PROPYLENE GLYCOL/WATER SOLUTION.

SOUND LEVELS	
UNIT TAG	NC
CB-A1	21
CB-A2	19
CB-B	17
CB-C1	19
CB-C2	19
CB-D	19

AIR FILTRATION UNIT SCHEDULE

TAG	MANUFACTURER	MODEL	GENERAL: WEIGHT (LBS)	GENERAL: L x W x H (IN.)	FAN DATA: TYPE	FAN DATA: CFM	FAN DATA: MOTOR HP	FAN DATA: DRIVE TYPE	PRE-FILTER: TYPE	PRE-FILTER: SIZE WxH (IN.)	PRE-FILTER: DEPTH (IN.)	PRE-FILTER: ASHRAE 52.2 MERV RATING	PRIMARY FILTER: TYPE	PRIMARY FILTER: SIZE WxH (IN.)	PRIMARY FILTER: DEPTH (IN.)	PRIMARY FILTER: ASHRAE 52.2 MERV RATING	ELECTRICAL: VOLTAGE	ELECTRICAL: PHASE	REMARKS
AFU-A	MONOMVENT	3025	160	59x24x24	FORWARD INCLINE	2,500	3/4	DIRECT	PANEL	24x24	4	N/A	MULTI-POCKET BAG	24x24	36	N/A	115	1	ALL

REMARKS:
1. UNIT SHALL BE CONTROLLED BY BMS, COORDINATE WITH ATC.
2. HUNG FROM STRUCTURE.

HEAT EXCHANGER SCHEDULE

SYMBOL	MANUFACTURER/ MODEL NUMBER	TYPE	LOCATION	COLD SIDE FLOW (GPM)	COLD SIDE TEMP IN/OUT DEG. F	WATER PD FT. W.G.	HOT SIDE FLOW (GPM)	HOT SIDE TEMP IN/OUT DEG. F	WATER PD FT. W.G.	CAPACITY (MBH)	REMARKS
HX-1	ARMSTRONG S17NS-18472-5000	PF	MECH. ROOM	91	42/57	1.82	170	65/57	4.82	650	ALL

TYPE:
PF=PLATE AND FRAME

REMARKS:
1. CAPACITY BASED ON 30% PROPYLENE GLYCOL SOLUTION.
2. PERFORMANCE CERTIFIED IN ACCORDANCE WITH AHRI 400.
3. ASME STAMPED
4. 304 STAINLESS STEEL PLATES
5. EPDM GASKETS.
6. 150 PSIG DESIGN PRESSURE
7. 72 PLATES.
8. MIN. OF 111.61 SF OF HEAT TRANSFER SURFACE AREA.
9. 448 LB. FLOODED WEIGHT.

PUMP SCHEDULE

SYMBOL	MANUFACTURER/ MODEL NUMBER	TYPE	LOCATION	SYSTEM SERVING	MEDIA	FLOW RATE (GPM)	TDH (FT)	FLUID TEMP (°F)	PUMP EFF (%)	MOTOR DATA: HP	RPM	VOLTS	PHASE	REMARKS
HWP-1 HWP-2	ARMSTRONG 4380 2505-001.0	IL	MECHANICAL 1060	HOT WATER	PPG	100	18	130	73	1.0	2314	460	3	1-4
HWP-3A/3B	ARMSTRONG 4372 0305-010.0	DIL	MECHANICAL 1060	HOT WATER	PPG	300	75	130	78	(2) 10	3437	460	3	1-4
CHWP-1 CHWP-2	ARMSTRONG 4380 0305-002.0	IL	MECHANICAL 1067	CHILLED WATER	PPG	255	30	42	75	3	3008	460	3	1-4
CHWP-3A/3B	ARMSTRONG 4302 0605-010.0	DIL	MECHANICAL 1067	CHILLED WATER	PPG	450	70	42	75	(2) 15	3111	460	3	1-4,5
MCHWP-1A/1B	ARMSTRONG 4372 0305-010.0	DIL	MECH ROOM	CHILLED BEAM COLD WATER	PPG	175	130	57	75	(2) 10	4459	460	3	1-4

TYPE:
ES = END SUCTION
IL = VERTICAL IN-LINE, SPLIT COUPLED
DIL = DUAL VERTICAL IN-LINE, SPLIT COUPLED

MEDIA:
W = WATER
PPG = 30% PROPYLENE GLYCOL WATER SOLUTION

REMARKS:
1. PROVIDE PUMP MOTOR WITH INTEGRAL VFD AND SENSORLESS PUMP CONTROLLER WITH NATIVE BACNET COMMUNICATION.
2. PROVIDE WITH FLOOR SUPPORT STAND.
3. PROVIDE WITH SUCTION DIFFUSER.
4. PROVIDE WITH TEC MOTORS.
5. PREMIUM EFFICIENT ODP INDUCTION MOTOR, OUTSIDE MECHANICAL SEALS, CLINO SEAL FLUSH LINE FILTER WITH SIGHT GLASS.

DUCT MOUNTED HOT WATER REHEAT COIL SCHEDULE

UNIT	MANUFACTURER MODEL #	UNIT LOCATION	TOTAL CAP. (MBH)	MAXIMUM FACE VELOCITY (FPM)	AIR SIDE: FLOW (CFM)	AIR SIDE: EDB (°F)	AIR SIDE: LDB (°F)	AIR SIDE: MAX PD (IN WG)	HOT WATER COIL DATA: FLOW (GPM)	HOT WATER COIL DATA: EWT (°F)	HOT WATER COIL DATA: LWT (°F)	HOT WATER COIL DATA: MAX PD (FT H2O)	SIZE/ ROWS (W/H/QTY)	REMARKS
RHC-A	TRANE MDTUS	HRV-1 SUPPLY DUCT	31.90	628	1,700	55	72	0.165	2.37	130	100	9.85	28x15 / 1	ALL

REMARKS:
1. WATER/ GLYCOL SOLUTION SHALL BE 30% PROPYLENE GLYCOL SOLUTION.
2. PROVIDE DUCT MOUNTED COILS WITH ALUMINUM FINS AND COPPER TUBING.
3. FURNISH ALL ACCESSORIES AND MATERIALS NEEDED FOR PROPERLY INSTALLING HOT WATER COIL IN SUPPLY DUCTWORK.
4. FURNISH WITH FLANGED CONNECTIONS

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Greenwich Central Middle School

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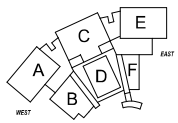
NORTH


KEYPLAN

Number	Date	Issued For
2	10/23/2024	ADDENDUM NO. 3
1	10/16/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

MECHANICAL SCHEDULES

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: M602

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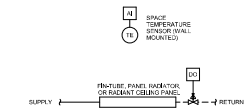
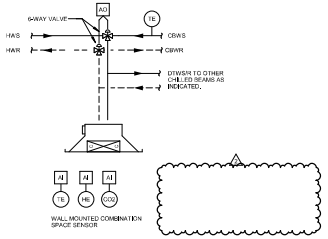


5 PERIMETER RADIATION CONTROL DIAGRAM
NTS



4 CHILLED BEAM CONTROL DIAGRAM
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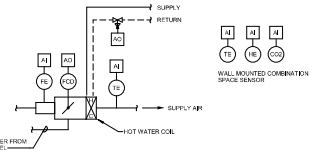

7 VAV AIR TERMINAL UNIT WITH HOT WATER REHEAT CONTROL DIAGRAM
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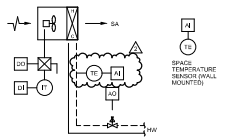

6 HOT WATER UNIT HEATER CONTROL DIAGRAM
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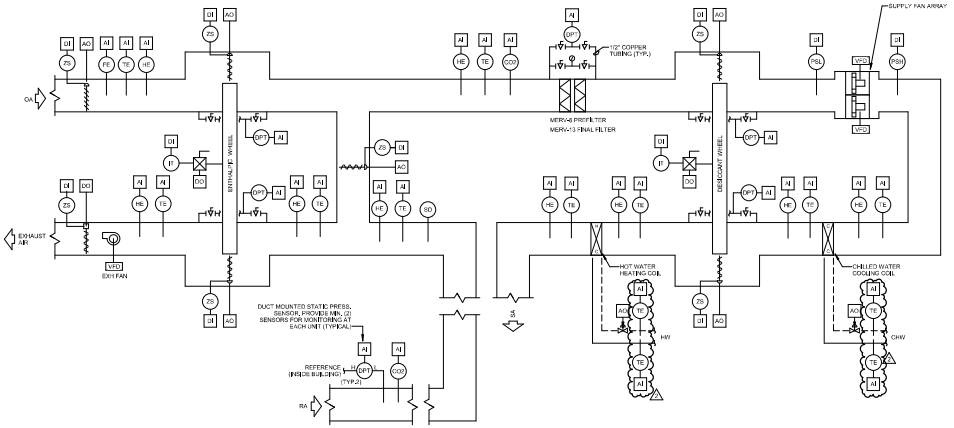

1 DEDICATED OUTDOOR AIR (DOA) UNIT CONTROL DIAGRAM (DOA-1 THRU 5)
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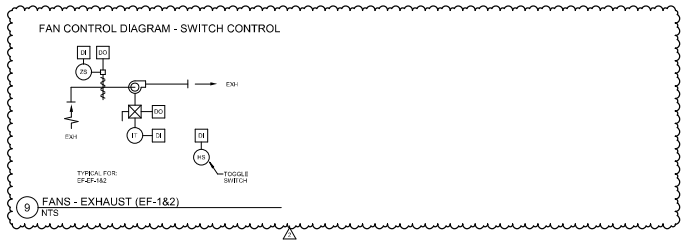
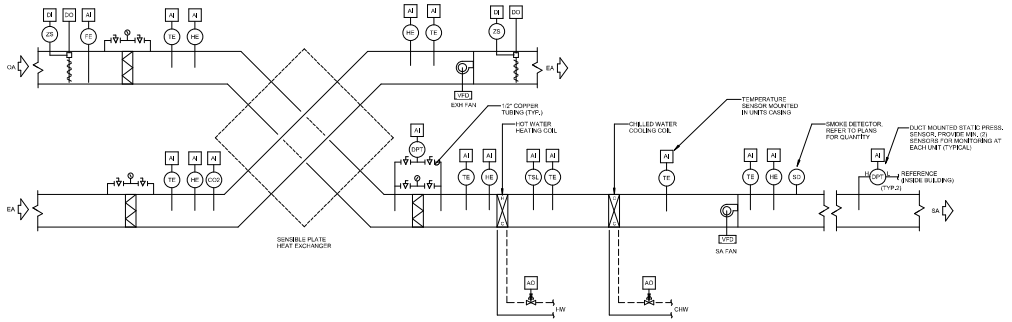


9 FANS - EXHAUST (EF-1&2)
NTS



2 HEAT RECOVERY VENTILATOR (HRV-1) CONTROL DIAGRAM
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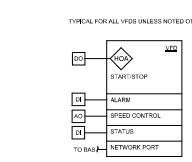
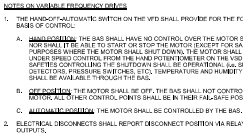


NOTES ON VARIABLE FREQUENCY DRIVES

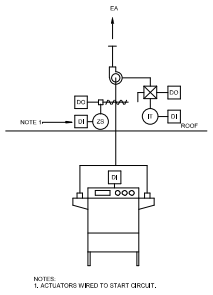
1. THE HAND-OFF-AUTOMATIC SWITCH ON THE VFD SHALL PROVIDE FOR THE FOLLOWING BASIS OF CONTROL:
   A. HAND POSITION: THE BAS SHALL HAVE NO CONTROL OVER THE MOTOR SPEED NOR SHALL IT BE ABLE TO START OR STOP THE MOTOR EXCEPT FOR SAFETY PURPOSES WHERE THE MOTOR SHALL SHUT DOWN. THE MOTOR SHALL RUN UNDER SPEED CONTROL FROM THE HAND POTENTIOMETER ON THE VSD. ALL SAFETIES CONTROLLING THE SHUTDOWN SHALL BE OPERATIONAL: (i.e., SMOKE DETECTORS, PRESSURE SWITCHES, ETC). TEMPERATURE AND HUMIDITY CONTROL SHALL BE AVAILABLE THROUGH THE BAS.
   B. OFF POSITION: THE MOTOR SHALL BE OFF. THE BAS SHALL NOT CONTROL THE MOTOR. ALL OTHER CONTROL POINTS SHALL BE IN THEIR FAIL-SAFE POSITION.
   C. AUTOMATIC POSITION: THE MOTOR SHALL BE CONTROLLED BY THE BAS.
2. ELECTRICAL DISCONNECTS SHALL REPORT DISCONNECT POSITION VIA RELAY OUTPUTS.
3. START/STOP, ALARM, SPEED CONTROL AND STATUS POINTS SHALL BE HARDWIRED
4. THE FOLLOWING POINTS SHALL BE COMMUNICATED TO THE BAS VIA THE VFD'S MANUFACTURERS STANDARD NETWORK COMMUNICATION PORT:
   - SPEED INDICATION
   - AUTO / OUT OF AUTO INDICATION
   - FAULT / FAULT CODE
   - MOTOR CURRENT
   - DRIVE TEMPERATURE
   - DC BUS VOLTAGE
   - POWER DEMAND (kW)

12 VFD CONTROL DIAGRAM
NTS

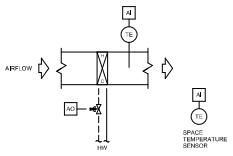


14 DRYER BOOSTER FAN CONTROLS
NTS

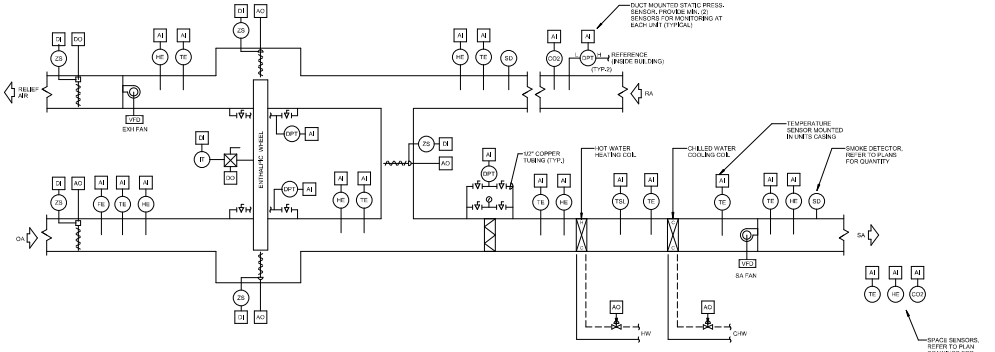
10 CLOTHES WASHER CONTROL DIAGRAM
NTS



11 DISHWASHER EXHAUST FAN CONTROL DIAGRAM (DWEF-1)
NTS



13 DUCT MOUNTED COIL - HW COIL SPACE TEMP CONTROL
NTS



3 SINGLE ZONE VAV AHU WITH RELIEF FAN AND ENERGY WHEEL CONTROL DIAGRAM (RTU-1,2&3)
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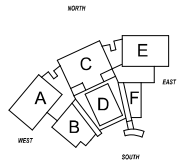

KEYPLAN

Number	Date	Issued For
2	10/23/2024	ADDENDUM NO. 3
1	10/16/2024	ADDENDUM NO. 2
	09/30/2024	BID/SUPERMIT
	07/08/2024	PHASE 2

MECHANICAL CONTROLS DIAGRAMS

Date: 07/08/2024
Scale: NTS
Proj. Number: 22367.00
Drawing Number: M700

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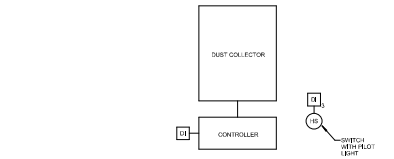

10 DUST COLLECTOR CONTROL DIAGRAM (DC-1)
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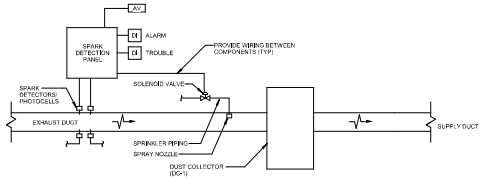

5 DUST COLLECTOR (DC-1) SPARK DETECTION/ EXTINGUISHING CONTROL DIAGRAM
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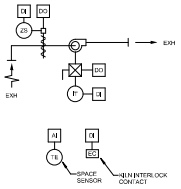


SEQUENCE OF OPERATION

GENERAL

1. PROVIDE BAS CONTROLS

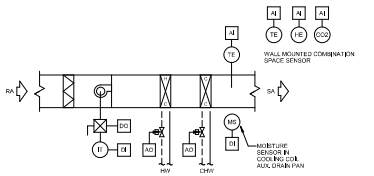
SAFETIES AND ALARMS

1. IF THE FAN IS COMMANDED ON AND IT DOES NOT ACTIVATE, AN ALARM SHALL BE GENERATED THROUGH THE BAS.

OPERATION

1. FAN SHALL OPERATE CONTINUOUSLY DURING THE OCCUPIED PERIOD. THE EXHAUST AIR CONTROL DAMPER (LOCATED IN EXHAUST DUCT WORK) SHALL BE CLOSED WHEN THE EXHAUST FAN IS OFF AND OPEN WHEN THE EXHAUST FAN IS ON. THE EXHAUST FAN SHALL NOT START UNTIL PROOF (BY END SWITCH) THAT THE EXHAUST AIR CONTROL DAMPER IS OPEN

4 FANS - LIFE SAFETY AND SPECIALTY (KILN)
NTS



2 FAN COIL UNIT CONTROL DIAGRAM
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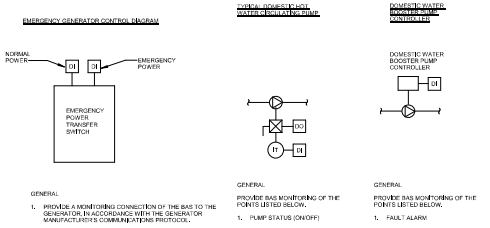
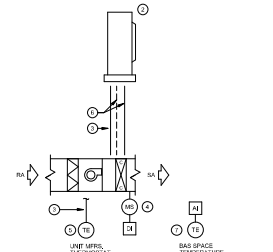
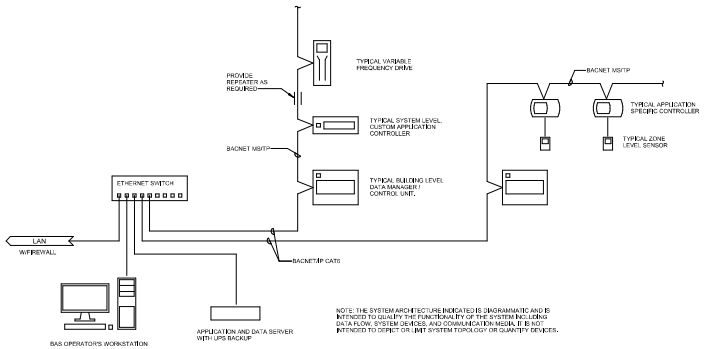


3 MISC ELECTRICAL, FA, & PLUMBING MONITORING CONTROL DIAGRAM
NTS

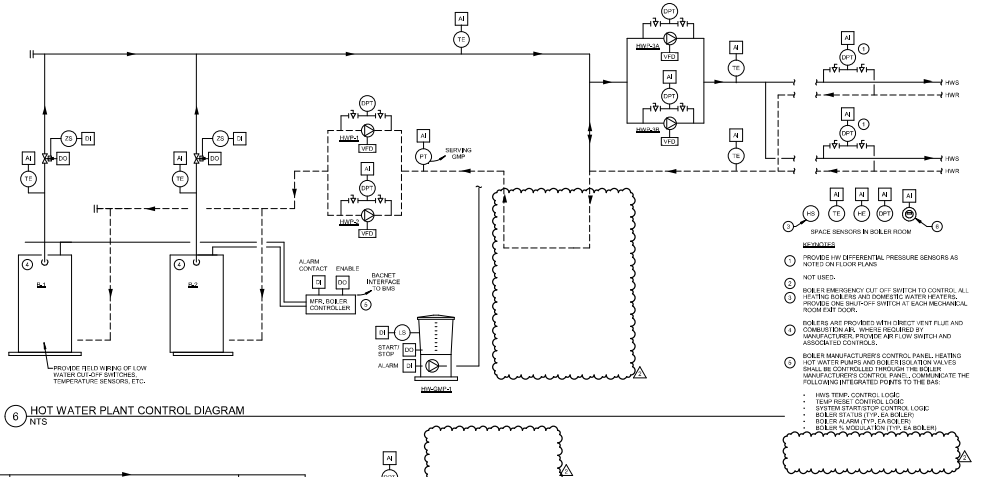


1 AC SPLIT SYSTEM CONTROL DIAGRAM
NTS

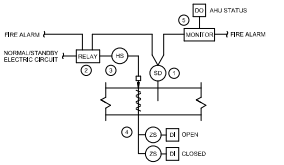


NOTE: THE SYSTEM ARCHITECTURE INDICATED IS DIAGRAMMATIC AND IS INTENDED TO QUALIFY THE FUNCTIONALITY OF THE SYSTEM INCLUDING DATA FLOW, SYSTEM DEVICES, AND COMMUNICATION MEDIA. IT IS NOT INTENDED TO DEFECT OR LIMIT SYSTEM TOPOLOGY OR QUANTITY DEVICES.

8 BAS SYSTEM ARCHITECTURE DIAGRAM
NTS



6 HOT WATER PLANT CONTROL DIAGRAM
NTS



GENERAL NOTES

1. REFER TO MECHANICAL RISER DIAGRAMS AND FLOOR PLANS FOR QUANTITY AND LOCATION OF FIRE/SMOKE DAMPERS.

KEYNOTES

1. SMOKE DETECTOR(S) FOR FIRE/SMOKE DAMPER ACTIVATION PROVIDED BY DIVISION 28, INSTALLED BY DIVISION 23. INSTALL DUCT DETECTORS WITHIN 5 FEET OF ASSOCIATED FIRE/SMOKE DAMPER.
2. FIRE ALARM RELAY MODULE FOR FIRE/SMOKE DAMPER CONTROL FURNISHED, INSTALLED AND WIRED BY DIVISION 28.
3. SINGLE OR MULTI-DAMPER TEST SWITCH REMOTE-MOUNTED WITH MOMENTARY TEST SWITCH AND DAMPER POSITION FEEDBACK INDICATOR LIGHTS FURNISHED BY DIVISION 23 AND INSTALLED/WIRED BY DIVISION 26. INSTALL TEST SWITCH DIRECTLY BELOW DAMPER(S) OR AS INDICATED ON MECHANICAL DRAWINGS.
4. FIRE/SMOKE DAMPER BLADE END SWITCHES FURNISHED AND INSTALLED BY DIVISION 23 AND WIRED BY DIVISION 26. BAS MONITORING OF END SWITCHES FURNISHED, INSTALLED AND WIRED BY DIVISION 23.
5. RELAY MODULE FOR SUPERVISION OF AIR HANDLING SYSTEM STATUS FURNISHED, INSTALLED AND WIRED BY DIVISION 26.

SEQUENCE OF OPERATION

1. IF ASSOCIATED AIR HANDLING SYSTEM IS ACTIVATED, DAMPER SHALL OPEN.
2. IF ASSOCIATED AIR HANDLING SYSTEM IS DEACTIVATED, DAMPER SHALL CLOSE.
3. UPON ACTIVATION OF DUCT DETECTOR(S) DAMPER SHALL CLOSE VIA FACTORY WIRED CONNECTION.
4. BAS SHALL MONITOR STATUS OF DAMPER END SWITCHES.

9 FIRE SMOKE DAMPER CONTROL DIAGRAM
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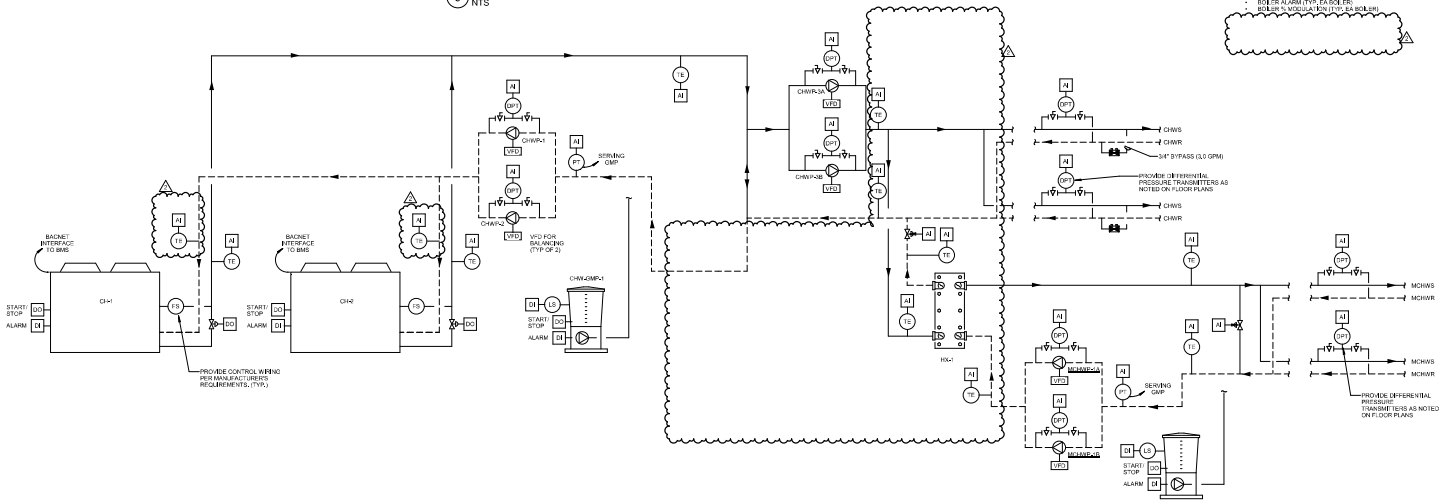

7 CHILLED WATER PLANT - AIR-COOLED PRIMARY SECONDARY
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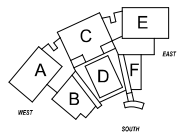

KEYPLAN

Number	Date	Issued For
2	10/23/2024	ADDENDUM NO. 3
1	10/16/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

MECHANICAL CONTROLS DIAGRAMS

Date 07/08/2024
Scale NTS
Proj. Number 22367.00
Drawing Number M701

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ELECTRICAL DEMOLITION NOTES

1. EXISTING ELECTRICAL DEVICES IN REGIONS OF DEMOLITION SHALL BE REMOVED UNLESS NOTED OTHERWISE INCLUDING BUT LIMITED TO PANELBOARDS, RECEPTACLES, LIGHT FIXTURES, LIGHTING CONTROLS, TRANSFORMERS, ETC. TELECOMMUNICATIONS DEVICES, FIRE ALARM DEVICES, SECURITY DEVICES, AND MECHANICAL EQUIPMENT CONNECTIONS. REMOVAL SHALL BE COMPLETE INCLUDING BOXES, BRACKETS, HANGERS AND BRANCH CIRCUIT WIRING BACK TO SOURCE PANELBOARD OR LAST ACTIVE DEVICE TO REMAIN.
2. ELECTRICAL DEMOLITION PLANS ARE DIAGRAMMATIC AND NOT INTENDED TO DEPICT THE ENTIRE SCOPE OF ELECTRICAL DEMOLITION. CONTRACTOR SHALL FIELD VERIFY THE LOCATION OF EXISTING DEVICES. ADDITIONAL DEMOLITION AND MODIFICATION WORK NOT SHOWN SHOULD BE ANTICIPATED.
3. REFER TO DRAWING E0.00 FOR SYMBOLLIST AND OTHER ABBREVIATIONS.
4. DEMOLITION OF EXISTING TELECOMMUNICATIONS DEVICES SHALL INCLUDE REMOVAL OF CONNECTORS, FACEPLATE, BACKBOX, CONDUIT AND WIRING BACK TO SOURCE.
5. DEMOLITION OF EXISTING SECURITY AND FIRE ALARM DEVICES SHALL INCLUDE REMOVAL OF DEVICE, CONNECTORS, MOUNTING HARDWARE, BACKBOX, CONDUIT AND WIRING BACK TO SOURCE OR LAST ACTIVE DEVICE TO REMAIN.
6. DEMOLITION OF EXISTING LIGHTING FIXTURES SHALL ALSO INCLUDE REMOVAL OF ASSOCIATED SWITCHES AND SWITCHED WIRING UNLESS OTHERWISE NOTED IN NEW WORK PLANS. LOCATIONS OF ALL SWITCHES SHALL BE FIELD VERIFIED PRIOR TO DEMOLITION.
7. REFER TO MECHANICAL PLUMBING DEMOLITION PLANS FOR EXISTING MECHANICAL AND PLUMBING EQUIPMENT SCHEDULED FOR DEMOLITION. DISCONNECT AND REMOVE WIRING BACK TO SOURCE AND REMOVE ASSOCIATED STARTERS, WIRING AND DISCONNECT SWITCHES AT EQUIPMENT LOCATIONS.
8. CONTRACTOR SHALL BE RESPONSIBLE FOR DISPOSAL OF ALL ITEMS TO BE REMOVED IN A SAFE, LEGAL AND RESPONSIBLE MANNER.
9. CONTRACTOR SHALL MODIFY EXISTING CIRCUITS, WHEN EXISTING DEVICES ARE REMOVED, AS REQUIRED TO MAINTAIN CIRCUIT CONTINUITY.
10. PRIOR TO SUBMITTING BID, VISIT SITE AND IDENTIFY EXISTING CONDITIONS AND DIFFICULTIES THAT WILL AFFECT WORK TO BE PERFORMED. NO COMPENSATION WILL BE GRANTED FOR ADDITIONAL WORK CAUSED BY UNFAMILIARITY WITH SITE CONDITIONS THAT ARE VISIBLE OR READILY IDENTIFIED BY EXPERIENCED OBSERVERS, INCLUDE IN THE BID ALL DEMOLITION WORK REQUIRED.
11. CONTRACTOR SHALL BE RESPONSIBLE FOR STORAGE AND HANDLING OF EXISTING TO BE RELOCATED EQUIPMENT AND DEVICES.
12. EXISTING FIRE ALARM SYSTEM SHALL BE MODIFIED IN AREA OF WORK AND BE MAINTAINED OUTSIDE OF AREA OF WORK. MAINTAIN OPERATION OF THE EXISTING FIRE ALARM SYSTEM DURING DEMOLITION. WHERE DEVICES TO BE REMOVED BACK TO NEXT DEVICE OUTSIDE THE AREA OF WORK, EXTEND CIRCUITS WITH WIRING TO MATCH EXISTING CLASS AND STYLE TO MAINTAIN CONTINUITY OF CIRCUITS UPSTREAM AND DOWNSTREAM OF THE WORK AFFECTED BY DEMOLITION. PROTECT EXISTING DEVICES DURING CONSTRUCTION, TAKE DEVICES OFFLINE IF NECESSARY. COORDINATE BYPASSING AND REACTIVATION OF THESE DEVICES WITH OWNER. PROVIDE TESTING AND REPROGRAMMING OF SYSTEM, AND COORDINATE ACCEPTANCE TESTING WITH THE LOCAL A.H.J.
13. BRANCH CIRCUITS THAT ARE EXISTING TO REMAIN OR TO BE RELOCATED IN PANELBOARDS THAT ARE BEING DEMOLISHED SHALL BE LABELED TO INDICATE WHAT THEY ARE SERVING BASED ON EXISTING PANELBOARD DIRECTORY.
14. PANELBOARDS THAT ARE EXISTING TO REMAIN SHALL HAVE THEIR DIRECTORY UPDATED TO INDICATE CIRCUITS THAT ARE EXISTING TO REMAIN. CIRCUITS THAT HAVE BEEN REMOVED AS PART OF DEMOLITION SHALL BE INDICATED IN THE REVISED DIRECTORY AS SPARES.
15. WHERE EXISTING LIGHT FIXTURES ARE SCHEDULED FOR RELOCATION, RECONFIGURATION OR REINSTALLATION IN NEW CEILINGS, CLEAN, RE-LAMP IF APPLICABLE AND TEST THE FIXTURES. REPLACE DAMAGED LENSES AND DEFECTIVE BALLASTS OR DRIVERS AS NEEDED.
16. REPLACE BATTERIES FOR EMERGENCY LIGHTING UNITS THAT ARE SCHEDULED TO BE RELOCATED AND REINSTALLED.

FIRE PROTECTION DEMOLITION NOTES

1. THE FIRE PROTECTION CONTRACTOR SHALL VISIT THE SITE AND BECOME FAMILIAR WITH THE EXISTING SYSTEM AND CONDITIONS IN AREAS OF RENOVATION.
2. ALL EXISTING PIPING AND EQUIPMENT SHOWN HAS BEEN TAKEN FROM THE BEST AVAILABLE EXISTING INFORMATION. THE DRAWINGS ARE DIAGRAMMATIC AND ALL PIPING AND DEVICES MAY NOT BE SHOWN.
3. CONTRACTOR TO VERIFY IN FIELD THE SIZE AND LOCATION OF FIRE PROTECTION PIPING AND TO REPORT ANY VARIANCES TO THE ARCHS/ENGINEER FOR INCLUSION IN THE DRAWINGS.
4. ALL PIPING TO BE REMOVED SHALL BE REMOVED COMPLETELY OR CAPPED AS SHOWN WITHOUT LEAVING ANY DEAD ENDED PIPING OR ABANDONED PIPING.
5. NO FIRE PROTECTION EQUIPMENT OR DEVICES THAT HAVE BEEN DISCONNECTED OR ABANDONED SHALL REMAIN.
6. ANY SYSTEM OR EQUIPMENT TO REMAIN ACTIVE DURING RENOVATION SHALL BE KEPT IN OPERATION BY PROVIDING TEMPORARY CONNECTIONS AS REQUIRED UNTIL NEW SYSTEMS ARE INSTALLED AND OPERATIONAL.
7. ALL SERVICE INTERRUPTIONS SHALL BE COORDINATED WITH THE BUILDING MANAGEMENT IN ADVANCE. THE FIRE MARSHALL MUST BE CONTACTED IN ADVANCE PRIOR TO COMMENCEMENT OF ANY WORK.
8. THE FIRE MARSHALL AND OR THE INSURANCE UNDERWRITER SHALL BE CONTACTED TO REVIEW AND APPROVE THE EXTENT OR PHASING OF THE FIRE PROTECTION DEMOLITION IN ORDER TO PROTECT THE OCCUPANTS AND PROPERTY. THESE DOCUMENTS DO NOT ADDRESS THE PHASING OF THE SYSTEM REMOVAL, ONLY THE EXTENT.
9. THE FIRE PROTECTION CONTRACTOR SHALL ALSO REVIEW THE ARCHITECTURAL DEMOLITION DRAWINGS AS PART OF THIS CONTRACT FOR ADDITIONAL INFORMATION AND REQUIREMENTS.

PLUMBING DEMOLITION NOTES

1. THE PLUMBING CONTRACTOR SHALL REMOVE ALL PLUMBING FIXTURES, CARRIERS, TRIM, ACCESSORIES, EQUIPMENT, FLOOR DRAINS AND PIPING AS SHOWN OR INDICATED ON THE DRAWINGS.
2. ALL PIPING TO BE REMOVED SHALL BE REMOVED COMPLETELY OR AS OTHERWISE SHOWN OR INDICATED ON DRAWINGS. ALL PIPE HANGERS, SLEEVES, INSERT CLAMPS, ETC., SHALL BE REMOVED COMPLETELY WITH PIPING. NO EXISTING HANGER SYSTEMS SHALL BE REUSED FOR NEW PIPING.
3. ALL PIPING TO BE REMOVED SHALL BE REMOVED TO BELOW FLOOR, ABOVE CEILING OR IN WALLS BACK TO MAINS OR SHUT OFF VALVES AT MAINS AND PROPERLY CAPPED PER CODE WITHOUT LEAVING DEAD ENDED PIPING.
4. NO EQUIPMENT OR DEVICES THAT HAVE BEEN DISCONNECTED AND OR ABANDONED SHALL REMAIN.
5. ALL EXISTING PIPING AND EQUIPMENT SHOWN HAS BEEN TAKEN FROM THE BEST AVAILABLE EXISTING INFORMATION. THE DRAWINGS ARE DIAGRAMMATIC AND ALL PIPING AND DEVICES MAY NOT BE SHOWN. IT IS THE INTENT OF THESE DRAWINGS IS THAT IN ALL AREAS OF RENOVATION THAT THEY ARE REMOVED, WHETHER OR NOT SHOWN UNLESS INDICATED TO REMAIN.
6. THE PLUMBING CONTRACTOR SHALL VISIT THE SITE AND BECOME FAMILIAR WITH THE EXISTING SYSTEMS AND CONDITIONS IN AREAS OF RENOVATION.
7. ANY SYSTEMS OR EQUIPMENT TO REMAIN ACTIVE DURING RENOVATION SHALL BE KEPT IN OPERATION BY PROVIDING TEMPORARY PIPING CONNECTIONS AS REQUIRED UNTIL NEW SYSTEMS ARE INSTALLED AND OPERATIONAL.
8. THE PLUMBING CONTRACTOR SHALL COORDINATE WITH THE OWNER, CM AND OR GENERAL CONTRACTOR ANY AND ALL PHASING OF THE PLUMBING DEMOLITION WORK IN ORDER TO SATISFY THE CONSTRUCTION SCHEDULE AND OWNERS OCCUPANCY REQUIREMENTS.
9. THE PLUMBING CONTRACTOR SHALL ALSO REVIEW THE ARCHITECTURAL DEMOLITON DRAWINGS AS PART OF THIS CONTRACT FOR ADDITIONAL INFORMATION AND REQUIREMENTS.
10. ALL SERVICE INTERUPTIONS SHALL BE COORDINATED AND APPROVED WITH THE OWNER A MINIMUM OF 5 DAYS IN ADVANCE PRIOR TO COMMENCEMENT OF ANY WORK.
11. THE PLUMBING CONTRACTOR SHALL COORDINATE THEIR DEMOLITION WORK WITH THAT OF OTHER TRADES IN ORDER TO AVOID CONFLICTS.
12. ANY FIXTURE OR EQUIPMENT TO BE REMOVED AND REUSED OR RETURNED TO OWNER AT OWNERS REQUEST OR AS INDICATED ON DRAWINGS SHALL BE CAREFULLY REMOVED AND STORED TO PREVENT DAMAGE.

MECHANICAL DEMOLITION NOTES

DEMOLITION NOTES

1. SITE VISIT: THIS PROJECT INVOLVES CONSTRUCTION INSIDE AN EXISTING STRUCTURE. BEFORE SUBMITTING BID, VISIT AND CAREFULLY EXAMINE SITE TO IDENTIFY EXISTING CONDITIONS AND DIFFICULTIES THAT WILL AFFECT WORK OF THIS SECTION. NO EXTRA PAYMENT WILL BE ALLOWED FOR ADDITIONAL WORK CAUSED BY UNFAMILIARITY WITH SITE CONDITIONS THAT ARE VISIBLE OR READILY CONSTRUED BY EXPERIENCED OBSERVER.
2. PREPARATORY WORK: BEFORE STARTING WORK IN A PARTICULAR AREA OF THE PROJECT, VISIT SITE AND EXAMINE CONDITIONS UNDER WHICH WORK MUST BE PERFORMED INCLUDING PREPARATORY WORK DONE UNDER OTHER SECTIONS OR CONTRACTS BY OWNER. REPORT CONDITIONS THAT MIGHT AFFECT WORK ADVERSELY IN WRITING TO ARCHITECT AND OWNER. DO NOT PROCEED WITH WORK UNTIL DEFECTS HAVE BEEN CORRECTED AND CONDITIONS ARE SATISFACTORY. COMMENCEMENT OF WORK SHALL BE CONSTRUED AS COMPLETE ACCEPTANCE OF EXISTING CONDITIONS AND PREPARATORY WORK.
3. PHASING: DEMOLITION WORK SHALL COMPLY WITH THE PHASING REQUIREMENTS OF THE PROJECT AND BE COORDINATED WITH THE OWNER, ARCHITECT, CM AND ENGINEER. NO REMOVALS SHALL BE IMPLEMENTED WITHOUT A THOROUGH UNDERSTANDING OF THE PHASING REQUIREMENTS.
4. ABANDONING OF DUCTWORK, PIPING OR EQUIPMENT IN PLACE WITHIN SCOPE AREA IS PROHIBITED.
5. PROVIDE 2 WEEKS NOTICE TO OWNER FOR SHUT DOWN OF ANY SERVICES AND/OR SYSTEMS.
6. COORDINATE EXISTING EQUIPMENT AND MATERIALS THAT SHALL REMAIN THE PROPERTY OF THE OWNER. ITEMS OF VALUE WHICH ARE NOT DIRECTED TO BE RETURNED TO THE OWNER, SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED FROM SITE AND LEGALLY DISPOSED OF. STORAGE OR SALE OF ITEMS ON THE PROJECT SITE IS PROHIBITED.
7. PROTECTION: ENSURE THE SAFE PASSAGE OF PERSONS IN AND AROUND THE BUILDING DURING DEMOLITION. PREVENT INJURY TO PERSONS AND DAMAGE TO PROPERTY. PROVIDE ADEQUATE SHORING AND BRACING TO PREVENT COLLAPSE. IMMEDIATELY REPAIR DAMAGED PROPERTY TO THE CONDITION BEFORE BEING DAMAGED. TAKE EFFECTIVE MEASURES TO PREVENT WINDBLOWN DUST.
8. UTILITIES: MAINTAIN ALL UTILITIES EXCEPT THOSE REQUIRING REMOVAL OR RELOCATION. KEEP UTILITIES IN SERVICE AND PROTECT FROM DAMAGE. DO NOT INTERRUPT UTILITIES SERVING OCCUPIED AREAS WITHOUT FIRST OBTAINING PERMISSION FROM THE OWNER IN WRITING. PROVIDE TEMPORARY SERVICES AS REQUIRED.
9. INFORMATION CONTAINED ON THESE DRAWINGS WAS OBTAINED FROM ARCHIVED DRAWINGS AND SITE VISITS. DRAWINGS ARE DIAGRAMMATIC ONLY AND REFLECT OVERALL SYSTEM REMOVAL. WHERE ENTIRE ITEM OR COMPONENT OF A SYSTEM IS SHOWN, PROVIDE COMPLETE REMOVAL OF ASSOCIATED ANCILLARY PIPES, HANGERS, VALVES AND ACCESSORIES SERVING SYSTEM SHOWN.
10. DEMOLITION WORK SHALL COMPLY WITH OSHA, EPA AND APPLICABLE STATE AND LOCAL CODES. COMPLY WITH HAULING AND DISPOSAL REGULATIONS.
11. REFER TO SPECIFICATIONS FOR ADDITIONAL DEMOLITION REQUIREMENTS AND PROCEDURES.

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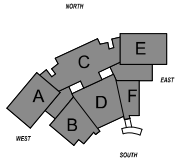

KEYPLAN

Number	Date	Issued For
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	07/08/2024	PHASE 2

MEP DEMOLITION ABBREVIATIONS, NOTES, AND SYMBOLS

Date: 07/08/2024
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Proj. Number: 22367.00
Drawing Number: MEPD000

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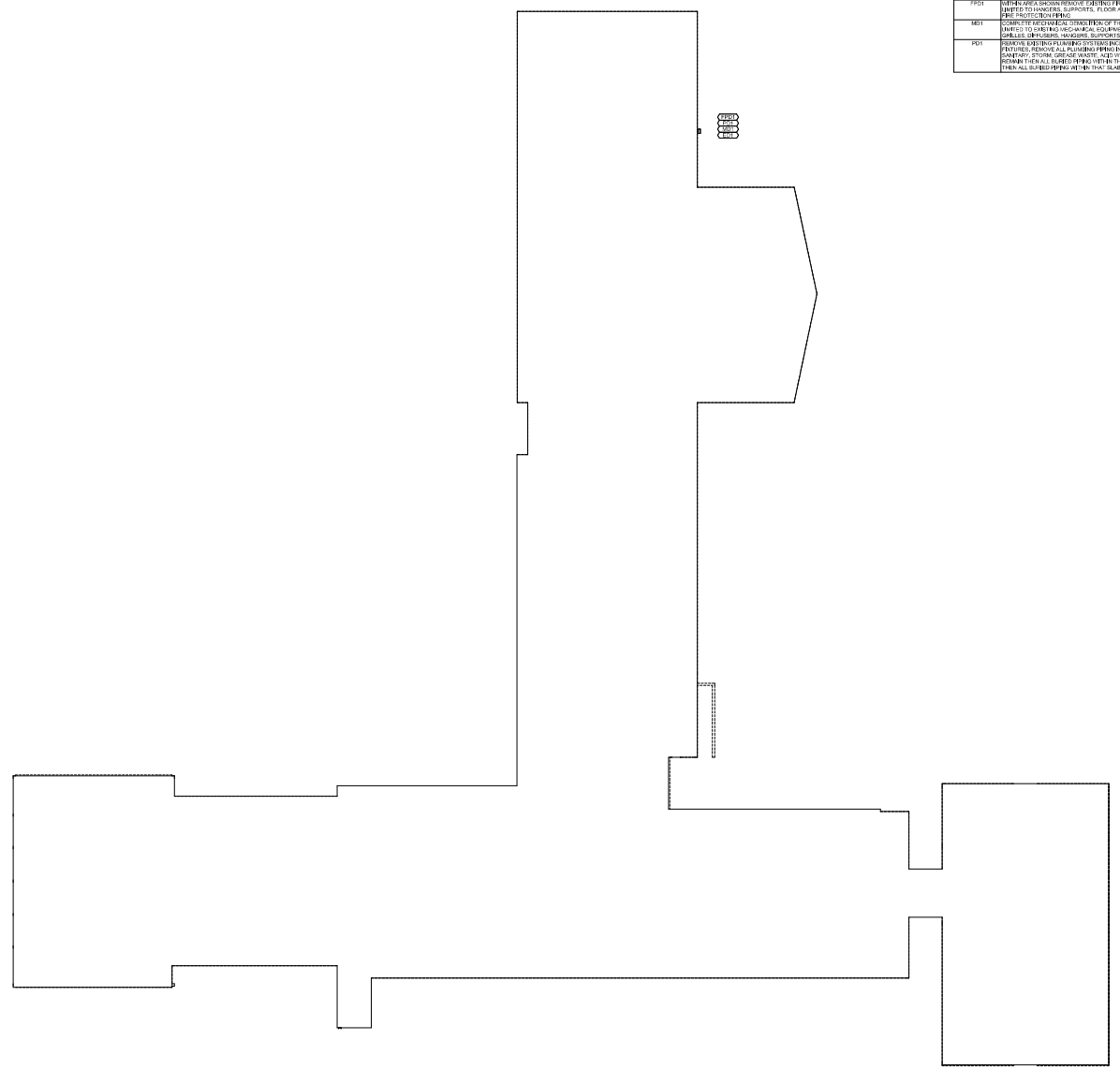
KEYNOTES - MEPFP DEMOLITION	
Key Value	Keynote Text
ED1	THE ELECTRICAL SYSTEMS WITHIN THE EXISTING MIDDLE SCHOOL BUILDING BOTH ACTIVE AND INACTIVE AND ANY THAT ARE ABANDONED IN PLACE SHALL BE DE-ENERGIZED, DE-ACTIVATED, DECOMMISIONED AND REMOVED IN THEIR ENTIRETY.
FPD1	WITHIN AREA SHOWN REMOVE EXISTING FIRE PROTECTION SYSTEM IN IT'S ENTIRETY, INCLUDING BUT NOT LIMITED TO HANGERS, SUPPORTS, FLOOR ASSEMBLIES, STANDPIPES, VALVES AND SPRINKLERS. REMOVE ALL FIRE PROTECTION PIPING
MD1	COMPLETE MECHANICAL DEMOLITION OF THIS AREA SHALL OCCUR UNDER THIS PROJECT INCLUDING BUT NOT LIMITED TO EXISTING MECHANICAL EQUIPMENT, BOILERS, AIR HANDLERS, FANS, DUCTWORK, HYDRONIC PIPING, GRILLES, DIFFUSERS, HANGERS, SUPPORTS, AND CONTROL DEVICES.
PD1	REMOVE EXISTING PLUMBING SYSTEMS INCLUDING BUT NOT LIMITED TO PUMPS, HANGERS, SUPPORTS, AND FIXTURES. REMOVE ALL PLUMBING PIPING INCLUDING BUT NOT LIMITED TO COLD WATER, HOT WATER, GAS, SANITARY, STORM, GREASE WASTE, ACID WASTE, CONDENSATE, AND VENT PIPING. IF SLAB IS EXISTING TO REMAIN THEN ALL BURIED PIPING WITHIN THAT SLAB SHALL BE CUT AND CAPPED. IF SLAB IS TO BE DEMOLISHED THEN ALL BURIED PIPING WITHIN THAT SLAB SHALL BE REMOVED.



1 EXISTING SCHOOL MEPFP DEMO PLAN VIEW
3/64" = 1'-0"

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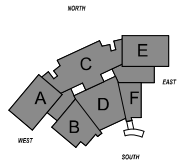

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Number	Date	Issued For
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	07/08/2024	PHASE 2

MEP DEMO PLAN VIEW

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Drawing Number: MEPD001
Scale: 3/64" = 1'-0"
Proj. Number: 22367.00

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KEYNOTES - MECHANICAL	
Key Value	Keynote Text
M1	ROUTE CONDENSATE PIPING TO THE NEAREST STORM PIPE AND CONNECT WITH AN INDIRECT DRAIN CONNECTION, REFER TO PLUMBING PLANS FOR STORM PIPING COORDINATION AND INDIRECT CONNECTION DETAIL.
M2	PROVIDE CONDENSATE DRAIN AND TRAP, AND ROUTE DOA CONDENSATE PIPING TO THE NEAREST STORM PIPE LOCATED AT THE MECHANICAL ROOM FLOOR. PROVIDE AN INDIRECT PIPE CONNECTION TO THE STORM PIPE AND SIZE THE CONDENSATE PIPE AND TRAP PER THE MANUFACTURER'S REQUIREMENTS. REFER TO PLUMBING PLANS FOR STORM PIPING COORDINATION AND INDIRECT CONNECTION DETAIL.

1 MECHANICAL PIPING FIRST FLOOR PLAN - A
1/8" = 1'-0"

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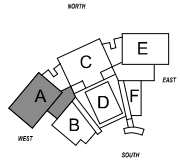

KEYPLAN

Number	Date	Issued For
1	10/16/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

MECHANICAL PIPING FIRST FLOOR PLAN - PART A

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **MP101A**

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KEYNOTES - MECHANICAL	
Key Value	Keynote Text
M1	ROUTE CONDENSATE PIPING TO THE NEAREST STORM PIPE AND CONNECT WITH AN INDIRECT DRAIN CONNECTION. REFER TO PLUMBING PLANS FOR STORM PIPING COORDINATION AND INDIRECT CONNECTION DETAIL.

1 MECHANICAL PIPING FIRST FLOOR PLAN - B
1/8" = 1'-0"

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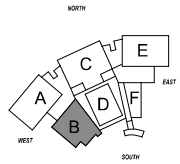

KEYPLAN

Number	Date	Issued For
2	10/23/2024	ADDENDUM NO. 3
1	10/16/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

MECHANICAL PIPING FIRST FLOOR PLAN - PART B

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
22367.00

Drawing Number
MP101B

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1 MECHANICAL PIPING FIRST FLOOR PLAN - C
1/8" = 1'-0"

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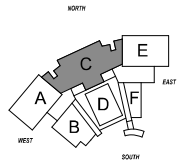

KEYPLAN

Number	Date	Issued For
2	10/23/2024	ADDENDUM NO. 3
1	10/16/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

MECHANICAL PIPING FIRST FLOOR PLAN - PART C

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **MP101C**

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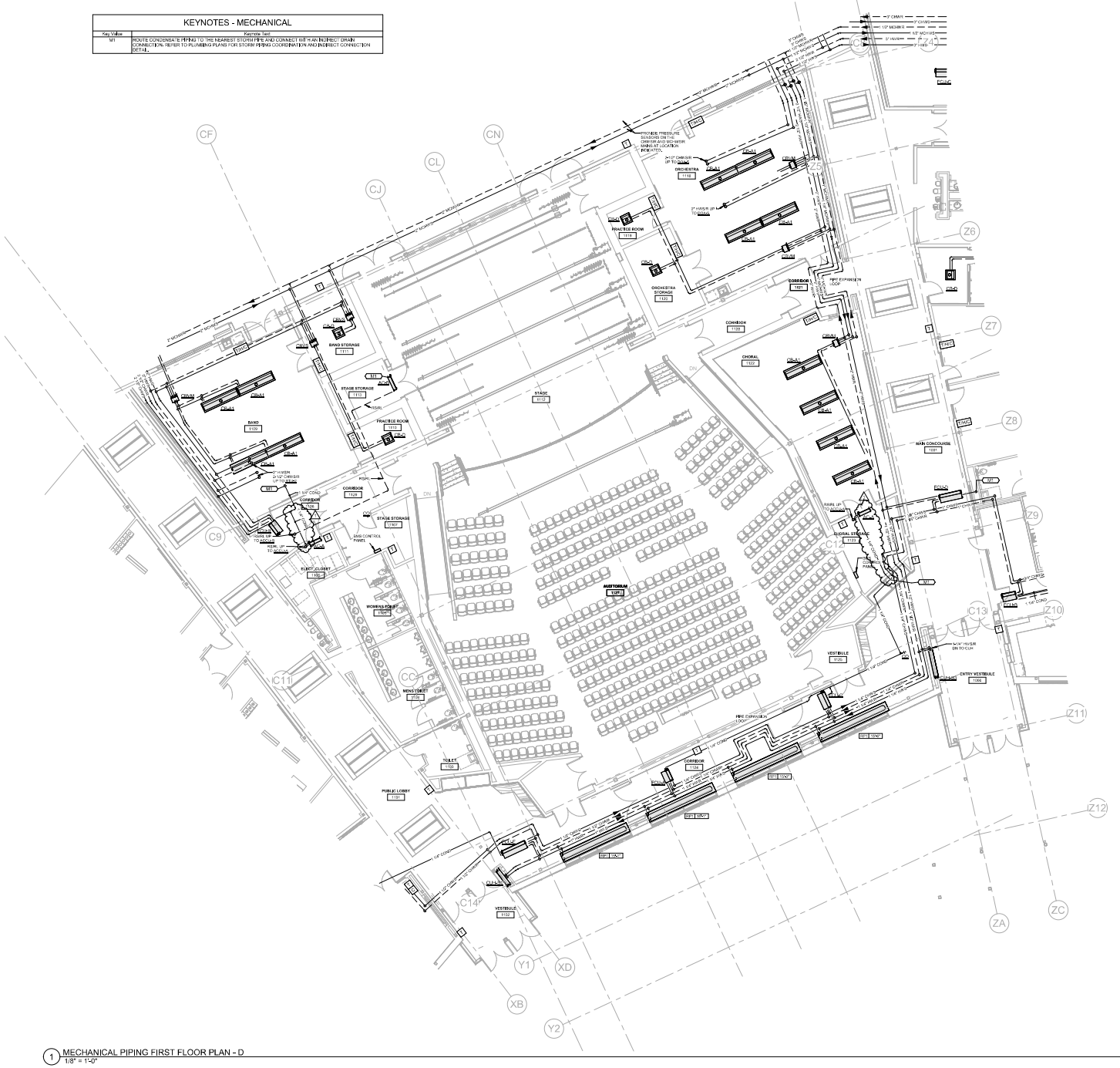
KEYNOTES - MECHANICAL	
Key Value	Keynote Text
M1	ROUTE CONDENSATE PIPING TO THE NEAREST STORM PIPE AND CONNECT WITH AN INDIRECT DRAIN CONNECTION. REFER TO PLUMBING PLANS FOR STORM PIPING COORDINATION AND INDIRECT CONNECTION DETAIL.



1 MECHANICAL PIPING FIRST FLOOR PLAN - D
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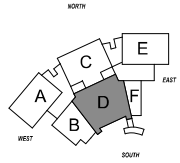

KEYPLAN

Number	Date	Issued For
1	10/16/2024	ADDENDUM NO. 2
	09/30/2024	BID/BUILDPERMIT
	07/08/2024	PHASE 2

MECHANICAL PIPING FIRST FLOOR PLAN - PART D

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **MP101D**

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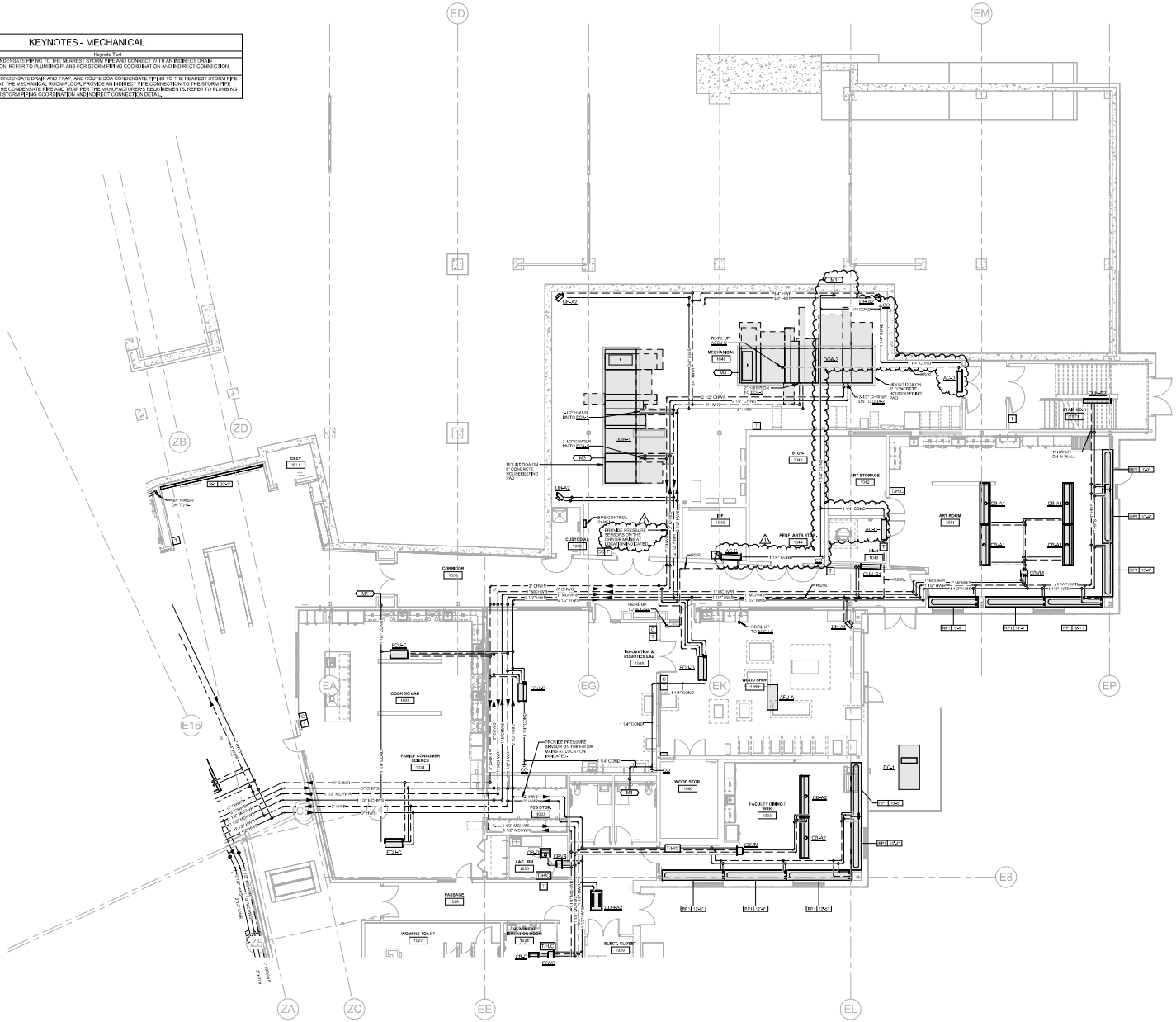
10/15/2024 10:30:10 AM

KEYNOTES - MECHANICAL	
Key Value	Keynote Text
M1	ROUTE CONDENSATE PIPING TO THE NEAREST STORM PIPE AND CONNECT WITH AN INDIRECT DRAIN CONNECTION. REFER TO PLUMBING PLANS FOR STORM PIPING COORDINATION AND INDIRECT CONNECTION DETAIL.
M3	PROVIDE CONDENSATE DRAIN AND TRAP, AND ROUTE DOA CONDENSATE PIPING TO THE NEAREST STORM PIPE LOCATED AT THE MECHANICAL ROOM FLOOR. PROVIDE AN INDIRECT PIPE CONNECTION TO THE STORM PIPE AND SIZE THE CONDENSATE PIPE AND TRAP PER THE MANUFACTURER'S REQUIREMENTS. REFER TO PLUMBING PLANS FOR STORM PIPING COORDINATION AND INDIRECT CONNECTION DETAIL.



1 MECHANICAL PIPING FIRST FLOOR PLAN - E
1/8" = 1'-0"

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Greenwich Public Schools

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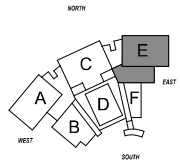

KEYPLAN

Number	Date	Issued For
1	10/16/2024	ADDENDUM NO. 2
	09/20/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

MECHANICAL PIPING FIRST FLOOR PLAN - PART E

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **MP101E**

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KEYNOTES - MECHANICAL	
Key Value	Keynote Text
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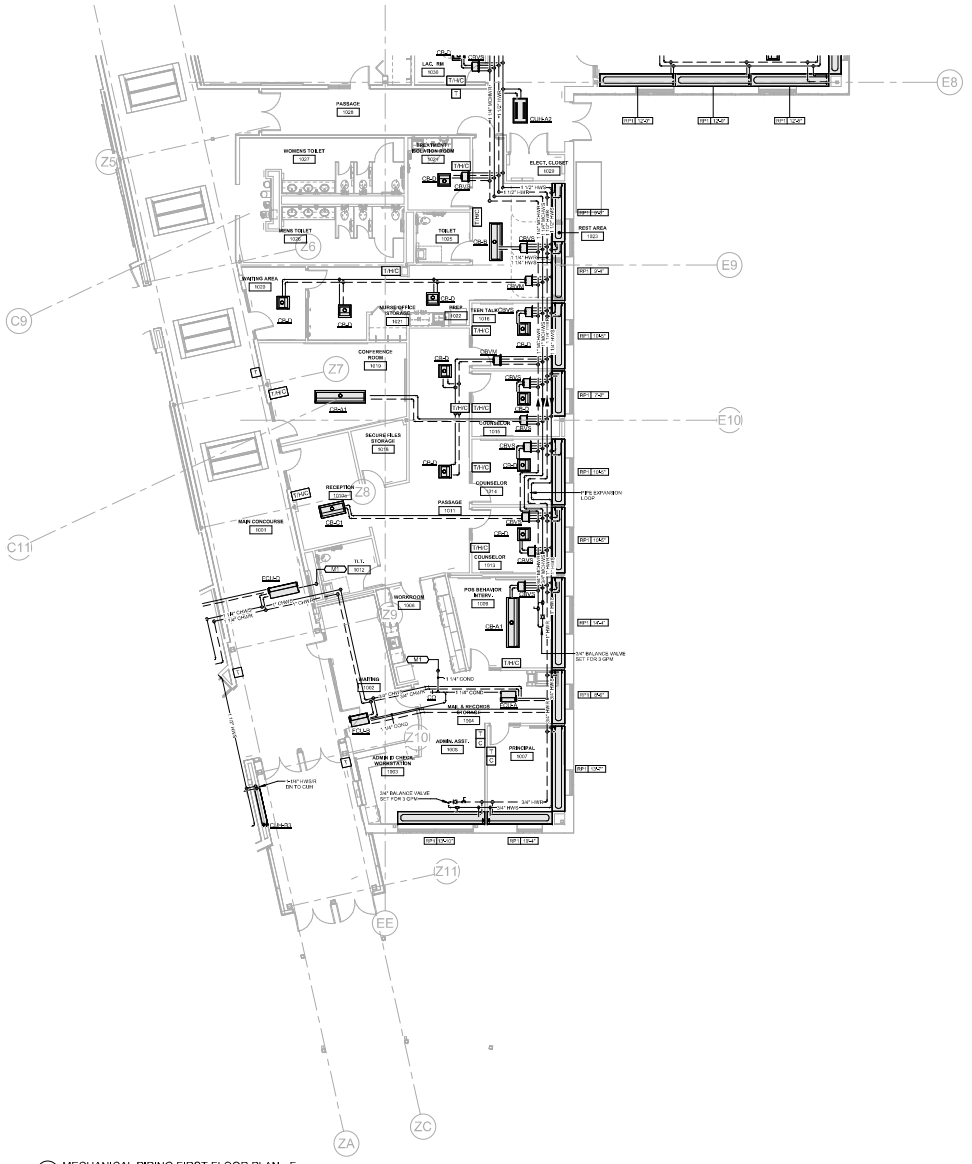
E8
E9
E10
E11
EE
ZA
ZC
Z5
Z6
Z7
Z8
Z9
Z10
Z11
C9
C11
PASSAGE 1028
WOMENS TOILET 1027
MENS TOILET 1026
SICK ROOM / ISOLATION ROOM 1024
TOILET 1025
ELECT. CLOSET 1022
REST AREA 1023
WAITING AREA 1028
NURSE OFFICE 1017
BREAK 1020
TEEN TAUSCHOOL 1018
CONFERENCE ROOM 1019
CONVERSATION 1015
SECURE FILES STORAGE 1016
RECEPTION 1000
COUNSELOR 1014
PASSAGE 1011
MAIN CONCOURSE 1001
COUNSELOR 1013
POS BEHAVIOR INTERV. 1009
WORKROOM 1008
WAITING 1002
MAIL & MESSAGE ATTENDANT 1003
ADMIN. ASST. 1005
PRINCIPAL 1007
ADMIN ID CHECK / ADMINISTRATION 1004
T.V. 1012
M1
3/4" BALANCE VALVE SET FOR 3 GPM
1" HWSR
1" HWRR
1" CHWS
1" CHWR
1" CWS
1" CWR
1" COND
1" DRAIN
1" CWS OR CWR
1" CWR OR CWS
1" HWS OR HWR
1" HWSR OR HWRR
1" HWSR DN TO CBH
1" HWRR
1" CHWS OR CHWR
1" CHWR OR CHWS



1 MECHANICAL PIPING SECOND FLOOR PLAN - A
1/8" = 1'-0"

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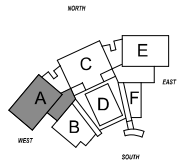

KEYPLAN

Number	Date	Issued For
4	11/05/2024	ADDENDUM NO. 5
3	10/23/2024	ADDENDUM NO. 3
2	10/16/2024	ADDENDUM NO. 2
1	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

MECHANICAL PIPING SECOND FLOOR PLAN - PART A

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
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1 MECHANICAL PIPING SECOND FLOOR PLAN - B
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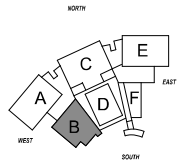

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

MECHANICAL PIPING SECOND FLOOR PLAN - PART B

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
22367.00

Drawing Number
MP102B

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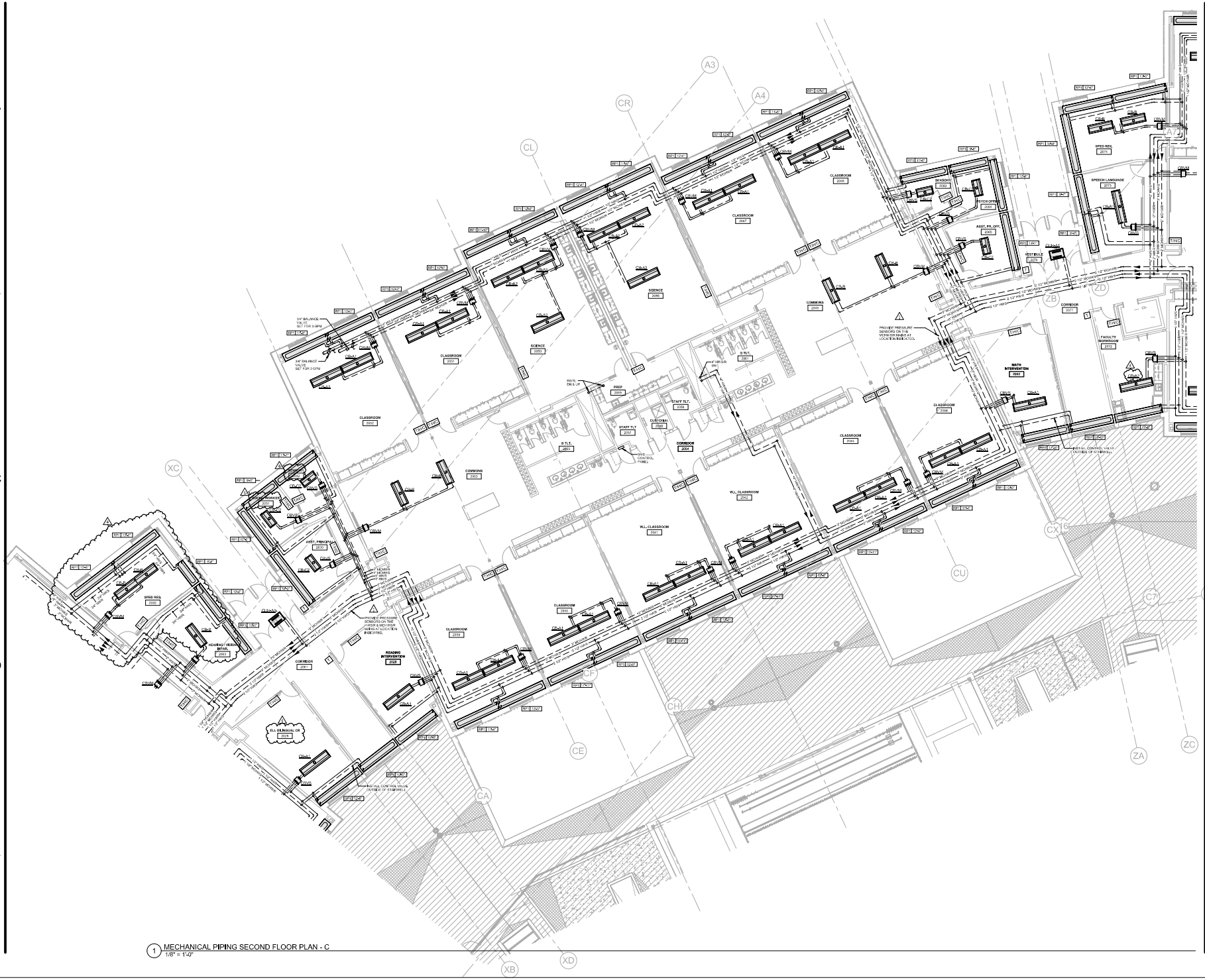

1 MECHANICAL PIPING SECOND FLOOR PLAN - C
1/8" = 1'-0"

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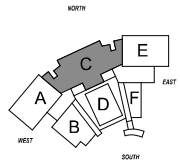

KEYPLAN

Number	Date	Issued For
4	11/06/2024	ADDENDUM NO. 6
1	10/16/2024	ADDENDUM NO. 2
	09/20/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

MECHANICAL PIPING SECOND FLOOR PLAN - PART C

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: MP102C

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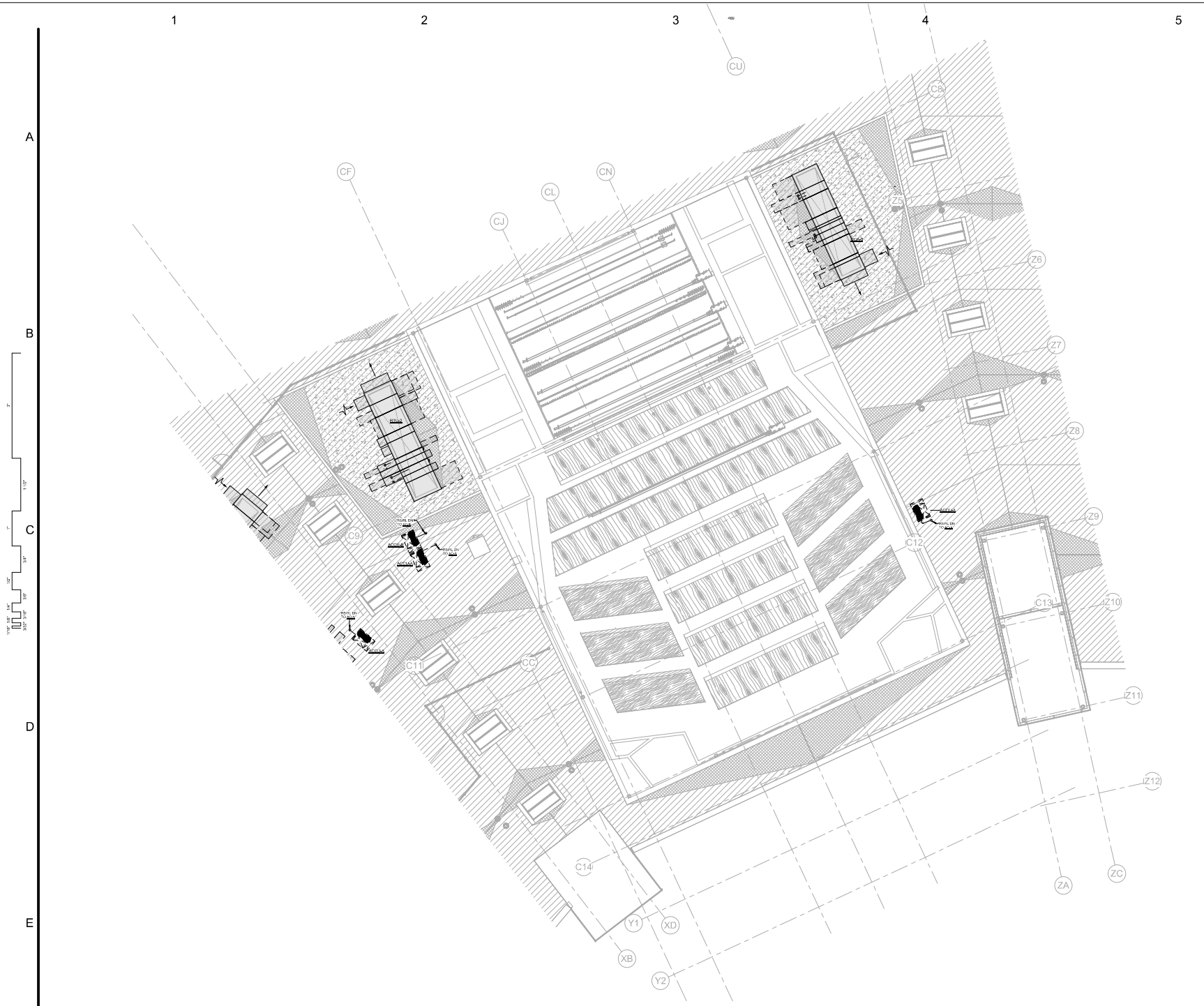

1 MECHANICAL PIPING SECOND FLOOR PLAN - D
1/8" = 1'-0"

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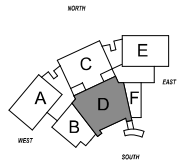

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

MECHANICAL PIPING SECOND FLOOR PLAN - PART D

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
22367.00

Drawing Number
MP102D

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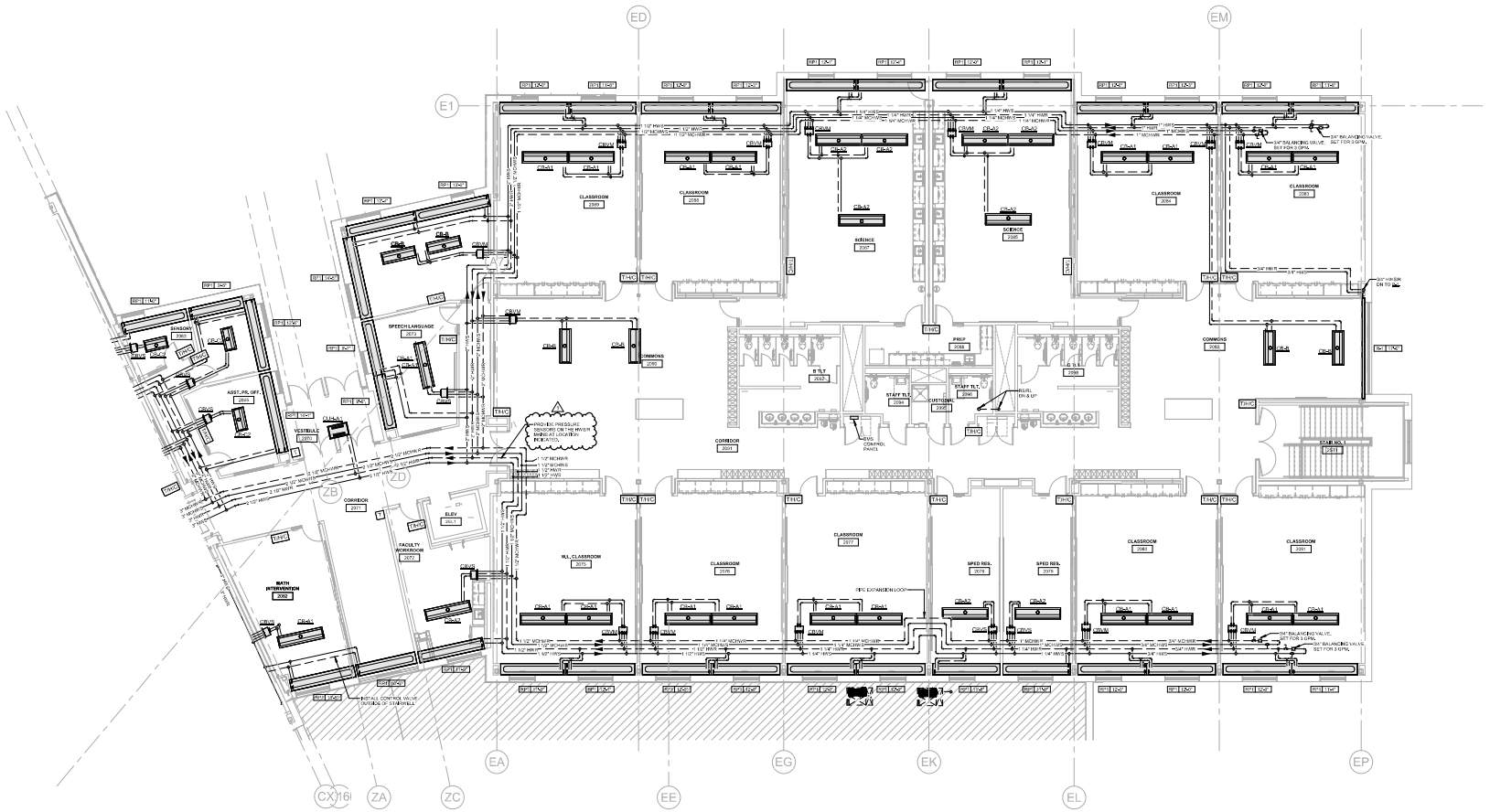

1 MECHANICAL PIPING SECOND FLOOR PLAN - E
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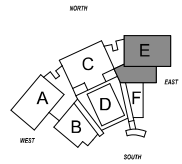

KEYPLAN

Number	Date	Issued For
1	10/16/2024	ADDENDUM NO. 2
	09/20/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

MECHANICAL PIPING SECOND FLOOR PLAN - PART E

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00

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ELECTRICAL ABBREVIATIONS

A/AMP	AMPERE
AC	ALTERNATING CURRENT
AFCI	ARC FAULT CIRCUIT INTERRUPTER
ACU	AIR CONDITIONING UNIT
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHU	AIR HANDLING UNIT
AIC	AMPS INTERRUPTING CURRENT
AL	ALUMINUM
ATS	AUTOMATIC TRANSFER SWITCH
AWG	AMERICAN WIRE GAUGE
BSMT	BASEMENT
C	CONDUIT
CATV	CABLE TELEVISION
CB	CIRCUIT BREAKER
CKT	CIRCUIT
COMP	COMPRESSOR
CP	CONDENSATE PUMP
CT	CURRENT TRANSFORMER
CU	CONDENSING UNIT OR COPPER
CUH	CABINET UNIT HEATER
D	DIPPER
DEG.	DEGREE
DIA	DIAMETER
DN	DOWN
DWG	DRAWING
ETR	EXISTING TO REMAIN
EF	EXHAUST FAN
EGC	EQUIPMENT GROUNDING
ELEV	ELEVATOR
EM	EMERGENCY
EMT	ELECTRIC METALLIC TUBING
EP	EMERGENCY PANEL
EUH	ELECTRIC UNIT HEATER
EWC	ELECTRIC WATER COOLER
EWH	ELECTRIC WATER HEATER
F	FAHRENHEIT
FA	FIRE ALARM
FACP	FIRE ALARM CONTROL PANEL
FC	FOOT CANDLE
FCU	FAN COIL UNIT
G	GROUND
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
HP	HORSE POWER
HPS	HIGH PRESSURE SODIUM
HR	HOUR
HZ	HERTZ
IG	ISOLATED GROUND
IN	INCHES
JB	JUNCTION BOX
KCMIL	THOUSAND CIRCULAR MILS
KVA	KILOVOLT AMPERE
KW	KILOWATT
MAX	MAXIMUM
MAU	MAKE-UP AIR UNIT
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MCCB	MOLDED CASE CIRCUIT BREAKER
MH	MANHOLE OR HANDHOLE
MIN	MINIMUM
MLO	MAIN LUGS ONLY
NA	NOT APPLICABLE
NE	NEW DEVICE INSTALLED IN SAME LOCATION AS EXISTING REMOVED DEVICE
NEC	NATIONAL ELECTRIC CODE
NIC	NOT IN CONTRACT
NL	NEW LOCATION OF RELOCATED DEVICE
NR	NEW TO REPLACE EXISTING
NTS	NOT TO SCALE
P	POLE
PE	PRIMARY ELECTRIC SERVICE
PF	POWER FACTOR
PH	PHASE
PNL	PANEL
PVC	POLYVINYL CHLORIDE CONDUIT
PWR	POWER TO BE REMOVED
REF	REFRIGERATOR
RGS	RIGID GALVANIZED STEEL CONDUIT
RL	EXISTING TO BE RELOCATED
RM	ROOM
RN	EXISTING TO BE REMOVED AND REPLACED WITH NEW (EXISTING BACKBOXES, CONDUIT AND WIRING TO REMAIN)
RR	EXISTING TO BE RELOCATED IN SAME LOCATION ON NEW SURFACE
RTU	ROOFTOP UNIT
SE	SECONDARY ELECTRICAL SERVICE
SPEC	SPECIFICATION
SWBD	SWITCHBOARD
SPD	SURGE PROTECTION DEVICE
TCUE	TELECOMMUNICATIONS/TELEPHONE
TV	TELEVISION
TYP	TYPICAL OR COMMON
UH	UNIT HEATER
UON	UNLESS OTHERWISE NOTED
V	VOLTS
VA	VOLT AMPERE
VAC	VOLTS ALTERNATING CURRENT
VIF	VERIFY IN FIELD
W	WATT OR WIRE
WA	WASHER
WG	WIRE GUARD
WP	WEATHERPROOF

FIRE ALARM LEGEND

SYMBOL	DESCRIPTION
EQUIPMENT	
EAS	EMERGENCY 24-WAY COMMUNICATION SYSTEM AREA CALL STATION. REFER TO 24-WAY COMMUNICATION SYSTEM WIRING DIAGRAM FOR ADDITIONAL INFORMATION.
EMS	EMERGENCY 24-WAY COMMUNICATION SYSTEM MASTER STATION. REFER TO 24-WAY COMMUNICATION SYSTEM WIRING DIAGRAM FOR ADDITIONAL INFORMATION.
FACP	FIRE ALARM CONTROL PANEL
FARA	FIRE ALARM REMOTE ANNUNCIATOR PANEL
FVAC	FIRE ALARM VOICE EVACUATION REMOTE MICROPHONE
FATP	FIRE ALARM TRANSPONDER PANEL
BMP*	BI-DIRECTIONAL AMPLIFICATION SYSTEM MONITORING PANEL
INITIATING DEVICES	
S	CEILING MOUNTED SMOKE DETECTOR
SB	CEILING MOUNTED SMOKE DETECTOR WITH SOUNDER BASE
SB CO	CEILING MOUNTED SMOKE DETECTOR WITH CARBON MONOXIDE SOUNDER BASE
SDC	CEILING MOUNTED SMOKE DETECTOR WITH LOW FREQUENCY 520HZ SOUNDER BASE
S	CEILING MOUNTED SMOKE DETECTOR WIRED TO ELEVATOR RECALL SYSTEM
S	WALL MOUNTED SMOKE DETECTOR
H	CEILING MOUNTED HEAT DETECTOR WITH TEMPERATURE RATING OF 135 DEGREES UNLESS OTHERWISE NOTED
HRR	CEILING MOUNTED COMBINATION FIXED TEMPERATURE / RATE-OF-RISE HEAT DETECTOR
DS	DUCT MOUNTED SMOKE DETECTOR AND HOUSING
SD SSD	SMOKE OR FIRE/SMOKE DAMPER WITH ASSOCIATED DUCT SMOKE DETECTOR, PROVIDE ALL ITEMS LISTED AS BY DIVISION 26 AND BY DIVISION 23 WITH ELECTRICAL SMOKE DAMPER DETAIL. PROVIDE WITH ONE DUCT SMOKE DETECTOR UNLESS OTHERWISE NOTED.
F	WALL MOUNTED FIRE ALARM MANUAL PULL STATION. MOUNT AT 48" AFF.
EA	HEAT DETECTOR FOR ELEVATOR RECALL CONTROLS
CO	CEILING MOUNTED CARBON MONOXIDE DETECTOR
NOTIFICATION	
XX W	WALL MOUNTED COMBINATION SPEAKER / STROBE LIGHT WITH A MULTI-CANDELA STROBE, MOUNT AT 6'-8" AFF, WG= PROVIDE WITH WIREGUARD, "XX"=CANDELA RATING
XX C	WALL MOUNTED STROBE-ONLY UNIT WITH A MULTI-CANDELA STROBE, MOUNT AT 6'-8" AFF, WG= PROVIDE WITH WIREGUARD, "XX"=CANDELA RATING
XX C	CEILING MOUNTED COMBINATION SPEAKER/STROBE LIGHT WITH A MULTI-CANDELA STROBE, "XX"=CANDELA RATING
XX C	CEILING MOUNTED STROBE-ONLY UNIT WITH A MULTI-CANDELA STROBE, "XX"=CANDELA RATING
F	WALL MOUNTED FIRE ALARM MANUAL PULL STATION. MOUNT AT 48" AFF. PROVIDE WITH LABEL STATION GUARD, STI-STOPPER II OR EQUAL WHERE REQUIRED.
B	EXTERIOR SPRINKLER BELL, PROVIDE 20A/1P CIRCUIT.
INTERFACE MODULES	
MM	FIRE ALARM MONITOR MODULE
CM	FIRE ALARM CONTROL MODULE
RM	FIRE ALARM RELAY MODULE
MISCELLANEOUS	
HDS	REMOTE DUCT SMOKE DETECTOR TEST SWITCH
TDS	FIRE PROTECTION TAMPER SWITCH AND FIRE ALARM MONITOR MODULE
FDS	FIRE PROTECTION FLOW SWITCH AND FIRE ALARM MONITOR MODULE
PDS	FIRE PROTECTION PRESSURE SWITCH AND FIRE ALARM MONITOR MODULE
M	MAGNETIC DOOR HOLD OPEN, PROVIDE WITH SMOKE DETECTORS WITHIN 5 FEET OF BOTH SIDES OF DOOR, REFER TO DETAIL E/ES2
EOL	END OF LINE RESISTOR

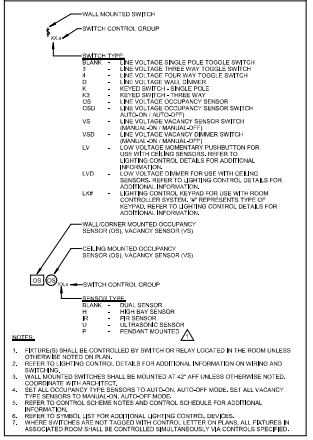
ELECTRICAL SYMBOLS

SYMBOL	DESCRIPTION
	SURFACE MOUNTED PANELBOARD
	RECESSED PANELBOARD
	DISCONNECT SWITCH
	FUSED DISCONNECT SWITCH
	COMBINATION STARTER AND DISCONNECT SWITCH
	MOTOR STARTER OR CONTACTOR
S M	MANUAL MOTOR STARTER
	MOTOR (REFER TO MOTOR CIRCUIT SCHEDULE FOR POWER REQUIREMENTS)
T	TRANSFORMER
M	ELECTRICAL METER
SPD	SURGE PROTECTIVE DEVICE
VFD	VARIABLE FREQUENCY DRIVE
	BRANCH CIRCUIT WIRING, CONCEALED IN WALLS OR CEILINGS
	HOMERUN TO PANELBOARD
	SWITCHED BRANCH CIRCUIT WIRING
PT P	POKE-THRU DEVICE, SUBSCRIPT 'P' INDICATES TYPE, REFER TO FLOOR BOX DEVICE SCHEDULE FOR TYPE.
TB P	FLOOR BOX, SUBSCRIPT 'P' INDICATES TYPE, REFER TO FLOOR BOX DEVICE SCHEDULE FOR TYPE.
J	JUNCTION BOX
MD	POWER CONNECTION TO MOTORIZED DAMPERS, COORDINATE LOCATIONS WITH DIV. 23
WM	SURFACE MOUNTED RACEWAY RISER TO NEAREST ACCESSIBLE CEILING
	WIREMOLD, LOCATE DEVICES AS INDICATED ON DRAWINGS
	SIMPLEX WALL MOUNTED RECEPTACLE, 18" AFF UNLESS OTHERWISE NOTED
	WALL MOUNTED RECEPTACLE, 18" AFF UNLESS OTHERWISE NOTED
	DUPLEX WALL MOUNTED RECEPTACLE, HALF SWITCHED
	DUPLEX WALL MOUNTED RECEPTACLE, ON CRITICAL BRANCH OF GENERATOR POWER
	DUPLEX GFCI-TYPE WALL MOUNTED RECEPTACLE FOR WASHING MACHINE, MOUNT AT 48" AFF UNLESS OTHERWISE NOTED.
M	DUPLEX WALL MOUNTED RECEPTACLE FOR MICROWAVE, COORDINATE WITH MICROWAVE LOCATION, VERIFY EXACT LOCATION AND MOUNTING HEIGHT WITH ARCHITECT PRIOR TO ROUGH-IN.
DW	DUPLEX WALL MOUNTED RECEPTACLE FOR DISHWASHER, MOUNT 18" AFF UNLESS OTHERWISE NOTED. CONNECT TO GFCI BREAKER IN PANELBOARD.
REF	DUPLEX WALL MOUNTED RECEPTACLE FOR REFRIGERATOR, MOUNT 48" AFF UNLESS OTHERWISE NOTED. CONNECT TO GFCI BREAKER IN PANELBOARD.
EWC	DUPLEX WALL MOUNTED RECEPTACLE FOR ELECTRIC WATER COOLER, MOUNT 18" AFF UNLESS OTHERWISE NOTED. CONNECT TO GFCI BREAKER IN PANELBOARD.
XX*	DUPLEX WALL MOUNTED RECEPTACLE MOUNTED AT XX" ABOVE FINISHED FLOOR
	DOUBLE DUPLEX WALL MOUNTED RECEPTACLE, 18" AFF UNLESS OTHERWISE NOTED
R RC	RECEPTACLE, MOUNT 6" ABOVE COUNTER OR CASEWORK
RC	RECEPTACLE MOUNTED BELOW FRONT OF COUNTER
GFI GFI	RECEPTACLE WITH GROUND FAULT CIRCUIT INTERRUPTER
WP* WP	RECEPTACLE WITH WEATHERPROOF COVER
C C	RECEPTACLE, CEILING MOUNTED
U U	RECEPTACLE WITH INTEGRAL USB OUTLET FOR CHARGING
DL	DOUBLE DUPLEX RECEPTACLE FOR INTERACTIVE DISPLAY, GROUND PLANE BOX IS 4"x4"x2-1/8" DEEP WITH 1" RAISED COVER
FV	RECEPTACLE FOR DIGITAL DISPLAY, MOUNT RECEPTACLE IN BOX PROVIDED BY OTHERS, REFER TO ARCHITECTURAL ELEVATIONS FOR EXACT MOUNTING HEIGHT
FB	FLOORBOX, REFER TO FLOORBOX SCHEDULE ON E/E00
CR	DUPLEX RECEPTACLE MOUNTED TO CEILING OR STRUCTURE ABOVE AND PROVIDE DROP-DOWN CORD REEL DEVICE WITH PENDANT S-CON DUPLEX RECEPTACLE AT END OF CORD, UNLESS OTHERWISE NOTED.
CR	SPECIALTY RECEPTACLE MOUNTED TO CEILING OR STRUCTURE ABOVE AND PROVIDE DROP-DOWN CORD REEL DEVICE WITH SPECIALTY RECEPTACLE AT END OF CORD, RECEPTACLE CONFIGURATION AS NOTED ON PLANS.
	SPECIAL PURPOSE HARDWIRED CONNECTION: WIRING AS INDICATED
RH	HARDWIRED 20A/1P CONNECTION TO RANGE HOOD, MAKE FINAL CONNECTIONS AS REQUIRED BY MANUFACTURER.
HD	HARDWIRED 20A/1P CONNECTION TO HAND DRYER, MAKE FINAL CONNECTIONS AS REQUIRED BY MANUFACTURER.
	SPECIAL PURPOSE RECEPTACLE, NEMA CONFIGURATION AND WIRING AS INDICATED
R	NEMA 14-50R RECEPTACLE FOR ELECTRIC RANGE, PROVIDE 3#6, #10G, 3/4"C, TO INDICATED BREAKER IN PANEL, (2 HOT, 1 NEUTRAL, 1 GROUND)
D	NEMA 14-30R RECEPTACLE FOR ELECTRIC DRYER, PROVIDE 3#10, #10G, 3/4"C, TO INDICATED BREAKER IN PANEL, (2 HOT, 1 NEUTRAL, 1 GROUND) CONNECT TO GFCI BREAKER IN PANELBOARD.
PP	MULTI-SERVICE POWER POLE WITH POWER AND COMMUNICATIONS INSERTS AS INDICATED ON PLANS, REFER TO SPECIFICATIONS AND/OR FLOOR PLANS FOR ACCEPTABLE MANUFACTURERS. SIZE TO ACCOMMODATE ALL CIRCUITS AND COMMUNICATIONS CABLING INDICATED, PROVIDE WITH CEILING FLANGE AND ENTRANCE FITTINGS, COORDINATE AND PROVIDE FITTINGS FOR ANY INDICATED FURNITURE FEEDS IN FIELD.
E	EMERGENCY CALL TOGGLE SWITCH
	EMERGENCY CALL FOR AP COMMUNICATION BUZZER / LIGHT. REFER TO CALL-FOR-AID WIRING SCHEMATIC FOR MORE INFORMATION.
B	JUNCTION BOX FOR BUILDING MANAGEMENT SYSTEM LOCATED ABOVE CEILING, PROVIDE 20A/1P DEDICATED CIRCUIT, COORDINATE EXACT LOCATION WITH EMS CONTRACTOR PRIOR TO INSTALLATION.
LVT	LOW VOLTAGE TRANSFORMER
GAP	REMOTE GENERATOR ANNUNCIATOR PANEL
SPO	EMERGENCY POWER OFF PUSH BUTTON
AD AO	AUTOMATIC DOOR OPENER AND PUSHBUTTON - FURNISHED AND INSTALLED BY DIV. 8, WIRED BY ELECTRICAL CONTRACTOR, PROVIDE 20A/1P - 120V CONNECTION TO MOTOR AND CONTROL WIRING IN 1" CONDUIT PER MFR. REQUIREMENTS FROM MOTOR TO EACH PUSHBUTTON.
PL	PLUG LOAD CONTROLLER FOR AUTOMATIC RECEPTACLE SHUTOFF TIED INTO LIGHTING CONTROL SYSTEM, REFER TO LIGHTING CONTROL DETAILS FOR ADDITIONAL INFORMATION. CONTROLLED RECEPTACLES ARE INDICATED WITH SWITCHED WIRING ON PLANS.
AVL	DUPLEX RECEPTACLE WITH INTEGRAL USB CHARGING AND 3A/VDC OUTPUT AVAILABLE FROM BACK SIDE OF DEVICE - EQUAL TO HUBBELL AVR5125, MOUNT IN SAME BACKBOX AS ADJACENT "AVL" AUDIO VIDEO DEVICE SHOWN ON TECHNOLOGY PLANS.
AVQ	DUPLEX RECEPTACLE WITH INTEGRAL USB CHARGING AND 3A/VDC OUTPUT AVAILABLE FROM BACK SIDE OF DEVICE - EQUAL TO HUBBELL AVR5152X, MOUNT IN SAME BACKBOX AS ADJACENT "AVQ" AUDIO VIDEO DEVICE SHOWN ON TECHNOLOGY PLANS.
CS	CLASSROOM SPEECH REINFORCEMENT SYSTEM. PROVIDE 120V, 20A-1P POWER VIA LOCAL UNSWITCHED RECEPTACLE CIRCUIT, REFER TO CLASSROOM A/V SYSTEM DETAIL FOR ADDITIONAL INFORMATION.

LIGHTING SYMBOLS

SYMBOL	DESCRIPTION
	POLE MOUNTED SITE LIGHTING FIXTURE
	EXTERIOR BUILDING MOUNTED LIGHTING FIXTURE
	EXTERIOR BUILDING MOUNTED EMERGENCY LIGHTING FIXTURE
	SURFACE MOUNTED LIGHTING FIXTURE
	SURFACE MOUNTED EMERGENCY LIGHTING FIXTURE
	PENDANT MOUNTED LIGHTING FIXTURE
	PENDANT MOUNTED EMERGENCY LIGHTING FIXTURE
	RECESSED LIGHTING FIXTURE
	RECESSED EMERGENCY LIGHTING FIXTURE
	INDUSTRIAL OR STRIP TYPE FIXTURE
	TRACK LIGHTING, HEADS AS INDICATED ON DRAWINGS
	RECESSED WALL WASH FIXTURE
	RECESSED DOWNLIGHT FIXTURE
	RECESSED DOWNLIGHT EMERGENCY FIXTURE
	SURFACE MOUNTED ROUND FIXTURE
	SURFACE MOUNTED ROUND EMERGENCY FIXTURE
	PENDANT HUNG LIGHTING FIXTURE
	PENDANT HUNG EMERGENCY LIGHTING FIXTURE
	WALL SCONCE
	EMERGENCY WALL SCONCE
	WALL MOUNTED LIGHTING FIXTURE
	WALL MOUNTED EMERGENCY LIGHTING FIXTURE
	WALL MOUNTED EXIT SIGN, DOUBLE FACED
	WALL MOUNTED EXIT SIGN
	CEILING MOUNTED EXIT SIGN
	CEILING MOUNTED EXIT SIGN, DOUBLE FACED
	SELF CONTAINED EMERGENCY LIGHTING FIXTURE WITH BATTERY
	SELF CONTAINED EMERGENCY LIGHTING FIXTURE WITH REMOTE CAPABILITY
	REMOTE EMERGENCY HEAD
	REMOTE DUAL HEAD EMERGENCY LIGHTING FIXTURE
EB	EMERGENCY BATTERY UNIT FOR USE WITH REMOTE LIGHTING HEADS
R	UL924 EMERGENCY LIGHTING RELAY, REFER TO EMERGENCY LIGHTING DETAILS FOR ADDITIONAL INFORMATION, SUBSCRIPT "1" INDICATES UL1008 TRANSFER RELAY FUNCTIONALITY.
PC	LIGHT SENSING PHOTOCELL / DAYLIGHT SENSOR
RCN	ROOM CONTROLLER FOR NORMAL POWER LOW VOLTAGE CONTROLS, REFER TO LIGHTING CONTROL DETAILS FOR ADDITIONAL INFORMATION.
RCE	ROOM CONTROLLER FOR EMERGENCY POWER LOW VOLTAGE CONTROLS, REFER TO LIGHTING CONTROL DETAILS FOR ADDITIONAL INFORMATION.
PP	POWER PACK FOR STANDALONE CONTROLS, REFER TO LIGHTING CONTROL DETAILS FOR ADDITIONAL INFORMATION.
PPN	POWER PACK FOR NORMAL POWER LOW VOLTAGE CONTROLS, REFER TO LIGHTING CONTROL DETAILS FOR ADDITIONAL INFORMATION.
PPE	POWER PACK FOR EMERGENCY POWER LOW VOLTAGE CONTROLS, REFER TO LIGHTING CONTROL DETAILS FOR ADDITIONAL INFORMATION.

LIGHTING SWITCH AND SENSOR TAGS



NOTES:
1. FIXTURE(S) SHALL BE CONTROLLED BY SWITCH OR RELAY LOCATED IN THE ROOM UNLESS OTHERWISE NOTED ON PLAN.
2. REFER TO LIGHTING CONTROL DETAILS FOR ADDITIONAL INFORMATION ON WIRING AND CONTROLS.
3. WALL MOUNTED SWITCHES SHALL BE MOUNTED AT 42" AFF UNLESS OTHERWISE NOTED. COORDINATE WITH ARCHITECT.
4. SET ALL OCCUPANCY TYPE SENSORS TO AUTO-ON, AUTO-OFF MODE. SET ALL VACANCY TYPE SENSORS TO MANUAL-ON, AUTO-OFF MODE.
5. REFER TO CONTROL SCHEME NOTES AND CONTROL SCHEDULE FOR ADDITIONAL INFORMATION.
6. REFER TO SYMBOL LIST FOR ADDITIONAL LIGHTING CONTROL DEVICES.
7. WHERE SWITCHES ARE NOT TAGGED WITH CONTROL LETTER ON PLANS, ALL FIXTURES IN ASSOCIATED ROOM SHALL BE CONTROLLED SIMULTANEOUSLY VIA CONTROLS SPECIFIED.

ELECTRICAL LIGHTING NOTES

1. REFER TO DRAWING E0.1 FOR LIGHTING FIXTURE SCHEDULE.
2. EXIT SIGNS AND EMERGENCY BATTERY UNITS SHALL BE WIRED TO LINE SIDE OF LOCAL LIGHTING BRANCH CIRCUIT AHEAD OF ALL SWITCHING DEVICES.
3. EMERGENCY LIGHTING RELAY LOCATIONS ARE SHOWN DIAGRAMMATICALLY, CONTRACTOR SHALL INSTALL RELAYS ABOVE NEAREST ACCESSIBLE CEILING, OR IN NEAREST STORAGE ROOM UTILITY SPACE, AND SHALL COORDINATE LOCATION WITH OTHER TRADES. REFER TO EMERGENCY LIGHTING WIRING SCHEMATICS FOR ADDITIONAL INFORMATION.
4. REFER TO DRAWING E0.1 FOR TYPICAL LIGHTING CONTROL WIRING SCHEMATICS.

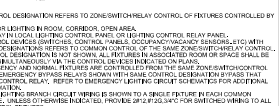
ELECTRICAL POWER NOTES

1. REFER TO DRAWING E0.0 FOR MOTOR/ EQUIPMENT CIRCUIT SCHEDULE.
2. RECEPTACLES LOCATED WITHIN 6' FROM WATER SOURCES SHALL BE GFCI TYPE.
3. ELECTRICAL CONTRACTOR SHALL PROVIDE (1)-2" CONDUIT SLEEVE INTO EACH ROOM SHOWN WITH COMMUNICATIONS DEVICES, LOCATE ABOVE CEILING TRIM PANELS.
4. PROVIDE ISOLATED GROUND RECEPTACLES FOR ALL "CLEAN" SOURCE PANELBOARD.
5. 15A AND 20A, 125V AND 250V NON-LOCKING TYPE RECEPTACLES MOUNTED BELOW 6'-6" AFF SHALL BE LISTED TAMPER-RESISTANT TYPE IN ACCORDANCE WITH NEC 406.12.

ELECTRICAL GENERAL NOTES

1. BRANCH CIRCUITS AND FEEDER CIRCUITS SHALL BE CONCEALED IN WALLS AND ABOVE CEILINGS WHERE POSSIBLE, INCLUDING HOMERUNS TO PANELBOARDS. BRANCH CIRCUITS AND FEEDERS SHALL NOT BE ROUTED IN OR UNDER SLAB UNLESS SPECIFICALLY INDICATED ON ELECTRICAL FLOOR PLANS OR DETAILS. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
2. BRANCH CIRCUITS SHALL BE 2#12,#12G,3/4"C., TO NEW 20A/1P CIRCUIT BREAKER IN PANEL INDICATED UNLESS NOTED OTHERWISE.
3. 120V, 1-PHASE, 20A BRANCH CIRCUITS EXCEEDING 150' IN LENGTH SHALL BE 2#10,#10G, 3/4"C, UNLESS NOTED OTHERWISE.
4. 277V, 1-PHASE, 20A BRANCH CIRCUITS EXCEEDING 350' IN LENGTH SHALL BE 2#10,#10G, 3/4"C, UNLESS NOTED OTHERWISE.
5. DEVICES SHALL BE LABELLED WITH SOURCE PANEL AND CIRCUIT NUMBER(S).
6. REFER TO ARCHITECTS REFLECTED CEILING PLAN FOR EXACT LOCATION OF CEILING MOUNTED ELECTRICAL DEVICES, REFER TO ARCHITECTURAL ELEVATIONS FOR EXACT LOCATION OF WALL MOUNTED ELECTRICAL DEVICES.
7. COORDINATE AND PROVIDE SMOKE BARRIER SEALING OF PENETRATIONS THROUGH FIRE WALLS OR SMOKE BARRIERS AS REQUIRED. REFER TO ARCHITECTURAL FLOOR PLANS AND CODE SHEETS FOR WALLS.
8. COORDINATE LOCATIONS OF ELECTRICAL DEVICES AND CONTROLS WITH RESPECT TO LOCATIONS OF CASEWORK AND EQUIPMENT PRIOR TO ROUGH-IN.
9. WHEN DEVICES ARE SHOWN ON PLANS OFFSET FROM ONE ANOTHER, DEVICES SHALL BE MOUNTED IN LINE, CENTERED ON WALL.
10. SHARED NEUTRAL WIRING IS NOT ACCEPTABLE, UNLESS NOTED OTHERWISE ON DRAWINGS. PROVIDE A DEDICATED NEUTRAL WIRE FOR EACH CIRCUIT, WHERE APPLICABLE.
11. DRAWINGS ARE DIAGRAMMATIC ONLY, DO NOT SCALE ELECTRICAL DRAWINGS. FIELD CONDITIONS AND ARCHITECTURAL ELEVATIONS AND DIMENSIONS SHALL GOVERN EXACT LOCATION AND MOUNTING HEIGHTS OF ELECTRICAL DEVICES AND RACEWAYS.
12. FINISHES AND COLOR OF ELECTRICAL WIRING DEVICES, EXPOSED RACEWAY, LIGHT FIXTURES, AND OTHER ELECTRICAL DEVICES SHALL BE DETERMINED BY THE ARCHITECT.
13. ELECTRICAL WORK SHALL BE SUPPORTED FROM THE BUILDING STRUCTURE (OTHER THAN ROOF DECK).
14. THE ELECTRICAL CONTRACTOR SHALL PERFORM CORES REQUIRED FOR ELECTRICAL WORK.
15. BUILDING WIRE AND CABLE NOT IN RACEWAY SHALL BE PLENUM RATED.
16. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS REGARDING SURFACE MOUNTED RACEWAY APPLICATIONS AND WIRING METHODS.
17. PER NEC ARTICLE 406.12 TAMPER-RESISTANT RECEPTACLES, ALL 15- AND 20-AMPERE, 125 AND 250-VOLT NON-LOCKING-TYPE RECEPTACLES IN EDUCATIONAL USE BUILDINGS SHALL BE PROVIDED THROUGHOUT WITH LISTED TAMPER-RESISTANT RECEPTACLES. THE EXCEPTIONS TO THIS REQUIREMENT ARE AS FOLLOWS:
(1) RECEPTACLES LOCATED MORE THAN 1.7 M (5 ½ FT) ABOVE THE FLOOR.
(2) RECEPTACLES THAT ARE PART OF AN APPLIANCE.
(3) A SINGLE RECEPTACLE, OR A DUPLEX RECEPTACLE FOR TWO APPLIANCES, LOCATED WITHIN THE DEDICATED SPACE FOR EACH APPLIANCE THAT, IN NORMAL USE, IS NOT EASILY MOVED FROM ONE PLACE TO ANOTHER AND THAT IS CORD-AND-PLUG-CONNECTED.

LIGHTING FIXTURE TAGS



NOTES
1. FIXTURE CONTROL DESIGNATION REFERS TO ZONE/SWITCH/RELAY CONTROL OF FIXTURES CONTROLLED BY COMMON:
   A. SWITCH FOR LIGHTING IN ROOM, CORRIDOR, OPEN AREA.
   B. ALL FIXTURES IN LOCAL LIGHTING CONTROL PANEL, OR LIGHTING CONTROL RELAY PANEL.
   C. ALL CEILING MOUNTED OCCUPANCY SENSORS, CONTROL PANELS, OCCUPANCY/VACANCY SENSORS, (ETC) WITH CONTROL DESIGNATIONS REFERS TO COMMON CONTROL OF THE SAME ZONE/SWITCH/RELAY CONTROL.
2. WHERE CONTROL DESIGNATION IS NOT SHOWN, ALL FIXTURES IN ASSOCIATED ROOM OR SPACE SHALL BE CONTROLLED SIMULTANEOUSLY, VIA THE CONTROL DEVICES INDICATED ON PLANS.
   WHERE EMERGENCY AND NORMAL FIXTURES ARE CONTROLLED FROM THE SAME ZONE/SWITCH/CONTROL RELAY, UL 924 EMERGENCY BYPASS RELAYS SHOWN WITH SAME CONTROL DESIGNATION BYPASS THAT ZONE/SWITCH/CONTROL RELAY. REFER TO EMERGENCY LIGHTING CIRCUIT SCHEMATICS FOR ADDITIONAL WIRING INFORMATION.
4. UNSWITCHED LIGHTING BRANCH CIRCUIT WIRING IS SHOWN TO A SINGLE FIXTURE IN EACH COMMON CONTROL ZONE. UNLESS OTHERWISE INDICATED, PROVIDE 2#12,#12G,3/4"C FOR SWITCHED WIRING TO ALL COMMON CONTROL FIXTURES.
5. PROVIDE LOW VOLTAGE DRIVING CONTROL WIRING AS INDICATED IN LIGHTING CONTROL DETAILS FOR DIMMABLE LIGHT FIXTURES IN COMMON CONTROL ZONE/SWITCH/RELAY CONTROL.
6. REFER TO LIGHTING CONTROL DETAILS FOR ADDITIONAL WIRING AND CONTROL INFORMATION.
7. REFER TO LIGHTING CONTROL RELAY PANEL SCHEDULES WHERE APPLICABLE FOR ADDITIONAL CONTROL INFORMATION.

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Greenwich Public Schools

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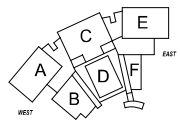
STATE PROJECT NO: 057-0114 N

NORTH



KEYPLAN

Number	Date	Issued For
3	10/30/2024	ADDENDUM NO. 4
1	10/16/2024	ADDENDUM NO. 2
	09/27/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ELECTRICAL ABBREVIATIONS, NOTES AND SYMBOLS

Date	Drawing Number
07/08/2024	E000
Scale: 12" = 1'-0"	
Proj. Number: 22367.00	

Drawn: KCM
Checked: SJM

10/30/2024 11:19:19 AM
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ELECTRICAL KITCHEN EQUIPMENT SCHEDULE

ITEM NO.	QTY.	DESCRIPTION	ELECTRICAL DATA V	PH	HP	KW	AMP	SOURCE PANEL	CIRCUIT BREAKER	WIRE AND CONDUIT	CONNECTION	DISCONNECT SWITCH	REMARKS
4	1	CLOTHES WASHER	120	1	-	-	-	KP	20A/1P	2#12, #12G, 3/4"C	CORD & PLUG (PROVIDE NEMA 5-20R)	N/A	#1
5	1	CLOTHES DRYER	208	1	-	-	-	KP	30A/2P	3#10, #10G, 3/4"C	CORD & PLUG (PROVIDE NEMA 14-30R)	N/A	#1
11	1	WALK-IN COOLER	120	1	-	1.1	-	OSKP	15A/1P	2#12, #12G, 3/4"C	DIRECT CONNECTION	1PTS	#1
12	1	WALK-IN FREEZER	120	1	-	1.3	-	OSKP	20A/1P	2#12, #12G, 3/4"C	DIRECT CONNECTION	1PTS	#1
13a	1	COOLER CONDENSING UNIT	208	3	-	-	4.7	OSKP	15A/3P	3#12, #12G, 3/4"C	DIRECT CONNECTION	30A/3P	#1
13b	1	COOLER EVAPORATOR COIL	120	1	-	-	1.0	OSKP	15A/1P	2#12, #12G, 3/4"C	DIRECT CONNECTION	30A/1P	#1
14a	1	FREEZER CONDENSING UNIT	208	3	-	-	8.7	OSKP	15A/3P	3#12, #12G, 3/4"C	DIRECT CONNECTION	30A/3P	#1
14b	1	FREEZER EVAPORATOR COIL	208	1	-	-	9.1	OSKP	15A/2P	2#12, #12G, 3/4"C	DIRECT CONNECTION	30A/3P	#1
21	1	ICEMAKER WITH BIN	120	1	-	-	11.5	OSKP	20A/1P	2#12, #12G, 3/4"C	DIRECT CONNECTION	N/A	#1
25	1	CONVECTION OVEN DOUBLE	120	1	-	-	8	KP	(2) 15A/1P	(2) 2#12, #12G, 3/4"C	DIRECT CONNECTION	(2) 30A/3P	#7
26	1	CONVECTION OVEN DOUBLE	120	1	-	-	8	KP	(2) 15A/1P	(2) 2#12, #12G, 3/4"C	DIRECT CONNECTION	(2) 30A/3P	#7
27	1	TEN PAN STEAMER	120	1	-	-	3.5	KP	15A/1P	2#12, #12G, 3/4"C	DIRECT CONNECTION	1PTS	#7
28	1	FOUR-BURNER RANGE WITH OVEN	120	1	-	-	0.1	KP	15A/1P	2#12, #12G, 3/4"C	CORD & PLUG (PROVIDE NEMA 5-20R)	N/A	#7
29	1	GRIDDLE WITH MOBILE STAND	120	1	-	-	0.5	KP	15A/1P	2#12, #12G, 3/4"C	DIRECT CONNECTION	1PTS	#7
32	1	UTILITY DISTRIBUTION SYSTEM	208	3	-	-	-	KP	50A/3P	4#6, #10G, 1"C	DIRECT CONNECTION	N/A	#1, #4
33	1	EXHAUST VENTILATOR	-	-	-	-	-	N/A	N/A	N/A	N/A	N/A	#4, #11
34	1	EXHAUST VENTILATOR	-	-	-	-	-	N/A	N/A	N/A	N/A	N/A	#4, #11
35	1	VENTILATOR THERMOSTATIC AUTO-START CONTROL SYSTEM	120	1	-	-	-	KP	15A/1P	2#12, #12G, 3/4"C	DIRECT CONNECTION	30A/1P	#4, #10
35a	1	VENTILATOR CONTROL INTERFACE SCREEN	-	-	-	-	-	N/A	N/A	N/A	N/A	N/A	#10, #12
35b	1	ROOM TEMPERATURE SENSOR	-	-	-	-	-	N/A	N/A	N/A	N/A	N/A	#10, #12
36	1	FIRE SUPPRESSION SYSTEM	120	1	-	-	-	OSKP	20A/1P	2#12, #12G, 3/4"C	DIRECT CONNECTION	30A/1P	#8
41	1	COOK'S WORK TABLE WITH OVERSHELF	120	1	-	-	-	KP	(3) 20A/1P	(3) 2#12, #12G, 3/4"C	N/A	N/A	#3
42	1	ACCESSIBLE PREP STATION TABLE WITH SINK	120	1	-	1	-	KP	(3) 20A/1P	(3) 2#12, #12G, 3/4"C	N/A	N/A	#3
44	1	AUTOMATIC SLICER	120	1	-	-	5	KP	15A/1P	2#12, #12G, 3/4"C	CORD & PLUG (PROVIDE NEMA 5-20R)	1PTS	#13
45	1	TWENTY-QUART MIXER	120	1	-	-	8	KP	15A/1P	2#12, #12G, 3/4"C	CORD & PLUG (PROVIDE NEMA 5-20R)	N/A	#14
48	1	FOOD PROCESSOR	120	1	-	-	12	KP	20A/1P	2#12, #12G, 3/4"C	CORD & PLUG (PROVIDE NEMA 5-20R)	N/A	
49	1	PREP TABLE WITH SINKS	120	1	-	-	-	KP	20A/1P	2#12, #12G, 3/4"C	CORD & PLUG (PROVIDE NEMA 5-20R)	N/A	
51	3	MOBILE HOT FOOD HOLDING CABINET, PASS-THRU	120	1	-	-	13.8	KP	20A/1P	2#12, #12G, 3/4"C	CORD & PLUG	30A/1P	#15
52	3	DROP CORD WITH INLINE GFCI	120	1	-	-	-	KP	20A/1P	2#12, #12G, 3/4"C	N/A	N/A	
54	1	REFRIGERATOR, PASS-THRU	120	1	-	-	6.0	OSKP	15A/1P	2#12, #12G, 3/4"C	CORD & PLUG (PROVIDE NEMA 5-20R)	N/A	#4
55	1	REFRIGERATOR, PASS-THRU	120	1	-	-	6.0	OSKP	15A/1P	2#12, #12G, 3/4"C	CORD & PLUG (PROVIDE NEMA 5-20R)	30A/3P	#4
57	1	REFRIGERATOR, PASS-THRU	120	1	-	-	6.0	OSKP	15A/1P	2#12, #12G, 3/4"C	CORD & PLUG (PROVIDE NEMA 5-20R)	1PTS	#4
61	1	FUTURE SERVING COUNTER	120	1	-	-	-	KP	20A/1P	2#12, #12G, 3/4"C	N/A	N/A	#3
62	1	REFRIGERATED SELF-SERVICE GRAB & GO CASE	120	1	-	-	15.3	OSKP	20A/1P	2#12, #12G, 3/4"C	CORD & PLUG (PROVIDE NEMA L5-20R)	1PTS	#2
63	4	HOT FOOD WELL, DROP-IN (MOUNTED IN GROUP)	208	1	-	3.6	-	KP	25A/2P	3#10, #10G, 3/4"C	DIRECT CONNECTION	N/A	#3, #9
64	1	SERVING COUNTER	120	1	-	-	-	OSKP	(4) 20A/1P	(4) 2#12, #12G, 3/4"C	N/A	N/A	#16
65	1	COLD WELL, DROP-IN	120	1	-	-	3.8	KP	20A/1P	2#12, #12G, 3/4"C	CORD & PLUG	N/A	#2
67	1	MILK COOLER	120	1	-	-	3	OSKP	20A/1P	3#12, #12G, 3/4"C	CORD & PLUG	30A/1P	#2
68	1	COLD WELL, DROP-IN	120	1	-	-	3.8	KP	20A/1P	2#12, #12G, 3/4"C	CORD & PLUG	N/A	#2
69	1	SERVING COUNTER	120	1	-	-	-	N/A	(3) 20A/1P	(3) 2#12, #12G, 3/4"C	N/A	N/A	#16
70	4	HOT FOOD WELL, DROP-IN (MOUNTED IN GROUP)	208	1	-	3.6	-	KP	25/2P	3#10, #10G, 3/4"C	DIRECT CONNECTION	30A/3P	#3, #9
71	1	REFRIGERATED SELF-SERVICE GRAB AND GO CASE	120	1	-	-	15.3	OSKP	20A/1P	2#12, #12G, 3/4"C	CORD & PLUG (PROVIDE NEMA L5-20R)	1PTS	#2
72	1	MERCHANDISING DISPLAY WARMERS	120	1	-	-	15.1	KP	20A/1P	2#12, #12G, 3/4"C	CORD & PLUG	N/A	#4
73	1	SERVING COUNTER	120	1	-	-	-	KP	(3) 20A/1P	(3) 2#12, #12G, 3/4"C	N/A	N/A	#16
74	1	NOVELTY ICE CREAM DISPLAY FREEZER	120	1	-	-	4.8	OSKP	20A/1P	2#12, #12G, 3/4"C	CORD & PLUG	N/A	#3
77	1	FUTURE MOBILE CASHIER STAND	120	1	-	-	-	KP	20A/1P	2#12, #12G, 3/4"C	CORD & PLUG (PROVIDE NEMA 5-20R)	N/A	#5
78	1	FUTURE CASHIER TERMINAL	120	1	-	-	-	KP	20A/1P	2#12, #12G, 3/4"C	CORD & PLUG (PROVIDE NEMA 5-20R)	N/A	#5
79	1	WORKTOP GLASS DOOR DISPLAY REFRIGERATOR	120	1	-	-	2.5	OSKP	15A/1P	2#12, #12G, 3/4"C	CORD & PLUG (PROVIDE NEMA 5-20R)	30A/3P	#1
81	3	CASHIER TERMINAL	120	1	-	-	-	KP	20A/1P	2#12, #12G, 3/4"C	CORD & PLUG (PROVIDE NEMA 5-20R)	N/A	#5
89	1	WAREWASHER, RACK CONVEYOR	480	3	-	-	68	KHP	90A/3P	3#3, #8G, 1-1/4"C	DIRECT CONNECTION	N/A	#17

GENERAL NOTES:
1. ABBREVIATIONS:
   - S.C. = SHUNT TRIP CIRCUIT BREAKER WIRED BY E.C.
   - FSC = FOOD SERVICE CONTRACTOR
   - KEC = KITCHEN EQUIPMENT CONTRACTOR
   - C.O. = CONVENIENCE OUTLET, ALL RECEPTACLE SHALL BE GFCI TYPE, "a" INDICATES ABOVE COUNTER
   - CAP = CORD & PLUG
2. COORDINATE ALL CONNECTION TYPES, MOUNTING HEIGHTS, STUB-UP AND DEVICE LOCATIONS AND OTHER ELECTRICAL REQUIREMENTS WITH KEC AND FOOD SERVICE ROUGH-IN PLANS PRIOR TO ROUGH-IN.
3. PROVIDE FINAL CONNECTIONS TO ALL PIECES OF EQUIPMENT SPECIFIED WITH DISCONNECT SWITCHES OR DIRECT CONNECTIONS.
4. ALL NEMA 5-15R AND 5-20R RECEPTACLES IN KITCHEN AND/OR SERVERY (INCLUDING CONVENIENCE RECEPTACLES SHOWN ON PLAN) SHALL BE DUPLEX GFCI-TYPE, UNLESS INDICATED TO HAVE GFCI CIRCUIT BREAKER IN THIS SCHEDULE.
5. ALL RECEPTACLES OTHER THAN NEMA 5-15R AND 5-20R SHALL BE PROTECTED BY A GFCI BREAKER IN SOURCE PANELBOARD.
6. ALL DISCONNECT SWITCHES SHALL BE NEMA 3R RATED.
   - 1PTS = 1-POLE TOGGLE SWITCH
   - 2PTS = 2-POLE TOGGLE SWITCH
7. ALL ACCESSIBLE CONVENIENCE RECEPTACLES SHALL BE GFCI RECEPTACLES. PROVIDE 15mA GFCI BREAKER IN PANELBOARD FOR ALL INACCESSIBLE RECEPTACLES AND RECEPTACLES FOR EQUIPMENT.

REMARKS:
1. PROVIDE 15mA GFCI BREAKER IN PANELBOARD FOR EQUIPMENT. DO NOT PROVIDE GFCI RECEPTACLE.
2. RECEPTACLE MOUNTED WITHIN KITCHEN COUNTER. RECEPTACLE FURNISHED AND MOUNTED BY KEC. WIRED BY EC.
3. EQUIPMENT FED FROM ABOVE VIA SJO DROP CORD WITH RECEPTACLE SPECIFIED IN SCHEDULE. EC SHALL FURNISH AND INSTALL DROP CORD WITH STRAIN RELIEF AND ATTACH TO STRUCTURE ABOVE CEILING. DO NOT SUPPORT VIA CEILING. PROVIDE CORDING PROTECTIVE COVER PLATE WITH OPENING IN CEILING FOR ROUTING OF CORD TO EQUIPMENT.
4. EQUIPMENT FED FROM ABOVE VIA SJO DROP CORD WITH RECEPTACLE SPECIFIED IN SCHEDULE. EC SHALL FURNISH AND INSTALL DROP CORD WITH STRAIN RELIEF AND ATTACH TO STRUCTURE ABOVE CEILING. DO NOT SUPPORT VIA CEILING. PROVIDE CORDING PROTECTIVE COVER PLATE WITH OPENING IN CEILING FOR ROUTING OF CORD TO EQUIPMENT.
5. RECEPTACLE MOUNTED IN FLOOR BOX. FURNISHED AND INSTALLED BY EC.
6. PROVIDE SHUNT TRIP BREAKER IN SOURCE PANEL PER KITCHEN ELECTRIC AND GAS SHUTOFF WIRING DIAGRAM DETAIL.
7. POWER VIA UTILITY DISTRIBUTION SYSTEM PANELBOARDS.
8. PROVIDE FIRE ALARM MONITOR MODULE AND CONNECTIONS TO FIRE ALARM SYSTEM. REFER TO FIRE ALARM RISER FOR ADDITIONAL INFORMATION.
9. 120/208V CIRCUIT. PROVIDE 2-HOT, 1-NEUTRAL, 1 GROUND WIRE.
10. COORDINATE EXACT LOCATION OF UNIT WITH DIV. 23 AND KEC.
11. PROVIDE 120V CONNECTION TO LIGHTS IN HOOD FROM VENTILATOR THERMOSTATIC AUTO-START CONTROL SYSTEM (ITEM 35). REFER TO NOTE E-3/ES121.
12. PROVIDE DATA CONNECTION TO REMOTE TOUCH SCREEN FROM VENTILATOR THERMOSTATIC AUTO-START CONTROL SYSTEM (ITEM 35). REFER TO NOTE E-3/FS121.
13. AUTOMATIC SLICER (ITEM 44) IS POWERED FROM DUPLEX RECEPTACLE MOUNTED AT COOK'S WORK TABLE WITH OVERSHELF (ITEM 41).
14. THERMOMETER-MINDER (ITEM 45) IS POWERED FROM DUPLEX RECEPTACLE MOUNTED AT ACCESSIBLE PREP STATION TABLE WITH SINK (ITEM 42).
15. MOBILE HOT FOOD HOLDING CABINET, PASS-THRU (ITEM 51) IS POWERED FROM DROP CORD WITH INLINE GFCI (ITEM 52).
16. COORDINATE CIRCUIT CONNECTIONS AT SERVING COUNTER WITH KEC FLOOR PLANS.
17. 480V-3PH CIRCUIT. PROVIDE 2 HOT, 1 NEUTRAL, 1 GROUND WIRE.

ELECTRICAL INTERWIRING NOTES

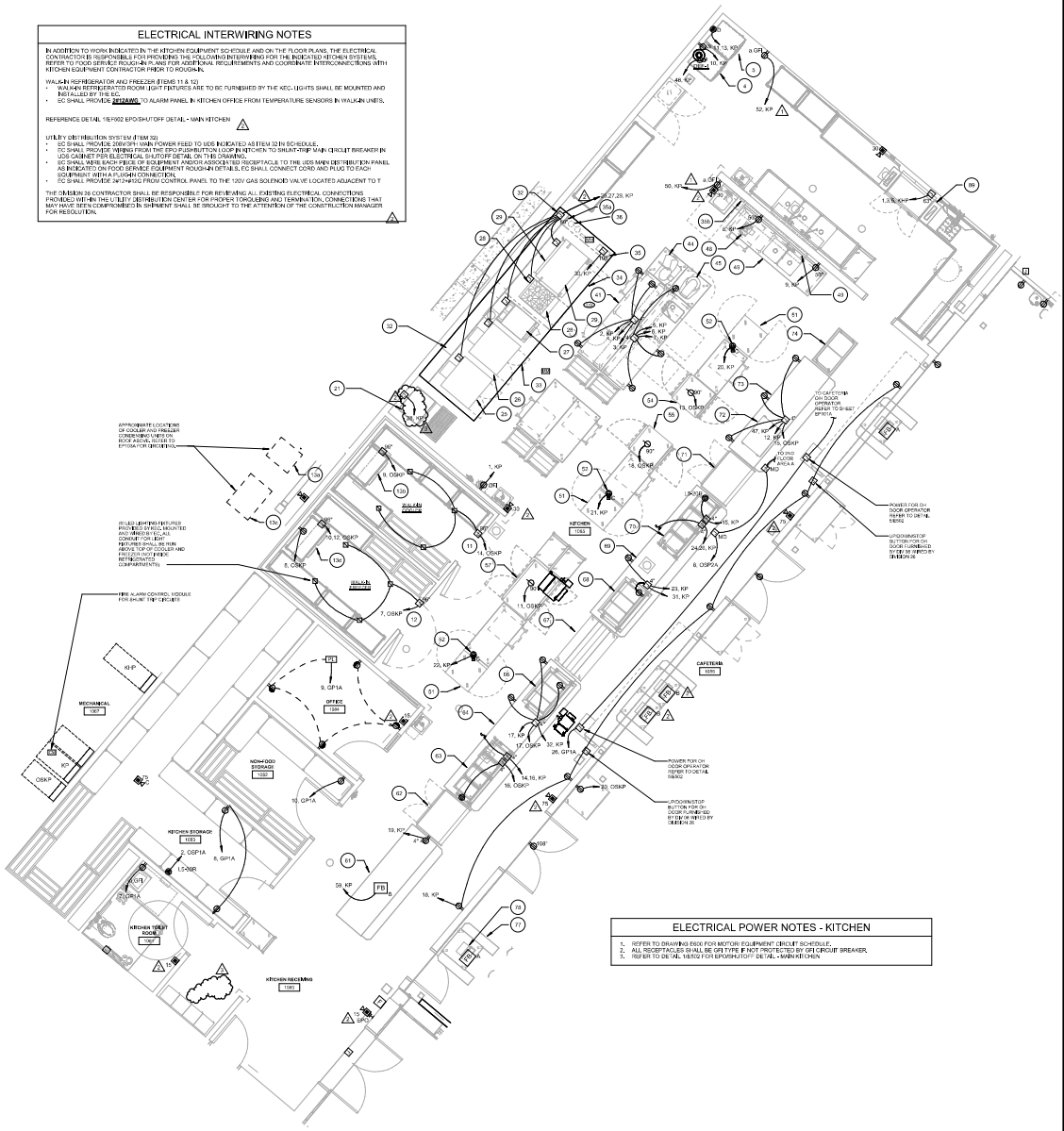
IN ADDITION TO WORK INDICATED IN THE KITCHEN EQUIPMENT SCHEDULE AND ON THE FLOOR PLANS, THE ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR PROVIDING THE FOLLOWING INTERWIRING FOR THE INDICATED KITCHEN SYSTEMS. REFER TO FOOD SERVICE ROUGH-IN PLANS FOR ADDITIONAL REQUIREMENTS AND COORDINATE INTERCONNECTIONS WITH KITCHEN EQUIPMENT CONTRACTOR PRIOR TO ROUGH-IN.

WALK-IN REFRIGERATOR AND FREEZER (ITEMS 11 & 12)
- WALK-IN REFRIGERATED ROOM LIGHT FIXTURES ARE TO BE FURNISHED BY THE KEC. LIGHTS SHALL BE MOUNTED AND INSTALLED BY THE EC.
- EC SHALL PROVIDE 2#12AWG TO ALARM PANEL IN KITCHEN OFFICE FROM TEMPERATURE SENSORS IN WALK-IN UNITS.

REFERENCE DETAIL 1/EF502 EPO/SHUTOFF DETAIL - MAIN KITCHEN (A)

UTILITY DISTRIBUTION SYSTEM (ITEM 32)
- EC SHALL PROVIDE 208V/3PH MAIN POWER FEED TO UDS INDICATED AS ITEM 32 IN SCHEDULE.
- EC SHALL PROVIDE WIRING FROM THE EPO/FLUSH BUTTON LOCATED IN KITCHEN TO SHUNT-TRIP MAIN CIRCUIT BREAKER IN UDS CABINET PER ELECTRICAL SHUTOFF DETAIL ON THIS DRAWING.
- EC SHALL WIRE EACH PIECE OF EQUIPMENT AND/OR ASSOCIATED RECEPTACLE TO THE UDS MAIN DISTRIBUTION PANEL AS INDICATED ON FOOD SERVICE EQUIPMENT ROUGH-IN DETAILS. EC SHALL CONNECT CORD AND PLUG TO EACH EQUIPMENT WITH A FLUSH CONNECTION.
- EC SHALL PROVIDE 2#12AWG TO CONTROL PANEL TO THE 120V GAS SOLENOID VALVE LOCATED ADJACENT TO T

THE DIVISION 26 CONTRACTOR SHALL BE RESPONSIBLE FOR REVIEWING ALL EXISTING ELECTRICAL CONNECTIONS PROVIDED WITHIN THE UTILITY DISTRIBUTION CENTER FOR PROPER TORQUEING AND TERMINATION. CONNECTIONS THAT MAY HAVE BEEN COMPROMISED IN SHIPMENT SHALL BE BROUGHT TO THE ATTENTION OF THE CONSTRUCTION MANAGER FOR RESOLUTION. (A)



ELECTRICAL POWER NOTES - KITCHEN

1. REFER TO DRAWING E600 FOR MOTOR EQUIPMENT CIRCUIT SCHEDULE.
2. ALL RECEPTACLES SHALL BE GFCI TYPE IF NOT PROTECTED BY GFCI CIRCUIT BREAKER.
3. REFER TO DETAIL 1/ES502 FOR EPO/SHUTOFF DETAIL - MAIN KITCHEN

(2) ELECTRICAL ENLARGED PLAN - KITCHEN
1/4" = 1'-0"

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NORTH
EAST
SOUTH
WEST
KEYPLAN

Number	Date	Issued For
3	10/23/2024	ADDENDUM NO. 4
2	10/23/2024	ADDENDUM NO. 3
1	10/16/2024	ADDENDUM NO. 2
	09/20/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

ELECTRICAL ENLARGED PLANS - KITCHEN

Date 07/08/2024
Scale As indicated
Proj. Number 22367.00
Drawing Number E400

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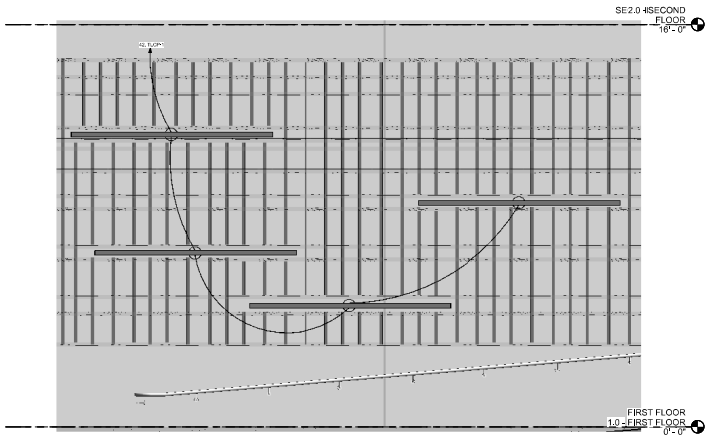
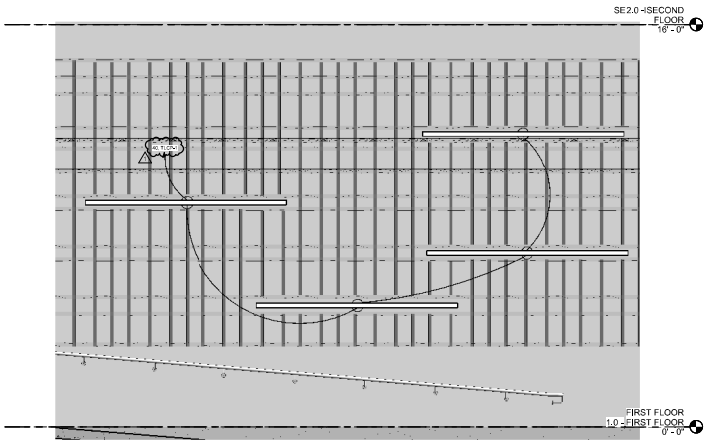
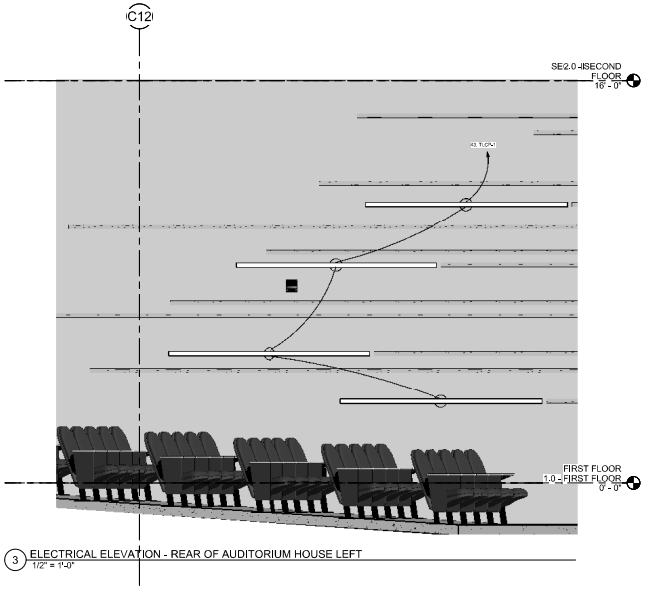


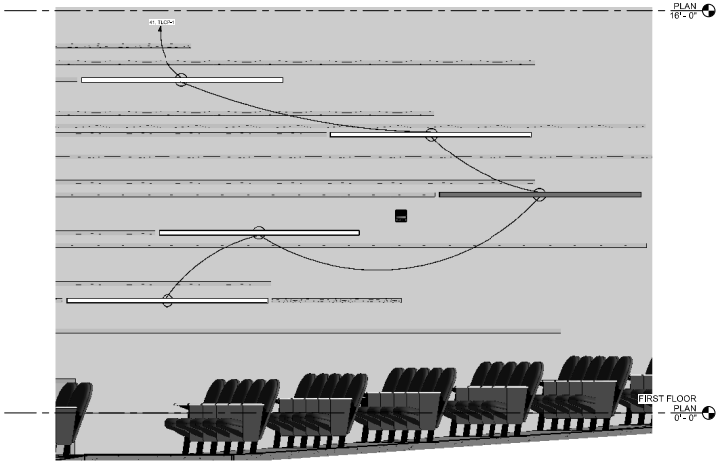
4 ELECTRICAL ELEVATION - FRONT OF AUDITORIUM HOUSE LEFT
1/2" = 1'-0"



1 ELECTRICAL ELEVATION - FRONT OF AUDITORIUM HOUSE RIGHT
1/2" = 1'-0"



3 ELECTRICAL ELEVATION - REAR OF AUDITORIUM HOUSE LEFT
1/2" = 1'-0"



2 ELECTRICAL ELEVATION - REAR OF AUDITORIUM HOUSE RIGHT
1/2" = 1'-0"

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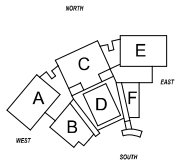

KEYPLAN

Number	Date	Issued For
1	10/16/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ELECTRICAL ENLARGED PLANS - AUDITORIUM

Date
07/08/2024
Scale
1/2" = 1'-0"
Proj. Number
22367.00

Drawing Number
E401

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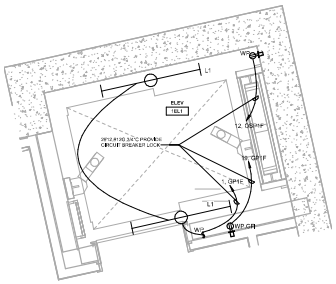
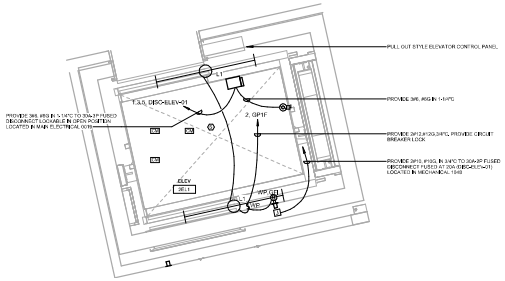


1 ELECTRICAL ENLARGED PLAN - ELEVATOR PIT
1/2" = 1'-0"



2 ELECTRICAL ENLARGED PLAN - ELEVATOR TOP OF SHAFT
1/2" = 1'-0"

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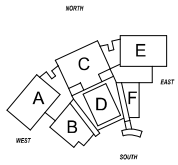

KEYPLAN

Number	Date	Issued For
	05/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ELECTRICAL ENLARGED PLANS - ELEVATORS

Date
07/08/2024
Scale
1/2" = 1'-0"
Proj. Number
22367.00

Drawing Number
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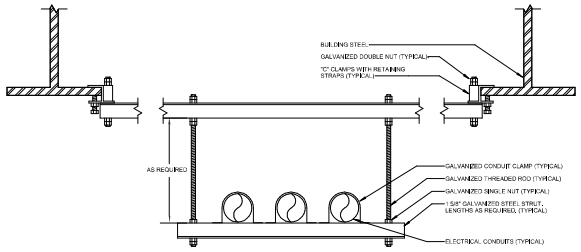
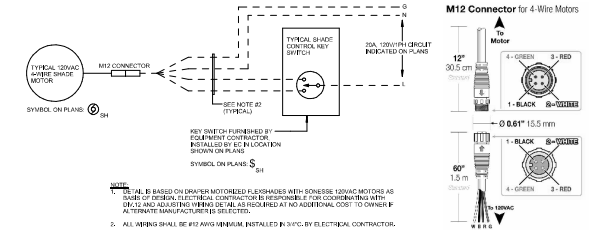


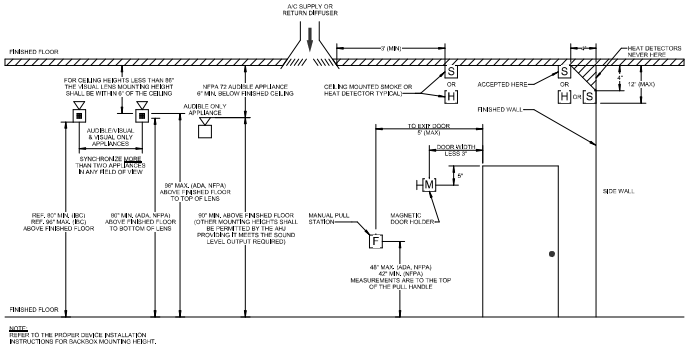
NOTES:
1. PROVIDE ALL REQUIRED HARDWARE INCLUDING BUT NOT LIMITED TO THREADED ROD, WASHERS, BOLTS, BEAM CLAMPS, STRAPS, AND CHANNEL SPRING NUTS.
2. QUANTITIES AND SIZE OF CONDUITS VARY.

5 TYPICAL CONDUIT HANGING DETAIL
1/8" = 1'-0"



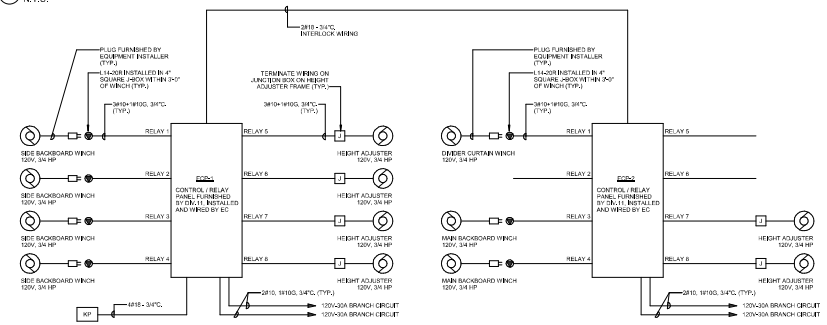
NOTE:
1. DETAIL IS BASED ON DRAPER MOTORIZED FLEXSHADES WITH SONESSE 120VAC MOTORS AS BASIS OF DESIGN. ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR COORDINATING WITH DIV.12 AND ADJUSTING WIRING DETAIL AS REQUIRED AT NO ADDITIONAL COST TO OWNER IF ALTERNATE MANUFACTURER IS SELECTED.
2. ALL WIRING SHALL BE #12 AWG MINIMUM, INSTALLED IN 3/4"C. BY ELECTRICAL CONTRACTOR.
3. INSTALL ALL COMPONENTS IN LOCATIONS PER MANUFACTURER'S RECOMMENDATIONS.
4. COORDINATE EXACT LOCATION AND QUANTITY OF MOTORS IN FIELD WITH DIV.12 CONTRACTOR PRIOR TO ROUGH-IN.

4 MOTORIZED SHADE WIRING SCHEMATIC
NTS



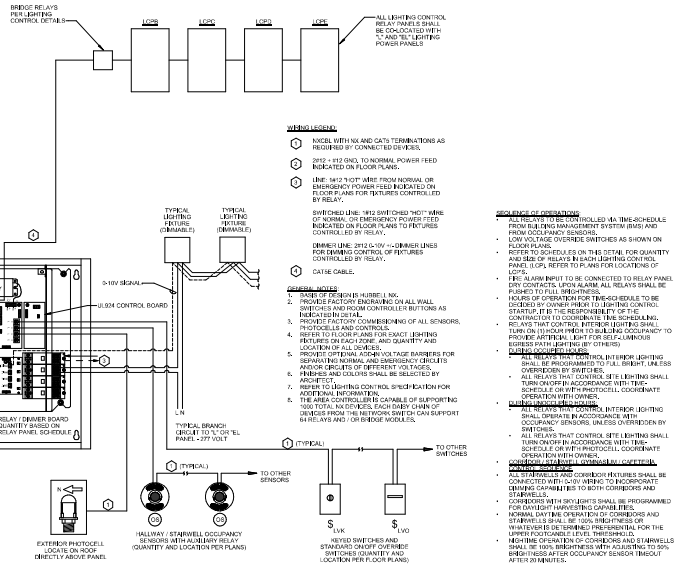
NOTE:
REFER TO THE PROPER DEVICE INSTALLATION INSTRUCTIONS FOR BACKBOX MOUNTING HEIGHT.

2 FIRE ALARM DEVICE MOUNTING HEIGHT REFERENCE DETAIL
N.T.S.



NOTES:
1. DETAIL IS BASED ON PORTER "POWR-TOUCH 2.0" GYMNASIUM CONTROL SYSTEM, ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR PROVIDING POWER AND CONTROL CONNECTIONS TO ALL PIECES OF EQUIPMENT AS REQUIRED BY MANUFACTURER AND FOR ALTERING THIS DETAIL AS REQUIRED IF ALTERNATE MANUFACTURER IS SELECTED.
2. ALL WIRING (POWER AND CONTROL) SHOWN ON THIS DETAIL SHALL BE #10 AWG.
3. DETAIL IS TYPICAL FOR EACH PIECE OF GYMNASIUM EQUIPMENT SHOWN ON PLANS.
4. COORDINATE EXACT POINT OF CONNECTION TO EQUIPMENT WITH DIV.11 CONTRACTOR PRIOR TO ROUGH-IN.

6 GYMNASIUM EQUIPMENT WIRING DETAILS
NTS



RELAY PANEL SCHEDULE		
PANEL	RELAY CAPACITY	QTY., OF 20A/1P RELAYS
LCPA	24	12 NORMAL / 12 EM
LCPB	12	8 NORMAL / 4 EM
LCPC	16	8 NORMAL / 8 EM
LCPD	12	8 NORMAL / 4 EM
LCPE	24	12 NORMAL / 12 EM

1 HUBBELL NX RELAY PANEL DETAIL
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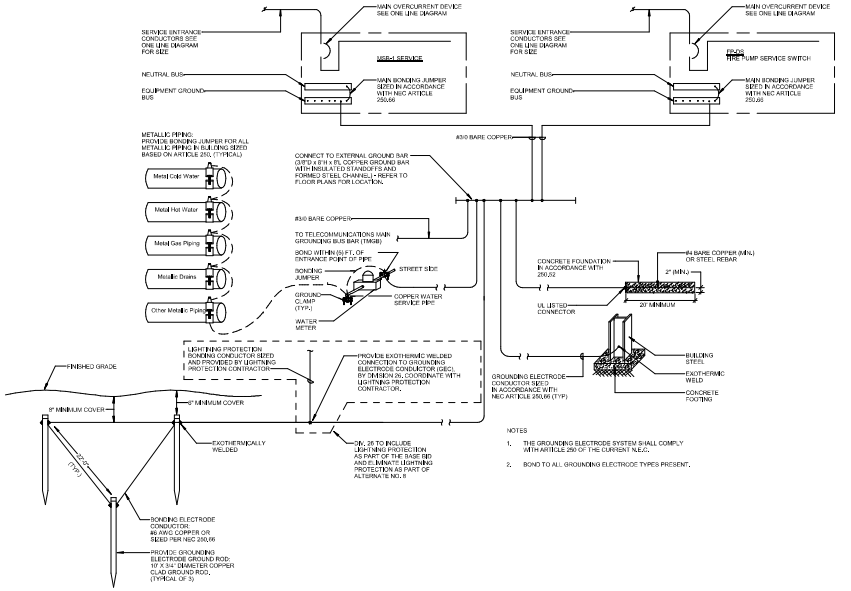

NOTES
1. THE GROUNDING ELECTRODE SYSTEM SHALL COMPLY WITH ARTICLE 250 OF THE CURRENT N.E.C.
2. BOND TO ALL GROUNDING ELECTRODE TYPES PRESENT.

3 SERVICE GROUNDING DETAIL
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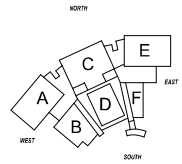

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ELECTRICAL DETAILS

Date 07/08/2024
Scale As indicated
Proj. Number 22367.00
Drawing Number E500

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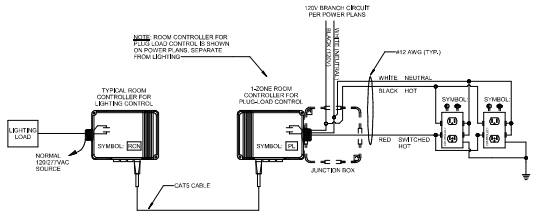
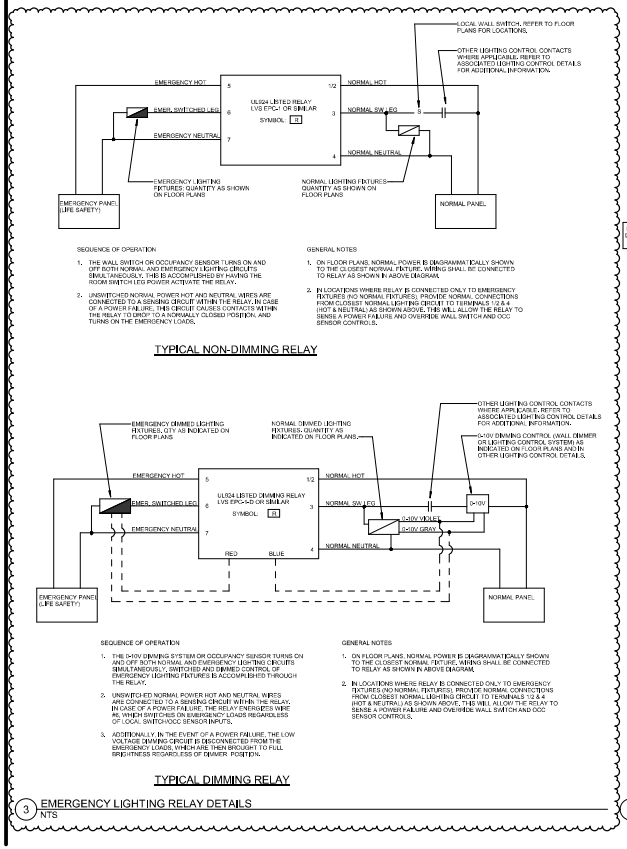


GENERAL NOTES:
1. BASIS OF DESIGN IS HUBBELL NX.
2. ALL PLUG-LOAD CONTROLLED RECEPTACLES SHALL BE PERMANENTLY MARKED PER NEC 406.3(F).
3. ONLY THE "BOTTOM" OUTLET OF DUPLEX RECEPTACLES SHALL BE CONTROLLED/ SWITCHED.
4. ANY UNCONTROLLED RECEPTACLES OR HARDWIRED DEVICES/EQUIPMENT SHOWN POWERED VIA THE SAME CIRCUIT AS CONTROLLED RECEPTACLES SHALL BE WIRED AHEAD OF THE CONTROL/SWITCH DEVICE.
5. REFER TO FLOOR PLANS FOR QUANTITY AND LOCATION OF ALL DEVICES.
6. FINISHES AND COLORS OF ALL RECEPTACLES AND COVER PLATES SHALL BE SELECTED BY ARCHITECT
7. REFER TO LIGHTING CONTROL SPECIFICATION FOR ADDITIONAL INFORMATION.
8. REFER TO LIGHTING CONTROL DETAILS FOR TYPICAL INTERCONNECTION WITH LIGHTING CONTROL SYSTEM.

2 HUBBELL NX - PLUG LOAD CONTROL DETAIL
NTS



SEQUENCE OF OPERATION:
1. THE WALL SWITCH OR OCCUPANCY SENSOR TURNS ON AND OFF BOTH NORMAL AND EMERGENCY LIGHTING CIRCUITS SIMULTANEOUSLY, THIS IS ACCOMPLISHED BY HAVING THE ROOM SWITCH LEG POWER ACTIVATE THE RELAY.
2. UNSWITCHED NORMAL POWER HOT AND NEUTRAL WIRES ARE CONNECTED TO A SENSING CIRCUIT WITHIN THE RELAY. IN CASE OF A POWER FAILURE, THIS CIRCUIT CAUSES CONTACTS WITHIN THE RELAY TO DROP TO A NORMALLY CLOSED POSITION, AND TURNS ON THE EMERGENCY LOADS.

GENERAL NOTES:
1. ON FLOOR PLANS, NORMAL POWER IS DIAGRAMMATICALLY SHOWN TO THE CLOSEST NORMAL FIXTURE. WIRING SHALL BE CONNECTED TO RELAY AS SHOWN IN ABOVE DIAGRAM.
2. IN LOCATIONS WHERE RELAY IS CONNECTED ONLY TO EMERGENCY FIXTURES (NO NORMAL FIXTURES): PROVIDE NORMAL CONNECTIONS FROM CLOSEST NORMAL LIGHTING CIRCUIT TO TERMINALS 1/2 & 4 (HOT & NEUTRAL) AS SHOWN ABOVE. THIS WILL ALLOW THE RELAY TO SENSE A POWER FAILURE AND OVERRIDE WALL SWITCH AND OCC SENSOR CONTROLS.

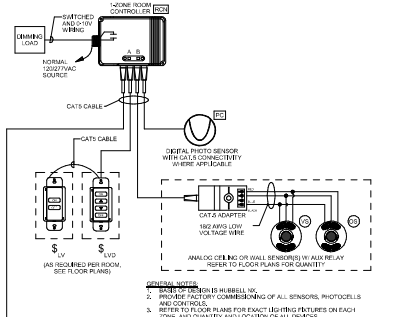
TYPICAL NON-DIMMING RELAY

SEQUENCE OF OPERATION
1. THE 0-10V DIMMING SYSTEM OR OCCUPANCY SENSOR TURNS ON AND OFF BOTH NORMAL AND EMERGENCY LIGHTING CIRCUITS SIMULTANEOUSLY, SWITCHED AND DIMMED CONTROL OF EMERGENCY LIGHTING FIXTURES IS ACCOMPLISHED THROUGH THE RELAY.
2. UNSWITCHED NORMAL POWER HOT AND NEUTRAL WIRES ARE CONNECTED TO A SENSING CIRCUIT WITHIN THE RELAY. IN CASE OF A POWER FAILURE, THE RELAY ENERGIZES WIRE #6, WHICH SWITCHES ON EMERGENCY LOADS REGARDLESS OF LOCAL SWITCH/OCC SENSOR INPUTS.
3. ADDITIONALLY, IN THE EVENT OF A POWER FAILURE, THE LOW VOLTAGE DIMMING CIRCUIT IS DISCONNECTED FROM THE EMERGENCY LOADS, WHICH ARE THEN BROUGHT TO FULL BRIGHTNESS REGARDLESS OF DIMMER POSITION.

GENERAL NOTES
1. ON FLOOR PLANS, NORMAL POWER IS DIAGRAMMATICALLY SHOWN TO THE CLOSEST NORMAL FIXTURE. WIRING SHALL BE CONNECTED TO RELAY AS SHOWN IN ABOVE DIAGRAM.
2. IN LOCATIONS WHERE RELAY IS CONNECTED ONLY TO EMERGENCY FIXTURES (NO NORMAL FIXTURES): PROVIDE NORMAL CONNECTIONS FROM CLOSEST NORMAL LIGHTING CIRCUIT TO TERMINALS 1/2 & 4 (HOT & NEUTRAL) AS SHOWN ABOVE. THIS WILL ALLOW THE RELAY TO SENSE A POWER FAILURE AND OVERRIDE WALL SWITCH AND OCC SENSOR CONTROLS.

TYPICAL DIMMING RELAY

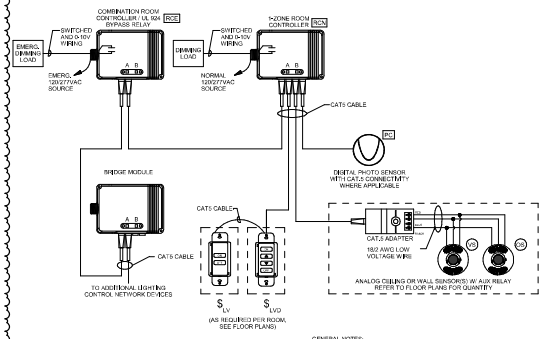
3 EMERGENCY LIGHTING RELAY DETAILS
NTS



GENERAL NOTES:
1. BASIS OF DESIGN IS HUBBELL NX.
2. PROVIDE FACTORY COMMISSIONING OF ALL SENSORS, PHOTOCELLS AND CONTROLS.
3. REFER TO FLOOR PLANS FOR EXACT LIGHTING FIXTURES ON EACH ZONE, AND QUANTITY AND LOCATION OF ALL DEVICES.
4. FINISHES AND COLORS OF ALL LIGHTING CONTROL DEVICES AND SWITCH PLATES SHALL BE SELECTED BY ARCHITECT
5. SENSORS SHALL BE PROVIDED WITH AUXILIARY RELAY OPTION FOR CONNECTION TO BMS BY DIVISION 23 CONTRACTOR.
6. REFER TO LIGHTING CONTROL SPECIFICATION FOR ADDITIONAL INFORMATION.

SEQUENCE OF OPERATIONS:
1. ROOM OCCUPANCY SENSORS SHALL BE SET FOR AUTO ON, AUTO OFF OPERATION, TIMEOUT AFTER 20 MINUTES.
2. ROOM VACANCY SENSORS SHALL BE SET FOR MANUAL ON, AUTO OFF OPERATION, TIMEOUT AFTER 20 MINUTES.
3. MANUAL-ON VIA LOCAL "LV" AND "LVD" KEYPADS.
4. DIMMING VIA LOCAL "LVD" KEYPAD(S).
5. 4-BUTTON "LVD" KEYPAD(S) TO BE PROGRAMMED AS FOLLOWS:
   - BUTTON 1: "ON" TURN ALL LIGHTS ON
   - BUTTON 2: "▲" PRESS TO RAISE ALL LIGHTS
   - BUTTON 3: "▼" PRESS TO LOWER ALL LIGHTS
   - BUTTON 4: "OFF" TURN ALL LIGHTS OFF
6. 2-BUTTON "LV" KEYPAD(S) TO BE PROGRAMMED AS FOLLOWS:
   - BUTTON 1: "ON": TOGGLE ALL LIGHTS ON
   - BUTTON 2: "OFF": TOGGLE ALL LIGHTS OFF
7. WHERE PHOTOCELL IS INDICATED ON PLANS, ZONE SHALL HAVE AUTOMATIC DIMMING VIA PHOTOCELL AND SHALL CAP MAXIMUM LIGHT LEVEL OF 40 FOOT-CANDLES IN THIS ZONE.

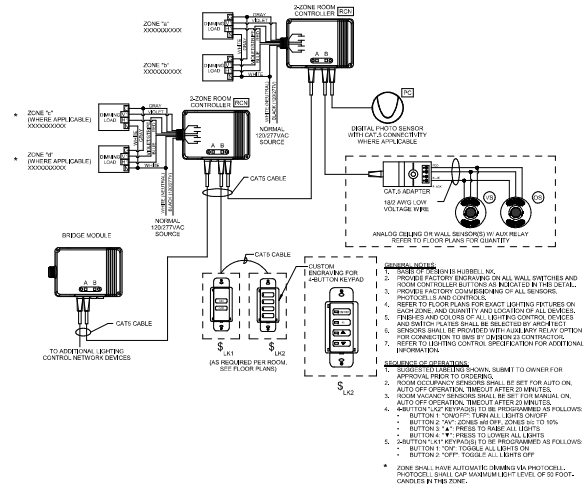
TYPICAL 1-ZONE LIGHTING CONTROL DETAIL - NORMAL FIXTURES ONLY
N.T.S.



GENERAL NOTES:
1. BASIS OF DESIGN IS HUBBELL NX.
2. PROVIDE FACTORY COMMISSIONING OF ALL SENSORS, PHOTOCELLS AND CONTROLS.
3. REFER TO FLOOR PLANS FOR EXACT LIGHTING FIXTURES ON EACH ZONE, AND QUANTITY AND LOCATION OF ALL DEVICES.
4. FINISHES AND COLORS OF ALL LIGHTING CONTROL DEVICES AND SWITCH PLATES SHALL BE SELECTED BY ARCHITECT
5. SENSORS SHALL BE PROVIDED WITH AUXILIARY RELAY OPTION FOR CONNECTION TO BMS BY DIVISION 23 CONTRACTOR.
6. REFER TO LIGHTING CONTROL SPECIFICATION FOR ADDITIONAL INFORMATION.

SEQUENCE OF OPERATIONS:
1. ROOM OCCUPANCY SENSORS SHALL BE SET FOR AUTO ON, AUTO OFF OPERATION, TIMEOUT AFTER 20 MINUTES.
2. ROOM VACANCY SENSORS SHALL BE SET FOR MANUAL ON, AUTO OFF OPERATION, TIMEOUT AFTER 20 MINUTES.
3. MANUAL-ON VIA LOCAL "LV" AND "LVD" KEYPADS.
4. DIMMING VIA LOCAL "LVD" KEYPAD(S).
5. 4-BUTTON "LVD" KEYPAD(S) TO BE PROGRAMMED AS FOLLOWS:
   - BUTTON 1: "ON": TURN ALL LIGHTS ON
   - BUTTON 2: "▲" PRESS TO RAISE ALL LIGHTS
   - BUTTON 3: "▼" PRESS TO LOWER ALL LIGHTS
   - BUTTON 4: "OFF": TURN ALL LIGHTS OFF
6. 2-BUTTON "LV" KEYPAD(S) TO BE PROGRAMMED AS FOLLOWS:
   - BUTTON 1: "ON": TOGGLE ALL LIGHTS ON
   - BUTTON 2: "OFF": TOGGLE ALL LIGHTS OFF
7. WHERE PHOTOCELL IS INDICATED ON PLANS, ZONE SHALL HAVE AUTOMATIC DIMMING VIA PHOTOCELL AND SHALL CAP MAXIMUM LIGHT LEVEL OF 40 FOOT-CANDLES IN THIS ZONE.

TYPICAL 1-ZONE LIGHTING CONTROL DETAIL - NORMAL AND EMERGENCY FIXTURES
N.T.S.

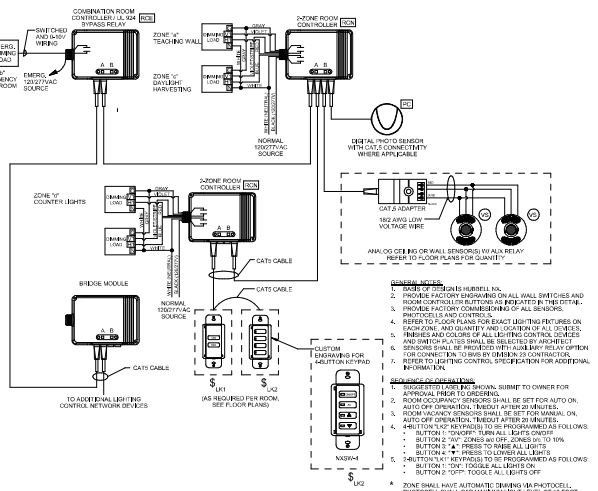


GENERAL NOTES:
1. BASIS OF DESIGN IS HUBBELL NX.
2. PROVIDE FACTORY ENGRAVING ON ALL WALL SWITCHES AND ROOM CONTROLLER BUTTONS AS INDICATED IN THIS DETAIL.
3. PROVIDE FACTORY COMMISSIONING OF ALL SENSORS, PHOTOCELLS AND CONTROLS.
4. REFER TO FLOOR PLANS FOR EXACT LIGHTING FIXTURES ON EACH ZONE, AND QUANTITY AND LOCATION OF ALL DEVICES.
5. FINISHES AND COLORS OF ALL LIGHTING CONTROL DEVICES AND SWITCH PLATES SHALL BE SELECTED BY ARCHITECT
6. SENSORS SHALL BE PROVIDED WITH AUXILIARY RELAY OPTION FOR CONNECTION TO BMS BY DIVISION 23 CONTRACTOR.
7. REFER TO LIGHTING CONTROL SPECIFICATION FOR ADDITIONAL INFORMATION.

SEQUENCE OF OPERATIONS:
1. SUGGESTED LOADS (NO SHOWN, SUBMIT TO OWNER FOR APPROVAL PRIOR TO ORDERING.
2. ROOM OCCUPANCY SENSORS SHALL BE SET FOR AUTO ON, AUTO OFF OPERATION, TIMEOUT AFTER 20 MINUTES.
3. ROOM VACANCY SENSORS SHALL BE SET FOR MANUAL ON, AUTO OFF OPERATION, TIMEOUT AFTER 20 MINUTES.
4. 4-BUTTON "LK" KEYPAD(S) TO BE PROGRAMMED AS FOLLOWS:
   - BUTTON 1: "ON": TOGGLE ALL LIGHTS ON
   - BUTTON 2: "▲" PRESS TO RAISE ALL LIGHTS
   - BUTTON 3: "▼" PRESS TO LOWER ALL LIGHTS
   - BUTTON 4: "OFF": TOGGLE ALL LIGHTS OFF
5. 2-BUTTON "LK" KEYPADS TO BE PROGRAMMED AS FOLLOWS:
   - BUTTON 1: "ON": TOGGLE ALL LIGHTS ON
   - BUTTON 2: "OFF": TOGGLE ALL LIGHTS OFF

* ZONE SHALL HAVE AUTOMATIC DIMMING VIA PHOTOCELL. PHOTOCELL SHALL CAP MAXIMUM LIGHT LEVEL OF 50 FOOT-CANDLES IN THIS ZONE.

TYPICAL MULTI-ZONE LIGHTING CONTROL DETAIL - NORMAL FIXTURES ONLY
N.T.S.



GENERAL NOTES:
1. BASIS OF DESIGN IS HUBBELL NX.
2. PROVIDE FACTORY ENGRAVING ON ALL WALL SWITCHES AND ROOM CONTROLLER BUTTONS AS INDICATED IN THIS DETAIL.
3. PROVIDE FACTORY COMMISSIONING OF ALL SENSORS, PHOTOCELLS AND CONTROLS.
4. REFER TO FLOOR PLANS FOR EXACT LIGHTING FIXTURES ON EACH ZONE, AND QUANTITY AND LOCATION OF ALL DEVICES.
5. FINISHES AND COLORS OF ALL LIGHTING CONTROL DEVICES AND SWITCH PLATES SHALL BE SELECTED BY ARCHITECT
6. SENSORS SHALL BE PROVIDED WITH AUXILIARY RELAY OPTION FOR CONNECTION TO BMS BY DIVISION 23 CONTRACTOR.
7. REFER TO LIGHTING CONTROL SPECIFICATION FOR ADDITIONAL INFORMATION.

SEQUENCE OF OPERATIONS:
1. SUGGESTED LOADS (NO SHOWN, SUBMIT TO OWNER FOR APPROVAL PRIOR TO ORDERING.
2. ROOM OCCUPANCY SENSORS SHALL BE SET FOR AUTO ON, AUTO OFF OPERATION, TIMEOUT AFTER 20 MINUTES.
3. ROOM VACANCY SENSORS SHALL BE SET FOR MANUAL ON, AUTO OFF OPERATION, TIMEOUT AFTER 20 MINUTES.
4. 4-BUTTON "LK" KEYPAD(S) TO BE PROGRAMMED AS FOLLOWS:
   - BUTTON 1: "ON": TOGGLE ALL LIGHTS ON
   - BUTTON 2: "▲" PRESS TO RAISE ALL LIGHTS
   - BUTTON 3: "▼" PRESS TO LOWER ALL LIGHTS
   - BUTTON 4: "OFF": TOGGLE ALL LIGHTS OFF
5. 2-BUTTON "LK" KEYPADS TO BE PROGRAMMED AS FOLLOWS:
   - BUTTON 1: "ON": TOGGLE ALL LIGHTS ON
   - BUTTON 2: "OFF": TOGGLE ALL LIGHTS OFF

* ZONE SHALL HAVE AUTOMATIC DIMMING VIA PHOTOCELL. PHOTOCELL SHALL CAP MAXIMUM LIGHT LEVEL OF 50 FOOT-CANDLES IN THIS ZONE.

TYPICAL MULTI-ZONE LIGHTING CONTROL DETAIL - NORMAL AND EMERGENCY FIXTURES
N.T.S.

1 LIGHTING CONTROL DETAILS
NTS

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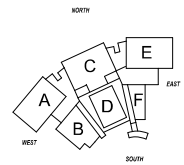
CES #2023066.00

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
1	10/16/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

ELECTRICAL DETAILS

Date 07/08/2024
Scale NTS
Proj. Number 22367.00
Drawing Number **E501**

Autodesk Docs://22367.00 - Greenwich Central Middle School/22367.00-MEP Central - Greenwich Central Middle School.rvt
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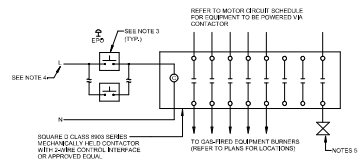
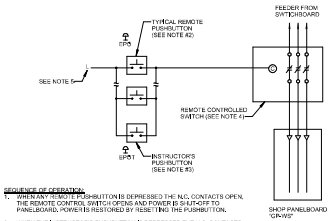


NOTES:
1. PROVIDE CONTACTOR WITH QUANTITY OF POLES REQUIRED TO SHUT POWER DOWN TO EQUIPMENT LISTED PLUS (3) SPARE POLES. COORDINATE LOCATION IN EQUIPMENT ROOM IN FIELD.
2. COORDINATE CONNECTIONS TO EQUIPMENT CONTROL PANELS IN FIELD.
3. SITI MODEL #SS2SS-4-PO-EN PUSHBUTTON, QUANTITY SHOWN ON PLANS:
   A. WITH (1) N.O. AND (1) N.C. CONTACT COMPATIBLE WITH CONTACTOR
   B. RED COLOR WITH "EMERGENCY POWER OFF" LEGEND
   C. NON-ALARMED PUSH-UP FLUSHED COVER
   D. MOMENTARY OPERATION
4. POWER VIA LOCAL 120VAC RECEPTACLE CIRCUIT IN EQUIPMENT ROOM.
5. NORMALLY OPEN 120VAC GAS SOLENOID VALVE IN ROOM SHALL BE DE-ENERGIZED UPON EPO SYSTEM ACTIVATION. SOLENOID VALVE AND ENCLOSURE SHALL BE FURNISHED AND INSTALLED BY DIV. 22 PLUMBING CONTRACTOR AND WIRED THROUGH CONTACTOR BY DIV. 26 EC. POWER VIA DEDICATED 20A/1P CIRCUIT BREAKER IN SAME PANEL AS BOILER MAIN FEEDS.

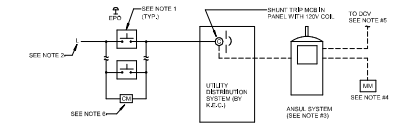
3 BOILER ROOM EPO DETAIL
NTS



SEQUENCE OF OPERATION:
1. WHEN ANY REMOTE PUSHBUTTON IS DEPRESSED THE N.C. CONTACTS OPEN. THE REMOTE CONTROL SWITCH OPENS AND POWER IS SHUT-OFF TO PANELBOARD. POWER IS RESTORED BY RESETTING THE PUSHBUTTON.
2. WHEN THE INSTRUCTOR'S PUSHBUTTON IS DEPRESSED THE N.C. CONTACTS OPEN. THE REMOTE CONTROL SWITCH OPENS AND POWER IS SHUT-OFF TO PANELBOARD. POWER IS RESTORED BY KEY RELEASE OF THE INSTRUCTOR'S PUSHBUTTON.

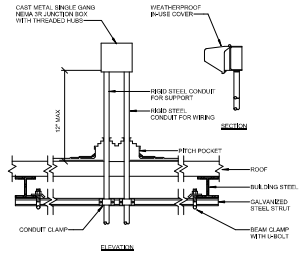
NOTES:
1. COORDINATE LOCATIONS OF EPO MUSHROOM HEAD PUSHBUTTONS WITH OWNER IN FIELD.
2. REMOTE EPO SITI MODEL #SS2SS-4-PO-EN PUSHBUTTONS QUANTITY SHOWN ON PLANS:
   A. WITH (1) N.O. AND (1) N.C. CONTACT COMPATIBLE WITH SHUNT TRIP PANELBOARD
   B. RED COLOR WITH "EMERGENCY POWER OFF" LEGEND
   C. NON-ALARMED PUSH-UP FLUSHED COVER
   D. MOMENTARY OPERATION
3. INSTRUCTORS EPO: SITI MODEL #SS2SS2-PO-EN PUSHBUTTON.
   A. WITH (1) N.O. AND (1) N.C. CONTACT COMPATIBLE WITH CONTACTOR
   B. RED COLOR WITH "EMERGENCY POWER OFF" LEGEND
   C. NON-ALARMED PUSH-UP FLUSHED COVER
   D. KEY-TO-RESET OPERATION WITH ILLUMINATION WHEN PRESSED
4. SQUARE D 8903SS6T1V02NR6RRR REMOTE CONTROL SWITCH WITH TWO-WIRE AUXILIARY CONTROL RELAY AND OPTIONAL LOSE INDICATING LIGHTS, RATING AS INDICATED ON PLANS.
5. POWER VIA LOCAL 120VAC RECEPTACLE CIRCUIT NOT CONNECTED TO PANEL THAT IS SHUT OFF (NEUTRAL WIRING NOT SHOWN)

2 EPO/SHUTOFF DETAIL - VOCATIONAL AREAS WITH REMOTE SHUTOFF SWITCH
NTS



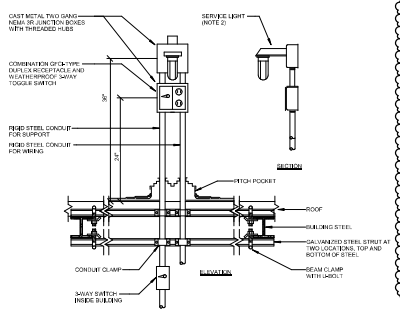
NOTES:
1. SITI MODEL #SS2SS-4-PO-EN PUSHBUTTON, QUANTITY SHOWN ON PLANS:
   A. WITH (1) N.O. AND (1) N.C. CONTACT COMPATIBLE WITH SHUNT TRIP PANELBOARD
   B. RED COLOR WITH "EMERGENCY POWER OFF" LEGEND
   C. NON-ALARMED PUSH-UP FLUSHED COVER
   D. MOMENTARY OPERATION
2. POWER VIA LOCAL 120VAC RECEPTACLE CIRCUIT NOT CONNECTED TO PANEL THAT IS SHUT OFF (NEUTRAL WIRING NOT SHOWN)
3. FIRE SUPPRESSION/ ANSUL CABINET SHALL BE WIRED TO UTILITY DISTRIBUTION SYSTEM FOR AUTOMATIC SHUTOFF IN THE EVENT OF A FIRE. PROVIDE INTERCONNECTIONS AS REQUIRED BY MANUFACTURER.
4. SYSTEM SHALL REPORT TO FIRE ALARM MONITOR MODULE TO SEND BUILDING INTO ALARM STATE AS INDICATED ON FIRE ALARM RISER DIAGRAM.
5. ANSUL SYSTEM SHALL BE INTERWIRED WITH DEMAND CONTROL VENTILATION SYSTEM TO AUTOMATICALLY TURN ON EXHAUST FANS DURING A FIRE. PROVIDE INTERCONNECTIONS AS REQUIRED BY MANUFACTURER.
6. PROGRAM FIRE ALARM CONTROL RELAY TO ACTIVATE SHUNT-TRIP CIRCUIT UPON ACTIVATION OF ALARM OUTPUT OF GENERAL FIRE ALARM IN THE KITCHEN (I.E. ACTIVATION OF ANY SYSTEM SMOKE OR HEAT DETECTOR SHOWN ON FLOOR PLANS WITHIN KITCHEN AREA).

1 EPO/SHUTOFF DETAIL - MAIN KITCHEN
NTS



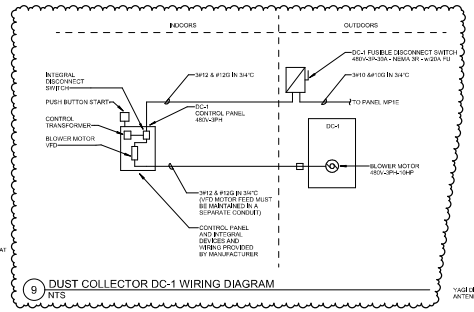
NOTES:
1. WHERE APPLICABLE MOUNT ROOF RECEPTACLE TO MECHANICAL EQUIPMENT ENCLOSURES.
2. COORDINATE WITH ROOFING CONTRACTOR FOR ALL ROOF PENETRATIONS AND SEALING TO MAINTAIN ROOF WARRANTY.

7 ROOF MOUNTED RECEPTACLE DETAIL
NTS

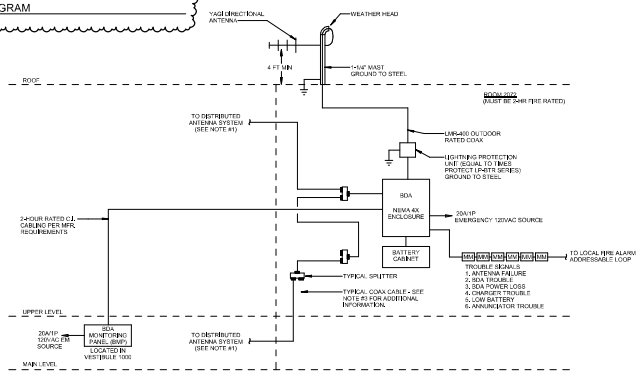


NOTES:
1. COORDINATE WITH ROOFING CONTRACTOR FOR ALL ROOF PENETRATIONS AND SEALING TO MAINTAIN ROOF WARRANTY.
2. PROVIDE SERVICE LIGHT FIXTURE WITH PNS LISTING, EQUAL TO HUBBELL VAPORTITE VWRGL-7 WITH VVS-GUARD WIREGUARD ACCESSORY. PROVIDE ALL REQUIRED MOUNTING ACCESSORIES FOR A COMPLETE INSTALLATION.

8 ROOF MOUNTED RECEPTACLE AND LIGHT DETAIL
NTS



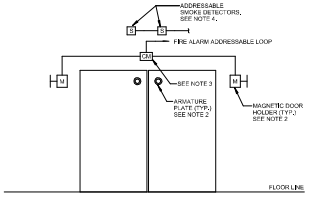
9 DUST COLLECTOR DC-1 WIRING DIAGRAM
NTS



BDA SYSTEM NOTES

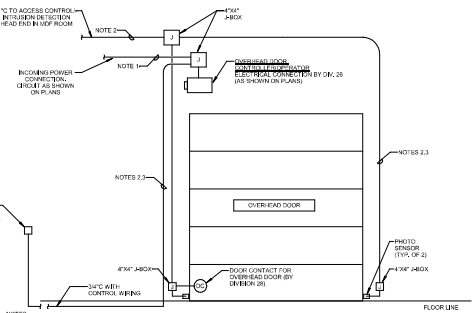
1. CONTRACTOR IS RESPONSIBLE FOR PROVIDING A COMPLETE DISTRIBUTED ANTENNA SYSTEM THROUGHOUT THE BUILDING TO MEET THE PERFORMANCE REQUIREMENTS OF THE SPECIFICATIONS. CONTRACTOR IS RESPONSIBLE FOR COMPLETING A SYSTEM LAYOUT AND SUBMITTING SHOP DRAWINGS OF THE SYSTEM COMPONENTS OVERLAYED ON THE FLOOR PLANS FOR REVIEW AND APPROVAL BY THE OWNER AND ENGINEER, COORDINATE ALL COMMUNICATION REQUIREMENTS WITH THE OWNER PRIOR TO INSTALLATION.
2. SYSTEM SHALL HAVE THE ABILITY TO SUPPORT THE FOLLOWING FREQUENCIES:
   A. GREENWICH FIRE DEPARTMENT
   B. GREENWICH POLICE DEPARTMENT
3. SHOWN PLENUM RATED COAX CABLE (EQUAL TO TRILOGY AR CELL APPETIZER).
   RISER COAXIAL CABLE (WHEN CROSSING BETWEEN FLOORS) SHALL BE EITHER OF THE FOLLOWING:
   A. BASIS OF DESIGN: PROVIDE 2-HOUR FIRE RATED COAXIAL CABLE, AMERICAN FIRE WIRE APPLICATIONS OR EQUAL.
   B. ALTERNATE SOLUTION: CABLE SHALL BE ROUTED IN RIGID STEEL CONDUIT AND WRAPPED IN ENDOTHERM® MAT (EQUAL TO 3M INTERAM E-A-S-E-M), PER MANUFACTURER'S RECOMMENDATION.

4 BI-DIRECTIONAL AMPLIFICATION SYSTEM RISER DIAGRAM
NTS



NOTES:
1. TYPICAL DOUBLE DOOR SHOWN. SEE DRAWINGS AND SPECIFICATIONS FOR DOOR TYPES, FRAMES AND HARDWARE REQUIREMENTS.
2. MAGNETIC DOOR HOLDERS, ARMATURE PLATES, AND ACCESSORY HARDWARE PROVIDED BY DIV. 8. COORDINATE POWER REQUIREMENTS AND FINAL CONNECTIONS WITH DIV. 8. PROVIDE 120VAC POWER FROM LOCAL UNSWITCHED RECEPTACLE CIRCUIT.
3. FIRE ALARM CONTROL MODULE/RELAY TO RELEASE MAGNETIC HOLD OPENS UPON ACTIVATION. COORDINATE PROGRAMMING WITH THE OWNER AND AUTHORITY HAVING JURISDICTION.
4. PROVIDE ADDRESSABLE FIRE ALARM SMOKE DETECTORS ON EITHER SIDE PER NFPA 72 REQUIREMENTS. CONNECT TO NEAREST FIRE ALARM ADDRESSABLE DEVICE WITH ADDRESSABLE LOOP WIRING PER THE MANUFACTURERS REQUIREMENTS.

6 MAGNETIC DOOR HOLDER INSTALLATION DETAIL
NTS



NOTES:
1. **POWER CONNECTION INFRASTRUCTURE:** PROVIDES POWER CONNECTION AS SHOWN ON PLANS. THIS CONNECTION SHALL INCLUDE WIRING, CONDUIT, ASSOCIATED BOXES, HANGERS, AND SUPPORT.
2. **CONDUIT INFRASTRUCTURE (LOW VOLTAGE ONLY):** PROVIDE 1" C RUNS WITH NYLON PULL STRING. CONDUIT SHALL INCLUDE VERTICAL RUNS TO COMPLETE CONTRACT AND INSTALLATION OF ALL RELATED ITEMS AND SENSORS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FAMILIARIZE OR REQUEST INFORMATION RELATED TO THE DOOR SIZE AND OPENINGS FOR PROPER INSTALLATION. PROVIDE ALL ASSOCIATED BOXES, HANGERS, AND SUPPORTS FOR A COMPLETE INSTALLATION.
3. **OVER HEAD DOOR CONTROL WIRING, BUTTONS, AND ACCESSORIES:** ITEMS SUCH AS CONTROL BUTTONS AND PHOTO SENSORS SHALL BE FURNISHED BY THE DOOR INSTALLER FOR REVIEW BY TO INSTALL THE CONTRACTOR SHALL PROVIDE CONTROL WIRING AS FOLLOWS. ROUTED VIA CONDUIT PATHWAYS SHOWN (UNLESS PROVIDED AS PART OF THE OVERHEAD DOOR PACKAGE):
   A. CONTROL BUTTON: 4#18AWG (TYPICAL PER BUTTON)
      a. PROVIDE SIMILAR QUANTITY OF WIRING FOR DAISY CHAIN CONFIGURATIONS.
   B. PHOTO SENSOR: 2#18AWG (TYPICAL PER SENSOR)
4. **GENERAL REQUIREMENTS:**
   A. PROVIDE ALL CONNECTIONS TO DOOR OPENER/CONTROLLER FROM ACCESS CONTROL SYSTEM PER MANUFACTURER REQUIREMENTS AND PER SECTION 27 05 00 GUIDELINES.
   B. THE ELECTRICAL CONTRACTOR SHALL COORDINATE ELEVATIONS OF ALL DEVICES WITH THE ARCHITECT PRIOR TO ROUGH-IN. REFERENCE SHEET A620 FOR INTERIOR ELEVATIONS OF OVERHEAD DOORS.

5 TYPICAL OVERHEAD DOOR DETAIL - WITHOUT RED/GREEN LIGHT
NTS

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Greenwich Public Schools

Greenwich Central Middle School

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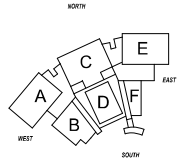
STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
2	10/23/2024	ADDENDUM NO. 3
	09/20/2024	BID/IMPLEMENT
	07/08/2024	PHASE 2

ELECTRICAL DETAILS

Date: 07/08/2024
Scale: NTS
Proj. Number: 22367.00
Drawing Number: E502

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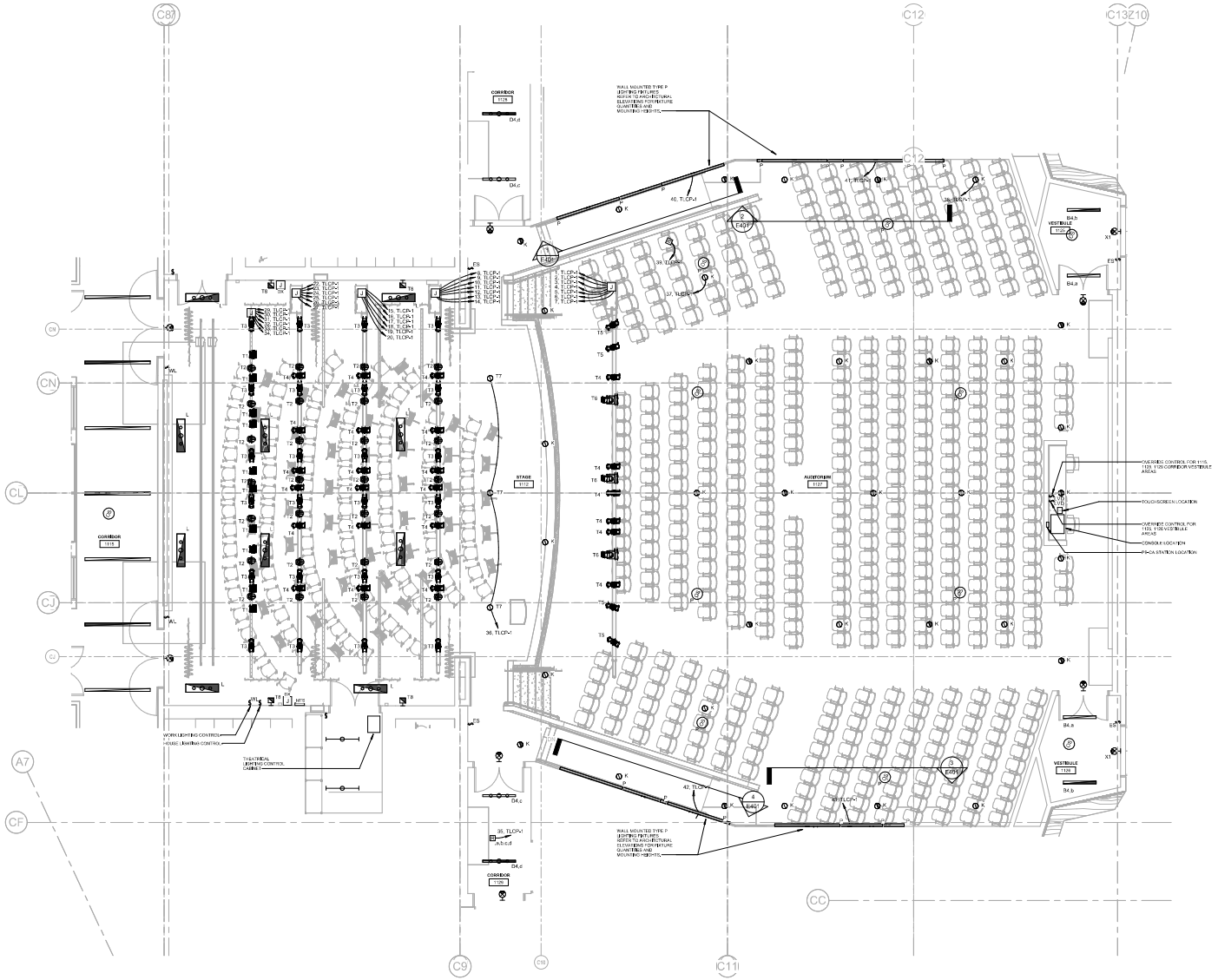

2 AUDITORIUM AND THEATRICAL LIGHTING LAYOUT
3/16" = 1'-0"

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Drawn: KCM
Checked: SJM

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CES #2023068.00

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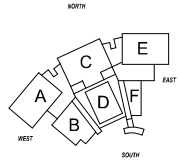
STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ELECTRICAL DETAILS

Date: 07/08/2024
Scale: 3/16" = 1'-0"
Proj. Number: 22367.00
Drawing Number: E503

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5/24/2024 11:37:33 AM

SENSOR IQ 48 RELAY PANEL: TLCP-1

JOB NUMBER:	JOB NAME: GCMS	DATE:	REVISION:	PROJECT NOTE:

SLOT	RELAY / DIMMER	AMP	ADDRESS UNI	ADDRESS ADD	DESCRIPTION	FIXTURE EM	FIXTURE TYPE	FIXTURE QTY	FIXTURE LOAD	LOAD PHASING A	LOAD PHASING B	LOAD PHASING C	FIXTURE LOAD	FIXTURE QTY	FIXTURE TYPE	FIXTURE EM	DESCRIPTION	ADDRESS ADD	ADDRESS UNI	AMP	RELAY / DIMMER	SLOT
1	1P RELAY/BREAKER	20	1	1	5th ELECTRIC - FOH		-	-	-	######	######		-	-	-		5th ELECTRIC - FOH	2	1	20	1P RELAY/BREAKER	2
3	1P RELAY/BREAKER	20	1	3	5th ELECTRIC - FOH		-	-	-		######	######	-	-	-		5th ELECTRIC - FOH	4	1	20	1P RELAY/BREAKER	4
5	1P RELAY/BREAKER	20	1	5	5th ELECTRIC - FOH		-	-	-			######	######	-	-	-		Worklights- FOH	6	1	20	1P RELAY/BREAKER	6
7	1P RELAY/BREAKER	20	1	7	WORKLIGHTS FOH		-	-	-	######	######		-	-	-		1st ELECTRIC	8	1	20	1P RELAY/BREAKER	8
9	1P RELAY/BREAKER	20	1	9	1st ELECTRIC		-	-	-		######	######	-	-	-		1st ELECTRIC	10	1	20	1P RELAY/BREAKER	10
11	1P RELAY/BREAKER	20	1	11	1st ELECTRIC		-	-	-			######	######	-	-	-		1st ELECTRIC	12	1	20	1P RELAY/BREAKER	12
13	1P RELAY/BREAKER	20	1	13	1st ELECTRIC		-	-	-	######	######		-	-	-		WORKLIGHTS 1	14	1	20	1P RELAY/BREAKER	14
15	1P RELAY/BREAKER	20	1	15	2nd ELECTRIC		-	-	-		######	######	-	-	-		2nd ELECTRIC	16	1	20	1P RELAY/BREAKER	16
17	1P RELAY/BREAKER	20	1	17	2nd ELECTRIC		-	-	-			######	######	-	-	-		2nd ELECTRIC	18	1	20	1P RELAY/BREAKER	18
19	1P RELAY/BREAKER	20	1	19	2nd ELECTRIC		-	-	-	######	######		-	-	-		WORKLIGHTS 2	20	1	20	1P RELAY/BREAKER	20
21	1P RELAY/BREAKER	20	1	21	SPARE		-	-	-		######	######	-	-	-		3rd ELECTRIC	22	1	20	1P RELAY/BREAKER	22
23	1P RELAY/BREAKER	20	1	23	3rd ELECTRIC		-	-	-			######	######	-	-	-		3rd ELECTRIC	24	1	20	1P RELAY/BREAKER	24
25	1P RELAY/BREAKER	20	1	25	3rd ELECTRIC		-	-	-	######	######		-	-	-		3rd ELECTRIC	26	1	20	1P RELAY/BREAKER	26
27	1P RELAY/BREAKER	20	1	27	WORKLIGHTS 3		-	-	-		######	######	-	-	-		SPARE	28	1	20	1P RELAY/BREAKER	28
29	1P RELAY/BREAKER	20	1	29	4th ELECTRIC		-	-	-			######	######	-	-	-		4th ELECTRIC	30	1	20	1P RELAY/BREAKER	30
31	1P RELAY/BREAKER	20	1	31	4th ELECTRIC		-	-	-	######	######		-	-	-		4th ELECTRIC	32	1	20	1P RELAY/BREAKER	32
33	1P RELAY/BREAKER	20	1	33	4th ELECTRIC		-	-	-		######	######	-	-	-		WORKLIGHTS 4	34	1	20	1P RELAY/BREAKER	34
35	1P RELAY/BREAKER	20	1	35	SPARE		-	-	-			######	######	-	-	-		HOUSE PENDANTS	36	1	20	1P RELAY/BREAKER	36
37	1P RELAY/BREAKER	20	1	37	HOUSE PENDANTS		-	-	-	######	######		-	-	-		HOUSE PENDANTS	38	1	20	1P RELAY/BREAKER	38
39	1P RELAY/BREAKER	20	1	39	HOUSE PEND. NORM/EM	X	-	-	-		######	######	-	-	-		SIDE WALL STRIPS - LEFT	40	1	20	1P RELAY/BREAKER	40
41	1P RELAY/BREAKER	20	1	41	SIDE WALL STRIPS - RIGHT		-	-	-			######	######	-	-	-		SIDE WALL STRIPS - LEFT	42	1	20	1P RELAY/BREAKER	42
43	1P RELAY/BREAKER	20	1	43	SEATING LIGHTS - RIGHT		-	-	-	######	######		-	-	-		SPARE	44	1	20	1P RELAY/BREAKER	44
45	1P RELAY/BREAKER	20	1	45	SPARE		-	-	-		######	######	-	-	-		SPARE	46	1	20	1P RELAY/BREAKER	46
47	1P BREAKER	20	1	47	EQUIPMENT RACK		-	-	-			######	######	-	-	-		PB-CA	48	1	20	1P BREAKER	48

ADDRESSING:
UNIVERSE: 1
ADDRESS: 1
PM: *****
AE: *****

TOTAL WATTS #VALUE! #VALUE! #VALUE!
TOTAL AMPS #VALUE! #VALUE! #VALUE!

RACK CONTENTS:
IQ48 120V 3PHASE ENCLOSURE W/O BREAKERS (7131A1061)
NO MAIN BREAKER
IQ48 DOOR SURFACE MOUNT (7131A1551)

ACCESSORY OPTIONS:

SNSR IQ MAIN FUSE KIT 200A 240/277V (7131K1807)	0
IQ CI CONTACT INPUT OPTION (7131K1001)	0
IQ-DALI DALI CONTROL OPTION (7131K1002)	0
IQ-LVD 0-10V DIMMING CONTROL OPTION (7131K1003)	0
IQ-RTO RIDE THRU OPTION (7131K1004)	0
IQ12 ISOLATED TECHNICAL GROUND (7131K1150)	0

CIRCUIT BREAKER COUNT

B15 120V IQ BREAKER;15A 1P (CB1026)	0
B20 120V IQ BREAKER;20A 1P (CB1026)	**2**
B15 120V IQ BREAKER;15A 1 P (CB1027)	0
B15Z 120V IQ BREAKER;15A 2P (CB1029)	0
B20Z 120V IQ BREAKER;20A 2P (CB1030)	0
B30Z 120V IQ BREAKER;30A 2P (CB1031)	0
B15S 120V IQ BREAKER;15A 3P (CB1033)	0
B20Z 120V IQ BREAKER;20A 3P (CB1034)	0
B30S 120V IQ BREAKER;30A 3P (CB1035)	0

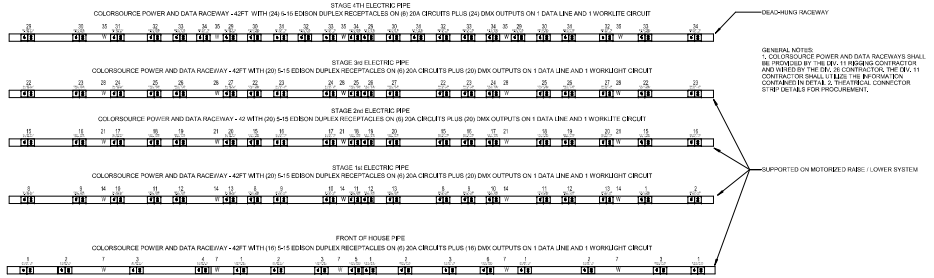
CIRCUIT BREAKER/RELAY COUNT

SNSR IQ CB W/RELAY 15A 1P 120V-TESTED (CB852-1)	0
SNSR IQ CB W/RELAY 20A 1P 120V-TESTED (CB852-1)	**46**
SNSR IQ CB W/RELAY 30A 1P 120V-TESTED (CB853-1)	0
SNSR IQ CB W/RELAY 15A 2P 120V-TESTED (CB854-1)	0
SNSR IQ CB W/RELAY 20A 2P 120V-TESTED (CB855-1)	0
SNSR IQ CB W/RELAY 30A 2P 120V-TESTED (CB856-1)	0
SNSR IQ CB W/RELAY 15A 3P 120V-TESTED (CB857-1)	0
SNSR IQ CB W/RELAY 20A 3P 120V-TESTED (CB858-1)	0
SNSR IQ CB W/RELAY 30A 3P 120V-TESTED (CB859-1)	0

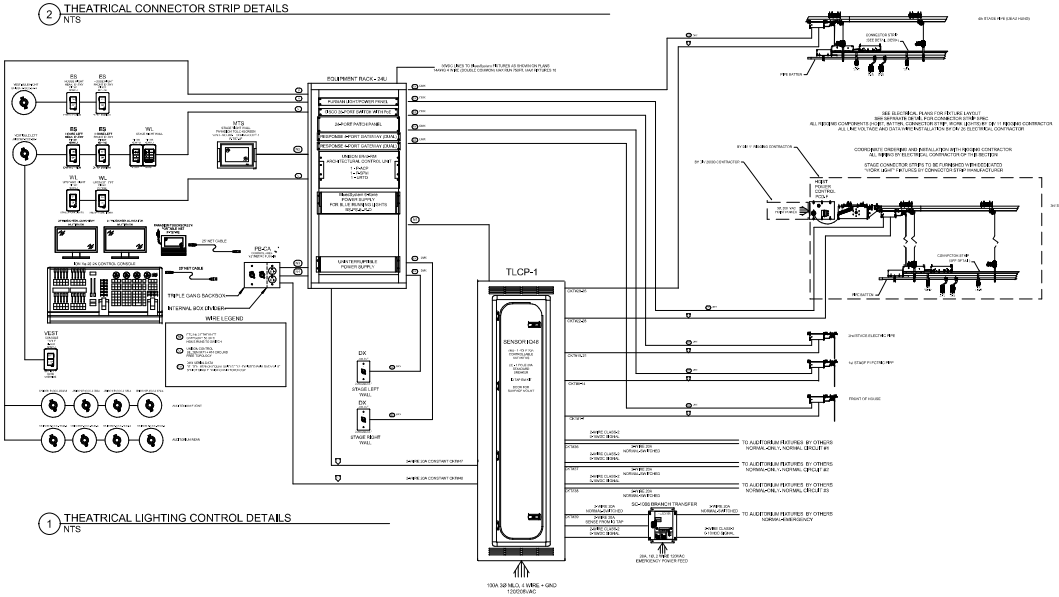
THEATRICAL LIGHTING FIXTURE SCHEDULE

TYPE	BASIS OF DESIGN MANUFACTURER / MODEL	EMITTER	SOURCE	DESCRIPTION	ACCESSORIES
T1	ETC / COLORSOURCE CYC CSCYC	RLGBI	4117 LM, 133 W	CYC.ORAMA LIGHT, 5 COLOR WITH DEEP BLUE	C-CLAMP 400CC
T2	ETC / COLORSOURCE FRESNEL V CSFRES2-A6PV	RLGBI	5330 LM, 148W	7" FRESNEL FLOOD, 5 COLOR WITH DEEP BLUE	C-CLAMP 400CC, BARN DOOR 400BD
T3	ETC / COLORSOURCE SPOT V CSSPOT-A4MVS	RLGBI	9498 LM, 197W	PROFILE SPOT 50 DEG, 5 COLOR WITH DEEP BLUE	C-CLAMP 400CC, LEDSOLT LENS TUBE
T4	ETC / COLORSOURCE SPOT CSSPOT-A3PVS	RLGBI	9498 LM, 197W	PROFILE SPOT 36 DEG, 5 COLOR WITH DEEP BLUE	C-CLAMP 400CC, 436-EDLT LENS TUBE
T5	ETC / COLORSOURCE SPOT CSSPOT-A4PV	RLGBI	9498 LM, 197W	PROFILE SPOT 25-50 ZOOM, 5 COLOR WITH DEEP BLUE	C-CLAMP 400CC, 425SOLT LENS TUBE
T6	HIGH END SYSTEMS / LONESTAR LS-OB-4N-2550A1200-S	7000K WHITE	15400 LM, 290W	MOVING YOKE SPOT, CMY+CCT+WHEEL	(2) MINI CLAW CLAMPS 87040010
T7	ETC / PRO FOUR CELL PENDANT ARCPNDT-4(3A1-3C)-HI / ARCPNDT-F2-HI	3000K WHITE	9000 LM, 55W	DOWNLIGHT PENDANT, BOTTOM OF FIXTURE MOUNTING HEIGHT SHALL BE 16 FEET A.F.F.	PENDANT MOUNTED FROM UNISTRUT FRAMING CHANNEL, OR SIMILAR
T8	ETC BSCab5-T	UNV	3.2 LM, 3.2W	BLUE DOME LOW-LEVEL "RUNNING LIGHTS", MOUNT 18" A.F.F.	EYELID BSEL

NOTES:
1. LIGHT FIXTURES IN THE SCHEDULE SHALL BE CONSIDERED BASIS OF DESIGN, EQUAL FIXTURE SUBSTITUTIONS ARE ACCEPTABLE FOR ALL FIXTURES IN THE LIGHTING FIXTURE SCHEDULE, UNLESS INDICATED OTHERWISE, EQUAL FIXTURE APPROVAL SHALL BE AS JUDGED BY THE ENGINEER AND THE ARCHITECT, IN ADDITION TO THE REQUIREMENTS LISTED IN THE LIGHTING FIXTURE SCHEDULE AND IN THE SPECIFICATIONS, THE PROPOSED EQUAL FIXTURES SHALL:
   A. BE THE SAME GENERAL SIZE, STYLE AND SHAPE, INCLUDING BUT NOT LIMITED TO LENS CONSTRUCTION AND SHADING.
   B. BE OF EQUAL QUALITY CONSTRUCTION AND FINISH.
   C. BE SUPPLIED WITH ALL REQUIRED ACCESSORIES TO MATCH THE SPECIFIED (BASIS OF DESIGN) FIXTURE.
   D. PROVIDE THE SAME DISTRIBUTION, EFFICACY AND SOURCE LUMEN OUTPUT.
   E. HAVE THE SAME LISTINGS AS THE BASIS OF DESIGN FIXTURE, INCLUDING ELC AND ENERGY STAR QUALIFICATIONS.
2. ALL FIXTURES SHALL BE UL LISTED.
3. ALL NECESSARY MOUNTING HARDWARE, HANGERS, BRACKETS, RAILS, YOKES, CANOPIES, STEMS, CHAINS, ROW JOINERS, ETC. SHALL BE FURNISHED AND INSTALLED.
4. REFER TO ARCHITECTURAL DRAWINGS FOR SPECIFIC DETAILS, ARRANGEMENT, MOUNTING HEIGHTS, SUSPENSION LENGTHS, CEILING CONSTRUCTION, ETC, ALL COLORS AND FINISHES SHALL BE SELECTED BY ARCHITECT.
5. FIXTURES SHALL BE SEISMICALLY SUPPORTED AS REQUIRED BY THE APPLICABLE BUILDING CODE, FIXTURES SHALL BE SUPPORTED FROM THE BUILDING STRUCTURE AND SHALL BE INDEPENDENT OF DUCTS, PIPES, CEILINGS AND TILES SUPPORTING MEMBERS. FIXTURES SHALL BE SUPPORTED WITH A MINIMUM OF 2 SUPPORTS.
6. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.



2 THEATRICAL CONNECTOR STRIP DETAILS
NTS



1 THEATRICAL LIGHTING CONTROL DETAILS
NTS

SLAM
The S:L:A:M Collaborative
80 Glastonbury Boulevard
Glastonbury, CT 06033-4410
Phone: 860 657.8077
www.slamcoll.com

Drawn: KCM
Checked: SJM

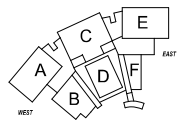
CES Consulting Engineering Services, Inc.
811 Middle Street
Middletown CT 06457
860.632.1682
ceseng.com
CES #2023068.00

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane,
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ELECTRICAL DETAILS

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: E504

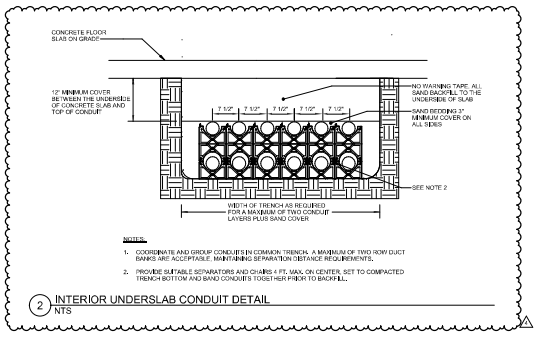
Autodesk Docs://22367.00 - Greenwich Central Middle School/22367.00-MEP Central - Greenwich Central Middle School.rvt
9/26/2024 11:37:37 AM

LIGHTING CONTROL RELAY PANEL SCHEDULE

RELAY PANEL	RELAY	LOAD	SOURCE PANEL	CONTROL	REMARKS
LCPA	1	OUTDOOR EQUIPMENT YARD NORMAL LIGHTING CONTROL ZONE 'z1'	LP1B	LINE VOLTAGE SWITCH	RELAY GROUP WITH WEATHERPROOF LINE VOLTAGE SWITCH FOR ON/OFF.
	2	AREA A,B,E EXTERIOR EMERGENCY LIGHTING CONTROL ZONE 'z2'	ELP1S	TIME CLOCK	RELAY GROUP CONTROLLED BY ASTRONOMICAL TIME CLOCK, COORDINATE TIME SETTINGS WITH OWNER, EMERGENCY RELAY AT PANEL. LOW VOLTAGE OVERRIDE SWITCH AT LOCATION SHOWN ON FLOOR PLAN.
	3	VESTIBULE 1071 & STAIR NO. 2 1ST2 NORMAL LIGHTING CONTROL ZONE 'z3'	LP1S	TIME CLOCK	RELAY GROUP CONTROLLED BY ASTRONOMICAL TIME CLOCK, COORDINATE TIME SETTINGS WITH OWNER.
	4	VESTIBULE 1071 & STAIR NO. 2 1ST2 EMERGENCY LIGHTING CONTROL ZONE 'z4'	ELP1S	TIME CLOCK	RELAY GROUP CONTROLLED BY ASTRONOMICAL TIME CLOCK, COORDINATE TIME SETTINGS WITH OWNER, EMERGENCY RELAY AT PANEL.
	5	ENTRANCE EXTERIOR NORMAL LIGHTING CONTROL ZONE 'z5'	LP1S	TIME CLOCK	RELAY GROUP CONTROLLED BY ASTRONOMICAL TIME CLOCK, COORDINATE TIME SETTINGS WITH OWNER.
	6	MAIN ENTRANCE EXTERIOR EMERGENCY LIGHTING CONTROL ZONE 'z6'	ELP1S	TIME CLOCK	RELAY GROUP CONTROLLED BY ASTRONOMICAL TIME CLOCK, COORDINATE TIME SETTINGS WITH OWNER, EMERGENCY RELAY AT PANEL.
	7	CORRIDOR 2020, STAIR NO. 2 2ST2 NORMAL LIGHTING CONTROL ZONE 'z7'	LP1B	TIME CLOCK	RELAY GROUP CONTROLLED BY ASTRONOMICAL TIME CLOCK, COORDINATE TIME SETTINGS WITH OWNER.
	8	CORRIDOR 2020, STAIR NO. 2 2ST2 EMERGENCY LIGHTING CONTROL ZONE 'z8'	ELP1S	TIME CLOCK	RELAY GROUP CONTROLLED BY ASTRONOMICAL TIME CLOCK, COORDINATE TIME SETTINGS WITH OWNER, EMERGENCY RELAY AT PANEL.
	9	SPARE	LP1B		
	10	SPARE	LP1B		
	11	SPARE	LP1B		
	12	SPARE	LP1B		
	13	SPARE	LP1B		
	14	SPARE	LP1B		
	15	SPARE	LP1B		
	16	SPARE	LP1B		
	17	SPARE	ELP1S		EMERGENCY RELAY AT PANEL.
	18	SPARE	ELP1S		EMERGENCY RELAY AT PANEL.
	19	SPARE	ELP1S		EMERGENCY RELAY AT PANEL.
	20	SPARE	ELP1S		EMERGENCY RELAY AT PANEL.
	21	SPARE	ELP1S		EMERGENCY RELAY AT PANEL.
	22	SPARE	ELP1S		EMERGENCY RELAY AT PANEL.
	23	SPARE	ELP1S		EMERGENCY RELAY AT PANEL.
	24	SPARE	ELP1S		EMERGENCY RELAY AT PANEL.
LCPB	1	PASSAGE 1068, PUBLIC LOBBY 1101, VESTIBULE 1102 NORMAL LIGHTING CONTROL ZONE 'z1'	LP1B	TIME CLOCK	RELAY GROUP CONTROLLED BY ASTRONOMICAL TIME CLOCK, COORDINATE TIME SETTINGS WITH OWNER.
	2	PASSAGE 1068, PUBLIC LOBBY 1101, VESTIBULE 1102 EMERGENCY LIGHTING CONTROL ZONE 'z2'	ELP1S	TIME CLOCK	RELAY GROUP CONTROLLED BY ASTRONOMICAL TIME CLOCK, COORDINATE TIME SETTINGS WITH OWNER, EMERGENCY RELAY AT PANEL.
	3	PUBLIC LOBBY 1101 DISPLAY CASE LIGHTING CONTROL ZONE 'z3'	LP1B	TIME CLOCK	RELAY GROUP CONTROLLED BY ASTRONOMICAL TIME CLOCK, COORDINATE TIME SETTINGS WITH OWNER.
	4	ENTRANCE EXTERIOR EMERGENCY LIGHTING CONTROL ZONE 'z4'	ELP1S	TIME CLOCK	RELAY GROUP CONTROLLED BY ASTRONOMICAL TIME CLOCK, COORDINATE TIME SETTINGS WITH OWNER, EMERGENCY RELAY AT PANEL.
	5	SPARE	LP1B		
	6	SPARE	LP1B		
	7	SPARE	LP1B		
	8	SPARE	LP1B		
	9	SPARE	ELP1S		EMERGENCY RELAY AT PANEL.
	10	SPARE	ELP1S		EMERGENCY RELAY AT PANEL.
	11	SPARE	ELP1S		EMERGENCY RELAY AT PANEL.
	12	SPARE	ELP1S		EMERGENCY RELAY AT PANEL.
LCPC	1	CORRIDOR 1115 NORMAL LIGHTING CONTROL ZONE 'z1'	LP1C	TIME CLOCK	RELAY GROUP CONTROLLED BY ASTRONOMICAL TIME CLOCK, COORDINATE TIME SETTINGS WITH OWNER.
	2	CORRIDOR 1115 EMERGENCY LIGHTING CONTROL ZONE 'z2'	ELP1C	TIME CLOCK	RELAY GROUP CONTROLLED BY ASTRONOMICAL TIME CLOCK, COORDINATE TIME SETTINGS WITH OWNER, EMERGENCY RELAY AT PANEL.
	3	CORRIDOR 2001 NORMAL LIGHTING CONTROL ZONE 'z3'	LP1C	TIME CLOCK	RELAY GROUP CONTROLLED BY ASTRONOMICAL TIME CLOCK, COORDINATE TIME SETTINGS WITH OWNER.
	4	VESTIBULE 2000, CORRIDOR 2001 EMERGENCY LIGHTING CONTROL ZONE 'z4'	ELP1C	TIME CLOCK	RELAY GROUP CONTROLLED BY ASTRONOMICAL TIME CLOCK, COORDINATE TIME SETTINGS WITH OWNER, EMERGENCY RELAY AT PANEL.
	5	CORRIDOR 2054 NORMAL LIGHTING CONTROL ZONE 'z5'	LP1C	TIME CLOCK	RELAY GROUP CONTROLLED BY ASTRONOMICAL TIME CLOCK, COORDINATE TIME SETTINGS WITH OWNER.
	6	CORRIDOR 2054 EMERGENCY LIGHTING CONTROL ZONE 'z6'	ELP1C	TIME CLOCK	RELAY GROUP CONTROLLED BY ASTRONOMICAL TIME CLOCK, COORDINATE TIME SETTINGS WITH OWNER, EMERGENCY RELAY AT PANEL.
	7	AREA C EXTERIOR LIGHTING CONTROL ZONE 'z7'	ELP1C	TIME CLOCK	RELAY GROUP CONTROLLED BY ASTRONOMICAL TIME CLOCK, COORDINATE TIME SETTINGS WITH OWNER, EMERGENCY RELAY AT PANEL.
	8	AREA C EXTERIOR LIGHTING CONTROL ZONE 'z8'	ELP1C	TIME CLOCK	RELAY GROUP CONTROLLED BY ASTRONOMICAL TIME CLOCK, COORDINATE TIME SETTINGS WITH OWNER, EMERGENCY RELAY AT PANEL.
	9	COURTYARD 1116 LIGHTING CONTROL ZONE 'z9'	ELP1C	TIME CLOCK	RELAY GROUP CONTROLLED BY ASTRONOMICAL TIME CLOCK, COORDINATE TIME SETTINGS WITH OWNER, EMERGENCY RELAY AT PANEL.
	10	COURTYARD 1116 LIGHTING CONTROL ZONE 'z10'	ELP1C	TIME CLOCK	RELAY GROUP CONTROLLED BY ASTRONOMICAL TIME CLOCK, COORDINATE TIME SETTINGS WITH OWNER, EMERGENCY RELAY AT PANEL.
	11	SPARE	LP1C		
	12	SPARE	LP1C		
	13	SPARE	LP1C		
	14	SPARE	LP1C		
	15	SPARE	LP1C		
	16	SPARE	ELP1C		EMERGENCY RELAY AT PANEL.
LCPD	1	CORRIDOR 1124, CORRIDOR 1131, CORRIDOR 1132 NORMAL AND DISPLAY CASE LIGHTING CONTROL ZONE 'z1'	LP1D	TIME CLOCK	RELAY GROUP CONTROLLED BY ASTRONOMICAL TIME CLOCK, COORDINATE TIME SETTINGS WITH OWNER.
	2	CORRIDOR 1124, CORRIDOR 1131, CORRIDOR 1132 EMERGENCY LIGHTING CONTROL ZONE 'z2'	ELP1D	TIME CLOCK	RELAY GROUP CONTROLLED BY ASTRONOMICAL TIME CLOCK, COORDINATE TIME SETTINGS WITH OWNER, EMERGENCY RELAY AT PANEL.
	3	ENTRY VESTIBULE 1000 NORMAL LIGHTING CONTROL ZONE 'z3'	LP1D	TIME CLOCK	RELAY GROUP CONTROLLED BY ASTRONOMICAL TIME CLOCK, COORDINATE TIME SETTINGS WITH OWNER.
	4	ENTRY VESTIBULE 1000 EMERGENCY LIGHTING CONTROL ZONE 'z4'	ELP1D	TIME CLOCK	RELAY GROUP CONTROLLED BY ASTRONOMICAL TIME CLOCK, COORDINATE TIME SETTINGS WITH OWNER, EMERGENCY RELAY AT PANEL.
	5	SPARE	LP1D		
	6	SPARE	LP1D		
	7	SPARE	LP1D		
	8	SPARE	LP1D		
	9	SPARE	ELP1D		EMERGENCY RELAY AT PANEL.
	10	SPARE	ELP1D		EMERGENCY RELAY AT PANEL.
	11	SPARE	ELP1D		EMERGENCY RELAY AT PANEL.
	12	SPARE	ELP1D		EMERGENCY RELAY AT PANEL.

NOTES:
1. DESCRIPTIONS LISTED ARE BASED ON HUBBELL NX SERIES LIGHTING RELAY PANELS AND CONTROLS. EQUAL PRODUCTS BY ACUITY BRANDS (NLIGHT)
2. PROVIDE (4, 8)X EMERGENCY LIGHTING RELAYS AT PANEL FOR EMERGENCY LIGHTING CIRCUITS.
3. TYPE LVD SWITCHES: FOUR BUTTON SWITCHES WITH INDICATOR LIGHTS AND ENGRAVED BUTTONS. PROVIDE MODEL BASED ON GANGED SWITCHES AT A GIVEN LOCATION. PROVIDE OFF BUTTONS ONLY WHERE INDICATED IN SCHEDULE.
4. COORDINATE PROGRAMMING OF ALL LIGHTING GROUPS/CHANNELS/ZONES WITH THE OWNER, INCLUDING BLINK WARNINGS AND TIME SCHEDULES.
5. 50% ON IN HALFFILL ON LIGHTING AND EMERGENCY CIRCUITS TO EXTEND TIMER FOR 2 HOURS FOLLOWING BLINK WARNING.
6. ALL ON BUTTONS SHALL BE GREEN WITH CUSTOM ENGRAVING. ALL OFF BUTTONS SHALL BE RED WITH CUSTOM ENGRAVING.
7. ALL ON BUTTONS SHALL BE GREEN WITH CUSTOM ENGRAVING. ALL OFF BUTTONS SHALL BE RED WITH CUSTOM ENGRAVING.
8. PROGRAM SYSTEM TO SWEEP ALL LIGHTS "OFF" WITH BLINK WARNING EVERY TWO HOURS AFTER A PROGRAM "OFF" EVENT UNTIL NEXT SCHEDULED TIMED "ON" EVENT.

RELAY PANEL	RELAY	LOAD	SOURCE PANEL	CONTROL	REMARKS
LCPE	1	MAIN CONCOURSE 1001 NORMAL LIGHTING CONTROL ZONE 'z1'	LP1E	TIME CLOCK	RELAY GROUP CONTROLLED BY ASTRONOMICAL TIME CLOCK, COORDINATE TIME SETTINGS WITH OWNER.
	2	MAIN CONCOURSE 1001 EMERGENCY LIGHTING CONTROL ZONE 'z2'	ELP1E	TIME CLOCK	RELAY GROUP CONTROLLED BY ASTRONOMICAL TIME CLOCK, COORDINATE TIME SETTINGS WITH OWNER, EMERGENCY RELAY AT PANEL.
	3	CORRIDOR 1050 NORMAL LIGHTING CONTROL ZONE 'z3'	LP1E	TIME CLOCK	RELAY GROUP CONTROLLED BY ASTRONOMICAL TIME CLOCK, COORDINATE TIME SETTINGS WITH OWNER.
	4	CORRIDOR 1050 EMERGENCY LIGHTING CONTROL ZONE 'z4'	ELP1E	TIME CLOCK	RELAY GROUP CONTROLLED BY ASTRONOMICAL TIME CLOCK, COORDINATE TIME SETTINGS WITH OWNER, EMERGENCY RELAY AT PANEL.
	5	PASSAGE 1078 NORMAL LIGHTING CONTROL ZONE 'z5'	LP1E	TIME CLOCK	RELAY GROUP CONTROLLED BY ASTRONOMICAL TIME CLOCK, COORDINATE TIME SETTINGS WITH OWNER.
	6	CORRIDOR 1058 EMERGENCY LIGHTING CONTROL ZONE 'z6'	ELP1E	TIME CLOCK	RELAY GROUP CONTROLLED BY ASTRONOMICAL TIME CLOCK, COORDINATE TIME SETTINGS WITH OWNER, EMERGENCY RELAY AT PANEL.
	7	MAIN CONCOURSE 1001 DISPLAY CASE LIGHTING CONTROL ZONE 'z7'	LP1E	TIME CLOCK	RELAY GROUP CONTROLLED BY ASTRONOMICAL TIME CLOCK, COORDINATE TIME SETTINGS WITH OWNER.
	8	VESTIBULE 1047, STAIR NO. 1 1ST1 NORMAL LIGHTING CONTROL ZONE 'z8'	LP1E	TIME CLOCK	RELAY GROUP CONTROLLED BY ASTRONOMICAL TIME CLOCK, COORDINATE TIME SETTINGS WITH OWNER.
	9	STAIR NO. 1 1ST1 EMERGENCY LIGHTING CONTROL ZONE 'z9'	ELP1E	TIME CLOCK	RELAY GROUP CONTROLLED BY ASTRONOMICAL TIME CLOCK, COORDINATE TIME SETTINGS WITH OWNER, EMERGENCY RELAY AT PANEL.
	10	CORRIDOR 2071 NORMAL LIGHTING CONTROL ZONE 'z10'	LP1E	TIME CLOCK	RELAY GROUP CONTROLLED BY ASTRONOMICAL TIME CLOCK, COORDINATE TIME SETTINGS WITH OWNER.
	11	VESTIBULE 2070, CORRIDOR 2071 EMERGENCY LIGHTING CONTROL ZONE 'z11'	ELP1E	TIME CLOCK	RELAY GROUP CONTROLLED BY ASTRONOMICAL TIME CLOCK, COORDINATE TIME SETTINGS WITH OWNER, EMERGENCY RELAY AT PANEL.
	12	CORRIDOR 2091, STAIR NO. 1 2ST1 NORMAL LIGHTING CONTROL ZONE 'z12'	LP1E	TIME CLOCK	RELAY GROUP CONTROLLED BY ASTRONOMICAL TIME CLOCK, COORDINATE TIME SETTINGS WITH OWNER.
	13	CORRIDOR 2091, STAIR NO. 1 2ST1 EMERGENCY LIGHTING CONTROL ZONE 'z13'	ELP1E	TIME CLOCK	RELAY GROUP CONTROLLED BY ASTRONOMICAL TIME CLOCK, COORDINATE TIME SETTINGS WITH OWNER, EMERGENCY RELAY AT PANEL.
	14	SPARE	LP1E		
	15	SPARE	LP1E		
	16	SPARE	LP1E		
	17	SPARE	LP1E		
	18	SPARE	LP1E		
	19	SPARE	ELP1E		EMERGENCY RELAY AT PANEL.
	20	SPARE	ELP1E		EMERGENCY RELAY AT PANEL.
	21	SPARE	ELP1E		EMERGENCY RELAY AT PANEL.
	22	SPARE	ELP1E		EMERGENCY RELAY AT PANEL.
	23	SPARE	ELP1E		EMERGENCY RELAY AT PANEL.
	24	SPARE	ELP1E		EMERGENCY RELAY AT PANEL.



2 INTERIOR UNDERSLAB CONDUIT DETAIL
NTS

SLAM
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80 Glastonbury Boulevard
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Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane,
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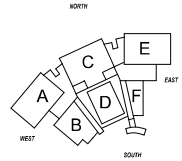
STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
4	11/06/2024	ADDENDUM NO. 6
2	10/23/2024	ADDENDUM NO. 3
	09/20/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

ELECTRICAL DETAILS

Date: 07/08/2024
Scale: NTS
Proj. Number: 22367.00
Drawing Number: E505

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MOTOR / EQUIPMENT CIRCUIT SCHEDULE

EQUIPMENT	OCPD	PANEL	LOAD HP	LOAD MCA	LOAD KW	LOAD PH	LOAD VOLT	LOCAL DISC. SW	MOTOR STARTER SIZE	MOTOR STARTER TYPE	WIRING LOCATION	WIRING REMARKS	REMARKS
AC-1	-	CP-WS	5	-	-	1	230	NEMA3R/ 40AT	-	SPC	AT UNIT	2#8, #10G, 1"C	
AC-A	-	ACCU-A	-	-	.03	1	208	MAN	-	SPC	AT UNIT	2#12, #12G, 3/4"C	SEE REMARKS 2, 4
AC-B	-	ACCU-B	-	-	.03	1	208	MAN	-	SPC	AT UNIT	2#12, #12G, 3/4"C	SEE REMARK 2, 4
AC-C	-	ACCU-C	-	-	.07	1	208	MAN	-	SPC	AT UNIT	2#12, #12G, 3/4"C	SEE REMARK 2, 4
AC-D	-	ACCU-D	-	-	.07	1	208	MAN	-	SPC	AT UNIT	2#12, #12G, 3/4"C	SEE REMARK 2, 4
ACCU-A	15A-2P	OR VARIES	-	11	-	1	208	MAN	-	SPC	AT UNIT	2#10, #10G, 3/4"C	SEE REMARK 4
ACCU-B	15A-2P	OR VARIES	-	11	-	1	208	MAN	-	SPC	AT UNIT	2#10, #10G, 3/4"C	SEE REMARK 4
ACCU-C	30A-2P	OSP2A	-	19	-	1	208	30A-2P	-	SPC	AT UNIT	2#10, #10G, 3/4"C	SEE REMARK 4
ACCU-D	30A-2P	OR VARIES	-	19	-	1	208	30A-2P	-	SPC	AT UNIT	2#10, #10G, 3/4"C	SEE REMARK 4
AFU-A	20A-1P	OSP1E	3/4	-	-	1	120	MAN	-	SPC	AT UNIT	2#12, #12G, 3/4"C	
DO-1	25A-3P	MP1E	10	-	-	3	480	30A-3P	-	SPC	AT UNIT	2#12, #12G, 3/4"C	SEE REMARKS 11, 12
B-1	15A-1P	OSP1C	-	13	-	1	120	MAN	-	SPC	AT UNIT	2#12, #12G, 3/4"C	SEE REMARK 7
B-2	15A-1P	OSP1C	-	13	-	1	120	MAN	-	SPC	AT UNIT	2#12, #12G, 3/4"C	SEE REMARK 7
BF-1A&1B	15A-3P	MP1C	(2)1	5	-	3	480	30A-3P	-	SPC	AT UNIT	3#12, #12G, 3/4"C	
CP-A	15A-2P	MP1B	-	6.5	-	1	208	30A-3P	-	SPC	AT UNIT	3#12, #12G, 3/4"C	
CHILLER CH-1	600A-3P	MSB-1	-	469.8	-	3	480	600A-3P	-	SPC	AT UNIT	(2)#350KCMIL #1G, (2)1"C	SEE REMARKS 6, 13
CH KEG BOX HEATER (CHWBR)	40A-1P	MSB-1	-	33.3	-	1	120	MAN	-	SPC	AT UNIT	2#6, #10G, 1"C	SEE REMARKS 6
CHWP-1	15A-3P	MP1C	1.5	-	-	3	480	30A-3P	-	VFD	AT UNIT	3#12, #12G, 3/4"C	
CHWP-2	15A-3P	MP1A	3	-	-	3	480	30A-3P	-	VFD	AT UNIT	3#12, #12G, 3/4"C	
CHWP-3A/3B	(2) 40A-3P	MP1A	(2) 10	-	-	3	480	60A-3P	-	VFD	AT UNIT	(2) 3#8, #10G, 1"C	
MCHWP-1A/1B	(2) 25A-3P	MP1A	(2) 10	-	-	3	480	30A-3P	-	VFD	AT UNIT	(2) 3#10, #10G, 3/4"C	
RP-1	15A-1P	OSP1C	-	1.25	-	1	120	MAN	-	SPC	AT UNIT	2#12, #12G, 3/4"C	
WI-1	15A-1P	OSP1C	-	-	-	1	120	MAN	-	SPC	AT UNIT	2#12, #12G, 3/4"C	SEE REMARK 7
PA-1	175A-3P	MSB-2	50	-	-	3	480	200A-3P	-	SPC	AT UNIT	3#2(4), #6G, 2"C	SEE REMARK 13
JP-1	15A-3P	MSB-2	1.5	-	-	3	480	30A-3P	-	SPC	AT UNIT	3#12, #12G, 3/4"C	
DOA-1 (EF)	45A-3P	MP1E	-	26.25	-	3	480	60A-3P	-	SPC	AT UNIT	3#8, #10G, 3/4"C	SEE REMARK 5
DOA-1 (EF)	20A-3P	MP1E	-	13.75	-	3	480	30A-3P	-	SPC	AT UNIT	3#12, #12G, 3/4"C	
DOA-1 (W/HEEL)	15A-3P	MP1E	-	1.65	-	3	480	30A-3P	-	SPC	AT UNIT	3#12, #12G, 3/4"C	
DOA-1 (CDQ)	15A-3P	MP1E	-	.27	-	3	480	30A-3P	-	SPC	AT UNIT	3#12, #12G, 3/4"C	
DOA-2 (EF)	60A-3P	MP1E	-	33.75	-	3	480	60A-3P	-	SPC	AT UNIT	3#6, #10G, 1"C	SEE REMARK 5
DOA-2 (EF)	30A-3P	MP1E	-	26.25	-	3	480	30A-3P	-	SPC	AT UNIT	3#10, #10G, 3/4"C	
DOA-2 (W/HEEL)	15A-3P	MP1E	-	1.65	-	3	480	30A-3P	-	SPC	AT UNIT	3#12, #12G, 3/4"C	
DOA-2 (CDQ)	15A-3P	MP1E	-	.27	-	3	480	30A-3P	-	SPC	AT UNIT	3#12, #12G, 3/4"C	
DOA-3 (SF)	60A-3P	MP1C	-	33.75	-	3	480	60A-3P	-	SPC	AT UNIT	3#6, #10G, 1"C	SEE REMARK 5
DOA-3 (EF)	30A-3P	MP1C	-	26.25	-	3	480	30A-3P	-	SPC	AT UNIT	3#10, #10G, 3/4"C	
DOA-3 (W/HEEL)	15A-3P	MP1C	-	1.65	-	3	480	30A-3P	-	SPC	AT UNIT	3#12, #12G, 3/4"C	
DOA-3 (CDQ)	15A-3P	MP1C	-	.27	-	3	480	30A-3P	-	SPC	AT UNIT	3#12, #12G, 3/4"C	
DOA-4 (SF)	60A-3P	MP1A	-	33.75	-	3	480	60A-3P	-	SPC	AT UNIT	3#6, #10G, 1"C	SEE REMARK 5
DOA-4 (EF)	30A-3P	MP1A	-	17.5	-	3	480	30A-3P	-	SPC	AT UNIT	3#10, #10G, 3/4"C	
DOA-4 (W/HEEL)	15A-3P	MP1A	-	1.65	-	3	480	30A-3P	-	SPC	AT UNIT	3#12, #12G, 3/4"C	
DOA-4 (CDQ)	15A-3P	MP1A	-	.27	-	3	480	30A-3P	-	SPC	AT UNIT	3#12, #12G, 3/4"C	
DOA-5 (SF)	60A-3P	MP1D	-	33.75	-	3	480	60A-3P	-	SPC	AT UNIT	3#6, #10G, 1"C	SEE REMARK 5
DOA-5 (EF)	30A-3P	MP1D	-	17.5	-	3	480	30A-3P	-	SPC	AT UNIT	3#10, #10G, 3/4"C	N/A
DOA-5 (W/HEEL)	15A-3P	MP1D	-	1.65	-	3	480	30A-3P	-	SPC	AT UNIT	3#12, #12G, 3/4"C	N/A
DOA-5 (CDQ)	15A-3P	MP1D	-	.27	-	3	480	30A-3P	-	SPC	AT UNIT	3#12, #12G, 3/4"C	N/A
HRV-1	15A-3P	MP1B	-	9.7	-	3	480	30A-3P	-	SPC	AT UNIT	3#12, #12G, 3/4"C	SEE REMARK 5
RTU-1 (SF)	30A-3P	MP1B	-	17.5	-	3	480	30A-3P	-	SPC	AT UNIT	3#10, #10G, 3/4"C	SEE REMARK 5
RTU-1 (EF)	20A-3P	MP1B	-	13.75	-	3	480	30A-3P	-	SPC	AT UNIT	3#12, #12G, 3/4"C	N/A
RTU-1 (W/HEEL)	15A-3P	MP1B	-	.55	-	3	480	30A-3P	-	SPC	AT UNIT	3#12, #12G, 3/4"C	N/A
RTU-2 (SF)	45A-3P	MP1D	-	26.25	-	3	480	60A-3P	-	SPC	AT UNIT	3#8, #10G, 3/4"C	SEE REMARK 5
RTU-2 (EF)	45A-3P	MP1D	-	26.25	-	3	480	60A-3P	-	SPC	AT UNIT	3#8, #10G, 3/4"C	N/A
RTU-2 (W/HEEL)	15A-3P	MP1D	-	1.65	-	3	480	30A-3P	-	SPC	AT UNIT	3#12, #12G, 3/4"C	N/A
RTU-3 (SF)	45A-3P	MP1B	15	26.25	-	3	480	60A-3P	-	SPC	AT UNIT	3#8, #10G, 1"C	SEE REMARK 5
RTU-3 (EF)	45A-3P	MP1B	-	26.25	-	3	480	60A-3P	-	SPC	AT UNIT	3#8, #10G, 3/4"C	N/A
RTU-3 (W/HEEL)	15A-3P	MP1B	-	1.65	-	3	480	30A-3P	-	SPC	AT UNIT	3#12, #12G, 3/4"C	N/A
FCU-A,B	15A-1P	VARIES	1/2	-	.07	1	120	MAN	-	SPC	AT UNIT	2#12, #12G, 3/4"C	SEE REMARKS 1, 2
FCU-C,D,E,F,G	20A-1P	VARIES	1/2	-	-	1	120	MAN	-	SPC	AT UNIT	2#12, #12G, 3/4"C	SEE REMARKS 1, 2
KHEP-1	20A-3P	KP	3	-	-	3	208	30A-3P	-	SPC	AT UNIT	3#12, #12G, 3/4"C	SEE REMARK 8
DWE*-1	15A-1P	KP	1/2	-	-	1	120	MAN	-	SPC	AT UNIT	2#12, #12G, 3/4"C	SEE REMARK 8
EF-1	15A-1P	OSP1F	1/4	-	-	1	120	MAN	-	SPC	AT UNIT	2#12, #12G, 3/4"C	
EF-2	15A-1P	OSP1F	1/4	-	-	1	120	MAN	-	SPC	AT UNIT	2#12, #12G, 3/4"C	
DBF-1	15A-1P	KP	1/4	-	-	1	120	MAN	-	SPC	AT UNIT	2#12, #12G, 3/4"C	
CUH-A1,A2,B1,B2,S3	15A-1P	OR VARIES	1/4	-	-	1	120	MAN	-	SPC	AT UNIT	2#12, #12G, 3/4"C	SEE REMARK 1
UH-A1,A2	15A-1P	OR VARIES	1/30	-	-	1	120	MAN	-	SPC	AT UNIT	2#12, #12G, 3/4"C	SEE REMARK 1
UH-A3,A4	15A-1P	OR VARIES	1/15	-	-	1	120	MAN	-	SPC	AT UNIT	2#12, #12G, 3/4"C	SEE REMARK 1

GENERAL NOTES:
1. DISCONNECT SWITCHES SHALL BE HEAVY-DUTY TYPE AND SHALL BE LOCATED AT EQUIPMENT LOCATION UNLESS OTHERWISE NOTED.
2. ABBREVIATIONS
   - MAN: MANUAL STARTER (TOGGLE SWITCH WITH THERMAL OVERLOADS)
   - FVNR: COMBINATION FULL VOLTAGE NON-REVERSING STARTER; DISCONNECT SWITCH
   - VFD: VARIABLE FREQUENCY DRIVE; FURNISHED BY DIV. 23, WIRED BY DIV. 26 (LINE POWER WIRING FROM SOURCE PANELBOARD TO VFD AND FROM VFD TO MOTOR(S); COORDINATE EXACT LOCATION IN FIELD WITH DIV.23)
   - SPC: SINGLE POINT CONNECTION; BY DIVISION 21 FIRE PROTECTION CONTRACTOR
   - DIV.22: EQUIPMENT FURNISHED BY DIVISION 22 PLUMBING CONTRACTOR
   - DIV.23: EQUIPMENT FURNISHED BY DIVISION 23 HVAC CONTRACTOR
   - SPC: SINGLE POINT CONNECTION (STARTERS INTEGRAL TO EQUIPMENT); COORDINATE EXACT POINT OF CONNECTION IN FIELD.
3. OVERCURRENT PROTECTION DEVICES (OCPD) SHALL BE MOLDED CASE CIRCUIT BREAKERS UNLESS NOTED WITH AN "F" FOR FUSE.
4. DISCONNECT SWITCHES AND STARTERS SHALL BE NEMA 3R RATED WHEN LOCATED OUTSIDE.
5. REFER TO PANEL SCHEDULES FOR SOURCE PANEL / CIRCUIT INFORMATION.
6. REFER TO ELECTRICAL AND MECHANICAL PLANS FOR EXACT LOCATIONS OF EQUIPMENT.
7. STARTERS SHALL BE SQUARE D CLASS 8536 OR APPROVED EQUAL.

REFERENCED REMARKS:
1. REFER TO FLOOR PLANS FOR CIRCUITING; ALL UNITS INDICATED ON PLANS SHALL BE DAISY-CHAINED TOGETHER. PROVIDE SEPARATE DISCONNECT SWITCH FOR EACH UNIT ON CIRCUIT.
2. CONDENSATE PUMP FOR AC/ FAN COIL UNIT SHALL BE FURNISHED/INSTALLED BY DIV.23; ELECTRICAL CONTRACTOR SHALL PROVIDE HARDWIRED CONNECTION TO PUMP VIA DEDICATED CIRCUIT POWERED FROM SAME UNIT AS AC/ FAN COIL UNIT. PROVIDE MOTOR RATED TOGGLE SWITCH AT PUMP FOR DISCONNECTING MEANS.
3. CONDENSATE PUMP FOR AC/ FAN COIL UNIT SHALL BE FURNISHED/INSTALLED BY DIV.23; ELECTRICAL CONTRACTOR SHALL PROVIDE HARDWIRED CONNECTION TO PUMP VIA LOCAL UNSWITCHED RECEPTACLE. COORDINATE EXACT LOCATION IN FIELD WITH HVAC CONTRACTOR PRIOR TO ROUGH-IN.
4. PROVIDE POWER WIRING FROM SOURCE PANELBOARD TO OUTDOOR UNIT. PROVIDE INTERCONNECT WIRING IN SWPC, FROM OUTDOOR UNIT TO INDOOR UNIT. WIRE SIZE AND TYPE SHALL BE PER MANUFACTURER'S REQUIREMENTS. PROVIDE SEPARATE DISCONNECT SWITCH FOR EACH OF THE TWO UNITS.
5. PROVIDE SEPARATE 20A/120V/1PH CONNECTION TO UNIT FOR INTEGRAL LIGHTS AND RECEPTACLES. POWER VIA CIRCUIT INDICATED ON PLANS.
6. UNIT IS LOCATED OUTSIDE BUILDING ON PAD. CIRCUIT SHALL RUN UNDER SLAB FROM PANEL TO UNIT LOCATION. COORDINATE EXACT STUB-UP LOCATION IN FIELD WITH HVAC CONTRACTOR PRIOR TO ROUGH-IN.
7. POWER VIA EPO/ SHUTOFF SYSTEM AS SPECIFIED ON ELECTRICAL DETAILS.
8. VFD FURNISHED AND INSTALLED BY KITCHEN EQUIPMENT CONTRACTOR. PROVIDE WIRING FROM SOURCE PANEL TO VFD, AND FROM VFD TO MOTOR(S). PROVIDE CONTROL WIRING AS DICTATED ON FOOD SERVICE DETAILS AND ELECTRICAL DRAWINGS.
9. NEMA 3R DISCONNECT SWITCH FOR CHILLER SHALL BE MOUNTED IN AN ACCESSIBLE LOCATION ADJACENT TO UNIT. COORDINATE EXACT LOCATION WITH STARTER/VFD AND CONTROL PANEL IN FIELD AND WITH CHILLER MANUFACTURER PRIOR TO ROUGH-IN AT EM.
10. DUPLEX PUMP ASSEMBLY - PROVIDE POWER WIRING TO CONTROL PANEL, AND FROM CONTROL PANEL TO EACH OF THE TWO PUMPS.
11. PROVIDE SEPARATE 20A/120V/1PH CONNECTION TO NO-RETURN VALVE CONTROL PANEL AND VTD. POWER VIA CIRCUIT INDICATED ON PLANS.
12. PROVIDE SEPARATE 20A/120V/1PH CONNECTION TO SPARK DETECTION SYSTEM CONTROL PANEL AND VTD. POWER VIA CIRCUIT INDICATED ON PLANS.
13. FIRE PUMP CONTROLLER IS SEPARATE OF FIRE PUMP SKID. ELECTRICAL CONTRACTOR TO WIRE FIRE PUMP FEEDER THROUGH THE FIRE PUMP CONTROLLER TO THE FIRE PUMP MOTOR TERMINAL. ELECTRICAL CONTRACTOR RESPONSIBLE FOR ALL CONNECTIONS FROM FIRE PUMP CONTROLLER TO FIRE PUMP MOTOR

ELECTRICAL FEEDER SCHEDULE

COPPER CONDUCTORS

CIRCUIT SYMBOL	CONDUCTORS (1 PH. 2W) WITH GROUND	CONDUIT SIZE	CONDUCTORS (1 OR 3 PH. 3 WIRE) WITH GROUND	CONDUIT SIZE	CONDUCTORS (3 PH. 4 WIRE) WITH GROUND	CONDUIT SIZE	OVERCURRENT RATING
1	2#12 & 1#12G	3/4"	3#12 & 1#12G	3/4"	4#12 & 1#12G	3/4"	15A
2	2#12 & 1#12G	3/4"	3#12 & 1#12G	3/4"	4#12 & 1#12G	3/4"	20A
2.5	2#10 & 1#10G	3/4"	3#10 & 1#10G	3/4"	4#10 & 1#10G	3/4"	25A
3	2#10 & 1#10G	3/4"	3#10 & 1#10G	3/4"	4#10 & 1#10G	3/4"	30A
3.5	2#8 & 1#10G	1"	3#8 & 1#10G	1"	4#8 & 1#10G	1"	35A
4	2#8 & 1#10G	1"	3#8 & 1#10G	1"	4#8 & 1#10G	1"	40A
4.5	2#8 & 1#10G	1"	3#8 & 1#10G	1"	4#8 & 1#10G	1"	45A
5	2#6 & 1#10G	1"	3#6 & 1#10G	1"	4#6 & 1#10G	1"	50A
6	2#6 & 1#10G	1"	3#6 & 1#10G	1"	4#6 & 1#10G	1"	60A
7	2#4 & 1#8G	1 1/4"	3#4 & 1#8G	1 1/4"	4#4 & 1#8G	1 1/4"	70A
8	2#4 & 1#8G	1 1/4"	3#4 & 1#8G	1 1/4"	4#4 & 1#8G	1 1/4"	80A
9	2#3 & 1#8G	1 1/4"	3#3 & 1#8G	1 1/4"	4#3 & 1#8G	1 1/4"	90A
10	2#3 & 1#8G	1 1/4"	3#3 & 1#8G	1 1/4"	4#3 & 1#8G	1 1/4"	100A
11			3#2 & 1#8G	1 1/4"	4#2 & 1#8G	1 1/2"	110A
12			3#1 & 1#8G	1 1/2"	4#1 & 1#8G	2"	125A
13			3#1/0 & 1#6G	2"	4#1/0 & 1#6G	2"	150A
14			3#2/0 & 1#6G	2"	4#2/0 & 1#6G	2"	175A
15			3#3/0 & 1#6G	2"	4#3/0 & 1#6G	2 1/2"	200A
16			3#4/0 & 1#4G	2 1/2"	4#4/0 & 1#4G	2 1/2"	225A
17			3#250KCMIL & 1#4G	3"	4#250KCMIL & 1#4G	3"	250A
18			3#350KCMIL & 1#4G	3"	4#350KCMIL & 1#4G	4"	300A
19			3#500KCMIL & 1#3G	4"	4#500KCMIL & 1#3G	4"	350A
20			3#600KCMIL & 1#3G	4"	4#600KCMIL & 1#3G	4"	400A
21			(2)3#1/0 & 1#2G	(2) 2 1/2"	2 SETS OF 4#4/0 & 1#2G	(2) 2 1/2"	450A
22			(2)3#250KCMIL & 1#2G	(2) 3"	2 SETS OF 4#250KCMIL & 1#2G	(2) 3"	500A
23			(2)3#350KCMIL & 1#1G	(2) 3"	2 SETS OF 4#350KCMIL & 1#1G	(2) 4"	600A
24			(2)3#500KCMIL & 1#1/0G	(2) 4"	2 SETS OF 4#500KCMIL & 1#1/0G	(2) 4"	700A
25			(2)3#600KCMIL & 1#1/0G	(2) 4"	2 SETS OF 4#600KCMIL & 1#1/0G	(2) 4"	800A
26			(3)3#350KCMIL & 1#2/0G	(3) 3"	3 SETS OF 4#350KCMIL & 1#2/0G	(3) 4"	900A
27			(3)3#500KCMIL & 1#2/0G	(3) 4"	3 SETS OF 4#500KCMIL & 1#2/0G	(3) 4"	1000A
28			(4)3#350KCMIL & 1#3/0G	(4) 3"	4 SETS OF 4#350KCMIL & 1#3/0G	(4) 4"	1200A
29			(4)3#500KCMIL & 1#4/0G	(4) 4"	4 SETS OF 4#500KCMIL & 1#4/0G	(4) 4"	1600A
30			(5)3#600KCMIL & 1#250G	(5) 4"	5 SETS OF 4#600KCMIL & 1#250G	(5) 4"	2000A
31			(6)3#600KCMIL & 1#350G	(6) 4"	6 SETS OF 4#600KCMIL & 1#350G	(6) 4"	2500A
32			(8)4#500KCMIL & 1#500G	(8) 4"	8 SETS OF 4#500KCMIL & 1#500G	(8) 4"	3000A

NOTES:
1. CONDUIT SIZES ARE BASED ON THE NEC ANNEX C TABLES FOR EMT/RSC/IMC WITH THWN/THWN CONDUCTORS. CONDUCTOR SIZES USED IN CONDUIT CALCULATION ARE BASED ON THE SIZE OF THE HOT CONDUCTORS OF CIRCUIT. EXAMPLE: 40A 3PH 4W CONDUIT SIZE IS BASED ON 4#8 + 1#8G + 1"ØE SPACE. FOR ACTUAL WIRE INSTALL USE QUANTITY AND SIZES WITHIN SCHEDULE.
2. UNLESS OTHERWISE INDICATED, CONDUCTOR SIZING SHALL MATCH THE SIZE INDICATED ABOVE FOR THE APPLICABLE OVERCURRENT DEVICE. PROVIDE LARGER CIRCUIT WHERE INDICATED.
3. PROVIDE MINIMUM SIZE CONDUIT INDICATED IN THE SPECIFICATIONS OR ON THE DRAWINGS.
4. FOR SINGLE PHASE FEEDERS, PROVIDE A 3-WIRE CIRCUIT UNLESS DEVICE SERVED DOES NOT HAVE PROVISIONS FOR A NEUTRAL. FOR THREE PHASE FEEDERS, PROVIDE A 4-WIRE CIRCUIT UNLESS DEVICE SERVED DOES NOT HAVE PROVISIONS FOR A NEUTRAL.
5. PROVIDE TYPE OF RACEWAY OR CABLE AS INDICATED IN THE SPECIFICATIONS OR ON THE DRAWINGS.
6. REFER TO PANELBOARD SCHEDULES AND ONE-LINE RISER DIAGRAM DRAWINGS FOR CONDUCTOR AND CONDUIT SIZE REQUIREMENTS.
7. ALL CONDUCTOR SIZES ARE BASED ON 75°C (167°F). ALL EQUIPMENT CONNECTED TO WIRES SHALL BE RATED OR 75°C (167°F)

FLOOR BOX SCHEDULE

SYMBOL	DESCRIPTION	CONDUIT/ FLOOR BOX	CABLING	NOTES
FB A	FLOOR BOX WITH POWER	LEGRAND #RFB5QG OR EQUAL WITH (1) 3/4"C FOR POWER TRENCHED TO NEAREST ACCESSIBLE WALL AND ABOVE CEILING.	POWER ONLY	PROVIDE WITH (2) INTEGRAL DUPLEX RECEPTACLES. PROVIDE WITH SURFACE STYLE ROUND COVER ASSEMBLY.
FB B	FLOOR BOX WITH POWER, DATA	LEGRAND #RFB4S-QG OR EQUAL WITH (1) 3/4"C FOR POWER AND (1) 1-1/4"C FOR DATA TRENCHED TO NEAREST ACCESSIBLE WALL AND ABOVE CEILING.	(1) CAT.6 CABLE TO DATA PATCH PANEL (1) CAT.6 CABLE TO VOIP PATCH PANEL	PROVIDE WITH (2) INTEGRAL DUPLEX RECEPTACLES. PROVIDE WITH SURFACE STYLE ROUND COVER ASSEMBLY.
FB C	FLOOR BOX WITH POWER, DATA, AV	LEGRAND #RFB5-QG OR EQUAL WITH (1) 3/4"C FOR POWER AND (1) 1-1/4"C FOR DATA TRENCHED TO NEAREST ACCESSIBLE WALL AND ABOVE CEILING. PROVIDE ADDITIONAL 1-1/4"C. TO LOCAL AV DISPLAY BOX IN ROOM.	(1) CAT.6 CABLE TO DATA PATCH PANEL (1) CAT.6 CABLE TO VOIP PATCH PANEL REFER TO AV DETAILS FOR CABLING	PROVIDE WITH (2) INTEGRAL DUPLEX RECEPTACLES. PROVIDE WITH SURFACE STYLE ROUND COVER ASSEMBLY. REFER TO AV DETAILS FOR CABLING
FB D	FLOOR BOX WITH POWER, DATA, AV (HIGH CAPACITY)	LEGRAND #RFB4-QG OR EQUAL WITH (1) 3/4"C FOR POWER AND (1) 1-1/4"C FOR DATA TRENCHED TO NEAREST ACCESSIBLE WALL AND ABOVE CEILING. PROVIDE ADDITIONAL 1-1/4"C. TO LOCAL AV DISPLAY BOX IN ROOM.	(1) CAT.6 CABLE TO DATA PATCH PANEL (1) CAT.6A CABLE TO VOIP PATCH PANEL REFER TO AV DETAILS FOR CABLING	PROVIDE WITH (2) INTEGRAL DUPLEX RECEPTACLES. PROVIDE WITH SURFACE STYLE ROUND COVER ASSEMBLY. REFER TO AV DETAILS FOR CABLING
FB E (X,Y)	FLOOR BOX WITH POWER AND DATA FURNITURE FEED	LEGRAND #EFBFTP-QG OR EQUAL WITH (1) 1-1/4"C FOR POWER AND (1) 1-1/4"C FOR DATA TRENCHED TO NEAREST ACCESSIBLE WALL AND ABOVE CEILING.	(X) CAT.6 CABLES TO DATA PATCH PANEL (Y) CAT.6 CABLES TO VOIP PATCH PANEL	PROVIDE WITH FLEXIBLE WHIP CONNECTIONS TO MODULAR FURNITURE. MINIMUM 1-1/4" LOCATE BOX IN KNEE SPACE UNDER FURNITURE, COORDINATE EXACT LOCATION IN FIELD WITH FURNITURE INSTALLER PRIOR TO INSTALLATION.

GENERAL NOTES:
1. ALL CONDUITS FOR FLOOR BOXES SHALL BE TRENCHED TO THE NEAREST WALL AND SHALL STUB ABOVE ACCESSIBLE CEILING, OR IN A LOCATION INDICATED ON PLANS.
2. ALL POKE-THROUGH DEVICES SHALL BE PROVIDED WITH SEPARATE CONDUIT SLEEVES TO FLOOR BELOW FOR POWER, DATA AND AV CABLING. PROVIDE ALL NECESSARY FIRESTOPPING OF CONDUIT SLEEVES TO MATCH FIRE RATING OF FLOOR.
3. PROVIDE INTERNAL BARRIER KITS TO SEPARATE POWER, DATA AND AV COMPARTMENTS IN ALL FLOOR BOXES AND POKE-THROUGH DEVICES.
4. ALL FINISHES, COLORS AND COVER MATERIALS SHALL BE SELECTED BY ARCHITECT.
5. PROVIDE MOUNTING BRACKETS AS RECOMMENDED BY MANUFACTURER FOR ALL DEVICES MOUNTED IN FLOOR BOXES AND POKE-THROUGH DEVICES.
6. DATA CABLING SHALL BE ROUTED TO PATCH PANELS IN I.T. ROOMS INDICATED ON FLOOR PLANS. TERMINATE CABLING AT SPECIFIC PATCH PANELS INDICATED IN I.T. RACK ELEVATIONS.
7. CONTRACTOR SHALL LABEL EACH DEVICE TERMINATION POINT AND CORRESPONDING PATCH PANEL PORT WITH THE SAME, UNIQUE LABEL. REFER TO SPECIFICATIONS FOR MORE INFORMATION. ALL LABELS SHALL BE FINALIZED WITH AND APPROVED BY OWNER'S I.T. STAFF PRIOR TO INSTALLATION.
8. PROVIDE ALL NECESSARY CONNECTORS, ADAPTERS, KEYSTONES, ATTACHMENTS AND OTHER ACCESSORIES REQUIRED FOR A COMPLETE AND OPERATIONAL SYSTEM.
9. TERMINATE ALL STRUCTURED CABLING CABLES IN RJ45 CONNECTORS UNLESS OTHERWISE NOTED.

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Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane,
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N

NORTH
EAST
WEST
SOUTH
KEYPLAN

Number	Date	Issued For
4	11/06/2024	ADDENDUM NO. 6
2	10/23/2024	ADDENDUM NO. 3
	09/27/2024	BID/CLERMIT
	07/08/2024	PHASE 2

ELECTRICAL SCHEDULES AND DIAGRAMS

Date 07/08/2024
Scale NTS
Proj. Number 22367.00
Drawing Number E600

Autodesk Docs://22367.00 - Greenwich Central Middle School/R22/22367.00-MEP Central - Greenwich Central Middle School.rvt
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LIGHTING FIXTURE SCHEDULE

TYPE	BASIS OF DESIGN MANUFACTURER / MODEL	VOLTAGE	SOURCE	FIXTURE DESCRIPTION - BASIS OF DESIGN
A6	AXIS / LIGHTING / SLATE PENDANT SLTP6-600-835-SWD-SA-SA-YA-UNV-DP-FE ALTERNATES: EXTANT / P-TOOL-1P ZICO / EDGESOL0025 PENDANT 3G LIGHTING / 3G4-PL501	UNV	600 LMFT UP, 500 LMFT DOWN, 9.0 WFT 3500K LED	PENDANT MOUNTED DIRECT/INDIRECT LED, 6"x4"x1-5/8", EXTRUDED ALUMINUM HOUSING, FROSTED ACRYLIC LENS, 80 CRI, 0-10V TO 1% DIMMING, LM-80
A8	AXIS / LIGHTING / SLATE PENDANT SLTP6-600-835-SWD-SA-SA-SA-YA-UNV-DP-FE ALTERNATES: EXTANT / P-TOOL-1P ZICO / EDGESOL0025 PENDANT 3G LIGHTING / 3G4-PL501	UNV	600 LMFT UP, 500 LMFT DOWN, 9.0 WFT 3500K LED	PENDANT MOUNTED DIRECT/INDIRECT LED, 8"x4"x1-5/8", EXTRUDED ALUMINUM HOUSING, FROSTED ACRYLIC LENS, 80 CRI, 0-10V TO 1% DIMMING, LM-80
A10	AXIS / LIGHTING / SLATE PENDANT SLTP6-600-835-SWD-SA-SA-SA-YA-UNV-ADP-FE ALTERNATES: EXTANT / P-TOOL-1P ZICO / EDGESOL0025 PENDANT 3G LIGHTING / 3G4-PL501	UNV	600 LMFT UP, 500 LMFT DOWN, 9.0 WFT 3500K LED	PENDANT MOUNTED DIRECT/INDIRECT LED, 10"x4"x1-5/8", EXTRUDED ALUMINUM HOUSING, FROSTED ACRYLIC LENS, 80 CRI, 0-10V TO 1% DIMMING, LM-80
A12	AXIS / LIGHTING / SLATE PENDANT SLTP6-600-835-SWD-SA-SA-SA-YA-UNV-ADP-FE ALTERNATES: EXTANT / P-TOOL-1P ZICO / EDGESOL0025 PENDANT 3G LIGHTING / 3G4-PL501	UNV	600 LMFT UP, 500 LMFT DOWN, 9.0 WFT 3500K LED	PENDANT MOUNTED DIRECT/INDIRECT LED, 12"x4"x1-5/8", EXTRUDED ALUMINUM HOUSING, FROSTED ACRYLIC LENS, 80 CRI, 0-10V TO 1% DIMMING, LM-80
A14	AXIS / LIGHTING / SLATE PENDANT SLTP6-600-835-SWD-SA-SA-SA-YA-UNV-ADP-FE ALTERNATES: EXTANT / P-TOOL-1P ZICO / EDGESOL0025 PENDANT 3G LIGHTING / 3G4-PL501	UNV	600 LMFT UP, 500 LMFT DOWN, 9.0 WFT 3500K LED	PENDANT MOUNTED DIRECT/INDIRECT LED, 14"x4"x1-5/8", EXTRUDED ALUMINUM HOUSING, FROSTED ACRYLIC LENS, 80 CRI, 0-10V TO 1% DIMMING, LM-80
A18	AXIS / LIGHTING / SLATE PENDANT SLTP6-600-835-SWD-SA-SA-SA-YA-UNV-ADP-FE ALTERNATES: EXTANT / P-TOOL-1P ZICO / EDGESOL0025 PENDANT 3G LIGHTING / 3G4-PL501	UNV	600 LMFT UP, 500 LMFT DOWN, 9.0 WFT 3500K LED	PENDANT MOUNTED DIRECT/INDIRECT LED, 18"x4"x1-5/8", EXTRUDED ALUMINUM HOUSING, FROSTED ACRYLIC LENS, 80 CRI, 0-10V TO 1% DIMMING, LM-80
A22	AXIS / LIGHTING / SLATE PENDANT SLTP6-600-835-SWD-SA-SA-SA-9224-UNV-ADP-FE ALTERNATES: EXTANT / P-TOOL-1P ZICO / EDGESOL0025 PENDANT 3G LIGHTING / 3G4-PL501	UNV	600 LMFT UP, 500 LMFT DOWN, 9.0 WFT 3500K LED	PENDANT MOUNTED DIRECT/INDIRECT LED, 22"x4"x1-5/8", EXTRUDED ALUMINUM HOUSING, FROSTED ACRYLIC LENS, 80 CRI, 0-10V TO 1% DIMMING, LM-80
B4	AXIS / LIGHTING / SCULPT RECESSED SCR-750-4-835-SA-FL-SA-XX-UNV-DP ALTERNATES: MERCURY / ML-S1L-SA-SF XICO / MICROSLOT RECESSED MSL-RD LEDALITE / TRUGROOVE RECESSED MICRO	UNV	750LM/FT, 6.2WFT 3500K LED	RECESSED MOUNTED LED, 4"x3-1/16"x3-1/4", EXTRUDED ALUMINUM HOUSING, EXTRUDED ACRYLIC LENS, 80 CRI, 0-10V TO 1% DIMMING, LM-80
B6	AXIS / LIGHTING / SCULPT RECESSED SCR-750-4-835-SA-FL-SA-XX-UNV-DP ALTERNATES: MERCURY / ML-S1L-SA-SF XICO / MICROSLOT RECESSED MSL-RD LEDALITE / TRUGROOVE RECESSED MICRO	UNV	750LM/FT, 6.2WFT 3500K LED	RECESSED MOUNTED LED, 6"x3-1/16"x3-1/4", EXTRUDED ALUMINUM HOUSING, EXTRUDED ACRYLIC LENS, 80 CRI, 0-10V TO 1% DIMMING, LM-80
B8	AXIS / LIGHTING / SCULPT RECESSED SCR-750-4-835-SA-FL-SA-XX-UNV-DP ALTERNATES: MERCURY / ML-S1L-SA-SF XICO / MICROSLOT RECESSED MSL-RD LEDALITE / TRUGROOVE RECESSED MICRO	UNV	750LM/FT, 6.2WFT 3500K LED	RECESSED MOUNTED LED, 8"x3-1/16"x3-1/4", EXTRUDED ALUMINUM HOUSING, EXTRUDED ACRYLIC LENS, 80 CRI, 0-10V TO 1% DIMMING, LM-80
B10	AXIS / LIGHTING / SCULPT RECESSED SCR-750-8-835-SA-FL-SA-XX-UNV-DP ALTERNATES: MERCURY / ML-S1L-SA-SF XICO / MICROSLOT RECESSED MSL-RD LEDALITE / TRUGROOVE RECESSED MICRO	UNV	750LM/FT, 6.2WFT 3500K LED	RECESSED MOUNTED LED, 10"x3-1/16"x3-1/4", EXTRUDED ALUMINUM HOUSING, EXTRUDED ACRYLIC LENS, 80 CRI, 0-10V TO 1% DIMMING, LM-80
C2	COLUMBIA / LCAT LCA12A5-40L/3960-4DU ALTERNATES: METALUX / CRUZE ST 22CZ2 DAY-BRITE CFI / FLUXFIRE GEN 2 2X2	UNV	3826LM, 28W 3500K LED	SHALLOW LED TROFFER, 23.75"x23.75"x3.28", DIE-FORMED CODE-GAUGE COLD-ROLLED STEEL HOUSING, EXTRUDED ACRYLIC LENS, 80 CRI, 0-10V DIMMING, LM-80
C4	COLUMBIA / LCAT LCA12A7-40L/4662-4DU ALTERNATES: METALUX / CRUZE ST 24CZ2 DAY-BRITE CFI / FLUXFIRE GEN 2 2X4	UNV	4837LM, 33W 3500K LED	SHALLOW LED TROFFER, 47.75"x23.77"x2.25", DIE-FORMED CODE-GAUGE COLD-ROLLED STEEL HOUSING, EXTRUDED ACRYLIC LENS, 80 CRI, 0-10V DIMMING, LM-80
D4	AXIS / LIGHTING / BEAM 3 TBD3LED-1100-R0-35-SD-SA-XX-UNV-DP ALTERNATES: MERCURY / ML-S3-AR ZICO / PROBEAM3 PENDANT LEDALITE / TRUGROOVE SUSPENDED	UNV	1100LM/FT, 9.7 WFT 3500K LED	PENDANT MOUNTED DIRECT LED, 4"x3-13/32"x4-1/2", EXTRUDED ALUMINUM HOUSING, EXTRUDED ACRYLIC LENS, 80 CRI, 0-10V TO 1% DIMMING, LM-80
D6	AXIS / LIGHTING / BEAM 3 TBD3LED-1100-R0-35-SD-SA-XX-UNV-DP ALTERNATES: MERCURY / ML-S3-AR ZICO / PROBEAM3 PENDANT LEDALITE / TRUGROOVE SUSPENDED	UNV	1100LM/FT, 9.7 WFT 3500K LED	PENDANT MOUNTED DIRECT LED, 6"x3-13/32"x4-1/2", EXTRUDED ALUMINUM HOUSING, EXTRUDED ACRYLIC LENS, 80 CRI, 0-10V TO 1% DIMMING, LM-80
D8	AXIS / LIGHTING / BEAM 3 TBD3LED-1100-R0-35-SD-SA-XX-UNV-DP ALTERNATES: MERCURY / ML-S3-AR ZICO / PROBEAM3 PENDANT LEDALITE / TRUGROOVE SUSPENDED	UNV	1100LM/FT, 9.7 WFT 3500K LED	PENDANT MOUNTED DIRECT LED, 8"x3-13/32"x4-1/2", EXTRUDED ALUMINUM HOUSING, EXTRUDED ACRYLIC LENS, 80 CRI, 0-10V TO 1% DIMMING, LM-80
D12	AXIS / LIGHTING / BEAM 3 TBD3LED-1100-R0-35-SD-SA-XX-UNV-DP ALTERNATES: MERCURY / ML-S3-AR ZICO / PROBEAM3 PENDANT LEDALITE / TRUGROOVE SUSPENDED	UNV	1100LM/FT, 9.7 WFT 3500K LED	PENDANT MOUNTED DIRECT LED, 12"x3-13/32"x4-1/2", EXTRUDED ALUMINUM HOUSING, EXTRUDED ACRYLIC LENS, 80 CRI, 0-10V TO 1% DIMMING, LM-80
F4	AXIS / LIGHTING / AIR ARWLED-500-R0-35-SA-XX-UNV-DP-XX ALTERNATES: MERCURY / ML-AR XICO / NICOLE DROPPED LENS TECH-LED / IRAD SERIES - DROP LENS	UNV	500 LM/FT, 4WFT 3500K LED	WALL MOUNTED LED, 6"x3-7/16"x3-15/16", EXTRUDED ALUMINUM HOUSING, EXTRUDED ACRYLIC LENS, 80 CRI, 0-10V TO 1% DIMMING, LM-80
F6	AXIS / LIGHTING / AIR ARWLED-500-R0-35-SA-XX-UNV-DP-XX ALTERNATES: MERCURY / ML-AR XICO / NICOLE DROPPED LENS TECH-LED / IRAD SERIES - DROP LENS	UNV	500 LM/FT, 4WFT 3500K LED	WALL MOUNTED LED, 6"x3-7/16"x3-15/16", EXTRUDED ALUMINUM HOUSING, EXTRUDED ACRYLIC LENS, 80 CRI, 0-10V TO 1% DIMMING, LM-80
G	PRESCOLITE / LTR LTR-4PDM-SL18LWM-L-TR-RED-T-SL35K90MW-EWDWT ALTERNATES: COSMOPHOTO / H COSOPHM - HALO COMMERCIAL LIGHTCURER / PAR	UNV	1636LM, 12W 3500K LED	4" DIAMETER RECESSED LED DOWNLIGHT, 4"dia x3.7", EXTRUDED ALUMINUM HOUSING, EXTRUDED ACRYLIC LENS, 80 CRI, 0-10V TO 1% DIMMING, LM-80
GS	PRESCOLITE / LTR LTR-4PDM-SL18LWM-L-TR-RED-T-SHSL35K-WTBD ALTERNATES:	UNV	1636LM, 12W 3500K LED	4" DIAMETER RECESSED LED DOWNLIGHT, 4"dia x3.7", EXTRUDED ALUMINUM HOUSING, NON-CONDUCTIVE DEAD FRONT TRIM, EXTRUDED ACRYLIC LENS, 80 CRI, 0-10V TO 1% DIMMING, LM-80
H-5	AXIS / SCULPT PERIMETER SCPLED-300-835-SA-FLAT-UNV-DP ALTERNATES: MERCURY / ML-PS PICASSO / P-MAX 2.5 FLUSH LENS SELUX / M60 PERIMETER MOUNT	UNV	300LM/FT, 2.4WFT 3500K LED	RECESSED PERIMETER LINEAR LED, 5"x3-13/16"x3-15/16", EXTRUDED ALUMINUM HOUSING, SPOTLESS FROSTED ACRYLIC LENS, 80 CRI, 0-10V TO 1% DIMMING, LM-80
H7-8	AXIS / SCULPT PERIMETER SCPLED-300-835-SA-FLAT-UNV-DP ALTERNATES: MERCURY / ML-PS PICASSO / P-MAX 2.5 FLUSH LENS SELUX / M60 PERIMETER MOUNT	UNV	300LM/FT, 2.4WFT 3500K LED	RECESSED PERIMETER LINEAR LED, 7.5"x3-13/16"x3-15/16", EXTRUDED ALUMINUM HOUSING, SPOTLESS FROSTED ACRYLIC LENS, 80 CRI, 0-10V TO 1% DIMMING, LM-80
H8	AXIS / SCULPT PERIMETER SCPLED-300-835-SA-FLAT-UNV-DP ALTERNATES: MERCURY / ML-PS PICASSO / P-MAX 2.5 FLUSH LENS SELUX / M60 PERIMETER MOUNT	UNV	300LM/FT, 2.4WFT 3500K LED	RECESSED PERIMETER LINEAR LED, 8"x3-13/16"x3-15/16", EXTRUDED ALUMINUM HOUSING, SPOTLESS FROSTED ACRYLIC LENS, 80 CRI, 0-10V TO 1% DIMMING, LM-80
H10	AXIS / SCULPT PERIMETER SCPLED-300-835-SA-FLAT-UNV-DP ALTERNATES: MERCURY / ML-PS PICASSO / P-MAX 2.5 FLUSH LENS SELUX / M60 PERIMETER MOUNT	UNV	300LM/FT, 2.4WFT 3500K LED	RECESSED PERIMETER LINEAR LED, 10"x3-13/16"x3-15/16", EXTRUDED ALUMINUM HOUSING, SPOTLESS FROSTED ACRYLIC LENS, 80 CRI, 0-10V TO 1% DIMMING, LM-80
H11	AXIS / SCULPT PERIMETER SCPLED-300-835-SA-FLAT-UNV-DP ALTERNATES: MERCURY / ML-PS PICASSO / P-MAX 2.5 FLUSH LENS SELUX / M60 PERIMETER MOUNT	UNV	300LM/FT, 2.4WFT 3500K LED	RECESSED PERIMETER LINEAR LED, 11"x3-13/16"x3-15/16", EXTRUDED ALUMINUM HOUSING, SPOTLESS FROSTED ACRYLIC LENS, 80 CRI, 0-10V TO 1% DIMMING, LM-80
H14	AXIS / SCULPT PERIMETER SCPLED-300-835-SA-FLAT-UNV-DP ALTERNATES: MERCURY / ML-PS PICASSO / P-MAX 2.5 FLUSH LENS SELUX / M60 PERIMETER MOUNT	UNV	300LM/FT, 2.4WFT 3500K LED	RECESSED PERIMETER LINEAR LED, 14"x3-13/16"x3-15/16", EXTRUDED ALUMINUM HOUSING, SPOTLESS FROSTED ACRYLIC LENS, 80 CRI, 0-10V TO 1% DIMMING, LM-80
H16	AXIS / SCULPT PERIMETER SCPLED-300-835-SA-FLAT-UNV-DP ALTERNATES: MERCURY / ML-PS PICASSO / P-MAX 2.5 FLUSH LENS SELUX / M60 PERIMETER MOUNT	UNV	300LM/FT, 2.4WFT 3500K LED	RECESSED PERIMETER LINEAR LED, 16"x3-13/16"x3-15/16", EXTRUDED ALUMINUM HOUSING, SPOTLESS FROSTED ACRYLIC LENS, 80 CRI, 0-10V TO 1% DIMMING, LM-80
I1-I4-5	AXIS / SCULPT PERIMETER SCPLED-375-835-SA-FLAT-UNV-DP ALTERNATES: MERCURY / ML-PS PICASSO / P-MAX 2.5 FLUSH LENS SELUX / M60 PERIMETER MOUNT	UNV	300LM/FT, 2.4WFT 3500K LED	RECESSED PERIMETER LINEAR LED, 19"x3-13/16"x3-15/16", EXTRUDED ALUMINUM HOUSING, SPOTLESS FROSTED ACRYLIC LENS, 80 CRI, 0-10V TO 1% DIMMING, LM-80
I9-10	AXIS / SCULPT PERIMETER SCPLED-375-835-SA-FLAT-UNV-DP ALTERNATES: MERCURY / ML-PS PICASSO / P-MAX 2.5 FLUSH LENS SELUX / M60 PERIMETER MOUNT	UNV	300LM/FT, 2.4WFT 3500K LED	RECESSED PERIMETER LINEAR LED, 19"x3-13/16"x3-15/16", EXTRUDED ALUMINUM HOUSING, SPOTLESS FROSTED ACRYLIC LENS, 80 CRI, 0-10V TO 1% DIMMING, LM-80
I13-20	AXIS / SCULPT PERIMETER SCPLED-375-835-SA-FLAT-UNV-DP ALTERNATES: MERCURY / ML-PS PICASSO / P-MAX 2.5 FLUSH LENS SELUX / M60 PERIMETER MOUNT	UNV	300LM/FT, 2.4WFT 3500K LED	RECESSED PERIMETER LINEAR LED, 19"x3-13/16"x3-15/16", EXTRUDED ALUMINUM HOUSING, SPOTLESS FROSTED ACRYLIC LENS, 80 CRI, 0-10V TO 1% DIMMING, LM-80
I12	AXIS / SCULPT PERIMETER SCPLED-300-835-SA-FLAT-UNV-DP ALTERNATES: MERCURY / ML-PS PICASSO / P-MAX 2.5 FLUSH LENS SELUX / M60 PERIMETER MOUNT	UNV	300LM/FT, 2.4WFT 3500K LED	RECESSED PERIMETER LINEAR LED, 7.5"x3-13/16"x3-15/16", EXTRUDED ALUMINUM HOUSING, SPOTLESS FROSTED ACRYLIC LENS, 80 CRI, 0-10V TO 1% DIMMING, LM-80
J	CONTECH / SCR SCR-L-35K4W/3G-NW-X ALTERNATES: LITHONIA / JDML ALPHABET / DELTA HIGH BAY - STATIC CCT DAY-BRITE CFI / NWL WRAPAROUND	UNV	16900LM, 137W 3500K LED	HIGH BAY LED PENDANT, 80 CRI, 0-10V DIMMING, LM-79
K	PRESCOLITE / LTC LTC-6SR3-P-TW-35K90W-SW1-S-X ALTERNATES: PRC LIGHTING / CLARUS ELEC-M3CI ALPHABET / BETA 6" RND ARCH CYL HI PERF, SSL / SSC6	UNV	6819LM, 72.1W 3500K LED	6" PENDANT MOUNTED LED, 7.34"H"x14", SEAMLESS HEAVY GUAGE ALUMINUM CYLINDER BODY, 80 CRI, 0-10V TO 1% DIMMING, LM-80
L	COLUMBIA / RLW RLW-430MM-TAW-840-MX ALTERNATES: MERCURY / LTH15 LAMARUES / WCLA DAY-BRITE CFI / NWL WRAPAROUND	UNV	3925LM, 28.6W 3500K LED	UTILITY LINEAR STRIP LED, 4"x5.3"x3.5", CODE-GAUGE STEEL HOUSING AND WIREWAY, ROUND FROSTED ACRYLIC LENS, 80 CRI, LM-80
L1	COLUMBIA / LXEM RLW-430M-48FA-ELI-MX ALTERNATES:	UNV	10111LM, 91.2W 3500K LED	UTILITY LINEAR HIGH-OUTPUT STRIP LED, 4"x5.3"x3.5", UL 94A FIBERGLASS HOUSING, LINEAL FROSTED ACRYLIC LENS, 80 CRI, 0-10V TO 1% DIMMING, LUMEN MAINTENANCE AT 60,000 HOURS, NEMA 4X, WET LOCATION LISTED
M4	AXIS / EXTEND 4 EX4-640-840-TS-SC-4-X-UNV-X-SC ALTERNATES: LUMENWERX / M4-SURFACE XICO / PROBEAM 4 SURFACE PBE4-S SELUX / MT25	UNV	600LM/FT, 10WFT 3500K LED	SURFACE MOUNTED LINEAR LED, 4"x4-932"x4-29/32", EXTRUDED ALUMINUM HOUSING, EXTRUDED ACRYLIC LENS, 80 CRI, 0-10V TO 1% DIMMING, LM-80
M6	AXIS / EXTEND 4 EX4-640-840-TS-SC-4-X-UNV-XC ALTERNATES: LUMENWERX / M4-SURFACE XICO / PROBEAM 4 SURFACE PBE4-S SELUX / MT25	UNV	600LM/FT, 10WFT 3500K LED	SURFACE MOUNTED LINEAR LED, 6"x4-932"x4-29/32", EXTRUDED ALUMINUM HOUSING, EXTRUDED ACRYLIC LENS, 80 CRI, 0-10V TO 1% DIMMING, LM-80
M8	AXIS / EXTEND 4 EX4-640-840-TS-SC-4-X-UNV-XC ALTERNATES: LUMENWERX / M4-SURFACE XICO / PROBEAM 4 SURFACE PBE4-S SELUX / MT25 ARANDA / PHC1 2 PHC1-2-14-1x4-342-EC-3-XX	UNV	600LM/FT, 10WFT 3500K LED	SURFACE MOUNTED LINEAR LED, 8"x4-932"x4-29/32", EXTRUDED ALUMINUM HOUSING, EXTRUDED ACRYLIC LENS, 80 CRI, 0-10V TO 1% DIMMING, LM-80
N31	L36Dx2-31-C-XXXX-LD ALTERNATES: ACUITY BRANDS / PEERLESS RD4MS IMPACT / Lmx4-Xxx PURE EDGE LIGHTING / PIPELINE 2 SUSPENSION ARANDA / PHC1 2 PHC1-2-14-1x4-342-EC-3-XX	UNV	1626LM, 23W XXXXK LED	DECORATIVE LINEAR PENDANT LED, 7.5"Dx36.5", MACHINED ALUMINUM, MACHINED SATIN POLYMER INTEGRAL DIFFUSER, 80 CRI, 0-10V DIMMING, LM-80
N40	L48Dx2-40-C-XXXX-LD ALTERNATES: ACUITY BRANDS / PEERLESS RD4MS IMPACT / Lmx4-Xxx PURE EDGE LIGHTING / PIPELINE 2 SUSPENSION ARANDA / PHC1 2 PHC1-2-14-1x4-342-EC-3-XX L60Dx2-61-C-XXXX-LD	UNV	2654LM, 32.7W 3500K LED	DECORATIVE LINEAR PENDANT LED, 7.5"Wx48.5", MACHINED ALUMINUM, MACHINED SATIN POLYMER INTEGRAL DIFFUSER, 80 CRI, 0-10V DIMMING, LM-80
N45	L60Dx2-61-C-XXXX-LD ALTERNATES: ACUITY BRANDS / PEERLESS RD4MS IMPACT / Lmx4-Xxx PURE EDGE LIGHTING / PIPELINE 2 SUSPENSION AXIS / BEAM SQUARE 2 PATTERN B2SQ3LED-T-840-35-TM-XXP-X-ANY-ADP-X-X	UNV	3800LM, 48W 3500K LED	DECORATIVE LINEAR PENDANT LED, 7.5"Wx71.5", MACHINED ALUMINUM, MACHINED SATIN POLYMER INTEGRAL DIFFUSER, 80 CRI, 0-10V DIMMING, LM-80
O1	AXIS / BEAM SQUARE 2 PATTERN B2SQ3LED-T-840-35-TM-XXP-X-ANY-ADP-X-X ALTERNATES: MERCURY / ML-SQ-RD STARTEK / SLIM BEAM DIRECT LEDALITE / TRUGROOVE SUSPENDED MICRO	UNV	750LM/FT, 6.2WFT 3500K LED	RECESSED MOUNT DIRECT REGULAR LIT CORNER PATTERN LED, 7.5"Wx71.5", ALUMINUM HOUSING, 80 CRI, 0-10V DIMMING, LM-80
O10	AXIS / BEAM SQUARE 2 PATTERN B2SQ3LED-T-840-35-TM-XXP-X-ANY-ADP-X-X ALTERNATES: MERCURY / ML-SQ-RD STARTEK / SLIM BEAM DIRECT LEDALITE / TRUGROOVE SUSPENDED MICRO	UNV	750LM/FT, 6.2WFT 3500K LED	RECESSED MOUNT DIRECT REGULAR LIT LED, 7.5"Wx71.5", ALUMINUM HOUSING, 80 CRI, 0-10V DIMMING, LM-80
O22	AXIS / BEAM SQUARE 2 PATTERN B2SQ3LED-T0-840-35-SO-HBUK-UNV-DP-X-X ALTERNATES: MERCURY / ML-SQ-RD STARTEK / SLIM BEAM DIRECT LEDALITE / TRUGROOVE SUSPENDED MICRO	UNV	750LM/FT, 6.2WFT 3500K LED	RECESSED MOUNT DIRECT REGULAR LIT LED, 7.5"Wx71.5", ALUMINUM HOUSING, 80 CRI, 0-10V DIMMING, LM-80
P	AXIS / BEAM 2 SURFACE TB2SLED-T0-840-35-SO-HBUK-UNV-DP-X-X ALTERNATES: MERCURY / ML-S2-RD ZICO / PROBEAM 2 SURFACE LEDALITE / TRUGROOVE SURFACE MICRO	UNV	750LM/FT, 6WFT 3500K LED	SURFACE MOUNTED DIRECT LINEAR LED, 8"x3-1/2"x3-1/8", EXTRUDED ALUMINUM HOUSING, EXTRUDED ACRYLIC LENS, 80 CRI, 0-10V TO 1% DIMMING, LM-80
P2	AXIS / BEAM 2 SURFACE TB2SLED-T0-840-35-SO-HHUK-UNV-DP-X-X ALTERNATES: MERCURY / ML-S2-RD ZICO / PROBEAM 2 SURFACE LEDALITE / TRUGROOVE SURFACE MICRO	UNV	750LM/FT, 6WFT 3500K LED	SURFACE MOUNTED DIRECT LINEAR LED, 8"x3-1/2"x3-1/8", EXTRUDED ALUMINUM HOUSING, EXTRUDED ACRYLIC LENS, 80 CRI, 0-10V TO 1% DIMMING, LM-80
Q1	BEACON / LIGHTING / RATIO WALL RW1-S-MS-35-WH-UNV ALTERNATES: NLS LIGHTING / NEAR GARDCO / DECORAH GWS LED WALL SCONCE	UNV	3536LM, 25W 3000K LED	EXTERIOR MOUNTED WALL PACK, CORROSION RESISTANT, DIE-CAST ALUMINUM HOUSING WITH POWDER COAT FINISH, 70 CRI, L70 AT 400,000+ HOURS, 0-10V STANDARD DIMMING DRIVER.
Q2	BEACON / LIGHTING / RATIO WALL RW1-S-MS-35-WH-UNV ALTERNATES: LITHONIA / WSTB LED NLS LIGHTING / NEAR GARDCO / DECORAH GWS LED WALL SCONCE	UNV	3536LM, 25W 3000K LED	SAME AS TYPE "Q1" EXCEPT WITH "TYPE 4W" OPTIC STRIKE PHOTOMETRY
Q3	BEACON / LIGHTING / RATIO WALL RW1-S-MS-35-W-T3-UNV ALTERNATES: LITHONIA / WSTB LED NLS LIGHTING / NEAR GARDCO / DECORAH GWS LED WALL SCONCE	UNV	3536LM, 25W 3000K LED	SAME AS TYPE "Q1" EXCEPT WITH "TYPE 3" OPTIC STRIKE PHOTOMETRY
R	SORBRIE / LIGHTING CR3YWAS-UNV-ZED-35-MED-UNV-TBW-X-X-X ALTERNATES: SPTLIGHTING / STA121S9 STARTEK / MICRO OPTIMO DIRECT PURE EDGE / PIPELINE STEM MNT STRAIGHT RUN	UNV	2460LM, 36W 3500K LED	WALL MOUNTED WALL WASH ACCENT LIGHTING FIXTURE; EXTRUDED ALUMINUM HOUSING, 90 CRI, 50,000 HOUR LED RATED LIFE, 0-10V DIMMING; DAMP LOCATION RATED
I12	AXIS / LIGHTING 105-S5-40-W-A-PSY-4-CRI-835-H4-1-D-Y-W ALTERNATES:	UNV	1200LM/FT, 9.7WFT 3500K LED	SUSPENDED ACCENT LIGHTING FIXTURE; EXTRUDED ALUMINUM HOUSING; HIGH-STRENGTH GALVANIZED STEEL AIRCRAFT CABLE SUSPENSION; LAMBERTIAN OPTICS; 90 CRI; LIFE, 0-10V DIMMING
X1	EVENLITE TRE-4-C-S-1C-W/SC ALTERNATES: ROLLET / EXCITMA SECHELLI / CYCLONE SIGNTEX / CRYSTAL SURFACE MOUNT	UNV	LED	EDGE LIT UL 924 EXIT SIGN, CLEAR ACRYLIC EDGE LIT LENS, SINGLE FACED OR DOUBLE FACED, SEE DRAWING FOR MOUNTING TYPE; PROVIDE RECESSED CEILING, WALL, END, OR PENDANT MOUNT AS REQUIRED; PROVIDE WIREGUARD OPTION FOR GYM.
X1-H	EVENLITE TRE-4-C-S-1C-W/SC ALTERNATES: ROLLET / EXCITMA SECHELLI / CYCLONE SIGNTEX / CRYSTAL ACCESSIBLE EXIT	UNV	LED	EDGE LIT UL 924 EXIT SIGN, CLEAR ACRYLIC EDGE LIT LENS, SINGLE FACED OR DOUBLE FACED, WITH HANDICAP ACCESSIBLE SYMBOL; SEE DRAWING FOR MOUNTING TYPE; PROVIDE RECESSED CEILING, WALL, END, OR PENDANT MOUNT AS REQUIRED; PROVIDE WIREGUARD OPTION FOR GYM.
X2	EVENLITE SCH-S-W-1-C-BK-ME-IC-H ALTERNATES: SECHELLI / TSL SIGNTEX / CRYSTAL SURFACE MOUNT	UNV	LED	EDGE LIT UL 924 EXIT SIGN, CLEAR ACRYLIC EDGE LIT LENS, SINGLE FACED OR DOUBLE FACED, MULLION MOUNTED.
X3	EVENLITE UEQG1-SX	NO POWER	SELF LUMINOUS	SELF LUMINOUS EXIT SIGN, 20 YEAR LIFE SERVICE RATING, RUGGED THERMOPLASTIC ABS MOLDED HOUSING WITH TAMPER RESISTANT FINISHING SIZES, GREEN LETTERS.
X4	EVENLITE AUR-4-W-W-X	UNV	LED	UL 924 EXIT SIGN, DIE-CAST ALUMINUM HOUSING, SINGLE FACED OR DOUBLE FACED, SEE DRAWING FOR MOUNTING TYPE; PROVIDE CEILING, WALL, END, OR PENDANT MOUNT AS REQUIRED
Y4	LL1 ARCHITECTURAL LIGHTING LL-LMX80-0-4-WW-TRK-0-7 ALTERNATES: NOVA FLEX / NTOS-SWH-1-4-W QTL / ESSENTIALS AKRA-FLAT (01)	UNV	350 LM/ft 4.4 W/ft 3500K LED	0.5" X 0.2" ANGLED EXTRUSION SURFACE MOUNTED LED TAPE LIGHT FOR DISPLAY CASE. DOUBLE ANODIZED ALUMINUM BODY WITH PLYCARBONATE LENS, 90+ CRI, 0-10V DIMMABLE. LED RATED LIFESPAN OF > 50,000 HOURS. PROVIDE WITH 0-10V DIMMABLE REMOTE DRIVER. COORDINATE EXACT MOUNTING OF LIGHT FIXTURE AND REMOTE DRIVER WITH ARCHITECT.
Y6	LL1 ARCHITECTURAL LIGHTING LL-LMX80-0-4-WW-TRK-0-7 ALTERNATES: NOVA FLEX / NTOS-SWH-1-4-W QTL / ESSENTIALS AKRA-FLAT (01)	UNV	350 LM/ft 4.4 W/ft 3500K LED	SAME AS TYPE "Y4" EXCEPT WITH DIFFERENT LENGTH

NOTES:
1. LIGHT FIXTURES IN THE SCHEDULE SHALL BE CONSIDERED BASIS OF DESIGN, EQUAL FIXTURE SUBSTITUTIONS ARE ACCEPTABLE FOR ALL FIXTURES IN THE LIGHTING FIXTURE SCHEDULE, UNLESS INDICATED OTHERWISE, EQUAL FIXTURE APPROVAL SHALL BE AS JUDGED BY THE ENGINEER AND THE ARCHITECT, IN ADDITION TO THE REQUIREMENTS LISTED IN THE LIGHTING FIXTURE SCHEDULE AND IN THE SPECIFICATIONS, THE PROPOSED EQUAL FIXTURES SHALL:
   A. BE THE SAME GENERAL SIZE, STYLE AND SHAPE INCLUDING BUT NOT LIMITED TO LENS CONSTRUCTION AND SHADING.
   B. BE OF EQUAL QUALITY CONSTRUCTION AND FINISH.
   C. BE SUPPLIED WITH ALL REQUIRED ACCESSORIES TO MATCH THE SPECIFIED (BASIS OF DESIGN) FIXTURE.
   D. PROVIDE THE SAME DISTRIBUTION, EFFICACY AND SOURCE LUMEN OUTPUT.
   E. HAVE THE SAME LISTINGS AS THE BASIS OF DESIGN FIXTURE, INCLUDING DLC AND ENERGY STAR QUALIFICATIONS.
2. ALL FIXTURES SHALL BE UL LISTED.
3. ALL NECESSARY MOUNTING HARDWARE, HANGERS, BRACKETS, RAILS, YOKES, CANOPIES, STEMS, CHAINS, NOW JOINERS, ETC, SHALL BE FURNISHED AND INSTALLED.
4. REFER TO ARCHITECTURAL DRAWINGS FOR SPECIFIC DETAILS, ARRANGEMENT, MOUNTING HEIGHTS, SUSPENSION LENGTHS, CEILING CONSTRUCTION, ETC., ALL COLORS AND FINISHES SHALL BE SELECTED BY ARCHITECT.
5. FIXTURES SHALL BE SEISMICALLY SUPPORTED AS REQUIRED BY THE APPLICABLE BUILD

Branch Panel: GP1A

Location: MAIN ELECTRICAL ROO... | Volts: 120/208 Wye | A.I.C. Rating: 42k AIC
Supply From: T-GPA/B | Phases: 3 | Bus Material: CU
Mounting: Surface | Wires: 4 | Bus Rating: 225 A
Enclosure: Type 1 | MCB Rating / MLO: 200A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	CONV, RECEPTACLE FIRE PUMP 1078	20 A	1	0,18 1,44			1	20 A	RECEPTACLES CUST, OFF/BRK RM...	2
3	RECEPTACLE CUST, EQUIP, 1073	20 A	1		0,18 0,18		1	20 A	RECEPTACLE CUST, TLT RM 1074	4
5	RECEPTACLE WATER SERVICE RM...	20 A	1			0,18 0,72	1	20 A	RECEPTACLES MECHANICAL 1067	6
7	RECEPTACLE KITCHEN TLT RM 1081	20 A	1	0,18 0,36			1	20 A	RECEPTACLES NON-FOOD STOR, 1082	8
9	RECEPTACLES OFFICE 1084	20 A	1		0,72 0,18		1	20 A	RECEPTACLE KITCHEN STOR, 1083	10
11	RECEPTACLES CAFETERIA 1086	20 A	1			0,72 0,54	1	20 A	RECEPTACLES CAFETERIA 1085	12
13	AV MONITORS CAFETERIA 1085	20 A	1	0,36 1,44			1	20 A	FLOOR BOXES CAFETERIA 1086	14
15	EWC CAFETERIA	20 A	1		0,18 0,00		2	20 A	SPARE	16
17	*SPARE	20 A	1			0,00 0,00	–	–	–	18
19	*SPARE	20 A	1	0,00 0,18			1	20 A	RECEPT, MAIN ELECTRICAL ROOM,...	20
21	*SPARE	20 A	1		0,00 0,72		1	20 A	RECEPTS, CUST, MAINT, CLOSET 1077	22
23	*SPARE	20 A	1			0,00 1,26	1	20 A	RECEPTS, CUST, WORK ROOM 1072	24
25	TIME CLOCK IN ROOM 1079	20 A	1	0,50 1,50			1	20 A	RECEPTACLES FIRE PUMP ROOM 1066	26
27	EXTERIOR RECEPTACLE AREA A	20 A	1		0,18 1,50		1	20 A	CH-1 RECEPTACLES AND LIGHTS	28
29	SERVICE RECEPTACLE ROOF A	20 A	1			0,18 1,50	1	20 A	CH-2 RECEPTACLES AND LIGHTS	30
31	SERVICE RECEPTACLE ROOF A	20 A	1	0,18 1,50			1	20 A	DOA-1 LIGHTS AND RECEPTACLES	32
33	SPARE	20 A	1		0,18 0,00		1	20 A	SPARE	34
35	CHWBH CH-1	40 A	1			3,84 0,00	1	20 A	SPARE	36
37	CHWBH CH-1	40 A	1	3,84 0,00			1	20 A	SPARE	38
39	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	40
41	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	42
43	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	44
45	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	46
47	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	48
49	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	50
51	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	52
53	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	54
55	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	56
57	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	58
59	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	60
61	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	62
63	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	64
65										66
67										68
69										70
71										72
73										74
75										76
77										78
79										80
81										82
83										84
	Phase Load:			11,66 kVA	4,02 kVA	8,94 kVA				
	Phase...:			103,5 A	33,5 A	80,8 A				
	Total Load:			24,62 kVA						
	Total Amps:			68,34 A						

Notes:
*PROVIDE GFCI CIRCUIT BREAKER

Branch Panel: GP1B

Location: ELECT, CLOSET 1092 | Volts: 120/208 Wye | A.I.C. Rating: 10k AIC
Supply From: T-GPA/B | Phases: 3 | Bus Material: CU
Mounting: Surface | Wires: 4 | Bus Rating: 225 A
Enclosure: Type 1 | MCB Rating / MLO: 200A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	RECEPTACLES ROOMS 1087/1088	20 A	1	0,90 0,09			2	30 A	DRYER LAUNDRY/ICE 1088	2
3	GYM EQUIPMENT CONTROL PANELS	30 A	1		0,90 0,09		--	--		4
5	WASH MACH, LAUNDRY/ICE 1088	20 A	1			0,18 1,08	1	20 A	RECEPTACLES PE OFFICE 1089	6
7	RECEPTACLES LOCKER ROOM 1091	20 A	1	0,72 0,18			1	20 A	RECEPTACLE ELECT, CLOSET 1092	8
9	RECEPTACLE GYM TLT ROOM 1090	20 A	1		0,36 0,72		1	20 A	RECEPTACLES LOCKER ROOM 1095	10
11	RECEPTACLE GYM TLT ROOM 1094	20 A	1			0,36 0,18	1	20 A	RECEPTACLE PE TLTS/SHOWER 1096	12
13	RECEPTACLES PE OFFICE 1097	20 A	1	1,26 0,36			1	20 A	RECEPTACLES ROOMS 1101/1132	14
15	CONV, RECEPTS, FITNESS ROOM 1099	20 A	1		1,08 1,08		1	20 A	CONV, RECEPTS, FITNESS ROOM 1099	16
17	EXTERIOR RECEPTACLE GYM	20 A	1			0,18 0,18	1	20 A	EXTERIOR RECEPTACLE VESTIBULE	18
19	FITNESS EQUIPMENT IN ROOM 1099	20 A	1	0,18 0,18			1	20 A	FITNESS EQUIPMENT IN ROOM 1099	20
21	FITNESS EQUIPMENT IN ROOM 1099	20 A	1		0,18 0,18		1	20 A	FITNESS EQUIPMENT IN ROOM 1099	22
23	RECEPTACLES PUBLIC LOBBY 1101	20 A	1			0,54 0,90	2	20 A	RECEPTACLES PUBLIC LOBBY 1101	24
25	SERVICE RECEPTACLE ROOF C	20 A	1	0,36 0,00			1	20 A	SPARE	26
27	*EWC PUBLIC LOBBY 1101	20 A	1		0,18 0,18		1	20 A	*EWC PUBLIC LOBBY 1101	28
29	*SPARE	20 A	1			0,00 0,00	1	20 A	*SPARE	30
31	*SPARE	20 A	1	0,00 0,00			1	20 A	*SPARE	32
33	SPARE	20 A	2		0,00 0,69		2	15 A	CEILING FAN - GYM	34
35	--	--	--			0,00 0,68	--	--	--	36
37	SCOREBOARD GYM	20 A	1	0,50 0,68			2	15 A	CEILING FAN - GYM	38
39	GYM EQUIPMENT CONTROL PANELS	30 A	1		0,00 0,69		--	--	--	40
41	RECEPTACLES GYM	20 A	1			0,36 0,69	2	15 A	CEILING FAN - GYM	42
43	RECEPTACLES GYM	20 A	1	1,08 0,68			--	--	--	44
45	RECEPTACLES GYM	20 A	1		1,08 0,68		2	15 A	CEILING FAN - GYM	46
47	RECEPTACLES EXTERIOR	20 A	1			0,18 0,68	--	--	--	48
49	SERVICE RECEPTACLE ROOF B	20 A	1	0,18 0,00			1	20 A	SHADE MOTORS - GYM	50
51	SERVICE RECEPTACLE ROOF B	20 A	1		0,18 0,00		1	20 A	SPARE	52
53	SERVICE RECEPTACLE ROOF B	20 A	1			0,18 0,00	1	20 A	SPARE	54
55	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	56
57	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	58
59	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	60
61	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	62
63	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	64
65	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	66
67	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	68
69	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	70
71	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	72
73										74
75										76
77										78
79										80
81										82
83										84
	Phase Load:			7,34 kVA	8,34 kVA	6,36 kVA				
	Phase...:			62,3 A	70,8 A	52,9 A				
	Total Load:			22,03 kVA						
	Total Amps:			61,14 A						

Notes:
*PROVIDE GFCI TYPE CIRCUIT BREAKER

Branch Panel: GP1C

Location: MECHANICAL 1060 | Volts: 120/208 Wye | A.I.C. Rating: 10k AIC
Supply From: T-GPC/D | Phases: 3 | Bus Material: CU
Mounting: Surface | Wires: 4 | Bus Rating: 225 A
Enclosure: Type 1 | MCB Rating / MLO: 200A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	RECEPTACLE CUSTODIAL 1066	20 A	1	0,18 1,08			1	20 A	RECEPTACLES OT/PT 1064	2
3	RECEPTACLES OT/PT 1064	20 A	1		1,08 0,18		1	20 A	RECEPTACLE OT/PT STOR, 1065	4
5	RECEPTACLE MEDIA EQUIP, STOR...	20 A	1			0,18 1,80	1	20 A	RECEPTACLES MEDIA PROD, CR 1063	6
7	RECEPTACLES ROOM 1061	20 A	1	0,72 0,72			1	20 A	RECEPTACLES MECHANICAL 1060	8
9	RECEPTACLES MECHANICAL 1060	20 A	1		0,90 1,44		1	20 A	RECEPTS,IFL BOX MEDIA COLLAB...	10
11	RECEPTS,IFL BOX MEDIA COLLAB...	20 A	1			1,44 1,44	1	20 A	RECEPTS,IFL BOX MEDIA COLLAB...	12
13	RECEPTACLES ROOMS 1053/1055	20 A	1	1,80 1,44			1	20 A	RECEPTACLES ROOMS 1054/1055	14
15	RECEPTACLES ROOMS 1055/1056	20 A	1		1,08 0,18		1	20 A	COPIER IN MEDIA COLLAB, 1056	16
17	COPIER IN MEDIA COLLAB, 1056	20 A	1			0,18 0,18	1	20 A	RECEPTACLE COURTYARD 1116	18
19	RECEPTACLE COURTYARD 1117	20 A	1	0,18 0,90			1	20 A	RECEPTACLES CORRIDOR 1115	20
21	RECEPTACLES IT 1058	20 A	1		1,44 1,26		1	20 A	RECEPTACLES IT 1056	22
23	WASHER LIFE SKILLS 1051	20 A	1			0,18 2,25	2	20 A	*DRYER LIFE SKILLS 1051	24
25	*DISHWASHER LIFE SKILLS 1051	20 A	1	0,18 2,25			--	--	--	26
27	RANGE LIFE SKILLS 1051	40 A	2		3,95 0,18		1	20 A	RANGE HOOD LIFE SKILLS 1051	28
29	--	--	--			3,95 1,62	1	20 A	RECEPTACLES LIFE SKILLS 1051	30
31	RECEPTACLES LIFE SKILLS 1051	20 A	1	1,44 0,36			1	20 A	PRINTERS MEDIA COLLAB 1056	32
33	*SPARE	20 A	1		0,00 0,90		1	20 A	*SPARE	34
35	*SPARE	20 A	1			0,00 0,00	1	20 A	*SPARE	36
37	RECEPT, MECHANICAL 1060	20 A	1	0,18 0,72			1	20 A	RECEPTS MEDIA BOOTH 1059	38
39	MOTORIZED LIFT, LIFE SKILLS 1052	20 A	1		0,90 0,72		1	20 A	RECEPTACLES, 2ND FLOOR...	40
41	SERVICE RECEPTACLE ROOF C	20 A	1			0,18 1,80	2	20 A	DOA-3 LIGHTS AND RECEPTACLES	42
43	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	44
45	SPARE	20 A	1		0,00 0,90		1	20 A	SPARE	46
47	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	48
49	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	50
51	SPARE	20 A	1		0,00 0,90		1	20 A	SPARE	52
53	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	54
55	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	56
57	SPARE	20 A	1		0,00 0,90		1	20 A	SPARE	58
59	SPARE	20 A	1			0,00 0,00	2	20 A	SPARE	60
61	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	62
63	SPARE	20 A	1		0,00 0,90		--	--	--	64
65										66
67										68
69										70
71										72
73										74
75										76
77										78
79										80
81										82
83										84
	Phase Load:			12,15 kVA	12,91 kVA	14,90 kVA				
	Phase...:			101,3 A	108,6 A	125,1 A				
	Total Load:			39,96 kVA						
	Total Amps:			110,93 A						

Notes:
*PROVIDE GFCI CIRCUIT BREAKER

Branch Panel: GP1D

Location: ELECT, CLOSET 1106 | Volts: 120/208 Wye | A.I.C. Rating: 10 KAIC
Supply From: T-GPC/D | Phases: 3 | Bus Material: CU
Mounting: Surface | Wires: 4 | Bus Rating: 225 A
Enclosure: Type 1 | MCB Rating / MLO: 200A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	HOIST POWER - 1ST ELECTRIC	15 A	3	0,17 0,00			3	15 A	SPARE	2
3	--	--	--		0,17 0,00		--	--	--	4
5	--	--	--			0,17 0,00	--	--	--	6
7	HOIST POWER - 3RD ELECTRIC	15 A	3	0,17 0,17			3	15 A	HOIST POWER - FOH ELECTRIC	8
9	--	--	--		0,17 0,17		--	--	--	10
11	--	--	--			0,17 0,17	--	--	--	12
13	RECEPTACLE BAND STORAGE 1111	20 A	1	0,18 0,90			1	20 A	RECEPTACLES BAND 1109	14
15	RECEPTACLES BAND 1109	20 A	1		0,90 0,90		1	20 A	RECEPTACLES BAND 1109	16
17	RECEPTACLE PRACTICE ROOM 1110	20 A	1			0,18 0,54	1	20 A	RECEPTACLE STAGE STORAGE 1113	18
19	RECEPTACLE CORRIDOR 1129	20 A	1	0,36 0,36			1	20 A	LOCAL SOUND SYSTEM PWR RM 1113	20
21					0,18		1	20 A	RECEPTACLE TOILET 1105	22
23	RECEPTACLE TOILET 1104	20 A	1			0,18 0,18	1	20 A	RECEPTACLE 1103	24
25	PROJECTION SCREEN PWR STAGE...	20 A	1	0,50 1,80			1	20 A	RECEPTACLES/FL BOX STAGE 1112	26
27	THEATR, LIGHT CONT, PWER RM 1113	20 A	1		0,36 0,90		1	20 A	RECEPTACLES H/L AUDITORIUM 1127	28
29	RECEPTACLES BOH AUDITORIUM 1127	20 A	1			0,72 0,90	1	20 A	RECEPTACLES H/R AUDITORIUM 1127	30
31	RECEPTS, AUDIO/LIGHT CTRL DESK	20 A	1	0,72 1,08			1	20 A	RECEPTS, AUDIO/LIGHT CTRL DESK	32
33	RECEPTS, CORR, 1124, 1131, 1132	20 A	1		0,54 0,00		1	20 A	*SPARE	34
35	*SPARE	20 A	1			0,00 0,00	1	20 A	*SPARE	36
37	*SPARE	20 A	1	0,00 0,72			1	20 A	RECEPTACLES, STAGE SUPPORT	38
39	RECEPT, ELECT, CLOSET 1106	20 A	1		0,18 0,54		1	20 A	RECEPTACLES STAGE 1112	40
41	THEATR, RIGGING HOIST CTRL PANEL	20 A	1			0,90 0,18	1	20 A	DOA-2 LIGHTS AND RECEPTACLES	42
43	SPARE	20 A	1	0,00 1,50			1	20 A	DOA-4 LIGHTS AND RECEPTACLES	44
45	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	46
47	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	48
49	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	50
51	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	52
53	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	54
55	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	56
57	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	58
59	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	60
61	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	62
63	SPARE	20 A	1		0,00 0,00		2	20 A	SPARE	64
65										66
67										68
69										70
71										72
73										74
75										76
77										78
79										80
81										82
83										84
	Phase Load:			8,62 kVA	5,00 kVA	3,88 kVA				
	Phase...:			73,3 A	43,1 A	32,3 A				
	Total Load:			17,50 kVA						
	Total Amps:			48,58 A						

Notes:
*PROVIDE GFCI CIRCUIT BREAKER

Branch Panel: GP1E

Location: MECHANICAL 1048 | Volts: 120/208 Wye | A.I.C. Rating: 10k AIC
Supply From: T-GPE/F | Phases: 3 | Bus Material: CU
Mounting: Surface | Wires: 4 | Bus Rating: 225 A
Enclosure: Type 1 | MCB Rating / MLO: 200A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	WHEEL ART 1041	20 A	1	0,18 0,18			1	20 A	WHEEL ART 1041	2
3	WHEEL ART 1041	20 A	1		0,18 0,18		1	20 A	WHEEL ART 1041	4
5	CORO REELS ART 1041	20 A	1			0,54 1,26	1	20 A	RECEPTACLES ART 1041	6
7	RECEPTACLES ART 1041	20 A	1	1,08 3,67			3	50 A	KILN	8
9	ART, 1042, KILN 1043	20 A	1		0,90 3,67		--	--	--	10
11	RECEPTACLES STORAGE 10444, 1045	20 A	1			0,54 3,67	--	--	--	12
13	*SPARE	20 A	1	0,00 0,00			1	20 A	*SPARE	14
15	*SPARE	20 A	1		0,00 0,00		1	20 A	*SPARE	16
17	RECEPT, MECHANICAL 1048	20 A	1			0,18 0,18	1	20 A	SPARE	18
19	Power	20 A	1	0,18 1,50			1	20 A	DOA-1 LIGHTS AND RECEPTACLES	20
21	SERVICE RECEPTACLE ROOF E	20 A	1		0,18 1,50		1	20 A	DOA-2 LIGHTS AND RECEPTACLES	22
23	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	24
25	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	26
27	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	28
29	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	30
31	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	32
33	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	34
35	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	36
37	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	38
39	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	40
41	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	42
43	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	44
45	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	46
47	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	48
49	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	50
51	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	52
53	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	54
55	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	56
57	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	58
59	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	60
61	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	62
63	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	64
65	RECEPTACLE CUSTODIAL 1049	20 A	1			0,18 0,72	1	20 A	RECEPTACLES CORRIDOR, 1050	66
67	RECEPTACLES WOOD SHOP EXT	20 A	1	0,18 0,72			1	20 A	RECEPTACLES ART 1041	68
69										70
71										72
73										74
75										76
77										78
79										80
81										82
83										84
	Phase Load:			7,69 kVA	6,61 kVA	7,27 kVA				
	Phase...:			64,9 A	55,3 A	61,4 A				
	Total Load:			21,56 kVA						
	Total Amps:			59,84 A						

Notes:
*PROVIDE GFCI CIRCUIT BREAKER

Branch Panel: GP1F

Location: ELECT, CLOSET 1029 | Volts: 120/208 Wye | A.I.C. Rating: 10k AIC
Supply From: T-GPE/F | Phases: 3 | Bus Material: CU
Mounting: Surface | Wires: 4 | Bus Rating: 400 A
Enclosure: Type 1 | MCB Rating / MLO: 400A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	LIGHTS - ELEVATOR PIT	20 A	1	0,00 0,00			1	20 A	Other	2
3	*WATER COOLER TOILET 1026, 1027	20 A	1		0,36 0,50		1	20 A	GCMS EXTERIOR SIGN	4
5	COPIER MAIL, 1034	20 A	1			0,36 0,90	1	20 A	RECEPTACLE CONFERENCE 1019	6
7	DC-1 SPARK DETECTION CONTROL	20 A	1	0,72 0,90			1	20 A	RECEPTACLE ADMIN/ID 1003	8
9	RECEPTACLES CHORAL 1122	20 A	1		1,26 1,40		1	20 A	RECEPTACLES TOILET 1025,...	10
11	RECEPTACLE ADMIN/ID 1003	20 A	1			1,08 0,18	1	20 A	SERVICE RECEPTACLE ROOF E	12
13	OVERHEAD DOOR WOOD SHOP 1039	20 A	1	6,00 0,18			1	20 A	SERVICE RECEPTACLE ROOF D	14
15	HEAT TRACE, WOOD SHOP 1039	20 A	2		1,99 9,95		3	100 A	GP-W/S	16
17	--	--	--			1,66 6,60	--	--	--	18
19	RECEPTACLE ELEVATOR PIT	20 A	1	0,18 9,88			--	--	--	20
21	GP-CL	200 A	3		16,26 0,18		1	20 A	SERVICE RECEPTACLE ROOF D	22
23	--	--	--			21,29 0,18	1	20 A	RECEPTACLE EXTERIOR AREA E	24
25	--	--	--	13,83 0,18			1	20 A	COPIER FACULTY 1033	26
27	RECEPTACLE EXT DUST COLLECTOR	20 A	1		0,18 0,18		1	20 A	EXT, RECEPT, ENTRY VEST 1030	28
29	RECEPT ELECT, CLOSET 1029	20 A	1			0,18 0,18	1	20 A	*FRIDGE WORKROOM 1036	30
31	*FRIDGE ISOLATION 1024	20 A	1	0,18 0,54			1	20 A	CORO REELS ROBOTICS 1038	32
33	*FRIDGE PREP 1022	20 A	1		0,18 0,54		1	20 A	CORO REELS ROBOTICS 1038	34
35	RECEPTACLES LAC-1030, STOR,-1037	20 A	1			0,54 0,72	1	20 A	RECEPTACLES TOILET 1026, 1027	36
37	COMPUTERS PASSAGE 1011	20 A	1	0,72 0,90			1	20 A	RECEPTACLES TLT 1031/32, STOR,...	38
39	RECEPTACLES CONCOURSE 1001	20 A	1		0,72 0,90		1	20 A	*SPARE	40
41	*SPARE	20 A	1			0,00 0,00	1	20 A	*SPARE	42
43	*SPARE	20 A	1	0,00 0,90			1	20 A	RECEPTACLES COUNSELOR 1015	44
45	RECEPTACLES WAITING 1002	20 A	1		0,90 0,90		1	20 A	RECEPTACLES REST 1023	46
47	RECEPTACLES WORKROOM 1006	20 A	1			0,90 0,90	1	20 A	RECEPTACLES TEEN TALK 1016	48
49	RECEPTACLES INTERVENTION 1008	20 A	1	0,90 1,08			1	20 A	RECEPTACLES CHORAL 1122	50
51	RECEPTACLES COUNSELOR 1013	20 A	1		0,90 1,08		1	20 A	RECEPTACLES ORCHESTRA 1116	52
53	RECEPTACLES COUNSELOR 1014	20 A	1			0,90 1,08	1	20 A	RECEPTACLES PRINCIPAL 1007	54
55	RECEPTACLE CONFERENCE 1019	20 A	1	1,08 1,26			1	20 A	RECEPTACLES FACULTY 1033	56
57	RECEPTACLES 1020, 1021, 1022	20 A	1		1,08 1,26		1	20 A	RECEPTACLES FACULTY 1033	58
59	RECEPTACLES BEHAVIOR 1009	20 A	1			1,08 1,26	1	20 A	RECEPTACLES ORCHESTRA 1116	60
61	RECEPTACLE CHORAL STORAGE 1123	20 A	1	0,18 1,62			1	20 A	RECEPTACLES RECEPTION 1010a	62
63	DC-1 NO-RETURN VALVE CONTROL	20 A	1		0,72 1,62		1	20 A	RECEPTACLES ROBOTICS 1038	64
65	RECEPTACLES ROBOTICS 1038	20 A	1			1,62 --	1	--	SPACE	66
67	SPACE	--	1	-- --			1	--	SPACE	68
69	SPACE	--	1		-- --		1	--	SPACE	70
71	SPACE	--	1			-- --	1	--	SPACE	72
73	SPACE	--	1	-- --			1	--	SPACE	74
75	SPACE	--	1		-- --		1

Branch Panel: GP2A

Location: ELEC 2026 | Volts: 120/208 Wye | A.I.C. Rating: 10k AIC
Supply From: T-GP/A/B | Phases: 3 | Bus Material: CU
Mounting: Surface | Wires: 4 | Bus Rating: 225 A
Enclosure: Type 1 | MCB Rating / MLO: 200A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	RECEPTACLES ELL BLINGUAL CR...	20 A	1	1,08	0,54		1	20 A	RECEPTACLES ELL BLINGUAL CR...	2
3	RECEPTACLES CLASSROOM 2019	20 A	1			0,54	0,54		1	20 A	RECEPTACLES CLASSROOM 2019	4
5	RECEPTACLES CLASSROOM 2018	20 A	1					0,90	0,54	1	20 A	RECEPTACLES CLASSROOM 2018	6
7	RECEPTACLES CLASSROOM 2016	20 A	1	0,90	0,54					1	20 A	RECEPTACLES CLASSROOM 2018	8
9	RECEPTACLES W.L. CLASSROOM 2017	20 A	1			0,54	0,72			1	20 A	RECEPTACLES W.L. CLASSROOM 2017	10
11	RECEPTACLES W.L. CLASSROOM 2017	20 A	1					0,90	0,54	1	20 A	RECEPTACLES SPED RES, 2016	12
13	RECEPTACLES SPED RES, 2016	20 A	1	0,72	0,54					1	20 A	RECEPTACLES SPED RES, 2015	14
15	RECEPTACLES SPED RES, 2015	20 A	1			0,72	0,54			1	20 A	RECEPTACLES CLASSROOM 2014	16
17	RECEPTACLES CLASSROOM 2014	20 A	1					0,72	0,90	1	20 A	RECEPTACLES CLASSROOM 2014	18
19	RECEPTACLES CLASSROOM 2013	20 A	1	0,54	0,54					1	20 A	RECEPTACLES CLASSROOM 2013	20
21	RECEPTACLES CLASSROOM 2013	20 A	1			0,90	0,54			1	20 A	RECEPTACLES CLASSROOM 2011	22
23	RECEPTACLES CLASSROOM 2011	20 A	1					0,54	0,90	1	20 A	RECEPTACLES CLASSROOM 2011	24
25	RECEPTACLES CLASSROOM 2010	20 A	1	0,54	0,54					1	20 A	RECEPTACLES CLASSROOM 2010	26
27	RECEPTACLES CLASSROOM 2010	20 A	1			0,90	0,72			1	20 A	RECEPTACLES SCIENCE 2089	28
29	RECEPTACLES SCIENCE 2089	20 A	1					1,08	0,72	1	20 A	RECEPTACLES SCIENCE 2089	30
31				0,72						1	20 A	RECEPTACLES SCIENCE 2087	32
33	RECEPTACLES SCIENCE 2087	20 A	1			1,44	0,72			1	20 A	RECEPTACLES SCIENCE 2087	34
35									0,54	1	20 A	RECEPTACLES CLASSROOM 2006	36
37	RECEPTACLES CLASSROOM 2006	20 A	1	0,54	0,90					1	20 A	RECEPTACLES CLASSROOM 2006	38
39	RECEPTACLES CLASSROOM 2006	20 A	1			0,54	0,90			1	20 A	RECEPTACLES CLASSROOM 2006	40
41	RECEPTACLES CLASSROOM 2005	20 A	1					0,54	0,72	1	20 A	RECEPTACLES SPED RES, 2002	42
43	RECEPTACLES SPED RES, 2002	20 A	1	0,72	0,90					1	20 A	RECEPTACLES HEARMS IMPAR 2003	44
45	RECEPTACLES HEARMS IMPAR 2003	20 A	1			0,90	0,90			1	20 A	RECEPTACLES COMMONS 2004	46
47	RECEPTACLES/FL BOX COMMONS...	20 A	1					0,90	0,18	1	20 A	RECEPTACLE B TLT 2027	48
49	RECEPTACLES CORRIDOR 2029	20 A	1	0,54	0,18					1	20 A	*EWC RECEPTACLE CORRIDOR 2029	50
51	EXTERIOR RECEPTACLE	20 A	1			0,18	0,18			1	20 A	RECEPTACLE STAFF TLT 2025	52
53	RECEPTACLE CUSTODIAL 2024	20 A	1					0,18	0,18	1	20 A	RECEPTACLE STAFF TLT 2023	54
55	RECEPTACLE ELEC 2022	20 A	1	0,18	0,18					1	20 A	*EWC RECEPTACLE CORRIDOR 2020	56
57	RECEPTACLE G TLT 2021	20 A	1			0,18	0,54			1	20 A	RECEPTACLES PREP 2008	58
59	REFRIGERATOR PREP 2008	20 A	1					0,18	0,18	1	20 A	*DISHWASHER PREP 2006	60
61	RECEPTACLES COMMONS 2012	20 A	1	1,08	0,90					1	20 A	RECEPTACLES/FL BOX COMMONS...	62
63	RECEPTACLES CORRIDOR 2001	20 A	1			0,72	0,00			1	20 A	*SPARE	64
65	*SPARE	20 A	1					0,00	0,00	1	20 A	*SPARE	66
67	*SPARE	20 A	1	0,00	0,72					1	20 A	RECEPTACLES SPED RES, 2015	68
69	RECEPTACLES SPED RES, 2016	20 A	1			0,72	0,00			1	20 A	SPARE	70
71	SPARE	20 A	1	0,00	0,00			0,00	0,00	2	20 A	SPARE	72
73	SPARE	20 A	1	0,00	0,00					2	20 A	SPARE	74
75	SPARE	20 A	1			0,00	0,00			–	–	–	76
77													78
79													80
81													82
83													84
			Phase Load:	14,04 kVA	14,58 kVA	11,34 kVA							
			Phase..	120,5 A	125 A	94,5 A							
			Total Load:	39,96 kVA									
Notes:			Total Amps:	110,97 A									
*PROVIDE GFCI CIRCUIT BREAKER													

Branch Panel: GP2C

Location: ELEC 2080 | Volts: 120/208 Wye | A.I.C. Rating: 10k AIC
Supply From: T-GP/CD | Phases: 3 | Bus Material: CU
Mounting: Surface | Wires: 4 | Bus Rating: 225 A
Enclosure: Type 1 | MCB Rating / MLO: 200A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	RECEPTACLES MATH INT, 2062	20 A	1	0,54	0,72		1	20 A	RECEPTACLES MATH INT, 2062	2
3	RECEPTACLES MATH INT, 2062	20 A	1		0,54	0,72	1	20 A	RECEPTACLES CORRIDOR 2071	4
5	RECEPTACLES ASST. PR. OFF. 2065	20 A	1			0,72	0,54	1	20 A	RECEPTACLES ASST. PR. OFF. 2065	6
7	RECEPTACLES PSYCH OFFICE 2064	20 A	1	0,90	0,54			1	20 A	RECEPTACLES SENSORY 2063	8
9	RECEPTACLES CLASSROOM 2044	20 A	1		0,54	0,72		1	20 A	RECEPTACLES CLASSROOM 2044	10
11	RECEPTACLES CLASSROOM 2044	20 A	1			0,72	0,54	1	20 A	RECEPTACLES CLASSROOM 2043	12
13	RECEPTACLES CLASSROOM 2043	20 A	1	0,72	0,72			1	20 A	RECEPTACLES CLASSROOM 2043	14
15	RECEPTACLES W.L. CLASSROOM 2042	20 A	1		0,54	0,72		1	20 A	RECEPTACLES W.L. CLASSROOM 2042	16
17	RECEPTACLES W.L. CLASSROOM 2042	20 A	1			0,72	0,54	1	20 A	RECEPTACLES W.L. CLASSROOM 2041	18
19	RECEPTACLES W.L. CLASSROOM 2041	20 A	1	0,72	0,72			1	20 A	RECEPTACLES W.L. CLASSROOM 2041	20
21	RECEPTACLES CLASSROOM 2046	20 A	1		0,72	0,72		1	20 A	RECEPTACLES CLASSROOM 2040	22
23	RECEPTACLES CLASSROOM 2040	20 A	1			0,54	0,54	1	20 A	RECEPTACLES CLASSROOM 2039	24
25	RECEPTACLES CLASSROOM 2039	20 A	1	0,72	0,72			1	20 A	RECEPTACLES CLASSROOM 2039	26
27	RECEPTACLES READING INT, 2029	20 A	1		0,36	0,72		1	20 A	RECEPTACLES READING INT, 2029	28
29	RECEPTACLES READING INT, 2029	20 A	1			0,54	0,54	1	20 A	RECEPTACLES ASST. PR. OFF. 2030	30
31	RECEPTACLES ASST. PR. OFF. 2030	20 A	1	0,72	0,72			1	20 A	RECEPTACLES SOCIAL WORKER 2031	32
33	RECEPTACLES SENSORY 2032	20 A	1		0,54	0,54		1	20 A	RECEPTACLES CLASSROOM 2052	34
35	RECEPTACLES CLASSROOM 2052	20 A	1			0,72	0,72	1	20 A	RECEPTACLES CLASSROOM 2052	36
37	RECEPTACLES CLASSROOM 2051	20 A	1	0,54	0,72			1	20 A	RECEPTACLES CLASSROOM 2051	38
39	RECEPTACLES CLASSROOM 2051	20 A	1		0,72	0,90		1	20 A	RECEPTACLES SCIENCE 2050	40
41	RECEPTACLES SCIENCE 2050	20 A	1			0,54	0,90	1	20 A	RECEPTACLES SCIENCE 2050	42
43					0,90			1	20 A	RECEPTACLES SCIENCE 2048	44
45	RECEPTACLES SCIENCE 2048	20 A	1		0,54	0,90		1	20 A	RECEPTACLES SCIENCE 2048	46
47							0,54	1	20 A	RECEPTACLES CLASSROOM 2047	48
49	RECEPTACLES CLASSROOM 2047	20 A	1	0,90	0,54			1	20 A	RECEPTACLES CLASSROOM 2047	50
51	RECEPTACLES CLASSROOM 2046	20 A	1		0,54	0,90		1	20 A	RECEPTACLES CLASSROOM 2046	52
53	RECEPTACLES CLASSROOM 2046	20 A	1			0,54	0,90	1	20 A	RECEPTACLES COMMONS 2045	54
55	RECEPTACLES/FL BOX COMMONS...	20 A	1	0,90	0,54			1	20 A	RECEPTACLES CORRIDOR 2054	56
57	*EWC RECEPTACLE CORRIDOR 2054	20 A	1		0,18	0,18		1	20 A	*EWC RECEPTACLE CORRIDOR 2054	58
59	EXTERIOR RECEPTACLE	20 A	1			0,18	0,18	1	20 A	RECEPTACLE ELEC 2056	60
61	RECEPTACLES PREP 2049	20 A	1	0,54	0,18			1	20 A	RECEPTACLE STAFF TLT 2057	62
63	RECEPTACLE CUSTODIAL 2058	20 A	1		0,18	0,18		1	20 A	RECEPTACLE STAFF TLT 2059	64
65	RECEPTACLE B TLT 2055	20 A	1			0,18	0,18	1	20 A	*REFRIGERATOR PREP 2049	66
67	*DISHWASHER PREP 2049	20 A	1	0,18	0,72			1	20 A	RECEPTACLES COMMONS 2053	68
69	RECEPTACLES/FL BOX COMMONS...	20 A	1		1,08	0,18		1	20 A	RECEPTACLE G TLT 2061	70
71	*SPARE	20 A	1				0,00	0,18	1	20 A	EXTERIOR RECEPTACLE	72
73	*SPARE	20 A	1	0,00	0,00					1	20 A	SPARE	74
75	SPARE	20 A	1		0,00	0,00				1	20 A	SPARE	76
77	SPARE	20 A	1				0,00	0,00	2	20 A	SPARE	78
79	SPARE	20 A	1	0,00	0,00					--	--	--	80
81													82
83													84
			Phase Load:	15,12 kVA	13,86 kVA	11,70 kVA							
			Phase..	126,8 A	116,3 A	97,5 A							
			Total Load:	40,68 kVA									
Notes:			Total Amps:	112,97 A									
*PROVIDE GFCI CIRCUIT BREAKER													

Branch Panel: GP2E

Location: ELEC 2097 | Volts: 120/208 Wye | A.I.C. Rating: 10k AIC
Supply From: T-GP/EF | Phases: 3 | Bus Material: CU
Mounting: Surface | Wires: 4 | Bus Rating: 225 A
Enclosure: Type 1 | MCB Rating / MLO: 200A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	RECEPTACLES CLASSROOM 2084	20 A	1	0,54	0,54		1	20 A	RECEPTACLES CLASSROOM 2084	2
3	RECEPTACLES CLASSROOM 2084	20 A	1		0,90	0,90	1	20 A	RECEPTACLES CLASSROOM 2083	4
5	RECEPTACLES CLASSROOM 2083	20 A	1				0,54	0,54	1	20 A	RECEPTACLES CLASSROOM 2083	6
7	RECEPTACLES SCIENCE 2085	20 A	1	0,90	0,90				1	20 A	RECEPTACLES SCIENCE 2085	8
9	RECEPTACLES SCIENCE 2085	20 A	1			0,72							10
11	RECEPTACLES SCIENCE 2087	20 A	1				0,72	0,90	1	20 A	RECEPTACLES SCIENCE 2087	12
13	RECEPTACLES SCIENCE 2087	20 A	1	0,90									14
15	RECEPTACLES CLASSROOM 2088	20 A	1		0,54	0,72			1	20 A	RECEPTACLES CLASSROOM 2088	16
17	RECEPTACLES CLASSROOM 2088	20 A	1				0,90	0,54	1	20 A	RECEPTACLES CLASSROOM 2089	18
19	RECEPTACLES CLASSROOM 2089	20 A	1	0,72	0,90				1	20 A	RECEPTACLES CLASSROOM 2089	20
21	RECEPTACLES W.L. CLASSROOM 2075	20 A	1		0,54	0,90			1	20 A	RECEPTACLES W.L. CLASSROOM 2075	22
23	RECEPTACLES W.L. CLASSROOM 2075	20 A	1				0,54	0,54	1	20 A	RECEPTACLES CLASSROOM 2076	24
25	RECEPTACLES CLASSROOM 2076	20 A	1	0,90	0,54				1	20 A	RECEPTACLES CLASSROOM 2076	26
27	RECEPTACLES CLASSROOM 2077	20 A	1		0,54	0,90			1	20 A	RECEPTACLES CLASSROOM 2077	28
29	RECEPTACLES CLASSROOM 2077	20 A	1				0,54	0,54	1	20 A	RECEPTACLES SPED RES, 2078	30
31	RECEPTACLES SPED RES, 2078	20 A	1	0,72	0,72				1	20 A	RECEPTACLES SPED RES, 2078	32
33	RECEPTACLES SPED RES, 2079	20 A	1		0,54	0,72			1	20 A	RECEPTACLES SPED RES, 2079	34
35	RECEPTACLES SPED RES, 2079	20 A	1				0,72	0,54	1	20 A	RECEPTACLES CLASSROOM 2080	36
37	RECEPTACLES CLASSROOM 2080	20 A	1	0,54	0,90				1	20 A	RECEPTACLES CLASSROOM 2080	38
39	RECEPTACLES CLASSROOM 2081	20 A	1		0,54	0,54			1	20 A	RECEPTACLES CLASSROOM 2081	40
41	RECEPTACLES CLASSROOM 2081	20 A	1				0,90	0,90	1	20 A	RECEPTACLES, FAC/ACAD, STORAGE 2072	42
43	COPIER IN FAC/ACAD, STORAGE 2072	20 A	1	0,18	0,18				1	20 A	*FRIDGE IN FAC/ACAD, STORAGE 2072	44
45	RECEPTACLES/FL BOX COMMONS...	20 A	1			1,08	0,72		1	20 A	RECEPTACLES COMMONS 2090	46
47	RECEPTACLES CORRIDOR 2091	20 A	1					0,54	0,18	1	20 A	*EWC RECEPTACLE CORRIDOR 2091	48
49	*EWC RECEPTACLE CORRIDOR 2091	20 A	1	0,18	0,18					1	20 A	EXTERIOR RECEPTACLE	50
51	RECEPTACLE ELEC, 2093	20 A	1			0,18	0,18			1	20 A	RECEPTACLE B TLT 2092	52
53	RECEPTACLE STAFF TLT 2094	20 A	1					0,18	0,18	1	20 A	RECEPTACLE CUSTODIAL 2095	54
55	RECEPTACLE STAFF TLT 2096	20 A	1	0,18	0,18					1	20 A	RECEPTACLE G TLT 2098	56
57	RECEPTACLES PREP 2098	20 A	1			0,54	0,18			1	20 A	*DISHWASHER PREP 2096	58
59	*REFRIGERATOR PREP 2096	20 A	1					0,18	0,90	1	20 A	RECEPTACLES/FL BOX COMMONS...	60
61	RECEPTACLES COMMONS 2082	20 A	1	0,54	0,72					1	20 A	RECEPTACLES COMMONS 2082	62
63	RECEPTACLES SPEECH LANG. 2073	20 A	1			0,72	0,90			1	20 A	RECEPTACLES SPEECH LANG. 2073	64
65	RECEPTACLES SPED RES, 2074	20 A	1					0,36	0,72	1	20 A	RECEPTACLES SPED RES, 2074	66
67	RECEPTACLES SPED RES, 2074	20 A	1	0,90	0,00					1	20 A	SPARE	68
69	SPARE	20 A	1			0,00	0,00			1	20 A	SPARE	70
71	SPARE	20 A	1				0,00	0,00	1	20 A	SPARE	72
73	SPARE	20 A	1	0,00	0,00					1	20 A	SPARE	74
75													76
77													78
79													80
81													82
83													84
			Phase Load:	12,96 kVA	13,50 kVA	12,60 kVA							
			Phase..	108,5 A	113 A	105 A							
			Total Load:	39,06 kVA									
Notes:			Total Amps:	108,42 A									
*PROVIDE GFCI CIRCUIT BREAKER													

Branch Panel: KHP

Location: MECHANICAL 1067 | Volts: 480/277 Wye | A.I.C. Rating: 25k AIC
Supply From: MSB-1 | Phases: 3 | Bus Material: CU
Mounting: Surface | Wires: 4 | Bus Rating: 225 A
Enclosure: Type 1 | MCB Rating / MLO: 200A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	WAREWASHER, RACK CONVEYOR	90 A	3	18,84	16,61		3	150 A	T-KP	2
3	--	--	--			18,84	15,39	--	--	--	4
5	--	--	--					18,84	14,31	--	--	--	6
7													8
9													10
11													12
13													14
15													16
17													18
19													20
21													22
23													24
25													26
27													28
29													30
31													32
33													34
35													36
37													38
39													40
41													42
			Phase Load:	35,44 kVA	34,22 kVA	33,15 kVA							
			Phase..	128,6 A	124,1 A	119,7 A							
			Total Load:	102,81 kVA									
Notes:			Total Amps:	123,67 A									

Branch Panel: KP

Location: MECHANICAL 1067 | Volts: 120/208 Wye | A.I.C. Rating: 22k AIC
Supply From: T-KP | Phases: 3 | Bus Material: CU
Mounting: Surface | Wires: 4 | Bus Rating: 225 A
Enclosure: Type 1 | MCB Rating / MLO: 150 MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	CONV, RECEPTACLE KITCHEN 1085	20 A	1	0,18	0,18		1	20 A	*CONV, RECPT, PREP COUNTER 1085	2
3	*CONV, RECPT, PREP COUNTER 1085	20 A	1		0,18	0,18	1	20 A	*AUTOMATIC SLICER	4
5	*TWENTY QUART MIXER	20 A	1			0,18	0,18	1	20 A	*CONV, RECPT, PREP COUNTER 1085	6
7	*CONV, RECPT, PREP COUNTER 1085	20 A	1	0,18	1,44			1	20 A	*FOOD PROCESSOR	8
9	*CONV, RECPT, PREP COUNTER 1085	20 A	1		0,18	0,18		1	20 A	*WASHING MACHINE KITCHEN 1085	10
11	*DRYER	30 A	2				2,50	1,81	1	20 A	MERCHANDISING DISPLAY WARMERS	12
13	--	--	--	2,50	1,80				2	25 A	*HOT FOOD WELLS	14
15	*REFRIGERATED GRAB & GO CASE	20 A	1			1,84	1,80		--	--	--	16
17	CONV, RECEPT SERV, COUNTER 1085	20 A	1					0,18	0,90	1	20 A	*CONV, RECEPTS, KITCHEN 1085	18
19	FUTURE SERVING COUNTER	20 A	1	0,18	1,66					1	20 A	**MOBILE HOT FOOD CABINET	20
21	**MOBILE HOT FOOD CABINET	20 A	1			1,66	1,66			1	20 A	**MOBILE HOT FOOD CABINET	22
23	CONV, RECEPT SERV, COUNTER 1085	20 A	1					0,18	1,80	2	25 A	*HOT FOOD WELLS	24
25	*UTILITY DISTRIBUTION SYSTEM	50 A	3	4,34	1,80					--	--	--	26
27	--	--	--			4,34	1,38			1	20 A	*ICEMAKER	28
29	--	--	--					4,34	0,50	1	20 A	*WOOD LIGHTS AND VENTILATOR...	30
31	*COLD WELLS	20 A	1	0,46	0,46					1	20 A	*COLD WELLS	32
33	KHEF-1	20 A	3			0,00	0,00			3	20 A	SPARE	34
35	--	--	--					0,00	0,00	--	--	--	36
37	--	--	--	0,00	0,00					--	--	--	38
39	*SPARE	20 A	1			0,00	0,00			1	20 A	*SPARE	40
41	*SPARE	20 A	1					0,00	0,00	1	20 A	*SPARE	42
43	*SPARE	20 A	1	0,00	0,00					1	20 A	*SPARE	44
45	*SPARE	20 A	1			0,00	0,70			1	15 A	DEF-1	46
47	*CONV, RECEPT SERV, COUNTER 1085	20 A	1					0,18	1,20	1	20 A	Other	48
49	SPARE	20 A	1	0,00	1,44					1	20 A	RECEPTACLE, HAYDEN	50
51	SPARE	20 A	1			0,00	1,44			1	20 A	RECEPTACLE, HAYDEN	52
53	SPARE	30 A	2					0,00	0,00	3	20 A	SPARE	54
55	--	--	--	0,00	0,00					--	--	--	56
57	SPARE	30 A	1			0,00	0,00			--	--	--	58
59	FLOOR BOX KITCHEN 1080	20 A	1					0,36	0,00	1	15 A	*CONVECTION OVEN (DOUBLE)	60
61	*CONVECTION OVEN (DOUBLE)	15 A	1	0,00	0,00					1	15 A	**CONVECTION OVEN (DOUBLE)	62
63	*CONVECTION OVEN (DOUBLE)	15 A	1			0,00							64
65													66
67													68
69													70
71													72
73													74
75													76
77													78
79													80
81													82
83													84
			Phase Load:	16,61 kVA	15,39 kVA	14,31 kVA							
			Phase..	139,8 A	129,6 A	119,3 A							
			Total Load:	46,31 kVA									
Notes:			Total Amps:	125,53 A									
*PROVIDE GFCI CIRCUIT BREAKER													

Branch Panel: GP-CL

Location: FAMILY CONSUMER... | Volts: 120/208 Wye | A.I.C. Rating:
Supply From: GP1F | Phases: 3 | Bus Material: CU
Mounting: RECESSED | Wires: 4 | Bus Rating: 225 A
Enclosure: Type 1 | MCB Rating / MLO: 200A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	RANGE HOODS COOKING 1035	20 A	1	0,90	3,95		2	50 A	RANGE COOKING 1035	2
3	RANGE COOKING 1035	50 A	2		3,95	3,95	--	--	--	4
5	--	--	--				3,95	3,95	2	50 A	RANGE COOKING 1035	6
7	RANGE COOKING 1035	50 A	2	3,95	3,95				--	--	--	8
9	--	--	--			3,95	3,95		2	50 A	DEMO RANGE COOKING 1035	10
11	RECEPTACLES COOKING 1035	20 A	1					0,72	3,95	1	--	--	12
13	RECEPTACLES COOKING 1035	20 A	1	0,36	0,72					1	20 A	RECEPTACLES CULINARY 1035	14
15	*DISHWASHER COOKING 1035	20 A	1			0,18	0,72			1	20 A	RECEPTACLES COOKING LAB 1035	16
17	CORD REELS FAM, & CONS, SCI, 1034	20 A	1					0,54	0,54	1	20 A	CORD REELS FAM, & CONS, SCI, 1034	18
19	WASHER FACS 1034	20 A	1	0,18	2,25					2	30 A	DRYER FAM, & CONS, SCI, 1034	20
21	RECEPTS, FAM, & CONS, SCI 1034	20 A	1			1,80	2,25			--	--	--	22
23	*SPARE	20 A	1					0,00	0,00	1	20 A	*SPARE	24
25	*SPARE	20 A	1	0,00	0,00					1	20 A	*SPARE	26
27	RECEPTACLES COOKING 1035	20 A	1			0,36	0,18			1	20 A	TV CULINARY 1035	28
29	RECEPTACLES COOKING 1035	20 A	1					0,18	0,00	1	20 A	SPARE	30
31	SPARE	20 A	1	0,00	0,00					1	20 A	SPARE	32
33	SPARE	20 A	1			0,00	0,90			1	20 A	SPARE	34
35	SPARE	20 A	1					0,00	0,00	1	20 A	SPARE	36
37	SPARE	20 A	1	0,00	0,00					1	20 A	SPARE	38
39	SPARE	20 A	1			0,00	0,00			1	20 A	SPARE	40
41	SPARE	20 A	1					0,00	0,00	1	20 A	SPARE	42
			Phase Load:	18,26 kVA	21,29 kVA	13,83 kVA							
			Phase..	138,6 A	160,5 A	115,3 A							
			Total Load:	51,38 kVA									
Notes:			Total Amps:	142,62 A									
*PROVIDE GFCI CIRCUIT BREAKER													

Branch Panel: GP-WS

Location: ELECT. CLOSET 1029 | Volts: 120/208 Wye | A.I.C. Rating: 10k AIC
Supply From: GP1F | Phases: 3 | Bus Material: CU
Mounting: Surface | Wires: 4 | Bus Rating: 100 A
Enclosure: Type 1 | MCB Rating / MLO: 100A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1

Branch Panel: OSP1A

Location: MECHANICAL 1067 | Volts: 120/208 Wye | A.I.C. Rating: 22k AIC
Supply From: T-OSPA8 | Phases: 3 | Bus Material: CU
Mounting: Surface | Wires: 4 | Bus Rating: 225 A
Enclosure: Type 1 | MCB Rating / MLO: 175 A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	*FRIDGE CUST, OFF/BRK RM 1075	20 A	1	0,18	0,18		1	30 A	AV RACK POWER IN ROOM 1083	2
3	AV RACK POWER IN ROOM 1082	20 A	1			0,18 4,55	3	60 A	OSKP	4
5	CU-3	30 A	2			1,08 3,86	--	--	--	6
7	--	--	--	1,98 3,28			--	--	--	8
9	CONV. RECEPTS, MDF 1068	20 A	1		0,72 0,18		1	15 A	RACK RECEPT, MDF 1068	10
11	IT EQUIPMENT MDF 1068	20 A	1			0,36 2,50	2	30 A	UPS POWER MDF 1068	12
13	IT EQUIPMENT MDF 1068	20 A	1	0,36 2,50			--	--	--	14
15	IT RACK RECEPT, MDF 1068	20 A	1		0,18 0,18		1	20 A	IT EQUIPMENT MDF 1068	16
17	HT-1	30 A	2			2,50 0,18	1	20 A	RECEPT, MAIN ELECTRICAL ROOM,.	18
19	--	--	--	2,50 2,50			2	30 A	UPS POWER MDF 1068	20
21	HT-2	30 A	2		2,50 2,50		--	--	--	22
23	--	--	--			2,50 2,05	2	20 A	ACCU-C, UTILITY COURTYARD	24
25	DOORS 1077,1078,1079,1080A	20 A	1	1,98 1,98			--	--	--	26
27	UNIT HEATERS CUSTODIAL, REC...	15 A	1		0,26 1,98		2	15 A	ACCU-A AREA ROOF	28
29	UNIT HEATERS CUSTODIAL MECH.	15 A	1			1,08 1,98	--	--	--	30
31	EMERGENCY BLUE LIGHT/PHONE	20 A	1	0,18 0,18			1	20 A	FATP-1	32
33	FIRE ALARM PANEL - FACP	20 A	1		0,18 0,00		1	20 A	SPARE	34
35	FIRE ALARM PANEL - FATP/NAC	20 A	1			0,18 0,00	1	20 A	FACP	36
37	ALERTUS SYSTEM	20 A	1	0,18 0,00			1	20 A	SPARE	38
39	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	40
41	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	42
		Phase Load:		17,77 kVA	13,37 kVA	19,10 kVA				
		Phase..		153,7 A	111,4 A	164,8 A				
		Total Load:		50,25 kVA						
Notes:		Total Amps:		139,47 A						

*PROVIDE GFCI CIRCUIT BREAKER

Branch Panel: OSP1B

Location: ELECT. CLOSET 1092 | Volts: 120/208 Wye | A.I.C. Rating:
Supply From: T-OSPA8 | Phases: 3 | Bus Material: CU
Mounting: Surface | Wires: 4 | Bus Rating: 100 A
Enclosure: Type 1 | MCB Rating / MLO: 50A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	*RE FRIGERATOR LAUNDRY/ICE 1088	20 A	1	0,18	1,14		2	30 A	CU-1	2
3	SPARE	20 A	2			0,00 1,14	--	--	--	4
5	--	--	--			0,00 0,18	1	20 A	RECEPTACLE ELECT, CLOSET 1092	6
7	DOORS 1109B, 1109C	20 A	1	0,75 0,00			2	15 A	CF-A	8
9	DOOR OPERATOR VESTIBULE 1102	20 A	1		0,36 0,00		--	--	--	10
11	DOOR OPERATOR PUBLIC LOBBY 1101	20 A	1			0,36 0,00	1	20 A	SPARE	12
13	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	14
15	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	16
17	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	18
19	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	20
21	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	22
23	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	24
25	FCU-D, FITNESS ROOM 1099	20 A	1	0,79 0,00			--	--	--	26
27	FCU-PE OFFICE	20 A	1		1,18 1,18		1	15 A	FCU-PE OFFICE	28
29	FCU PE STORAGE	20 A	1			0,86 0,00	1	15 A	SPARE	30
31	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	32
33	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	34
35	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	36
37	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	38
39	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	40
41	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	42
		Phase Load:		2,75 kVA	3,86 kVA	1,34 kVA				
		Phase..		24,7 A	33,9 A	11,1 A				
		Total Load:		7,86 kVA						
Notes:		Total Amps:		21,81 A						

*PROVIDE GFCI CIRCUIT BREAKER

Branch Panel: OSP1C

Location: MECHANICAL 1060 | Volts: 120/208 Wye | A.I.C. Rating: 10k AIC
Supply From: T-OSPC0 | Phases: 3 | Bus Material: CU
Mounting: Surface | Wires: 4 | Bus Rating: 100 A
Enclosure: Type 1 | MCB Rating / MLO: 50A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	*FRIDGE LIFE SKILLS 1051	20 A	1	0,18	0,18		1	20 A	*FRIDGE MEDIA 1057	2
3	COPIER IT 1058	20 A	1			0,18 0,00	1	15 A	WH-1	4
5	HWPR-1	15 A	1			0,00 0,00	1	15 A	WH-2	6
7	EPO SHUTDOWN CONTACTOR	20 A	1	0,18 0,18			1	20 A	RECEPT, MECHANICAL 1060	8
9	DOORS 1116A, 1116B	20 A	1		1,00 0,15		1	20 A	FATP-2	10
11	DOORS 1117A, 1117B	20 A	1			1,00 0,18	1	20 A	MIXING VALVE TV-1	12
13	BMS CONTROL PANEL	20 A	1	0,18 0,00			1	20 A	SPARE	14
15	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	16
17	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	18
19	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	20
21	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	22
23	SPARE	20 A	1			0,00 0,00	1	30 A	SPARE	24
25	ACCU-D ROOF C	30 A	2	1,98 0,00			1	15 A	B-1	26
27	--	--	--		1,98 0,00		1	15 A	FATP-2	28
29	UNIT HEATERS, MECHANICAL 1060	15 A	1			0,24 0,00	1	15 A	SPARE	30
31	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	32
33	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	34
35	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	36
37	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	38
39	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	40
41	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	42
		Phase Load:		2,88 kVA	3,31 kVA	1,42 kVA				
		Phase..		25,0 A	29,4 A	11,8 A				
		Total Load:		7,60 kVA						
Notes:		Total Amps:		21,1 A						

Branch Panel: OSP1D

Location: ELECT, CLOSET 1106 | Volts: 120/208 Wye | A.I.C. Rating: 10 KAIC
Supply From: T-OSPC0 | Phases: 3 | Bus Material: CU
Mounting: Surface | Wires: 4 | Bus Rating: 100 A
Enclosure: Type 1 | MCB Rating / MLO: 50A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	CU-2	30 A	2	1,14 1,14			1	30 A	CU-2	2
3	--	--	--		1,14 1,14		--	--	--	4
5	SPARE	30 A	1			0,00 0,00	1	20 A	SPARE	6
7	SPARE	30 A	2	0,00 1,18			1	20 A	FCU-B CORRIDOR 1100	8
9	--	--	--		0,00 0,00		1	20 A	SPARE	10
11	RECEPT, ELECT, CLOSET 1106	20 A	1			0,18 0,00	1	20 A	SPARE	12
13	RADON FAN ROOF D	20 A	1	0,50 0,00			1	20 A	SPARE	14
15	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	16
17	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	18
19	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	20
21	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	22
23	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	24
25	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	26
27	FCU-E CORRIDOR 1132	20 A	1		0,05 0,86		1	20 A	FCU-B CORRIDOR 1124	28
29	CU-HR1 CORRIDOR 1132	20 A	1			0,70 1,18	1	20 A	CU-C CORRIDOR 1131	30
31	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	32
33	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	34
35	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	36
37	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	38
39	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	40
41	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	42
		Phase Load:		3,79 kVA	3,07 kVA	1,35 kVA				
		Phase..		33,1 A	27 A	16,2 A				
		Total Load:		8,19 kVA						
Notes:		Total Amps:		74,39 A						

Branch Panel: OSP1E

Location: MECHANICAL 1048 | Volts: 120/208 Wye | A.I.C. Rating: 10k AIC
Supply From: T-OSP8F | Phases: 3 | Bus Material: CU
Mounting: Surface | Wires: 4 | Bus Rating: 225 A
Enclosure: Type 1 | MCB Rating / MLO: 100A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	UH-A1 WOOD SHOP 1039	20 A	1	0,00 0,18			2	20 A	DATA RACK RECEPT, IDF 1046	2
3	DATA RACK RECEPT, IDF 1046	20 A	1		0,18 0,50		1	20 A	RADON FAN ROOF E	4
5	BOA	20 A	1			0,50 0,70	1	15 A	CUH-N CORRIDOR 1050	6
7	RECEPT, MECHANICAL 1048	20 A	1	0,54 1,66			1	20 A	AFUA WOOD SHOP 1039	8
9	FCU WOOD SHOP 1039	20 A	1		1,18 0,36		1	20 A	IT EQUIPMENT IDF 1046	10
11	CUH STAIR NO.1 1S11	15 A	1			0,70 0,72	1	20 A	CONV. RECEPTS, IDF 1046	12
13	UPS POWER IDF 1046	30 A	2	2,50 0,36			1	20 A	IT EQUIPMENT IDF 1046	14
15	--	--	--		2,50 2,50		2	30 A	UPS POWER IDF 1046	16
17	HT-3	20 A	2			1,66 2,50	--	--	--	18
19	--	--	--	1,66 1,98			2	30 A	ACCU-C AREA E ROOF	20
21	DOORS 1041B, 1050A	20 A	1		1,50 1,98		--	--	--	22
23	UNIT HEATERS MECH 1048	15 A	1			0,36 1,98	2	30 A	ACCU-C AREA E ROOF	24
25	SPARE	30 A	2	0,00 1,98			--	--	--	26
27	--	--	--		0,00 1,66		2	30 A	ACCU-C AREA E ROOF	28
29	FATP-3	20 A	1			0,18 1,98	--	--	--	30
31	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	32
33	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	34
35	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	36
37	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	38
39	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	40
41	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	42
		Phase Load:		10,85 kVA	12,45 kVA	11,24 kVA				
		Phase..		90,4 A	104,3 A	94,1 A				
		Total Load:		34,53 kVA						
Notes:		Total Amps:		96,85 A						

Branch Panel: OSP1F

Location: ELECT, CLOSET 1029 | Volts: 120/208 Wye | A.I.C. Rating: 10k AIC
Supply From: T-OSP8F | Phases: 3 | Bus Material: CU
Mounting: Surface | Wires: 4 | Bus Rating: 100 A
Enclosure: Type 1 | MCB Rating / MLO: 50A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	*FRIDGE COOKING 1035	20 A	1	0,18 0,18			1	20 A	*FRIDGE COOKING 1035	2
3	*FRIDGE LAC, 1030	20 A	1		0,18 0,18		1	20 A	*FRIDGE FACULTY 1033	4
5	EF-2	20 A	1			1,20 1,14	1	30 A	ACCU-A ROOF D	6
7	RECEPT ELECT, CLOSET 1029	20 A	1	0,18 1,14			1	20 A	SPARE	8
9	DOOR 1029B	20 A	1		3,33 0,50		1	20 A	RADON FAN D ROOF	10
11	ADA DOOR OPERATORS	20 A	1			1,00 0,18	1	20 A	RECEPTACLE ELEVATOR	12
13	SPARE	20 A	1	0,00 0,20			1	20 A	SPARE	14
15	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	16
17	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	18
19	SPARE	20 A	1	0,00 0,20			1	20 A	SPARE	20
21	ADA DOOR OPERATORS	20 A	1		1,00 0,70		1	15 A	EF-1 ROOF	22
23	CUH, CULINARY	15 A	1			1,18 1,18	1	15 A	CUH CULINARY	24
25	CUH, PASSAGE 1026	20 A	1	0,70 1,18			1	20 A	CUH WOOD SHOP	26
27	FCU-A, WAITING 1002	20 A	1		0,86 1,18		1	20 A	FCU-D, MAIN CONCOURSE 1001	28
29	CUH, ENTRY VESTIBULE 1000	15 A	1			0,70 0,86	1	20 A	FCU, MAIL 1004	30
31	SPARE	20 A	1	0,00 0,20			1	20 A	SPARE	32
33	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	34
35	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	36
37	SPARE	20 A	1	0,00 0,20			1	20 A	SPARE	38
39	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	40
41	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	42
		Phase Load:		3,39 kVA	7,07 kVA	7,06 kVA				
		Phase..		28,3 A	59,2 A	63,5 A				
		Total Load:		18,05 kVA						
Notes:		Total Amps:		50,89 A						

Branch Panel: OSP2A

Location: ELEC 2022 | Volts: 120/208 Wye | A.I.C. Rating: 10k AIC
Supply From: T-OSPA8 | Phases: 3 | Bus Material: CU
Mounting: Surface | Wires: 4 | Bus Rating: 100 A
Enclosure: Type 1 | MCB Rating / MLO: 50A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	SPARE	30 A	2	0,00 0,00			2	30 A	SPARE	2
3	--	--	--		0,00 0,00		--	--	--	4
5	SPARE	30 A	1			0,00 0,18	1	20 A	RECEPTACLE ELEC 2026	6
7	RADON FANS ROOF A	20 A	1	0,50 0,72			1	20 A	MOTORIZED DAMPERS AREA A	8
9	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	10
11	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	12
13	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	14
15	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	16
17	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	18
19	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	20
21	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	22
23	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	24
25	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	26
27	SPARE	15 A	1		0,00 0,00		1	15 A	SPARE	28
29	SPARE	15 A	1			0,00 0,00	1	15 A	SPARE	30
31	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	32
33	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	34
35	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	36
37	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	38
39	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	40
41	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	42
		Phase Load:		1,22 kVA	0,00 kVA	3,18 kVA				
		Phase..		10,4 A	0 A	1,7 A				
		Total Load:		1,40 kVA						
Notes:		Total Amps:		3,89 A						

Branch Panel: OSP2C

Location: ELEC 2056 | Volts: 120/208 Wye | A.I.C. Rating: 10k AIC
Supply From: T-OSPC0 | Phases: 3 | Bus Material: CU
Mounting: Surface | Wires: 4 | Bus Rating: 100 A
Enclosure: Type 1 | MCB Rating / MLO: 50A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	SPARE	30 A	2	0,00 0,00			2	30 A	SPARE	2
3	--	--	--		0,00 0,00		--	--	--	4
5	SPARE	30 A	1			0,00 0,18	1	20 A	RECEPTACLE ELEC 2060	6
7	RADON FANS ROOF C	20 A	1	0,50 0,66			1	20 A	DOORS 2000A, 2000B	8
9	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	10
11	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	12
13	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	14
15	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	16
17	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	18
19	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	20
21	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	22
23	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	24
25	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	26
27	CUH VESTIBULE 2000	20 A	1		0,70 0,00		1	15 A	SPARE	28
29	MOTORIZED DAMPERS AREA C	20 A	1			0,36 0,00	1	15 A	SPARE	30
31	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	32
33	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	34
35	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	36
37	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	38
39	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	40
41	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	42
		Phase Load:		7,16 kVA	0,70 kVA	0,54 kVA				
		Phase..		59,8 A	6 A	4,5 A				
		Total Load:		8,39 kVA						
Notes:		Total Amps:		23,26 A						

Branch Panel: OSP2E

Location: ELEC 2093 | Volts: 120/208 Wye | A.I.C. Rating: 10k AIC
Supply From: T-OSP8F | Phases: 3 | Bus Material: CU
Mounting: Surface | Wires: 4 | Bus Rating: 100 A
Enclosure: Type 1 | MCB Rating / MLO: 50A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	SPARE	30 A	2	0,00 0,00			2	30 A	SPARE	2
3	--	--	--		0,00 0,00		--	--	--	4
5	RECEPTACLE ELEC, 2097	20 A	1			0,18 0,72	1	20 A	MOTORIZED DAMPERS AREA E	6
7	DOORS 2070A, 2070B	20 A	1	6,66 0,00			1	20 A	SPARE	8
9	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	10
11	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	12
13	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	14
15	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	16
17	FCU VESTIBULE 2070	20 A	1			0,70 0,00	1	15 A	SPARE	18
19	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	20
21	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	22
23	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	24
25	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	26
27	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	28
29	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	30
31	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	32
33	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	34
35	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	36
37	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	38
39	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	40
41	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	42
		Phase Load:		6,66 kVA	0,00 kVA	1,60 kVA				
		Phase..		57,5 A	0 A	15,3 A				
		Total Load:		8,25 kVA						
Notes:		Total Amps:		22,91 A						

Branch Panel: OSKP

Location: MECHANICAL 1067 | Volts: 120/208 Wye | A.I.C. Rating: 22k AIC
Supply From: OSP1A | Phases: 3 | Bus Material: CU
Mounting: Surface | Wires: 4 | Bus Rating: 225 A
Enclosure: Type 1 | MCB Rating / MLO: 60A MLO

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	*COOLER CONDENSING UNIT	15 A	3	0,57 1,05			3	15 A	FREEZER CONDENSING UNIT	2
3	--	--	--		0,57 1,05		--	--	--	4
5	--	--	--			0,57 1,05	--	--	--	6
7	FREEZER LIGHTING	20 A	1	1,30 0,18			1	20 A	**FREEZER DRAIN LINE HEAT TRACE	8
9	COOLER EVAPORATOR COIL	15 A	1		0,22 0,95		2	15 A	FREEZER EVAPORATOR COIL	10
11	*PASS-THRU REFRIGERATOR	20 A	1			0,18 0,95	--	--	--	12
13	*PASS-THRU REFRIGERATOR	20 A	1	0,18 1,10			1	20 A	*COOLER LIGHTING	14
15	*NOVELTY ICE CREAM DISP. FREEZER	20 A	1		0,58 0,50		1	20 A	*REFRIGERATED GRAB & GO CASE	16
17	*MILK COOLER	20 A	1			0,36 0,18	1	20 A	*PASS-THRU REFRIGERATOR	18
19	SPARE	20 A	1	0,00 0,18			1	20 A	*WORKTOP GLASS DOOR DISP....	20
21	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	22
23	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	24
25	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	26
27	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	28
29	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	30
31	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	32
33	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	34
35	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	36
37	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	38
39	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	40
41	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	42
		Phase Load:		4,85 kVA	3,85 kVA	3,28 kVA				
		Phase..		36,7 A	32,6 A	27,3 A				
		Total Load:		11,68 kVA						
Notes:		Total Amps:		32,43 A						

*PROVIDE GFCI CIRCUIT BREAKER
**PROVIDE GFPE CIRCUIT BREAKER

Branch Panel: OSDP

Location: MAIN ELECTRICAL ROO... | Volts: 480/277 Wye | A.I.C. Rating: 65k AIC
Supply From: ATS-2 | Phases: 3 | Bus Material:
Mounting: Surface | Wires: 4 | Bus Rating: 400 A
Enclosure: Type 1 | MCB Rating / MLO: 400A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	OSDPC	150 A	3	13,78 20,84			3	150 A	OSDPE	2
3	--	--	--		7,04 20,04		--	--	--	4
5	--	--	--			3,84 19,72	--	--	--	6
7	T-OSPAB	150 A	3	21,70 0,00			3	60 A	SPARE	8
9	--	--	--		17,23 0,00		--	--	--	10
11	--	--	--			20,52 0,00	--	--	--	12
13	JOCKEY PUMP	15 A	3	0,83 0,00			3	60 A	SPARE	14
15	--	--	--		0,83 0,00		--	--	--	16
17	--	--	--			0,83 0,00	--	--	--	18
19										20
21										22
23										24
25										26
27										28

Branch Panel: MP1A

Location: MAIN ELECTRICAL ROO.. | Volts: 480/277 Wye | A.I.C. Rating: 65k AIC
Supply From: MHDP | Phases: 3 | Bus Material: CU
Mounting: Surface | Wires: 4 | Bus Rating: 200 A
Enclosure: Type 1 | MCB Rating / MLO: 200 A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	DOA-4 (SF)	60 A	3	9.35 4.85			3	30 A	DOA-4 (EF)	2
3	–	–	--		9.35 4.85		–	–	--	4
5	–	–	--			9.35 4.85	–	–	--	6
7	DOA-1 (WHEEL)	15 A	3	0,51 0,10			3	15 A	DOA-2 (CDQ)	8
9	–	–	--		0,51 0,10		–	–	--	10
11	–	–	--			0,51 0,10	–	–	--	12
13	SPARE	20 A	3	0,00 0,00			3	20 A	SPARE	14
15	–	–	--		0,00 0,00		–	–	--	16
17	–	–	--			0,00 0,00	–	–	--	18
19	SPARE	20 A	3	0,00 0,00			3	20 A	SPARE	20
21	–	–	--		0,00 0,00		–	–	--	22
23	–	–	--			0,00 0,00	–	–	--	24
25	SPARE	20 A	3	0,00 0,00			3	20 A	SPARE	26
27	–	–	--		0,00 0,00		–	–	--	28
29	–	–	--			0,00 0,00	–	–	--	30
31	SPARE	20 A	3	0,00 0,00			3	30 A	SPARE	32
33	–	–	--		0,00 0,00		–	–	--	34
35	–	–	--			0,00 0,00	–	–	--	36
37	SPARE	20 A	3	0,00 0,00			3	70 A	SPARE	38
39	–	–	--		0,00 0,00		–	–	--	40
41	–	–	--			0,00 0,00	–	–	--	42
43	CHWP-1	15 A	3	1,33 1,33			3	15 A	CHWP-2	44
45	–	–	--		1,33 1,33		–	–	--	46
47	–	–	--			1,33 1,33	–	–	--	48
49	CHWP-3A	40 A	3	5,82 5,82			3	40 A	CHWP-3B	50
51	–	–	--		5,82 5,82		–	–	--	52
53	–	–	--			5,82 5,82	–	–	--	54
55	MCHWP-1A	25 A	3	3,88 3,88			3	25 A	MCHWP-1B	56
57	–	–	--		3,88 3,88		–	–	--	58
59	–	–	--			3,88 3,88	–	–	--	60
		Phase Load:		36,87 kVA	36,87 kVA	36,87 kVA				
		Phase..		153,1 A	153,1 A	153,1 A				
		Total Load:		110,61 kVA						
		Total Amps:		153,04 A						

Notes:

Branch Panel: MP1D

Location: ELECT, CLOSET 1106 | Volts: 480/277 Wye | A.I.C. Rating: 14 KAIC
Supply From: MHDP | Phases: 3 | Bus Material: CU
Mounting: Surface | Wires: 4 | Bus Rating: 225 A
Enclosure: Type 1 | MCB Rating / MLO: 200A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	DOA-5 (SF)	60 A	3	9,35 0,10			3	15 A	DOA-6 (CDQ)	2
3	–	–	--		9,35 0,10		–	–	--	4
5	–	–	--			9,35 0,10	–	–	--	6
7	RTU-2 (SF)	45 A	3	7,27 7,27			3	45 A	RTU-2 (EF)	8
9	–	–	--		7,27 7,27		–	–	--	10
11	–	–	--			7,27 7,27	–	–	--	12
13	RTU-7 (WHEEL)	15 A	3	0,15 4,85			3	30 A	DOA-6 (EF)	14
15	–	–	--		0,15 4,85		–	–	--	16
17	–	–	--			0,15 4,85	–	–	--	18
19	SPARE	20 A	3	0,00 0,51			3	15 A	DOA-5 (WHEEL)	20
21	–	–	--		0,00 0,51		–	–	--	22
23	–	–	--			0,00 0,51	–	–	--	24
25										26
27										28
29										30
31										32
33										34
35										36
37										38
39										40
41										42
		Phase Load:		29,51 kVA	29,51 kVA	29,51 kVA				
		Phase..		106,5 A	106,5 A	106,5 A				
		Total Load:		88,52 kVA						
		Total Amps:		106,47 A						

Notes:

Branch Panel: LP1C

Location: MECHANICAL 1060 | Volts: 480/277 Wye | A.I.C. Rating: 14k AIC
Supply From: LDP | Phases: 3 | Bus Material: CU
Mounting: Surface | Wires: 4 | Bus Rating: 100 A
Enclosure: Type 1 | MCB Rating / MLO: 100A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	LITES 1054-56, 1059, 1061	20 A	1	0,20 0,40			1	20 A	LITES 1062-1066	2
3	LITES 2045, 49, 2053, 55, 57-59, 2061	20 A	1		1,75 2,51		1	20 A	LITES 2062-2065	4
5	LITES 2039-2044	20 A	1			3,06 0,05	1	20 A	LITES CORRIDOR 1115	6
7	LITES 1051, 1052, 1057-58, 1060	20 A	1	0,66 2,51			1	20 A	LITES 2029-2032	8
9	LITES 2S13, 2000, 2001	20 A	1		0,05					10
11										12
13	LITES 2054	20 A	1	0,05						14
15										16
17										18
19										20
21										22
23										24
25										26
27										28
29										30
		Phase Load:		3,62 kVA	4,30 kVA	4,03 kVA				
		Phase..		13,8 A	15,6 A	14,7 A				
		Total Load:		32,13 kVA						
		Total Amps:		14,61 A						

Notes:

Branch Panel: LP1E

Location: MECHANICAL 1048 | Volts: 480/277 Wye | A.I.C. Rating: 14k AIC
Supply From: LDP | Phases: 3 | Bus Material: CU
Mounting: Surface | Wires: 4 | Bus Rating: 225 A
Enclosure: Type 1 | MCB Rating / MLO: 100A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	LITES ADMIN AREA	20 A	1	0,20 0,20			1	20 A	LITES 1013-16, 1011, 1018, 1023	2
3	LITES 2075-2081	20 A	1		3,92 4,38		1	20 A	LITES 2083-2085, 2087-2089	4
5	LITES 2072-2074	20 A	1			1,98 1,75	1	20 A	LITES 2082, 86, 2090, 92, 94-96, 98	6
7	LITES CORRIDOR 1060	20 A	1	0,05 0,20			1	20 A	LITES 1030,31,32,33,34,37,38,40	8
9	LITES 1010a, 1012, 19, 1020, 26	20 A	1		0,80 0,40		1	20 A	LITES 1041,42,43,44,46,48,49	10
11	LITES 2S11, 2S13, 2070, 2071	20 A	1			0,05 0,10	1	20 A	LITES 1031, 1121	12
13	LITES 1028	20 A	1	0,06 0,09			1	20 A	LITES 1ST1, 1047	14
15	LITES 2S11, 2091	20 A	1		0,06 0,50		1	20 A	QC46 SIGNAGE ADMIN EXTERIOR	16
17	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	18
19	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	20
21	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	22
23	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	24
25	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	26
27	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	28
29	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	30
		Phase Load:		0,80 kVA	10,08 kVA	3,77 kVA				
		Phase..		2,9 A	38 A	15,3 A				
		Total Load:		14,64 kVA						
		Total Amps:		17,8 A						

Notes:

Branch Panel: MP1B

Location: ELECT. CLOSET 1092 | Volts: 480/277 Wye | A.I.C. Rating: 14 KAIC
Supply From: MHDP | Phases: 3 | Bus Material: CU
Mounting: Surface | Wires: 4 | Bus Rating: 225 A
Enclosure: Type 1 | MCB Rating / MLO: 200A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	RTU-1 (SF)	30 A	3	4,85 4,85			3	30 A	RTU-3 (SF)	2
3	–	–	--		4,85 4,85		–	–	--	4
5	–	–	--			4,85 4,85	–	–	--	6
7	RTU-1 (EF)	20 A	3	3,81 4,85			3	30 A	RTU-3 (EF)	8
9	–	–	--		3,81 4,85		–	–	--	10
11	–	–	--			3,81 4,85	–	–	--	12
13	RTU-1 (WHEEL)	15 A	3	0,15 0,45			3	15 A	RTU-3 (WHEEL)	14
15	–	–	--		0,15 0,45		–	–	--	16
17	–	–	--			0,15 0,45	–	–	--	18
19	HRV-1	15 A	3	2,69 0,00			3	30 A	SPARE	20
21	–	–	--		2,69 0,00		–	–	--	22
23	–	–	--			2,69 0,00	–	–	--	24
25	SPARE	20 A	3	0,00 0,00			3	15 A	SPARE	26
27	–	–	--		0,00 0,00		–	–	--	28
29	–	–	--			0,00 0,00	–	–	--	30
31										32
33										34
35										36
37										38
39										40
41										42
		Phase Load:		21,64 kVA	21,64 kVA	21,64 kVA				
		Phase..		78,1 A	78,1 A	78,1 A				
		Total Load:		64,93 kVA						
		Total Amps:		78,09 A						

Notes:

Branch Panel: MP1E

Location: MECHANICAL 1048 | Volts: 480/277 Wye | A.I.C. Rating: 14k AIC
Supply From: MHDP | Phases: 3 | Bus Material: CU
Mounting: Surface | Wires: 4 | Bus Rating: 225 A
Enclosure: Type 1 | MCB Rating / MLO: 200A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	DOA-1 (SF)	45 A	3	7,27 3,81			3	30 A	DOA-1 (EF)	2
3	–	–	--		7,27 3,81		–	–	--	4
5	–	–	--			7,27 3,81	–	–	--	6
7	DOA-1 (WHEEL)	15 A	3	0,51 0,10			3	15 A	DOA-1 (CDQ)	8
9	–	–	--		0,51 0,10		–	–	--	10
11	–	–	--			0,51 0,10	–	–	--	12
13	DOA-2 (SF)	60 A	3	9,35 7,27			3	45 A	DOA-2 (EF)	14
15	–	–	--		9,35 7,27		–	–	--	16
17	–	–	--			9,35 7,27	–	–	--	18
19	DOA-2 (WHEEL)	15 A	3	0,51 0,10			3	15 A	DOA-2 (CDQ)	20
21	–	–	--		0,51 0,10		–	–	--	22
23	–	–	--			0,51 0,10	–	–	--	24
25	DC-1	25 A	3	3,88						26
27	–	–	--			3,88				28
29	–	–	--		3,88					30
31										32
33										34
35										36
37										38
39										40
41										42
		Phase Load:		32,81 kVA	32,81 kVA	32,81 kVA				
		Phase..		118,4 A	118,4 A	118,4 A				
		Total Load:		98,42 kVA						
		Total Amps:		118,38 A						

Notes:

Branch Panel: LP1D

Location: ELECT. CLOSET 1106 | Volts: 480/277 Wye | A.I.C. Rating: 14 KAIC
Supply From: LDP | Phases: 3 | Bus Material: CU
Mounting: Surface | Wires: 4 | Bus Rating: 225 A
Enclosure: Type 1 | MCB Rating / MLO: 150A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	LITES 1116-20, 1122, 1123	20 A	1	0,00						2
3	LITES 1103-07, 1109-11, 1113	20 A	1		1,90					4
5	LITES 1124, 1131, 1132	20 A	1			0,05 0,08	1	20 A	LITES 1000, 1001	6
7	SPARE	20 A	1	0,00 6,16			1	20 A	SPARE	8
9	SPARE	20 A	1		0,00 5,34		–	–	--	10
11	SPARE	20 A	1			0,00 6,11	–	–	--	12
13	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	14
15	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	16
17	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	18
19	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	20
21	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	22
23	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	24
25	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	26
27	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	28
29	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	30
31	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	32
33	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	34
35	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	36
37	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	38
39										40
41										42
		Phase Load:		6,16 kVA	6,34 kVA	6,22 kVA				
		Phase..		22,2 A	22,8 A	22,5 A				
		Total Load:		18,72 kVA						
		Total Amps:		22,51 A						

Notes:

Branch Panel: LDP

Location: MAIN ELECTRICAL ROO.. | Volts: 480/277 Wye | A.I.C. Rating: 65k AIC
Supply From: MSB-1 | Phases: 3 | Bus Material: CU
Mounting: Surface | Wires: 4 | Bus Rating: 225 A
Enclosure: Type 1 | MCB Rating / MLO: 200A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	LP1D	150 A	3	6,16 3,82			3	100 A	LP1C	2
3	–	–	--		6,34 4,30		–	–	--	4
5	–	–	--			6,22 4,03	–	–	--	6
7	LP1E	100 A	3	0,80 9,16			3	100 A	LP1B	8
9	–	–	--		10,06 3,76		–	–	--	10
11	–	–	--			3,77 2,32	–	–	--	12
13	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	14
15	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	16
17	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	18
19	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	20
21	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	22
23	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	24
25	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	26
27	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	28
29	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	30
		Phase Load:		19,96 kVA	24,47 kVA	16,34 kVA				
		Phase..		74,1 A	90,9 A	59 A				
		Total Load:		60,76 kVA						
		Total Amps:		73,09 A						

Notes:

Branch Panel: MP1C

Location: MECHANICAL 1060 | Volts: 480/277 Wye | A.I.C. Rating: 14k AIC
Supply From: MHDP | Phases: 3 | Bus Material: CU
Mounting: Surface | Wires: 4 | Bus Rating: 225 A
Enclosure: Type 1 | MCB Rating / MLO: 200A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	DOA-3 (SF)	60 A	3	9,35 7,27			3	30 A	DOA-3 (EF)	2
3	–	–	--		9,35 7,27		–	–	--	4
5	–	–	--			9,35 7,27	–	–	--	6
7	DOA-3 (WHEEL)	15 A	3	0,51 0,10			3	15 A	DOA-3 (CDQ)	8
9	–	–	--		0,51 0,10		–	–	--	10
11	–	–	--			0,51 0,10	–	–	--	12
13	BP-1A	15 A	3	0,58 0,58			3	15 A	BP-1B	14
15	–	–	--		0,58 0,58		–	–	--	16
17	–	–	--			0,58 0,58	–	–	--	18
19	SPARE	60 A	3	0,00 0,00			3	60 A	HWP-1B	20
21	–	–	--		0,00 0,00		–	–	--	22
23	–	–	--			0,00 0,00	–	–	--	24
25	HWP-1	15 A	3	0,83 0,83			3	15 A	HWP-2	26
27	–	–	--		0,83 0,83		–	–	--	28
29	–	–	--			0,83 0,83	–	–	--	30
31	HWP-3A	25 A	3	3,88 3,88			3	25 A	HWP-3B	32
33	–	–	--		3,88 3,88		–	–	--	34
35	–	–	--			3,88 3,88	–	–	--	36
37	SPARE	15 A	3	0,00 0,00			3	15 A	SPARE	38
39	–	–	--		0,00 0,00		–	–	--	40
41	–	–	--			0,00 0,00	–	–	--	42
		Phase Load:		27,82 kVA	27,82 kVA	27,82 kVA				
		Phase..		106,4 A	106,4 A	106,4 A				
		Total Load:		83,45 kVA						
		Total Amps:		100,37 A						

Notes:

Branch Panel: LP1B

Location: ELECT, CLOSET 1092 | Volts: 480/277 Wye | A.I.C. Rating: 14 KAIC
Supply From: LDP | Phases: 3 | Bus Material: CU
Mounting: Surface | Wires: 4 | Bus Rating: 225 A
Enclosure: Type 1 | MCB Rating / MLO: 100A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	LITES 2005-2007, 2009-2011	20 A	1	4,36 3,92			1	20 A	LITES 2013-2015	2
3	LITES 2004, 08, 2012, 2021, 23-25, 27	20 A	1		1,75 0,08		1	20 A	LITES 2S12, CORRIDOR 2020	4
5	LITES 2002, 2003, 2028	20 A	1			1,12 0,80	1	20 A	LITES 1067, 1068, 1071-75, 1077-79	6
7	LITES KITCHEN ZONE A	20 A	1	0,00 0,20			1	20 A	LITES CAFETERIA ZONES B-D	8
9	LITES 1087, 1089-92, 1094-97	20 A	1		1,60 0,18		1	20 A	LITES 1093, 98, 1101, 1108	10
11	LITES GYMNASIUM ZONE A	20 A	1			0,20 0,20	1	20 A	LITES GYMNASIUM ZONE B	12
13	LITES VESTIBULE 1071	20 A	1	0,09 0,40			1	20 A	LITES 1081-1084	14
15	SITE LIGHTING - UNDER CANOPY	20 A	1		0,16 0,00		1	20 A	EQUIPMENT YARD LIGHTING	16
17	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	18
19	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	20
21	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	22
23	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	24
25	SPARE	20 A	1	0,00 0,00			1	20 A	SPARE	26
27	SPARE	20 A	1		0,00 0,00		1	20 A	SPARE	28
29	SPARE	20 A	1			0,00 0,00	1	20 A	SPARE	30
		Phase Load:		9,18 kVA	3,76 kVA	2,32 kVA				
		Phase..		33,9 A	14,4 A	8,4 A				
		Total Load:		15,26 kVA						
		Total Amps:		16,39 A						

Notes:

Branch Panel: MHDP

Location: MAIN ELECTRICAL ROO.. | Volts: 480/277 Wye | A.I.C. Rating: 65k AIC
Supply From: MSB-1 | Phases: 3 | Bus Material:
Mounting: Surface | Wires: 4 | Bus Rating: 1200 A
Enclosure: Type 1 | MCB Rating / MLO: 1200A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	MP1B	200 A	3	21,64 29,51			3	200 A	MP1D	2
3	–	–	--		21,64 29,51		–	–	--	4
5	–	–	--			21,64 29,51	–	–	--	6
7	MP1C	200 A	3	27,82 32,81			3	200 A	MP1E	8
9	–	–	--		27,82 32,81		–	–	--	10
11	–	–	--			27,82 32,81	–	–	--	12
13	MP1A	200 A	3	36,87 0,00			3	200 A	SPARE	14
15	–	–	--		36,87 0,00		–	–	--	16
17	–	–	--			36,87 0,00	–	–	--	18
19										20
21										22
23										24
25										26
27										28
29										30
31										32
33										34
35										36
37										38
39										40
41										42
43										44
45										46
47										48
49										50
51										52
53										54
55										56
57										58
59										60
		Phase Load:		148,64 kVA	148,64 kVA	148,64 kVA				
		Phase..		536,6 A	536,6 A	536,6 A				
		Total Load:		445,92 kVA						
		Total Amps:		536,36 A						

Notes:

SLAM
The S:L:A:M Collaborative
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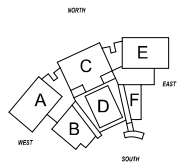
Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane,
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ELECTRICAL PANEL SCHEDULES

Drawn: KCM
Checked: SJM

Date: 07/08/2024
Scale:
Proj. Number: 22367.00
Drawing Number: E605

Autodesk Docs://22367.00 - Greenwich Central Middle School/22367.00-MEP Central - Greenwich Central Middle School.rvt
9/26/2024 11:38:26 AM

Branch Panel: ELDP

Location: EMERG. ELEC 1070 | **Supply From:** ATS-1 | **Mounting:** Surface | **Enclosure:** Type 1
Volts: 480/277 Wye | **Phases:** 3 | **Wires:** 4
A.I.C. Rating: 65k AIC | **Bus Material:** CU | **Bus Rating:** 125 A | **MCB Rating / MLO:** 100A FUSED MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	ELP1B	50 A	3	2,69 / 1,42			3	50 A	ELP1C	2
3	--	--	--		1,10 / 1,44		--	--	--	4
5	--	--	--			0,46 / 4,52	--	--	--	6
7	ELP1D	50 A	3	1,05 / 0,71			3	50 A	ELP1E	8
9	--	--	--		0,03 / 1,31		--	--	--	10
11	--	--	--			0,00 / 0,54	--	--	--	12
13	SPARE	50 A	3	0,00						14
15	--	--	--		0,00					16
17	--	--	--			0,00				18
19										20
21										22
23										24
25										26
27										28
29										30
31										32
33										34
35										36
37										38
39										40
41										42

	A	B	C
Phase Load:	5,27 kVA	3,88 kVA	5,52 kVA
Phase..	22,1 A	14 A	20,9 A
Total Load:	15,27 kVA		
Total Amps:	18,37 A		

Notes: PROVIDE FUSIBLE PANELBOARD WITH FUSED SWITCHES AS OVERCURRENT PROTECTION DEVICES

Branch Panel: ELP1B

Location: ELECT. CLOSET 1092 | **Supply From:** ELDP | **Mounting:** Surface | **Enclosure:** Type 1
Volts: 480/277 Wye | **Phases:** 3 | **Wires:** 4
A.I.C. Rating: 14 KAIC | **Bus Material:** CU | **Bus Rating:** 225 A | **MCB Rating / MLO:** 50A FUSE MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	LITES 2037, 2009	20 A	1	0,42 / 0,42			1	20 A	LITES 2004, 2008, 2012, 2021, 23, 25, 27	2
3	SITE LIGHTING - UNDER CANOPY	20 A	1		0,05 / 0,60		1	20 A	LITES 1067, 1068, 1071-75, 1079	4
5	LITES KITCHEN ZONE A	20 A	1			0,20 / 0,20	1	20 A	LITES CAFETERIA ZONES B-D	6
7	LITES 1089-92, 1094-97, 1089	20 A	1	1,60 / 0,21			1	20 A	LITES 1083, 1098, 1101, 1102, 1108	8
9	LITES GYMNASIUM ZONE A	20 A	1		0,20 / 0,20		1	20 A	LITES GYMNASIUM ZONE B	10
11	LITES 1ST2, VESTIBULE 1071	20 A	1			0,06 / 0,00	1	20 A	LITES MECHANICAL 1087	12
13	LITES 2ST2, CORRIDOR 2020	20 A	1	0,05 / 0,00			1	20 A	LITES 1081, 1083	14
15	SITE LIGHTING - UNDER CANOPY	20 A	1		0,05 / 0,00		1	20 A	BLDG MOUNTED WALLPACKS	16
17										18
19										20
21										22
23										24
25										26
27										28
29										30
31										32
33										34
35										36
37										38
39										40
41										42

	A	B	C
Phase Load:	2,69 kVA	1,10 kVA	0,46 kVA
Phase..	10,1 A	4,3 A	1,7 A
Total Load:	4,25 kVA		
Total Amps:	5,11 A		

Notes: FUSIBLE PANELBOARD
PROVIDE FUSIBLE PANELBOARD WITH FUSED SWITCHES AS OVERCURRENT PROTECTION DEVICES

Branch Panel: ELP1C

Location: MECHANICAL 1060 | **Supply From:** ELDP | **Mounting:** Surface | **Enclosure:** Type 1
Volts: 480/277 Wye | **Phases:** 3 | **Wires:** 4
A.I.C. Rating: 14k AIC | **Bus Material:** CU | **Bus Rating:** 225 A | **MCB Rating / MLO:** 50A FUSE MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	LITES ROOMS 2048, 2050	20 A	1	0,42 / 0,40			1	20 A	LITES 2030,2031	2
3	LITES 2045, 2046, 2053, 55, 57, 59, 2061	20 A	1		0,42 / 0,40		1	20 A	LITES 2064, 2065	4
5	LITES 2ST3, 2000, 2001	20 A	1			0,08 / 4,36	1	20 A	LITES 2046-2048, 2060-2062	6
7	LITES 1059, 1061, 1063, 1064	20 A	1	0,40 / 0,20			1	20 A	LITES 1051-56	8
9	LITES 1051, 1052, 1053-58, 1060	20 A	1		0,40 / 0,05		1	20 A	LITES 2054	10
11	LITES UNDER CANOPY AREA A/C	20 A	1			0,94 / 0,94	1	20 A	LITES UNDER CANOPY AREA C/E	12
13	LITES COURTYARD 1116	20 A	1	0,00 / 0,00			1	20 A	LITES COURTYARD 1117	14
15	LITES 1059, 1061	20 A	1		0,12 / 0,05		1	20 A	LITES 1115	16
17										18
19										20
21										22
23										24
25										26
27										28
29										30
31										32
33										34
35										36
37										38
39										40
41										42

	A	B	C
Phase Load:	1,42 kVA	1,44 kVA	4,52 kVA
Phase..	5,1 A	5,2 A	16,3 A
Total Load:	7,38 kVA		
Total Amps:	9,87 A		

Notes: FUSIBLE PANELBOARD
PROVIDE FUSIBLE PANELBOARD WITH FUSED SWITCHES AS OVERCURRENT PROTECTION DEVICES

Branch Panel: ELP1D

Location: ELECT. CLOSET 1106 | **Supply From:** ELDP | **Mounting:** Surface | **Enclosure:** Type 1
Volts: 480/277 Wye | **Phases:** 3 | **Wires:** 4
A.I.C. Rating: 14 KAIC | **Bus Material:** CU | **Bus Rating:** 225 A | **MCB Rating / MLO:** 50A FUSE MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	LITES 1102-08, 1109-10	20 A	1	1,00 / 0,05			1	20 A	LITES 1124, 1131, 1132	2
3	LITES 1000, 1001	20 A	1		0,03 /					4
5	SPARE	20 A	1			0,00 / 0,00	1	20 A	SPARE	6
7	SPARE	20 A	1	0,00 / 0,00			1	20 A	SPARE	8
9	SPARE	20 A	1		0,00 / 0,00		1	20 A	SPARE	10
11	SPARE	20 A	1			0,00 / 0,00	1	20 A	SPARE	12
13	SPARE	20 A	1	0,00 / 0,00			1	20 A	SPARE	14
15	SPARE	20 A	1		0,00 / 0,00		1	20 A	SPARE	16
17										18
19										20
21										22
23										24
25										26
27										28
29										30
31										32
33										34
35										36
37										38
39										40
41										42

	A	B	C
Phase Load:	1,25 kVA	0,03 kVA	0,03 kVA
Phase..	3,8 A	0,1 A	0 A
Total Load:	1,28 kVA		
Total Amps:	1,3 A		

Notes: FUSIBLE PANELBOARD
PROVIDE FUSIBLE PANELBOARD WITH FUSED SWITCHES AS OVERCURRENT PROTECTION DEVICES

Branch Panel: ELP1E

Location: MECHANICAL 1048 | **Supply From:** ELDP | **Mounting:** Surface | **Enclosure:** Type 1
Volts: 480/277 Wye | **Phases:** 3 | **Wires:** 4
A.I.C. Rating: 14k AIC | **Bus Material:** CU | **Bus Rating:** 225 A | **MCB Rating / MLO:** 50A FUSE MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	LITES ADMIN AREA	20 A	1	0,20 / 0,20			1	20 A	LITES 1013-16, 1011, 1018, 1023	2
3	LITES ROOMS 2085, 2087	20 A	1		0,42 / 0,05		1	20 A	LITES 2ST1, 2ST3, 2070, 2071	4
5	LITES COMMONS 2082	20 A	1			0,23 / 0,70	1	20 A	LITES 1ST1, 1041,42,43,44,46,48,49	6
7	LITES 1030,31,32,33,34,36,40	20 A	1	0,20 / 0,05			1	20 A	LITES 1061, 1121	8
9	LITES 1010a,12,18,19,20,26,27	20 A	1		0,80 / 0,05		1	20 A	LITES CORRIDOR 1050	10
11	LITES 1ST1, 1047	20 A	1			0,03 / 0,08	1	20 A	LITES 2ST1, 2091	12
13	LITES 1115-20, 1122, 1123	20 A	1	0,30 / 0,06			1	20 A	LITES 1029	14
15	DISC-ELEV-01 CABLIGHT	20 A	1		0,00 / 0,00		1	20 A	SPARE	16
17	SPARE	20 A	1			0,00 / 0,00	1	20 A	SPARE	18
19	SPARE	20 A	1	0,00 / 0,00			1	20 A	SPARE	20
21										22
23										24
25										26
27										28
29										30
31										32
33										34
35										36
37										38
39										40
41										42

	A	B	C
Phase Load:	0,71 kVA	1,31 kVA	0,54 kVA
Phase..	2,7 A	4,8 A	2 A
Total Load:	2,56 kVA		
Total Amps:	3,28 A		

Notes: FUSIBLE PANELBOARD
PROVIDE FUSIBLE PANELBOARD WITH FUSED SWITCHES AS OVERCURRENT PROTECTION DEVICES

Branch Panel: TLCP-1

Location: ELECT. CLOSET 1106 | **Supply From:** T-TCLP-1 | **Mounting:** Surface | **Enclosure:** Type 1
Volts: 120/208 Wye | **Phases:** 3 | **Wires:** 4
A.I.C. Rating: | **Bus Material:** CU | **Bus Rating:** 225 A | **MCB Rating / MLO:** 100A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	TH, LIGHTING FOH ELECTRIC	20 A	1	0,50 / 0,50			1	20 A	TH, LIGHTING FOH ELECTRIC	2
3	TH, LIGHTING FOH ELECTRIC	20 A	1		0,50 / 0,50		1	20 A	TH, LIGHTING FOH ELECTRIC	4
5	TH, LIGHTING FOH ELECTRIC	20 A	1			0,50 / 0,50	1	20 A	TH, LIGHTING FOH ELECTRIC	6
7	W.ORKLIGHTS FOH ELECTRIC	20 A	1	0,50 / 0,50			1	20 A	TH, LIGHTING FIRST ELECTRIC	8
9	TH, LIGHTING FIRST ELECTRIC	20 A	1		0,50 / 0,50		1	20 A	TH, LIGHTING FIRST ELECTRIC	10
11	TH, LIGHTING FIRST ELECTRIC	20 A	1			0,50 / 0,50	1	20 A	TH, LIGHTING FIRST ELECTRIC	12
13	TH, LIGHTING FIRST ELECTRIC	20 A	1	0,00 / 0,00			1	20 A	W.ORKLIGHTS FIRST ELECTRIC	14
15	TH, LIGHTING SECOND ELECTRIC	20 A	1		0,50 / 0,50		1	20 A	TH, LIGHTING SECOND ELECTRIC	16
17	TH, LIGHTING SECOND ELECTRIC	20 A	1			0,50 / 0,50	1	20 A	TH, LIGHTING SECOND ELECTRIC	18
19	TH, LIGHTING SECOND ELECTRIC	20 A	1	0,50 / 0,50			1	20 A	W.ORKLIGHTS SECOND ELECTRIC	20
21	SPARE	20 A	1		0,00 / 0,50		1	20 A	TH, LIGHTING THIRD ELECTRIC	22
23	TH, LIGHTING THIRD ELECTRIC	20 A	1			0,50 / 0,50	1	20 A	TH, LIGHTING THIRD ELECTRIC	24
25	TH, LIGHTING THIRD ELECTRIC	20 A	1	0,50 / 0,50			1	20 A	TH, LIGHTING THIRD ELECTRIC	26
27	W.ORKLIGHTS THIRD ELECTRIC	20 A	1		0,50 / 0,00		1	20 A	SPARE	28
29	TH, LIGHTING FOURTH STAGE PIPE	20 A	1			0,50 / 0,50	1	20 A	TH, LIGHTING FOURTH STAGE PIPE	30
31	TH, LIGHTING FOURTH STAGE PIPE	20 A	1	0,50 / 0,50			1	20 A	TH, LIGHTING FOURTH STAGE PIPE	32
33	TH, LIGHTING FOURTH STAGE PIPE	20 A	1		0,50 / 0,50		1	20 A	W.ORKLIGHTS FOURTH STAGE PIPE	34
35	LITES 1125, 1126, 1128, 1129	20 A	1			0,00 / 0,19	1	20 A	TH, LIGHTING DOWNSTAGE APRON	36
37	HOUSE LIGHTS NORMAL POWER	20 A	1	0,06 / 0,06			1	20 A	HOUSE LIGHTS NORMAL POWER	38
39	HOUSE LIGHTS NORMEMA POWER	20 A	1		0,00 / 0,03		1	20 A	WALL LIGHTS FRONT HOUSE RIGHT	40
41	WALL LIGHTS REAR HOUSE RIGHT	20 A	1			0,03 / 0,03	1	20 A	WALL LIGHTS FRONT HOUSE LEFT	42
43	WALL LIGHTS REAR HOUSE LEFT	20 A	1	0,03 / 0,00			1	20 A	SPARE	44
45	AISLE LTG HOUSE CENTER-RIGHT	20 A	1		0,16 / 0,16		1	20 A	AISLE LTG HOUSE CENTER-LEFT	46
47	EQUIPMENT RACK - IN ROOM 1113	20 A	1			0,36 / 0,50	1	20 A	PB-CA AT CONTROL DESK	48

	A	B	C
Phase Load:	6,16 kVA	5,34 kVA	6,11 kVA
Phase..	52,3 A	44,5 A	51,9 A
Total Load:	17,61 kVA		
Total Amps:	48,87 A		

Notes:

Branch Panel: EVHP

Location: EXTERIOR | **Supply From:** MSB-1 | **Mounting:** Surface | **Enclosure:** Type 1
Volts: 480/277 Wye | **Phases:** 3 | **Wires:** 4
A.I.C. Rating: 25 KAIC | **Bus Material:** CU | **Bus Rating:** 400 A | **MCB Rating / MLO:** 400A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	T-EVLP	400 A	3	72,00						2
3	--	--	--		72,00					4
5	--	--	--			64,80				6
7										8
9										10
11										12
13										14
15										16
17										18
19										20
21										22
23										24
25										26
27										28
29										30
31										32
33										34
35										36
37										38
39										40
41										42

	A	B	C
Phase Load:	72,00 kVA	72,00 kVA	64,80 kVA
Phase..	263,9 A	263,9 A	233,9 A
Total Load:	205,93 kVA		
Total Amps:	251,15 A		

Notes:

Branch Panel: EVLP1

Location: EXTERIOR | **Supply From:** T-EVLP | **Mounting:** Surface | **Enclosure:** Type 1
Volts: 120/208 Wye | **Phases:** 3 | **Wires:** 4
A.I.C. Rating: 22 KAIC | **Bus Material:** CU | **Bus Rating:** 400 A | **MCB Rating / MLO:** 400A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	SITE CAMERAS	20 A	1	0,00 / 0,00			1	20 A	SITE CAMERAS	2
3	EV CHARGERS	40 A	2		3,60 / 3,60		2	40 A	EV CHARGERS	4
5	--	--	--			3,60 / 3,60	--	--	--	6
7	EV CHARGERS	40 A	2	3,60 / 3,60			2	40 A	EV CHARGERS	8
9	--	--	--		3,60 / 3,60		--	--	--	10
11	EV CHARGERS	40 A	2			3,60 / 3,60	2	40 A	EV CHARGERS	12
13	--	--	--	3,60 / 3,60			--	--	--	14
15	EV CHARGERS	40 A	2		3,60 / 3,60		2	40 A	EV CHARGERS	16
17	--	--	--			3,60 / 3,60	--	--	--	18
19	EV CHARGERS	40 A	2	3,60 / 3,60			2	40 A	EV CHARGERS	20
21	--	--	--		3,60 / 3,60		--	--	--	22
23	EV CHARGERS	40 A	2			3,60 / 3,60	2	40 A	EV CHARGERS	24
25	--	--	--	3,60 / 3,60			--	--	--	26
27	EV CHARGERS	40 A	2		3,60 / 3,60		2	40 A	EV CHARGERS	28
29	--	--	--			3,60 / 3,60	--	--	--	30
31	EV CHARGERS	40 A	2	3,60 / 3,60			2	40 A	SPARE	32
33	--	--	--		0,00 / 0,00		--	--	--	34
35	SPARE	40 A	2			0,00 / 0,00	2	40 A	SPARE	36
37	--	--	--	0,00 / 0,00			--	--	--	38
39	SPARE	40 A	2		0,00 / 0,00		2	40 A	SPARE	40
41	--	--	--			0,00 / 0,00	--	--	--	42

	A	B	C
Phase Load:	36,00 kVA	36,00 kVA	36,00 kVA
Phase..	300 A	300 A	300 A
Total Load:	108,00 kVA		
Total Amps:	299,78 A		

Notes:

Branch Panel: EVLP2

Location: EXTERIOR | **Supply From:** T-EVLP | **Mounting:** Surface | **Enclosure:** Type 1
Volts: 120/208 Wye | **Phases:** 3 | **Wires:** 4
A.I.C. Rating: 22 KAIC | **Bus Material:** CU | **Bus Rating:** 400 A | **MCB Rating / MLO:** 400A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	EV CHARGERS	40 A	2	3,60 / 3,60			2	40 A	EV CHARGERS	2
3	--	--	--		3,60 / 3,60		--	--	--	4
5	EV CHARGERS	40 A	2			3,60 / 3,60	2	40 A	EV CHARGERS	6
7	--	--	--	3,60 / 3,60			--	--	--	8
9	EV CHARGERS	40 A	2		3,60 / 3,60		2	40 A	EV CHARGERS	10
11	--	--	--			3,60 / 3,60	--	--	--	12
13	EV CHARGERS	40 A	2	3,60 / 3,60			2	40 A	EV CHARGERS	14
15	--	--	--		3,60 / 3,60		--	--	--	16
17	EV CHARGERS	40 A	2			3,60 / 3,60	2	40 A	EV CHARGERS	18
19	--	--	--	3,60 / 3,60			--	--	--	20
21	EV CHARGERS	40 A	2		3,60 / 3,60		2	40 A	EV CHARGERS	22
23	--	--	--			3,60 / 3,60	--	--	--	24
25	EV CHARGERS	40 A	2	3,60 / 3,60			2	40 A	EV CHARGERS	26
27	--	--	--		3,60 / 3,60		--	--	--	28
29	SPARE	40 A	2			0,00 / 0,00	2	40 A	SPARE	30
31	--	--	--	0,00 / 0,00			--	--	--	32
33	SPARE	40 A	2		0,00 / 0,00		2	40 A	SPARE	34
35	--	--	--			0,00 / 0,00	--	--	--	36
37	SPARE	40 A	2	0,00 / 0,00			2	40 A	SPARE	38
39	--	--	--		0,00 / 0,00		--	--	--	40
41	SPARE	20 A	1			0,00 / 0,00	1	20 A	SPARE	42

	A	B	C
Phase Load:	36,00 kVA	36,00 kVA	28,80 kVA
Phase..	309,2 A	309,2 A	240 A
Total Load:	130,80 kVA		
Total Amps:	276,79 A		

Notes:

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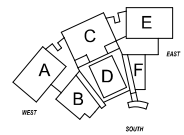
Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N

NORTH / EAST / SOUTH / WEST



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ELECTRICAL PANEL SCHEDULES

Date: 07/08/2024
Scale:
Proj. Number: 22367.00
Drawing Number: E606

Autodesk Docs://22367.00 - Greenwich Central Middle School/22367.00-MEP Central - Greenwich Central Middle School.rvt
9/26/2024 11:38:39 AM

Branch Panel: GDPC

Location: MECHANICAL 1060 | **Supply From:** GDP | **Mounting:** Surface | **Enclosure:** Type 1
Volts: 480/277 Wye | **Phases:** 3 | **Wires:** 4
A.I.C. Rating: 14k AIC | **Bus Material:** CU | **Bus Rating:** 400 A | **MCB Rating / MLO:** 400A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	T-SPCO	200 A	3	34,39						2
3	–	–	–		31,77					4
5	–	–	–			28,98				6
7										8
9										10
11										12
13										14
15										16
17										18
19										20
21										22
23										24
25										26
27										28
29										30
31										32
33										34
35										36
37										38
39										40
41										42

	A	B	C
Phase Load:	34,39 kVA	31,77 kVA	28,98 kVA
Phase..	285,7 A	118,2 A	104,6 A
Total Load:	95,14 kVA		
Total Amps:	114,44 A		

Notes:

Branch Panel: GDPE

Location: MECHANICAL 1048 | **Supply From:** GDP | **Mounting:** Surface | **Enclosure:** Type 1
Volts: 480/277 Wye | **Phases:** 3 | **Wires:** 4
A.I.C. Rating: 14k AIC | **Bus Material:** CU | **Bus Rating:** 600 A | **MCB Rating / MLO:** 600A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	T-GPEF	350 A	3	60,43	6,65					2
3	--	–	–		59,64	6,65				4
5	--	–	–			61,48	6,65	--	--	6
7										8
9										10
11										12
13										14
15										16
17										18
19										20
21										22
23										24
25										26
27										28
29										30
31										32
33										34
35										36
37										38
39										40
41										42

	A	B	C
Phase Load:	67,08 kVA	66,49 kVA	68,13 kVA
Phase..	240,6 A	240 A	246,3 A
Total Load:	201,69 kVA		
Total Amps:	242,6 A		

Notes:

Switchboard: MSB-1

Location: MAIN ELECTRICAL ROOM 1069 | **Supply From:** | **Mounting:** | **Enclosure:**
Volts: 480/277 Wye | **Phases:** 3 | **Wires:** 4
A.I.C. Rating: 65k AIC | **Mains Type:** | **Mains Rating:** | **MCB Rating:** 3000 A

Notes:

CKT	Circuit Description	# of Poles	Frame Size	Trip Rating	Load	Remarks
1	EVHP	3	400 A	400 A	208800 VA	
2	LDP	3	250 A	200 A	64224 VA	
3	GDP	3	1200 A	1200 A	371283 VA	
4	MHDP	3	1200 A	1200 A	445923 VA	
5	KHP	3	250 A	200 A	102814 VA	
6	CH-1	3	600 A	400 A	266927 VA	
7	CH-2	3	600 A	450 A	298027 VA	
8	SHP	3	100 A	100 A	0 VA	
9	ATS-1	3	100 A	100 A	15469 VA	
10	ATS-2	3	400 A	400 A	147098 VA	
11	SPARE	3	400 A	400 A	0 VA	
12	SPARE	3	400 A	400 A	0 VA	
13	SPARE	3	250 A	225 A	0 VA	
14	SPARE	3	250 A	225 A	0 VA	
15	SPARE	3	400 A	400 A	0 VA	
16	*PV BACKFEED DEVICE	3	1200 A	1200 A	0 VA	
17						
18						
19						
20						
				Total Conn. Load:	1929268 VA	
				Total Amps:	2320,2 A	

Legend:

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals
HVAC	51026 VA	100,00%	51026 VA	
Lighting	60445 VA	125,00%	75556 VA	Total Conn. Load: 1929268 VA
Other	973574 VA	100,00%	973574 VA	Total Est. Demand: 1944380 VA
Power	526306 VA	100,00%	526306 VA	Total Conn. Current: 2320,5 A
Cooling	13226 VA	100,00%	13226 VA	Total Est. Demand Current: 2338,7 A

Notes:
SUITABLE FOR REVERSE FEED. LOCATE ON OPPOSITE SIDE OF BUS FROM MAIN BREAKER PER NEC ARTICLE 690

Branch Panel: OSP2C

Location: ELEC 2098 | **Supply From:** T-OSPCD | **Mounting:** Surface | **Enclosure:** Type 1
Volts: 120/208 Wye | **Phases:** 3 | **Wires:** 4
A.I.C. Rating: 10k AIC | **Bus Material:** CU | **Bus Rating:** 100 A | **MCB Rating / MLO:** 50A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	SPARE	30 A	2	0,00	0,00					2
3	–	–	–							4
5	SPARE	30 A	1				0,00	0,18	1 20 A RECEPTACLE ELEC 2060	6
7	HAXON FANS ROOF C	20 A	1	0,60	6,66				1 20 A SPARE	8
9	SPARE	20 A	1			0,00	0,00		1 20 A SPARE	10
11	SPARE	20 A	1				0,00	0,00	1 20 A SPARE	12
13	SPARE	20 A	1	0,00	0,00				1 20 A SPARE	14
15	SPARE	20 A	1			0,00	0,00		1 20 A SPARE	16
17	SPARE	20 A	1				0,00	0,00	1 20 A SPARE	18
19	SPARE	20 A	1	0,00	0,00				1 20 A SPARE	20
21	SPARE	20 A	1			0,00	0,00		1 20 A SPARE	22
23	SPARE	20 A	1				0,00	0,00	1 20 A SPARE	24
25	SPARE	20 A	1	0,00	0,00				1 20 A SPARE	26
27	CUH VESTIBULE 2000	20 A	1			0,70	0,00		1 15 A SPARE	28
29	MOTORIZED DAMPERS AREA C	20 A	1				0,36	0,00	1 15 A SPARE	30
31	SPARE	20 A	1	0,00	0,00				1 20 A SPARE	32
33	SPARE	20 A	1			0,00	0,00		1 20 A SPARE	34
35	SPARE	20 A	1				0,00	0,00	1 20 A SPARE	36
37	SPARE	20 A	1	0,00	0,00				1 20 A SPARE	38
39	SPARE	20 A	1			0,00	0,00		1 20 A SPARE	40
41	SPARE	20 A	1				0,00	0,00	1 20 A SPARE	42

	A	B	C
Phase Load:	7,18 kVA	0,70 kVA	0,54 kVA
Phase..	59,8 A	6 A	4,5 A
Total Load:	8,39 kVA		
Total Amps:	23,29 A		

Notes:

Branch Panel: OSP2E

Location: ELEC 2093 | **Supply From:** T-OSPEF | **Mounting:** Surface | **Enclosure:** Type 1
Volts: 120/208 Wye | **Phases:** 3 | **Wires:** 4
A.I.C. Rating: 10k AIC | **Bus Material:** CU | **Bus Rating:** 100 A | **MCB Rating / MLO:** 50A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	SPARE	30 A	2	0,00	0,00					2
3	--	–	–							4
5	RECEPTACLE ELEC. 2097	20 A	1				0,18	0,72	1 20 A MOTORIZED DAMPERS AREA E	6
7	DOORS 2070A, 2070B	20 A	1	6,66	0,00				1 20 A SPARE	8
9	SPARE	20 A	1			0,00	0,00		1 20 A SPARE	10
11	SPARE	20 A	1				0,00	0,00	1 20 A SPARE	12
13	SPARE	20 A	1	0,00	0,00				1 20 A SPARE	14
15	SPARE	20 A	1			0,00	0,00		1 20 A SPARE	16
17	FCU VESTIBULE 2070	20 A	1				0,70	0,00	1 15 A SPARE	18
19	SPARE	15 A	1	0,00	0,00				1 15 A SPARE	20
21	SPARE	20 A	1			0,00	0,00		1 20 A SPARE	22
23	SPARE	20 A	1				0,00	0,00	1 20 A SPARE	24
25	SPARE	20 A	1	0,00	0,00				1 20 A SPARE	26
27	SPARE	20 A	1			0,00	0,00		1 20 A SPARE	28
29	SPARE	20 A	1				0,00	0,00	1 20 A SPARE	30
31	SPARE	20 A	1	0,00	0,00				1 20 A SPARE	32
33	SPARE	20 A	1			0,00	0,00		1 20 A SPARE	34
35	SPARE	20 A	1				0,00	0,00	1 20 A SPARE	36
37	SPARE	20 A	1	0,00	0,00				1 20 A SPARE	38
39	SPARE	20 A	1			0,00	0,00		1 20 A SPARE	40
41	SPARE	20 A	1				0,00	0,00	1 20 A SPARE	42

	A	B	C
Phase Load:	6,66 kVA	0,00 kVA	1,80 kVA
Phase..	57,5 A	0 A	15,3 A
Total Load:	8,25 kVA		
Total Amps:	22,97 A		

Notes:

Branch Panel: OSDPC

Location: MECHANICAL 1060 | **Supply From:** OSDP | **Mounting:** Surface | **Enclosure:** Type 1
Volts: 480/277 Wye | **Phases:** 3 | **Wires:** 4
A.I.C. Rating: 14k AIC | **Bus Material:** CU | **Bus Rating:** 225 A | **MCB Rating / MLO:** 150 A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	T-OSPCD	90 A	3	13,78	0,00		3	60 A	SPARE	2
3	–	–	–			7,04	0,00			4
5	–	–	–		3,84	0,00	–	–	–	6
7	SPARE	30 A	3	0,00	0,00		3	20 A	SPARE	8
9	–	–	–			0,00	0,00			10
11	–	–	–		0,00	0,00	–	–	–	12
13										14
15										16
17										18
19										20
21										22
23										24
25										26
27										28
29										30
31										32
33										34
35										36
37										38
39										40
41										42

	A	B	C
Phase Load:	13,78 kVA	7,04 kVA	3,84 kVA
Phase..	51,5 A	27,2 A	13,9 A
Total Load:	24,64 kVA		
Total Amps:	29,63 A		

Notes:

Branch Panel: OSDPE

Location: MECHANICAL 1048 | **Supply From:** OSDP | **Mounting:** Surface | **Enclosure:** Type 1
Volts: 480/277 Wye | **Phases:** 3 | **Wires:** 4
A.I.C. Rating: 14k AIC | **Bus Material:** CU | **Bus Rating:** 225 A | **MCB Rating / MLO:** 150A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	T-OSPEF	90 A	3	20,64	0,00		3	60 A	SPARE	2
3	–	–	–		20,04	0,00	–	–	–	4
5	–	–	–			19,72	0,00	–	–	6
7	SPARE	30 A	3	0,00	0,00		3	20 A	SPARE	8
9	–	–	–			0,00	0,00	–	–	10
11	–	–	–		0,00	0,00	–	–	–	12
13										14
15										16
17										18
19										20
21										22
23										24
25										26
27										28
29										30
31										32
33										34
35										36
37										38
39										40
41										42

	A	B	C
Phase Load:	20,64 kVA	20,04 kVA	19,72 kVA
Phase..	75,4 A	72,5 A	71,2 A
Total Load:	60,58 kVA		
Total Amps:	72,86 A		

Notes:

Branch Panel: SHP

Location: MAIN ELECTRICAL ROO... | **Supply From:** MSB-1 | **Mounting:** Surface | **Enclosure:** Type 1
Volts: 480/277 Wye | **Phases:** 3 | **Wires:** 4
A.I.C. Rating: 65 KAIC | **Bus Material:** CU | **Bus Rating:** 100 A | **MCB Rating / MLO:** 100A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	WEST PARKING & ENTRY DRIVE	20 A	1	0,00	0,00				1 20 A EAST PARKING AND ENTRY DRIVE	2
3	W PARK & ENTRY DRIVE - NITE LITES	20 A	1			0,00	0,00		1 20 A E PARK & ENTRY DRIVE - NITE LITES	4
5	REAR ACCESS DRIVE	20 A	1				0,00	0,00	1 20 A SPARE	6
7	REAR ACCESS DRIVE - NITE LITES	20 A	1	0,00	0,00				1 20 A SPARE	8
9	SPARE	20 A	1			0,00	0,00		1 20 A SPARE	10
11	SPARE	20 A	1				0,00	0,00	1 20 A SPARE	12
13	SPARE	20 A	1	0,00	0,00				1 20 A SPARE	14
15	SPARE	20 A	1			0,00	0,00		1 20 A SPARE	16
17	SITE LIGHTING	20 A	2				0,00	0,00	2 20 A SITE LIGHTING	18
19	–	–	–	0,00	0,00				– – –	20
21	SITE LIGHTING	20 A	2			0,00	0,00		2 20 A SITE LIGHTING	22
23	–	–	–				0,00	0,00	– – –	24
25	SITE LIGHTING	20 A	2	0,00	0,00				2 20 A SITE LIGHTING	26
27	–	–	–			0,00	0,00		– – –	28
29	SPARE	20 A	1				0,00	0,00	1 20 A SPARE	30
31	SPARE	20 A	1	0,00	0,00				1 20 A SPARE	32
33	SPARE	20 A	1			0,00	0,00		1 20 A SPARE	34
35	SPARE	20 A	1				0,00	0,00	1 20 A SPARE	36
37	T-SLP	30 A	3	0,00	0,00				1 20 A SPARE	38
39	–	–	–			0,00	0,00		1 20 A SPARE	40
41	–	–	–				0,00			42

	A	B	C
Phase Load:	0,00 kVA	0,00 kVA	0,00 kVA
Phase..	0 A	0 A	0 A
Total Load:	0,00 kVA		
Total Amps:	0 A		

Notes:

Branch Panel: SLP

Location: MAIN ELECTRICAL ROO... | **Supply From:** T-SLP | **Mounting:** Surface | **Enclosure:** Type 1
Volts: 120/208 Wye | **Phases:** 3 | **Wires:** 4
A.I.C. Rating: 42k AIC | **Bus Material:** CU | **Bus Rating:** 100 A | **MCB Rating / MLO:** 50A MCB

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	FLAGPOLE LIGHT	20 A	1	0,00	0,00				1 20 A SPARE	2
3	SOFTBALL FIELD #1 DUGOUTS	20 A	1			0,00	0,00		1 20 A SPARE	4
5	SOFTBALL FIELD #2 DUGOUTS	20 A	1				0,00	0,00	1 20 A SPARE	6
7	SPARE	20 A	1	0,00	0,00				1 20 A SPARE	8
9	SPARE	20 A	1			0,00	0,00		1 20 A SPARE	10
11	SPARE	20 A	1				0,00	0,00	1 20 A SPARE	12
13	SPARE	20 A	1	0,00	0,00				1 20 A SPARE	14
15	SPARE	20 A	1			0,00	0,00		1 20 A SPARE	16
17	SPARE	20 A	1				0,00	0,00	1 20 A SPARE	18
19	SPARE	20 A	1	0,00	0,00				1 20 A SPARE	20
21	SPARE	20 A	1			0,00	0,00		1 20 A SPARE	22
23	SPARE	20 A	1				0,00	0,00	1 20 A SPARE	24
25	SPARE	20 A	1	0,00	0,00				1 20 A SPARE	26
27	SPARE	20 A	1			0,00	0,00		1 20 A SPARE	28
29	SPARE	20 A	1				0,00	0,00	1 20 A SPARE	30
31	SPARE	20 A	1	0,00	0,00				1 20 A SPARE	32
33	SPARE	20 A	1			0,00	0,00		1 20 A SPARE	34
35	SPARE	20 A	1				0,00	0,00	1 20 A SPARE	36
37	SPARE	20 A	1	0,00	0,00				1 20 A SPARE	38
39	SPARE	20 A	1			0,00	0,00		1 20 A SPARE	40
41	SPARE	20 A	1				0,00	0,00	1 20 A SPARE	42

	A	B	C
Phase Load:	0,00 kVA	0,00 kVA	0,00 kVA
Phase..	0 A	0 A	0 A
Total Load:	0,00 kVA		
Total Amps:	0 A		

Notes:

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Greenwich Public Schools

Greenwich Central Middle School

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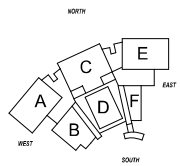
STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
3	10/30/2024	ADDENDUM NO. 4
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

ELECTRICAL PANEL SCHEDULES

Date: 07/08/2024
Scale:
Proj. Number: 22367.00
Drawing Number: E607

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ELECTRICAL SUBMETER SCHEDULE

DESIGNATION	VOLTAGE	CURRENT SENSOR RATING	ITEMS METERED	ENCLOSURE
SM1	480/277 3PH	1200A	RECEPTACLES (GDP)	SEE NOTE #1
SM2	480/277 3PH	200A	LIGHTING (LDP)	
SM3	480/277 3PH	1200A	MECHANICAL (MDP)	
SM4	480/277 3PH	200A	KITCHEN (KP)	
SM5	480/277 3PH	100A	EMERG. LIGHTING (ELDP)	
SM6	480/277 3PH	400A	STANDBY (GSDP)	
SM7	480/277 3PH	450A	HVAC EQUIPMENT	
SM8	480/277 3PH	450A	HVAC EQUIPMENT	
SM9	480/277 3PH	400A	SITE	
SM10	480/277 3PH	450A	EV CHARGING	

NOTE:

1. SATEC #BFM/I BRANCH FEEDER MONITOR. WALL MOUNTED IN MAIN ELECTRICAL ROOM WITH THE FOLLOWING CHARACTERISTICS:
   A. 8 CHANNEL EXPANSION MODULE.
   B. BUILT IN RS-485 COMMUNICATIONS CAPABILITY.
   C. MONITORING/DISPLAY CAPABILITIES FOR KWH, POWER FACTOR PER PHASE, KW DEMAND, REAL TIME LOAD (KW), VOLTS PER PHASE, DATE & TIME. ID CODES FOR COMMUNICATION.
   D. 0 TO 2 VOLT OUTPUT SPLIT CORE HIGH ACCURACY CURRENT SENSORS (HACS).

ELECTRICAL RISER DIAGRAM KEY NOTES

1. PROVIDE CONCRETE PAD AND GROUNDING SYSTEM FOR UTILITY TRANSFORMER, PER UTILITY COMPANY REQUIREMENTS. PROVIDE PER ELECTRICAL DETAILS.
2. PROVIDE THE FOLLOWING GENERATOR AUXILIARY CONNECTIONS ROUTED UNDERGROUND:
   - #8AWG CIRCUIT FOR BATTERY CHARGER, 2P10+1P10G, 3/4"C, TO BREAKER IN PANEL GSDP1A
   - #8AWG CIRCUIT FOR BLOCK HEATER, 2P10+1P10G, 3/4"C, TO BREAKER IN PANEL GSDP1A
   - 1"C, WITH WIRING PER MFR. REQUIREMENTS TO ATS-1 FOR START CIRCUIT.
   - 1"C, WITH WIRING PER MFR. REQUIREMENTS TO ATS-2 FOR START CIRCUIT - THIS WIRING SHALL TRANSITION TO 2-HOUR RATED ALL CABLE WHEN ABOVE GROUND INSIDE THE BUILDING. IF ROUTED THROUGH A SPACE OTHER THAN THE EMERGENCY ELECTRICAL ROOM.
3. PROVIDE THE FOLLOWING GENERATOR AUXILIARY CONNECTIONS ROUTED UNDERGROUND:
   - 1"C, WITH WIRING PER MFR. REQUIREMENTS TO GENERATOR ANNUNCIATOR PANEL, LOCATED PER ELECTRICAL FLOOR PLANS.
   - 1"C, WITH WIRING PER MFR. REQUIREMENTS TO REMOTE EPO PUSHBUTTON, LOCATED PER ELECTRICAL FLOOR PLANS.
   - PROVIDE GENERATOR MODULE FOR ENGINE START MONITORING SYSTEM AT GENERATOR FOR ATS-2 AND ATS-3 FIRE PUMP. PROVIDE POWER FROM GENERATOR BATTERY AND CONNECT ONE ALARM OUTPUT TO GENERATOR ANNUNCIATOR ALARM CIRCUIT. CONNECT SECOND ALARM OUTPUT TO FIRST ALARM SYSTEM MONITORING MODULE IN BUILDING.
4. PROVIDE GROUNDING AS A SEPARATELY DERIVED SYSTEM IN ACCORDANCE WITH NEC. PROVIDE GROUNDING ELECTRODES AT GENERATOR PER NEC.
5. CONCRETE HOUSEKEEPING PAD BY DIVISION 03 CONTRACTOR. COORDINATE ALL REQUIREMENTS WITH DIVISION 03 CONTRACTOR.
6. PV DISCONNECT SWITCH AND CT/PT METERING CABINET LOCATION.
7. PV COLLECTOR PANEL LOCATION.
8. LOCATE ON OPPOSITE SIDE OF BUS AS MAIN CIRCUIT BREAKER. PER NEC 690 REQUIREMENTS.
9. PROVIDE CT-RATED UTILITY METER SOCKET PER UTILITY COMPANY REQUIREMENTS. LOCATION SHOWN ON PLANS. PROVIDE 1-1/2"C. WITH NYLON PULLSTRING FROM METER TO SWITCHBOARD CT. CABINET. COORDINATE METER AND CT. CABINET PRODUCT AND INSTALLATION REQUIREMENTS WITH UTILITY COMPANY PRIOR TO INSTALLATION.
10. PROVIDE SIGNAGE AT THE SWITCHBOARD PER SPECIFICATIONS AND NEC FOR ARC FLASH AND FAULT CURRENT INDICATION. IN ADDITION, PROVIDE PERMANENT SIGNAGE INDICATING OTHER SOURCES OF POWER, WHERE APPLICABLE.
11. TRANSFORMERS MOUNTED REMOTELY FROM PANELBOARDS BEING SERVED SHALL BE PROVIDED WITH SECONDARY OVERCURRENT PROTECTION AT THE TRANSFORMER.

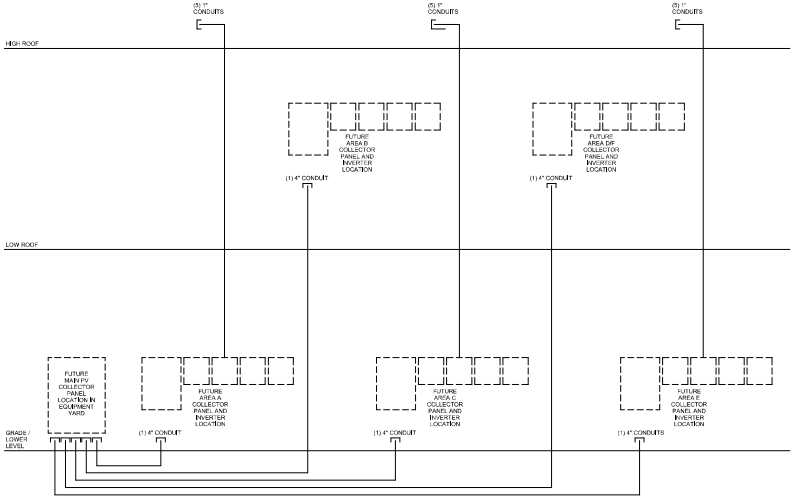
DRY TYPE TRANSFORMER SCHEDULE

COPPER CONDUCTORS

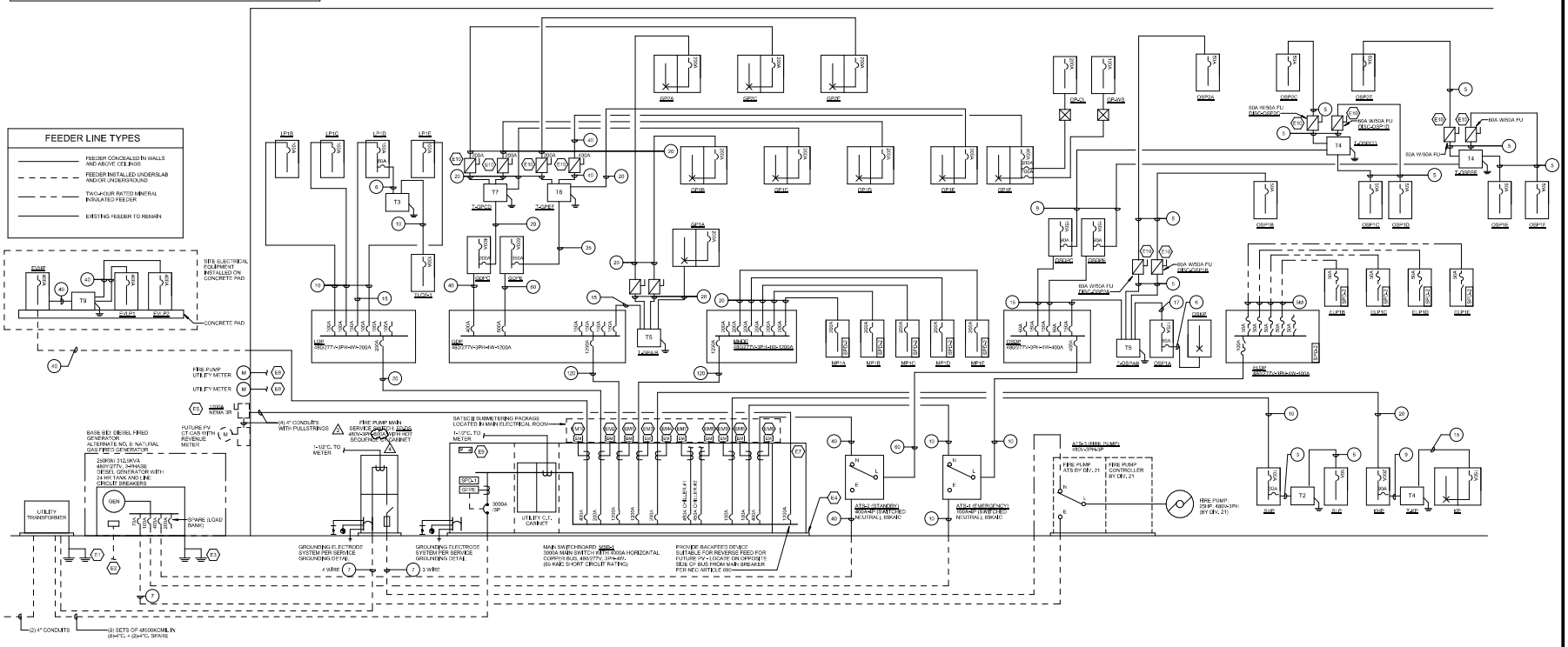
SIZE	KVA	PRIMARY AMPS	SECONDARY AMPS	480 VOLT OVERCURRENT	208 VOLT OVERCURRENT (NOTE 4)	480 VOLT FEEDER	208/120 VOLT FEEDER	GEC (NOTE 5)	SSBJ (NOTE 6)
T1	9	11	25	20A, 3P	30A, 3P	3#12 & 1#12G - 3/4"C	4#10 - 3/4"C	1#8 - 3/4"C	1#8
T2	15	18	42	30A, 3P	50A, 3P	3#10 & 1#10G - 3/4"C	4#8 - 1"C	1#8 - 3/4"C	1#8
T3	30	36	83	60A, 3P	100A, 3P	3#6 & 1#10G - 1"C	4#3 - 1 1/4"C	1#6 - 3/4"C	1#6
T4	45	54	125	90A, 3P	150A, 3P	3#3 & 1#6G - 1 1/4"C	4#1/0 - 2"C	1#6 - 3/4"C	1#6
T5	75	90	208	150A, 3P	250A, 3P	3#1/0 & 1#6G - 2"C	4#250 KCMIL - 3"C	1#2 - 3/4"C	1#2
T6	112.5	135	313	200A, 3P	400A, 3P	3#300 & 1#6G - 2"C	4#500 KCMIL - 4"C	1#1/0 - 3/4"C	1#1/0
T7	150	181	417	300A, 3P	500A, 3P	3#350 KCMIL & 1#4G - 3"C	(2) SETS OF 4#250 KCMIL - (2) 3"C	1#1/0 - 3/4"C	1#1/0
T8	225	270	625	400A, 3P	800A, 3P	3#600 KCMIL & 1#3G - 4"C	(2) SETS OF 4#500 KCMIL - (2) 4"C	1#3/0 - 3/4"C	1#3/0
T9	300	361	834	600A, 3P	1000A, 3P	3#750 KCMIL & 1#1/0 - (2) 3"C	(3) SETS OF 4#500 KCMIL - (3) 4"C	1#3/0 - 3/4"C	1#3/0
T10	500	602	1400	1000A, 3P	1600A, 3P	3#1250 KCMIL & 1#2/0 - (4) 4"C	(4) SETS OF 4#500 KCMIL - (4) 4"C	1#300 KCMIL - 1"C	1#300 KCMIL

TRANSFORMER NOTES:

1. BOND NEUTRAL TRANSFORMER SECONDARY TO THE TRANSFORMER GROUND BAR AND CASE WITH SYSTEM BONDING JUMPER.
2. USE NEAREST AVAILABLE EFFECTIVELY GROUNDED WATER PIPE, STRUCTURAL STEEL, AND/OR DRIVEN GROUND ROD IN ACCORDANCE WITH N.E.C. 250-81 AND 250-83 FOR THE SEPARATELY DERIVED SYSTEM GROUNDING ELECTRODE.
3. ALL CONDUCTOR SIZES ARE FOR COPPER CONDUCTORS, N.E.C. TABLE 310.15(B)(16).
4. SECONDARY OVERCURRENT PROTECTION SHALL BE LOCATED WITHIN (10) FEET OF THE TRANSFORMER SECONDARY TERMINALS EITHER IN A PANELBOARD (MAIN BREAKER), AN INDIVIDUALLY MOUNTED CIRCUIT BREAKER, OR A FUSIBLE DISCONNECT SWITCH.
5. GROUNDING ELECTRODE CONDUCTOR TO BE RUN FROM GROUND BAR IN TRANSFORMER TO THE GROUNDING ELECTRODE FOR THE SEPARATELY DERIVED SYSTEM.
6. SYSTEM BONDING JUMPER/SUPPLY SIDE BONDING JUMPER TO BE INSTALLED BETWEEN THE TRANSFORMER GROUND BAR AND CASE AND BETWEEN THE GROUND BAR IN THE FIRST SUPPLY SIDE DISCONNECTING MEANS (PANELBOARD, ENCLOSED CIRCUIT BREAKER OR FUSIBLE DISCONNECT SWITCH) AND TRANSFORMER GROUND BAR. INSTALL MULTIPLE SUPPLY SIDE BONDING JUMPERS OF THE SIZE LISTED. (1) IN EACH FEEDER RACEWAY.
7. 600 KCMIL CONDUCTORS SHALL BE PROVIDED WITH VAC ADAPTERS AS REQUIRED TO COORDINATE WITH BREAKER LUG SIZES.



2 FUTURE PV SYSTEM CONDUIT RISER DIAGRAM
1/8" = 1'-0"



1 ELECTRICAL RISER DIAGRAM
1/8" = 1'-0"

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Greenwich Public Schools

Greenwich Central Middle School

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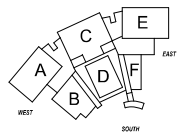

KEYPLAN

Number	Date	Issued For
4	11/05/2024	ADDENDUM NO. 5
3	10/30/2024	ADDENDUM NO. 4
2	10/23/2024	ADDENDUM NO. 3
1	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

ELECTRICAL RISER DIAGRAM

Date: 07/08/2024
Scale: NTS
Proj. Number: 22367.00
Drawing Number: E700

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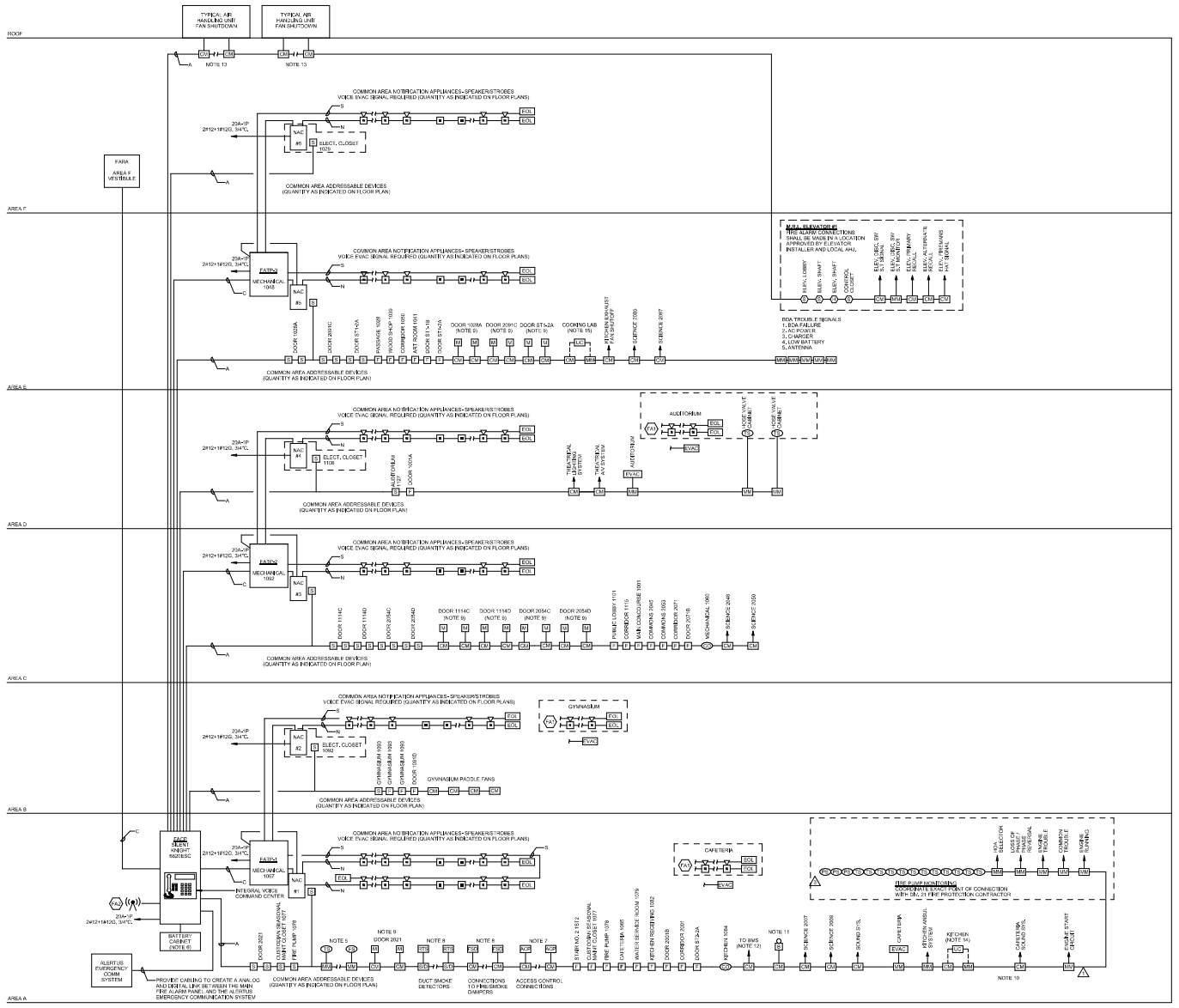
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AREA E
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AREA C
AREA B
AREA A
TYPICAL AIR HANDLING UNIT FAN SHUTDOWN
NOTE 13
FARA AREA F VESTIBULE
COMMON AREA NOTIFICATION APPLIANCES - SPEAKER/STROBES VOICE EVAC SIGNAL REQUIRED (QUANTITY AS INDICATED ON FLOOR PLANS)
COMMON AREA ADDRESSABLE DEVICES (QUANTITY AS INDICATED ON FLOOR PLAN)
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FATPO MECHANICAL 1092
FATPO MECHANICAL 1007
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ELECT. CLOSET 1109
ELECT. CLOSET 1092
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GYMNASIUM 1093
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GYMNASIUM PADDLE FANS
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SCIENCE 2050
MECHANICAL 1060
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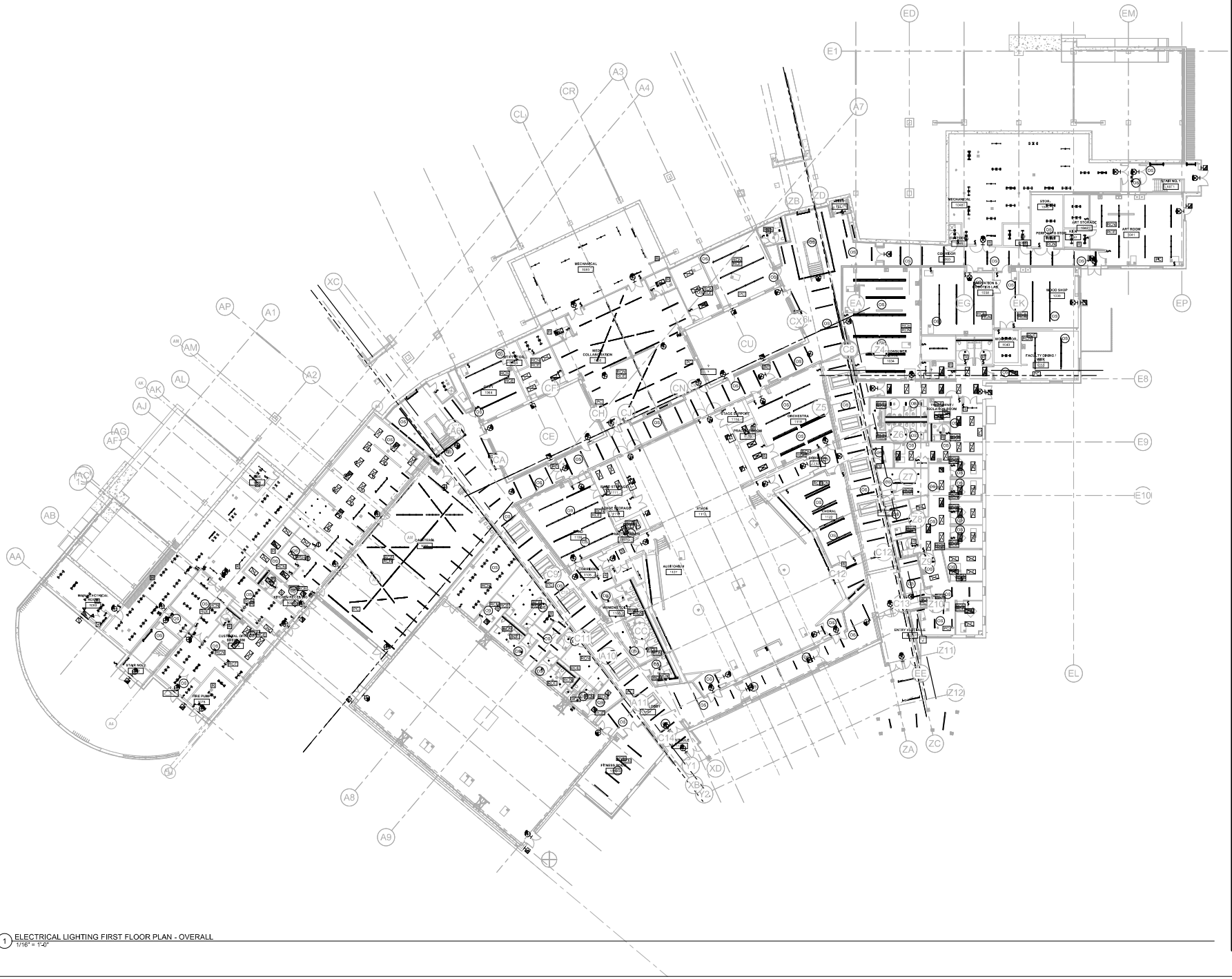

1 ELECTRICAL LIGHTING FIRST FLOOR PLAN - OVERALL
1/16" = 1'-0"

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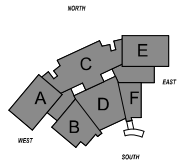

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ELECTRICAL LIGHTING FIRST FLOOR OVERALL PLAN

Date
07/08/2024
Scale
1/16" = 1'-0"
Proj. Number
22367.00

Drawing Number
EL001

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1 ELECTRICAL LIGHTING SECOND FLOOR PLAN - OVERALL
1/16" = 1'-0"

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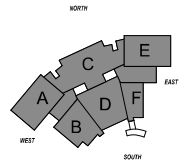

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ELECTRICAL LIGHTING SECOND FLOOR OVERALL PLAN

Date
07/08/2024
Scale
1/16" = 1'-0"
Proj. Number
22367.00

Drawing Number
EL002

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1 ELECTRICAL LIGHTING FIRST FLOOR PLAN - A
1/8" = 1'-0"

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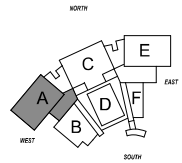

KEYPLAN

Number	Date	Issued For
1	10/16/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

ELECTRICAL LIGHTING FIRST FLOOR PLAN - PART A

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **EL101A**

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1 ELECTRICAL LIGHTING FIRST FLOOR PLAN - B
1/8" = 1'-0"

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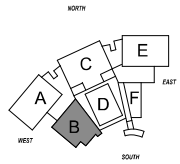

KEYPLAN

Number	Date	Issued For
1	10/16/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ELECTRICAL LIGHTING FIRST FLOOR PLAN - PART B

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **EL101B**

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1 ELECTRICAL LIGHTING FIRST FLOOR PLAN - C
1/8" = 1'-0"

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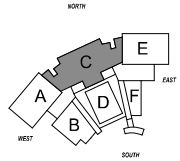

KEYPLAN

Number	Date	Issued For
1	10/16/2024	ADDENDUM NO. 2
2	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

ELECTRICAL LIGHTING FIRST FLOOR PLAN - PART C

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **EL101C**

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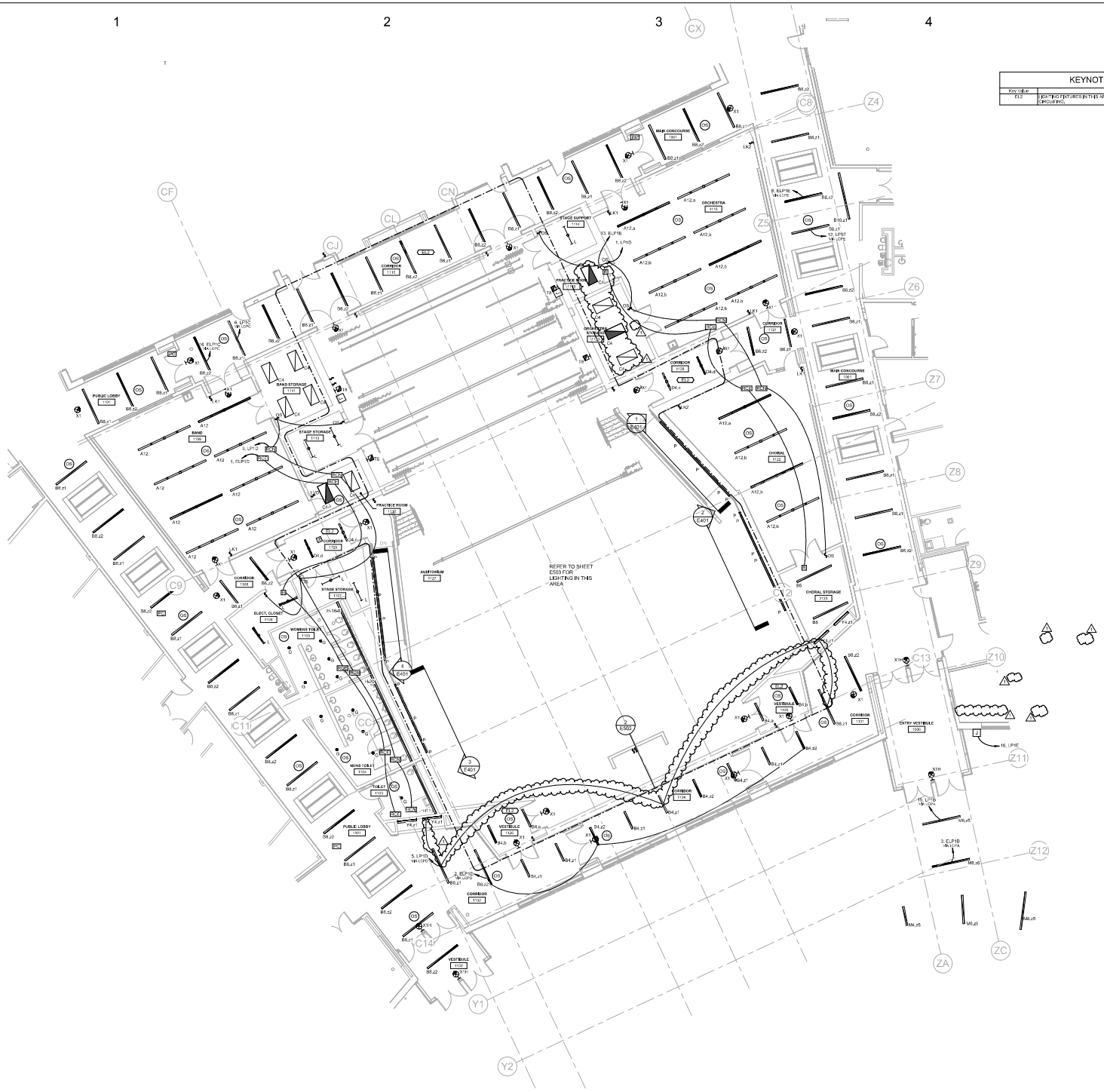

1 ELECTRICAL LIGHTING FIRST FLOOR PLAN - D
1/8" = 1'-0"

KEYNOTES - ELECTRICAL LIGHTING	
Key Value	Keynote Text
EL2	LIGHTING FIXTURES IN THIS AREA CONTROLLED VIA THEATRICAL LIGHTING SYSTEM. REFER TO SHEET E503 FOR CIRCUITING.

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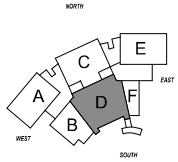

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Number	Date	Issued For
1	10/16/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ELECTRICAL LIGHTING FIRST FLOOR PLAN - PART D

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
22367.00

Drawing Number
EL101D

Autodesk Docs://22367.00 - Greenwich Central Middle School/022-2023095-MEP Central - Greenwich Central Middle School.rvt

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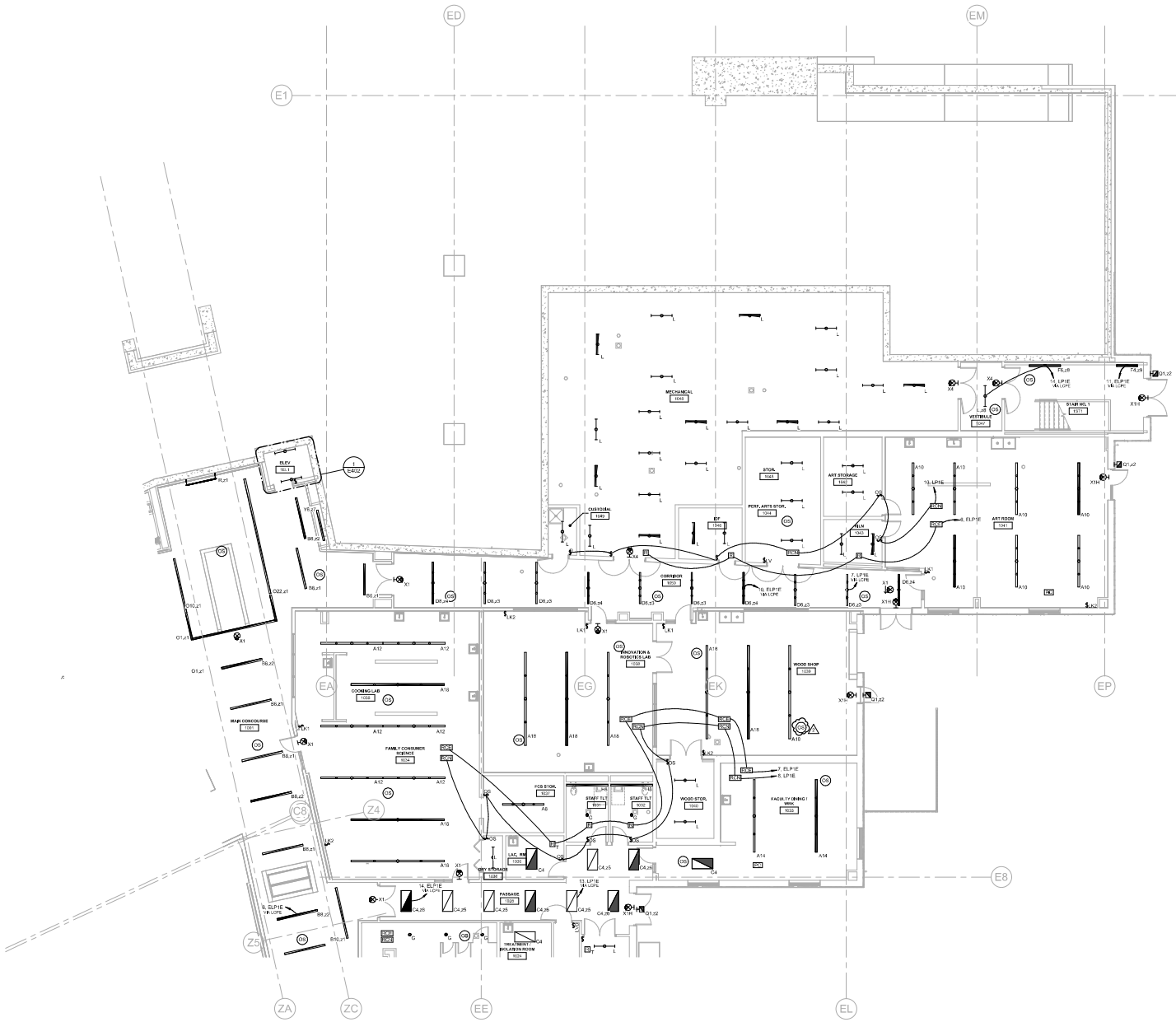

1 ELECTRICAL LIGHTING FIRST FLOOR PLAN - E
1/8" = 1'-0"

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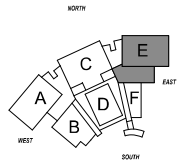

KEYPLAN

Number	Date	Issued For
2	10/23/2024	ADDENDUM NO. 3
	09/20/2024	BID/BUILDPERMIT
	07/08/2024	PHASE 2

ELECTRICAL LIGHTING FIRST FLOOR PLAN - PART E

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: EL101E

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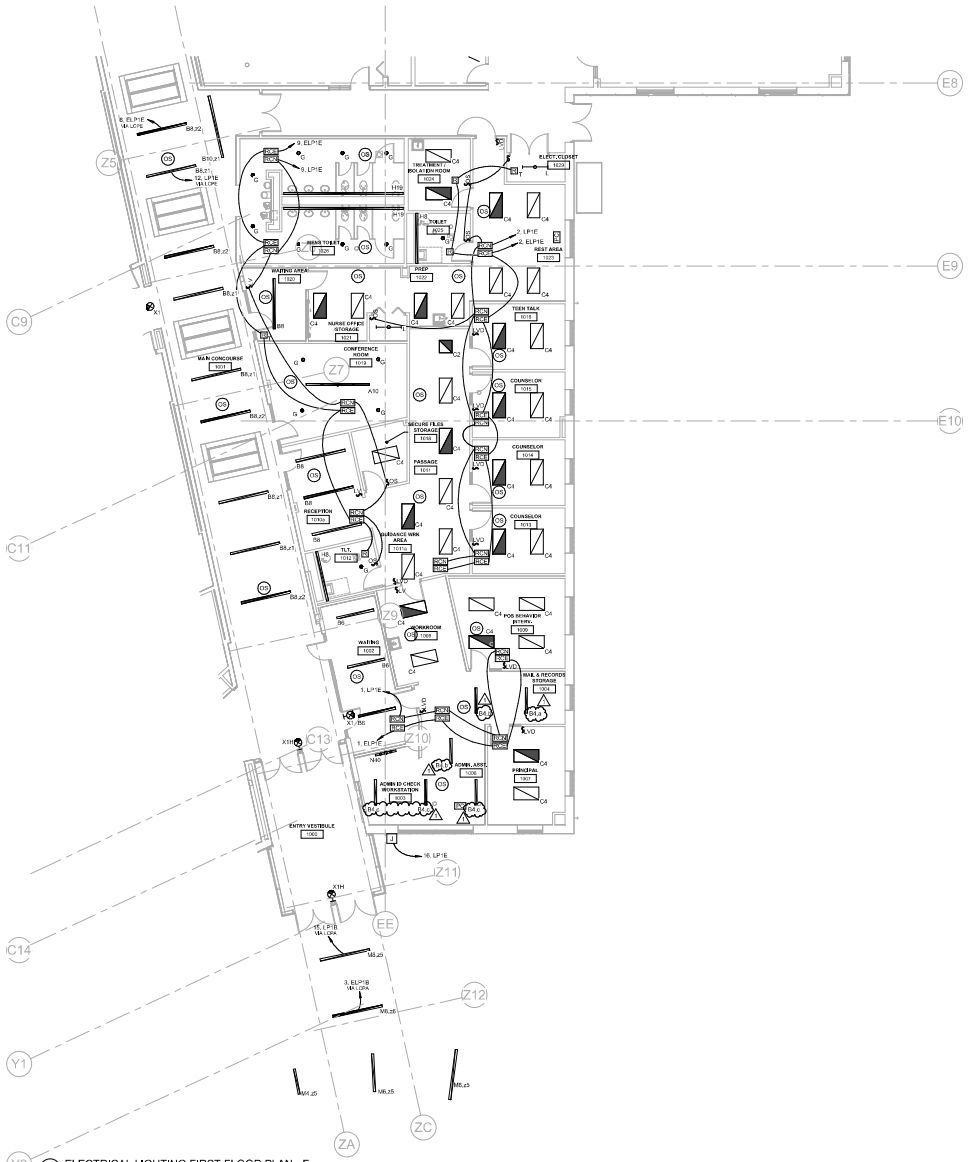

1 ELECTRICAL LIGHTING FIRST FLOOR PLAN - F
1/8" = 1'-0"

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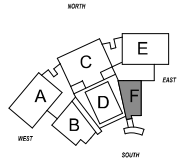

KEYPLAN

Number	Date	Issued For
1	10/16/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ELECTRICAL LIGHTING FIRST FLOOR PLAN - PART F

Date	Drawing Number
07/08/2024	EL101F
Scale: 1/8" = 1'-0"	
Proj. Number: 22367.00	

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KEYNOTES - ELECTRICAL LIGHTING	
Key Value	Keynote Text
EL1	REMOTE DRIVER FOR TYPE N FIXTURES TO BE MOUNTED IN THIS LOCATION AND CONCEALED ABOVE ACCESSIBLE CEILINGS.

1 ELECTRICAL LIGHTING SECOND FLOOR PLAN - A
1/8" = 1'-0"

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Greenwich Public Schools

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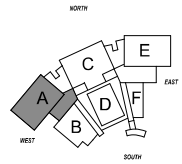

KEYPLAN

Number	Date	Issued For
1	10/16/2024	ADDENDUM NO. 2
	09/20/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ELECTRICAL LIGHTING SECOND FLOOR PLAN - PART A

Date	Drawing Number
07/08/2024	EL102A
Scale	
1/8" = 1'-0"	
Proj. Number	
22367.00	

Autodesk Docs://22367.01 - Greenwich Central Middle School/R22-23/2305-MEP Central - Greenwich Central Middle School.rvt
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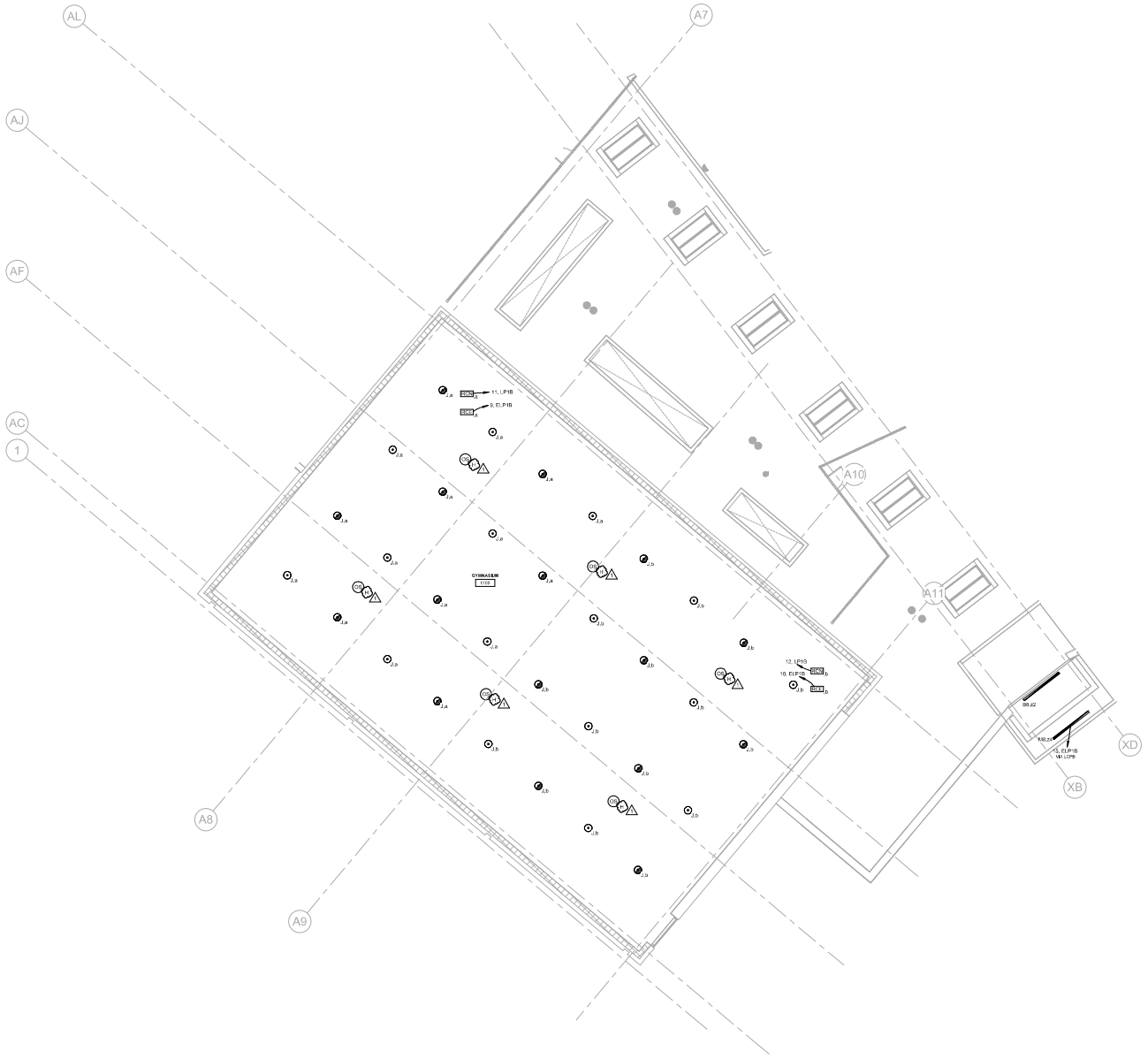

1 ELECTRICAL LIGHTING SECOND FLOOR PLAN - B
1/8" = 1'-0"

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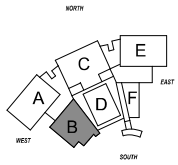

KEYPLAN

Number	Date	Issued For
1	10/16/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ELECTRICAL LIGHTING SECOND FLOOR PLAN - PART B

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: EL102B

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10/15/2024 10:46:01 AM

KEYNOTES - ELECTRICAL LIGHTING	
Key Value	Keynote Text
EL1	REMOTE DRIVER FOR TYPE N FIXTURES TO BE MOUNTED IN THIS LOCATION AND CONCEALED ABOVE ACCESIBLE CEILING.



1 ELECTRICAL LIGHTING SECOND FLOOR PLAN - C
1/8" = 1'-0"

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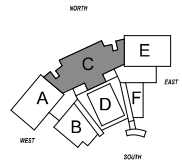
STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
1	10/16/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ELECTRICAL LIGHTING SECOND FLOOR PLAN - PART C

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
22367.00

Drawing Number
EL102C

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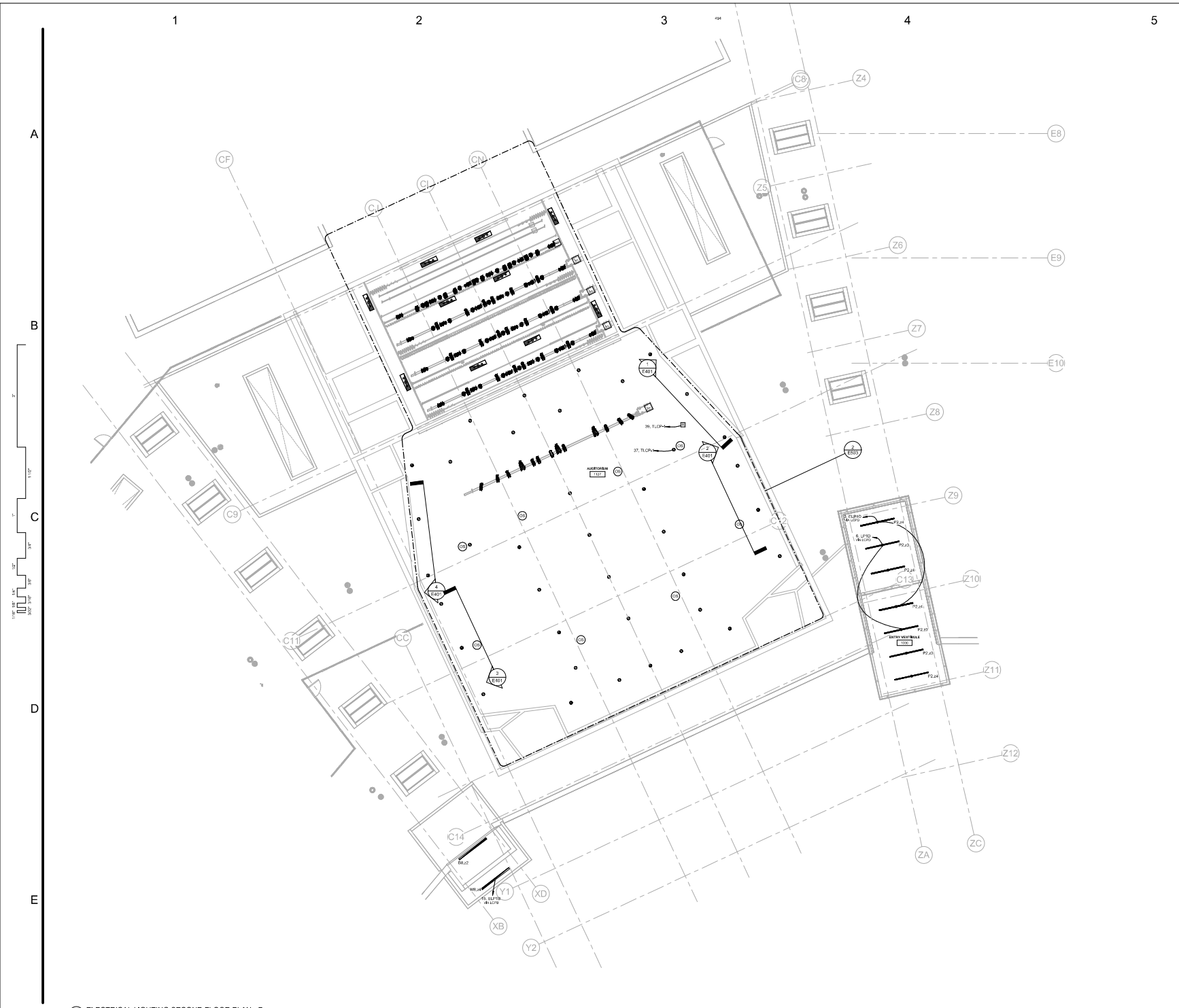

1 ELECTRICAL LIGHTING SECOND FLOOR PLAN - D
1/8" = 1'-0"

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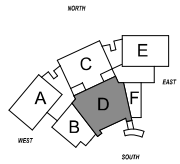

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

ELECTRICAL LIGHTING SECOND FLOOR PLAN - PART D

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
22367.00

Drawing Number
EL102D

Autodesk Docs://22367.00 - Greenwich Central Middle School/022-2023095-MEP Central - Greenwich Central Middle School.rvt
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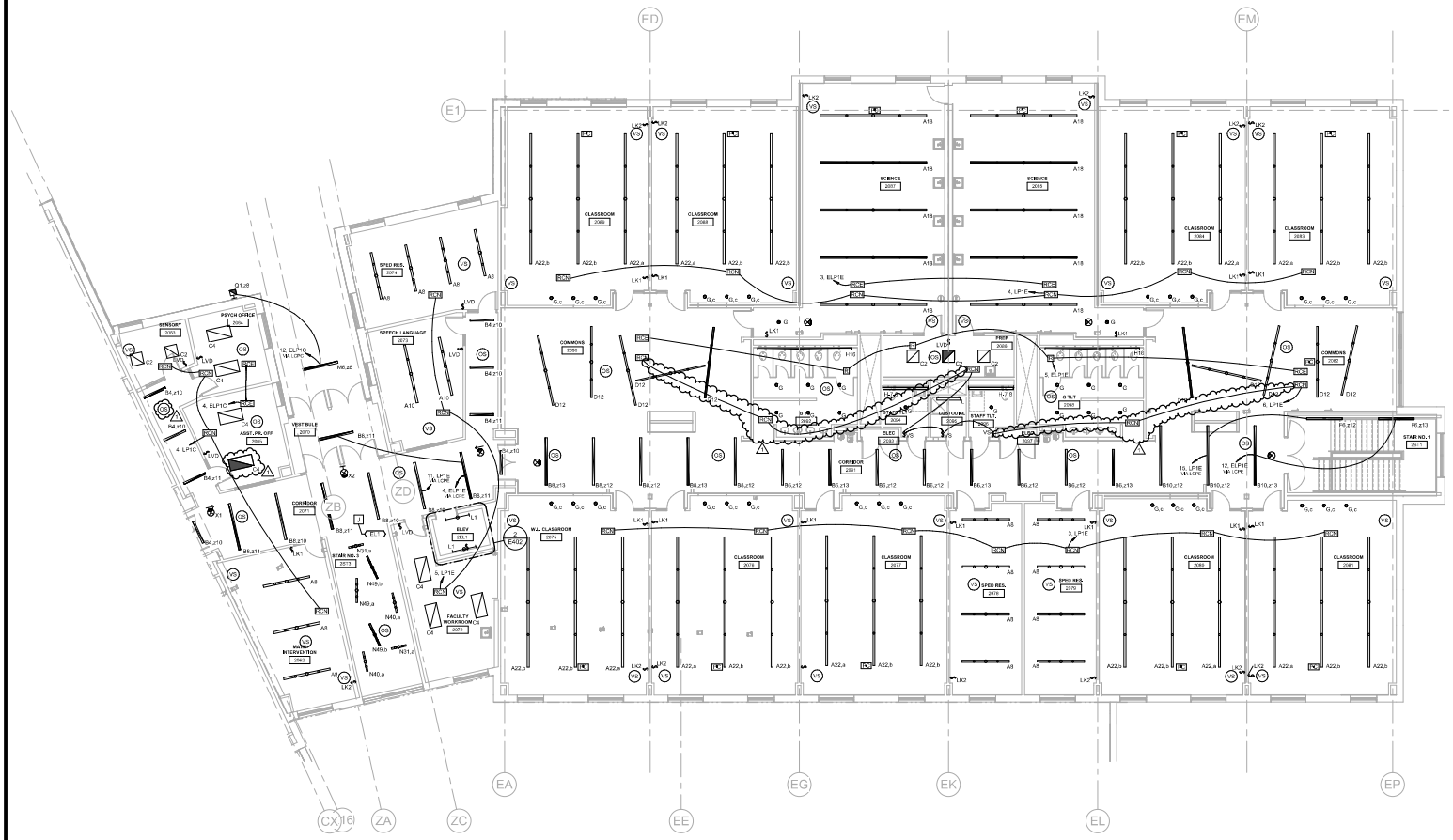

1 ELECTRICAL LIGHTING SECOND FLOOR PLAN - E
1/8" = 1'-0"

KEYNOTES - ELECTRICAL LIGHTING	
Key Value	Keynote Text
EL1	REMOTE DRIVER FOR TYPE IN FIXTURES TO BE MOUNTED IN THIS LOCATION AND CONCEALED ABOVE ACCESIBLE CEILING.

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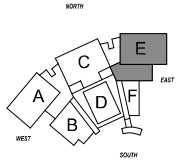

KEYPLAN

Number	Date	Issued For
1	10/16/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ELECTRICAL LIGHTING SECOND FLOOR PLAN - PART E

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
22367.00

Drawing Number
EL102E

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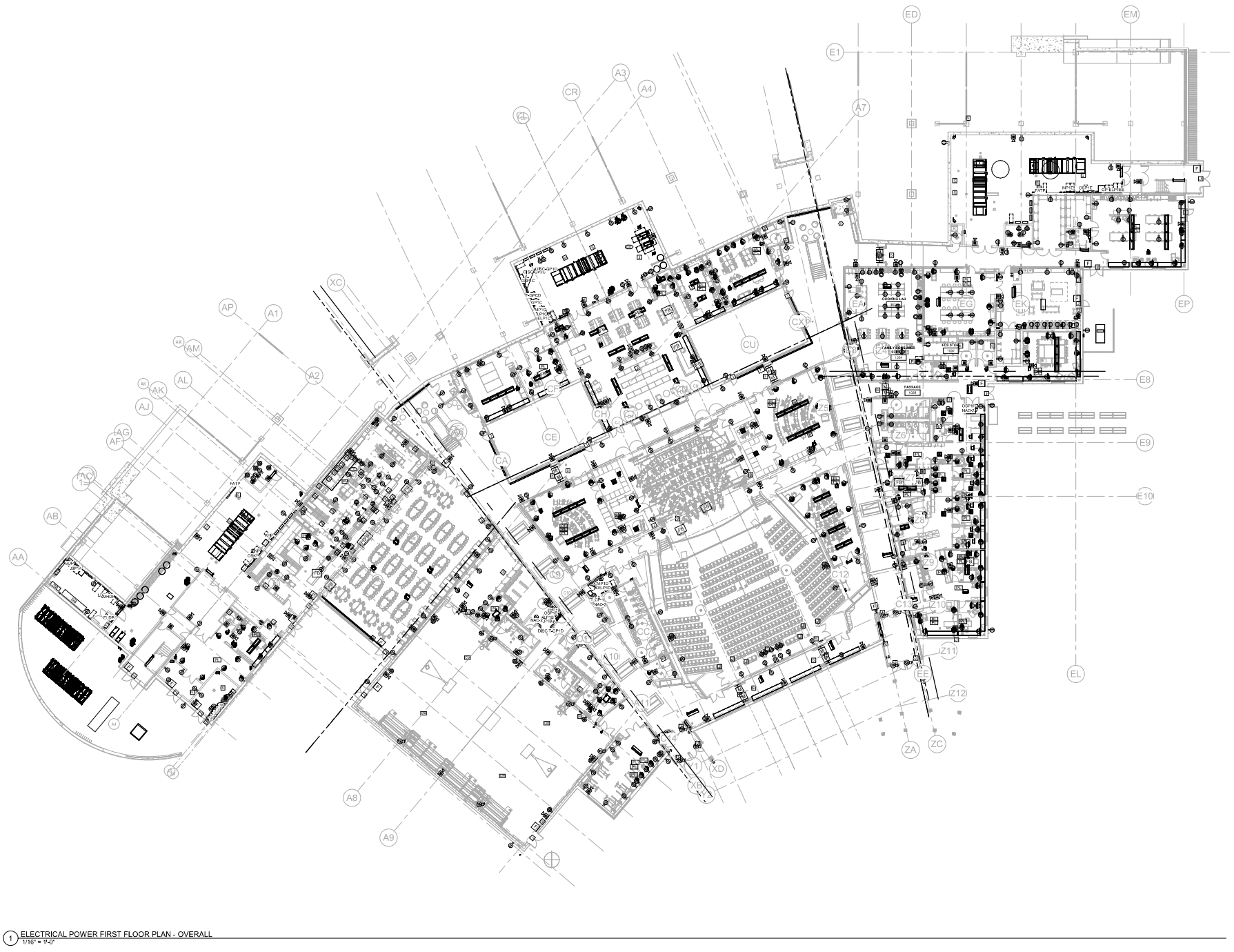

1 ELECTRICAL POWER FIRST FLOOR PLAN - OVERALL
1/16" = 1'-0"

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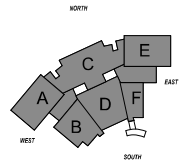

KEYPLAN

Number	Date	Issued For
	05/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ELECTRICAL POWER FIRST FLOOR OVERALL PLAN

Date
07/08/2024
Scale
1/16" = 1'-0"
Proj. Number
22367.00

Drawing Number
EP001

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1 ELECTRICAL POWER SECOND FLOOR PLAN - OVERALL
1/16" = 1'-0"

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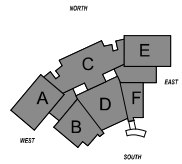

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ELECTRICAL POWER SECOND FLOOR OVERALL PLAN

Date
07/08/2024
Scale
1/16" = 1'-0"
Proj. Number
22367.00

Drawing Number
EP002

Autodesk Docs://22367.00 - Greenwich Central Middle School/022-2023095-MEP Central - Greenwich Central Middle School.rvt
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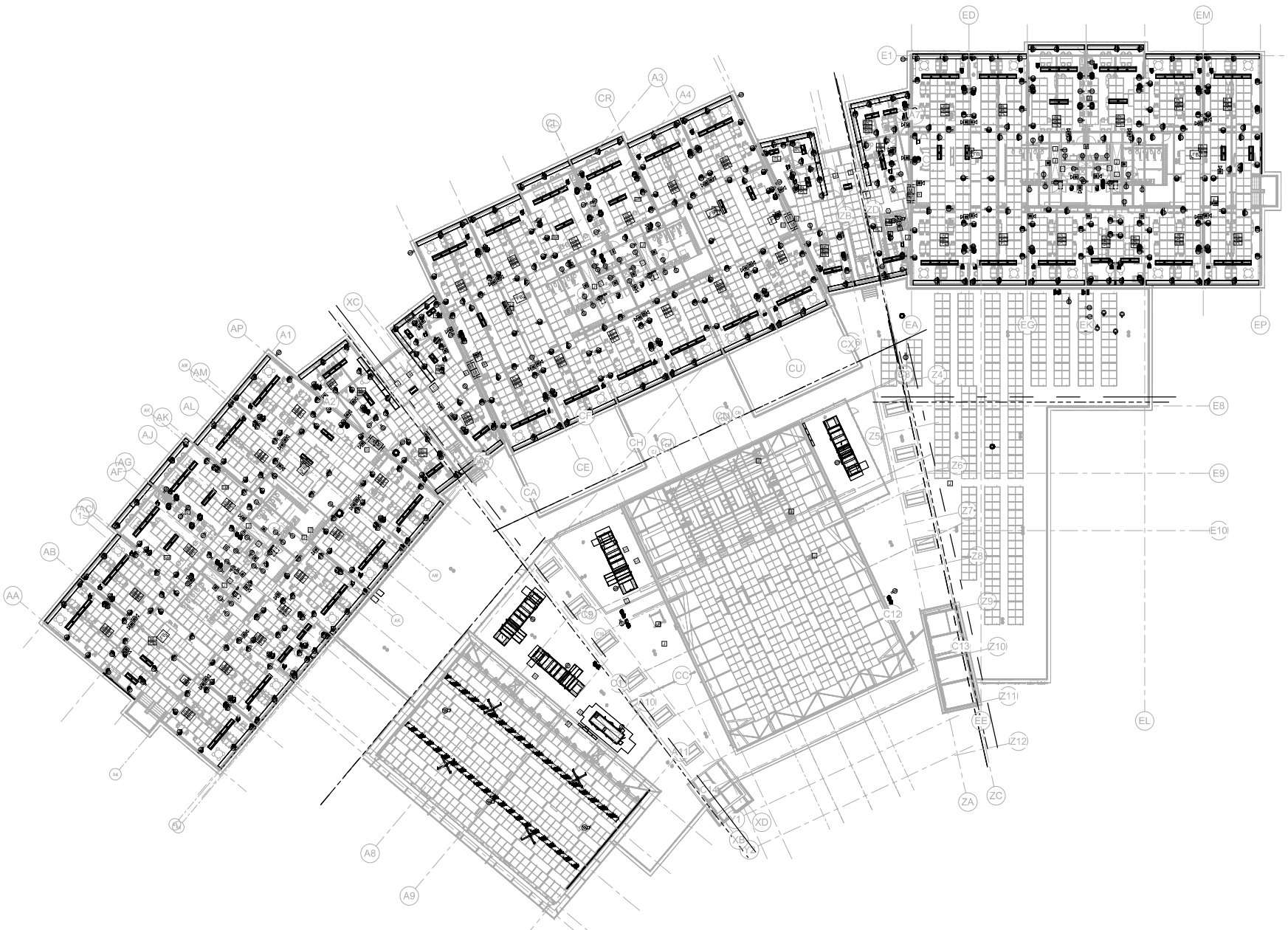

1 ROOF FLOOR PLAN
1/16" = 1'-0"

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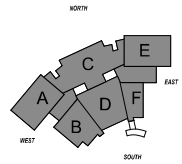


KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ELECTRICAL POWER ROOF OVERALL PLAN

Date
07/08/2024

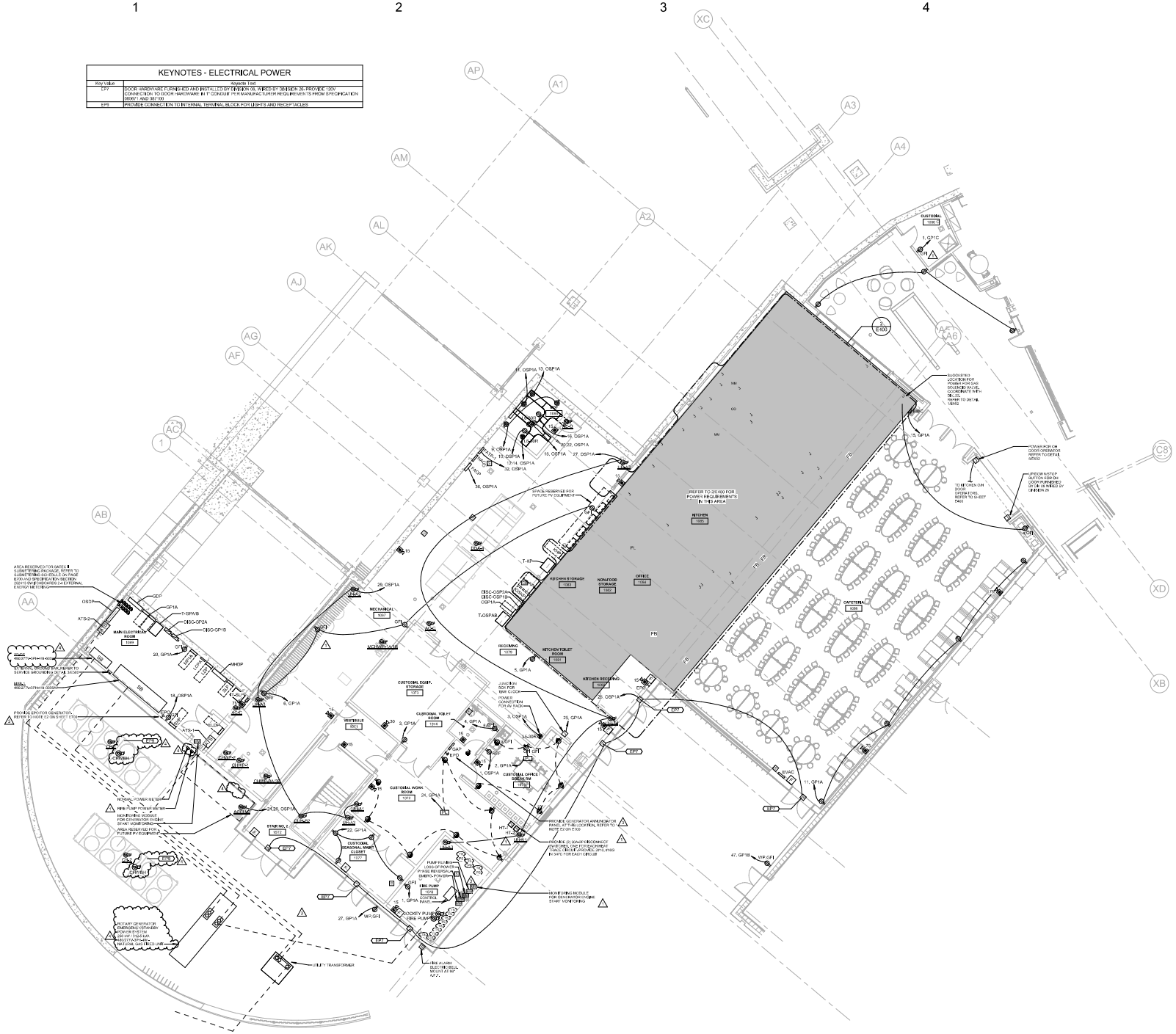
Scale
1/16" = 1'-0"

Proj. Number
22367.00

Drawing Number
EP003

Autodesk Docs://22367.00 - Greenwich Central Middle School/022-2023095-MEP Central - Greenwich Central Middle School.rvt
9/26/2024 11:43:14 AM

KEYNOTES - ELECTRICAL POWER	
Key Value	Keynote Text
EP7	DOOR HARDWARE FURNISHED AND INSTALLED BY DIVISION 08; WIRED BY DIVISION 26; PROVIDE 120V CONNECTION TO DOOR HARDWARE IN 1" CONDUIT PER MANUFACTURER REQUIREMENTS FROM SPECIFICATION 086671 AND 087100
EP8	PROVIDE CONNECTION TO INTERNAL TERMINAL BLOCK FOR LIGHTS AND RECEPTACLES



1 ELECTRICAL POWER FIRST FLOOR PLAN - A
1/8" = 1'-0"

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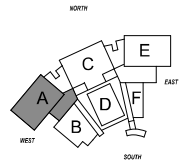

KEYPLAN

Number	Date	Issued For
4	11/05/2024	ADDENDUM NO. 5
3	10/30/2024	ADDENDUM NO. 4
1	10/16/2024	ADDENDUM NO. 2
	09/20/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ELECTRICAL POWER FIRST FLOOR PLAN - PART A

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **EP101A**

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11/7/2024 4:17:17 PM



KEYNOTES - ELECTRICAL POWER	
Key Value	Keynote Text
EP5	GYMNASIUM EQUIPMENT SHALL BE POWERED FROM EQUIPMENT CONTROL PANEL LOCATED IN FIRST FLOOR CUSTODIAL CLOSET, REFER TO DETAIL 6/E500 FOR ADDITIONAL INFORMATION.
EP6	REFER TO DETAIL 4/E503 FOR SHADE MOTOR WIRING DETAIL
EP7	DOOR HARDWARE FURNISHED AND INSTALLED BY DIVISION 08, WIRED BY DIVISION 26, PROVIDE 120V CONNECTION TO DOOR HARDWARE IN 1" CONDUIT, PER MANUFACTURER'S REQUIREMENTS FROM SPECIFICATION 085671 AND 087100

1 ELECTRICAL POWER FIRST FLOOR PLAN - B
1/8" = 1'-0"

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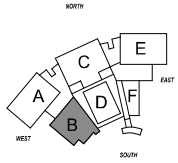

KEYPLAN

Number	Date	Issued For
2	10/23/2024	ADDENDUM NO. 3
	09/30/2024	BID/CM PERMIT
	07/08/2024	PHASE 2

ELECTRICAL POWER FIRST FLOOR PLAN - PART B

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: EP101B

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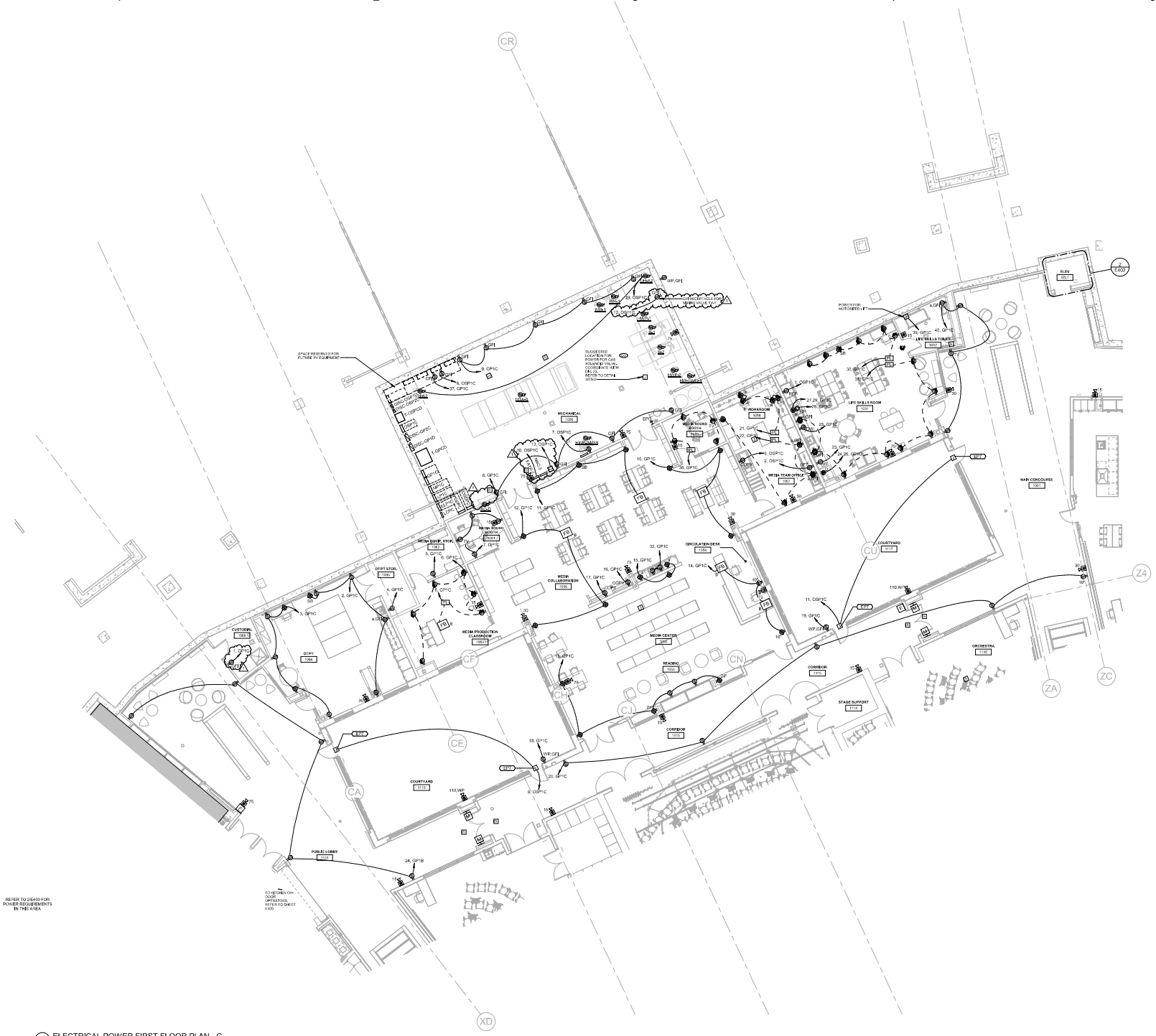

1 ELECTRICAL POWER FIRST FLOOR PLAN - C
1/8" = 1'-0"

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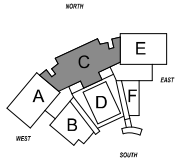

KEYPLAN

Number	Date	Issued For
1	10/16/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ELECTRICAL POWER FIRST FLOOR PLAN - PART C

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
22367.00

Drawing Number
EP101C

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1 ELECTRICAL POWER FIRST FLOOR PLAN - D
1/8" = 1'-0"

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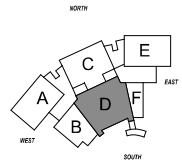

KEYPLAN

Number	Date	Issued For
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2	10/23/2024	ADDENDUM NO. 3
1	10/16/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ELECTRICAL POWER FIRST FLOOR PLAN - PART D

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: EP101D

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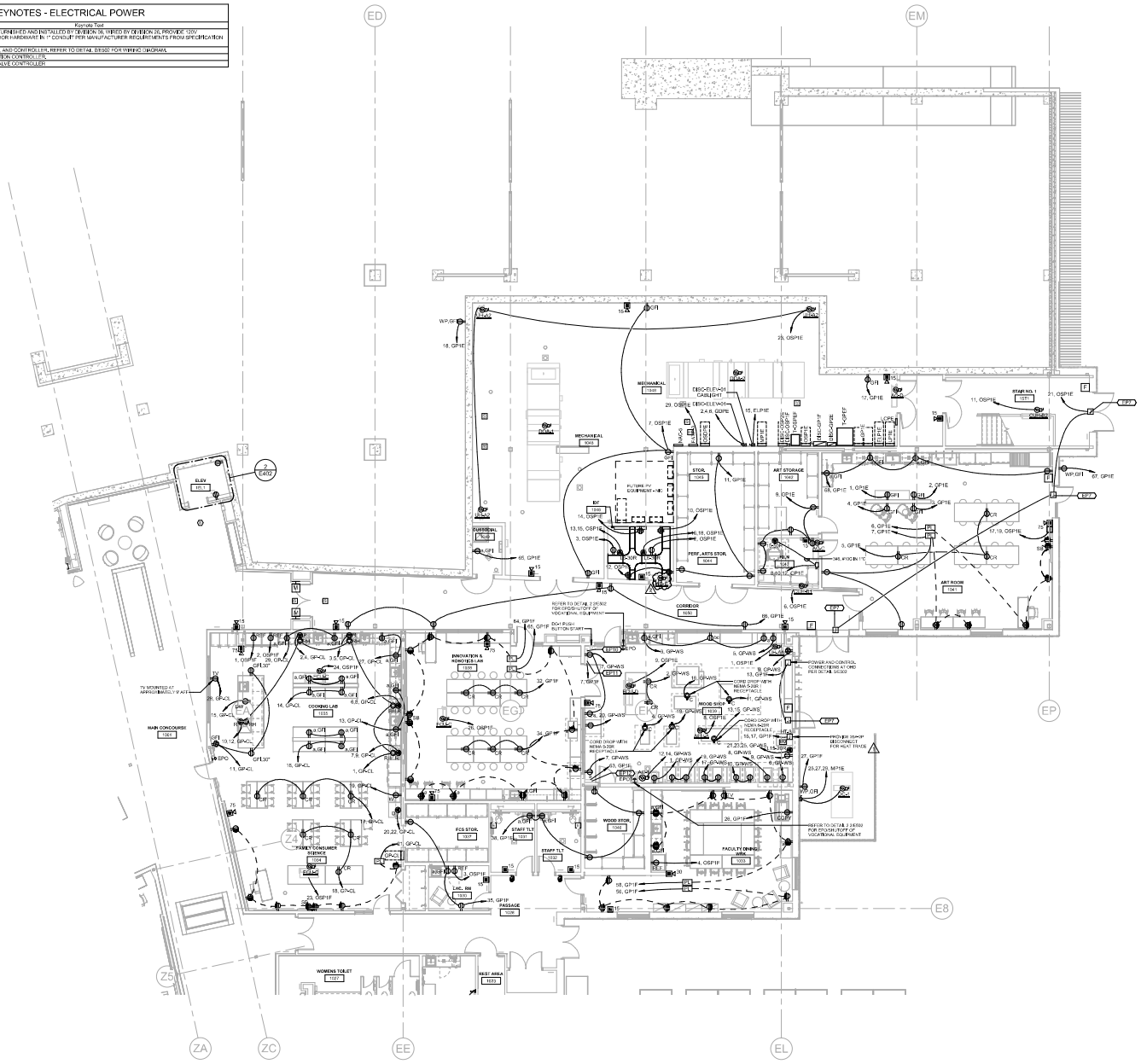
10/30/2024 11:19:57 AM

KEYNOTES - ELECTRICAL POWER

Key Value	Keynote Text
EP2	DOOR HARDWARE FURNISHED AND INSTALLED BY DIVISION 08, WIRED BY DIVISION 26, PROVIDE 120V CONNECTION TO DOOR HARDWARE IN 1" CONDUIT PER MANUFACTURER REQUIREMENTS FROM SPECIFICATION 000671 AND 087100
EP10	DC-1 VFD, STARTER, AND CONTROLLER, REFER TO DETAIL 8/E502 FOR WIRING DIAGRAM.
EP11	DC-1 SPARK DETECTION CONTROLLER.
EP12	DC-1 NO-RETURN VALVE CONTROLLER



1 ELECTRICAL POWER FIRST FLOOR PLAN - E
1/8" = 1'-0"

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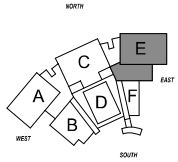
STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
2	10/23/2024	ADDENDUM NO. 3
1	10/16/2024	ADDENDUM NO. 2
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ELECTRICAL POWER FIRST FLOOR PLAN - PART E

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
22367.00

Drawing Number
EP101E

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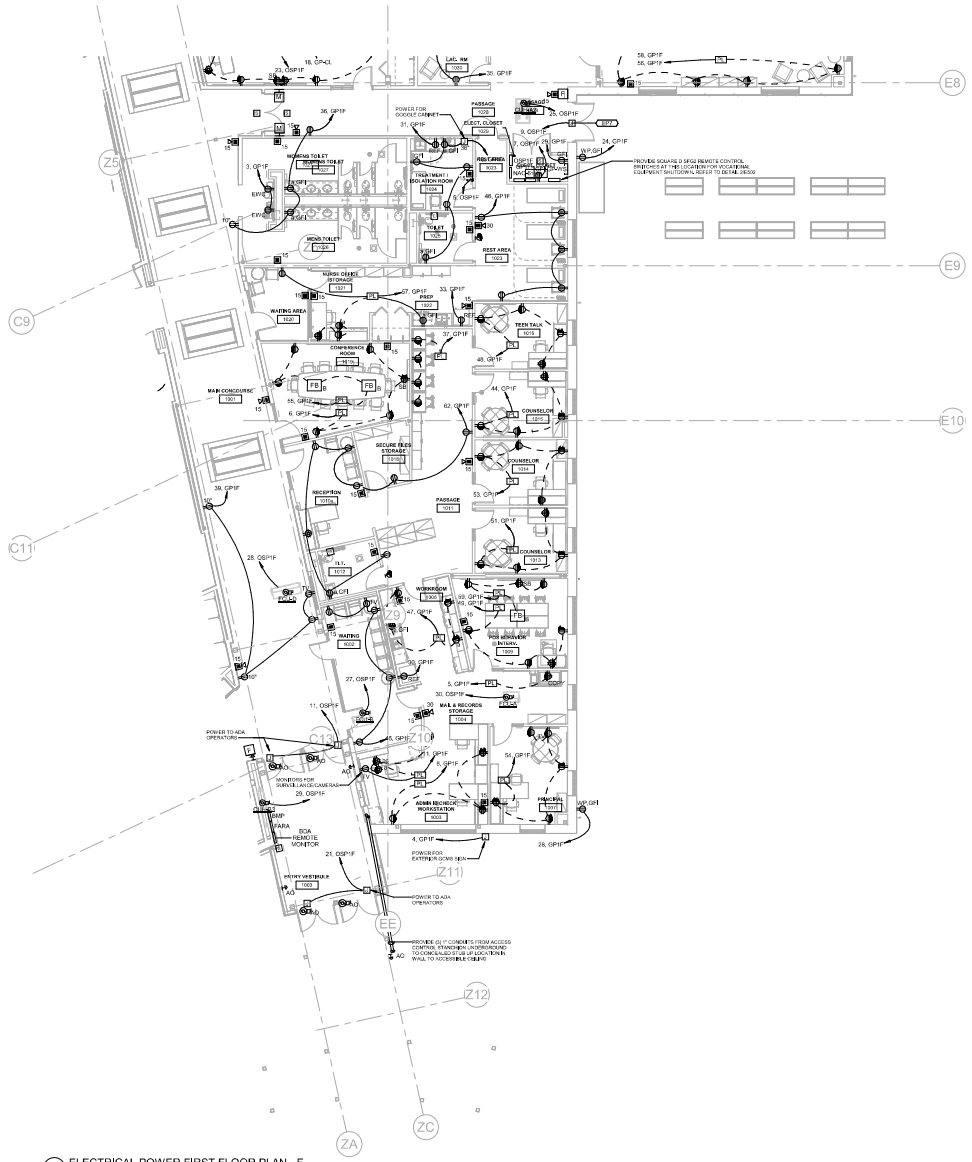

1 ELECTRICAL POWER FIRST FLOOR PLAN - F
1/8" = 1'-0"

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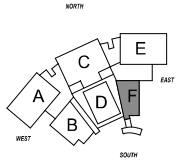
STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ELECTRICAL POWER FIRST FLOOR PLAN - PART F

Date
07/08/2024

Scale
1/8" = 1'-0"

Proj. Number
22367.00

Drawing Number
EP101F

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9/26/2024 11:44:21 AM



1 ELECTRICAL POWER SECOND FLOOR PLAN - A
1/8" = 1'-0"

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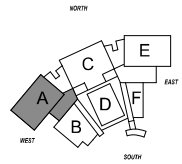

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

ELECTRICAL POWER SECOND FLOOR PLAN - PART A

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
22367.00

Drawing Number
EP102A

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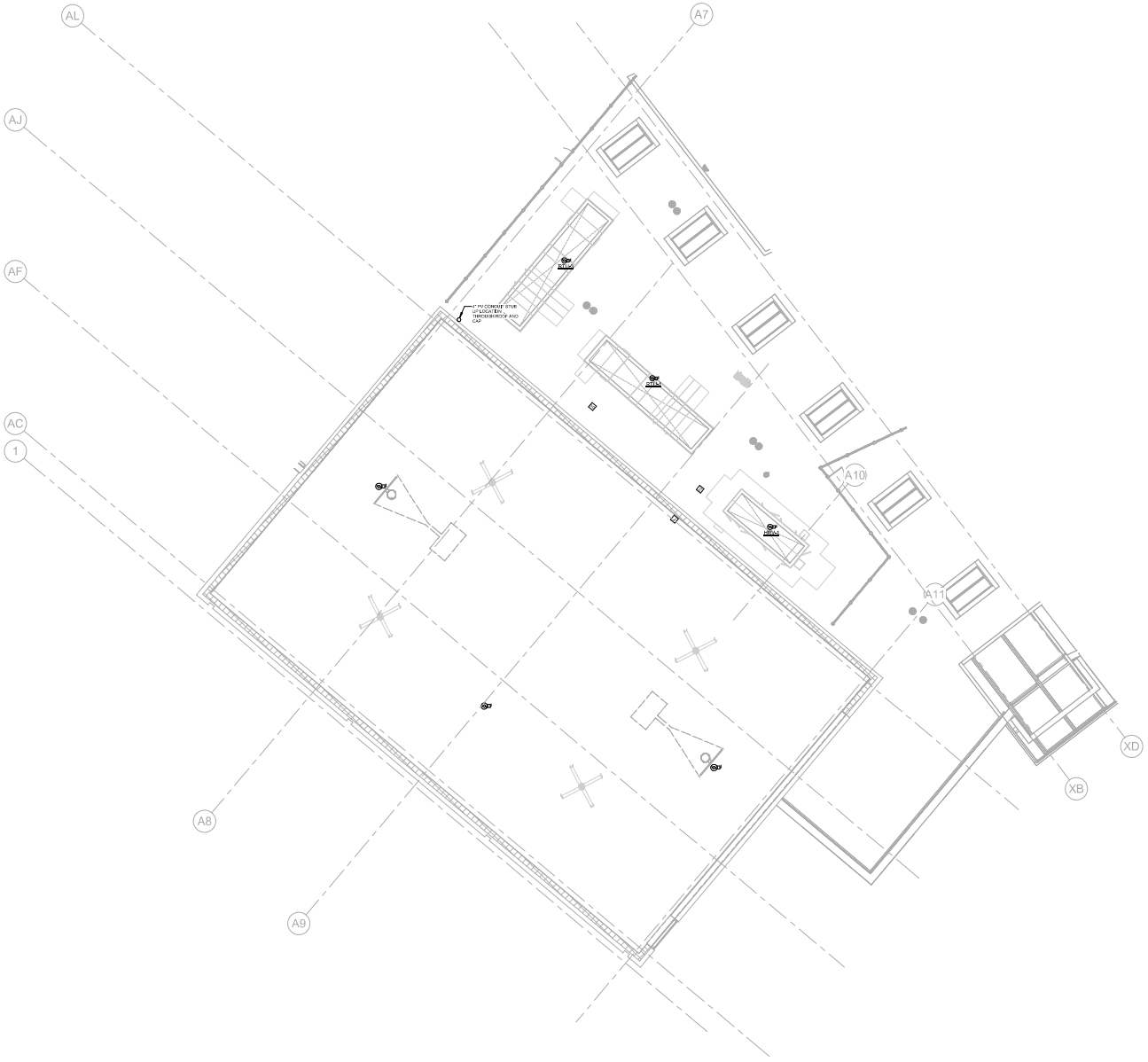

1 ELECTRICAL POWER SECOND FLOOR PLAN - B
1/8" = 1'-0"

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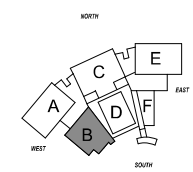

KEYPLAN

Number	Date	Issued For
	05/30/2024	BIDDING/PERMIT
	07/08/2024	PHASE 2

ELECTRICAL POWER SECOND FLOOR PLAN - PART B

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
22367.00

Drawing Number
EP102B

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KEYNOTES - ELECTRICAL POWER	
Key Value	Keynote Text
EP7	DOOR HARDWARE FURNISHED AND INSTALLED BY DIVISION 08, WIRED BY DIVISION 26, PROVIDE 120V CONNECTION TO DOOR HARDWARE IN 1" CONDUIT PER MANUFACTURER REQUIREMENTS FROM SPECIFICATION 085671 AND 087100



1 ELECTRICAL POWER SECOND FLOOR PLAN - C
1/8" = 1'-0"

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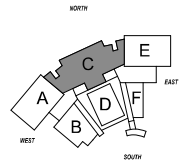

KEYPLAN

Number	Date	Issued For
	05/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ELECTRICAL POWER SECOND FLOOR PLAN - PART C

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
22367.00

Drawing Number
EP102C

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1 ELECTRICAL POWER SECOND FLOOR PLAN - D
1/8" = 1'-0"

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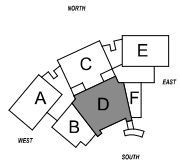

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ELECTRICAL POWER SECOND FLOOR PLAN - PART D

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
22367.00

Drawing Number
EP102D

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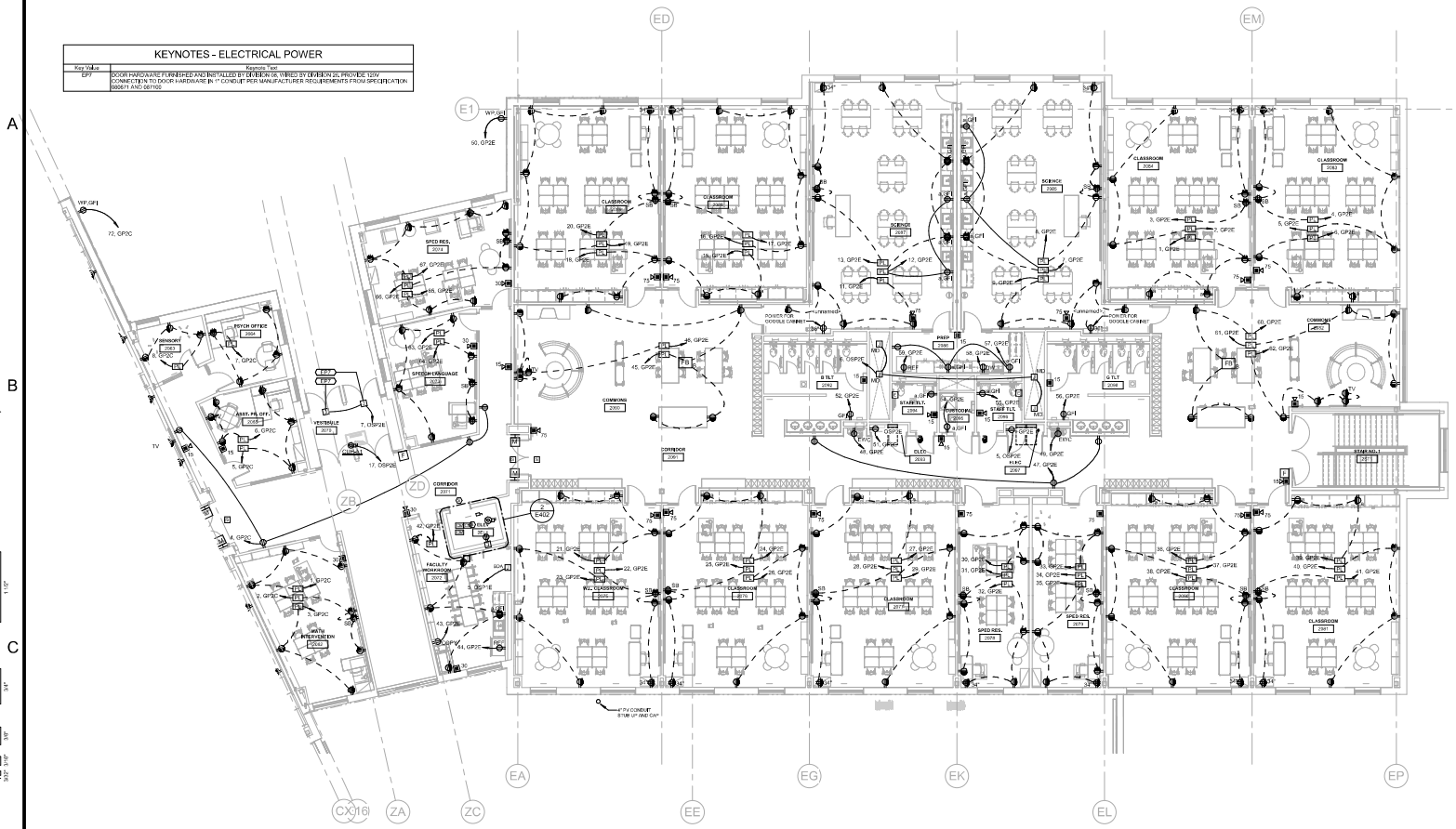
5/5/2024 11:45:19 AM

KEYNOTES - ELECTRICAL POWER	
Key Value	Keynote Text
EP7	DOOR HARDWARE FURNISHED AND INSTALLED BY DIVISION 08, WIRED BY DIVISION 26, PROVIDE 120V CONNECTION TO DOOR HARDWARE IN 1" CONDUIT PER MANUFACTURER REQUIREMENTS FROM SPECIFICATION 080671 AND 087100



1 ELECTRICAL POWER SECOND FLOOR PLAN - E
1/8" = 1'-0"

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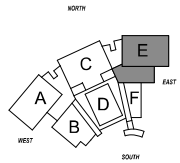

KEYPLAN

Number	Date	Issued For
	05/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ELECTRICAL POWER SECOND FLOOR PLAN - PART E

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
22367.00

Drawing Number
EP102E

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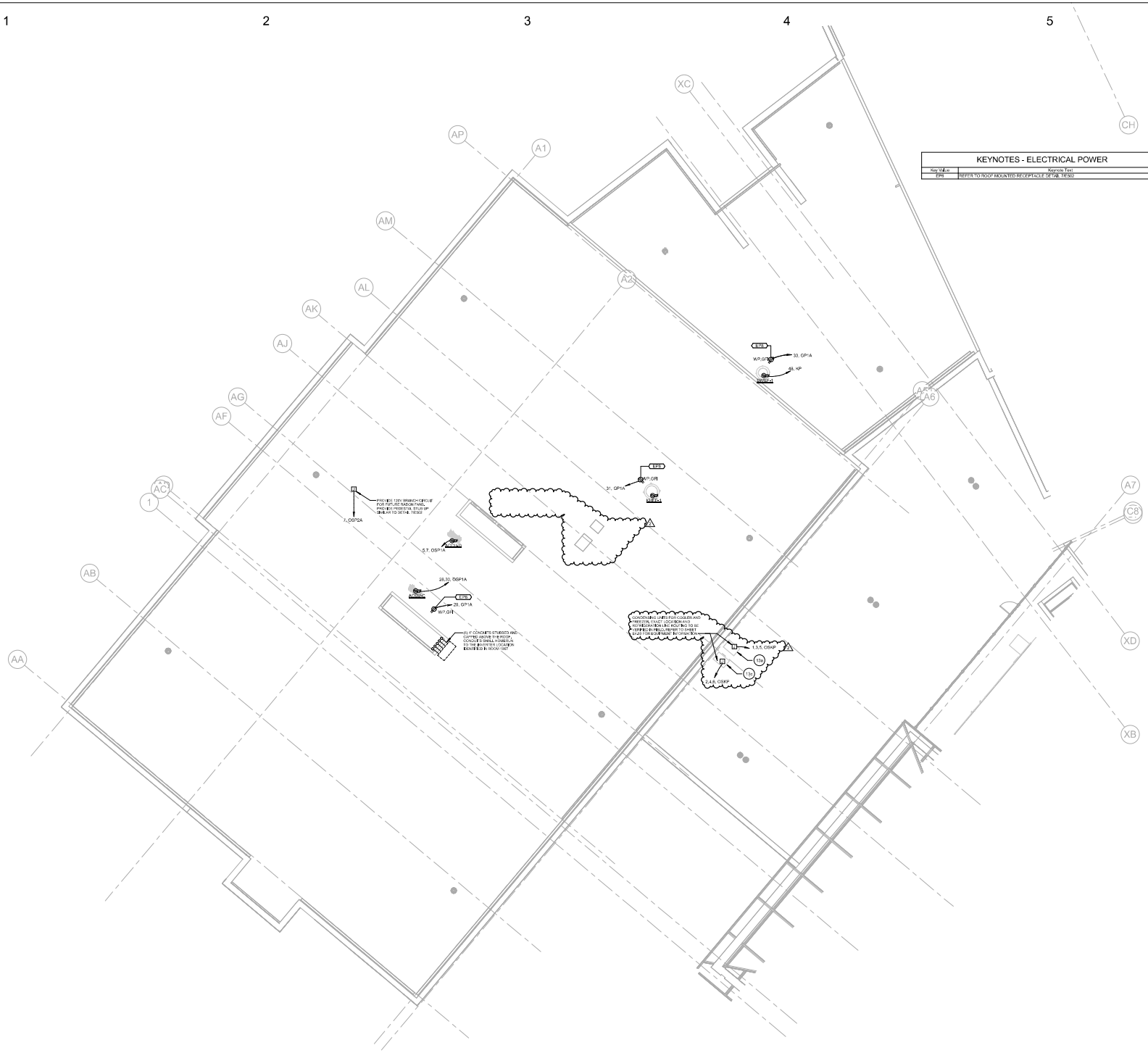

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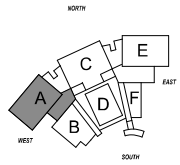


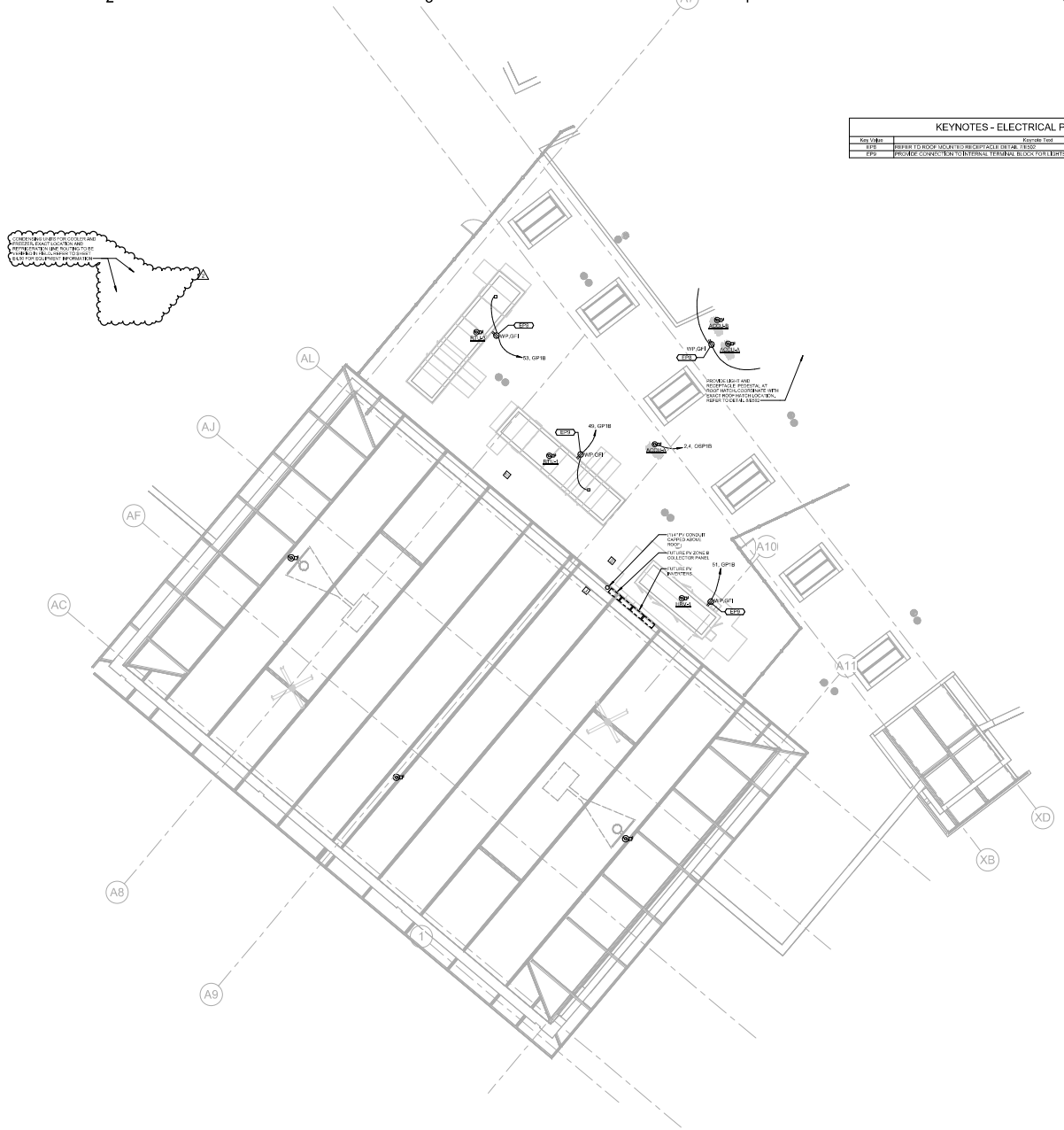
KEYPLAN

Number	Date	Issued For
2	10/23/2024	ADDENDUM NO. 3
	09/20/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ELECTRICAL POWER ROOF PLAN - PART A

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **EP103A**

10/23/2024 10:04:14 AM
Autodesk Docs://22367.00 - Greenwich Central Middle School/22-23/2305-MEP Central - Greenwich Central Middle School.rvt



KEYNOTES - ELECTRICAL POWER	
Key Value	Keynote Text
EP8	REFER TO ROOF MOUNTED RECEPTACLE DETAIL 7/E502
EP9	PROVIDE CONNECTION TO INTERNAL TERMINAL BLOCK FOR LIGHTS AND RECEPTACLES

1 ELECTRICAL POWER ROOF FLOOR PLAN - B
1/8" = 1'-0"

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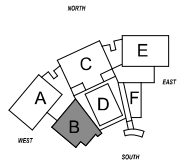

KEYPLAN

Number	Date	Issued For
2	10/23/2024	ADDENDUM NO. 3
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ELECTRICAL POWER ROOF PLAN - PART B

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
22367.00

Drawing Number
EP103B

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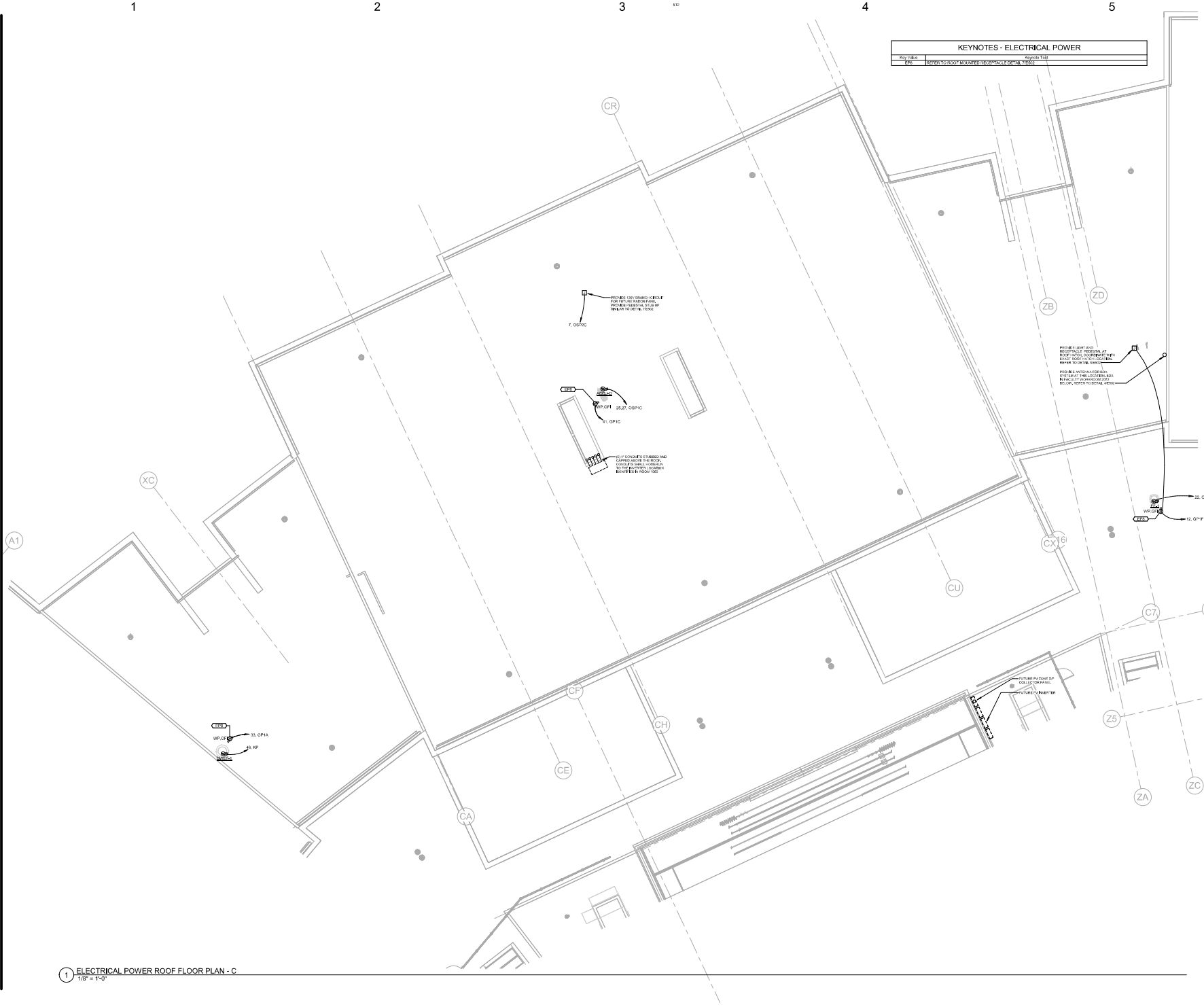

1 ELECTRICAL POWER ROOF FLOOR PLAN - C
1/8" = 1'-0"

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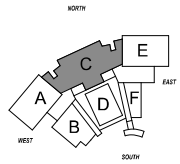

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ELECTRICAL POWER ROOF PLAN - PART C

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: EP103C

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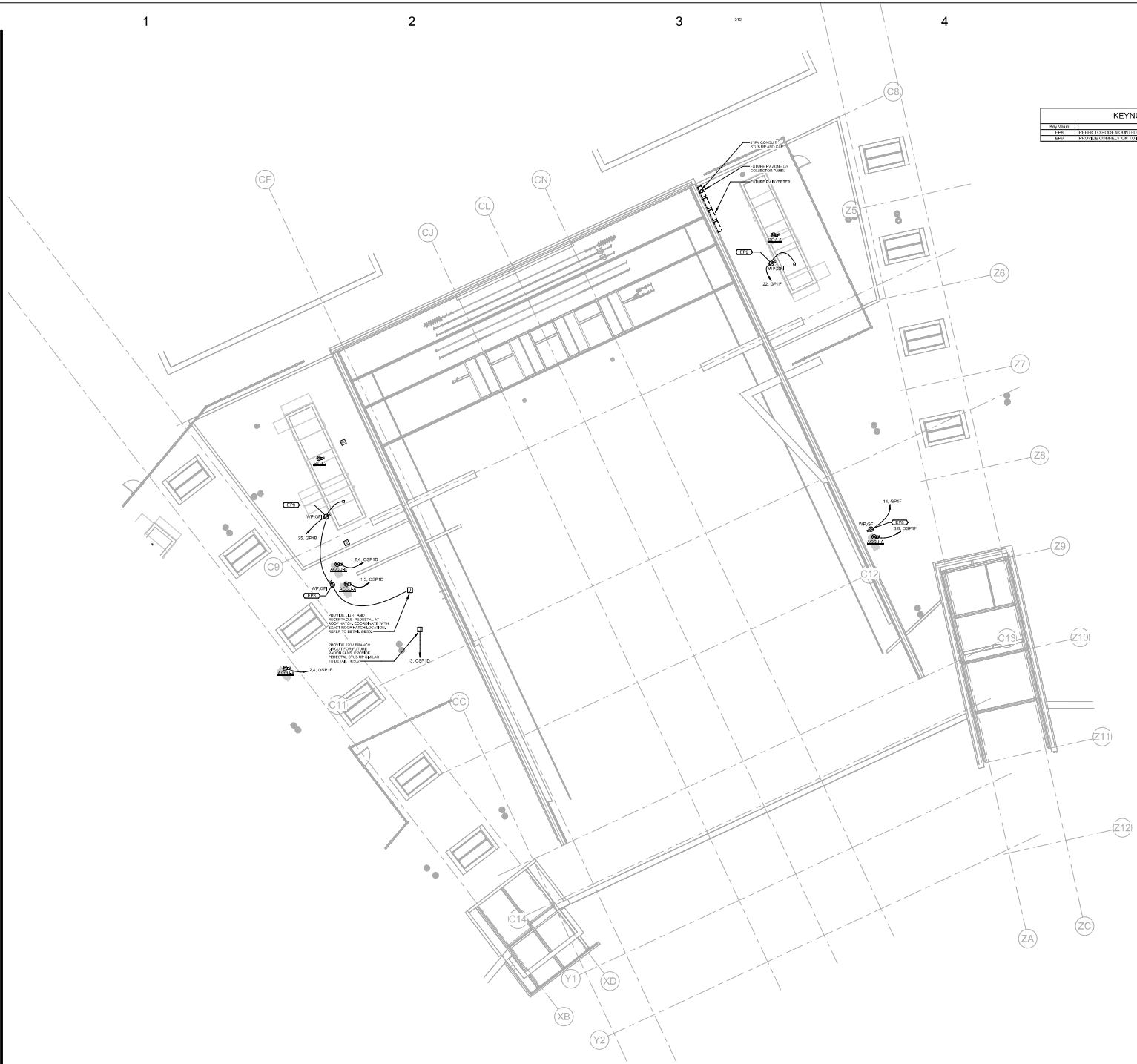

1 ELECTRICAL POWER ROOF FLOOR PLAN - D
1/8" = 1'-0"

KEYNOTES - ELECTRICAL POWER	
Key Value	Keynote Text
EP8	REFER TO ROOF MOUNTED RECEPTACLE DETAIL 7/E502
EP9	PROVIDE CONNECTION TO INTERNAL TERMINAL BLOCK FOR LIGHTS AND RECEPTACLES

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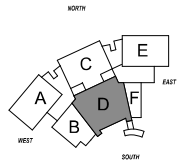

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ELECTRICAL POWER ROOF PLAN - PART D

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
22367.00

Drawing Number
EP103D

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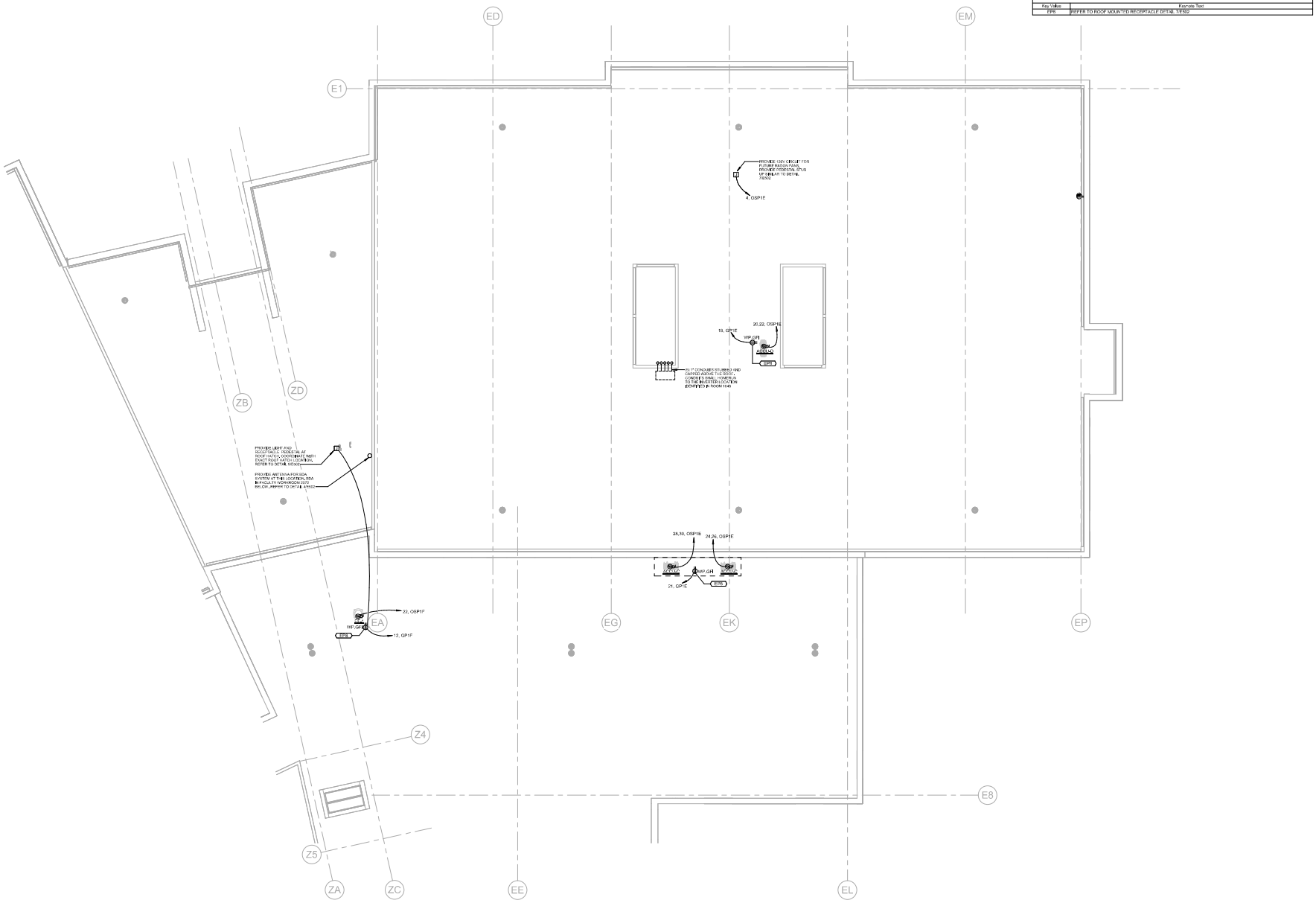

1 ELECTRICAL POWER ROOF FLOOR PLAN - E
1/8" = 1'-0"

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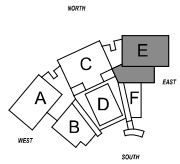

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ELECTRICAL POWER ROOF PLAN - PART E

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **EP103E**

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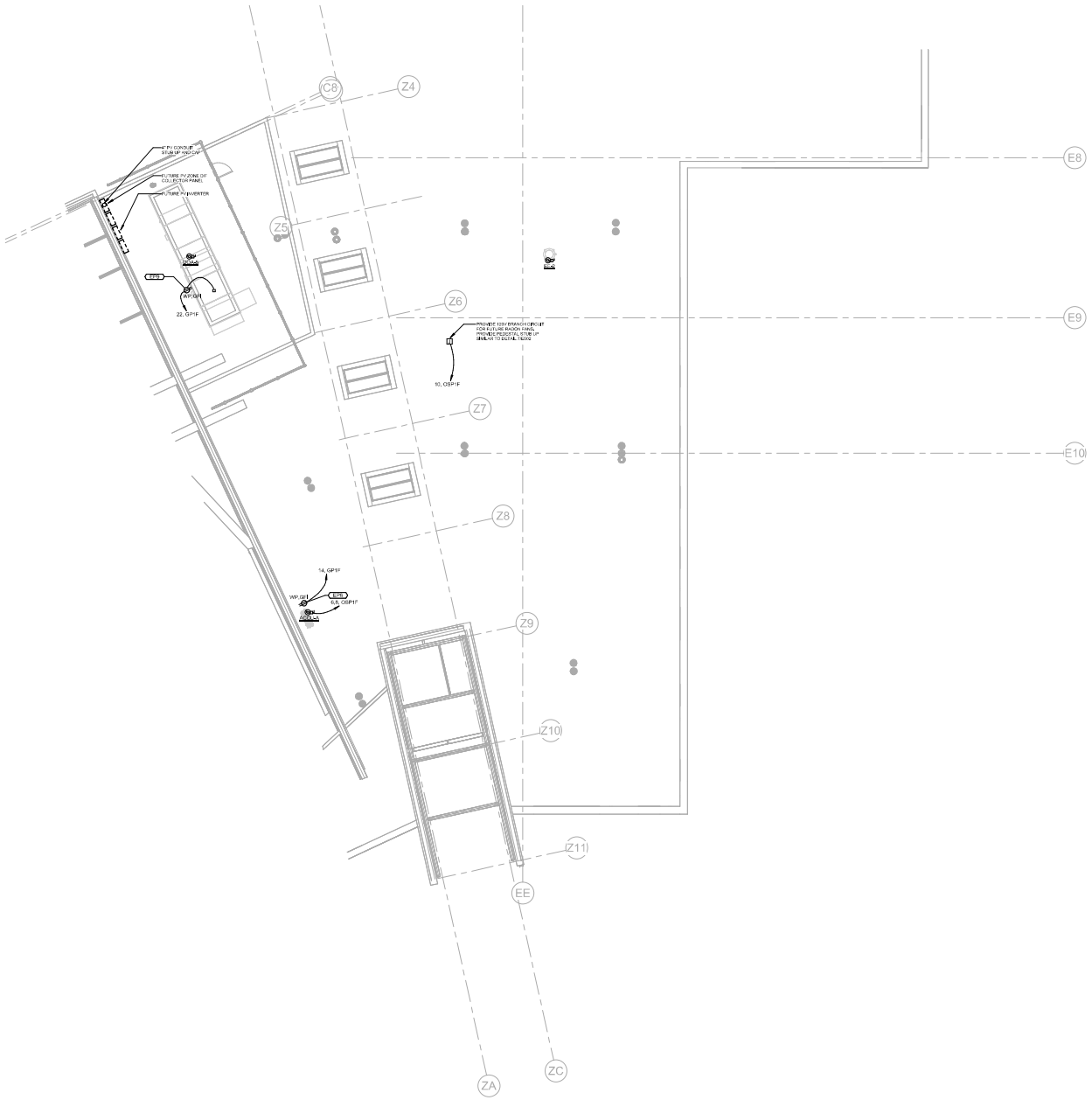
5/24/2024 11:45:18 AM



1 ELECTRICAL POWER ROOF FLOOR PLAN - F
1/8" = 1'-0"

KEYNOTES - ELECTRICAL POWER	
Key Value	Keynote Text
E26	REFER TO ROOF MOUNTED RECEPTACLE DETAIL 7/E6/2
E76	PROVIDE CONNECTION TO INTERNAL TERMINAL BLOCK FOR LIGHTS AND RECEPTACLES

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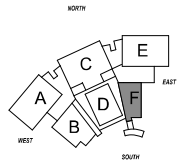

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

ELECTRICAL POWER ROOF PLAN - PART F

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: EP103F

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5/5/2024 11:45:24 AM

COMMUNICATION CABLING INFRASTRUCTURE

REFER TO SPECIFICATION SECTION 27 1000 FOR DEVICES

SYMBOL	DESCRIPTION	OUTLET BOX & CONDUIT SIZES PROVIDED & INSTALLED BY ELECTRICAL CONTRACTOR: MOUNTING AFF UNLESS OTHERWISE NOTED	1 G - 2 1/2" DP	4 x 4" x 2 1/8" DP	1G DEVICE RING	1" C	CHIEF #PACDSFCW	LEGRAND #EPS84	CABLE & TERMINATION PROVIDED & INSTALLED BY LOW VOLTAGE CONTRACTOR: CAT5A SHLD PLENUM CABLE	BP8C (RJ45) JACK - CAT5A	FACEPLATE - DATA	WALL PHONE MTG PLATE	HUBBELL #NS82WP	CAT5 PLENUM CABLE	BP8C (RJ45) JACK - CAT5				COMMMENTS
W	WALL PHONE OUTLET	48" AFF	1		1	1						1		1	1				
1D	1 DATA OUTLET	18" AFF		1	1	1					1			1	1				
2D	2 DATA OUTLET	18" AFF		1	1	1					1			2	2				
3D	3 DATA OUTLET	18" AFF		1	1	1					1			3	3				
4D	4 DATA OUTLET	18" AFF		1	1	1					1			4	4				
1V1D	1 VOICE - 1 DATA OUTLET	18" AFF		1	1	1					1			2	2				
1V2D	1 VOICE - 2 DATA OUTLET	18" AFF		1	1	1					1			3	3				
2V2D	2 VOICE - 2 DATA OUTLET	18" AFF		1	1	1					1			4	4				
1V	1 VOICE OUTLET	18" AFF		1	1	1					1			1	1				
#/ #O	FLOOR BOX					A/R			A/R	A/R	1								REFER TO ELECTRICAL DRAWINGS FOR FLOOR BOX CONDUIT REQUIREMENTS. # - DENOTES QTY OF CABLES
#/ #O	CEILING MOUNTED BOX			1	1	A/R			A/R	A/R	1								CEILING MOUNTED DEVICES. # -DENOTES QTY OF CABLES
AP	WIRELESS ACCESS POINT CEILING MOUNTED								2	2			1						CEILING MOUNTED AP SHALL HAVE A 15FT SERVICE LOOP AND LOCATED AT APPROXIMATE LOCATIONS SHOWN ON PLANS. REFER TO DETAILS FOR ADDITIONAL INFORMATION.
AP	WIRELESS ACCESS POINT WALL MOUNTED	95" AFF	1		1	1			2	2			1						
	ETHERNET CABLE FOR CAMERA			1	1									1	1	1			INCLUDE 15 FT SERVICE LOOP FOR CABLING, CONFIRMING OBSTRUCTIONS BLOCK THE INTENDED CAMERA FIELD OF VIEW PRIOR TO INSTALLATION OF CABLING, WHICH MAY INCLUDE: SIGNAGE, PENDANT LIGHTS, SPEAKERS, TREES, OR ANY OTHER OBSTRUCTIONS IN THE IMMEDIATE FIELD OF VIEW. BRING ALL FIELD OF VIEW OBSTRUCTIONS TO THE ATTENTION OF THE SECURITY CONSULTANT.
	ETHERNET CABLE FOR CAMERA			1	1									1	1	1			
	ETHERNET CABLE FOR CAMERA			1	1									1	1	1			
AB	ETHERNET CABLE FOR ALERT BEACON	88" AFF		1	1									1	1				
TTS	ETHERNET CABLE FOR TEXT TO SPEECH MODULE	88" AFF		1	1									1	1				
IE-XX	ETHERNET CABLE FOR INTERACTIVE DISPLAY	60" AFF				2	1							1	2	2			COORDINATE POWER IN CHIEF BOX. COIL ETHERNET IN BOX.
MO-XX	ETHERNET CABLE FOR DISPLAY/MONITOR	60" AFF				1		1						1	1	1			COORDINATE POWER IN CHIEF BOX. COIL ETHERNET IN BOX.
PE	ETHERNET CABLING FOR FUTURE PLENUM ENCLOSURE					A/R								1	1	1			COIL IN CEILING WITH 10' SERVICE LOOP. COORDINATE IN FIELD NEAR ENCLOSURE POWER IN CEILING.

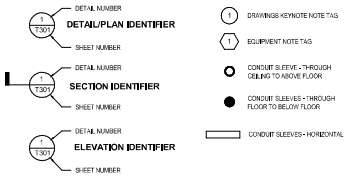
PUBLIC ADDRESS & CLOCKS

REFER TO SPECIFICATION 27 5116 FOR PA DEVICES & 27 5313 OF CLOCK DEVICES

SYMBOL	DESCRIPTION	OUTLET BOX & CONDUIT SIZES PROVIDED & INSTALLED BY ELECTRICAL CONTRACTOR: MOUNTING AFF UNLESS OTHERWISE NOTED	2G - 2 1/2" DP	1G - DEVICE RING	3/4" C	CABLING PROVIDED & INSTALLED BY PA CONTRACTOR: PLENUM RATED CABLE A/R					COMMMENTS
VC	PA SPEAKER W/BUILT-IN VOLUME CONTROL					1					VERIFY COLOR WITH ARCHITECT
S	PA SPEAKER - 8" DIAMETER					1					VERIFY COLOR WITH ARCHITECT
S 2x2	CLASSROOM SPEAKER 2' X 2' TILE					1					
PS	PA WALL MOUNTED BOX SPEAKER	96" AFF	1		1	1					VERIFY COLOR WITH ARCHITECT
VC	PA VOLUME CONTROL	48" AFF	1	1	1	1					VOLUME CONTROL SHALL CONTROL THE SPEAKERS SHOWN WITHIN THE SAME ROOM. CONFIRM COLOR WITH ARCHITECT.
PA	PA MASTER HANDSET BOGEN #MCDS4					1					INCLUDE CABLING A/R, DATA JACK, & FACEPLATE FOR CABLING.
CS	PA CALL SWITCH	48" AFF	1	1	1	1					CS SHALL ACTIVATE 2-WAY CONVERSATIONS BETWEEN CLASSROOM SPEAKERS AND MAIN OFFICE. CABLING A/R
HN	PA HORN SPEAKER			1		1					SECURE HORNS TO STRUCTURE. EXTERIOR HORNS SHALL RECEIVE PROPER WEATHER PROOFING ASSEMBLY.
PSB	PA STROBE	108" AFF	1	1	1	1					
PS	PA PENDANT SPEAKER			1		1					
	CLOCK - ALL CLOCKS ARE 12" DIA. CLOCKS NOTED AS 16 ARE TO BE 16" DIA. CLOCKS	96" AFF									REFER TO ARCHITECTURAL PLAN FOR MOUNTING HEIGHT.

RESPONSIBILITY MATRIX			
DEFINITIONS & NOTES: OFOI = Owner Furnished / Owner Installed CICO = Contractor Furnished / Contractor Installed NOTE = Scope Delineation of bids per Bid Packages			
	DISCIPLINE	OW/OI	CI/CO
1	SERVICE INTO BUILDING		
	PHONE, CABLE, FIBER, OTHER SERVICE FROM STREET	X	
	LIGHTNING PROTECTION FOR COPPER INTO BUILDING	X	
	PATHWAYS / CONDUIT INTO BUILDING FOR SERVICE PROVIDER		X
2	HORIZONTAL CABLING		
	CATEGORY RATED ETHERNET CABLE		X
	TERMINATION EQUIPMENT AND TERMINATIONS		X
	TESTING OF ETHERNET CABLE		X
	EXTENDED MANUFACTURER'S WARRANTY		X
	CABLE TRAY & J HOOKS		X
	FLOOR BOXES		X
	PATHWAYS, CONDUIT, OUTLET BOXES, AND PENETRATIONS		X
	FIRESTOPPING		X
3	BACKBONE CABLING (FIBER, COPPER, & GROUNDING)		
	CATEGORY RATED ETHERNET CABLE & FIBER BACKBONE		X
	TERMINATION EQUIPMENT AND TERMINATIONS		X
	TESTING OF FIBER & COPPER CAT6A		X
	EXTENDED MANUFACTURER'S WARRANTY		X
	CABLE TRAY & J HOOKS		X
	PATHWAYS, CONDUIT, OUTLET BOXES, AND PENETRATIONS		X
	GROUNDING CONDUCTOR BETWEEN DATA ROOMS		X
	GROUNDING BUSBARS AND GROUNDING OF EQUIPMENT TO BUSBARS		X
	GROUNDING OF BUSBARS TO ELECTRICAL PANELS OR OTHER MEANS		X
	FIRESTOPPING		X
4	DATA ROOM BUILDOUT		
	EQUIPMENT RACKS & CABINETS		X
	PATCH PANELS (SHIELDED / UNSHIELDED CAT6A)		X
	WIRE MANAGERS - VERTICAL & HORIZONTAL		X
	CABLE TRAY & J HOOKS		X
	PVC BACKER BOARD		X
	GROUNDING OF DATA EQUIPMENT TO BUSBARS		X
	GROUNDING OF BUSBARS TO ELECTRICAL PANELS OR OTHER MEANS		X
	FIRESTOPPING		X
	SECURITY SYSTEM SERVERS		X
	POWER		X
	UPS'S & PDU'S		X
	PATCH CORDS TO CAMERAS AND SPECIFIED AV DEVICES		X
	PATCH CORDS TO SWITCHES (FIBER & COPPER) IN MDF / IDF	X	
5	TECHNOLOGY EQUIPMENT		
	WIRELESS ACCESS POINTS	X	
	BUILDING LAN NETWORK ELECTRONICS (SWITCHES) IN MDF/IDF	X	
	PHONE SYSTEM INCLUDING HANDSETS AND SERVERS	X	
	CCTV (CAMERAS) AND SECURITY SERVERS	X	
6	PHYSICAL SECURITY SYSTEMS		
	SECURITY CAMERAS		X
	SECURITY CABLING FOR INTRUSION DETECTION & ACCESS CONTROL		X
	INTRUSION DETECTION DEVICES AND PANELS		X
	ACCESS CONTROL DEVICES AND PANELS		X
	SECURITY SYSTEM SERVERS		X
	SECURITY SYSTEM LICENSING		X
7	AUDIO VIDEO SYSTEMS		
	BACKBOX, CONDUIT, AND PATHWAYS FOR ALL AV SYSTEMS SHOWN ON DRAWINGS		X
	CLASSROOM AV DEVICES AND CABLING	X	
	OFFICE AV DEVICES AND CABLING	X	
	CONFERENCE ROOM AV DEVICES AND CABLING	X	
	CCTV (VIDEO) MONITORS, DRAWING BOARDS, AV SWITCHES, CONFIGURATION - COMPLETE SYSTEM		X
	GYMNASIUM AV DEVICES, CABLING, LICENSES, AV SWITCHES, CONFIGURATION - COMPLETE SYSTEM		X
	GYMNASIUM AV DEVICES, CABLING, LICENSES, AV SWITCHES, CONFIGURATION - COMPLETE SYSTEM		X

GENERAL PLAN SYMBOLS



GENERAL NOTES

1. DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS AND WORK INCLUDED IN THE CONTRACT.
2. ALL COMMUNICATION OUTLETS MUST COINCIDE WITH ELECTRICAL POWER DRAWINGS AND SECURITY DRAWINGS. THE CONTRACTOR MUST COORDINATE ALL LOCATIONS OF THE ELECTRICAL OUTLETS WITH THE DATA OUTLETS.
3. REQUIRED CABLE COLORS: SUBMIT ALL CABLE AND JACK COLOR WITH PRODUCT SUBMITTALS PRIOR TO PROCUREMENT
4. LABEL ALL CABLES WITHIN 12" OF FINAL TERMINATION.
5. THE CONTRACTOR SHALL MAINTAIN THE TWIST OF THE INDIVIDUAL PAIRS TO WITHIN 1/2" OF FINAL TERMINATION FOR ALL CATEGORY 3 OR HIGHER CABLE.
6. USE ONLY HOOK AND LOOP CABLE TIES (VELCRO) FOR CABLES RATED CATEGORY 3 OR HIGHER.
7. ALL CABLES RUN IN CEILING AREAS SHALL BE PROPERLY SUPPORTED WITH CONDUIT OR J-HOOKS MOUNTED TO SLAT AT MINIMUM OF 5' INTERVALS. NO CABLE SHALL REST OR TOUCH CEILING ASSEMBLIES. CABLES SHALL NOT BE INSTALLED EXPOSED IN OPEN CEILING AREAS.
8. ALL LABELS SHALL BE MACHINE PRINTED. NO HAND LETTERED LABELS SHALL BE USED.
9. USE ONLY PLENUM RATED CABLES.
10. DO NOT RUN ETHERNET CABLES PARALLEL TO POWER CABLES. CROSS POWER CABLES ONLY AT RIGHT ANGLES.
11. MAINTAIN 5" DISTANCE FROM ALL LIGHTING TRANSFORMERS.
12. COLOR AND STYLE OF TELECOMMUNICATION FACE PLATES SHALL MATCH ELECTRICAL FACE PLATES AND BE COORDINATED WITH AND CONFIRMED BY THE ARCHITECT.
13. OBTAIN AND EXTEND TO OWNER ALL AVAILABLE MANUFACTURER AND SYSTEM WARRANTIES. THE LOW VOLTAGE INSTALLATION CONTRACTOR SHALL SUBMIT ALL TEST RESULTS TO THE CABLE MANUFACTURER TO CERTIFY THE CABLING INSTALLATION AND ATTAIN AND DELIVER TO THE OWNER THE EXTENDED MANUFACTURER'S WARRANTY FOR MATERIAL AND WORKMANSHIP.
14. SPLICING CABLES IS NOT PERMITTED EXCEPT AS SPECIFICALLY NOTED.
15. DEVICE CABLING SHALL BE TERMINATED WITHIN THE INDICATED DATA ROOMS AND SHALL BE TERMINATED ONTO A 19" RACK MOUNTED, RJ45, 48 PORT, CATEGORY 6A RATED PATCH PANEL.
16. THE FOLLOWING CABLING SHALL BE TERMINATED ONTO IT'S OWN DISCRETE AND SEPARATE CATEGORY 6A RATED, RACK MOUNTED PATCH PANELS, REFER TO RACK ELEVATION DETAILS:
    A. ALL WIRELESS APS
    B. ALL VIDEO SURVEILLANCE CAMERAS (REFER TO SECURITY DRAWINGS FOR PLACEMENT)
17. LOCATIONS OF EQUIPMENT FOR ALL OTHER TRADES SHALL BE COORDINATED BEFORE CONSTRUCTION.
18. THE CONTRACTOR SHALL COORDINATE LAYOUT LOCATIONS AND CLEARANCE OF ALL EQUIPMENT WITH OTHER TRADES AND ATTAIN OWNER'S APPROVAL PRIOR TO INSTALLATION.
19. CONTRACTOR SHALL COORDINATE ALL RACEWAYS, LOCATIONS, AND POWER REQUIREMENTS WITH THE ELECTRICAL CONTRACTOR.
20. ALL VOICE AND DATA OUTLETS THAT DO NOT HAVE AN ELECTRICAL OUTLET WITHIN 3FT SHALL BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE THE PROJECT ARCHITECT, CONSTRUCTION MANAGER, AND TECHNOLOGY CONSULTANT PRIOR TO THE TIME OF INSTALLATION.
21. ALL DEVICES SHOWN ON THESE PLANS MUST BE COORDINATED AND APPROVED BY THE ARCHITECT. THE INSTALLATION CONTRACTOR SHALL DEPICT ALL DEVICES ONTO ELEVATION SUBMITTALS BEFORE INSTALLATION. ANY DEVICE THAT IS NOT APPROVED BY THE ARCHITECT PRIOR TO INSTALLATION MAY BE REQUIRED TO BE RELOCATED AS DIRECTED BY THE ARCHITECT AND COORDINATED BY THE CONTRACTOR WITH NO ADDITIONAL CHARGE TO THIS PROJECT.
22. ALL PATHWAYS, INCLUDING ALL WALL AND CEILING PENETRATIONS ARE REQUIRED TO INSTALL CABLING TO THE END DEVICE AND SHALL BE COORDINATED BETWEEN THE LOW VOLTAGE AND SECURITY CONTRACTOR AND THE ELECTRICAL CONTRACTOR AND SHALL BE INCLUDED AS PART OF THIS SECTION.
23. SECURE ATTACHMENT OF TECHNOLOGY AND SECURITY DEVICES:
    A. TO ENSURE PROPER ATTACHMENT OF FIXTURES, FURNISHINGS & EQUIPMENT ITEMS, INCLUDING AND TECHNOLOGY ITEMS. WHERE "ITEMS" ARE ATTACHED TO WALL, CEILING, OVERHEAD STRUCTURE, AND/OR FLOOR, CONTRACTOR SHALL PROVIDE INFORMATION ADEQUATE FOR ARCHITECT TO VERIFY ITEMS ATTACHED TO WALL, CEILING, AND/OR FLOOR ARE ATTACHED SECURELY AND PER MANUFACTURER'S RECOMMENDATIONS. ARCHITECT'S REVIEW MAY BE IMPLEMENTED DURING SUBMITTAL PROCESS.
    B. CONTRACTOR SHALL PROVIDE STRUTS, HANGERS, FASTENERS, SAFETY HARNESSES, CHANNELS, BOLTS, SCREWS, RODS, ETC., TO SECURELY ATTACH ITEMS TO THE EXISTING STRUCTURE AS REQUIRED TO MEET FIELD CONDITIONS AND MEET APPLICABLE CODES.
24. ALL CONDUIT IS TO ABOVE ACCESSIBLE CEILING UNLESS OTHERWISE NOTED.
25. PLACEMENT OF ALL SECURITY VIDEO SURVEILLANCE CAMERA CABLING MUST BE COORDINATED WITH THE SECURITY CONTRACTOR AND APPROVED BY THE SECURITY CONSULTANT AND/OR OWNER PRIOR TO CONSTRUCTION.

TECHNOLOGY ABBREVIATIONS

(NOTE: NOT ALL ABBREVIATIONS APPLICABLE)

AFF	ABOVE FINISH FLOOR
AFG	ABOVE FINISHED GRADE
AIC	ABOVE COUNTER
ACS	ACCESS CONTROL SYSTEM
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
AIR	AS REQUIRED
AWG	AMERICAN WIRE GAUGE
BICSI	BUILDING INDUSTRY CONSULTING SERVICE INTERNATIONAL
BNC	BAYONET NEILL-CONCELMAN
C	CONDUIT(S)
DEMARC	DEMARCATION
DPDT	DOUBLE THROW DOUBLE PULL
EIA	ELECTRONICS INDUSTRIES ALLIANCE
EMT	ELECTRICAL METALLIC TUBING
FACP	FIRE ALARM CONTROL PANEL
F	FACSIMILE (FAX)
IDS	INTRUSION DETECTION SYSTEM
LAN	LOCAL AREA NETWORK
MER	MAIN EQUIPMENT ROOM
NEC	NATIONAL ELECTRIC CODE
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
O/E	OWNER FURNISHED EQUIPMENT
PA	PUBLIC ADDRESS
PBX	PRIVATE BRANCH EXCHANGE
PC	PERSONAL COMPUTER
PoE	POWER OVER ETHERNET
PP	PATCH PANEL
PVC	POLYVINYL CHLORIDE CONDUIT
QTY	QUANTITY
STP	SHIELDED TWISTED PAIR
TBB	TELECOMMUNICATIONS BONDING BACKBONE
TGB	TELECOMMUNICATIONS GROUNDING BUSBAR
TIA	TELECOMMUNICATIONS INDUSTRY ASSOCIATIONS
TMGB	TELECOMMUNICATIONS MAIN GROUNDING BUSBAR
TR	TELECOMMUNICATIONS ROOM
TV	TELEVISION
TYP	TYPICAL
UON	UNLESS OTHERWISE NOTED
UPS	UNINTERRUPTIBLE POWER SUPPLY
UTP	UNSHIELDED TWISTED PAIR
VGA	VIDEO GRAPHICS ARRAY
VoIP	VOICE OVER INTERNET PROTOCOL
VSS	VIDEO SURVEILLANCE SYSTEM
W	WALL TELEPHONE (VOICE)
WAN	WIDE AREA NETWORK
WAO	WORK AREA OUTLET
WAP	WIRELESS (DATA) ACCESS POINT
WG	WIRE GUARD
WP	WEATHERPROOF

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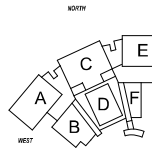

KEYPLAN

Number	Date	Issued For
1	10/16/2024	Addendum No. 2
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

TECHNOLOGY SYMBOL LEGEND & GENERAL NOTES

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Scale: NTS
Proj. Number: 22367.00
Drawing Number: T000

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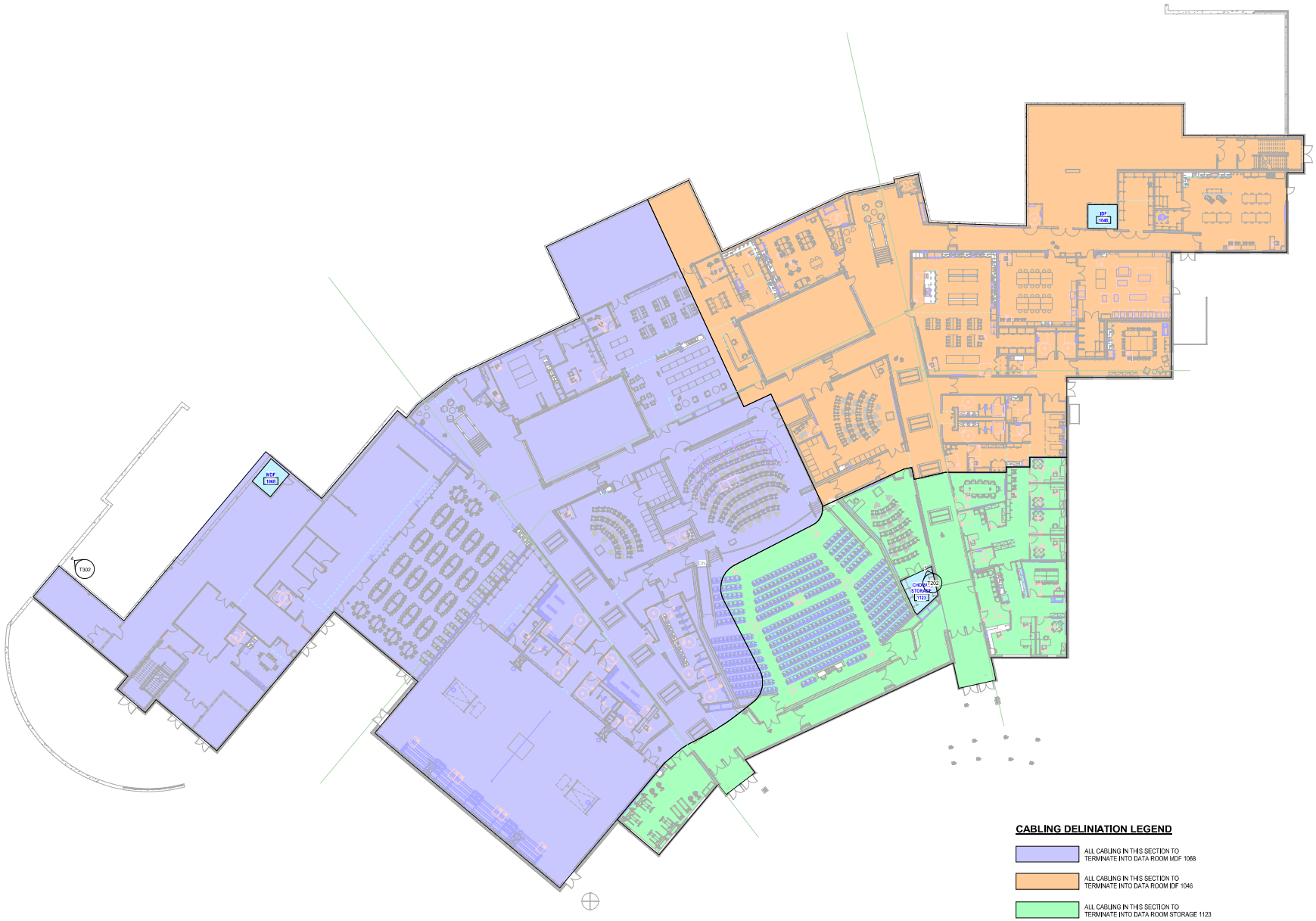

CABLING DELINIATION LEGEND

- ALL CABLING IN THIS SECTION TO TERMINATE INTO DATA ROOM MDF 1068
- ALL CABLING IN THIS SECTION TO TERMINATE INTO DATA ROOM IDF 1046
- ALL CABLING IN THIS SECTION TO TERMINATE INTO DATA ROOM STORAGE 1123

1 TECHNOLOGY OVERALL FIRST FLOOR
1/16" = 1'-0"

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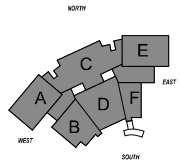

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

TECHNOLOGY OVERALL FIRST FLOOR PLAN
CABLING DELINIATION PLAN

Date: 07/08/2024
Scale: 1/16" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **T001**

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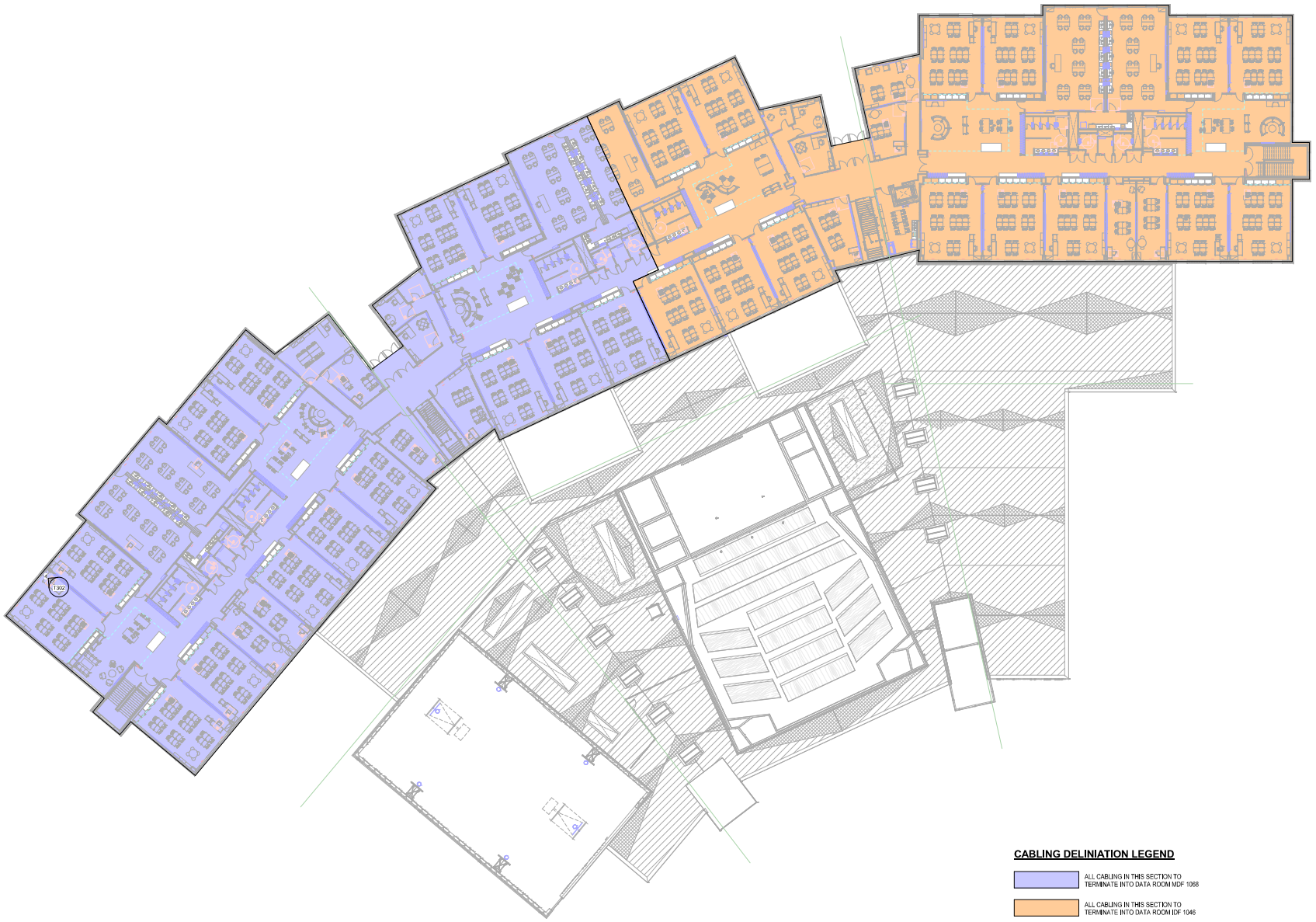

CABLING DELINIATION LEGEND

- ALL CABLING IN THIS SECTION TO TERMINATE INTO DATA ROOM MDF 1068
- ALL CABLING IN THIS SECTION TO TERMINATE INTO DATA ROOM IDF 1046
- ALL CABLING IN THIS SECTION TO TERMINATE INTO DATA ROOM STORAGE 1123

1 TECHNOLOGY OVERALL SECOND FLOOR
1/16" = 1'-0"

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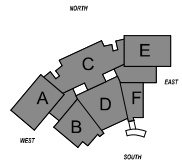

KEYPLAN

Number	Date	Issued For
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TECHNOLOGY OVERALL SECOND FLOOR PLAN CABLE DELINIATION PLAN

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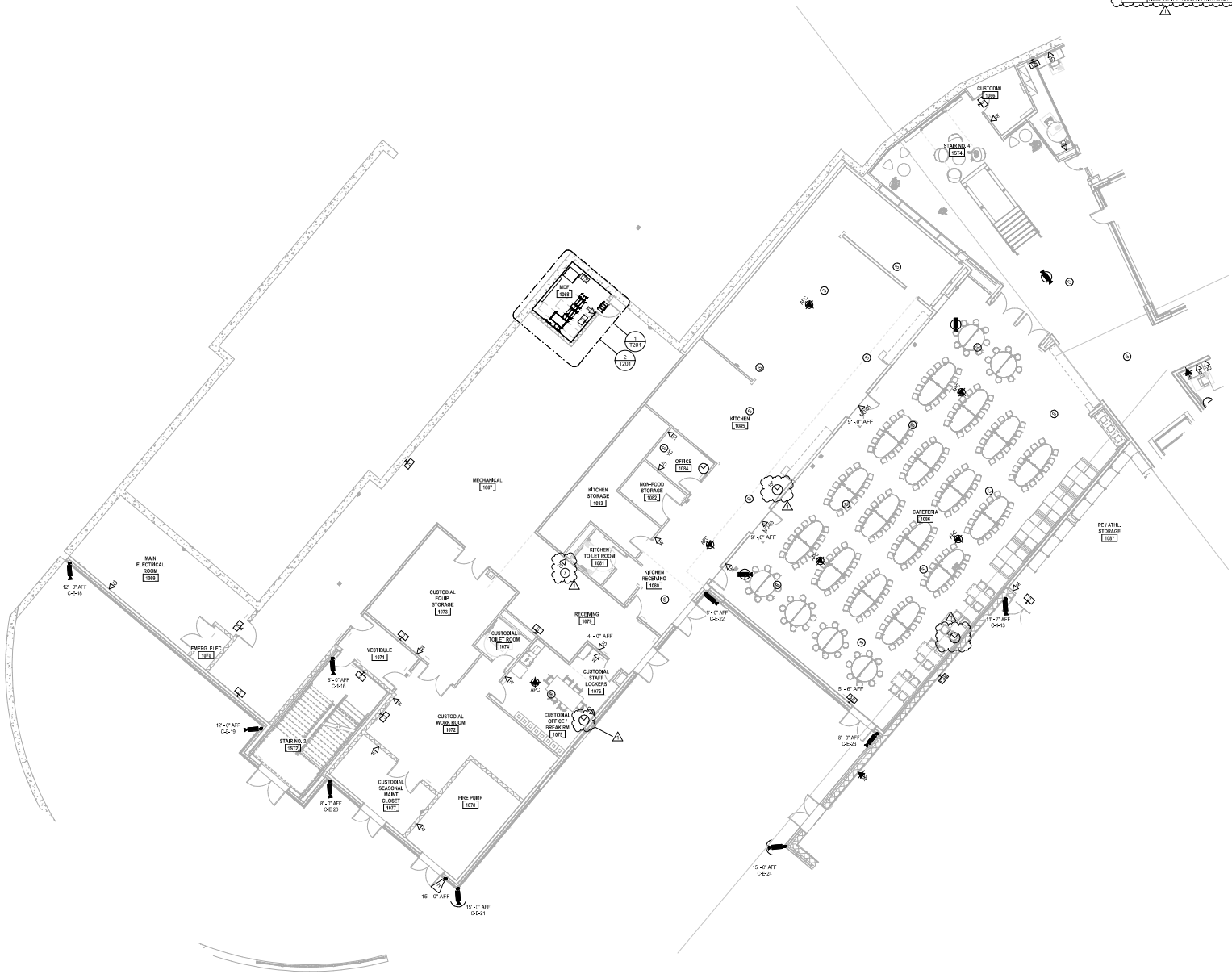
TECHNOLOGY DRAWING KEYNOTES

No.	DESCRIPTION
1	MOUNT OUTLETS ABOVE COUNTER
2	INCLUDE OBERON PROTECTIVE BOX FOR WIRELSS ACCESS POINT
3	COORDINATE WITH ELEVATOR VENDOR FOR POTS LINE, TERMINATE CABLE DIRECTLY TO 110 BLOCK IN MDF.
4	FACTORY PAINT SPEAKER BLACK
5	SPEAKER SHALL BE SOUNDTUBE #CM31-EZ OR EQUIVALENT. USE INDOOR/OUTDOOR RATED SPEAKER CABLE AND WEATHERIZE ALL PENETRATIONS AND OPENINGS.
6	PROPERLY SECURE HORNS TO STEEL DECKING ABOVE. BOTTOM OF SPEAKERS TO BE ABOVE BOTTOM OF JOISTS. [illegible] LL GYM HORNS.
7	FIELD VERIFY ROUGHIN WITH BMS / FACP VENDOR.



1 1.0 - TECHNOLOGY FIRST FLOOR PLAN A
1/8" = 1'-0"

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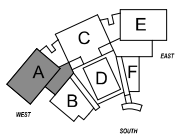

KEYPLAN

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1	10/16/2024	Addendum No. 2
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TECHNOLOGY FIRST FLOOR PLAN A

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Drawing Number: T101A

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1 1.0 - TECHNOLOGY FIRST FLOOR PLAN B
1/8" = 1'-0"

TECHNOLOGY DRAWING KEYNOTES

No.	DESCRIPTION
1	MOUNT OUTLETS ABOVE COUNTER
2	INCLUDE OBERON PROTECTIVE BOX FOR WIRELESS ACCESS POINT
3	COORDINATE WITH ELEVATOR VENDOR FOR POTS LINE. TERMINATE CABLE DIRECTLY TO 110 BLOCK IN MDF.
4	FACTORY PAINT SPEAKER BLACK
5	SPEAKER SHALL BE SOUNDTUBE ACMG-EZ OR EQUIVALENT. USE INDOOR/OUTDOOR RATED SPEAKER CABLE AND WEATHERIZE ALL PENETRATIONS AND OPENINGS.
6	PROPERLY SECURE HORNS TO STEEL DECKING ABOVE. BOTTOM OF SPEAKERS TO BE ABOVE BOTTOM OF JOISTS. COORDINATE SPEAKER LOCATIONS FOR BEST COVERAGE. TYP ALL GYM HORNS.
7	FIELD VERIFY ROUGH-IN WITH BMS / FACP VENDOR.

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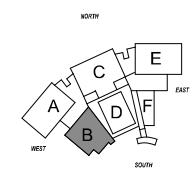

KEYPLAN

Number	Date	Issued For
1	10/16/2024	Addendum No. 2
	09/30/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

TECHNOLOGY FIRST FLOOR PLAN B

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
22367.00

Drawing Number
T101B

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TECHNOLOGY DRAWING KEYNOTES

No.	DESCRIPTION
1	MOUNT OUTLETS ABOVE COUNTER
2	INCLUDE CHERON PROTECTIVE BOX FOR WIRELESS ACCESS POINT
3	COORDINATE WITH ELEVATOR VENDOR FOR POTS LINE. TERMINATE CABLE DIRECTLY TO 110 BLOCK IN MDF.
4	FACTORY PAINT SPEAKER BLACK
5	SPEAKER SHALL BE SOUNDTUBE #CM3-62 OR EQUIVALENT. USE INDOOR/OUTDOOR RATED SPEAKER CABLE AND WEATHERIZE ALL PENETRATIONS AND OPENINGS.
6	PROPERLY SECURE HORNS TO STEEL DECKING ABOVE. BOTTOM OF SPEAKERS TO BE ABOVE BOTTOM OF JOISTS. COORDINATE SPEAKER LOCATIONS CAN SPACE COVERAGE. TYP ALL GYM HORNS.
7	FIELD VERIFY ROUGH-IN WITH BMS / FACP VENDOR.



1 1.0 - TECHNOLOGY FIRST FLOOR PLAN C
1/8" = 1'-0"

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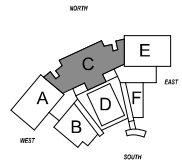

KEYPLAN

Number	Date	Issued For
1	10/16/2024	Addendum No. 2
	09/30/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

TECHNOLOGY FIRST FLOOR PLAN C

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
22367.00

Drawing Number
T101C

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TECHNOLOGY DRAWING KEYNOTES

No.	DESCRIPTION
1	MOUNT OUTLETS ABOVE COUNTER
2	INCLUDE OBERON PROTECTIVE BOX FOR WIRELESS ACCESS POINT
3	COORDINATE WITH ELEVATOR VENDOR FOR FOTS, INC. TERMINATE CABLE DIRECTLY TO 110 BLOCK IN MDF.
4	FACTORY PAINT SPEAKER BLACK
5	SPEAKER SHALL BE SOUNDTUBE XCM81-EZ OR EQUIVALENT, USE INDOOR/OUTDOOR RATED SPEAKER CABLE AND WEATHERIZE ALL PENETRATIONS AND OPENINGS.
6	PROPERLY SECURE HORNS TO STEEL DECKING ABOVE, BOTTOM OF SPEAKERS TO BE ABOVE BOTTOM OF JOISTS.
7	FIELD VERIFY ROUGH-IN WITH EMS / FACP VENDOR.



1 1.0 - TECHNOLOGY FIRST FLOOR PLAN D
1/8" = 1'-0"

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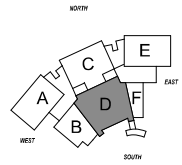

KEYPLAN

Number	Date	Issued For
1	10/15/2024	Addendum No. 2
	09/20/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

TECHNOLOGY FIRST FLOOR PLAN D

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: T101D

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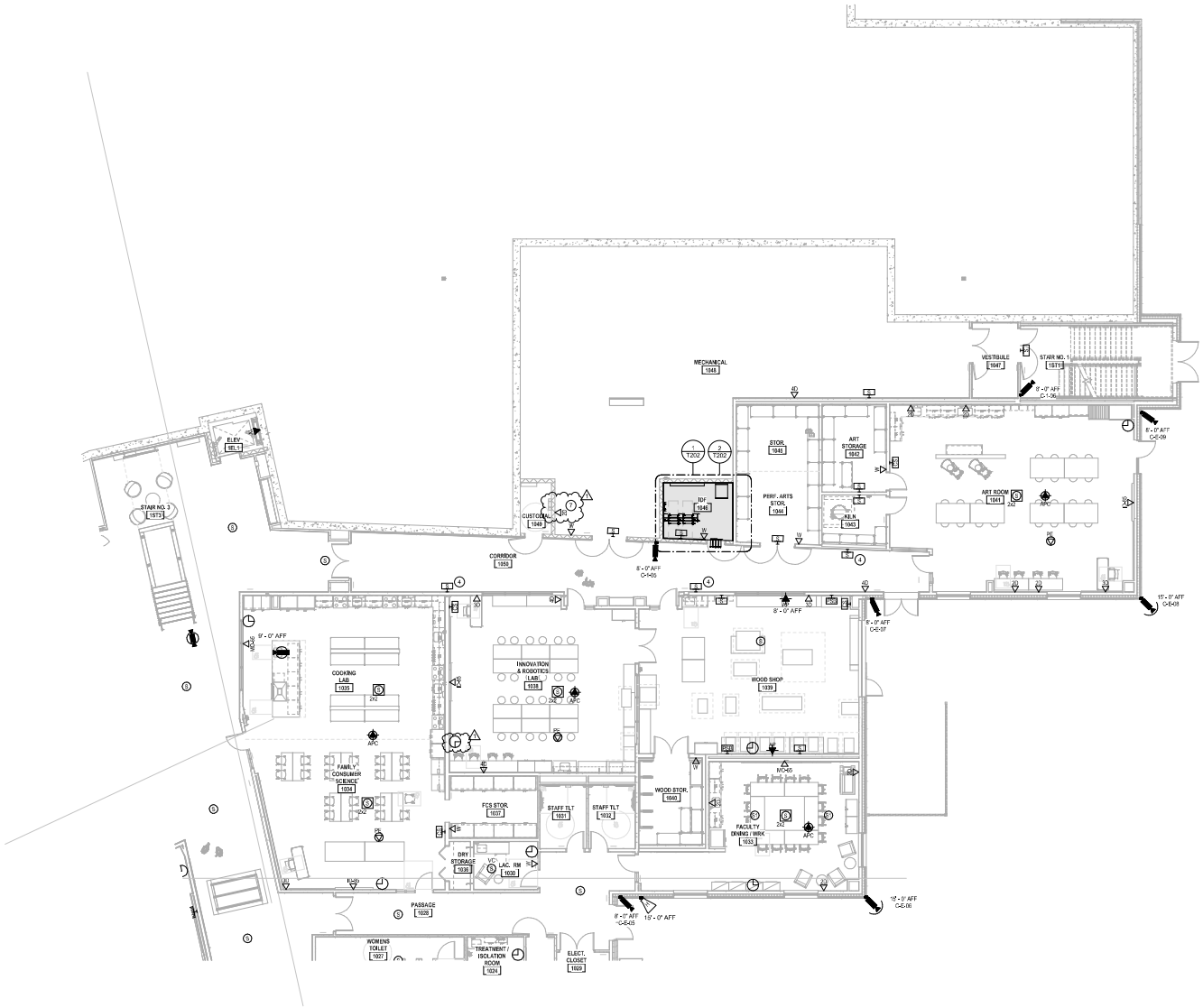
10/15/2024 8:34:23 AM

TECHNOLOGY DRAWING KEYNOTES

No.	DESCRIPTION
1	MOUNT OUTLETS ABOVE COUNTER
2	INCLUDE OBERON PROTECTIVE BOX FOR WIRELSS ACCESS POINT
3	COORDINATE WITH ELEVATOR VENDOR FOR POTS LINE, TERMINATE CABLE DIRECTLY TO 110 BLOCK IN MDF.
4	FACTORY PAINT SPEAKER BLACK
5	SPEAKER SHALL BE SOUNDTUBE #CM1-CZ OR EQUIVALENT, USE INDOOR/OUTDOOR RATED SPEAKER CABLE AND WEATHERIZE ALL PENETRATIONS AND OPENINGS.
6	PROPERLY SECURE HORNS TO STEEL DECKING ABOVE, BOTTOM OF SPEAKERS TO BE ABOVE BOTTOM OF JOISTS, COORDINATE SPEAKER LOCATIONS FOR BEST COVERAGE, TYP ALL GYM HORNS.
7	FIELD VERIFY ROUGH-IN WITH BMS / FACP VENDOR.



1 1.0 - TECHNOLOGY FIRST FLOOR PLAN E
1/8" = 1'-0"

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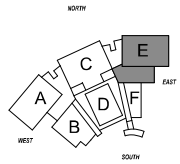

KEYPLAN

Number	Date	Issued For
1	10/16/2024	Addendum No. 2
	09/30/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

TECHNOLOGY FIRST FLOOR PLAN E

Date 07/08/2024
Scale 1/8" = 1'-0"
Proj. Number 22367.00
Drawing Number T101E

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1 1.0 - TECHNOLOGY FIRST FLOOR PLAN F
1/8" = 1'-0"

TECHNOLOGY DRAWING KEYNOTES

No.	DESCRIPTION
1	MOUNT OUTLETS ABOVE COUNTER
2	INCLUDE OBERON PROTECTIVE BOX FOR WIRELSS ACCESS POINT
3	COORDINATE WITH ELEVATOR VENDOR FOR POTS LINE, TERMINATE CABLE DIRECTLY TO 110 BLOCK IN MDF.
4	FACTORY PAINT SPEAKER BLACK
5	SPEAKER SHALL BE SOUNDTUBE #CMB-CZ OR EQUIVALENT. USE INDOOR/OUTDOOR RATED SPEAKER CABLE AND WEATHERIZE ALL PENETRATIONS AND OPENINGS.
6	PROPERLY SECURE HORNS TO STEEL DECKING ABOVE, BOTTOM OF SPEAKERS TO BE ABOVE BOTTOM OF JOISTS, COORDINATE SPEAKER LOCATIONS FOR BEST COVERAGE, TYP ALL GYM HORNS.
7	FIELD VERIFY ROUGH-IN WITH BMS / FACP VENDOR.

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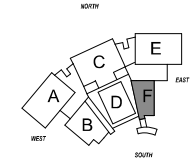

KEYPLAN

Number	Date	Issued For
1	10/16/2024	Addendum No. 2
	09/30/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

TECHNOLOGY FIRST FLOOR PLAN F

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
22367.00

Drawing Number
T101F

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TECHNOLOGY DRAWING KEYNOTES

No.	DESCRIPTION
1	MOUNT OUTLETS ABOVE COUNTER
2	INCLUDE OBERON PROTECTIVE BOX FOR WIRELESS ACCESS POINT
3	COORDINATE WITH ELEVATOR VENDOR FOR POTS LINE. TERMINATE CABLE DIRECTLY TO 110 BLOCK IN MDF.
4	FACTORY PAINT SPEAKER BLACK
5	SPEAKER SHALL BE SOUNDTUBE #CM31-EZ OR EQUIVALENT. USE INDOOR/OUTDOOR RATED SPEAKER CABLE AND WEATHERIZE ALL PENETRATIONS AND OPENINGS.
6	PROPERLY SECURE HORNS TO STEEL DECKING ABOVE. BOTTOM OF SPEAKERS TO BE ABOVE BOTTOM OF JOISTS. COORDINATE SPEAKER LOCATIONS FOR PCP COVERAGE. TYP ALL GYM HORNS.
7	FIELD VERIFY ROUGH-IN WITH BMS / FACP VENDOR.



1 2.0 - TECHNOLOGY SECOND FLOOR PLAN A
1/8" = 1'-0"

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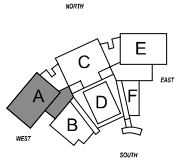

KEYPLAN

Number	Date	Issued For
1	10/16/2024	Addendum No. 2
	09/30/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

TECHNOLOGY SECOND FLOOR PLAN A

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: T102A

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10/16/2024 8:34:32 AM

TECHNOLOGY DRAWING KEYNOTES	
No.	DESCRIPTION
1	MOUNT OUTLETS ABOVE COUNTER
2	INCLUDE OSBORN PROTECTIVE BOX FOR WIRELESS ACCESS POINT
3	COORDINATE WITH ELEVATOR VENDOR FOR POTS LINE, TERMINATE CABLE DIRECTLY TO 110 BLOCK IN MDF.
4	FACTORY PAINT SPEAKER BLACK.
5	SPEAKER SHALL BE SOUNDTUBE AO40-CZ OR EQUIVALENT. USE INDOOR/OUTDOOR RATED SPEAKER CABLE AND WEATHERIZE ALL PENETRATIONS AND OPENINGS.
6	PROPERLY SECURE HORNS TO STEEL DECKING ABOVE, BOTTOM OF SPEAKERS TO BE ABOVE BOTTOM OF JOISTS. COORDINATE SPEAKER LOCATIONS FOR BEST COVERAGE. TYP ALL GYM HORNS.



1 2.0 - TECHNOLOGY SECOND FLOOR PLAN B
1/8" = 1'-0"

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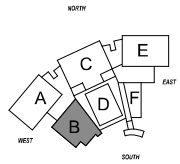

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

TECHNOLOGY SECOND FLOOR PLAN B

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **T102B**

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5/30/2024 3:35:17 AM

TECHNOLOGY DRAWING KEYNOTES

No.	DESCRIPTION
1	MOUNT OUTLETS ABOVE COUNTER
2	INCLUDE OBERON PROTECTIVE BOX FOR WIRELESS ACCESS POINT
3	COORDINATE WITH ELEVATOR VENDOR FOR POTS LINE, TERMINATE CABLE DIRECTLY TO 110 BLOCK IN MDF.
4	FACTORY PAINT SPEAKER BLACK
5	SPEAKER SHALL BE SOUNDTUBE #CM3-CZ OR EQUIVALENT. USE INDOOR/OUTDOOR RATED SPEAKER CABLE AND WEATHERIZE ALL PENETRATIONS AND OPENINGS.
6	PROPERLY SECURE HORNS TO STEEL DECKING ABOVE. BOTTOM OF SPEAKERS TO BE ABOVE BOTTOM OF JOISTS. PROPERLY SECURE SPEAKERS TO DECKING FOR PROPER STORAGE. TYP ALL GYM HORNS.
7	FIELD VERIFY ROUGH-IN WITH BMS / FACP VENDOR.



1 2.0 - TECHNOLOGY SECOND FLOOR PLAN C
1/8" = 1'-0"

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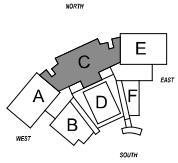

KEYPLAN

Number	Date	Issued For
1	10/16/2024	Addendum No. 2
	09/30/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

TECHNOLOGY SECOND FLOOR PLAN C

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
22367.00

Drawing Number
T102C

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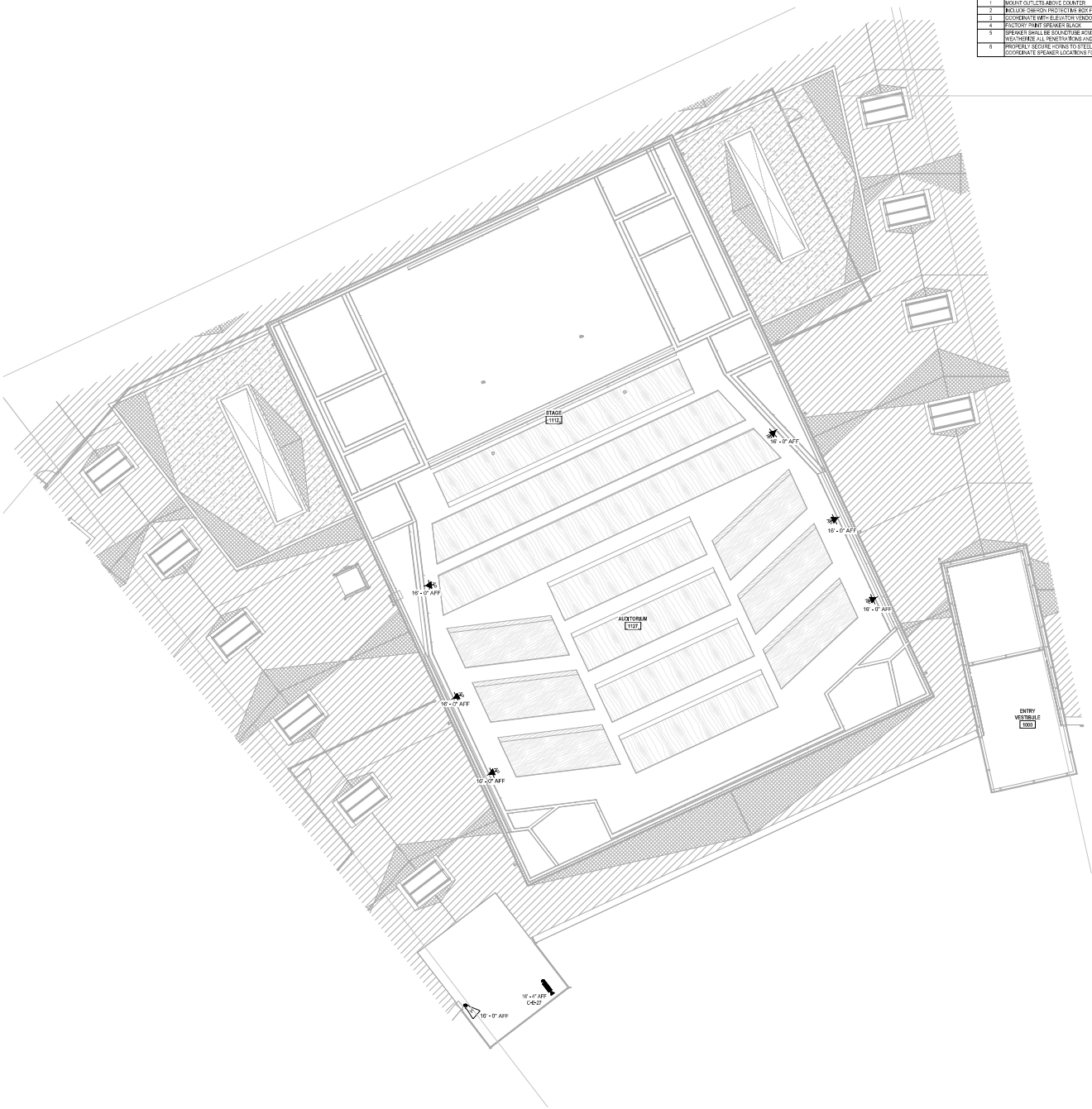
TECHNOLOGY DRAWING KEYNOTES

No.	DESCRIPTION
1	MOUNT OUTLETS ABOVE COUNTER
2	INCLUDE OBERON PROTECTIVE BOX FOR WIRELESS ACCESS POINT
3	COORDINATE WITH ELEVATOR VENDOR FOR POTS LINE. TERMINATE CABLE DIRECTLY TO 110 BLOCK IN MDF.
4	FACTORY PAINT SPEAKER BLACK
5	SPEAKER SHALL BE SOUNDTUBE #CM31-EZ OR EQUIVALENT. USE INDOOR/OUTDOOR RATED SPEAKER CABLE AND WEATHERIZE ALL PENETRATIONS AND OPENINGS.
6	PROPERLY SECURE HORNS TO STEEL DECKING ABOVE. BOTTOM OF SPEAKERS TO BE ABOVE BOTTOM OF JOISTS. COORDINATE SPEAKER LOCATIONS FOR BEST COVERAGE. TYP ALL GYM HORNS.



1 2.0 - TECHNOLOGY SECOND FLOOR PLAN D
1/8" = 1'-0"

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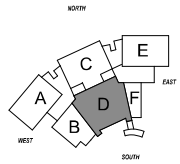

KEYPLAN

Number	Date	Issued For
	05/30/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

TECHNOLOGY SECOND FLOOR PLAN D

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
22367.00

Drawing Number
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9/26/2024 9:35:29 AM

TECHNOLOGY DRAWING KEYNOTES	
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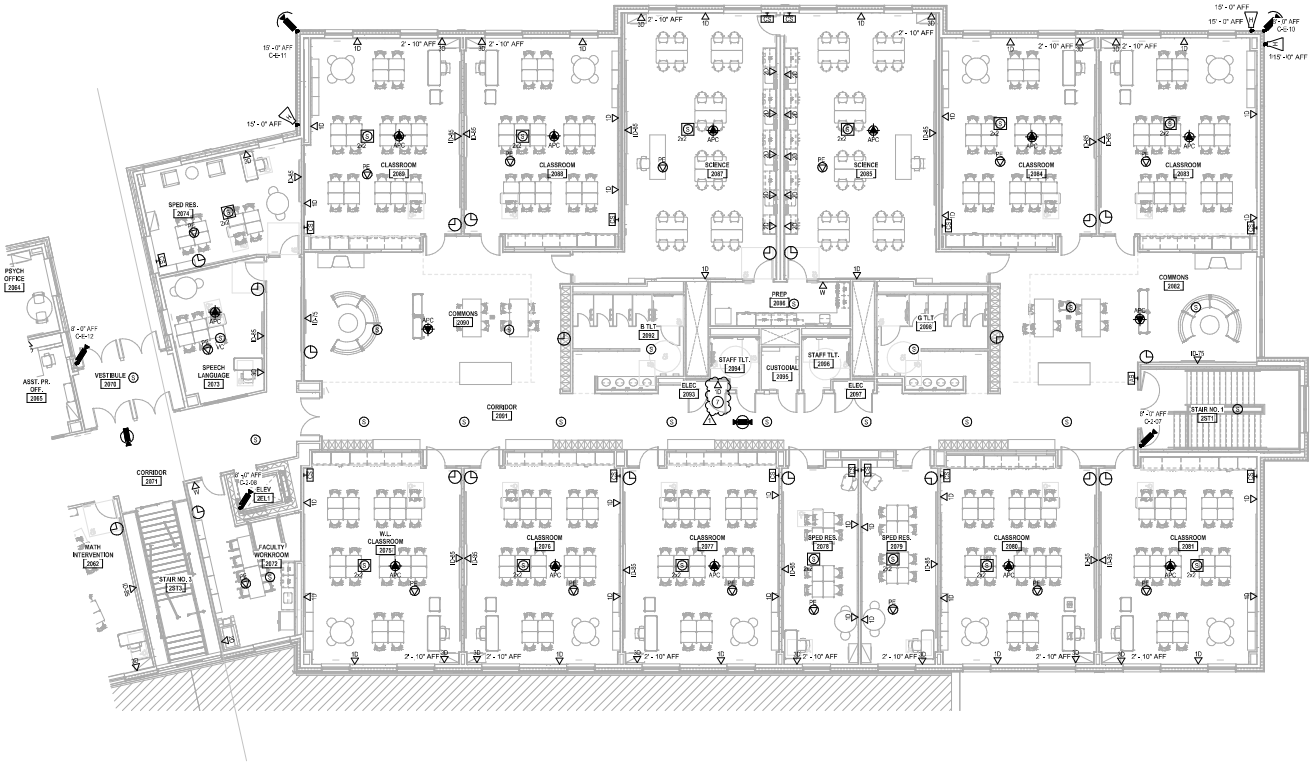
1	MOUNT OUTLETS ABOVE COUNTER
2	INCLUDE OBERON PROTECTIVE BOX FOR WIRELESS ACCESS POINT
3	COORDINATE WITH ELEVATOR VENDOR FOR POTS LINE. TERMINATE CABLE DIRECTLY TO 110 BLOCK IN MDF.
4	FACTORY PAINT SPEAKER BLACK
5	SPEAKER SHALL BE SOUNDTUBE ICM3-EZ OR EQUIVALENT, USE INDOOR/OUTDOOR RATED SPEAKER CABLE AND WEATHERIZE ALL PENETRATIONS AND OPENINGS.
6	PROPERLY SECURE HORNS TO STEEL DECKING ABOVE. BOTTOM OF SPEAKERS TO BE ABOVE BOTTOM OF JOISTS. PROPERLY SECURE HORNS WITH BMS / FACP VENDOR.
7	FIELD VERIFY ROUGH-IN WITH BMS / FACP VENDOR.



1 2.0 - TECHNOLOGY SECOND FLOOR PLAN E
1/8" = 1'-0"

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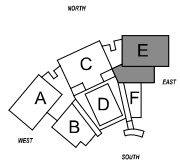

KEYPLAN

Number	Date	Issued For
1	10/16/2024	Addendum No. 2
	09/30/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

TECHNOLOGY SECOND FLOOR PLAN E

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
22367.00

Drawing Number
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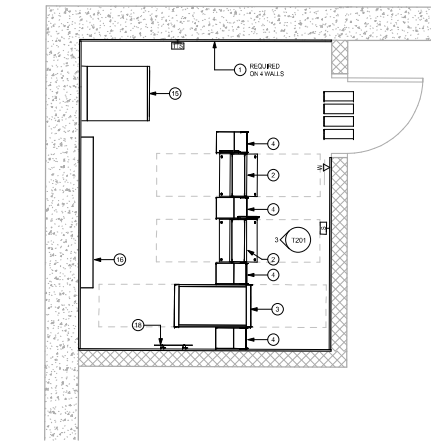
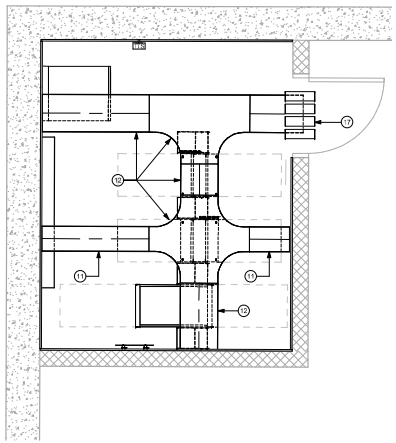
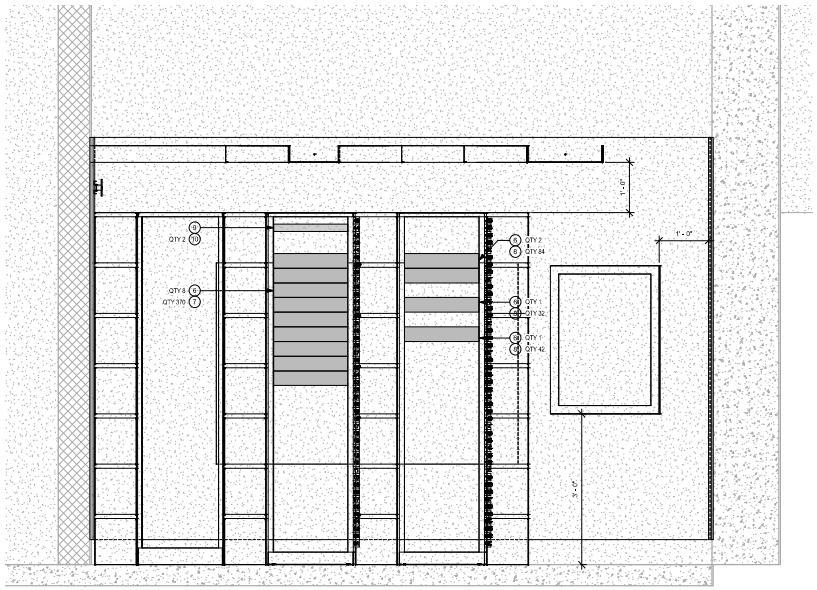


1 MDF 1066 PLAN VIEW
1/2" = 1'-0"



2 MDF 1066 RCP VIEW
1/2" = 1'-0"



3 MDF 1066 ELEVATION VIEW
1" = 1'-0"

PRODUCT DESCRIPTION		
KEY	DESCRIPTION	MANUFACTURER #
1	3/4" FIRE RATED PLYWOOD PAINTED WITH 2 COATS OF FIRE RETARDANT PAINT AS SPECIFIED. MOUNT BOTTOM OF PLAYWOOD AT 6" AFF.	AS REQUIRED
2	TWO-POST RACK; 45 RMU 19" W x 7' H x 3" D	CPI #46353-703 OR EQUIV
3	ADJUSTABLE RAIL QUADRACK; 84", 45U H x 23.62" W x 35.43" D; 35.43 to 41.33" to 41.33" RAIL DEPTH; BLACK	CPI #15252-703 OR EQUIV
4	10" WIDE, DOUBLE SIDED VERTICAL WIRE MANAGER	CPI #13914-703 OR EQUIV
5	HORIZONTAL WIRE MANAGER - 1RU	CPI #30139-719 OR EQUIV
6	48 PORT MODULAR ANGLED PATCH PANELS, 2RU	AS SPECIFIED
7	CATEGORY 6A JACK MODULE, BLUE	AS SPECIFIED
8	CATEGORY 6A JACK MODULE, RED (WAPS)	AS SPECIFIED
9	FIBER OPTIC CABINET - 1RU	AS SPECIFIED
10	LC ADAPTER PLATES, 8 LC DUPLEX (12 FIBERS) SM, AQUA	AS SPECIFIED
11	12" WIDE CABLE TRAY MOUNTED TO CEILING DECK, INCLUDE THREADED RODS W/PROTECTIVE COVERS, TRAPEZE BRIDGE SUPPORT AND ALL REQUIRED MOUNTING ACCESSORIES	CPI OR EQUIV
12	18" WIDE CABLE TRAY MOUNTED TO CEILING DECK, INCLUDE THREADED RODS W/PROTECTIVE COVERS, TRAPEZE BRIDGE SUPPORT AND ALL REQUIRED MOUNTING ACCESSORIES	CPI OR EQUIV
13	12" WIDE RADIUS DROP	CPI OR EQUIV
14	18" WIDE RADIUS DROP	CPI OR EQUIV
15	PUBLIC ADDRESS WALL CABINET	AS SPECIFIED
16	SECURITY PANEL LOCATION	AS SPECIFIED
17	4" CONDUITS SLEEVES	AS SPECIFIED
18	GROUNDING BUSBAR	FURNISHED BE DIV 26 0000

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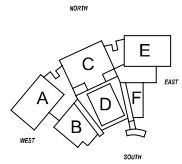

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

TECHNOLOGY MDF 1066 DETAILS

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: **T201**

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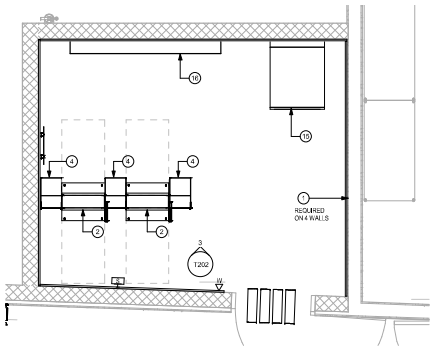
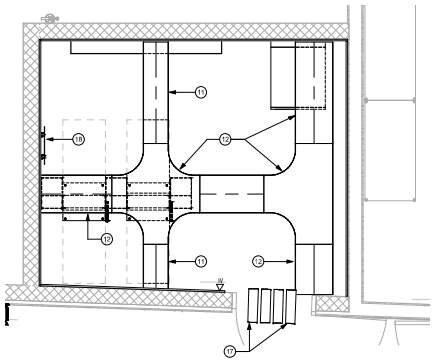
5/24/2024 8:55:49 AM

PRODUCT DESCRIPTION		
KEY	DESCRIPTION	MANUFACTURER #
1	3/4" FIRE RATED PLYWOOD PAINTED WITH 2 COATS OF FIRE RETARDANT PAINT AS SPECIFIED. MOUNT BOTTOM OF PLAYWOOD AT 6" AFF.	AS REQUIRED
2	TWO-POST RACK; 45 RMU 19" W x 7' H x 3" D	CPI #46353-703 OR EQUIV
3	WALL MOUNTED CABINET, 24"W x 30"D x 48"H VERTICAL CABLING SECTION DUAL FAN KIT (120V) REPLACEMENT FILTER KIT	CPI #12419-X48 OR EQUIV CPI #40970-711 OR EQUIV CPI #40975-001 OR EQUIV CPI #40973-001 OR EQUIV
4	10" WIDE, DOUBLE SIDED VERTICAL WIRE MANAGER	CPI #13914-703 OR EQUIV
5	HORIZONTAL WIRE MANAGER - 1RU	CPI #30139-719 OR EQUIV
6	48 PORT MODULAR ANGLED PATCH PANELS, 2RU	AS SPECIFIED
7	CATEGORY 6A JACK MODULE, BLUE	AS SPECIFIED
8	CATEGORY 6A JACK MODULE, RED (WAP'S)	AS SPECIFIED
9	FIBER OPTIC CABINET - 1RU	AS SPECIFIED
10	LC ADAPTER PLATES, 6 LC DUPLEX (12 FIBERS) SM, AQUA	AS SPECIFIED
11	12" WIDE CABLE TRAY MOUNTED TO CEILING DECK, INCLUDE THREADED RODS W/PROTECTIVE COVERS, TRAPEZE BRIDGE SUPPORT AND ALL REQUIRED MOUNTING ACCESSORIES	CPI OR EQUIV
12	18" WIDE CABLE TRAY MOUNTED TO CEILING DECK, INCLUDE THREADED RODS W/PROTECTIVE COVERS, TRAPEZE BRIDGE SUPPORT AND ALL REQUIRED MOUNTING ACCESSORIES	CPI OR EQUIV
13	12" WIDE RADIUS DROP	CPI OR EQUIV
14	18" WIDE RADIUS DROP	CPI OR EQUIV
15	PUBLIC ADDRESS WALL CABINET	AS SPECIFIED
16	SECURITY PANEL LOCATION	AS SPECIFIED
17	4" CONDUITS SLEEVES	AS SPECIFIED
18	GROUNDING BUSBAR	FURNISHED BE DIV 26 0000



1 IDF 1046 PLAN VIEW
1/2" = 1'-0"



2 IDF 1046 RCP VIEW
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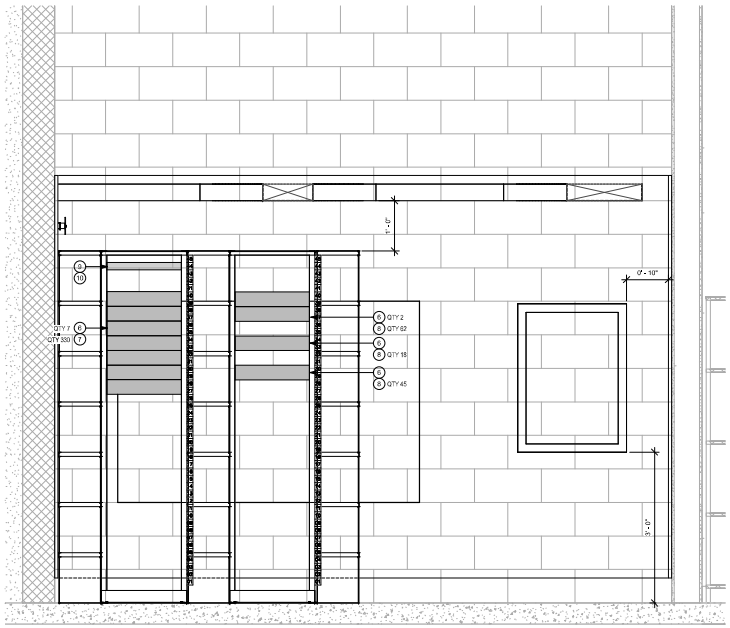
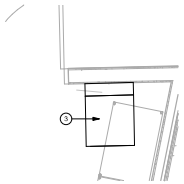
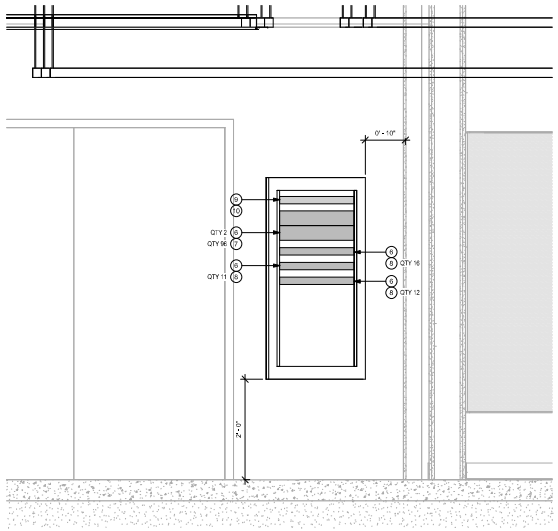


3 IDF 1046 ELEVATION VIEW
1" = 1'-0"



4 IDF 1123 PLAN VIEW
1/2" = 1'-0"



5 IDF STORAGE 1123
1" = 1'-0"

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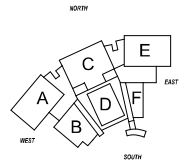
Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024 07/08/2024	BIDDING / PERMIT PHASE 2

TECHNOLOGY IDF 1046 & 1023 DETAILS

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: T202

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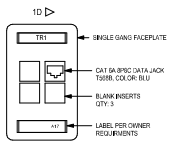
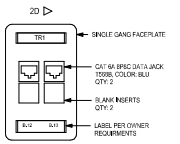
9/26/2024 9:35:47 AM



1 DATA OUTLET DETAIL - 1D
NTS



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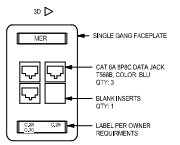

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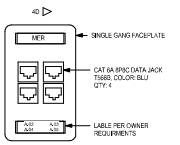

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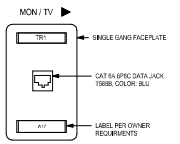

5 DATA OUTLET DETAIL - MON-TV
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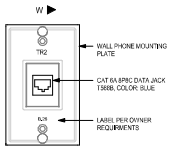
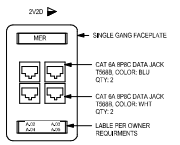


6 WALL PHONE MTG PLATE
NTS



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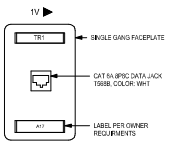

8 DATA OUTLET DETAIL - 1V
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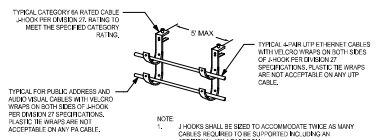

9 J-HOOK INSTALLATION - CABLING SUPPORT
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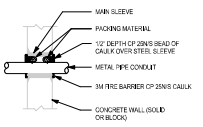

10 FIRE STOP DETAIL
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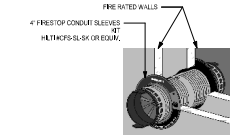

11 FIRE STOP HILTI SLEEVE DETAIL
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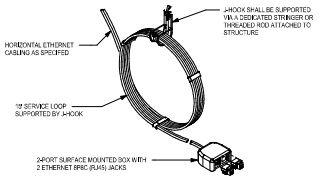

12 WAP - CEILING MOUNTED CABLING 2
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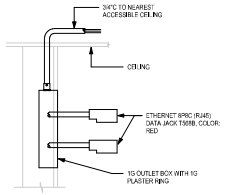

13 WAP - WALL MOUNTED CABLING
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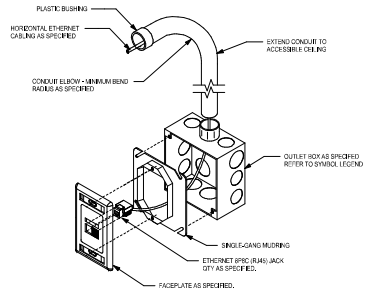
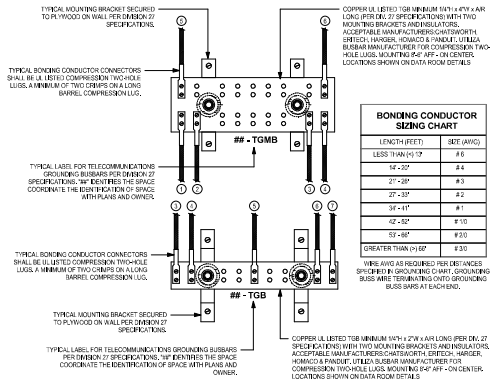


14 TELECOMMUNICATIONS DEVICE OUTLET ASSEMBLY
NTS



BONDING CONDUCTOR SIZING CHART	
LENGTH (FEET)	SIZE (AWG)
LESS THAN (=) 13'	# 6
14' - 20'	# 4
21' - 27'	# 3
27' - 33'	# 2
34' - 41'	# 1
42' - 52'	# 1/0
53' - 66'	# 2/0
GREATER THAN (=) 67'	# 3/0

WIRE AWG AS REQUIRED PER DISTANCES SPECIFIED IN GROUNDING CHART, GROUNDING BUSS WIRE TERMINATING ONTO GROUNDING BUSS BARS AT EACH END.

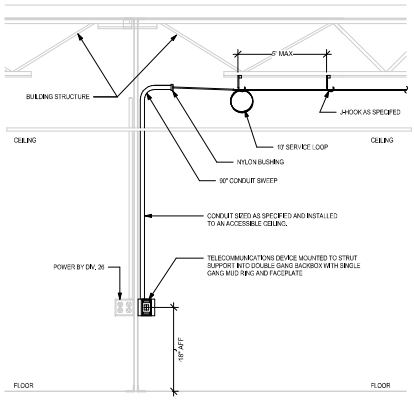
GROUNDING AND BONDING KEYNOTES

1. BONDING CONDUCTOR FOR TELECOMMUNICATIONS (BCT) TO BUILDING GROUNDING ELECTRODE. REFER TO RISER DIAGRAM.
2. BCT TO NEAREST BUILDING STEEL STRUCTURE. IF APPLICABLE, UTILIZE EXOTHERMIC WELDING CONNECTION TO BUILDING STEEL.
3. BCT TO NEAREST BUILDING ELECTRICAL PANELBOARD GROUND BAR. UTILIZE LISTED CONNECTOR TO PANELBOARD GROUND BUS.
4. TELECOMMUNICATION BONDING BACKBONE (TBB) FOR GROUNDING EQUALIZER (GE). IF APPLICABLE. REFER TO RISER DIAGRAM.
5. TYPICAL TBB(S) THAT INTERCONNECTS ALL TCB(S) WITH THE TMGB. REFER TO RISER DIAGRAM.
6. BCT TO TELECOMMUNICATIONS CABLE RUNWAY(S), RACK(S), CABINET(S) AND APPLICABLE EQUIPMENT. DIRECT CRIMPING OF BCT AT RISER IS NOT ACCEPTABLE. EACH RACK IS TO HAVE A BCT TO A COMPRESSION LUG TAP TO THE DEDICATED HOME RUN BCT BACK TO THE TGB, SEE DETAILS.

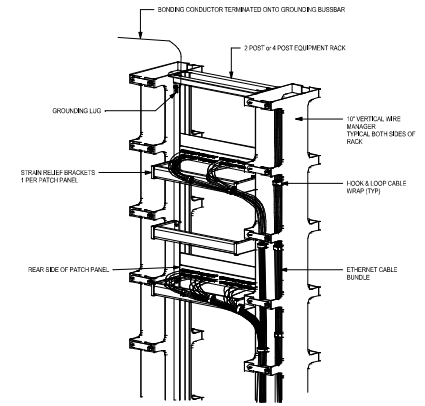
GROUNDING AND BONDING GENERAL NOTES

A. REFER TO GROUNDING AND BONDING DIVISION 27 SPECIFICATIONS FOR ADDITIONAL INFORMATION.
B. REFER TO GROUNDING AND BONDING RISER DIAGRAM FOR ADDITIONAL INFORMATION.
C. PROVIDED 2"C SLEEVE PATHWAY AT EACH FLOOR AND WALL PENETRATIONS FOR THE TELECOMMUNICATION BONDING BACKBONE (TBB). COORDINATE PROPER METHODS FOR PENETRATIONS WITH FIRESTOPPING AS REQUIRED PER DIVISION 07 SPECIFICATIONS.
D. BONDING CONDUCTORS SHALL BE #6/0 AWG COLOR GREEN INSULATED COPPER CONDUCTOR OR SIZED PER "BONDING CONDUCTOR SIZING CHART" (ANSI-J-STD-607-A) IN PATHWAY.
E. FASTENING BONDING CONNECTOR TWO-HOLE LUGS TO ALL BUSBARS SHALL BE CLEAN AND APPLY A COPPER ANTIOXIDANT TO THE CONTACT AREA OF BOTH THE CONNECTOR LUG AND THE BUSBAR.
F. BONDING CONDUCTORS AND BUSBARS SHALL BE LABELED WITH IDENTIFICATION IN ACCORDANCE WITH THE REQUIREMENTS OF ANSI/TIA/EIA-606-A.
G. BONDING CONDUCTORS SHALL BE LASELED WITH IDENTIFICATION LABEL. NOTED BELOW AND SECURED WITH CABLE TIE TO EACH CONDUCTOR, (NABLE-TIES-STD-951-M). IF THIS CONNECTOR OR CABLE IS LOOSE OR MUST BE REMOVED, PLEASE CALL THE BUILDING TELECOMMUNICATIONS MANAGER.
H. CONTINUITY TESTING MEASUREMENTS OF THE GROUNDING RESISTANCE TO NOT EXCEED 0.1 OHM BETWEEN:
   H.1 THE TMGB AND THE NEAREST GROUNDING ELECTRODE.
   H.2 EACH TGB AND THE NEAREST GROUNDING ELECTRODE.
   H.3 EACH TGB AND PATHWAY(S), RACK(S), CABINET(S) AND APPLICABLE EQUIPMENT.

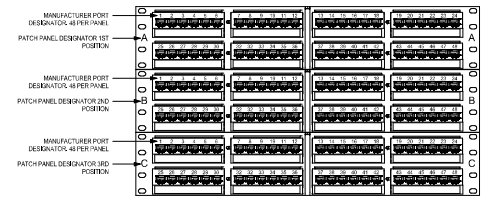
15 DATA ROOM - GROUNDING BUSS BAR TMGB & TGB
NTS



16 TELECOMMUNICATIONS DEVICE MOUNTING TO STRUT SUPPORT
NTS



18 TYP RACK ASSEMBLY DETAIL
NTS



NOTE: CONTINUE LETTERING PATCH PANELS ALPHABETICALLY FOR EACH ADDITIONAL PATCH PANEL.

17 PATCH PANEL LABELING
NTS

25 PAIR, CAT 5E PLENUM CABLE		
PR #	PAIR COLOR	PATCH PANEL JACK #
1	WHITE/BLUE - BLUE/WHITE	JACK 1, PAIR #1
2	WHITE/ORANGE - ORANGE/WHITE	JACK 2, PAIR #1
3	WHITE/GREEN - GREEN/WHITE	JACK 3, PAIR #1
4	WHITE/BROWN - BROWN/WHITE	JACK 4 PAIR #1
5	WHITE/GRAY - GRAY/WHITE	JACK 5, PAIR #1
6	RED/BLUE - BLUE/RED	JACK 6, PAIR #1
7	RED/ORANGE - ORANGE/RED	JACK 7, PAIR #1
8	RED/GREEN - GREEN/RED	JACK 8, PAIR #1
9	RED/BROWN - BROWN/RED	JACK 9, PAIR #1
10	RED/GRAY - GRAY/RED	JACK 10, PAIR #1
11	BLACK/BLUE - BLUE/BLACK	JACK 11, PAIR #1
12	BLACK/ORANGE - ORANGE/BLACK	JACK 12, PAIR #1
13	BLACK/GREEN - GREEN/BLACK	JACK 13, PAIR #1
14	BLACK/BROWN - BROWN/BLACK	JACK 14, PAIR #1
15	BLACK/GRAY - GRAY/BLACK	JACK 15, PAIR #1
16	YELLOW/BLUE - BLUE/YELLOW	JACK 16, PAIR #1
17	YELLOW/ORANGE - ORANGE/YELLOW	JACK 17, PAIR #1
18	YELLOW/GREEN - GREEN/YELLOW	JACK 18, PAIR #1
19	YELLOW/BROWN - BROWN/YELLOW	JACK 19, PAIR #1
20	YELLOW/GRAY - GRAY/YELLOW	JACK 20, PAIR #1
21	VIOLET/BLUE - BLUE/VIOLET	JACK 21, PAIR #1
22	VIOLET/ORANGE - ORANGE/VIOLET	JACK 22, PAIR #1
23	VIOLET/GREEN - GREEN/VIOLET	JACK 23, PAIR #1
24	VIOLET/BROWN - BROWN/VIOLET	JACK 24, PAIR #1
25	VIOLET/GRAY - GRAY/VIOLET	SPARE - COIL @ PANEL



568B PIN ASSIGNMENTS

PAIR	PIN
1	5
	4
2	1
	2
3	3
	6
4	7
	8

18 BACKBONE CABLING - VOICE PATCH PANEL
NTS

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Greenwich Public Schools

Greenwich Central Middle School

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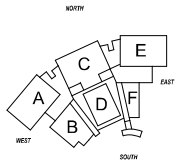

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

TECHNOLOGY DETAILS

Date: 07/08/2024
Scale: NTS
Proj. Number: 22367.00
Drawing Number: T301

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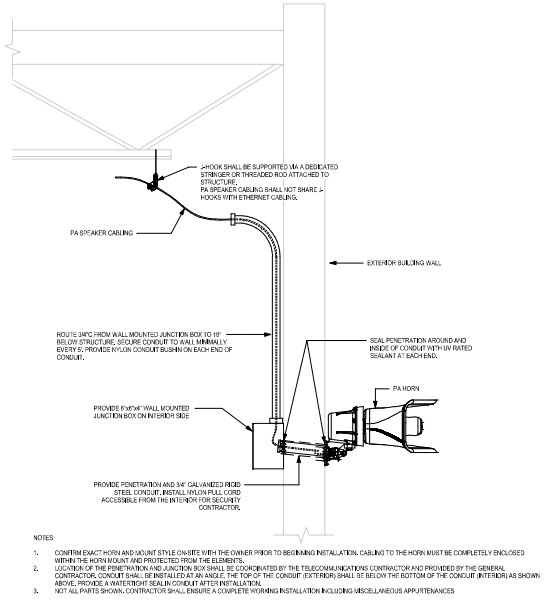
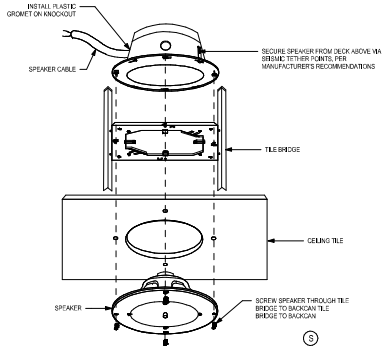


NOTES:

1. CONFIRM EXACT HORN AND MOUNT STYLE ON-SITE WITH THE OWNER PRIOR TO BEGINNING INSTALLATION. CABLING TO THE HORN MUST BE COMPLETELY ENCLOSED WITHIN THE HORN MOUNT AND PROTECTED FROM THE ELEMENTS.
2. LOCATION OF THE PENETRATION AND JUNCTION BOX SHALL BE COORDINATED BY THE TELECOMMUNICATIONS CONTRACTOR AND PROVIDED BY THE GENERAL CONTRACTOR. CONDUIT SHALL BE INSTALLED AT AN ANGLE, THE TOP OF THE CONDUIT (EXTERIOR) SHALL BE BELOW THE BOTTOM OF THE CONCUIT (INTERIOR) AS SHOWN ABOVE. PROVIDE A WATERTIGHT SEALIN CONDUIT AFTER INSTALLATION.
3. NOT ALL PARTS SHOWN. CONTRACTOR SHALL ENSURE A COMPLETE WORKING INSTALLATION INCLUDING MISCELLANEOUS APPURTENANCES

① PA- EXTERIOR HORN
NTS



② PA CEILING SPEAKER ROUND
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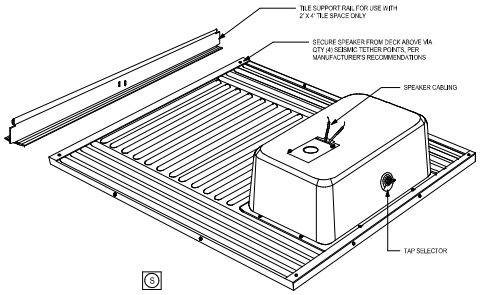
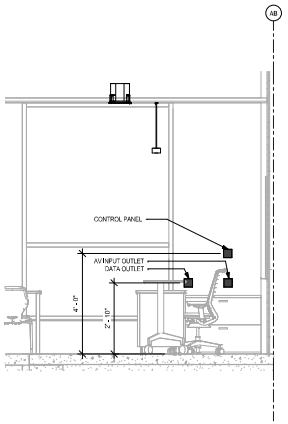


③ PA TILE INLAY SPEAKER 2x2
NTS



④ TYPICAL CLASSROOM - TEACHER LOCATION WITH FURNITURE
1/2" = 1'-0"

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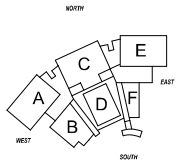

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

TECHNOLOGY DETAILS

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: **T302**

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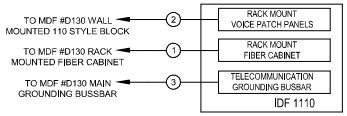
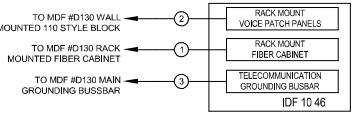
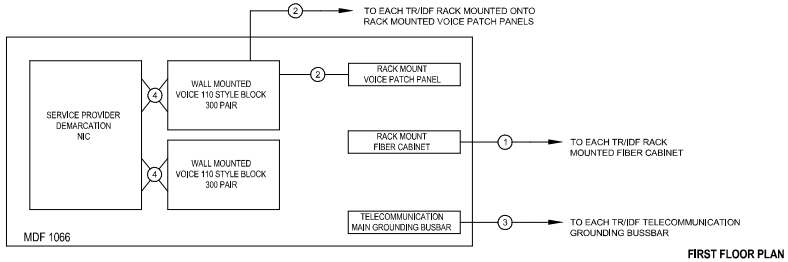




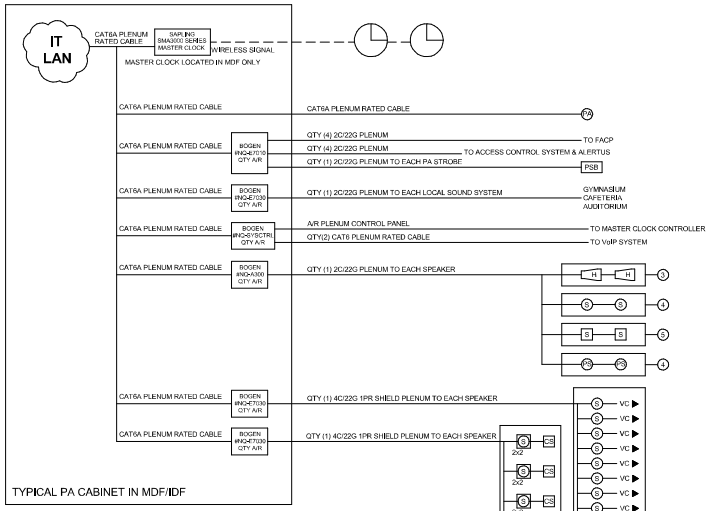
KEYNOTES:

1. 12 STRAND OM4 MULTI-MODE FIBER OPTIC PLENUM RATED ARMORED CABLE TERMINATED ONTO "LC" TYPE ADAPTER PLATES WHICH WILL BE TERMINATED WITHIN RACK MOUNTED FIBER OPTIC CABINETS AT EACH ENDS.
2. 50 PAIR CATEGORY 5E RATED PLENUM CABLE FROM 100 PAIR 110 STYLE WALL MOUNTED BLOCK IN THE ER/MDF #D119 AND TERMINATED ONTO 110 STYLE 24 PORT, RACK MOUNTED PATCH PANELS IN ER/MDF #D119 & EACH IDF WITHIN THE SCHOOL, ONTO RACK MOUNTED CATEGORY 5E PATCH PANELS. TERMINATE EACH PAIR OF THE COPPER RISER CABLES ON THE BLUE PAIR (PAIR 1) OF EACH PORT OF THE PATCH PANELS. COIL THE 25TH PAIR (VIOLET/SLATE) AT THE PATCH PANEL END OF EACH CABLE FOR REPAIR OR FUTURE USE.
3. #6 AWG (OR AWG AS REQUIRED PER DISTANCES) GROUNDING BUSS WIRE TERMINATING ONTO GROUNDING BUSS BARS AT EACH END
4. CROSS CONNECT A MINIMUM OF 500 PAIRS BETWEEN THE SERVICE PROVIDERS DEMARCATION BLOCK AND THE 110 STYLE BLOCKS.



FIRST FLOOR PLAN

BACKBONE CABLING DIAGRAM | NTS | 01



KEY NOTES	
KEY	NOTE
1	CLASSROOM SPEAKERS: UP TO 24 CLASSROOM SPEAKERS AND ANALOG CALL SWITCHES CAN BE POWERED VIA QTY (1) #NQ-E7030, EACH CLASSROOM SPEAKER ASSEMBLY SHALL TERMINATE ONTO A #NQ-E7030.
2	OFFICE SPEAKERS: UP TO 24 OFFICE SPEAKERS AND ANALOG VOLUME CONTROL PANELS CAN BE POWERED VIA QTY (1) #NQ-E7030, EACH OFFICE SPEAKER ASSEMBLY SHALL TERMINATE ONTO A #NQ-E7030.
3	HORNS: EXTERIOR HORNS SHALL BE LOOPED ONTO AN ISOLATED ZONE. GYMNASIUM HORNS SHALL BE ON AN ISOLATED ZONE, UP TO 20 EXTERIOR HORNS MAY BE ON ONE ZONE AND DAISY-CHAINED. HORNS SHALL TERMINATE ONTO #NQ-A300
4	CORRIDOR SPEAKERS: CORRIDOR SPEAKERS MAY BE LOOPED ONTO AN ISOLATED ZONE, UP TO 20 CORRIDOR SPEAKERS MAY BE ON ONE ZONE AND DAISY-CHAINED. CORRIDOR SPEAKERS SHALL TERMINATE ONTO #NQ-A300
5	METAL WALL SPEAKERS: METAL WALL SPEAKERS MAY BE LOOPED ONTO AN ISOLATED ZONE, UP TO 20 METAL WALL SPEAKERS MAY BE ON ONE ZONE AND DAISY-CHAINED. METAL WALL SPEAKERS SHALL TERMINATE ONTO #NQ-A300
6	PENDANT SPEAKERS: PENDANT SPEAKERS MAY BE LOOPED ONTO AN ISOLATED ZONE, UP TO 20 PENDANT SPEAKERS MAY BE ON ONE ZONE AND DAISY-CHAINED. PENDANT SPEAKERS SHALL TERMINATE ONTO #NQ-A300

CABLE ALL PA DEVICES TO THE CORESPONDING DATA ROOM INDICATED ON THE OVERALL CABLE DELINEATION PLANS. DATA ROOM # D127 SHALL NOT RECEIVE ANY PA CABLING

GENERAL NOTES

1. ALL PUBLIC ADDRESS CABLING FOR DEVICES SHALL BE CABLED TO THE DATA ROOMS AS INDICATED ON THE CABLE DECLINATIONS FOR LOW VOLTAGE CABLING.
2. RISER DIAGRAM ON THIS DRAWING IS FOR DESIGN PURPOSES ONLY. CONTRACTOR SHALL PROVIDE A COMPLETE RISER DIAGRAM WITH ACTUAL FIELD WIRING REQUIRED.
3. REFER TO SPECIFICATIONS FOR SYSTEM DESCRIPTION, SEQUENCE OF OPERATION AND OF WIRING.
4. FOR MICROPHONE CABLE RUNS, MAINTAIN A CLEARANCE OF A MINIMUM OF 12" FROM CONDUIT AND CABLES USED FOR ELECTRICAL POWER DISTRIBUTION. WHERE THIS IS NOT FEASIBLE, CROSS HIGHER VOLTAGE LINES PERPENDICULARLY.
5. ALL PENETRATION THROUGH FIRE RATED WALLS SHALL BE SEALED WITH AN APPROVED FIRE STOPPING MATERIAL.
6. SPEAKER CONDUCTORS INSTALLED IN ROOMS OF INSTRUCTION AND OFFICES SHALL BE ONE CONTINUOUS HOME RUN TO THE CENTRAL CONTROL RACK. NO SPLICES SHALL BE ALLOWED.
7. THIS RISER DIAGRAM IS SHOWN AS REFERENCE TO INDICATE LOOPING AND ZONING REQUIREMENTS. ACTUAL QUANTITIES MUST BE CONFIRMED BY THE BIDDING CONTRACTOR AND BE OBTAINED FROM THE ARCHITECTURAL DRAWINGS, T-SERIES.
8. PA SHALL BE INSTALLED IN ACCORDANCE WITH NFPA 72, 2010 OR THE MOST CURRENT FIRE CODE STANDARD ADOPTED BY THE STATE OF CONNECTICUT.
9. THE FIRE ALARM CONNECTION WITH THE PA SYSTEM SHALL BE COORDINATED WITH OWNER, FIRE ALARM INSTALLER, SECURITY CONSULTANT, AND PA DESIGNER.
10. PRIORITY OVERRIDE LOADS IN EACH INTERACTIVE DISPLAY LOCATION MUST BE CALCULATED INTO THE PUBLIC ADDRESS AMPLIFIER LOADS.
11. A 1 WATT REPEATER SHALL BE INCLUDED IN EACH DATA CLOSET FOR THE 2-WIRED CLOCK SYSTEM.
12. ALL EXTERIOR HORNS SHALL BE ON AN ISOLATED ZONE AND CAPABLE OF BEING PROGRAMMED TO ONLY ENGAGE DURING BUS OR EMERGENCY ANNOUNCEMENTS.
13. ALL LAN CONNECTIONS SHOWN ON THE TYPICAL WIRING DIAGRAM SHALL TERMINATE ONTO THE REAR OF 19" CATEGORY 6 RATED PATCH PANELS MOUNTED IN THE TWO/FOUR POST RACKS AS SHOWN ON THE MDF/IDF TECHNOLOGY DETAILS.
14. REFER TO PUBLIC ADDRESS SPECIFICATION FOR ALL REQUIRED LICENSES.
15. NETWORK ELECTRONICS (NETWORK SWITCHES) WILL BE OWNER FURNISHED IN A LATER PHASE. IT IS THE RESPONSIBILITY OF THE CONTRACTOR AWARDED THIS PROJECT TO ADVISE THE OWNER ON IP ADDRESSING, CREATION OF VLANS, AND TO FURNISH THE CONFIGURATION REQUIRED FOR A FULLY FUNCTIONAL PUBLIC ADDRESS SYSTEM ON THE OWNERS LAN. THE CONTRACTOR SHALL INCLUDE WORK HOURS REQUIRED TO CONFIGURE THIS SYSTEM WITH THE OWNER AFTER SUBSTANTIAL COMPLETION OF THE CONSTRUCTION PROJECT WHEN THE SWITCHES ARE FURNISHED AND INSTALLED.

PUBLIC ADDRESS & 2-WIRE CLOCK SYSTEM | NTS | 02

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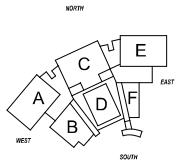
Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

TECHNOLOGY WIRING DIAGRAM

Date: 07/08/2024
Scale:
Proj. Number: 22367.00
Drawing Number: T400

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TECHNOLOGY ABBREVIATIONS

(NOTE: NOT ALL ABBREVIATIONS APPLICABLE)

AFF	ABOVE FINISH FLOOR
AFG	ABOVE FINISHED GRADE
A/C	ABOVE COUNTER
ACS	ACCESS CONTROL SYSTEM
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
AIR	AS REQUIRED
AWG	AMERICAN WIRE GAUGE
BICSI	BUILDING INDUSTRY CONSULTING SERVICE INTERNATIONAL
BNC	BAYONET NEIL-CONCELMAN
C	CONDUIT(S)
DEMARC	DEMARCATION
DPDT	DOUBLE THROW DOUBLE PULL
EIA	ELECTRONICS INDUSTRIES ALLIANCE
EMT	ELECTRICAL METALLIC TUBING
FACP	FIRE ALARM CONTROL PANEL
F	FACSIMILE (FAX)
IDS	INTRUSION DETECTION SYSTEM
LAN	LOCAL AREA NETWORK
MER	MAIN EQUIPMENT ROOM
NEC	NATIONAL ELECTRIC CODE
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
OFE	OWNER FURNISHED EQUIPMENT
PA	PUBLIC ADDRESS
PBX	PRIVATE BRANCH EXCHANGE
PC	PERSONAL COMPUTER
PoE	POWER OVER ETHERNET
PP	PATCH PANEL
PVC	POLYVINYL CHLORIDE CONDUIT
QTY	QUANTITY
STP	SHIELDED TWISTED PAIR
TBB	TELECOMMUNICATIONS BONDING BACKBONE
TGB	TELECOMMUNICATIONS GROUNDING BUSBAR
TIA	TELECOMMUNICATIONS INDUSTRY ASSOCIATIONS
TMGB	TELECOMMUNICATIONS MAIN GROUNDING BUSBAR
TR	TELECOMMUNICATIONS ROOM
TV	TELEVISION
TYP	TYPICAL
UON	UNLESS OTHERWISE NOTED
UPS	UNINTERRUPTIBLE POWER SUPPLY
UTP	UNSHIELDED TWISTED PAIR
VGA	VIDEO GRAPHICS ARRAY
VoIP	VOICE OVER INTERNET PROTOCOL
VSS	VIDEO SURVEILLANCE SYSTEM
W	WALL TELEPHONE (VOICE)
WAN	WIDE AREA NETWORK
WAO	WORK AREA OUTLET
WAP	WIRELESS (DATA) ACCESS POINT
WG	WIRE GUARD
WP	WEATHERPROOF

AUDIO VISUAL

REFER TO SPECIFICATION SECTION 27 4100 FOR DEVICES

SYMBOL	DESCRIPTION	MOUNTING AFF UNLESS OTHERWISE NOTED	OUTLET BOX & CONDUIT SIZES PROVIDED & INSTALLED BY ELECTRICAL CONTRACTOR: 4"-S" 4"-D" DP	12"-S" 12"-D" DP	3/4 DEVICE RING	3/4" C	1" C	1-1/4" C	CHIEF IPFACE/FOH	CABLING PROVIDED & INSTALLED BY LOW VOLTAGE CONTRACTOR (ALL CABLING TO BE PLENUM RATED): CAT6A CABLE	BPEC (RJ45) JACK - CAT6A	AV CABLING INDICATED ON SIGNAL FLOW DIAGRAMS	COMMMENTS
ID-XX	INTERACTIVE DISPLAY - EMPTY BACKBOX XX = DISPLAY SIZE	-											* REFER TO ARCHITECTUAL ELEVATIONS FOR MOUNTING HEIGHTS. ETHERNET TERMINATES TO LAN (MDF / IDF)
MON-XX	DIGITAL DISPLAY	60" AFF										1	REFER TO 27 4100 FOR REQUIRED DISPLAYS.
A	EMPTY BACKBOX FOR FUTURE AV CABLING & DEVICE.	34" AFF	1	1			2						CONDUIT TO ABOVE ACCESSIBLE CEILING.
B	EMPTY BACKBOX FOR FUTURE AV CABLING & DEVICE.	48" AFF	1	1			1						CONDUIT TO ABOVE ACCESSIBLE CEILING.
C	EMPTY BACKBOX FOR FUTURE AV CABLING & DEVICE.	18" AFF	1	1			1					1	CONDUIT TO ABOVE ACCESSIBLE CEILING.
D	AVOIP ENCODER	18" AFF	1	1			1					1	REFER TO SIGNAL FLOW DIAGRAMS FOR CABLING AND ROUTING REQUIREMENTS
E	AV CONTROL PANEL	48" AFF	1	1			1					1	REFER TO SIGNAL FLOW DIAGRAMS FOR CABLING AND ROUTING REQUIREMENTS
F	FOH MIX PANEL	18" AFF	1	1			1					1	REFER TO SIGNAL FLOW DIAGRAMS FOR CABLING AND ROUTING REQUIREMENTS
GS	GYM LOUDSPEAKER	As Noted	1	1			1					1	REFER TO SIGNAL FLOW DIAGRAMS FOR CABLING AND ROUTING REQUIREMENTS
ALS	ASSISTED LISTENING TRANSMITTER	As Noted	1	1			1					1	REFER TO SIGNAL FLOW DIAGRAMS FOR CABLING AND ROUTING REQUIREMENTS
ANT	ANTENNA - WIRELESS MIC RECEIVER	As Noted	1	1			1					1	REFER TO SIGNAL FLOW DIAGRAMS FOR CABLING AND ROUTING REQUIREMENTS
MIC	DIGITAL XLR	18" AFF	1	1			1					1	REFER TO SIGNAL FLOW DIAGRAMS FOR CABLING AND ROUTING REQUIREMENTS
P	PROJECTOR PANEL	As Noted	1	1			1					1	REFER TO SIGNAL FLOW DIAGRAMS FOR CABLING AND ROUTING REQUIREMENTS
PS	CEILING MOUNTED PLENUM RATED ENCLOSURE - SHOWN FOR REF.												
S1	CLASSROOM SPEAKER - SHOWN FOR REF.												
S2	FLUSH MOUNT SPEAKER - REFER TO SPEC.												
SP	SPEAKER PANEL	As Noted	1	1			1					1	REFER TO SIGNAL FLOW DIAGRAMS FOR CABLING AND ROUTING REQUIREMENTS
R	WALL MOUNTED PIVOT CABINET	As Noted	1	1			1					1	REFER TO SIGNAL FLOW DIAGRAMS FOR CABLING AND ROUTING REQUIREMENTS
R2	AUDITORIUM WALL MOUNTED PIVOT CAB.	As Noted	1	1			1					1	REFER TO SIGNAL FLOW DIAGRAMS FOR CABLING AND ROUTING REQUIREMENTS
R3	MIX POSITION AV RACK	As Noted	1	1			1					1	REFER TO SIGNAL FLOW DIAGRAMS FOR CABLING AND ROUTING REQUIREMENTS
F	5-GANG FLOOR BOX - 4" DP	As Noted	1	1			1					1	REFER TO SIGNAL FLOW DIAGRAMS FOR CABLING AND ROUTING REQUIREMENTS
IO	AUDIO INTERFACE	As Noted	1	1			2					1	REFER TO SIGNAL FLOW DIAGRAMS FOR CABLING AND ROUTING REQUIREMENTS
SC	SCREEN PASS-THRU PANEL	As Noted	1	1			1					1	REFER TO SIGNAL FLOW DIAGRAMS FOR CABLING AND ROUTING REQUIREMENTS
XX	FLOOR BOX MOUNTED DEVICE												
XX	CEILING MOUNTED DEVICE												CEILING MOUNTED DEVICE XX = DENOTES DEVICE AND CABLING REQUIREMENTS

AUDIO/VIDEO WIRE TYPES

AUDIO/VIDEO SYSTEM WIRING IS DIVIDED INTO GROUPS ACCORDING TO NOMINAL VOLTAGE LEVELS

	WIRING TYPE
GROUP A	MICROPHONE AND OTHER SENSITIVE WIRING (0mV to 100 mV)
GROUP B	LINE LEVEL WIRING (100 mV to 10V)
GROUP C	LOUDSPEAKER AND CONTROL WIRING (10 V TO 70 V)
GROUP D	VIDEO, CONTROL AND DIGITAL CIRCUITS
GROUP E	DATA AND FIBER OPTIC CABLE
GROUP F	SPARE CONDUIT

NOTE: THESE WIRING GROUPS MUST NEVER BE INTERMIXED WITHIN A GIVEN CONDUIT RUN OR JUNCTION BOX!

AUDIO/VIDEO CONDUIT SEPARATION

MINIMUM CONDUIT SEPARATION BETWEEN CONDUITS CARRYING WIRING OF DIFFERENT GROUPS IS:

	GROUP A	GROUP B	GROUP C	GROUP D	GROUP E
GROUP A	ADJACENT	6"	12"	12"	12"
GROUP B	–	ADJACENT	12"	6"	6"
GROUP C	–	–	ADJACENT	6"	6"
GROUP D	–	–	–	ADJACENT	ADJACENT
GROUP E	–	–	–	–	ADJACENT
GROUP F	12"	12"	12"	12"	12"

NOTE: NINETY DEGREE CROSSINGS IN CLOSE PROXIMITY ARE ACCEPTABLE. SEPARATIONS MUST BE MAINTAINED UNTIL WITHIN SIX FEET OF BOX OR GUTTER ENTRY.

ELECTRICAL CONDUIT SEPARATION

MINIMUM CONDUIT SEPARATION BETWEEN CONDUITS CARRYING AUDIO/MDEO WIRING AND OTHER ELECTRICAL SERVICE CONDUIT IS:

	GROUP A	GROUP B	GROUP C	GROUP D	GROUP E	GROUP F
DIMMER CONTROLED LIGHTING	24"	12"	6"	12"	12"	24"
SCR CONTROLLED SERVICES	24"	12"	6"	12"	12"	24"
220/440VAC CIRCUITS	6"	6"	ADJACENT	ADJACENT	ADJACENT	24"
ALL OTHER SERVICES	6"	6"	ADJACENT	ADJACENT	ADJACENT	24"

NOTE: HEAVY CURRENT DEMANDS IN, OR LONG PARALLEL RUN WITH THE ABOVE SERVICES MAY DICTATE GREATER SEPARATIONS TO AVOID INTERFERENCE IN THE SYSTEMS. SEPARATIONS MUST BE MAINTAINED UNTIL WITHIN SIX FEET OF BOX OR GUTTER ENTRY.

EXCEPTIONS:

1. THE CONDUIT SEPARATIONS ABOVE ARE BASED ON THE USE OF EMT CONDUIT FOR ALL AV AND OTHER SIGNALS.
2. SEPARATIONS WHERE RIGID CONDUIT IS UTILIZED FOR AV SYSTEMS AND/OR OTHER ADJACENT SYSTEMS MAY BE HALVED.
3. SEPARATIONS WHERE PVC CONDUIT IS UTILIZED FOR AV SYSTEMS AND/OR OTHER ADJACENT SYSTEMS MUST BE DOUBLED.
4. THE CONTRACTOR MUST HAVE WRITTEN AUTHORIZATION FROM THE SYSTEMS DESIGNER FOR ANY CONDUIT INSTILLATION WHICH DOES NOT CONFORM TO THESE REQUIREMENTS.

SIGNAL TYPE	DESCRIPTION	DESCRIPTOR	MANUFACTURER	WIRE NUMBER
A	MICROPHONE	MIC	BELDEN	9451
C	TWISTED JACKETED 12 AWG	70V12	WEST PENN	227
C	TWISTED JACKETED 16 AWG - REMOTE POWER	PWR	WEST PENN	225
C	TWISTED UNJACKETED 10 AWG	LS10	WEST PENN	NJ210BKWH
C	TWISTED UNJACKETED 12 AWG	LS12	WEST PENN	C207
C	TWISTED UNJACKETED 14 AWG	LS14	WEST PENN	C208
D	RF-MICS AND RF-ALS	ANT	BELDEN	7919A
D	CONTROL SYSTEM RELAY	RLY	BELDEN	9493
D	CONTROL SYSTEM 232/485 AND IR	SER	BELDEN	9493
E	MULTIMODE FIBER - 6 STR - OM4	MMF	BELDEN	FXD003R6A
E	SINGLE MODE FIBER - 6 STR - OS2	SMF	BELDEN	FXD006R9
E	SMPTE HYBRID	SMPTE	GEPCO	HOG320R
E	SHIELDED CAT6A	STP	BELDEN	10GX52F
E	UNSHIELDED CAT6A	UTP	BELDEN	2414
-	EMPTY CONDUIT - 1"	ECD1		
-	EMPTY CONDUIT - 2"	ECD2		

GENERAL NOTES

1. DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS AND WORK INCLUDED IN THE CONTRACT.
2. ALL AUDIO VISUAL OUTLETS MUST COINCIDE WITH ELECTRICAL POWER DRAWINGS AND TECHNOLOGY DRAWINGS. THE CONTRACTOR MUST COORDINATE ALL LOCATIONS OF THE ELECTRICAL OUTLETS WITH THE AUDIO VISUAL OUTLETS.
3. REQUIRED CABLE AND TERMINATIONS SUBMIT ALL CABLE AND TERMINATION DEVICES WITH PRODUCT SUBMITTALS PRIOR TO PROCUREMENT
4. LABEL ALL CABLES WITHIN 12" OF FINAL TERMINATION.
5. USE ONLY HOOK AND LOOP CABLE TIES (VELCRO) FOR CABLES RATED CATEGORY 3 OR HIGHER.
6. ALL CABLES RUN IN CEILING AREAS SHALL BE PROPERLY SUPPORTED WITH CONDUIT OR J-HOOKS MOUNTED TO SLAT AT MINIMUM OF 5' INTERVALS. NO CABLE SHALL REST ON TOUCH CEILING ASSEMBLIES. CABLES SHALL NOT BE INSTALLED EXPOSED IN OPEN CEILING AREAS.
7. ALL LABELS SHALL BE MACHINE PRINTED. NO HAND LETTERED CABLES SHALL BE USED.
8. USE ONLY PLENUM RATED CABLES.
9. DO NOT RUN ETHERNET CABLES PARALLEL TO POWER CABLES. CROSS POWER CABLES ONLY AT RIGHT ANGLES.
10. MAINTAIN 6" DISTANCE FROM ALL LIGHTING TRANSFORMERS.
11. COLOR AND STYLE OF AUDIO VISUAL FACE PLATES SHALL BE COORDINATED WITH AND CONFIRMED BY THE ARCHITECT.
12. OBTAIN AND EXTEND TO OWNER ALL AVAILABLE MANUFACTURER AND SYSTEM WARRANTEES.
13. SPLICING CABLES IS NOT PERMITTED EXCEPT AS SPECIFICALLY NOTED.
14. LOCATIONS OF EQUIPMENT FOR ALL OTHER TRADES SHALL BE COORDINATED BEFORE CONSTRUCTION.
15. CONTRACTOR SHALL COORDINATE LAYOUT LOCATIONS AND CLEARANCE OF ALL EQUIPMENT WITH OTHER TRADES AND ATTAIN OWNERS APPROVAL PRIOR TO INSTALLATION.
16. CONTRACTOR SHALL COORDINATE ALL RACEWAYS, LOCATIONS, AND POWER REQUIREMENTS WITH THE ELECTRICAL CONTRACTOR.
17. ALL DEVICES SHOWN ON THESE PLANS MUST BE COORDINATED AND APPROVED BY THE ARCHITECT. THE INSTALLATION CONTRACTOR SHALL DEPICT ALL DEVICES ONTO ELEVATION SUBMITTALS BEFORE INSTALLATION. ANY DEVICE THAT IS NOT APPROVED BY THE ARCHITECT PRIOR TO INSTALLATION MAY BE REQUIRED TO BE RELOCATED AS DIRECTED BY THE ARCHITECT AND CORRECTED BY THE CONTRACTOR WITH NO ADDITIONAL CHARGE TO THE PROJECT.
18. ALL PATHWAYS, INCLUDING ALL WALL AND CEILING PENETRATIONS ARE REQUIRED TO INSTALL CABLING TO THE END DEVICE AND SHALL BE COORDINATED BETWEEN THE LOW VOLTAGE AND ELECTRICAL CONTRACTOR AND SHALL BE INCLUDED AS PART OF THIS SECTION.
19. SECURE ATTACHMENT OF AUDIO VISUAL DEVICES
    A. TO ENSURE PROPER ATTACHMENT OF FIXTURES, FURNISHINGS & EQUIPMENT ITEMS, INCLUDING AND TECHNOLOGY ITEMS, WHERE ITEMS' ARE ATTACHED TO WALL, CEILING, OVERHEAD STRUCTURE, AND/OR FLOOR, CONTRACTOR SHALL PROVIDE INFORMATION ACCEPTABLE FOR ARCHITECT TO VERIFY ITEMS, ATTACHED TO WALL, CEILING, AND/OR FLOOR ARE ATTACHED SECURELY AND PER MANUFACTURER'S RECOMMENDATIONS. ARCHITECT'S REVIEW MAY BE IMPLEMENTED DURING SUBMITTAL PROCESS.
    B. CONTRACTOR SHALL PROVIDE STRUTS, HANGERS, FASTENERS, SAFETY HARNESSES, CHANNELS, BOLTS, SCREWS, RODS, ETC. TO SECURELY ATTACH ITEMS TO EXISTING STRUCTURE AS REQUIRED TO MEET FIELD CONDITIONS AND MEET APPLICABLE CODES.
20. ALL CONDUITS TO ABOVE ACCESSIBLE CEILING UNLESS OTHERWISE NOTED.

GENERAL PLAN SYMBOLS

- DETAIL NUMBER / SHEET NUMBER — DETAIL/PLAN IDENTIFIER (e.g. 1 / TA301)
- DETAIL NUMBER / SHEET NUMBER — SECTION IDENTIFIER (e.g. 1 / TA301)
- DETAIL NUMBER / SHEET NUMBER — ELEVATION IDENTIFIER (e.g. 1 / TA301)
- DRAWINGS KEYNOTE NOTE TAG (1)
- EQUIPMENT NOTE TAG (1)
- CONDUIT SLEEVE - THROUGH CEILING TO ABOVE FLOOR
- CONDUIT SLEEVES - THROUGH FLOOR TO BELOW FLOOR
- CONDUIT SLEEVES - HORIZONTAL

RESPONSIBILITY MATRIX			
DEFINITIONS & NOTES: OFOI = Owner Furnished / Owner Installed CFCI = Contractor Furnished / Contractor Installed NOTE = Scope Delineation of Subs per Bid Packages			
	DISCIPLINE	OWNR	CNTR
1	ENTRANCE INTO BUILDING		
	PHONE, CABLE, FIBER, OTHER SERVICE FROM STREET	X	
	LIGHTNING PROTECTION FOR COPPER INTO BUILDING	X	
	PATHWAYS / CONDUIT INTO BUILDING FOR SERVICE PROVIDER		X
3	HORIZONTAL CABLING		
	CATEGORY RATED ETHERNET CABLE		X
	TERMINATION EQUIPMENT AND TERMINATIONS		X
	TESTING OF ETHERNET CABLE		X
	EXTENDED MANUFACTURER'S WARRANTY		X
	CABLE TRAY & J-HOOKS		X
	FLOOR BOXES		X
	PATHWAYS, CONDUIT, OUTLET BOXES, AND PENETRATIONS		X
	GROUNDING		X
3	BACKBONE CABLING (FIBER, COPPER, & GROUNDING)		
	CATEGORY RATED ETHERNET CABLE & FIBER BACKBONE		X
	TERMINATION EQUIPMENT AND TERMINATIONS		X
	TESTING OF FIBER & COPPER CABLE		X
	EXTENDED MANUFACTURER'S WARRANTY		X
	CABLE TRAY & J-HOOKS		X
	PATHWAYS, CONDUIT, OUTLET BOXES, AND PENETRATIONS		X
	GROUNDING CONTACTOR RITWITH DATA ROOMS		X
	GROUNDING BUSBARS AND BONDING OF EQUIPMENT TO BUSBARS		X
	GROUNDING OF BUSBARS TO ELECTRICAL PANELS OR OTHER MEANS		X
	FIRESTOPPING		X
4	DATA ROOM BUILDOUT		
	EQUIPMENT RACKS & CABINETS		X
	PATCH PANELS FOR ETHERNET CABLING		X
	WIRE MANAGERS - VERTICAL & HORIZONTAL		X
	CABLE TRAY & J-HOOKS		X
	FIRE RATED BACKER BOARD		X
	GROUNDING OF DATA EQUIPMENT TO BUSBARS		X
	GROUNDING OF BUSBARS TO ELECTRICAL PANELS OR OTHER MEANS		X
	FIRESTOPPING		X
	SECURITY SYSTEM SERVERS		X
	POWER		X
	UPS'S & PDU'S		X
	PATCH CORDS TO CAMERAS AND SPECIFIED AV DEVICES		X
	PATCH CORDS TO SWITCHES (FIBER & COPPER) IN MDF / IDF	X	
5	TECHNOLOGY EQUIPMENT		
	WIRELESS ACCESS POINTS	X	
	BUILDING LAN NETWORK ELECTRONICS (SWITCHES) IN MDF/IDF	X	
	PHONE SYSTEM INCLUDING HANDSETS AND SERVERS	X	
	SERVERS (OTHER THAN SECURITY SERVERS)	X	
6	PHYSICAL SECURITY SYSTEMS		
	SECURITY CAMERAS		X
	SECURITY CABLING FOR INTRUSION DETECTION & ACCESS CONTROL		X
	INTRUSION DETECTION DEVICES AND PANELS		X
	ACCESS CONTROL DEVICES AND PANELS		X
	SECURITY SYSTEM SERVERS		X
	SECURITY SYSTEM LICENSING		X
7	AUDIO VIDEO SYSTEMS		
	RACKING, CONDUIT, AND PATHWAYS FOR ALL AV SYSTEMS SHOWN ON DRAWINGS		X
	CLASSROOM AV DEVICES AND CABLING	X	
	ARTES AV DEVICES AND CABLING	X	
	CONFERENCE ROOM AV DEVICES AND CABLING	X	
	CONTROL AV CIRCUITS, CABLING, LICENSES, AV SWITCHES, CONFIGURATION - COMPLETE SYSTEM		X
	GYM/AUDITORIUM AV DEVICES, CABLING, LICENSES, AV SWITCHES, CONFIGURATION - COMPLETE SYSTEM		X
	GYM/AUDITORIUM AV DEVICES, CABLING, LICENSES, AV SWITCHES, CONFIGURATION - COMPLETE SYSTEM		X

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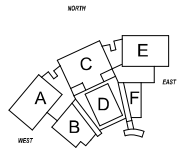

KEYPLAN

Number	Date	Issued For
1	10/16/2024	Addendum No. 2
	09/30/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

AUDIO VISUAL SYMBOL LEGEND & GENERAL NOTES

Date: 07/08/2024
Scale: As indicated
Proj. Number: 22367.00
Drawing Number: TA000

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10/16/2024 8:34:58 AM

TECHNOLOGY DRAWING KEYNOTES

No.	DESCRIPTION
1	MOUNT OUTLETS ABOVE COUNTER
2	INCLUDE OBERON PROTECTIVE BOX FOR WIRELESS ACCESS POINT
3	COORDINATE WITH ELEVATOR VENDOR FOR POTS LINE. TERMINATE CABLE DIRECTLY TO 110 BLOCK IN MDF.
4	FACTORY PAINT SPEAKER BLACK
5	SPEAKER SHALL BE SOUNDTUBE #CM-SZ OR EQUIVALENT. USE INDOOR/OUTDOOR RATED SPEAKER CABLE AND WEATHERIZE ALL PENETRATIONS AND OPENINGS.
6	PROPERLY SECURE HORNS TO STEEL DECKING ABOVE, BOTTOM OF SPEAKERS TO BE ABOVE BOTTOM OF JOISTS. COORDINATE SPEAKER LOCATIONS FOR BEST COVERAGE. TYP ALL GYM HORNS.



1 1.0 - AUDIO VISUAL FIRST FLOOR PLAN A
1/8" = 1'-0"

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NORTH
EAST
WEST
SOUTH
A B C D E F

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

AUDIO VISUAL FIRST FLOOR PLAN A

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **TA101A**

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TECHNOLOGY DRAWING KEYNOTES	
No.	DESCRIPTION
1	MOUNT OUTLETS ABOVE COUNTER
2	INCLUDE OMRON PROTECTIVE BOX FOR WIRELESS ACCESS POINT
3	COORDINATE WITH ELEVATOR VENDOR FOR POTS LINE, TERMINATE CABLE DIRECTLY TO 110 BLOCK IN MDF.
4	FACTORY PAINT SPEAKER BLACK
5	SPEAKER SHALL BE SOUNDTUBE XCM1-EZ OR EQUIVALENT. USE INDOOR/OUTDOOR RATED SPEAKER CABLE AND WEATHERIZE ALL PENETRATIONS AND OPENINGS.
6	PROPERLY SECURE HORNS TO STEEL DECKING ABOVE. BOTTOM OF SPEAKERS TO BE ABOVE BOTTOM OF JOISTS. COORDINATE SPEAKER LOCATIONS FOR BEST COVERAGE. TYP ALL GYM HORNS.



1 1.0 - AUDIO VISUAL FIRST FLOOR PLAN B
1/8" = 1'-0"

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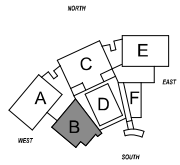

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

AUDIO VISUAL FIRST FLOOR PLAN B

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **TA101B**

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TECHNOLOGY DRAWING KEYNOTES	
No.	DESCRIPTION
1	MOUNT OUTLETS ABOVE COUNTER
2	INCLUDE OMNIDIN PROTECTIVE BOX FOR WIRELESS ACCESS POINT
3	COORDINATE WITH ELEVATOR VENDOR FOR POTS LINE, TERMINATE CABLE DIRECTLY TO 110 BLOCK IN MDF.
4	FACTORY PAINT SPEAKER BLACK
5	SPEAKER SHALL BE SOUNDTUBE XCM11-EZ OR EQUIVALENT, USE INDOOR/OUTDOOR RATED SPEAKER CABLE AND WEATHERIZE ALL PENETRATIONS AND OPENINGS.
6	PROPERLY SECURE HORNS TO STEEL DECKING ABOVE, BOTTOM OF SPEAKERS TO BE ABOVE BOTTOM OF JOISTS. COORDINATE SPEAKER LOCATIONS FOR BEST COVERAGE, TYP ALL GYM HORNS.



1 1.0 - AUDIO VISUAL FIRST FLOOR PLAN C
1/8" = 1'-0"

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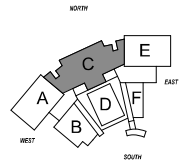

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

AUDIO VISUAL FIRST FLOOR PLAN C

Date: 07/08/2024
Scale: 1/8" = 1'-0"
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Drawing Number: **TA101C**

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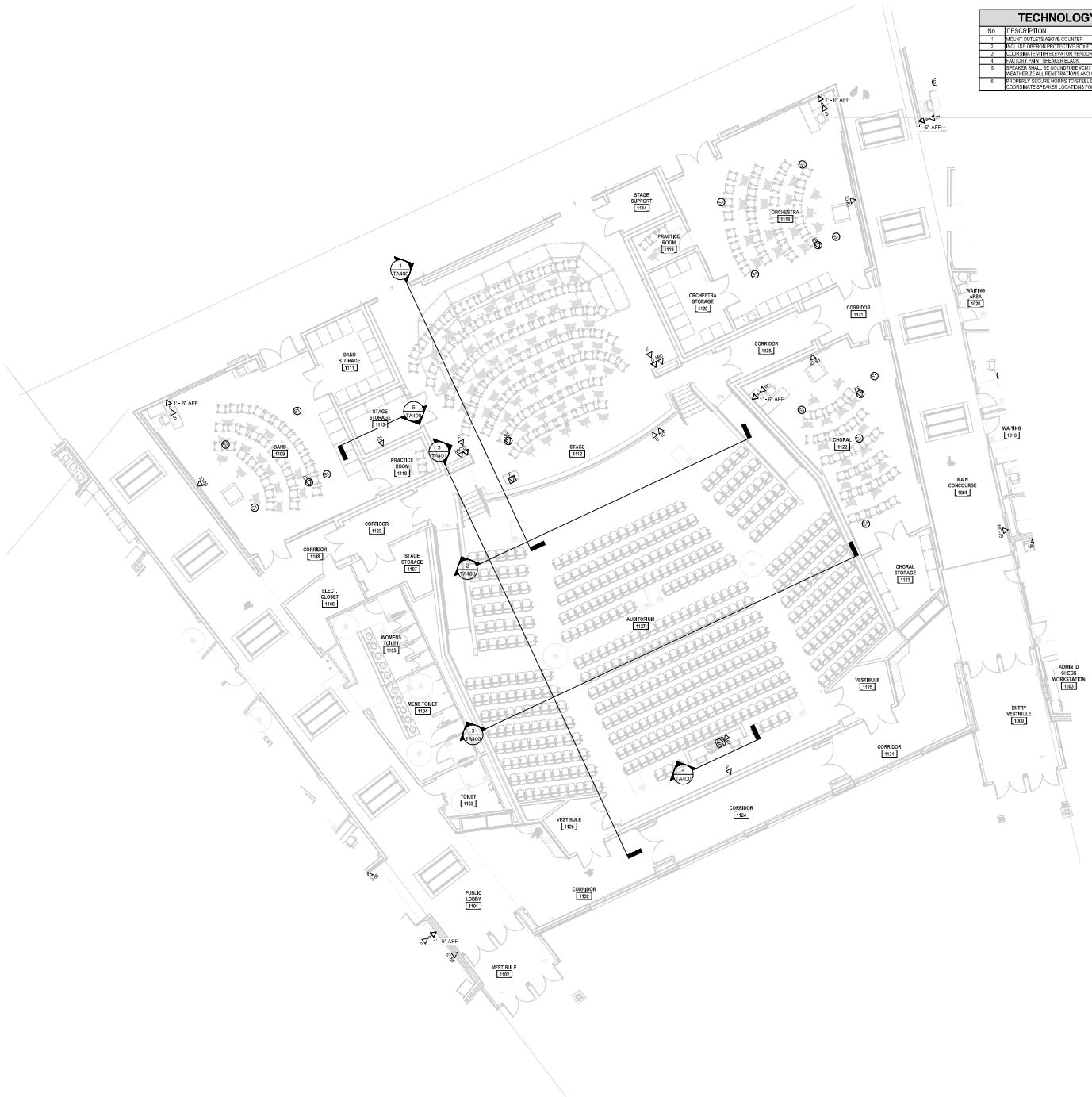
TECHNOLOGY DRAWING KEYNOTES

No.	DESCRIPTION
1	MOUNT OUTLETS ABOVE COUNTER
2	INCLUDE OBERON PROTECTIVE BOX FOR WIRELESS ACCESS POINT
3	COORDINATE WITH ELEVATOR VENDOR FOR "POTS LINE" TERMINATE CABLE DIRECTLY TO 110 BLOCK IN MDF.
4	FACTORY PAINT SPEAKER BLACK
5	SPEAKER SHALL BE SOUNDTUBE ROAM-EZ OR EQUIVALENT, USE INDOOR/OUTDOOR RATED SPEAKER CABLE AND WEATHERIZE ALL PENETRATIONS AND OPENINGS.
6	PROPERLY SECURE HORNS TO STEEL DECKING ABOVE, BOTTOM OF SPEAKERS TO BE ABOVE BOTTOM OF JOISTS, COORDINATE SPEAKER LOCATIONS FOR BEST COVERAGE. TYP ALL GYM HORNS.



1 1.0 - AUDIO VISUAL FIRST FLOOR PLAN D
1/8" = 1'-0"

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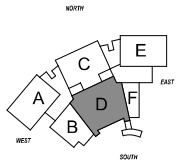

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

AUDIO VISUAL FIRST FLOOR PLAN D

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **TA101D**

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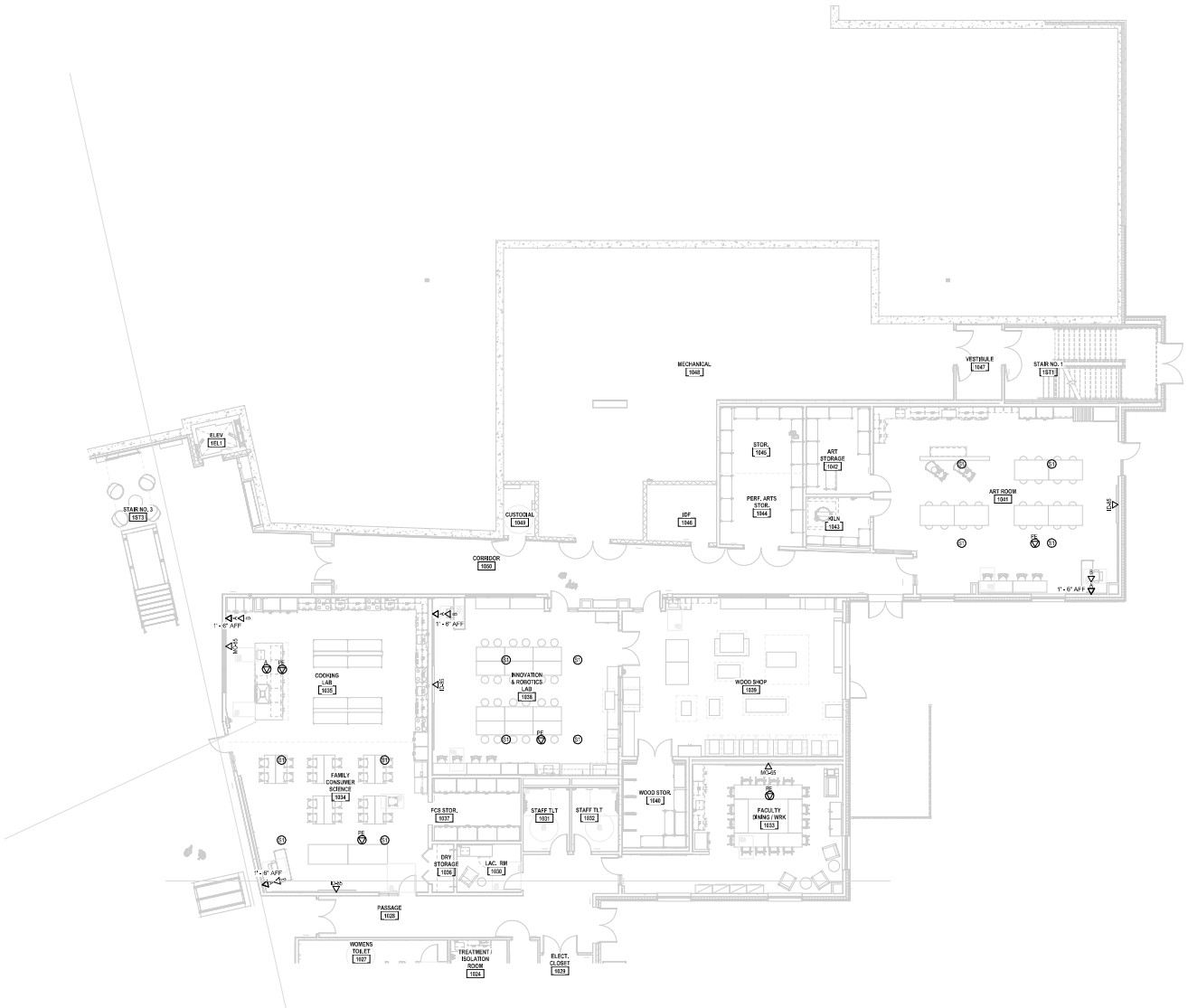
TECHNOLOGY DRAWING KEYNOTES

No.	DESCRIPTION
1	MOUNT OUTLETS ABOVE COUNTER
2	INCLUDE OBERON PROTECTIVE SOX FOR WIRELSS ACCESS POINT
3	COORDINATE WITH ELEVATOR VENDOR FOR POTS LINE, TERMINATE CABLE DIRECTLY TO 110 BLOCK IN MDF.
4	FACTORY PAINT SPEAKER BLACK
5	SPEAKER SHALL BE SOUNDTUBE #CM35-E2 OR EQUIVALENT. USE INDOOR/OUTDOOR RATED SPEAKER CABLE AND WEATHERIZE ALL PENETRATIONS AND OPENINGS.
6	PROPERLY SECURE HORNS TO STEEL DECKING ABOVE, BOTTOM OF SPEAKERS TO BE ABOVE BOTTOM OF JOISTS. COORDINATE SPEAKER LOCATIONS FOR BEST COVERAGE. TYP ALL GYM HORNS.



1 1.0 - AUDIO VISUAL FIRST FLOOR PLAN E
1/8" = 1'-0"

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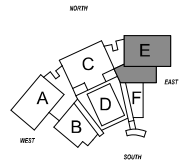

KEYPLAN

Number	Date	Issued For
	05/30/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

AUDIO VISUAL FIRST FLOOR PLAN E

Date: 07/08/2024
Scale: 1/8" = 1'-0"
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TECHNOLOGY DRAWING KEYNOTES	
No.	DESCRIPTION
1	MOUNT OUTLETS ABOVE COUNTER
2	INCLUDE OBERON PROTECTIVE SOX FOR WIRELESS ACCESS POINT
3	COORDINATE WITH ELEVATOR VENDOR FOR POTS LINE. TERMINATE CABLE DIRECTLY TO 110 BLOCK IN MDF.
4	FACTORY PAINT SPEAKER BLACK
5	SPEAKER SHALL BE SOUNDTUBE IC90H-LEZ OR EQUIVALENT. USE INDOOR/OUTDOOR RATED SPEAKER CABLE AND WEATHERIZE ALL PENETRATIONS AND OPENINGS.
6	PROPERLY SECURE HORNS TO STEEL DECKING ABOVE. BOTTOM OF SPEAKERS TO BE ABOVE BOTTOM OF JOISTS. COORDINATE SPEAKER LOCATIONS FOR BEST COVERAGE. TYP ALL GYM HORNS.



1 1.0 - AUDIO VISUAL FIRST FLOOR PLAN F
1/8" = 1'-0"

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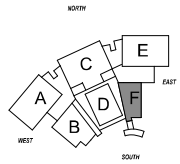

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

AUDIO VISUAL FIRST FLOOR PLAN F

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **TA101F**

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TECHNOLOGY DRAWING KEYNOTES

No.	DESCRIPTION
1	MOUNT OUTLETS ABOVE COUNTER
2	INCLUDE OBERON PROTECTIVE BOX FOR WIRELSS ACCESS POINT
3	COORDINATE WITH ELEVATOR VENDOR FOR POTS LINE. TERMINATE CABLE DIRECTLY TO 110 BLOCK IN MDF.
4	FACTORY PAINT SPEAKER BLACK
5	SPEAKER SHALL BE SOUNDTUBE ICM31-EZ OR EQUIVALENT. USE INDOOR/OUTDOOR RATED SPEAKER CABLE AND HEATHERIZE ALL PENETRATIONS AND OPENINGS.
6	PROPERLY SECURE HORNS TO STEEL DECKING ABOVE. BOTTOM OF SPEAKERS TO BE ABOVE BOTTOM OF JOISTS. COORDINATE SPEAKER LOCATIONS FOR BEST COVERAGE. TYP ALL GYM HORNS.



1 2.0 - AUDIO VISUAL SECOND FLOOR PLAN A
1/8" = 1'-0"

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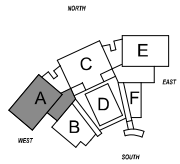

KEYPLAN

Number	Date	Issued For
	05/30/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

AUDIO VISUAL SECOND FLOOR PLAN A

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
22367.00

Drawing Number
TA102A

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TECHNOLOGY DRAWING KEYNOTES	
No.	DESCRIPTION
1	MOUNT OUTLETS ABOVE COUNTER
2	INCLUDE OBERON PROTECTIVE BOX FOR WIRELESS ACCESS POINT
3	COORDINATE WITH ELEVATOR VENDOR FOR POTS LINE, TERMINATE CABLE DIRECTLY TO 110 BLOCK IN MDF.
4	FACTORY PAINT SPEAKER BLACK
5	SPEAKER SHALL BE SOUNDTUBE #CM31-EZ OR EQUIVALENT, USE INDOOR/OUTDOOR RATED SPEAKER CABLE AND WEATHERIZE ALL PENETRATIONS AND OPENINGS.
6	REINFORCE SECURE WORKS TO STEEL DECKING ABOVE, BOTTOM OF SPEAKERS TO BE ABOVE BOTTOM OF JOISTS, COORDINATE SPEAKER LOCATIONS FOR BEST COVERAGE. TYP ALL GYM HORNS.



1 2.0 - AUDIO VISUAL SECOND FLOOR PLAN B
1/8" = 1'-0"

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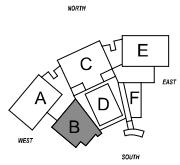

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

AUDIO VISUAL SECOND FLOOR PLAN B

Date: 07/08/2024
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Drawing Number: TA102B

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TECHNOLOGY DRAWING KEYNOTES

No.	DESCRIPTION
1	MOUNT OUTLETS ABOVE COUNTER
2	INCLUDE OBERON PROTECTIVE BOX FOR WIRELESS ACCESS POINT
3	COORDINATE WITH ELEVATOR VENDOR FOR POTS LINE, TERMINATE CABLE DIRECTLY TO 110 BLOCK IN MDF.
4	FACTORY PAINT SPEAKER BLACK
5	SPEAKER SHALL BE SOUNDTUBE ICM314EZ OR EQUIVALENT, USE INDOOR/OUTDOOR RATED SPEAKER CABLE AND WEATHERIDE ALL PENETRATIONS AND OPENINGS.
6	PROPERLY SECURE HORNS TO STEEL DECKING ABOVE, BOTTOM OF SPEAKERS TO BE ABOVE BOTTOM OF JOISTS, COORDINATE SPEAKER LOCATIONS FOR BEST COVERAGE, TYP ALL GYM HORNS.

1 2.0 - AUDIO VISUAL SECOND FLOOR PLAN C
1/8" = 1'-0"

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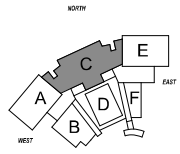

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

AUDIO VISUAL SECOND FLOOR PLAN C

Date 07/08/2024
Scale 1/8" = 1'-0"
Proj. Number 22367.00
Drawing Number **TA102C**

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TECHNOLOGY DRAWING KEYNOTES

No.	DESCRIPTION
1	MOUNT OUTLETS ABOVE COUNTER
2	INCLUDE DEBRON PROTECTIVE BOX FOR WIRELESS ACCESS POINT
3	COORDINATE WITH ELEVATOR VENDOR FOR POTS LINE. TERMINATE CABLE DIRECTLY TO 110 BLOCK IN MDF.
4	FACTORY PAINT SPEAKER BLACK
5	SPEAKER SHALL BE SOUNDTUBE #CM31-EZ OR EQUIVALENT. USE INDOOR/OUTDOOR RATED SPEAKER CABLE AND WEATHERIZE ALL PENETRATIONS AND OPENINGS.
6	PROPERLY SECURE HORNS TO STEEL DECKING ABOVE. BOTTOM OF SPEAKERS TO BE ABOVE BOTTOM OF JOISTS. COORDINATE SPEAKER LOCATIONS FOR BEST COVERAGE. TYP ALL GYM HORNS.



1 2.0 - AUDIO VISUAL SECOND FLOOR PLAN D
1/8" = 1'-0"

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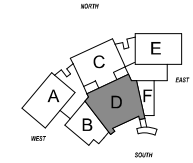

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Number	Date	Issued For
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	07/08/2024	PHASE 2

AUDIO VISUAL SECOND FLOOR PLAN D

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Drawing Number
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TECHNOLOGY DRAWING KEYNOTES

No.	DESCRIPTION
1	MOUNT OUTLETS ABOVE COUNTER
2	INCLUDE OBERON PROTECTIVE BOX FOR WIRELESS ACCESS POINT
3	COORDINATE WITH ELEVATOR VENDOR FOR POTS LINE. TERMINATE CABLE DIRECTLY TO 110 BLOCK IN MDF.
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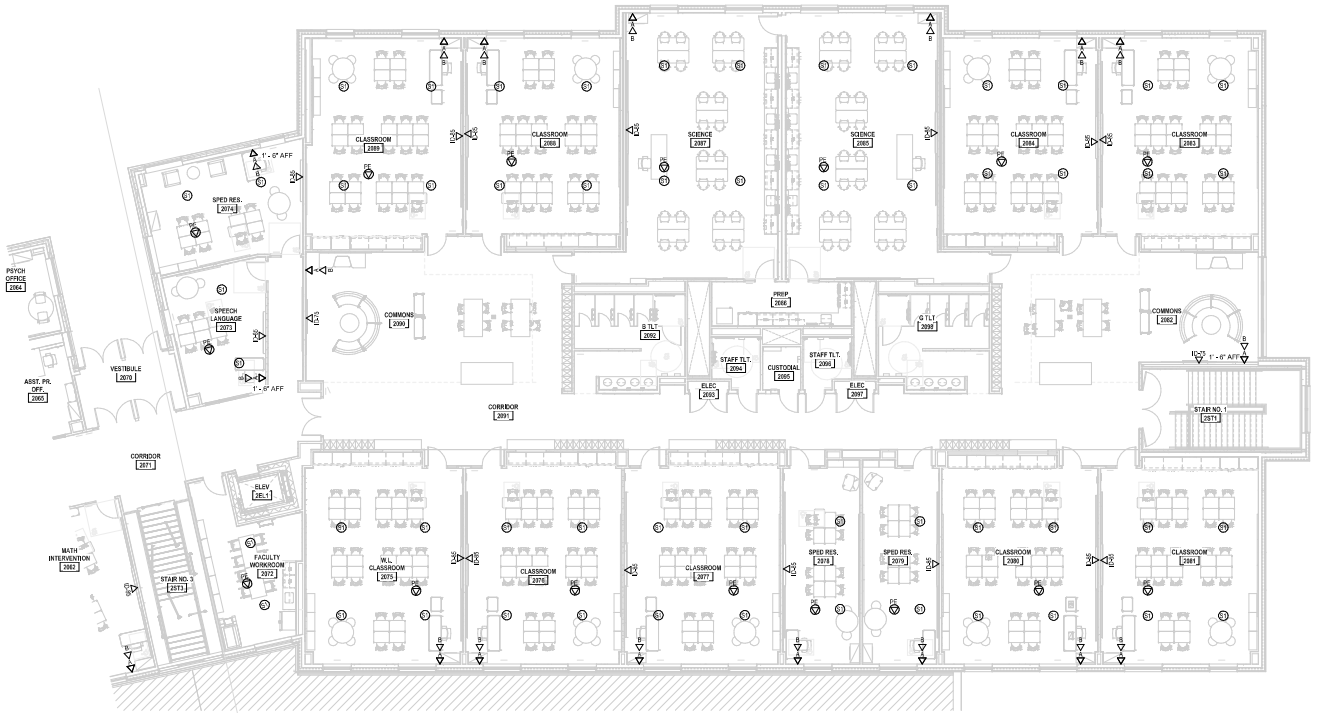
5	SPEAKER SHALL BE SOUNDTUBE #CM31-EZ OR EQUIVALENT. USE INDOOR/OUTDOOR RATED SPEAKER CABLE AND WEATHERIZE ALL PENETRATIONS AND OPENINGS.
6	PROPERLY SECURE HORNS TO STEEL DECKING ABOVE. BOTTOM OF SPEAKERS TO BE ABOVE BOTTOM OF JOISTS. COORDINATE SPEAKER LOCATIONS FOR BEST COVERAGE. TYP ALL GYM HORNS.



1 2.0 - AUDIO VISUAL SECOND FLOOR PLAN E
1/8" = 1'-0"

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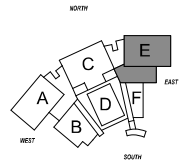
Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane,
Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

AUDIO VISUAL SECOND FLOOR PLAN E

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
22367.00

Drawing Number
TA102E

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Autodesk Docs://22367.00 - Greenwich Central Middle School/TAS_22367_GREENWICH_CENTRAL_MS_R22.rvt
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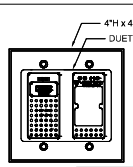
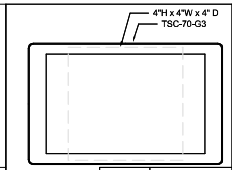


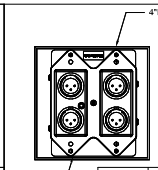
SYMBOL: D

ENCODER | 6" = 1' | 01



SYMBOL: E

AV CONTROL PANEL | 6" = 1' | 02



SYMBOL: MIC

DIGITAL XLR | 6" = 1' | 03



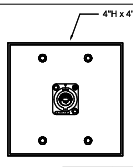
SYMBOL: ALS

ALS ANTENNA INTERFACE | 6" = 1' | 04



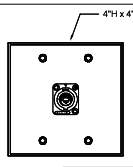
SYMBOL: ANT

MIC ANTENNA INTERFACE | 6" = 1' | 05



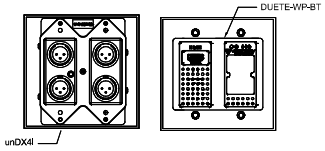
SYMBOL: SP

SPEAKER INTERFACE | 6" = 1' | 06



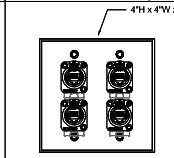
SYMBOL: GS

SPEAKER INTERFACE | 6" = 1' | 07



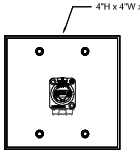
SYMBOL: F

FLOOR BOX | 6" = 1' | 08



SYMBOL: F

FOH MIX PANEL | 6" = 1' | 09

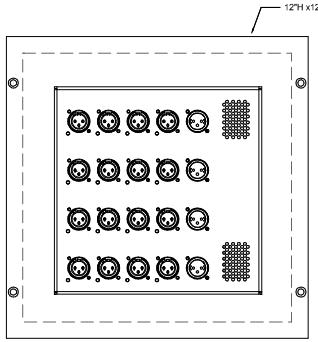


SYMBOL: P

PROJECTOR PANEL | 6" = 1' | 10

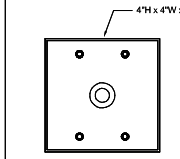
18	POWER SEQUENCER
17	NETWORK SWITCH
16	DSP
15	WIRELESS MIC RECEIVER
14	ALS TRANSMITTER
13 12 11 10	4RU DRAWER
09	2RU DRAWER
08	
07	VENTED BLANK
06 05	AMPLIFIER 01 / AR
04	VENTED BLANK
03 02	UPS
01	BLANK

CAFETERIA CABINET ELEVATION | NTS | 13



SYMBOL: IO

AUDIO INTERFACE | 6" = 1' | 17



SYMBOL: SC

SCREEN PASS-THRU PANEL | 6" = 1' | 11

CONNECTOR SYMBOL LEGEND

DEVICE	DESCRIPTION
	GROMMET
	CAT6A JACK PANEL CONNECTOR NEUTRIK NE8FDX-Y6-B
	SPEAKON MALE 4-PIN PANEL CONNECTOR NEUTRIK NL4MP-UC
	RCA PANEL CONNECTOR NEUTRIK NF2D-B-V

CONNECTOR SYMBOL | 6" = 1' | 12

18	POWER SEQUENCER
17	NETWORK SWITCH
16	DSP
15	WIRELESS MIC RECEIVER
14	ALS TRANSMITTER
13 12 11 10	4RU DRAWER
09	2RU DRAWER
08	
07	VENTED BLANK
06 05	AMPLIFIER 01 / AR
04	VENTED BLANK
03 02	UPS
01	BLANK

CAFETERIA CABINET ELEVATION | NTS | 14

14	2RU DRAWER
13	
12 11 10 09	4RU DRAWER
08	2RU DRAWER
07	
06	2RU DRAWER
05	
04	2RU DRAWER
03	
02 01	2RU DRAWER

FOH AV RACK | NTS | 15

ANTENNA DISTRIBUTION	
DIGITAL WLESS MIC RECEIVER	
DIGITAL WLESS MIC RECEIVER	
DIGITAL WLESS MIC RECEIVER	
ALS TRANSMITTER	SHELF / CHARGING BASES
AV NETWORK SWITCH	
DSP CORE	SHELF / CHARGING BASES
AV CONTROL PANEL	
	SHELF / CHARGING BASES
4 RU DRAWER	
	SHELF / CHARGING BASES
4 RU DRAWER	4 RU DRAWER
4 RU DRAWER	4 RU DRAWER
4 RU DRAWER	4 RU DRAWER
AMPLIFIER 02	4 RU DRAWER
VENTED BLANK	
AMPLIFIER 01	
VENTED BLANK	4 RU DRAWER
UPS	

AUDITORIUM STAGE RACK ELEVATION | NTS | 16

SYSTEM RACK CONSISTS OF:
- QTY (2) MIDDLE ATLANTIC SR-40-28
- INCLUDE VENTED LOCKING DOOR FOR EACH ASSEMBLY
- DEVICES REQUIRED FOR SYSTEM THAT ARE NOT RACK-MOUNTABLE SHALL BE SECURED WITHIN CABINET.
- DSP COMPONENTS, CONTROL SYSTEM COMPONENTS, AND ALL SWITCHES SHALL BE PLUGGED INTO UPS.
- CONTRACTOR SHALL SUBMIT ELEVATION OF RACK WITHIN PRODUCT SUBMITTALS.

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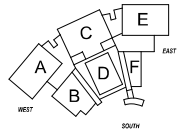
STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

AUDIO VISUAL DETAILS

Date: 07/08/2024
Scale:
Proj. Number: 22367.00
Drawing Number: TA201

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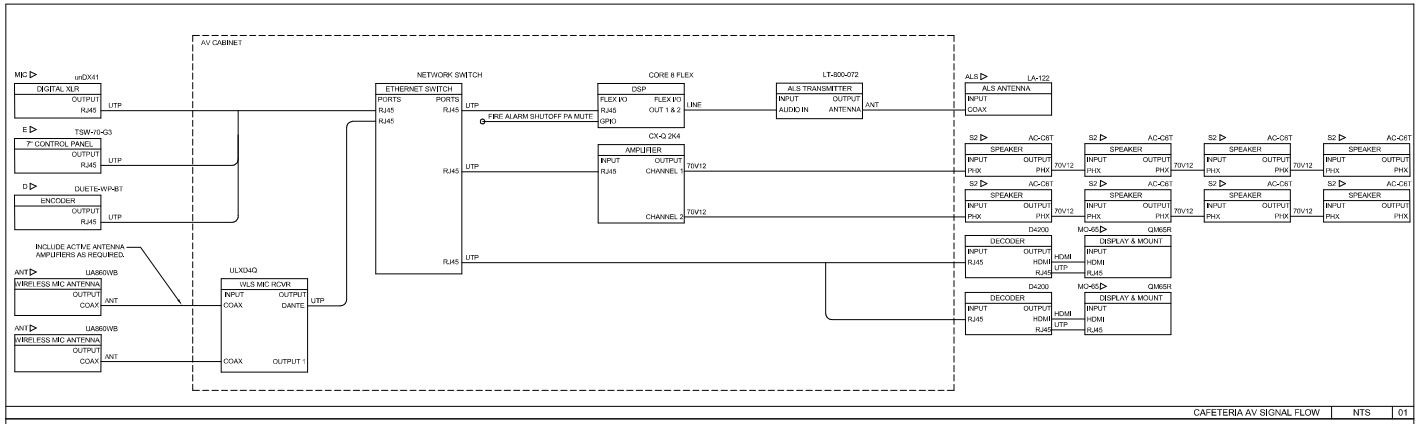

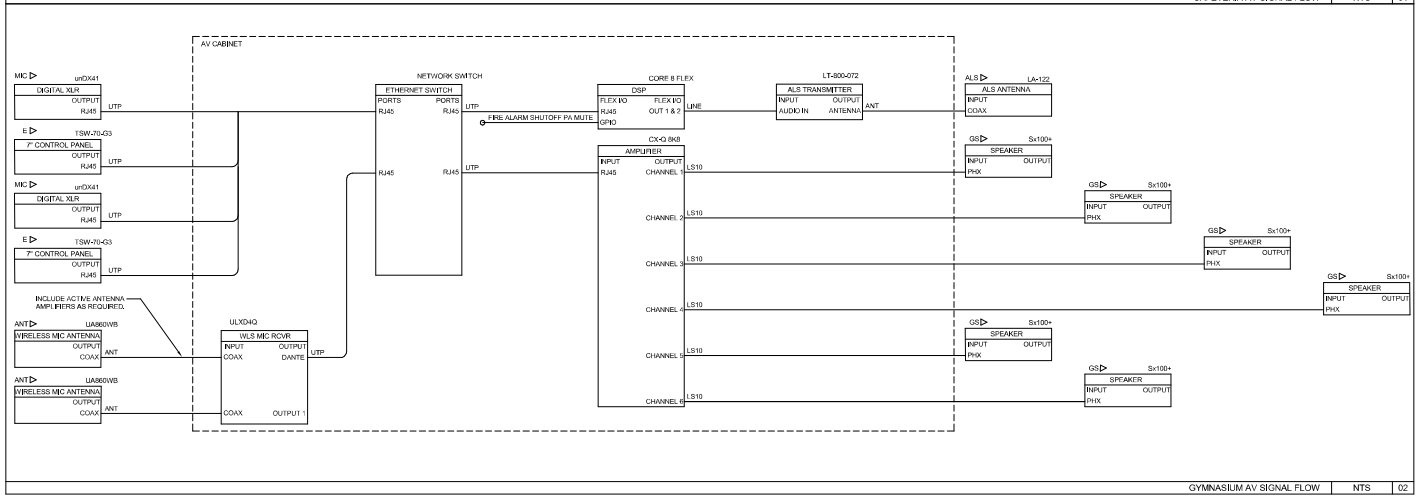

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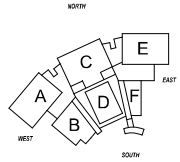

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

AUDIO VISUAL SIGNAL FLOW

Date: 07/08/2024
Scale:
Proj. Number: 22367.00
Drawing Number: **TA300**

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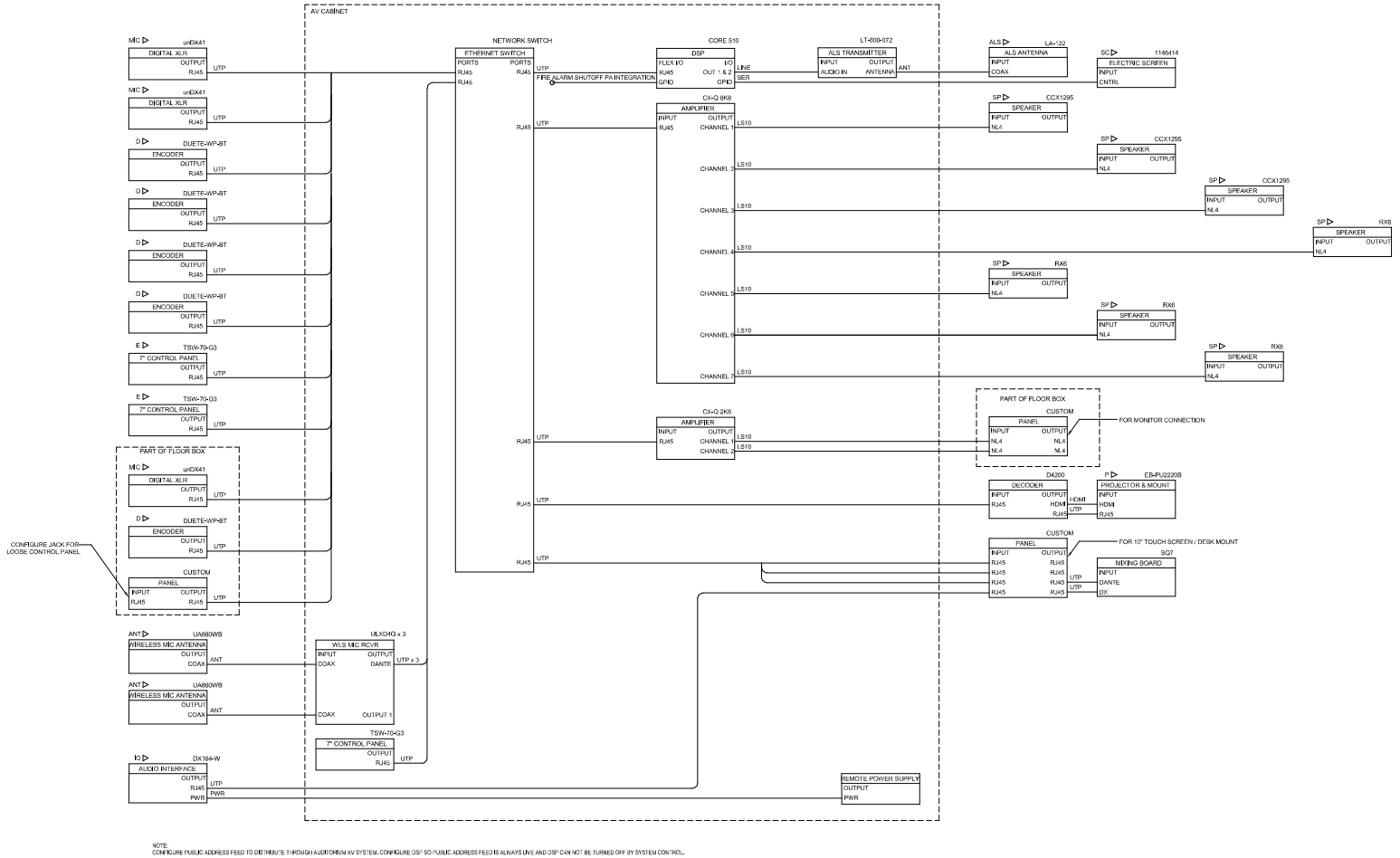

NOTE:
CONFIGURE PUBLIC ADDRESS FEED TO DISTRIBUTE THROUGH AUDITORIUM AV SYSTEM. CONFIGURE DSP SO PUBLIC ADDRESS FEED IS ALWAYS LIVE AND DSP CAN NOT BE TURNED OFF BY SYSTEM CONTROL.

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Greenwich Public Schools

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STATE PROJECT NO: 057-0114 N

NORTH
EAST
SOUTH
WEST
KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

AUDIO VISUAL AUDITORIUM SIGNAL FLOW

Date: 07/08/2024
Scale:
Proj. Number: 22367.00
Drawing Number: **TA301**

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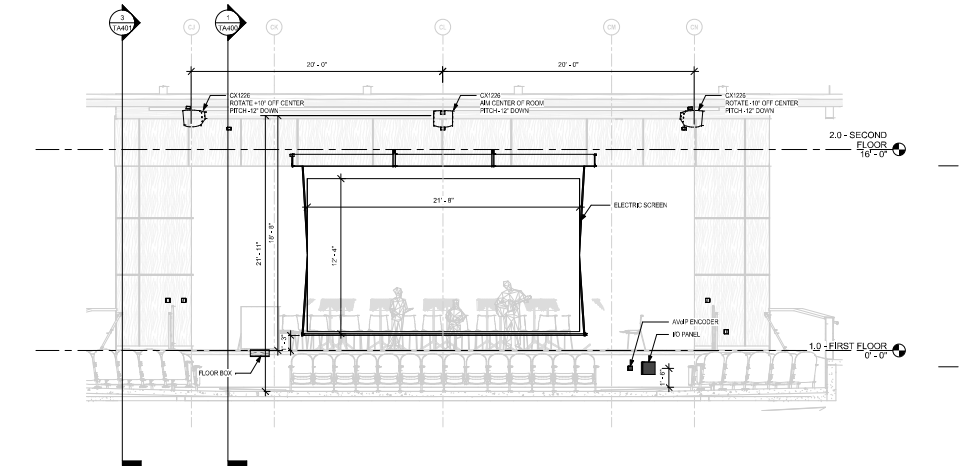
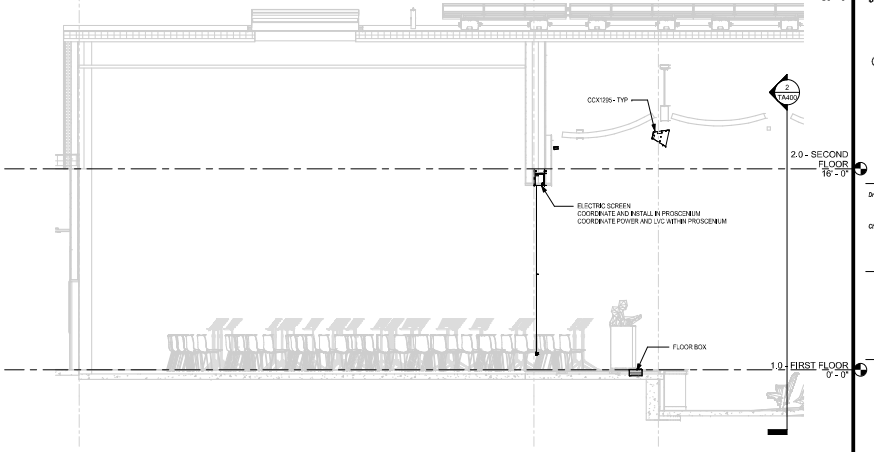
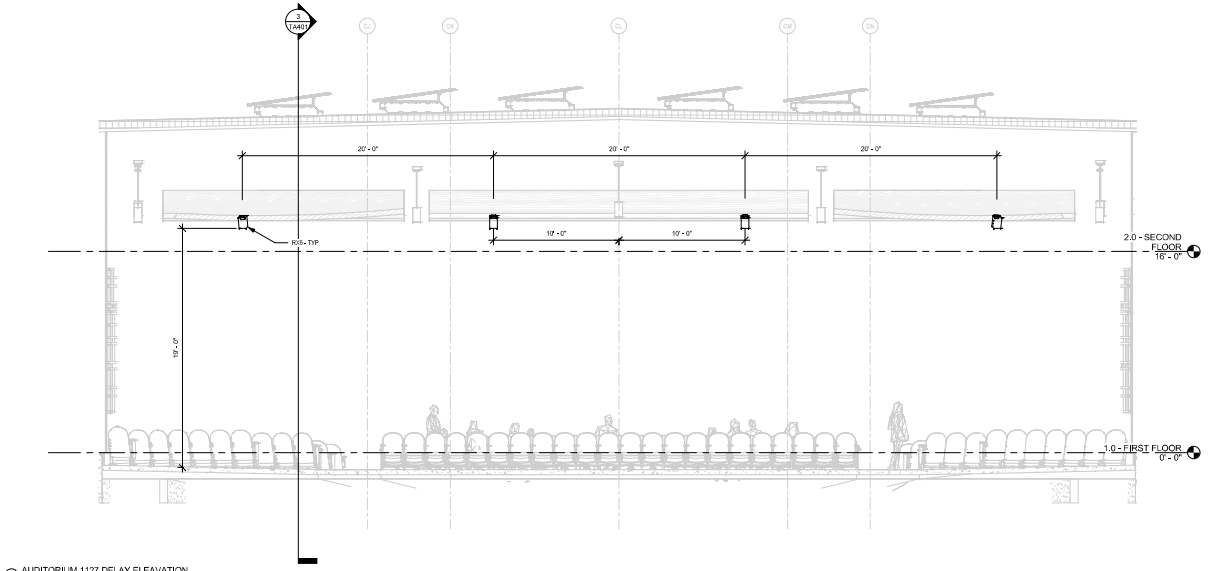


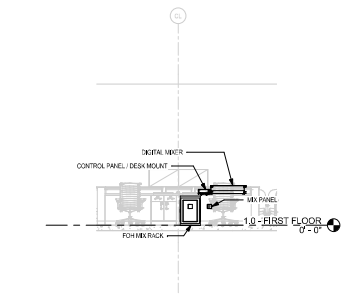
2 STAGE 1112 FRONT ELEVATION
1/4" = 1'-0"



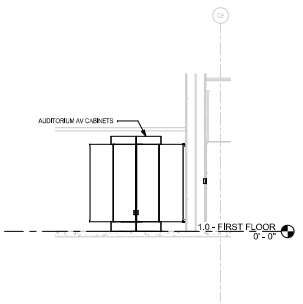
1 STAGE 1112 SIDE ELEVATION
1/4" = 1'-0"



3 AUDITORIUM 1127 DELAY ELEAVATION
1/4" = 1'-0"



4 FOH MIX ELEVATION
1/4" = 1'-0"



5 STAGE STORAGE 1113 AV CABINET ELEVATION
1/4" = 1'-0"

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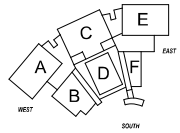

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

AUDIO VISUAL AUDITORIUM ELEVATIONS

Date: 07/08/2024
Scale: 1/4" = 1'-0"
Proj. Number: 22367.00
Drawing Number: TA400

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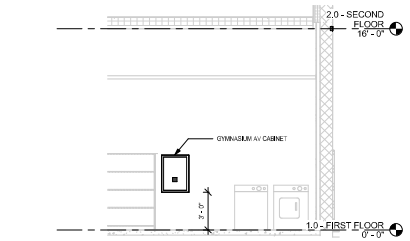
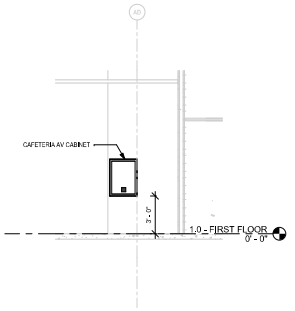
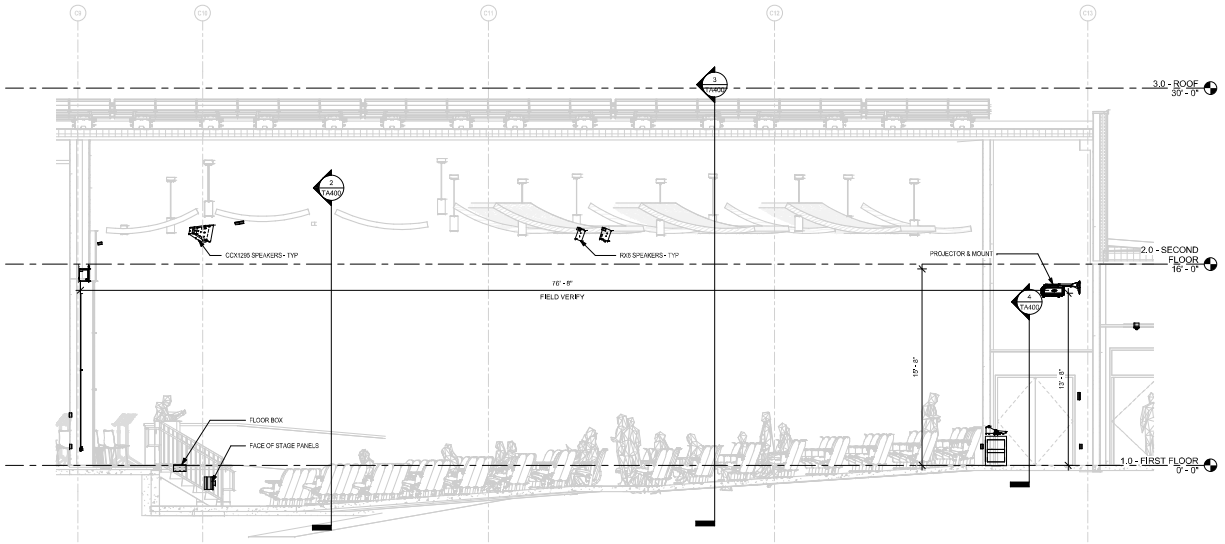


2 STORAGE 1087 - GYMNASIUM AND FITNESS AV CABINET
1/4" = 1'-0"



1 RECEIVING 1029 CAFETERIA AV CABINET
1/4" = 1'-0"



3 AUDITORIUM SIDE VIEW
1/4" = 1'-0"

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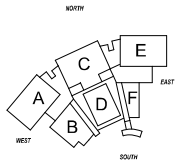

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

AUDIO VISUAL ELEVATIONS

Date: 07/08/2024
Scale: 1/4" = 1'-0"
Proj. Number: 22367.00
Drawing Number: TA401

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5/24/2024 9:32:41 AM

SECURITY

REFER TO SPECIFICATION 28 1300 FOR DEVICES

SYMBOL	DESCRIPTION	MOUNTING HEIGHT UNLESS OTHERWISE NOTED:	OUTLET BOX & CONDUIT SIZES PROVIDED & INSTALLED BY ELECTRICAL CONTRACTOR: 1G - 2-1/2" DP	4 x 4 x 2-1/8" DP	1G DEVICE RING	2G DEVICE RING	3/4" C	1" C	1/2" FLEX	SURFACE MOUNTED BOX	CABLING PROVIDED & INSTALLED BY SECURITY CONTRACTOR: ALL CABLING TO BE PLENUM RATED: CAT 1IA - CABLE TO NETWORK	CAT 1IA - 6 ft. LONG PATCH CORD / CABLE	CAT 1IA - 5 ft. LONG PATCH CORD / CABLE	#22 - 2C	#22 - 4C	#18 - 4C	#18 - 6C	#18 - 18C SHLD	PLENUM CABLE AIR	PLENUM #6/8AWG COMPOSITE	BELDEN #6/8AWG COMPOSITE 16-6C SHLD, 22-2C, 22-4C, 18-4C	COMMMENTS
	FIXED DOME CAMERA - WALL MTG	As Noted										1										REFER TO CAMERA SCHEDULE FOR ADDITIONAL INFORMATION.
	FIXED DOME CAMERA - CEILING MTG - INTERIOR											1										REFER TO CAMERA SCHEDULE FOR ADDITIONAL INFORMATION.
	MULTI SENSOR CAMERA	As Noted										1										REFER TO CAMERA SCHEDULE FOR ADDITIONAL INFORMATION.
CR	ACCESS CONTROL CARD READER HID MULTICLASS SE RP10 or SE RP40	48" AFF		1														1				
DC	DOOR POSITION SWITCH								1						1							SPECIFIED IN DIV 08 0071, DPS SHALL BE DPDT SHOWN ON THESE PLANS FOR FINAL CABLING CONNECTIONS.
JB	JUNCTION BOX				1			1	AR												1	REFER TO DETAILS FOR OUTLET AND CONDUIT INSTALLATION.
EL, ETK	ELECTRIC DOOR HARDWARE															1						SPECIFIED IN DIV 08 0071, SHOWN ON THESE PLANS FOR FINAL CABLING CONNECTIONS.
PS	POWER SUPPLY FOR DOOR HARDWARE															1						SPECIFIED IN DIV 08 0071, SHOWN ON THESE PLANS FOR FINAL CABLING CONNECTIONS.
VCD	VIDEO INTERCOM DOOR STATION	48" AFF		1				1			1									1		INTERCOM DOOR RELEASE SHALL RELEASE LOCKED DOOR FROM THE ACCESS CONTROL PANEL.
VCM	VIDEO MASTER STATION - INTERCOM - DOOR RELEASE											1										CONTRACTOR TO CONFIRM ROUTING OF ICD TO ICMS, AND ROLLOVER, FROM THE OWNER PRIOR TO CONFIGURATION.
KPD	INTRUSION DETECTION KEYPAD	48" AFF		1			1											1				
M	MOTION SENSOR, CEILING MOUNTED - 360 DEGREE			1			1										1					
M	MOTION SENSOR - CORNER / WALL MOUNT	108" AFF		1			1										1					
DB	DURESS BUTTON SENTROL UL RATED #3050	*	1		1			1	1								2					* MOUNT BELOW DESKS, REFER TO DETAILS FOR ADDITIONAL INFORMATION, COORDINATE WITH FURNITURE INSTALLATION.
LD	EMERGENCY LOCK DOWN BUTTON	48" AFF	1				1										2					STI BOX SHALL BE GREEN - CUSTOM LABEL - "LOCKDOWN". CONFIRM LOCATION WITH CONSULTANT PRIOR TO INSTALLATION.
DR	DOOR RELEASE BUTTON - DORTRONICS #27DHD29 1 GANG, FSR #DSKRL_SS TABLE BOX			1		1			1	1	1					1						MOUNT SWITCH TO TABLE BOX, LABEL SWITCH "DOOR # PUSH TO RELEASE", LABEL SHALL BE ENGRAVED, CONFIRM LOCATION ON DESK WITH OWNER AND FURNITURE CONTRACTOR.
SBE	BLUE SECURITY STROBE - EXTERIOR	As Noted	1				1													1		COORDINATE 120V POWER WITH ELECTRICIAN, REFER TO DETAILS AND WIRING DIAGRAMS FOR ADDITIONAL INFORMATION.
SBI	BLUE SECURITY STROBE - INTERIOR	As Noted	1				1													1		COORDINATE 120V POWER WITH ELECTRICIAN, REFER TO DETAILS AND WIRING DIAGRAMS FOR ADDITIONAL INFORMATION.
SM	SPOT MONITOR & MICRO PC	6' AFF	1				1				1		1									ALL CONNECTIONS BY CONTRACTOR AWARDED THIS PROJECT, 55" DIAGONAL 4K PROFESSIONAL DISPLAY UCDA.
IR	INTERNAL REQUEST TO EXIT SWITCH								1						1							SPECIFIED IN DIV 08 0071, SHOWN ON THESE PLANS FOR FINAL CABLING CONNECTIONS.
DA	LOCAL DOOR ALARM DSI #ES4203ATL-T1 DSI #ES4304H1	8' AFF		1			1													1		COORDINATE MTG HEIGHT OF ALARM WITH OWNER PRIOR TO ROUGH-IN. KEYED ALARM AND DPS SHALL BE FLUSH MOUNTED. COORDINATE WITH DOOR CONTRACTOR, REFER TO SECURITY DETAILS FOR ADDITIONAL INFO.
MP	LOCAL DOOR ALARM REMOTE MONITORING PLATE				1			1												1		COORDINATE MTG HEIGHT OF ALARM WITH OWNER PRIOR TO ROUGH-IN, REFER TO SECURITY DETAILS FOR ADDITIONAL INFO.
CPU	COMPUTER LOCATION FOR "SM" - TOWER WORKSTATION & DISPLAYS																					
AB	ALERTUS ALERT BEACON	8'-0" AFF										1										SIGURE TO BACKBOX PROVIDED IN DIV. 27, PATCH TO NETWORK & CONFIGURE.
TTS	ALERTUS TEXT TO SPEECH OR EQUIVALENT	8'-0" AFF										1			1							REFER TO ALERTUS SIGNAL FLOW.

RESPONSIBILITY MATRIX			
DEFINITIONS & NOTES: OI/OI = Owner Furnished / Owner Installed CI/CI = Contractor Furnished / Contractor Installed SSTE = Scope Delineation of Subs per Bid Packages			
	DISCIPLINE	OI/OI	CI/CI
1	SERVICE INTO BUILDING		
	PHONE, CABLE, FIBER, OTHER SERVICE FROM STREET	x	
	LIGHTNING PROTECTION FOR COPPER INTO BUILDING	x	
	PATHWAYS / CONDUIT INTO BUILDING FOR SYSTEMS PROVIDED		x
2	HORIZONTAL CABLING		
	CATEGORY RATED ETHERNET CABLE		x
	TERMINATION EQUIPMENT AND TERMINATIONS		x
	TESTING OF ETHERNET CABLE		x
	EXTENDED MANUFACTURER'S WARRANTY		x
	CABLE TRAY & J-HOOKS		x
	FLOOR BOXES		x
	PATHWAYS, CONDUIT, OUTLET BOXES, AND PENETRATIONS		x
	FIRESTOPPING		x
3	BACKBONE CABLING (FIBER, COPPER, & GROUNDING)		
	CATEGORY RATED ETHERNET CABLE & MMF BACKBONE		x
	TERMINATION EQUIPMENT AND TERMINATIONS		x
	TESTING OF FIBER & COPPER CABLE		x
	EXTENDED MANUFACTURER'S WARRANTY		x
	CABLE TRAY & J-HOOKS		x
	PATHWAYS, CONDUIT, OUTLET BOXES, AND PENETRATIONS		x
	GROUNDING CONDUCTOR BETWEEN DATA ROOMS		x
	GROUNDING BUSBARS AND GROUNDING OF EQUIPMENT TO BUSBARS		x
	GROUNDING OF BUSBARS TO ELECTRICAL PANELS OR OTHER MEANS		x
	FIRESTOPPING		x
4	DATA ROOM BUILDOUT		
	EQUIPMENT RACKS & CABINETS		x
	PATCH PANELS FOR ETHERNET CABLING		x
	WIRE MANAGERS - VERTICAL & HORIZONTAL		x
	CABLE TRAY & J-HOOKS		x
	FIRE RATED BACKER BOARD		x
	GROUNDING OF DATA EQUIPMENT TO BUSBARS		x
	GROUNDING OF BUSBARS TO ELECTRICAL PANELS OR OTHER MEANS		x
	FIRESTOPPING		x
	SECURITY SYSTEM SERVERS		x
	POWER		x
	UPS's & PDU's		x
	PATCH CORDS TO CAMERAS AND SPECIFIED AV DEVICES		x
	PATCH CORDS TO SWITCHES (PDDS & COPPER IN MDF / IDF	x	
5	TECHNOLOGY EQUIPMENT		
	WIRELESS ACCESS POINTS	x	
	ROUTING (AS W/ FROM ISP'S) PHONICS (SWITCHES IN MAIN IDF)	x	
	PHONE SYSTEM INCLUDING HANDSETS AND SERVERS	x	
	SERVERS (OTHER THAN SECURITY SERVERS)	x	
6	PHYSICAL SECURITY SYSTEMS		
	SECURITY CAMERAS		x
	SECURITY CABLING FOR INFRASTRUCTURE ACCESS CONTROL		x
	INTRUSION DETECTION DEVICES AND PANELS		x
	ACCESS CONTROL DEVICES AND PANELS		x
	SECURITY SYSTEM SERVERS		x
	SECURITY SYSTEM LICENSING		x
7	AUDIO VIDEO SYSTEMS		
	BACKBOX, CONDUIT, AND PATHWAYS FOR ALL AV SYSTEMS SHOWN ON DRAWINGS		x
	CLASSROOM AV DEVICES AND CABLING	x	
	OFFICE AV DEVICES AND CABLING	x	
	CONFERENCE ROOM AV DEVICES AND CABLING	x	
	CAFETERIA AV DEVICES, CABLING, LICENSES, AV SWITCHES, CONFIGURATION - COMPLETE SYSTEM		x
	GYMNASIUM AV DEVICES, CABLING, LICENSES, AV SWITCHES, CONFIGURATION - COMPLETE SYSTEM		x
	GYMNASIUM AV DEVICES, CABLING, LICENSES, AV SWITCHES, CONFIGURATION - COMPLETE SYSTEM		x

GENERAL NOTES

1. DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS AND WORK INCLUDED IN THE CONTRACT.
2. ALL SECURITY DEVICES AND OUTLETS MUST COINCIDE WITH ELECTRICAL POWER DRAWINGS AND TECHNOLOGY DRAWINGS. THE CONTRACTOR MUST COORDINATE ALL LOCATIONS OF THE ELECTRICAL OUTLETS WITH THE SECURITY DEVICES.
3. REQUIRED CABLE: SUBMIT ALL CABLE AND TERMINATION DEVICES WITH PRODUCT SUBMITTALS PRIOR TO PROCUREMENT.
4. LABEL ALL CABLES WITHIN 12" OF FINAL TERMINATION.
5. ALL CABLES RUN IN CEILING AREAS SHALL BE PROPERLY SUPPORTED WITH CONDUIT OR J-HOOKS MOUNTED TO SLAT AT MINIMUM OF 5' INTERVALS. NO CABLE SHALL REST ON TOUCH CEILING ASSEMBLIES. CABLES SHALL NOT BE INSTALLED EXPOSED IN OPEN CEILING AREAS.
6. ALL LABELS SHALL BE MACHINE PRINTED. NO HAND LETTERED CABLES SHALL BE USED.
7. USE ONLY PLENUM RATED CABLES.
8. DO NOT RUN ETHERNET CABLES PARALLEL TO POWER CABLES. CROSS POWER CABLES ONLY AT RIGHT ANGLES.
9. MAINTAIN 8" DISTANCE FROM ALL LIGHTING TRANSFORMERS.
10. SPLICING CABLES IS NOT PERMITTED EXCEPT AS SPECIFICALLY NOTED.
11. LOCATIONS OF EQUIPMENT FOR ALL OTHER TRADES SHALL BE COORDINATED BEFORE CONSTRUCTION.
12. CONTRACTOR SHALL COORDINATE LAYOUT LOCATIONS AND CLEARANCE OF ALL EQUIPMENT WITH OTHER TRADES AND ATTAIN OWNER'S APPROVAL PRIOR TO INSTALLATION.
13. CONTRACTOR SHALL COORDINATE ALL RACEWAYS, LOCATIONS, AND POWER REQUIREMENTS WITH THE ELECTRICAL CONTRACTOR.
14. ALL DEVICES SHOWN ON THESE PLANS MUST BE COORDINATED AND APPROVED BY THE ARCHITECT. THE INSTALLATION CONTRACTOR SHALL DEPICT ALL DEVICES ONTO ELEVATION SUBMITTALS BEFORE INSTALLATION. ANY DEVICE THAT IS NOT APPROVED BY THE ARCHITECT PRIOR TO INSTALLATION MAY BE REQUIRED TO BE RELOCATED AS DIRECTED BY THE ARCHITECT AND CORRECTED BY THE CONTRACTOR WITH NO ADDITIONAL CHARGE TO THIS PROJECT.
15. ALL PATHWAYS, INCLUDING ALL WALL AND CEILING PENETRATIONS ARE REQUIRED TO INSTALL CABLING TO THE END DEVICE AND SHALL BE COORDINATED BETWEEN THE LOW VOLTAGE AND ELECTRICAL CONTRACTOR AND SHALL BE INCLUDED AS PART OF THE SECTION.
16. SECURE ATTACHMENT OF TECHNOLOGY AND SECURITY DEVICES:
    A. TO ENSURE PROPER ATTACHMENT OF FIXTURES, FURNISHINGS & EQUIPMENT ITEMS, INCLUDING AND TECHNOLOGY ITEMS, WHERE 'ITEMS' ARE ATTACHED TO WALL, CEILING, OVERHEAD STRUCTURE, AND/OR FLOOR, CONTRACTOR SHALL PROVIDE INFORMATION ADEQUATE FOR ARCHITECT TO VERIFY ITEMS, ATTACHED TO WALL, CEILING, AND/OR FLOOR ARE ATTACHED SECURELY AND PER MANUFACTURER'S RECOMMENDATIONS. ARCHITECT'S REVIEW MAY BE IMPLEMENTED DURING SUBMITTAL PROCESS.
    B. CONTRACTOR SHALL PROVIDE STRUTS, HANGERS, FASTENERS, SAFETY HARNESSES, CHANNELS, BOLTS, SCREWS, RODS, ETC. TO SECURELY ATTACH ITEMS TO EXISTING STRUCTURE AS REQUIRED TO MEET FIELD CONDITIONS AND MEET APPLICABLE CODES.
17. ALL CONDUIT IS TO ABOVE ACCESSIBLE CEILING UNLESS OTHERWISE NOTED.
18. PLACEMENT OF ALL SECURITY VIDEO SURVEILLANCE CAMERAS MUST BE APPROVED BY THE SECURITY CONSULTANT AND/OR OWNER PRIOR TO CONSTRUCTION.

TECHNOLOGY ABBREVIATIONS

(NOTE: NOT ALL ABBREVIATIONS APPLICABLE)

AFF	ABOVE FINISH FLOOR
AFG	ABOVE FINISHED GRADE
AIC	ABOVE COUNTER
ACS	ACCESS CONTROL SYSTEM
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
AIR	AS REQUIRED
AWG	AMERICAN WIRE GAUGE
BICSI	BUILDING INDUSTRY CONSULTING SERVICE INTERNATIONAL
BNC	BAYONET NEIL-CONCELMAN
C	CONDUIT(S)
DEMARC	DEMARCATION
DPDT	DOUBLE THROW DOUBLE PULL
EIA	ELECTRONICS INDUSTRIES ALLIANCE
EMT	ELECTRICAL METALLIC TUBING
FACP	FIRE ALARM CONTROL PANEL
F	FACSIMILE (FAX)
IDS	INTRUSION DETECTION SYSTEM
LAN	LOCAL AREA NETWORK
MER	MAIN EQUIPMENT ROOM
NEC	NATIONAL ELECTRIC CODE
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
OFE	OWNER FURNISHED EQUIPMENT
PA	PUBLIC ADDRESS
PBX	PRIVATE BRANCH EXCHANGE
PC	PERSONAL COMPUTER
PoE	POWER OVER ETHERNET
PP	PATCH PANEL
PVC	POLYVINYL CHLORIDE CONDUIT
QTY	QUANTITY
STP	SHIELDED TWISTED PAIR
TBB	TELECOMMUNICATIONS BONDING BACKBONE
TGB	TELECOMMUNICATIONS GROUNDING BUSBAR
TIA	TELECOMMUNICATIONS INDUSTRY ASSOCIATIONS
TMGS	TELECOMMUNICATIONS MAIN GROUNDING BUSBAR
TR	TELECOMMUNICATIONS ROOM
TV	TELEVISION
TYP	TYPICAL
UON	UNLESS OTHERWISE NOTED
UPS	UNINTERRUPTIBLE POWER SUPPLY
UTP	UNSHIELDED TWISTED PAIR
VGA	VIDEO GRAPHICS ARRAY
VoIP	VOICE OVER INTERNET PROTOCOL
VSS	VIDEO SURVEILLANCE SYSTEM
W	WALL TELEPHONE (VOICE)
WAN	WIDE AREA NETWORK
WAO	WORK AREA OUTLET
WAP	WIRELESS (DATA) ACCESS POINT
WG	WIRE GUARD
WP	WEATHERPROOF

GENERAL PLAN SYMBOLS

- DETAIL NUMBER / SHEET NUMBER — DETAIL/PLAN IDENTIFIER
- DETAIL NUMBER / SHEET NUMBER — SECTION IDENTIFIER
- DETAIL NUMBER / SHEET NUMBER — ELEVATION IDENTIFIER
- DRAWINGS KEYNOTE NOTE TAG
- EQUIPMENT NOTE TAG
- CONDUIT SLEEVE - THROUGH CEILING TO ABOVE FLOOR
- CONDUIT SLEEVES - THROUGH FLOOR TO BELOW FLOOR
- CONDUIT SLEEVES - HORIZONTAL

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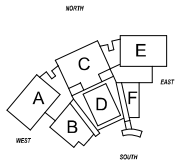

KEYPLAN

Number	Date	Issued For
1	10/16/2024	Addendum No. 2
	09/30/2024	BIDDING PERMIT
	07/08/2024	PHASE 2

SECURITY SYMBOL LEGEND & GENERAL NOTES

Date: 07/08/2024
Scale: NTS
Proj. Number: 22367.00
Drawing Number: TY000

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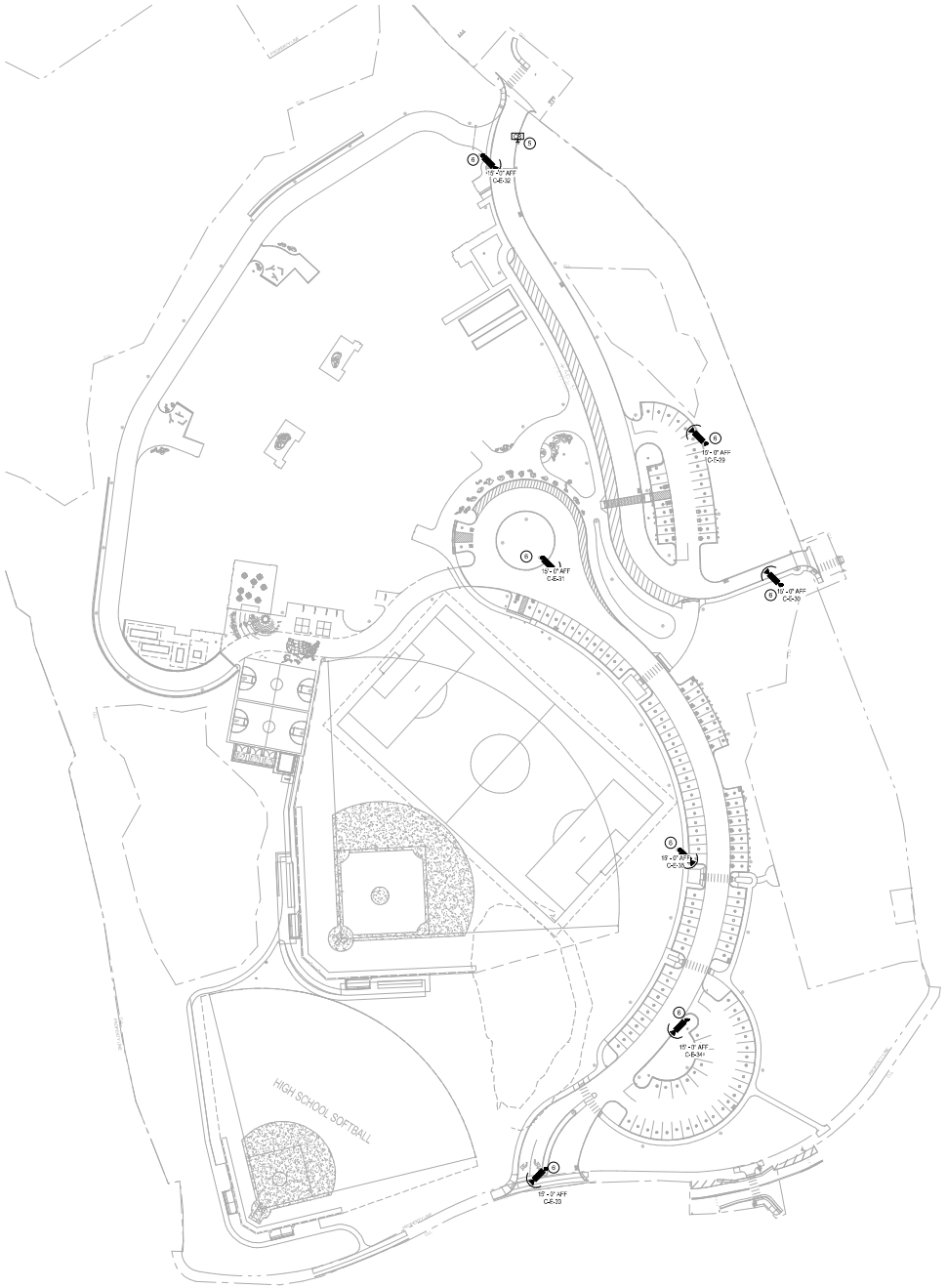

1 5 - SECURITY SITE PLAN
1" = 50'-0"

SECURITY DRAWING KEYNOTES

No.	DESCRIPTION
1	CARD READER SHALL SHUNT LOCAL ALARM AND NOT IMPEDE EGRESS UNDER ANY CIRCUMSTANCES.
2	DOOR RELEASE BUTTON SHALL UNLOCK DOOR #100.1.
3	CONFIGURE DOOR TO BE LOCKED AND UNLOCKED ON A SCHEDULE FROM THE ACS SYSTEM INCLUDE ALL LOCK CABLING AS...
4	SEQUENCE OF OPERATION WITH AUTO DOOR OPPENER.
5	INSTALL 4 STRAND OUTDOOR RATED OS2 FIBER TO CARD ACCESS PEDESTAL. PROCURE AND INSTALL HARDENED ELECTRIC SWITCH AND ACS DOOR CONTROLLER IN PEDESTAL. INSTALL LONG-RANGE READER AT TWO DIFFERENT HEIGHTS FOR CARD AND SUSS'S. LONG-RANGE READER SHALL BE CONFIRMED WITH OWNER PRIOR TO PROCUREMENT. COORDINATE WITH SITE PEDESTAL DRAWINGS.
6	REFER TO CAMERA POLE MOUNT DETAIL TYP..
7	AT DISPLAY CONFIGURED WITH VMS AND SELECT EXTERIOR CAMERAS. COORDINATE WITH OWNER PRIOR TO CONFIGURATION.

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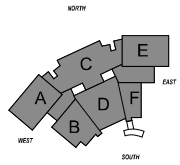

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

SECURITY SITE PLAN

Date: 07/08/2024
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Drawing Number: TY100

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1 1.0 - SECURITY FIRST FLOOR PLAN A
1/8" = 1'-0"

SECURITY DRAWING KEYNOTES

No.	DESCRIPTION
1	CARD READER SHALL SHUNT LOCAL ALARM AND NOT IMPEDE EGRESS UNDER ANY CIRCUMSTANCES.
2	DOOR RELEASE BUTTON SHALL UNLOCK DOOR #1001D.
3	CONFIGURE DOOR TO BE LOCKED AND UNLOCKED ON A SCHEDULE FROM THE ACS SYSTEM; INCLUDE ALL DOOR CASUALS A/R.
4	SEQUENCE OF OPERATION WITH AUTO DOOR OPPENER.
5	INSTALL 4 STRAND OUTDOOR RATED OS2 FIBER TO CARD ACCESS PEDESTAL. PROCURE AND INSTALL HARDENED ELECTRIC SWITCH AND ACS DOOR CONTROLLER IN PEDESTAL. INSTALL LONG-RANGE READER AT TWO DIFFERENT HEIGHTS FOR CARS AND BUSSES. LONG-RANGE READER SHALL BE CONFIRMED WITH OWNER PRIOR TO PROCUREMENT. COORDINATE WITH SITE PEDESTAL DRAWINGS.
6	REFER TO CAMERA POLE MOUNT DETAIL TYP.
7	48" DISPLAY CONFIGURED WITH VMS AND SELECT EXTERIOR CAMERAS. COORDINATE WITH OWNER PRIOR TO CONFIGURATION.

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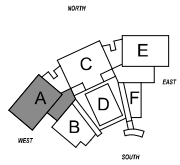

KEYPLAN

Number	Date	Issued For
1	10/16/2024	Addendum No. 2
	09/20/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

SECURITY FIRST FLOOR PLAN A

Date: 07/08/2024
Scale: 1/8" = 1'-0"
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Drawing Number: TY101A

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SECURITY DRAWING KEYNOTES

No.	DESCRIPTION
1	CARD READER SHALL SHUNT LOCAL ALARM AND NOT IMPEDE EGRESS UNDER ANY CIRCUMSTANCES.
2	DOOR RELEASE BUTTON SHALL UNLOCK DOOR #100TD.
3	CONFIGURE DOOR TO BE LOCKED AND UNLOCKED ON A SCHEDULE FROM THE ACS SYSTEM. INCLUDE ALL LOCK CABLING AIR.
4	SEQUENCE OF OPERATION WITH AUTO DOOR OPPENER.
5	INSTALL 4 STRAND OUTDOOR RATED OSZ FIBER TO CARD ACCESS PEDESTAL. PROCURE AND INSTALL HARDENED ELECTRIC SWITCH AND ACS DOOR CONTROLLER IN PEDESTAL. INSTALL LONG-RANGE READER AT TWO DIFFERENT HEIGHTS FOR CARS AND BUSSES. LONG-RANGE READER SHALL BE CONFIRMED WITH OWNER PRIOR TO PROCUREMENT. COORDINATE WITH SITE PEDESTAL DRAWINGS.
6	REFER TO CAMERA POLE MOUNT DETAIL, TYP.
7	40" DISPLAY CONFIGURED WITH VMS AND SELECT EXTERIOR CAMERAS. COORDINATE WITH OWNER PRIOR TO CONFIGURATION.



1 1.0 - SECURITY FIRST FLOOR PLAN B
1/8" = 1'-0"

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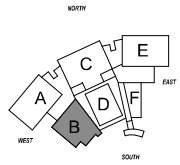

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

SECURITY FIRST FLOOR PLAN B

Date 07/08/2024
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Drawing Number TY101B

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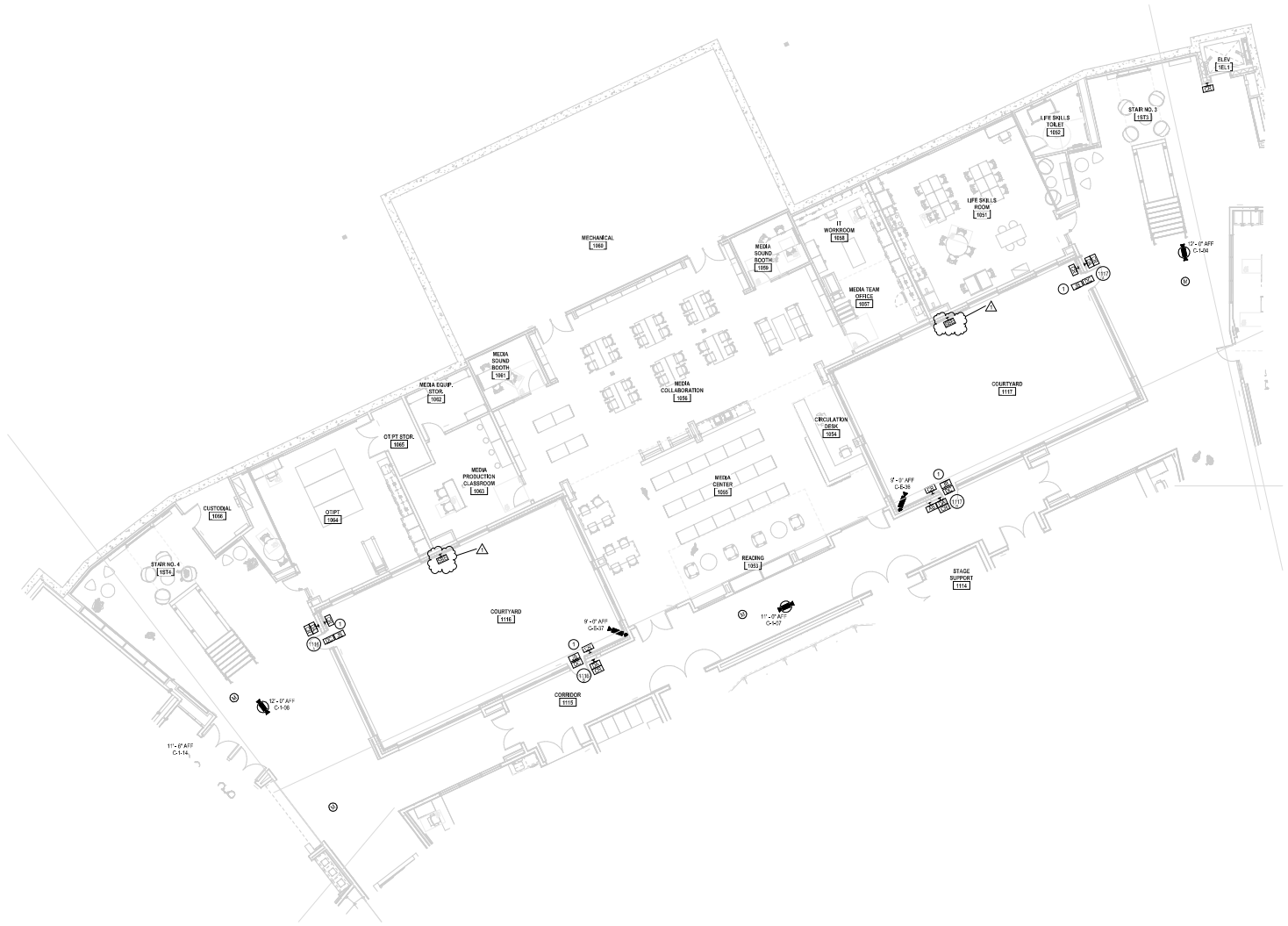
SECURITY DRAWING KEYNOTES

No.	DESCRIPTION
1	CARD READER SHALL SHUNT LOCAL ALARM AND NOT IMPEDE EGRESS UNDER ANY CIRCUMSTANCES.
2	DOOR RELEASE BUTTON SHALL UNLOCK DOOR #100105.
3	CONTINUOUS DOOR TO BE LOCKED AND UNLOCKED ON A SCHEDULE FROM THE ACS SYSTEM, INCLUDE ALL LOCK CABLING APL
4	SEQUENCE OF OPERATION WITH AUTO DOOR OPENER.
5	INSTALL 4 STRAND OUTDOOR RATED OS2 FIBER TO CARD ACCESS PEDESTAL. PROCURE AND INSTALL HARDENED ELECTRIC SWITCH AND ACS DOOR CONTROLLER IN PEDESTAL. INSTALL LONG-RANGE READERS AT TWO DIFFERENT HEIGHTS FOR CARS AND BUSSES. LONG-RANGE READER SHALL BE CONFIRMED WITH OWNER PRIOR TO PROCUREMENT. COORDINATE WITH SITE PEDESTAL DRAWINGS.
6	REFER TO CAMERA POLE MOUNT DETAIL, TYP.
7	65" DISPLAY CONFIGURED WITH VMS AND SELECT EXTERIOR CAMERAS. COORDINATE WITH OWNER PRIOR TO CONFIGURATION.



1 1.0 - SECURITY FIRST FLOOR PLAN C
1/8" = 1'-0"

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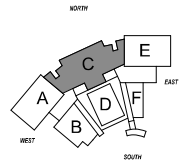

KEYPLAN

Number	Date	Issued For
1	10/16/2024	Addendum No. 2
	09/30/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

SECURITY FIRST FLOOR PLAN C

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: TY101C

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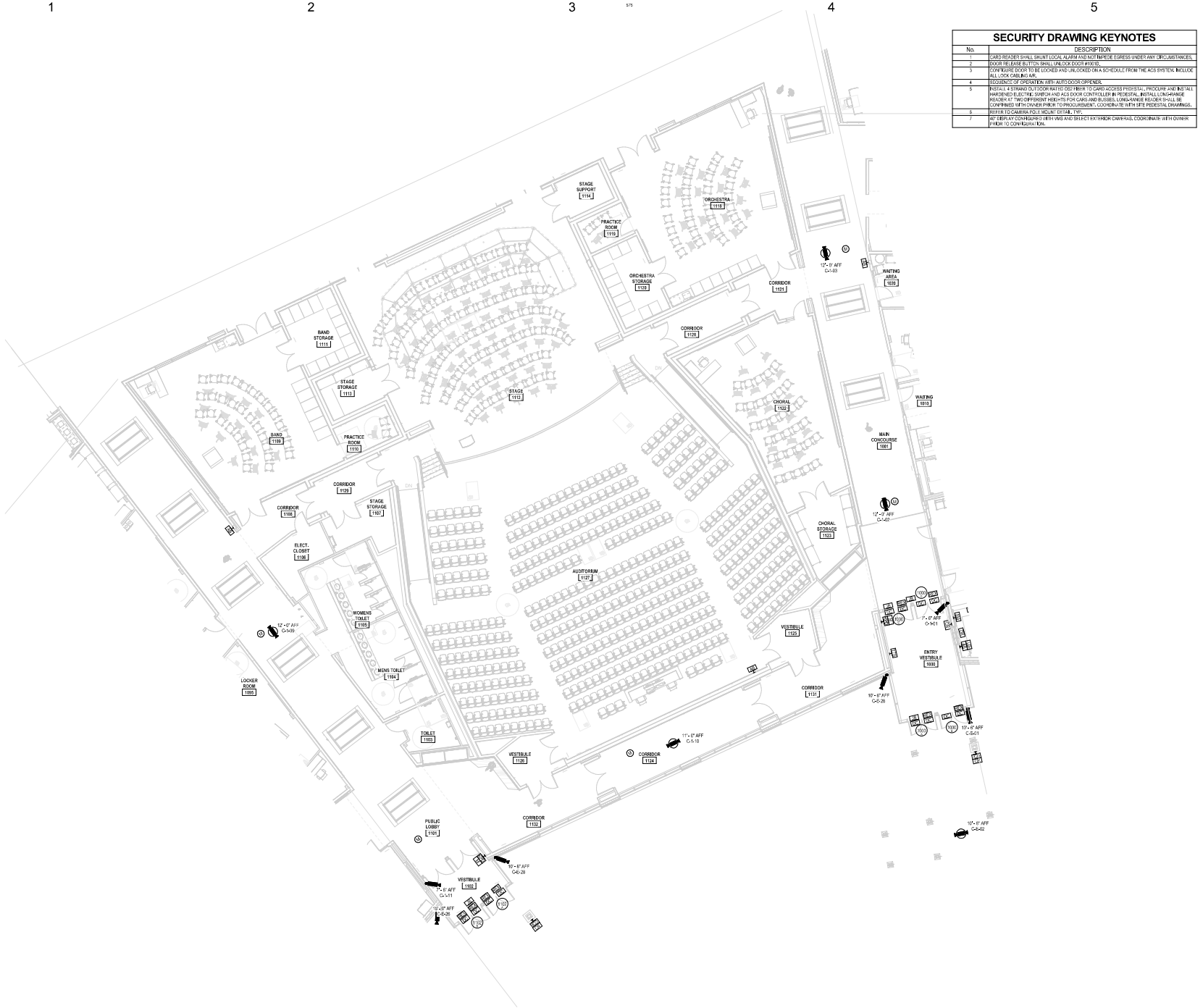
SECURITY DRAWING KEYNOTES

No.	DESCRIPTION
1	CARD READER SHALL SHUNT LOCAL ALARM AND NOT IMPEDE EGRESS UNDER ANY CIRCUMSTANCES.
2	DOOR RELEASE BUTTON SHALL UNLOCK DOOR #1010.
3	CONFIGURE DOOR TO BE LOCKED AND UNLOCKED ON A SCHEDULE FROM THE ACS SYSTEM. INCLUDE ALL LOCK CABLING AS REQUIRED.
4	SEQUENCE OF OPERATION WITH AUTO DOOR OPPENER.
5	INSTALL 4 STRAND OUTDOOR RATED OS2 FIBER TO CARD ACCESS PEDESTAL. PROCURE AND INSTALL HARDENED ELECTRIC SWITCH AND ACS DOOR CONTROLLER IN PEDESTAL. INSTALL LONG-RANGE READER AT TWO DIFFERENT HEIGHTS FOR CARS AND BUSSES. LONG-RANGE READER SHALL BE CONFIRMED WITH OWNER PRIOR TO PROCUREMENT. COORDINATE WITH SITE PEDESTAL DRAWINGS.
6	REFER TO CAMERA POLE MOUNT DETAIL, TYP.
7	40" DISPLAY CONFIGURED WITH VMS AND SELECT EXTERIOR CAMERAS. COORDINATE WITH OWNER PRIOR TO CONFIGURATION.



1 1.0 - SECURITY FIRST FLOOR PLAN D
1/8" = 1'-0"

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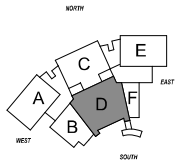

KEYPLAN

Number	Date	Issued For
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	07/08/2024	PHASE 2

SECURITY FIRST FLOOR PLAN D

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Drawing Number: TY101D

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SECURITY DRAWING KEYNOTES	
No.	DESCRIPTION
1	CARD READER SHALL SHUNT LOCAL ALARM AND NOT IMPEDE EGRESS UNDER ANY CIRCUMSTANCES.
2	DOOR RELEASE BUTTON SHALL UNLOCK DOOR #1001D.
3	CONFIGURE DOOR TO BE LOCKED AND UNLOCKED ON A SCHEDULE FROM THE ACS SYSTEM, INCLUDE ALL LOCK CABLING AIR.
4	SEQUENCE OF OPERATION WITH AUTO DOOR OPPENER.
5	INSTALL 4 STRAND OUTDOOR RATED OS2 TIGER TO CARD ACCESS PEDESTAL. PROCURE AND INSTALL HARDENED ELECTRIC SWITCH AND ACS DOOR CONTROLLER IN PEDESTAL. INSTALL LONG-RANGE READER AT TWO DIFFERENT HEIGHTS FOR CARS AND BUSSES. LONG-RANGE READER SHALL BE CONFIRMED WITH OWNER PRIOR TO PROCUREMENT. COORDINATE WITH SITE PEDESTAL DRAWINGS.
6	REFER TO CAMERA POLE MOUNT DETAIL, TYP.
7	60" DISPLAY CONFIGURED WITH VMS AND SELECT EXTERIOR CAMERAS. COORDINATE WITH OWNER PRIOR TO CONFIGURATION.



1 1.0 - SECURITY FIRST FLOOR PLAN E
1/8" = 1'-0"

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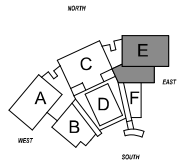
Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

SECURITY FIRST FLOOR PLAN E

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **TY101E**

Autodesk Docs://22367.00 - Greenwich Central Middle School/TY&S_22367_GREENWICH_CENTRAL_MS_R22.rvt
5/30/2024 3:38:33 AM

SECURITY DRAWING KEYNOTES

No.	DESCRIPTION
1	CARD READER SHALL SHUNT LOCAL ALARM AND NOT IMPEDE EGRESS UNDER ANY CIRCUMSTANCES.
2	DOOR RELEASE BUTTON SHALL UNLOCK DOOR #1001D.
3	CONTROLLED DOOR TO BE LOCKED AND UNLOCKED ON A SCHEDULE FROM THE ACS SYSTEM, INCLUDE ALL LOCK CABLING A/R.
4	SEQUENCE OF OPERATION WITH AUTO DOOR OPENER.
5	INSTALL 4 STRAND OUTDOOR RATED OS2 FIBER TO CARD ACCESS PEDESTAL. PROCURE AND INSTALL HARDENED ELECTRIC SWITCH AND ACS DOOR CONTROLLER IN PEDESTAL. INSTALL LONG-RANGE READER AT TWO DIFFERENT HEIGHTS FOR CARS AND BUSSES. LONG-RANGE READER SHALL BE CONFIRMED WITH OWNER PRIOR TO PROCUREMENT. COORDINATE WITH SITE PEDESTAL DRAWINGS.
6	REFER TO CAMERA POLE MOUNT DETAIL, TYP.
7	40" DISPLAY CONFIGURED WITH VMS AND SELECT EXTERIOR CAMERAS. COORDINATE WITH OWNER PRIOR TO CONFIGURATION.



1 1.0 - SECURITY FIRST FLOOR PLAN F
1/8" = 1'-0"

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Checked: NAD

Greenwich Public Schools

Greenwich Central Middle School

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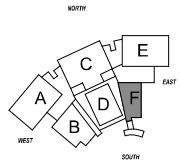
STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

SECURITY FIRST FLOOR PLAN F

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: TY101F

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5/30/2024 3:38:39 AM

SECURITY DRAWING KEYNOTES

No.	DESCRIPTION
1	CARD READER SHALL SHUNT LOCAL ALARM AND NOT IMPEDE EGRESS UNDER ANY CIRCUMSTANCES.
2	DOOR RELEASE BUTTON SHALL UNLOCK DOOR IF HELD.
3	CORRIDOR DOOR TO BE LOCKED AND UNLOCKED ON A SCHEDULE FROM THE ACS SYSTEM, INCLUDE ALL LOCK CABLING A/R.
4	SEQUENCE OF OPERATION WITH AUTO DOOR OPPENER.
5	INSTALL 4 STRAND OUTDOOR RATED OS2 FIBER TO CARD ACCESS PEDESTAL - PROCURE AND INSTALL HARDENED ELECTRIC SWITCH AND ACS DOOR CONTROLLER IN PEDESTAL. INSTALL LONG-RANGE READER AT TWO DIFFERENT HEIGHTS FOR CARS AND BUSSES. LONG-RANGE READER SHALL BE CONFIRMED WITH OWNER PRIOR TO PROCUREMENT. COORDINATE WITH SITE PEDESTAL DRAWINGS.
6	REFER TO CAMERA POLE MOUNT DETAIL, TYP.
7	49" DISPLAY CONFIGURED WITH VMS AND SELECT EXTERIOR CAMERAS, COORDINATE WITH OWNER PRIOR TO CONFIGURATION.



1 2.0 - SECURITY SECOND FLOOR PLAN A
1/8" = 1'-0"

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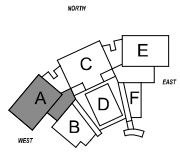
STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

SECURITY SECOND FLOOR PLAN A

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: TY102A

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SECURITY DRAWING KEYNOTES

No.	DESCRIPTION
1	CARD READER SHALL SHUNT LOCAL ALARM AND NOT IMPEDE EGRESS UNDER ANY CIRCUMSTANCES.
2	DOOR RELEASE BUTTON SHALL UNLOCK DOOR #100TD.
3	CONFIGURE DOOR TO BE LOCKED AND UNLOCKED ON A SCHEDULE FROM THE ACS SYSTEM, INCLUDE ALL LOCK CABLING AIR.
4	SEQUENCE OF OPERATION WITH AUTO DOOR OPPENER.
5	INSTALL 4 STRAND OUTDOOR RATED OS2 FIBER TO CARD ACCESS PEDESTAL. PROCURE AND INSTALL HARDENED ELECTRIC SWITCH AND ACS DOOR CONTROLLER IN PEDESTAL. INSTALL LONG-RANGE READER AT TWO DIFFERENT HEIGHTS FOR CARS AND BUSSES. LONG-RANGE READER SHALL BE CONFIRMED WITH OWNER PRIOR TO PROCUREMENT. COORDINATE WITH SITE PEDESTAL DRAWINGS.
6	REFER TO CAMERA POLE MOUNT DETAIL, TYP.
7	42" DISPLAY CONFIGURED WITH VMS AND SELECT EXTERIOR CAMERAS. COORDINATE WITH OWNER PRIOR TO CONFIGURATION.



1 2.0 - SECURITY SECOND FLOOR PLAN B
1/8" = 1'-0"

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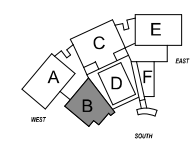

KEYPLAN

Number	Date	Issued For
	05/30/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

SECURITY SECOND FLOOR PLAN B

Date
07/08/2024
Scale
1/8" = 1'-0"
Proj. Number
22367.00

Drawing Number
TY102B

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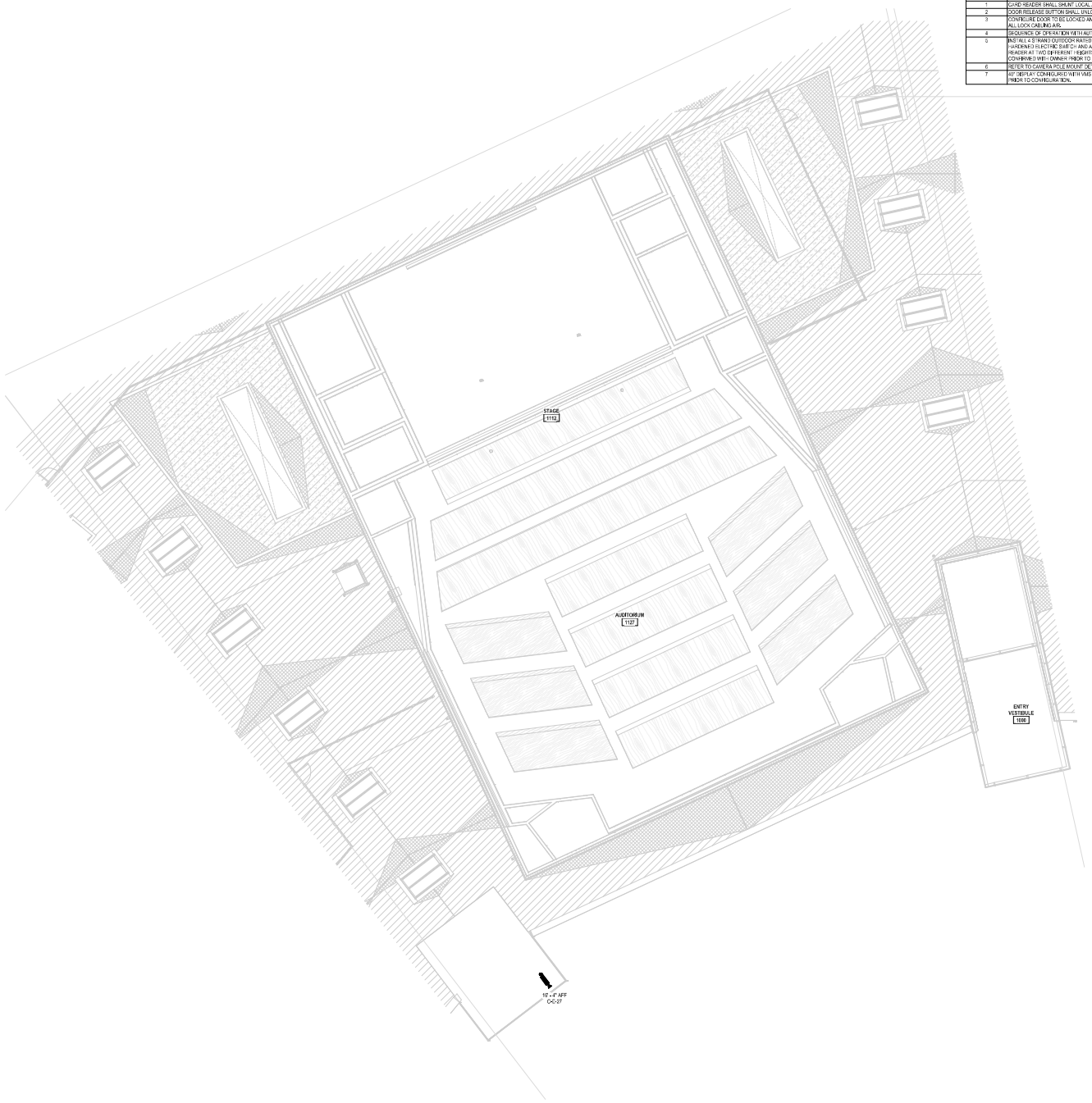
SECURITY DRAWING KEYNOTES	
No.	DESCRIPTION
1	CARD READER SHALL SHUNT LOCAL ALARM AND NOT IMPEDE EGRESS UNDER ANY CIRCUMSTANCES.
2	DOOR RELEASE BUTTON SHALL UNLOCK DOOR #100 ID.
3	CONFIGURE DOOR TO BE LOCKED AND UNLOCKED ON A SCHEDULE FROM THE ACS SYSTEM, INCLUDE ALL LOCK CABLING A/R.
4	SEQUENCE OF OPERATION WITH AUTO DOOR OPPENER.
5	INSTALL 4 STRAND OUTDOOR RATED OS2 FIBER TO CARD ACCESS PEDESTAL. PROCURE AND INSTALL HARDENED ELECTRIC SWITCH AND ACS DOOR CONTROLLER IN PEDESTAL. INSTALL LONG-RANGE READER AT TWO DIFFERENT HEIGHTS FOR CARS AND BUSSES. LONG-RANGE READER SHALL BE CONFIRMED WITH OWNER PRIOR TO PROCUREMENT. COORDINATE WITH SITE PEDESTAL DRAWINGS.
6	REFER TO CAMERA POLE MOUNT DETAIL, TYP.
7	40' DISPLAY CONFIGURED WITH VMS AND SELECT EXTERIOR CAMERAS. COORDINATE WITH OWNER PRIOR TO CONFIGURATION.





1 2.0 - SECURITY SECOND FLOOR PLAN D
1/8" = 1'-0"

SECURITY DRAWING KEYNOTES

No.	DESCRIPTION
1	CARD READER SHALL SHUNT LOCAL ALARM AND NOT IMPEDE EGRESS UNDER ANY CIRCUMSTANCES.
2	DOOR RELEASE BUTTON SHALL UNLOCK DOOR IF ISSUED.
3	CONFIGURE DOOR TO BE LOCKED AND UNLOCKED ON A SCHEDULE FROM THE ACS SYSTEM, INCLUDE ALL LOCK CABLING AS.
4	SEQUENCE OF OPERATION WITH AUTO DOOR OPPENER.
5	INSTALL 4 STRAND OUTDOOR RATED OS2 FIBER TO CARD ACCESS PEDESTAL, PROCURE AND INSTALL HARDENED ELECTRIC SWITCH AND ACS DOOR CONTROLLER IN PEDESTAL, INSTALL LONG-RANGE READER AT TWO DIFFERENT HEIGHTS FOR CARS AND BUSSES. LONG-RANGE READER SHALL BE CONFIRMED WITH OWNER PRIOR TO PROCUREMENT, COORDINATE WITH SITE PEDESTAL DRAWINGS.
6	REFER TO CAMERA POLE MOUNT DETAIL, TYP.
7	40" DISPLAY CONFIGURED WITH VMS AND SELECT EXTERIOR CAMERAS, COORDINATE WITH OWNER PRIOR TO CONFIGURATION.

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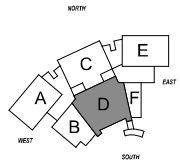

KEYPLAN

Number	Date	Issued For
	09/30/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

SECURITY SECOND FLOOR PLAN D

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **TY102D**

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9/26/2024 3:39:21 AM

SECURITY DRAWING KEYNOTES	
No.	DESCRIPTION
1	CARD READER SHALL SHUNT LOCAL ALARM AND NOT SUPERSEDE EGRESS UNDER ANY CIRCUMSTANCES.
2	DOOR RELEASE BUTTON SHALL UNLOCK DOOR IF USED.
3	CONFIGURE DOOR TO BE LOCKED AND UNLOCKED ON A SCHEDULE FROM THE ACS SYSTEM, INCLUDE ALL LOCK CABLING AIR.
4	SEQUENCE OF OPERATION WITH AUTO DOOR OPENER.
5	INSTALL 4 STRAND OUTDOOR RATED OS2 FIBER TO CARD ACCESS PEDESTAL. PROCURE AND INSTALL HARDENED ELECTRIC SWITCH AND ACS DOOR CONTROLLER IN PEDESTAL. INSTALL LONG-RANGE READER AT TWO DIFFERENT HEIGHTS FOR CARS AND BUSSES. LONG-RANGE READER SHALL BE CONFIRMED WITH OWNER PRIOR TO PROCUREMENT. COORDINATE WITH SITE PEDESTAL DRAWINGS.
6	REFER TO CAMERA POLE MOUNT DETAIL, TYP.
7	40" DISPLAY CONFIGURED WITH VMS AND SELECT EXTERIOR CAMERAS. COORDINATE WITH OWNER PRIOR TO CONFIGURATION.



1 2.0 - SECURITY SECOND FLOOR PLAN E
1/8" = 1'-0"

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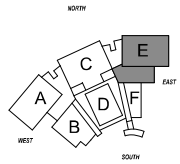

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

SECURITY SECOND FLOOR PLAN E

Date: 07/08/2024
Scale: 1/8" = 1'-0"
Proj. Number: 22367.00
Drawing Number: **TY102E**

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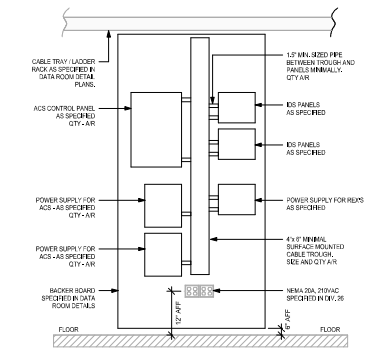
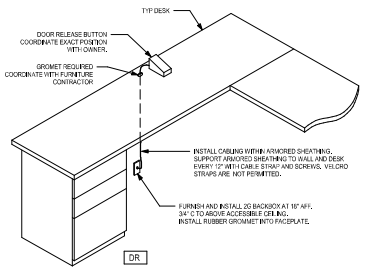


1 ACS & IDC TYP CONTROL PANEL ELEVATION
NTS



2 ACS - DOOR RELEASE BUTTON MTG DETAIL
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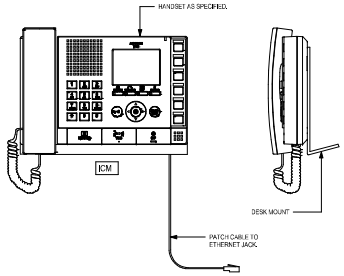
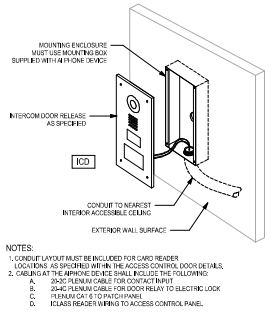
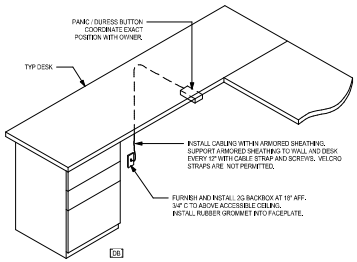


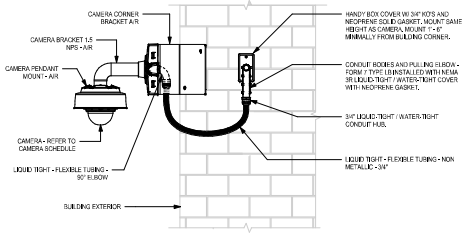
3 ACS - INTERCOM MASTER STATION
NTS



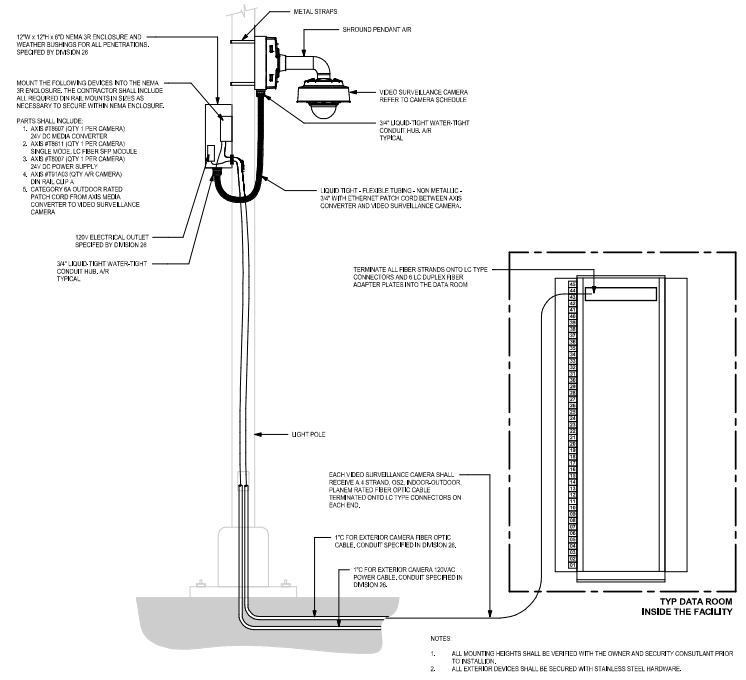
4 ACS - INTERCOM VIDEO DOOR RELEASE
NTS



5 ACS - PANIC / DURESS BUTTON MTG DETAIL
NTS



6 CAMERA - EXTERIOR CORNER MOUNT
NTS



7 CAMERA - EXTERIOR POLE MOUNTED
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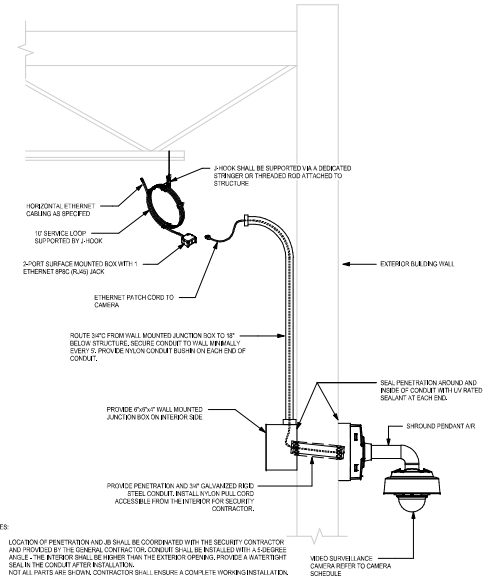
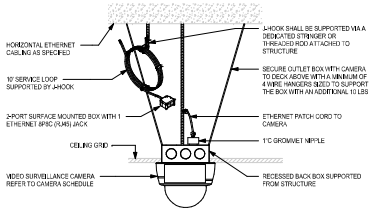


8 CAMERA - EXTERIOR WALL MOUNTED W/ PENDANT
NTS



9 CAMERA - INTERIOR CEILING MOUNT
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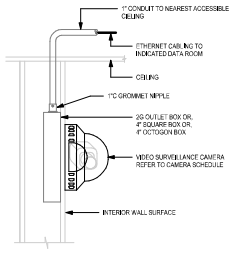
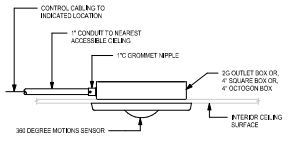


10 CAMERA - INTERIOR WALL MOUNT
NTS



11 IDS - 360 DEGREE MOTION SENSOR
NTS

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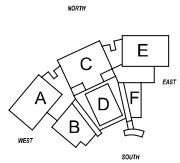

KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

SECURITY DETAILS

Date: 07/08/2024
Scale: NTS
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Drawing Number: TY301

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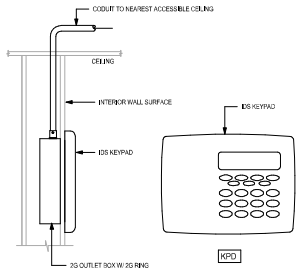


1 IDS - KEYPAD DETAIL
NTS

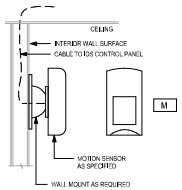


NOTES:

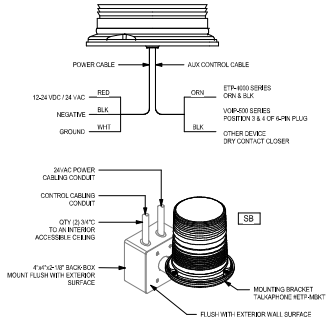
THE LOCKDOWN BUTTONS SHALL CONNECT TO THE ACCESS CONTROL SYSTEM, MASS NOTIFICATION SYSTEM (PUBLIC ADDRESS SYSTEM) AND FIRE ALARM SYSTEM. CONFIGURATION OF FUNCTIONALITY MUST BE COORDINATED WITH THE OWNER AND SECURITY CONSULTANT. AT A MINIMUM THE FOLLOWING FEATURES SHALL BE OCCUR UPON ACTIVATION:

1. MUST LOCK DOWN ALL ACCESS CONTROLLED DOORS WITH ASSOCIATED THREAT LEVELS CONFIGURED INTO THE ACCESS CONTROLLED SYSTEM. THIS THREAT LEVEL ACCESS SHALL BE DESCRIBED BY THE OWNER DURING CONFIGURATION OF THESE SECURITY SYSTEMS. AS AN EXAMPLE, THE PRINCIPAL, FIRE AND POLICE SHALL BE THE ONLY AUTHORIZED PERSONNEL ALLOWED ACCESS THROUGH THE CONTROLLED DOORS.
2. MUST INTERFACE WITH THE FIRE ALARM SYSTEM TO CLOSE SMOKE DOORS.
3. MUST NOTIFY THE SECURITY MONITORING COMPANY OF AN EMERGENCY EVENT VIA THE INTRUSION DETECTION PANEL.
4. MUST INITIATE AN EMERGENCY ANNOUNCEMENT OVER THE ALERTUS SYSTEM.
5. THE LOCKDOWN BUTTON SHALL BE COLORED GREEN.
6. LABEL AS "LOCKDOWN"
7. MOUNT 48" AFF
8. REFER TO WRITTEN SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
9. LOCKDOWN BUTTON MUST IONCLUDE A PROTECTIVE, HINGED, COVER.

2 ACS - LOCKDOWN BUTTON
NTS



3 IDS - MOTION SENSOR WALL MTG
NTS



4 SECURITY - EMERGENCY STROBE LIGHT
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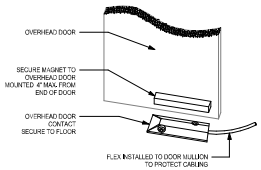
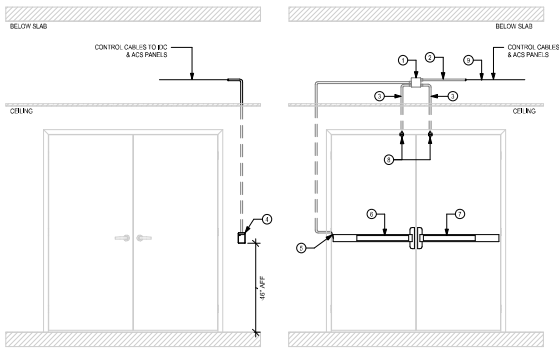


10 IDS OVERHEAD DOOR DPS
NTS

IDS & ACS DOOR KEYNOTES

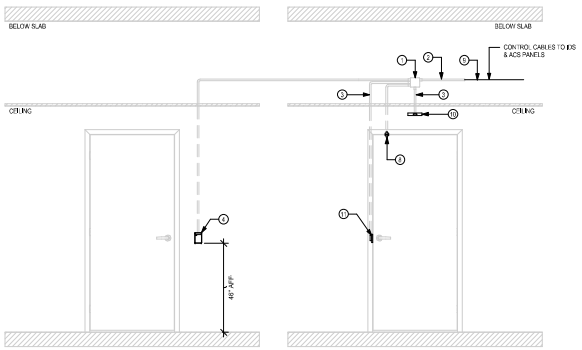
1. 4"X4"X2-1/8" DEEP JUNCTION BOX (JB) ON SECURE SIDE, ABOVE ACCESSIBLE CEILING FURNISHED AND INSTALLED BY GENERAL CONTRACTOR.
2. 1" CONDUIT TO (JB) FOR SECURITY COMPOSITE CABLE FURNISHED AND INSTALLED BY GENERAL CONTRACTOR.
3. 3/4" CONDUIT TO (JB) FOR SECURITY DEVICES FURNISHED AND INSTALLED BY GENERAL CONTRACTOR. TYPICAL FOR ALL DEVICES.
4. CARD READER (CR) - FURNISHED AND INSTALLED BY SECURITY CONTRACTOR.
   SINGLE GANG ELECTRICAL BOX FLUSH MOUNTED 48" A.F.F., ON UNSECURED SIDE FURNISHED AND INSTALLED BY GENERAL CONTRACTOR.
5. ELECTRIFIED TRANSFER HINGE (12 CONDUCTOR MINIMUM) AND WIREWAY TO CRASH BAR FURNISHED AND INSTALLED BY DIVISION 08 DOOR HARDWARE.
6. CRASH BAR WITH ELECTRIFIED TRIM AND INTEGRATED REQUEST-TO-EXIT (REX) - CRASH BAR AND TRIM FURNISHED AND INSTALLED BY DIVISION 08 DOOR HARDWARE.
   CONNECTION TO ELECTRIFIED TRANSFER HINGE FOR LOCK AND REX BY SECURITY CONTRACTOR. DOOR PREP BY GENERAL CONTRACTOR.
7. NON-ELECTRIFIED CRASH BAR AND TRIM LOCK FURNISHED AND INSTALLED BY DIVISION 08 DOOR HARDWARE.
8. DOOR POSITION SWITCH FURNISHED AND INSTALLED BY DIVISION 08 DOOR HARDWARE, CABLED BY SECURITY CONTRACTOR. DOOR AND FRAME PREP BY GENERAL CONTRACTOR.
9. COMPOSITE ACCESS CONTROL CABLE FURNISHED AND INSTALLED BY SECURITY CONTRACTOR.
10. REQUEST TO EXIT (REX) MOTION SENSOR INSTALLED ON SECURED SIDE OF DOOR FURNISHED AND INSTALLED BY SECURITY CONTRACTOR. SINGLE GANG ELECTRICAL BOX FLUSH MOUNTED HORIZONTALLY @ 8'-0"AFF ON UNSECURED SIDE OF DOOR FURNISHED AND INSTALLED BY GENERAL CONTRACTOR.
11. ELECTRIC STRIKE FURNISHED AND INSTALLED BY DIVISION 08 DOOR HARDWARE. CABLE AND CONNECTION BY SECURITY CONTRACTOR

5 ACS & IDS KEYNOTES
NTS



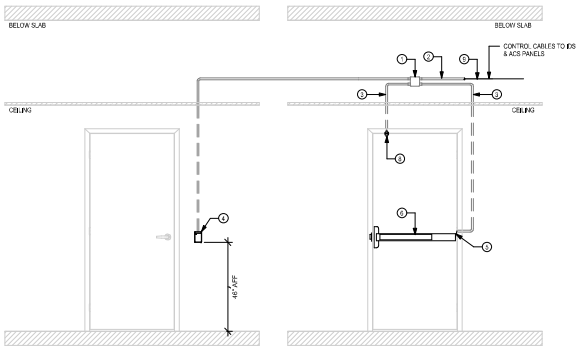
NOTE: REFER TO ACS & IDS DOOR KEYNOTES - THIS SHEET.

6 ACS - DOUBLE DOOR W/ELECTRIC TRANSFER HINDGE
NTS



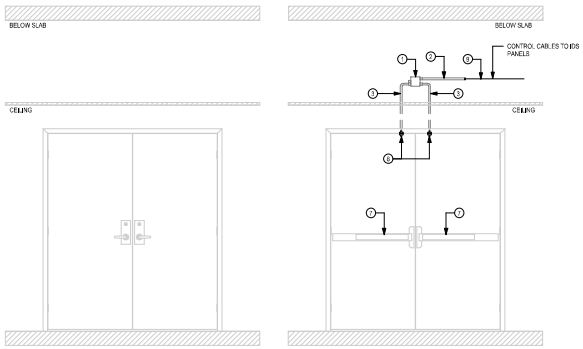
NOTE: REFER TO ACS & IDS DOOR KEYNOTES - THIS SHEET.

7 ACS - SINGLE DOOR W/ELECTRIC STRIKE
NTS



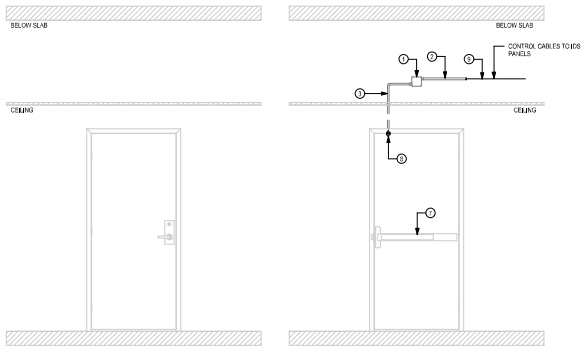
NOTE: REFER TO ACS & IDS DOOR KEYNOTES - THIS SHEET.

8 ACS - SINGLE DOOR W/ELECTRIC TRANSFER HINDGE
NTS



NOTE: REFER TO ACS & IDS DOOR KEYNOTES - THIS SHEET.

9 IDS DOUBLE DOOR -W/DPS
NTS



NOTE: REFER TO ACS & IDS DOOR KEYNOTES - THIS SHEET.

11 IDS SINGLE DOOR - W/DPS
NTS

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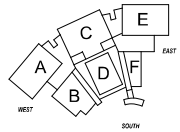
Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/31/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

SECURITY DETAILS

Date: 07/08/2024
Scale: NTS
Proj. Number: 22367.00
Drawing Number: TY302

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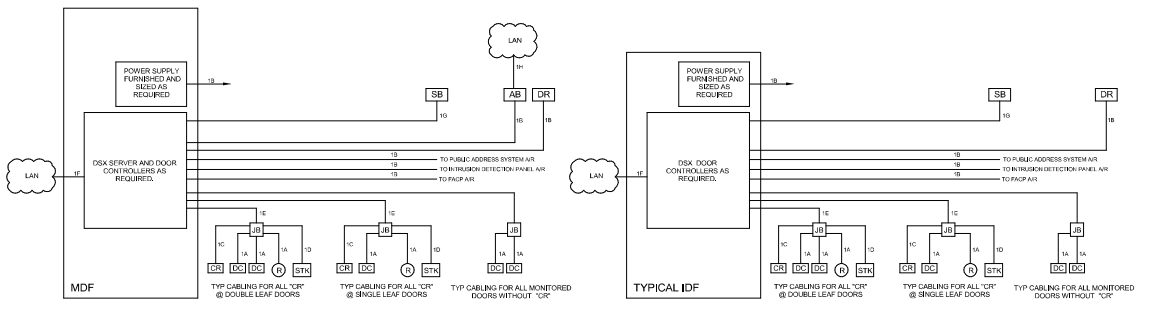


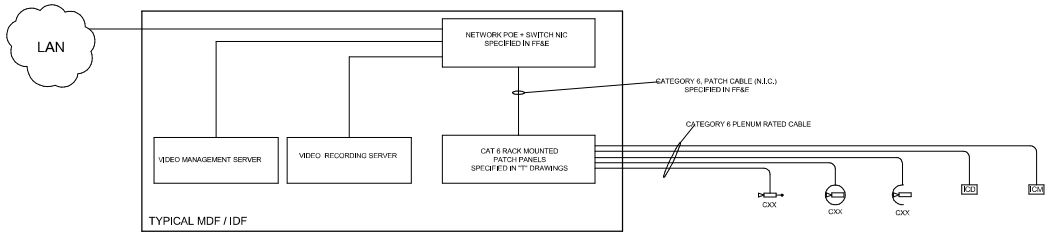
ELECTRIC LOCKSETS, REQUEST TO EXIT DEVICES, AND DOOR POSITION SWITCHES
REFER TO DIV 08 FOR DOOR HARDWARE

ELECTRIC LOCKSETS, REQUEST TO EXIT DEVICES, AND DOOR POSITION SWITCHES
REFER TO DIV 08 FOR DOOR HARDWARE

NOTES:
1. QTY OF DOOR CONTROLLERS SHALL BE PER CARD READER QUANTITIES ON PLANS.
2. INCLUDE ALL REQUIRED ELEVATOR CONTROL LICENSES. COORDINATE ELEVATOR FUNCTIONALITY WITH OWNER AND ELEVATOR CONTRACTOR.
   2.1. THERE SHALL BE A CARD READER DEDICATED TO EACH ELEVATOR ON EACH FLOOR, UPON PRESENTATION OF A VALID CREDENTIAL, THE ACCESS CONTROL SYSTEM SHALL CALL THE ELEVATOR FROM THE ELEVATOR CONTROL PANEL.
   2.2. INCLUDE ALL REQUIRED LICENSES, CABLING, AND CONFIGURATION REQUIRED FOR A FULLY FUNCTIONAL SYSTEM.
3. ALL REQUIRED CONTROL CABLING FROM THE DATA ROOMS TO EACH ACCESS CONTROL DEVICE IS REQUIRED AS PART OF HIS BID MANUAL.
4. ALL REQUIRED POWER CABLING TO EACH LOW VOLTAGE DEVICE AT EACH DOOR RECEIVING A CARD READER IS REQUIRED AS PART OF HIS BID MANUAL.
2. REFER TO DIVISION 08, DOOR HARDWARE SPECIFICATION TO ENSURE ALL REQUIRED POWER SUPPLIES AND SIZING OF SUCH SHALL ACCOMMODATE ALL CARD READERS, ELECTRONIC DOOR STRIKES / LOCKS AND REQUEST TO EXIT DEVICES WHICH ARE BUILT INTO THE DEVICES.
3. ALL FINAL TERMINATIONS, CONFIGURATION AND TESTING SHALL BE PERFORMED BY THE CONTRACTOR.
4. THE INTERCOM DOOR RELEASE AND DOOR RELEASE BUTTONS SHALL RELEASE THE DOORS FROM THE ACS PANEL. INCLUDE ALL ANALOG/IP RELAYS SUPPORTED BY THE INTERCOM DOOR RELEASE MANUFACTURER AS REQUIRED.
5. CONTROL CABLING TO THE FIRE ALARM CONTROL PANEL SHALL BE CAPABLE OF RELEASING THE MAGNETIC HOLD OPEN DOORS AS NOTED ON THE DRAWINGS DURING A LOCKDOWN EVENT.
6. ACTIVATION OF THE LOCKDOWN OR DURESS BUTTONS SHALL REGISTER AS AN ADDRESSABLE ALARM ON THE INTRUSION DETECTION PANEL AND DIAL-OUT TO THE CENTRAL MONITORING COMPANY.
7. ALERT BEACONS SHALL CONNECT TO DISTRICT ALERTUS SERVER, CONFIGURE THE ALERTBEACONS SO THAT LOCKDOWN AND DURESS BUTTONS WILL ACTIVATE ALERT BEACONS IN THE EVENT OF AN EMERGENCY. COORDINATE ALERT BEACON TEXT AND NOTIFICATION STATUS WITH OWNER DURING CONFIGURATION.
8. THE MERCURY CONTROLLER SHALL CONNECT TO THE BUILDING LAN. NETWORK SWITCHES ARE BY OTHERS, COORDINATE SECURITY VLAN AND IP ADDRESSING WITH OWNERS IT TEAM.
9. THE ACCESS CONTROL SYSTEM SHALL CONNECT TO THE PUBLIC ADDRESS SYSTEM, VIDEO SURVEILLANCE SYSTEM, ALERTUS SYSTEM, AND FIRE ALARM SYSTEM FOR FULL INTEROPERABILITY AND NOTIFICATION OF ALARMS.

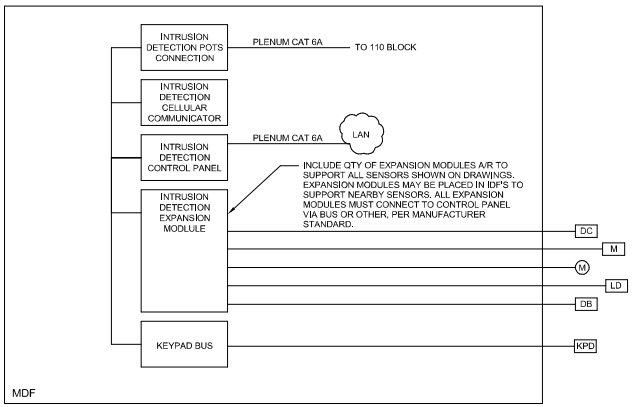
DESIGNATION	WIRE TYPE
1A	#22 - 2C, PLENUM
1B	CABLE A/R PER DEVICES & MANUFACTURER RECOMMENDATIONS
1C	#18AWG SHLD, PLENUM
1D	#18 - 2C SHLD, PLENUM
1E	BELDEN #6508FJ COMPOSITE CABLE PLENUM or Equiv., #18-6C SHLD, 22-2C, 22-4C, 18-4C
1G	#22-2C UNSHIELDED, SOLID, PLENUM
1H	CAT6A PLENUM

TYPICAL ACCESS CONTROL WIRING DIAGRAM | NONE | 01

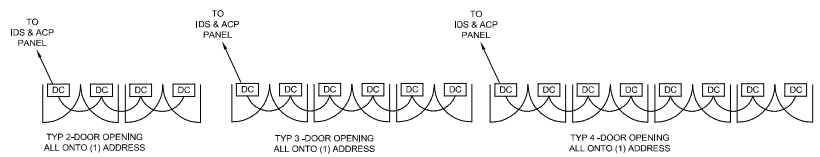


NOTES:
1. REFER TO "T" DRAWINGS TO DETERMINE WHICH DATA ROOM EACH CAMERA IS TERMINATED BACK TO.
2. VIDEO FROM THE INTERCOM DOOR RELEASES SHALL BE STORED ON THE VMS SERVERS. INCLUDE ALL APPROPRIATE LICENSES.
3. INTERCOM DOOR RELEASE SHALL RELEASE DOORS FROM ACCESS CONTROL PANEL.
4. VMS MANAGEMENT AND RECORDING SERVERS SHALL BE MOUNTED WITHIN THE MDF ONLY.

TYPICAL VIDEO SURVEILLANCE & INTERCOM DOOR RELEASE WIRING DIAGRAM | NONE | 02



NOTES:
1. THE IDS CONTROL PANEL MODEL SHALL INCLUDE AN ADDITIONAL 40% OF HEADROOM FOR FUTURE EXPANSION OF SENSORS.
2. ZONING SHALL BE DESCRIBED BY THE OWNER PRIOR TO INSTALLATION. AT A MINIMUM, THE FOLLOWING ZONES SHALL BE CONFIGURED FOR SEPARATE ARMING AND DISARMING OF THE SYSTEM.
3. THE INTRUSION DETECTION SYSTEM SHALL BE CAPABLE OF ALERTING CENTRAL MONITORING VIA CELLULAR, POTS, AND IP. ALL THREE MEANS OF COMMUNICATION MUST BE PRESENT.
4. THE INTRUSION DETECTION SYSTEM SHALL BE CONFIGURED WITH A "DAY-ALARM" THAT SENDS INFORMATION ON DOORS THAT ARE PROPPED OPEN TO SELECT USERS VIA TEXT AND EMAIL. THE SYSTEM SHALL BE CAPABLE OF BEING PROGRAMMED TO ALERT USERS OF A PROPPED OPEN DOOR BASED ON DIFFERENT DURATION.
5. THE INTRUSION DETECTION SYSTEM SHALL HAVE A GRAPHICAL USER INTERFACE OF A MAP OF THE FACILITY TO ALERT USERS OF A DOOR PROPPED OPEN SENSOR. INCLUDE ALL LICENSING AND SOFTWARE AS REQUIRED.
6. ALL ENCLOSURES, CABLING, TERMINATIONS, CONFIGURATION AND FINAL TESTING IS REQUIRED FOR A FULLY FUNCTIONAL SYSTEM.
7. INCLUDE ALL BATTERIES AND POWER SUPPLIES PER SPECIFICATION AND AS REQUIRED FOR A FULLY FUNCTIONAL SYSTEM.
8. INCLUDE ALL MODULES FOR A FULLY FUNCTIONAL SYSTEM.
9. EACH ENDPOINT, SHALL BE HOMERUN TO THE APPLICABLE MDF / IDF.
10. EACH SENSOR SHALL BE CONFIGURED WITH AS AN INDIVIDUALLY IDENTIFIED POINT TO DIRECT CENTRAL MONITORING TO THE EXACT SENSOR WHEN ALARMED.
11. SYSTEM SHALL FUNCTION AS ONE COMPLETE SYSTEM.
12. CONFIRM ALL WIRE GAUGES WITH MANUFACTURER PRIOR TO INSTALLATION. INCLUDE ALL EOL RESISTORS. DO NOT APPLY POWER UNTIL OSM REPRESENTATIVE INSPECTED THE INSTALLATION. IMPROPER INSTALLATION MAY DAMAGE EQUIPMENT.
13. ALL CABLING SHALL BE PLENUM RATED.
14. THE CONTRACTOR AWARDED THIS PROJECT SHALL SUBMIT A COMPLETE SHOP DRAWING DURING THE PRODUCT SUBMITTAL PHASE SHOWING EACH DEVICE AND INTERCONNECTION PRIOR TO ROUGH-IN OR THE PULLING OF CABLE.



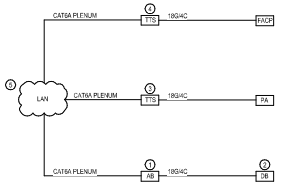
TYPICAL INTRUSION DETECTION WIRING DIAGRAM | NONE | 05

CAMERA SCHEDULE

#	MANUFACTURER	MODEL	MOUNTING TYPE	MOUNTING HEIGHT	FACTORY REPAINT
C-001	AVIGILON	3.0C-H5A-D1-IR	WALL	7'-0"	No
C-002	AVIGILON	3.0C-H5A-D2-IR	IN-CEILING	12'-0"	No
C-003	AVIGILON	H5DH-D1-IR	CEILING	12'-0"	No
C-004	AVIGILON	H5DH-D1-IR	CEILING	12'-0"	No
C-005	AVIGILON	H5DH-D1-IR	CEILING	8'-0"	No
C-006	AVIGILON	3.0C-H5A-D2-IR	WALL	8'-0"	No
C-007	AVIGILON	H5DH-D1-IR	CEILING	11'-0"	No
C-008	AVIGILON	H5DH-D1-IR	CEILING	12'-0"	No
C-009	AVIGILON	H5DH-D1-IR	CEILING	12'-0"	No
C-010	AVIGILON	H5DH-D1-IR	CEILING	11'-0"	No
C-011	AVIGILON	3.0C-H5A-D2-IR	WALL	7'-0"	No
C-012	AVIGILON	4.0C-H5A-D1	WALL	11'-7"	No
C-013	AVIGILON	4.0C-H5A-D1	WALL	11'-7"	No
C-014	AVIGILON	4.0C-H5A-D1	CEILING	11'-8"	No
C-015	AVIGILON	4.0C-H5A-D1	CEILING	11'-8"	No
C-016	AVIGILON	3.0C-H5A-D2-IR	WALL	8'-0"	No
C-017	AVIGILON	3.0C-H5A-D2-IR	WALL	8'-0"	No
C-002	AVIGILON	H5DH-D1-IR	CEILING	9'-0"	No
C-003	AVIGILON	3.0C-H5A-D2-IR	IN-CEILING	12'-0"	No
C-004	AVIGILON	H5DH-D1-IR	CEILING	9'-0"	No
C-005	AVIGILON	3.0C-H5A-D2-IR	IN-CEILING	10'-0"	No
C-006	AVIGILON	H5DH-D1-IR	CEILING	9'-0"	No
C-007	AVIGILON	3.0C-H5A-D2-IR	WALL	8'-0"	No
C-008	AVIGILON	3.0-H5A-CR-BS	CORNER WALL	8'-0"	No
C-B-01	AVIGILON	4.0C-H5A-D1	WALL	10'-8"	Yes
C-B-02	AVIGILON	H5DH-D01-IR	CEILING	10'-8"	Yes
C-B-03	AVIGILON	3.0C-H5A-D1	WALL	11'-5"	Yes
C-B-01	AVIGILON	19C-H5A-DM1 - INCLUDE IR RING	WALL PENDANT	12'-0"	Yes
C-B-01	AVIGILON	4.0C-H5A-D01	WALL	8'-0"	Yes
C-B-06	AVIGILON	19C-H5A-DM1 - INCLUDE IR RING	CORNER PENDANT	15'-0"	Yes
C-B-07	AVIGILON	4.0C-H5A-D01	WALL	8'-0"	Yes
C-B-08	AVIGILON	19C-H5A-DM1 - INCLUDE IR RING	CORNER PENDANT	15'-0"	Yes
C-B-09	AVIGILON	4.0C-H5A-D01	WALL	8'-0"	Yes
C-B-10	AVIGILON	19C-H5A-DM1 - INCLUDE IR RING	CORNER PENDANT	8'-0"	Yes
C-B-11	AVIGILON	19C-H5A-DM1 - INCLUDE IR RING	CORNER PENDANT	15'-0"	Yes
C-B-12	AVIGILON	4.0C-H5A-D01	WALL	8'-0"	Yes
C-B-13	AVIGILON	19C-H5A-DM1 - INCLUDE IR RING	CORNER PENDANT	15'-0"	Yes
C-B-14	AVIGILON	19C-H5A-DM1 - INCLUDE IR RING	CORNER PENDANT	15'-0"	Yes
C-B-15	AVIGILON	4.0C-H5A-D01	WALL	8'-0"	Yes
C-B-16	AVIGILON	19C-H5A-DM1 - INCLUDE IR RING	CORNER PENDANT	15'-0"	Yes
C-B-17	AVIGILON	19C-H5A-DM1 - INCLUDE IR RING	CORNER PENDANT	24'-0"	Yes
C-B-18	AVIGILON	4.0C-H5A-D01	WALL	12'-0"	Yes
C-B-19	AVIGILON	4.0C-H5A-D01	WALL	12'-0"	Yes
C-B-20	AVIGILON	4.0C-H5A-D01	WALL	8'-0"	Yes
C-B-21	AVIGILON	19C-H5A-DM1 - INCLUDE IR RING	CORNER PENDANT	15'-0"	Yes
C-B-22	AVIGILON	4.0C-H5A-D01	WALL	8'-0"	Yes
C-B-23	AVIGILON	4.0C-H5A-D01	WALL	8'-0"	Yes
C-B-24	AVIGILON	19C-H5A-DM1 - INCLUDE IR RING	CORNER PENDANT	15'-0"	Yes
C-B-25	AVIGILON	19C-H5A-DM1 - INCLUDE IR RING	CORNER PENDANT	15'-0"	Yes
C-B-26	AVIGILON	4.0C-H5A-D01	CORNER PENDANT	15'-0"	Yes
C-B-27	AVIGILON	4.0C-H5A-D01	WALL	10'-8"	Yes
C-B-28	AVIGILON	4.0C-H5A-D01	WALL PENDANT	10'-8"	Yes
C-B-29	AVIGILON	4.0C-H5A-D01	WALL PENDANT	10'-8"	Yes
C-B-29	AVIGILON	32C-H5A-DM1 - INCLUDE IR RING	POLE PENDANT	15'-0"	No
C-B-30	AVIGILON	32C-H5A-DM1 - INCLUDE IR RING	POLE PENDANT	15'-0"	No
C-B-31	AVIGILON	32C-H5A-DM1 - INCLUDE IR RING	POLE PENDANT	15'-0"	No
C-B-32	AVIGILON	32C-H5A-DM1 - INCLUDE IR RING	POLE PENDANT	15'-0"	No
C-B-33	AVIGILON	32C-H5A-DM1 - INCLUDE IR RING	POLE PENDANT	15'-0"	No
C-B-34	AVIGILON	32C-H5A-DM1 - INCLUDE IR RING	POLE PENDANT	15'-0"	No
C-B-35	AVIGILON	32C-H5A-DM1 - INCLUDE IR RING	POLE PENDANT	15'-0"	No
C-B-36	AVIGILON	4.0C-H5A-D01	WALL	9'-0"	No
C-B-37	AVIGILON	4.0C-H5A-D01	WALL	8'-0"	No

NOTE: FACTORY REPAINTED CAMERAS SHALL BE PROFESSIONALLY RE-PAINTED FROM A CAMERA MANUFACTURER APPROVED PAINTER, COORDINATE COLORS WITH ARCHITECT PRIOR TO PROCUREMENT. VENDOR MAY BE REQUIRED TO SEND SAMPLES TO ARCHITECT FOR REVIEW PRIOR TO PROCUREMENT.

SURVEILLANCE CAMERA SCHEDULE | NONE | 03



ALERT BEACON CONFIGURATION NOTES:
1. EACH ALERT BEACON SHALL CONNECT TO THE BUILDING LAN - REFER TO FLOOR PLANS FOR QUANTITIES AND LOCATIONS.
2. EACH DURESS BUTTON AND LOCKDOWN BUTTON SHALL CONNECT TO THE NEAREST ALERT BEACON - REFER TO FLOOR PLANS FOR QUANTITIES AND LOCATIONS OF BUTTONS.
3. INCLUDE QTY (1) ALERTUS 'TEXT' TO SPEECH MODULE, OR EQUIVALENT, TO DISTRIBUTE EMERGENCY ANNOUNCEMENTS OVER THE PUBLIC ADDRESS EXTERIOR HORNS. NOTE: THIS ANNOUNCEMENTS SHALL NOT BROADCAST OVER THE INTERIOR PUBLIC ADDRESS SPEAKERS.
4. INCLUDE QTY (1) ALERTUS 'TEXT' TO SPEECH MODULE, OR EQUIVALENT, TO DISTRIBUTE EMERGENCY ANNOUNCEMENTS OVER THE FIRE ALARM CONTROL PANEL SPEAKERS WITHIN THE BUILDING. COORDINATE WITH FIRE ALARM VENDOR.
5. ALERT BEACONS SHALL CONNECT TO DISTRICT OFFSITE DISTRICT SERVER. COORDINATE CONFIGURATION WITH DISTRICT SECURITY, IT, AND SECURITY CONSULTANT.

GENERAL NOTES:
1. AT LEAST ONE ALERT BEACON SHALL CONNECT TO THE ACCESS CONTROL SYSTEM TO ACTIVATE THE SECURITY STROBES FROM THE ALERTUS SERVER.
2. AT LEAST ONE ALERT BEACON SHALL CONNECT TO THE INTRUSION DETECTION SYSTEM TO DIAL-OUT TO CENTRAL MONITORING FROM THE ALERTUS SERVER.

ALERT BEACON SIGNAL FLOW | NONE | 04

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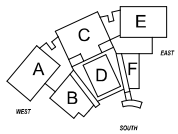
Drawn: MJD
Checked: NAD

Greenwich Public Schools

Greenwich Central Middle School

9 Indian Rock Lane, Greenwich, CT 06830

STATE PROJECT NO: 057-0114 N



KEYPLAN

Number	Date	Issued For
	05/03/2024	BIDDING / PERMIT
	07/08/2024	PHASE 2

SECURITY WIRING DIAGRAMS

Date: 07/08/2024
Scale:
Proj. Number: 22367.00
Drawing Number: TY401

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